

**GUNNISON'S PRAIRIE DOG**  
**Cynomys gunnisoni**



**In the Office of Endangered Species  
U.S. Fish and Wildlife Service  
United States Department of Interior**

**Petition to the U.S. Fish and Wildlife Service to  
List the Gunnison's Prairie Dog as an Endangered or Threatened Species Under the  
Endangered Species Act, 16 U.S.C. § 1531 et Seq. (1973 as amended), and to  
Designate Critical Habitat**

Primary Petitioner

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Additional Petitioners:

**Scientists & Academics**

1. Dr. Con Slobodchikoff (biologist with expertise in Gunnison's prairie dog, professor)
2. Ana Davidson (biologist with expertise in Gunnison's prairie dog)
3. Jennifer Verdolin (biologist with expertise in Gunnison's prairie dog)
4. Dr. Jean-Luc Cartron (biologist, with expertise in Gunnison's prairie dog ecosystem)
5. Dr. Paul J. Polechla Jr. (biologist, with expertise in Gunnison's prairie dog ecosystem)
6. Paula Martin (biologist)
7. Glenn Harper (biologist)
8. Dr. Wayne Bundy (geologist; president of Santa Fe Geological Society)
9. Dr. Linda Wiener (entomologist)
10. David Lamkin (retired mechanical engineering professor)
11. Dr. Charles Ervin (psychologist; animal behaviorist)
12. Greg Litus (horticulturalist)
13. Hollace L. Bristol (Ph.D. candidate in Education and Sustainability, Northern Arizona University)
14. Marcus Hamilton (Ph.D. candidate in Anthropology, University of New Mexico)

**Different Walks of Life**

*Realtors & Homebuilders*

15. Bennett Hammer (Realtor in New Mexico)
16. Tish Bogan-Ozmun (Realtor in Arizona)
17. Luella V. McGhie (Realtor in Arizona)
18. Patricia Schilling (Realtor in Arizona)
19. Lori Kuebler (Homebuilder in New Mexico)
20. Mark Bundy (Homebuilder in New Mexico)
21. Charlie Laurel (Homebuilder in Arizona)

*Religious Organizations & Individuals*

22. Jews of the Earth (Religious organization)
23. Rev. Jackie Ziegler, Unitarian Church (Religious leader)
24. Rev. Jed Schenck, Pastor, Federated Community Church, Flagstaff, Arizona (Religious leader)

*Small Business Owners, Land Owners, & Economic Development*

25. Rich Williams (New Mexico economic development professional)
26. Yvonne Boudreaux (New Mexico former oil company advisor)
27. Ed Urbanski (New Mexico former oil company engineer)
28. Sina Brush (New Mexico landowner with horses)
29. Medicine Dog Ranch (New Mexico rancher)
30. Stephanie Huerta (New Mexico artist)
31. Sharyn Davidson (New Mexico artist)
32. Jess Alford (New Mexico photographer)

*Military*

33. Sandra Kingham (New Mexico retired US Air Force Major)
34. Lynn Lucchetti (New Mexico retired US Air Force Colonel)

*Citizens*

35. Terry Flanagan (equestrian, New Mexico citizen)
36. Hunter Red Day (Arizona citizen)
37. Trudy Jura (Arizona citizen)
38. Amy Sipes (Arizona citizen)
39. Miriam Hillson (Arizona citizen)
40. Marcia Lamkin (Arizona citizen)
41. Nita Paden (Arizona citizen)
42. Jill Dederer (Arizona citizen)
43. Cindy Parker (Arizona citizen)
44. Liz Boussard (Arizona citizen)
45. Roxanne George (Arizona citizen)
46. Deborah Jensen (employee, Dept. of Environmental Services, City of Flagstaff, Arizona)
47. Susan Harris (Arizona citizen)
48. Kim Crumbo (Arizona citizen)
49. Denise Saccone (New Mexico citizen)

**Animal & Conservation Organizations**

50. Center for Native Ecosystems (Colorado conservation organization)
51. Animal Defense League of Arizona (Arizona animal protection organization)
52. People for Native Ecosystems (New Mexico conservation organization)
53. Prairie Dog Pals (New Mexico conservation organization)
54. SUWA (Utah conservation organization)
55. HSUS (national animal protection organization)
56. Habitat Harmony (Arizona conservation organization)
57. Center for Biological Diversity (national conservation organization)

58. Animal Protection Institute (national animal protection organization)
59. Rocky Mountain Animal Defense (Colorado animal protection organization)
60. Wildlands Conservation Alliance (conservation organization)
61. Great Plains Restoration Council (conservation organization)
62. Red Rock Forests (Utah conservation organization)
63. Prairie Preservation Alliance (Colorado conservation organization)
64. American Lands Alliance (national conservation organization)
65. The Fund for Animals (national animal protection organization)
66. Utah Environmental Congress (Utah conservation organization)
67. Animal Protection of New Mexico (New Mexico animal protection organization)
68. Northern Arizona Audubon Society (Arizona conservation organization)
69. Escalante Wilderness Project (Utah conservation organization)
70. Boulder Regional Group (Utah conservation organization)
71. Western Nebraska Resources Council (conservation organization)
72. T & E, Inc. (conservation organization)
73. Flagstaff Activist Network (Arizona conservation organization)

## Introduction

*“I have used all types of pellets, gasoline, fire, guns, propane, and I have a new blaster that mixes propane and oxygen and then the mixture is detonated and the concussion and fire kill them little bastards. I have declared all out war on them.”*

Private landowner in Montrose County, Colorado, in 1990.<sup>1</sup>

Forest Guardians and 73 organizations and individuals (described at Appendix A) hereby petition for a rule to list the Gunnison’s prairie dog (*Cynomys gunnisoni*) as threatened or endangered within its historic range in Arizona, Colorado, New Mexico, and Utah under the Endangered Species Act (ESA) as described in 16 U.S.C. § 1531 et seq. This petition is filed under 5 U.S.C. § 553(e), 16 U.S.C. § 1533(b)(3)(A) and 50 C.F.R. § 424.19 (1987) which give interested persons the right to petition for issuance of a rule.

Gunnison’s prairie dogs (GPDs) face a slew of threats, which are causing severe population and acreage declines. Throughout its range, the Gunnison’s prairie dog is vulnerable to catastrophic population declines and range shrinkage due to sylvatic plague, poisoning, and habitat destruction. Compounding these threats is shooting. Poisoning is not restricted by the states within the range of this species, and limitations on shooting, where they exist, are insufficient. Federal land managers are not actively conserving remaining GPD colonies. Destruction of habitat continues in urban areas from urban sprawl and in rural areas from oil and gas development.

The threats against Gunnison’s prairie dogs reverberate throughout the prairie dog ecosystem. The Gunnison’s prairie dog is a keystone species, which creates and sustains habitat for a myriad of associated wildlife, and serves as a prey base for many raptors and mammalian predators. As prairie dogs decline, so too do the birds, herptiles, carnivores, and insects, that benefit from, and in some cases require, the keystone functions performed by the Gunnison’s prairie dog.

Several authors have already noted that ESA listing for this species may be warranted (Wagner 2002; Wagner and Drickamer 2003). We agree with Wagner’s (2002: 76) sentiment that,

It is time to reject the obsolete perception of prairie dogs as vermin, to be destroyed at all costs, and accept them as important, and threatened, components of western grassland ecosystems.

This petition documents the sound scientific basis for proceeding with listing the Gunnison’s prairie dog as an Endangered or Threatened species under the ESA.

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<sup>1</sup>See Colorado Department of Agriculture (1990), at p. A-51. Montrose County contains both Gunnison’s and white-tailed prairie dogs.

## Executive Summary

Petitioners are requesting listing of the Gunnison's prairie dog under the Endangered Species Act as threatened or endangered and request the designation of critical habitat for this species. The best available information indicates population declines and range shrinkage. Across their range, acreage occupied by Gunnison's prairie dogs has declined by over 90% in less than a century.

GPD acreage and populations are impacted by sylvatic plague, poisoning, habitat destruction, and shooting. Of all cases of sylvatic plague reported in the U.S., 80% of those cases are within the range of the GPD. In recent years, plague has devastated prairie dog populations in large regions in northern Arizona. In the 1980s, an extensive prairie dog complex was nearly eliminated by plague in north-central New Mexico and that population has never recovered. In the 1940s, plague eliminated over 600,000 acres of prairie dogs in a 60-mile long swath in South Park, Colorado, and Gunnison's prairie dogs populations in those areas are scant to this day.

Early poisoning efforts were staggering, with 48.7 million acres of prairie dogs poisoned from 1915-1964 across the four states in the range of the GPD. While some of this acreage includes other species of prairie dogs, substantial acreage was specifically GPDs. Poisoning of Gunnison's prairie dogs occurs at a lower level presently, due to the fact that there are far fewer prairie dogs left to poison. Nonetheless, the federal government itself remains involved in distributing poisons and poisoning prairie dog colonies upon request. For example, from 1993-2001, the federal "Wildlife Services" within the U.S. Department of Agriculture applied enough poison to control over 16,000 acres of Gunnison's prairie dogs in Arizona, a state which currently contains approximately 100,000 acres of GPDs.

Habitat destruction is also a threat to Gunnison's prairie dogs, largely in the form of urban sprawl and oil and gas operations. Urban sprawl harms GPD populations and habitat in many areas, including Flagstaff, Arizona; and Albuquerque and Santa Fe, New Mexico. While relocation is occurring for some prairie dogs in those urban areas, destruction of habitat of removed prairie dogs continues apace. In addition, since 2002 alone, oil and gas leases have been offered on over 300,000 acres within the GPD's range. Oil and gas exploration and extraction causes harm to prairie dogs from habitat loss (especially from road-building) and human disturbance. While much of this leasing is occurring on federal lands, public land managers are categorically failing to consider, much less avoid, harmful impacts on Gunnison's prairie dogs.

Shooting is rampant within the range of the Gunnison's prairie dog. While spring closures on shooting prairie dogs have been implemented in Arizona and Utah, large loopholes are provided for agricultural operators and there is no bag limit outside of these seasonal closures. In Colorado and New Mexico, there are no restrictions on shooting. While New Mexico refuses to monitor prairie dog shooting, Colorado's monitoring program indicates massive numbers of Gunnison's prairie dogs are being shot. In 2002, over 200,000 prairie dogs were shot in counties in the range of the GPD in Colorado.

The tremendous decline of GPDs from historic levels, combined with the severe, multiple threats that currently face remaining populations, provide a sound biological basis for listing this species under the Endangered Species Act. In fact, Gunnison's prairie dogs will likely have difficulty recovering due to the impact of sylvatic plague alone. Other anthropogenic threats compounding the impact of plague – poisoning, shooting, and habitat destruction – must be addressed. Listing under the federal Endangered Species Act is the most effective way to harness these threats and alter course, from one where prairie dogs are reviled as varmints in need of control to one where we acknowledge their imperiled status and their keystone role in native ecosystems.

### **Endangered Species Act Implementing Regulations**

Section 424 of the regulations implementing the Endangered Species Act (50 C.F.R. § 424) is applicable to this petition. Subsections that concern the formal listing of the Gunnison's prairie dog as an Endangered or Threatened species are:

424.02(e) "Endangered species" means a species that is in danger of extinction throughout all or a significant portion of its range."... (k) "species" includes any species or subspecies that interbreeds when mature.

"Threatened species" means a species that "is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range" (16 U.S.C § 1532(20)).

424.11(c) "A species shall be listed... because of any one or a combination of the following factors:

1. The present or threatened destruction, modification, or curtailment of habitat or range;
2. Overutilization for commercial, recreational, scientific, or educational purposes;
3. Disease or predation;
4. The inadequacy of existing regulatory mechanisms; and
5. Other natural or manmade factors affecting its continued existence."

All five of the factors set forth in 424.11(c) have resulted in the continued decline of the Gunnison's prairie dog and are causing the species to face endangerment and extinction.

### **The Spirit of the Endangered Species Act**

The purposes of the ESA are two-fold, to conserve threatened and endangered species and the ecosystems on which they depend. The Act's Section 2 reads:

The purposes of this chapter are to provide a means whereby the ecosystems upon which endangered species and threatened species depend

may be conserved, to provide a program for the conservation of such endangered species and threatened species...

See 16 U.S.C.A. § 1531(b). This is set forth as the very purpose of the ESA and our petition therefore goes to the very heart of this visionary law. We attach as Exhibit 1, a U.S. Fish and Wildlife Service (FWS) brochure advocating a multiple species approach to endangered species policy, with a focus on prairie dogs.

There is ample literature on prairie dogs in general playing keystone roles in the ecosystems where they are found (Kotliar et al. 1999; Kotliar 2000; Miller et al. 2000; Lomolino and Smith 2003). Prairie dog colonies host a high diversity of vertebrate, invertebrate, and plant species (Miller et al. 1996; Reading et al. 1989; Clark et al. 1982; Campbell and Clark 1981), a level of diversity sometimes markedly higher than surrounding grassland (Hansen and Gold 1977). Reading (1993), for instance, found that 170 vertebrate species are associated with prairie dogs. Earlier, Reading et al. (1989) found that 163 vertebrate species are associated with prairie dog towns. A similarly high count was reported for prairie dog associates in South Dakota, where 134 vertebrate species were recorded as associated with colonized areas. This number represents 40% of the vertebrate wildlife species in western South Dakota (Sharps and Uresk 1990). These counts surpass the already high earlier recordings of prairie dog associates, such as the finding of Clark et al. (1982) that 107 vertebrate species were associated with prairie dog colonies. Clark et al. (1982) also references studies that collectively indicate 140 vertebrate associates of prairie dogs and note that larger prairie dog towns contain higher vertebrate diversity than smaller towns. In addition, prairie dog vegetation manipulation enhances plant species diversity and nutrition that attracts ungulates to the colonies (including bison, cattle, and pronghorn) (Whicker and Detling 1988).

The most recent review of prairie dog associated species is by Kotliar et al. (1999), who examined 208 species that have been observed on or near prairie dog colonies. These researchers found that nine species can be considered to be dependent on prairie dogs and their colonies (black-footed ferret (*Mustela nigripes*),<sup>2</sup> burrowing owl (*Athene cunicularia*), mountain plover (*Charadrius montanus*), ferruginous hawk (*Buteo regalis*), golden eagle (*Aquila chrysaetos*), swift fox (*Vulpes velox*), horned lark (*Eremophila alpestris*), deer mouse (*Peromyscus maniculatus*),<sup>3</sup> northern grasshopper mouse (*Onychomys leucogaster*)). In addition, these researchers noted that twenty species benefited from opportunistic use of prairie dog colonies. Moreover, 117 have life history characteristics indicating that they benefit from prairie dogs and their colonies, but there is insufficient data about those species to draw conclusions about the degree of their association with prairie dogs. Therefore, approximately 146 vertebrate species likely benefit from prairie dogs and their colonies.

While not all associated vertebrates are prairie dog obligates, many would benefit from larger prairie dog populations and acreages. Kotliar et al.'s (1999) analysis of

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<sup>2</sup>Black-footed ferrets historically existed in black-tailed, white-tailed, and Gunnison's prairie dog towns (Miller et al. 1996).

<sup>3</sup>Everett (2002) confirmed the strong relationship between deer mice and black-tailed prairie dog colonies.

vertebrate species associated with the prairie dogs indicates that a number of species flourish in the presence of prairie dogs, or at least prefer to breed, feed, hide, or rest on prairie dog colonies. Given the unique ecological role played by prairie dogs in their ecosystems, they further fit the definition of keystone species (Kotliar 2000).

Moreover, it may be that scientific research has overlooked historic prairie dog associates, as research in this area has largely been post-1960. By 1960, an estimated 98% of prairie dog acreage had already been destroyed (Marsh 1984; Miller et al. 1994). In the face of scarce prairie dog acreage, associated wildlife may have altered their behavior in order to survive. Quite possibly, at historic peaks of prairie dog-occupied acreages, even more vertebrate species were associated with prairie dogs and their towns. An example is the northern aplomado falcon (*Falco femoralis septentrionalis*), which disappeared from the southwestern U.S. by the early 1950s. Truett (2002) recently suggested that part of the reasons for this raptor's disappearance was an extreme reduction of prairie dog colonized areas within the U.S. portion of the falcon's range in the first half of the 20<sup>th</sup> century.

Like other members of the prairie dog genus, Gunnison's prairie dogs are a keystone species. This keystone role includes both serving as a prey base and creating habitat for associated species. Prairie dogs create habitat through their burrow systems and impacts on plants and soils. Measuring vertebrate species diversity, Clark et al. (1982) recorded 16 reptile, 23 bird, and 16 mammal species on GPD towns. The imperiled status of the burrowing owl in Arizona is due, in part, to the loss of suitable habitat given outbreaks of plague among GPDs (Wagner 2002, citing Brown 2001). Prairie dog numbers in the Albuquerque region are acknowledged as declining "from various kinds of prairie dog control."<sup>4</sup> The burrowing owl population in that area has declined by 58% in five years, and prairie dog control is recognized as a contributing factor to the trend (Hawks Aloft 2004). Ferruginous hawks are also tied to GPDs, and Cully (1991) documented a decline in the number of ferruginous hawks after a plague epizootic decimated GPDs in Moreno Valley, New Mexico. In early reports, Ligon (1914: 91) noted golden eagle predation of GPDs in Arizona and stated that, "I believe their food, here, consists entirely of Jack Rabbits and Prairie Dogs."

Also in New Mexico, researchers have documented a larger population of nesting ferruginous hawks in the Estancia Valley than in the Plains of San Agustin, which they trace to the greater acreage of Gunnison's prairie dogs in the former area (Hawks Aloft 2000; Cook et al. 2003). Historically, the Plains of San Agustin and vicinity supported the highest densities of nesting ferruginous hawks in New Mexico. Write Cook et al. (2003: 1081), "there is good reason to suspect that the apparent drastic reduction in abundance of prairie dogs has reduced the nesting population of ferruginous hawks in the PSA [Plains of San Agustin] from historic levels." These authors discourage continued prairie dog eradication efforts on the basis of the harm to ferruginous hawks and other wildlife associated with prairie dogs (Cook et al. 2003).

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<sup>4</sup>Environmental Assessment for the Establishment of a Prairie Dog Relocation Site at Kirtland Air Force Base (NM) 1999.

Black-footed ferrets have been reintroduced into the GPD complex in Aubrey Valley, Arizona and are dependent on GPDs there for their survival and persistence (Van Pelt 1995; Winstead et al. 1999; 2000). The range of the black-footed ferret correlates generally with that of the black-tailed, Gunnison's, and white-tailed prairie dogs (Miller et al. 1996).

The northern sagebrush lizard (Sceloporus graciosus graciosus) is "sometimes found abundantly in association with prairie dog towns" (Arizona Game and Fish Department 2000).

In an examination of the keystone role of GPDs, Davidson et al. (1999) found that kangaroo rats (Dipodomys spp.) were associated with GPD colonies (see also, Ana Davidson, unpublished dissertation data). Davidson (pers. comm.) has also documented an association of herptiles, arthropods, and rodents with prairie dog colonies, given colonized areas differ from uncolonized grassland, and enhance beta, or regional, diversity (see also Lomolino and Smith 2003).

In north-central New Mexico, Cully (1986a), documented that raptors migrating in the autumn appeared to primarily subsist on Gunnison's prairie dogs. His study documented predation by ferruginous hawks, red-tailed hawks (Buteo jamaciensis), and golden and bald eagles (Haliaeetus leucocephalus) on GPDs.

Researchers have also analyzed vegetation and other above-ground habitat features on GPD towns to address the keystone species issue. Bangert and Slobodchikoff (2000) found that active and inactive Gunnison's prairie dog modified areas were significantly less complex than adjacent grasslands. Shrubs were less aggregated on prairie dog towns and had larger, consistently sized areas of bare ground. The implications of this dynamic are important for species such as beetles who might preferentially select for prairie dog towns given the more predictable arrangement of resources on prairie dog colonized areas (Bangert and Slobodchikoff 2000). Grant (2003) found that plant nitrogen concentration was higher in some dominant plant species and plant litter was lower on GPD colonies contrasted with off-town sites. However, there were no significant differences in canopy height, plant biomass, and plant species diversity on or off GPD towns, versus findings on black-tailed prairie dog colonies. Gunnison's prairie dogs' impact on vegetation on their colonies appears to be less dramatic than black-tailed prairie dogs, and may be related to the significantly smaller basal area of GPD burrows versus black-tailed prairie dog burrows; GPD hibernation (and thus shorter grazing seasons per year); and the different habitats in which the two prairie dog species are found (Grant 2003).

Given its status as a keystone species, listing the Gunnison's prairie dog as an Endangered or Threatened species under the ESA would further the ecosystem protection purpose of this law and should therefore be a high priority listing action. FWS has committed itself to the principle of ecosystem management (e.g., GAO 1994; FWS 1997), and federal protection for the Gunnison's prairie dog is an important manner in which the agency could fulfill this commitment.

## Petitioners

Forest Guardians is a non-profit environmental organization committed to protecting flora, fauna, natural processes, and native habitats in Colorado, New Mexico, Arizona, and Utah. Forest Guardians has a grasslands protection campaign, with particular focus on short-grass prairie in the southern plains and southwestern desert grasslands. Forest Guardians is interested in the conservation of species that face high levels of imperilment, especially those who play important umbrella and keystone functions within their ranges. The Gunnison's prairie dog is therefore a high priority species for Forest Guardians. In addition, Forest Guardians strives for the restoration and preservation of all naturally occurring components and processes within native ecosystems.

Descriptions of the 73 co-petitioners are attached at Appendix A.

### Endangered Species Listing Criteria Applicable to the Current Status of the Gunnison's Prairie Dog

1. The present or threatened destruction, modification, or curtailment of habitat or range;
2. Overutilization for commercial, recreational, scientific, or educational purposes;
3. Disease or predation;
4. The inadequacy of existing regulatory mechanisms; and
5. Other natural or manmade factors affecting its continued existence.

### Classification and Nomenclature

**Common Name.** The common name for Cynomys gunnisoni (Baird, 1858) is the Gunnison's prairie dog. The common name for one recognized subspecies of Gunnison's prairie dog, zuniensis, is the Zuni prairie dog.

**Taxonomy.** Five species of prairie dogs (Cynomys spp.), classified in two subgenera, inhabit North America:

#### Subgenus Cynomys

1. Black-tailed prairie dog (Cynomys ludovicianus);
2. Mexican prairie dog (Cynomys mexicanus).

#### Subgenus Leucocrossuromys

3. White-tailed prairie dog (Cynomys leucurus);
4. Gunnison's prairie dog (Cynomys gunnisoni);
5. Utah prairie dog (Cynomys parvidens); and

Prairie dogs are rodents within the squirrel family (Sciuridae). The two subgenera are commonly differentiated on the basis of tail color: the white-tailed (subgenus Leucocrossuromys) and the black-tailed (subgenus Cynomys) groups (Pizzimenti and Hoffman 1973; Fitzgerald et al. 1994).

Of all the members in the genus, the common ancestor of Cynomys is thought to resemble C. gunnisoni, originating in the southern Rocky Mountains in the Pliocene (5 million years ago). As a result of climatic change and uplift in the Rocky Mountain region, the multiple species east and west of the Rocky Mountains evolved. The Gunnison's prairie dog has had a long history in the area of its present range and has diverged least from its ancestral lineage (Goodwin 1995).

The Mexican and the Utah prairie dog are listed as endangered and threatened species, respectively, under the Endangered Species Act (50 C.F.R. § 17.11). The black-tailed prairie dog is a candidate for listing under the Act (65 Federal Register 5476-5488 (February 4, 2000)). The white-tailed was petitioned for listing by the Center for Native Ecosystems and other groups on July 11, 2002 (Center for Native Ecosystems 2002), and a 90-day finding and 12-month listing determination on that petition is now overdue. In this petition, "GPD" "prairie dog" "Gunnison's prairie dog" and "Gunnison's" are used interchangeably.

There is disagreement over whether two subspecies of Gunnison's prairie dog exist, a northern subspecies, C. g. gunnisoni (Baird), and a southern subspecies, C. g. zuniensis (Hollister). Pizzimenti (1975) analyzed the issue and questioned whether these two subspecies are taxonomically valid. Knowles (2002) agreed with Pizzimenti's assessment but also noted that DNA analysis is underway to clarify whether two GPD subspecies should be recognized. Alternatively, Hall (1981) recognized the two subspecies. Hubbard and Schmitt (1984) question Pizzimenti's analysis and suggest that zuniensis continue to be recognized on the basis of its paler coloration. Hoffmeister (1986) also questions Pizzimenti's analysis, maintaining that differences in size and proportion do exist between the two subspecies, although acknowledging that the area of intergradation between the two subspecies may need to be revised. Fitzgerald requested in 1991 that FWS review this taxonomic issue (Fitzgerald 1991). Genetic analysis related to this taxonomic question is currently underway through a cooperative agreement between FWS and the New Mexico Museum of Natural History.<sup>5</sup>

Petitioners request the designation of all Gunnison's prairie dogs as Endangered or Threatened under the ESA, regardless of whether C.g. gunnisoni and C.g. zuniensis represent valid subspecies.

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<sup>5</sup>Formal agreement was signed in August 2002. Research results are anticipated in late summer 2004 (David Hafner, New Mexico Museum of Natural History, pers. comm., Nicole Rosmarino, Forest Guardians, January 20, 2004).



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### **Description**

*Coloring and pelage.* Fitzgerald et al. (1994: 183) describe the Gunnison's prairie dog's coloring:

Dorsal color is yellowish buff to cinnamon with numerous interspersed black hairs. The ventral color is slightly paler. The top of the head, cheeks, and superciliary line above the eyes are darker than the rest of the body but do not show the striking pattern exhibited by the white-tailed prairie dog. The terminal one-third of the tail is gray to dirty white in color.

In general, Gunnison's prairie dogs are darker and have less striking patterns than the white-tailed prairie dog (Fitzgerald et al. 1994) and can be differentiated from the black-tailed prairie dog by tail tip color. While the GPD can be mistaken for the Wyoming ground squirrel (*Spermophilus elegans*), the GPD has a shorter tail, stockier build, and different vocalizations than this ground squirrel species (Fitzgerald et al. 1994).

GPDs molt twice annually, in the spring and autumn, although their tail only molts once per year. By October, individuals have a long full coat with a dense underfur. Molt patterns may be more pronounced in warmer areas within their range and less

pronounced where there is a short summer season. Albino GPDs were observed in South Park by Hollister (1916) (Pizzimenti and Hoffman 1973).

*Weight.* Males are generally heavier than females (Pizzimenti and Hoffman 1973; Fitzgerald and Lechleitner 1974). Weight ranges from 250-1,100 g for adults (Hoogland 1998a). In Gunnison County, Colorado, adult and yearling males ranged from 750-1,300 g in weight, while adult females range from 600-850 g during the active season. Young males weigh from 175-725 gm and young females weigh from 150-725 g, also during the active season (Rayor et al. 1987). In Park County, Colorado, Fitzgerald and Lechleitner (1974) found that pups (male and female) weighed 100-150 g when they emerged from natal burrows, and weighed over 400 g when they entered hibernation. In addition, some pups were as large as smaller adults by September.

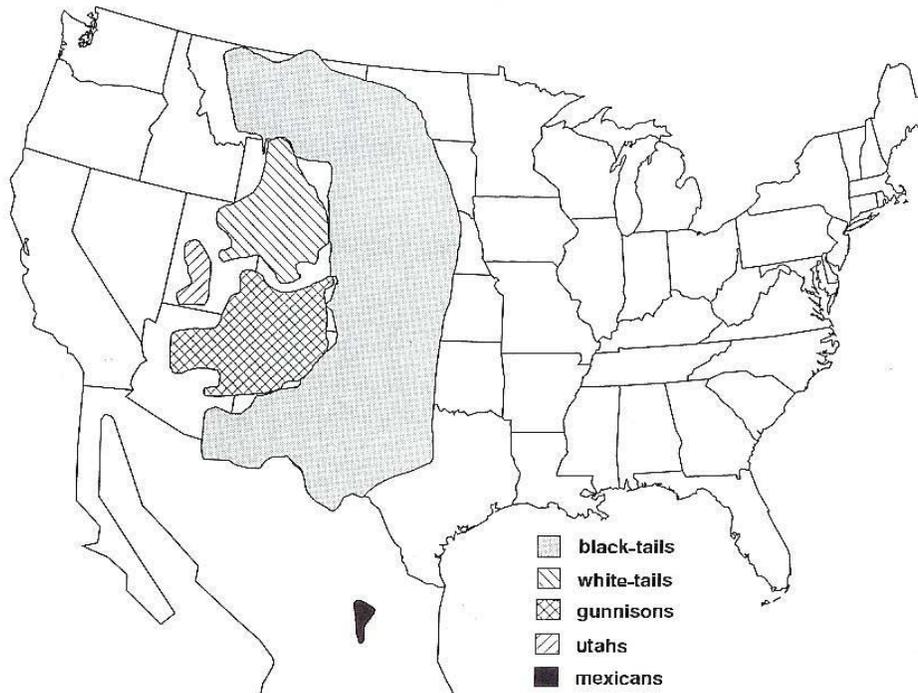
*Lengths.* Lengths are as follows: Total length is 300-390 mm; length of tail is 40-64 mm; length of hindfoot is 53-61 mm (Fitzgerald et al. 1994).

*Dimorphism.* Gunnison's prairie dogs are sexually dimorphic, with males being over 20% larger than females (Hoogland 1995).

*Distinctive traits.* As discussed above, Fitzgerald et al. (1994) indicate the different coloration of the two species, and white-tailed prairie dogs generally weigh more than Gunnison's (Fitzgerald and Lechleitner 1974). Vocalizations also differ between GPDs and other prairie dog species and allow identification (Pizzimenti and Hoffman 1973).

*Range distinctions.* The GPD's and the white-tailed prairie dog's ranges are generally distinct, although they nearly overlap in southwestern Gunnison County (Pizzimenti and Hoffman 1973). GPD range does not overlap with that of its other fellow member of the subgenus *Leucocrossuromys*, the Utah prairie dog (Figure 1). Where Gunnison's and black-tailed prairie dog ranges overlap (southcentral Colorado, northeastern New Mexico, and southwestern New Mexico, see Knowles 2002), the two species are easily distinguishable via their distinctly colored tails. In addition, Gunnison's are generally small, have five rather than four pairs of mammae, have a shorter tail, and a smaller skull (Hoffmeister 1986). Truett (pers. comm., March 19, 1999) suggested that, historically, where GPD and black-tailed prairie dog ranges overlapped in southwestern New Mexico, black-tailed prairie dogs inhabited the bottom of swales and GPDs could be found on slopes just above those swales. Similarly, Bailey (1932) noted that Gunnison's prairie dogs had been collected in the near Pecos on the upper Pecos River on the same area where black-tailed prairie dogs occurred, but that the two species were usually slightly separate geographically. Ligon (1914: 2) described GPDs as preferring steep hillsides and "rarely resorting to level grounds," although in other entries he refers to GPDs occupying valleys and mesas.

Figure 1. Prairie Dog Genus Rangemap. Source: Hoogland 1995.



