Government-to-Government Relationship With Tribes

In accordance with the President's memorandum of April 29, 1994, "Government-to-Government Relations with Native American Tribal Governments" (59 FR 22951), Executive Order 13175, and the Department of Interior's manual at 512 DM 2, we readily acknowledge our responsibility to communicate meaningfully with recognized Federal Tribes on a government-to-government basis. We have determined that there are no tribal lands affected by this proposal.

References Cited

A complete list of all references cited in this rule is available on the Internet at *http://www.regulations.gov*, or upon request from the Field Supervisor, Ohio Field Office (see **FOR FURTHER INFORMATION CONTACT**).

Author(s)

The primary authors of this document are the staff members of the Ohio Field Office, U.S. Fish and Wildlife Service (see **FOR FURTHER INFORMATION CONTACT**).

List of Subjects in 50 CFR Part 17

Endangered and threatened species, Exports, Imports, Reporting and recordkeeping requirements, Transportation.

Proposed Regulation Promulgation

Accordingly, we propose to amend part 17, subchapter B of chapter I, title 50 of the Code of Federal Regulations, as follows:

PART 17—[AMENDED]

1. The authority citation for part 17 continues to read as follows:

Authority: 16 U.S.C. 1361-1407; 16 U.S.C. 1531-1544; 16 U.S.C. 4201-4245; Pub. L. 99-625, 100 Stat. 3500; unless otherwise noted.

2. Amend §17.11 (h) by removing the entry "Snake, Lake Erie water" under "REPTILES" from the List of Endangered and Threatened Wildlife.

Dated: May 17, 2010

Gregory E. Siekaniec

Acting Director, Fish and Wildlife Service

[FR Doc. 2010–12910 Filed 5–28–10; 8:45 am]

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DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 17

[Docket No. FWS-R6-ES-2008-0053]
[MO 92210-0-0008-B2]

Endangered and Threatened Wildlife and Plants; 12–month Finding on a Petition to List the White-tailed Prairie Dog as Endangered or Threatened

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Notice of a 12–month petition finding.

SUMMARY: We, the U.S. Fish and Wildlife Service announce a 12–month finding on a petition to list the white-tailed prairie dog (*Cynomys leucurus*) as endangered or threatened under the Endangered Species Act of 1973, as amended. After a review of all available scientific and commercial information, we find that listing the white-tailed prairie dog is not warranted at this time. However, we ask the public to submit to us any new information that becomes available concerning the threats to the white-tailed prairie dog or its habitat at any time.

DATES: The finding announced in this document was made on June 1, 2010.

ADDRESSES: This finding is available on the Internet at *http://www.regulations.gov* at Docket Number FWS-R6-ES-2008-0053. 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, Utah Field Office, 2369 West Orton Circle, Suite 50, West Valley City, UT 84119. Please submit any new information, materials, comments, or questions concerning this finding to the above street address.

FOR FURTHER INFORMATION CONTACT: Larry Crist, Field Supervisor, Utah Field Office (see **ADDRESSES**); by telephone at 801-975-3330; or by facsimile at 801-975-3331. If you use a telecommunications device for the deaf (TDD), please call the Federal Information Relay Service (FIRS) at 800-877-8339.

SUPPLEMENTARY INFORMATION:

Background

Section 4(b)(3)(B) of the Endangered Species Act of 1973, as amended (Act) (16 U.S.C. 1531 *et seq.*), requires that, for any petition to revise the Federal Lists of Endangered and Threatened Wildlife and Plants that contains substantial scientific or commercial information that listing the species may be warranted, we make a finding within 12 months of the date of receipt of the petition. In this finding, we will determine that the petitioned action is: (1) Not warranted, (2) warranted, or (3) 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 expeditious progress is being made to add or remove qualified species from the Federal 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 Action

On July 15, 2002, we received a petition dated July 11, 2002, from the Center for Native Ecosystems, Forest Guardians, Biodiversity Conservation Alliance, and Terry Tempest Williams, requesting that the white-tailed prairie dog (*Cynomys leucurus*) be listed as endangered or threatened across its entire range. We acknowledged the receipt of the petition in a letter to the petitioners, dated August 27, 2002. In that letter we also stated that higher priority actions precluded addressing the petition immediately, but it would be addressed when funding allowed.

Section 4(b)(3)(B) of the Act requires that for any petition to revise the Lists of Threatened and Endangered Wildlife and Plants, to the maximum extent practicable, within 90 days after receiving the petition, we make a finding as to whether the petition presents substantial scientific or commercial information indicating that the petitioned action may be warranted. On November 9, 2004, we announced our 90–day finding (69 FR 64889) that the petition did not present substantial scientific or commercial information indicating that listing may be warranted. On July 12, 2007, in a Director's memorandum, the U.S. Fish and Wildlife Service (Service) announced that we would review the November 9, 2004, finding after questions were raised about the integrity of scientific information used and whether the decision was consistent with the appropriate legal standards. We received notice of a lawsuit from the Center for Native Ecosystems, and three other entities, on November 27, 2007, regarding our not-substantial 90–day finding. We agreed in a stipulated settlement agreement on February 22, 2008, to submit a notice initiating a 12–month finding for the white-tailed prairie dog to the **Federal Register** on or before May 1, 2008, and to submit a 12–month finding for the white-tailed prairie dog to the **Federal Register** on or before June 1, 2010. Due to the stipulated settlement agreement, the petitioners dismissed the lawsuit on February 26, 2008. This notice constitutes the 12–month finding under the stipulated settlement agreement on the petition to list the white-tailed prairie dog as endangered or threatened.

Species Information

Species Description

White-tailed prairie dogs are between 340 to 370 millimeters (mm) (13.4 to 14.6 inches (in)) in length with a 40- to 65-mm (1.6- to 2.6-in) long tail (Clark *et al.* 1971, p. 1). The tail has a grayish white tip and is white on the terminal half. The coat is generally yellow-tan with distinctive dark brown or black cheek patches that extend above the eye with a lighter black stripe that extends below the eye onto the cheek (Clark *et al.* 1971, p. 1).

Taxonomy

The white-tailed prairie dog is one of five prairie dog species that inhabit western North America (Clark *et al.* 1971, p. 1; Pizzimenti 1975, pp. 62-63). Prairie dogs are in the squirrel family, Sciuridae, and belong to the genus *Cynomys* (Hollister 1916, p. 5). The genus is split into two subgenera; *Leucocrossuromys* includes prairie dogs with white tails and *Cynomys* includes prairie dogs with black tails. White-tailed prairie dogs are included in the subgenus *Leucocrossuromys* along with Utah and Gunnison prairie dogs (Clark *et al.* 1971, p. 1; Pizzimenti 1975, pp. 15-16). Due to this consensus, we determined that the white-tailed prairie dog is a valid taxonomic species and a listable entity under the Act.

Ecology and Life History

White-tailed prairie dogs occur at elevations ranging from 1,150 meters (m) (3,773 feet (ft)) (Flath 1979, p. 63) to 3,200 m (10,500 ft) (Tileston and Lechleitner 1966, p. 295). Unlike the grass-dominated habitats of black-tailed prairie dogs, white-tailed prairie dogs inhabit drier landscapes with shrubland vegetation (Tileston and Lechleitner 1966, p. 295; Clark 1977, pp. 3-5; Collins and Lichvar 1986, pp. 88-91; Gadd 2000, pp. 15-16). Their habitats are generally flat (Collins and Lichvar 1986, p. 92).

Prairie dogs are primarily herbivorous and mainly eat grasses and forbs (Kelso 1939, pp. 7-11). However, they consume other plants seasonally. Prairie dog selection of plants is somewhat dependent on site-specific conditions and seasonality. For example, white-tailed prairie dogs eat sagebrush and saltbush during early spring, grasses in the summer, and seed heads and rabbitbrush flowers in the fall (Kelso 1939, p. 10; Tileston and Lechleitner 1966, p. 302). White-tailed prairie dogs eat the least amount of grass of any prairie dog species and the most saltbush (Kelso 1939, p. 11). White-tailed prairie dogs also eat insects (Stockard 1929, p. 476). Prairie dogs obtain most of their water by eating vegetation and can become water-stressed if sufficient succulent vegetation is unavailable (Seglund *et al.* 2006, p. 7).

White-tailed prairie dogs prefer areas with lower vegetation heights (Collins and Lichvar 1986, p. 92), but they may use dense sagebrush adjacent to grassier areas (Tileston and Lechleitner 1966, p. 314). White-tailed prairie dogs use the dense vegetation within sagebrush habitat to hide from predators (Hoogland 1981, pp. 266-268; Gadd 2000, pp. 24-26), reducing their need to visually search for predators and consequently reducing their need for dense colonies and cohesive social structures. This habitat use differs from black-tailed prairie dogs, who actively work to maintain the grassland vegetation surrounding their burrows for visibility.

White-tailed prairie dogs dig their own burrows. Burrow construction requires deep, well-drained soils. Preferred soils are derived from sandstone or shale and may be clay-loam, silty clay, or sandy loam (Lupis *et al.* 2007, p. 6). Burrows are used throughout the year for hibernation, cover from temperature extremes, predator avoidance, and birthing and raising young (Clark 1977, p. 9; Hoogland 1981, pp. 258-264). Burrow complexes are usually widespread with numerous entrances, tunnels, and chambers. The number of burrows in an area varies greatly from location to location, ranging from 0.12 to 47.75 per hectare (ha) (0.3 to 118 per acre (ac)) with a mean of 0.32 to 6.79 per ha (0.8 to 16.8 per ac) (Tileston and Lechleitner 1966, p. 314; Menkens and Anderson 1989, p. 84; Seglund and Schnurr 2009, p. 94).

For purposes of this finding, a group of burrows is referred to as a colony. A complex is a collection of colonies grouped on the landscape. There is usually a high degree of connectivity between colonies in the same complex.

White-tailed prairie dog colonies have fewer animals per unit area with less obvious borders than black-tailed prairie dog colonies (Tileston and Lechleitner 1966, pp. 297, 314; Hoogland 1981, p. 252). Home range sizes range from 0.2 to 1.9 ha (0.5 to 4.7 ac) (Clark 1977, p. 65; Cooke 1993, p. 23), which are generally larger than black-tailed prairie dog home ranges (Clark 1977, p. 65).

White-tailed prairie dogs can live up to 8 years in captivity but may not live past 4 years in the wild (Pauli *et al.* 2006, p. 18). Prairie dog annual mortality rates average 30 to 60 percent, largely due to disease and predation (Tileston and Lechleitner 1966, p. 305; Clark 1977, pp. 80-81).

Adult sex ratios are approximately one male to two females (Clark 1977, p. 76; Hoogland 2010, pers. comm.). White-tailed prairie dogs can reproduce at 1 year of age, and they have a single litter once a year averaging four to five pups (Bakko and Brown 1967, pp. 110-111). Breeding occurs from late March to mid-April (Tileston and Lechleitner 1966, p. 303). Pups are born in the burrows after a gestation period of approximately 30 days (Tileston and Lechleitner 1966, p. 304), and emerge from the burrow for the first time 4 to 6 weeks after birth (Bakko and Brown 1967, p. 103). They begin to disperse from the colony in June and July when population densities are the highest (Clark 1977, p. 72). Migration is recognized as an important factor to white-tailed prairie dog population dynamics (Clark 1977, p. 80). Plague in this species often results in near extirpation of colonies. Rapid recolonization of some areas post-plague with few or no surviving reproductive adults suggests the species is highly mobile (Seglund *et al.* 2006, p. 10). Dispersal distances of up to 8 kilometers (km) (4.8 miles (mi)) have been observed (Cooke 1993 in Seglund *et al.* 2006, p. 10)

White-tailed prairie dogs have the least cohesive social structure of any prairie dog species. Their social system is organized around family groups or “clans,” comprised of several reproductive females, one or two males of reproductive age, and dependent young (Clark 1977, p. 62; Cooke 1993, p. 22). Adult white-tailed prairie dogs spend little time displaying social behavior, and most of their time feeding or in alert postures (Clark 1977, p. 44). Pups spend a large amount of time playing during their first few weeks (Tileston and Lechleitner 1966, p. 300).

White-tailed prairie dog populations exhibit large fluctuations of more than

50 percent from year to year (Menkens and Anderson 1989, p. 345). Population fluctuations are likely due to disease cycles, vegetation quantity and quality, and drought (Seglund and Schnurr 2009, p. 16) (see *Factor A*. Climate Change; *Factor C*. Disease). We do not know the level at which population fluctuations are a natural part of white-tailed prairie dog ecology, or the result of environmental or human-caused threat factors. In many cases, prairie dog colonies persist despite large population fluctuations (see *Factor C*. Disease). We define "persistence" as the long-term continuance of white-tailed prairie dog colonies, at a high enough level to exist in the long-term with minimal management assistance.

White-tailed prairie dogs are diurnal (active during the day) (Tileston and Lechleitner 1966, p. 200). They are active approximately 5 to 7 months per year from early spring to fall and hibernate during late fall and winter (Clark 1977, pp. 59-60; Cooke 1993, p. 11). Time spent hibernating is determined by available food resources (Clark 1977, p. 60). In warm weather, even in mid-winter, white-tailed prairie dogs will feed if grasses are growing (Hollister 1916, p. 6; Goodrich and Buskirk 1998, p. 177). If resources are not sufficient, prairie dogs become inactive and spend more time in their burrows (Harlow and Menkens 1986, p. 795). During periods of high summer temperatures, white-tailed prairie dogs avoid the highest temperatures of midday by foraging in the cooler morning and evening hours (Clark 1977, p. 58).

Distribution and Abundance

The overall species' distribution is mapped as "gross range." The available white-tailed prairie dog literature uses the term "gross range" to describe the outer boundary identifying the overall rangewide distribution of the white-tailed prairie dog (Figure 1). However, not all lands within the species' gross range are occupied or have the potential to be occupied by white-tailed prairie dogs (Seglund *et al.* 2006, p. 100). The predicted range is a subset of the gross range and thus represents a more accurate spatial representation of the potential range of the white-tailed prairie dog (Seglund *et al.* 2006, pp. 16, 110; Seglund and Schnurr 2009, p. 23). Predicted range is defined using habitat characteristics of vegetation, land use, slope, and elevation (Seglund *et al.* 2006, pp. 14-39). Depending on available data, we use gross range, predicted range, or mapped occupied habitat throughout this document to evaluate status and threats to the species. For example, gross range mapping data was available for our use for all States across the species' range. However, the data for the predicted range map (Seglund *et al.* 2006, p. 110; Seglund and Schnurr 2009, p. 23) was only available for the State of Colorado. Information regarding mapped occupied habitat (all areas mapped on Federal lands as occupied by white-tailed prairie dogs since 1985) was available for the State of Utah, but not for any other States.

