DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 17

[Docket No. FWS–R6–ES–2013–0115; 4500030113]

Endangered and Threatened Wildlife and Plants; 12-Month Finding on a Petition To List the Gunnison's Prairie Dog as an Endangered or Threatened Species

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Notice of 12-month petition finding.

SUMMARY: We, the U.S. Fish and Wildlife Service (Service), announce a 12-month finding on a petition to list the Gunnison's prairie dog (*Cynomys gunnisoni*) as an endangered or threatened species under the Endangered Species Act of 1973, as amended (Act). After review of the best available scientific and commercial information on both subspecies of Gunnison's prairie dog, we find that listing either *C. g. gunnisoni* or *C. g. zuniensis* or both is not warranted at this time. The best available information indicates that populations of both subspecies are stable and that there are no threats causing or projected to cause either subspecies to be at risk of extinction. This action also removes the Gunnison's prairie dog from our candidate list. Although listing is not warranted at this time, we ask the public to submit to us any new information that becomes available concerning threats to the Gunnison's prairie dog or its habitat at any time.

DATES: This finding announced in this document was made on November 14, 2013.

ADDRESSES: This finding is available on the Internet at *http://www.regulations.gov* at Docket Number FWS–R6–ES–2013–0115. Supporting documentation we used in preparing this finding is available for public inspection, by appointment, during normal business hours at the U.S. Fish and Wildlife Service, Colorado Field Office, 134 Union Blvd., Suite 670, Lakewood, CO 80228; telephone (303) 236–4773; facsimile (303) 236–4005. Please submit any new information, materials, comments, or questions concerning this finding to the above street address.

FOR FURTHER INFORMATION CONTACT: Susan Linner, Field Supervisor, U.S. Fish and Wildlife Service, Colorado Field Office (see **ADDRESSES**); by telephone at (303) 236–4773; or by facsimile at (303) 236–4005. If you use a telecommunications device for the deaf (TDD), call the Federal Information Relay Service (FIRS) at 800–877–8339.

SUPPLEMENTARY INFORMATION:

Background

Section 4(b)(3)(B) of the Act (16 U.S.C. 1531 *et seq.*) requires that, for any petition containing substantial scientific and commercial information that listing may be warranted, we make a finding within 12 months of the date of receipt of the petition on whether the petitioned action is: (a) Not warranted, (b) warranted, or (c) warranted, but the immediate proposal of a regulation implementing the petitioned action is precluded by other pending proposals to determine whether species are endangered or threatened, and whether expeditious progress is being made to add or remove qualified species from the Lists of Endangered and Threatened Wildlife and Plants. Section 4(b)(3)(C) of the Act requires that we treat a petition for which the requested action is found to be warranted but precluded as though resubmitted on the date of such finding; that is, requiring a subsequent finding to be made within 12 months. We must publish these 12-month findings in the **Federal Register.**

Previous Federal Actions

On February 23, 2004, we received a petition from Forest Guardians (now called WildEarth Guardians) and 73 other organizations and individuals requesting that we list the Gunnison's prairie dog (found in Arizona, Colorado, New Mexico, and Utah) as endangered or threatened. On February 7, 2006, we published a 90-day finding in the **Federal Register** (71 FR 6241) determining that the petition did not present substantial scientific information indicating that listing the Gunnison's prairie dog species may be warranted.

On December 13, 2006, Forest Guardians and eight other organizations or individuals filed a complaint challenging our finding. On June 29, 2007, we reached a settlement agreement with the plaintiffs and agreed to submit a 12-month finding to the **Federal Register** by February 1, 2008.

On February 5, 2008, we published a 12-month finding on the petition to list the Gunnison's prairie dog (73 FR 6660). Our finding determined that the Gunnison's prairie dog warranted listing in a significant portion of its range, or SPR, in northcentral New Mexico and central and southcentral Colorado. In that finding, we determined that the Gunnison's prairie dog warranted listing in the montane portion of its range, but not in the prairie portion, due primarily to the effects of sylvatic plague, an exotic disease. In other words, the SPR determination recognized a difference in status between the montane and prairie portions of the Gunnison's prairie dog range. Although we found listing to be warranted, higher priority listing actions precluded the development of a proposed rule to list the species under the Act, and we added the Gunnison's prairie dog in the montane portion of its range to our candidate species list.

On March 24, 2009, WildEarth Guardians filed a complaint with the courts challenging our interpretation of the Act's SPR language, as used in our February 5, 2008, 12-month finding. On September 30, 2010, the Court found that we determined something other than a species warranted listing, and ordered that we complete a new 12-month finding. Since that Court ruling, montane Gunnison's prairie dogs have remained on our candidate species list awaiting our reevaluation of their status.

Through the annual candidate notice of review process (73 FR 75175, December 20, 2008; 74 FR 57804, November 9, 2009; 75 FR 69222, November 10, 2010; 76 FR 66370, October 26, 2011; 77 FR 69993, November 21, 2012), we continued to solicit information from the public regarding the status of the Gunnison's prairie dog, its taxonomy, its life history, its distribution, threats to the species, and ongoing conservation measures designed to protect the species.

On December 9, 2011, the Service and the National Marine Fisheries Service (NMFS) published a notice (76 FR 76987) of draft policy to establish a joint interpretation and application of the Act's statutory phrase ''in danger of extinction throughout all or a significant portion of its range.'' To date we have not finalized our draft SPR policy, and as explained under Significant Portion of the Range, below, we do not follow the draft policy for this finding.

On September 9, 2011, we entered into a multi-district litigation stipulated settlement agreement (*WildEarth Guardians* v. *Salazar,* No. 1:10–mc–00377–EGS (D.D.C.); *Center for Biological Diversity* v. *Salazar,* No. 1:10–mc–00377–EGS (D.D.C.)), which requires that we submit to the **Federal Register** a new 12-month finding on the petition to list the Gunnison's prairie dog, and a proposed rule if warranted, before the end of Fiscal Year 2016. This not-warranted 12-month finding fulfills that requirement of the multi-district litigation stipulated settlement agreement.

Summary of New Information

Since our 2008 12-month finding, we have reviewed new information regarding Gunnison's prairie dog taxonomy and population trends, the dynamics of sylvatic plague, and conservation efforts for the Gunnison's prairie dog. Specifically:

- A genetics study supports the distinctness of two Gunnison's prairie dog subspecies: *Cynomys gunnisoni gunnisoni* and *C. g. zuniensis* (Martin and Sackett 2012, p. 1). The ranges of these two subspecies correspond roughly to the ''montane'' and ''prairie'' ranges described in our 2008 12-month finding, although the results of the genetics study clarify the location of the boundary between the subspecies (Martin and Sackett 2012, p. 14).
- Additional occupancy surveys completed rangewide in 2010 augmented occupancy data collected by all four States in 2007, and by Colorado in 2005. These occupancy data indicate that populations of both subspecies are stable throughout their ranges and within individual population areas (Seglund 2012, p. 11).
- New studies indicate that dusting Gunnison's prairie dog burrows with insecticide effectively controls the intensity and frequency of plague (Biggins *et al.* 2010; Abbott *et al.* 2012, p. 244). In addition, recent laboratory trials have demonstrated the efficacy of an oral vaccine against plague for prairie dogs (Rocke *et al.* 2010, p. 53; Abbott *et al.* 2012, p. 247). Field trails of the oral vaccine began in 2012, and continued in 2013 (Van Pelt 2013, p. 11).

Species Information

Prairie dogs are ground-dwelling squirrels unique to North America, so named for their doglike ''barks'' and broad distribution across the Great Plains, Colorado Plateau, and eastern Great Basin, extending from southern Canada to northern Mexico (Hoogland 2011, p. 918; Fitzgerald *et al.* 2011, p. 136). The Gunnison's prairie dog *(Cynomys gunnisoni*) is one of five prairie dog species, including the white-tailed (*C. leucurus*), the Utah (*C. parvidens*), the black-tailed (*C. ludovicianus*), and the Mexican (*C. mexicanus*) prairie dogs (Goodwin 1995, pp. 100–101; Fitzgerald *et al.* 2011, p. 136). The ranges of the five prairie dog species meet, with limited overlap between Gunnison's prairie dogs and black-tailed prairie dogs in New Mexico (Goodwin 1995, p. 101; Sager 1996, p. 1), and between Gunnison's prairie dogs and white-tailed prairie dogs in Colorado (Knowles 2002, p. 5), but the species do not likely interbreed due to evolutionary divergence. The Gunnison's prairie dog occupies a variety of grasslands and shrub-steppe of intermountain valleys in the southern Rocky Mountains of northern Arizona, southwestern and southcentral Colorado, northwestern New Mexico, and southeastern Utah (Pizzimenti and Hoffman 1973, p. 2; Goodwin 1995, p. 101).

Although *Cynomys gunnisoni gunnisoni* and *C. g. zuniensis* may differ slightly in color, size (Pizzimenti and Hoffman 1973, p. 1), or habitat attributes, they share similar life histories, and therefore we discuss them together as a single species below.

The Gunnison's prairie dog (including both subspecies) has fewer chromosomes (2n = 40) than the other prairie dog species (2n = 50), which suggests its early evolutionary divergence and uniqueness from the other prairie dogs (Pizzimenti and Hoffman 1973, p. 3; Pizzimenti 1975, pp. 10, 14, 60; Goodwin 1995, p. 109). Additionally, the Gunnison's prairie dog is slightly smaller than the black-tailed prairie dog, but larger than the Utah prairie dog (Pizzimenti and Hoffman 1973, p. 1). The Gunnison's prairie dog is also distinguished from other prairie dogs by its darker body and shorter, grayish-white tail (Pizzimenti and Hoffman 1973, p. 1; Fitzgerald *et al.* 2011, p. 138).

Gunnison's prairie dogs dig their own burrows, and hibernate in their underground burrows for approximately 4 months during the winter, beginning in October and ending in mid-February to late-April (Fitzgerald and Lechleitner 1974, p. 150; Hoogland 1998, p. 888; Hoogland 2001, p. 918; Fitzgerald *et al.* 2011, p. 139). Burrows require well-drained, deep soils, with few rocks on the soil surface (Wagner and Drickamer 2004, pp. 188, 195; Seglund *et al.* 2006, pp. 5, 6; Underwood 2007, p. 3). Deep soils are important for establishing hibernation burrows below the frost line (Wagner and Drickamer 2004, pp. 188, 194; Underwood 2007, p. 3). The Gunnison's prairie dog likely evolved to hibernate in order to cope with its arid, nutrient-limited habitats, which feature erratic precipitation and temperature extremes (Rayor *et al.* 1987, p. 149; Seglund *et al.* 2006, p. 7). Prairie dogs hibernate and aestivate (sleep during the summer) when they are metabolically stressed or when the weather is cold (Harlow and Menkens 1986, p. 795; Seglund *et al.* 2006, p. 7; Seglund and Schnurr 2010, p. 14). Lack of precipitation, lack of forage, and extreme daily temperatures drive aestivation and hibernation (Seglund and Schnurr 2010, p. 14), which allow the Gunnison's prairie dog to adapt to changing habitat conditions.

After hibernating, Gunnison's prairie dogs typically breed in April or May, but latitude, elevation, and seasonal variations may influence breeding dates (Hoogland 1998, p. 888; Hoogland 2001, p. 923; Fitzgerald *et al.* 2011, p. 139). With adequate resources, females breed as yearlings, but may not breed until their second year if food is scarce (Hall 1981, p. 414; Hoogland 1999, p. 249; Hoogland 2001, p. 923; Seglund *et al.* 2006, p. 7). Body mass, which is directly correlated to the availability of food, influences reproductive success, and underscores the importance of suitable habitats (Hoogland 2001, p. 923; Underwood 2007, p. 4). Females may mate with up to five different males, a reproductive strategy that maximizes breeding success and promotes genetic diversity between pups (Hoogland 1998, p. 882; Haynie *et al.* 2003, p. 1251; Seglund *et al.* 2006, p. 7; Underwood 2007, p. 5).

Compared to other small rodents, Gunnison's prairie dogs reproduce relatively slowly. Females are sexually receptive for several hours on only one day of the year and therefore wean a maximum of one small litter per year (Hoogland 1998, p. 889; Hoogland 2001, pp. 919, 921, 923; Seglund *et al.* 2006, p. 7). Other small rodents often wean more than two litters per year (Hoogland 2001, p. 921; Seglund *et al.* 2006, p. 7). Litters are small, ranging in size from 2 to 7 pups, with an average of 3.77 pups (Fitzgerald *et al.* 2011, p. 139). When food is plentiful, reproduction is more successful, but females remain physiologically limited to only one litter per year (Hoogland 2001, p. 923; Seglund *et al.* 2006, p. 7). In addition to breeding only once annually, small litter sizes, low annual survivorship, and delayed reproduction in yearling males also slow reproduction in the Gunnison's prairie dog (Hoogland 2001, p. 917; Seglund *et al.* 2006, p. 7; Underwood 2007, p. 5).

Despite their relatively slow reproduction, Gunnison's prairie dogs reproduce more rapidly under certain conditions (Hoogland 2001, p. 923). Young, expanding colonies reproduce faster because resources are more plentiful (Rayor 1985b, p. 2835; Hoogland *et al.* 2001, p. 923). Additionally, reproductive rates increase and colonies expand following dramatic population crashes caused by shooting, poisoning, or plague (Hoogland 2001, p. 923). For example, new colonies may triple in size each year following a plague outbreak as the surviving prairie dogs disperse and form new colonies, and as the juveniles grow

faster, survive longer, and breed at an earlier age (Cully 1997, pp. 146, 153–154, 156; Wagner and Drickamer 2002, p. 16; Seglund *et al.* 2006, p. 8; Underwood 2007, p. 7; Fitzgerald *et al.* 2011, p. 139). In general, this cycle of local extirpation and subsequent colonization allows populations to survive and expand rapidly following dramatic losses (Wagner and Drickamer 2002, p. 16; Seglund *et al.* 2006, pp. 8, 16; Underwood 2007, p. 7). In Gunnison's prairie dogs, the ability to rebound after crashes depends largely on the maintenance of a metapopulation structure, as discussed below.

Gunnison's prairie dogs live in family groups called clans, with adjacent clans forming a colony (Fitzgerald and Lechleitner 1974, p. 149; Hoogland 1999, p. 243; Goodwin 2001, p. 918). Clans include 1 to 19 individuals (mean 5.3) with 21 to 23 clans per colony (Hoogland 1999, p. 245; Fitzgerald *et al.* 2011, p. 140; Underwood 2007, p. 4; Seglund and Schnurr 2010, p. 16). Clan members defend a home territory of approximately 2.5 acres (ac) (1 hectare (ha)), but commonly forage outside the home territory in the weakly defended peripheral sections of territories belonging to other clans (Hoogland 1998, pp. 887–888; Hoogland 1999, pp. 245, 248; Seglund *et al.* 2006, p. 6). Although clans display social cohesion, Gunnison's prairie dogs are not as socially organized as black-tailed prairie dogs and have a less defined social hierarchy (Fitzgerald and Lechleitner 1974, p. 155; Hall 1981, p. 414; Goodwin 1995, p. 101; Hoogland 1999, p. 248; Haynie *et al.* 2003, p. 1245; Fitzgerald *et al.* 2011, p. 140).

Gunnison's prairie dogs are a colonial species, historically occurring in large complexes of colonies over large areas. Within colonies, prairie dog densities vary widely, ranging from 2 to 23 Gunnison's prairie dogs per ac (5 to 57 per ha) (Seglund *et al.* 2006, p. 8; Underwood 2007, p. 6; Fitzgerald *et al.* 2011, p. 140). Within colonies, burrows may be densely aggregated or scattered and isolated, the density likely driven by the quality and quantity of vegetation (Underwood 2007, p. 6). Colonial behavior offers an effective defense mechanism by aiding in the detection of predators, but it also can play an important role in the transmission of disease (Hoogland 1999, p. 248; Biggins and Kosoy 2001, p. 911; Antolin *et al.* 2002, p. 19). Through their burrowing and grazing, colonies influence the abundance and diversity of other prairie species, and serve as a relatively constant prey base, such that the Gunnison's prairie dog is a keystone species (Kotliar *et al.* 1999, p. 183; Wagner and Drickamer 2002, p. 1; Seglund *et al.* 2006, p. 5; Underwood 2007, p. 7; Fitzgerald *et al.* 2011, p. 139).

Complexes of Gunnison's prairie dog colonies form metapopulations, or an ensemble of interacting, local populations linked together by dispersing individuals (Hanski and Gilpin 1991, pp. 4, 6; Wagner and Drickamer 2002, p. 15). Populations within a metapopulation may be isolated, such that the dispersing individuals must move across unsuitable habitats or may fail to locate another suitable habitat patch to colonize (Hanski and Gilpin 1991, p. 7).

A metapopulation helps spread the risk of extinction across the multiple populations in order to increase survival during a stochastic (random) or catastrophic event (Den Boer 1968, p. 166). In other words, a metapopulation ensures that local extinctions are offset by dispersers from other local populations who establish new populations or colonize the empty habitats (Hanski and Gilpin 1991, pp. 7, 9). The metapopulation provides a ready cache of individuals to repopulate. The dispersing individuals link the populations within a metapopulation, so their dispersal capabilities are fundamentally important to the structure of the metapopulation. Factors that inhibit or impair dispersal would also impact the metapopulation. For example, habitat fragmentation may isolate colonies beyond dispersal distances such that the metapopulation collapses (Hanski and Gilpin 1991, p. 13; Wagner and Drickamer 2002, p. 16). Within suitable habitats, leap-frog colonization radiating from expanding colonies may eventually reestablish the metapopulation (Wagner and Drickamer 2002, p. 16).

According to the cycle of local extirpation and recolonization, metapopulations of Gunnison's prairie dog populations expand or contract over time depending upon various natural factors (such as reproduction, food availability, and disease) and human-caused factors (such as poisoning and shooting). The Gunnison's prairie dog requires a metapopulation structure across the landscape to substantially augment depleted populations or replace populations without human intervention, so that migration between colonies is possible (Clark *et al.* 1982, pp. 574–575; Gilpin and Soule 1986, p. 24; Lomolino and Smith 2001, p. 938).

Gunnison's prairie dogs disperse in the fall before hibernating, and in the spring before breeding (Travis *et al.* 1996, p. 95; Seglund 2006, p. 8). When not dispersing, Gunnison's prairie dogs are relatively sedentary and tend to remain within the boundaries of their colony (Kotliar *et al.* 1999, p. 183; Wagner and Drickamer 2004, p. 188). Approximately 95 percent of females remain in their natal territory for life, but only 5 percent of males remain in their natal territory for more than 1 year (Hoogland 1999, p. 247; Seglund *et al.* 2006, p. 8). Dispersal distances range from 112 to 1,886 feet (34 to 575 meters), and may be as long as 4.8 miles (7.7 kilometers) (Hoogland 1999, p. 247; Seglund *et al.* 2006, p. 8; Seglund and Schnurr 2010, p. 15). The disappearance of related kin motivates dispersal (Hoogland 2013, p. 1205). Maximum travel distances have not been recorded for the Gunnison's prairie dog, but black-tailed prairie dogs may move up to 6.2 miles (10 kilometers) when dispersing, frequently traveling along roads or cattle trails (Knowles 1985, pp. 37–38; Wagner and Drickamer 2002, p. 16).