### Geographic Distribution: Historic and Current

The distribution of Gunnison's prairie dogs within their historic range, and the extent of that range, has been significantly reduced over the past century. GPDs historically occurred in northern Arizona, southwestern and southcentral Colorado, northwestern and west-central New Mexico, and extreme southeastern Utah (Fitzgerald et al. 1994). Knowles (2002) estimates the historic range of GPDs to be 67.1 million acres, with 45% of that acreage in New Mexico, 30% in Arizona, 22% in Colorado, and 3% in Utah. GPDs occur both east and west of the Continental Divide. West of the Divide, they occur in montane valleys and plateaus, while east of the Divide they occur in upper drainage basins (Knowles 2002).

Currently, the Gunnison's prairie dog occurs in only four of the eight counties in Arizona in which they historically occurred (Wagner 2002; Wagner and Drickamer 2003). As we document below, substantial acreage declines have occurred throughout New Mexico, although it does not appear that their range in that state has been significantly altered (Hubbard and Schmitt 1984). Gunnison's prairie dogs have also disappeared from at least three counties within their range in Colorado, and have been eliminated (via plague or poisoning) from extensive geographic areas such as South Park and large expanses in Chaffee and Saguache Counties in Colorado (Fitzgerald 1991; 1993; Fitzgerald et al. 1994). Finley (1991) found an active colony in South Park near Hartsel, but generally GPD colonies in South Park are inactive.

## Life History

### Habitat requirements

Early in the 20<sup>th</sup> Century, Ligon (1914) referred to the Gunnison's prairie dog as the "mountain prairie dog." Gunnison's prairie dogs occur in high desert and montane grasslands, in habitat types such as montane meadows, hillsides, broad alluvial valleys, floodplains, and playas. Knowles (2002) describes GPDs as generally occupying mesic plateaus and montane valleys and arid lowlands. This species is found at elevations ranging from 6,000-10,000 feet (Bailey 1932; Hubbard and Schmidt 1984; Wagner 2002; Wagner and Drickamer 2003), although they have been recorded at altitudes as high as 12,000 feet (Lechleitner 1969; Pizzimenti and Hoffman 1973).

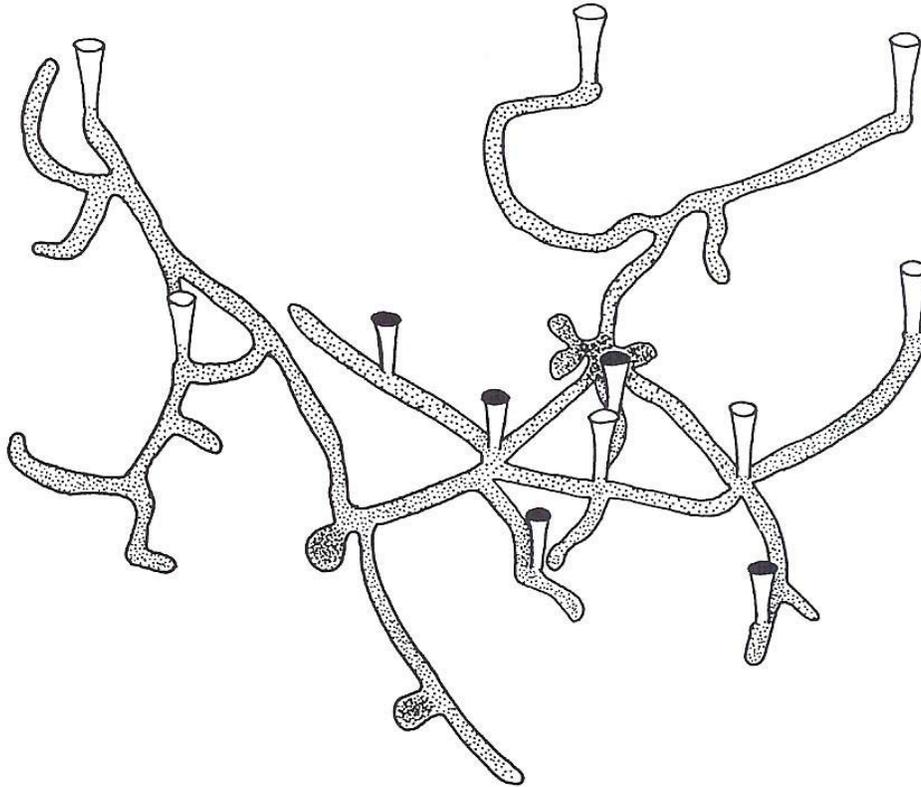
Wagner (2002) found that GPDs are correlated with areas containing deep soils, flat slopes, and little rock cover. He suggested that the association with deeper soils is likely related to the need for GPDs to establish hibernacula below the frost line, and that flat slope preference may be related to the need for intraspecific GPD alarm calls to carry farther (Wagner 2002).

This prairie dog species tolerates the presence of shrubs, such as rabbitbrush (*Chrysothamnus* spp.), sagebrush (*Artemisia* spp.), and saltbrush (*Atriplex* spp.) (Hubbard and Schmitt 1984). Longhurst (1944) noted the species could also be found among aspen groves. Ligon (1914: 3) similarly noticed more tolerance among GPDs for shrubs and visual barriers, although contemporary scientists indicate that GPDs are most closely associated with semiarid grasslands (Ana Davidson, pers. comm.).

*Burrows.* Ecke and Johnson (1952: 12) describe the "corkscrew nature" of GPD burrows, which they were usually unable to probe deeper than 3 feet. Hoffmeister (1986) also describes GPD burrows as not especially deep, with a Prescott (AZ) area burrow averaging 3.5 feet. GPD burrows may have multiple entrances (Figure 2). Mounds at surface of burrow systems are generally not well-tamped or shaped, especially compared to black-tailed prairie dogs (Bailey 1932; Longhurst 1944; Pizzimenti and Hoffman 1973; Hoffmeister 1986). Gunnison's prairie dog burrows have a significantly smaller basal area (average size of 1.5 sq. m) than those of black-tailed prairie dogs (average size of 2.8 sq. m) (Grant 2003).

Older burrow systems are deeper and more complex (Pizzimenti and Hoffman 1973) and may therefore better protect GPDs from threats such as predators and flooding (discussed below). Cully (n.d.) suggested that GPDs may increase their burrow to prairie dog ratio to make it more costly for badgers to excavate and prey on them. Relatedly, Clark et al. (1982) noted that badger activity was positively correlated to number of burrow openings and colony size on GPD colonies.

Figure 2. Diagram of Gunnison's Prairie Dog Burrow. Source: Hoffmeister 1986.



### Behavior & Communication

The petitioned species is strictly diurnal, with greatest activity in the early morning and late afternoon, especially in warmer weather. Fitzgerald and Lechleitner (1974) described activity patterns in late spring and early summer: highest surface activity occurring from sunrise to about 9am, and then from 2pm until an hour or two prior to sunset. As temperatures cooled in late summer and early autumn, prairie dogs were more active throughout the day. While rain or snow might cause animals to remain underground, GPDs were observed aboveground during light precipitation. Activities above ground include moving, making social contacts, feeding, being alert to potential predators, grooming, and playing. Most of their time aboveground is spent feeding (Pizzimenti and Hoffman 1973; Fitzgerald and Lechleitner 1974).

Gunnison's prairie dogs are social, colonial animals (Fitzgerald and Lechleitner 1974; Slobodchikoff 1984). Hoffmeister (1986) states that GPD colonies are generally smaller than those of black-tailed prairie dogs, and he describes that they may include as many as 50 individuals in Arizona. Likewise, Pizzimenti and Hoffman (1973) state that GPD colonies often number fewer than 50-100 individuals. However, larger colonies were historically recorded in Arizona – e.g., Ruffner (1980) – that likely contained more than 50 individuals. Slobdchikoff et al. (1998) state that GPD colonies can number several hundred individuals.

GPDs are considered to be less social and less densely colonized than black-tailed prairie dogs (Fitzgerald et al. 1994), but more social than white-tailed prairie dogs. Hostile behavior among GPDs appears related to common feeding area disputes rather than territorial boundaries around family group (clan) boundaries (Fitzgerald and Lechleitner 1974; Fitzgerald et al. 1994). In one study, adult female Gunnison's most frequently initiated social contacts with other adult GPDs, while adult males were more likely to engage in conflict, possibly because they ranged more widely in feeding (Fitzgerald and Lechleitner 1974).

Home territories of individual clans are approximately 1 ha (2.47 ac) (Hoogland (1998b). Clan sizes range from 1-19 GPDs, with a mean of 5.30 individuals on a Petrified Forest National Park site in Arizona (Hoogland 1999). Clans consisted of 1.06 +/- 0.39 breeding males; 3.01 +/- 2.08 breeding females; and 1.23 +/- 1.65 non-breeding yearling males. There are four different types of clans: one-male clans, two-male clans, no-male clans, and half-male clans (where one male spends his time among two different groups of females). Researchers have found that clan composition may vary with plant patchiness (i.e., resource distribution) within a colony and population density (Travis et al. 1995; See also Slobodchikoff 1984; 2002).

Approximately 95% of females appear to remain in their natal clan territory for life, compared with 5% of males (Hoogland 1999). DNA analysis indicates that females are significantly more closely related to other females within their clans than they are to randomly selected individuals, while males sharing territories are not (Travis et al. 1996). Researchers (e.g., Fitzgerald and Lechleitner 1974) have noted that the use of identification "kisses" (where two prairie dogs touch teeth) is prevalent among GPDs.

Gunnison's prairie dogs have an intriguingly sophisticated communication system. Early researchers noted the communication signals employed by GPDs. Ligon (1914:5) wrote of the GPD's verbal communications, "These sounds in each case seem to be a language, that conveys quiet conditions in the 'town.'" More specifically, researchers noted the GPD's warning bark, all-clear, chuckle, snarl, scream, purr, tooth chatter, and growl, possibly used to express alertness, apprehension, and distress (Tileston and Lechleitner 1966; Waring 1970; Fitzgerald and Lechleitner 1974; Hoffmeister 1986).

Fitzgerald and Lechleitner (1974) noted that adult female GPDs were usually the first to give warning calls. Hoogland (1996) documented that females within kin in their home territory made anti-predator calls more often than females who lacked nearby kin, and females with nearby progeny were especially likely to make anti-predator calls. In contrast, male calling patterns appear to be unrelated to proximity of kin. Gunnison's more vigorously move the lower jaw when making anti-predator calls, in comparison with black-tailed prairie dogs, and males and females are approximately equally likely to call.

Recent research indicates that Gunnison's prairie dogs have the most complex communication system of any non-human animal investigated (Slobodchikoff 2002). Ackers and Slobodchikoff (1999) documented that prairie dogs vary their alarm calls according to the physical properties (size and shape) of a given stimulus. Those researchers found GPDs emitted different calls for live versus model coyotes and skunks. Different calls for coyotes, humans, domestic dogs, and red-tailed hawks have been recorded, along with different escape responses depending on which call is emitted (Placer and Slobodchikoff 2000; Slobodchikoff 2002). Prairie dogs can also differentiate the color of clothes humans are wearing, along with their general size and shape and the relative speed of travel of a predator. In fact, GPDs appear to employ a primitive grammar, in which information contains noun-, adjective-, and verb-like elements (Slobodchikoff 2002). There are dialectical variations in calls between colonies (Slobodchikoff and Coast 1980; Slobodchikoff et al. 1998; Slobodchikoff 2002). Habitat variation and levels of protection from human activities such as shooting may explain different dialects in Gunnison's (Slobodchikoff et al. 1998).

### Dispersal

Dispersal occurs near the end of the active season (pre-hibernation) or prior to the beginning of the subsequent mating season (Travis et al. 1996). Cully (1985) estimates that young male GPDs disperse approximately six weeks after emergence from hibernation. Most dispersal is to an adjacent clan territory, rather than inter-colonial. Dispersal is primarily undertaken by young males, with 95% of females living out their lives in their natal clans, and only 5% of males remaining in their natal clan more than one year after weaning (Hoogland 1999).

### Food Habits

GPDs rely primarily on grasses and sedges (Fitzgerald and Lechleitner 1974; Fitzgerald et al. 1994), although they also consume forbs and will eat insects on occasion (Hoffmeister 1986). Insects consumed include grasshoppers, beetles, and cutworms (Pizzimenti and Hoffman 1973). About 60% of their time spent above ground is directed toward foraging and feeding (Fitzgerald et al. 1994). This species does not require free-standing water, although Bailey (1932) noted that they may drink from pools after rain and Fitzgerald and Lechleitner (1974) made similar observations of GPD use of water from ditches and streams.

One study indicated that Gunnison's prairie dogs alter their diet seasonally. During spring and fall, they seem to feed more on dead grass and seeds, due to the lack of growing vegetation, while during the summer, GPDs seem to feed more on growing vegetation. Seeds have a higher-caloric yield than grasses and forbs and may thereby allow GPDs to meet high-energy demands of reproduction, lactation and territorial defense (Shalaway and Slobodchikoff 1988).

## Population density

Ecke and Johnson (1952) describe densities of 25 or more GPDs per acre in Park County (CO) in July 1949, just prior to the onset of a major plague epizootic there. After emergence of pups, Fitzgerald and Lechleitner (1974) recorded densities of 12.1 GPDs per ha (4.9 per ac) in mid-July 1965, also in Park County. Cully documented prairie dog densities of 12.1 per acre among GPDs in north-central New Mexico in October 1984 and densities of 5-6 per acre in April 1985 (prior to the onset of a plague epizootic) (Cully 1989). Knowles (2002) estimates GPD population densities at 5-10 per acre. Fitzgerald et al. (1994) describe GPD densities as from 5-57 animals per ha (2-23 per ac).

While in reference to black-tailed prairie dogs, Hoogland (1995) discourages attempts to correlate the number of burrows with population estimates, Slobdchikoff et al. (1988) has suggested estimating the size of GPD populations by assuming each prairie dog uses a minimum of two burrows.

## Demography and Reproduction

Generally, breeding occurs in March and April, young (pups) are born in April or May, and the pups emerge from the burrows in June or July, with variation in dates depending on climate and altitude. Mating occurred in mid-March through early April, with first emergence of pups in late May and June at a northeastern Arizona study site (Hoogland 1999). Mating was observed in South Park, Colorado, in late April and May, with first emergence of pups during early July (Fitzgerald et al. 1994). At 7,000-8,500 feet in Colorado, females were lactating in mid-May and pups had emerged by June 3 (Pizzimenti and Hoffman 1973). Longhurst (1944) reported pups emerging from burrows at several sites of differing altitude in Costilla County, Colorado: June 27 at 8,500 feet; July 1 at 8,800 feet; July 14 at 9,200 feet; and July 16 at 9,500 feet. At the Moreno Valley complex in north-central New Mexico, juveniles emerged between June 1-July 8 (Cully 1997).

Hoogland (1997) documented gestation at 29.3 +/- 0.53 days, followed by a lactation period of 38.6 +/- 2.08 days. Birth sex ratios favor males, while adult sex ratios favor females, likely due to the higher rate of mortality among young males (Fitzgerald and Lechleitner 1974; Fitzgerald et al. 1994).

The majority of reproductive females mate with more than one male, and mating primarily takes place underground, possibly because of increased risk of predation during mating behavior (Hoogland 1997). Hoogland (1998b) found that there was a 100% probability of pregnancy and parturition for females that copulated with at least three males. In addition, litter size was directly related to the mother's number of sexual partners and maternal body mass. In another study, one in three females who reproduced had litters of mixed male parentage, and 61% of all progeny was sired by males from outside the mother's clan (Travis et al. 1996).

The most recent analysis of GPD reproduction indicates that the species reproduces slowly (Hoogland 2001). Reproductively active females come into estrus for several hours on only one day during the year,<sup>6</sup> therefore weaning, at maximum, only one litter per year. The percentage of males that copulate as yearlings is 24%, and the percentage of yearlings copulating as females is 100%. After copulation, 82% of reproductive female GPDs wean a litter. The mean litter size for those females that wean offspring is 3.77. Litter size varies directly with the body mass of the reproductive female. There are a multitude of factors that cause reproductive females to lose their young before they are born or weaned, including abortion, genetic defects, disease, and predation (Hoogland 2001). While infanticide appears to be less prevalent in GPDs than in other prairie dog species,<sup>7</sup> Fitzgerald and Lechleitner (1974) noted that Gunnison's females would protect natal burrows from other prairie dogs before pup emergence.

Survivorship in the first year of female GPDs is less than 50% and for males is under 40%. Survival rates among adults in subsequent years are even lower. These two dynamics – substantial loss of young prairie dogs and subsequent losses of adults – “severely limit[s] prairie dog reproduction” (Hoogland 2001: 921).

Hoogland singles out large body mass as a vital factor in reproductive success among prairie dogs. In turn, the availability of plentiful food and other resources is related to body mass and therefore reproductive success. Hoogland (2001: 923) consequently underscores “the importance of high-quality habitats for the conservation and long-term survival of prairie dogs.”

### Hibernation

Gunnison's prairie dogs generally began hibernating in October or November and emerge from their burrows in February or March. The hibernation schedule varies with latitude and elevation (Wagner 2002; Wagner and Drickamer 2003). Near Gunnison, Colorado, Rayor et al. (1987) noted that, while prairie dogs immerse into hibernation in late October, some individuals emerge periodically throughout the winter. Near Flagstaff, Arizona, researchers found that prairie dogs are generally below ground by the end of October and emerge from their burrows between mid-February and late March, although some GPDs may be seen above ground on clear and/or warm winter days, in agreement with Rayor et al. (1987). While emergence time appears to vary with weather, GPDs at the Flagstaff area sites always emerged by the end of March, even if snow fell in April (Hoffmeister 1986, citing Slobodchikoff, pers. comm.). Emergence from hibernation at Petrified Forest National Park in Arizona occurred from late February through early April (Hoogland 1999). At the Moreno Valley in north-central New Mexico, most adult GPDs emerged during March (Cully 1997).

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<sup>6</sup>Female GPDs may come into estrus a second time if they fail to conceive during the first estrus (Hoogland 2001). Hoogland (1997) notes that, out of 308 reproductive females, a lone female came into estrus a second time because she had failed to conceive in her first estrus.

<sup>7</sup>Hoogland (2001) observed that he did not detect a single case of infanticide among Gunnison's prairie dogs (in a study of 358 litters).

## Mortality

Knowles (2002) estimates prairie dog annual mortality rates at 30-60%. After weaning, causes of mortality include poisoning, sylvatic plague, shooting, road mortality, lack of suitable habitat, flooding, land conversion (dislocation, injury, and death from heavy machinery), and predation.

### *Predation*

Native GPD predators include badgers (Taxidea taxus), coyotes (Canis latrans), golden eagles, bald eagles, bobcats (Lynx rufus), red-tailed hawks, ferruginous hawks, long-tailed weasels (Mustela frenata), and black-footed ferrets (Fitzgerald and Lechleitner 1974; Hubbard and Schmitt 1984; Fitzgerald et al. 1994; Miller et al. 1996). Rattlesnakes (Crotalus spp.) may take GPD pups (Pizzimenti and Hoffman 1973). Non-native predators include domestic dogs (Canis familiaris) and domestic cats (Felis catus) (Cully 1985).

### *Eradication programs*

As is discussed in a subsequent section on the history of GPD management, there has been a concerted effort to reduce the prairie dog population and amount of prairie dog-occupied acreage throughout the GPD's range. This effort has been highly effective, for example, with the elimination, by 1930 (prior to sylvatic plague) of GPDs from four of the eight counties in which they historically occurred in Arizona (Wagner 2002; Wagner and Drickamer 2003). Substantial poisoning efforts have also been documented in Colorado, New Mexico, and Utah (Forrest 2002). As petitioners show in the Threats section, lethal control of GPDs continues to the present, via poisoning and shooting, some of which is conducted or facilitated by federal and state government agencies.

### *Sylvatic plague*

Petitioners discuss the impact of sylvatic plague on GPD populations in the subsection on disease and predation, under the Threats section. GPDs are nearly 100% susceptible to the sylvatic plague, which was introduced to North America in 1899 (Barnes 1993; Cully 1993; Fitzgerald 1993). It was first documented within the Gunnison's prairie dog's range in 1932 (Barnes 1982). Recently, sylvatic plague has eliminated thousands of hectares of GPD colonies in northern Arizona. There have been major plague epizootics, with lasting impacts, in Arizona, New Mexico, and Colorado (Fitzgerald 1991; Cully 1997; Wagner 2002; Wagner and Drickamer 2003).

### *Shooting*

While seasonal closures on prairie dog shooting have been instituted by two states within the GPD's range - Arizona and Utah - prairie dog shooting continues in those states and in New Mexico and Colorado. In Colorado, shooting rates are extremely high.

In New Mexico, shooting may be significant but remains undetected due to negligence by the state in monitoring this activity. In Arizona, shooting even occurs on the largest remaining complex, which is also the only black-footed ferret reintroduction site in the GPD's range (Aubrey Valley). Whether considered singly or in tandem with other threats to the Gunnison's prairie dog, shooting must be considered a threat to the persistence of this species.

#### *Habitat degradation and loss*

Gunnison's prairie dog habitat has been converted to cropland, roads, oil and gas well pads and infrastructure, municipalities, reservoirs, and other land uses. In addition, as petitioners discuss below, habitat degradation from proliferation of non-native weeds, desertification, and fire suppression has reduced remaining suitable habitat. Much of the GPD's habitat, as well as that of other prairie dogs in the southwest, has become desertified (dominated by shrubs). The Plains of San Agustin and the Navajo Reservation are examples of this problem within GPD habitat. The plains of San Agustin were once occupied by both GPD and BTPD, but most of it is now desertified (Davidson, pers. comm.) and prairie dogs are much scarcer there than historically (Cook et al. 2003). Although GPD are more tolerant of shrubs relative to black-taileds, they prefer open grassland.

#### *Flooding and drowning*

Ruffner (1980) reports the loss of several GPD colonies on National Forests from flooding related to heavy precipitation. However, Hoffmeister (1986) also notes the role of a complex burrow system in providing GPDs with refugia that do not fill with water during flooding, and it appears that at least some prairie dogs within a colony can survive flooding. Alternatively, intentional drowning has been employed by humans to kill GPDs. For instance, Curecanti National Recreation Area staff has intentionally flooded prairie dog burrows in an effort to reduce the population (see below). Drowning has been employed elsewhere as a method to control this species, for instance, in Montezuma County, Colorado (Cary 1911, cited in Pizzimenti and Hoffman 1973).

### **Historic and Current Population Status & Trends**

Gunnison's prairie dogs have declined throughout their range. Wagner (2002) describes "massive reduction" in prairie dog numbers on account of poisoning, sylvatic plague, recreational shooting, and habitat conversion. Throughout their range, GPDs are either declining or are stable at substantially reduced levels. They are generally found in small, fragmented populations (Knowles 2002).

The best available information indicates population declines, reduction in GPD-occupied acreage, and range shrinkage. While range-wide surveys and population monitoring are needed, acquisition of this information should not delay much-needed GPD protection.

## Arizona

Historically, Gunnison's prairie dogs were numerous in many areas within their range in the state. Hoffmeister (1986: 196) cites Vernon Bailey's notes in 1908, where he states, "these prairie dogs are common all along the Zuni River and Little Colorado River valleys and over the mesas." GPDs were especially numerous between Seligman and Flagstaff (Hoffmeister 1986). Charged with mapping GPD towns for the U.S. Biological Survey, Ligon (1914) mapped 226,851 acres of GPDs in a 595,200-acre area in northeastern Arizona in 1914. Within that area, Ligon (1914) estimated 50,000 acres of GPDs in southern Apache County, primarily on the Apache National Forest (Springerville and Alpine Ranger Districts). By 1952, after government orchestrated poisoning campaigns, prairie dogs were thought to be "practically eliminated" from the Apache National Forest (Exhibit 2: Apache-Sitgreaves Open Records Documents).

Prior to sylvatic plague, range shrinkage in Arizona occurred due to poisoning campaigns. Wagner (2002) and Wagner and Drickamer (2003) reported that, by 1930, poisoning had reduced the GPD's range in the state from eight to four counties, a diminishment in range which has endured, with current GPD populations occurring only in Apache, Coconino, Navajo, and Yavapai counties. Donald Gilchrist of the U.S. Biological Survey estimated four million acres of GPDs across Apache, Navajo, Coconino, and Yavapai counties in Arizona in a 1928 report (See Exhibit 3: Donald Gilchrist Report 1927/1928). Van Pelt (2000) also cites an estimate of four million acres of GPDs once having occurred in Arizona.

As we document in this petition, intensive poisoning efforts were directed toward the extermination of Gunnison's prairie dogs from National Forests and private lands in Arizona in the first half of the 20<sup>th</sup> century. As a result, for example, acreage on the Apache-Sitgreaves National Forest appears to have declined from 250,000 acres in 1914 to a total of 200 acres in 5-6 small towns (<10-20 ac) as of 1996.<sup>8</sup>

In surveying for black-footed ferret habitat (i.e., GPD-occupied acreage) on the Apache-Sitgreaves, Cibola, Coconino, Gila, and Kaibab National Forests in northern Arizona and northwestern New Mexico in the late 1970s, Ruffner (1980) measured the size of 27 colonies. The Apache-Sitgreaves had the fewest colonies and smallest mean colony size, at 9.85 ha (24.3 ac). Six towns were located on the Gila National Forest, which contained the two largest colonies found in the study and the largest mean colony size, at 127.06 ha (313.8 ac). Five active colonies were found on the Kaibab National Forest, nine GPD towns were measured on the Coconino, and four on the Cibola. However, the number of towns located and visited was a subset of the total colonies that existed on these forests at the time of the study.

Subsequently, despite containing the largest GPD acreage documented by Ruffner (1980), with one colony covering 385 ha (952 ac) and another covering 206 ha (510 ac), GPDs have apparently been eliminated from the Gila (Keith Menasco, Kaibab National

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<sup>8</sup>Keith Menasco, Kaibab National Forest, pers. comm., April 30, 1998; Terry Myers, Apache-Sitgreaves National Forest, pers. comm., April 8, 1996.

Forest, pers. comm., April 30, 1998). In addition, as of 1984, there were only 260 acres of GPDs on the Kaibab National Forest, which was described as a static acreage (Leonard Lindquist, Kaibab National Forest, pers. comm., Sept. 7, 1984).

More recently, on the Williams Ranger District on the Kaibab National Forest, Van Pelt (pers. comm., dated February 26, 1997), described the following notable complexes and GPD acreage: 1) Navajo Army Depot Complex, comprising six towns totaling 308 ha (760.8 ac); 2) Government Prairie Complex, eight towns totaling 155 ha (382.9 ac); 3) San Francisco Peak Complex, with 13 towns totaling 203 ha (501.4 ac); and 4) 24 isolated towns, totaling 288 ha (711.4 ac). However, Van Pelt indicated that as of 1997 a number of these towns went extinct, possibly as a result of plague. Of the 51 towns reported by Van Pelt, over half (26) measured less than 10 ha (24.7 ac), which Clark et al. (1982) characterized as a small colony size.

In their study area in east-central Arizona, Yarchin et al. (1988) recorded 46 colonies, 25 of which were on BLM lands, in survey work from May 1987 through April 1988. The colonies on BLM land totaled 3,206 acres. In May of 2002, BLM revisited 5-6 of the sites Yarchin et al. (1988) surveyed, finding that “approximately half of those seemed uninhabited for some time,” although the latter survey was cursory (Ted Cordery, BLM, pers. comm., 9/12/02). Hoffmeister (1986) states that there were many GPD colonies located north of the Mogollon Rim and west of these mountains to the Prescott area, but many of these populations died off of unknown causes (plague or poisoning).

The Arizona Game and Fish Department conducted prairie dog mapping in the state in 1990-1996, which indicated a total of 215 towns in northern Arizona, comprising 13,846 ha (34,199.6 ac). There has subsequently been a dramatic decrease in the number of active GPD colonies in Arizona in the last 7-15 years, primarily caused by plague. Between May 2000 and October 2001, the number of active colonies in extensive portions of northern Arizona study sites decreased from 273 to 86 and total area declined from 13,559 ha (33,490.7 ac) to 4,526 ha (11,179.2 ac) (Wagner 2002; Wagner and Drickamer 2003). Moreover, the remaining populations experienced a complete die-off in the summer of 2002. These authors warn that there is likely to be range shrinkage, given the failure of populations to recover from plague epizootics that had occurred 5-6 years prior. In addition, they found that active GPD colonies in the state are generally small in size (< 20 ha) (Wagner 2002; Wagner and Drickamer 2003). This likely renders them vulnerable to the isolation and fragmentation effects petitioners discuss below.

Among the areas in which plague epizootics have been documented in northern Arizona are the Coconino and Kaibab National Forests. Indeed, after the summer of 2001, only 24 of 94 colonies were active.<sup>9</sup> As of September 2001, only 21 of 96 colonies on the two forests were known to be active (Drickamer and Wagner 2001). In subsequent research, Drickamer and Wagner (2002) reported discovering 11 additional colonies on the Kaibab National Forest and nine on nearby state and private lands. Five of these newly found 20 colonies were inactive due to plague. In all, these researchers reported

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<sup>9</sup>This information was provided in a research proposal submitted by Lee Drickamer and David Wagner in December 2001 to the National Fish and Wildlife Foundation. See p. 2.

114 colonies on the Kaibab National Forest or on lands within 10 km of forest boundaries, only 31 of which were known to be active. At least four GPD colonies died off on Petrified Forest National Park in Arizona due to plague in 1995 (Bangert and Slobodchikoff 2000).

The largest complex in the state (and probably across the GPD's range) is in Aubrey Valley. Over half of Arizona's black-footed ferret carrying capacity is located in Aubrey Valley, and the next largest identified GPD complex is only about one third of the size of Aubrey Valley (Van Pelt 1995). As of 1997, the total prairie dog acreage in this complex measured 12,001 ha (29,653 ac) (Winstead et al. 2000). While it is considered to have increased 8% annually since 1992, Knowles (2002) notes that this estimate is based largely on anecdotal information rather than precise mapping. Within Aubrey Valley, the majority of the acreage is contained within the Aubrey Valley subcomplex, which measures 11,391 ha (28,147 ac). The two largest towns, Pica Camp and North Audley, make up 83% of that subcomplex (Winstead et al. 2000).

The Arizona Fish and Game Department has mapped 106,000 GPD occupied acres across the state. However, this figure does not include two Native American reservations and includes only a portion of the Navajo Reservation. Approximately 14,315 acres of GPDs were mapped on a portion of the Navajo reservation in the mid-1990s but a significant portion of those colonies had disappeared or been reduced by 2001 (Knowles 2002). Indeed, plague outbreaks centered around Dilkon, Seligman, and Flagstaff in recent years have caused GPD decline in significant stretches of their range in Arizona (Wagner 2002; Knowles 2002).

### Colorado

The historic nucleus for the gunnisoni subspecies was the San Luis Valley and South Park, with populations also occurring throughout the Arkansas River valley from Twin Lakes almost to Pueblo, and west to the upper Gunnison River Drainage, Saguache Park, and Cochetopa Park areas (Fitzgerald 1991). Longhurst (1944) described the GPD as "abundant wherever the habitat is suitable" in the San Luis Valley.

