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 2005 evaluation report of the same name.

Introduction

To meet requirements described below, this report lists and describes the wildlife species-of-concern and species-of-interest for the draft Cimarron and Comanche National 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 2005 National Forest Systems Land Management Planning Rule[1] (2005 Planning Rule), and the first stand-alone plan for the Cimarron and Comanche National Grasslands. (Grasslands)

Under the 2005 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 2005 state: "The Responsible Official should identify federally threatened and endangered species, species-of-concern, and species-of-interest whose ranges include the plan area[2], taking into account limitations that exist at the edge of a species' range" (FSH 1909.12, 43.22).

The Existing Conditions Description: Fisheries report[3] (USDA FS 2005) prepared for the development of the Grasslands Plan provides a species-specific summary of current conditions for wildlife species in the Planning area[4] that are of interest for conservation or monitoring objectives. Because it is not feasible to track all native and non-native 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 et al. 2003); and
3. Species listed as Management Indicator Species (MIS) for the Grasslands based on the MIS Amendment 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; USDA FS 2005; Ryke and Wagner 2002).

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[1] U.S. Department of Agriculture, Forest Service. 2005 National Forest System Land Management Planning, Final Rule (2005 Planning Rule). 36 CFR 219; FR 70(3): 1023-1061.

[2] A document or set of documents that integrates and displays information relevant to managing a unit of the National Forest System. 36 CFR 219.16, p. 1061.

[3] U.S. Department of Agriculture, Forest Service. 2005b. Existing conditions descriptions: Wildlife. Unpublished paper on file at: Pike and San Isabel National Forests and Cimarron and Comanche National Grasslands Supervisor's Office, Pueblo, CO. All Plan-related reports and evaluations are available at http://www.fs.fed.us/r2/psicc/projects/forest_revision/evaluations.shtml [Accessed 15 August 2006]

[4] The area of the Grasslands that includes Forest Service-administered lands described as the Plan Area and all other adjacent lands, including private and state-owned and state-managed lands.

The Existing Conditions Description: Wildlife report provided a starting point for developing the species-of-concern and species-of-interest lists, but additional criteria and species were also considered based on the new planning directives developed for the 2005 Planning Rule.

Species-of-Concern

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

1. Species listed as candidate and proposed species under the ESA.
2. Species with ranks of G-1 through G3 on the NatureServe ranking system.
3. Infraspecific (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).

Six terrestrial vertebrate species have been identified as species-of-concern for the Grasslands because they occur within the Planning Area and meet one or more of the five criteria: lesser prairie chicken, mountain plover, black-tailed prairie dog, swift fox, massasauga rattlesnake, and the triploid Colorado checkered whiptail. These six species are evaluated below in further detail to provide the information outlined in FSH 1909.12, 43.23. For each species, we also provide an explanation of Plan components that provide for the species habitat needs.

Black-Tailed Prairie Dog

Species evaluation

Black-tailed prairie dogs are 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 et al. 1999, Kotliar 2000, Kretzer and Cully 2001). On the Grasslands, black-tailed prairie dog occur primarily in the shortgrass prairie ecological area. The black-tailed prairie dog is a highly social ground-dwelling squirrel that lives in towns or colonies covering from one 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 occurred in Arizona, Colorado, Kansas, Montana, Nebraska, New Mexico, North Dakota, Oklahoma, South Dakota, Texas and Wyoming (Virchow and Hyngstrom 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 USFWS completed the status review, and concluded that the species 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 within the foreseeable future and no longer meets the Endangered Species Act 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 have been 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, 2004). All occupied prairie dog colonies were inventoried on both Grasslands 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 and the Carrizo Unit of the Comanche; Table 2), likely representing a recovery from plague outbreaks in the mid-1990s (Cully and Johnson 2002, 2004). However, colony acreage on the Timpas Unit of the Comanche has remained low over the past six years (Table 2).

Table 2. Acreage of Occupied Black-Tailed Prairie Dog Colonies on the Cimarron and Comanche National Grasslands, 1999 – 2004

	Comanche				Cimarron
	Carizzo	Timpas	Total		Total
1999	1894	36	1930		1697
2001	3851	362	4213		2446
2002	5127	575	5702		3321
2003	6064	556	6620		4006
2004	11592	536	12128		5634

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 Comanche and Cimarron 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 black-tailed prairie dog 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 (such as due to low grazing pressure or lack of fire) may currently limit black-tailed prairie dog occupancy. Potential black-tailed prairie dog habitat therefore 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 occurs primarily north of the Cimarron River. On the Carrizo Unit of the Comanche, potential black-tailed prairie dog habitat is widely distributed across all three grazing associations, but is extensively mingled with private lands. Potential habitat also occurs throughout much of the Timpas Unit, except in the southern canyonlands.

Low potential black-tailed prairie dog habitat on the Grasslands represents areas where soils, 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 *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 represents areas where soils, 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 occur in potential habitat,

while minimal colony acreage occurs 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 Potential, Low Potential, and Unsuitable Black-Tailed Prairie Dog Habitat on the Comanche and Cimarron National Grasslands, with Acreage of Occupied Colonies in 2002 Occurring in Each Habitat Class

	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).

Plan components that contribute to supporting self-sustaining populations

Three components of the Plan's Desired Conditions for the shortgrass prairie ecosystem contribute to supporting self-sustaining populations of the black-tailed prairie dog. First, the desired condition of consolidated NFS lands within the Plan Area (see the Land Administration section) will provide for larger, contiguous blocks of prairie dog habitat and minimize unwanted colonization onto adjoining private lands. Second, the desired conditions state that "Widespread and interacting disturbances influencing vegetation mosaics in this ecosystem would include grazing by black-tailed prairie dogs (a species-of-concern), grazing by livestock, and fire." The maintenance of widespread prairie dog colonies is therefore an explicit desired condition in the shortgrass prairie; livestock grazing and fires (both prescribed and wild) will further contribute to vegetation heights that allow for the persistence of prairie dog populations. Second, the desired conditions provide for the

targeted use of grazing and fire to improve habitat for prairie dogs if populations decline to low levels, and include a detailed definition of potential habitat in Appendix F.

In addition, several objectives and guidelines provide more specific contributions to sustainable black-tailed prairie dog populations. Both the objective to maintain a minimum average of 1% of the shortgrass prairie burned each year (Shortgrass Prairie Ecosystem, Fire Use Objectives) and the objective to graze livestock in areas that have been recently burned (Shortgrass Prairie Ecosystem, Livestock Administration Grazing Objectives) can contribute to prairie dog habitat. Additional objectives provide for assisting the states in maintaining at least one large prairie dog colony complex, encouraging consolidation of ownership in black-tailed prairie dog habitat, and implementing new methods to mitigate the effects of plague (Shortgrass Prairie Ecosystem, Wildlife and Rare Plant Objectives).