Taxonomy

The genus Cynomys is split into two subgenera; Leucocrossuromys includes prairie dogs with white tails, and Cynomys includes prairie dogs with black tails. Gunnison's prairie dogs are included in the subgenus Leucocrossuromys along with the Utah and white-tailed prairie dogs (Clark *et al.* 1971, p. 1; Pizzimenti 1975, pp. 15–16; Seglund *et al.* 2006, p. 3).

Early taxonomists divided the Gunnison's prairie dog into two subspecies, *Cynomys gunnisoni gunnisoni* and *C. g. zuniensis,* based on morphological differences (Hollister 1916, pp. 29–32). However, later morphological and genetic analyses disputed the designation of subspecies (Pizzimenti 1975, pp. 11, 15, 63; Goodwin 1995, pp. 100, 101, 110; Seglund *et al.* 2006, p. 3). Later, an unpublished study used genetics to again support the designation of two subspecies (Hafner 2004, p. 6; Hafner *et al.* 2005, p. 2; NMDGF 2008, p. 2). However, during the status review for our 2008 12-month finding, we determined that this genetics study was too preliminary to substantiate the designation of two subspecies, and we did not recognize the subspecific taxonomy of the Gunnison's prairie dog. However, we anticipated that an ongoing genetics study could clarify the taxonomy of the Gunnison's prairie dog.

The results of this genetics study are now available in an unpublished report that provides support for the taxonomic differentiation of the Gunnison's prairie dog into two subspecies: *Cynomys gunnisoni gunnisoni* and *C. g. zuniensis* (Martin and Sackett 2012, p. 14). Following a thorough analysis of 12

different lines of genetic evidence, the report proposes two distinct subspecies of Gunnison's prairie dog that correspond roughly to the previously recognized ''montane'' and ''prairie'' forms (Martin and Sackett 2012). *C. g. gunnisoni* occurs in the ''montane'' northeastern part of the Gunnison's prairie dog's range in Colorado and New Mexico. *C. g. zuniensis* occurs in the ''prairie'' southwestern part of the range in southeastern Utah, southwestern Colorado, northwestern New Mexico, and northeastern Arizona (Figure 1). The genetics results support previous hypotheses that there are two geographically separated, but overlapping, genetic groups of Gunnison's prairie dog (Martin and Sackett 2012, p. 14). Although this report is currently awaiting peer-review and publication, it provides the best available information regarding the subspecific taxonomy of the Gunnison's prairie dog.

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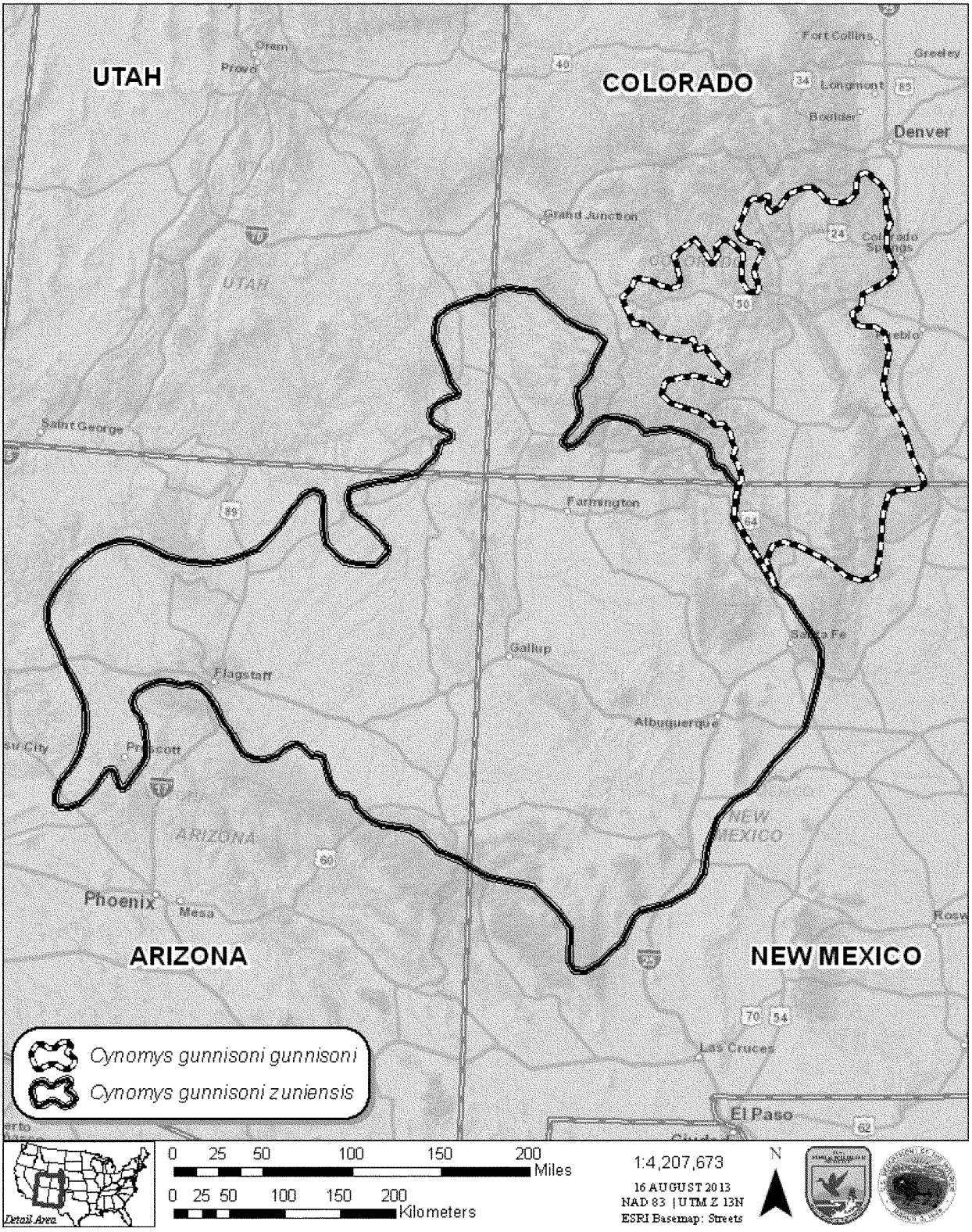
FIGURE 1: APPROXIMATE RANGE OF THE GUNNISON'S PRAIRIE DOG



The genetics data also clarified the location of the boundary between the two subspecies. Previously, genetic analysis described the boundary as a diagonal line extending from south-central Colorado to northeastern New Mexico, but with a substantial, southwestern extension, or ''tongue'' of *Cynomys gunnisoni gunnisoni* extending into Albuquerque, New Mexico. Now, genetic data indicate that the boundary should be redrawn as a straight line, and provide little support for the southern extension, or ''tongue'' of *Cynomys gunnisoni gunnisoni* into northcentral New Mexico near Albuquerque (Martin and Sackett 2012, p. 14). We used this information to draw

the approximate range of both subspecies, as illustrated in Figure 1. However, there is evidence of genetic mixing and overlap across this boundary, as individuals living in colonies along the boundary have genetic code from both subspecies (Martin and Sackett 2012, pp. 13–14). In other words, *C. g. gunnisoni* and *C. g. zuniensis* along the boundary have interbred or currently interbreed. However, the extent, scope, and taxonomic consequences of this genetic mixing along the boundary are unclear.

Based on this new genetic analysis, we accept the subspecific taxonomy of the Gunnison's prairie dog as *Cynomys gunnisoni gunnisoni* and *C. g. zuniensis.* Both subspecies are valid taxonomic subspecies of the Gunnison's prairie dog and are listable entities under the Act. This finding evaluates both subspecies.

Habitat

Gunnison's prairie dogs establish their colonies on gently sloping grasslands and semi-desert and montane shrublands, at elevations ranging from 4,600 to 12,000 feet (1,400 to 3,660 meters) (Bailey 1932, p. 125; Pizzimenti and Hoffman 1973, p. 1; Findley *et al.* 1975, p. 133; Wagner and Drickamer 2002, p. 4; NMDGF 2008, p. 9; Seglund *et al.* 2006, p. 4; Fitzgerald *et al.* 2011, pp. 138, 139). They primarily eat grasses, and will occasionally eat forbs, sedges, and shrubs (Pizzimenti and Hoffman 1973, p. 3; Shalaway and Slobodchikoff 1988, p. 840; Seglund *et al.* 2006, p. 5; Fitzgerald *et al.* 2011, p. 139). Gunnison's prairie dog habitats are arid, unpredictable, and often characterized by limited vegetation and short growing seasons (Seglund and Schnurr 2010, pp. 17, 18).

The two subspecies occupy similar prairie habitats at different elevations. *Cynomys gunnisoni gunnisoni,* in central and southcentral Colorado and northcentral New Mexico, occupies high-elevation, cool, and mesic (wet) plateaus, benches, and intermountain valleys. Grass-shrub vegetation in low valleys and mountain meadows bordered by steep topography dominate these habitats (Seglund *et al.* 2005, p. 12). *Cynomys gunnisoni zuniensis* in southeastern Utah, southwestern Colorado, northwestern New Mexico, and northeastern Arizona occupies lower elevation, xeric (dry) plains and plateaus (Bailey 1932, pp. 125–127; Pizzamenti and Hoffman 1973, pp. 1–2; Hall 1981, p. 7; Knowles 2002, p. 4). *C. g. zuniensis* occupies grass-shrub prairies within these habitats (Seglund *et al.* 2005, p. 12).

Distribution, Abundance, and Trends

As illustrated in Figure 1, we mapped the overall distribution of *Cynomys gunnisoni gunnisoni* and *C. g. zuniensis* as an approximate ''overall range.'' However, the ''overall range'' is a gross estimate because the subspecies do not occupy or potentially occupy all lands within its boundaries (Seglund *et al.* 2006, p. 70). Instead, the ''predicted range'' is a subset of the overall range and represents a more accurate spatial representation of the potential range of the subspecies (Seglund *et al.* 2006, p. 9; Seglund and Schnurr 2010, p. 20). Habitat characteristics, such as vegetation and slope, built the predicted range model. Compared to the overall range, the predicted range provides a more accurate, spatial range for the Gunnison's prairie dog, but it similarly does not imply that all the areas are occupied or suitable.

A predicted range model estimates that the Gunnison's prairie dog could occupy 23,459,525 ac (9,493,733 ha) across the four States in its range (Seglund *et al.* 2006, p. 70). At the species level, approximately 27 percent of this potential Gunnison's prairie dog (*Cynomys gunnisoni*) range occurs in Arizona, 25 percent in Colorado, 45 percent in New Mexico, and 3 percent in Utah (Seglund *et al.* 2006, p. 70).

We used a predicted range model (USGS 2011) for the Gunnison's prairie dog, with the revised overall range for both *Cynomys gunnisoni gunnisoni* and *C. g. zuniensis* and updated landownership data (BLM 2011; BLM 2012a; BLM 2012b; BLM 2013) to approximate the percentages of each subspecies' potential range by State and landowner (Table 1). Colorado supports the largest percentage, 81 percent, of *Cynomys gunnisoni gunnisoni's* potential range, with the remaining 19 percent in New Mexico. New Mexico and Arizona support the largest percentage of *C. g. zuniensis'* potential range, 48 and 42 percent respectively, with 7 percent of *C. g. zuniensis'* potential range in Colorado and 3 percent in Utah (Table 1).

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Table 1. Percent of *Cynomys gunnisoni gunnisoni* and *C. g. zuniensis* predicted range (USGS 2011) by State and landowner.

		C. g. gunnisoni			*C. g. zuniensis*					*C. gunnisoni*
		Colorado	New Mexico	Subspecies' Range	Colorado	New Mexico	Arizona	Utah	Subspecies' Range	Species' Range
	Percent of Predicted Range for each Subspecies	81	19	100	7	48	42	3	100	100
PERCENT OF PREDICTED RANGE BY LANDOWNER	**Private**	11	38	50	29	27	22	17	25	27
	State	40	11	5	2	8	13	6	10	9
	Tribal/Bureau of Indian Affairs	0	3	<1	25	33	53	25	40	36
	Bureau of Land Management	42	37	32	37	19	1	48	14	16
	National Park Service	2	0	2	1	1	2	0	1	1
	U.S. Forest Service	3	11	9	6	11	9	4	10	9
	U.S. Fish and Wildlife Service	2	0	2	0	0.5	0	0	<1	<1
	Department of Defense	0	0	0	0	0.5	0	0	<1	<1

According to this predicted range model (USGS 2011), Tribal and private lands support the largest percentage of the Gunnison's prairie dog's (*Cynomys gunnisoni's*) predicted range at the species level, with 36 percent and 27 percent respectively (Table 1). The Bureau of Land Management (BLM) manages approximately 16 percent of this predicted range, the U.S. Forest Service (USFS) manages approximately 9 percent, the National Park Service (NPS) manages approximately 1 percent, and the U.S. Department of Defense and the Service both manage less than 1 percent of the Gunnison's prairie dog's predicted range (Table 1). The States manage approximately 9 percent of the Gunnison's prairie dog's predicted range. These percentages differ from the percentages reported in our last status review (February 5, 2008; 73 FR 6664) after we recalculated using the revised overall ranges for the subspecies, a different predicted range model (USGS 2011), and current landownership layers (BLM 2011; BLM 2012a; BLM 2012b; BLM 2013).

According to the predicted range model (USGS 2011), the largest percentage of *Cynomys gunnisoni gunnisoni's* predicted range occurs on private lands (50 percent) followed by lands managed by the BLM with 32 percent (Table 1). The USFS, the States, the Service, the NPS, and Tribes each manage less than 10 percent of *C. g. gunnisoni's* predicted range. Tribes manage the largest percentage of *C. g. zuniensis's* predicted range (40 percent), followed by private lands (25 percent) and the BLM (14 percent).

Native American Tribes manage the largest percentage (36 percent) of the Gunnison's prairie dog's predicted range (Table 1). The Navajo Nation in Utah, Arizona, and New Mexico manages approximately 64 percent of the Tribal lands within the overall range of the Gunnison's prairie dog (*Cynomys gunnisoni*) (Johnson *et al.* 2010, p. 8). The Hopi Tribe in Arizona manages 9 percent of the Tribal lands, while 4 percent are jointly managed by the Navajo Nation and Hopi Tribe (Johnson *et al.* 2010, p. 8). The Gunnison's prairie dog also occurs on Hualapai Tribe lands in Arizona.

Estimating the abundance of prairie dogs, or the number of individuals in a population, is notoriously difficult (Fitzgerald *et al.* 2011, p. 137). Densities of individuals range widely, with anywhere from 2 to 23 Gunnison's prairie dogs per ac (5 to 57 per ha) (Fitzgerald *et al.* 2011, p. 140). Additionally, the quality of habitats, season, colony age, precipitation, amount and quality of forage, predation, disease, poisoning, shooting, and other factors influence the number of prairie dogs present at a particular location (Knowles 2002, pp. 7–8). Prairie dogs also spend time in underground burrows, making them difficult to count. As a result, counting individual prairie dogs to estimate the population size is difficult, time-consuming, and only feasible for small areas (Biggins *et al.* 2006, p. 94).

Instead of counting individual prairie dogs, most abundance estimates are expressed as the area (acres (ac) or hectares (ha)) of occupied habitat (Biggins *et al.* 2006, p. 94). Occupied area estimates are derived by mapping the boundaries of colonies. Although easier and more efficient than counting individuals, mapping is also time-consuming, costly, and often inaccurate. Ground or aerial mapping of colonies over a predicted habitat range of 23 million ac (9.5 million ha) in 4 States would be required to develop a rangewide estimate of the area occupied by the Gunnison's prairie dog (Seglund *et al.* 2005, pp. 17–19). Mapping colonies across this large area is expensive and logistically unfeasible. Additionally, colony boundaries are often difficult to discern, whether on the ground or in the air, and the variability in distribution and activity levels of individuals makes mapping difficult and subjective (CDOW 2007, p. 18; WAFWA 2012, p. 1). Mapping may also overestimate the area of occupied habitats by including inactive burrows, which are especially difficult to identify or distinguish from active burrows by air or with remote imagery (Seglund *et al.* 2005, pp. 23–24; Johnson *et al.* 2006, p. 3; Seglund *et al.* 2006, pp. 15, 25; CDOW 2007, p. 18; Seglund 2012, p. 1). Mapping accuracy suffers over the longer time intervals necessary to visit large range portions, because colony area, location, and persistence on the landscape often change relatively quickly (Wagner *et al.* 2006, p. 335).

Occupancy modeling is a newer technique that improves the accuracy of abundance estimates and the evaluation of population trends for the Gunnison's prairie dog. Occupancy provides a powerful way to estimate abundance (Nicholson and Van Maner 2009, p. 233). An occupancy model estimates the percent of habitats that are occupied across a certain area and is a useful surrogate for estimating abundance (MacKenzie and Nichols 2004, pp. 461–466). Occupancy models detect changes over time in the proportion of habitats occupied by a species, which correlates to changes in population size (MacKenzie 2005, p. 849).

For Gunnison's prairie dogs, surveys are used to develop an occupancy model by recording the presence or absence of prairie dogs within a sub-set of random plots distributed throughout the current and historic range of the subspecies. On a scale of 1 to 100, the model represents the percentage of surveyed plots occupied by the Gunnison's prairie dog. The percentage of random plots occupied across the predicted range builds the model, which extrapolates to a rangewide estimate of occupancy (MacKenzie *et al.* 2002, pp. 2248–2249; MacKenzie *et al.* 2003, pp. 2200–2201). Changes in occupancy over time result from local extinction and colonization (Nicholson and Van Mayer 2005, p. 233). Therefore, occupancy trends also provide insight into metapopulation structure (MacKenzie 2005, p. 849).

Unlike counts of individuals or acreage estimates, occupancy models are statistically derived, are more objective, and can be implemented across large areas in a single season (Andelt *et al.* 2006, pp. 1–2; CDOW 2007, pp. 18–19; WAFWA 2007, p. 4; CPW 2010, p. 27; WAFWA 2012, p. 2). Occupancy models provide statistically derived trends over time (Seglund 2012, p. 2), and subsampling random plots for only presence-absence data improves efficiency and consistency when collecting data. Furthermore, the results of individual surveys can be interpreted separately to assess prairie dog occupancy and document trends within specific areas of concern. Occupancy modeling is well-established in the literature and deemed adequate and reliable for the long-term monitoring of the Gunnison's prairie dog throughout its range (Seglund and Schnurr 2010, p. 10; USGS 2011, p. 20). Since 2005, all four States within the range of the Gunnison's prairie dog have adopted this approach and have successfully completed at least 2 years of occupancy surveys (Seglund 2012, p. 2).