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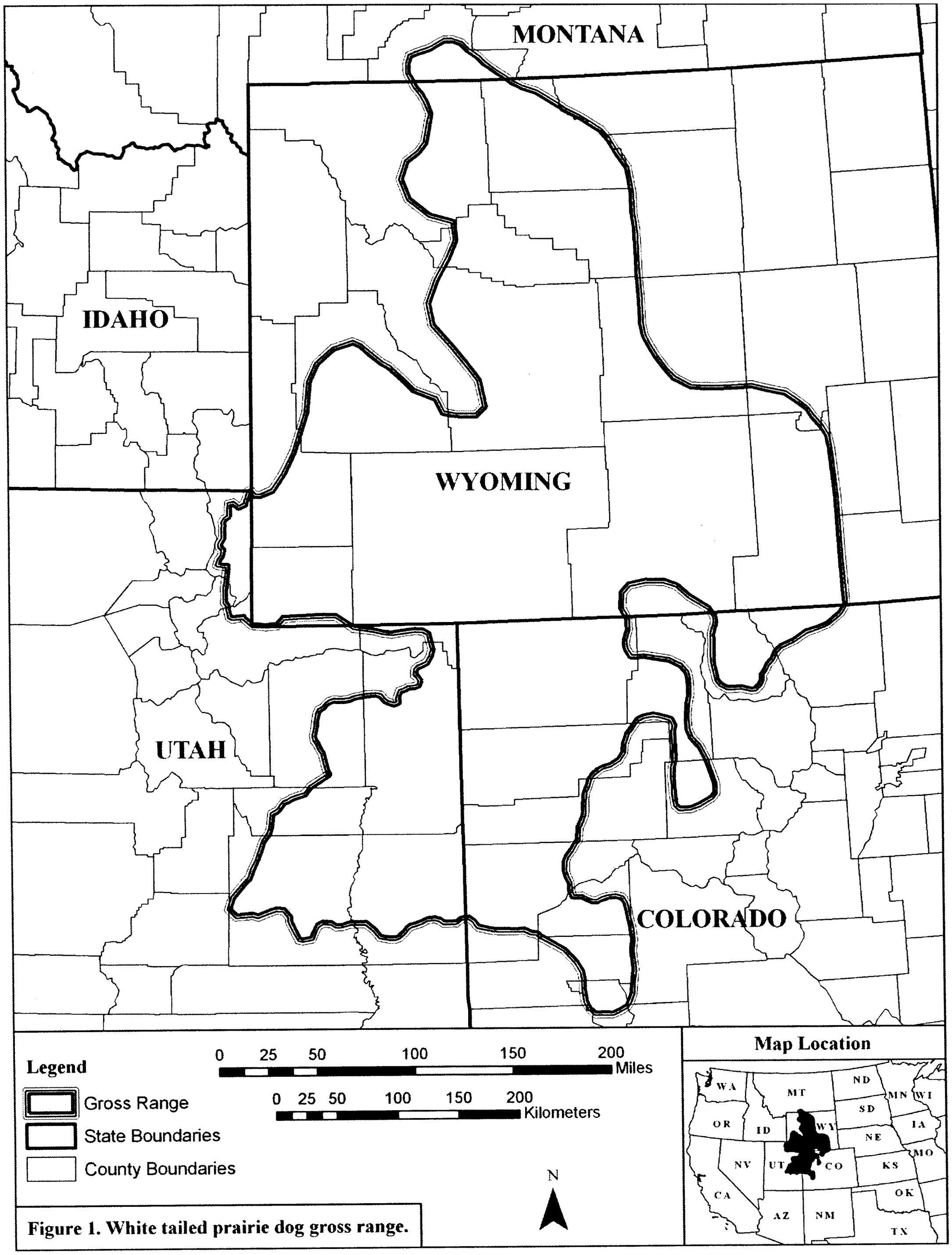

Figure 1. White tailed prairie dog gross range.

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The white-tailed prairie dog occurs from a small area in south-central Montana, throughout much of Wyoming, into western Colorado, and northeastern Utah. There are 20,224,801 ha (49,976,572 ac) within the gross range of the white-tailed prairie dog and 13,066,887 ha (32,288,981 ac) within the species' predicted range (Seglund *et al.* 2006, p. 91). Therefore, approximately 65 percent of the gross range has the characteristics necessary to support the white-tailed prairie dog. Wyoming contains the largest amount of white-tailed prairie dog predicted range (75 percent) (Knowles 2002, p. 4). Less than 1 percent of predicted range occurs in Montana (Table 1). The majority of white-tailed prairie dog predicted range (56 percent) occurs on land managed by the Bureau of Land Management (BLM). A significant portion of the predicted range occurs on private land (37 percent). Very little of the predicted range is managed by the Service (0.4 percent), U.S. Forest Service (USFS) (0.5 percent), or National Park Service (NPS) (0.9 percent) (Table 1).

TABLE 1. PERCENT PREDICTED RANGE BY STATE AND LAND MANAGEMENT ENTITY (SEGLUND *et al.* 2006, PP. 91, 98, 100, 104, 109).

	Total Range	Private	BLM	USFS	NPS	USFWS	State	Other
Colorado	11	37	56	< 1	1	< 1	5	< 1
Montana	< * 1	49	44	2	0	0	5	< 1
Utah	13	20	60	< 1	< 1	< 1	11	7
Wyoming	75	33	54	< 1	< 1	< 1	6	6
Total		37	56	< 1	< 1	< 1	5	< 1

* < less than

Historical abundance and distribution are not well documented for white-tailed prairie dogs prior to the 1980s (Pauli *et al.* 2006, p. 13; Seglund *et al.* 2006, p. 11). The distribution of white-tailed prairie dogs has not changed appreciably since historic times (Knowles 2002, pp. 5-6). The only recorded change in distribution is in Montana, where white-tailed prairie dogs were previously captured 40 miles north of currently occupied habitat (Knowles 2002, p. 5). However, abundance declined as a result of past control efforts and plague (Cully 1993, p. 38; Knowles 2002, pp. 1-2) (see *Factor B.* Overutilization and *Factor C.* Disease). We are not able to quantify changes in occupied habitat for the species because mapping did not use standardized methods, and we do not have accurate estimates of historical occupied habitat (Seglund *et al.* 2006, p. 13).

We do not have rangewide population trend information due to a lack of historical population information and inconsistencies in survey methodologies (Seglund *et al.* 2006, pp. 4, 13). Surveys for white-tailed prairie dog distribution and occupancy rates were recently conducted across portions of the species' gross range (Grenier and Filipi 2009, entire; Seglund and Schnurr 2009, p. 27; Wright 2009, entire). While occupancy surveys are intended to determine population trends (Seglund and Schnurr 2009, p. 10), the data are not yet available to provide trend information. In addition, each State used different methods to conduct ground surveys and determine occupancy rates; thus, the results are not comparable. We present State-by-State information below with the caveat that comparing colony occupancy rates across the gross range of the species is not possible.

Colorado

White-tailed prairie dog predicted range includes Moffat, Routt, Rio Blanco, Garfield, Mesa, Delta, Montrose, Eagle, Jackson, Ouray, and Larimer Counties in northwestern Colorado (Seglund *et al.* 2004, p. 133). Approximately 1,246,441 ha (3,104,733 ac) of predicted white-tailed prairie dog habitat occurs in three Individual Population Areas (IPAs): Grand Valley-Uncompahgre IPA, North IPA, and Northwest IPA (Hotze 2010, pp. 9-10). An IPA is an area physically separated from other populations that may face a unique subset of threats (Seglund and Schnurr 2009, p. 1). These population areas are geographically separated from each other but connected to population areas in Utah and Wyoming (Seglund and Schnurr 2009, p. E-5).

Colorado completed Statewide white-tailed prairie dog surveys in 2004 and 2008; occupancy rates were 24.1 and 23.1 percent, respectively, a statistically insignificant difference (Seglund and Schnurr 2009, pp. 27-28). Occupancy rate is the number of randomly selected plots in predicted habitat with prairie dogs, and is not a measure of abundance. We do not have population trend information across the entire predicted range of the species in Colorado. Localized declines and habitat degradation were reported in the Grand Valley-Uncompahgre IPA due largely to urbanization (Seglund and Schnurr 2009, p. 54). Information in the North IPA is restricted to colonies associated with black-footed ferret reintroduction; a historical record of ferrets in this area suggests it once supported abundant populations of prairie dogs (Seglund and Schnurr 2009, p. 58). Only two colonies remain, although they have remained stable for the past 20 years (Seglund and Schnurr 2009, p. 58). Population densities and distribution in the Northwest IPA appear to fluctuate greatly in large part due to the prevalence of plague (Seglund and Schnurr 2009, pp. 63-76).

Montana

White-tailed prairie dogs occur in one population area in Carbon County, along the Montana-Wyoming border (Seglund *et al.* 2006, p. 25). Fifteen colonies were mapped in the 1970s across 312.8 ha (773 ac) (Flath 1979, p. 63). White-tailed prairie dogs were previously reported in north Sage Creek in Carbon County (Hollister 1916, p. 27), and in Yellowstone County just northeast of Carbon County (Kelso 1939, p. 7), but no animals were found in these locations in later surveys (Flath 1979, entire).

Current occupied area of white-tailed prairie dogs in Montana includes 112 ha (277 ac) across 11 colonies; 8 colonies were considered active in 2009 (MFWP 2009a, p. 1). The apparent loss in occupied habitat is likely due to plague and agricultural land conversion (Parks *et al.* 1999 in Knowles 2002, p. 15). We do not have population trend data for the white-tailed prairie dog in Montana.

Utah

White-tailed prairie dogs occur in Rich, Summit, Daggett, Uintah, Duchesne, Carbon, Emery, and Grand Counties (Seglund *et al.* 2004, p. 140) in northern and eastern Utah. In 2002 and 2003, 57,463 ha (141,808 ac) of occupied white-tailed prairie dog habitat were documented, mostly within Uintah and Duchesne Counties (Lupis *et al.* 2007, p. 17). Smaller population areas are found in the Cisco Desert in Emery and Grand Counties (10,869 ha (26,856 ac)), and in Rich County (73 ha (180 ac)) (Lupis *et al.* 2007, p. 15). Surveys did not include private lands; therefore, the amount of occupied habitat is an underestimate. These population areas are mostly disconnected from each other, but connect to population areas in Wyoming and Colorado. Based on surveys conducted in 2008, the white-tailed prairie dog occupancy rate was 46 percent of sampled plots (Wright 2009, p. 5).

We do not have information on long-term population status or trends for white-tailed prairie dogs in Utah. Surveys in black-footed ferret management areas in the Uintah basin recorded fluctuating population levels: increasing densities since the early 1990s, declines in 1999 and 2003, and population recoveries in 2004-2008 (Seglund *et al.* 2006, p. 28; Maxfield 2009, pers. comm.) (see *Factor A.* Climate Change).

Wyoming

White-tailed prairie dogs are found in the Counties of Big Horn, Park, Hot Springs, Natrona, Fremont, Sublette, Sweetwater, Lincoln, Uinta, Carbon, and Albany in northern and southern central Wyoming (Seglund *et al.* 2004, p. 130). Wyoming Fish and Game documented 11,511,356 ha (27,822,847 ac) of potential habitat and 1,170,952 ha (2,893,487 ac) of occupied habitat in 2008 by aerial survey (Grenier and Filipi 2009, p. 5). The majority of these acres are in Albany and Carbon Counties. Habitat in Wyoming is mostly continuous and not split into discrete population areas. Approximately 68 percent of the surveyed areas were estimated to be occupied (Grenier and Filipi 2009, p. 5). This estimate is not a statistically determined "occupancy rate." Occupancy from these aerial surveys cannot be compared with ground surveys from Colorado and Utah, because the observed location of colony boundaries varies between methods, presumably due to the difficulty in measuring colony boundaries from the air (Andelt *et al.* 2005, p. 3). We do not have long-term status or trend information for white-tailed prairie dogs in Wyoming.

Summary of White-Tailed Prairie Dog Population Status

We do not have reliable long-term historical or current white-tailed prairie dog status, trend, or distribution data. White-tailed prairie dog populations are likely below historical levels, though their overall distribution has not substantially changed (Knowles 2002, p. 6). Large acreages of occupied habitat exist across the species' range, particularly in Wyoming. Each State plans to continue occupancy surveying, so more information may be available in the future.

Evaluation of Information Pertaining to the Five Threat Factors

Section 4 of the Act and implementing regulations (50 CFR 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 12–month finding, information pertaining to the white-tailed prairie dog in relation to the five factors provided in section 4(a)(1) of the Act is discussed below. In making our 12–month finding on the petition we considered and evaluated the best available scientific and commercial information.

Factor A. The present or threatened destruction, modification, or curtailment of the species' habitat or range.

The following potential factors that may affect the habitat or range of the white-tailed prairie dog are discussed in this section, including: (1) Oil and gas exploration and development, (2) oil shale and tar sands development, (3) mineral development, (4) renewable energy development—wind and solar, (5) urbanization, (6) agricultural land conversion, (7) grazing, (8) fire occurrence and suppression, (9) invasive plant species and (10) climate change.

Oil and Gas Exploration and Development

Exploration and development of oil and gas resources is widespread throughout the gross range of the white-tailed prairie dog (Hotze 2010, pp. 11-26). Between 2004 and 2008, exploration of oil and gas in the intermountain west increased substantially because of political and economic incentives (National Petroleum Council 2007, pp. 5-7). The 2005 Energy Policy Act expedited the leasing and permitting process on Federal lands (42 U.S.C. 15801). The global recession of 2008 resulted in decreased energy demand resulting in a reduced rate of energy development. Fossil fuel production is expected to regain and surpass the early 2008 levels in 2010-2030 (Copeland *et al.* 2009, p. 1; Energy Information Administration (EIA) 2009, p. 109).

Energy development includes exploration, drilling, production, and reclamation phases (Tribal Energy and Environmental Information Clearinghouse (TEEIC) 2009, entire), each of which may potentially impact the white-tailed prairie dog or its habitat. During the exploration phase, oil and gas resources are delineated using a variety of technologies, including seismic shot-hole surveys (planting and detonation of underground explosives to produce vibrations that reveal locations of mineral resources) and vibroseis trucks (vehicle with a vibration plate used to survey mineral resources) (TEEIC 2009, p. 6). These activities may result in mortality and the crushing of vegetation along the seismic route, but there are no permanent structures established during the exploration phase. If oil and gas resources are proven, the lessee moves into the drilling phase. During the drilling phase, access roads and well pads are constructed, pipelines are installed, and the infrastructure necessary for the production phase (such as compressor stations) is developed and constructed (TEEIC 2009, p. 9). This phase typically results in longer-term disturbance to white-tailed prairie dog habitat. The production phase includes maintaining the wells and infrastructure as well as continuing the extraction of the oil and gas resources. Wells may be in the production phase for up to 20 to 30 years for gas wells (TEEIC 2009, p. 5) and up to 100 years for oil wells (Connelly *et al.* 2004, p. 7:41). The final phase begins when a well is no longer producing oil or gas because the resource is depleted. The lessee is responsible for reclaiming the land back to its original condition, or as close to the original condition as possible (BLM 2007a, p. 2; TEEIC 2009, p. 15).

Oil and gas developments are typically configured as point (e.g., well pads, compressors) and line (e.g., roads, pipelines) disturbances across broad areas. The amount of direct habitat loss may encompass 5 to 10 percent of leased areas. However, the extent of disturbance to white-tailed prairie dogs may reach far beyond the direct habitat loss, due to the loss and fragmentation of habitats; the alteration of vegetation resources, which often promotes nonnative invasive plant species; increased noise levels; increased vehicle traffic; and increased human access to previously remote areas (Pauli *et al.* 2006, p. 27; Seglund *et al.* 2006, p. 46; Seglund and Schnurr 2009, p. 126; Wyoming Game and Fish Department (WGFD) 2009, p. 10). The amount of direct habitat loss and total fragmentation varies greatly depending on well density (number of acres per well) and spacing (distance between individual well pads). Increasing wells per unit area decreases the amount of habitat available for wildlife. Well densities and spacing are typically designed to maximize recovery of the resource and are administered by State oil and gas agencies and the BLM on Federal mineral estate. Each geologic basin has a standard spacing, but exemptions are granted (Connelly *et al.* 2004, pp. 7-39 to 7-40). Within the range of the white-tailed prairie dog, well spacing can vary from 5 to 160 acres per well. Larger well spacing is often characterized by more wells drilled per pad. Increasing the number of wells per pad increases the size of the individual pad but decreases the amount of habitat fragmented. The variation in well and well pad spacing results in a variation in the intensity of effects across the species' range. However, we are unable to determine how the ultimate effects to the species vary with well density. The threshold levels of oil and gas development that result in reduced populations or eliminated colonies are unknown.

Resulting impacts to white-tailed prairie dogs from oil and gas development may include direct mortality from vehicles; direct mortality associated with increased access by recreational shooters who utilize the new access routes (Gordon *et al.* 2003, p. 12); increased disturbance responses from increased human activity; direct loss of habitat and forage resources during exploration, drilling, and production; and indirect loss of forage resources from invasive, nonnative plant species (Seglund and Schnurr 2009, p. 126).