GPDs in the state have dramatically declined due to sylvatic plague and poisoning (Fitzgerald 1991; Knowles 2002). By the end of the 1940s, GPD populations in Park County were reduced by 915,000 acres via poisoning and plague (Ecke and Johnson 1952). In a 1991 survey, with the exception of a small colony (21-60 mounds, likely <30 GPDs) near Hartsel in Park County, and some peripheral colonies nearby in Chaffee and Teller Counties, GPD colonies in South Park were generally defunct or inactive (Finley 1991). In 1991, Fitzgerald alerted FWS that plague and poisoning had largely eliminated gunnisoni from South Park and the extreme upper Arkansas River Valley, and that the subspecies occurred in low populations in the San Luis Valley. In addition, remnant populations appeared "very small and patchy" in other areas within its historic range in Colorado (Fitzgerald 1991: 2; See also Fitzgerald et al. 1994). Fitzgerald (1991) also stated that GPDs have been eliminated from Jefferson, Douglas, and Lake Counties in Colorado.

In his 1991 roadside survey of the gunnisoni subspecies in southwestern and southcentral Colorado, Finley (1991) found 42 active GPD colonies, 28 of which (67%) contained less than 60 mounds, or fewer than 30 individuals. There were 20 inactive colonies and 6 colonies whose activity level was not ascertained. Overall, there were many more small or inactive colonies (48) than “large” active colonies (14). Even the large category is questionable, as it is defined as areas with more than 60 burrows, with no further specification of how large the colonies observed actually were. BLM conducted a prairie dog survey in the San Luis Valley in 1988. They found a total of only 446 acres of active colonies, despite surveying over 65,000 acres.<sup>10</sup>

The only large complex that Fitzgerald notes was on the Curecanti National Recreation Area (Fitzgerald 1991). Pizzimenti and Hoffman (1973: 3) earlier wrote that, “Where habitat is open and the animals have been afforded protection (for example, at Blue Mesa Reservoir, Gunnison County, Colorado) colonies can become extensive and densely populated.” As petitioners discuss below, the GPD population was severely reduced by the construction of the Blue Mesa Reservoir and has since been continually controlled by NPS.

Within the Montrose Resource Area of the BLM, GPD populations are considered to be decreasing, particularly in the western part of the resource area (See Exhibit 4: Gunnison’s Prairie Dog Meeting Notes).

Recently, Capodice and Harrell (2003) surveyed GPDs within the Gunnison Field Office of the BLM in Gunnison, Saguache, and Montrose Counties. The survey included federal and non-federal lands. Roughly half (36) of the 73 sites surveyed had active prairie dog towns, occupying a total area of 770 acres. Of this acreage, 36% was on BLM land, 33% was on NPS land, 22% was on private land, 4% was on DOW land, 3% was on City of Gunnison land, 1% on Gunnison County holdings, and less than 1% on USFS land. These researchers noted that within their survey area only 7 of the 16 GPD towns identified by FWS in 1992 (Finley 1991) were still active, representing a decline of more than 45%. As discussed above, Finley’s survey indicated at least 20 inactive or defunct colonies, out of a set of 68 colonies detected, with the status of six other colonies uncertain. Several of these defunct, inactive, or uncertain status colonies were in the counties surveyed by Capodice and Harrell (2002). This suggests an even greater percentage of GPD colonies have become inactive over the past two decades in the Gunnison Field Office and vicinity.

The decline on BLM lands in the Gunnison Field Office is dramatic, as discussed by Capodice and Harrell (2003). In 1979-1980, BLM described 15,569 acres of GPDs on 19 active colonies within this district. In contrast, Capodice and Harrell (2003) found only 278 acres from five active towns. This represents a 98.3% decline in active town acreage, and, including the 5 new active towns discovered by Capodice and Harrell, a nearly 50% decline in the number of active towns since 1979/1980. Moreover, Capodice and Harrell (2003) surveyed 19 of the 36 active prairie dog towns for burrow activity and

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<sup>10</sup>John Spinks, FWS, pers. comm., Jim Fitzgerald, University of Northern Colorado, dated June 10, 1991.

found that five of the 19 towns – nearly 25% – had less than 10% active burrows. In addition, they found that most active colonies were isolated from each other (i.e., were farther apart than standard prairie dog dispersal distances). Only one of the GPD populations cited by these authors measured over 100 acres, and this was on the Curecanti National Recreation Area, which, as petitioners discuss below, is continually exposed to lethal control and plague. 58% (21 of the 36) of the colonies in this study measured 10 acres or less.

Currently, the state estimates that there is a minimum of 85,795 acres of GPDs in Colorado (Knowles 2002). A 1990 state Department of Agriculture survey estimated 153,300 acres of prairie dogs in counties in which the GPD occurred, and Fitzgerald modified this to eliminate probable black-tailed acreages with a resulting estimate of 108,300 acres of GPDs in the state (CDA 1990). However, those estimates have been questioned as inflated (Fitzgerald 1991; Clark, pers. comm., 1998; Knowles 2002). In fact, Clark (Black-footed Ferret Recovery Group, pers. comm., 1998) conducted a follow-up phone survey and county personnel generally did not know how much prairie dog acreage occurred in their county or cited acreages much lower than the state survey. Knowles (2002) suggests that GPDs in the state are either declining or are stable at substantially reduced levels. The Colorado Division of Wildlife's COVERS program describes the global and state population trend as "declining slowly; or unknown, but thought to be declining," and describes its global distribution trend as "slowly declining, or has experienced large historical reduction" (CDOW 1999).

### New Mexico

Early in the 20<sup>th</sup> century, Ligon (1914) described abundant populations of the species in his New Mexico entries: "I find prairie dogs abundant on and near the Tula Rosa River, above Reserve" (p. 9), "Dogs rather abundant from Bill Night Gap, to Arizona and New Mexico state line, where they extend well up into the mountains" (p. 14). Subsequently, GPDs have declined significantly in the state, due to poisoning and sylvatic plague (Findley et al. 1975; Hubbard and Schmitt 1984; Knowles 2002).

R.V. Shriver of the U.S. Bureau of Sports Fisheries and Wildlife stated that, after almost a decade of eradication efforts, by 1919 prairie dog acreage in New Mexico had been reduced to 3.4 million acres on federal lands and 8.6 million acres on private lands. By 1965 (the year in which Shriver was reporting), that acreage had been further reduced to 250,000 acres on Navajo lands, and only 120,000 acres on federal and private lands, for a total of 370,000 acres. This acreage included both Gunnison's and black-tailed prairie dogs within the state (Shriver 1965). By 1971, a census of both Gunnison's and black-tailed prairie dog acreage in the state indicated further decline, with a total of 840 colonies covering 248,000 acres (U.S. Department of Interior 1971, cited in Stuart and Christensen 1973).

Findley et al. (1975: 134) also describe a trend of GPD decline, "Formerly they were common around Albuquerque, but now they have disappeared from the middle Rio

Grande Valley. In the upper Rio Grande Valley, the upper Chama Valley, and the San Juan-Chaco basin one may still expect to see a few animals along the roadsides.”

Continued decreases were reported in the 1980s. In 1971, FWS reported GPDs on 14,210 ha (35,100 ac) in Catron County, 8,693 ha (21,480 ac) in McKinley County, and 12,607 ha (31,140 ac) in Valencia County. The mean size of the 79 colonies in Catron County was 180 ha (444 ac), the mean size of the 73 colonies visited in McKinley County was 119 ha (294 ac), and the mean size of the 58 colonies visited in Valencia County was 217 ha (537 ac). Less than a decade later, the mean colony size on the Apache-Sitgreaves National Forest (NM portion is located in Catron County) was only 9.85 ha (24.3 ac) and on the Cibola National Forest (partially located in Socorro, McKinley, and Catron Counties) only 39.68 ha (98 ac) (Ruffner 1980).

Bodenchuk reported in 1981 that GPDs occupied 107,574 acres, as reported by landowners and county extension agents. GPDs were reported on 70,905 acres of private lands (66.2% of total reported), 15,925 acres of state lands (14.8%); 10,205 acres of BLM lands (9.5%), 426 acres on USFS lands (0.4%), and 9,743 acres on Native American reservations (9.1%). By extrapolation, Bodenchuk (1981) suggested a total of 497,012-518,720 acres of both GPDs and black-tailed prairie dogs statewide.

In the 1980s, drawing from Bodenchuk’s (1981) prairie dog survey, Hubbard and Schmidt (1984) calculated that prairie dog occupancy of counties in the state ranges from 0-0.98% of county area. Based on Bodenchuk’s lower estimate of 497,012 acres of both prairie dog species in the state, Hubbard and Schmitt (1984) estimated only 0.64% of the state’s acreage was occupied by prairie dogs. Knowles (2002) calculates that there may have been 4.5 million acres occupied by GPDs in New Mexico prior to intense poisoning campaigns but that acreage may have declined to only 75,000 acres by the 1980s. This latter figure is much lower than the acreage measured in only three counties in the GPDs range in 1971 (Ruffner 1980) and is substantially lower than the overall GPD acreage reported by Bodenchuk (1981).

Small GPD colonies seem to be the norm in New Mexico. In 1996, Sager documented a total of 34 individual GPDs at six sites in western Colfax and Mora Counties (Sager 1996). BLM has also conducted surveys that overwhelmingly demonstrate extremely small remaining colonies. For instance, despite extensive survey effort in recent years, active GPD colonies have been recorded at only 15 sites since 1973 in the Albuquerque Field Office of the BLM. In a 2002 field survey for that office, actual GPDs were observed at only two sites. No acreages are given, although from reports it seems these are very small populations.<sup>11</sup>

Surveys conducted in the Taos Field Office are similarly bleak. Open records documents petitioners examined indicated 18 colonies that appeared to be either inactive or contained less than 10 burrows; 16 colonies on which two or fewer GPDs were

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<sup>11</sup>Information was obtained from documents received from the Albuquerque Field Office of the BLM in NM. The reports are from a “Wildlife Management Biologist” with no name given. Documents are dated November 7, 2002 and October 7, 2003.

observed despite clear weather; and six colonies on which 0 or 1 GPD was observed, but which contained more than ten burrows and were surveyed during less than optimal weather.<sup>12</sup> Altogether, no more than two prairie dogs were observed on any of the colonies surveyed in the Taos Field Office.

In the Farmington Field Office, surveys conducted by San Juan College students and faculty indicated 16 colonies ranging in size from 7.6-162.3 acres. While apparently larger than colony sizes on the Albuquerque or Taos districts, the total area calculated to be occupied by GPDs in the Farmington Field Office is only 756 acres. All but one of the colonies (the largest) is less than 100 acres (Lorance et al. 2002). These survey results stand in sharp contrast with the early reports of extensive populations in many areas of the state (e.g., Bailey 1932) and is evidence that current populations of the species in the state occur in small, scattered remnant populations.

It seems that GPD acreage has significantly declined on BLM lands in the last few decades, given Bodenchuk's (1981) estimate of over 10,000 acres of GPDs on these federal lands, along with his proviso that there was "an apparent reluctance of BLM permittees to report prairie dog towns. Since the BLM was not allowing control during the period of the survey, several permittees verbally indicated that they would not report the towns and might control them without BLM consent" (Bodenchuk 1981: 4) (we discuss lack of BLM restrictions on poisoning and shooting below).

Indeed, a Hawks Aloft (2000) survey and Cook et al. (2003) indicate that GPDs have nearly disappeared from the Plains of San Agustin (in Socorro and Catron Counties), a good portion of which is managed by the BLM, in contrast to the Estancia Valley, which is primarily private land operated by many different landowners. Cook et al. (2003) suggest that eradication efforts are more intense on the Plains of San Agustin, perhaps because much of the land is used by a relatively small number of BLM grazing permittees, thus facilitating coordination for eradication efforts. Write Hawks Aloft (2000),

The Plains of San Agustin, an area in west central New Mexico, historically supported a large population of prairie dogs and also had the highest densities of nesting ferruginous hawks in the state. Three years of surveys conducted by Hawks Aloft suggest a population decline of the ferruginous hawk in this area that is most likely associated with the near eradication of prairie dogs.

Cook et al. (2003) noted a total of six towns within the Plains of San Agustin, with an average town size of 33 +/- 31 ha (81.5 +/- 76.6 ac) and a total prairie dog acreage of 214 ha (528.6 ac). The Estancia Valley had greater total GPD acreage (and consequently, more ferruginous hawks). 28 colonies were located, and 25 of these colonies were mapped. Average colony size was 36 +/- 31 ha (88.9 +/- 76.6 ac) and a total area across colonies of 919 ha (2270.0 ac). However, in the Estancia Valley, while 43 prairie dog

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<sup>12</sup>We included reports in the latter category of less than optimal weather if weather conditions were not stated.

towns were located in 1999, only 27 of these colonies (plus one new active town) were located one year later (Cook et al. 2003).

In addition, prairie dog numbers in the Albuquerque region are acknowledged as declining "from various kinds of prairie dog control."<sup>13</sup>

Davidson (pers. comm.) consulted with a former Wildlife Services officer who had conducted prairie dog extermination on the Sevilleta National Wildlife Refuge during the 1960-1970s. All of the areas poisoned were grassland habitat, which is the dominant habitat type on the refuge. Only one small town of approximately 3 acres remained up until the early 1990s. Since, the refuge has been recolonized by another town, which now measures approximately 10 acres. Therefore, despite extensive grassland habitat, the refuge has scant prairie dog populations, which can be traced to eradication efforts.

It does not appear that there are any sizeable GPD complexes remaining in New Mexico, and, according to the state, the trend is at best stable (Knowles 2002). However, if the population trend is stable, this stability is at a greatly reduced level (Hubbard and Schmitt 1984).

## Utah

In 2002, 3,779 acres of GPDs were mapped on public lands (UDWR 2003). Colony size averaged 74.5 ha (183.9 acres), and most colonies were larger than 30 ha (74.1 ac). While some areas contained robust populations of GPDs, at least two areas, primarily comprising federal lands – Lisbon Valley and Tank Mesa – had few GPDs and low numbers of active burrows (Seglund 2002). The trend for GPD populations and acreage across the GPD's range in the state (portions of San Juan and Grand Counties) is unclear.

## Land ownership

Across the GPD's range, 33.2% of potential habitat is located on private land, 26% on tribal lands, 19.4% on USFS lands, 12.4% on BLM lands, and 7.7% on state lands.<sup>14</sup> USFS, BLM, and state lands together contain 39.5% of potential GPD habitat. Land ownership patterns vary, however, among the four different states. In Arizona, GPD habitat is primarily on Native American and private lands: 60.2% is on Native American reservations, 21.8% is privately held, 12.9% is state trust land, 1.9% on USFS lands, 1.4% is managed by the BLM, and other county, state, and federal entities each manage less than 1% of the total GPD habitat. In the Aubrey Valley (AZ), site of the largest known GPD complex, 33% of the land is private, 22% are state trust lands, and 45% is on Native American reservations (61 Fed. Reg. 11320, 11323 (March 20, 1996)).

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<sup>13</sup>Environmental Assessment for the Establishment of a Prairie Dog Relocation Site at Kirtland Air Force Base (NM) 1999.

<sup>14</sup>Land ownership acreages and proportions were obtained via GIS analysis of GAP vegetation data and habitat modeling for the Gunnison's prairie dog. While GAP data has been critiqued, it is the best data available for discerning land ownership across various categories.

In Colorado, GPD habitat is primarily on private, USFS, and BLM lands: 44.8% of GPD habitat is privately held, 33.6% is managed by the U.S. Forest Service, 14.7% is operated by the BLM, 4.6% is on state lands, 1.3% is on NPS lands, and Native American reservations, USFWS, and Department of Defense each operate less than 1% of the land within the Gunnison's range in the state.

State officials in New Mexico believe that approximately half of GPD acreage is on private lands (Knowles 2002). Our analysis indicates that, in New Mexico, GPD habitat is primarily on private, Native American, USFS, and BLM lands: 31.9% of potential GPD habitat occurs on private lands, 23.5% on Native American lands, 20.3% on USFS holdings, 16.1% on BLM lands, 7% on state lands (including state school lands, state parks, and state wildlife agency lands), and less than 1% each on National Park Service, Department of Defense, Bureau of Reclamation, and FWS holdings.

In Utah, GPD habitat is primarily on private, BLM, and Native American lands: 35.5% is on private lands; 30.3% is on BLM lands; 29.0% is on Native American holdings; 4.6% on state lands; and 0.6% on USFS land.

While there are significant federal holdings in the range of the GPD, Gunnison's prairie dog colonies on federal lands are generally small. BLM lands reported no large colonies, with 80-200 acre colonies being the largest (Knowles 2002). Seglund (2002) noted that GPD populations were small in Lisbon Valley and Tank Mesa in Utah, both of which are primarily on BLM land. USFS lands also typically have small colonies, whether due to plague or poisoning (discussed below). As discussed below, these small colonies are more vulnerable to extirpation.

Rangewide, there may be 200,000-335,600 acres of GPDs currently in existence with perhaps a total population of 1-2 million individuals (Knowles 2002). In contrast, approximately four million acres of GPDs were estimated as occurring in Arizona in the early 1900s (even after intense poisoning had begun); approximately 4.5 million acres occurred in New Mexico; and nearly a million acres of GPDs once existed in only a fraction of the GPDs range in Colorado. Remaining GPD populations are often scattered and small, and few large complexes exist. Remnant populations are exposed to multiple threats of plague, poisoning, shooting, and habitat destruction, as petitioners demonstrate below.

### **Identified Threats to the Petitioned Species: Criteria for Listing**

Gunnison's prairie dogs meet all five criteria for listing under the ESA:

1. Present and threatened destruction, modification, and curtailment of habitat and range;
2. Overutilization of habitat for commercial and recreational purposes;
3. Disease;

4. The inadequacy of existing regulatory mechanisms; and
5. Other natural or manmade factors affecting its continued existence.

In their 1982 survey of GPD colonies in southwest Colorado and northeast New Mexico, Clark et al. (1982: 581) remarked,

Evidence of human presence – roads, spent shell casings, plowing, and some evidence of poisoning – was obvious on many colonies. Our observations in this study and elsewhere indicate that most prairie dog colonies are negatively influenced by humans; only a few areas still contain large, undisturbed colonies.

To this list of threats we would add sylvatic plague. As petitioners demonstrate in this section, the multiple threats to which these researchers point endure to the present, causing continued declines of the Gunnison's prairie dog.

### **I. Present and Threatened Destruction, Modification, or Curtailment of Habitat or Range.**

#### Habitat loss and fragmentation

Habitat loss has been implicated as a significant cause of imperilment for 85% of the species listed under the ESA (Wilcove et al. 1993). Habitat loss has also played a role in the imperilment of the Gunnison's prairie dog. This includes both absolute loss of habitat with residential and commercial construction in Flagstaff, Arizona; Santa Fe, Albuquerque, and Taos, New Mexico; and other municipalities throughout the GPD's range. In addition, GPD habitat has been converted to cropland and has been degraded by livestock ranching and oil and gas development.

#### *Conversion to cropland, municipal development, and other use*

Mesic and bottomland habitat has been converted to cropland in the GPD's range (Knowles 2002). In addition, urban development in Arizona and New Mexico has reduced GPD habitat. While this threat may be considered very localized (Knowles 2002; Wagner 2002), it should be considered in the context of the multiple threats faced by GPDs, including isolation and fragmentation, plague, poisoning, and shooting.

#### **1. Santa Fe, NM.**

Table 1 documents the destruction of 205 acres from development, 90 acres via poisoning associated with urban development, and 39 acres from relocation of prairie dog colonies in Santa Fe from 1996 to 2003.

Table 1. Estimated Acreage of Known Urban Gunnison's Prairie Dog Populations Eliminated by Development 1996 – 2003 in Santa Fe, New Mexico.<sup>15</sup>

<b>Location</b>	<b>Acres lost to Development</b>	<b>Acres poisoned</b>	<b>Acres relocated</b>
<b>Private Land</b>			
Century Bank Shopping Center; Cerrillos & Airport Road*	6	0	10 individuals
State Library Complex Cerrillos & Camino Carlos Rey*	5	0	3
Albertson's Complex Saint Francis & Zia*	5	0	0
Alberston's/ Target Complex at Cerrillos Rd*	10	0	15 individuals
Housing development Bultolf Rd*	3	2	30 individuals
5 <sup>th</sup> Street Offices*	5	0	0
Airport & Country Club Rds*	10	0	0
Airport & Country Club Rds	5	0	25 individuals
Walgreen's at Saint Francis & Zia	2	0	0
Lots off of Agua Fria*	12	3	0
Valdes Business Park (in progress)*	28	0	2
Off County Road 62	60	0	0
<b>Subtotal Acreage Destroyed Via Private Lands Development</b>	<b>154</b>	<b>5</b>	<b>5 acres + 80 individuals</b>
<b>School &amp; University Properties</b>			
College of Santa Fe	5	25	2
Indian School Cerrillos and Second Street*	20	40	20
Ortiz Middle School (SF Public School System)	10	0	0
Capitol High Paso de Sol (SF Public School System)	N/A	10	5
Santa Fe High (SF Public School System)*	4	5	2
DeVargas Middle School (SF Public School System)	1	5	5
Alameda Middle School	2	0	1

<sup>15</sup>Based on personal observations of Paula Martin, biologist.

Accidental Bulldozing off Rufina Road (Santa Fe Public Schools bulldozed the wrong lot)*	10	0	0
<b>Subtotal Acreage Destroyed on School Properties</b>	<b>51</b>	<b>85</b>	<b>35</b>
County Lands			
<b>Total Acreage Destroyed</b>	<b>205</b>	<b>90</b>	<b>40 acres + 80 individuals</b>

\*Colony now extirpated.

Prior to 1996, the destruction of GPDs caused by developments such as the Villa Linda Mall (20 acres), and the shopping complex at St. Michael’s and 5th Street (5 acres) incited local citizens to advocate protection for the species in Santa Fe.

Gunnison’s prairie dogs have no protection in the region surrounding Santa Fe. For example, Eldorado is a 4 square mile suburb located approximately 10 miles from Santa Fe off of Highway 285. Once known as “The Simpson Ranch,” today 2,700 lots have been developed or proposed for development. This area once contained extensive acreage of GPDs. Local residents estimate that prairie dogs inhabited about 80% of the land in 1996, compared to about 30% in 2003. The 50% loss was due to both development and poisoning. Prairie dogs have been extirpated from most properties and the remaining populations are highly fragmented, consisting of only a few individuals (2-10 burrows). Poisoning is rampant (pers. obs. Lynne and Jonas Snyder, David Van Hulsteyen, Paula Martin).

In addition, the Agora shopping center was built on approximately 2 acres of prairie dogs and additional commercial development (e.g., a movie complex, offices, shopping) is planned nearby, which will destroy about 5-10 acres of scattered individuals.

Urban sprawl is also occurring south of Eldorado on 285 and is encroaching on GPD habitat.

## 2. Albuquerque, NM.<sup>16</sup>

Development in the city limits of Albuquerque has already eliminated most known GPD populations. Most known populations exist on the far eastern edge of the City between Tramway and Juan Tabo from I-40 to where Tramway turns west. Based on the distances between scattered populations, prairie dogs might have inhabited most of this several thousand-acre region, which is zoned entirely for development.<sup>17</sup> Over the past few years, approximately 154 acres of GPDs have been completely lost to development. Only 26 acres have been relocated. In some cases, a few prairie dogs are surviving in marginal conditions in the right of way corridors of highways and major

<sup>16</sup>Based on personal observations of Paula Martin, biologist.

<sup>17</sup>General Land-Use Planning Map. 2003. City of Albuquerque Planning Dept.

thoroughfares. They are continually subject to mortality due to traffic, starvation, potential road construction, and right of way improvements. The recent Interstate 40 project destroyed several miles of prairie dogs living in these right of way areas.

Additionally, several suburbs of Albuquerque, (Rio Rancho, Bernalillo, Edgewood), have experienced considerable growth within the last five years. There are known prairie dog populations that have been eradicated in each area and there are no relocation programs available.

### 3. Taos, NM & Vicinity.<sup>18</sup>

As of early 2004, there appear to be four primary regions that prairie dogs inhabit in and around Taos. The general conditions of the habitat are compromised, mostly due to sagebrush encroachment and irrigated cropland. However, sparse GPD populations reside in the sagebrush in areas of approximately 0.25 acre to 15 acres throughout the four areas. Sites where the brush has been cleared tend to have densely populated, highly active prairie dog colonies. Burrow densities at one location are about 30 per acre (Medicine Dog Ranch). Due to brush cover and private property it is difficult to assess how many actual populations are in these areas.

The Taos Airport had some prairie dogs after clearing away brush, but chemical control began in 2001. The area of highway out to the gorge around the airport may have some populations, but none are documented.

**Main Street Region:** The main thoroughfare (Paseo Del Pueblo) through Taos has about 2.3 miles of scattered prairie dog populations on virtually every empty lot along the development corridor. The prairie dogs tend to inhabit a swath about 1.5 - 2 miles wide along either side of the Paseo. Currently, two large areas and four smaller lots are proposed for commercial development on the Paseo. The 2002 flood control project at the Paseo and Canyon Roads eliminated about 4 acres of GPDs through excavation. The Sonic was built the same year, destroying about 1 acre, including landscaping.

**The Plaza Region:** Individual prairie dogs are occasionally reported around the Taos Plaza. A lot of approximately 5 acres on Quesnel Road located adjacent to the plaza on the east side, where the prairie dogs appear to be chemically controlled, may be the source of prairie dogs on the plaza. A few blocks east of the Plaza on Kit Carson Road is an approximately 50-acre field of prairie dogs. Apartments have recently been built on part of the population. Local reports suggest that this may be the largest colony in Taos, but it is declining in area due to development. Some other small populations are found in adjacent to the plaza on the west side, but most of the region is the “valley floor” and is heavily irrigated and prairie dogs occur in extremely small, scattered populations. On the west side of the Plaza are small pockets of prairie dogs located several blocks from Town Hall.

**Southeast Region:** An 8-acre population was recently destroyed by development

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<sup>18</sup>Based on personal observations of Paula Martin, biologist.

and very heavy vehicle mortality on the very eastern edge of the Taos Mesa. Dozens of scattered populations in Taos' southeastern region have perished from the development of "ranchettes" in the last 5 years. Some regions around Canyon, Weimer and Gusdorf Roads have ongoing commercial and subdivision development.

**Northwest Region:** Salazar Road runs parallel to the Paseo and tends to have the same circumstances of prairie dogs inhabiting vacant lots which are subject to both new commercial and residential development.

**Taos Vicinity:** In El Prado, a village near Taos, and other outlying areas, prairie dogs remain in only scattered, small colonies. In the villages of Arroyo Seco and Des Montes, some small prairie dog populations persist but are subject to development. In the Valdez Valley, there are reports of prairie dogs once inhabiting the valley, but they appear to have been extirpated from nearly the entire valley.

There are no protections or planned open space for prairie dogs in and around Taos. Relocation programs have been difficult to implement due to many landowners' and elected officials' hostility toward GPD conservation. Poisoning is the common response to prairie dogs in this region. Though popular among many local residents, even the few prairie dogs in front of the Taos Visitor's Center have been poisoned.

#### 4. Flagstaff, AZ & Vicinity

Over the past decade there has been significant loss of prairie dog habitat both inside and outside the city limits in Flagstaff. While plague has been responsible for the loss of some prairie dog communities the following documents loss of habitat through development and intentional poisoning.

##### **Inside Flagstaff city limits:**

- Foxglenn Park with two large soccer fields and other amenities was completed in 2003. It destroyed approximately **ten acres** of prairie dog habitat. 148 prairie dogs were relocated from the site before the park was developed.
- Plans are underway to develop **92 acres** to expand the shopping mall in east Flagstaff. 299 prairie dogs were relocated from the site last summer. Construction will begin later this year. The remaining prairie dogs (many!) will be destroyed.
- The interchange at Enterprise and Butler in central Flagstaff was re-built last year and destroyed about **five acres** of prairie dog habitat. Over the last three years another **ten acres** prairie dog habitat near the railroad tracks in the same area has been destroyed.
- An overpass for the railroad tracks is being built in east Flagstaff and is destroying about **15 acres** of prairie dog habitat.
- About ten years ago a strip mall with a Target was built near the university in southeast Flagstaff and destroyed about **ten acres** of prairie dog habitat.
- About ten years ago, the university built a parking lot of about **five acres** on a thriving prairie dog town.

- On old Route 66 between Milton Rd. and I 40 in southeast Flagstaff, approximately **20 acres** of prairie dog habitat has been destroyed by development of various kinds.
- In southeast Flagstaff there is a golf course, a driving range and five ball fields on what was once probably **200 acres** of prairie dog habitat. For several years the golf course trapped prairie dogs and sent them to the black footed ferret reintroduction project in the Aubrey Valley; now the golf course poisons the prairie dogs. When grass was installed on the driving range last year, the prairie dogs were poisoned. The City of Flagstaff regularly poisons the prairie dogs that burrow onto the ball fields (the prairie dogs love the grass on the ball fields during the drought of the last few years). To top it off the City has purchased **80 acres** adjacent to the ball fields for future ball field development. There are thousands of prairie dogs on the land recently purchased.

#### **Outside the Flagstaff city limits:**

- Northeast of the Flagstaff city limits is a forty square mile area called Doney Park. There are many areas of development in this large area, but the entire area is referred to as Doney Park because it is served by the Doney Park Water System. The terrain is primarily prairie although there are sections of trees, Ponderosa pines, pinon and juniper. This area has been the fastest growing part of the Flagstaff urban area for the last five years. In a Feb. 9, 2004, article in the Arizona Daily Sun Dave Weger, Coconino County engineer, said that the Doney Park area is close to being built out, i.e. when all individual lots have been purchased. The average size of these lots is 2 ½ acres. There are no studies that I am aware of that give an estimate of the number of prairie dogs before or after development. Obviously, prairie dogs were directly destroyed or displaced with construction of homes and roads. It is well known that many people in this area use pest control companies to destroy prairie dogs. In 2000 about 40 prairie dogs were relocated from the site where a ball field and other park facilities were later developed. One developer of two acre parcels is required to work with Habitat Harmony and AZ Game & Fish for the humane treatment of the prairie dogs in their development of approximately 100 lots. If I were to guess with the experience of selling real estate in the Flagstaff area for the last 27 years, I would say that **approximately one half of the forty square miles** of Doney Park is, or was, prairie dog habitat.
- A new development on 640 acres immediately northwest of the city limits has an area of prairie habitat on perhaps **60 acres**. The minimum size of lot in this area is one acre. These prairie dogs are subject to the same pressure as those in Doney Park..
- In the Parks area approximately 18 miles west of Flagstaff, there is prairie dog habitat in large prairies both north and south of Interstate 40. There is rural development in that area but not on as quick a pace as in Doney Park. It is estimated that there might be **two or three sections** (640 acres each) of prairie dog habitat subject to slow development in this area.

- Another development that destroyed approximately **40 acres** of prairie dogs is west of Flagstaff on Hwy. 180, just west of Peak View Store. There are different housing developments on both sides of the highway.