Unfortunately, occupancy modeling estimates are not directly comparable to estimates of occupied acres (including most historical estimates), because acreages are not recorded during the occupancy modeling surveys. When surveyors visit a random plot, observers record only presence or absence of Gunnison's prairie dogs, not the acres occupied. Without mapping, occupancy modeling provides no information about colony size or location within each random plot surveyed, and therefore cannot be directly correlated to previous approximations of occupied acres (USGS 2011, p. 17). However, the occupancy surveys and models are the best available information regarding the

Gunnison's prairie dog's current population status and trends.

Below we briefly summarize the historical and current abundance data available for the Gunnison's prairie dog, extrapolating to the subspecies where possible.

Historical Estimates of Abundance

Federal records from early poisoning campaigns provide historical estimates of Gunnison's prairie dog occupied habitat in Arizona and New Mexico. In 1916, approximately 6.6 million ac (2.7 million ha) of Gunnison's prairie dog occupied habitat occurred in Arizona (*Cynomys gunnisoni zuniensis*), and 11 million ac (4.4 million ha) occurred in New Mexico (*C. g. zuniensis* and *C. g. gunnisoni*) (Oakes 2000, pp. 169–171). In our 90-day finding in 2006 (71 FR 6241; February 7, 2006), we calculated historical estimates (circa 1916) for Colorado (6 million ac (2.4 million ha), both subspecies) and Utah (700,000 ac (284,000 ha), *C. g. zuniensis*) from prairie dog information in various publications and reports, because data were not available for these States. By summation, based on the best available information, we estimated that the Gunnison's prairie dog (including both subspecies) historically occupied approximately 24.3 million ac (9.8 million ha) across its range in 1916. This historical estimate is similar to the predicted range model's rangewide estimate of 23,459,525 ac (9,493,733 ha) for the species based on habitat characteristics (Seglund *et al.* 2006, p. 70).

In 1961, the Gunnison's prairie dog occupied an estimated 445,000 ac (180,000 ha) of habitat in Arizona; 116,000 ac (47,000 ha) in Colorado; 355,000 ac (144,000 ha) in New Mexico; and 100,000 ac (41,000 ha) in Utah (Bureau of Sport Fisheries and Wildlife 1961, pp. 1, 5). By summation, in 1961, the Gunnison's prairie dog (including both subspecies) occupied approximately 1 million ac (405,000 ha) rangewide. When compared, these estimates indicate that, from 1916 to 1961, Gunnison's prairie dog populations decreased by approximately 93 percent in Arizona, 98 percent in Colorado, 97 percent in New Mexico, and 86 percent in Utah, or by approximately 95 percent rangewide, largely because of disease and poisoning.

To summarize the historical abundance data, between 1916 and 1961, habitat occupied by the Gunnison's prairie dog throughout its range declined by 95 percent as a result of disease and poisoning. However, historical declines do not necessarily imply that current populations continue to decline.

After 1961, survey efforts documented declines, die-offs, or gradual increases in the acreage of occupied Gunnison's prairie dog habitats. Seglund *et al.* (2006, pp. 12–27) summarize the post-1961 surveys for each of the four States, and each State's conservation assessment provides additional summaries (Underwood 2007; Lupis *et al.* 2007; NMDGF 2008; Seglund and Schnurr 2010). We highlight several surveys for each State and Tribal lands below. However, because different survey methodologies were used, it is difficult to evaluate rangewide populations or assess trends from the post-1961 survey data. Additionally, surveys generally did not differentiate the Gunnison's prairie dog by subspecies; however, where possible, we have attempted to interpret data to the subspecies.

Arizona

In 1990, colony mapping of eight complexes identified 34,214 ac (13,846 ha) of active *Cynomys gunnisoni zuniensis* colonies (Seglund *et al.* 2006, p. 12). In the Aubrey Valley, the subspecies occupied 19,368 ac (7,838 ha) in 1990, and 29,655 ac (12,001 ha) in 1997, with burrow densities fluctuating yearly from 52 to 82 burrows per ac (21 to 33 burrows per ha) between 1996 and 2001 (Seglund *et al.* 2006, p. 13). Populations at the Aubrey Valley increased following mild winters with above average rainfall, with lower numbers during droughts (Seglund *et al.* 2006, p. 13). Surveys in 2000 and 2001 across the range of *C. g. zuniensis* in Arizona, not including the Aubrey Valley and Tribal lands, identified approximately 11,184 ac (4,526 ha) of active colonies; however, this represented a 66 percent reduction in acreage from surveys conducted in 1987 (Wagner and Drickamer 2003; Seglund *et al.* 2006, p. 14). Die-offs from plague resulted in this decline.

Colorado

In 1980, *Cynomys gunnisoni gunnisoni* occupied approximately 15,568 ac (6,300 ha) on BLM lands in Gunnison (Seglund *et al.* 2006, p. 19). In 1988, *C. g. gunnisoni* occupied approximately 640 ac (259 ha), or approximately 0.9 percent of the San Luis Valley of Colorado (Seglund *et al.* 2006, p. 17). In 1990, the Colorado Agricultural Statistics Service estimated 438,876 ac (177,607 ha) of Gunnison's prairie dog in Colorado; however, the survey methodology likely overestimated the actual acreage of occupied habitat (Knowles 2002; Seglund *et al.* 2006, p. 17). In 1990, there were 5,800 ac (2,347 ha) of occupied *C. g. gunnisoni* habitats in Gunnison County, Colorado, but populations potentially declined by 94 percent within 12 years (Capodice and Harrell 2003; Seglund *et al.* 2006, p. 19). In 2002, Colorado supported approximately 151,547 ac (61,329 ha) of active colonies (Seglund *et al.* 2006, p. 20). Plague was responsible for all observed declines and extirpations.

New Mexico

In 1971, New Mexico supported approximately 87,748 ac (35,510 ha) of occupied Gunnison's prairie dog habitat (Seglund *et al.* 2006, p. 21), which includes both *Cynomys gunnisoni gunnisoni* and *C. g. zuniensis.* Surveys of agricultural producers estimated 106,572 ac (43,128 ha) of occupied Gunnison's prairie dog colonies in New Mexico (Seglund *et al.* 2006, p. 22). The Estancia Valley had 43 active colonies in 1999 across 2,271 ac (919 ha), but only 27 were active a year later due to unknown causes (Seglund *et al.* 2006, p. 24). In 2004, surveys on BLM lands identified 2,378 ac (962 ha) of occupied habitat (Seglund *et al.* 2006, p. 24).

Utah

In 1968, Utah supported approximately 22,007 ac (8,906 ha) of occupied *Cynomys gunnisoni zuniensis* habitat (Seglund *et al.* 2006, p. 26). In 1984, *C. gunnisoni zuniensis* occupied 2,212 ac (895 ha) on BLM lands in San Juan County, Utah (Seglund *et al.* 2006, p. 26). Surveys in 2002 on public, non-Tribal lands in Grand and San Juan Counties, Utah, identified 3,687 ac (1,492 ha) of active colonies with high prairie dog densities (Seglund *et al.* 2006, p. 27).

Tribal Lands

Since 1961, only two surveys evaluated the Gunnison's prairie dog on Tribal lands of the Navajo Nation. In 1994 and 1996, 18 of 90 colonies totaled 5,987 ac (2,423 ha), with an additional, estimated area of more than 988 ac (400 ha) of active colonies that were not surveyed. The limited survey area represented only a small portion of potentially occupied prairie dog habitat on the Navajo Nation (Navajo Natural Heritage Program 1996). Limited surveys along a linear transect within the road right-of-way along a 69 mile stretch of highway on the Navajo Nation in New Mexico supported 37 prairie dog colonies in 2001, but these colonies were largely abandoned in 2003 (Seglund *et al.* 2006, p. 24).

Current Rangewide and Statewide Estimates of Abundance

In 2005, Colorado conducted occupancy surveys to assess the status of Gunnison's prairie dog populations throughout its historical and current range in the State. Following Colorado's effort, in 2007 and 2010, Colorado, Utah, Arizona, and New Mexico all conducted occupancy surveys to assess the status of Gunnison's prairie dog populations throughout its historical and current range. To date, three occupancy surveys spanning 6 years have been completed in Colorado, and two surveys spanning 3 years have been completed in Utah, Arizona, and New Mexico, mostly on public and non-Tribal lands. Because prairie dogs have up to one litter per year and live for 3 years, two surveys spanning 3 years account for up to three generations of Gunnison's prairie dog. Therefore, 2 years of surveys provides the best available assessment of current population trends.

The occupancy surveys and modeling reveal that the Gunnison's prairie dog occupied 20 percent of its potential habitat rangewide in 2010 (Seglund 2012, p. 11). This percentage represents the current status of the Gunnison's prairie dog across its range. It does not imply an 80 percent decline from historical levels, because different, incomparable methodologies were used, and the species is discontinuously distributed across its potential range. Furthermore, the surveys indicate that between 2005 and 2010, the occupancy remained stable in Colorado and stable between 2007 and 2010 in Colorado, New Mexico, Utah, and Arizona. Occupancy for individual population areas in Colorado and New Mexico also remained stable between survey years. A rangewide occupancy of 20 percent likely reflects the Gunnison's prairie dog's colonial and discontinuous distribution across its predicted range. Colonial behavior and a naturally discontinuous distribution would prevent the species from ever achieving full, 100 percent occupancy across its predicted range.

Stable occupancy trends indicate that populations of both Gunnison's prairie dog subspecies are also stable and not declining. The stable trends indicate that the Gunnison's prairie dog has exhibited sufficient resiliency to recover from periodic disturbance, such as poisoning, shooting, or plague. Due to this stability, the States delayed the next occupancy surveys to 2016, rather than 2013 (Van Pelt 2013, p. 5). Declines in occupancy of within any one individual population area will trigger rangewide conservation actions, including increased funding, personnel support, and annual occupancy surveys until the decline reverses (WAFWA 2007, p. 5; Seglund 2012, p. 13).

Below, we briefly summarize the available abundance data from each State and Tribe.

Arizona

Only *Cynomys gunnisoni zuniensis* occurs in Arizona. In 2007, this subspecies occupied approximately 108,570 ac (40,500 ha) on non-Tribal lands in Arizona (Underwood 2007, p. 30), which is a gross underestimate because it did not include Tribal lands in Arizona, which occupy more than 50 percent of the Statewide potential habitat (Table 1). Between 2007 and 2011, these occupied acres in Arizona increased by approximately 1 percent from 108,570 (40,500 ha) ac to 109,402 ac (44,273 ha) (Van Pelt 2012, p. 5). Lands managed by the Navajo Nation and Hopi Tribe in Arizona supported approximately 111,108 ac (44,965 ha) of active colonies in 2008 (Johnson *et al.* 2010; Johnson 2013, p. 1).

At the Espee Ranch black-footed ferret reintroduction site in Arizona, occupied acres of *Cynomys gunnisoni zuniensis* dropped by 85 percent between 2009 and 2010, from 8,000 ac (3,237 ha) to 1,200 ac (486 ha) due to plague (Van Pelt 2011, p. 4). However, in 2011, the occupied acres increased by 90 percent, with an approximate total of 5,738 ac (2,322 ha) at the Espee Ranch (Van Pelt 2011, p. 4). Between 2011 and 2012, the Espee Ranch population again increased, by 65 percent, from 5,738 ac (2,322 ha) to 9,514 ac (3,850 ha) (Van Pelt 2013, p. 6). The population rebound at the Espee Ranch illustrates the resiliency of the Gunnison's prairie dog to catastrophic events, including reoccurring outbreaks of plague.

In 2012, *Cynomys gunnisoni zuniensis* occupied approximately 54,047 ac (21,872 ha) in the Aubrey Valley complex (Van Pelt 2013, p. 6). Annual monitoring at the Aubrey Valley complex reveals that populations are increasing and may have some genetically-based resistance to sylvatic plague (Van Pelt 2013, p. 11). Overall, the acreage of habitat occupied by *Cynomys gunnisoni zuniensis* in Arizona has increased from the 1961 levels.

In 2007, occupancy surveys in Arizona's three population areas ranged from 11 to 36 percent (Seglund 2013, p. 1). In 2010, occupancy surveys in Arizona's three population areas ranged from 14 to 37 percent. Between 2007 and 2010, occupancy of *Cynomys gunnisoni zuniensis* was stable. Therefore, populations were also stable in Arizona, which also suggests that the metapopulation structure is intact.

Colorado

In 1990, Gunnison's, white-tailed, and black-tailed prairie dogs occupied an estimated 1,553,000 ac (621,200 ha) in Colorado (CDA 1990, p. A–3). Based on species occurrence by county, Gunnison's prairie dogs occupied approximately 438,876 ac (177,607 ha) in Colorado in 1990 (Seglund *et al.* 2005, p. 26).

Between 2002 and 2005, the Colorado Parks and Wildlife (CPW) mapped approximately: 182,237 ac (72,895 ha) of active Gunnison's prairie dog colonies; 9,042 ac (3,617 ha) of inactive colonies; and 171,970 ac (68,788 ha) of colonies in unknown status within Colorado (CDOW 2007, p. 3). These abundance estimates suggest a 36 percent increase in abundance from the historical 1961 estimate of 115,650 ac (46,802 ha), although errors associated with mapping likely reduced the accuracy of these estimates.

CPW selected individual population areas within Colorado to focus their management efforts. In Colorado, *Cynomys gunnisoni gunnisoni* occupy the Gunnison, San Luis Valley, South Park, and Southeast population areas. *Cynomys gunnisoni zuniensis* occupy the La Plata–Archuleta and Southwest population areas. *C. g. gunnisoni* occupy approximately 80 percent of the potential habitat and 40 percent of the occupied habitat in Colorado (CDOW 2007, p. 28). *C. g. zuniensis* occupy approximately 20 percent of the potential habitat and about 60 percent of the occupied habitat in Colorado (CDOW 2007, pp. 3, 19). In other words, there is more potential habitat for *C. g. gunnisoni* in Colorado, but this subspecies occupies only 40 percent of the total occupied habitat. Comparatively, there is less potential habitat in Colorado available to *C. g. zuniensis,* but the subspecies occupies 60 percent of the total occupied Gunnison's prairie dog habitat in Colorado. This indicates that *C. g. zuniensis* is more abundant in Colorado than *C. g. gunnisoni.*

Occupancy surveys confirmed that *Cynomys gunnisoni zuniensis* is more abundant than *C. g. gunnisoni* in Colorado. In 2005, *C. g. gunnisoni* occupied 4.5 percent and *C. g. zuniensis* occupied 17.3 percent of the potential habitats in Colorado (Seglund 2013, p. 1). In 2007, *C. g. gunnisoni* occupied 5.5 percent and *C. g. zuniensis* occupied 18.4 percent of its potential habitats (Seglund 2013, p. 1). In 2010, C. *g. gunnisoni* occupied approximately 8.2

percent of the potential habitats in Colorado and *C. g. zuniensis* occupied approximately 14.2 percent of the potential habitats (Seglund 2013, p. 1). These percentages provide both subspecies with sufficient redundancy to rebound and repopulate following declines from catastrophic events, such as plague outbreaks. Additionally, between 2005 and 2010, occupancy rates for both subspecies were stable in all the individual population areas of Colorado (Seglund 2012, pp. 2, 11; Seglund 2013, p. 1). Stability between the individual population areas suggests that the metapopulation structure is intact in Colorado, as extirpated colonies are successfully recolonized. The data also indicate that both subspecies have demonstrated resiliency to plague, the primary factor impacting populations.

It remains unclear why *C. g. gunnisoni* occupies a smaller percentage of its potential habitats than *C. g. zuniensis* in Colorado, although this percentage provides sufficient population redundancy for *C. g. gunnisoni* to rebound and repopulate following catastrophic events. Disease and poisoning may have initially contributed to this discrepancy, but both subspecies are resilient to periodic disturbance from these impacts. The difference may have more to do with habitat productivity. Although *C. g. gunnisoni*'s habitats are generally moister, growing seasons are shorter at higher elevations, which may reduce the annual productivity of forage available to *C. g. gunnisoni* in Colorado.

New Mexico

Both *Cynomys gunnisoni gunnisoni* and *C. g. zuniensis* occur in New Mexico. *C. g. gunnisoni* occupies approximately 17 percent of the potential Gunnison's prairie dog habitat in New Mexico, while *C. g. zuniensis* occupies approximately 83 percent of the potential habitat. However, historical and current estimates of abundance in New Mexico do not differentiate between the two subspecies, so percentages of habitat occupied by each subspecies are not available. Therefore, the data do not reveal whether one subspecies is more or less abundant.

Estimates of habitat occupied by the Gunnison's prairie dog in New Mexico during the early 1980s range widely, from approximately 348,000 ac (141,000 ha) to 75,000 ac (30,000 ha) (Bodenchuck 1981, p. 8; Oakes 2000, p. 216; Knowles 2002, p. 22). In 2004, aerial mapping estimated a minimum of 9,108 ac (3,689 ha) of habitat occupied by the Gunnison's prairie dog in New Mexico (Seglund *et al.*2006, p. 24). On its lands in New Mexico, the Navajo Nation supported approximately 134,210 ac (54,314 ha) of active colonies in 2008 (Johnson *et al.* 2010; Johnson 2013, p. 1).

Occupancy in 2010 for the entire species was 18.1 percent (Seglund 2010, p. 11). Between 2007 and 2010, occupancy was stable, suggesting that populations were also stable. Occupancy surveys in New Mexico did not differentiate between *Cynomys gunnisoni gunnisoni* in the northeast and *C. g. zuniensis* in the southwest part of the State. However, there is no information to indicate that abundance should differ significantly between the two subspecies in New Mexico.

Utah

Only *Cynomys gunnisoni zuniensis* occurs in Utah; however surveys have been relatively limited compared to the other States. In 1968, Utah supported approximately 22,000 ac (8,906 ha) of occupied Gunnison's prairie dog (*Cynomys gunnisoni zuniensis*) habitat (Seglund *et al.* 2006, p. 26). In 2002, Gunnison's prairie dogs occupied at least 3,678 ac (1,490 ha) in Utah (Knowles 2002, p. 21), although this was not a Statewide estimate. Occupied habitat may have decreased by 60 percent between 1961 and 2007, from 100,000 ac (40,500 ha) in 1961 (Bureau of Sport Fisheries and Wildlife 1961, p. 5), to 40,000 ac (16,000 ha) in 2007 (Lupis *et al.* 2007, p. 3); however, these data suffer from differing survey techniques. In 2008, the Navajo Nation in Utah supported approximately 3,334 ac (8,238 ha) of active *Cynomys gunnisoni zuniensis* colonies (Johnson *et al.* 2010; Johnson 2013, p. 1). The best available information indicates that *C. g. zuniensis* populations fluctuated over time in Utah.