Lesser Prairie Chicken

Species evaluation

The lesser prairie chicken (*Tympanuchus pallidicinctus*) breeds in Texas, New Mexico, Oklahoma, Kansas, and Colorado. The occupied range of the lesser prairie chicken is estimated to have decreased 92% from its original range in the late 1800s, due to 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 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 Endangered Species Act. The global ranking for lesser prairie chicken by NatureServe is G3, with a state rank of S2 in both Kansas and Colorado. Details concerning the species' natural history and conservation threats are summarized by Mote, et al. (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 occur south of the Cimarron River on the Cimarron National Grasslands (Cimarron) and in the southeastern portions of the Comanche National Grasslands (Comanche). Surveys conducted on the Cimarron during 1988 – 1997 identified 44 leks (locations where males congregate during the breeding season) and indicate that all National Forest System (NFS) land south of the Cimarron River (64,387 acres total, of which 61,638 acres is sandsage prairie) is occupied by lesser prairie chicken. Suitable habitat for lesser prairie chicken is not present 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 mi^2 (61.9 km^2), 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 1). 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 (*Artemisia filifolia)* and mid-grass prairie.

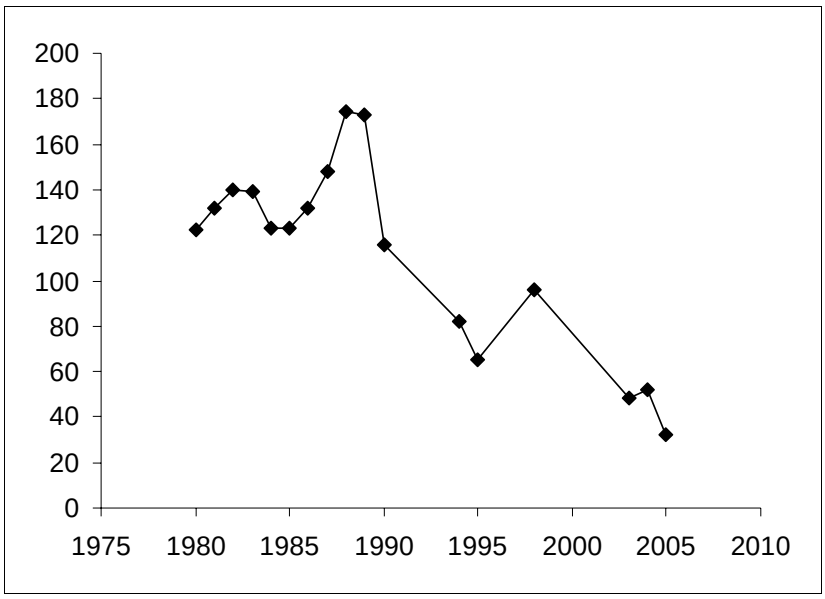
Lesser prairie chicken use several different types of habitat during the year, which corresponds to different stages in their reproductive cycle. During the mating season, males congregate in areas termed leks. Lesser prairie chicken leks are typically on elevated, open areas where vegetation is short, visibility is good, and calls (gobbling) can be heard for long distances. After mating on leks, hens select a nest site to lay and incubate the eggs, usually within a mile of the lek, but occasionally up to 2 or more miles distant. 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 et al. 2002). Adequate vegetative cover to provide suitable nesting habitat can be a major limiting factor for lesser prairie chicken populations (Mote et al. 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 Appendix J.

Table 1. Acres of Sand-Sage Prairie and Other Habitat (Summarized by Range Site) within the Estimated Occupied Range of lesser prairie chickens on the Comanche and Cimarron National 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

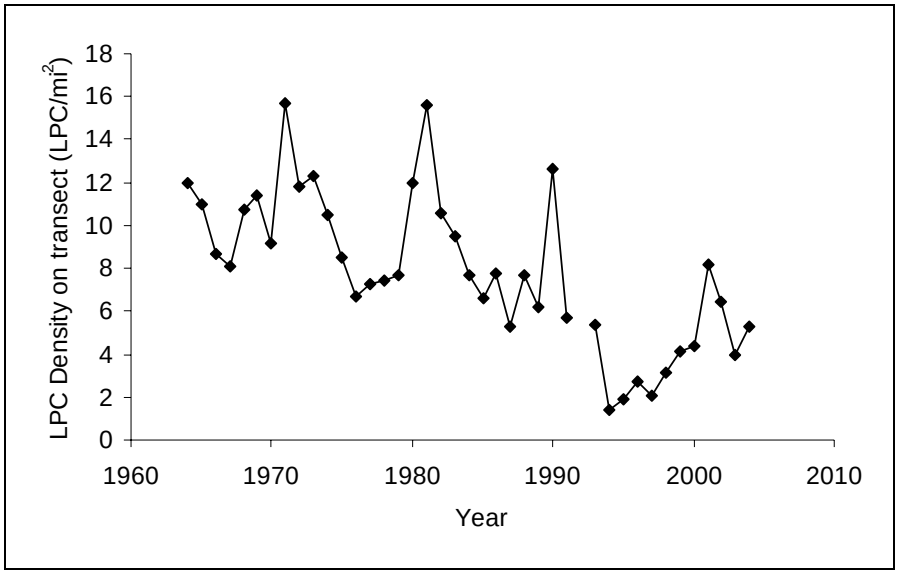
On the Comanche, lek censuses conducted during 1980 – 2005 show a sharp decline in the population after 1989 (Figure 1). The total lesser prairie chicken population estimate on the Comanche was highest in 1988 with 348 birds and the lowest in 2005 with 64 birds. The total population estimate in 2005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

Figure 1. Total number of male lesser prairie chickens counted via lek censuses on the Comanche during 1980 – 2004



