

Species Diversity Evaluation: Wildlife

Habitat Needs, Distribution, and Description of Wildlife Species-of-Concern and Species-of-Interest on the Cimarron and Comanche National Grasslands

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Note: This evaluation report is an update of the 2006 evaluation report of the same name.

1. Introduction

To meet requirements described below, this report lists and describes the wildlife species-of-concern and species-of-interest for the Cimarron and Comanche National Grasslands (Grasslands) Land Management Plan (Plan). It also describes habitat needs for wildlife species-of-concern and species-of-interest to assess if Plan components provide for these identified species. The Plan will be the first land management plan released under the 2008 National Forest Systems Land Management Planning Rule¹ (2008 Planning Rule), and the first stand-alone plan for the Grasslands.

Under the 2008 Planning Rule the U.S. Department of Agriculture Forest Service is directed to “Focus evaluation and development of plan components for species diversity on those species for which the Responsible Official determines that provisions in plan components are needed.” Forest Service Handbook directives released in 2006 state: “The Responsible Official should identify federally threatened and endangered species, species-of-concern, and species-of-interest whose ranges include the Plan Area², taking into account limitations that exist at the edge of a species’ range” (FSH 1909.12, 43.22).

The report Existing Conditions: Chapter 23 - Wildlife (USDA FS 2005a) prepared for the development of the Grasslands Plan provides a species-specific summary of current conditions for wildlife species in the Planning Area³ that are of interest for conservation or monitoring objectives. Because it is not feasible to track all native and nonnative species, the 27 species described in that report were:

1. Species listed as threatened, endangered, and candidate species listed by the U.S. Fish and Wildlife Service (USFWS) under the authority of the Endangered Species Act of 1973, as amended (ESA), for Baca, Otero, and Las Animas Counties in Colorado, and Morton and Stevens Counties in Kansas;
2. Species that breed within the Planning Area and are listed on the Regional Forester’s Sensitive Species list (Ryke and others 2003); and
3. Species listed as Management Indicator Species (MIS) for the Grasslands based on the MIS Amendment Number 30 (USDA FS 2005b) to the 1984 Land and Resource Management Plan for the Pike and San Isabel National Forests, Cimarron and Comanche National Grasslands (1984 Plan) (USDA FS 1984, Ryke and Wagner 2002).

The report, Existing Conditions: Chapter 23 – Wildlife (USDA-FS 2005a), provided a starting point for developing the species-of-concern and species-of-interest lists, but

¹ U.S. Department of Agriculture, Forest Service. 2008. National Forest System Land Management Planning; final rule, part 219 [36 CFR 219]. Washington, DC: Federal Register 73(77):21505-21512. April 21, 2008.

² Plan Area: “The National Forest System lands covered by a plan.” 36 CFR 219.16, p. 21512.

³ Planning Area: The area within the Grasslands’ administrative boundaries that includes Forest Service-administered lands (the Plan Area) and also private and state-owned and state-managed lands.

additional criteria and species were also considered based on the new planning directives developed for the 2008 Planning Rule.

2. Species-of-concern

Species-of-concern are species for which the Responsible Official determines that management actions may be necessary to prevent listing under the ESA. Following the recommendations in FSH 1909.12, 43.22b, potential species-of-concern were identified as:

1. Species identified as proposed and candidate species under the ESA.
2. Species with ranks of G-1 through G3 on the NatureServe ranking system.
3. Intraspecific (subspecific) taxa with ranks of T-1 through T-3 on the NatureServe ranking system.
4. Species that have been petitioned for federal listing and for which a positive “90-day finding” has been made (a 90-day finding is a preliminary finding that substantive information was provided indicating that the petition listing may be warranted and a full status review will be conducted), and
5. Species that have been recently delisted (these include species delisted within the past five years and other delisted species for which regulatory agency monitoring is still considered necessary).

2.1. Species considered but not included on the species-of-concern list

The **New Mexico meadow jumping mouse** (*Zapus hudsonius luteus*), a candidate species for listing under the ESA, is endemic to New Mexico, Arizona, and a small area of southern Colorado. It nests in dry soils but uses moist, streamside, dense riparian/wetland vegetation (USFWS 2007). The New Mexico meadow jumping mouse has been found in riparian areas of western Las Animas County, Colorado, east of the Grasslands. There are no documented occurrences of this species on the Grasslands; the New Mexico meadow jumping mouse is not included as a species-of-concern (Jones 1999, NatureServe 2007, CNHP 2007).

Gunnison’s prairie dog (*Cynomys gunnisoni*), a candidate species for listing under the ESA, is found in two separate ranges: higher elevations (montane populations) and lower elevations (prairie populations). The montane habitat is found in central and south-central Colorado and north-central New Mexico; the prairie habitat is found in northern Arizona, northwestern New Mexico, southeastern Utah, and southwestern Colorado. Within these ranges the Gunnison’s prairie dog is found on grasslands and semi-desert and montane shrublands at elevations from 6,000 to 12,000 feet. The documented occurrence of this species closest to the Grasslands is in the extreme southwest corner of Las Animas County. There are no documented occurrences of Gunnison’s prairie dog on the Grasslands themselves; it is not included as a species-of-concern (USFWS 2008).

2.2. Species evaluated and included on the species-of-concern list

Six terrestrial vertebrate species have been identified as species-of-concern for the Grasslands because they are found in the Planning Area and meet one or more of the five criteria, as identified in Table 1.

Table 1. Species evaluated and included on the species-of-concern list with the potential to occur on the Grasslands

Common name	Scientific name	ESA proposed?	ESA petitioned?	NatureServe ranking	FSH 1909.12, 43.22b condition ⁴
Black-tailed prairie dog	<i>Cynomys ludovicianus</i>	No	Yes	G3G4	2
Lesser prairie chicken	<i>Tympanuchus pallidicinctus</i>	No	Yes	G3	1, 2
Massasauga rattlesnake	<i>Sistrurus catenatus</i>	No	No	G3G4	2, 3
Mountain plover	<i>Charadrius montanus</i>	No	No	G2	2
Swift fox	<i>Vulpes velox</i>	No	No	G3	2
Triploid Colorado checkered whiptail	<i>Aspidoscelis neotesselata</i>	No	No	G2	2, 3

These six species are evaluated below in more detail. For each species, we also include an explanation of Plan components that provide for the species' habitat needs.

2.2.1. Black-tailed prairie dog

2.2.1.a. Species evaluation

The black-tailed prairie dog (*Cynomys ludovicianus*) is considered a keystone species in grassland ecosystems because they have dramatic effects on vegetation height and composition, provide physical structures (burrows) used by a wide range of species, and are an important prey source for many grassland predators (Kotliar and others 1999, Kotliar 2000, Kretzer and Cully 2001). On the Grasslands, black-tailed prairie dogs are found primarily in the Shortgrass Prairie Ecosystem.

The black-tailed prairie dog is a highly social ground-dwelling squirrel that lives in towns or colonies that can cover from one acre to thousands of acres of grassland habitat (Hoogland 1995). Historically, the black-tailed prairie dog occupied short- and mid-grass prairies from Mexico to Canada, and was found in Arizona, Colorado, Kansas, Montana, Nebraska, New Mexico, North Dakota, Oklahoma, South Dakota, Texas, and Wyoming (Virchow and Hynstrom 2002).

In 1999, the USFWS issued a positive 90-day finding in response to a petition to list the species as Threatened under the ESA, and initiated a full status review. In 2000, the

⁴ Numbers in this column refer to items 1-5 in Section 2. of this evaluation.

USFWS completed the species review, and concluded that the black-tailed prairie dog is a candidate for listing as threatened under the ESA, an action that is warranted, but precluded by other higher listing priorities. In 2004, an updated evaluation by the USFWS determined that the black-tailed prairie dog was not likely to become an endangered species in the foreseeable future and no longer meets the ESA definition of threatened; the species was therefore removed as a candidate for listing under the ESA. The current global ranking for the black-tailed prairie dog by NatureServe is G3G4, with a rounded global ranking of G3.

Black-tailed prairie dog natural history, habitat needs, current status, and recent population trends on the Grasslands are summarized in the “Habitat Management Objectives for the Black-tailed Prairie Dog for the Comanche National Grasslands” (Augustine 2004), and by Cully and Johnson (2002 and 2004). All occupied prairie dog colonies on the Grasslands were inventoried using GPS technology in 1999, 2001, 2002, 2003, and 2004. These surveys show a rapidly increasing black-tailed prairie dog population on both Grasslands (Cimarron National Grassland [Cimarron] and the Carrizo unit of the Comanche National Grassland [Comanche]; Table 2), likely representing a recovery from plague outbreaks in the mid-1990s (Cully and Johnson 2002 and 2004). However, colony acreage on the Timpas unit of the Comanche has remained low over the past eight years, increasing slightly in the last two (Table 2).

Table 2. Acreage of occupied black-tailed prairie dog colonies on the Cimarron and Comanche National Grasslands, 1999–2007

	Comanche			Cimarron
	Carrizo	Timpas	Total	Total
1999	1,894	36	1,930	1,697
2001	3,851	362	4,213	2,446
2002	5,127	575	5,702	3,321
2003	6,064	556	6,620	4,006
2004	11,592	536	12,128	5,634
2005	14,387	508	14,895	5,793
2006	5,786	988	6,774	5,660
2007	3,554	1,075	4,629	2,710

The distribution of black-tailed prairie dog habitat on the Comanche was mapped using criteria based on slope and general soil type (range site). Potential habitat was classified as areas with both suitable slope and suitable range site type. Unsuitable habitat was classified as all areas with unsuitable slope or unsuitable range site type, and low potential habitat was classified as all other areas based on the definitions in Table 5.

Table 3. Slope and soil criteria used to define black-tailed prairie dog habitat on the Cimarron and Comanche National Grasslands

Habitat Class	Soil (Range Site)	Slope
Potential	Loamy uplands, loamy plains, limey uplands, alkaline plains, loamy bottomlands, basalt loam, clayey	0% - 5 %
Low potential	Sandy plains, gravelly breaks, saline overflow, playa, salt flat, gravel/eroded, limestone, shaley plains	5.1% - 10 %
Unsuitable	Sandy bottomland, choppy sand, deep sand, sandstone breaks, basalt breaks	> 10%

Potential black-tailed prairie dog habitat on the Grasslands represents areas that the species could potentially occupy given an appropriate disturbance regime and an available source of dispersing animals. In some of the areas mapped as potential habitat, the lack of a nearby black-tailed prairie dog colony and current vegetation height (for example, because of low grazing pressure or lack of fire) may currently limit black-tailed prairie dog occupancy. Potential black-tailed prairie dog habitat represents areas where management of disturbance processes (fire, grazing) and population regulation agents (disease, predation, dispersal) could have the greatest effect on black-tailed prairie dog distribution and abundance. On the Cimarron, potential black-tailed prairie dog habitat is primarily north of the Cimarron River. On the Carrizo unit of the Comanche, potential black-tailed prairie dog habitat is widely distributed across the areas used by all three grazing associations, but is extensively mingled with private lands. There is potential habitat throughout much of the Timpas unit, except in the southern canyonlands.

On the Grasslands, low potential black-tailed prairie dog habitat are areas where soil, slope, and vegetation are generally limiting to prairie dog occupancy, primarily due to the presence of sandy soils where prairie dogs cannot burrow, and woody shrubs, such as sand sagebrush (*Artemisia filifolia*), that impede visibility. However, small patches of loamy soils are often interspersed throughout these areas, and such patches are capable of supporting small black-tailed prairie dog colonies. Because black-tailed prairie dog distribution is primarily limited by soil structure and vegetation, the management of disturbance processes and population regulation agents in areas of low potential habitat are unlikely to have a major effect on black-tailed prairie dog abundance or distribution. Unsuitable habitat on the Grasslands is described as areas where soil, slope, and vegetation generally prevent any occupancy by prairie dogs. Detailed analysis of the distribution of occupied black-tailed prairie dog colonies on the Grasslands in 2002 confirmed that most colonies are in potential habitat, while minimal colony acreage is in

low potential or unsuitable habitat (Table 4). Note that the percentage of habitat occupied by prairie dogs has increased from 2002 to 2004 by a factor of 1.70 on the Cimarron (to approximately 14% of potential habitat) and by a factor of 2.26 on the Carrizo unit of the Comanche (to approximately 8% of potential habitat).

Table 4. Acreage of black-tailed prairie dog habitat: potential, low potential, and unsuitable, with acreage of occupied colonies of each (2002)

	Comanche			Cimarron
	Carrizo unit	Timpas unit	Total	Total
Acres of potential black-tailed prairie dog habitat	122,336	98,770	221,106	36,230
Acres of low potential black-tailed prairie dog habitat	107,716	54,068	161,783	48,181
Acres of unsuitable black-tailed prairie dog habitat	23,961	22,684	46,644	24,123
Acres of unmapped habitat ¹	3,242	10,989	14,231	0
Occupied acres in potential habitat	4,518	534	5,052	3,036
Occupied acres in low potential habitat	524	25	549	229
Occupied acres in unsuitable habitat	37	15	53	16
Occupied acres in unmapped habitat	29	2	31	0
% of potential habitat occupied	3.7	0.5	2.3	8.4
¹ Not mapped due to current lack of Range Site classification				

Because habitat for the black-tailed prairie dog is affected by Forest Service management activities, the species has undergone a major range-wide decline, and the Grasslands provide a substantial area of potential year-round habitat for the species, the black-tailed prairie dog is recommended for inclusion on the species-of-concern list (see FSH 1909.12, 43.22a).

2.2.1.b. Plan components that contribute to supporting self-sustaining populations of the black-tailed prairie dog

Several components in the Grasslands Plan that would directly contribute to supporting sustainable populations of the black-tailed prairie dog can be found in desired conditions and objectives.

Desired conditions – Grasslands Plan

In the Grasslands Plan, desired conditions are described in Part 1: Vision. The desired conditions describe how Grasslands resources would look and function; they show the future direction of the ecological, economic, and social resources. The desired conditions that would influence resource conditions beneficial for black-tailed prairie dogs are

described in several places in Part 1: Land Administration and the Shortgrass Prairie Ecosystem.

In Section 1.3.1.a. Land Administration, is a desired condition to consolidate National Forest System (NFS) lands within the Plan Area.⁵ This would help provide for larger, contiguous blocks of habitat for at least one large complex of black-tailed prairie dog colony.

In Section 1.3.2.e. The Shortgrass Prairie Ecosystem, is a description of the habitat conditions that would help provide for sustainable populations of black-tailed prairie dogs. Livestock grazing and fire (both prescribed and wild), as disturbance processes, would contribute to vegetation heights that allow for the persistence of prairie dog populations. Also, “Widespread and interacting disturbances influencing vegetation mosaics would include grazing by black-tailed prairie dog and livestock, and fire.” Livestock grazing and fire would be used to improve for prairie dogs if populations decline to low levels, and include a definition of potential habitat in the Plan’s appendix titled “Descriptions of Species-of-Concern Habitats”.