The Gunnison's prairie dog occupancy in Utah was estimated to be 14.5 percent in 2007, and 15.1 percent in 2010 (Wright 2007, p. 3; Lupis *et al.* 2007, pp. 24, 60; Seglund 2012, p. 11). Occupancy surveys in 2008 revealed similar occupancy percentages on Tribal lands managed by the Navajo Nation (Seglund 2012, p. 8). Stable occupancy percentages indicate that populations of *Cynomys gunnisoni zuniensis* were stable in Utah.

Tribal Lands

In 2010, the Navajo Nation in Arizona, New Mexico, and Utah, and the Reservation of the Hopi Tribe in Arizona, supported approximately 253,567 ac (102,615 ha) of active Gunnison's prairie dog (*Cynomys gunnisoni zuniensis*) colonies spread throughout the land holdings of both Tribes (Johnson *et al.* 2010, p. 21). In Arizona, the Navajo Nation and Hopi Tribe in Arizona supported approximately 111,108 ac (44,965 ha) of active colonies in 2008 (Johnson *et al.* 2010; Johnson 2013, p. 1). In Utah, the Navajo Nation supported approximately 3,334 ac (8,238 ha) of active *Cynomys gunnisoni zuniensis* colonies (Johnson *et al.* 2010; Johnson 2013, p. 1). On its lands in New Mexico, the Navajo Nation supported approximately 134,210 ac (54,314 ha) of active colonies in 2008 (Johnson *et al.* 2010; Johnson 2013, p. 1).

CPW completed occupancy modeling for *Cynomys gunnisoni zuniensis* on the Southern Ute and Ute Mountain Indian Reservation in the southwest corner of Colorado (Seglund 2012, p. 6). Occupancy was 26.5 percent in 2010, with stability between 2007 and 2010. Occupancy surveys in Utah revealed similar occupancy percentages on Tribal lands managed by the Navajo Nation (Seglund 2012, p. 8). Although occupancy surveys for the Gunnison's prairie dog have not been completed on other Tribal lands, there is no information to indicate that occupancy percentages or trends differ.

Summary of Abundance and Trends

Historical estimates of abundance indicate a rangewide 95 percent decline in the acres occupied by the Gunnison's prairie dog between 1916 and 1961. Declines occurred within all four States, and populations fluctuated after 1961. However, the best available information indicates that population numbers have been stable since that time, especially as prairie dog eradication efforts decreased in magnitude. Current occupancy modeling indicates that the Gunnison's prairie dog occupies 20 percent of its available habitat, which provides sufficient redundancy of populations for continued stability. This percent occupancy represents the current status of the Gunnison's prairie dog across its range and does not represent an 80 percent decline. Furthermore, occupancy surveys and modeling completed throughout the ranges of both subspecies revealed that Gunnison's prairie dog occupancy, and hence populations, were stable throughout the ranges of both subspecies between 2007 and 2010 in Arizona, New Mexico, and Utah, and between 2005 and 2010 in Colorado. This stability rangewide and within individual population areas also suggests that any local extinctions are offset by recolonization, so the metapopulation structure is intact.

Summary of Information Pertaining to the Five Factors

Section 4 of the Act (16 U.S.C. 1533) and implementing regulations (50 CFR part 424) set forth procedures for adding species to, removing species from, or reclassifying species on the Federal Lists of Endangered and Threatened Wildlife and Plants. Under section 4(a)(1) of the Act, a species may be determined to be endangered or threatened based on any of the following five factors:

(A) The present or threatened destruction, modification, or curtailment of its habitat or range;

(B) Overutilization for commercial, recreational, scientific, or educational purposes;

(C) Disease or predation;

(D) The inadequacy of existing regulatory mechanisms; or

(E) Other natural or manmade factors affecting its continued existence.

In making this finding, information pertaining to the Gunnison's prairie dog, and the subspecies *Cynomys gunnisoni gunnisoni* and *C. g. zuniensis,* in relation to the five factors provided in section 4(a)(1) of the Act is discussed below. When considering what factors might constitute threats, we must look beyond the mere exposure of the species (or in this case, subspecies) to the factor to determine whether the species responds to the factor in a way that causes actual impacts to the species. If there is exposure to a factor, but no response, or only a positive response, that factor is not a threat. If there is exposure and the species responds negatively, the factor may be a threat and we then attempt to determine how significant a threat it is. If the threat is significant, it may drive or contribute to the risk of extinction of the species such that the species warrants listing as endangered or threatened as those terms are defined by the Act. This does not necessarily require empirical proof of a threat. The combination of exposure and some corroborating evidence of how the species is likely impacted could suffice. The mere identification of factors that could impact a species negatively is not sufficient to compel a finding that listing is appropriate; we require evidence that these factors are operative threats that act on the species to the point that the species meets the definition of an endangered or threatened species under the Act.

In making our 12-month finding on the petition, we considered and evaluated the best scientific and commercial information available.

Factor A. The Present or Threatened Destruction, Modification, or Curtailment of Its Habitat or Range

Below, we examine the following potential factors that may affect the habitat or range of *Cynomys gunnisoni gunnisoni* or *C. g. zuniensis* including: (1) Agricultural land conversion; (2) grazing; (3) invasive plant species; (4) urbanization; and (5) oil and gas exploration and development.

Agricultural Land Conversion

Agricultural land conversion describes a change in land use to an agricultural use, such as crops or pastures. Agricultural land conversion historically impacted Gunnison's prairie dog habitat by displacing Gunnison's prairie dogs from some of the more productive valley bottomlands in Colorado and New Mexico (Longhurst 1944, p. 36; Knowles 2002, p. 12). Agricultural land conversions may also increase mortality rates of prairie dogs when control efforts, such as poisoning and shooting, accompany the change in land use (Hoogland 2001, p. 917; Knowles 2002, p. 12).

Today, agriculture currently impacts 2,063,930 ac (834,243 ha), or less than 3 percent of the Gunnison's prairie dog's range (Seglund *et al.* 2005, p. 43). In Arizona, agricultural development impacts 31,444 ac (12,725 ha), or less than 1 percent of the predicted range of *Cynomys gunnisoni zuniensis* (Underwood 2007, pp. 9–10). Between 2002 and 2007, acres of farmland in Colorado increased by 1.6 percent, but decreased by 3.5 percent in New Mexico, 5.4 percent in Utah, and 1.8 percent in Arizona (USDA 2009). Gunnison's prairie dogs may benefit from agricultural land conversions because agricultural fields provide highly productive forage for Gunnison's prairie dogs, in place of the native, arid landscape (Crocker-Bedford 1976, pp. 73–74; Seglund *et al.* 2005, p. 41). Further, control efforts that may accompany agriculture currently occur locally and do not result in rangewide population declines of either subspecies (see discussions of Factors C and E).

Therefore, due to the small percentage of the range affected by agriculture and the small amount of land likely to be converted to agriculture in the future, agricultural land conversion is not a threat to either subspecies now nor is it likely to become so in the future.

Livestock Grazing

Prairie dogs coevolved with native herbivores, such as bison (*Bison bison*), that grazed across the intermountain west before European settlers introduced domesticated livestock in the 1800s. By 1890, hundreds of thousands of cattle and large numbers of sheep grazed within the range of the Gunnison's prairie dog (Seglund *et al.* 2006, p. 33). Livestock numbers peaked in the early 1900s (Oliphant 1968, p. vii; Young *et al.* 1976, pp. 194–195; Carpenter 1981, p. 106; Donahue 1999, p. 15). However, the intensity of grazing on Federal lands has declined since the early 1900s (Laycock *et al.* 1996, p. 3). Between 2000 and 2012, numbers of cattle, including calves, decreased by 13 percent in Colorado, decreased by 15 percent in New Mexico, decreased by 12 percent in Utah, and increased by 9.5 percent in Arizona (National Agricultural Statistics Service 2013).

In general, livestock grazing can alter the diversity of plants and disrupt the function and structure of ecosystems by decreasing cover by grasses and shrubs, total plant biomass, and the diversity and richness of rodents (Fleischner 1994, pp. 633–635; Seglund *et al.* 2006, p. 33). Fencing and roads associated with livestock grazing may fragment habitats, kill prairie dogs crossing roads, create perches for raptors, and provide access corridors for predators (Call and Maser 1985, p. 3; Connelly *et al.* 2000, p. 974; Connelly *et al.* 2004, pp. 1–2). Overgrazing occurs when the forage plants are unable to recover (Vallentine 1990, p. 329). Overgrazing may reduce the forage available to prairie dogs and may promote the establishment of invasive species, such as cheat grass (*Bromus tectorum*) (Masters and Sheley 2001, p. 503). The intensity, duration, and distribution of livestock grazing influence the condition of rangeland more than the density of livestock (Aldridge *et al.* 2008, p. 990).

Non-grazed habitats within the range of the Gunnison's prairie dog are rare, so evaluating potential impacts of livestock grazing on prairie dog habitats and populations is difficult (Seglund *et al.* 2006, p. 33). Overgrazing may impact prairie dogs by degrading the quality, quantity, and diversity of forage, and by decreasing forage availability during important breeding, rearing, and pre-hibernation periods (Seglund *et al.* 2006, p. 34). Altered hydrology, compacted soils, altered nutrient cycling, and decreased water infiltration resulting from overgrazing may also impact Gunnison's prairie dog habitats (Seglund *et al.* 2006, p. 34).

When properly managed, livestock grazing may be beneficial to the Gunnison's prairie dog. Grazing benefited black-tailed prairie dog colonies by reducing the height of grasses, which improves visibility to detect predators (Uresk *et al.* 1981, p.

200; Cable and Timm 1987, p. 46). Well managed grazing also increases production of the prairie dog's preferred grass species (Seglund *et al.* 2006, p. 34), and prairie dog densities increase in grazed habitats, likely because well-managed grazing is compatible with the shortgrass prairie environment preferred by prairie dogs (Fagerstone and Ramey 1996, p. 88; Marsh 1984, p. 203; Slobodchikoff *et al.* 1988, p. 406). Prairie dogs and native herbivores coexisted before the arrival of domesticated livestock, so prairie dogs should be able to coexist with livestock that are properly grazed (Hoogland 1996, p. 6; Underwood 2007, p. 8). In Arizona, some of the largest and recently expanding *Cynomys gunnisoni zuniensis* colonies are actively grazed (Underwood 2007, p. 10).

However, improperly managed grazing, or overgrazing, may reduce the forage available to the Gunnison's prairie dog. For example, Utah prairie dog densities declined in overgrazed habitats (Collier and Spillett 1975 p. 151; Cheng and Ritchie 2006, p. 550). As overgrazing reduced the diversity of plants, more Utah prairie dog colonies went extinct (Ritchie 1999, p. 12) and unfavorable shrub densities increased (Crocker-Bedford 1976, p. 88). At the same time, Utah prairie dogs preferred moderately grazed areas to ungrazed areas due to the availability of short grasses (Cheng and Ritchie 2006, p. 554). Therefore, overgrazing may negatively impact the Gunnison's prairie dog, but properly managed grazing may benefit the Gunnison's prairie by increasing visibility and the quality and quantity of preferred forage (Seglund *et al.* 2006, p. 34).

We lack information regarding site-specific range conditions on Federal or non-Federal grazing allotments within the range of *Cynomys gunnisoni gunnisoni* or *C. g. zuniensis.* Range condition data are not collected in a biologically meaningful way that is relevant to small mammals. Gunnison's prairie dogs evolved with other herbivores in arid environments and can persist with limited forage. Prairie dogs hibernate and aestivate (sleep during the summer) when they are metabolically stressed (Harlow and Menkens 1986, p. 795; Seglund *et al.* 2006, p. 7; Seglund and Schnurr 2010, p. 14), an adaptation which may allow the Gunnison's prairie dog to persist within overgrazed habitats. The point at which overgrazing makes habitats unsuitable is unclear, so quantifying the habitats that are overgrazed versus moderately grazed, and the impacts on prairie dogs, is difficult. The available literature indicates that prairie dogs can coexist with some level of properly managed grazing, and may benefit from well managed grazing in some cases (Uresk *et al.* 1981, p. 200; Marsh 1984, p. 203; Cable and Timm 1987, p. 46; Slobodchikoff *et al.* 1988, p. 406; Fagerstone and Ramey 1996, p. 88; Hoogland 1996, p. 6; Seglund *et al.* 2006, p. 34; Cheng and Ritchie 2006, p. 554; Underwood 2007, pp. 8, 10). Gunnison's prairie dogs have persisted under more intense grazing in the past, and stocking rates have decreased across most of the range, and increased slightly only in Utah. Therefore, grazing is not a threat to either subspecies now nor is it likely to become so in the future.

Invasive Plant Species

The alteration of native prairie habitats throughout the western United States by the invasion of noxious weeds, such as cheat grass (*Bromus tectorum*) is well documented in the literature (Mack 1981, pp. 145–165; D'Antonio and Vitousek 1992, pp. 63–87; Knapp 1996, pp. 37–52; Young and Allen 1997, pp. 530–535; Stohlgren *et al.* 1999, pp. 45–64; Pimental *et al.* 2005, pp. 273–288; Davies and Sheley 2007, p. 178; DiTomaso 2009, pp. 255–265). Invasive plant species displace native plants, degrade wildlife habitats, alter fire regimes, and promote continued invasions (Masters and Sheley 2001, p. 503). The continued expansion of juniper forests into semi-arid grasslands and shrublands may reduce native prairie habitats (Miller and Rose 1999, p. 550) and restrict or fragment Gunnison's prairie dog habitats (Seglund and Schnurr 2010, p. 159).

Prairie dog densities increase when there are more native plants (Slobodichikoff *et al.* 1988, p. 406), and invasive plants may reduce densities by reducing the quality and quantity of the Gunnison's prairie dog's preferred forage. Although noxious weeds are now widespread throughout the range of the Gunnison's prairie dog, there is no evidence that the subspecies are impacted by invasive plant species at more than a localized scale. Additionally, although juniper encroachment may reduce available habitats, the available information indicates that juniper encroachment occurs at no more than a localized scale at the periphery of the overall range. Therefore, invasive plant species are not threats to either subspecies of Gunnison's prairie dog now nor are they likely to become so in the future.

Urbanization

Urban development reduces and fragments habitats. More infrastructure, such as roads and transmission lines, accompany expansions of human population centers, which may impact habitats beyond the immediate urban area. Prairie dog control efforts, such as shooting and poisoning, may also be more prevalent next to urban areas (Seglund and Schnurr 2010, p. 171). Impacts to the Gunnison's prairie dog associated with urban and suburban development exist, but have not been quantified, in the five cities of Santa Fe and Albuquerque, New Mexico; Flagstaff, Arizona; and Gunnison and Durango, Colorado (CDOW 2007, p. 4).

The effects of urban development on the Gunnison's prairie dog have not been specifically studied, but the weights and sex ratios of black-tailed prairie dogs living in urban environments were within the normal ranges for the species (Magle 2008, p. 116). However, within urban areas, black-tailed prairie dogs were more likely to occur on larger, continuous habitats, rather than smaller, highly fragmented urban parcels (Magle and Crooks 2009, p. 197). Existing black-tailed prairie dog colonies collapsed within highly fragmented urban environments (Magle and Crooks 2009, pp. 197, 199). In other words, black-tailed prairie dogs survived in habitats fragmented by urban areas, but populations decreased over time as habitats became more fragmented (Magle and Crooks 2009, p. 200). We expect that the impacts of urban development on Gunnison's prairie dogs would be similar.

Today, urbanization affects approximately 577,438 ac (233,681 ha), or less than 2 percent, of the predicted range of the Gunnison's prairie dog (Seglund *et al.* 2005, p. 41; Seglund *et al.* 2006, p. 35). In Arizona, urban development impacts 42,371 ac (17,147 ha), or less than 1 percent of the predicted range for *Cynomys gunnisoni zuniensis* (Underwood 2007, p. 10). During surveys in Arizona, only one *C. g. zuniensis* colony became inactive due to urbanization (Wagner *et al.* 2006, p. 334). Rates of urbanization with the western United States are below the national average (White *et al.* 2009, pp. 41–45). Low-density developments may actually be compatible with Gunnison's prairie dog populations where lawns and pastures provide high quality forage (Seglund *et al.* 2005, p. 41; Seglund *et al.* 2006, p. 35). Secondary effects of urbanization, such as shooting and poisoning, occur locally but do not significantly reduce rangewide populations. Near Santa Fe, New Mexico, Gunnison's prairie dogs are relocated to preserves before lands are urbanized, although this does not reduce the loss of habitat. Urbanization

is projected to occur rapidly on Colorado's western slope, and high density urban development may impact a larger percentage of the *Cynomys gunnisoni zuniensis'* range in western Colorado. However, urbanization is a concern only at localized scales primarily near the urban areas of Durango and Montrose (Seglund and Schnurr 2010, pp. 171, 176), and there is no evidence that urbanization negatively impacts *C. g. zuniensis* populations near these cities.

To summarize, habitat loss and fragmentation due to urbanization may impact both subspecies of the Gunnison's prairie dog, but only in localized areas. There will not likely be significant increases in urbanization across the subspecies' ranges in the future. Therefore, urbanization is not a threat to either subspecies now or likely to become so in the future.

Oil and Gas Exploration and Development

Oil and gas exploration and development occur throughout the ranges of both Gunnison's prairie dog subspecies. Between 2004 and 2008, political and economic incentives increased the exploration of oil and gas resources in the intermountain west. The 2005 Energy Policy Act expedited the leasing and permitting of energy development on Federal lands (42 U.S.C. 13201 *et seq.;* Seglund and Schnurr 2010, p. 121). Although the global recession of 2008 decreased energy demand and reduced the rate of development, demand will likely increase (Copeland *et al.* 2009, p. 1; EIA 2009, p. 109).

Exploration for oil and gas may increase human activity within previously undisturbed habitats and introduce other disturbances, such as seismic waves, which may collapse burrows, impair hearing, and disrupt social systems (Underwood 2007, p. 10). The development of well pads and supporting infrastructure, such as roads and pipelines, may reduce or fragment available habitats (Seglund and Schnurr 2010, p. 126). Prairie dog control, such as shooting or poisoning, and road mortality, may accompany the oil and gas developments (Gordon *et al.* 2003, p. 12).

Approximately 6 percent of the Gunnison's prairie dog's range is under authorized or pending Federal lease for oil and gas development (Seglund and Schnurr 2010, p. 117). We lack similar estimates for development on private lands. However, the available information does not indicate that Gunnison's prairie dogs are negatively impacted by oil and gas activities at the population, subspecies, or landscape levels. Increased mortality associated with control efforts or roads are similarly localized and do not result in widespread population reductions or losses, as evidenced by the stable occupancy trends. Furthermore, seismic exploration does not likely negatively affect prairie dogs (Menkens and Anderson 1985, p. 13). Therefore, oil and gas exploration and development are not threats to either subspecies of Gunnison's prairie dog now or likely to become so in the future.