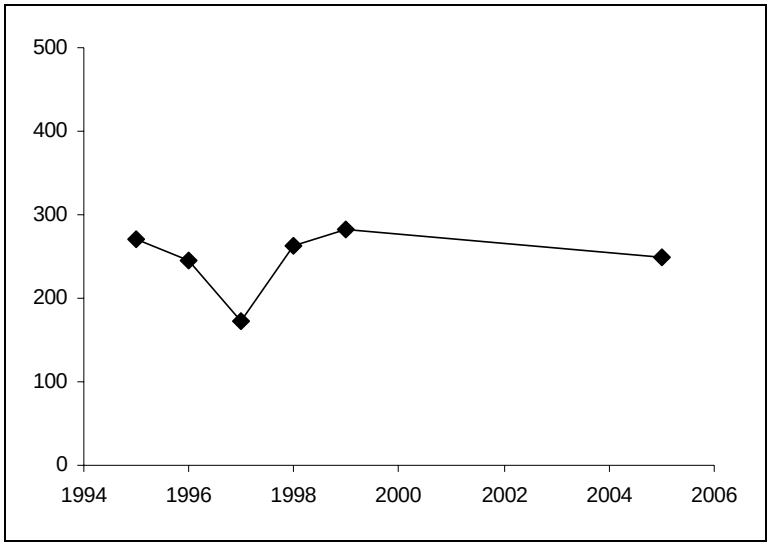
On the Cimarron, counts conducted along the Kansas Parks and Wildlife (KDWP) lesser prairie chicken survey route showed a decline from a mean of 10.1 birds/mi^2 during the first 15 years of the survey (1964-1978) to an average of only 4.9 birds/mi^2 over the past 15 years (1989-2004). However, the KDWP surveys also indicate the population has been recovering in recent years (Figure 2; 1993 – 2004).

Figure 2. Long-term trend in number of lesser prairie chicken counted along the KDPW 10-mile long survey route on the Cimarron (expressed as lesser prairie chicken/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 chicken 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 – 283 lesser prairie chicken (1.8 – 2.9 birds/mi^2; 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.

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 chicken (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 sandsage 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, et al. 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 (Rogers 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 to "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, et al. 2002).

Recent studies in Oklahoma found that where fencing constructed for livestock management occurs 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 et al. 2003; Patten et al. 2005). They concluded that within their study area, collisions with fences are a major mortality factor, 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, et al. 2003, page 18; Patten et al. 2004).

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

The loss of habitat to agriculture does not affect lesser prairie chicken on National Forest System lands, but is ongoing within the Planning Area. Land exchanges that seek to 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, implementation of vegetation management practices that increase cover of forbs on CRP lands within the Planning Area may help mitigate the loss of sandsage prairie to cropland (Bidwell et al. 2002). Recent studies found that declining lesser prairie chicken populations were associated with landscapes with a high rate of change in land uses and that contained $\geq$10% cropland, while stable populations occurred in landscapes with <5% cropland (Fuhlendorf, et al. 2002; Woodward, et al. 2001). These analyses also emphasized the importance of contiguous shrublands within 4.8 km of leks for stable lesser prairie chicken populations (Woodward et al. 2001).

Because habitat for this species is affected by Forest Service management activities, the species has undergone a major rangewide decline, and 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).

Plan components that contribute to supporting self-sustaining populations

Four components of the Desired Conditions in the Plan contribute to supporting self-sustaining populations of the lesser prairie chicken. First, the desired condition of consolidated National Forest System lands within the Plan Area (see Land Administration section) will improve habitat for lesser prairie chicken in the sandsage prairie ecosystem by increasing the size of contiguous blocks of habitat available to lesser prairie chicken. This should 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, et al. 2002, Woodward, et al. 2001). Second, the desired conditions outlined for the Sandsage Prairie Ecosystem emphasize 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 described in the Plan, contributes to 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). Third, the desired conditions for the Sandsage Prairie Ecosystem include "spatial variability in livestock grazing timing and intensity, (ranging from areas that are intensively grazed to areas that are ungrazed for one or more years), and prescribed fire and naturally-occurring wildfire as a component of the disturbance regime." 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). Fourth, and perhaps most important for the long-term sustainability of lesser prairie chicken populations, the desired conditions for the Sandsage Prairie Ecosystem specifically call for the provision of quality habitat for lesser prairie chicken, and provide a detailed definition of quality habitat in Appendix E.

Several objectives in the Strategy section of the Plan provide more detail on how management of the Grasslands will maintain or improve lesser prairie chicken habitat. First, achieving the specific objectives for land adjustment proposals and reducing total Grassland boundary length (Land Administration, Objectives Common to All Ecosystems) can consolidate lesser prairie chicken habitat and thereby improve habitat configuration at the landscape scale. Second, the vegetative objective (Sandsage Prairie Ecosystem, Vegetation Objectives) that the abundance of side-oats grama, blue grama, and purple three-awn would be decreased, and that the abundance of tall-structure grasses, such as sand lovegrass, sand bluestem, big bluestem, and little bluestem, would increase will contribute to improved nesting cover for lesser prairie chicken. Third, the vegetative objectives for vertical height structure (Sandsage Prairie Ecosystem, Vegetation Structure Objectives) were based on nesting habitat needs for lesser prairie-chickens (Giesen 1988, 1994, Mote et al. 1999, Elson 2000). Finally, the objective to use prescribed fire to manipulate livestock grazing distribution (Livestock grazing administration, objective) will contribute to greater vegetative heterogeneity within allotments in a manner that provides both nesting and brood-rearing habitat for the lesser prairie-chicken.

Finally, several objectives (Strategy) and guidelines (Design Criteria) in the Plan have been included to reduce or minimize factors that contribute to lesser prairie chicken mortality or displacement from habitat. First, the objective to reduce total length of barbed wire fencing on the Comanche (Objectives Common to All Economic and Social Resources) will 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 et al. 2005).

Second, the objective to remove trees and tree clusters in sandsage prairie that may attract lesser prairie chicken predators could reduce lesser prairie chicken mortality rates. Finally, to minimize nest loss and abandonment of habitat, the Plan includes guidelines that address mowing, ground-disturbing activities, and the construction of structures/facilities in lesser prairie chicken habitat (Sand-2, Sand-3 and Sand-4).

Massasauga Rattlesnake

Species evaluation

The massasauga (*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: the eastern massasauga (*S. c. catenatus*), which is distributed from New York to Missouri and is currently a candidate for listing under the Endangered Species Act; the western massasauga (*S. c. tergeminous*); and the desert subspecies (*S. c. edwardsii*). On the Cimarron, there are no known occurrences of the massasauga rattlesnake (Collins and Collins 1991). The population of massasagua in Colorado, which includes documented occurrences on the Comanche, is disjunct from other populations in neighboring states. Morphological and habitat data indicate that massasaugas in Colorado are the desert subspecies (*S. c. edwardsii*; Hobert 1997; Mackessy 1998). 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 on the east-central plains, with the core of the population occurring in Lincoln County, and lower-density populations occurring in Otero and Baca Counties (Mackessy 2005). The species is primarily nocturnal, with juveniles feeding on lizards and adults feeding 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 ha (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. Primary threats to the species are the loss and degradation of native grassland habitat due to urbanization, farming, livestock overgrazing, and drawdown of the water table (Mackessy 2005).