No studies have been done regarding the short-term or long-term impact of oil and gas development on individual white-tailed prairie dogs or their colonies. White-tailed prairie dogs can be negatively impacted by the direct loss of habitat that occurs as a result of development. For example, white-tailed prairie dog burrow densities were lower at well locations compared to areas further from the well pads (Biggins *et al.* 1984, p. 12). Dead prairie dogs were found in oil and gas reserve pits (Esmoil 1995 in Peterson 2008, p. 5), although the extent of population level impact is not known. The use of vibroseis trucks in prairie dog colonies appears to impact vegetation, but preliminary results did not document prairie dog mortality or burrow collapse (Young and Sawyer 1981, pp. 1-2; Menkens and Anderson 1985, p. 7).

However, as described above, exposure to a factor does not necessarily indicate that the factor is a threat. We know that white-tailed prairie dog colonies exist in areas with long-term oil and gas development. Some of the largest and most robust colonies are located near areas of intense oil and gas development (see *Distribition and Abundance*, above, and our discussion under *Factor C*, below). For example, the Coyote Basin, Kennedy Wash, and Snake John colonies in Uintah County, Utah, occur within a landscape fragmented by oil and gas infrastructure, although their immediate occupied habitats have not sustained significant energy development. Fifty percent of the mapped occupied habitat in this region has been leased with 17 percent currently producing (See Utah, below). Populations in this area have fluctuated; although this has been attributed to drought (See *Climate Change*, below). Despite the high amount of leasing in this area, populations have recovered to their 20 year recorded peak. Similarly, Coyote Basin and Wolf Creek are historically Colorado's most robust colonies and occur within the Northwest IPA where oil and gas development is high. Forty one percent of this IPA has already been leased, with 7 percent currently producing (Hotze 2010, p. 20). Prairie dogs continue to occupy a moderately sized complex within the Coal Oil Basin (Colorado's largest oil field) despite an active drilling history that extends back to 1944 (Wolf Creek Work Group 2001, p. 15).

Available information does not indicate that white-tailed prairie dogs are currently reacting to oil and gas activities on a local landscape scale or at the population or species level. We also do not know if there is a level of oil and gas development at which the status of prairie dogs at the population or species level would be negatively impacted. As described above, white-tailed prairie dogs persist in several areas with oil and gas activity.

To evaluate the extent to which oil and gas development may affect white-tailed prairie dogs in the foreseeable future, we overlaid BLM-authorized oil and gas leases with the species' gross range. More specific information was available for Utah and Colorado, so we overlaid oil and gas development with white-tailed prairie dog predicted range (Seglund and Schnurr 2009, p. 24) in Colorado and mapped occupied habitat in Utah (Hotze 2010, p. 7). We also reviewed information on State-specific potential oil and gas reserves where that information was available. The results are presented below and in the State-by-State analysis sections.

In additional to managing lands in Wyoming, Colorado, and Utah, the BLM manages the Federal mineral estate, including authorizing oil and gas leases. Leases may be producing or non-producing. Producing leases are those being actively developed. Non-producing leases are leased; however, the resources for which they were leased are not currently being extracted. Non-producing leases may become developed in the future, but development is not guaranteed (Thompson 2010, pers. comm.). We consider these leases to be indicative of potential development. However, we do not know the percent of non-producing leases that will become developed in the future because the variables governing development are complex and include the price of gas, the number of other leases the company holds, the actual amount of resource the lease contains (often unknown at the time of lease), and other complex economic and social factors.

In addition to the producing and non-producing leases, BLM has authorized a significant amount of the Federal mineral estate that may be leased in the future. Each BLM field office developed a resource management plan that delineates areas available for leasing and depicts surface access constraints (e.g., BLM 2008a, p. 7). The areas that are available for leasing are larger than those that have already been authorized, and include areas that may be developed in the future should proven reserves be located. Development of the entire area available for leasing is unlikely due to BLM's multi-use mandate, but the area available for leasing represents a potential maximum of oil and gas development. Non-Federal mineral estates are managed by State, tribal, and private mineral rights owners under different programs and using different processes.

We were unable to specifically quantify the impacts of development on non-Federal mineral rights. Total active and plugged wells are available as GIS layers from each State's oil and gas development commission. However, number of wells is not a biologically meaningful measure to the white-tailed prairie dog because the effects depend on the amount of land leased and well density and spacing. As previously stated, the impacts to the species at different well spacing densities are not well understood. Approximately two-thirds of wells within the species range are located on Federal versus non-Federal estate (BLM 2009; Colorado Oil and Gas Conservation Commission 2010; Wyoming Oil and Gas Conservation Commission 2010; Utah Division of Oil and Mining 2010; unpublished data). Similarly, approximately two-thirds of the species range is in Federal vs. non-Federal ownership. We assume that a similar ratio of development of non-Federal minerals is likely to occur in the future as is occurring for Federal minerals. Because leasing does not guarantee development, and the fact that we are unable to estimate leasing rates on non-Federal estate, we consider the numbers presented below (in the State-by-State analysis) as an approximate measurement of Federal and non-Federal development that could occur in the foreseeable future.

The BLM has authorized 5,687,259 ha (14,053,523 ac) of producing and non-producing leases for oil and gas development, representing approximately 28 percent of the white-tailed prairie dog's gross range (Hotze 2010, p. 18). Producing leases occur across 1,435,580 ha (3,547,395 ac), or 7 percent, of the species' gross range (Hotze 2010, p. 18). Future exploration and development of fossil fuels is likely to focus in areas of highest potential return. Highest potential return is defined by several geological characteristics including permeability and porosity of the underlying rock (BLM 2005a, p. 41). For example, in the BLM Little Snake field office of northwest Colorado, approximately 96 percent of new wells will be drilled in areas with high oil and gas potential (BLM 2007b, p. 3:100). In high and moderate potential areas in Wyoming, a single well can produce 4 to 30 times as much as a well in low potential areas (BLM 2008b, p. A20:6). Therefore, we assume these areas will be the focus of future leasing.

Colorado

In Colorado, the BLM authorized oil and gas leases on 30 percent of the white-tailed prairie dog's predicted range in the State (Hotze 2010, p. 20) across the Northwest, North, and Grand Valley-Uncompahgre IPAs. Of the authorized oil and gas leases within the predicted range in Colorado, there are 61,334 ha (151,560 ac) of producing leases, which comprise approximately 5 percent of the predicted State range (Hotze 2010, p. 14). Non-producing leases encompass 311,650 ha (770,104 ac), or approximately 25 percent of the predicted State range (Hotze 2010, p. 14).

Northwest Individual Population Area (IPA)

The Northwest IPA in Moffat and Rio Blanco Counties is within the Greater Green River Basin (DOI *et al.* 2006, p. 20) and has the highest potential for oil and gas development (Seglund and Schnurr 2009, p. 61). This IPA comprises approximately 54 percent of white-tailed prairie dog predicted habitat in Colorado (Hotze 2010, p. 10). Authorized lease areas in 2009 encompassed approximately 41 percent of the Northwest IPA (Hotze 2010, p. 20), and oil and gas development is projected to significantly increase over the next 20 years (Seglund and Schnurr 2009, p. 128). For example, the BLM anticipates authorizing the drilling of 3,031 oil and gas wells over the next 20 years in Routt and southwestern Moffat Counties (BLM 2007b, p. 3:100), whereas the previous 20 years resulted in 594 drilled wells (BLM 2007b, p. 3:99). Similarly, the BLM anticipates between 17,800 and 21,200 new wells will be drilled over the next 20 years in Rio Blanco and central and northern Moffat Counties, whereas there were 5,800 wells drilled previously (Seglund and Schnurr 2009, p. 129). However, the majority of these wells will occur outside of the white-tailed prairie dog's predicted range (Seglund and Schnurr 2009, p. 129). Approximately 96 percent of new wells will be drilled in areas with high oil and gas potential as defined by the BLM (2007b, p. 3:100); we believe this localizes the development to some extent and thus limits the amount of prairie dog habitat impacted.

Three potential coal bed methane areas partially overlap white-tailed prairie dog habitat in the Northwest IPA: eastern Sand Wash Basin, Lower White River, and Danforth Hill (BLM 2007b, p. 3:102). However, the majority of the coal bed methane areas occur outside the predicted range for the species within Colorado (BLM 2007b, Figure 3-16; Seglund and Schnurr 2009, p. 119).

Grand Valley-Uncompahgre IPA

There is potential for energy development to occur in a corridor of the Grand Valley-Uncompahgre IPA in Mesa, Montrose, and Ouray Counties (Seglund and Schnurr 2009, p. 54). Approximately 14 percent of the white-tailed prairie dog's predicted range in this IPA is authorized for lease or contains pending leases from the BLM (Seglund and Schnurr 2009, p. 131; Hotze 2010, p. 20). The BLM estimates authorizing 3,600 wells on 1,519 pads over the next 20 years in this IPA (Ewing 2009, pers. comm.). The total area disturbed is estimated at 13,200 ac (5,342 ha) of short-term disturbance and 4,100 ac (1,659 ha) of long-term disturbance (Ewing 2009, pers. comm.). We do not know where this development will occur with respect to known prairie dog colonies. However, 85 percent of this IPA remains unleased, and future wells represent a relatively small (less than 2 percent of this IPA) amount of additional disturbance.

North IPA

Crude oil was historically produced in the North IPA to a limited degree. However, EOG Resources discovered a large reservoir of crude oil in this area in 2008, and subsequently acquired a lease for 100,000 ac (40,469 ha) of land in the area (Seglund and Schnurr 2009, p. 129). Approximately 25 percent of the white-tailed prairie dog's predicted range in the North IPA has authorized or pending leases (Seglund and Schnurr 2009, p. 131; Hotze 2010, p. 20).

In summary, BLM has authorized and has pending leases on approximately 30 percent of the predicted range of the species within Colorado for oil and gas development (Seglund and Schnurr 2009, p. 131; Hotze 2010, p. 20). The largest potential for overlap and impacts to white-tailed prairie dogs occurs in the Northwest IPA; oil and gas development is projected to increase substantially in this IPA over the next 20 years (Seglund and Schnurr 2009, p. 129). We expect the majority of future oil and gas development to occur in this IPA. We do not know the exact locations of energy development facilities with respect to locations of white-tailed prairie dog colonies. Oil and gas development will likely impact white-tailed prairie dogs, causing individual mortalities and habitat loss and fragmentation. However, the majority of oil and gas development will occur in areas of high potential energy reserves, and particularly in the Northwest IPA, so impacts to the species are likely to be more localized, and are not expected to occur at high levels across the species' predicted range in Colorado. Based on the available information, we do not believe oil and gas development in Colorado is a threat to the species now or in the foreseeable future.

Montana

White-tailed prairie dog habitat in Montana represents less than 1 percent of the gross range of the species (Seglund *et al.* 2006, p. 91), and is contained entirely within Carbon County. Therefore we did not calculate the area impacted by oil and gas leasing. The area containing the South Sage Creek white-tailed prairie dog colony was leased in January 2002, but is not yet developed (Begley 2010a, pers. comm.). The South Sage Creek colony occupies less than 6 ha (15 ac), or 5 percent of the occupied habitat in Montana (MFWP 2009b, p. 3). The area containing the Robertson Draw colony is available for leasing but has not yet been leased (Begley 2010a, pers. comm.). Oil and gas development is not impacting the remaining six colonies in Montana (Seglund *et al.* 2006, p. 26). Because of the small amount of habitat impacted, oil and gas development is not a significant threat in this State, now or in the foreseeable future.

Utah

The BLM has authorized oil and gas leases on 31 percent of the white-tailed prairie dog's gross range in Utah (Hotze 2010, p. 18). The highest overlap between the gross range of the white-tailed prairie dog and oil and gas development potential occurs in Uintah, Duchesne, Grand, and Carbon Counties (Hotze 2010, pp. 21-22; Utah Department of Natural Resources 2004 in Seglund *et al.* 2006, p. 33).

The Uinta and Piceance Basin areas of Utah have significant oil and gas resources (BLM 2008a, p. 3:38). Approximately 82 percent of 18,982 existing well locations in Utah occur in the Uinta Basin in Duchesne and Uintah Counties (Hotze 2010, pp. 15-16). There are 97,266 ha (240,350 ac) of mapped occupied white-tailed prairie dog habitat in Uinta and Duchesne Counties (Hotze 2010, pp. 7-8). The BLM has authorized oil and gas leasing on approximately 51 percent of this mapped occupied habitat (Hotze 2010, p. 22). The BLM estimates that approximately 2,055 new oil wells, 4,345 new gas wells, and 130 new coal bed methane wells will be drilled within the Uinta Basin during the 15- to 20–year planning period (BLM 2008a, p. 3:36). Approximately 73 percent of the Federal mineral rights open to leasing in the Uinta Basin area have already been authorized (Hotze 2010, p. 24). Therefore, the authorized leases represent a fair assessment of the potential impact to white-tailed prairie dogs. These leases have a 201-meter (660-ft) no surface occupancy stipulation adjacent to occupied prairie dog colonies, which will minimize direct mortality of prairie dogs and the loss of habitat from future development (see *Factor D. Inadequacy of Regulatory Mechanisms,* below, for a discussion of these stipulations).

There are 14627 ha (36,144 ac) of mapped white-tailed prairie dog habitat in Carbon and Emery Counties (Hotze 2010, p. 8). The BLM has authorized oil and gas leasing on approximately 52 percent of this occupied mapped habitat (Hotze 2010, p. 22). About 2300 ha (5,600 ac) (15 percent) of this habitat is located within areas considered to have high potential for oil and gas resources (BLM 2004, p. 4:119). These leases also have a no surface occupancy stipulation for prairie dog colonies (see *Factor D*).

In summary, oil and gas leasing and development is authorized by BLM across 31 percent of the species' gross range in Utah. The majority of current and future project development occurs in the Uinta Basin in northeastern Utah, and thus potential impacts to the species could be greatest in this area, particularly because 52 percent of the species' mapped occupied habitat is leased. We consider the Uinta Basin to be the highest potential development area in Utah. Exploration and drilling, as previously discussed, can result in mortality of individual prairie dogs and the loss and fragmentation of habitats. However, robust white-tailed prairie dog colonies continue to persist in the Uinta Basin, in areas associated with existing oil and gas development. The BLM imposes a no surface occupancy stipulation that prohibits activity within 201 meters (660 ft) of white-tailed prairie dog colonies in the Uinta Basin (see *Factor D*), which will minimize direct mortality of prairie dogs and the loss of habitat from future development. The likely concentration of oil and gas development in high potential resource areas should also minimize the amount of white-tailed prairie dog habitat directly lost to development. Due to these factors, we do not believe oil and gas development in Utah is a threat to the species now or in the foreseeable future.

Wyoming

Seventy-seven percent of the species' gross range in Wyoming overlaps potential energy resources in Wyoming (Seglund *et al.* 2006, p. 39). However, not all potential energy resources will be developed. Therefore, we further reviewed leases and potential energy resources to determine the extent of development in the foreseeable future (the next 20 years).

Approximately 3,443,269 ha (88,508,503 ac) of land, or 27 percent of the species' gross range in Wyoming, is authorized for leasing by BLM (Hotze 2010, p. 18). These leases are either producing or are non-producing. However, we expect the majority of new wells will be drilled in areas with high oil and gas potential. In high and moderate potential areas in Wyoming, a single well can produce 4 to 30 times as much as a well in low potential areas (BLM 2008b, p. A20:6). Most wells will be drilled in areas of high potential oil and gas resources (Copeland *et al.* 2009). Only 415,649 ha (1,027,057 ac), or 4.2 percent of the species' predicted range in Wyoming, occurs in high potential oil and gas resource in areas as defined by Seglund *et al.* (2006, p. 39). Low and medium potential oil and gas resources overlap 73 percent of the gross range of white-tailed prairie dog (Seglund *et al.* 2006, p. 39). Twenty-three percent of the gross range has no oil or gas resources. Given the existing development, we consider the area in southern Wyoming between Rawlins and Rock Springs to be a high potential area (Hotze 2010, p. 11).