USFS (1998) describes that the Badderville area as “quickly becoming subdivided,” with consequent negative impacts on prairie dogs. In addition, USFS staff noted that many private land colonies in Flagstaff have been eliminated through development (Exhibit 5: Coconino National Forest Open Records Documents).

Build-out of smaller municipalities within the GPD’s range has also caused, and continues to cause, GPD population and acreage reductions. For instance, private land development in the Montrose area (CO) has eliminated multiple prairie dog colonies (See Exhibit 4: Gunnison’s Prairie Dog Meeting Notes). A 24-acre colony in the city of Gunnison (CO), numbered Colony #59 in Capodice and Harrell (2003), is facing imminent destruction by residential construction. Other uses reducing GPD populations and acreage include 1) the extension of runways at the Show Low Municipal Airport in Arizona, as assessed in 1993 (Coffman Associates 1993); 2) the construction of a telescope observatory and accompanying infrastructure at W Mountain Ranch in Gunnison Valley (CO);<sup>19</sup> and 3) gravel pit development in Gunnison County in Colorado, which destroyed approximately 75% of a 48-acre town (Colony #63 in Capodice and Harrell (2003)).

On the case of the gravel pit in Gunnison County, surveyors write, that, originally it seemed that the county would place the pit in a less active area of the colony. However,

After further investigation in the spring of 2003 it appears that the county decided to place the gravel pit in the core of the town and approximately 75% of the town has been destroyed. Further communication with individuals in Gunnison has revealed that the county is now flood irrigating the area around the gravel pit including what is left of the town. Prognosis for the town is not good and for all practical purposes the town appears to be gone (Capodice and Harrell 2003: 31).

The detailed insight into the fate of this colony provides useful insights on at least three counts: 1) a 48-acre colony has almost totally vanished; 2) this 48-acre colony was located in a region where colonies of 10 acres or less are the norm (see earlier discussion); and 3) this destruction was carried out, deliberately, by a county government, very recently.

Both Arizona and New Mexico permit the relocation of GPDs displaced by development (Knowles 2002). However, county ordinances in New Mexico are erecting barriers to prairie dog relocation (e.g., Mora County in New Mexico), thereby hindering an important restoration tool. In addition, for inter-county relocation of prairie dogs, the

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<sup>19</sup>See “Final Report Gunnison Valley Observatory Science and Technology Center Site Environmental Assessment and Public Opinion Survey,” Prepared by Western State College Environmental Studies 400 Class, May 7, 2003.

state of Colorado passed a law in 1999 requiring the approval of the county commission of the county into which prairie dogs were being relocated (C.R.S. 35-7-203), thereby erecting a nearly insurmountable barrier to prairie dog restoration in rural areas where adequately sized reserves are feasible. In Arizona, Wagner (2002) has advocated reintroduction of GPDs to areas where they have been eradicated in order to expand the species' range within that state, as a step toward GPD conservation.

As petitioners have described above, a portion of urban prairie dog populations are subject to translocation (Santa Fe & Albuquerque, NM. Flagstaff, AZ). However, even in those municipalities such as Santa Fe, New Mexico, where significant translocation is occurring (as opposed to outright destruction of resident prairie dogs via bulldozing or poisoning), it is utilized in less than half of the cases where urban acreage is developed (see Table 1). Regardless of whether the prairie dogs are relocated, development causes a permanent conversion of prairie dog habitat. Additionally, large regions of historical Gunnison's prairie dog habitat have experienced severe noxious weed infestation and soil erosion. Prairie dog reintroduction sites that contain appropriate vegetation conditions are difficult to acquire, tend to be fragile, and favorable conditions dramatically degrade during drought conditions. Some regions within Gunnison's habitat have experienced minimal vegetation re-growth in recent years. Drought and severely compromised habitat conditions may contribute to the extirpation of the reintroduced populations or diminish the survival of viable reintroduced populations over time.

One of the primary areas where prairie dogs are being relocated to in Albuquerque is Montesa Park, a City Open Space adjacent to Kirtland Air Force Base. The small, confined site is completely devoid of perennial vegetation and is dominated by Russian thistle (*Salsola kali*), which is an annual weed. This site provides marginal habitat with highly unstable food resources, and most of the prairie dogs relocated to this site did not survive.

Additional threats to GPD habitat include water impoundments. On the Curecanti National Recreation Area in Colorado, GPD habitat was, according to NPS, "drastically reduced" with the construction of Blue Mesa Reservoir. GPD habitat declined from 830 ha (2,050 ac) to 500 ha (1,225 ac) with the construction of this reservoir (NPS 1995: xii). Rayer (1985) suggested that stress related to a substantial loss in habitat due to the storage of water in the Blue Mesa Reservoir might have factored in the contraction of plague on her study site on the Curecanti. More generally, with the loss of habitat on this NPS site, GPDs have been displaced to areas where they are more likely to be perceived as in conflict with people, and recreational use of the Curecanti has increased (NPS 1995). As discussed in the inadequacy of regulatory mechanisms section below, GPDs have experienced repeated lethal control at Curecanti, which is, in part, attributable to the initial habitat loss suffered with the construction of Blue Mesa Reservoir. As of 2001, NPS estimated that only four colonies of GPDs, totaling 252 acres, existed on the Curecanti (See Exhibit 4: Gunnison's Prairie Dog Meeting Notes).

Not safe on National Park Service lands, GPDs are also not safe on Colorado Division of Wildlife lands. Capodice and Harrell (2003) note that Colony #25 in their

survey was plowed under by the state wildlife agency, reducing the colony's size from seven acres to two acres.

GPD habitat is also harmed on other public lands. For instance, an access road to a shooting range was proposed to run through Gunnison's prairie dog occupied habitat on the Coconino National Forest (AZ). In addition to habitat degradation, increased access by humans – especially armed with guns, on their way to a shooting range – can result in increased shooting of prairie dogs and the Forest Service acknowledges that recreational shooting of prairie dogs already occurs on the Coconino (Gene Waldrip, USFS, pers. comm., May 16, 2000). In addition, the Rudd Tank Road, also constructed on the Coconino, was proposed to run through a prairie dog town (referenced in USFS 1996).

### *Rangeland Management Impacts*

Noxious Weed Proliferation. The proliferation of non-native noxious weeds can degrade GPD habitat. Shalaway and Slobdchikoff (1988) found that the diet of Gunnison's prairie dogs was 60-80% native plants. Slodchikoff et al. (1988: 407) recommend that, "Gunnison's prairie dogs must be conserved by maintaining habitats with a large component of native vegetation." Capodice and Harrell (2003) note that at least one GPD colony on National Park Service land was plowed and seeded with crested wheat grass (*Agropyron cristatum*). As of 2002, the colony was inactive.

In a review of the Coconino National Forest (AZ) plan, the issue of livestock grazing impacts on GPDs was reviewed,

Demographic and behavioral differences have been observed within local colonies. These differences appear to be related to vegetation differences observed within the colonies. Where native vegetation is more abundant, general grassland health is better, prairie dogs are mated, reproduction is higher, and less single individuals occupy the colony. These colonies are on fewer acres and the total number of prairie dogs is less. The native vegetation provides for greater fitness, therefore, more reproduction than colonies dominated by non-native vegetation. Where non-native vegetation occurs, there are fewer mated individuals, reproduction is lower and the total number of prairie dogs per colony is greater. The non-native vegetation colonies mostly occur in areas where there is evidence of past agricultural activities, development, and or heavy livestock grazing.

Along with the demographic differences there are some behavioral differences recorded within colonies. Within the native vegetation colonies, the prairie dogs are spending more of their time caring for young, and less time in a defensive mode watching for predators (USFS 1996: 90).

These observations, in general, agree with Hoogland's (2001) suggestions concerning the positive relationship between habitat quality and reproductive success. Despite the Coconino's disclosure of the impacts on prairie dogs from grazing, this activity has not been appreciably reduced. While moderate well-managed grazing can be beneficial to prairie dogs, including Gunnison's, across the Southwest Forest Service Region 85% of USFS grazing allotments were in violation of lease terms or monitoring requirements in 2002. Some 26 out of 27 allotments on the Coconino were in violation. USFS (1996) also acknowledges that, along with the habitat degradation caused by livestock grazing, grazing permittees consideration of GPDs as a pest could lead to additional impacts from lethal control.

Livestock grazing, which is an extensive land use within the GPD's range, can lead to the proliferation of noxious weeds (Jones 2001), as well as other impacts that may harm prairie dogs. Grazing by livestock can aid the spread and establishment of alien species in three ways: 1) dispersing seeds in hair/wool and dung; 2) opening up habitat for weedy species; and 3) reducing competition from native species by eating them (Fleischner 1994). A multitude of studies have found increased densities, cover or biomass of exotic plant species in grazed versus ungrazed sites (Green and Kaufman 1995; Drut 1994; Harper et al. 1996). Kitchen and Hall (1996) found that spring grazing by sheep resulted in higher percent cover of exotic annuals, and favored halogeton and cheatgrass (*Bromus tectorum*) expansion. Grazing can reduce leaf area to the point where native plants cannot complete photosynthesis, or can prevent native plants from reaching reproductive maturity (Knapp 1996). Annual noxious weeds, such as cheatgrass, have a competitive advantage over native plants in overgrazed environments. Livestock also can transport noxious weed seeds on their hides or hooves (Knapp 1996).

In a recent extensive literature review, Jones (2001) illustrated how cattle disseminate weed seeds in their hair/wool and hooves; increase the "invasibility" of sites; and maintain weedy communities by preferentially grazing on natives. The ability of cattle to increase a site's susceptibility to invasion has received the most attention from the scientific community. Sites become invulnerable due to increased bare soils as a result of grazing, which offer greater opportunity for weed establishment, with less competition.<sup>20</sup> Evans and Young (1972) found that increased soil erosion [shown to be caused by grazing] also loosens surface soils and helps bury seeds. Exotic seeds adapted to more erosion-prone environments will benefit from this alteration while native species likely will not. Deposition of nitrogen-rich livestock dung also increases invasion of nitrophilous weeds such as cheatgrass by stimulating germination and enhancing growth over that of native plants (Evans and Young 1975; Smith and Nowak 1990; Trent et al. 1994; Young and Allen 1997). Finally, cattle grazing can compound the above impacts by creating warmer and drier soil microclimates, through soil compaction, and loss of plant, microbiotic crust and litter cover. The resulting warmer, drier microclimate reduces the competitive vigor of many native grasses (Piemeissal 1951; Archer and Smeins 1991), thus further increasing viability of aggressive exotics.

Once they are established, weeds negatively impact western arid ecosystems in numerous ways. Weed infestations reduce biodiversity (Randall 1996), increase fire frequency (Esque 1999; Brooks et al. 1999), disrupt nutrient cycling (Vitousek 1990), alter soil microclimate (Evans and Young 1984), reduce effectiveness of wildlife habitat (Davidson et al. 1996; Knick and Rotenberry 1997), and can expedite loss of topsoil in xeric environments (Lacy et al. 1989).

The evidence for cattle's implication in spread and establishment of exotic weeds is greater than any evidence to the contrary. Examples of documented cattle harms to native plant communities in southern Utah include:

- Rawlings et al. (1997) found that the part of Canyonlands National Park that had been grazed most intensively prior to 1967 has since been extensively invaded by cheatgrass.
- In a study of 530 different rangeland sites in southern Utah, Gelbard (1999) found that cheatgrass cover was five times greater on sites without cryptobiotic soils (disturbed by either cattle or motorized use) than on sites with undisturbed crusts (and 64% of all sites that were disturbed and lacking crusts were attributed to cattle grazing).
- Bich et al. (1995) found that both density and basal area of Indian ricegrass (*Orzopsis hymenoides*), a native bunchgrass, increased with decreasing grazing intensity, while density and foliar cover of snakeweed (*Gutierrezia* spp.) increased with increasing grazing intensity.
- A study in Capitol Reef National Park (Cole et al. 1997) found that pre-settlement middens contained abundant macro-fossils of plant species palatable to livestock, such as winterfat (*Ceratoides lanata*) and Indian ricegrass. Their packrat midden analysis demonstrated that drastic vegetation changes, unprecedented during the last 5,000 years, occurred in this part of southern Utah between roughly 1800 and the present. Species typical of overgrazed range, such as snakeweed, rabbitbrush (*Chrysothamnus nauseosus*), and Russian thistle (*Salsola iberica*) were not recorded in middens prior to the introduction of grazing animals.

In particular, cheatgrass forms monocultures and germinates in the fall when prairie dogs are hibernating, therefore limiting the availability of this exotic grass to prairie dogs before drying up. There may potentially be a lack of alternative food sources for the rest of the active prairie dog season because of the cheatgrass monoculture. In addition, as cheatgrass dries out, the amount of digestible protein decreases (Young and Allen 1997), and prairie dog nutritional needs may not be met. Cheatgrass has taken over vast acreages throughout much of the GPD's range in Arizona and Utah, replacing important prairie dog forage such as blue grama (Ana Davidson, pers. comm.). As discussed below, cheatgrass also changes fire regimes.

The productivity of cheatgrass is extremely variable – in consecutive years, tenfold differences in cheatgrass production have been observed (Young and Allen 1997). Cheatgrass production is extremely low under drought conditions, and may provide no forage in some years (Young and Allen 1997). Stewart and Young (1939, as cited in

Knapp 1996) determined that perennial grasses produced twice as much vegetative biomass as cheatgrass in wet years, and 12 times as much herbage as cheatgrass in drought conditions. In areas where cheatgrass forms dense monocultures, forage options are extremely limited, and small variations in weather may lead to large-scale population swings among native grazers.

Cheatgrass is capable of increasing even in areas where livestock have been excluded (Goodrich et al. 1999) and can out-compete native plants because it produces massive numbers of seeds that accumulate in the seed bank (Young and Allen 1997). Cheatgrass can be infected by a smut (Ustilago bromivora), which can spread to other grasses. The cheatgrass seed bank can perpetuate the presence of this smut (Young and Allen 1997). Cheatgrass develops more rapidly than some native plants. For example, Goodwin et al. (1999) found that cheatgrass roots grew 17 times faster than Idaho fescue (Festuca idahoensis) roots.

In addition, livestock have been implicated in the spread of halogeton. Kitchen and Hall (1996) found that spring grazing by sheep resulted in a higher percent cover of exotic annuals, and favored halogeton and cheatgrass expansion. Halogeton is a noxious weed that concentrates selenium, and can poison livestock (Phinney, personal communication, 2002). Its effects on prairie dogs are unknown. It is possible that halogeton is not palatable to prairie dogs.

Many areas in the West that were once dominated by perennial plant species are now dominated by introduced annuals such as those mentioned above. Overgrazing is a major cause of this conversion. Rather than addressing the threat of exotic weed proliferation, the BLM claims, “grazing can help prevent the spread of undesirable plant species” and can minimize, or at least have no effect on, the spread of invasive weeds such as cheatgrass (See Jones 2001). In both cases the agency cites Sheley (1995), an article that appears in a magazine, not a peer-referred journal. This paper is a two-page set of grazing recommendations, based on no experimental evidence of its own (or any other studies for that matter) that goes into no detail on the “proper grazing management practices” that can supposedly control weeds (Jones 2001).

Alteration of Fire Ecology. Van Pelt (2000) notes the role of both prairie dog elimination and fire suppression in tree and brush invasion of grasslands, which then made those areas unusable to Gunnison’s prairie dogs. Livestock grazing alters fire ecology by causing shrub and exotic weed proliferation and by reducing fuel loads (See Jones 2001). For instance, cheatgrass is extremely susceptible to intense wildfires, and these wildfires actually lead to the spread of cheatgrass across the landscape. Physical disturbances and wildfires both accelerate nitrogen mineralization, and cheatgrass proliferates in areas that have experienced nitrogen enrichment (Young and Allen 1997). Cheatgrass can also survive in areas where mycorrhizal fungi have been drastically reduced (Knapp 1996).

In stands of cheatgrass that lack woody fuel, even intense wildfires do not significantly decrease the number of cheatgrass seeds in the seedbank, which allows for quick reestablishment of this noxious weed (Young and Allen 1997). Hull (1965, as cited in Knapp 1996) estimated that areas dominated by cheatgrass are ten to 500 times more likely to experience wildfire than areas dominated by native bunchgrasses, and he estimated that fire seasons are between one and three months longer in areas dominated by cheatgrass. Fire can then occur so frequently that native shrubs that do not resprout after fire cannot become established by seeds (Knapp 1996). Alternatively, cheatgrass germinates quickly after fire and outcompetes native plants as a colonizer of disturbed areas. In fact, cheatgrass germination success rates can reach 99.5% (Knapp 1996).

In addition, on areas grazed by livestock, there is decreased accumulation of dead grasses and forbs than in areas without livestock. This reduces fire frequency (Cole et al. 1997). The reduction in fuel loads can be dramatic. For instance, Goodrich et al. (1999: 164) found that,

Litter cover was about two times greater in areas protected from livestock or under moderate intensity grazing than in the area that was heavily grazed in spring each year. Reduction in ground cover included not only smaller basal area of perennial grass plants but also lower ability of plants to produce litter.

Reduced fire frequency consequently facilitates shrub encroachment as shrubs susceptible to fire, such as sagebrush, may form inordinately dense stands with fewer fires on the landscape (Austin and Urness 1998). Other authors correlating noxious weed proliferation with increased fire frequency include Esque (1999) and Brooks et al. (1999).

As mentioned previously, Hoogland (2001) has stressed the importance of habitat quality in GPD reproduction. Petitioners are concerned about land uses which cause noxious weed proliferation and alter fire ecology, thus degrading prairie dog habitat.

#### *Transfer of public lands*

Utah's School and Institutional Trust Lands Administration (SITLA) is increasingly offering state parcels for sale to private parties (Williams 2002). To the extent that those parcels are inhabited by GPDs and are sold to private landowners, the proportion of GPDs on private lands would increase and opportunities for proactive conservation of Gunnison's prairie dogs on public lands would therefore decrease.

In addition, in July 2002, the Safford Field Office of the BLM issued an environmental assessment on its plan to transfer federal lands to the State of Arizona. The plan was to transfer 15,234.15 acres of surface estate and 15,172.07 acres of mineral estate in Apache County to the state. The lands were in the St. John's-Springerville area, an area historically hosting extensive GPD populations (See Ligon 1914). There are several Gunnison's prairie dog colonies on the lands that are slated for transfer. In

consultation documents, BLM stated that the land use could change after transfer to the state, as the project area overlies an underground CO<sub>2</sub> gas field, which might be developed via drilling about 200 wells, with related infrastructure such as access roads, an in-field pipeline system, and a 40-acre gas processing plant (Carl Rountree, BLM, memo to FWS Field Supervisor, dated July 16, 2002). In considering the impacts of this land ownership change on burrowing owls, BLM wrote:

Prairie dog towns are unusual enough on the selected lands that it is unlikely enough prairie dog towns would be impacted by long term CO<sub>2</sub> development to reduce use by burrowing owls in the In-Lieu Selection Area.<sup>21</sup>

The confounded logic is apparent – because the prairie dog towns are scarce, the ecological harms of land uses which impact those towns can, according to BLM, be dismissed. We would argue just the opposite – where prairie dog towns are scarce, they deserve especial safeguards, both because they are Gunnison’s prairie dogs are imperiled and because of the keystone role they play.

Of course, as we discuss below, oil and gas development is a threat on BLM lands. However, the BLM has the authority to protect prairie dogs and their habitat through the designation of Areas of Critical Environmental Concern, under the Federal Land Policy & Management Act (43 U.S.C. § 1712(c)(3)). Conversely, on Arizona school lands, the management emphasis is on commodity production, not wildlife.

#### *Oil and gas impacts*

The impacts to prairie dogs of oil and gas exploration, infrastructure, and extraction-related activities have been documented elsewhere (Center for Native Ecosystems 2002). A list of potential impacts on prairie dogs from these operations includes:

- Fragmentation and loss of prairie dog habitat;
- Human disturbance of prairie dogs, including increased wildlife harassment, as well as general disturbance from human presence;
- Road construction, which increases potential for road mortality and shooting;
- New powerlines may increase perching opportunities for raptors, potentially increasing predation on prairie dogs;
- Crushing, burying, and degradation of vegetation;
- Noxious weed proliferation;
- Reduction in forage quality;
- Load noises (including continuous din from compressor stations), which can lead to increased stress among prairie dogs;
- Soil compaction, with negative impacts on prairie dog burrows;
- Direct mortality from heavy equipment; and

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<sup>21</sup>See EA NO. AZ-040-2002-0024, Safford Field Office, U.S. Bureau of Land Management. Dated July 16, 2002.

- Contamination or degradation of habitat through wastewater generated by coal-bed methane extraction (Center for Native Ecosystems 2002).

There are extensive oil and gas operations in the GPD's range. As documented in the above example within the Safford Field Office, CO2 development is a threat. Oil and gas leases have been offered by BLM on over 307,000 acres within the GPD's range in CO, NM, and UT since 2002 alone (Table 2).

Table 2. Bureau of Land Management Oil and Gas Leasing in Gunnison's Prairie Dog Range, 2002-2004.

Date of Sale	BLM Resource Area	County	ST	Surface Owner	Number of Parcels	Acreage
1/16/2002	Albuquerque	Rio Arriba	NM	BLM/private	1 (#009)	2326.1
4/17/2002	Albuquerque	Sandoval	NM	BLM	1 (#009)	320
7/17/2002	Albuquerque	Sandoval	NM	BLM/private	6 (#047-52)	4407.9
7/17/2002	Farmington	San Juan	NM	BIA/BLM	1 (#053)	80.3
7/17/2002	Albuquerque	Bernalillo	NM	private	4 (#043-46)	5016.5
10/16/2002	Farmington	San Juan	NM	BLM/BIA	13 (#017-020, 022-30)	11905.9
10/16/2002	Farmington	Sandoval	NM	BLM/BIA	10 (#007-016)	11935.8
10/16/2002	Farmington	McKinley	NM	BLM/BIA	2 (#004-005)	1549.7
10/16/2002	Albuquerque	Sandoval	NM	Private	1 (#003)	160
1/22/2003	Farmington	McKinley	NM	BLM	1 (#034)	91.7
1/22/2003	Albuquerque	Rio Arriba	NM	USFS/private	2 (#032-033)	800
4/16/2003	Farmington	San Juan	NM	BLM/private	1 (#011)	640
7/16/2003	Farmington	San Juan	NM	BLM/BIA	1 (#074)	160
7/16/2003	Farmington	Sandoval	NM	BLM	1 (#073)	1,760
10/22/2003	Socorro & Albuquerque	Catron & Cibola	NM	BLM/BIA/private	70 (#042-111)	120,229
1/21/2004	Taos	Rio Arriba	NM	BLM	1 (#014)	240
<b>New Mexico Subtotal: 161,622.9 Acres</b>						
3/19/2002	Monticello	San Juan	UT	BLM/private, state	16 (#067-069, 081-085,	16289.5

					091-94, 100- 103)	
3/19/2002	Moab	San Juan	UT	BLM/USFS/ private	33 (#066, 077- 080, 086- 090, 095- 099, 105- 122)	39141.1
5/21/2002	Moab	San Juan	UT	BLM	2 (#092, 098)	1320
5/21/2002	Monticello	San Juan	UT	BLM	2 (#088- 089)	2518.2
8/20/2002	Moab & Monticello	San Juan	UT	BLM	5 (#055- 057, 059, 066)	2637.6
11/19/2002	Moab	San Juan	UT	USFS (Manti La Sal NF)	10 (#058- 065, 067, 070)	15269.3
2/28/2003	Moab	San Juan	UT	USFS (Manti La Sal NF)	9 (#113- 120, 123)	14639.3
5/20/2003	Monticello	San Juan	UT	BLM/SITLA	2 (#045, 069)	515
8/19/2003	Moab	San Juan	UT	BLM	1 (#117)	636.3
11/18/2003	Monticello	San Juan	UT	BIA	1 (#054)	1918.4
<b>Utah Subtotal: 94,884.7 Acres</b>						
2/14/2002	San Juan	Montezuma	CO	BLM/USFS	3 (#856, 859-860)	348.3
2/14/2002	San Juan	Dolores	CO	Private	1 (#855)	958.7
5/9/2002	San Juan	Archuleta	CO	BLM/private	2 (#057, 059)	943.9
5/9/2002	La Jara	Rio Grande	CO	BLM/private	2 (#060- 061)	4857.2
5/9/2002	San Juan	Montezuma	CO	BLM/private	1 (#058)	80
11/14/2002	Royal Gorge	Fremont	CO	BLM/private	3 (#367- 369)	2227.9
2/13/2003	Uncompahgre	Montrose	CO	BLM/private	1 (#597)	849
5/8/2003	Uncompahgre	Montrose	CO	BLM/private	8 (#768-	4383.5

	& San Juan	& San Miguel			775)	
8/14/2003	Uncompahgre & San Juan	Montrose & San Miguel	CO	BLM/private	4 (#961, 962, 964, 965)	3655.5
8/14/2003	San Juan	Montezuma	CO	Private	2 (#960, 963)	800.1
2/12/2004	Royal Gorge	Park	CO	BLM/private/state	20 (#348-367)	31840.4
<b>Colorado Subtotal: 50,944.5 Acres</b>						
<b>Total: 307,452.1 Acres</b>						

This recent oil and gas leasing compounds previous exploration and extraction of fossil fuels on GPD habitat, which has been massive throughout much of the GPD's range. Impacts of oil and gas leasing on GPDs is not examined at the leasing stage nor, as petitioners demonstrate below, does BLM consider harms to GPDs from this land use activity in its Resource Management Plans.

The construction of new roads in conjunction with oil and gas development is a particularly significant issue, as it causes habitat fragmentation and loss, increased access for prairie dog shooters, and other impacts listed above. Estimates of road construction related to oil and gas development are one new mile of road per oil well (U.S. Department of Agriculture, Forest Service, Bridger-Teton National Forest 2000), 0.4 miles of road per conventional natural gas well (U.S. Department of the Interior, Bureau of Land Management, Pinedale Field Office 2000), and 0.3 miles of road per coalbed methane well (U.S. Department of the Interior, Bureau of Land Management, Wyoming State Office, Buffalo Field Office 2002) (cited in Center for Native Ecosystems 2002).

#### *Road mortality*

GPD fatalities from vehicles are probably widespread, but are not monitored. Capodice and Harrell (2003) note road mortalities at a large active prairie dog town (Colony #60 in their survey) that was subsequently eradicated by the landowner in 2000. They state: "Reproduction in this town was excellent; and each year many dogs are killed feeding along or trying to cross Highway 50" (Capodice and Harrell 2003: 30). These authors describe seven additional colonies (out of 73 colonies examined) as hindered from expansion due to area highways (including Highways 50, 114, 135). Other abuse includes burrows being run over by cars and clogged with trash at a colony on the Curecanti National Recreation Area (Capodice and Harrell 2003).

Related impacts of roads include Cully's (1985) observation that GPD populations near roads are more likely to be experience hunting. USFS (1996) also notes potential for increased shooting and traffic mortality from increased roads. As discussed,

the proliferation of oil and gas wells throughout the GPD's range is an important factor in increased imperilment of prairie dogs through increased road-building.

### Impacts of Isolation and Fragmentation

Combined threats of habitat loss, shooting, poisoning, and plague have resulted in the fragmentation and isolation of remnant prairie dog towns. These small, isolated towns are more susceptible to local extirpation by factors such as poisoning and sylvatic plague (Barnes 1993; Miller et al. 1994; 1996; Mulhern and Knowles 1995; Wuerthner 1997; Wagner 2002). This threat was discussed for black-tailed prairie dogs by Miller et al. (1994: 678),

As a result of the poisoning programs, the few remaining prairie dog colonies are smaller and more isolated. These fragmented colonies are more susceptible to extirpation, particularly by sylvatic plague (*Yersinia pestis*). Yet some individuals argue that prairie dog populations are safe because prairie dogs can still be found throughout a geographical region between Canada and Mexico. That analysis masks the severity of habitat fragmentation.

With the Gunnison's prairie dog's much narrower geographic range, fragmentation and isolation of Gunnison's habitat brings even greater risks to this prairie dog species.

There is a substantial body of literature on the risks that small, isolated and fragmented populations face (Gilpin and Soulé 1986; Lande 1987), including environmental and demographic stochasticity (Caswell 1989; Goodman 1987; Mode and Jacobson 1987; Lande 1993), Allee effects (Allee et al. 1949), extinction due to demographic fluctuation, environmental stochasticity, inbreeding and random drifts in gene frequencies (Charlesworth and Charlesworth 1987, Soule 1987), and reduced chance for recolonization after a population is extirpated (Wagner 2002).

Brussard and Gilpin (1989) and Miller et al. (1996) note the critical role played by stochastic processes in the survival of small populations. There are three types of these processes:

- (1) populational or demographic uncertainty,
- (2) environmental uncertainty, and
- (3) genetic uncertainty (Brussard and Gilpin 1989: 37).

The first type of stochastic process, demographic factors, comprises the following:

- random variation in sex ratios,
- age of first reproduction,
- number of offspring,
- distribution of offspring over the lifetime of an individual, and

- age at death (Brussard and Gilpin 1989: 37).

Hoogland's (2001) finding that Gunnison's prairie dogs reproduce slowly, as a result of delayed reproduction, production of only one litter per year, and relatively small average size of litters, indicates that the fecundity of this species is naturally relatively low. Populations that are already small may decline further if sex ratios fluctuate and mates are not available. These kinds of small shifts in population dynamics may extirpate small colonies.

The second type of stochastic process, uncertain environmental factors, involves, for prairie dogs, the presence or absence of pandemic diseases, fire, drought, and flooding. The most ominous environmental factor for prairie dogs is the sylvatic plague, to which prairie dogs have almost no natural immunity (Barnes 1993; Cully 1993). The isolation of prairie dog colonies does not provide them with insurance against sylvatic plague. While isolated GPD colonies have contracted plague (e.g., Fitzgerald 1970), the more isolated the colony, the less chance the colony will be recolonized following a plague outbreak (Wagner 2002).

The third type of stochastic process, genetic uncertainty, includes a reduction of variation through genetic drift and inbreeding (Brussard and Gilpin 1989). GPDs at colonies in the Flagstaff area were found to have low genetic diversity, which the authors suggested was related to a history of sylvatic plague outbreaks in that area (Travis et al. 1997). In addition, in an analysis of population reduction and genetic variability in black-tailed prairie dogs, Daley (1992: 219) concluded that:

In cases of more severe colony isolation, the effects of population control would probably be more noticeable, because genetic variability lost during bottlenecks would be less likely to be replaced through immigration.

Specifying the conditions for such immigration, Daley suggested that successful immigration is probably impacted by dynamics such as the distance between colonies and fluctuations in population density. Isolation would therefore inhibit successful immigration and would consequently have negative ramifications on genetic variability. This finding coincides with observations on habitat fragmentation. Two consequences of fragmentation reported by Wilcox and Murphy (1985) are 1) the loss of sources of immigration; and 2) the obstruction of recolonization and genetic exchange.

In addition, Hoogland (1982) finds that black-tailed prairie dogs avoid extreme inbreeding through several mechanisms: 1) young males leave their natal coterie before breeding, while females remain; 2) adult males leave their breeding coterie before their daughters mature; 3) young females are less likely to come into estrus with their fathers present in the coterie; and 4) estrous females avoid mating with their fathers, sons, or brothers.