Plan components that contribute to supporting self-sustaining populations

The Region 2 evaluation of the massasaugua for inclusion on the Regional Forester's Sensitive Species list (USDA FS 2005) noted the following. First, 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 significant losses of habitat in Colorado and western Kansas, and may be the cause of apparent isolation of the Colorado population. Specific threats 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. Because 1) conversion of prairie habitat to agricultural uses is not occurring on the Grasslands, 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), plan components have not been identified to address massasaugua habitat management at the species level. The Plan's desired conditions, objectives and guidelines for the Shortgrass prairie and Canyonland Ecosystems all contribute to sustaining habitat for the massasaugua rattlesnake.

Mountain Plover

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 in small, scattered populations (Knopf 1996). Due to widespread population declines of this species (Sauer, et al. 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, it breeds locally on shortgrass prairie and agricultural land in the western part of the state. The highest known densities of breeding plovers occur 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.

As summarized by Dinsmore (2003), mountain plovers historically nested in shortgrass prairie experiencing frequent disturbance by fire and primary grazers such as prairie dogs and bison. Constriction of the breeding distribution has resulted from 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, which consists of 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 due to relatively high (>2 inch or 5 cm) grass cover, and 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, and 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 Geisen 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 prescribed burns can contribute to improved population viability. Intensive grazing by cattle following 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/midgrass allotments with potential habitat for mountain plovers, covering approximately 4,000 acres. At least 28 plover 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 will require a combination of prairie dog conservation, the use of proactive management strategies combining 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 vs. managed shortgrass prairie is needed.

Because habitat for this species is affected by Forest Service management activities, the species has undergone a major rangewide decline, and 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).

Plan components that contribute to supporting self-sustaining populations

Two components of the Plan's Desired Conditions for the shortgrass prairie ecosystem contribute to supporting self-sustaining populations of the mountain plover. First, the desired conditions state that "Widespread and interacting disturbances influencing vegetation mosaics in this ecosystem would include grazing by black-tailed prairie dogs (a species-of-concern), grazing by 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 National Grassland has successfully provided mountain plover nesting habitat (Svingen and Giesen 1999). Second, the desired conditions for the shortgrass prairie ecosystem specifically call for the provision of sufficient areas of sparse, low-structure vegetation conditions needed for mountain plover nesting, and define those conditions in detail in Appendix F.

In addition, several objectives and guidelines in the Plan provide more specific contributions to sustainable mountain plover populations. First, the objective to maintain a minimum average of 1% of the shortgrass prairie burned each year (Shortgrass Prairie Ecosystem, Fire Use Objectives) will directly provide mountain plover nesting habitat. Second, the objective to graze livestock in areas that have been recently burned will further improve mountain plover nesting habitat (Shortgrass Prairie Ecosystem, Livestock Administration Grazing Objectives). Third, the objectives contributing to the maintanance of black-tailed prairie dog populations (Shortgrass Prairie Ecosystem, Wildlife and Rare Plant Objectives) will also provide for mountain plover habitat. In addition, the Plan acknowledges that for long-term mountain plover population sustainability, greater emphasis will need to be placed on prescribed burning and livestock grazing in years when prairie dog colonies have been reduced in extent by plague (Appendix F). Finally, the Plan provides guidelines that ground-disturbing acitivites should not occur within ¼ mile of plover nests during April 10 – July 10 (Short-1), and that mowing and other mechanical treatments should not occur in plover habitat during March 15 – July 15 (Short-2).

Swift Fox

Species evaluation

The swift fox (*Vulpes velox*) is endemic to short and mid-grass prairies of the Great Plains of North America. 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, et al. 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, et al. 1998). Records from the Colorado Natural Heritage Program (CNHP 2003) show five swift fox occurrences on the Timpas Unit and three occurrences on the Carrizo Unit of the Comanche. 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, and 3) vehicle-caused mortality (Stephens and Anderson 2005). Swift foxes in fragmented prairie landscapes rely almost exclusively on shortgrass prairie habitat (Kamler, et al. 2003a). Available habitat for swift foxes within the Planning Area is, therefore, likely to be congruent with the area identified as 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, et al. 2003b, Stephens and Anderson 2005).

Because habitat for the swift fox is affected by Forest Service management activities, the species has undergone a major rangewide decline, and 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).

Plan components that contribute to supporting self-sustaining populations

Several aspects of the Plan's desired conditions contribute to habitat needed to maintain self-sustaining populations of the swift fox. First, 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 et al. 2005). Achieving the desired conditions outlined in the Land Administration section of the Plan will reduce land ownership fragmentation within the Planning Area, and contribute to the restoration of expansive shortgrass prairie upon which swift fox depend. Second, 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). Therefore, the combination of: 1) achieving the desired habitat conditions described in the Plan and discussed above for mountain plovers, 2) plan provisions for maintaining prairie dog colonies as a component of the shortgrass prairie ecosystem, and 3) maintaining variable livestock grazing intensities in combination with fires as disturbance processes within the shortgrass prairie will all provide for the habitat needs of the swift fox. In addition, a guideline in the Plan outlines how localized ground-disturbing activities should be modified in their timing if they occur near a swift fox den.

Triploid Colorado Checkered Whiptail

Species evaluation

The triploid Colorado checkered whiptail (*Aspidoscelis neotesselata*, a.k.a. *Cnemidophorus neotesselatus*) is a unique Colorado endemic, 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 hypridized with a six-lined racerunner (*C. sexlineatus*), which led to the current population of individuals which have three complete sets of chromosomes (Walker et al. 1997). NatureServe ranks Colorado checkered whiptail as G2Q, with a rounded rank of G2. Since it is an all-female species, taxonomy is complex, therefore 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 et al. 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, *Cnemidophorus tesselatus* 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.

Plan components that contribute to supporting self-sustaining populations

In screening species to be included on the species-of-concern list, FSH 1909.12, 43.33c states: "Identify species that will not be considered further in the planning process because they are secure in the plan area or they are species over which Forest Service management would have no influence in the plan area." On the Comanche, management activities within the Canyonland areas on the Timpas Unit are not expected to have any negative impact on

this species' habitat. Because the species 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, Plan components have not been identified to address whiptail habitat management at the species level. The Plan's desired conditions, objectives and guidelines for the Canyonland Ecosystem all contribute to sustaining habitat for the triploid Colorado checkered whiptail.