Oil and gas development and reserves occur throughout the gross range in Wyoming. We do not know the exact locations of future energy development facilities with respect to locations of white-tailed prairie dog colonies. Oil and gas development will likely impact white-tailed prairie dogs, causing individual mortalities and habitat loss and fragmentation. However, as previously discussed, only a small portion (4.2 percent) of the species' gross range overlaps areas of high potential energy reserves. Energy development is most likely to be concentrated in areas of high potential reserves, so impacts to the white-tailed prairie dog will not occur at high levels across the species' entire gross range in Wyoming. Based on the available information, we do not believe oil and gas development in Wyoming is a threat to the species now or in the foreseeable future.

Summary of Oil and Gas Development

Table 2 (below) gives a summary of the percentage of BLM-leased area for oil and gas in gross, predicted, and mapped occupied range, by State. Generally, the area attributed to producing leases makes up a small portion of the species' range, although up to 28 percent of the species' gross range has been leased for potential development.

TABLE 2. PERCENTAGE OF LEASED AREA FOR OIL AND GAS IN GROSS, PREDICTED, AND MAPPED OCCUPIED RANGE OF THE WHITE-TAILED PRAIRIE DOG.

(Totals include a small amount of land authorized for leasing but not yet leased; and therefore not included in the other two categories.)

State	Percent Producing Leases	Percent Non-Producing Leases	Total Percent Leased*
Colorado (Gross)	9	20	30
Northwest IPA (Predicted)	7	34	41
North IPA (Predicted)	2	22	25
Grand Valley/Uncompahgre IPA (Predicted)	3	11	14
Total, Predicted range	5	25	30
Utah (Gross)	10	19	31
Uintah Basin (mapped occupied)	17	32	51
Carbon and Emery Counties (mapped occupied)	4	48	52
Wyoming (Gross)	6	21	27
Total (Gross)	7	20	28

Oil and gas development is a major cause of development in the gross range of the species and is likely to continue into the foreseeable future at similar rates of development. Twenty-eight percent of the species' gross range is authorized for leasing. Leasing does not guarantee development, and therefore we consider the area leased Federally to be an estimate of the rangewide development, including non-Federal estate. A minimum of 13,000 additional wells will be authorized in the foreseeable future. However, energy development will not occur uniformly across the landscape. Most development will occur in areas of high resource potential. Development is also mediated by variations in well density and spacing. There are localized regions across the white-tailed prairie dog's gross range where development is most prevalent, including the Uinta Basin in Utah, the Northwest IPA in northwestern Colorado, and the southwestern region of Wyoming. The impacts to white-tailed prairie dogs would thus be greater in these locations than in other parts of the species' gross range.

In areas where energy development overlaps occupied white-tailed prairie dog habitats, the resulting habitat loss and fragmentation likely has negative effects on individuals and populations, including mortality, noise disturbance, and habitat loss and fragmentation. Presumably, there is a threshold level wherein habitat loss and fragmentation may threaten the white-tailed prairie dog, at least in localized regions. However, our available information indicates energy development does not currently significantly threaten the species; for example, large prairie dog complexes continue to persist in areas of high energy development (see *Colorado* and *Utah*, above). Based on the information available to us, we have determined that oil and gas development does not significantly threaten the white-tailed prairie dog now or in the foreseeable future.

Development of Oil Shale, Tar Sands, and Other Minerals

Extraction of oil shale and tar sands results in the removal of wide swaths of habitat. Oil shale and tar sands development results in a loss of habitat of the entire lease, although only portions of the lease would be impacted at a given time. Impact footprints for oil shale leases for strip mines are approximately 2,331 ha (5,760 ac) in size (BLM 2008c, p. 4:4), and each surface retort mine (an underground mine with processing of the material above ground) is approximately 668 ha (1,650 ac) (BLM 2008c, p. 4:8). When an area is processed, the impact footprint shifts to another portion of the lease, and mined areas are reclaimed. The success of reclamation varies dependent on site conditions (BLM 2008c, p. 4:71). Oil shale and tar sand development activities can result in long- term or permanent habitat loss and fragmentation of white-tailed prairie dog habitats (BLM 2008c, p. 4:109) depending on the quality and success of habitat reclamation.

Oil shale and tar sands resources occur across 8 percent of the gross range of the species (Hotze, 2010, p. 34). Approximately 1,228,100 ha (3,034,696 ac) of potentially productive land for oil shale and tar sands occurs in Wyoming and Utah (BLM 2008c, p. 2:113), and the BLM made available 660,215 ha (1,631,424 ac) of Federal land for leasing in this area (BLM 2008c, p. ES:7). A very small portion of the white-tailed prairie dog's gross range is identified for leasing in Colorado (Seglund and Schnurr 2009, p. 121).

Oil shale and tar sands development has failed to materialize due largely to technological problems and unfavorable economics. Significant economic questions remain regarding the development of the Green River formation oil shale and tar sands resources (Bartis *et al.* 2005, pp. 15, 53; BLM 2006, pp. 7, 15-19, 31, 34-36). The cost associated with an essentially new industry using new and innovative technologies is likely to be great.

Economic success of oil shale- and tar sands-derived petroleum will depend on continuing high and stable petroleum prices. Due to past fluctuation of petroleum prices, private industry has exhibited a reluctance to proceed with research, development, and subsequent commercial production of oil shale. This situation will likely continue unless the petroleum industry is convinced that petroleum prices will remain high well into the future (Bartis *et al.* 2005, pp. 59-61; Bunger *et al.* 2004, pp. 7-9).

Oil shale and tar sands extraction and development remains a speculative industry. At this time, we believe it is unlikely that the BLM will begin leasing the identified properties for development within the foreseeable future, which we define as approximately 10-15 years. In addition, while oil shale and tar sands resources overlap 8 percent of the species' gross range, actual oil shale and tar sands development facilities overlap with only a small portion (less than 0.1 percent) of the species' gross range. We do not believe development of oil shale and tar sands is a significant threat to the species now or in the foreseeable future.

Mineral Development

Coal, uranium, sand, and gravel mining can result in the removal of habitat (BLM 2004, p. 4:12). These activities have the potential to result in long-term or permanent habitat loss and fragmentation, depending on the quality and success of habitat reclamation. These activities are not common land uses on BLM holdings in the gross range of the species. The BLM solid mineral leases total 108,170 ha (445,209 ac), less than 1 percent of the species' gross range (Hotze 2010, p. 30). The BLM coal leases total 88,167 ha (217,866 ac), also less than 1 percent of the species' gross range (Hotze 2010, p. 32). Available evidence does not suggest solid mineral leases are more common on private lands. Available information does not suggest they will become more widespread within the species' gross range in the future. Given the small percentage of the gross range impacted by these activities, we do not believe mineral development is a significant threat to the species now or in the foreseeable future.

Renewable Energy Development—Wind and Solar

The BLM has accessed areas of renewable resource potential with the objective of allowing the industries to focus development in the areas of highest potential (BLM and DOE 2003, p. 2). The majority of the species' gross range (Federal and non-Federal lands) has a low (~ 5kWh/m2/day) amount of direct solar resources (BLM and DOE 2003, p. A2). Currently, less than 1 percent of the species' range has been leased by BLM for development of solar resources (BLM 2009, unpublished data). We are unaware of solar developments on private land within the gross range of the species. The majority of the land containing the species' range is federally owned, and therefore we consider potential solar developments on non-Federal land to be insufficient to threaten the species. Given the limited solar resources and lack of development to date in the species' range, we do not consider solar energy to be a significant threat to the species now or in the foreseeable future.

Wind energy could impact the species by creating habitat loss, disturbance, or fragmentation; increasing the amount of invasive vegetation; increasing direct mortality; and increasing disturbance from noise and human presence (BLM 2005b, p. 5:42). Wind power has experienced a rate of expansion greater than any other renewable energy resource, and continued increases are predicted through 2030 (EIA 2009, pp. 47, 74). Depending on costs, wind power production could increase nationwide by as much as 38 percent by 2030 (EIA 2009, p. 74).

The BLM manages more land areas of high wind resource potential than any other land management agency. In 2005, the BLM completed the Wind Energy Final Programmatic Environmental Impact Statement (EIS) that provides an overarching guidance for wind project development on BLM-administered lands (BLM 2005b, entire). Best management practices are prescribed to minimize impacts of all phases of construction and operation of a wind production facility. We do not have information on how or where the EIS guidance was applied since 2005 and, therefore, cannot evaluate its effectiveness.

Wind energy developments leased by the BLM total 823,358 ha (2,034,562 ac), or approximately 4 percent of the species' gross range (Hotze 2010, p. 28). Only 5 to 10 percent of a development will have long-term surface disturbances (i.e., roads, foundations, substation, fencing) (BLM 2005b, p. 5:2).

To evaluate the potential of future wind energy developments to impact the species, we examined the potential locations for development. Within the species' gross range in Colorado and Utah, only poor and marginal wind power resources exist (NREL 2003, entire; NREL 2004, entire). In Wyoming, there are pockets of good, excellent, and outstanding wind power within the species' gross range in Fremont, Natrona, and Carbon Counties (NREL 2002, entire). The majority (more than 75 percent) of these counties are federally owned land. However, better wind power resources (rated as outstanding and superb, based on wind speeds) are available east of the species' gross range (NREL 2002, entire). We expect areas with the best wind resources will be developed first and receive more total development.

We are unable to quantify the wind development scenario for private lands in the species' gross range. No central organization currently tracks wind development on private lands. Given the small amount of private land that coincides with an economically developable wind resource, we assume a maximum development of less than 10 percent of the species' gross range in Wyoming.

The BLM maximum potential development scenario for wind energy in the entire State of Wyoming is an estimated total of 3,197,937 ha (7,902,000 ac) of potentially developable lands, but a much smaller amount is likely to be developed on BLM-administered lands (1,497 ha (3,700 ac)) (BLM 2005b, p. 5:2). The BLM estimates that only 5 to 10 percent of BLM area, or 150 ha (370 ac) of lands, will have long-term surface disturbance (BLM 2005b, p. 5:2). We expect that much of the economically developable land exists outside the species' gross range, and given the small size of the total area on Federal lands likely to be developed in Wyoming (1,497 ha (3,700 ac)), and that the majority of the species' range occurs on Federal lands, we do not expect wind energy development to have a significant impact on the species.

Because only small portions of the species' gross range are currently impacted by wind development and expected to be impacted in the future, we do not believe wind energy development represents a significant threat to the species. Given that projected development is small in regard to the size of the species' gross range, and that the majority of development will take place where better resources exist, we expect the overall impact of wind development on the white-tailed prairie dog to be low.

Urbanization

Conversion of land for urban development results in a permanent loss of habitat and fragmentation for many species, including the white-tailed prairie dog. Increases in major population centers result in increased infrastructure, such as roads and transmission lines. These infrastructure features may impact habitats beyond the immediate urban area. Increased urbanization can introduce domestic animals, such as dogs and cats, that may prey on some prairie dogs (Magle and Crooks 2009, p. 198). Human population growth may result in an increased use of surrounding public lands for recreation (Seglund and Schnurr 2009, p. 54).

The effects of urban fragmentation on the white-tailed prairie dog have not been studied. Some information exists for the black-tailed prairie dog. Weights and sex ratios of black-tailed prairie dogs in urban environments were within normal ranges for the species (Magle 2008, p. 116). However, black-tailed prairie dogs were more likely to occur on larger, contiguous habitats within the urban environments rather than smaller, highly fragmented parcels (Magle and Crooks 2009, p. 197). Collapses of existing colonies were observed within highly fragmented urban environments (Magle and Crooks 2009, pp. 197, 199). This information suggests that some prairie dogs can survive in fragmented habitat, but population loss increases with degree of fragmentation and amount of time since fragmentation occurred (Magle and Crooks 2009, p. 200).

The rate of urbanization within the Rocky Mountain region is below the national average (White *et al.* 2009, pp. 41-42). As of 2004, urbanization affected 0.2 percent of the white-tailed prairie dog's gross range (Seglund *et al.* 2006, p. 45). Much of the existing and future predicted urbanization is localized to specific population centers, as further described below.

Colorado

Twenty-eight percent of the overall white-tailed prairie dog's predicted range is expected to be impacted by high density urban development (i.e., less than 16 ha (40 ac) per housing unit), 5 percent by moderate density urban development (16 to 32 ha (40 to 80 ac) per housing unit), and 8 percent by low density urban development (greater than 32 ha (80 ac) per housing unit) by 2020 in Colorado (Seglund and Schnurr 2009, p. 171). Public land comprises 59 percent of the species' predicted range in Colorado and is not expected to be impacted by urbanization (Seglund and Schnurr 2009, p. 171). We expect that only moderate and high density urban development will negatively impact the species, because low density developments still provide large expanses of area for colonies to exist and allow for connectivity between colonies.

The majority of urban development is predicted to occur in the Grand Valley-Uncompahgre IPA (Seglund and Schnurr 2009, pp. 52, 54). Urbanization has already fragmented white-tailed prairie dog habitats in this IPA (Seglund and Schnurr 2009, p. 54). By 2020, 37 percent of the IPA is expected to be impacted by high or moderate density urban development (Seglund and Schnurr 2009, p. 174). However, urbanization will be localized largely to the Grand Junction and Montrose urban areas. High or moderate density urban development will occur across much less of the North IPA (0.9 percent) and Northwest IPA (0.4 percent) (Seglund and Schnurr 2009, p. 174).

Urbanization has the potential to impact the species in Colorado, particularly in portions of the Grand Valley/Uncompahgre IPA. However, as noted above, high-density urbanization will be localized primarily to the human population centers of Grand Junction and Montrose. Because of its localized impact and the availability of large acreages of Federal, non-urbanized lands in the species' predicted range, we do not consider urbanization to be a significant threat to the species in Colorado now or in the foreseeable future.

Montana

In Montana, 49 percent of the species' predicted range is privately owned (Table 1, above). Private land uses include grazing, agriculture, and housing; a metropolitan area is located in nearby Carbon County. At one time, 31 distinct white-tailed prairie dog colonies occurred in Montana. Urbanization resulted in the loss of 3 colonies to road construction and development (Begley 2010b, pers. comm.). An additional 20 colonies were lost to impacts associated with mining, agriculture, or other unknown causes not directly attributable to urban development (Begley 2010b, pers. comm.).

Of the eight remaining colonies in Montana, four occur on privately owned land (Begley 2010b, pers. comm.). Three of these colonies are in areas that support livestock grazing (Begley 2010b, pers. comm.). We are unaware of any plans to develop these properties in the foreseeable future. The remaining four colonies occur on Federal lands and are thus not threatened by urbanization. Therefore, we do not consider urbanization in Montana to significantly threaten the species now or in the foreseeable future.

Utah

Urban development is expected to expand by 188,600 ha (466,041 ac) across the State of Utah by the year 2030 (White *et al.* 2009, p. 44). However, development is localized to metropolitan areas along the Wasatch front in Weber, Morgan, Summit, Davis, Salt Lake, Toole, Utah, and Juab Counties (U.S. Department of Agriculture (USDA) 2008, p. 2; U.S. Census Bureau (USCB) 2005a, p. 1). These areas do not overlap the species' gross range.

The majority of white-tailed prairie dogs in Utah occur in the Uinta basin (Lupis *et al.* 2007, p. 17). The potential for future urban development in the Uinta Basin is associated largely with the city of Vernal (USCB 2005a, p. 1). Vernal is a support and staging area for the oil and gas development (see *Factor A*. Oil and Gas Exploration and Development) of the Uinta basin; increased urbanized development is primarily the result of increased oil and gas expansion. However, much of the required urban infrastructure is already in place, and the majority of gross range in Utah is managed by Federal agencies (Table 1, above). The gross range and mapped occupied habitat of the white-tailed prairie dog in the Uinta basin does not overlap the developing areas associated with the city of Vernal; thus we expect that most of the predicted development through 2030 will occur outside of the species' gross range.

We evaluated the likely centers for urbanization in Utah through 2030 and compared these to the gross range and mapped occupied habitat of the white-tailed prairie dog. Based on our evaluation, we do not consider urbanization to be a significant threat to the species in Utah now or in the foreseeable future.