These mechanisms, however, can be distilled down to two dynamics: male dispersal and female avoidance. The first of these dynamics underscores the importance of unfettered migration by prairie dogs to ensure genetic variability. With hindered

dispersal of males, a sophisticated scheme for avoiding extreme inbreeding may be destroyed. This importance of male migration to prevent inbreeding has been reported elsewhere (Foltz and Hoogland 1983). In terms of the second dynamic, female avoidance, Hoogland (1982: 1641) states,

Even when individuals avoid mating with close genetic relatives such as parents, offspring, and siblings, inbreeding coefficients can be high if populations are small and isolated...

It is therefore clear that small, isolated prairie dog populations are more vulnerable to inbreeding.

The dynamics involved in these stochastic factors indicate that the surest route for maintaining viability of small populations is to encourage these populations to increase in size or increase connectivity so that small populations interact and form a metapopulation. In addition, any GPD complexes with relatively large populations should be protected, whether on private or public land.

In yet another way, prairie dog viability depends on naturally occurring sizes of prairie dog colonies and complexes. Prairie dogs are colonial species, and one of the benefits of increased colony size is less time devoted to predator detection. Hoogland (1979) traced the relationship between prairie dog alertness and colony size, and found that relationship to be a negative one, with prairie dogs in larger colonies able to spend a smaller portion of their time on predator detection. Spending less time being on the alert for predators leaves more time for activities such as feeding and breeding. Alternatively, the very small sizes of GPD colonies at present impose more constraints on prairie dog activity.

The fragmentation and loss of prairie dog habitat described above also affects those species associated with prairie dog colonies. As discussed above, the Gunnison's prairie dog, like other prairie dogs, is a keystone species. Its continued decline therefore has ecosystemic repercussions. Its listing as Endangered or Threatened under the ESA would therefore bring collateral protections to other native species.

It is clear that the destruction of habitat and impact of isolation and fragmentation represents a biological threat to the biological integrity of the Gunnison's prairie dog and the ecosystem this species supports. An adequate manner in which to counteract this threat is to list the petitioned species as Endangered or Threatened under the ESA.

## **II. Overutilization for commercial, recreational, scientific, or educational purposes.**

### Prairie dog shooting

Shooting of GPDs occurs throughout their range. Shooting harms prairie dogs through population reduction, alteration of behavior, and potential extirpation of entire

colonies. First, shooting reduces prairie dog populations and population densities. In the National Wildlife Federation's petition to list the black-tailed prairie dog under the ESA, that organization provided the following data, "...the Forest Service reported that in 1998, shooters on a 12,000 acre portion of the Conata Basin in South Dakota shot 162,000 prairie dogs out of an estimated population of 216,000 animals" (National Wildlife Federation 1998).

FWS also acknowledged the threat of shooting to prairie dogs in a letter to the Forest Supervisor for the Buffalo Gap National Grassland. FWS recognized that shooting was a significant threat to prairie dogs based on the observation that prairie dog shooting significantly reduces black-tailed prairie dog populations and population densities. FWS stated, "We understand that differences in prairie dog density between protected areas and areas open to shooting are significant (approximately 18 versus 8 prairie dogs per acre, respectively)..." (USFWS 7/15/98 correspondence to USDA Forest Service). Similarly, FWS has advocated for the closure to shooting on BLM lands administered in the Malta, MT Field Office, on account of that activity's reduction of prairie dog populations, and the consequent threat to black-footed ferret restoration projects (USFWS Memo dated 3/11/98 from FWS to BLM Malta, MT Field Office).

Second, shooting alters prairie dog behavior. For instance, Irby and Vosburgh (1994) found that even light shooting has a significant effect on prairie dog behavior, with 42% of prairie dogs retreating to the burrows on a lightly shot colony, contrasted with a 22% retreat rate on unshot colonies, and 55% retreat rate on heavily shot colonies. Further, Irby and Vosburgh (1994) found that prairie dog shooters prefer higher densities of prairie dogs. This causes shooters to spread the pressure of their activity depending on population density. Consequently, shooters may cause uniformity in prairie dog populations across colonies. Biologically, such uniformity is destabilizing to prairie dog populations.

Studies also report that shooting may decrease colony expansion rates (Miller et al. 1993; Reading et al. 1989). One study revealed that a colony in Montana had a 15% annual expansion rate when prairie dogs were not hunted, contrasted with a 3% expansion rate when they were (Miller et al. 1993). This dramatic decrease in rates of expansion represents decreased migration, which constitutes human interference with an integral population dynamic in prairie dogs: prairie dog dispersal.

Even without shooting pressure, there is a low survival rate of dispersing males (Garrett and Franklin 1981). In addition, prairie dog dispersal takes place in late spring (Knowles 1985; Garrett and Franklin 1981), which is one of the most popular times of the year for recreational prairie dog shooting. The negative impacts of shooting on prairie dog migration may therefore be considerable.

In addition, the threat that shooting poses extends to prairie dog associated species. For example, prairie dog shooting causes a reduction in the prey base. This may affect a broad range of avian and mammalian predators that prey on prairie dogs. The danger here is apparent:

Viable populations of associated species cannot be expected at low prairie dog densities. Based on our observations of other prairie dog complexes in Montana, prairie dog complexes need to be broadly distributed and with relatively high occupancy to assure minimal viable populations of associated species (Knowles and Knowles 1994).

Low population densities result from shooting and will therefore work to the detriment of mammalian and avian prairie dog predators. In addition, there is no evidence to suggest that prairie dog shoots do not result in the harming or killing of non-target species, such as the burrowing owl, ferruginous hawk, and mountain plover. To the contrary, first-hand accounts indicate that these shoots do result in the harming and killing of a variety of wildlife species other than prairie dogs.

Shooting impacts may be unpredictable and colony-specific. Knowles and Vosburgh (2001: 7) compared black-tailed prairie dog shooting studies conducted in Montana, and concluded, “Shooting can impact prairie dog populations and ...it is just a matter of the number of hours of shooting effort expended on a colony in relation to the size of the colony that determines the level of impact.”

Individual shooters can seriously impact prairie dog colonies. Randall (1976) chronicled the activity of three individual shooters who traveled from Minnesota to shoot white-tailed prairie dogs in Wyoming. In one week they concentrated on seven towns and tallied 1023 kills. This was in 1976, and prairie dog shooters are much better equipped today. Jerry Godbey of the U.S. Geological Survey Biological Resources Discipline reported that when he surveyed white-tailed prairie dog towns in Colorado, Utah, and Wyoming in 1997-1998, he found spent shells or dead prairie dogs at “virtually every site” (Jerry Godbey, USGS, personal communication to Erin Robertson, 3 August 2001). Mr. Godbey said that he met one shooter near Delta, Colorado with three rifles who said that he shot white-tailed prairie dogs at least four times a week. This shooter estimated that he used 10,000 rounds per year, with an estimated 95% kill rate. Those figures translate to take of 9500 prairie dogs annually by a single person. Keffer et al. (2000) found that after they shot 22% of the black-tailed prairie dogs on one colony as part of a controlled shooting study, 69% (212 individuals) of the remaining prairie dogs left the colony. Small colonies may be particularly vulnerable to negative impacts from shooting (Knowles 2002, citing J. Capodice, pers. comm.).

Entire colonies can potentially be eliminated due primarily to shooting pressure. For example,

- Craig Knowles’s (1988) controlled shooting study of two colonies. Colonies were along a dirt road less than 3 km from a 247-acre colony, so immigration complicated results. Nevertheless, after a total of 40.3 hours of shooting over two years, there was a 74% decline in the number of adults at colony A. After a total of 42.5 hours of shooting over two years, there was a 100% decline in the number of adults at colony B. Only one juvenile prairie survived the shooting study. In

this study, shooting was the identified source of prairie dog declines: “Both treated colonies showed strong population recovery trends in 1980 in the absence of shooting” (p. 54). The study suggested that shooting might lead to direct extirpation: “In the case of the smaller colony, shooting appeared capable of removing all prairie dogs.” (p. 54)

In addition, Knowles suggested that shooting may decrease prairie dog populations to the point where they are extremely susceptible to extirpation from stochastic events:

“In another small colony on the Refuge, 12 prairie dogs were removed by shooting in the spring of 1975. The three remaining prairie dogs were eliminated by natural causes by late fall of that year. This colony site had not been re-colonized by 1984 (year of last survey). Lewis et al. (1979) thought 10 to 20 prairie dogs were needed to start a colony. Possibly the reduction of prairie dogs below a certain threshold number may have a negative population consequence (Allee’s Principle, Allee et al. 1949) because fewer prairie dogs are available to watch for predators (Hoogland 1981) and keep the vegetation clipped around burrows.” (p. 55)

- Livieri’s (1999) modeling of population responses to shooting. The starting population estimate was 105,035 prairie dogs. The model assumed that prairie dog population growth would be logistic. In this analysis, shooting caused population declines: “At the [Buffalo Gap National Grassland] in 1998, it was estimated that the prairie dog population was reduced by as much as 75% by recreational shooting (USFWS 1998)” (unpaged). In addition, shooting may cause extirpation: “Harvest levels of 50% would cause a precipitous decline from the current population size and 75% would cause the population to go extinct within 40 years” (unpaged).
- Reeve and Vosburgh (2003) also modeled prairie dog population response to shooting. “But if the harvest exceeds some maximum yield level and continues over time, the population will eventually decline to zero. Figure 3 shows that an annual harvest of 75 animals or fewer can be sustained by a population initially of 1000 with  $R_{max}=2.00$ . When 79 animals are harvested annually, the population declines toward zero. The maximum sustained yield is approximately 77 animals and any annual harvest [less than or equal to sign] 77 stabilizes the population at some level less than the carrying capacity. But constant harvesting at excessive levels  $>77$  animals first reduces population size and then reduces the population growth rate with eventual extinction (Caughley and Sinclair 1994, Akcakaya et al. 1999)” (Reeve and Vosburgh 2003: 10-11). These authors later state, “Constant numbers harvested each year, if slightly too high, will lead to extinction”; and “An annual quota of 75, applied to 100 simulations of a population with demographic variability however, produces no such population stability (Figure 5). In fact, the Leslie matrix model (Akcakaya et al 1999) predicts an 11% chance that the population will become extinct within a 15-year period” (Reeve and Vosburgh 2003: 16).

- Gunnison's prairie dog colony extirpated from shooting (pers. comm., Con Slobodchikoff, dated September 18, 2003).

In addition, there is growing concern about the effects that spent shells may have on prairie dog predators. A preliminary study on the effects of prairie dog shooting on raptors (Wyoming Cooperative Fish and Wildlife Research Unit 2001) showed that black-tailed prairie dog towns on Thunder Basin National Grassland that were shot were visited by raptors an average of 2.42 times per hour, while towns that were not shot were visited an average of 0.5 times per hour. Blood samples taken from burrowing owls on a town where shooting occurred showed elevated lead levels. Knowles and Vosburgh (2001: 15-16) also raise this issue:

Fragments of lead ingested by raptors when scavenging shot prairie dog carcasses have the potential to kill or severely disable raptors. Burrowing owls are reported to scavenge poisoned prairie dogs (Butts 1973) and would also be expected to feed on prairie dogs killed by recreational shooting. Ferruginous hawks and golden eagles are 2 other raptors known to scavenge on dead prairie dogs. Shooting in some areas has been sufficiently intense during the past decade to literally put millions of pieces of lead on the ground. It is unknown if passerine birds are picking up pieces of this toxic heavy metal. Mortalities in mourning [sic] doves have been noted with ingestion of only 2 lead pellets. Ingestion of lead is a known significant problem for birds (Lewis and Ledger 1968 and Wiemyer et al. 1988).

On his Moreno Valley (NM) study site, Cully (1986b: 2) noted that, "One of the major sources of recreation for the residents of the area is shooting prairie dogs, a practice that may contribute to the attraction of raptors to the valley." He suspected many of the area raptors were primarily subsisting on shot prairie dogs. To the extent shooters were using lead shot – which is extremely likely – those raptors were being exposed to lead poisoning.

While some of the above studies pertain to white-tailed and black-tailed prairie dogs, cited biological impacts - reduced populations and population densities, altered behavior, and potential colony extirpation – would reasonably extend to GPDs.

### Arizona

Wagner (2002) reports that "Prairie dogs are routinely shot" by recreational shooters, and that approximately 91,000 GPDs were shot on non-tribal lands in the state in 2000 (tribal lands comprise 50% of the GPD's range in Arizona). Wagner (2002) considers shooting, along with plague, to be the primary threats to GPDs in the state. Prairie dog shooting even occurs on the black-footed ferret reintroduction site in Aubrey Valley (Tom Silvia, Arizona Game and Fish Dept., pers. comm., November 22, 1999). Wagner and Drickamer (2003) recommend that localized, year-round shooting bans be

considered where plague epizootics have reduced GPD populations. Drickamer and Wagner (2002) recommended banning GPD shooting on the Kaibab National Forest until populations recover from plague.

Prairie dog shooting is occurring, for example, on the Coconino National Forest (Gene Waldrip, USFS, pers. comm., May 16, 2000). In fact, a prairie dog researcher reported to USFS that two of her study colonies, at Cosnino tank and Antelope Hill, were being shot at, and the “prairie dog pups are a favorite target so the shooting probably will be escalating now” (Exhibit 5: Coconino National Forest Open Records Documents). If prairie dog pups are indeed a preferred target of shooters, there is cause for concern that a seasonal closure may not be limiting prairie dog shooting when it reaches its peak (i.e., after the pups emerge). On state lands, there was a colony within several miles of the Navajo Army Depot complex which was a traditional prairie dog shooting spot for local residents in the 1970s and 1980s (Exhibit 5: Coconino National Forest Open Records Documents).

In 2002, the Game and Fish Department estimates 75,791 GPDs were shot, while 21,134 were shot in 2003. While the seasonal shooting closure partially explains the decline in take between 2002 and 2003, extreme drought conditions also likely played a role.<sup>22</sup>

### Colorado

There is rampant shooting of prairie dogs within the GPD’s range in the state. Significant prairie dog shooting occurred in the early 1990s in the Nucla/Naturita area as part of an organized contest shoot (Fitzgerald 1991). Subsequently, GPD populations in Nucla/Naturita have nearly disappeared due to plague (e.g., Knowles 2002). Capodice and Harrell (2003: 15) note that Colony #70 in their study, which is located on private and BLM land, and comprises 30 acres, is “a popular area for target shooters.”

High levels of shooting of GPDs continue across their range in the state. While the state restricted contest killing by instituting a five animal bag limit during such contests (Colorado Wildlife Commission Regulation #302-1.a.1; non-contest shooting is not restricted by a bag limit), massive numbers of GPDs continue to be shot. The Colorado Division of Wildlife (CDOW) monitors prairie dog shooting through hunter surveys conducted under the Harvest Information Program (HIP). During the 2000/2001 season, HIP estimates that 229,502 prairie dogs were shot by 3,369 small game license-holders during 32,851 hunter-days. Shooting appears to have increased in the 2001/2002 season, with HIP estimates of 452,772 prairie dogs shot by 3,703 small game license-holders during 54,305 hunter-days. Shooting for 2002/2003 was conducted by an estimated 4,176 small game license-holders, with a total prairie dog kill of 303,878.<sup>23</sup>

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<sup>22</sup>See “Meeting Notes Prairie Dog Conservation Team Meeting,” held September 18, 2003, statement of Bill Van Pelt at p. 3.

<sup>23</sup>Information obtained from CDOW HIP data.

While HIP statistics do not differentiate according to the three prairie dog species, an approximation of the magnitude of GPD shooting in the state can be obtained by looking at county-level data. Within counties containing Gunnison's prairie dogs (including some counties in which GPDs occur in same counties as other prairie dog species), 119,813 prairie dogs were shot in the 1999/2000 season; 47,238 in the 2000/2001 season; 206,312 in the 2001/2002 season; and at least 102,067 in the 2002/2003 season (Table 3).<sup>24</sup>

Across the three years, counties containing only GPDs saw high levels of prairie dogs shooting, at 53,088 in 1999/2000, 25,385 in 2000/2001, and 136,936 in 2001/2002 (Table 3). These data is undoubtedly flawed, as indicated by high standard errors in some cases. In addition, the data are extrapolated from a small sample (e.g., 4,486 out of 72,677 hunters in 2000/2001). However, the shooting statistics do provide an approximate gauge of the magnitude of the shooting threat to prairie dogs in the state.

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<sup>24</sup>Prairie dog shooting data were not available for nine counties in the range of the GPD in Colorado for the 2002/2003 season.

Table 3. Prairie Dog Shooting in Colorado, 1999-2002. Source: Colorado Division of Wildlife's Harvest Information Program. (G=Gunnison's prairie dog; W=White-tailed prairie dog; B=Black-tailed prairie dog; SE = Standard error.)

Species Present	County	1999-2000	2000-2001	2001-2002	SE 1999-2000	SE 2000-2001	SE 2001-2002
G, W	Delta	17539.96	9282	41379	502.54	260	17413
G, W	Montrose	5386.9	3224	14227	69.15	23	656
G, W	Ouray	130.12	162	0	0.24	0	0
<b>G+W Subtotal</b>		<b>23056.98</b>	<b>12668</b>	<b>55606</b>			
G	Alamosa	130.12	0	0	0.24	0	0
G	Archuleta	416.38	0	1467	2.16	0	13
G	Chaffee	1561.42	356	1833	24.83	1	22
G	Conejos	533.49	0	92	3.01	0	0
G	Costilla	260.24	65	22001	0.96	0	4514
G	Custer	2732.49	0	0	95.76	0	0
G	Dolores	1912.74	3888	38501	18.55	55	17378
G	Gunnison	3357.06	972	9717	101.58	9	1087
G	Hinsdale	195.18	0	0	0.54	0	0
G	La Plata	20597.75	5378	6765	1127.46	120	272
G	Mineral	0	49	0	0	0	0
G	Montezuma	12048.97	7970	44551	820.89	135	17709
G	Park	1053.96	0	917	9.39	0	11
G	Rio Grande	2172.98	3224	550	39.06	81	2
G	Saguache	4215.84	243	10524	61.64	1	353
G	San Miguel	1899.73	3240	18	13.57	140	18
<b>G Only Subtotal</b>		<b>53088.35</b>	<b>25385</b>	<b>136936</b>			
B, G	Douglas	1379.26	1458	367		12	
B, G	El Paso	6740.13	4892	11184		157	
B, G	Fremont	22536.51	324	367		1	
B, G	Huerfano	260.24	0	0		0	
B, G	Jefferson	12035.96	972	917		9	
B, G	Las Animas	260.24	1539	935		16	
B, G	Teller	455.41					
<b>B+G Subtotal</b>		<b>43667.75</b>	<b>9185</b>	<b>13770</b>			
<b>Total</b>		<b>119,813</b>	<b>47,238</b>	<b>206,312</b>			

### New Mexico

There are site-specific examples of prevalent GPD shooting, but the extent of this shooting is unknown. The New Mexico Department of Game and Fish (NMDGF) acknowledges that no monitoring of black-tailed prairie dog shooting is currently taking place, despite that species' status as a candidate for ESA listing (Bruce Thompson, Director NMDGF, pers. comm., Pete Gober, FWS, dated December 2, 2003). GPDs, which are not even a candidate species, are also neglected in this regard.

Despite the lack of monitoring, Schmitt (pers. comm. 1999) considers shooting to be a significant threat to GPDs in the state. Sager (1996) noted that recreational shooters

were eager to pay landowners to shoot prairie dogs in his survey area in the northern part of the state. Hawks Aloft (2000) notes the extreme diminution of GPDs in the Plains of San Augustin and suggests poisoning and shooting as the cause.

Cully (1985: 37) noted the prevalence of shooting on his study site in Moreno Valley:

Prairie dog hunting by humans, particularly by ranchers, may be one of the most important sources of mortality other than disease and starvation in the Moreno Valley. I have talked to a number of hunters in Eagle Nest and Angel Fire who reported killing more than 100 prairie dogs in a single day. Hunting is prohibited around Eagle Nest Lake, but I frequently saw hunters shooting from their automobiles along Highway 64. I have also found one marked and two or three unmarked prairie dogs on the periphery [sic] of my study area that were freshly shot. Prior to imergence [sic] in October, mummified prairie dog carcasses were common outside of burrows near roads, suggesting additional human predation.

I have talked to most of the local hunters that I have seen in the vicinity of my study area, explained my project and asked them not to shoot prairie dogs on the study area. This seems to be having an effect; I have not found any freshly killed prairie dogs on my study area since April 1985 [writing date of July 29, 1985]. Nevertheless, human hunting pressure clearly has an important effect on prairie dogs, particularly on those living near roads.

Cully (1986a) also noted that “several of the ranchers were encouraging hunters to shoot prairie dogs” at the Moreno Valley study site in 1984. Later, after prairie dogs in that complex had suffered a plague epizootic, hunting continued, even though the GPD population was at an extremely low density (Cully et al. 1997).

FWS has argued that shooting does not rise to the level of a threat to black-tailed prairie dogs because, while it can significantly reduce population densities at particular sites, no data is available demonstrating total extirpation or near-extirpation of a prairie dog population due to shooting. The agency believes that while, in isolated instances, this scenario may occur, shooting interest is generally not high when prairie dog populations are low and low prairie dog populations can likely recover from recreational shooting, just as prairie dogs can recover from plague.<sup>25</sup> However, as we discuss below in the disease section, prairie dogs may not be able to fully recover from plague due to recurring epizootics.

In addition, when an “isolated instance” of intense shooting is on a locality as big as the Moreno Valley complex was (prior to the mid-1980s plague epizootic), impacts can be significant from a range-wide perspective. Moreover, notwithstanding FWS’ suppositions about hunter interest, the fact that shooters would continue to assault this

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<sup>25</sup>See Candidate and Listing Priority Assignment Form for the black-tailed prairie dog. Dated March 18, 2002 at p. 16.

complex after its population had declined by over 99% (Cully et al. 1997) indicates that some hunters will not stop targeting a prairie dog colony until every last prairie dog is killed.

The New Mexico State University Cooperative Extension Service maintains that “Consistent shooting of prairie dog towns can remove 65% of the population during the year” and can therefore reduce forage losses (See Exhibit 6: Prairie Dog Control in New Mexico). The Extension Service recommends prairie dog control (preferably poisoning) in almost all cases, as discussed below.

### Utah

The Pack Creek Area was reported by the BLM in Moab to have an “extensive shooting campaign” (See Exhibit 4: Gunnison’s Prairie Dog Meeting Notes).

In sum, shooting should be considered a threat to the persistence of Gunnison’s prairie dogs. In Colorado, where shooting is monitored, massive take of GPDs is occurring. There is anecdotal evidence of extensive shooting in New Mexico, but it is not regulated. While seasonal closures on prairie dog shooting exist in Utah and Arizona, exemptions are allowed for agricultural operators. Whether viewed individually or in tandem with poisoning and plague, the shooting threat to GPD is likely significant.

## **III. Disease**

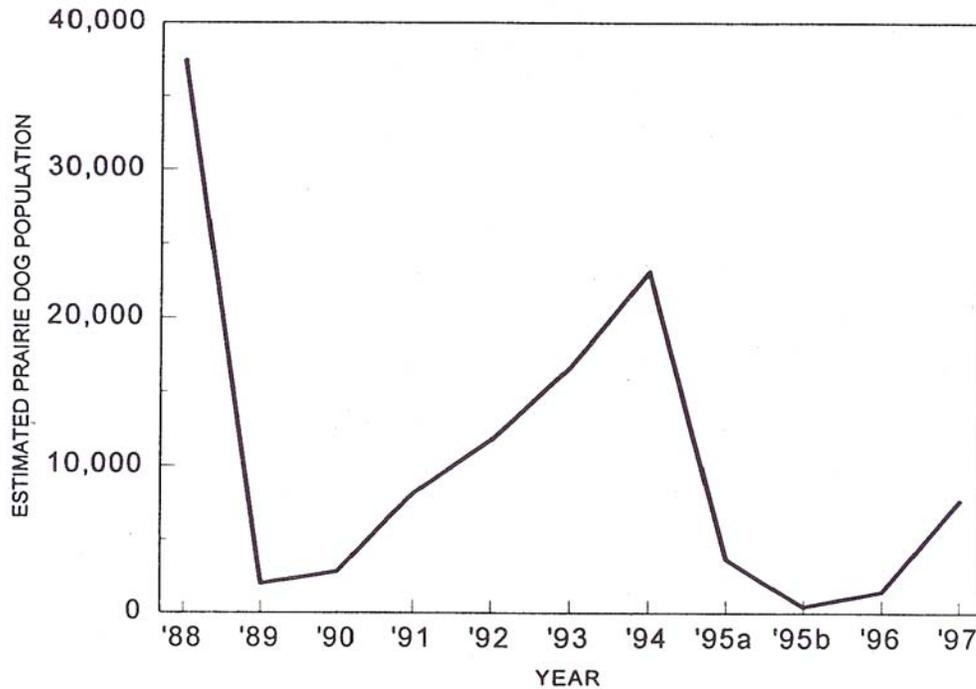
### Sylvatic plague

Sylvatic plague (*Yersinia pestis*) was first recorded from two sailors on a Japanese ship in San Francisco in 1899 (Cully 1993; Fitzgerald 1993). The “plague” was first reported in western states in 1936 (Fitzgerald 1993) and was first recorded in the range of the GPD in 1932 (Barnes 1993). Plague has been shown to limit maximum colony ages to 5-11 years (Roach et al. 2001)

Given their almost total lack of a natural immunity to sylvatic plague, with mortality rates placed at 99-100% (Barnes 1993; Cully 1989; 1993; Fitzgerald 1993), prairie dogs cannot carry plague, as they typically die within several days after contact with this bacterium. Fleas and other small mammals (including domesticated companion animals) are the usual carriers of the plague.

It is clear that plague is a threat to prairie dogs, given their lack of immunity to the bacterium. The danger that sylvatic plague poses to prairie dog persistence is underscored by its cyclical nature. According to researchers, plague does not disappear. Rather, it “remains enzootic until prairie dog numbers are sufficient to support another epizootic” (Cully 1989; see also Knowles 1995; Mulhern and Knowles 1995). Recovery from plague is a slow process, as has been witnessed on the Rocky Mountain Arsenal in Colorado. At the Arsenal, black-tailed prairie dog population levels have been severely impacted from periodic plague epizootics (USFWS 1998; Figure 3).

Figure 3. Black-tailed Prairie Dog Population Fluctuations on the Rocky Mountain Arsenal National Wildlife Refuge (Denver, CO). Source: USFWS 1998.



Plague can cause the loss of both isolated populations and large, contiguous complexes. Cully and Williams (2001: 895) explain:

Some of the important consequences of plague in prairie dogs are local extirpation of colonies, reduced colony size, increased variance in local population sizes, and increased distances between colonies... The impacts of plague reduce the effectiveness of dispersal in demographic rescue among colonies and increase the probability of extinction of entire complexes.

Sylvatic plague occurs throughout the GPD's range in Arizona, Colorado, New Mexico, and Utah (Cully 1989; 1993) and severe impacts from this disease on the GPD have been documented. Barnes (1993: 33) stated that,

Devastating plague epizootics are common among Gunnison's prairie dogs, having been reported from one locality or another in the Southwest in each of the past 20 years. Mortality in a colony during a plague epizootic often approaches 100%. Epizootics may be sporadic and localized in small colonies, but in large continuous colonies may sweep across hundreds of square kilometers.

While small colonies may never recover, even those colonies and complexes that recover may suffer subsequent epizootics that again result in near-eradication (Barnes 1993; Figure 3). Some 83% of wild rodent-associated cases of plague in humans in the U.S. in recent decades were within the GPD's range (Barnes 1982; 1993). Fitzgerald (1991: 1) describes plague as having "eliminated Gunnison prairie dogs over thousands of acres in Colorado and New Mexico or reduced numbers to very low levels." He also notes that, "Most researchers on the species have had efforts to study the ecology of Gunnison's prairie dogs thwarted within 1-3 years because of plague outbreaks" (Jim Fitzgerald, pers. comm., 12/5/1990).

### Arizona

Plague has significantly reduced Gunnison's prairie dog acreage in Arizona, beginning in the early 20<sup>th</sup> Century, and continuing to the present. Eskey and Haas (1940: 4) reported that, "In 1932, the Zuni prairie dogs were nearly exterminated in northwestern Arizona" due to plague. By 1937, plague was also documented in east central Arizona (Apache County) and adjacent New Mexico (Catron County) (Eskey and Haas 1940).

Wagner (2002) documented tremendous decline in prairie dog acreage between May 2000 and October 2001, with active towns decreasing from 273 to 86 and occupied area falling from 13,987 ha (34,548 ac) to 4,526 ha (11,179 ac). The author of that study stated that, while these acreages may not be directly comparable for methodological reasons, it is reasonable to conclude that there has been a reduction in the total acreage occupied by active colonies.

In addition, Wagner (2002) notes that two previous plague outbreaks had been documented recently in Arizona: an outbreak centered around Dilkon over approximately 2,900 sq. km., and an outbreak centered around Seligman, occurring over approximately 1,100 sq. km. Although the Dilkon outbreak likely occurred in 1995 or 1996, there is still little GPD activity within that area. Previously, the area contained 45 active colonies comprising more than 3,500 ha (8,645 ac). However, by 2001, only one town, measuring 17.5 ha (42 ac) was still active. In the Seligman outbreak area, the Arizona Game and Fish Department recorded 47 active colonies comprising 3,500 ha (8,645 ac) between 1990-1994. By 2001, only 11 of the 47 colonies were active (Wagner 2002). At least four GPD colonies died off on Petrified Forest National Park in Arizona due to plague in 1995 (Bangert and Slobodchikoff 2000). In addition, as discussed in the current population status section, extensive plague die-offs have been documented in the Coconino and Kaibab National Forests.

Ruffner (1980) indicated that there is a plague epizootic every year on different portions of the Navajo Nation. According to a Navajo Natural Heritage Program (1996: 5) study, "In 1994 a lot of prairie dog town die-offs were reported by Winslow Service Unit [of the Indian Health Service] to the CDC." Knowles (2002) also noted the disappearance of GPDs from portions of this area, likely due to plague.

There is no guarantee that Aubrey Valley, the largest known GPD complex, will escape plague much longer. Certainly, the close proximity of the Seligman plague epizootic is cause for concern. In addition, titer samples from carnivores within and adjacent to Aubrey Valley have tested positive for plague (Winstead et al. 1999). Indeed, if even two colonies – Pica Camp and North Audley – contract plague, the majority of GPD acreage in Aubrey Valley will be lost.

## Colorado

Plague has decimated GPD populations throughout the species' range in the state. From 1945-49 in South Park, Colorado, plague eradicated GPDs from 627,000 acres in a 60-mile long swath from southeast to northeast Park County (Ecke and Johnson 1952). Prior to this outbreak in South Park, the Gunnison's prairie dog "ranged almost continuously throughout South Park. These prairie dogs nearly saturated most of Park County, avoiding the peaks of some of the higher hills" (Ecke and Johnson 1952: 12).