Conservation Efforts To Reduce Habitat Destruction, Modification, or Curtailment of Its Range

Current approved or draft resource management plans (RMPs) for BLM lands in Utah and New Mexico include specific conservation measures to avoid and minimize impacts to the Gunnison's prairie dog from oil and gas activities (as discussed below under *Factor D*). RMPs in Colorado and Arizona do not specifically address the Gunnison's prairie dog. Conservation measures include precluding oil and gas development and other surface-disturbing activities within 600 feet (183 meters) of active colonies and limiting the construction of power lines within colonies (BLM 2008a, pp. 138–139; BLM 2008b, pp. 122–123; BLM 2012, p. 2–125; BLM 2013, pp. 19, 143). The BLM's RMPs confer conservation recommendations for the management of prairie dogs on BLM lands.

Summary of Factor A

Agriculture, grazing, the spread of invasive plants, urbanization, and oil and gas exploration and development occur within the ranges of *Cynomys gunnisoni gunnisoni* and *C. g. zuniensis* and will continue to occur in the future. Agriculture and urbanization currently impact a small portion of the Gunnison's prairie dog's range. Urbanization may impact local populations, but it is not a rangewide threat. Grazing and oil and gas development likely impact some habitats, but there is no evidence that they are significantly impacting either subspecies. Additionally, there is no evidence that invasive plants are having a significant impact.

Therefore, the best scientific and commercial information available indicates that the present or threatened destruction, modification, or curtailment of its habitat or range is not currently a threat to *Cynomys gunnisoni gunnisoni* or *C. g. zuniensis,* nor is it likely to become so in the future.

Factor B. Overutilization for Commercial, Recreational, Scientific, or Educational Purposes

Recreational Shooting

Gunnison's prairie dogs have been historically subjected to recreational shooting and shooting as a form of pest management on ranch and agricultural lands. State regulations in all four States allow shooting of Gunnison's prairie dogs.

Colonial behavior makes prairie dogs vulnerable to shooting by providing shooters with easy access to many individuals at once (Seglund *et al.* 2005, p. 48). There is little information regarding shooting specific to the Gunnison's prairie dog (Seglund 2006, p. 41), but the effects of shooting on black-tailed prairie dogs are well documented and relevant to the Gunnison's prairie dog (CDOW 2007, p. 41; Seglund and Schnurr 2010, p. 165). Shooting reduces prairie dog populations and alters behaviors of individual animals. The prairie dogs eat less and spend more time alert, which reduces the vigor of individual prairie dogs and the reproductive output of the colony (Knowles 1988, p. 54; Vosburgh 1996, pp. 32–33; Vosburgh and Irby 1998, p. 368; Pauli and Buskirk 2007, pp. 1223–1224). At specific sites, shooting can reduce prairie dog populations (Miller *et al.* 1993, p. 91; Vosburgh 1996, pp. 13–14; Vosburgh and Irby 1998, pp. 366–367; Knowles 2002, p. 14), and shooting may have locally extirpated colonies in isolated circumstances in the past (Knowles 1988, p. 54).

However, increased population growth rates or recovery from very low numbers following shooting have occurred (Knowles 1988, p. 54). Even small numbers of Gunnison's prairie dogs experience increased reproductive rates following population declines, a life history trait that likely mediates the effects of shooting and enables populations to recover. A population viability analysis confirmed that the probability of colony extirpation from recreation shooting alone is low (Seglund and Schnurr 2010, p. 168).

Recreational shooting is permitted rangewide, but it is unlikely that all Gunnison's prairie dog colonies experience the same levels of shooting. Recreational shooting of prairie dogs is more concentrated on colonies with reasonably easy access (Gordon *et al.* 2003, p. 12). Higher elevation or more remote colonies may never experience shooting pressures due to the difficulty of access. Shooting is likely concentrated near urban areas and agricultural fields (Gordon *et al.* 2003,

p. 12; Seglund *et al.* 2006, p. 33). However, urbanization and agriculture affect less than 3 percent of the Gunnison's prairie dog's range (see Factor A discussion).

Unlike Arizona, Utah, or New Mexico, Colorado classifies both *Cynomys gunnisoni gunnisoni* and *C. g. zuniensis* as small game. Therefore, Colorado is the only State within the range of the Gunnison's prairie dog that requires a species-specific hunting permit to shoot prairie dogs. The Gunnison's prairie dog is a nongame mammal in Arizona, Utah, and New Mexico, so shooting is lawful under the auspices of a general hunting license (Seglund *et al.* 2006, pp. 28, 30, 31; Underwood 2007, p. 11). Because permits are not required in other States, quantifying the number of prairie dogs killed by shooting is difficult. However, local residents generally shoot Gunnison's prairie dog, compared to the large numbers of nonresidents that travel to shoot black-tailed prairie dogs (Knowles 2002, p. 14; Seglund *et al.* 2006, p. 39; Seglund and Schnurr 2010, p. 165).

Harvest surveys for Colorado indicate that only 4.6 to 7.4 percent of hunters shot prairie dogs of any species between 2001 and 2005 (CDOW 2001–2005). In 2005, the Statewide harvest estimate for all prairie dog species in Colorado was 388,714 ± 154,520 and 328,936 ± 36,787 in 2004 (CDOW 2005, p. 1). Hunting surveys after 2005 do not record the numbers of prairie dogs taken by each hunter, but shooters may hit from 40 to 100 black-tailed prairie dogs per day (Seglund *et al.* 2006, pp. 39–40). In Arizona, hunting surveys estimate that between 30,000 to 94,000 *Cynomys gunnisoni zuniensis* are taken each year and that the number of prairie dogs killed declined by approximately 56 percent between 2000 and 2006 (Wagner *et al.* 2006, p. 336; Underwood 2007, pp. 11, 39). Using the minimum density estimate of 2 prairie dogs per ac (5 per ha) (Fitzgerald *et al.* 2011, p. 140) and the predicated range for the Gunnison's prairie dog (Seglund *et al.* 2006, p. 70), these harvest estimates represent less than 1 percent of the potential Gunnison's prairie dog population in Arizona and a maximum 4.5 percent of the potential population in Colorado. Therefore, these data indicate that shooting pressure is low on the Gunnison's prairie dog in Arizona and Colorado. There is no information to indicate that shooting pressures are greater in New Mexico or Utah. The Navajo Nation also requires a small game permit to hunt prairie dogs, but provided no data on numbers of animals taken.

Conservation Efforts To Reduce Overutilization for Commercial, Recreational, Scientific, or Educational Purposes

Shooting closures during the breeding season reduce the impacts of recreational shooting (discussed below under *Factor D*). A population viability analysis for the Gunnison's prairie dog confirmed that shooting closures from March 1 through June 14 each year increased population growth rates and reduced the risk of extinction (CDOW 2007, pp. 135–137). Without a seasonal shooting closure, small populations subjected to intense shooting experienced a decrease in growth rate and an increased risk of extinction (CDOW 2007, pp. 135–137). Colorado, Utah, and Arizona (outside Tribal lands) have implemented seasonal closures on prairie dog shooting. These closures reduced population declines caused by shooting. *Cynomys gunnisoni zuniensis* populations at the Aubrey Valley Complex increased after Arizona instituted its seasonal shooting closure (SSA Workshop 2013). In Arizona, New Mexico and Utah, the Navajo Nation requires a small game permit but currently implements no closures on shooting because the level of shooting is low and localized (Cole 2007, p. 4; Johnson *et al.* 2010, p. 3).

Summary of Factor B

The effects of recreational shooting may be high on specific, easily accessible, localized colonies. However, these effects do not result in rangewide population declines for either *Cynomys gunnisoni gunnisoni* or *C. g. zuniensis.* There are no other known threats due to commercial, scientific, or educational uses of the species.

Therefore, the best scientific and commercial information available indicates that overutilization for commercial, recreational, scientific, or educational purposes is not currently a threat to *Cynomys gunnisoni gunnisoni* or *C. g. zuniensis,* nor is it likely to become so in the future.

Factor C. Disease or Predation

Predation

Predation is a natural occurrence for Gunnison's prairie dogs. Numerous species, including coyotes, badgers, black-footed ferrets, and various raptor species, prey on the Gunnison's prairie dog. However, there is no information available to indicate that predation is a threat to the species. Stable or increasing populations within black-footed ferret release areas suggest that predation is not a threat to Gunnison's prairie dog populations where the black-footed ferret has been reintroduced (Van Pelt 2013, p. 5). Therefore, predation is not a threat to either subspecies of the Gunnison's prairie dog now nor is it likely to become so in the future.

Sylvatic Plague

Severe outbreaks of sylvatic plague, or plague, often kill more than 99 percent of the Gunnison's prairie dogs in a population and can extirpate entire populations within one season (Lechleitner *et al.* 1962, pp. 190–192; Lechleitner *et al.* 1968, p. 736; Rayor 1985, p. 194; Cully 1989, p. 49; Fitzgerald *et al.* 2011, p. 139). Plague is an exotic disease caused by an infection of the Old World bacterium *Yersinia pestis* foreign to the evolutionary history of North American species, including the Gunnison's prairie dog (Barnes 1982, p. 238; Barnes 1993, p. 29; Biggins and Kosoy 2001, p. 907). Bites from infected fleas, direct contact with infected animals, or inhalation of infected respiratory droplets transmit the bacterium *Y. pestis* to rodents (Gage *et al.* 1995, pp. 695–696). Once infected, the bacterium multiplies within the host's bloodstream, and when highly concentrated, the hosts may die of septic shock, systemic inflammation, multi-organ failure, or hemorrhaging (Eisen and Gage 2009, p. 2).

Prairie dogs are highly susceptible to plague, likely because of their dense populations, social nature, abundant flea vectors, and uniformly low resistance to the bacterium (Biggins and Kosoy 2001, p. 913). After arriving in North America in 1908, plague was first detected in Gunnison's prairie dogs in the 1930s (Eskey and Hass 1940, p. 6), and the bacterium is now firmly established in the western United States, including the entire range of the Gunnison's prairie dog (Cully 1989, p. 49; Centers for Disease Control 1998, p. 1; Antolin *et al.* 2002, pp. 105–106; Girard *et al.* 2004, p. 8408). Gunnison's prairie dogs are likely more susceptible to plague than some other prairie dog species due to their less territorial nature, more social behaviors, and denser populations (Torres 1973, p. 31; Ruffner 1980, p. 20; Hubbard and Schmitt 1983, p. 51; Cully 1989, p. 51; Hoogland 1999, p. 8; Cully and Williams 2001, p. 899; Turner 2001, p. iii; Antolin *et al.* 2002, p. 14; Knowles 2002, p. 13).

Plague maintains itself at low levels throughout the range of the Gunnison's prairie dog. The disease cycles through Gunnison's prairie dog populations like a wildfire, with periods of low and high intensities. It smolders relatively quietly at low intensities within a population until conditions such as temperature,

moisture, or host susceptibility fuel a more severe outbreak. These outbreaks can dramatically reduce the abundance of Gunnison's prairie dogs within specific populations (Gage *et al.* 1995, p. 696; Gage and Kosoy 2005, p. 506; Hanson *et al.* 2007, p. 790). Although the outbreak may reduce or extirpate entire populations, the outbreak eventually falls back to less severe levels, returning to smolder in the background in a maintenance state (Gage *et al.* 1995, p. 696). During this smoldering maintenance period, the bacterium establishes a stable reservoir that may later erupt into an outbreak (Girard *et al.* 2004, p. 8413; Gage and Kosoy 2005, pp. 506–509). The plague bacterium may maintain itself in the soil, within fleas, or by slowly transmitting itself within the prairie dog community (Biggins *et al.* 2010, p. 17).

The factors that cause plague outbreaks are not well understood, but may involve the density of hosts (including other mammals), the density of fleas, and climatic conditions (Cully 1989, p. 49; Cully and Williams 2001, pp. 899–903; Enscore *et al.* 2002, p. 186; Lomolino *et al.* 2003, pp. 118–119; Stapp *et al.* 2004; p. 237; Gage and Kosoy 2005, p. 509; Eisen 2006, p. 15380; Stapp *et al.* 2009, p. 807; Salkeld *et al.* 2010, p. 14247). The number of fleas may increase during outbreaks (Tripp *et al.* 2009, p. 313). Successive plague outbreaks may reduce populations so that the loss of colonies exceeds the rate of recolonization (Knowles 2002, p. 13). Repeated plague outbreaks, and the subsequent recovery of the local population, result in a cycle of contraction and expansion within Gunnison's prairie dog colonies (Wagner and Drickamer 2002, p. 16; Underwood 2007, p. 14). Consequences of repeated plague outbreaks could potentially include isolation, decreases in genetic diversity, and range contraction (Wagner and Drickamer 2002, p. 17).

Plague outbreaks do not erupt within all populations throughout the range of the Gunnison's prairie dog at the same time. Instead, outbreaks are patchy, occurring discretely in space and time within individual, local populations (Antolin *et al.* 2002, p. 102). Plague outbreaks are not large pandemics sweeping across the landscape (Antolin *et al.* 2002, p. 102). This sporadic, patchy pattern of outbreak eruption is consistent with a model of resistant hosts occasionally transmitting plague to susceptible, less-resistant hosts (Antolin *et al.* 2002, p. 109). The patchy distribution of outbreaks offers a temporal and spatial break for survivors and colonizers to repopulate.

Plague is responsible for major declines and fluctuations in Gunnison's prairie dog populations throughout the subspecies' ranges over the last 80 years (Seglund *et al* 2006, p. 42). The literature documents plague's periodic outbreaks and the subsequent reduction, extirpation, or recovery of local Gunnison's prairie dog populations in all four States and on Tribal lands (Lechleitner *et al.* 1968, p. 734; Rayor 1985, p. 194; Cully 1989, p. 49; CDOW 2007, p. 4; Wagner and Drickamer 2002, p. 15; Wagner and Drickamer 2004, p. 14; Seglund *et al.* 2005, p. 52; Luce 2005, p. 4; Seglund *et al.* 2006, pp. 42–43; Lupis *et al.* 2007, p. 32; Underwood 2007, p. 18; Johnson *et al.* 2010, p. 3).

However, the Gunnison's prairie dog currently occupies many of the same habitats where plague has reduced or eliminated populations in the past. Some populations declined and remain low after plague outbreaks, while other populations declined and either partially or fully recovered. In specific cases, populations tripled annually following outbreaks (Cully 1997, p. 146), while others remain low or absent (Fitzgerald *et al.* 1993, p. 52). The Gunnison's prairie dog's 80-year history with plague is characterized by often-drastic population declines punctuated by gradual repopulation, and complete losses of populations in some areas, but overall persistence across the subspecies' ranges. Persistence is evidenced by the long-term continuance of Gunnison's prairie dog populations at sufficient levels to survive with minimal management assistance in a variety of locations across the subspecies' ranges. Stable populations, as evidenced by the stable occupancy trends, indicate that repopulation rates for *Cynomys gunnisoni gunnisoni* or *C. g. zuniensis* equal or exceed the rates of decline, likely a factor of an intact metapopulation structure. Although plague causes wide fluctuations in population numbers, the Gunnison's prairie dog has demonstrated the resiliency and redundancy to return to pre-outbreak numbers and remain viable in the future.

Life-history traits may contribute to the subspecies' resiliency and continued viability in light of plague. The Gunnison's prairie dog reproduces more rapidly following intense population declines (Hoogland 2001, p. 923), a strategy that allows populations to survive and expand rapidly, even when numbers are very small (Wagner and Drickamer 2002, p. 16; Seglund *et al.* 2006, pp. 8, 16). A population viability analysis confirmed this life-history trait: Under modeled demographic scenarios, even small Gunnison's prairie dog populations can have robust population growth rates (CDOW 2007, p. 128). The population viability analysis also identified that more frequent outbreaks increased the risk of extinction (CDOW 2007, p. 129). Hibernation slows transmission of plague, but may merely delay the onset of symptoms (Barnes 1993, p. 35).

Climate change may affect the frequency of plague. As discussed under Factor E, yearly precipitation will vary, but temperature will increase over the next 40 years. Increased rainfall, particularly in the spring, significantly increases plague outbreaks (Stapp *et al.* 2004, p. 237; Snäll *et al.* 2008, pp. 245; 2008, pp. 245–246). However, outbreaks are less frequent when temperatures are hotter and there are more hot days per year (Snapp *et al.* 2004, p. 238; Snäll *et al.* 2008, p. 245).

Annual rainfall totals will vary due to climate change (Stapp *et al.* 2004, pp. 504–505). As a result, plague outbreaks will vary with the precipitation. Warmer winters can increase the transmission of plague (Stapp *et al.* 2004, p. 236; Salkeld and Stapp 2008, p. 620), likely because hibernation is shorter (Rayor 1985, p. 195), more fleas survive the winter, and habitats are more productive (Stapp *et al.* 2004, pp. 237–238). However, winters will also vary due to climate change, with both wet and dry years (Karl *et al.* 2009, p. 505). Seasonal variation may result in pulses of winter or early spring plague outbreaks during wetter years that decrease in intensity over time as hotter summer temperatures reduce plague in the environment. Plague occurrences are likely to decrease in black-tailed prairie dogs due to the effects of climate change (Snäll *et al.* 2009, p. 505). As temperatures rise throughout the ranges of both Gunnison's prairie dog subspecies due to climate change, the frequency of plague outbreaks and the prevalence of the *Yersinia pestis* bacterium within Gunnison's prairie dog habitats will likely decrease. Climate change may have less of a moderating effect on plague if the Gunnison's prairie dog shifts its range in response to increasing temperatures.

Plague occurs throughout the ranges of *Cynomys gunnisoni gunnisoni* and *C. g. zuniensis.* However, we found no evidence that plague impacts one subspecies more than the other or is more frequent or more intense within any portion of either subspecies' range. Plague historically reduced or eliminated large populations of both subspecies, but occupancy trends for both subspecies indicate that populations are stable and not declining. Therefore, both subspecies

have demonstrated resiliency to the disease.