Wyoming

Wyoming has the largest amount of white-tailed prairie dog habitat and the smallest amount of predicted development. Over 46 percent of the species' gross range occurs in counties with no urban development: Park, Big Horn, Washakie, Hot Springs, Sublette, and Carbon Counties (USCB 2005b, p. 1). Only localized, small portions of the remaining counties will be impacted in the metropolitan area of Casper and the micropolitan areas of Riverton, Evanston, Rock Springs, and Laramie (USCB 2005b, p. 1). Given these factors, we do not believe urbanization is a significant threat to the species in this State now or in the foreseeable future.

In summary, habitat loss and fragmentation due to urbanization may impact the white-tailed prairie dog, but only in localized areas. There is no indication that there will be significant increases in urbanization across the species' gross range in the future. Therefore, we do not believe urbanization to be a threat to the species now or in the foreseeable future.

Agricultural Land Conversion

Agricultural land conversion is the change in land use from any use to an agricultural use, including crops and pastures. Agricultural crops can benefit prairie dogs by providing highly nutritious forage (Crocker-Bedford 1976, pp. 73-74; Seglund and Schnurr 2009, p. 95). However, these colonies also are subject to additional mortality factors including higher lethal control efforts (see *Factor B.* Shooting and *Factor E.* Poisoning) to protect crops (Knowles 2002, p. 12), increased habitat fragmentation from fences and roads, and increased urban predators (Seglund and Schnurr 2009, p. 95).

The impact of past agricultural conversion is difficult to determine given how little we know about the historical range of white-tailed prairie dogs. Historical population declines occurred for all prairie dog species, and range contractions were documented for white-tailed prairie dogs in localized areas in Colorado and Montana (Knowles 2002, p. 12). However, we do not know if these losses were the result of agricultural conversion or other factors; it is likely that historical population losses were the result of a combination of impacts across the range of the species. Agricultural land conversion probably displaced some white-tailed prairie dogs in areas of Colorado and the Big Horn Basin in Wyoming (Knowles 2002, p. 12).

Today, agriculture occurs across 3.7 percent of the gross range of the white-tailed prairie dog (Seglund *et al.* 2006, p. 50). Many of the areas currently inhabited by white-tailed prairie dogs are arid and semi-arid with short growing seasons (Seglund *et al.* 2006 pp. 4-5) and therefore have limited potential for crops. In Colorado, the counties containing white-tailed prairie dogs saw a decrease in the amount of agricultural land by an average of 37 percent between 1954 and 2002 (calculated from data in Seglund and Schnurr 2009, p. 96). Farm land (e.g., crops, pasture, grazing (not including Federal grazing permits), USDA 2009, p. B:14) acreages have continued to decline across all States and counties that occur within the gross range of the white-tailed prairie dog (see Table 3, below). There is not a direct correlation between the decline in farm lands and increases in other land uses, although it is likely that the farmland has been re-converted to other rural uses, such as grazing, or has become urbanized (see *Factor A.* Urbanization).

TABLE 3. PERCENTAGE DECREASE OF FARM LAND, STATEWIDE AND IN COUNTIES PARTLY OR WHOLLY CONTAINED WITHIN THE RANGE OF THE WHITE TAILED PRAIRIE DOG, BETWEEN 2002 AND 2007 (USDA 2009, PP. CO 316, UT 249, WY 268, 316).

State	Statewide	Counties Within White-tailed Prairie Dog Range
Wyoming	12.1	14.0
Colorado	7.6	9.5
Utah	2.3	13.1
Average	7.3	12.2

In summary, agricultural land conversion was likely a major historical impact on the species. However, many of the areas currently inhabited are not suitable for crop lands, and appear to be supporting sufficient populations of the species. The effects of land conversion on the species are mixed, and currently very limited land is being converted to agricultural uses. Therefore, we do not consider agricultural land conversion to be a significant threat to the species now or in the foreseeable future.

Grazing

Native herbivores, such as pronghorn antelope (*Antilocarpo americana*), mule deer (*Odocoileus hemionus*), and bison (*Bison bison*), occurred in the sagebrush-steppe region prior to European settlement of western States (Osborne 1953, p. 267; Miller *et al.* 1994, p. 111), and prairie dogs co-evolved with these grazers. Domestic livestock grazing in the intermountain west began with the arrival of European settlers in the 1800s. The numbers of livestock were unregulated, and peaked in the early 1900s (Oliphant 1968, p. vii; Young *et al.* 1976, pp. 194-195, Carpenter 1981, p. 106; Donahue 1999, p. 15; Seglund *et al.* 2006, pp. 49, 51), with an estimated 19.6 million cattle and 25 million sheep in the West (BLM, 2009, pp. 1-2).

Excessive grazing by domestic livestock during the late 1800s and early 1900s, along with severe drought, significantly impacted sagebrush ecosystems (Knick *et al.* 2003, p. 616). Livestock grazing continues to be the most widespread type of land use across the sagebrush biome (Knick *et al.* 2003, p. 616; Connelly *et al.* 2004, pp. 7-29; Knick *et al.*, in press, p. 27). However, the intensity of grazing on all Federal lands has declined since the early 1900s (Laycock *et al.* 1996, p. 3).

Livestock grazing can affect ecosystem functions and structures, including a general decrease in grass and shrub cover, total plant biomass, and rodent species diversity and richness (Fleischner 1994, pp. 633-635; Jones 2000, pp. 160-161). Fencing and roads associated with grazing may cause habitat fragmentation and may directly or indirectly cause increased mortality of prairie dogs by increasing prairie dog-vehicle collisions, creating perch sites for raptors, and providing access corridors for predators (Call and Maser 1985, p. 3; Connelly *et al.* 2000, p. 974; Connelly *et al.* 2004, pp. 1-2).

"Overgrazing" refers to continued heavy grazing beyond the recovery capacity of the forage plants (Vallentine 1990, p. 329). Overgrazing causes the palatable and preferred herbaceous vegetation of prairie dogs to be preferentially removed, allowing shrubs and unpalatable plants to flourish. Overgrazing can facilitate the establishment of invasive species such as cheatgrass (*Bromus tectorum*) (Masters and Sheley 2001, p. 503) (see below for more information). The intensity, duration, and distribution of livestock grazing are more influential on rangeland condition than livestock density (Aldridge *et al.* 2008, p. 990). Grazing impacts to rangeland are determined by the type of animal, stocking rate, duration of grazing, season of use, and current habitat conditions (Vallentine 1990, entire).

Impacts of livestock grazing on white-tailed prairie dogs are not known largely because of our lack of historical species distribution information and the lack of ungrazed habitats as a baseline (Seglund *et al.* 2006, p. 49). Overgrazing may impact prairie dogs by degrading the quality and quantity of forage; decreasing forage availability during important breeding, rearing, and pre-hibernation periods; and decreasing white-tailed prairie dog reproductive success and over-wintering survival (Seglund *et al.* 2006, p. 49). However, the potential for impacts is likely to be site-specific. For example, removing livestock from shrub-steppe habitat can result in either an increase of species richness (Anderson and Inouye 2001, pp. 538, 544-545, 549-550), or a decrease in species richness (Manier and Hobbs 2007, p. 743), depending on site variables.

Grazing effects to other prairie dog species are known to some degree. Livestock grazing can have positive effects on black-tailed prairie dog colonies because of grazing's effect of converting mid-height and tall grasses to short grasses improves predator surveillance visibility (Uresk *et al.* 1981, p. 200; Cable and Timm 1987, p. 46). Overgrazing was shown to negatively affect Utah prairie dog growth rates, foraging ability, and survivorship (Cheng and Ritchie 2006, p. 550). Utah prairie dog colony extinction rates increased as plant species richness declined due to overgrazing (Ritchie 1999, p. 12). Heavy grazing also can contribute to an increase in shrubs in Utah prairie dog habitat (Crocker-Bedford 1976, p. 88). However, over time, Utah prairie dogs prefer areas with moderate grazing intensities over ungrazed areas, because sufficient forage remained available in the grazed plots (Cheng and Ritchie 2006, p. 554); cattle cannot eat plants below 2 centimeters (0.879 in), limiting the impacts of moderate grazing on prairie dogs. Results from the Utah prairie dog studies are most applicable to white-tailed prairie dogs due to similarities in habitat preferences. Both species use arid shrub-steppe habitats, and white-tailed prairie dogs can utilize shrub cover for hiding (Gadd 2000, pp. 24-26). Therefore, we assume that white-tailed prairie dogs react to grazing in a similar manner to Utah prairie dogs. However, reactions to overgrazing may not be as extreme in the white-tailed species due to their higher shrub tolerance.

We do not have information regarding site-specific range conditions on Federal or non-Federal allotments that overlap white-tailed prairie dog habitats. Range condition data is not collected in a manner that is biologically meaningful for small mammals. White-tailed prairie dogs, being a diet generalist living in arid environments, can persist with limited forage. It is unknown how far range condition must deteriorate before a habitat becomes incapable of supporting a colony. Therefore, we do not know how much of the habitat is overgrazed versus moderately grazed. It is likely that overgrazing impacts white-tailed prairie dog colonies in localized portions across the species' range. However, the available literature indicates that prairie dogs can coexist with some level of grazing, and in some cases, benefit from grazing. White-tailed prairie dogs have persisted during higher historical grazing pressures and livestock stocking rates have declined substantially. Therefore, we do not consider grazing to be a significant threat to the species now or in the foreseeable future.

Fire Occurrence and Suppression

The shrub-steppe habitat occupied by the white-tailed prairie dog evolved with infrequent fire frequency intervals of 100 to 450 years depending on the dominant species of sagebrush (Baker 2006, pp. 180-181). Fire suppression activities also were infrequent (Baker 2006, p. 182) and probably had little effect on sagebrush landscapes (Baker in press, p. 22).

Fire ecology of sagebrush habitats has changed since European settlement of the West. In general, fire frequencies have increased in lower elevation sagebrush habitats due to (and resulting in further) invasion of nonnative annual grasses, such as cheatgrass (Baker 2006, p. 178; Crawford *et al.* 2004, p. 8). Fire frequencies also have increased due in part to human activities and presence (Miller *et al.* in press p. 38). Fire frequencies have declined in higher elevation sagebrush habitats, resulting in the expansion of shrubs and trees (Miller and Rose 1999, p. 557; Baker 2006, p. 178; Crawford *et al.* 2004, p. 8). The number of fires and total area burned increased from 1980-2007 in sage-grouse habitat (Miller *et al.* in press, p. 39); this overlaps much of the white-tailed prairie dog's gross range in Wyoming and Colorado. However, the habitat mosaics and effects to wildlife resulting from fires are not well understood and vary across the landscape (Baker 2006, pp. 178, 183).

We do not have information specific to the effects of fire or fire suppression on white-tailed prairie dogs. White-tailed prairie dogs are adapted to a shrub-steppe grass mosaic. They use shrubs as forage and cover from predators (Tileston and Lechleitner 1966, pp. 31, 302; Hoogland 1981, pp. 266-268; Gadd 2000, pp. 24-26). They feed on forbs and grasses, and these can be increased by fire in shrubland habitat (Pyle and Crawford 1996, p. 323; Davies *et al.* 2007, p. 518).

We anticipate that the impacts of fire to white-tailed prairie dogs will vary locally across the species' gross range. In some places where fire has occurred, shrub or pinyon-juniper invasions are likely to occur and may reduce available sagebrush communities for the species (Miller and Rose 1999, p. 557). In other cases, cheatgrass may become the dominant plant species (Baker 2006, p. 178; Crawford *et al.*, p. 8), reducing preferred forage quantity and quality for the white-tailed prairie dog. However, the white-tailed prairie dog is able to use the mosaic of habitats created by fire and fire suppression activities, and thus we do not believe that fire occurrence or suppression is a significant threat to the white-tailed prairie dog now or in the foreseeable future.

Invasive Plant Species

Invasive plant species are promoted by intense levels of disturbance to the environment (Masters and Shelley 2001, p. 504), such as oil and gas development, agriculture, and urbanization. Invasive plant species alter ecological processes by displacing native species, increasing the vulnerability of communities to more invaders, and reducing wildlife habitat quality (Masters and Sheley 2001, p. 503). They can be particularly damaging in areas of low moisture, including shrub-steppe habitats, because they reduce water infiltration of the soil and possess deeper roots than native species, allowing them to use more water and reduce nutrient availability over time (DiTomaso 2000, p. 257). The proliferation of exotic annual weeds over native perennial grasses and forbs may impact the ability of white-tailed prairie dogs to meet their dietary needs, especially during drought years. Utah prairie dog colony extinction rates were found to increase as the number of locally occurring plant species declined (Ritchie 1999, p. 12). Cheatgrass in particular is widely distributed across the gross range of the white-tailed prairie dog. Cheatgrass creates an altered fire regime, increasing the amount of fire and reducing native grasses and shrubs (Masters and Sheley 2001, p. 503). Juniper species have invaded sagebrush habitat beginning with European settlement (Miller and Rose 1999, pp. 551, 555), and may result in decreased habitat if forestation progresses.

The main effect of invasive species is the decrease in habitat quality and forage. Some habitat may be lost due to pine-juniper invasion. It is likely that invasive species will have localized impacts to individual white-tailed prairie dog habitat. Presumably, a certain amount of invasive species is tolerable. Despite localized impacts, no data indicate that invasive species are threatening the species on a rangewide scale. At this point, the available information does not indicate that invasive species, although present within the gross range, are a significant threat to the white-tailed prairie dog now or in the foreseeable future.

Climate Change

Global surface temperatures rose (with regional variations) during the past 157 years, with the largest increases occurring since the 1970s (Trenberth *et* *al.* 2007, p. 252). Globally, average surface temperatures rose by 0.074 degrees Celsius (°C) plus or minus 0.018 °C (0.13 degrees Fahrenheit (°F) plus or minus 0.03 °F) per decade during the past century (1906 through 2005) and by 0.177 °C plus or minus 0.052 °C (0.32 °F plus or minus 0.09 °F) per decade during the past quarter-century (1981 through 2005) (Trenberth *et al.* 2007, p. 253).

Similar surface temperature increases occurred across the gross range of the white-tailed prairie dog. The Southwest region, including the Colorado and Utah portion of the species' gross range, observed a 0.83 °C (1.5 °F) increase in average temperatures when compared to a 1960 to 1979 baseline (Karl *et al.* 2009, p. 129). The Great Plains region (including the Wyoming and Montana portion of the gross range) experienced a 0.83 °C (1.5 °F) increase over average temperatures, compared to the same baseline (Karl *et al.* 2009, p. 123). Drought conditions across the species' gross range were moderate to extreme (Marshall *et al.* 2008, p. 274).

The timeframe over which the best available scientific information allows us to reliably assess the effects of climate change is an important consideration. Until about 2050, greenhouse gas emissions scenarios (reviewed in the Intergovernmental Panel on Climate Change Special Report on Emission Scenarios in 2000, as cited in Ray *et al.* 2009, p. 8), which are an essential component of any climate change assessment, result in a similar range of projections of global and regional climate change (Ray *et al.* 2009, p. 8). Temperature increases over the next 30 to 50 years are relatively insensitive to the emissions scenarios used to model the projected change. Some warming, as projected in the greenhouse gas emissions scenarios, is anticipated as a result of greenhouse gases already in the atmosphere that will influence future climate, more so for mid-century versus late century (Meehl *et al.* 2007, p. 749; Mote and Salathé 2009, p. 30). The range in the spread of the models is due both to details in the formulation (which includes emission scenarios) of each individual model, and natural variability in climate. Because increases of greenhouse gas emissions have lag effects on climate, and because projections of greenhouse gas emissions can be interpreted with greater confidence until approximately mid-century, model projections for the next 30 to 50 years (centered on 2050) have greater credibility than results projected further into future. On the basis of available information, we have determined that predicted climate changes for 2025 and 2050 are more reliable than projections for the second half (up until 2100) of the 21st century and as such, we consider 2050 to represent the foreseeable future.