Species-of-Interest

Species-of-interest are defined as 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). The Planning Directives identified six potential sources of species to be considered for the species-of-interest list. The first five sources were all evaluated during the development of the Regional Forester's Sensitive Species List for Region 2 of the Forest Service (USDA Forest Service, Rocky Mountain Region 2003), and the sixth source is species that are hunted or fished, and species of public interest including invasive species (FSH 1909.12, 43.22c). 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.

Table 1. Species on the Regional Forester's Sensitive Species (RFSS) list with the potential to occur on the Grasslands (excluding species already included on the species-of-concern list). These species were evaluated in terms of current population trends, the role that the Grasslands play in providing habitat, and potential effects of Forest Service management activities on habitat.

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 were the species could reproduce exist on the Grasslands?
BIRDS				
American bittern	*Botaurus lentiginosus*	Migration	Migration	No
American peregrine falcon	*Falco peregrinus anatum*	Migration	Migration	No
American three-toed woodpecker	*Picoides dorsalis*	Accidental	No (Accidental)	
Black tern	*Chlidonias niger*	Migration	Migration	No
Brewer's sparrow	*Spizella breweri*	Breeding	Edge of range	Edge of range
Burrowing owl	*Athene cunicularia*	Breeding	Yes	Yes
Cassin's sparrow	*Aimophila cassinii*	Breeding	Yes	Yes
Chestnut-collared longspur	*Calcarius ornatus*	Winter	Winter/Migration	No
Ferruginous hawk	*Buteo regalis*	Year-round	Yes	Yes
Grasshopper sparrow	*Ammodramus savannarum*	Breeding	Yes	Yes
Lewis' woodpecker	*Melanerpes lewis*	Year-round	Yes	Yes
Loggerhead shrike	*Lanius ludovicianus*	Breeding	Yes	Yes
Long-billed	*Numenius*	Breeding	Yes	Yes

curlew	*americanus*			
McCown's longspur	*Calcarius mccownii*	Winter	Winter/Migration	No
Northern goshawk	*Accipiter gentilis*	Winter	Winter	No
Northern harrier	*Circus cyaneus*	Year-round	Yes	Yes
Olive-sided flycatcher	*Contopus borealis*	Migration	Migration	No
Purple martin	*Progne subis*	Accidental	No (Accidental)	No
Sage Sparrow	*Amphispiza belli*	Winter/ Accidental	Winter	No
Short-eared owl	*Asio flammeus*	Winter	Winter	No
Yellow-billed cuckoo	*Coccyzus americanus*	Breeding	Yes	Yes
MAMMALS				
Common hog-nosed skunk	*Conepatus leuconotus*	Year-round	Edge of range	Edge of range
Fringed myotis	*Myotis thysanodes*	Year-round	Edge of range	Edge of range
Townsend's big-eared bat	*Plecotus townsendii townsendii*	Year-round	Edge of range	Edge of range
REPTILES AND AMPHIBIANS				
Plains leopard frog	*Rana blairi*	Year-round	Yes	Yes

Table 1. Hunted, fished and invasive species of public interest considered for the Species-of-interest list.

BIRDS		**Seasonal presence on Grasslands**
Northern bobwhite	*Colinus virginianus*	Year-round
Scaled quail	*Callipepla squamata*	Year-round
Wild turkey	*Meleagris gallopavo*	Year-round
MAMMALS		
Elk	*Cervus elaphus*	Year-round
Pronghorn	*Antilocapra americana*	Year-round

Species considered but not included on the Species-of-Interest list

The American bittern, American peregrine falcon, black tern, and olive-sided flycatcher may occasionally occur on the Grasslands during migration, but are not present during the breeding season or winter (Gibbs et al. 1992, White et al. 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 2004, Wiggins 2005c).

Chestnut-collared longspurs may occur from fall through spring on Grasslands, but migrate to the northern Great Plains during the breeding season (Hanni et al. 2003, Sedgwick 2004, Hanni et al. 2005). Normal occurrence dates on the Grasslands range from late September to late April (Cable et al. 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 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 US and the species only occasionally occur in the planning area during winter, they are not included on the species-of-interest list.

Northern goshawks primarily occur 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 NG is within the winter range of the goshawk (Kennedy 2003), and the species is listed as an accidental on the Cimarron NG (Cable et al. 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 2006). The species primarily winters in the southwestern US (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 2005). The species is listed as an accidental on the Cimarron NG (Cable et al. 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 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 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 is reportedly a common bat species at lower and intermediate elevations throughout the mid-west, including oak, pinon-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 NG did not find these species (see Wildlife Specialist Report). 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 occurs in rocky canyon country in pinon-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 1920's (Fitzgerald et al. 1994) with one occurrence in extreme southwestern Baca County. However, 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.

Species evaluated and included on the Species-of-Interest List

Birds

Brewer's sparrow

Species evaluation

Brewer's sparrow typically breeds in arid brushland and thickets at higher elevations throughout the western U.S. (Rotenberry et al. 1999). Plant communities where the species breeds typically have average canopy height < 1.5m (Rotenberry et al. 1999). The species

has a scattered breeding distribution on the eastern plains of Colorado (Hanni et al. 2003) and is a rare summer resident on the Cimarron NG (Cable et al. 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 NG, the species was recorded in sand-sage 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 NG in 2001 and 2002 (Hanni et al. 2003). A more intensive survey of the entire Planning Area in 2003 only documented this species in 5 sections on the extreme western portion of the Comanche's Carrizo Unit, near the base of Mesa de Maya (Hanni and McLachlan 2004).

Plan components that provide for Brewer's sparrow populations on the Grasslands

The Plan provides for the habitat needs of the Brewer's sparrow through the desired conditions and vegetative objectives for the Sandsage and Shortgrass Prairie Ecosystems, both of which include objectives for tall-structure vegetation. The Plan also provides for the habitat needs of Brewer's sparrow a guideline that prevents mowing and mechanical activities during the nesting season, and through a guideline that prevents ground-disturbing activities (e.g. pipeline construction, oil and gas development) in portions of the sandsage prairie ecosystem during nesting season.