In our previous 2008 finding, we determined that plague affected Gunnison's prairie dogs living in wetter, higher elevation, ''montane'' habitats more than those in drier, lower elevation, ''prairie'' habitats. We reached this conclusion largely because we reasoned that the abundance of fleas within a colony was the primary factor influencing plague in the Gunnison's prairie dog (February 5, 2008; 73 FR 6668) and that environments that are more humid generally support more fleas, which favors the transmission of plague (Stenseth *et al.* 2006, p. 13111). As a result, we reasoned that plague affected *Cynomys gunnisoni gunnisoni* more than *C. g. zuniensis* due to its moister, higher elevation habitats that supported more plague-transmitting fleas. Because we implicated plague as the only threat responsible for whole population declines and extirpations, we deduced that the disease affected *C. g. gunnisoni* more than *C. g. zuniensis,* resulting in its lower percent occupancy (February 5, 2008; 73 FR 6670, 6677). More frequent plague outbreaks, coupled with smaller, more isolated populations that we reasoned were unable to recolonize due to mountainous topography, led to our conclusion that plague was a greater risk to *C. g. gunnisoni* than to *C. g. zuniensis.*

New research has improved our understanding of how plague is transmitted and reveals that fleas are not the sole instigators behind plague outbreaks. Fleas obviously play an important role in the transmission and maintenance of plague, as evidenced by the success of insecticide dusting to prevent and reduce outbreaks (Webb *et al.* 2006, p. 6238; Tripp *et al.* 2009, pp. 314, 319). Although infected fleas may be important plague vectors at the start of an outbreak, a short-term, plague reservoir that persists longer than the short lifecycles of infected fleas or prairie dogs is required to produce and sustain an outbreak (Webb *et al.* 2006, p. 6236; Eisen and Gage 2009, p. 6). This short-term infectious reservoir may include: Prairie dogs or other rodents that are resistant to the disease; recently dead or decaying carcasses; cannibalism of infected animals; plague bacteria in the soil; or longer living, infected fleas that continue to bite prairie dogs (Webb *et al.* 2006, pp. 6236, 6239; Eisen and Gage 2009, p. 6; Stapp *et al.* 2009, p. 807; Salkeld *et al.* 2010, pp. 14247, 14249). In other words, a combination of vectors, not just the abundance of fleas, helps drive plague outbreaks, so the presence of more fleas in *C. g. gunnisoni*'s ''montane'' habitats does not necessarily make plague worse or more frequent. In the future, continued colony dusting with insecticide and drying by climate change may limit the role that fleas play during plague outbreaks in *C. g. gunnisoni* colonies.

The mountainous topography of *Cynomys gunnisoni gunnisoni*'s higher elevation habitats may isolate colonies more than the flat, lower elevation habitats of *C. g. zuniensis.* Mountainous terrain may minimize the zone of contact between populations (Knowles 2002, p. 3) and make recolonization more difficult. After a plague outbreak, smaller prairie dog colonies and greater inter-colony distances may further isolate colonies and reduce the probability of recolonization (Wagner and Drickamer 2002, p. 17; Cully *et al.* 2010, p. 13). However, *C. g. gunnisoni* colonies may also benefit from greater inter-colony distances, because isolation also isolates the colony from plague. Isolated prairie dog colonies have lower transmission rates of plague, which lessens the impact of an outbreak and ultimately enhances the persistence of the population (Cully *et al.* 2010, p. 7). Therefore, mountainous habitats and isolation do not necessarily render *C. g. gunnisoni* more susceptible to plague-related population declines than *C. g. zuniensis.* Furthermore, the new occupancy surveys indicate that *C. g. gunnisoni* populations are not declining, which suggests that mountainous terrain and isolation have not impeded recolonization.

To summarize, the best available information currently indicates that *Cynomys gunnisoni gunnisoni* is not more susceptible or less able to resist the effects of plague than *C. g. zuniensis.* Although moister habitats may support more fleas, plague outbreaks are driven by more than flea abundance. Isolated colonies experience reduced transmission rates, so isolation may protect *C. g. gunnisoni* populations from plague. Despite historic losses to plague, population monitoring shows evidence of recovery of *C. g. gunnisoni* and indicates that mountainous terrain has not impeded movements or recolonization. Therefore, we find that plague is not significantly impacting one subspecies of Gunnison's prairie dog more than the other. Plague is not a threat to either subspecies, or the species as a whole now, nor is it likely to become so in the future.

Tularemia, Monkeypox, and Other Diseases

Captive black-tailed prairie dogs kept as pets have infected humans with tularemia (*Francisella tularensis*) and monkeypox (*Orthopoxvirus* spp.) (Anderson *et al.* 2003, p. 1093; Avashia *et al.* 2004, p. 483; Seglund and Schnurr 2010, p. 116), rare diseases that could potentially infect the Gunnison's prairie dog. West Nile Virus has infected wild black-tailed prairie dogs in Colorado (Seglund *et al.* 2006b, p. 58). However, we have no information to indicate that these or other diseases currently infect or impact the Gunnison's prairie dog. Therefore, these diseases are not a threat to either subspecies of Gunnison's prairie dog now, nor are they likely to become so in the future.

Conservation Efforts To Reduce Disease or Predation

Dusting (applying) insecticide on Gunnison's prairie dog burrows effectively reduces fleas and increases prairie dog survival rates from plague (Biggins *et al.* 2010; Abbott *et al.* 2012, p. 244). Dusting reduces fleas on prairie dogs from 45 to 86 percent for 10 months after application (Biggins *et al.* 2010, p. 17; Abbott *et al.* 2012, p. 246). Rangewide, State wildlife agencies and private landowners dusted approximately 5,209 ac (2,108 ha) of occupied Gunnison's prairie dog colonies in 2011 (Van Pelt 2012, p. 8), and dusted 1,010 ac (409 ha) in 2012 (Van Pelt 2013, p. 10). In 2011, private landowners, CPW, and the BLM preemptively dusted 651 acres within 19 different *Cynomys gunnisoni gunnisoni* colonies in Colorado to prevent plague outbreaks; the dusting appeared to stabilize colony occupancy (Van Pelt 2012, p. 9). Dusting colonies with insecticide has effectively reduced population declines from plague and has likely contributed to the population stability. Pursuant to its Statewide conservation plan, CPW will continue to proactively manage plague by dusting colonies in Colorado on private, State, and Federal lands (Seglund and Schnurr 2010, p. 115; Seglund 2012, p. 1).

A new vaccine that effectively inoculates black-footed ferrets from plague may also benefit Gunnison's prairie dogs in the future. This vaccine increased the survival of released black-footed ferrets as effectively as dusting (Matchett *et al.* 2010, p. 27; Abbott *et al.* 2012, 246). In the laboratory, 94 percent of the vaccinated prairie dogs survived plague (Rocke *et al.* 2010, p. 53; Abbott *et al.* 2012, p. 247). State agencies completed safety trials of the vaccine in 2012, and distributed vaccine-laden bait to eight Gunnison's prairie dog sites in 2012 (Van Pelt 2013, p. 11) and to four sites in 2013 (Rocke 2013, p. 1). Success of the prairie dog vaccine would reduce mortality from plague and prevent a population decline (Abbott *et al.* 2012, p. 248). Although researchers are still

developing and testing the plague vaccine for use in prairie dogs, promising early results suggest that this tool will be available in the future to address the threat of plague. Because of the uncertainty surrounding the efficacy and feasibility of delivering the vaccine at a large enough scale, we do not rely on the vaccine in making this finding.

Summary of Factor C

Plague occurs throughout the ranges of *Cynomys gunnisoni gunnisoni* and *C. g. zuniensis* and maintains itself in local populations. Plague reduced populations from historical levels, extirpated some local populations, and may have isolated or fragmented colonies. However, the Gunnison's prairie dog continues to occupy approximately 20 percent of its potential habitats rangewide, and occupancy trends are stable rangewide and within individual population areas (Seglund 2012, p. 11). This percentage of occupied habitats provides the Gunnison's prairie dog with sufficient population redundancy to rebound and repopulate following declines, as evidenced by stable trends. Therefore, plague has not eliminated Gunnison's prairie dogs from large portions of its range even after at least 80 years of exposure to the disease. Affected colonies have demonstrated partial or complete recovery after plague outbreaks and populations of both subspecies continue to persist at the landscape level and within individual population areas. Plague outbreaks are temporally and spatially localized, which may mediate effects to the subspecies. Climate change may reduce the frequency of plague outbreaks in the future. Plague does not impact one subspecies more than the other. Therefore, while plague is affecting *Cynomys gunnisoni gunnisoni* and *C. g. zuniensis,* it is not a threat that is causing or projected to cause the species to be at risk of extinction. Furthermore, managers and researchers have successfully implemented plague control mechanisms, such as insecticide dusting. Vaccines were successful in the laboratory, and if successful in the wild, should alleviate population fluctuations and declines due to plague in the future.

Therefore, the best scientific and commercial information available indicates that neither disease nor predation is currently a threat to *Cynomys gunnisoni gunnisoni* or *C. g. zuniensis,* nor is either likely to become so in the future. Continued plague monitoring and research will allow us to assess the level of impact this disease plays in the long-term conservation of the Gunnison's prairie dog.

Factor D. The Inadequacy of Existing Regulatory Mechanisms

State Regulations and Private Land Management

Approximately 50 percent and 5 percent of *Cynomys gunnisoni gunnisoni's* potential range occurs on private and State lands respectively (Table 1). Approximately 25 percent of *C. g. zuniensis'* potential range occurs on private lands and 10 percent on State lands (Table 1).

State laws and regulations may provide specific authority for the conservation of the Gunnison's prairie dog on State-owned lands. State laws and regulations may also provide broad authority to regulate and protect wildlife on all lands within the State. These regulations may provide the States with a mechanism for indirect conservation through the regulation of threats to the species (e.g., noxious weeds). In general, States have broad authority to regulate and protect wildlife within their borders.

Potential impacts to the species that State agencies or private entities can manage include recreational shooting, shooting to protect agricultural interests, and oil and gas development on non-Federal mineral estates. In addition, State wildlife agencies can contribute to species conservation by supporting research and monitoring efforts, including plague management.

The Western Association of Fish and Wildlife Agencies (WAFWA) coordinates management efforts of the Gunnison's prairie dog and other species among the western States. The WAFWA prepared a rangewide conservation assessment and conservation plan for the Gunnison's prairie dog (Seglund *et al.* 2006; Seglund *et al.* 2007). The conservation plan required that each State develop and implement an objective, repeatable estimation technique to monitor long-term Gunnison's prairie dog population trends. Under the plan, all four States agreed to conduct occupancy surveys modeling (Seglund 2012, p. 1). Although WAFWA's conservation documents provide expertise, recommendations, and coordination for the conservation of the Gunnison's prairie dog, they do not provide regulatory protection.

Private lands comprise a large portion, approximately 27 percent, of the predicted range of the species (*Cynomys gunnisoni*) and approximately 50 percent of the predicted range for C. g. *gunnisoni* and 25 percent for *C. g. zuniensis* (Seglund *et al.* 2006, p. 71; Table 1). Private landowners can control prairie dogs on their land as necessary in Colorado, New Mexico, Arizona, and Utah. However, trespass laws generally limit public access and hunting on private lands throughout the subspecies' ranges. We have no evidence that the control activities or the policies of individual private landowners are impacting the species.

Oil and gas development occurs across the gross range of the species, including on lands managed by the four States. We are not aware of any regulations or land use plans that address Gunnison's prairie dogs on State and private lands. However, based on available information, we do not consider oil and gas development a factor that significantly affects the subspecies (see Factor A discussion, above).

Arizona

Arizona considers the Gunnison's prairie dog a Species of Greatest Conservation Need in its Comprehensive Wildlife Conservation Strategy (AGF 2006, p. 136). Species of Greatest Conservation Need are a conservation priority in Arizona (AGF 2006, p. 13), but this designation provides no regulatory protection. Private lands in Arizona support approximately 22 percent of *Cynomys gunnisoni zuniensis'* potential range within the State (Table 1).

Regulations in Arizona address recreational shooting of Gunnison's prairie dogs. Arizona classifies all prairie dogs as nongame mammals and requires a hunting license to shoot them (Underwood 2007, p. 27). However, Arizona prohibits shooting Gunnison's prairie dogs on all Federal, State, and private lands between April 1 and June 15 to protect populations during the breeding season (Seglund *et al.* 2006, p. 28; Underwood 2007, p. 28).

Colorado

Colorado's Comprehensive Wildlife Conservation Strategy considers the Gunnison's prairie dog a Species of Greatest Conservation Need (CDOW 2006, p. 17); however this designation provides no regulatory protection. Colorado also completed a Conservation Strategy for the Gunnison's prairie dog to guide conservation efforts for the species at the State and local levels (CDOW 2010, p. 1). This document guides conservation strategies, management priorities, and guidance, but it does not provide regulatory protection.

Colorado classifies the Gunnison's prairie dog as a small game species, and hunters may take animals by rifle, handgun, shotgun, handheld bow, crossbow, pellet gun, slingshot,

falconry, and toxicants (CDOW 2007, pp. 41–42). Hunting Gunnison's prairie dogs requires a small game license, with the exception of private landowners who may take Gunnison's prairie dogs causing damage on their lands without a permit. Shooting Gunnison's prairie dogs on public lands is prohibited by regulation in Colorado between March 1 and June 14 to protect breeding individuals and young (CDOW 2007, pp. 41–42). During the open season, no bag or possession limits exist; however, contestants in shooting events may take no more than five prairie dogs per event (CDOW 2007, pp. 41–42). Colorado's seasonal shooting closure does not apply on private or Tribal lands.

The Colorado Oil and Gas Commission requires that oil and gas companies consult with State wildlife officials from CPW regarding impacts of their proposed developments to wildlife (COGCC 2009, p. 1200–1). The consultation process promotes best management practices and allows Colorado to set reasonable conservation conditions in sensitive wildlife areas (COGCC 2009, pp. 1200.1–1200.5). However, State wildlife officials voluntarily choose whether to consider prairie dogs during the consultation process, and it is unclear how frequently this occurs.

New Mexico

New Mexico classifies the Gunnison's prairie dog as a Species of Greatest Conservation Need (NMDGF 2006, p. 55) and drafted a Gunnison's prairie dog Conservation Plan (NMDGF 2008). This plan provides guidance, but does not confer regulatory protections.

Gunnison's prairie dogs are not a game animal in New Mexico and may be taken year-round without a permit by residents. However, non-residents must obtain a New Mexico hunting license to shoot prairie dogs within the State (Seglund *et al.* 2005, pp. 31, 32). New Mexico prohibits recreational shooting of the Gunnison's prairie dog on State lands (Seglund *et al.* 2006, p. 30).

We are aware of one city regulation that addresses potential impacts to *Cynomys gunnisoni gunnisoni* from urbanization. The City of Santa Fe, New Mexico, prohibits intentional destruction or other harm to the Gunnison's prairie dog on any lands within Santa Fe at any time in relation to development (Santa Fe 2013). Without an exemption, Gunnison's prairie dogs must be relocated to a city-approved relocation site (Santa Fe 2013). Although this regulation reduces direct mortality associated with development, it does not address the loss of habitat from urbanization. However, we have not found the loss of habitat from urbanization to be a threat to the subspecies.

Utah

The Gunnison's prairie dog is a Species of Concern and a Sensitive Species in Utah (UDWR 2005, p. 5–4; Seglund *et al.* 2006, p. 31), but this designation does not confer any regulatory protections. Utah completed a conservation agreement and Conservation Strategy for the Gunnison's and white-tailed prairie dogs in 2007 (Lupis *et al.* 2007). The Conservation Strategy outlines conservation priorities, but does not provide regulatory protection.

In Utah, shooting of Gunnison's prairie dogs is prohibited on public lands from April 1 to June 15, but they may be taken on private lands year-round. Utah does not require a license to shoot Gunnison's prairie dogs, and there is no bag limit (Lupis *et al.* 2007, pp. 18–19).

Tribal Laws and Regulations

Tribes manage approximately 36 percent of the Gunnison's prairie dog's potential habitat (Table 1). Tribes manage the most (53 percent) of *Cynomys gunnisoni zuniensis* habitat in Arizona (Table 1). Tribes manage very little of *C. g. gunnisoni's* potential range in Colorado and New Mexico (Table 1). However, we are aware of only a few Tribal laws and regulations that specifically address potential impacts to the Gunnison's prairie dog.

For example, the Navajo Nation (overlapped by Arizona, New Mexico, and Utah) and Reservation of the Hopi Tribe in Arizona contain approximately 235,567 ac (102,615 ha) of active *Cynomys gunnisoni zuniensis* colonies, but these Tribes have limited regulatory mechanisms specific to the Gunnison's prairie dog, other than those that address hunting (Johnson *et al.* 2010, pp. 3, 21). The Navajo Nation classifies *C. g. zuniensis* as small game and requires a hunting license for shooting, but there is no seasonal shooting closure (Cole 2007, p. 4; Johnson *et al.* 2010, p. 3). The Navajo Nation also allows lethal and nonlethal removal of *C. g. zuniensis* for agricultural, human health, and safety purposes (Cole 2007, pp. 4, 5). The Hualapai Tribe in Arizona classifies *C. g. zuniensis* as small game, and requires a permit to hunt with a bag limit of 15, but has no seasonal closure (Hualapai 2013, pp. 1, 4, 7).

In general, Tribal members can hunt freely on Tribal lands, but trespass laws generally make it difficult for non-Tribal members to hunt on Tribal lands without a permit. Therefore, Tribal hunting regulations may provide some protection to the Gunnison's prairie dog from impacts related to shooting. However, we determined that recreational shooting is not a threat to either subspecies.

Other than hunting regulations that may provide some protection from recreational shooting, we are not aware of any other Tribal laws or ordinances that specifically address the Gunnison's prairie dog, its habitat, or other potential impacts. Tribal ordinances that address issues such as agriculture, transportation, and zoning for various types of land uses could potentially influence the Gunnison's prairie dog or its habitat. For example, zoning that protects open space might retain suitable habitat, and zoning that allows a housing development might destroy or fragment habitat.

Although Tribes manage a large percentage of potential Gunnison's prairie dog habitats, we have no evidence that Tribal management practices have a significant impact on either subspecies.

Federal Laws and Regulations

Federal agencies are responsible for managing approximately 26 percent of the Gunnison's prairie dog potential range, or about 25 percent of *Cynomys gunnisoni zuniensis'*s and 45 percent of *C. g. gunnisoni'*s potential range (Table 1). The BLM is the primary Federal agency managing Gunnison's prairie dog's potential range (16 percent), followed by the USFS (9 percent), and the National Park Service (1 percent) (Table 1). The Service and the Department of Defense each manage less than 1 percent of the species' potential range (Table 1). Potential impacts to the subspecies that could be managed by Federal land management agencies include oil and gas development, grazing, poisoning, and recreational shooting.

Bureau of Land Management

The Federal Land Policy and Management Act of 1976 (FLPMA) (43 U.S.C. 1701 *et seq.*) governs most land uses on BLM lands and specifically recognizes that BLM lands should be managed for the benefit of fish and wildlife resources (section 102(a)(8)). Under the FLMPA, the BLM must consider the needs of wildlife, including general considerations of Gunnison's prairie dogs, when conducting activities in their habitat. Typically, the BLM considers impacts to the Gunnison's prairie dog when planning projects and may adopt conservation measures intended to avoid or minimize impacts. The BLM must also adhere to

environmental planning requirements under the National Environmental Policy Act, or NEPA (73 FR 61292, October 15, 2008; 42 U.S.C. 4321 *et seq.*), a Federal law that requires Federal agencies to consider the effects of their actions on the environment, including wildlife, before implementing a project.