A decade later, in 1959, an isolated population of approximately 275 GPDs went extinct due to plague in a mountain meadow named Chubbs Park in Chaffee County (Lechleitner et al. 1962; Cully 1989; 1993). From 1964-66, a GPD complex comprising seven colonies in Cochetopa Park, Saguache County was nearly eradicated due to plague and FWS poisoning<sup>26</sup> (Lechleitner et al. 1968; Cully 1989; 1993). From 1965-67 in South Park, an isolated population of 68 GPDs was eliminated due to plague (Fitzgerald 1970; Cully 1989; 1993). GPDs have generally failed to recover from plague epizootics in South Park, with this large area now likely containing less than a few hundred acres of GPDs (Finley 1991; Knowles 2002).

Jim Ferguson (pers. comm.) of the BLM noted that in Montrose and San Miguel Counties periodic plague outbreaks are impacting numbers and distribution of GPDs.

Gunnison's prairie dog populations on the Curecanti National Recreation Area have been decimated by plague repeatedly, including epizootics in 1971, 1981, and 1996 (Rayor 1985; Cully 1989; 1993; Stone n.d.). Rayor (1985) documented the disappearance of 1,000-1,500 individual GPDs due to plague at her study site over a two-month period in 1981. At least one colony (Iola) has gone extinct due to plague on the Curecanti (NPS 2000; Stone, n.d.).

A 1990 survey of landowners in the state documented landowner observations of prairie dog die-offs, potentially due to plague, in several counties within the GPD's range (Table 4).

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<sup>26</sup>The researchers themselves engaged in regular prairie dog shooting of at least one colony, the Texas Creek Colony. The authors speculate that FWS poisoning may have actually slowed the epizootic (Lechleitner et al. 1968). Regardless, whatever the chain of causality or sequence of events, this Saguache County complex all but disappeared in 1964-66.

Table 4. Private landowner observations of prairie dog die-offs (possibly due to plague) within Gunnison’s prairie dog’s range in Colorado (Colorado Dept. of Agriculture 1990).

County	Comment
Chaffee	“On approximately 50 acres of my ranch where there was a heavy population of prairie dogs about 2 months ago all of a sudden there was [sic] no prairie dogs in this area. Evidently they got some sort of a disease and all of them in this area died. We haven’t seen a single prairie dog in this area in the past month to 5 weeks. Will bubonic plague kill them off like this?” (p. A-16)
Fremont	“I had a problem 2 years ago but they all died of the plague.” (p. A-29)
La Plata	“In the last 2 years our prairie dog population decreased rapidly. I feel that the plague has reduced them.” (p. A-37)
La Plata	“We had a few – maybe a 10 acre infestation of prairie dogs until about 1950. Within 5 years they were all gone. We do not know why – disease or cold weather.” (p. A-37)
La Plata	“This spring/summer 1990 was a surprise as at the moment we have no prairie dogs. The plague came through and wiped them out. I feel sure they will be back but we are real happy for now!!” (p. A-38)
Montezuma	“Infestation this Spring seemed heavier than usual, but by mid-summer almost all had disappeared and a few carcasses began showing up near dens. I have not seen or heard of one in weeks. Disease, perhaps?” (p. A-48)

Plague continues to be routinely reported in the GPD’s range in Colorado. For instance, in 2001, six plague positive specimens (cats and fleas) were reported from Montezuma County, two from San Miguel, and seven from La Plata (coyotes) (Dale Tanda, Colorado Dept. of Public Health and Environment, pers. comm., Nicole Rosmarino, Forest Guardians, 2001).

### New Mexico

Plague has also significantly impacted GPDs in New Mexico. In 1937-1938, a plague epizootic was reported from Catron County, NM, which destroyed “all prairie dogs except in a few scattered spots” (Ecke and Johnson 1952: 19, see also Eskey and Haas 1940). In the 1980s and 1990s, Cully documented plague epizootics in GPDs in New Mexico, including an epizootic in 1984-1986 that nearly eliminated the GPD population in Moreno Valley, Colfax County. The population fell from an estimated 100,000 GPDs prior to the plague epizootic, to 250-500 GPDs after the plague worked through the valley complex, a reduction rate between 99.5-99.8% (Cully 1989; 1993; 1997). While Cully reported abnormally high reproduction rates among the surviving population, the area GPD population suffered a second epizootic, thus thwarting recovery (Cully 1997; Knowles 2002). Plague has been present in the Moreno Valley since at least 1949 and prairie dogs have been subject to multiple epizootics there (Cully 1987).

Plague continues to be routinely reported within the GPD's range in New Mexico. The Center for Disease Control has documented plague in eighteen cases across eight counties within the GPDs range from 1996-2002, including documented plague in a prairie dog from Santa Fe county (See Exhibit 7: Plague Cases in New Mexico, 1996-2002). Schmitt (pers. comm. 1999) considers sylvatic plague to be a significant threat to GPDs in the state.

## Utah

Sylvatic plague negatively impacts GPD populations in the state (Cully 1989; 1993; Knowles 2002). The Lisbon Valley was reported by the BLM in Moab to be experiencing a die-off as of 2001 (See Exhibit 4: Gunnison's Prairie Dog Meeting Notes). This was an area the BLM had been planning to poison in 1991 (Bill Bates, Utah Division of Wildlife Resources, pers. comm., Linda Siebert, BLM, dated August 27, 1991). A 2002 survey by UDWR indicated that GPDs in Lisbon Valley and Tank Mesa appeared to be undergoing a die-off (Seglund 2002), possibly due to plague.

## Rangewide

Across the GPD's range, BLM biologists have noted that plague has limited colony size on BLM lands to a high of 80-200 acres, with the exception of Aubrey Valley, Arizona (Knowles 2002). Plague has decreased the number of active colonies on USFS lands such as the Kaibab and Coconino National Forests, as described in the current population status section above. On National Park Service lands, the Curecanti National Recreation Area is notable for recurring plague, which (along with routine poisoning, discussed below) has limited colony size and distribution on that federally managed area.

Historically, some ranchers participated in spreading plague. Ecke and Johnson (1952: 34-35) wrote that, "Ranchers were found to be instrumental in spreading plague by transporting plague-infected rodents over great distances in an effort to control rodents on their own land. Three authentic cases were discovered, one of them being the case of a rancher who carried infected rodents as far as 250 miles." Far from being anomalous, Ecke and Johnson (1952: 33) describe this rancher-facilitation of plague to be "quite common."

While one would hope that such insidious behavior would be a thing of the past, more recent evidence suggests that such a practice endures. John Pape, of the Colorado Dept. of Health and the Environment, has stated:

...when we do die-off investigations, we'll often have ranchers call and ask us where the die-off is, so they can come a collect a few fleas for their colonies... (Pape 2001)

Fortunately, based on public health and bioterrorism concerns, this agency does not accommodate the ranchers' requests (Pape 2001). However, the 1990 landowner survey

in Colorado demonstrated that ranchers are aware of plague epizootics occurring in their localities and counties (See Table 4), and it is quite possible that landowners hostile to prairie dogs may help themselves to fleas and plague-killed prairie dogs in order to spread the plague.

Unfortunately, sylvatic plague is often used as a justification for exterminating prairie dogs, as we document in the rodent control section, below. Yet, fewer than 3% of human cases of plague are due to prairie dogs or their fleas (See, e.g., Barnes 1993). Barnes (1982: 255) wrote that, “human cases resulting from prairie dog plague, regardless of the species, are relatively few” and usually resulted from direct interaction with an infected prairie dog rather than its fleas. John Pape of the Colorado Dept. of Health and Environment has also discussed the low threat of plague transmission to humans from prairie dogs, unless people handle prairie dogs. From 1957-2000, there were 48 documented cases of plague transmitted to humans in Colorado. Prairie dogs were implicated in seven of those cases. However, of those seven cases, two were of people exposed while skinning prairie dogs and one was a child who had killed a prairie dog with a spear (Pape 2001).

It is not even clear if GPDs will recover, given the threat of plague alone. Any additional threats to GPDs, such as the continued loss and degradation of their habitat, shooting, and poisoning, intersect with plague to present a tremendous cumulative set of threats against this imperiled species. Given the difficulty of restraining the impact of plague on GPDs, it is imperative that all other anthropogenic threats against this species be removed. A listing of Endangered or Threatened under the ESA would provide policy tools for eliminating anthropogenic threats in the face of plague and would generate additional impetus to develop and administer inoculations or other measures to reduce the impact of plague on prairie dogs.

#### **IV. Inadequacy of Existing Regulatory Mechanisms.**

Gunnison’s prairie dogs continue to be poisoned, shot, and have their habitat destroyed, with the permission and sometimes the active participation of government agencies at the federal, state, and local levels. GPDs are killed on public and private lands alike. Neither the states within the range of the GPD or federal land managers have instituted regulatory mechanisms sufficient to protect this species from further decline.

##### Arizona

Since 2002, the state has instituted a season shooting closure on Gunnison’s prairie dogs from April 1 to June 15 (Wagner 2002). However, this seasonal closure on shooting is waived for private landowners. In addition, there is no bag limit on prairie dog shooting during open season.

The largest complex of GPDs throughout its range – which is estimated at 28,147 acres (Winstead et al. 2000) – is included under an experimental non-essential administrative rule issued by FWS for black-footed ferrets. The area included under this

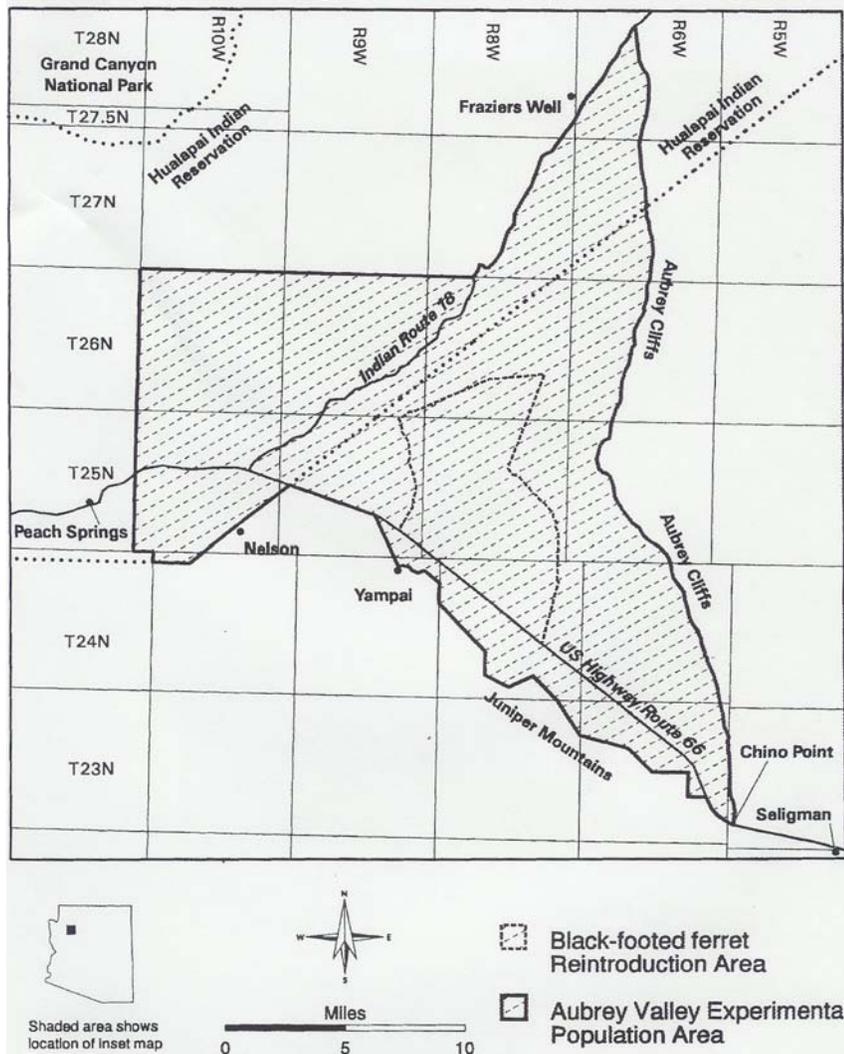
rule is called the Aubrey Valley Experimental Population Area (AVEPA), totals 89,820 ha (221,894 ac) and stretches over parts of Coconino, Mohave, and Yavapai Counties (Figure 4). Ironically, this rule allows continued threats, including poisoning and shooting of prairie dogs within the largest known existing complex of Gunnison's prairie dogs. Land ownership within the AVEPA is 33% private, 22% state trust, and 45% Hualapai (Bureau of Indian Affairs) lands (61 Fed. Reg. 11320-11336 (March 20, 1996)).

Under this non-essential experimental rule in Aubrey Valley, key protections in the ESA are waived. First, the ESA's Section 7(a)(2), which requires federal agencies consult with the U.S. Fish and Wildlife Service when undertaking actions which may jeopardize a listed species, no longer applies (61 Fed. Reg. at 11322). This consultation requirement could have provided protection for Gunnison's whose exposure to poisoning, shooting, and other threats might jeopardize the black-footed ferret. Second, the prohibition on take of ferrets is relaxed, with implications for prairie dog control. While ferrets may not be intentionally killed, the rule anticipates take of 12% of ferrets and their offspring through take incidental to other lawful activities. Regarding prairie dog management, the rule states,

No restrictions will apply to landowners regarding prairie dog control on private lands within the AVEPA. If prairie dog control efforts proposed for private or State trust lands locally affect ferret prey base within a specific area, State and Federal biologists will determine whether ferrets would be potentially impacted. The Service, Department, or authorized cooperators may translocate ferrets from problem areas to other areas of lesser conflict. Big game hunting, prairie dog shooting, and trapping of furbearers or predators in the AVEPA are not expected to affect ferrets (61 Fed. Reg. at 11325).

This excerpt indicates that prairie dog poisoning is not only allowed, but anticipated, and that prairie dog shooting has been disregarded as a threat to ferrets, despite scientific evidence that shooting can greatly reduce or eliminate prairie dog populations and can significantly alter prairie dog behavior (see above discussion on threats of shooting).

Figure 4. Aubrey Valley Experimental Population Area. Source: U.S. Fish and Wildlife Service (61 Federal Register at 11335 (March 20, 1996)).



Moreover, FWS made clear in the AVEPA rule that “This rule makes no distinction between and applies no separate conditions to State versus private lands” and that “otherwise legal activities (such as prairie dog control) within the AVEPA, even those that may incidentally take black-footed ferrets, will not violate the Act [ESA]” (61 Fed. Reg. at 11329 and 11327). The erosion of protection through the AVEPA rule for the largest known complex of Gunnison’s prairie dogs has an indefinite timeframe (61 Fed. Reg. at 11329).

The state’s draft management plan for black-tailed prairie dogs does not include any conservation measures for Gunnison’s prairie dogs (Van Pelt et al. 2001). In addition, the plan fails to provide sufficient measures for conservation and recovery of black-tailed prairie dogs, despite their extreme endangerment (i.e., extirpation from the wild) in the state. Weaknesses of the plan include: 1) the plan defines suitable habitat on a political basis, thereby reducing acreage considered suitable; 2) a lack of commitment to BTPD

restoration in the plan; 3) the plan's failure to address sufficiently anthropogenic threats to BTPDs; 4) the inadequacy of the plan's discussion on real and perceived conflicts between livestock and prairie dogs; 5) the inadequacy of the plan in noting the ecological importance of BTPDs.<sup>27</sup>

Moreover, when this draft plan was presented to the state wildlife commission in October 2001, it was voted down. However, the commission informally directed the Fish and Game Department to continue with the 12-step process for a future black-tailed prairie dog reintroduction effort. This does not equal acceptance to reintroduce, however. A majority of the current commission expressed opposition to reintroduction at the October 2001 meeting. Continued participation was requested, at least in part, so that the Commission and the Arizona Game and Fish Department could continue to monitor the activities of the interstate working group.

At a February 2003 meeting of the Commission, there was little sign of forward progress in regard to black-tailed prairie dog reintroduction. In fact, the Commission unanimously approved a motion stating

That the Commission direct the Department to review the latest science on the population numbers and acreage of present and historic range of the black-tailed prairie dog and bring forward to the Commission prior to making any recommendation in the 12-step process an analysis of the potential financial costs, including liabilities, for the effects of any introduction of black-tailed prairie dogs on public and private land uses, rural communities and cultures and the potential effects of prairie dog carried diseases [sic] on other wildlife, humans, and domestic animals.<sup>28</sup>

While the state continues to ban all BTPD shooting on its nonexistent colonies, its hostile behavior relative to an extirpated species – the black-tailed prairie dog – has bleak implications for Gunnison's prairie dogs.

As discussed below, the federal Wildlife Services engages in poisoning and shooting of Gunnison's prairie dogs in the state and there are inadequate regulatory restrictions on this agency (a division within the U.S.D.A.). In addition, there are inadequate protections for GPDs on federal lands within the state.

### Colorado

GPDs continue to be legally shot and poisoned in the state. In fact, the state Department of Agriculture itself poisons Gunnison's prairie dogs. In addition, Gunnison's prairie dogs are considered to be "destructive rodent pests" for which mandatory control can be invoked (C.R.S. 35-7-101 et seq.). The Department of

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<sup>27</sup>See Forest Guardians, Comments on Interagency Management Plan for Black-tailed Prairie Dogs in Arizona, letter submitted during formal comment period, dated October 1, 2002. 16 pp.

<sup>28</sup>See "Minutes of the Meeting of the Arizona Game and Fish Commission," February 21, 2003 at pp. 8-10, emphasis added.

Agriculture is authorized to conduct control at the expense of landowners, including those who do not agree to prairie dog control (C.R.S. 35-7-112). After the poisoning occurs, county commissions are authorized to impose a lien against private property if landowners do not reimburse for the cost of prairie dog poisoning (C.R.S. 35-7-114).

Gunnison's prairie dogs are also not sufficiently protected by state regulation from shooting. GPDs can legally be shot on federal and non-federal lands. While Colorado banned the shooting of black-tailed prairie dogs on federal lands, it did not provide the same protection for Gunnison's prairie dogs. The only restriction on shooting relevant to GPDs in the state is a bag limit of five (5) prairie dogs during contest hunts (2 CCR 406-3). This restriction does not apply to non-contest prairie dog shooting.

The Colorado Department of Agriculture participates in GPD poisoning both by supplying poisons to private applicators and by controlling GPDs upon request. We discuss in the following section of the petition the extensive poisoning activity in the state.

As discussed above, the state has erected barriers to restoration of prairie dogs through translocation (C.R.S. 35-7-203). In addition, there are state, county, and municipal ordinances that impede GPD conservation. For example, the city of Gunnison requires GPD control on private land (See Exhibit 4: Gunnison's Prairie Dog Meeting Notes; Capodice and Harrell 2003).

Capodice and Harrell (2003: 7) urged recovery actions to prevent federal listing of the gunnisoni subspecies. They advocate:

- Setting aside sufficient public lands to support viable populations of GPDs;
- Regulation of shooting;
- Prevention of poisoning on public lands;
- Translocation of GPDs from private lands where they are threatened to public lands;
- Instituting a flea control program to protect GPD colonies from plague;
- Subsidizing private landowners to protect GPD colonies on private lands;
- Cooperatively census GPDs with private landowners.

Petitioners agree with these recommendations but they have generally not been implemented by BLM (Joe Capodice, pers. comm., February 6, 2004; Sandy Borthwick, pers. comm., February 13, 2004). Petitioners discuss BLM policy pertaining to poisoning and shooting below.

The state's draft grassland species conservation plan does not include conservation provisions for the Gunnison's prairie dog (Colorado Division of Wildlife). That plan pertains to the black-tailed prairie dog and several associated species. However, despite the black-tailed prairie dog's candidacy for ESA listing, the Colorado plan fails to address the threats causing the imperilment of the black-tailed prairie dog. Many of those threats also extend to Gunnison's prairie dogs and are worthy of discussion here, as they

demonstrate the lack of will on the part of the state of Colorado to take proactive conservation measures urgently needed for imperiled species conservation.

Colorado's draft grassland plan is flawed in many respects. It assumes the validity of the very questionable estimate that the state contains 631,000 acres of black-tailed prairie dogs. The Plan tiers its regulatory scheme to the estimated BTPD acreage in Colorado. At this presently assumed level of 631,000 acres of BTPDS, plague will be addressed only via public outreach and voluntary reporting; poisoning will continue without state restrictions (beyond licensing of private applicators); the current restrictions on shooting will be loosened; no measures are set forward for repopulation; and incentives are only "provided as necessary to provided long term protection" (Colorado Division of Wildlife 2003: 18, Table 3). In addition, the plan illegitimately and unprofessionally questions the keystone role of black-tailed prairie dogs.<sup>29</sup> Overall, despite three years after the finding of FWS that the black-tailed prairie dog warrants ESA listing (but is precluded by higher priorities), the State of Colorado has failed to get its act together on prairie dog conservation. The policies of this state cannot be looked to for guarantee of the long-term persistence of the Gunnison's prairie dog.

In addition, as discussed below, there are inadequate protections for GPDs on federal lands within the state.

### New Mexico

Schmitt (pers. comm.. 1999), of the state Department of Game and Fish, stated that, along with sylvatic plague, extensive poisoning programs, and shooting, a threat to GPDs included a "lack of legal protection under New Mexico statutes, including regulations administered by the New Mexico Department of Game and Fish..."

The Plains of San Agustin in Socorro and Catron County are an illustrative example of the inadequacy of regulatory mechanisms within the state. Hawks Aloft (2000) has documented the near eradication of GPDs in that area, which they attribute to continued poisoning and shooting of prairie dogs. They write, "It is likely that once small prairie dog towns grow and become large enough to be detected, the prairie dogs are eradicated" (Hawks Aloft 2000: 16).

The state's latest draft prairie dog plan does not include provisions for GPD conservation. Moreover, regarding black-tailed prairie dogs, a candidate for ESA listing, the plan fails to restrict threats, such as poisoning, shooting, and habitat destruction; conservation measures are voluntary on state trust and private lands, and there are no restrictions on threats to prairie dogs on federal lands.<sup>30</sup>

In addition to not protecting GPDs from threats, the state is involved in GPD poisoning. Specifically, the state department of agriculture has had extensive involvement

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<sup>29</sup>See comments of Forest Guardians et al. (Dated October 13, 2003) on Colorado's Draft Grassland Plan.

<sup>30</sup>"Conservation and management strategic plan for black-tailed prairie dogs in New Mexico," New Mexico Black-tailed Prairie Dog Working Group, 15 November 2001.

with prairie dog control.<sup>31</sup> The two primary complaints leading to assistance with prairie dog control include agricultural activities (55%) and turf installation for urban parks, golf courses, etc (40%). In 1999, the average size of the population treated was 110 acres and the average number of aluminum phosphide pellets distributed per site was 500. Also in 1999, the NMDA planned to assist with ongoing control of GPDs in a 30,000-acre region of Socorro County near the Bosque del Apache National Wildlife Refuge. The estimated acreage of some of the populations that had been subject to previous control efforts was 500 – 718. The reason for eradication was agricultural land uses.

Other large populations of GPDs have been subject to lethal control programs. In Sandoval County near Cuba, New Mexico approximately 3,237 acres were poisoned over the course of two months in 1991 with the participation of 30 people trained specifically for this eradication effort. 122,850 aluminum phosphide pellets were used. While the general consensus was that most of the prairie dogs had been eliminated, ongoing monitoring of the area and treatment of recurring prairie dogs was planned.

As discussed below, the federal Wildlife Services engages in poisoning and shooting of Gunnison’s prairie dogs in the state and there are inadequate regulatory restrictions on this agency. In addition, there are inadequate protections for GPDs on federal lands within New Mexico.

## Utah

Since 1999, the state has instituted a seasonal closure on GPD shooting, prohibiting the take of this species between April 1 and June 25 (Utah Wildlife Board R657-19-10-4(a)). No license is required nor is there a bag limit outside of this seasonal closure. In addition, a special provision allows farmers and ranchers to take GPDs at any time if they cause damage (Utah Wildlife Board R657-19-10-5).

The UDWR lists the GPD as a Sensitive Species, a designation that provides authority for management of prairie dog shooting, but not other threats (Amy Seglund, UDWR, pers. comm.).

As with Arizona and New Mexico, the federal Wildlife Services engages in poisoning and shooting of Gunnison’s prairie dogs in the state and there are inadequate regulatory restrictions on this agency. In addition, there are inadequate protections for GPDs on federal lands within the state.

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<sup>31</sup>Often, distinctions between black-tailed and GPD species are not indicated in the NMDA documents.

## Federal policies

*Wildlife Services.* Wildlife Services (WS) (formerly called Animal Damage Control) is a division within the U.S. Department of Agriculture's Animal Plant Health Inspection Service (APHIS). WS is very active in controlling GPDs.<sup>32</sup>

For example, in Arizona, Wildlife Services kills Gunnison's prairie dogs in two districts, the Western and Eastern. In the Western District, from 1993 to 2001, Wildlife Services reported poisoning 1,744 acres and shooting 103 GPDs. However, the amount of acreage impacted is undoubtedly much greater. In some cases, the amount of lethal toxicant used was disproportionately higher than the amount of acreage reported poisoned. Contrast the following rates of zinc phosphide use by Wildlife Services with estimates by Henderson (1989) that approximately 1/3 lb. of zinc phosphide is required for black-tailed prairie dog towns (which are often higher density than GPD towns):

- 140 lbs. of zinc phosphide applied on 23 GPD acres (over 18 times the ordinary rate of application);
- 40 lbs. of zinc phosphide applied on 2 GPD acres (at least 60 times the ordinary rate of application); and
- 25 lbs. of zinc phosphide applied on 1 GPD acre (at least 75 times the ordinary rate of application).

There is consequently a strong basis for suspecting that Wildlife Services under-reports the amount of GPD acreage it poisons. For the Western District, Wildlife Services reported applying a total of 2,184 pounds of zinc phosphide from 1993-2001. An application rate of 1/3 lb. per acre yields a total of 6,552 acres poisoned. An additional 162 acres were poisoned with aluminum phosphide, for a total of 6,714 acres. Moreover, 47 sites were lethally controlled with aluminum phosphide or gas cartridges, but Wildlife Services failed to disclose the amount of acreage controlled.

In Arizona's Eastern District, from 1994-2001, Wildlife Services poisoned 2,298 acres and shot 143 GPDs. Wildlife Services reported using 3,133 lbs. of zinc phosphide, which, under normal application rates, equates to 9,399 acres poisoned. Twelve additional acres were poisoned with aluminum phosphide. There were 22 additional sites poisoned with aluminum phosphide and gas cartridges, but for which Wildlife Services did not disclose the number of acres treated.

Therefore, from 1993-2001 in Arizona, Wildlife Services applied enough poison to control at least 16,125 acres of GPDs and conducted lethal control on at least 69 additional sites. This is over half the size of the largest known remaining GPD complex in existence and does not include private lethal control efforts.

As we discussed above, unjustifiably, plague is often used as a rationale for poisoning prairie dogs. Indeed, plague was cited by Wildlife Services as the rationale for

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<sup>32</sup>All Wildlife Services information was obtained through open records request and is on file with Forest Guardians.

control in 9 of 38 cases in the Western District and 3 cases in the Eastern District of Arizona.

In AZ, NM, and UT, from 1996-2002, WS distributed and applied 6,149 lbs. of zinc phosphide. This is enough zinc phosphide to poison 18,447 acres of GPDs.<sup>33</sup> In addition, the agency distributed and applied 790,181 aluminum phosphide pellets or tablets, which is enough fumigant to control 12,954 acres of GPDs.<sup>34</sup> In the same time period, Wildlife Services distributed or used 13,846 gas cartridges, enough to control 1,215 additional acres of GPDs.<sup>35</sup> In sum, Wildlife Services distributed and used a quantity of fumigants and poisons capable of lethally controlling 32,616 acres across AZ, NM, and UT from 1996-2002. This estimate does not include distribution of poisons from Wildlife Services to the Colorado Department of Agriculture (which has an active control program and disseminates poisons to private applicators), nor does it capture poisons and fumigants distributed by the South Dakota Department of Agriculture to agencies and applicators in any of the four states within the GPD's range.

In terms of direct poisoning by the agency (a subset of the above estimate), Wildlife Services reported poisoning 4,290 acres on private and public lands, and an additional 824 private and public land sites. However, as we indicated above, the agency likely underreports the number of acres it poisons (and in fact does not disclose the acreage of most sites). For example, in 1997, in Utah, Wildlife Services reported using 100 lbs. of zinc phosphide to poison one acre of prairie dogs, which is 300 times the ordinary rate of application.<sup>36</sup> It is worthy of note that Wildlife Services poisoned at least 667 public land sites from 1996-2002. This extensive poisoning on public lands is made possible by the lack of protections for GPDs among federal and state land managing agencies.

*U.S. Department of Defense.* A notable instance of the inadequacy of regulatory mechanisms on DOD lands is GPD management at Kirtland Air Force Base (KAFB) in Albuquerque, New Mexico. This base has been known to contain a relatively large acreage of GPDs.<sup>37</sup> More than 310 acres out of 1091 acres are regularly controlled.<sup>38</sup> The

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<sup>33</sup>In New Mexico, Wildlife Services refers to Gunnison's prairie dogs as "white-tailed prairie dogs." However, as white-tailed prairie dogs do not occur in NM, we assume that Wildlife Services is referring to Gunnison's prairie dogs. The agency does not differentiate between white-tailed and Gunnison's prairie dogs in Utah. Of the 6,149 lbs. of zinc phosphide used or distributed by Wildlife Services, 988 lbs were applied in Utah and may have been used on either white-tailed prairie dogs or Gunnison's prairie dogs. Estimated acreage poisoned is based on application rate of 0.33 lb/acre estimated by Henderson (1989). However, Roemer and Forrest (1996) report application rate of 0.83 lb/acre.

<sup>34</sup>Based on application rate of 61 tablets/acre (Roemer and Forrest 1996). 456 of these tablets were used or distributed in Utah and may have been used on either white-tailed or Gunnison's prairie dogs.

<sup>35</sup>Based on application rate of 11.4 cartridges/acre (Roemer and Forrest 1996).

<sup>36</sup>Application rate based on Henderson (1989); may have been applied on either Gunnison's or white-tailed prairie dogs.

<sup>37</sup>See Kirtland Air Force Base Final Environmental Assessment Prairie Dog Management Program 1997.

<sup>38</sup>Ibid; See also Environmental Assessment for the Establishment of a Prairie Dog Relocation Site at Kirtland Air Force Base 1999.

recommended and selected method of control is fumigation,<sup>39</sup> though shooting has been utilized in some cases.<sup>40</sup>

Due to the designation of numerous “no tolerance zones” for prairie dogs on the base, an attempt was made at transitioning from fumigation to non-lethal control methods in these areas.<sup>41</sup> However, reports of regular poisoning of prairie dogs on base persist. Some poisonings have received media attention<sup>42</sup> and a critical response from the public nationwide.<sup>43</sup> Federal restrictions currently prohibit a relocation program at this time and fumigation will continue to be utilized exclusively.<sup>44</sup> There are no provisions for prairie dog protection outside of the no tolerance zone on KAFB, and prairie dogs in these areas appear to be declining and have been subjected to poisoning and shooting as recently as 2003 (pers. obs., base personnel).