Objectives – Grasslands Plan

In the Grasslands Plan, objectives are described in Part 2: Strategy. The objectives are the steps that Grasslands managers expect to take during plan implementation to retain or move resources toward achieving desired conditions.

In Section 2.1.1.a. Land Administration, are objectives to reduce the net property boundary length and reduce the length of total permanent fences that can help consolidate NFS lands in areas of potential black-tailed prairie dog habitat at a landscape scale.

In Section 2.1.2.e. The Shortgrass Prairie Ecosystem, are objectives to 1) burn 50,270 acres (15%) of the ecosystem and to 2) provide a minimum of one large habitat complex for black-tailed prairie dog colonies. These objectives would help contribute to sustainable populations of the species.

2.2.2. Lesser prairie chicken

2.2.2.a. Species evaluation

The lesser prairie chicken (*Tympanuchus pallidicinctus*) breeds in Colorado, Kansas, Texas, New Mexico, and Oklahoma. The occupied range of the lesser prairie chicken is estimated to have decreased 92% from its range in the late 1800s, a result of the conversion of prairies to farmland and the overgrazing of rangelands (Taylor and Guthery 1980). Population estimates in the early 1990s were approximately 50,000 birds overall, with 1,200 to 1,800 birds in Colorado (Davies 1992). The lesser prairie chicken is listed

⁵ Plan Area: “The National Forest System lands covered by a plan” (36 CFR 219.16) (USDA FS 2008). The area within the Grasslands administrative boundaries that includes only those lands administered by the Forest Service, not state or private lands.

as a threatened species by the State of Colorado; Kansas manages it as a game species. In 1998, the USFWS determined that listing the species as federally threatened was warranted but precluded by other higher listing priorities, so it is currently a candidate for listing under the ESA. The global ranking for lesser prairie chicken by NatureServe is G3, with a state rank of S2 in both Colorado and Kansas.

Details about the species' natural history and conservation threats are summarized by Mote and others (1999) and Robb and Schroeder (2005). Current standards and guidelines regarding lesser prairie chickens in the 1984 Plan are discussed by Ryke (1995).

Lesser prairie chickens are found south of the Cimarron River on the Cimarron National Grassland and in the southeastern portions of the Comanche. Surveys conducted on the Cimarron during 1988–1997 identified 44 leks (locations where males congregate during the breeding season) and indicate that all NFS lands south of the Cimarron River are occupied by lesser prairie chicken (64,387 acres total, of which 61,638 acres is sandsage prairie). There is no suitable habitat for lesser prairie chicken north of the Cimarron River or along the river corridor. On the Comanche, surveys conducted during 1984–2005 identified 53 leks on or immediately adjacent to NFS lands. Studies on the Comanche determined that the maximum area of sandsage prairie used by lesser prairie chicken attending a single lek was approximately 24 mi² (61.9 km²), which corresponds to a 2.75 mile (4.4 km) radius around the lek (Giesen 1991). Using this radius around all documented leks on the Comanche, the estimated area occupied by lesser prairie chicken during the past 20 years is 65,168 acres, of which 59,167 acres are sandsage prairie (Table 5). On both Grasslands, year-round lesser prairie chicken habitat consists of sandsage prairie (sandy plains, choppy sand, deep sand, gravelly breaks, dry creek beds and sandy bottomland range sites) dominated by sand sagebrush and mid-grass prairie.

Lesser prairie chickens use several different types of habitat during the year, which correspond to different stages in their reproductive cycle. During the mating season, males congregate in leks. Leks are typically on elevated, open areas where vegetation is short, visibility is good, and from which calls (gobbling) can be heard for long distances. Hens, after mating on leks, select a nest site to lay and incubate the eggs, usually within a mile of the lek, but occasionally up to two or more miles away. Nesting habitat consists of sandsage prairie with tall grass and forb cover, and may be interspersed with patches of shorter vegetation. Patches with native grasses 18–20 inches tall are important to completely conceal nesting hens and provide thermal cover (Bidwell and others 2002). Adequate vegetative cover to provide suitable nesting habitat can be a major limiting factor for lesser prairie chicken populations (Mote and others 1999). Brood rearing and foraging habitat is provided by areas with a mosaic of grasses and forbs; areas that are re-growing following recent grazing or fire often produce more food (seeds and insects) than areas that are ungrazed or heavily grazed. For further discussion of lesser prairie chicken habitat needs, see the Plan's appendix titled "Descriptions of Species-of-Concern Habitats".

Table 5. Acres of sandsage prairie and other habitat within the estimated occupied range of lesser prairie chickens on the Grasslands

Range Site	Comanche Acres	Cimarron Acres
Sandsage Prairie		
Sandy plains	50,455	17,130
Deep sand	4,828	30,122
Sandy bottomland	766	858
Choppy sand	40	13,330
Gravelly breaks	2,759	0
Dry creek beds	319	197
Total	59,167	61,638
Other Range Sites		
Loamy plains	5,181	2,722
Loamy bottomland	0	7
Limy uplands	0	20
Sandstone breaks	821	0
Total Other	6,002	2,749

On the Comanche, lek censuses conducted during 1980–2005 show a sharp decline in the population after 1989 (see Figure 1). The total lesser prairie chicken population estimate on the Comanche was highest in 1988 (348 birds) and the lowest in 2005 (64 birds). The total population estimate in 2005 was only 25% of the mean population size documented during the 1980s.

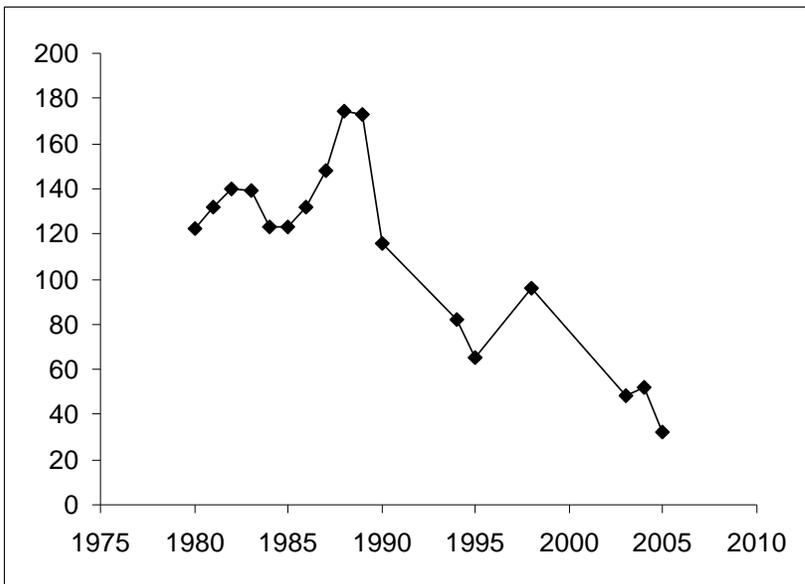


Figure 1. Total number of male lesser prairie chickens counted through lek censuses on the Comanche during 1980–2005

On the Cimarron, counts conducted along the Kansas Department of Wildlife and Parks' (KDWP) lesser prairie chicken survey route showed a decline from a mean of 10.1 birds/mi² during the first 15 years of the survey (1964–1978) to an average of only 4.9 birds/mi² over the past 15 years (1989–2004). However, the KDWP surveys also indicate the population has been recovering in recent years (see Figure 2).

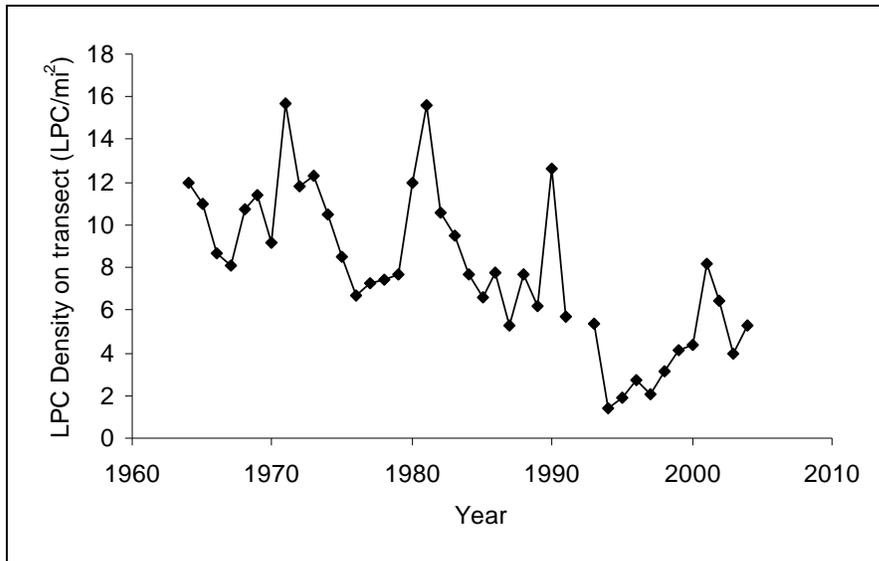


Figure 2. Long-term trend in number of lesser prairie chickens counted along the KDPW 10-mile long survey route on the Cimarron (expressed as lesser prairie chickens/mi² assuming the transect surveys a 20 mi² area)

More intensive lesser prairie chicken surveys conducted on the Cimarron during 1995–1999 and 2005 involved repeated counts of lesser prairie chickens on all known leks. The lek-census method showed a stable lesser prairie chicken population during 1995–1999 and provided total population estimates for the Cimarron varying annually from 173 to 283 lesser prairie chickens (1.8–2.9 birds/mi²) (Smith and Smith 1999). This survey method was repeated in 2005 and gave a total population estimate of 249 birds, indicating a stable population on the Cimarron since 1995 (see Figure 3).

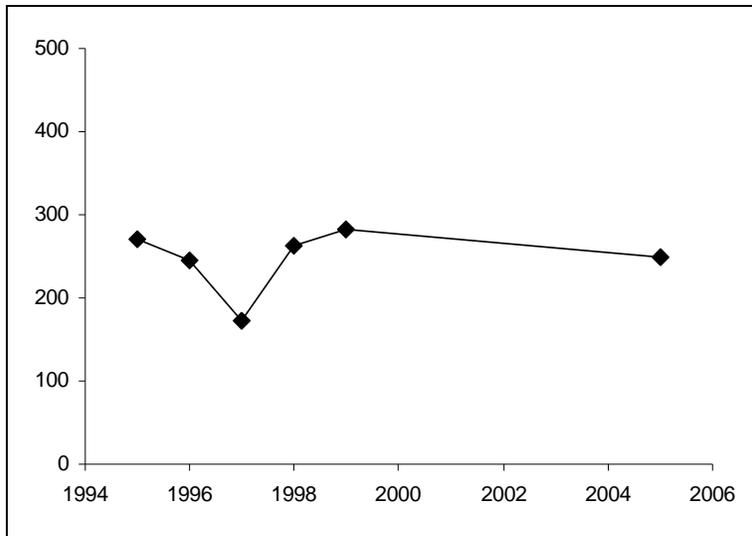


Figure 3. Lesser prairie chicken population trend on the Cimarron 1995–2005 based on lek censuses

Primary threats to lesser prairie chicken populations, outlined by Robb and Schroeder (2005), are:

1. Inappropriate timing and intensity of livestock grazing
2. Conversion of native prairie for development and crop production
3. Fragmentation of habitat with roads, utility corridors, fences, towers, turbines, and energy developments
4. Introduction and expansion of noxious weeds
5. Alteration of fire regimes
6. Planting of trees

Studies on the Grasslands identified nesting habitat as one limiting factor for lesser prairie chickens (Giesen 1994, Elson 2000). Grazing management affects the quality of nesting habitat. The lesser prairie chicken Interstate Working Group recommends that livestock be managed in sand sage prairie to provide pastures with a mean VOM of 4 inches or greater and at least 10% of all VOM observations being 12 inches or greater (Mote and others 1999) and the same standard has been recommended for the Comanche (Ryke 1995). More recent studies in southwestern Kansas show brood survivorship can be even more limiting to lesser prairie chicken populations than nesting success (Pitman 2003, Hagen 2003). Habitat management that provides patches of abundant forb cover appears to be critical for brood survival in dry years (Rodgers 2003). Overall, heterogeneous grazing pressure appears to benefit lesser prairie chicken habitat, while uniform grazing pressure is detrimental. The Oklahoma Cooperative Extension Service’s guide “Ecology and Management of the Lesser Prairie-Chicken” recommends “Do not install extensive electric or other fencing for short duration grazing that creates uniform grazing” (Bidwell and others 2002).

Recent studies in Oklahoma found that where fencing constructed for livestock management is at high densities, these fences can be a threat to lesser prairie chicken

population viability, causing 32% of all documented mortalities in the study area (Wolfe and others 2003, Patten and others 2005). They concluded that, within their study area, collisions with fences are a major mortality factor, fences kill more hens than cocks, and appear to have the greatest impact during nesting season. In areas managed for viable lesser prairie chicken populations, they recommended removing unnecessary fencing and discouraged the use of cross fencing, especially cell-type grazing systems (Wolfe and others 2003 page 18, Patten and others 2005).

Several studies have also documented high predation rates on hens by raptors, coyotes and other mammals during the nesting season (Giesen 1994, Elson 2000, Pitman 2003, Wolfe and others 2003). Increased abundance of these predators, possibly associated with habitats provided by agriculture, grazing management, and tree plantings on private lands in the Planning Area⁶, is also affects lesser prairie chicken populations.

The loss of habitat to agriculture does not affect lesser prairie chickens on NFS lands, but is ongoing in the Planning Area. Land exchanges that acquire lesser prairie chicken habitat on the Grasslands can help mitigate this impact. The Lesser Prairie-Chicken Recovery Plan for the State of Colorado specifically calls on Colorado Department of Wildlife (CDOW) to “Work with the USFS to acquire additional lesser prairie chicken habitat in the Comanche Grasslands by purchase of lands or trading of USFS lands for private lands” (Davies 1992, page 16). In addition, implementing vegetation management practices that increase the cover of forbs on CRP lands in the Planning Area may help mitigate the loss of sandsage prairie to cropland (Bidwell and others 2002). Recent studies found that declining lesser prairie chicken populations were associated with landscapes that have a high rate of change in land uses and that contain $\geq 10\%$ cropland, while stable populations occur in landscapes with $< 5\%$ cropland (Fuhlendorf and others 2002, Woodward and others 2001). These analyses also emphasized the importance of contiguous shrublands within 4.8 km of leks for stable lesser prairie chicken populations (Woodward and others 2001).

Because habitat for this species is affected by Forest Service management activities, the species has undergone a major rangewide decline, and because surveys indicate a declining population trend on the Comanche, the lesser-prairie chicken is recommended for inclusion on the species-of-concern list (see FSH 1909.12, 43.22a).

2.2.2.b. Plan components that contribute to supporting self-sustaining populations of the lesser prairie chicken

Several components in the Grasslands Plan that would directly contribute to supporting sustainable populations of the lesser prairie chicken can be found in desired conditions, objectives, guidelines, and special areas.

⁶ Planning Area: The area within the Grasslands’ administrative boundaries that includes Forest Service-administered lands (the Plan Area) and also private and state-owned and state-managed lands.