The BLM's resource management plans (RMPs) are the basis for all of its actions and authorizations involving BLM-administered lands and resources. The RMPs establish allowable resource uses, general management practices, program constraints, and other parameters of project design (43 CFR 1601.0–5(n)). The RMPs provide programmatic guidance for site-specific activity plans and may include conservation measures to protect wildlife.

Current approved or draft RMPs for BLM lands in Utah and New Mexico include specific conservation measures for *Cynomys gunnisoni zuniensis* in Arizona and *C. g. zuniensis* and *C. g. gunnisoni* in New Mexico. Conservation measures include precluding oil and gas development and other surface-disturbing activities within 600 feet (183 meters) of active colonies, limiting the construction of power lines within colonies, and restricting shooting during the breeding season (BLM 2008a, pp. 138–139; BLM 2008b, pp. 122–123; BLM 2012, p. 2–125; BLM 2013, pp. 19, 143). Draft RMPs do not confer any regulatory protection to either subspecies. Although RMPs in Colorado and Arizona do not include the Gunnison's prairie dog, they are outdated or currently under revision. However, the BLM in Colorado and Arizona recognize the Gunnison's prairie dog as a BLM sensitive species (BLM 2009, p. 1; BLM 2010, p. 2; BLM 2011, p. 2). The BLM evaluates the effects of their actions on sensitive species and initiates proactive conservation measures to reduce or eliminate threats in order to minimize the likelihood and need for listing sensitive species under the Act (BLM 2008c, p. 3). The BLM in Colorado has actively participated in plague vaccine trails and dusting (Van Pelt 2012, p. 9). The BLM in Utah and New Mexico does not recognize the Gunnison's prairie dog as a sensitive or special status species, but RMPs provide conservation guidance and restrictions on BLM lands in these States.

U.S. Forest Service

The USFS recognizes the Gunnison's prairie dog as a Sensitive Species in New Mexico and Colorado (USFS 2007, line 135). As a Sensitive Species, the USFS evaluates potential impacts to the species and recommends mitigating potential effects. Policy directs the USFS to analyze and document the potential impacts to sensitive species from proposed management activities in a biological evaluation. However, the sensitive species designation does not confer regulatory protection to either subspecies.

The National Forest Management Act (NFMA) (16 U.S.C. 1600 *et seq.*), as amended, guides the management of Federal activities on National Forest System lands. The NFMA specifies that all national forests and grasslands must have a land and resource management plan (LRMP) to guide and set standards for natural resource management activities. The NFMA requires the USFS to incorporate standards and guidelines into LRMPs. Provisions to manage plant and animal communities for diversity, based on the suitability and capability of a specific land area, are developed in order to meet overall multiple-use objectives. In Colorado, the San Juan National Forest's LRMP addresses the Gunnison's prairie dog, but provides only conservation recommendations (USFS 2013, p. T–15).

The USFS manages approximately 9 percent of *Cynomys gunnisoni gunnisoni's* predicted range and 10 percent of *C. g. zuniensis's* predicted range (Table 1). While a USFS sensitive species designation and following the recommendations contained in the 2005 RCP (GSRSC 2005, entire) can provide some conservation benefits, they are voluntary in nature. Therefore, the USFS has minimal regulatory authority to address either subspecies of Gunnison's prairie dog.

Other Federal Agencies

The National Park Service, the Department of Defense, and the Service each manage 1 percent or less of the Gunnison's prairie dog's overall range (Table 1). Therefore, their management strategies are unlikely to significantly impact the subspecies throughout their respective ranges.

The federally endangered black-footed ferret (*Mustela nigripes*) has been reintroduced into two Gunnison's prairie dog (*Cynomys gunnisoni zuniensis*) colonies in Arizona (Van Pelt 2013, p. 5). The Act's protections of the black-footed ferret may indirectly benefit *C. g. zuniensis* at these relocation sites. Black-footed ferrets have not been reintroduced into *C. g. gunnisoni* colonies.

To summarize, Federal agencies have very few regulations that specifically address potential impacts to the Gunnison's prairie dog. Surface use restrictions on BLM lands in Utah likely minimize the impacts of oil and gas development to *Cynomys gunnisoni zuniensis.* The lack of protective measures for the subspecies in the other States that specifically address oil and gas development may impact the species in the future. However, the available information does not indicate that oil and gas development will significantly impact either subspecies in the future. Federal regulations also control poisoning. Therefore, the available evidence does not indicate that the Federal regulations are inadequate to protect either subspecies.

Summary of Factor D

Regulatory mechanisms may reduce potential impacts associated with oil and gas development, urbanization, grazing, poisoning, and recreational shooting. However, none of these potential activities and their potential impacts rise to the level of a threat to either subspecies. Existing regulatory mechanisms adequately reduce impacts associated with shooting and poisoning. Seasonal shooting closures in Colorado, Utah, and Arizona reduced population declines due to shooting. Federal regulation and prohibition of pesticides on Federal lands reduced the historical threat of poisoning.

Although the available information does not indicate that current levels of management are inadequate to address potential impacts, the Gunnison's prairie dog will benefit from continued coordination between State, Federal, Tribal, and private landowners, and other partners, particularly to address future plague outbreaks and habitat fragmentation.

Factor E. Other Natural or Manmade Factors Affecting Its Continued Existence

Poisoning

Poisoning of Gunnison's prairie dogs historically occurred throughout the range of both subspecies (Seglund *et al.* 2005, pp. 56–57). The U.S. Department of Agriculture's Bureau of Biological Survey and the Agricultural Appropriations Act of 1915 planned and authorized the elimination of prairie dogs across the western United States (Oakes 2000). From 1914 to 1964, 2,310,203 ac (934,906 ha) of Gunnison's prairie dog habitat were poisoned in Arizona; 23,178,959 ac (9,380,192 ha) of habitat were poisoned in Colorado; 20,501,301 ac (8,296,582 ha) of habitat were poisoned in New Mexico; and 2,715,930 ac (1,099,098 ha) of habitat were poisoned in Utah. Between 1921 and 1961, poisoning reduced the amount of occupied Gunnison's prairie

dog habitat in Arizona by 92 percent (Oakes 2000; Underwood 2007, pp. 16, 22). Poisoning campaigns led to a reduction in occupied habitat, extirpation from local areas, fragmentation, and isolation of colonies. The poisoning campaigns targeted black-tailed prairie dogs due to their visibility on the landscape, but Gunnison's and white-tailed prairie dogs were also poisoned (Seglund and Schnurr 2010, p. 140). Poisoning in all States became less common after Federal regulations of pesticides were enacted in the 1970s (Seglund *et al.* 2006, p. 47).

Today, State and Federal agencies are rarely involved in Gunnison's prairie dog control efforts unless human health and safety are at risk (Seglund *et al.* 2005, p. 57; Seglund *et al.* 2006 p. 47). The BLM restricts poisoning of prairie dogs on its lands unless required for human health and safety or if resource damage meets specific requirements (Hoogland 2005, p. 228). Individual landowners may still control prairie dogs on their private property. Poisoning occurs on the Navajo Nation within at least one large agricultural area (Johnson *et al.* 2010, p. 3).

Poisons can effectively control prairie dog populations. Baited poisons can result in 75 to 85 percent mortality, and fumigants can reduce populations by 95 percent (Seglund and Schnurr 2010, p. 141). Although poisoning was historically widespread, there is no information to indicate that poisoning occurs at more than a localized scale today. The four States within the range of the Gunnison's prairie dog do not compile records of pesticide sales, so it is difficult to quantify the amounts of poisons sold to control prairie dogs. Rozol, a poison used to control rodents, is not authorized for use on Gunnison's prairie dogs (Andelt and Hopper 2012, p. 3), which restricts its use rangewide. There is no information to indicate that pesticide applicators violate this regulation or that Rozol's use on other species impacts either *Cynomys gunnisoni gunnisoni* or *C. g. zuniensis.*

Black-trailed prairie dogs recover quickly from poisoning due to an increase of their population growth rate (Seglund and Schnurr 2010, p. 140). Poisoned black-tailed prairie dog colonies that declined by 45 percent rebounded within 10 months, while eradicated colonies returned to pre-poisoning densities after 5 years (Apa *et al.* 1990, pp. 107, 110; Seglund and Schnurr 2010, p. 140). Gunnison's prairie dogs likely rebound similarly from poisoning.

Although poisoning historically impacted Gunnison's prairie dog populations and may continue to impact local populations, there is no evidence that it is a threat to either subspecies of the Gunnison's prairie dog now nor is it likely to become so in the future.

Road Mortality

Vehicles may crush prairie dogs as the animals attempt to cross roads. Road-related Gunnison's prairie dog mortality is likely concentrated near specific human population areas, such as cities and towns. Oil and gas development and urbanization require new roads, so road-related mortality may increase near these areas.

However, there is no information that specifically quantifies road mortality of Gunnison's prairie dogs. Most road mortality likely occurs locally, near urbanized areas; however, urbanization currently impacts less than 2 percent of the Gunnison's prairie dog's range (Seglund *et al.* 2005, p. 41). Stable population trends suggest that Gunnison's prairie dog populations are able to recover from losses due to road mortality. Therefore, road mortality is not a threat to either subspecies of the Gunnison's prairie dog now nor is it likely to become so in the future.

Drought and Climate Change

Our analyses under the Act include consideration of ongoing and projected changes in climate. The terms ''climate'' and ''climate change'' are defined by the Intergovernmental Panel on Climate Change (IPCC). The term ''climate'' refers to the mean and variability of different types of weather conditions over time, with 30 years being a typical period for such measurements, although shorter or longer periods also may be used (IPCC 2007a, p. 78). The term ''climate change'' thus refers to a change in the mean or variability of one or more measures of climate (e.g., temperature or precipitation) that persists for an extended period, typically decades or longer, whether the change is due to natural variability, human activity, or both (IPCC 2007a, p. 78).

Scientific measurements spanning several decades demonstrate that changes in climate are occurring, and that the rate of change has been faster since the 1950s. Examples include warming of the global climate system, and substantial increases in precipitation in some regions of the world and decreases in other regions. (For these and other examples, see IPCC 2007a, p. 30; and Solomon *et al.* 2007, pp. 35–54, 82–85). Results of scientific analyses presented by the IPCC show that most of the observed increase in global average temperature since the mid-20th century cannot be explained by natural variability in climate, and is ''very likely'' (defined by the IPCC as 90 percent or higher probability) due to the observed increase in greenhouse gas (GHG) concentrations in the atmosphere as a result of human activities, particularly carbon dioxide emissions from use of fossil fuels (IPCC 2007a, pp. 5–6 and figures SPM.3 and SPM.4; Solomon *et al.* 2007, pp. 21–35). Further confirmation of the role of GHGs comes from analyses by Huber and Knutti (2011, p. 4), who concluded it is extremely likely that approximately 75 percent of global warming since 1950 has been caused by human activities.

Scientists use a variety of climate models, which include consideration of natural processes and variability, as well as various scenarios of potential levels and timing of GHG emissions, to evaluate the causes of changes already observed and to project future changes in temperature and other climate conditions (e.g., Meehl *et al.* 2007, entire; Ganguly *et al.* 2009, pp. 11555, 15558; Prinn *et al.* 2011, pp. 527, 529). All combinations of models and emissions scenarios yield very similar projections of increases in the most common measure of climate change, average global surface temperature (commonly known as global warming), until about 2030. Although projections of the magnitude and rate of warming differ after about 2030, the overall trajectory of all the projections is one of increased global warming through the end of this century, even for the projections based on scenarios that assume that GHG emissions will stabilize or decline. Thus, there is strong scientific support for projections that warming will continue through the 21st century, and that the magnitude and rate of change will be influenced substantially by the extent of GHG emissions (IPCC 2007a, pp. 44–45; Meehl *et al.* 2007, pp. 760–764 and 797–811; Ganguly *et al.* 2009, pp. 15555–15558; Prinn *et al.* 2011, pp. 527, 529). (See IPCC 2007b, p. 8, for a summary of other global projections of climate-related changes, such as frequency of heat waves and changes in precipitation. Also see IPCC 2011 (entire) for a summary of observations and projections of extreme climate events.)

Various changes in climate may have direct or indirect effects on species. These effects may be positive, neutral, or negative, and they may change over time, depending on the species and other relevant considerations, such as interactions of climate with other variables (e.g., habitat fragmentation) (IPCC 2007, pp. 8–14, 18–19). Identifying likely effects often involves

aspects of climate change vulnerability analysis. Vulnerability refers to the degree to which a species (or system) is susceptible to, and unable to cope with, adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of the type, magnitude, and rate of climate change and variation to which a species is exposed, its sensitivity, and its adaptive capacity (IPCC 2007a, p. 89; see also Glick *et al.* 2011, pp. 19–22). There is no single method for conducting such analyses that applies to all situations (Glick *et al.* 2011, p. 3). We use our expert judgment and appropriate analytical approaches to weigh relevant information, including uncertainty, in our consideration of various aspects of climate change.

As is the case with all stressors that we assess, even if we conclude that a species is currently affected or is likely to be affected in a negative way by one or more climate-related impacts, it does not necessarily follow that the species meets the definition of an ''endangered species'' or a ''threatened species'' under the Act. If a species is listed as endangered or threatened, knowledge regarding the vulnerability of the species to, and known or anticipated impacts from, climate-associated changes in environmental conditions can be used to help devise appropriate strategies for its recovery.

Global climate projections are informative, and, in some cases, the only or the best scientific information available for us to use. However, projected changes in climate and related impacts can vary substantially across and within different regions of the world (e.g., IPCC 2007a, pp. 8–12). Therefore, we use ''downscaled'' projections when they are available and have been developed through appropriate scientific procedures, because such projections provide higher resolution information that is more relevant to spatial scales used for analyses of a given species (see Glick *et al.* 2011, pp. 58–61, for a discussion of downscaling).

We reviewed climate records and projections for western North America, to evaluate potential impacts of climate change on both subspecies of Gunnison's prairie dog. Climate models predict a trend of continued warming, with hotter summers, warmer winters, decreased snowpack, earlier spring melts, increased evaporation, more droughts, and reduced summer flows throughout the subspecies' ranges.

Increased magnitude and frequency of droughts may reduce the availability of grasses for both subspecies of Gunnison's prairie dogs. Extensive drought in New Mexico may be responsible for a slight contraction in the southern part of the range. However, we lack specific information to indicate that drought has a negative rangewide effect on either subspecies of Gunnison's prairie dog. Furthermore, the Gunnison's prairie dog is well adapted to its arid and unpredictable habitats. Both subspecies disperse, hibernate, or aestivate when food is scarce or temperatures are hot, adaptations that may allow the subspecies to cope under drought regimes.

Specific impacts to the Gunnison's prairie dog under predicted future climate change scenarios are relatively unclear. As climates warm and native prairies become hotter and drier, prairie dogs will likely shift their ranges but occupy the same amount of habitat. Hotter and drier conditions may also reduce the frequency and intensity of plague outbreaks by reducing the abundance of fleas (see Factor C discussion). Hot, dry conditions may also make recreational shooting less appealing. Furthermore, the Gunnison's prairie dog disperses, hibernates, and aestivates to cope with environmental variability, such as reduced forage and extreme temperatures, adaptations which may help the species adapt to a changing climate.

Although both subspecies of Gunnison's prairie dogs may shift their occupied ranges in response to the effects of global climate change, both subspecies are well adapted to environmental variability. Therefore, drought and climate change are not threats to either subspecies now nor are they likely to become so in the future.

Summary of Factor E

Historically, poisoning contributed to large declines in areas occupied by Gunnison's prairie dogs. However, the available information does not indicate that poisoning currently occurs beyond a localized scale or that poisoning will increase in the future. Drought may reduce the availability of forage, but populations should be able to shift to more favorable habitats. Warming and drying associated with climate change may increase the frequency and intensity of droughts, but may also reduce the intensity and frequency of plague outbreaks.

Therefore, the best scientific and commercial information available indicates that other natural or manmade factors affecting its continued existence are not a threat to *Cynomys gunnisoni gunnisoni* or *C. g. zuniensis* now or nor are they likely to become so in the future.

Cumulative Effects of Factors A Through E

All four States within the Gunnison's prairie dog's range are actively involved in its management and prepared their own conservation assessments and plans for the two subspecies of Gunnison's prairie dog (Seglund and Schnurr 2010; Underwood 2007; Lupis *et al.* 2007; NMGFD 2008). These plans provide comprehensive conservation strategies to guide conservation efforts at the State and local levels. Each plan intends to provide conservation and management strategies and recommendations to reduce impacts and maintain viable populations. Although the States' conservation agreements and strategies are not regulatory documents, they provide important direction to mitigate potential threats to the subspecies.

Agriculture, grazing, the introduction of invasive plants, urbanization, oil and gas development, shooting, plague, and poisoning may impact *Cynomys gunnisoni gunnisoni* or *C. g. zuniensis* in at least localized areas. Historically, each of these factors impacted the subspecies and likely acted cumulatively to reduce the abundance of Gunnison's prairie dogs from historical levels. However, agriculture, grazing, and poisoning declined over time and are not currently impacting the subspecies with the same intensity. Today, many of these threats may act synergistically to impact populations, but colonies persist in many of these areas and populations are stable rangewide. Urbanization and shooting will likely continue into the future, but they currently impact local populations, with potential impacts most likely concentrated near urban areas. Plague, invasive plants, and climate change will also likely continue into the future, but plague outbreaks occur locally, while climate change and conservation efforts may mediate the effects of plague. The two subspecies are adapted to dry, arid habitats, but may shift their ranges in response to invasive plants and the effects of climate change. Therefore, we do not believe cumulative factors are a threat to the continued existence of *C. g. gunnisoni* or *C. g. zuniensis* now, nor are they likely to become so in the future.

Finding

As required by the Act, we considered the five factors to assess whether *Cynomys gunnisoni gunnisoni* or *C. g. zuniensis,* the two subspecies of the Gunnison's prairie dog, or both meets the definition of an endangered or threatened species throughout all of its

range. We examined the best scientific and commercial information available regarding the past, present, and future threats faced by the two subspecies. We reviewed the petition, information available in our files, and other available published and unpublished information, and we consulted with recognized Gunnison's prairie dog experts and other Federal, State, Tribal, and local agencies.

We identified and evaluated the risks of the present or threatened destruction, modification, or curtailment of the habitat or range of the two subspecies of Gunnison's prairie dog: (1) Agricultural land conversion; (2) grazing; (3) invasive plant species; (4) urbanization; and (5) oil and gas exploration and development. While these factors impact the subspecies, they impact only small portions of each subspecies' range or occur locally.

We identified and evaluated the risks from overutilization for commercial, recreational, scientific, or education purposes. Although recreational shooting kills individuals and may reduce populations in easily accessible colonies, the available evidence indicates that the magnitude or intensity of shooting is not having rangewide impacts to either subspecies.