One scenario predicts an average increase in annual temperature in western North America (covering the entire gross range of the species) of between 1.1 to 3.4 °C (2 to 4 °F) by 2050, compared to a 1961 to 1979 baseline in the western United States (Smith *et al.* 2000, p. 29). Other predictions range from an annual mean warming of about 1.4 to 3 °C (2.5 to 5.5 °F) by 2050 as part of a continent-wide pattern of warming (Ray *et al.* 2009 p. 15). The projections show summers warming more (1.7 to 3.9 °C (3 to 7°F)) than winters (1.1 to 2.7 °C (2 to 5 °F)) (Ray *et al.* 2009 p. 15)

Climate change will affect precipitation. Generally, a reduction of depth, duration, and distribution of snowpack is expected (Solomon *et al.* 2007, pp. 770-772; Marshall *et al.* 2008, p. 276). Precipitation is predicted to decrease in the Southwest region (Karl *et al.* 2009, p. 129), and increase in the Great Plains region (Karl *et al.* 2009, p. 123). Climate change also will affect plague ecology (please see *Factor C. Disease and Predation*, below).

Recent climatic changes, including increased temperatures and freeze-free periods, and changes in precipitation, are important driving forces on ecosystems and have affected a wide variety of organisms with diverse geographic distributions (Walther *et al.* 2002, pp. 391-392; Parmesan and Yohe 2003, p. 41). Many plant and animal species have advanced the timing of spring events (e.g., plant flowering or bird migration) to occur earlier in the year and experienced a shift in latitudinal and altitudinal range (i.e., movement to higher latitudes or higher altitude) (Walther *et al.* 2002, pp. 391-392).

The white-tailed prairie dog and its habitat will likely be affected in some manner by climate change. Climate change could impact habitat quality, which may in turn affect prairie dog productivity. For example, higher quality habitats promote higher weaning success of adult and yearling female white-tailed prairie dogs (Cooke 1993, *in* Seglund *et al.* 2006, p. 7). We would expect higher quality habitats to occur in areas where rainfall is predicted to increase. Alternatively, increased drought in the southwestern portion of the gross range could reduce vegetation quality and quantity, resulting in lowered nutrition for the white-tailed prairie dog (Collier and Spillet 1975, p. 153; Seglund *et al.* 2006, p. 64). Drought may result in more time spent in burrows and less time spent foraging, as well as water-stress from lack of succulent forage (Collier and Spillet 1975, p. 153).

Population fluctuations of white-tailed prairie dog colonies at the Coyote Basin Subcomplex, Kennedy Wash Subcomplex, and Snake John Subcomplex in Uintah County, Utah, were likely the result of drought (Maxfield 2009, pers. comm.). The 2002 drought resulted in a decrease in available forage for white-tailed prairie dogs at a time when populations had peaked. This resulted in little or no reproduction in 2003, and a population crash in 2004 (Maxfield 2010, pers. comm.). Habitat conditions improved and the colonies rebounded to pre-drought population levels by 2008-2009 (Seglund *et al.* 2006, p. 101; Maxfield 2010, pers. comm.), indicating a level of resiliency of this species to withstand at least short-term climatic variations.

Life-history characteristics of the white-tailed prairie dog may be responsible for its resiliency and may provide protection from effects of climate change. The burrowing and hibernating behaviors of prairie dogs provide protection in times of low resource availability and unfavorable conditions, including those associated with climate change (Liow *et al.* 2009, pp. 264, 270). Overwinter survival and reproductive success is linked to habitat quality (Rayor 1985, p. 2839), so lack of adequate food resources during drought leads to a decrease in reproductive output as seen above. Individual animals also may adapt by becoming mostly inactive during times of drought (Liow *et al.* 2009, p. 270).

Shifts in the geographic ranges of wildlife have occurred as an effect of climate change (Walther *et al.* 2002, pp. 390-391), and may thus be anticipated for the white-tailed prairie dog. Due to the large gross range of the species (from the Southwest to the Great Plains, which are projected to have much different impacts from climate change, as discussed above), we expect the effects of climate change to vary throughout the species' gross range, both in nature of the impact and the timing of these effects. In addition, the species' gross range is contained within a region that already witnesses climatic variability as climate varies considerably between years (Smith *et al.* 2000, p. 224). Therefore we expect the effects of climate change to vary temporally (year-to-year) as well. This variation in effects will buffer the cumulative effects of climate change on the species as a whole because only a portion of the gross range will be impacted at a given time.

Although the white-tailed prairie dog will likely be affected by climate change, it is not apparent that a net loss in occupied habitat will result. Variation in conditions across the gross range and a possible gross range shift could maintain sufficient habitat for the species. The species is adaptable to a wide array of climes, as evidenced by a geographic range that includes four States, as well as a wide elevational distribution (see *Ecology and Life History*, above). Unlike more vulnerable species in polar, coastal, and alpine ecosystems, habitat space exists to accommodate shifts in range. Therefore, we do not believe that climate change poses a threat to the species now or in the foreseeable future. The relationship between climate change and plague is discussed in more detail below (see *Factor C. Disease or Predation*).

Summary of Factor A

Energy development, urbanization, agricultural conversion, grazing, fire suppression, introduction of invasive plant species, and climate change within the gross range of the white-tailed prairie dog have occurred and will continue to occur in the future. We do not expect oil shale, tar sands, coal, and other mineral extraction activities to impact a large portion of the species' gross range. Urbanization will have an effect on some local populations, particularly in Colorado, but is not considered a rangewide threat. Grazing is likely impacting some areas of habitat, but no evidence indicates it is a significant threat. A net loss of habitat is not expected to result from climate change. Oil and gas development has the most potential to impact the species due to its widespread distribution and magnitude, yet the intensity of these activities varies greatly across the range due to differences in well density and spacing. Robust colonies and complexes exist even in the most developed areas. The majority of the gross range has not been subject to the intensity of development witnessed around robust colonies of Coyote Basin and Wolf Creek. While further development will occur, we expect the majority to occur in areas with high potential for productivity. Therefore, we do not consider oil and gas to be a significant threat to the species. We have no indication that invasive plant species are a significant threat to the white-tailed prairie dog now or in the foreseeable future.

We conclude that the best scientific and commercial information available indicates that the white-tailed prairie dog is not now, or in the foreseeable future, threatened by the present or threatened destruction, modification, or curtailment of its habitat or range to the extent that listing under the Act as an endangered or threatened species is warranted at this time.

Factor B. Overutilization for commercial, recreational, scientific, or educational purposes.

White-tailed prairie dogs were historically subjected to recreational hunting and shooting as a form of pest management on ranch and agricultural land; these practices continue under State regulations (see *Factor D.* Inadequacy of Existing Regulatory Mechanisms).

The effects of recreational shooting on white-tailed prairie dogs have not been examined. We do have limited information on how shooting affects black-tailed prairie dog populations. Black-tailed prairie dogs in colonies subject to hunting spent more time in alert behaviors and less time foraging, although this effect decreased a year after shooting (Pauli and Buskirk 2007, p. 1223). Recreational shooting reduced black-tailed prairie dog density at specific sites (Vosburgh and Irby 1998, pp. 366–367; Knowles 2002, p. 14) and may negatively affect reproductive rates (Pauli and Buskirk 2007, p. 1228). However, recovery of black-tailed prairie dog populations following shooting occurs (Knowles 1988, p. 54). No research has evaluated long-term impacts from recreational shooting, although population viability monitoring suggests it is unlikely to lead to extinctions of even small populations (Seglund and Schnurr 2009, p. 167).

Life-history traits and species distribution are likely to mediate the effects of shooting on white-tailed prairie dogs. The majority of black-tailed prairie dogs do not reproduce until 2 years of age (Hoogland 2001, p. 920). White-tailed prairie dogs, as previously stated, reach maturity at 1 year of age. Thus, we believe that white-tailed prairie dog populations may be able to recover from the effects of shooting more quickly than black-tailed prairie dogs.

Human recreationists may prefer targeting black-tailed prairie dogs because they live in larger, denser, more identifiable colonies and their mounds are more conspicuous (Seglund *et al.* 2006. p. 55). White-tailed prairie dogs are more dispersed on the landscape and use shrubland habitat for cover from predators. As a consequence, they may be more difficult to find and successfully shoot (Grenier 2009, pers. comm.), limiting the number of recreationists targeting white-tailed prairie dog colonies.

Recreational hunting is permitted rangewide, but it is unlikely that all colonies are exposed to equal risk. Recreational hunting is concentrated on colonies with reasonably easy access (Gordon *et al.* 2003, p. 12). Colonies at higher elevations or in remote areas may never receive hunting pressure due to the difficulty in gaining access. Colonies in close proximity to urban areas and agricultural fields likely receive the greatest shooting pressure (Gordon *et al.* 2003, p. 12; Seglund *et al.* 2006, p. 33). Urban and agricultural land uses affect a small part of the species' gross range (see *Factor A*).

The reproductive cycle of prairie dogs may influence impacts of recreational shooting. Lactating females spend the most time above ground, and lactation occurs during the months of April through July (Tileston and Lechleitner 1966, p. 301). During this time, adult male activity decreases. Recreational hunting in April, May, and June may have the greatest population level impacts because pregnant and lactating females and young of the year are the most vulnerable (Vosburgh and Irby 1998, p. 369; Keffer *et al.* 2000, p. 7). Recreational shooting could remove more offspring than adults or artificially skew the population sex ratio. Thus, seasonal restrictions may be important to reduce the effects of shooting at localized sites.

Seasonal white-tailed prairie dog hunting regulations are implemented in Utah and Colorado. In Utah, shooting is not permitted on white-tailed prairie dog towns between April 1 and June 15 (Utah Division of Wildlife Resources (UDWR) 2007, p. 4). In Colorado, shooting is not permitted on public land between March 1 and June 15 (Colorado Division of Wildlife (CDOW) 2009, p. 10). These closures may reduce impacts to the demographic structure and are expected to provide protection to white-tailed prairie dog populations (Seglund and Schnurr 2009, p. 165).

Recreational and pest removal shooting of white-tailed prairie dogs is allowed without a permit across much of the species' gross range; only Colorado requires a license. Because permits are not required, quantifying the number of prairie dogs killed by shooting is difficult. The only data available are from Colorado's Harvest Information Program (CDOW 2001-2005). In this program, a random survey of registered hunters was performed and an estimated take extrapolated from the survey results. This program does not differentiate between species of prairie dog, so estimates include Gunnison's, black-tailed, and white-tailed prairie dogs.

According to the data in Colorado's 2000-2005 Small Game Harvest Reports, prairie dogs are not a common target among hunters. Only 4.6 to 7.4 percent of hunters reported shooting prairie dogs (CDOW 2001-2005). In addition, as previously discussed, the majority of hunted prairie dogs are likely to be black-tailed and Gunnison's prairie dogs, not white-tailed prairie dogs. Therefore, we do not believe this represents high hunting pressure on white-tailed prairie dogs.

Summary of Factor B

White-tailed prairie dogs, due to their distribution and life-history characteristics, are likely less affected by shooting than other species of prairie dogs. Effects of recreational shooting may be high on specific, easily accessible, localized colonies. However we do not expect that these effects will occur equally across the species' gross range or significantly threaten the species as a whole.

There are no other known threats due to commercial, scientific, or educational uses of this species. We conclude that the best scientific and commercial information available indicates that the white-tailed prairie dog is not now, or in the foreseeable future, significantly threatened by the overutilization for commercial, recreational, scientific, or educational purposes.

Factor C. Disease or predation.

Sylvatic Plague

Sylvatic plague (plague) is an exotic disease foreign to the evolutionary history of North American prairie dogs. Plague was first observed in wild rodents in North America near San Francisco, California, in 1903 (Eskey and Haas 1940, p. 1), and was first confirmed in white-tailed prairie dogs in 1936 (Eskey and Haas 1940, p. 14). It now occurs throughout the entire species' gross range (Biggins and Kosoy 2001, p. 906; Pauli *et al.* 2006, p. 3).

Plague is caused by a bacterium (*Yersinia pestis*), which fleas acquire by biting infected animals and subsequently transmit via a bite to other animals (Gage and Kosoy 2005, pp. 516-517). The disease also can be transmitted through pneumonic (airborne) or septicemic (blood) pathways from infected to disease-free animals (Barnes 1993, p. 28; Ray and Collinge 2005, p. 203; Cully *et al.* 2006, p. 158; Rocke *et al.* 2006, p. 243; Webb *et al.* 2006, p. 6236).

Plague occurs in prairie dog colonies as enzootic and epizootic events. Enzootic plague is an infection maintained in the population over time and causes a low rate of mortality within the colony. Not all individuals are affected because the low density within a colony results in less contact between individuals and a reduced transmission rate. Epizootic plague occurs when the disease spreads from enzootic hosts to more susceptible animals, resulting in a rapidly spreading die-off cycle (Barnes 1993, p. 29; Biggins and Kosoy 2001, p. 909; Cully and Williams 2001, p. 900; Gage and Kosoy 2005, pp. 506-508). Large numbers of animals can die within a few days (Lechleitner *et al.* 1962, pp. 190-192; Cully 1993, pp. 40-42).

The factors that cause a change from an enzootic to epizootic cycle are still being researched, but may include host density, flea density, and climatic conditions (Cully 1989, p. 49; Parmenter *et al.* 1999, p. 814; 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; Ray and Collinge 2005, p. 204; Stenseth *et al.* 2006, p. 13110; Adjemian *et al.* 2007, p. 372; Snäll *et al.* 2008, p. 246). Plague cycles (e.g., epizootic, recovery, enzootic) may result in successive population peaks that are progressively lower than the previous peak and that with each new epizootic, the loss of colonies from plague will exceed the rate of establishment of new colonies (Knowles 2002, p. 13). However, this pattern of progressively lower peaks has not been consistently observed throughout significant portions of the species' gross range.

White-tailed prairie dogs are extremely susceptible to plague (Williams 1986, p. 4). Individual colony population declines of 85 to 96 percent were reported throughout the species' gross range following epizootic plague events (Anderson and Williams 1997, pp. 702, 729). Recovery of white-tailed prairie dog colonies post-plague has occurred within as little as 1 to 2 years (Anderson and Williams 1997, p. 728; Menkens and Anderson 1991, p. 330; Anderson and Williams 1997, p. 728; Seglund *et al.* 2006, p. 69), or can take greater than 10 years (see site discussions below, particularly Little Snake). Epizootic plague frequently recurs in colonies (Barnes 1993, p. 29; Cully 1993, p. 39).

Plague likely persists in prairie dog colonies as an enzootic even when an epizootic outbreak subsides. In the absence of epizootic events, plague was found in fleas, plague antibodies were found in prairie dog and carnivore blood serum samples, and dead plague-positive prairie dogs were found (Biggins *et al. in press*, p. 7). More evidence of enzootic plague acting in populations of prairie dogs and of black-footed ferrets is an increase in survivorship when treated with experimental vaccines and flea control, even in the absence of epizootic plague outbreaks (Matchett *et al.* 2009 *in* Biggins *et al. in press*, p. 7). Increased survival with these treatments compared with untreated areas is indicative that enzootic plague is frequently present and suppressing population levels in untreated areas.

Possible reasons for maintenance of plague as an enzootic in the environment include survival of the bacterium in the soil, persistence of the bacterium in fleas, and the continued slow transmission of the bacterium within the prairie dog community (Gage and Kosoy 2006 in Biggins *et al.* in press, p. 2). Infected fleas exist in burrows for up to 13 months following a plague event (Fitzgerald 1993, p. 57).

Impacts of long-term enzootic plague infection may include local extirpation of colonies, extreme fluctuations in densities and occupied habitat, and inbreeding (Seglund *et al.* 2006, p. 58). Enzootic plague also may alter ecological processes (Biggins 2003, p. 7), such as population dynamics and dispersal. For example, if plague results in higher mortality of adults than juveniles, the remaining juveniles would be less likely to disperse away from their native colonies; they would instead replace the adults in the native colony, resulting in a younger population (Biggins *et al.* in press, pp. 2, 7).