Desired conditions – Grasslands Plan

In the Grasslands Plan, desired conditions are described in Part 1: Vision. The desired conditions describe how Grasslands resources would look and function; they show the future direction of the ecological, economic, and social resources. The desired conditions that would influence resource conditions beneficial for lesser prairie chickens are described in several places in Part 1: Land Administration, the Sandsage Prairie Ecosystem, and the Comanche Lesser Prairie Chicken Habitat Zoological Area.

In Section 1.3.1.a. Land Administration, is a desired condition to consolidate NFS lands within the Plan Area. This condition can improve habitat for lesser prairie chicken in the Sandsage Prairie Ecosystem by increasing the size of contiguous blocks of habitat available to the species. This would contribute to self-sustaining populations because research suggests that landscapes containing <10% agriculture and consisting primarily of native rangeland support stable lesser prairie chicken populations, while landscapes with >10% cropland intermingled with smaller blocks of native rangeland are associated with declining lesser prairie chicken populations (Fuhlendorf and others 2002, Woodward and others 2001).

In Section 1.3.2.d. The Sandsage Prairie Ecosystem, desired conditions emphasize mid- to tall-structure vegetation, a greater diversity of native grasses and forbs, and an increase in perennial, tall-structure grasses. An increase in tall-structure vegetation, particularly the perennial grass species listed in the Grasslands Plan, contributes to lesser prairie chicken nesting habitat (Giesen 1994, Elson 2000 reviewed by Robb and Schroeder 2005), and increased plant species diversity, including native forbs, can improve brood-rearing habitat (Robb and Schroeder 2005). These conditions are based on nesting habitat needs for lesser prairie-chickens (Giesen 1988, Giesen 1994, Mote and others 1999, Elson 2000).

This desired conditions describe that existing plant communities “where the sand sagebrush understory is dominated by blue grama [*Bouteloua gracilis*], buffalograss (*Buchloe dactyloides*), and purple threeawn (*Aristida purpurea*), would be reduced in extent and replaced by an understory dominated by a diversity of native grass and forb species, including tall-structure grasses.” On the Carrizo unit of the Comanche, near-monoculture stands of sideoats grama (*Bouteloua curtipendula*) (would make up less than 5,000 acres (5%) of “ that portion of the ecosystem. Achieving these desired conditions would contribute to improved nesting cover for lesser prairie chicken.

The desired conditions state that “spatial variability of the ecological conditions would continue to be beneficially influenced by the disturbance processes of livestock grazing timing and intensity (ranging from areas that would be intensively grazed to areas that would be ungrazed for one or more years), prescribed fire, and naturally-occurring wildfire.” Inappropriate timing and intensity of livestock grazing has been identified as a key threat to lesser prairie chicken habitat and populations (Robb and Schroeder 2005). Livestock grazing systems that vary grazing intensity among pastures and incorporate prescribed fire as a tool to manipulate grazing distribution can increase heterogeneity in plant structure and species composition (Fuhlendorf and Engle 2004), and create the

patchy combination of nesting and brood-rearing habitat where lesser prairie chicken can reproduce successfully (Robb and Schroeder 2005).

The desired conditions state that the “amount of moderate-structure and tall-structure vegetation would provide areas of high-quality nesting and brood-rearing habitat for the lesser prairie chicken.”

In Section 1.3.3.b. Livestock Grazing, the desired conditions that state “allotment management would adapt to mimic natural disturbances in order to move ecological conditions towards desired vegetation composition and structure...” would contribute to greater vegetative heterogeneity within allotments in a manner that provides both nesting and brood-rearing habitat for the lesser prairie-chicken.

In Section 1.3.5.c. The Comanche Lesser Prairie Chicken Habitat Zoological Area, the desired conditions would provide a contiguous 10,177 acre special area with the primary focus on providing sustainable habitat conditions for and a reduction in hazards to lesser prairie chickens.

For additional information about habitat needs of lesser prairie chickens, see the Plan’s appendix titled “Descriptions of Species-of-Concern Habitats”.

Objectives and Guidelines – Grasslands Plan

In the Grasslands Plan, objectives are described in Part 2: Strategy. The objectives are the steps that Grasslands managers expect to take during plan implementation to retain or move resources toward achieving desired conditions. In the Plan, guidelines are described in Part 3: Design Criteria. The guidelines provide information and guidance for carrying out projects and activities to help maintain or achieve the desired conditions and objectives.

Several objectives and guidelines that apply to all ecosystems, that are specific for the Sandsage Prairie Ecosystem, and that pertain to the Comanche Lesser Prairie Chicken Habitat Zoological Area provide more detail on how management of Grasslands resources would help maintain or improve lesser prairie chicken habitat. The guidelines that would be applied at the project level would help minimize nest loss and abandonment of habitat.

In Section 2.1.1. Land Administration, are objectives that reduce the net property boundary length and reduce the length of total permanent fences can help consolidate lesser prairie chicken habitat and thereby improve habitat configuration at the landscape scale. Reducing fences would improve sustainability of lesser prairie chicken populations because fence collisions can cause high rates of lesser prairie chicken mortality in areas with high fence density (Patten and others 2005).

In Section 2.1.2.d. The Sandsage Prairie Ecosystem, are objectives that would improve potential habitat for lesser prairie chicken.

In Section 2.1.5.c. The Comanche Lesser Prairie Chicken Habitat Zoological Area, the objective to increase the diversity of native plants would benefit lesser prairie chickens.

In Section 3.1.2.1. Ecol-4, the guideline describes a guideline pertaining to mowing and prescribed burning that should not take place “during nesting and brood-rearing periods of ground-nesting birds to protect their nests and young broods.”

In Section 3.1.2.4. Wlfe-1, the guideline states that “timing restrictions and buffers should be applied where activities cause unacceptable disturbances during reproductive periods (... nesting, brood-rearing) to species-of-concern.” The lesser prairie chicken is one of the species-of-concern listed in the Grasslands Plan.

In Section 3.1.2.7. Sand-1, the guideline states that “New structures or facilities should not be constructed within a distance (typically within two miles) that negatively impacts lesser prairie chickens on known display grounds.” The **Sand-2** guideline states that “Timing restrictions (typically from March 15 to July 15) and buffers (typically within two miles) should be applied where ... activities ... cause unacceptable disturbances to the lekking, nesting, and early brood-rearing life-cycle of the lesser prairie chicken.” The **Sand-3** guideline states that “Adequate residual cover (measured before the nesting period) should be carried over from the previous growing season in areas where tall, dense cover is desired for ground-nesting birds that nest in April or May.” The **Sand-4** guideline states that “Wildlife viewing sites should not exceed acceptable wildlife disturbance levels during key periods.”

In Section 3.1.5.3. LPC-1, the guideline states that “Livestock grazing should take place in ways that do not result in negative effects on lesser prairie chicken nesting habitat. **LPC-2** guideline states that “Livestock grazing should take place in ways that help ensure the occurrence of desired changes in plant species composition.”

2.2.3. Massasauga rattlesnake

2.2.3.a. Species evaluation

The massasauga rattlesnake (*Sistrurus catenatus*) ranges discontinuously from the Great Lakes region (east to parts of southern Ontario and a few sites in New York) southwest through the central and southern Great Plains region to southeastern Arizona, Texas Gulf Coast, and northeastern Mexico. The species is divided into three subspecies:

1. Eastern massasauga (*S. c. catenatus*), distributed from New York to Missouri and is currently a candidate for listing under the ESA
2. Western massasauga (*S. c. tergeminous*)
3. Desert subspecies (*S. c. edwardsii*)

Morphological and habitat data indicate that massasaugas in Colorado are the desert subspecies (*S. c. edwardsii*; Hobert 1997, Mackessy 1998). On the Cimarron, there are no known occurrences of the massasauga rattlesnake (Collins and Collins 1991). The

population of massasauga in Colorado, which includes documented occurrences on the Comanche, is disjunct from other populations in neighboring states. At the species level, the NatureServe global ranking for massasauga is G3G4, with a rounded global status of G3. As a subspecies, the global ranking for the desert massasauga is T3T4, with a rounded global status of T3.

Massasaugas in Colorado occupy shortgrass and sandsage prairie habitats on the east-central plains; the core of the population is in Lincoln County, and lower-density populations in Otero and Baca counties (Mackessy 2005). The species is primarily nocturnal; juveniles feed on lizards and adults feed on both lizards and rodents (Hobert 1997). The highest densities of massasaugas have been documented foraging during the summer in sandsage prairie habitats (Mackessy 1998, 2005). Massasaugas that were radio-tracked for a substantial period of time (94–100 days) during one activity season in Colorado had activity ranges of 90–120 hectare (2.4–3.4 km maximum linear dimension, Mackessy 1998). Extensive roadside surveys conducted by Hobert (1997) in southeastern Colorado documented two specimens from Otero County on the Timpas unit of the Comanche. Similar surveys documented specimens in Baca County on private land adjacent to the Comanche's Carrizo unit.

The Region 2 [Rocky Mountain Region of the Forest Service] evaluation of the massasauga rattlesnake for inclusion on the Regional Forester's Sensitive Species list (USDA FS 2003) noted the following.

Because of the nature of the habitat and current development patterns in southeast Colorado, the massasauga population may be reasonably secure for the moment. However, conversion of prairie to agriculture has resulted in notable losses of habitat in Colorado and western Kansas, and may be the cause of apparent isolation of the Colorado population.

Specific threats to the species identified in the Region 2 evaluation included wetland loss, late summer burning, summer mowing, overgrazing, road mortality, off-road vehicle use, intentional killing, and collection. Mackessy (2005) identified the primary threats to the massasauga to be the loss and degradation of native grassland habitat due to urbanization, farming, livestock overgrazing, and drawdown of the water table.

Because habitat for this species can be positively affected by Forest Service management activities, the massasauga rattlesnake is recommended for inclusion on the species-of-concern list (see FSH 1909.12, 43.22a).

2.2.3.b. Plan components that contribute to supporting self-sustaining populations of the massasauga rattlesnake

Grasslands Plan components (desired conditions, objectives, guidelines, special areas) have not been identified to address massasauga habitat management at the species level because 1) the conversion of prairie habitat to agricultural uses is not taking place on the Grasslands themselves, and 2) Forest Service management actions do not contribute to the threats identified in the Region 2 sensitive species evaluation or in the Region 2 Technical Conservation Assessment (Mackessy 2005).

However, the Plan's desired conditions, objectives and guidelines for the Shortgrass Prairie Ecosystem (section 1.3.2.e.) and the Canyonland Ecosystem (section 1.3.2.b.) contribute to sustaining habitat for the massasauga rattlesnake.

2.2.4. Mountain plover

2.2.4.a. Species evaluation

Mountain plovers (*Charadrius montanus*) once nested over much of the Great Plains, from southern Canada to the plains of Texas, but today are found only in small, scattered populations (Knopf 1996). Because of widespread population declines of this species (Sauer and others 2003), it was proposed for listing under the ESA by the USFWS in 1999, but was withdrawn in 2003. The Global Ranking for mountain plovers by NatureServe is G2, with a state rank of S1 in Kansas and S2 in Colorado.

The status, distribution, and ecology of the mountain plover have been recently described in detail by Dinsmore (2003, and references therein). Briefly, the current continental population is estimated to be 8,000–10,000 birds, and best available data suggest numbers are still undergoing a severe, long-term decline. Mountain plovers breed primarily in eastern Colorado, central Wyoming and eastern Montana. In Colorado, Weld County was long considered the center of the breeding range, but larger breeding numbers may now occur in South Park and southeastern Colorado (Kingery 1998). In Kansas, mountain plovers breed locally on shortgrass prairie and agricultural land in the western part of the state. The highest known densities of breeding plovers are on prairie dog colonies in Montana, but the extent of this population is limited. Most plovers winter in the Imperial Valley in southern California, southern New Mexico, southern Texas, and northern Mexico.

Mountain plovers historically nested in shortgrass prairie that underwent frequent disturbance by fire and by primary grazers such as prairie dogs and bison (Dinsmore 2003). Constriction of the breeding distribution has resulted because of the high degree of fragmentation of native prairie, loss of prairie to agriculture, and suppression of natural disturbances (fire and intense native mammal grazing). Today, nesting plovers use four broad types of habitats:

1. Disturbed native short- and mixed-grass prairie
2. Prairie dog colonies
3. Semi-desert sites
4. Agricultural land

Common microhabitat characteristics of nesting areas in all four habitat categories are short vegetation (typically <2 inch or 5 centimeters), a bare-ground component (typically >30 %), some history of disturbance, and flat or gently sloping terrain.

On the Grasslands, potential habitat for mountain plover is equivalent to the area mapped as potential habitat for black-tailed prairie dogs: areas with loamy to clayey soils and slopes less than 5% (216,704 acres on the Comanche; 31,216 acres on the Cimarron).

However, most of the shortgrass prairie in the Planning Area is likely unoccupied because of relatively high (>2 inch or 5 cm) grass cover, and a limited area of bare ground (<30%). During spring and fall, large flocks of mountain plovers are often seen migrating through the Planning Area, usually on fallow crop fields.

On the Cimarron, mountain plovers are an uncommon migrant and very rare summer breeder, and most documented nesting records have been in agricultural lands north of the Cimarron River (Chynoweth 1998). Surveys have been conducted periodically on the Cimarron and adjacent private land from 1978–2002, funded by the Forest Service, USFWS, and KDWP. These surveys indicate that plovers prefer the cropland to the adjacent Grassland. Observations after prescribed burning events also reveal that plovers prefer very short prairie lands similar to the fallow or newly planted crop fields. In 2003 and 2004, mountain plover surveys were conducted on prairie dog colonies throughout the Cimarron, but no plovers were observed. In 2005, at least one pair of breeding mountain plovers was present on a prescribed burn conducted in shortgrass prairie north of the Cimarron River.

On the Comanche, surveys in 1979 and 1994 documented small numbers of breeding mountain plovers distributed throughout the Carrizo unit. Since 1995, the CDOW and the Comanche have collaborated on a prescribed burning program to improve mountain plover habitat. Studies of prescribed burns in 1998 and 1999 showed they provide important migration and nesting habitat for plovers (Svingen and Giesen 1999). Apparent nest success of 51% on these prescribed burns (Giesen 2000) was similar to or greater than nesting success reported from other plover studies (Dinsmore 2003), indicating that prescribed burns can contribute to improved population viability. Intensive grazing by cattle after a burn and the presence of prairie dogs may extend the number of post-burn years in which the area is used by nesting plovers (Giesen 2000). In 2004, six prescribed burns were conducted in shortgrass/mid-grass allotments with potential habitat for mountain plovers, covering approximately 4,000 acres. At least 28 plovers were documented on these burns during migration, but attempted breeding was only observed on three of the six burns by a total of 10 plovers. In 2005, three prescribed burns were conducted in potential plover habitat, with a total of 61 plovers documented during migration, and 12 plovers documented on one burn during the nesting season. During 2003–2005, mountain plover surveys were also conducted on 20 prairie dog colonies on the Carrizo unit. No plovers were observed in 2003, but breeding plovers were found on 3 of 20 colonies in 2004 and 6 of 20 colonies in 2005. Similar surveys of prairie dog colonies on the Timpas unit in 2004 and 2005 found no breeding plovers.