Plague impacts populations throughout both of the subspecies' ranges. However, colonies persist and populations are stable in their post-plague environments, which demonstrates a rangewide resiliency to the disease. Life-history characteristics, such as increased reproductive rates within small populations and a metapopulation structure, allow Gunnison's prairie dog populations to rebound and persist following plague outbreaks. Additionally, plague affects only portions of the range at one time. Climate change and management actions, such as dusting and vaccines, may decrease the threat of plague. Other diseases, such as tularemia, monkey-pox, or West Nile virus, are not threats to either *Cynomys gunnisoni gunnisoni* or *C. g. zuniensis.* Additionally, although numerous species prey on Gunnison's prairie dogs, there is no evidence that predation adversely impacts either subspecies.

Based on our analysis of the existing regulatory mechanisms, we determined that the States are actively involved in managing the subspecies through conservation agreements and strategies. Although these agreements are not regulatory, they provide an important mechanism for conservation, monitoring, and research. Existing regulatory mechanisms on State, Federal, and Tribal lands are limited. Seasonal shooting closures provide some protection for the Gunnison's prairie dog in Arizona and Colorado. Bag limits and permit requirements may provide protection from shooting on the Navajo Nation and the Hualapai Tribe.

We also assessed the potential risks to *Cynomys gunnisoni gunnisoni* and *C. g. zuniensis* from poisoning, roads, and the effects of climate change. The available evidence indicates that poisoning or road mortality do not occur at more than a local scale. *C. g. gunnisoni* and *C. g. zuniensis* may shift their ranges in response to climate change, but climate change may reduce the frequency and intensity of plague outbreaks.

In the past, many of these factors may have synergistically impacted both subspecies of the Gunnison's prairie dog. Today, many of these factors occur locally or are less intense or frequent than they were historically.

Therefore, based on our review of the best available scientific and commercial information pertaining to the five factors, we find that the threats are not of sufficient imminence, intensity, or magnitude to indicate that *Cynomys gunnisoni gunnisoni* or *C. g. zuniensis* is in danger of extinction (endangered), or likely to become endangered within the foreseeable future (threatened), throughout all of their respective ranges. To summarize, although a variety of factors impact both subspecies of Gunnison's prairie dog, such as the loss or modification of habitats from urbanization, oil and gas development, grazing, agriculture, invasive plants, or other factors, such as recreational shooting, poisoning, and plague, most of these factors occur locally and do not impact rangewide populations of either subspecies. Plague is the primary impact to both subspecies and plague outbreaks can reduce individual populations by more than 99 percent. However, our review determined that colonies and populations of both *C. g. gunnisoni* and *C. g. zuniensis* recover and persist following plague outbreaks, due largely to the spatial and temporal separation of plague outbreaks and life history characteristics that allow populations to recover following dramatic declines. Additionally, ongoing conservation efforts, such as dusting burrows with insecticide, will likely continue to mediate the effects of plague outbreaks in the future and climate change may reduce the frequency and intensity of plague outbreaks. Therefore, we do not consider plague or any other impacts to be a threat such that either subspecies of Gunnison's prairie dog is warranted for listing as an endangered or threatened species under the Act.

Under the Act, a ''species'' is defined as including any subspecies of fish or wildlife or plants, and any distinct population segment (DPS) of any species of vertebrate fish or wildlife which interbreeds when mature (16 U.S.C. 1532(16)). For this finding, we evaluated potential threats to the two recognized subspecies of Gunnison's prairie dog, whose combined ranges comprise the entire species' range. By evaluating both subspecies (*Cynomys gunnisoni gunnisoni* and *C. g. zuniensis*), which comprise the entire species, we effectively assessed the status of the entire species (*C. gunnisoni*). Because we found that neither subspecies is threatened or endangered throughout all of its respective range, the Gunnison's prairie dog at the species level is similarly not in danger of extinction or likely to become endangered within the foreseeable future throughout the range of the species.

Distinct Population Segment Analysis

After assessing whether *Cynomys gunnisoni gunnisoni* or *C. g. zuniensis* is endangered or threatened throughout its range, we evaluated whether any distinct vertebrate population segment (DPS) of either subspecies exists and is threatened or endangered. We consider three elements when evaluating a potential distinct vertebrate population segment under our Policy Regarding the Recognition of Distinct Vertebrate Population Segments Under the Endangered Species Act, or DPS Policy (February 7, 1996; 61 FR 4722). The three elements include:

(1) The discreetness of a population in relation to the remainder of the taxon to which it belongs;

(2) The significance of the population segment to the taxon to which it belongs; and

(3) The population segment's conservation status in relation to the Act's standards for listing, delisting, or reclassification.

Under our DPS policy, we consider a population segment of a vertebrate taxon discrete if it satisfies either of the following conditions:

(1) The segment is markedly separated from other populations of the same taxon as a consequence of physical, physiological, ecological, or behavioral factors. Quantitative measures of genetic or morphological discontinuity may provide evidence of this separation; or

(2) The segment is delimited by international governmental boundaries within which differences in control of exploitation, management of habitat, conservation status, or regulatory

mechanisms exist that are significant in light of section 4(a)(1)(D) of the Act.

We did not identify any population segment of *Cynomys gunnisoni gunnisoni* or *C. g. zuniensis* so markedly separated from other Gunnison's prairie dog populations by physical, physiological, ecological, or behavioral factors such that it may be considered discrete. The Gunnison's prairie dog is a colonial species that inhabits large landscapes, potentially occupying 23,459,500 ac (9,493,733 ha) across four States (Seglund *et al.* 2006, p. 79). Available colony mapping indicates that populations across these landscapes are discontinuous, or patchy, and occupied habitats dynamically shift as individuals disperse, recolonize, or establish new colonies. However, this discontinuous distribution is natural for the Gunnison's prairie dog, as dispersers move and interact between populations within the larger ecological framework of the metapopulation. The metapopulation links the individual populations and promotes genetic exchange. The best available population monitoring information indicates that the metapopulation structure is intact and that any discontinuity between occupied habitats is not impeding dispersers or markedly separating any population segment. Additionally, Gunnison's prairie dogs are very social and live in complex family groups, so populations are not markedly separated by behavioral factors and the available information does not indicate that physiological differences occur between populations. Therefore, ecological, behavioral, or physiological factors are not markedly separating a population segment of either *C. g. gunnisoni* or *C. g. zuniensis* from other populations.

Mountainous topography may isolate Gunnison's prairie dog populations, particularly in the higher elevation habitats of *Cynomys gunnisoni gunnisoni.* However, the available information does not indicate that terrain markedly separates one population segment from any other population. The best available population monitoring data indicate that the metapopulation structure operates despite physical boundaries. For instance, mountainous terrain delineates the approximate boundary between *C. g. gunnisoni* and *C. g. zuniensis* in northern New Mexico and southcentral Colorado, but the two subspecies have shared genetic material across the boundary. Quantitative measures indicate that there is no genetic discontinuity between the two subspecies. Although steeper mountainous terrain separates *C. g. gunnisoni* populations in central Colorado from those in New Mexico, the available information does not indicate that populations in Colorado, or any segment of a population, are genetically or morphologically different from any other population. Dispersal of prairie dogs along valley bottoms between the steep terrain likely maintains the metapopulation link between *C. g. gunnisoni* populations. Therefore, the available information does not indicate that any physical factors have resulted in genetically or morphologically discreet population segments of *C. g. gunnisoni* or *C. g. zuniensis* that are markedly separated from any other populations.

To summarize, based on the best available information, we determine that no population segment within the range of the Gunnison's prairie dog or either of the two subspecies of Gunnison's prairie dog meets our DPS Policy's discreteness criteria. Because we did not identify any population segment as discrete, we do not evaluate significance under our DPS policy. Therefore, no population segment of Gunnison's prairie dog, *C. gunnisoni gunnisoni,* or *C. g. zuniensis* qualifies as a DPS and is therefore not a listable entity under the Act.

Significant Portion of the Range

Under the Act and our implementing regulations, a species may warrant listing if it is endangered or threatened throughout all or a significant portion of its range. The Act defines ''endangered species'' as any species which is ''in danger of extinction throughout all or a significant portion of its range,'' and ''threatened species'' as any species which is ''likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.'' The definition of ''species'' is also relevant to this discussion. The Act defines the term ''species'' to include ''any subspecies of fish or wildlife or plants, and any distinct population segment [DPS] of any species of vertebrate fish or wildlife which interbreeds when mature.'' The phrase ''significant portion of its range'' (SPR) is not defined by the statute, and we have never addressed in our regulations: (1) The consequences of a determination that a species is either endangered or likely to become so throughout a significant portion of its range, but not throughout all of its range; or (2) what qualifies a portion of a range as ''significant.''

Two recent district court decisions have addressed whether the SPR language allows the Service to list or protect less than all members of a defined ''species'': *Defenders of Wildlife* v. *Salazar,* 729 F. Supp. 2d 1207 (D. Mont. 2010), vacated as moot, 2012 U.S. App. Lexis 26769 (9th Circ. Nov. 7, 2012), concerning the Service's delisting of the Northern Rocky Mountain gray wolf (74 FR 15123, April 2, 2009); and *WildEarth Guardians* v. *Salazar,* 2010 U.S. Dist. LEXIS 105253 (D. Ariz. September 30, 2010), concerning the Service's 2008 finding on a petition to list the Gunnison's prairie dog (73 FR 6660, February 5, 2008) (see *Previous Federal Actions*). The Service had asserted in both of these determinations that it had authority, in effect, to protect only some members of a ''species,'' as defined by the Act (i.e., species, subspecies, or DPS), under the Act. Both courts ruled that the determinations were arbitrary and capricious on the grounds that this approach violated the plain and unambiguous language of the Act. The courts concluded that reading the SPR language to allow protecting only a portion of a species' range is inconsistent with the Act's definition of ''species.'' The courts concluded that once a determination is made that a species (i.e., species, subspecies, or DPS) meets the definition of ''endangered species'' or ''threatened species,'' it must be placed on the list in its entirety and the Act's protections applied consistently to all members of that species (subject to modification of protections through special rules under sections 4(d) and 10(j) of the Act).

Consistent with the district court decisions discussed above, and for the purposes of this finding, we now interpret the phrase ''significant portion of its range'' in the Act's definitions of ''endangered species'' and ''threatened species'' to provide an independent basis for listing; thus there are two situations (or factual bases) under which a species would qualify for listing: A species may be endangered or threatened throughout all of its range; or a species may be endangered or threatened in only a significant portion of its range. If a species is in danger of extinction throughout a significant portion of its range, the species is an ''endangered species.'' The same analysis applies to ''threatened species.'' Based on this interpretation and supported by existing case law, the consequence of finding that a species is endangered or threatened in only a significant portion of its range is that the entire species shall be listed as endangered or threatened, respectively, and the Act's protections shall be applied across the species' entire range.

We conclude, for the purpose of this finding, that interpreting the significant portion of its range phrase as providing

an independent basis for listing is the best interpretation of the Act because it is consistent with the purposes and the plain meaning of the key definitions of the Act; it does not conflict with established past agency practice, as no consistent, long-term agency practice has been established; and it is consistent with the judicial opinions that have most closely examined this issue. Having concluded that the phrase ''significant portion of its range'' provides an independent basis for listing and protecting the entire species, we next turn to the meaning of ''significant'' to determine the threshold for when such an independent basis for listing exists.

Although there are potentially many ways to determine whether a portion of a species' range is ''significant,'' we conclude for the purposes of this finding that the significance of the portion of the range should be determined based on its biological contribution to the conservation of the species. For this reason, we describe the threshold for ''significant'' in terms of an increase in the risk of extinction for the species. We conclude that a biologically based definition of ''significant'' best conforms to the purposes of the Act, is consistent with judicial interpretations, and best ensures species' conservation. Thus, for the purposes of this finding, and as explained further below, a portion of the range of a species is ''significant'' if its contribution to the viability of the species is so important that without that portion, the species would be in danger of extinction.

We evaluate biological significance based on the principles of conservation biology using the concepts of redundancy, resiliency, and representation. *Resiliency* describes the characteristics of a species and its habitat that allow it to recover from periodic disturbance. *Redundancy* (having multiple populations distributed across the landscape) may be needed to provide a margin of safety for the species to withstand catastrophic events. *Representation* (the range of variation found in a species) ensures that the species' adaptive capabilities are conserved. Redundancy, resiliency, and representation are not independent of each other, and some characteristic of a species or area may contribute to all three. For example, distribution across a wide variety of habitat types is an indicator of representation, but it may also indicate a broad geographic distribution contributing to redundancy (decreasing the chance that any one event affects the entire species), and the likelihood that some habitat types are less susceptible to certain threats, contributing to resiliency (the ability of the species to recover from disturbance). None of these concepts is intended to be mutually exclusive, and a portion of a species' range may be determined to be ''significant'' due to its contributions under any one or more of these concepts.

For the purposes of this finding, we determine if a portion's biological contribution is so important that the portion qualifies as ''significant'' by asking whether *without that portion,* the representation, redundancy, or resiliency of the species would be so impaired that the species would have an increased vulnerability to threats to the point that the overall species would be in danger of extinction (i.e., would be ''endangered''). Conversely, we would not consider the portion of the range at issue to be ''significant'' if there is sufficient resiliency, redundancy, and representation elsewhere in the species' range that the species would not be in danger of extinction throughout its range if the population in that portion of the range in question became extirpated.

We recognize that this definition of ''significant'' (a portion of the range of a species is ''significant'' if its contribution to the viability of the species is so important that without that portion, the species would be in danger of extinction) establishes a threshold that is relatively high. On the one hand, given that the consequences of finding a species to be endangered or threatened in a significant portion of its range would be listing the species throughout its entire range, it is important to use a threshold for ''significant'' that is robust. It would not be meaningful or appropriate to establish a very low threshold whereby a portion of the range can be considered ''significant'' even if only a negligible increase in extinction risk would result from its loss. Because nearly any portion of a species' range can be said to contribute some increment to a species' viability, use of such a low threshold would require us to impose restrictions and expend conservation resources disproportionately to conservation benefit: Listing would be rangewide, even if only a portion of the range of minor conservation importance to the species is imperiled. On the other hand, it would be inappropriate to establish a threshold for ''significant'' that is too high. This would be the case if the standard were, for example, that a portion of the range can be considered ''significant'' only if threats in that portion result in the entire species' being currently endangered or threatened. Such a high bar would not give the significant portion of its range phrase independent meaning, as the Ninth Circuit held in *Defenders of Wildlife* v. *Norton,* 258 F.3d 1136 (9th Cir. 2001).

The definition of ''significant'' used in this finding carefully balances these concerns. By setting a relatively high threshold, we minimize the degree to which restrictions will be imposed or resources expended that do not contribute substantially to species conservation. However, we have not set the threshold so high that the phrase ''in a significant portion of its range'' loses independent meaning. Specifically, we have not set the threshold as high as it was under the interpretation presented by the Service in the *Defenders of Wildlife* v. *Norton* litigation. Under that interpretation, the portion of the range would have to be so important that current imperilment there would mean that the species would be *currently* imperiled everywhere. Under the definition of ''significant'' used in this finding, the portion of the range need not rise to such an exceptionally high level of biological significance. (We recognize that if the species is imperiled in a portion that rises to that level of biological significance, then we should conclude that the species is in fact imperiled throughout all of its range, and that we would not need to rely on the significant portion of its range language for such a listing.) Rather, under this interpretation we ask whether the species would be endangered everywhere without that portion, *i.e.,* if that portion were completely extirpated. In other words, the portion of the range need not be so important that even the species being in danger of extinction in that portion would be sufficient to cause the species in the remainder of the range to be endangered; rather, the *complete extirpation* (in a hypothetical future) of the species in that portion would be required to cause the species in the remainder of the range to be endangered.

The range of a species can theoretically be divided into portions in an infinite number of ways. However, there is no purpose to analyzing portions of the range that have no reasonable potential to be significant or to analyzing portions of the range in which there is no reasonable potential for the species to be endangered or threatened. To identify only those portions that warrant further consideration, we determine whether there is substantial information indicating that: (1) The portions may be ''significant,'' *and* (2) the species may be

in danger of extinction there or likely to become so within the foreseeable future. Depending on the biology of the species, its range, and the threats it faces, it might be more efficient for us to address the significance question first or the status question first. Thus, if we determine that a portion of the range is not ''significant,'' we do not need to determine whether the species is endangered or threatened there; if we determine that the species is not endangered or threatened in a portion of its range, we do not need to determine if that portion is ''significant.'' In practice, a key part of the determination that a species is in danger of extinction in a significant portion of its range is whether the threats are geographically concentrated in some way. If the threats to the species are essentially uniform throughout its range, no portion is likely to warrant further consideration. Moreover, if any concentration of threats to the species occurs only in portions of the species' range that clearly would not meet the biologically based definition of ''significant,'' such portions will not warrant further consideration.

Our review determined that there are not any concentrations of threats in any part of the ranges occupied by *Cynomys gunnisoni gunnisoni* or *C. g. zuniensis.* Plague is the most substantial factor currently affecting both subspecies of the Gunnison's prairie dog. The entire ranges of both subspecies are operating in a post-plague environment. There is variation between colonies and populations in their ability to maintain abundance following outbreaks. However, variation occurs throughout the range of both subspecies and is not concentrated in any one geographic location. Although *C. g. gunnisoni* has a lower occupancy than *C. g. zuniensis,* we have no evidence that plague outbreaks today are more frequent or more intense in any one part of the range. Rather, populations for both subspecies have remained stable throughout their respective ranges and within individual population areas. Therefore, at this time, there is no evidence to suggest that plague affects portions of either *C. g. gunnisoni'*s or *C. g. zuniensis'*s range differently now or will within the foreseeable future. Because there are no concentrations of threats in any portion of the range of *C. g. gunnisoni* or *C. g. zuniensis,* we did not evaluate whether any portions meet the definition of ''significant.''

Conclusion

Our review of the best available scientific and commercial information indicates that neither *Cynomys gunnisoni gunnisoni* nor *C. g. zuniensis* is in danger of extinction (endangered), nor likely to become endangered within the foreseeable future (threatened), throughout all or a significant portion of its range. Therefore, we find that listing *C. g. gunnisoni* or *C. g. zuniensis* as endangered or threatened subspecies under the Act is not warranted at this time.

We request that you submit any new information concerning the status of, or threats to, *C. g. gunnisoni* or *C. g. zuniensis* to our Colorado Field Office (see **ADDRESSES**) whenever it becomes available. New information will help us monitor these two subspecies and encourage their conservation. If an emergency situation develops for either of these subspecies, we will act to provide immediate protection.

References Cited

A complete list of all references cited in this document is available on the Internet at *http://www.regulations.gov* and upon request from the Colorado Field Office (see **ADDRESSES**).

Authors

The primary authors of this notice are staff located at the Colorado Field Office.

Authority

The authority for this action is section 4 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*).

Dated: November 1, 2013,

Rowan W. Gould,

Acting Director, U.S. Fish and Wildlife Service.

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