Burrowing owl

Species evaluation

Burrowing owls are widely distributed in western North America (Klute et al. 2003). In eastern Colorado and western Kansas, the species is widespread but occurs in isolated populations. Burrowing owls typically inhabit dry grasslands, particularly shortgrass prairie, and are intimately associated with prairie dogs because 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 Plans of the US and in Canada (Klute et al. 2003). Declines in burrowing owl populations are closely associated with declines in active BTPD colonies (Desmond et al. 2000). Surveys conducted on the Comanche and Cimarron National Grasslands found that burrowing owls occupy and reproduce successfully in nearly 100% of the active BTPD colonies, and that the owls migrate out of the Grasslands during November – February each year (Wickman et al. 2000). Primary threats to burrowing owl populations are habitat loss to agriculture on private land and loss of black-tailed prairie dog colonies; secondary threats include habitat fragmentation, predation, illegal shooting, pesticides and other contaminants (Klute et al. 2003).

Plan components that provide for burrowing owl populations on the Grasslands

The Plan provides for the habitat needs of burrowing owls through its provisions for the black-tailed prairie dog, upon which burrowing owls in the southern Great Plains are highly dependent. For a detailed discussion of Plan components concerning black-tailed prairie dogs, see the Species-of-Concern section.

Cassin's sparrow

Species evaluation

This sparrow 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 US during 1966 – 1994 (Sauer et al. 1995). In Colorado, Cassin's sparrow populations declined during 1966 – 1979, but recovered during 1980 – 1994 (Sauer et al. 1995). In eastern Colorado, breeding populations primarily occur in the southern half of the state, especially within and around the Comanche NG (Hanni et al. 2003). The species is also widespread on the Cimarron NG, with greatest abundance in sandsage prairie. Although numbers have fluctuated between years, long-term population trend on the Cimarron NG 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), and the Planning Area is one of the most important breeding areas for Cassin's sparrow in the United States (Sauer et al. 1995). Primary threats to the species are habitat loss to agriculture on private land and rangeland management practices that reduce or eliminate the woody shrub component of grasslands.

Plan components that provide for Cassin's sparrow populations on the Grasslands

Cassin's sparrow are closely associated with sandsage prairie. All of the Plan components that provide for the habitat needs of the lesser prairie-chicken within the Sandsage Prairie Ecosystem (see the Species-of-Concern section) also provide for the habitat needs of Cassin's sparrow. In particular, the desired conditions to maintain a shrub-grass mosaic in sandsage prairie, vegetative objectives 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 Cassin's sparrow a guideline that prevents mowing activities during the nesting season, and through a guideline that prevents ground-disturbing activities (e.g. pipeline construction, oil and gas development) in portions of the sandsage prairie ecosystem during nesting season.

Ferruginous hawk

Species evaluation

The ferruginous hawk (*Buteo regalis*) occurs 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, et al. 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, et al. 2003). The Global Ranking by NatureServe is G4, with a state rank 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, Oklahoma, New Mexico and Nebraska (BCR 18) and by the Cimarron and Comanche National 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 et al. 2005). In southwestern Kansas, one pair of ferruginous hawks typically nested in Morton County between 1978 and 1996 (Cable, et al. 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 survey effort has been relatively consistent (Table 1). 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 USFS staff suggest that densities of wintering ferruginous hawks on the Grasslands may be even 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 1. Number of Known Successful Ferruginous Hawk Nests within the Eastern Three-Quarters of the Carrizo Unit on the Comanche, 1977 – 2004 (private land nests are excluded from totals)

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

Average nest productivity (chicks/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.

In addition to nest site availability, 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, et al. 2001). In shortgrass and sandsage prairie, important prey items include 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.

Plan components that provide for ferruginous hawk populations on the Grasslands

Two key factors affecting ferruginous hawks within the Plan Area are the availability of nest sites, and the availability of prey. Plan provisions for the black-tailed prairie dog, which is an important prey source for ferruginous hawks, particularly during the winter, are discussed under species-of-concern. The Plan also provides an objective (Objectives Common to All Ecosystems) that the availability of structures (trees and artificial platforms) that serve as potential ferruginous hawk nest sites will be maintained at current levels. This objective 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 a guideline to prevent human-caused disturbances within 0.5 miles of active ferruginous hawk nests when they may negatively affect nesting success. Collectively, these Plan components contribute to maintaining the stable ferruginous hawk population that currently occurs on the Grasslands.

Grasshopper sparrow

Species evaluation

Grasshopper sparrows 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 US (Sauer, et al. 2003). The 2004 section-based survey of the Planning Area (Hanni et al 2005) documented the species in three sections on the Timpas Unit and seven sections on the Carrizo Unit of the Comanche.

Plan components that provide for grasshopper sparrow populations on the Grasslands

Grasshopper sparrows are closely associated with sandsage prairie and with areas of the shortgrass prairie containing tall-structure vegetation. All of the Plan components that provide for the habitat needs of the lesser prairie-chicken within the Sandsage Prairie Ecosystem (see the Species-of-Concern section) also provide for the habitat needs of the grasshopper sparrow. In particular, the desired conditions to maintain a shrub-grass mosaic in sandsage prairie, vegetative objectives 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. In addition, the desired conditions and vegetative objectives to maintain a tall-structure component within the Shortgrass Prairie Ecosystem would maintain habitat for the grasshopper sparrow. The Plan also provides for the habitat needs of grasshopper sparrows through a guideline that prevents mowing and mechanical activities during the nesting season, and a guideline that prevents ground-disturbing activities (e.g. pipeline construction, oil and gas development) in portions of the sandsage prairie ecosystem during nesting season.

Lewis' woodpecker

Species evaluation

Lewis's woodpecker is a locally common but patchily distributed woodpecker species usually seen in open forests of western North America (Abele et al. 2004). The species distribution closely resembles that of ponderosa pine in the western US. In the Rocky Mountain Region, 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 occur more often along the edges of riparian woodlands or in trees in agricultural settings (i.e. 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 et al. 1971). Potential habitat for the Lewis' woodpecker occurs within the Canyonland Ecosystem on the Comanche NG. Despite this species' association with large-diameter cottonwoods, the Lewis' woodpecker breeding range does not extend to the Cimarron NG (Abele et al. 2004, Cable et al. 1996).

Plan Components that provide for Lewis' woodpecker populations on the Grasslands:

Plan components for the Riparian and Aquatic and the Canyonland Ecosystems provide for the habitat needs of the Lewis' woodpecker through desired conditions and vegetative objectives that call for the long-term restoration and maintenance of cottonwood populations along riparian corridors within the canyons.

Loggerhead shrike

Species evaluation

Loggerhead shrikes occur throughout most of the US, southern Canada, and northern Mexico. As summarized by Wiggins (2005a), loggerhead shrikes in Colorado and Kansas have historically been noted as common breeders statewide at lower elevations. 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 2005a).