Conservation of sustainable mountain plover populations would require a combination of prairie dog conservation, proactive management strategies that combine prescribed fire and intensive livestock grazing, and protection of known nesting sites (Dinsmore 2003). In addition, given considerable use by mountain plovers of fallow agricultural lands surrounding the Grasslands, greater understanding of relative breeding success on agricultural land compared to managed shortgrass prairie is needed.

Because habitat for this species is affected by Forest Service management activities, the species has undergone a major range-wide decline, and because the Grasslands are an

important area of potential breeding habitat for the species, the mountain plover is recommended for inclusion on the species-of-concern list (see FSH 1909.12, 43.22a).

2.2.4.b. Plan components that contribute to supporting self-sustaining populations of the mountain plover

Desired conditions – Grasslands Plan

In the Grasslands Plan, desired conditions are described in Part 1: Vision. The desired conditions describe how Grasslands resources would look and function; they show the future direction of the ecological, economic, and social resources. The desired conditions that would influence resource conditions and would help contribute to supporting self-sustaining populations of the mountain plover are described in Part 1: the Shortgrass Prairie Ecosystem.

In Section 1.3.2.e. The Shortgrass Prairie, are desired conditions that state “Widespread and interacting disturbances influencing vegetation mosaics in this ecosystem would include grazing by black-tailed prairie dog and livestock, and fire.” All three of these disturbances can provide nesting habitat for the mountain plover, particularly where grazing occurs in shortgrass prairie that has been recently burned (Dinsmore 2003), and past prescribed burning management on the Comanche has successfully provided mountain plover nesting habitat (Svingen and Giesen 1999).

In Section 1.3.2.e. The Shortgrass Prairie, are desired conditions that specifically call for the provision of sufficient areas of sparse, low-structure vegetation conditions needed for mountain plover nesting, and define those conditions in the Plan’s appendix titled “Descriptions of Species-of-Concern Habitats”.

Objectives and Guidelines – Grasslands Plan

In the Grasslands Plan, objectives are described in Part 2: Strategy. The objectives are the steps that Grasslands managers expect to take during plan implementation to retain or move resources toward achieving desired conditions. In the Plan, guidelines are described in Part 3: Design Criteria. The guidelines provide information and guidance for carrying out projects and activities to help maintain or achieve the desired conditions and objectives.

Several objectives and guidelines that apply to the Common to All Ecosystems, and the Shortgrass Prairie Ecosystem provide more detail on how Grasslands management would help maintain or improve habitat for mountain plover, and provide for the long-term sustainability of mountain plover populations.

In Section 2.1.2.e. The Shortgrass Prairie Ecosystem, is an objective burn 50,270 acres (15%) of the Ecosystem during the next 15 years. This would directly provide mountain plover nesting habitat, helping to provide for the long-term sustainability of the species.

In Section 3.1.2.1. Ecol-4, the guideline describes a guideline pertaining to mowing and prescribed burning that should not take place “during nesting and brood-rearing periods of ground-nesting birds to protect their nests and young broods.”

In Section 3.1.2.8. Short-1, the guideline states that “Timing restrictions (typically from April 10 to July 10) and buffers (typically within 0.25 miles) should be applied where activities cause unacceptable disturbances to mountain plover...during reproductive periods.”

2.2.5. Swift fox

2.2.5.a. Species evaluation

The swift fox (*Vulpes velox*) is endemic to short and mid-grass prairies of the Great Plains. The USFWS was petitioned to list the swift fox as threatened in 1992. Listing was found to be warranted but precluded other higher priority species by the USFWS in 1995. Improved conservation of the species through an inter-state Swift Fox Conservation Team led to its removal from the Federal candidate list in 2001. The Global Ranking for swift fox by NatureServe is G3, with a state rank of S3 in both Kansas and Colorado.

In Colorado, the swift fox population is thought to be stable (Fitzgerald and others 1994). Colorado recently approved a Grassland Species Conservation Plan (CDOW 2003) and conducted state-wide monitoring of swift fox populations across the eastern plains in 2004 using mark-recapture methodology. In Kansas, swift fox populations are monitored through annual furbearer harvest surveys and track surveys. Harvest data show a small recent increase, but harvest in 2002 was substantially lower than in the 1980s (Grenier 2003). Current distribution, habitat use, and conservation threats for swift fox have recently been reviewed in detail by Stephens and Anderson (2005).

Swift foxes are widely distributed at apparently low density in shortgrass habitats across the Planning Area. A spotlight survey conducted in September 1998 documented three swift foxes on the Cimarron in allotments north of the Cimarron River (Chynoweth and others 1998). Records from the Colorado Natural Heritage Program show five swift fox occurrences on the Timpas unit and three occurrences on the Carrizo unit of the Comanche (CNHP 2003). An ongoing telemetry study conducted by Utah State University and Comanche staff documented use of the Timpas unit by at least seven swift foxes during 2003–2005, and identified four den sites.

The technical conservation assessment for the swift fox identified three key threats to swift fox populations:

1. Competition with coyotes and red fox
2. Habitat loss and fragmentation due to agriculture
3. Vehicle-caused mortality (Stephens and Anderson 2005)

Swift foxes in fragmented prairie landscapes rely almost exclusively on shortgrass prairie habitat (Kamler and others 2003a). Available habitat for swift foxes in the Planning Area is, therefore, likely to be congruent with potential habitat for black-tailed prairie dogs, plus adjacent private shortgrass rangeland. Within these areas of suitable habitat, the distribution and abundance of swift foxes is strongly affected by the abundance of

coyotes, which are a major swift fox predator (Kamler and others 2003b, Stephens and Anderson 2005).

Because habitat for the swift fox is affected by Forest Service management activities, the species has undergone a major range-wide decline, and because the Grasslands provide a vital area of potential year-round habitat for the species, the swift fox is recommended for inclusion on the species-of-concern list (see FSH 1909.12, 43.22a).

2.2.5.b. Plan components that contribute to supporting self-sustaining populations of the swift fox

Desired conditions – Grasslands Plan

In the Grasslands Plan, desired conditions are described in Part 1: Vision. The desired conditions describe how Grasslands resources would look and function; they show the future direction of the ecological, economic, and social resources. The desired conditions that would influence resource conditions and would help contribute to supporting self-sustaining populations of the swift fox are described in Part 1: Land Administration, and in the Shortgrass Prairie Ecosystem.

In Section 1.3.1.a. Land Administration, are desired conditions that would reduce land ownership fragmentation within the Planning Area, and contribute to the restoration of expansive shortgrass prairie upon which swift fox depend. The maintenance and restoration of expansive areas of shortgrass prairie within the range of the swift fox is a critical factor for maintaining swift fox populations (Stephens and Anderson 2005, Finley and others 2005).

In Section 1.3.2.e. The Shortgrass Prairie Ecosystem, the combination of 1) achieving the desired habitat conditions described in the Plan and discussed above for mountain plovers, 2) providing for the availability for potential habitat and for providing habitat for one large black-tailed prairie dog colony, and 3) maintaining variable livestock grazing intensities in combination with fires as disturbance processes, would all help provide for the habitat needs of the swift fox. Swift foxes select prairie habitat with low-growing vegetation and relatively flat terrain, likely to allow them to scan large areas for potential predators (Stephens and Anderson 2005).

Objectives and Guidelines – Grasslands Plan

In the Grasslands Plan, objectives are described in Part 2: Strategy. The objectives are the steps that Grasslands managers expect to take during plan implementation to retain or move resources toward achieving desired conditions. In the Plan, guidelines are described in Part 3: Design Criteria. The guidelines provide information and guidance for carrying out projects and activities to help maintain or achieve the desired conditions and objectives.

Several objectives and guidelines that apply to the Land Administration and the Shortgrass Prairie Ecosystem provide more detail on how Grasslands management would help maintain or improve habitat for the swift fox, and provide for the long-term sustainability of swift fox populations. The objectives that contribute to sustaining

populations of black-tailed prairie dogs and mountain plovers would also contribute to sustaining populations of swift fox.

In Section 2.1.1.a. Land Administration, are objectives to reduce the net property boundary length and reduce the length of total permanent fences that can help consolidate NFS lands in areas of potential black-tailed prairie dog habitat at a landscape scale.

In Section 2.1.2.e. The Shortgrass Prairie Ecosystem, are objectives to burn 50,270 acres (15%) of the ecosystem and to provide a minimum of one large habitat complex for black-tailed prairie dog colonies.

In Section 3.1.2.4. Wliffe-1, the guideline states that “Timing restrictions and buffers should be applied where activities cause unacceptable disturbances during reproductive periods (denning ...) to species-of-concern ...”

In Section 3.1.2.8. Short-2, the guideline states that “Timing restrictions (typically from March 1 to August 31) and buffers (typically within 0.5 miles) should be applied where activities cause unacceptable disturbances to active swift fox ... den sites.”

2.2.6. Triploid Colorado checkered whiptail

2.2.6.a. Species evaluation

The triploid Colorado checkered whiptail (*Aspidoscelis neotesselata*, also known as *Cnemidophorus neotesselatus*) is a unique Colorado endemic species, found in foothills and canyons of the upper Arkansas River drainage and the Purgatoire River drainage. The species is parthenogenetic and thought to have originated relatively recently from hybridization between an individual of *C. tigris* and *C. gularis*, yielding a reproducing population and new species. The hybrids had one set of chromosomes from each parent. A member of that population is then thought to have hybridized with a six-lined racerunner (*C. sexlineatus*), which led to the current population of individuals which have three complete sets of chromosomes (Walker and others 1997). NatureServe ranks Colorado checkered whiptail as G2Q, with a rounded rank of G2. Since it is an all-female species, taxonomy is complex, hence the “Q” in its global ranking.

Triploid Colorado checkered whiptails inhabit canyons and hillsides found at the ecotone of shortgrass prairie and canyon rims, and among juniper limestone breaks (Walker and others 1997, Hammerson 1999). Apparently, it burrows in sandy soils for shelter and egg-laying (Hammerson 1999). In the Purgatoire River drainage, it is sympatric with its parent species, *C. tessellatus* and *C. sexlineatus*. It is presumed to be extirpated from the Pueblo area due to development. However, populations appear to be stable in the canyonland areas on and near the Comanche, and there are several documented occurrences of this species on the Timpas unit of the Comanche. Hammerson (1999) considers the species to be somewhat adaptable and tolerant of human activities.

Because the Grasslands provide year-round habitat for the species, the triploid Colorado checkered whiptail is recommended for inclusion on the species-of-concern list (see FSH 1909.12, 43.22a).

2.2.6.b. Plan components that contribute to supporting self-sustaining populations of the triploid Colorado checkered whiptail

Because the whiptail remains locally common, habitat in the portion of its range in and around the Comanche remains secure, and the species exhibits adaptability to the presence of humans and development, no specific Plan components have been identified to directly address whiptail habitat management at the species level.

The Plan's desired conditions, objectives and guidelines for the Canyonland Ecosystem and the Shortgrass Prairie Ecosystem all contribute to sustaining habitat for the triploid Colorado checkered whiptail.

3. Species-of-Interest

Species-of-interest are species for which the Responsible Official determines that management actions may be necessary or desirable to achieve ecological or other multiple use objectives (FSH 1909.12, 43.22c). These planning directives identified the following six potential sources of species to be considered for the species-of-interest list:

1. Species with ranks of S-1, S-2, N1, or N2 on the NatureServe ranking system.
2. State-listed threatened and endangered species that do not meet the criteria as species-of-concern.
3. Species identified as species of conservation concern in State Comprehensive Wildlife Strategies.
4. Bird species on the U.S. Fish and Wildlife Service Birds of Conservation Concern National Priority list.
5. Additional species that valid existing information indicates are of regional or local conservation concern due to factors that may include:
 - a. Significant threats to populations or habitat.
 - b. Declining trends in populations or habitat.
 - c. Rarity.
 - d. Restricted ranges (for example, narrow endemics, disjunct populations, or species at the edge of their range).
6. Species that are hunted or fished and other species of public interest. Invasive species may also be considered. [Items a-I for number 6 are listed below.]

The first five sources of species listed above were evaluated during the development of the Regional Forester's Sensitive Species (RFSS) List for the Rocky Mountain Region of the Forest Service (USDA FS 2003). Therefore, we used the RFSS list and a consideration of hunted, fished and invasive species to identify species to consider for the species-of-interest list for the Grasslands.

After identifying a list of possible species-of-interest on the basis of the six criteria above, the following nine factors were considered when determining the final species-of-interest list (FSH 1909.12, 43.22c). The presence of one or more of these nine factors taken from FSH 1909.12 should suggest, but not compel, that a species be included as a species-of-interest (FSH 1909.12, 43.22c, number 6):

- a. Species habitat or population has declined significantly in the plan area.
- b. Species and its habitats are not well-distributed in the plan area.
- c. Species population numbers are low in the plan area.
- d. Species is dependent on the specialized and/or limited habitat in the plan area.
- e. Species is subject to some imminent threat (for example, invasion of exotic species into habitat or disturbance due to road systems).
- f. Species habitat or population is not generally secure within its range and NFS lands act as an important refuge.
- g. Species is of public interest, including those species identified cooperatively with State Fish and Wildlife Agencies consistent with the Sikes Act.
- h. Species is invasive.
- i. Species poses a threat to ecosystem or species diversity.

Table 6 identifies the species on the RFSS list (excluding three species that are on the species-of-concern list) with the potential to occur on the Grasslands. These species were evaluated in terms of current population trends, the Grasslands' role in providing habitat, and potential effects of Forest Service management activities on habitat. Table 7 identifies the species that are hunted and fished, and the invasive species with the potential to occur on the Grasslands.