We lack an understanding of how plague is impacting the white-tailed prairie dog on a rangewide basis. Plague monitoring is not performed rangewide. To assess the effects of plague, we evaluated available population and trend data on colonies and complexes known or suspected to be affected by plague. Sharp declines in abundance are generally attributed to epizootic plague outbreaks in the absence of testing. No data was available before the 1980s; all available data were collected after introduction of plague, in what we consider to be a post-plague environment. Therefore, recovery is defined as a return to observed population highs and not a return to pre-plague (prior to 1936 when it was first observed) abundance. We previously defined persistence as the long-term continuance of white-tailed prairie dog colonies, at a high enough level to exist in the long-term with minimal management assistance (i.e., dusting, the application of insecticides to control flea populations, to reduce the spread of plague), in a variety of locations across the species' gross range. We recognize that different methodologies were used at different times and in different locales to derive the various historical estimates we obtained for review. These estimates contribute to the best available information, and we consider them comparable for determining long-term population trends, while acknowledging potential error margins.

Evaluating the data is difficult due to differences in survey methodologies. Information available for various colonies is alternately presented as surveys of active burrows, occupied habitat, population estimates, or prairie dog counts. For this reason, comparison between colonies is not appropriate, and we review each colony individually to derive a general understanding of plague effects. Available data for several colonies includes estimated prairie dog populations and prairie dog counts for different years; these figures are not directly comparable but still describe general trends.

Much of the available data is for sites that were considered for black-footed ferret management areas, which often, but not always, represent the most robust of the known white-tailed prairie dog colonies. Data collected at many of these sites was intended to determine suitability for black-footed ferret reintroduction, and not specifically designed to measure prairie dog abundance. The following is a discussion of some examples of white-tailed prairie dog complexes that have been impacted by plague. Some have declined and maintain lower numbers (appear to still be in a period of decline), while other complexes have declined but either partially or fully recovered. We believe population numbers in colonies or portions of colonies will continue to fluctuate widely, but retain the capacity to return to pre-epizootic numbers.

Little Snake Complex, Moffat County, Colorado

Plague was documented at this complex in 1994 and 1995, following notable declines in populations in 1983-1987 and again in 1993 (USFWS 1995, p. 11). In 1995, white-tailed prairie dog populations were estimated to equal 60 percent of levels prior to the 1983 epizootic (USFWS 1995, p. 11). Mapped occupied habitat declined by 92 percent between 1994 and 1999 (Seglund *et al.* 2006, p. iii). A portion of the complex representing 20 percent of the total area was remapped in 2009. Occupied habitat in that area was 11 percent of the area mapped in 1989 (Ausmus 2010, pers. comm.). Population trends in the remaining 80 percent of the complex were not yet assessed. No dusting (for flea control) is performed at this site. In summary, dramatic declines have occurred at the Little Snake Complex. We cannot document any recovery of the colony to date based on this limited information. The amount of occupied habitat has declined since the detection of plague in the mid-1990s.

Wolf Creek Complex, Moffat and Rio Blanco Counties, Colorado

Plague was suspected in 1985, due to white-tailed prairie dog declines. By 1994, the prairie dog population rebounded to pre-1985 levels (Seglund *et al.* 2006, p. 20). In 2001, population numbers at the Wolf Creek ferret management area were 52 percent lower than in 1993-1994. Populations remained stable through 2002 and 2003 (Seglund *et al.* 2006, p. 93), and densities increased from 2004 to 2006 (Seglund and Schnurr 2009, p. 72).

Wolf Creek was again heavily affected by plague in 2008, and the colony was treated with an insecticide for flea control in fall of 2008 and 2009 (Holmes 2010a, pers. comm.). Active colonies remain in the complex. Quantitative population estimates will not be available until fall 2010 (Rustand 2010, pers. comm.). In summary, white-tailed prairie dog populations at the Wolf Creek Complex have shown dramatic declines followed by recoveries. Fluctuations are likely related to climatic conditions, disease, or a combination of both (Holmes 2008 *in* Seglund and Schnurr 2009, p. 72).

Dinosaur National Monument, Moffat County, Colorado

A large white-tailed prairie dog colony occurred at the National Monument. No prairie dogs were observed on the colony in 2009. The colony is near Wolf Creek and may be affected by the same epizootic plague outbreak (Holmes 2010a, pers. comm.; Holmes 2010b, pers. comm.)

Montana

Montana Fish, Wildlife and Parks (MFWP) has records of 31 white-tailed prairie dog colonies historically occurring in the State (Begley 2010b, pers. comm.). In 1997, only two colonies remained (FaunaWest 1998 *in* Knowles 2002, p. 15). Three of these colonies were permanently lost to urbanization (Begley 2010b, pers. comm.). The cause behind the loss of the remaining 26 is unknown, although poisoning and plague are potential causes (Begley 2010c, pers. comm.). In 2006, the total number of colonies had increased to 10. In 2009, there were eight known active colonies (MFWP 2009a, p. 1; Hanebury 2009, pers. comm.). Plague was suspected by State biologists in the disappearance of one colony from 2006-2009. We do not have population numbers or trend information for any of the Montana colonies.

Shiner Subcomplex, Uintah County, Utah

White-tailed prairie dog population estimates in Shiner Basin were 15,065 in 1997; 47,551 in 1998; 5,383 in 1999, and 13,707 in 2000 (Seglund *et al.* 2006, p. 101). Total animals were counted on transects (not extrapolated for the area) between 2002 and 2007, and estimates were 5,475 animals in 2002; 4,284 in 2004; and 6,124 in 2007 (Maxfield 2009, pers. comm.). In summary, white-tailed prairie dog populations in this area have fluctuated since 1997. The population appears to be lower than occurred in 1998, but has stabilized since 2002. Plague was suspected in this decline (Maxfield 2010, pers. comm.).

Cisco Desert, Southeastern Utah

Mapping and burrow density estimates were conducted for white-tailed prairie dogs from 1985 to 1986. The area was resurveyed using counts of individuals in 1991 and 1992, because of concerns that prairie dog colonies may be declining (Seglund *et al.* 2006, p. 30). Substantially more prairie dogs were counted during 1992 than in 1991 (Seglund *et al.* 2006, p. 30). The population was estimated to be 50,000 animals in 1997 followed by apparent declines in burrow activity in 2001 (Wright 2006, p. 3). Between 1985 and 2006, burrows detected on transects dropped from 48.8 per ha (120.6 per ac) to 37.1 per ha (91.8 per ac). Of the individual complexes, 14 increased in density while 31 decreased (Wright 2006, p. 7).

We interpret this to represent an overall decline in this area between 1985-2006, with marked fluctuations during this period. Plague is suspected in these declines, although drought also contributed (Wright 2006, p. 3). The white-tailed prairie dog is still considered widespread and abundant in this area (Wright 2006, p. 3).

Meeteetsee Complex, Park County, Wyoming

Plague was first documented at Meeteetsee in 1985 (Biggins 2003, p. 7). Large fluctuations in population estimates and active burrows occur at this complex. For example, total active burrows counted were 12,481 in 1985; 7,644 in 1989; 6,782 in 1997; 12,428 in

1990; and 16,736 in 1998 (Biggins 2003, p. 11). This complex was resampled in 2008, and numbers were higher than 1997, but still below 1980s values (Biggins 2010, pers. comm.). In summary, individual colonies within the complex appear to suffer local, large population collapses followed by subsequent recoveries (Biggins *et al.* in press, p. 2). White-tailed prairie dogs continue to occupy the Meeteetsee Complex.

Shirley Basin/Medicine Bow Complex, Wyoming

Population estimates for the complex are available, based on partial surveys. Therefore, numbers presented represent trends but are not directly comparable. Numbers in parenthesis are the percent of complex transected during that year. Population estimates were 30,389 (31) in 1991; 14,551 (22) in 1993; 5,916 (6) in 1994; 19,876 (19) in 1996; 6,547 (16) in 1998; 6,669 (16) in 2000; and 34,698 (8) in 2001 (Seglund *et al.* 2006, p. 107). An additional 38,756 white-tailed prairie dogs also were recorded in 2001, in an area of the complex not surveyed in the previous years (Grenier *et al.* 2002, p. 23). Mapped occupied habitat increased 25 percent between 1991 and 2006 (Grenier *et al.* 2007, p. 133). Similar to other complexes, white-tailed prairie dog populations at Shirley Basin fluctuate dramatically, although direct comparisons are not appropriate due to yearly variation in transect sites. Plague was first documented at Shirley Basin in 1987 (Seglund *et al.* 2006, p. 36). In summary, plague likely impacted populations at Shirley Basin (Seglund *et al.* 2006, p. 36) and may be responsible for the fluctuating populations.

The examples above clearly show that plague is present within white-tailed prairie dog colonies across the species' gross range, and is likely responsible for large population fluctuations and significant declines in complexes or portions of complexes. However, the colonies and complexes also show a capacity to recover after plague events. Some colonies decline and maintain lower numbers, perhaps due to enzootic plague (Little Snake, Montrose County, and Shiner Basin). Other complexes decline but either partially recover (Montana colonies, Wolf Creek, Cisco Desert) or fully recover (Shirley Basin/Medicine Bow).

We do not know if the colonies and complexes recovered to population numbers that existed before plague was introduced because we do not have historical population information. We also do not know if the colonies and complexes exhibit pre-plague life-history patterns of mortality, reproduction, dispersal, and colonization. The available data indicates that white-tailed prairie dogs can continue to persist in the presence of plague. Population numbers in colonies or portions of colonies will continue to fluctuate widely, but retain the capacity to return to pre-epizootic numbers. Plague is demonstrated to cause this pattern in rodent species in Asia, where plague is native (Biggins and Kosoy 2001, p. 64).

Continued persistence of colonies rangewide is impacted by many factors. The separation of colonies within complexes and distance between colonies may mediate the spread of plague. For example, the slow population decline witnessed at Meeteetsee between 1989 and 1997 is likely the impact of plague affecting only a portion of the complex at a time (Biggins *et al. in press,* p. 2). Similarly, only a portion of Wolf Creek was affected by plague while the nearby Crooked Wash did not experience a concurrent decline (Holmes 2010b, pers. comm.). Finally, a population at the Arapaho National Wildlife Refuge in north-central Colorado did not decline concurrent with the decline at Wolf Creek (Hoogland 2010, pers. comm.).

The ability for white-tailed prairie dogs to migrate may promote recolonization of colonies impacted by plague (Seglund *et al.* 2006, p. 10). The ability to repopulate colonies depends on a mosaic of interconnected colonies; isolated colonies are less likely to support sufficient immigration for long-term persistence of plague-affected colonies (Seglund *et al.* 2006, p. 60). The complexes of Little Snake, Wolf Creek, Coyote Basin, Kennedy Wash, Snake John, and Shiner are considered separate but are all located in adjacent Uintah and Moffat Counties, and a reasonable amount of connectivity exists between them.

Size also may be an important factor regulating persistence of individual colonies. Most of the sites discussed above are considered large complexes. In black-tailed prairie dogs, introduction of plague has resulted in colonies being consistently smaller than before first exposure to plague (Cully and Johnson 2008, p. 12). White-tailed prairie dog colonies may overall be smaller now when compared to pre-plague levels. Small colonies not part of a large complex may be affected by plague at a higher intensity and may not have enough source individuals to recover. Smaller populations are generally accepted to be more vulnerable than larger populations (Shaffer 1981, p. 131). Larger groups of black-tailed prairie dogs had a higher survival probability after translocation than small groups (Robinette *et al.* 1995, p. 872). We do not have data to assess specifically how plague operates in smaller, more isolated colonies. However, population viability modeling in black-tailed prairie dogs demonstrated continued persistence in small, fragmented colonies, assuming connectivity between populations (George *et al.* 2008, p. 1).

The temporal nature of plague is an important factor when considering rangewide impacts (Seglund *et al.* 2006, p. 59). Plague does not impact all populations rangewide at the same time, with a predictable reoccurrence rate, or to the same intensity. Large plague-related population declines were witnessed across the gross range, but in different years: Montana in 1997; Shirley Basin/Medicine Bow, Wyoming, in 1994 and 1998; Wolf Creek, Colorado, in 2001/2002 and 2008; and Uintah Basin in 1999 and 2003/2004.

Some social and behavioral traits of white-tailed prairie dogs appear to favor their long-term persistence in a plague environment. White-tailed prairie dog colonies are less dense and more widely dispersed than black-tailed or Gunnison's prairie dog colonies, which may slow transmission rates (Cully 1993, pp. 40-41; Cully and Williams 2001, pp. 898-899). White-tailed prairie dogs are less social when compared to other species; this trait may reduce transmission among individual animals (Hoogland 1981, pp. 252-253; Cully 1993, p. 40). Hibernation also contributes to slower transmission rates, although this may simply delay the onset of symptoms throughout all the colonies (Barnes 1993, p. 35).

Some tools are available to control plague. Deltamethrin and pyraperm are two insecticides used to successfully control fleas on colonies of different prairie dog species (Seery *et al.* 2003, entire; Hoogland *et al.* 2004, entire). Use of these insecticides has increased the number of juvenile Utah prairie dogs weaned (Hoogland *et al.* 2004, p. 379) and resulted in higher survival rates for black-tailed, white-tailed, and Utah prairie dogs (Biggins *et al.* in press, p. 5). Currently, insecticide use on white-tailed prairie dog colonies is limited to experimental use and when plague appears to be impacting colonies that support black-footed ferret reintroduction sites. Wolf Creek was treated in the summer and fall of 2009, in conjunction with that outbreak, and likely will be treated again in 2010. Other sites with black-footed ferrets include Coyote Basin, Snake John, Shirley Basin/ Medicine Bow, and Meeteetsee. Due to the expense of applying insecticide and the effects to non-target species, this method is only used when plague has already been detected.

Experimental vaccine-laden baits are in development to immunize prairie dogs against plague. Black-tailed prairie dogs exposed to plague in a lab setting and fed vaccine baits experienced a high rate of survival (Mencher *et al.* 2004, pp. 5503-5504, Rocke *et al.* 2008, pp. 933, 936). The effectiveness of the vaccine is scheduled for field testing over the next year. A systemic flea control bait also is under development (Poche *et al.* 2008, entire). The flea control bait reduces flea loads on animals, the primary vector in spreading plague in prairie dogs (Jachowski 2009, entire). While use of any of the above techniques, or combinations thereof, to manage plague has not been tested at the landscape level, these techniques show promise in the ability to manage plague.

The occurrence of plague may be affected by climate change. As discussed in *Factor A*, Wyoming and Montana's yearly precipitation will become more variable while temperatures are expected to increase rangewide over the next 40 years. Plague outbreaks are significantly correlated with increased rainfall, particularly spring rainfall (Stapp *et al.* 2004, p. 237; Snäll *et al.* 2008, pp. 245-246). However, plague outbreaks are negatively correlated with the yearly total number of hot days and overall increased temperatures (Stapp *et al.* 2004, p. 238; Snäll *et al.* 2008, p. 245).

Because climate change will likely produce variation in annual rainfall (Stapp *et al.* 2004, pp. 504-505), plague outbreaks may oscillate as these factors interact. Warmer winters in particular can result in increased plague transmission (Stapp *et al.* 2004, p. 236; Salkeld and Stapp 2008, p. 620). This effect is probably due to a range of factors including reduced hibernation (Rayor 1985, p. 195), better over-winter flea survival, and increased habitat productivity (Stapp *et al.* 2004, pp. 237-238). In the Colorado and Utah portions of the gross range, winter precipitation is expected to vary greatly from year to year, with some winters being very dry while others experience intense precipitation and flooding (Karl *et al.* 2009, p. 130). This variation may result in pulses of winter or early spring plague outbreaks during wetter years that are reduced in intensity over several years as hotter summer temperatures reduce plague in the environment. Plague occurrences are likely to decrease in black-tailed prairie dogs due to climate change effects (Snä ll *et al.* 2009, p. 505). Because it is believed that changing environmental conditions resulting from climate change is directly impacting plague transmission, we also may expect that plague will eventually decrease in white-tailed prairie dog habitats, concurrent with rising temperatures. Climate change may have less of an impact on plague levels if white-tailed prairie dogs exhibit a range shift as witnessed in some other species.