Loggerhead shrikes breed in a wide 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 2005a). On the Comanche, small numbers of shrikes are regularly observed on the Breeding Bird Survey route near Campo, Colorado (Sauer, et al. 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 et al. 1996). Wiggins (2005a) notes that potential nest trees and shrubs in the Great Plains are likely more abundant and widespread today than they were historically.

Plan components that provide for loggerhead shrike populations on the Grasslands

Desired conditions and vegetative objectives for all four ecosystems provide for 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/nesting habitat. Desired conditions and vegetative objectives also provide for the maintenance 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.

Long-billed curlew

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 (BBS) in Kansas (Sauer, et al. 2003). Both BBS (Sauer et al. 2005) and surveys conducted by the Rocky Mountain Bird Observatory throughout the shortgrass prairie region of Colorado, Kansas, Oklahoma, Wyoming and Nebraska (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.

Within 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 located in the central portion of the Carrizo Unit on the Comanche (Hanni and McLachlan 2004, Hanni et al. 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 et al. 2005), where this species is listed as a common migrant but uncommon summer resident (Cable, et al. 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 of the observation (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 5 years.

Plan Components that provide for long-billed curlew populations on the Grasslands

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 mountain plover, swift fox and prairie dogs above) also provide for curlew nesting habitat. The Desired Conditions for the shortgrass prairie ecosystem also include the presence of taller-structure patches of grassland in the vicinity of areas managed for short structure, 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 "Ecological conditions in any given year include 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 that currently occurs on the Grasslands.

Northern bobwhite

Species evaluation

Northern bobwhite (*Colinus virginianus*) range throughout the central and eastern United States and south through eastern Mexico (Sibley 2000). Throughout much of their range,

northern bobwhite are an abundant game species. They have a Global Ranking of G5 and a State Ranking of S4 in Colorado and S5 in Kansas. Northern bobwhite typically inhabit brushlands and open woodlands. With the exception of the nesting season, they forage and roost in coveys. Nesting occurs 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 bobwhite are considered a common resident on the Cimarron (Cable et al. 1996), and occur 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 due to 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. The Forest Service receives donated funds from local Quail Unlimited chapters through co-operative agreements to accomplish habitat improvements for bobwhite and other wildlife species. This working partnership has been noted by local community leaders, and they are developing strategies to capitalize on the growing hunting popularity on the Grasslands.

Because of high public demand for northern bobwhite for hunting, 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].

Plan components that provide for northern bobwhite populations on the Grasslands

Components of the Desired Conditions for both the riparian/aquatic ecosystem and the sandsage prairie ecosystem address habitat needs for the northern bobwhite. In the riparian/aquatic ecosystem, the desired condition of self-perpetuating communities dominated by native woody riparian species, in particular the long-term maintenance 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 will all contribute to a structurally and compositionally diverse plant community, which in turn will provide both nesting and brood rearing habitat for northern bobwhite. In addition, specific objectives that provide for bobwhite habitat needs include the maintenance of food plots along the Cimarron River corridor (Riparian/Aquatic Ecosystem Objectives), acreage objectives for tamarisk control and riparian vegetation restoration (Riparian-Aquatic Ecosytem Objectives), and the provision or maintenance of gallinaceous guzzlers and native shrub plantings that provide water and habitat for bobwhite (Objectives Common to All Ecosystems).

Northern harrier

Species evaluation

The northern harrier breeds from northern Alaska and Canada, south to northern Baja California, and east to southern Texas, southern Missouri, central West Virginia, and southeastern Virginia. As summarized by Slater and Rock (2005), harrier abundance varies widely with respect to habitat, with the highest abundance of breeding birds in wet grasslands and marshes. 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 United States, south through the United Sates 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, with 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 NG is located at the southern edge of this species' breeding range. The 2003 section-based survey of the Comanche and Cimarron NGs documented northern harriers in only three of 189 sections during the breeding season, all within the east-central portion of the Carrizo Unit on the Comanche (Hanni and McLachlan 2004). The 2004 section-based survey of the Comanche and Cimarron NGs found no occurrences of this species during the breeding season (Hanni et al. 2005).

Plan components that provide for northern harrier populations on the Grasslands

Desired conditions for the Sandsage and Shortgrass Prairie Ecosystems include the maintenance 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.

Scaled quail

Species evaluation

The scaled quail (*Callipepla squamata***)** is a familiar game bird of the desert grasslands of Mexico and the southwestern United States.. The range of the scaled quail generally conforms to the Chihuahaun desest 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 CO and southwest KS, the species primarily occurs in sandsage prairie, including areas interspersed with agriculture, and often in disturbed areas having an abundance of annual forbs. The species also occurs in juniper woodlands in the Canyonland ecosystem on the Comanche. Overhead cover, such as sand sagebrush and cholla cactus, that provides shade

and protection from avian predators is key characteristic of loafing (resting) cover (Schemnitz 1994). The scaled quail is a species of interest for the due to hunting popularity and 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].

Plan components that provide for scaled quail populations on the Grasslands

Components of the Desired Conditions for the Sandsage Prairie, Canyonland and Riparian/Aquatic Ecosystems address habitat 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 will all contribute to a structurally and compositionally diverse plant community, which in turn will provide both nesting and brood rearing habitat for scaled quail. In addition, specific objectives that provide for scaled quail habitat needs include the maintenance of food plots along the Cimarron River corridor (Riparian/Aquatic Ecosystem Objectives), and the provision or maintenance of gallinaceous guzzlers and native shrub plantings that provide water and habitat for bobwhite (Objectives Common to All Ecosystems). Finally, vegetative objectives to increase the distribution and abundance of native shrubs and herbaceous species within the Canyonland bottomlands, particularly within the Picketwire Special Area, will improve habitat for scaled quail.

Wild turkey

Species evaluation

Wild turkeys were extirpated from Kansas by the 1870's, but began to recolonize the Cimarron National Grassland area from the Oklahoma panhandle by the 1950's. Planned releases of Rio Grande wild turkeys on the Cimarron NG followed in 1966 and 1988. The population expanded after releases, but apparent declines in turkeys in southwestern Kansas during the late 1990's spurred research on habitat use and population dynamics on the Cimarron during 1999 – 2004. Wild turkeys on the Cimarron primarily occur 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 et al. 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 1-2 m tall shrubs (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 primarily occur in the Picket Wire Canyonland Special Area, and in canyons within the southwestern portion of the Comanche's Carrizo Unit. These populations are primarily the Merriam's subspecies, 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 within the canyon bottomlands, and the presence of mature cottonwoods along riparian corridors for roost trees.

Because of high public demand for wild turkey hunting, 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].