Table 6. Species on the Regional Forester's Sensitive Species list with the potential to occur on the Grasslands

Common name	Scientific name	Seasonal presence on Grasslands	Do the Grasslands include all or a portion of the known range of the species?	Does potential habitat where the species could reproduce exist on the Grasslands?
Birds				
American bittern	<i>Botaurus lentiginosus</i>	migration	migration	no
American peregrine falcon	<i>Falco peregrinus anatum</i>	migration	migration	no
American three-toed woodpecker	<i>Picoides dorsalis</i>	accidental	no (accidental)	no
Black tern	<i>Chlidonias niger</i>	migration	migration	no
Brewer's sparrow	<i>Spizella breweri</i>	breeding	edge of range	edge of range
Burrowing owl	<i>Athene cunicularia</i>	breeding	yes	yes
Cassin's sparrow	<i>Aimophila cassinii</i>	breeding	yes	yes
Chestnut-collared longspur	<i>Calcarius ornatus</i>	Winter	Winter/migration	no
Ferruginous hawk	<i>Buteo regalis</i>	year-round	yes	yes
Grasshopper sparrow	<i>Ammodramus savannarum</i>	breeding	yes	yes
Lewis' woodpecker	<i>Melanerpes lewis</i>	year-round	yes	yes
Loggerhead shrike	<i>Lanius ludovicianus</i>	breeding	yes	yes
Long-billed curlew	<i>Numenius americanus</i>	breeding	yes	yes
McCown's longspur	<i>Calcarius mccownii</i>	Winter	Winter/migration	no
Northern goshawk	<i>Accipiter gentilis</i>	Winter	Winter	no
Northern harrier	<i>Circus cyaneus</i>	year-round	yes	yes
Olive-sided flycatcher	<i>Contopus borealis</i>	migration	migration	no
Purple martin	<i>Progne subis</i>	accidental	no (accidental)	no
Sage sparrow	<i>Amphispiza belli</i>	Winter/accidental	Winter	no
Short-eared owl	<i>Asio flammeus</i>	Winter	Winter	no
Yellow-billed cuckoo	<i>Coccyzus americanus</i>	breeding	yes	yes

Common name	Scientific name	Seasonal presence on Grasslands	Do the Grasslands include all or a portion of the known range of the species?	Does potential habitat where the species could reproduce exist on the Grasslands?
Mammals				
Common hog-nosed skunk	<i>Conepatus leuconotus</i>	year-round	edge of range	edge of range
Fringed myotis	<i>Myotis thysanodes</i>	year-round	edge of range	edge of range
Townsend's big-eared bat	<i>Plecotus townsendii townsendii</i>	year-round	edge of range	edge of range
Amphibians and reptiles				
Green toad	<i>Bufo debilis</i>	year-round	yes	yes
Plains leopard frog	<i>Rana blairi</i>	year-round	yes	yes

Table 7. Hunted, fished, and invasive species of public interest considered for the species-of-interest list

Common name	Scientific name	Seasonal presence on Grasslands
Birds		
Northern bobwhite	<i>Colinus virginianus</i>	year-round
Scaled quail	<i>Callipepla squamata</i>	year-round
Wild turkey	<i>Meleagris gallopavo</i>	year-round
Mammals		
Elk	<i>Cervus elaphus</i>	year-round
Pronghorn	<i>Antilocapra americana</i>	year-round

3.1. Species considered but not included on the species-of-interest list

The **American bittern** (*Botaurus lentiginosus*), **American peregrine falcon** (*Falco peregrinus*), **black tern** (*Chlidonius niger*), and **olive-sided flycatcher** (*Contopus cooperi*) may occasionally be found on the Grasslands during migration, but are not present during the breeding season or winter (Gibbs and others 1992, White and others 2002, Dunn and Agro 1995, Altman and Sallabanks 2000). Because the Grasslands do not provide any key staging or other types of habitats used by these four species during migration, they were not carried forward on the species-of-interest list. The **American three-toed woodpecker** and **purple martin** have also been observed on the Grasslands,

but they are considered accidentals and not included as species-of-interest because the Grasslands are outside of their range (Wiggins 2004a, Wiggins 2005a).

Chestnut-collared longspurs (*Calcarius ornatus*) may be found on the Grasslands from fall through spring, but migrate to the northern Great Plains during the breeding season (Hanni and others 2004, Sedgwick 2004a, Hanni and others 2005). Normal occurrence dates on the Grasslands range from late September to late April (Cable and others 1996). Wintering ground habitats used by this species are broad and include grasslands, deserts, and plateaus dominated by low grasses and forbs, where the vegetation is <0.5 m high (Sedgwick 2004a). **McCown's longspurs** (*Calcarius mccownii*) also breed in loose colonies on the northern Great Plains (Sedgwick 2004b). They winter in the southern U.S. from western Oklahoma south through eastern New Mexico and central and west Texas into northern Mexico (mainly on the Plateau from northern Sonora and Chihuahua to northern Durango). They may rarely winter in southern California, southeastern Colorado, and western Kansas (Sedgwick 2004b). Christmas Bird Count (CBC) data reveal major annual shifts in the distribution of wintering populations, presumably due to fluctuating weather patterns and conditions on the wintering grounds. In Colorado, the McCown's longspur is unusual in winter, having been recorded in only seven years of CBCs (high count = 270; through 2002; Sedgwick 2004b). Wintering ground habitats are open with sparse vegetation, including shortgrass prairie, overgrazed pastures, plowed fields, and dry lakebeds (Sedgwick 2004b). Because wintering ground habitats for these two longspur species are widespread in the southwestern U.S. and the species only occasionally occur in the planning area during winter, they are not included on the species-of-interest list.

Northern goshawks (*Accipiter gentilis*) are found primarily in forested habitats. The goshawk is considered a habitat generalist at large spatial scales in forests and uses a wide variety of forest types, but the species tends to nest in a relatively narrow range of structural conditions (Kennedy 2003). Goshawks seem to prefer mature forests with large trees, relatively closed canopies (60–90%), and open understories (Kennedy 2003). Only the western portion of the Comanche is within the winter range of the goshawk (Kennedy 2003), and the species is listed as an accidental on the Cimarron (Cable and others 1996). Because the Grasslands are at the edge of the species range and do not provide a key wintering habitat, the northern goshawk is not included on the species-of-interest list.

The **sage sparrow** (*Amphispiza belli*) is a sagebrush-obligate sparrow that breeds in portions of western, central, and northeastern Wyoming, and in western and south-central Colorado (Holmes and Johnson 2005). The species primarily winters in the southwestern U.S. (southern California, Nevada and Utah, New Mexico, Arizona and west Texas), although low densities may occur during winter in southeast Colorado and southwestern Kansas in some years (Holmes and Johnson 2006). The species is listed as an accidental on the Cimarron (Cable and others 1996). Because the Grasslands are at the edge of the species range and do not provide a key wintering habitat, the sage sparrow is not included on the species-of-interest list.

Short-eared owls (*Asio flammeus*) are infrequent residents in Colorado and Kansas, and are primarily present during winter (Wiggins 2004b). In general, short-eared owls breed and winter in relatively dense grasslands, especially those associated with water, but their

numbers and location vary strongly from year to year (Wiggins 2004b). Recently published nesting records within Region 2 suggest that typical habitat is Conservation Reserve Program (CRP) grasslands in Kansas (five nests) and South Dakota (two nests), and inter-mountain and prairie grasslands, as well as marshy areas in Colorado (four nests; Wiggins 2004b). Because the Grasslands are south of the species breeding range and do not provide a key winter habitat, the short-eared owl is not included on the species-of-interest list.

Townsend's big-eared bat (*Plecotus townsendii*) is commonly found in colonies in caves and mine tunnels, and inhabits arid western desert scrub, pinyon-juniper, and pine forests (Barbour and Davis 1969). In arid regions, the species typically does not inhabit buildings. The **fringed myotis** (*Myotis thysanodes*) is reportedly a common bat species at lower and intermediate elevations throughout the mid-west, including oak, piñon/juniper, and desert scrub habitats, and typically roosts in caves, mines, rock crevices and buildings (Barbour and Davis 1969). Both Townsend's big-eared bat and fringed myotis have been documented in the Skull Canyon Copper Mine in southwestern Baca County (outside the Grasslands planning area), but surveys conducted in the canyonlands of Comanche did not find these species (USDA FS 2005a). Because the Grasslands are on the eastern edge of the range of both species and surveys have not documented either species on the Grasslands, they are not included on the species-of-interest list.

The **common hog-nosed skunk** (*Conepatus mesoleucus*) is found in rocky canyon country in piñon/juniper woodlands and montane shrublands of the Southwest. Southern Colorado is the northernmost extension of the species' range. Two specimens were collected from southwestern Baca County in the 1920s (Fitzgerald and others 1994) with one occurrence in extreme southwestern Baca County. Because there are no known recent occurrences in southeast Colorado, and the species has not been documented on the Grasslands; therefore, the common hog-nosed skunk will not be carried forward as a species-of-interest for the Grasslands.

3.2. Species evaluated and included on the species-of-interest list – Birds

3.2.1. Brewer's sparrow

3.2.1.a. Species evaluation

Brewer's sparrow (*Spizella breweri*) typically breeds in arid brushland and thickets at higher elevations throughout the western U.S. (Rotenberry and others 1999). Plant communities where the species breeds typically have an average canopy height < 1.5m (Rotenberry and others 1999). The species has a scattered breeding distribution on the eastern plains of Colorado (Hanni 2003) and is a rare summer resident on the Cimarron (Cable and others 1996). In contrast to its limited breeding-season distribution in eastern Colorado, Brewer's sparrow is a common summer resident on mesas and foothills of western Colorado, where it breeds in sagebrush and other woody shrublands (Andrews

and Righter 1992). On the Cimarron, the species was recorded in sandsage prairie habitat during 1979–1993, but none were observed in 1998 (Chynoweth 1998). Brewer’s sparrow was present during the breeding season on the western portion of the Carrizo unit of the Comanche in 2001 and 2002 (Hanni 2003). A more intensive survey of the entire Planning Area in 2003 documented this species in five sections on the extreme western portion of the Comanche’s Carrizo unit, near the base of Mesa de Maya (Hanni and McLachlan 2004).

3.2.1.b. Plan components that provide for Brewer’s sparrow populations on the Grasslands

Desired conditions, objectives, and guidelines – Grasslands Plan

In the Grasslands Plan, desired conditions are described in Part 1: Vision. The desired conditions describe how Grasslands resources would look and function; they show the future direction of the ecological, economic, and social resources. The objectives are described in Part 2: Strategy. They are the steps that Grasslands managers expect to take during plan implementation to retain or move resources toward achieving desired conditions. The guidelines are described in Part 3: Design Criteria. They provide information and guidance for carrying out projects and activities to help maintain or achieve the desired conditions and objectives.

The desired conditions that address and influence the tall-structure vegetation component most beneficial for Brewer’s sparrows are described in both the Sandsage Prairie Ecosystem (Section 1.3.2.d.) and the Shortgrass Prairie Ecosystem (Section 1.3.2.e.). The Plan also provides for the habitat needs of the species by including a guideline that prevents mowing and prescribed burning activities during the nesting and brood-rearing periods of ground-nesting birds to protect their nests and young broods (Section 3.1.2.1. Ecol-4).

3.2.2. Burrowing owl

3.2.2.a. Species evaluation

Burrowing owls (*Athene cunicularia*) are widely distributed in western North America (Klute and others 2003). In eastern Colorado and western Kansas, the species is widespread but in isolated populations. Burrowing owls typically inhabit dry grasslands, particularly shortgrass prairie, and are intimately associated with black-tailed prairie dogs: they depend on pre-excavated burrows for nesting, shelter, and thermoregulation. Populations of burrowing owls have declined in several large portions of their range, especially the northeastern Great Plains of the U.S. and in Canada (Klute and others 2003). Declines in burrowing owl populations are closely associated with declines in active black-tailed prairie dog colonies (Desmond and others 2000). Surveys conducted on both Grasslands found that burrowing owls occupy and reproduce successfully in nearly 100% of the active black-tail prairie dog colonies, and that the owls migrate out of the Grasslands during November–February each year (Wickman and others 2000).

Primary threats to burrowing owl populations are the loss of habitat resulting from agricultural practices on private land and the loss of black-tailed prairie dog colonies. Secondary threats include habitat fragmentation, predation, illegal shooting, pesticides and other contaminants (Klute and others 2003).

Desired conditions, objectives, and guidelines – Grasslands Plan

In the Grasslands Plan, desired conditions are described in Part 1: Vision. The desired conditions describe how Grasslands resources would look and function; they show the future direction of the ecological, economic, and social resources. The objectives are described in Part 2: Strategy. They are the steps that Grasslands managers expect to take during plan implementation to retain or move resources toward achieving desired conditions. The guidelines are described in Part 3: Design Criteria. They provide information and guidance for carrying out projects and activities to help maintain or achieve the desired conditions and objectives.

The desired conditions and objectives that provide for the habitat needs of burrowing owls, both directly and indirectly, describe the habitat conditions in the Shortgrass Prairie Ecosystem needed to help contribute to the sustainability of black-tailed prairie dogs on which burrowing owls in the southern Great Plains are highly dependent. These desired conditions and objectives are located in the Plan in sections 1.3.2.e. and 2.1.2.e., and in section 2.2.1. of this evaluation.

3.2.3. Cassin's sparrow

3.2.3.a. Species evaluation

Cassin's sparrow (*Aimophila cassinii*) inhabits shrublands with scattered grass openings or shortgrass prairie with scattered shrubs, yucca, cactus or bunchgrass patches (Lynn 2006). The Cassin's sparrow requires grassland habitats with scattered shrubs, necessary for perching and skylarking, and avoids overgrazed and recently burned areas (Lynn 2006). They can generally use habitats with a wide range of shrub cover as long as some grass is also present. Breeding bird surveys show the species declined in the U.S. during 1966–1994 (Sauer and others 1995). In Colorado, Cassin's sparrow populations declined during 1966–1979, but recovered during 1980–1994 (Sauer and others 1995).

The Planning Area is one of the most important breeding areas in the U.S. for Cassin's sparrow (Sauer and others 1995). In eastern Colorado, breeding populations are found primarily in the southern half of the state, especially in and around the Comanche (Hanni and others 2003). The species is also widespread on the Cimarron, with greatest abundance in sandsage prairie. Although numbers have fluctuated between years, the long-term population trend on the Cimarron has been stable (Chynoweth 1998). Cassin's sparrow was widespread and abundant across the Planning Area during the breeding season in 2003, with detections in 65% of the 189 sections surveyed (Hanni and McLachlan 2004). Primary threats to the species are the loss of habitat to agriculture on private land and rangeland management practices that reduce or eliminate the woody shrub component of grasslands.

Desired conditions, objectives, and guidelines – Grasslands Plan

In the Grasslands Plan, desired conditions are described in Part 1: Vision. The desired conditions describe how Grasslands resources would look and function; they show the future direction of the ecological, economic, and social resources. The objectives are described in Part 2: Strategy. They are the steps that Grasslands managers expect to take during plan implementation to retain or move resources toward achieving desired conditions. The guidelines are described in Part 3: Design Criteria. They provide information and guidance for carrying out projects and activities to help maintain or achieve the desired conditions and objectives.

Cassin's sparrows are closely associated with sandsage prairie. All the Plan components that provide for the habitat needs of the lesser prairie-chicken in the Sandsage Prairie Ecosystem (section 1.3.2.d. and detailed in section 2.2.2. of this evaluation) also provide for the habitat needs of Cassin's sparrow. In particular, the desired conditions to maintain a shrub-grass mosaic in sandsage prairie, to increase the distribution and abundance tall-structure perennial grasses and to maintain tall-structure vegetation, and guidelines to prevent disturbance during the nesting season all contribute to sustaining habitat for the Cassin's sparrow. The Plan also provides for the habitat needs of the species by including a guideline that prevents mowing and prescribed burning activities during the nesting and brood-rearing periods of ground-nesting birds to protect their nests and young broods (Section 3.1.2.1. Ecol-4).

