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

Introduction

Under 2005 National Forest Systems Land Management Planning Rule (2005 Rule) released in January 2005, the U.S.D.A. 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" (36 CFR 219). Forest Service Handbook Interim 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[1], taking into account limitations that exist at the edge of a species' range" (FSH 1909.12, 43.22). To meet these requirements, this document lists and describes the wildlife species-of-concern and species-of-interest for the draft Cimarron and Comanche National Grasslands (Grasslands) Land Management Plan (Plan). It also describes habitat needs for wildlife species-of-concern and species-of-interest to assess if Plan components

[1] Plan Area – The area that includes only those lands administered by the Forest Service.

provide for these identified species.

The Existing Condition Description Fisheries Specialist's Report (USDA FS 2005) prepared for the Grasslands Plan revision effort provided a species-specific summary of current conditions for wildlife species in the Planning Area[2] 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).

The Existing Condition Description Wildlife Specialist's 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 (36 CFR 219).

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 ESA. Following the recommendations described in FSH 1909.12, 43.22a, 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.

Six terrestrial vertebrate species that occur within the Planning Area meet one or more of the three criteria above: 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 (providing the type of information outlined in FSH 1909.12, 43.23), and four of the six species are recommended for the Grasslands' species-of-concern list: lesser prairie-chicken, mountain plover, black-tailed prairie dog, and swift fox.

[2] Planning Area – The area that includes Forest Service-administered lands described as the Plan Area plus all other adjacent ands, including private and state-owned and state-managed lands.

Lesser Prairie Chicken

Species evaluation and rationale for selection

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

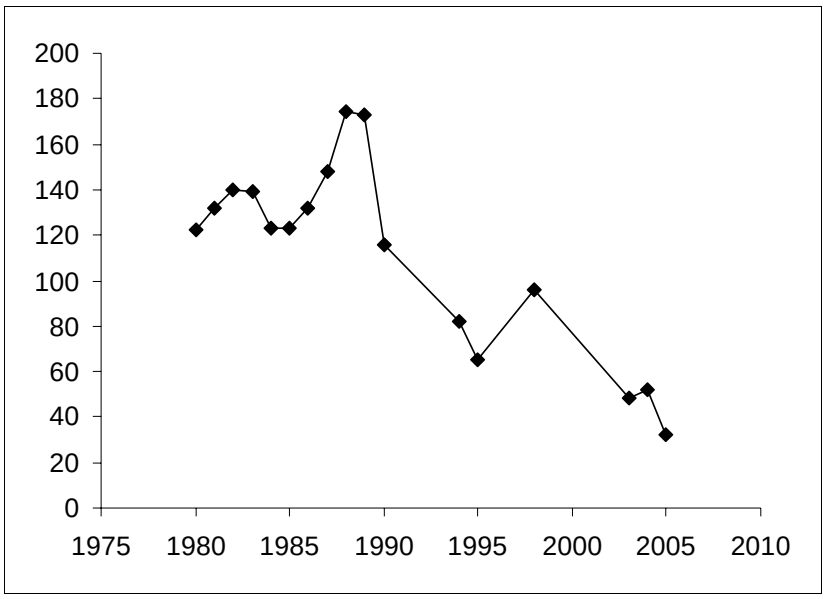
be a major limiting factor for lesser prairie chicken populations (Mote et al. 1999). Brood rearing and foraging habitat is provided by areas with a mosaic of grasses and forbs; areas that are re-growing following recent grazing or fire often produce more food (seeds and insects) than areas that are 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	CimarronAcres
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

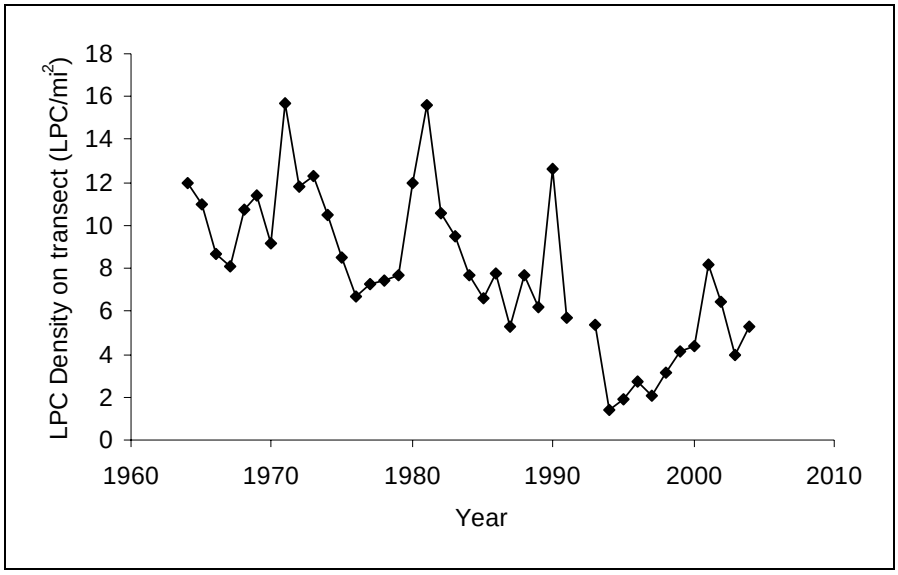
On the Comanche, lek censuses conducted during 1980 – 2005 show a sharp decline in the population after 1989 (Figure 1). The total lesser prairie chicken population estimate on the Comanche was highest in 1988 with 348 birds and the lowest in 2005 with 64 birds. The total population estimate in 2005 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 NG during 1980 – 2004