*National Park Service.* In Arizona, Gunnison’s prairie dogs occur on the Wupatki National Monument. Yet, in the general management plan for the Wupatki, no special conservation provisions are accorded to the GPD (NPS 2002). This is clearly a missed conservation opportunity.

In Colorado, GPDs on the Curecanti National Recreation Area have been subjected to significant lethal control since at least 1971 under the auspices of protecting visitor safety. From 1982-1986, 7,463 gas cartridges and 83 pounds of zinc phosphide were applied to prairie dog burrows on the recreation area (Lynn Cudlip & Erin Reeser, NPS, pers. comm., Rick Harris, NPS, dated 7/19/92). In 1991, Dr. Jim Fitzgerald of the University of Northern Colorado submitted a research proposal to analyze the ecology of GPDs at Curecanti. In that proposal, Fitzgerald suggested caution about controlling GPDs in the name of human safety. In addition to surveying GPD colonies, Fitzgerald proposed experimenting with vegetation barriers to separate GPDs and recreationists (Jim Fitzgerald, University of Northern Colorado, memo to Mark Boyce, NPS, dated 5/17/91). Nonetheless, in 1992, 461 burrows were gassed on the Curecanti (Rick Harris, NPS, pers. comm., 7/19/92). In a 2000 document, NPS states that there has been some control of prairie dogs at Curecanti in every year except 1975. In 1975, NPS attempted to flood prairie dogs at Elk Creek through the use of irrigation (NPS 2000). At the North Willow Creek/Old Stevens prairie dog colony, prairie dog shooting occurs (NPS 2000). To improve prairie dog management at Curecanti, Stone (n.d.) proposed to test a combination of relocation, revegetation, construction of visual barriers, and lethal control of prairie dogs that can’t be removed.

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<sup>39</sup>See Kirtland Air Force Base Final Environmental Assessment Prairie Dog Management Program 1997, Kirtland Air Force Base Pest Management Plan 2002.

<sup>40</sup>See Kirtland Air Force Base Final Environmental Assessment Prairie Dog Management Program 1997.

<sup>41</sup>See Environmental Assessment for the Establishment of a Prairie Dog Relocation Site at Kirtland Air Force Base 1999.

<sup>42</sup>See, e.g., Ludwick, Jim. 2003. “Kirtland still poisons prairie dogs.” *Albuquerque Journal* March 14, 2003.

<sup>43</sup>E.g., letters to Gen. Lester Lyles regarding Kirtland Air Force Base poisonings 2003, received via open records request.

<sup>44</sup>Kirtland Air Force Base, Finding of No Significant Impact. Prairie Dog Management Program 2003.

The relentless lethal control of GPDs at Curecanti is motivated by a fear of plague. In a 1997 General Management Plan for the recreation area, one objective is to “Manage populations of prairie dogs to minimize a human health hazard and provide for adequate public education” with the provision that “Prairie dog habitat is modified to reduce the potential for plague” (NPS 1997). Indeed, NPS has both vilified GPDs for carrying plague (which they cannot, see, e.g., Stone n.d.) and has fundamentally mischaracterized the ecology of this disease. In a 1996 press release, NPS warns about a plague-carrying flea found at the Iola prairie dog colony on Curecanti and assert, “Plague naturally occurs in the environment infecting rodents and occasionally causing [sic] large die-offs of rodent populations” (NPS 1996). More recently, in a “Plague Action Plan” for the Curecanti, NPS writes, “Bubonic plague is a natural population control mechanism that is common at rodent populations throughout the United States and other parts of the world” (NPS 2000: 1). NPS fails to consider that, on the Curecanti, plague is an exotic, non-natural disease that is an extreme threat to GPD persistence. GPDs are nearly 100% susceptible to this disease and it has caused substantial range shrinkage (e.g., Fitzgerald 1991; Wagner 2002).

*U.S. Fish and Wildlife Service.* Gunnison’s prairie dogs were relocated from Albuquerque, to a small area (3.5 ha) on the Sevilleta National Wildlife Refuge in New Mexico in 1997 (Davidson et al. 1999). However, range-wide, FWS holdings cover only a modicum of potential GPD habitat.

*U.S. Bureau of Land Management.* BLM manages 12.4% of the potential GPD habitat across the species’ range. This agency does not restrict prairie dog shooting, rather it defers to state policies that, as we have reviewed, are deficient. In addition, the BLM does not restrict Gunnison’s prairie dog poisoning. While 43 C.F.R. 4140.1(c)(1) prohibits grazing permittees or lessees from: “Violation of Federal or State laws or regulations pertaining to the: (i) Placement of poisonous bait or hazardous devices designed for the destruction of wildlife,” it does not limit poisoning of prairie dogs conducted in compliance with federal and state laws. Yet, federal and state laws do not limit GPD poisoning. Moreover, currently proposed revisions to grazing regulations on BLM lands nation-wide would relax this prohibition under the Proposed Action by making it applicable “only when the permittee or lessee commits a prohibited act on an allotment for which he holds a permit or lease from the BLM.”<sup>45</sup> Under the Modified Action, the current regulation regarding wildlife poisoning at 43 C.F.R. 4140.1(c)(1) would be deleted in its entirety.<sup>46</sup>

BLM participated in rodent extermination efforts in the 1960s (See, e.g., Shriver 1965). GPDs were the target of poisoning on BLM lands in the Albuquerque district of the BLM in New Mexico in the 1980s. One example is BLM poisoning of multiple prairie dog colonies on the Ignacio Chavez Grant. Obstacles to conservation within this agency are noted by a staff wildlife biologist in the Albuquerque District, who writes, “If Gunnison’s prairie dog is federally listed a significant emotional adjustment will be

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<sup>45</sup>See “Proposed Revisions to Grazing Regulations for the Public Lands Draft Environmental Impact Statement DES 03-062,” prepared the U.S. Bureau of Land Management, December 2003 at p. 2-23.

<sup>46</sup>Ibid., at p. 2-25.

required of our staff and the ranchers, i.e. the common historic mindset was to eliminate them [Gunnison's prairie dogs]."<sup>47</sup>

Conservation measures could be provided within Resource Management Plans (RMPs) for districts of the BLM, whether Resource Areas (RAs) or Field Offices (FOs). However, as petitioners demonstrate below, GPDs are either not provided protections in RMPs or, in some cases, are not even mentioned in these RMPs.

### Arizona BLM

There are three BLM districts within the GPD's range in the state: the Phoenix, Arizona Strip, and Safford FOs. None of these RMPs discuss Gunnison's prairie dogs or provide conservation measures for this species. The Phoenix RMP was issued in 1988. It fails to mention Gunnison's prairie dogs or provide protections for this species. Potential harms to GPDs from implementation of this RMP include disposal of 12% of the federal land in the FO.<sup>48</sup> The Arizona Strip RMP was issued in 1990. This RMP does not discuss Gunnison's prairie dogs in either its special status species or wildlife habitat sections and provides no protection for this species.<sup>49</sup> Similarly, the Safford RMP does not mention GPDs or provide protections for this species.<sup>50</sup>

### Colorado BLM

There are five BLM districts within the GPD's range in Colorado: the San Juan, San Luis, Gunnison, Uncompaghre Basin, and Canon City RAs. None of the RMPs for these districts provides protections for the Gunnison's prairie dog. The RMP for the San Juan/San Miguel RAs was issued in 1984. This plan does not mention Gunnison's prairie dogs or provide any special protections for GPDs or their habitat.<sup>51</sup> The RMP for the San Luis RA was issued in fall 1991.<sup>52</sup> The only special status plants and animals listed in this RMP are Cleome multicaulis, Astragalus ripleyi, and the black-footed ferret (RMP at p. 4-15). No special conservation measures are provided for the GPD from authorized land uses such as oil and gas development and motorized recreation. The RMP describes prairie dog colonies in the RA as generally small (RMP at p. 2-51). The Gunnison RMP, issued in 1993, does not mention GPDs or provide protections for this species.<sup>53</sup> The

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<sup>47</sup>This is stated in documents received from the Albuquerque Field Office of the BLM in NM. The reports are from a "Wildlife Management Biologist" with no name given. Documents are dated November 7, 2002 and October 7, 2003.

<sup>48</sup>U.S. Bureau of Land Management. 1988. "Proposed Phoenix Resource Management Plan and Final Environmental Impact Statement." Phoenix (AZ) District, December 1988.

<sup>49</sup>U.S. Bureau of Land Management. 1990. "Proposed Arizona Strip District Resource Management Plan and Final Environmental Impact Statement." Arizona Strip District, December 1990.

<sup>50</sup>U.S. Bureau of Land Management. 1991. "Safford District Resource Management Plan Environmental Impact Statement." Safford (AZ) District Office, August 1991.

<sup>51</sup>U.S. Bureau of Land Management. 1984. "Proposed Resource Management Plan for the San Juan/San Miguel Planning Area." Montrose (CO) District, FEIS 84-31.

<sup>52</sup>U.S. Bureau of Land Management. 1991. "San Luis Resource Area Proposed Resource Management Plan and Final Environmental Impact Statement." Canon City (CO) District, FES 91-22, September 1991.

<sup>53</sup>U.S. Bureau of Land Management. 1993. "Gunnison Resource Area Record of Decision, Approved Resource Management Plan, and Rangeland Program Summary." Montrose District (CO), February 1993.

Uncompahgre Basin RMP & ROD, issued in 1989, does not mention GPDs or provide protections for this species.<sup>54</sup> The RMP for the Canon City RA was issued in 1996. This plan fails to mention GPDs and does not contain any prairie dog conservation measures.<sup>55</sup>

### New Mexico BLM

There are four BLM districts within the GPD's range in New Mexico: the Farmington, Albuquerque, Taos, and Socorro Resource Areas. None of the RMPs or RMP amendments (RMPAs) provide conservation measures targeted at Gunnison's prairie dogs.

The RMP for the Farmington RA was finalized in September 2003. Despite its recent date, neither this document nor the Record of Decision for the RMP discusses GPDs, either as wildlife or as a special status species.<sup>56</sup> This oversight is particularly alarming, given the tremendous oil and gas extraction occurring in this RA. As of 1991, there were 22,000 oil and gas wells in the Farmington RA.<sup>57</sup> The 2003 RMP provides for 2.6 million acres to be open for oil and gas leasing without special restrictions.<sup>58</sup>

The RMP for the Taos RA was finalized in 1988.<sup>59</sup> The only mention of GPDs is a note on their occurrence in the Wild Rivers Recreation Area, but no provisions are included for their conservation or protection.<sup>60</sup>

In 1991, an RMPA regarding oil and gas leasing and development was made to the Albuquerque and Taos RMPs which provided for 4.6 million acres in the Albuquerque RA and 1.2 million acres in the Taos RA to be open to oil and gas leasing.<sup>61</sup> Despite the likely harms from this extensive potential oil and gas leasing, GPDs are not discussed in the RMPA, nor are provisions included to protect GPDs from harms of oil and gas leasing. While Gunnison's prairie dogs are mentioned as occurring in the Ignacio

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<sup>54</sup>U.S. Bureau of Land Management. 1989. "Uncompahgre Basin Resource Management Plan and Record of Decision." Montrose District (CO), Uncompahgre Basin Resource Area, July 1989.

<sup>55</sup>U.S. Bureau of Land Management. 1996. "Royal Gorge Resource Area Record of Decision and Approved Resource Management Plan." Royal Gorge Resource Area, Canon City (CO) District, May 1996.

<sup>56</sup>See U.S. Bureau of Land Management. 2003. "Record of Decision, Farmington Proposed Resource Management Plan and Final Environmental Impact Statement." Farmington Field Office (NM), September 2003; and U.S. Bureau of Land Management. 2003. "Farmington Proposed Resource Management Plan and Final Environmental Impact Statement." Farmington Field Office (NM), March 2003.

<sup>57</sup>U.S. Bureau of Land Management. 1991. "Albuquerque District Proposed Resource Management Plan Amendment/Final Environmental Impact Statement Oil and Gas Leasing Development." Albuquerque District (NM), December 1991 at Appendix J, p. J-3.

<sup>58</sup>See U.S. Bureau of Land Management. 2003. "Record of Decision, Farmington Proposed Resource Management Plan and Final Environmental Impact Statement." Farmington Field Office (NM), September 2003 at p. 3.

<sup>59</sup>U.S. Bureau of Land Management. 1988. "Taos Resource Management Plan." Albuquerque District (NM), Taos Resource Area, October 1988.

<sup>60</sup>Ibid. at p. 5-8.

<sup>61</sup>U.S. Bureau of Land Management. 1991. "Albuquerque District Proposed Resource Management Plan Amendment/Final Environmental Impact Statement Oil and Gas Leasing Development." Albuquerque District (NM), December 1991.

Chaves Special Management Area, this area is open to oil and gas leasing under the RMPA.<sup>62</sup>

The Socorro RMP was issued in 1989.<sup>63</sup> There only two mentions of GPDs within the RMP. First, the RMP stipulates that oil and gas activities in prairie dog towns include black-footed ferret surveys and consultation with FWS.<sup>64</sup> However, the RMP also states that,

Due to the USF&WS recently declaring the black-footed ferret extinct south of Interstate Highway 40, all references to prairie dog and black-footed ferret habitat and acreages have been deleted from the Approved Plan.<sup>65</sup>

The RMP therefore has no provisions for the conservation of Gunnison's prairie dogs. The Socorro plan is currently under revision. In a 2003 report on energy and mineral resource potential issued as part of the revision analysis process, oil and gas (including coal-bed methane), geothermal, coal, gold, silver, copper, lead, manganese, zinc, tin, uranium, perlite, basalt, andesite, sand and gravel, scoria, travertine, pumice, and flagstone were mentioned among the resources to be extracted in this RA.<sup>66</sup> This likely extensive energy and mineral resource extraction will pose a threat where it occurs within proximity to GPD colonies.

### Utah BLM

There are two BLM districts within the GPD's range in Utah: the Monticello and Moab Resource Areas. Plans for both areas fail to mention GPD or provide protections for this species from harmful activities.

The Monticello RA is governed by the San Juan RMP, which was issued in 1991. This plan does not mention Gunnison's prairie dog or provide this species with protections.<sup>67</sup> In September 2002, a preparation plan for a new Monticello RMP was released. The Gunnison's prairie dog is not mentioned in this preparation plan.<sup>68</sup>

The Moab RA is governed by the Grand RA RMP, which was issued in 1985. This plan does not mention Gunnison's prairie dog or provide this species with protections. The plan allows extensive exploitation that would harm GPDs in area,

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<sup>62</sup>Ibid. at Appendix J, p. J-8

<sup>63</sup>U.S. Bureau of Land Management. 1989. "Socorro Resource Management Plan." Las Cruces District (NM), Socorro Resource Area, August 1989.

<sup>64</sup>Ibid. at Appendix F, p F-11.

<sup>65</sup>Ibid. at Appendix F, p. F-6.

<sup>66</sup>URS Corporation. 2003. "Energy and Mineral Resource Potential Report." Prepared for U.S. Bureau of Land Management, Socorro Field Office (NM), October 2003.

<sup>67</sup>U.S. Bureau of Land Management. 1991. "Resource Management Plan Record of Decision and Rangeland Program Summary for the San Juan Resource Area, Moab District, Utah." March 1991.

<sup>68</sup>U.S. Bureau of Land Management. 2002. "Pre-Plan Contract for the Monticello Field Office Resource Management Plan." September 2002.

including 1.2 million acres to be used by off-road vehicles and leaving entire resource area (except 1,850 acres) to mining claims.<sup>69</sup> In August 2002, a preparation plan for a new Moab RMP was released. This plan does not mention Gunnison's prairie dogs.<sup>70</sup>

*U.S. Forest Service.* The USFS manages 19.4% of the potential GPD habitat across the species' range. As discussed above, USFS has an extensive history of participation in prairie dog eradication efforts on its lands. Remaining colonies on USFS lands tend to be small and isolated. GPDs occur within the Rocky Mountain (Region 2), Southwestern (Region 3), and Intermountain (Region 4) Regions. While some individual forests restrict grazing permittees from lethal control of prairie dogs, such as the Coconino National Forest (AZ) in Region 3, there are no region-wide policies prohibiting lethal control on forests or by permittees.

The Rocky Mountain Region (Region 2) has designated the Gunnison's prairie dog a sensitive species.<sup>71</sup>

National Forest long range management plans categorically fail to provide protections for Gunnison's prairie dogs. Usually the species is not even mentioned. Though large regions of the Cibola National Forest fall within suitable GPD habitat, there is no mention of GPDs or provisions for conserving their habitat.<sup>72</sup> Similarly, on the Rio Grande National Forest, there is no mention of GPDs or provisions for their habitat conservation. Burrowing Owls are mentioned on a table of species, but no provisions are made for preserving prairie dogs, with whom burrowing owls are generally associated in this region.<sup>73</sup> GPDs are not mentioned, though some of the areas are within the historical range on the Uncompahgre, Gunnison, San Juan, and Manti-La Sal National Forests.<sup>74</sup> On the Pike National Forest, the plan does not mention GPDs, although several counties

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<sup>69</sup>U.S. Bureau of Land Management. 1985. "Grand Resource Area Resource Management Plan." Grand Resource Area (UT), Moab District, 1985.

<sup>70</sup>U.S. Bureau of Land Management. 2002. "Preparation for the Moab Field Office Resource Management Plan." Moab Field Office (UT), August 23, 2002.

<sup>71</sup>Sensitive Species list for Region 2 located at:

<http://www.fs.fed.us/r2/projects/scp/evals/sensitivelist.shtml>, visited 11 February 2004.

<sup>72</sup>USDA Forest Service. 1984. "Proposed Cibola National Forest Land and Resource Management Plan." Southwestern Region.

<sup>73</sup>USDA Forest Service. 1996. "Final Environmental Impact Statement for the Revised Land and Resource Management Plan. Rio Grande National Forest." Rocky Mountain Region; and USDA Forest Service. 1996. "Revised Land and Resource Management Plan. Rio Grande National Forest." Rocky Mountain Region.

<sup>74</sup>USDA Forest Service. 1991. "Amended Land and Resource Management Plan." Grand Mesa, Uncompahgre, and Gunnison National Forests. Rocky Mountain Region. Delta, CO; USDA Forest Service. 1991. "Final Supplemental Environmental Impact Statement. " Grand Mesa, Uncompahgre, and Gunnison National Forests. Rocky Mountain Region. Delta, CO; USDA Forest Service. "Final Supplemental Environmental Impact Statement. San Juan National Forest." Rocky Mountain Region. Durango, CO; USDA Forest Service. 1992. "Amended Land and Resource Management Plan." San Juan National Forest. Rocky Mountain Region. Durango, CO; USDA Forest Service. "Land and Resource Management Plan". Manti-Lasal National Forest. Price, Utah.

in the area, particularly Park, had large historical acreages.<sup>75</sup> GPDs are not mentioned in the Coconino National Forest plan, although the forest contains this species.<sup>76</sup> GPDs are not mentioned though there are large areas of suitable habitat and some, known existing populations on Carson National Forest. The Black-footed Ferret is listed as a Federally Endangered Species under “Threatened and Endangered Species Habitat”, but is considered, “not applicable.”<sup>77</sup> In the Santa Fe National Forest plan, GPDs are not mentioned, though the black-footed ferret is and “Management for the protection of potential habitat” is mentioned and continues, “Habitat potential on the Forest is low compared to other areas of the state.” (In 1991 Wildlife Services assisted with a Sandoval County GPD eradication that included a portion of Santa Fe National Forest).<sup>78</sup> GPDs are not mentioned in the plan for the Kaibab, though it is probable they inhabit the area. A recent history of poisoning of GPDs has occurred around Williams and Flagstaff, AZ.<sup>79</sup> GPDs not mentioned in the plan for the Gila National Forest,<sup>80</sup> though this forest historically contained GPDs (see Ruffner 1980).

On February 2004, USFS withdrew a moratorium that had been placed on black-tailed prairie dogs in 2000 (Tom Thompson, USFS, memorandum to Regional Foresters of Regions 1, 2, 3, dated February 12, 2004). The implications for GPDs are ominous: the Forest Service is backtracking on the few gains in prairie dog protections made in the past several years.

*U.S. Bureau of Indian Affairs.* Approximately 26% of GPD potential habitat occurs on tribal lands. Routine lethal control occurs on many Native American reservations. In addition, as noted above, plague is reported from the Navajo reservation and throughout the four corners area. ESA candidacy or listing could help facilitate funding of tribal conservation programs for the Gunnison’s prairie dog.

#### Interstate prairie dog working group

In response to the 1998 petitions to list the black-tailed prairie dog under the ESA (National Wildlife Federation 1998; Biodiversity Legal Foundation et al. 1998), the states within the range of that species formed an interstate group, which has produced a conservation assessment and strategy and addendum (Van Pelt 1999; Luce 2003). In Spring 2003, the interstate effort was expanded to address conservation of Gunnison’s and white-tailed prairie dogs. A conservation assessment for the GPD was supposed to be

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<sup>75</sup>USDA Forest Service. 1984. “Final Environmental Impact Statement.” Pike and San Isabel National Forests; Comanche and Cimarron National Grasslands. Pueblo, CO.

<sup>76</sup>USDA Forest Service. 1987. “Coconino National Forest Land and Resource Management Plan.” Southwestern Region.

<sup>77</sup>USDA Forest Service. 1986. “Environmental Impact Statement, Carson National Forest Plan”. Southwestern Region.

<sup>78</sup>USDA Forest Service. 1987. Environmental Impact Statement. Santa Fe National Forest Land Management Plan. Southwestern Region. Santa Fe, NM.

<sup>79</sup>USDA Forest Service. 1987. Environmental Impact Statement for the Kaibab National Forest Plan. Southwestern Region. Williams, AZ.

<sup>80</sup>USDA Forest Service. 1986. “Environmental Impact Statement”. Gila National Forest. Southwestern Region. Silver City, NM.

complete by December 2003 (Luce, pers. comm., dated March 26, 2003), but was delayed and a draft conservation assessment is now scheduled to be completed in Fall 2004 (Luce, pers. comm., dated Jan. 27, 2004).

## **V. Other Natural or Man-made Factors Affecting the Gunnison's Prairie Dog's Continued Existence.**

### Rodent Control Efforts

Since the early 1900s, Gunnison's prairie dogs have been subjected to eradication efforts, principally motivated by agricultural operators. In addition to the 1902 statement of C.H. Merriam, the Chief of the Bureau of Biological Survey, that prairie dogs rob cattle of 50-75% of their forage (Merriam 1902), Taylor and Loftfield (1924) specifically examined the Zuni prairie dog in northern Arizona and concluded that these prairie dogs destroyed 76% of wheatgrass (Agropyron smithii) and 100% of dropseed (Sporobolus crytandrus), the primary grasses available. In a speech prepared for the Ecological Society of America meeting on September 18, 1923, Taylor decreed that,

So far as these experiments go the prairie dog does not possess a single beneficial food habit; nor is there, so far as available facts and figure go, any argument against their eradication on all grazing ranges (Taylor 1923).

In that speech, in addition to discussing his perception of the tremendous consumption of western wheatgrass and dropseed grass by prairie dogs, he also maintained they consumed 83% of the blue grama (Bouteloua gracilis) (Taylor, pers. comm., 1923). Indeed, it was the Gunnison's prairie dog unnerving expropriation of blue grama that so caught J. Stokely Ligon's eye. He wrote that grama grass seemed to be their favorite in the Nutrioso District (AZ) and that their overgrazing of this grass caused soil erosion. In addition, of concern to Ligon was that the prairie dogs ate the grama flower heads or grazed down the stems and prevented grama from flowering, which prevented livestock from accessing forage after snowfall (Ligon 1914).

These early accounts of perceived competition between prairie dogs and livestock ushered in intense eradication efforts orchestrated by the federal government. Those efforts resulted in significant reduction in populations and range, and acreage occupied by this species. Lethal control of GPDs continues to the present, and is facilitated and executed by state and federal agencies, as well as private parties. Control takes place on both private and public lands throughout the GPD's range.

### Arizona

Zealous eradication efforts were well underway by the 1910s. Ligon reported in 1914 that, "the farmers constantly wage war on them [GPDs]" (p. 8), "the dogs are constantly being killed by hundreds" (p. 10), and, notably,

The People of the Nutrioso District have a scalp dance each year, when hundreds of scalps are turned in by the contesting sides. Each year the two sides are selected with about 18 members each. Each side makes an effort to secure the greatest number of scalps. The loosing [sic] side pays all the expenses of the Scalp Dance...In 1914 Scalps of all injurious rodents were turned in – Prairie Dog, Rabbits, Squirrel, Gofers [sic], etc. (pp. 10-11)

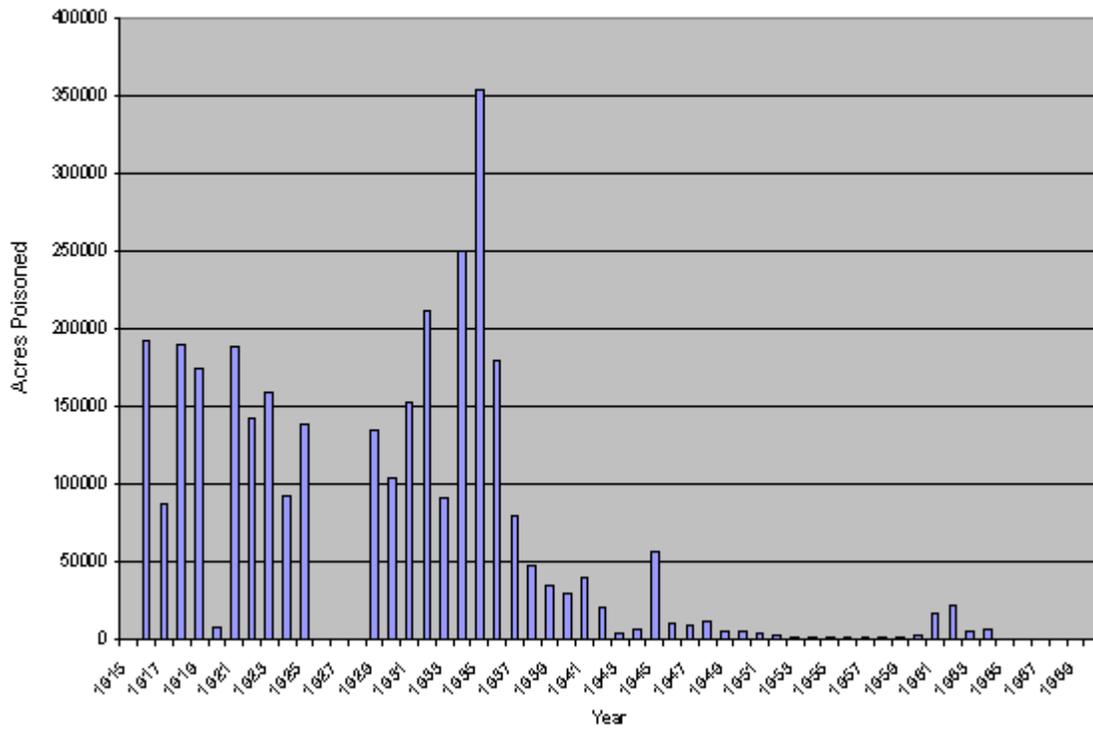
In addition, even by 1914, Ligon suggested that GPDs had already undergone extermination efforts “many times” (p. 37). Moreover, Ligon (1914: 46) describes the local citizens as ever alert for the presence of prairie dogs, which would complement his prairie dog mapping efforts: “They are on the lookout for dogs, and this fact will prove of benefit, in the final locating, in case I have overlooked individuals, or a few isolated colonies.” Given the rest of Ligon’s journal entries, there can be no doubt that the “benefit” of this vigilance would be total extermination of Gunnison’s prairie dogs.

As noted previously, by 1930, poisoning had reduced the GPD’s range in the state from eight to four counties, a range shrinkage that has generally endured (Wagner 2002). According to data from the National Archives, 934,906 ha (2.3 million ac) of Gunnison’s prairie dogs<sup>81</sup> from 1915-1964 (data are not included from 1926-1928, as they were missing) (Figure 5). The peak year for GPD poisoning in Arizona was 1935, a year in which 143,305 ha (353,963 ac) were poisoned (Forrest 2002).

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<sup>81</sup>Given the extirpation of black-tailed prairie dogs from Arizona by 1924 (Oakes 2000), all poisoning acreages after that year are assumed to be of Gunnison’s prairie dogs (Forrest 2002).

Figure 5. Prairie Dog Poisoning in Arizona, 1915-64, Adapted from Forrest (2002).



The poisoning effort against GPDs was extensive and high-magnitude, and largely successful, judging by the decreased poisoning efforts from 1947-64. During this latter period, intolerance for the prairie dog “infestation” in Arizona did not suddenly vanish. Rather, there were far fewer GPD acres left to poison.

These numbers don’t capture the intensity and thoroughness of the poisoning effort against GPDs. Annual Work Plans and related correspondence from the Sitgreaves National Forest document the aim of total eradication.<sup>82</sup> In 1914, the Forest Supervisor expressed his desire that the U.S. Biological Survey exterminate prairie dogs on the forest, and noted that area landowners were using both poison grain and carbon bisulfide gas to eliminate prairie dogs. In the workplans for 1913-1915, USFS noted three townships in which prairie dogs “are especially bad and should be exterminated.” In a later work plan, the Forest Supervisor described the range of GPDs on the Forest as “practically all of the lower woodland ranges on the Forest, as well as gradually migrating to higher elevations.” By the end of the next year, 1915, the U.S. Biological Survey poisoned 224,000 acres on the Sitgreaves. In addition, the Survey furnished poison to “a great many land owners who exterminated the prairie dogs on their private land thus making the work on the government land more effective.” The Survey’s goal for 1916 were to retreat 214,000 acres on the Forest and treat 70,000 acres in a one-mile wide swath outside the Forest boundary. The plan was to first poison the burrows and

<sup>82</sup>All cited work plans on file with Forest Guardians.

then ensure eradication by following up with carbon bisulfide gas. In March 1916, the Sitgreaves Forest Supervisor wrote,

It is gratifying to know that the work of exterminating prairie dogs on your Forest has been prosecuted with such vigor and with such excellent results. The interest expressed by private land owners is extremely gratifying, since it is apparent that unless the Service takes a hand in many localities reinfestation of areas will result in the future...

Federal land managers were clearly striving for total eradication, which they nearly obtained. In 1916, 250,480 acres were treated on the Sitgreaves, with cited success rates of 95% and an estimated 12,000 acres remaining to be treated.<sup>83</sup>

By 1917, the Forest Supervisor was still not satisfied, and he targeted the remaining 12,000 acres of GPDs, writing that he hoped the U.S. Biological Survey would “do all that they can toward cleaning up the remaining areas on your Forest” and in particular a 5-mile strip along the north boundary of the Sitgreaves so that “we can be assured of safety from a reinfestation of the Forest for many years to come.” In the work plan for 1918, the Forest Supervisor indicates that the follow-up treatment was accomplished, including the strip along the north boundary of the Sitgreaves and adjacent private lands: “Manifestly splendid work has been accomplished along this line.” The supervisor also notes his goal of preventing the return of GPDs to the area and the need to “continue the campaign for their [Gunnison’s prairie dog] eradication through settlers and interested individuals in the possession of the necessary formula or by organized effort on the part of the Survey if such seems necessary.”