3.2.4. Ferruginous hawk

3.2.4.a. Species evaluation

The ferruginous hawk (*Buteo regalis*) is found throughout the western U.S., south central Canada, and north central Mexico. The species nests and hunts in native grasslands or in landscapes with moderate (less than 50%) coverage of cropland and hay fields (Dechant and others 2001). Breeding bird surveys show that ferruginous hawk populations in Kansas declined during 1966–2002, while populations in Colorado have been low but stable (Sauer and others 2003). The Global Ranking by NatureServe is G4, with state ranks of S2 in Kansas and S3 in Colorado. In Colorado, the species is a common winter resident on the eastern plains, but a local and uncommon nester, with the state population estimated at only 150 nesting pairs (Andrews and Righter 1992).

Surveys conducted by the Rocky Mountain Bird Observatory throughout the shortgrass prairie areas of Colorado, Kansas, Nebraska, New Mexico, and Oklahoma (BCR 18) and by the Grasslands indicate that southeast Colorado and southwestern Kansas is a key breeding area for ferruginous hawks (Wiggins 2003, Hanni and McLachlan 2004). Breeding bird surveys also identify southeastern Colorado as a key breeding area on the Great Plains (Sauer and others 2005). In southwestern Kansas, one pair of ferruginous hawks typically nested in Morton County between 1978 and 1996 (Cable and others 1996).

Two active nests were documented on the Cimarron in 1997 and again in 2003 (Carpenter and Jones 2002, A. Chappell 2003). On the Comanche, periodic surveys have been conducted on all or part of the Carrizo unit since 1977. Survey effort, personnel and the area covered has varied among years, but all available reports were analyzed for the number of active and successful ferruginous hawk nests documented on NFS lands on the eastern three-fourths of the Carrizo unit, where the survey effort has been relatively consistent (see Table 8). This area coincides with the study area for the Denver Museum of Natural History’s raptor studies conducted during 1996–2000. Winter surveys conducted by Forest Service staff suggest that densities of wintering ferruginous hawks on the Grasslands may be greater than densities of breeding hawks. In 2005, a tri-national study examining migration patterns of ferruginous hawks from Mexico to Canada included the Grasslands as a study site to determine movement patterns of the southern plains populations (Watson 2005).

Table 8. Number of known successful ferruginous hawk nests in the eastern three-quarters of the Carrizo unit on the Comanche, 1977–2004 (excluding nests on private land)

Year	1977	1995	1998	1999	2000	2003	2004
Successful nests	10	8	7	9	6	5	8

Average nest productivity (chicks per nest) has consistently been greater than 2.0 in all years surveyed (Wiggins 2003). Based on average mortality rates, approximately 1.5 young must be produced per nest to maintain stable population levels (Woffinden and Murphy 1989).

One limiting factor for ferruginous hawks range-wide may be nest site availability. Historically, the majority of ferruginous hawk nests were found on the ground or near the ground, but more recently many nests are built in trees, shrubs, utility structures, artificial platforms, and roofs of abandoned buildings (Bechard and Schmutz 1995). Available substrates, surrounding land uses, human activity, topography, and prey populations influence nest site selection. When trees are used, ferruginous hawks prefer lone or peripheral trees more than 437 yards (400 m) from roads (Carpenter and Jones 2002, Wiggins 2003). Management for ferruginous hawks on the Comanche has focused on protecting existing nest trees and erecting artificial nesting structures. Since 1996, at least 45 ferruginous hawk nest trees have been documented on the Comanche. About 35 trees have been protected by fences or cribbing, and eleven artificial nest structures have been constructed for ferruginous hawks.

Human disturbance and prey populations around nest sites may also affect ferruginous hawk populations. Ferruginous hawks are easily disturbed during the breeding season, and abandonment of nests can especially occur early in the nesting period (Dechant and others 2001). In shortgrass and sandsage prairie, important prey includes black-tailed prairie dog, thirteen-striped ground squirrels, Ord’s kangaroo rat, jackrabbits, and cottontails (Bechard and Schmutz 1995, Plumpton and Andersen 1997, Carpenter and Jones 2003). Rodent and lagomorph populations on the Grasslands fluctuate in response

to drought and plague (Cully and Johnson 2002, Carpenter and Jones 2003), but the degree to which these changes affect the ferruginous hawk population is currently unclear.

Desired conditions, objectives, and guidelines – Grasslands Plan

In the Grasslands Plan, desired conditions are described in Part 1: Vision. The desired conditions describe how Grasslands resources would look and function; they show the future direction of the ecological, economic, and social resources. The objectives are described in Part 2: Strategy. They are the steps that Grasslands managers expect to take during plan implementation to retain or move resources toward achieving desired conditions. The guidelines are described in Part 3: Design Criteria. They provide information and guidance for carrying out projects and activities to help maintain or achieve the desired conditions and objectives.

Two key factors affecting ferruginous hawks in the Plan Area are the availability of nest sites and the availability of prey. Plan provisions for the black-tailed prairie dog (an important prey source for ferruginous hawks, particularly during the winter) are discussed in section 2.2.1. of this evaluation. The Plan also states a desired condition common to all ecosystems (section 1.3.2.a.) that “The availability of nesting structures (trees and artificial platforms) for ferruginous hawks (*Buteo regalis*) would continue at current levels.” This is based on the fact that with the current availability of such structures, nest success has been relatively high and the density of breeding pairs has been greater on the Grasslands than in many other portions of the species’ range (Wiggins 2003, Hanni and McLachlan 2004). Finally, the Plan includes guideline Wlife-1 (section 3.1.2.4.) about timing restrictions and buffers that “should be applied where activities cause unacceptable disturbances during reproductive periods” ... “to species-of-interest.” Collectively, these Plan components contribute to maintaining the stable ferruginous hawk population currently on the Grasslands.

3.2.5. Grasshopper sparrow

3.2.5.a. Species evaluation

Grasshopper sparrows (*Ammodramus savannarum*) breed throughout the central Great Plains from southern Canada to Texas, typically in mid- and tallgrass prairies and sandsage and rabbitbrush grasslands, but also in shortgrass prairie with shrubs or tall forbs (Slater 2004). Southeastern Colorado and southwestern Kansas are important breeding areas for grasshopper sparrows in the U.S. (Sauer and others 2003). The 2004 section-based survey of the Planning Area documented the species in three sections on the Timpas unit and seven sections on the Carrizo unit of the Comanche (Hanni and others 2005).

Desired conditions, objectives, and guidelines – Grasslands Plan

In the Grasslands Plan, desired conditions are described in Part 1: Vision. The desired conditions describe how Grasslands resources would look and function; they show the

future direction of the ecological, economic, and social resources. The objectives are described in Part 2: Strategy. They are the steps that Grasslands managers expect to take during plan implementation to retain or move resources toward achieving desired conditions. The guidelines are described in Part 3: Design Criteria. They provide information and guidance for carrying out projects and activities to help maintain or achieve the desired conditions and objectives.

Grasshopper sparrows are closely associated with sandsage prairie and with areas of the shortgrass prairie that have tall-structure vegetation. All of the Plan components that provide for the habitat needs of the lesser prairie-chicken in the Sandsage Prairie Ecosystem, including the Comanche Lesser Prairie Chicken Habitat Zoological Area, also provide for the habitat needs of the grasshopper sparrow (see section 2.2.2. of this evaluation). In particular, the desired conditions to maintain a shrub-grass mosaic in sandsage prairie, to increase the distribution and abundance tall-structure perennial grasses and to maintain tall-structure vegetation, and guidelines to prevent disturbance during the nesting season all contribute to sustaining habitat for the grasshopper sparrow. The Plan also provides for the habitat needs of grasshopper sparrows through a guideline (Ecol-4) that prevents mowing and prescribed burning activities during the nesting and brood-rearing period of ground-nesting birds.

3.2.6. Lewis' woodpecker

3.2.6.a. Species evaluation

Lewis's woodpecker (*Melanerpes lewis*) is a locally common but patchily distributed woodpecker species usually seen in open forests of western North America (Abele and others 2004). The species distribution closely resembles that of ponderosa pine in the western U.S. In the Rocky Mountain Region of the Forest Service, populations are most strongly represented in south-central Colorado during the winter and throughout Colorado, eastern Wyoming, and the Black Hills of South Dakota during the breeding season. Lewis' woodpecker is associated with lowland riparian habitat on the Grasslands, particularly large diameter cottonwood trees with decaying wood. The species depends on standing, dead, or partly dead trees in advanced stages of decay for nest sites, and old cottonwood trees with desiccation cracks for winter storage sites (Ryke and Wagner 2002). In southeastern Colorado, Lewis' woodpeckers are found more often along the edges of riparian woodlands or in trees in agricultural settings (for example, homesteads near grain fields) rather than within riparian woodlands, and year-round residency by Lewis' woodpecker may depend on the availability of agricultural crops (Bock and others 1971). There is potential habitat for the Lewis' woodpecker in the Canyonland Ecosystem on the Comanche. Despite this species' association with large-diameter cottonwoods, the Lewis' woodpecker breeding range does not extend to the Cimarron (Abele and others 2004, Cable and others 1996).

Desired conditions, objectives, and guidelines – Grasslands Plan

In the Grasslands Plan, desired conditions are described in Part 1: Vision. The desired conditions describe how Grasslands resources would look and function; they show the future direction of the ecological, economic, and social resources. The objectives are described in Part 2: Strategy. They are the steps that Grasslands managers expect to take during plan implementation to retain or move resources toward achieving desired conditions. The guidelines are described in Part 3: Design Criteria. They provide information and guidance for carrying out projects and activities to help maintain or achieve the desired conditions and objectives.

Plan components for the Canyonland Ecosystem (section 1.3.2.b.) and the Riparian and Aquatic Ecosystem (section 1.3.2.c.) provide for the habitat needs of the Lewis' woodpecker through desired conditions that call for the long-term presence of mature plains cottonwood stands and areas with regenerating cottonwood saplings along riparian corridors within the canyons.

3.2.7. Loggerhead shrike

3.2.7.a. Species evaluation

Loggerhead shrikes (*Lanius ludovicianus*) are found throughout most of the U.S., southern Canada, and northern Mexico. Loggerhead shrikes in Colorado and Kansas have historically been noted as common breeders statewide at lower elevations (Wiggins 2005b). Recent breeding bird atlas data show a widespread breeding distribution on the eastern plains of Colorado and in western Kansas, but only spotty distribution in the southern and western valleys of Colorado. In addition, the breeding bird atlas data suggest that loggerhead shrikes are relatively common on the eastern plains of Colorado, and this is one of the few areas in North America where shrike populations appear to be stable (Wiggins 2005b).

Loggerhead shrikes breed in a variety of open habitats including native and non-native grasslands, sage scrub, and other areas with a scattering of bushes and trees and bare ground. Breeding habitat requirements include scattered trees, shrubs, or low bushes as nesting substrate, elevated perches for hunting and courtship activities, foraging areas comprised of open, short vegetation with some relatively bare areas, and thorny trees or barbed wire fences for impaling prey (Wiggins 2005b).

On the Comanche, small numbers of shrikes are regularly observed on the breeding bird survey route near Campo, Colorado (Sauer and others 2003). A raptor and shrike nesting survey conducted on the Carrizo unit of the Comanche in 2003 found a total of eight shrike pairs in three localities: 1) the vicinity of Campo; 2) south of Pritchett; and 3) the eastern half of the Kim Grazing Association (Wiggins 2003). On the Timpas unit of the Comanche, loggerhead shrikes are found year-round in shortgrass prairie with clusters or isolated individuals of juniper. Shrikes are also found in areas where the Shortgrass Prairie Ecosystem borders on the canyonlands. On the Cimarron, the species is a common resident, with nesting documented along the Cimarron River corridor, and numbers increasing due to migrants in spring and fall (Cable and others 1996). Potential nest trees

and shrubs in the Great Plains are likely more abundant and widespread today than they were historically (Wiggins 2005b).

Desired conditions, objectives, and guidelines – Grasslands Plan

In the Grasslands Plan, desired conditions are described in Part 1: Vision. The desired conditions describe how Grasslands resources would look and function; they show the future direction of the ecological, economic, and social resources. The objectives are described in Part 2: Strategy. They are the steps that Grasslands managers expect to take during plan implementation to retain or move resources toward achieving desired conditions. The guidelines are described in Part 3: Design Criteria. They provide information and guidance for carrying out projects and activities to help maintain or achieve the desired conditions and objectives.

Desired conditions for four ecosystems described in the Plan (Canyonland, Riparian and Aquatic, Sandsage Prairie, Shortgrass Prairie) address the habitat needs of the loggerhead shrike by providing areas of open, short vegetation interspersed within other areas of taller-structure vegetation, which provides for a combination of foraging and perching and or nesting habitat. Desired conditions also provide for the long-term presence of potential nest trees and shrubs in appropriate locations of the Canyonland Ecosystem, and along riparian corridors such as the Cimarron River in the Riparian and Aquatic Ecosystem.

3.2.8. Long-billed curlew

3.2.8.a. Species evaluation

The long-billed curlew (*Numenius americanus*) is North America's largest shorebird, standing about 16 inches tall, and breeds in grasslands throughout the Great Plains and the inter-mountain west. Populations declined rapidly in Colorado during 1966–2002, and trends could not be determined from breeding bird surveys in Kansas (Sauer and others 2003). Both breeding bird surveys (Sauer and others 2005) and surveys conducted by the Rocky Mountain Bird Observatory throughout the shortgrass prairie region of Colorado, Kansas, Nebraska, Oklahoma, and Wyoming (BCR 18; Hanni and McLaughlin 2004) indicate that southeastern Colorado is a key breeding area for long-billed curlews. NatureServe ranks the species as G5 globally, but it is ranked as S1 in Kansas and S2 in Colorado.

In the Planning Area, long-billed curlews are most often observed on the Carrizo unit of the Comanche. Section-based surveys of the Planning Area during the breeding season documented the species in 12 of the 189 sections in 2003, and 15 of 202 sections in 2004, with all occurrences in the central portion of the Carrizo unit on the Comanche (Hanni and McLachlan 2004, Hanni and others 2005). On the Cimarron, avian surveys have occasionally documented breeding pairs in shortgrass prairie north of the Cimarron River, but sightings are more frequent on agricultural lands north of the Cimarron (Chynoweth 1998). None were documented on the Cimarron in 2003 or 2004 (Hanni and McLachlan

2004, Hanni and others 2005), where this species is listed as a common migrant but uncommon summer resident (Cable and others 1996).

Breeding habitat for long-billed curlews is typically described as shortgrass or mixed grass native prairie but varies from moist meadows to very dry grasslands. Within certain parameters, curlews appear to be somewhat flexible in their breeding habitat preferences, generally preferring to nest in areas with large open expanses of relatively low vegetation (Paton and Dalton 1994). Brood-rearing habitat is also important for curlews. Shortly after the eggs hatch, adults move their broods to areas where denser vegetative cover is available, presumably to reduce predation risk. On the Comanche, long-billed curlews are most often observed in shortgrass prairie where at least one other type of taller vegetation is present in the immediate vicinity (King 1977). On the Comanche, breeding pairs of curlews are primarily observed in allotments that contain a heterogeneous mosaic of both shortgrass prairie and mid-height grasses (Hanni and McLachlan 2004; D. Augustine, pers. obs.). Surveys conducted by the Rocky Mountain Bird Observatory indicate populations in the Planning Area have been stable over the past five years.