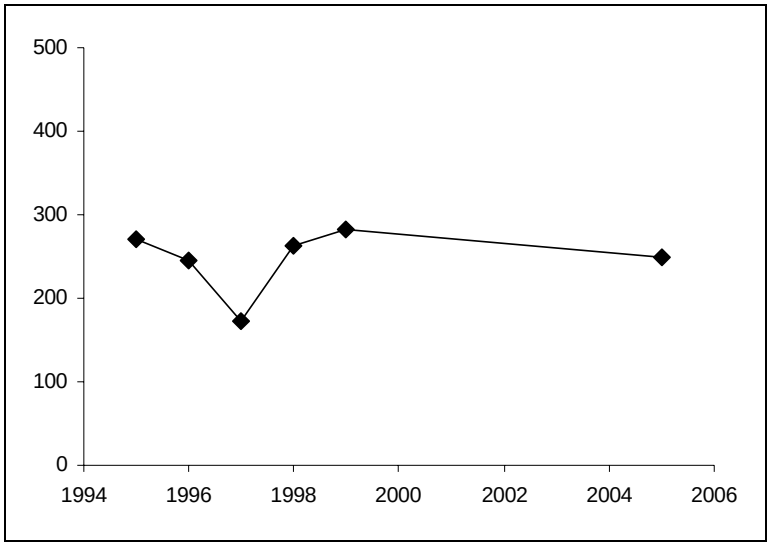
On the Cimarron, counts conducted along the Kansas Parks and Wildlife (KDWP) lesser prairie chicken survey route showed a decline from a mean of 10.1 birds/mi^2 during the first 15 years of the survey (1964-1978) to an average of only 4.9 birds/mi^2 over the past 15 years (1989-2004). However, the KDWP 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 NG (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 bunchgrasses. An increase in tall-structure vegetation, particularly the perennial bunchgrasses, 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; 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 (Sandsage Prairie Ecosystem, Wildlife and Rare Plant Objectives) 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).

Mountain Plover

Species evaluation and rationale for selection

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).

Black-Tailed Prairie Dog

Species evaluation and rationale for selection

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 NG				Cimarron NG
	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 rangewide 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, 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).

Swift Fox

Species evaluation and rationale for selection

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 (Short-3) outlines how localized ground-disturbing activities should be modified in their timing if they occur near a swift fox den.

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).

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. 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." Because 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) , the massasaugua is <u>not</u> recommended for inclusion on the species-of-concern list (see FSH 1909.12, 43.22a).

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.

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 some adaptability, the triploid Colorado checkered whiptail is not recommended for inclusion on the species-of-concern list.

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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, 43.22b). Based on the evaluations provided below, species evaluations provided in the Wildlife Specialist Report, and a consideration of species of public interest for hunting, five terrestrial vertebrate species were identified for the Grasslands' species-of-interest list: ferruginous hawk, long-billed curlew, pronghorn, elk, and northern bobwhite.

Ferruginous Hawk

Species evaluation and rationale for selection

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.

Because NatureServe ranks the ferruginous hawk as G4 globally and S2 in Kansas, the Grasslands are a key breeding area for the species, and Forest Service management activities have the potential to both positively and negatively affect specialized habitat for the ferruginous hawk, the species is recommended for inclusion on the species-of-interest list [see criteria (d) and (f), FSH 1909.12 43.22c].

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 above. 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 (Wlife-1). Collectively, these Plan components contribute to maintaining the stable ferrugionous hawk population that currently occurs on the Grasslands.

Long-Billed Curlew

Species evaluation and rationale for selection

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 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 2003, 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 2003, 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 2003; 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.

Because NatureServe ranks the species as S1 in Kansas and S2 in Colorado, the Grasslands are a key breeding area for long-billed curlews, and Forest Service management activities have the potential to both positively and negatively affect habitat for the species, the long-billed curlew is recommended for inclusion on the species-of-interest list [see criteria (d) and (f), FSH 1909.12 43.22c].

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.

Pronghorn

Species evaluation and rationale for selection

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 (Shortgrass prairie ecosystem, Fire Use 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.

Elk

Species evaluation and rationale for selection

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.

Northern Bobwhite

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).

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