Plan components that provide for wild turkey populations on the Grasslands

Components of the Desired Conditions for the Riparian/Aquatic and Canyonland Ecosystems and the Picket Wire Canyonland Special Area contribute to supporting wild turkey populations in three locations on the Grasslands: the Cimarron River Corridor, 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 turkey, and would provide for long-term maintenance of turkey roost trees (mature cottonwoods). The Plan's Strategy section includes specific acreage objectives for tamarisk control and riparian woodland restoration (Riparian/Aquatic Objectives). Additional objectives that would provide improved turkey foraging habitat include the maintenance of food plots along the Cimarron River corridor (Riparian/Aquatic Ecosystem Objective), and the restoration of native shrub and grass communities in canyon bottomlands affected by historic farming (Canyonland Ecosystem Vegetation Objectives, Canyon Bottomlands).

Yellow-billed cuckoo

Species evaluation

Yellow-billed cuckoos are common breeding birds in eastern portions of Kansas, Nebraska, and South Dakota, but they become much scarcer to the west (Wiggins 2005b). 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 loss of mature, closed-canopy riparian forests (Andrews and Righter 1992). However, only the eastern subspecies occurs on the Grasslands (Andrews and Righter 1992, Cable et al. 1996). The Comanche NG is at the western fringe of the breeding range for the eastern subspecies of yellow-billed cuckoo (Wiggins 2005b). 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 2005b).

Plan components that provide for yellow-billed cuckoo populations on the Grasslands

Plan components for the Riparian and Aquatic and the Canyonland Ecosystems provide directly for the habitat needs of the Lewis' woodpecker through desired conditions and vegetative objectives that call for the long-term restoration and maintenance 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.

Mammals

Elk

Species evaluation

Elk (*Cervus elaphus*) were widely distributed in North America at the time of European settlement, occurring 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 U.S. southwest, and most of the Great Plains during the 1800s. By 1900, the original North American population of several million elk had declined to under 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 tallgrass 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 occurred 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 et al. 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 hunter harvest in Colorado and Oklahoma.

On the Comanche, elk are present in low numbers throughout the Picket Wire Canyonlands 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. Hunter harvest 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-January). Ongoing habitat management efforts for elk on the Grasslands include tamarisk control and cottonwood/willow restoration along the Purgatoire and Cimarron 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 within 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].

Plan components that provide for elk populations on the Grasslands

Components of the Desired Conditions for the Riparian/Aquatic Ecosystem and the Picket Wire Canyonland Special Area contribute to supporting elk populations in two locations on the Grasslands: the Cimarron River Corridor and the Picket Wire Canyonlands. In both of 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 habitat for elk. The Plan's Strategy section includes specific acreage objectives for tamarisk control and riparian woodland restoration (Riparian/Aquatic Objectives). Additional objectives that would provide improved elk foraging habitat include the maintenance of food plots for elk along the Cimarron River corridor (Riparian/Aquatic Ecosystem Objective), and the restoration of native shrub and grass communities in canyon bottomlands affected by historic farming (Canyonland Ecosystem Vegetation Objectives, Canyon Bottomlands). Finally, two objective (Riparian/Aquatic Ecosystem Objective; Picket Wire Canyonlands Special Area Objectives) provide for the Grasslands to develop and implement elk habitat management strategies in collaboration with the state wildlife agencies and the Pinon Canyon Maneuver Site. Such collaboration will encourage the Grasslands and state agencies to acknowledge common as well as differing management goals on public versus private land, and to develop integrated habitat and harvest management approaches that can achieve population goals at appropriate scales.

Pronghorn

Species evaluation

Pronghorn (*Antilocapra americana*) occur 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 andYoakum 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 et al. 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 affecting pronghorn distribution include livestock fencing and water developments. Because pronghorn are adapted to flat, open 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 conducted 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 present on the Cimarron for at least the past 2 decades, but numbers were supplemented with animals transplanted from Colorado in the early 1990's. 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/mi^2.

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, hunter harvest of 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/mi^2 on the Timpas Unit and 0.36 pronghorn/mi^2 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 criteria (g), FSH 1909.12 43.22c].

Plan components that provide for pronghorn populations on the Grasslands

Four components of the Desired Conditions for the shortgrass prairie provide for the maintenance or improvement of pronghorn habitat. First, the desired condition of consolidated NFS lands within the Plan Area (see Land Administration section) will 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. Second, the desired condition of maintained or increased pasture size would minimize fragmentation of

pronghorn habitat by fencing. Third, the maintenance of fires as a disturbance in this ecosystem would improve foraging habitat, and potentially reduce pronghorn use of nearby private agricultural lands.

Several objectives and guidelines provide more specific direction for achieving desired conditions for pronghorn on the Grasslands. These include an objective to have a minimum annual average of 0.5 - 1% of this ecosystem affected by fire, and an objective to implement 10 – 40% of prescribed burns in the shortgrass prairie during the fall or winter under appropriate moisture conditions (Shortgrass prairie ecosystem, Objectives). Regrowth on fall and winter burns can provide high-quality forage for pronghorn at times when food is especially limiting, and can also reduce pronghorn use of privately-owned winter wheat fields. One guideline (Short-4) also provides direction on plant species to be included in reseeding and interseeding projects to improve winter pronghorn habitat. An objective to reduce the total length of barbed wire fencing on the Comanche (Objectives Common to all Economic and Social Resources) will contribute to larger areas of unfragmented pronghorn habitat, and a guideline for fencing design (LivGraz-1) will reduce the effects of fencing on pronghorn movement. An additional objective provides for the Grasslands to contribute to the development and implementation of pronghorn population and habitat management objectives within the relevant game management units. Such collaboration will encourage the Grasslands and state agencies to acknowledge common as well as conflicting management goals on public and private land, and to develop both habitat and harvest management approaches that can achieve population goals at appropriate scales.

Reptiles and Amphibians

Plains leopard frog

Species evaluation

Plains leopard frogs hibernate in larger 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 occur near wetland habitats throughout the Cimarron and Comanche. However, competition and consumption by bullfrogs is reported to have reduced or eliminated plains leopard frogs from many areas of SE Colorado (Smith and Kienath 2005).

Plan components that provide for plains leopard frog populations on the Grasslands

Desired conditions for the Riparian/Aquatic ecosystem include maintaining the inherent ecological qualities, hydrologic functions, and wildlife habitat benefits of seeps and springs on the Grasslands. In addition, one objective for the Riparian/Aquatic ecosystem is to rehabilitate or enhance springs that have been developed for livestock use in a manner that improves habitat for native aquatic species, including the plains leopard frog.

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