Desired conditions, objectives, and guidelines – Grasslands Plan

In the Grasslands Plan, desired conditions are described in Part 1: Vision. The desired conditions describe how Grasslands resources would look and function; they show the future direction of the ecological, economic, and social resources. The objectives are described in Part 2: Strategy. They are the steps that Grasslands managers expect to take during plan implementation to retain or move resources toward achieving desired conditions. The guidelines are described in Part 3: Design Criteria. They provide information and guidance for carrying out projects and activities to help maintain or achieve the desired conditions and objectives.

Key factors influencing long-billed curlews on the Grasslands include the presence of variable grass heights and the prevention of ground-disturbing activities that may affect nests. Provisions in the desired conditions for the Shortgrass Prairie Ecosystem that provide for short, sparse vegetation (discussed for the black-tailed prairie dog (section 2.2.1.), mountain plover (section 2.2.4.), and swift fox (section 2.2.5) in this evaluation) also provide for curlew nesting habitat. The desired conditions for the Shortgrass Prairie Ecosystem (section 1.3.2.e.) address the presence of taller-structure patches of grassland in the vicinity of areas with sparse, low structure vegetation, in order to provide the type of area to which long-billed curlews move their broods after hatching. The desired conditions for the Shortgrass Prairie Ecosystem state that “In any given year, there would be areas that are ungrazed, areas that are intensively grazed, and areas that have recently burned.” Livestock grazing systems that vary grazing intensity among pastures and incorporate prescribed fire as a tool to manipulate grazing distribution can increase heterogeneity in plant structure and species composition (Fuhlendorf and Engle 2004), and create the patchy shortgrass prairie conditions where breeding long-billed curlews typically occur (King 1977). Collectively, these Plan components contribute to maintaining the stable long-billed curlew population currently on the Grasslands.

3.2.9. Northern bobwhite

3.2.9.a. Species evaluation

The northern bobwhite (*Colinus virginianus*) ranges throughout the central and eastern U.S. and south through eastern Mexico (Sibley 2000). Throughout much of their range, the northern bobwhite is an abundant game species. They have a Global Ranking of G5 and a State Ranking of S4 in Colorado and S5 in Kansas. Northern bobwhites typically inhabit brushlands and open woodlands. With the exception of the nesting season, they forage and roost in coveys. They nest on the ground in areas with moderate amounts of cover, often near habitat edges or openings. Quail numbers may fluctuate widely with climatic variations (Rosene 1984). Northern bobwhites are considered a common resident on the Cimarron (Cable and others 1996), and are found throughout the Grassland but are most common along the riparian corridor of the Cimarron River. Wing barrel surveys to assess hunter-harvest trends are conducted by the KDWP, and show a cyclic trend that is relatively stable overall. Northern bobwhite are also found on the eastern portion of the Comanche, particularly in sandsage prairie, riparian woodlands, and portions of the Grassland that border on irrigated agricultural fields.

The northern bobwhite is a species-of-interest for the Grasslands because of its hunting popularity and local interest, particularly on the Cimarron. The Grasslands experience hunting pressure from local and out-of state hunters, which provides an important economic benefit to local communities during the hunting season.

Because of high public demand for hunting northern bobwhite, and due to management needs to enhance habitat for the species, the northern bobwhite is recommended for inclusion on the Grasslands species-of-interest list [see criteria (g), FSH 1909.12 43.22c].

Desired conditions, objectives, and guidelines – Grasslands Plan

In the Grasslands Plan, desired conditions are described in Part 1: Vision. The desired conditions describe how Grasslands resources would look and function; they show the future direction of the ecological, economic, and social resources. The objectives are described in Part 2: Strategy. They are the steps that Grasslands managers expect to take during plan implementation to retain or move resources toward achieving desired conditions. The guidelines are described in Part 3: Design Criteria. They provide information and guidance for carrying out projects and activities to help maintain or achieve the desired conditions and objectives.

The Plan desired conditions for Common to All Ecosystems (section 1.3.2.a.), the Riparian and Aquatic Ecosystem (section 1.3.2.c.), and the Sandsage Prairie Ecosystem (section 1.3.2.d.) describes the habitat needs for the northern bobwhite. In the Riparian and Aquatic Ecosystem, the desired condition of self-perpetuating communities dominated by native woody riparian species, in particular the long-term presence of mature cottonwood stands and areas with regenerating cottonwood and willow saplings, would provide key habitat for northern bobwhite. In the Sandsage Prairie Ecosystem, the

desired conditions of 1) a broader diversity of native grasses and forbs, 2) greater spatial variability in livestock grazing pressure, and 3) the use of prescribed fire, would all contribute to a structurally and compositionally diverse plant community, that would provide nesting and brood-rearing habitat for northern bobwhite. In addition, desired conditions address the need for functioning wildlife habitat structural improvements (such as gallinaceous guzzlers), and “Clusters of native shrubs would be located where they would retain or improve foraging and escape habitat for northern bobwhite.” All of these Plan provisions would provide for the needs of northern bobwhite populations on the Grasslands.

3.2.10. Northern harrier

3.2.10.b. Species evaluation

The northern harrier (*Circus cyaneus*) breeds from northern Alaska and Canada, south to northern Baja California and east to southern Texas, southern Missouri, central West Virginia, and southeastern Virginia. Harrier abundance varies widely with respect to habitat, with the highest abundance of breeding birds in wet grasslands and marshes (Slater and Rock 2005). Intermediate breeding densities are found in dry grasslands, and low densities in shrub-steppes and desert habitats. During the non-breeding season, the northern harrier winters from southern Canada and the northern contiguous U.S., south through the U.S. and into Mexico. Northern harriers reside throughout most of Colorado but are usually more abundant during migration than during the breeding season (Andrews and Righter 1992). Fifty-seven percent of northern harriers detected on the breeding bird atlas survey were found on the eastern Plains, most located in the northern half. The northern harrier occupies a wide range of open wetland and upland habitats during the breeding season, including fresh to alkali wetlands, wet or dry grasslands, lightly grazed agricultural pastures, old fields, brushy areas, and cold desert shrub-steppe. In the nonbreeding season, the northern harrier uses a wide variety of open habitats with herbaceous cover, including freshwater and saltwater wetlands, grasslands, idle fields, agricultural pastureland, desert, and to a lesser extent cropland (Slater and Rock 2005).

The Comanche is at the southern edge of this species’ breeding range. The 2003 section-based survey of the Grasslands documented northern harriers in only three of 189 sections during the breeding season, all in the east-central portion of the Carrizo unit of the Comanche (Hanni and McLachlan 2004). The 2004 section-based survey of the Grasslands found no occurrences of this species during the breeding season (Hanni and others 2005).

Desired conditions, objectives, and guidelines – Grasslands Plan

In the Grasslands Plan, desired conditions are described in Part 1: Vision. The desired conditions describe how Grasslands resources would look and function; they show the future direction of the ecological, economic, and social resources. The objectives are described in Part 2: Strategy. They are the steps that Grasslands managers expect to take during plan implementation to retain or move resources toward achieving desired conditions. The guidelines are described in Part 3: Design Criteria. They provide

information and guidance for carrying out projects and activities to help maintain or achieve the desired conditions and objectives.

Desired conditions for the Sandsage Prairie Ecosystem (section 1.3.2.d.) and the Shortgrass Prairie Ecosystem (section 1.3.2.e.) include the presence of tall-structure vegetation distributed in a heterogeneous mosaic throughout both ecosystems. This structural component provides the type for foraging habitat used by northern harriers in both the breeding and non-breeding season.

3.2.11. Scaled quail

3.2.11.a. Species evaluation

The scaled quail (*Callipepla squamata*) is a familiar game bird of the desert grasslands of Mexico and the southwestern U.S. The range of the scaled quail generally conforms to the Chihuahaun desert and adjacent grasslands, including southeastern Colorado and southwestern Kansas. Scaled quail habitat has been described as intermediate between grass-adapted species and those adapted to scrub habitats (Schemnitz 1994). In southeastern Colorado and southwest Kansas, the species is found primarily in sandsage prairie, including areas interspersed with agriculture, and often in disturbed areas having an abundance of annual forbs. The species is also found in juniper woodlands in the Canyonland Ecosystem of the Comanche. Overhead cover, such as sand sagebrush and cholla cactus, that provides shade and protection from avian predators is a key characteristic of loafing (resting) cover (Schemnitz 1994). The scaled quail is a species-of-interest because it is a popular hunting prey and because of local interest on both Grasslands. Because of high public demand for scaled quail, due to management needs to enhance habitat for the species, and due to a long history of partnerships to restore and enhance quail habitat on the Grasslands, the scaled quail is recommended for inclusion on the Grasslands species-of-interest list [see criteria (g), FSH 1909.12 43.22c].

Desired conditions, objectives, and guidelines – Grasslands Plan

In the Grasslands Plan, desired conditions are described in Part 1: Vision. The desired conditions describe how Grasslands resources would look and function; they show the future direction of the ecological, economic, and social resources. The objectives are described in Part 2: Strategy. They are the steps that Grasslands managers expect to take during plan implementation to retain or move resources toward achieving desired conditions. The guidelines are described in Part 3: Design Criteria. They provide information and guidance for carrying out projects and activities to help maintain or achieve the desired conditions and objectives.

The Plan desired conditions for Common to All Ecosystems (section 1.3.2.a.), the Canyonland Ecosystem (section 1.3.2.b.), the Riparian and Aquatic Ecosystem (section 1.3.2.c.), and the Sandsage Prairie Ecosystem (section 1.3.2.d.) describes the habitat conditions that meet the needs for the scaled quail. In the Sandsage Prairie Ecosystem,

the desired conditions of 1) a broader diversity of native grasses and forbs, 2) greater spatial variability in livestock grazing pressure, and 3) the use of prescribed fire would all contribute to a structurally and compositionally diverse plant community, that would provide both nesting and brood rearing habitat for scaled quail. In addition, desired conditions address the need for functioning wildlife habitat structural improvements (such as gallinaceous guzzlers), and “Clusters of native shrubs would be located where they would retain or improve foraging and escape habitat” All of these Plan provisions would provide for the needs of scaled quail populations on the Grasslands. Finally, achieving desired conditions that would increase the distribution and abundance of native shrubs and herbaceous species in the Canyonland Ecosystem bottomlands, particularly in the Picket Wire Canyonlands paleontological area, would help improve habitat for scaled quail.

3.2.12. Wild turkey

3.2.12.a. Species evaluation

Wild turkeys (*Meleagris gallopavo*) were extirpated from Kansas by the 1870s, but by the 1950s had begun to recolonize on the Cimarron from the Oklahoma panhandle. Planned releases of Rio Grande wild turkeys on the Cimarron followed in 1966 and 1988. The population expanded after releases. However, apparent declines in turkeys in southwestern Kansas during the late 1990s spurred research on habitat use and population dynamics on the Cimarron during 1999–2004. Wild turkeys on the Cimarron are found primarily along the Cimarron River corridor. Birds from this population typically winter on private lands along the river, but primarily nest and raise broods on the Cimarron (Spears 2002). Hens with nests and young broods use areas of the riparian corridor with high visual obstruction (>0.4 m) from grasses and shrubs and downed trees, particularly areas with shrubs 1–2 m tall (Spears 2002, Huffman 2003). Removal of tamarisk stands in the 2–4 m height class and replacement with native grasses and shrubs in the 1–2 m height class could improve nesting and brood-rearing habitat for wild turkeys (Ballard and Wallace 2006).

On the Comanche, wild turkeys are found primarily in the Picket Wire Canyonlands special area and in canyons in the southwestern portion of the Carrizo unit. These populations are primarily the Merriam’s subspecies (*M. g. merriami*), but may interbreed with the Rio Grande populations introduced along the Cimarron River. As on the Cimarron, key habitat components include shrub and grass communities that provide adequate nesting cover in the canyon bottomlands, and the presence of mature cottonwoods along riparian corridors for roost trees.

Because of high public demand for wild turkey as hunting prey, due to management needs to enhance habitat for the species, and due to a long history of partnerships to restore and enhance turkey habitat on the Grasslands, the wild turkey is recommended for inclusion on the Grasslands species-of-interest list [see criteria (g), FSH 1909.12 43.22c].

Desired conditions, objectives, and guidelines – Grasslands Plan

In the Grasslands Plan, desired conditions are described in Part 1: Vision. The desired conditions describe how Grasslands resources would look and function; they show the future direction of the ecological, economic, and social resources. The objectives are described in Part 2: Strategy. They are the steps that Grasslands managers expect to take during plan implementation to retain or move resources toward achieving desired conditions. The guidelines are described in Part 3: Design Criteria. They provide information and guidance for carrying out projects and activities to help maintain or achieve the desired conditions and objectives.

The Plan desired conditions for the Canyonland Ecosystem (section 1.3.2.b.), the Riparian and Aquatic Ecosystem (section 1.3.2.c.), and for the Picket Wire Canyonlands paleontological area (section 1.3.5.f.) describes the habitat conditions and how those conditions would contribute to supporting wild turkey populations in three locations on the Grasslands: the Cimarron River corridor, the Picket Wire Canyonlands, and canyonlands in the southwestern portion of the Comanche's Carrizo unit. In these areas, desired conditions include a diverse and structurally variable riparian woodland composed of native woody and herbaceous plant species. In contrast to the currently tamarisk-dominated riparian corridors, this desired condition would provide improved year-round foraging, nesting and brood-rearing habitat for wild turkey, and would provide for long-term presence of wild turkey roost trees (mature cottonwoods). The Plan objectives that address treating tamarisk and restoring riparian woodland would help achieve the desired conditions beneficial for wild turkey.

3.2.13. Yellow-billed cuckoo

3.2.13.a. Species evaluation

Yellow-billed cuckoos (*Coccyzus americanus*) are common breeding birds in eastern portions of Kansas, Nebraska, and South Dakota, but they become much scarcer to the west (Wiggins 2005c). The species is a rare summer resident in riparian woodlands of western Kansas and eastern Colorado. Most conservation concern has focused on the western subspecies of yellow-billed cuckoo, which has experienced widespread range contraction and population decline due to the loss of mature, closed-canopy riparian forests (Andrews and Righter 1992). However, only the eastern subspecies is found on the Grasslands (Andrews and Righter 1992, Cable and others 1996). The Comanche is at the western fringe of the breeding range for the eastern subspecies of yellow-billed cuckoo (Wiggins 2005c). Yellow-billed cuckoos prefer to nest in open woodlands with an understory of dense vegetation, especially near water. On the Great Plains, the favored nesting habitats are well-wooded river valleys and associated deciduous forests (Wiggins 2005c).

Desired conditions, objectives, and guidelines – Grasslands Plan

In the Grasslands Plan, desired conditions are described in Part 1: Vision. The desired conditions describe how Grasslands resources would look and function; they show the future direction of the ecological, economic, and social resources. The objectives are described in Part 2: Strategy. They are the steps that Grasslands managers expect to take during plan implementation to retain or move resources toward achieving desired conditions. The guidelines are described in Part 3: Design Criteria. They provide information and guidance for carrying out projects and activities to help maintain or achieve the desired conditions and objectives.