Sticking to the mandate of total elimination, the Forest Supervisor wrote in January 1918 that, “Rangers should be made to feel their share of the responsibility, and to take active steps to destroy colonies of dogs as soon as they make their appearance.” The goal was to make the prairie dog poisoning efforts “permanently effective” by destroying prairie dogs on sight. In the 1921 work plan, there was concern over a “few dogs [that had] survived the campaign” but the supervisor was cheered by a new poison formula used by the Biological Survey, which was reported to be more effective and might therefore increase the degree of extermination. In the 1923 work plan, the Forest Supervisor began to lament his perception that area ranchers were not adequately poisoning GPDs on their private lands, which was undoing some of the “good work” done in previous years to exterminate prairie dogs. In 1924, the Forest Service, Biological Survey, and private ranchers mobilized to poison most of the remaining GPDs from the Sitgreaves on an area called Chevalon Butte. Towards this end, they poisoned 4,480 acres within the Forest and 3,200 acres (5 sections) on adjacent private lands, for a total of 7,680 ac.

Indeed, just as the Forest Service was pressuring private landowners in some areas to poison their prairie dogs to avoid “re-infestation,” in other areas private property

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<sup>83</sup>While the report for the Forest lists this acreage under “range destroying rodents” work plans almost exclusively refer to prairie dog extermination (versus pocket gophers, ground squirrels, or other rodents).

holders were advocating the poisoning of prairie dogs on public lands. Wrote Ligon (1914: 20),

I have found – to date, without an exception, that the people who have or own land, are willing and anxious to destroy their dogs, if only those on the public domain will be exterminated, but so long as there is [sic] dogs in the surrounding district, the farmer must constantly battle with the dogs, and the expense of fighting them for possibly a single season – would destroy them permanently [sic] if they were destroyed over the entire country.

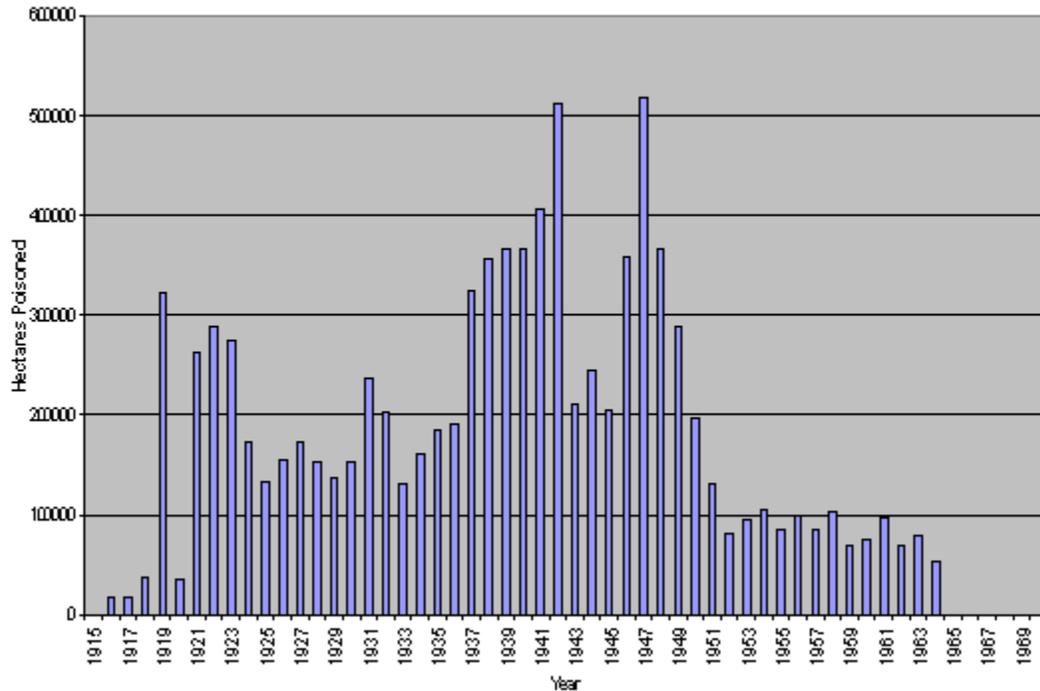
The battle for prairie dog extermination on the Sitgreaves was certainly not anomalous. One reason for the Biological Survey's delay in poisoning prairie dogs on the Sitgreaves was that it was busy exterminating prairie dogs on the Coconino National Forest, where it was estimated that GPDs had been reduced to less than half of 1% of their original acreage by the late 1920s (See Exhibit 3: Donald Gilchrist Report 1927/1928). Some 1,641 GPDs were poisoned on 320 acres in one night on that forest in 1917 (Ruffner 1980, citing Howell 1960). From July 1, 1927-June 30, 1928, Donald Gilchrist, the Biological Survey agent in charge of prairie dog extermination on the Sitgreaves, also busied himself, six employees, and cooperators in poisoning 151,735 acres on the Apache, Coconino, and Tusayan National Forests, along with the Hualapai Reservation. Gilchrist also retreated 100,103 acres on these areas during that period. Despite this high magnitude effort, Gilchrist warned that there were still 321,687 acres of GPDs within Arizona national forests and that this was causing strife for private landowners who are "compelled to fight the army of rodents who annual emigrate from the federal lands." On private lands in Apache and Navajo Counties, 95,735 acres of GPDs were eliminated in the same time period. In total, Gilchrist estimated four million acres of GPDs existing in Apache, Navajo, Coconino, and Yavapai counties in Arizona in 1928 (See Exhibit 3: Donald Gilchrist Report 1927/1928).

In his report on controlling rodents from July 1, 1929-June 30, 1930, Gilchrist reported poisoning 164,620 acres across the Apache, Coconino, and Tusayan National Forests, and the Apache Indian Reserve. Altogether, 255,819 acres were poisoned that year, with the use of 48,960 pounds of oats poisoned with strychnine or thallium sulphate and 4,609 pounds of carbon bisulfide gas (See Exhibit 8: Donald Gilchrist Report 1929/1930).

### Colorado

Extensive eradication efforts were directed toward all three species of prairie dogs in Colorado (Figure 6). From 1912-1923, incredibly, some 44.6 million acres of prairie dogs and ground squirrels were poisoned across the state (Knowles 2002).

Figure 6. Prairie Dog Poisoning in Colorado, 1915-64, Adapted from Forrest (2002).



According to data from the National Archives, Colorado poisoned a total of 9,380,192 ha (23.2 million ac) of all three prairie dog species in the state from 1915-1964 (separate data were not recorded for the individual species). The high point for poisoning was 1947, during which 517,356 ha (1.3 million acres) were poisoned (Figure 6). Unlike most other states, Colorado continued to poison on the order of 53,000 ha (130,910 ac) per year into the 1960s (Forrest 2002). In the 1940s, through the use of strychnine, thallium, and then sodium fluoroacetate, 288,750 acres of GPDs were eradicated in Park County (Ecke and Johnson 1952).

Prairie dog poisoning continues. As discussed above, the state Department of Agriculture itself poisons GPDs and Wildlife Services poisons and shoots GPDs, as well as disseminates toxicants to private parties for application against GPDs. Fitzgerald (1991) notes that, while control efforts on public lands generally ceased in the early 1970s, Gunnison’s prairie dogs in Colorado have apparently not recovered from those control operations. Capodice and Harrell (2003) note that Colony #21 in their survey was a large colony until 2001, at which point it was poisoned. Five other colonies in their study (#13, 15, 60, 62, 70) are described as likely subjected to eradication efforts (not including colonies destroyed by development or other land uses).

The state Dept. of Agriculture's 1990 landowner survey indicated extensive lethal control of prairie dogs within the GPD's range (Table 5). Private poisoning is unmonitored in the state, but the 1990 survey indicates that it is likely widespread.

Table 5. Private landowner control of prairie dogs within Gunnison's prairie dog's range in Colorado (Colorado Dept. of Agriculture 1990).<sup>84</sup>

County	Comment
Archuleta	"I seem to have them under control at the moment." (p. A-10)
Archuleta	"I have always attempted to control them by shooting and trapping." (p. A-10)
Chaffee	"Last year I shot 275. This year over 500." (p. A-16)
Custer	"Prairie dogs used to be a real problem in our area but we have got [sic] rid of them some years back." (p. A-21)
Custer	"I used gastoxin on one bunch of prairie dogs and I am not sure if they died or it killed them but I have not seen any for three weeks." (p. A-21).
Custer	"In the 1950's a government trapper and I worked for days poisoning prairie dogs." (p. A-21)
Delta	"Some people over here have serious prairie dog problems...I've personally shot 40 of them this year." (p. A-22)
Delta	"Our county has a prairie dog control program which helps keep them down." (p. A-23)
Delta	"I have eradicated rodents on my land only to be re-infested with them a few months later. It is costly to eradicate the dogs on my land when the borders are not eradicated because they keep coming back." (p. A-23)
Dolores	"The prairie dogs have been coming in on us but we try to kill them right away." (p. A-24)
Dolores	"Have spent many dollars to control them [prairie dogs] but no luck getting rid of them." (p. A-24)
Dolores	"In 1936-1940 we had 40 acres of prairie dogs, by trapping, using poison oats and corn, and finally by using an old tractor and gassing them we finally got rid of them. So in our area so far we don't have any." (p. A-24)
El Paso	"Am working with the El Paso County Pest Control Office to eliminate the [prairie dog] problem." (p. A-27)
El Paso	"Prairie dogs under yearly control." (p. A-27)
El Paso	"The prairie dogs on our El Paso, Co. ranch and on the neighbors are terrible. We spent \$600 one year on poison grain and it did no good. We have tried other things too." (p. A-28)
El Paso	"I have been trying to poison the prairie dogs." (A –

<sup>84</sup>Unless noted in the table, only cases where there was strong evidence that the landowner was talking about prairie dogs (not other rodents, such as pocket gophers, ground squirrels, and kangaroo rats) were included.

	28)
El Paso	“I have had up to 160 acres of prairie dogs. 2 years ago we spent \$300 on control and got them down quite a bit.” (p. A-28)
El Paso	“Prairie dogs are a very serious problem in this area. We have conscientiously used every legal poison available from the minute they started to move in; we have spent many hours and hundreds of dollars...” (p. A-28)
El Paso	“We poisoned prairie dogs quite a few years ago.” (p. A-28)
Gunnison	“I have worked for Gunnison Co. for about 5 years controlling rodents. I use a pickup with a hose hooked up to the exhaust. This works but it is very time consuming and expensive. I have eliminated all rodents in many areas, and have reduced the rodent population in the county considerably. I would like to know if there is a better way to control rodents.” (p. A-31) [this respondent did not specifically name prairie dogs]
La Plata	“I have shot 872 prairie rats and it doesn’t seem to stop them from increasing.” (p. A-37)
La Plata	“I have used gas pellets, guns and gasoline and it seems impossible to keep up with them.” (p. A-37)
La Plata	“We spent a lot of time and money in trying to control the prairie dogs on our land. We have Indian land on 2 sides that is badly infested with dogs and they do very little to control them, so it is a continual job for us to keep the dogs under control.” (p. A-37)
La Plata	“We have fought prairie dogs for 19 years – Probably 200-300 active holds.” (p. A-38)
La Plata	“Prairie dogs are a problem on 2 sides of my place. We try to drown them out twice a year...” (p. A-38)
Las Animas	“I have no prairie dogs on my land. A couple of years ago an absent landowner across the fence from me had about 130 burrows of the dogs, I tried poisoning them with poison milo but it didn’t work, so used gasoline, about ½ pint per hole, stuffed newspaper in hole covered with dirt – this measure got the dogs cleaned out 100%.” (p. A-41)
Las Animas	“I took a lot of time and effort to bring the prairie dog under control and now there is little or next to nothing for control of this very serious problem. More money and greater control is needed.” (p. A-41)
Montezuma	“All around use the prairie dogs are so thick. We try to get rid of them but the neighbors don’t.” (p. A-47)
Montezuma	“The prairie dog problem around this area is getting real bad. I bet I gassed prairie dogs 8 to 10 days this year...” (p. A-47)
Montezuma	“We have spent considerable time gassing them with a tractor or shooting them.” (p. A-47)
Montezuma	“Prairie dogs have been a significant problem on

	this farm for many years. Futile efforts with live trapping, shooting, gasoline, phosphine, and carbon monoxide have resulted only in minor short-lived control.” (p. A-48)
Montezuma	“When I get mine cleaned out, they move back in again.” (p. A-48)
Montezuma	“We have tried to control on land that we own and have worked several years but the neighbors have not all done the same.” (p. A-49)
Montezuma	“I have been trying to control prairie dogs on my place for several years.” (p. A-49)
Montezuma	“Prairie dogs are getting worse every year. Can’t seem to keep ahead of them. Need more assistance from anyone. More public prairie dog shoots like at Nucla.” (p. A-49)
Montezuma	“It is hard to believe the man hours I have spent trying to control prairie ‘rats’ on my place.” (p. A-49)
Montrose	“As soon as a prairie dog shows up I trap or shoot them.” (p. A-50)
Montrose	“I have used all types of pellets, gasoline, fire, guns, propane, and I have a new blaster that mixes propane and oxygen and then the mixture is detonated and the concussion and fire kill them little bastards. I have declared all out war on them.” (p. A-51)
Montrose	“Back in the 1940s the government had a program that nearly eliminated the prairie dog in our area. In the last 15-20 years we cannot keep up with the problem.” (p. A-51)
Montrose	“I have tried trapping, poison, exhaust gassing, smoke bombs, and shooting for the past 40 years and none of these succeeded in controlling prairie dogs.” (p. A-51)
Montrose	“We try to control the prairie dogs especially in the pastures.” (p. A-52)
Saguache	“Prairie dogs now increasing after being mostly killed 4 to 5 years ago.” (p. A-62)
San Miguel	“I am using Rotox-AT to control this prairie – Do not know what results I am having at this time.” (p. A-63)
San Miguel	I made a concentrated effort to eliminate prairie dog in 1989 within a 10 acre area. I used Rotox 3 or 4 times plus once in ’90.” (p. A-63)
San Miguel	“We have used many means of repellent to control these creatures and cannot see anything but further devastation.” (p. A-63)
San Miguel	“Spent considerable money on control but ground too dry for pellets to work.” (p. A-63)
Teller	“I shoot and gas prairie dogs and ground squirrels.” (p. A-64)

More recently, open records documents received from FWS indicate the following poisonings or intended poisonings of GPDs in the state, orchestrated by the federal Wildlife Services:

- 4/25/01. Montrose: approximately 50 GPD burrows on 7 acres near the intersection of La Salle and 6100 Road. Letter from FWS clearing landowner from black-footed ferret poisoning restrictions;
- 6/15/01. Bayfield: approximately 1 acre in and around Valiant Chair's property adjoining town of Bayfield in La Plata County. Phostoxin to be used. Letter from FWS clearing landowner from black-footed ferret poisoning restrictions;
- 7/19/01. Dolores: approximately 2 acres at 15200 County Road U. Letter from San Juan Basin Technical School to FWS;
- 5/4/02. Gunnison: north end of 3<sup>rd</sup> St; about ½ acre of land near assisted living center. Poisoned with Fumitoxin. Hand-written note by FWS;
- 5/4/02. Gunnison: ranch land on highway to Crested Butte; ¼ acre near Hwy 135. Poisoned with Fumitoxin. Hand-written note by FWS;
- 5/23/02. Montrose: at American Park; 1 acre; "PDs were forced in to Park by subdivision nearby, Pestaway in Montrose will do work". Hand-written note by FWS;
- 5/28/02. Montrose: Prairie dogs in grass and hay irrigated pasture; 75 acres; 200-300 prairie dogs [possibly an additional 420 acres poisoned as well]. Hand-written note by FWS;
- 5/29/02. Montrose: La Raza Park: "family of PD's – maybe a dozen. Wants to control. OK." Hand-written note by FWS;
- 6/27/02. Breen: "25 acres irrigated pasture; PD holes in 2/3 of property." Hand-written note by FWS;
- 7/29/02. Cortez: 3.5 miles north of Cortez; CR 25; 20 acres total." It appears that fumitoxin was used. Hand-written note by FWS;
- 8/9/02. Durango: CR and CR 301 intersection; 12 miles south of Durango. 15 acres of prairie dogs "in/out for years – plagued out at one time." Hand-written note by FWS;
- 8/20/02. Pagosa Springs. 50 acres on rangeland being converted to houses: "plan to treat entire 50 acres." Hand-written note by FWS;
- 9/12/02. Plan to control 750 acres of GPDs in El Paso County (the eastern most record of the species), near Monument. Internal FWS memo. Apparently, FWS requested the landowner live-trap GPDs for the food for ferret program. [Nicole – email Pat and Bob to ask if this poisoning took place]
- 5/2/03. Hesperus. "Small PD in front open meadow. 4-5 PD on 45 acres total." Hand-written note by FWS;
- 6/2/03. Durango: approximately 40 acres. Letter from FWS clearing landowner from black-footed ferret poisoning restrictions;
- 7/8/03. Montrose: at 2282 Odelle Road. No acreage given. Letter from FWS clearing landowner from black-footed ferret poisoning restrictions.

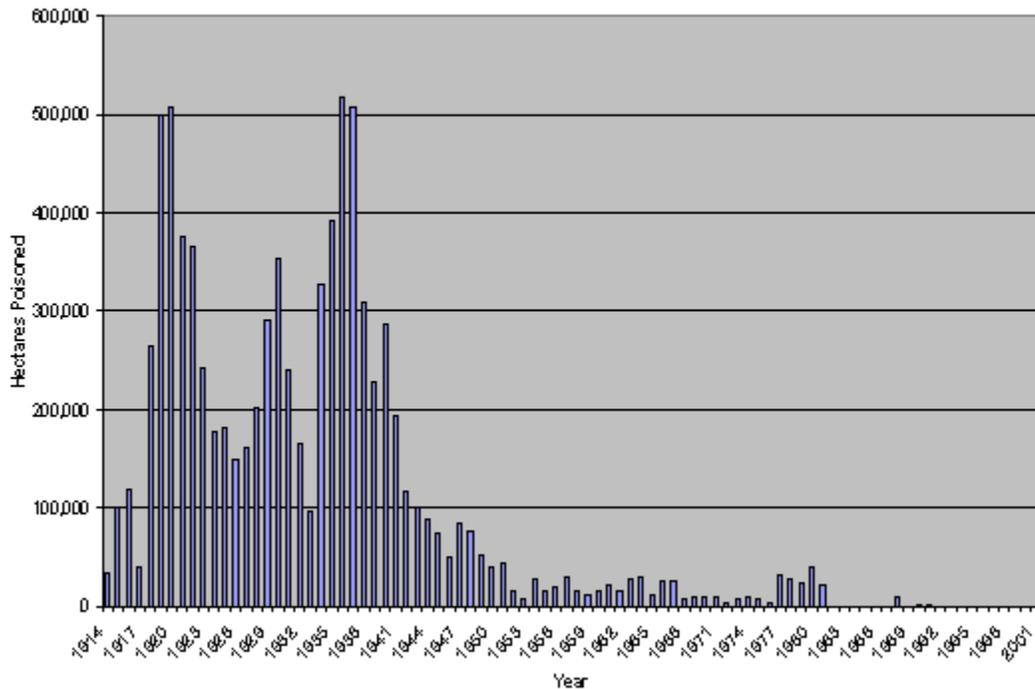
From 1991–1999, the United States Fish and Wildlife Service reviewed one hundred and three known requests for GPD poisoning in Colorado. This figure does not capture private poisoning efforts.

### New Mexico

There has been a tremendous poisoning effort directed toward Gunnison’s prairie dogs (along with black-tailed prairie dogs, other rodents, and lagomorphs) in the state throughout the 20<sup>th</sup> century.

Early documentation of prairie dog poisoning in the state includes an 1888 account cited by Bailey (1932), in which a San Juan County citizen reported having tried to control Gunnison’s prairie dogs using strychnine grain and phosphorized wheat because of crop damage caused by prairie dogs (Hubbard and Schmitt 1984). Significant rodent control in the state appears to have begun in 1914 (Hubbard and Schmitt 1984). Figure 7 illustrates the magnitude of poisoning historically.

Figure 7. Prairie Dog Poisoning in New Mexico, Adapted from Forrest (2002).



According to data from the National Archives, New Mexico poisoned 8.3 million ha (20.5 million ac) of two species of prairie dogs from 1914-1964. Data from Hubbard and Schmitt are displayed after 1964 (Forrest 2002). Shriver (1965) reported that 33,029 acres of prairie dogs were poisoned by the Bureau of Sports Fisheries and Wildlife and cooperators in 1965, 2,900 acres of which was on USFS and BLM lands.

Hubbard and Schmitt (1984) estimate that rodents and lagomorphs were poisoned on 45.1% of the state's acreage between 1914 and 1981. From 1931-1981, 10.8 million acres of prairie dogs were poisoned across the state, with three high points in poisoning occurring in 1930, 1935-38, and 1940. From 1933-1943, there was an especially intense eradication campaign, in which 8.6 million acres of GPDs were poisoned (Hubbard and Schmitt 1984; Knowles 2002). Lower levels of poisoning occurred in the 1950s and 1960s, likely due to the efficacy of sodium fluoroacetate in eradicating GPDs (Knowles 2002). Hubbard and Schmitt (1984) also note that northern urban areas in the state poisoned Gunnison's prairie dogs in response to a perceived plague threat in the summer of 1983, with 41,050 burrows poisoned in Taos (Hubbard and Schmitt 1984). A substantial portion of GPD acreage on private land is subjected to periodic control (Knowles 2002).

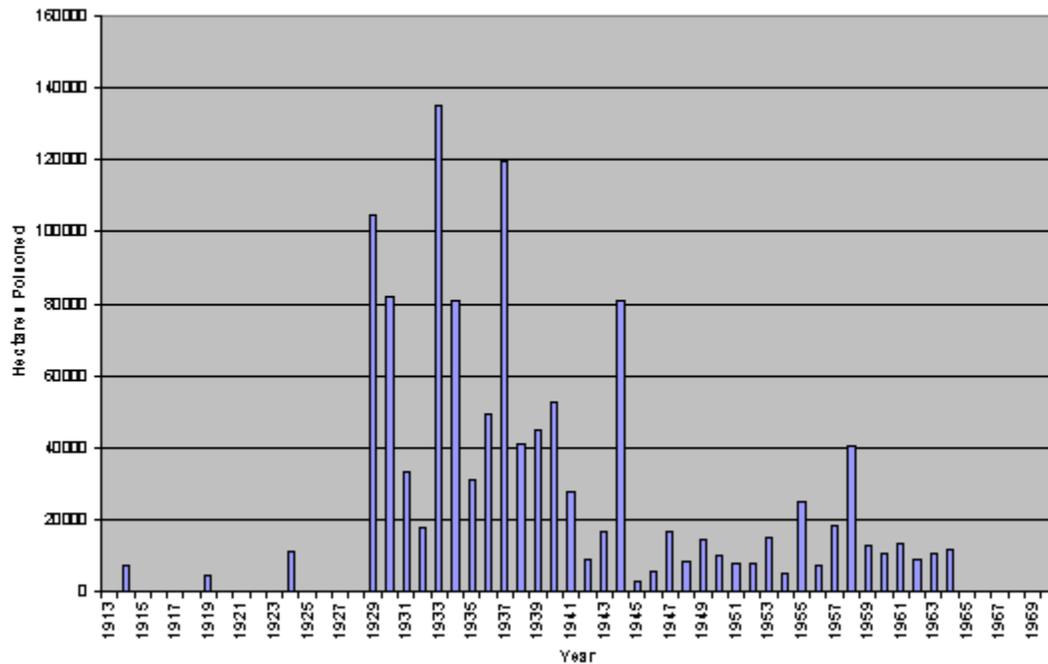
The New Mexico State University Cooperative Extension Service suggests that control is justified if there are at least 10-15 prairie dog mounds per acre. The extension service also notes that if the control is implemented to prevent colony expansion, other considerations beside vegetation loss justify the control effort (See Exhibit 6: Prairie Dog Control in New Mexico). Most GPD colonies likely have burrow densities of 10-15 per acre or higher (Knowles 2002) and should, according to the state extension service, be controlled.

Schmitt (pers. comm. 1999) considers large-scale poisoning programs to be a significant threat to GPDs in the state. As was described in the previous section, the federal government continues to facilitate extensive poisoning across the GPD's range in the state.

### Utah

According to data from the National Archives, Utah poisoned 1.1 million ha (2.7 million ac) of all three prairie dog species in the state from 1914 – 1964 (data were not separated according to individual species; data are missing for several years) (Forrest 2002) (Figure 8).

Figure 8. Prairie Dog Poisoning in Utah, 1914-64, Adapted from Forrest (2002).



Petitioners were unable to gauge the level of GPD poisoning in the state in more recent years. Our inquiry to the state agricultural department on the issue was not answered.

While there seems to be an orthodoxy in the scientific literature that Gunnison’s prairie dogs were less persecuted than were black-tailed prairie dogs (e.g., Longhurst 1944; Cully 1985), much of the primary historical materials, and National Archives data from Arizona after black-tails had been extirpated, indicate a zealous aim of total eradication based on the perception that Gunnison’s were fundamentally incompatible with productive use of lands within its range. We therefore disagree with the assumption that Gunnison’s prairie dogs suffered less poisoning than their eastern cousins. Both were persecuted mercilessly, with disastrous ecological and biological consequences.

However, throughout the eradication campaigns there was resistance from the saner subset of humanity. Van Pelt (2000) notes that Native Americans often would not poison prairie dogs on reservation lands because they provided a food source. Oakes (2000) also recounts that, in 1918, the NM Bureau of Biological Survey reported that twenty percent of private landowners in New Mexico disagreed with poisoning or would not allow agents on their lands. In the 1930s, there is an account of Navajo women who were observed sweeping poison grain off prairie dog colonies. However, the federal government appeared to railroad over these dissidents, frenetically moving ahead with eradication.

## Drought

The impact of drought on GPDs has not been examined in the published scientific literature. However, drought is recognized as a limiting factor on fellow members of the white-tailed subgenus, the Utah prairie dog (e.g., USFWS 1991). In addition, Arizona Game and Fish Department (2001: 3) state that drought “killed many [Gunnison’s] prairie dogs” in Aubrey Valley, Arizona. In April 2003, that agency again noted the impact of drought, commenting that forage is “thin” from the continued drought and appears to be impacting prairie dogs.<sup>85</sup>

Drought is defined as prolonged dry weather, typically less than 75% of the average annual precipitation (Society for Range Management 1989). While drought is a naturally occurring dynamic in the range of the GPD, other anthropogenic factors, such as livestock grazing and oil and gas impacts, are likely exacerbating the negative impacts of drought on Gunnison’s prairie dogs.

Although speculative, we are concerned that livestock ranchers and other operators are more likely to lethally control GPDs during times of below-normal precipitation, given the potential for heightened perceptions of GPDs as economically damaging. Indeed, Ligon (1914) remarked that, while GPD depredations on rangeland and cropland may be (somewhat) tolerable in wetter years, the species committed (in his view) intolerable damage during drier years. Taylor (1919) made a similar observation. For other prairie dog species, expansion after dry years and contraction after wet years has been noted (Rich Reading, pers. comm.). We suggest that expansion after dry years would heighten the perception among agricultural operators that prairie dogs are increasing in numbers and therefore in need of culling or eradication. For GPDs, the stress of drought may subsequently be coupled with increased persecution by humans.

## **Summary**

The Gunnison’s prairie dog merits listing as Endangered or Threatened under the Endangered Species Act. This species has suffered range shrinkage and range-wide reductions in populations and acreage. Historic eradication campaigns, sylvatic plague, habitat destruction, and continued poisoning and shooting have resulted in this precarious state of imperilment. While rangewide surveys of the species are still needed, nearly everywhere researchers have looked, Gunnison’s prairie dog populations and acreages were smaller than expected or disappeared from plague while being studied. When researchers, particularly in Arizona, have revisited past survey sites, they have often encountered ghost towns.

FWS has been aware of the imperiled status of the GPD since at least 1991. Throughout the 1990s and to the present, federal agencies have met to discuss the need to address the GPD’s status. While that agency energy has sometimes resulted in better information about remaining GPD population, the conservation and restoration activities required to recover this species have generally not been implemented. We submit this

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<sup>85</sup>See Arizona Game and Fish, “Wildlife News,” dated April 14, 2003.

petition in the hopes that federal agencies, including FWS, will finally take the steps necessary to ensure the survival and recovery of the GPD. We believe ESA listing is vital to motivate an adequate conservation program for this species.

### **Need for Ecosystem Management**

Petitioners believe that classification of the Gunnison's Prairie Dog as an Endangered or Threatened species under the ESA will insure that state and federal agencies develop an effective form of ecosystem protection. Biologists working on prairie dog ecosystems recognize the profound need for a multiple-species, habitat-wide, and whole-ecosystem approach to the successful conservation of viable populations of prairie dog-associated species. In particular, these researchers have noted the need to protect the prairie dog in order to safeguard the biotic integrity of native ecosystems (Benedict et al. 1996; Miller et al. 1994; 1996; Wuerthner 1997). The efficiency of such management has been noted by several commentators, including FWS itself (See Exhibit 1; GAO 1994; Noss et al. 1995; Benedict et al. 1996).

Moreover, the protection of ecosystems is stated as the very purpose of the ESA. Where single species play keystone roles, the ESA's single-species protection provisions can correlate to ecosystem-wide protection. As an imperiled keystone species, the Gunnison's prairie dogs listing as Endangered or Threatened should be among FWS's highest priorities.

### **Requested Designation**

Forest Guardians and 73 co-petitioners hereby petition the U.S. Fish and Wildlife Service under the Department of Interior to list the Gunnison's prairie dog (Cynomys gunnisoni) as an Endangered or Threatened species pursuant to the Endangered Species Act. This listing action is warranted, given historical and continued declines in GPD populations and acreages occupied by this species. The Gunnison's prairie dog is threatened by all five of the factors which FWS must consider in assessing whether a species qualifies for listing under the Endangered Species Act. As such, we request expeditious listing of the Gunnison's prairie dog as a Threatened or Endangered Species under the ESA.

### **Critical habitat**

This petition requests that critical habitat be designated for the Gunnison's prairie dog concurrent with final ESA listing.

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## **List of Exhibits**

- Exhibit 1: U.S. Fish and Wildlife Service Document on Need for a Prairie Dog Ecosystem Approach
- Exhibit 2: Apache-Sitgreaves Open Records Documents
- Exhibit 3: Donald Gilchrist Report 1927/1928
- Exhibit 4: Gunnison's Prairie Dog Meeting Notes
- Exhibit 5: Coconino National Forest Open Records Documents
- Exhibit 6: Prairie Dog Control in New Mexico
- Exhibit 7: Plague Cases in New Mexico, 1996-2002
- Exhibit 8: Donald Gilchrist Report 1929/1930