The Plan desired conditions for the Canyonland Ecosystem (section 1.3.2.b.) and the Riparian and Aquatic Ecosystem (section 1.3.2.c.) provide directly for the habitat needs of the yellow-billed cuckoo by addressing the long-term presence of 1) cottonwood and willow populations along riparian corridors within the canyons, and 2) native herbaceous and shrub communities within the understory of riparian woodlands.

3.3. Species evaluated and included on the species-of-interest list – Mammals

3.3.1. Elk

3.3.1.a. Species evaluation

Elk (*Cervus elaphus*) were widely distributed in North America at the time of European settlement, across southern Canada from Vancouver Island to Quebec and southward to northern Mexico, Louisiana, and Georgia. Due to land settlement and market hunting, elk were eliminated from eastern North America, the southwest U.S., and most of the Great Plains during the 1800s. By 1900, the original North American population of several million elk had dropped to fewer than 100,000. Since then, restoration and reintroduction efforts have returned elk populations to many portions of their former range, and increased the total North American population to more than 700,000 (Rocky Mountain Elk Foundation 1989). NatureServe ranks the species as G5 globally and as S5 in Colorado and S1 in Kansas.

Elk were an important component of the Great Plains fauna at the time of European settlement, and were noted repeatedly in the journals of early explorers as they traveled across the prairie. On the southern plains, elk disappeared from the tall-grass and shortgrass regions by 1833, but persisted in mixed grass prairie through the 1850s (Shaw and Lee 1997). The last wild elk in Kansas were probably killed around 1900. Today, elk reintroductions on the southern plains have established at least 7 populations in Kansas, Oklahoma, and Texas, and recolonization by elk has taken place in limited portions of the prairie in Colorado and New Mexico. Elk inhabit a variety of habitats, although they are most frequently associated with semi-open forests and forest edges (Fitzgerald and others 1994). Grasses make up the majority of their diet in most areas.

In Kansas, a free-ranging elk population was reintroduced to the Cimarron in 1981, using individuals from the Maxwell Game Refuge. This population currently occupies riparian and prairie habitat along the Cimarron River in southwest Kansas (Cimarron), southeast

Colorado, and the panhandle of Oklahoma. The population is maintained at an estimated 50 animals, primarily through hunting in Colorado and Oklahoma.

On the Comanche, elk are present in low numbers throughout the Picket Wire Canyonlands special area on the Timpas unit and the surrounding private land in the Purgatoire River watershed. This population appears to have been established by elk dispersing from the Raton Mesa and Mesa de Maya area of southern Colorado. Individual elk are also occasionally sighted on the Carrizo unit of the Comanche. Hunting is likely an important factor affecting population size on the Comanche; the CDOW currently issues an unlimited number of either-sex elk licenses in southeastern Colorado (east of I-25) for a five-month hunting season (September through January). Ongoing habitat management efforts for elk on the Grasslands include tamarisk treatment and cottonwood/willow restoration along the Purgatoire River and Cimarron River riparian corridors (to improve summer and winter forage and provide calving areas) and establishing food plots along the Cimarron River. Partners in these management efforts include the Rocky Mountain Elk Foundation and KDPW.

Because of high public demand for elk for hunting and recreational viewing, the limited distribution of elk in the Plan Area, and the need for management to reduce conflicts with elk use of private land, the elk is recommended for inclusion on the Grassland's species-of-interest list [see criteria (b) and (g), FSH 1909.12 43.22c].

Desired conditions, objectives, and guidelines – Grasslands Plan

In the Grasslands Plan, desired conditions are described in Part 1: Vision. The desired conditions describe how Grasslands resources would look and function; they show the future direction of the ecological, economic, and social resources. The objectives are described in Part 2: Strategy. They are the steps that Grasslands managers expect to take during plan implementation to retain or move resources toward achieving desired conditions. The guidelines are described in Part 3: Design Criteria. They provide information and guidance for carrying out projects and activities to help maintain or achieve the desired conditions and objectives.

The Plan desired conditions for the Riparian and Aquatic Ecosystem (section 1.3.2.c.) and the Picket Wire Canyonlands paleontological area (section 1.3.5.f.) describes the habitat conditions that contribute to supporting elk populations in two locations on the Grasslands: the Cimarron River Corridor and the Picket Wire Canyonlands paleontological area. Desired conditions in both of these areas include a diverse and structurally variable riparian woodland made up of native woody and herbaceous plant species. In contrast to the current tamarisk-dominated riparian corridors, these desired conditions would provide improved year-round foraging habitat for elk. The Plan objectives that address treating tamarisk and restoring riparian woodland would help achieve the desired conditions beneficial for elk.

3.3.2. Pronghorn

3.3.2.a. Species evaluation

Pronghorn (*Antilocapra americana*) are found throughout the shortgrass prairie of North America, from Alberta and Saskatchewan in Canada south to Mexico, and in arid, shrub-steppe areas of the intermountain west. The current distribution of pronghorn is similar to the estimated distribution when Europeans first came to America (O’Gara and Yoakum 2004). The pronghorn is a specialized grassland herbivore that has developed physiological and behavioral adaptations to survive in large expanses of flat, open shortgrass prairie. NatureServe ranks the species as G5 globally and as S4 in Colorado and S2 in Kansas.

In Colorado and Kansas, the pronghorn is an important wildlife species for hunting and recreational viewing. State management objectives for this species must balance its importance as a game animal with the problem of depredation on winter wheat fields. Pronghorn primarily forage on forbs and dwarf shrubs, but also forage in wheat fields November–March when alternative forage sources are less attractive (Alldredge and others 1987). In southeastern Colorado, the abundance and diversity of key winter forage species influence pronghorn distribution, abundance, and use of wheat fields (Barrington 1975).

Other habitat features that affect pronghorn distribution include livestock fencing and water developments. Because pronghorn are adapted to flat, open, unfenced terrain, they are generally incapable of jumping over fences. Instead, they typically stop at fences and crawl under the lowest wire. The Grasslands have implemented a standard that all livestock fences have a smooth lower wire (no barbs) at a height of 18 inches, to allow pronghorn to pass between allotment units. Antelope-fence studies were summarized by O’Gara and Yoakum (2004), who recommended that: (1) barbed wire fences have a wire at least 16” from the ground, (2) the bottom wire be smooth, (3) stays between fence posts be avoided, (4) key antelope pathways and migration routes should provide for low-height or pass structures, and (5) fenced areas should be kept as large as possible. Water developments for cattle are a well-known benefit to pronghorn if fencing around the water source does not exclude pronghorn (O’Gara and Yoakum 2004).

Prescribed burning on the Grasslands provides high-quality spring forage that attracts pronghorn herds. Prescribed burning in late fall/winter has been proposed as a strategy to decrease private lands depredation by pronghorn. Populations are stable but low on the Grasslands.

In Kansas, pronghorn have been on the Cimarron for at least the past two decades, but numbers were supplemented with animals transplanted from Colorado in the early 1990s. Research on the pronghorn transplanted to the Cimarron showed higher survivorship in the shortgrass prairie north of the Cimarron River compared to the sandsage prairie south of the river. In southwest Kansas, which is at the eastern edge of the current distribution

of pronghorn, hunter harvest is low (fewer than 10 muzzleloader permits per year and no rifle permits). The 2003 pronghorn survey conducted by Kansas KDWP for Morton County, which encompasses the Cimarron, found a county-wide density of 0.15 pronghorn (less than 1) per square mile.

Pronghorn populations were re-established in southeastern Colorado beginning in 1946 with transplants from the north central areas of the state. Current population objectives set by the CDOW for the Data Analysis Units that encompass the Comanche reflect the desire to minimize crop damage on private lands. As a result, hunting does is a major factor influencing population size. On the Comanche, aerial counts conducted in 2003 and 2004 indicate post-harvest densities of approximately 0.45 pronghorn/mi² on the Timpas unit and 0.36 pronghorn (less than 1) per square mile on the Carrizo unit.

Because of high public demand for pronghorn for recreational viewing and hunting and due to management needs to reduce conflicts with pronghorn use of private land, the pronghorn is recommended for inclusion on the Grassland's species-of-interest list [see criterion (g), FSH 1909.12 43.22c].

Desired conditions, objectives, and guidelines – Grasslands Plan

In the Grasslands Plan, desired conditions are described in Part 1: Vision. The desired conditions describe how Grasslands resources would look and function; they show the future direction of the ecological, economic, and social resources. The objectives are described in Part 2: Strategy. They are the steps that Grasslands managers expect to take during plan implementation to retain or move resources toward achieving desired conditions. The guidelines are described in Part 3: Design Criteria. They provide information and guidance for carrying out projects and activities to help maintain or achieve the desired conditions and objectives.

The Plan describes the desired habitat conditions for Land Administration (section 1.3.2.a.) the Shortgrass Prairie Ecosystem (section 1.3.2.e.) that provides for the maintenance or improvement of pronghorn habitat. First, the desired condition of consolidated NFS lands in the Plan Area would provide for larger, contiguous blocks of pronghorn habitat and reduce conflicts with pronghorn use of private agricultural land. Second, the desired increase in native forbs and subshrubs in the Shortgrass Prairie Ecosystem would improve pronghorn foraging habitat. Third, the desired condition to increase, where possible, allotment sizes would help minimize fragmentation of pronghorn habitat currently affected by fencing. Fourth, the use of fires as a disturbance process in this ecosystem would improve foraging habitat, and potentially reduce pronghorn use of nearby private agricultural lands.

The Plan objectives state that 50,270 acres (15%) of the Shortgrass Prairie Ecosystem would be burned (section 2.1.2.e.) during the next 15 years. Regrowth on fall and winter burns can provide high-quality forage for pronghorn at times when food is especially limited, and can also reduce pronghorn use of privately-owned winter wheat fields. A Land Administration objective to reduce the total length of permanent fencing (section 2.1.1.a.) would help contribute to larger areas of unfragmented pronghorn habitat.

3.4. Species evaluated and included on the species-of-interest list – Amphibians

3.4.1. Green toad

3.4.1.a. Species evaluation

The green toad (*Bufo debilis*) is associated with riparian areas within the shortgrass prairie ecosystem (Livo 1995). The species is restricted to intermittent streams and pools (ponds) that are associated with loamy clay soils and consistently-flooded vegetation (Taggart 1994). During daylight hours, green toads have been observed in rodent burrows and under rocks along Alkali Creek (on the Timpas unit of the Comanche). The small size of the green toad and its cryptic behavior make it difficult to detect even in places where it may be abundant (Livo 1995).

Distribution on the Cimarron: There are no current reports or records of the green toad in Morton County, Kansas. From a 1994 report on file at the Cimarron district, the green toad has not been found since the Dust Bowl era of the 1930s. The KDWP conducted follow-up surveys after their 1992 and 1993 green toad reintroduction efforts; no green toads were found. Amphibian surveys of the Cimarron River drainage were also conducted in 2001 (Elson 2001); no green toads were located.

Distribution on the Comanche: Three green toads were found in surveys conducted in 1994 and 1996 in Otero County, Colorado on the Comanche. In 1995, more than 20 green toads were observed under rocks along Alkali Creek (Livo 1995). In 1997, surveys following heavy rains documented significant surface activity by this species; it was encountered several times in Otero County on the Comanche including a documented observation of at least 20 adults in a breeding group (Mackessy 1998). The species occurs throughout much of the Timpas unit of the Comanche. There have been recent discoveries of the green toad in Baca County, and with old records of occurrence in the vicinity of Trinidad and in Bent County, the species “may be fairly widespread in southeastern Colorado” (Livo 1995).

The population status of green toads is difficult to evaluate because they appear to be active on the surface for only brief periods following rainstorms (Mackessy 1998). NatureServe ranks the green toad as G5 and S2. The State of Kansas lists the green toad as threatened; the Colorado Natural Heritage Program considers the species to be of special concern in Colorado (Livo 1995). The CDOW currently does not list the green toad as a Species of Concern but there is a strong likelihood of listing the species when the list is updated and revised by the State of Colorado (Jackson 2008, CDOW 2008). The species is not currently listed on the Regional Forester’s Sensitive Species List (FSH 1909.12, 43.22).

Although habitat for green toad is intermittent in nature and recent surveys failed to relocate the species on the Cimarron, the green toad is thought to be fairly common and widespread – at least in southeastern Colorado. The green toad is considered to be of

public interest (FSH 1909.12, 43.22c(6)) and is recommended for inclusion on the Grassland's species-of-interest list.

Desired conditions, objectives, and guidelines – Grasslands Plan

In the Grasslands Plan, desired conditions are described in Part 1: Vision. The desired conditions describe how Grasslands resources would look and function; they show the future direction of the ecological, economic, and social resources. The objectives are described in Part 2: Strategy. They are the steps that Grasslands managers expect to take during plan implementation to retain or move resources toward achieving desired conditions. The guidelines are described in Part 3: Design Criteria. They provide information and guidance for carrying out projects and activities to help maintain or achieve the desired conditions and objectives.

The desired conditions for the Riparian and Aquatic Ecosystem (section 1.3.2.c.) describe the habitat conditions that address maintaining the inherent ecological qualities, hydrologic functions, and wildlife habitat benefits of seeps and springs on the Grasslands. A Plan objective for this ecosystem (section 2.1.2.c.) is to rehabilitate or enhance seeps or springs. This objective could be accomplished in ways that improve habitat for native aquatic species, including the green toad.

3.4.2. Plains leopard frog

3.4.2.a. Species evaluation

Plains leopard frogs (*Rana blairi*) hibernate in large bodies of water and presumably breed in smaller ponds. They may be found in all types of water bodies and frequently wander far from water (Smith and Kienath 2005). The Plains leopard frog can be found near wetland habitats throughout the Grasslands. However, competition and consumption by bullfrogs is reported to have reduced or eliminated Plains leopard frogs from many areas of southeastern Colorado (Smith and Kienath 2005).

Desired conditions, objectives, and guidelines – Grasslands Plan

In the Grasslands Plan, desired conditions are described in Part 1: Vision. The desired conditions describe how Grasslands resources would look and function; they show the future direction of the ecological, economic, and social resources. The objectives are described in Part 2: Strategy. They are the steps that Grasslands managers expect to take during plan implementation to retain or move resources toward achieving desired conditions. The guidelines are described in Part 3: Design Criteria. They provide information and guidance for carrying out projects and activities to help maintain or achieve the desired conditions and objectives.

The desired conditions for the Riparian and Aquatic Ecosystem (section 1.3.2.c.) describe the habitat conditions that address maintaining the inherent ecological qualities, hydrologic functions, and wildlife habitat benefits of seeps and springs on the Grasslands. A Plan objective for this ecosystem (section 2.1.2.c.) is to rehabilitate or enhance seeps or

springs. This objective could be accomplished in ways that improve habitat for native aquatic species, including the Plains leopard frog.

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