Tularemia and Monkeypox

Tularemia (*Francisella tularensis*) and monkeypox (*Orthopoxvirus* spp.) are diseases that have had impacts on captive black-tailed prairie dogs associated with the pet trade, and a wild black-tailed prairie dog was reported as having fallen victim to West Nile virus (Seglund *et al.* 2006, p. 58). We have no information to indicate that any of these diseases are a concern for white-tailed prairie dogs at the population or species level.

Predation

Many species prey upon the white-tailed prairie dog including black-footed ferrets (*Mustela nigripes*), hawks (*Accipiter*, *Micronisus*, *Melierax*, *Urotriorchis* and *Megatriorchis* spp.), eagles (*Haliaeetus* spp.), badgers (*Taxidea taxus*), and coyotes (*Canus lupis*) (Seglund *et al.* 2006, p. 58). However, predation is a natural occurrence for white-tailed prairie dogs, and we have no information to indicate that predation is a threat to the species.

Summary of Factor C

Plague occurs throughout the gross range of the white-tailed prairie dog. The rangewide and long-term effects of plague on prairie dog populations are not well understood. There is evidence of epizootic outbreaks of the disease and enzootic maintenance of the disease in prairie dog colonies. We acknowledge that populations are probably reduced from historic levels, and some colony behavioral functions, including migration and social interactions, may be impaired by plague. However, we have no evidence that demonstrates that plague has eliminated white-tailed prairie dogs from large portions of its gross range after over 70 years of exposure to the disease. Affected colonies have shown partial or complete recovery after plague events, and complexes continue to persist at the landscape level. Available information indicates that plague events are to some extent localized temporally and spatially, which may help mediate the species-level effects. Management actions are underway to research and implement plague control mechanisms, such as dusting, vaccines, and flea control, which should help alleviate colony population fluctuations and declines due to plague in the foreseeable future. As a result, we have determined that while plague is affecting the white-tailed prairie dog, it is not a significant threat that is now causing or projected to cause the species to be at risk of extinction.

The available evidence does not indicate that other diseases or predation are sufficiently acting on the species to threaten the species with possible extinction now or in the foreseeable future. We conclude that the best scientific and commercial information available indicates that the white-tailed prairie dog is not now, or in the foreseeable future, threatened by disease or predation to the extent that listing under the Act as an endangered or threatened species is warranted at this time. Continued plague monitoring and research will be important for us to continue to assess the level of impact this disease plays in the long-term conservation of white-tailed prairie dogs. The development of a vaccine to protect prairie dog populations may help decrease future effects of plague.

Factor D. The inadequacy of existing regulatory mechanisms.

State Regulations and Private Land Management

Rangewide

State laws and regulations may impact white-tailed prairie dog conservation by providing specific authority for white-tailed prairie dog conservation over lands which are directly owned by the State; providing broad authority to regulate and protect wildlife on all lands within their borders; and providing a mechanism for indirect conservation through regulation of threats to the species (e.g., noxious weeds). In general, States have broad authority to regulate and protect wildlife within their borders. All of the States within the range of the white-tailed prairie dog have State school trust lands that they manage for income to support their schools. We are unaware of any specific regulations to ensure that the management of the State trust lands is consistent with the needs of white-tailed prairie dog. Thus there are currently no regulatory mechanisms on State trust lands to ensure conservation of the species.

Environmental planning regulations establish environmental quality as an essential component of land use and project planning and provide a structured, analytical frame work to make decisions that balance environmental and economic factors (Council on Environmental Quality (CEQ) 1997, p.11). The implementation of the National Environmental Policy Act (NEPA, 42 U.S.C. 4321 *et seq.*) has improved the quality of projects and reduced impacts to the environment in the Federal planning process (CEQ 1997, p. 17). Within the range of the white-tailed prairie dog, only Montana has NEPA-like environmental planning regulations (CEQ 2009, entire). Because activities on private and State lands in Colorado, Utah, and Wyoming are not subject to environmental review, they may have a greater impact to white-tailed prairie dogs than similar activities on Federal lands.

Potential impacts to the species that can be managed by State or private entities include recreational shooting, shooting to protect agricultural interests, and oil and gas development on non-Federal mineral estates. In addition, the 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 white-tailed prairie dog and other species among the western States. The WAFWA prepared a Rangewide Conservation Agreement for the White-Tailed Prairie Dog in 2006 (Seglund *et al.* 2006, entire). The objectives of the conservation agreement include identification and monitoring of the species' status and distribution, public education, identification and implementation of priority research needs, and creation of State management plans (Seglund *et al.* 2006, p. 3). The conservation agreement provides expertise, recommendations, and coordination of funding for the conservation of the species, but does not provide regulatory protection.

Private lands comprise a large portion of the predicted range of the species. Private landowners can control prairie dogs on their land as necessary in all States. However, general public access and hunting on private lands throughout the gross range are limited by trespass laws. We have no evidence that the control activities or policies of individual private landowners are threatening the species.

Oil and gas development occurs across the gross range of the species, including on lands managed by the States. We are unaware of any regulations or protection measures for white-tailed prairie dogs on these lands. However, based on available information, we do not consider oil and gas development a factor that significantly threatens the white-tailed prairie dog (see *Factor A.* Oil and Gas Exploration and Development, above).

Colorado

The Colorado Department of Wildlife (CDOW) released a Statewide Conservation Strategy outlining the management of white-tailed and Gunnison's prairie dogs in fall 2009 (Seglund and Schnurr 2009, entire). This document guides the development of conservation strategies for the three white-tailed prairie dog Individual Population Areas (IPAs) (see Distribution and Abundance). Local action plans with individual goals and objectives are under development for each IPA. The Statewide Conservation Strategy provides management priorities and guidance for the species, but does not provide regulatory protection.

All prairie dog species are classified as small game in Colorado. A small game license is required for shooting prairie dogs, with the exception of private landowners and their immediate family members or designees, who may kill prairie dogs causing damage on their lands (CDOW 2009, p. 10). Shooting of prairie dog species is not permitted on public land between March 1 and June 15 (CDOW 2009, p. 10), providing protection during the sensitive breeding and rearing time periods.

The Colorado Oil and Gas Conservation Commission (COGCC) had a policy encouraging voluntary cooperation among oil and gas operators in preventing and mitigating potential impacts to wildlife (COGCC 1996, entire). In 2009 the state legislature passed rules requiring oil and gas companies to consult with state wildlife officials regarding the impacts of their proposed development to wildlife. The rules promote best management practices and allow the state to set reasonable conditions of development in sensitive wildlife areas (COGCC 2009, entire). Application of these rules to white-tailed prairie dogs in particular is then up to state wildlife officials. Given the recent passing of these rules, it is unknown if they will be applied to prairie dog species.

Montana

White-tailed prairie dogs are identified as a Species of Greatest Conservation Need (Tier 1) in Montana's Comprehensive Fish and Wildlife Conservation Strategy (MFWP 2009a, p. 1). The State defines this as a species whose needs must be specifically addressed, whether through focus areas, community types, or individually (MFWP 2005, p. 188). This designation gives the State statutory authority to manage the species. For example, under this authority, MFWP translocates white-tailed prairie dogs in an effort to establish new colonies. Translocations began in 2007, and are expected to continue until at least 2011.

White-tailed prairie dogs in Montana were once protected from all shooting, but the regulation protecting them has lapsed, and they are currently unprotected. A license is not required to hunt prairie dogs in Montana.

Utah

The white-tailed prairie dog is listed as a Species of Concern in Utah, defined by the State as a wildlife species for which there is credible scientific evidence to suggest a threat to continued population viability within the State (UDWR 2007, p. 1). Species are provided this designation in order to encourage management actions and prevent the species from declining to the point where listing is necessary. Utah completed a conservation agreement and Strategy for white-tailed and Gunnison's prairie dogs in 2007. Under the conservation agreement, the State committed to conduct occupancy surveys in an effort to detect population declines and respond with appropriate management actions (Lupis *et al.* 2007, pp. 22-23). The Statewide conservation strategy provides management priorities and guidance for the species, but does not provide regulatory protection.

No license is required to hunt prairie dogs in Utah (UDWR 2009, p. 1). However, prairie dog shooting is not allowed between April 1 and June 15 (UDWR 2009, p. 4), providing the species with protection during sensitive breeding and rearing periods. In addition, a year-round shooting closure is implemented in the Coyote Basin black-footed ferret reintroduction area (7,604 ha (18,789 ac)).

Wyoming

White-tailed prairie dogs are considered a Species of Greatest Conservation Need: Native Species Status 4 in Wyoming. Species are given this designation when habitat is restricted or threatened, or population numbers are declining and unknown. The species was given a status level of 4 due to unknown population trends and restricted or vulnerable but not declining habitat (Wyoming Game and Fish Commission 1998, p. 238). No conservation agreement is in place for the species in Wyoming. State biologists participate in prairie dog surveys and management under the guidance of WAFWA.

Shooting of white-tailed prairie dogs is permitted in Wyoming without a license (WGFC 1998, pp. 52-54), and there are no seasonal closures. State biologists have witnessed no negative effects from removing a seasonal closure on the Shirley Basin population (Grenier 2009, pers. comm.); therefore, it seems unlikely that lack of closures is having a population-level effect.

In summary, the States are actively involved in prairie dog research and monitoring efforts under direction of the WAFWA Conservation Agreement and State-specific species management plans. The information obtained through these efforts will be valuable for future efforts to conserve the species and avoid threats. Recreational shooting of prairie dogs is not considered a threat to the species (see *Factor B*. Overutilization, above). However, seasonal shooting closures are implemented on a site-specific basis in Colorado and Utah. The lack of environmental planning and protection for the species from all land use activities on non-Federal land, including non-Federal oil and gas leases, may impact the species in the future. However, at this time the information we do have does not indicate that threats from land use activities are sufficient to require regulatory mechanisms now or in the foreseeable future (see *Factor A*., above).

Federal Management Authority

Potential impacts to the species that could be managed by the Federal land management agencies include oil and gas development, grazing, fire suppression, 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.*) is the primary Federal law governing most land uses on BLM lands. Section 102(a)(8) of FLPMA specifically recognizes wildlife and fish resources as being among the uses for which these lands are to be managed. The BLM considers the needs of wildlife, including the white-tailed prairie dog, when conducting activities in their habitat. Typically, this means the impacts to these species are considered during project planning stages and conservation measures may be included at the discretion of the agency biologists. In addition, the BLM is required to meet environmental planning requirements under NEPA (73 FR 61292), which requires reviewing the effects of actions on the environment (including wildlife) before implementation.

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(k)). These plans provide a framework and programmatic guidance for site-specific activity plans. In addition, BLM management plans may include conservation measures to protect the species. These measures vary between State and field offices.

Site-specific plans likely to affect white-tailed prairie dogs typically include livestock grazing, oil and gas field development, wildlife habitat management, and other land use activities. The potential effects of these activities on the species' habitat are addressed under *Factor A*, above.

In Colorado's Grand Valley/Uncompahgre IPA, BLM lands have special designations offering protections, such as a yearly closure to motorized and non-motorized travel restrictions to designated routes only, and withdrawal from all forms of mineral entry, including oil and gas leasing (Seglund and Schnurr 2009, p. 55). The BLM-owned portion of the Northwest IPA's white-tailed prairie dog's gross range is considered high or medium potential for oil and gas development. The RMPs stipulating activities in this IPA are undergoing revisions to address oil and gas development and associated impacts (Seglund and Schnurr 2009, p. 61). We do not know if the RMP revisions will include conservation measures to minimize the effects of oil and gas development to white-tailed prairie dogs. At this time, we do not believe oil and gas development to be a significant threat to the species (see *Factor A*. Oil and Gas Exploration and Development, above). However, the ability to adequately monitor the species in energy development areas will be important for our long-term ability to minimize impacts.

In Utah, the BLM updated several field office RMPs in 2007. These updated RMPs included a stipulation to avoid surface-disturbing activities within 201 m (660 ft) of white-tailed prairie dog colonies in known prairie dog habitat (BLM 2008a, p. K:13). An exception may be granted if impacts can be mitigated or if there is no other reasonable location to develop the lease. This stipulation is included in the management plans that apply to white-tailed prairie dog colonies near Vernal, Richfield, Price, and Moab. No exceptions to this stipulation have yet been made in the Moab or Price field offices. Vernal field office staff report four exceptions to this stipulation. In all examples, disturbance was limited to the edge of a colony because no other alternatives were available (McDonald 2010, pers. comm.). The RMP governing activities in Rich County has not been amended to include a stipulation to protect white-tailed prairie dog habitat (Madsen 2009, pers. comm.). However, this area comprises a very small amount of occupied habitat in Utah, and any impacts to this area are unlikely to produce population-level effects.

In Wyoming, no extra protections are extended to white-tailed prairie dogs on BLM land, although control efforts (described below in *Factor E*) are not permitted except in the case of extensive resource damage or a threat to human health and safety (Keefe 2009, pers. comm.). Given the extent of oil and gas development in this State, lack of regulations on BLM land could be detrimental to the species, but the available evidence does not suggest that impacts are rising to a significant population-level threat (see *Factor A*. Oil and Gas Exploration and Development, above).

U.S. Forest Service (USFS)

The USFS considers the white-tailed prairie dog to be a Region 2 sensitive species, which requires USFS to consider the presence of the species and recommend mitigation when planning projects that may affect the species (Seglund and Schnurr 2009, p. 55). Controlling prairie dogs with toxicants is banned or closely controlled on USFS lands (Seglund *et al.* 2006, p. 62). The USFS manages less than 1 percent of the total species' gross range, so their management strategies are unlikely to impact the species rangewide significantly.

U.S. Fish and Wildlife Service

The Service manages over 500 National Wildlife Refuges and their satellites, but only about 7,975 ha (19,706 ac) fall within the white-tailed prairie dog's predicted range (Seglund *et al.* 2006 pp. 98, 104, 109). Management of this species is not addressed on these lands (Seglund *et al.* 2006, p. 62). Control of prairie dogs through toxicants on these lands is banned or closely controlled (Seglund *et al.* 2006, p. 62). Given the small amount (less than 1 percent) of predicted habitat managed by us, the available information does not suggest that our management practices are having a significant impact on the species.

National Park Service

The NPS preserves unimpaired the natural and cultural resources and values of the national park system for the enjoyment, education, and inspiration of this and future generations. This agency manages 13,393 ha (33,096 ac) of the white-tailed prairie dog's predicted range (Seglund *et al.* 2006, pp. 98, 104, 109). Management of this species is not addressed on these lands (Seglund *et al.* 2006, p. 62). Control of prairie dogs through toxicants on these lands is banned or closely controlled (Seglund *et al.* 2006, p. 62). Given the small amount (less than 1 percent) of predicted habitat managed by this agency, the available information does not suggest that NPS management practices are having a significant impact on the species.

Tribal Lands

The Bureau of Indian Affairs (BIA) administers 135,376 ha (334,523 ac) of land within the white-tailed prairie dog's predicted range (Seglund *et al.* 2006, pp. 98, 104, 109). Additional land owned by Tribes or Tribal members may have been included under the calculations for private land. We are unaware of any official policies from the BIA or Tribal councils regarding protection of white-tailed prairie dogs on BIA-administered or Tribally owned lands. Given the small amount (less than 1 percent) of predicted habitat managed by Tribes, the available informationdoes not suggest that BIA management practices are having a significant impact on the species.

In summary, Federal agencies have very few regulations for the protection of this species. The oil and gas surface use restrictions in the State of Utah likely help minimize the impacts of oil and gas development to white-tailed prairie dogs. The lack of protection measures for the species elsewhere may impact the species in the future; however, at this time the available information does not indicate that factor significantly threatens the species in the foreseeable future (see *Factor A*. Oil and Gas Exploration and Development, above). Poisoning also is banned or closely controlled on Federal lands (see *Factor E*. Poisoning, below, for further discussion).

Summary of Factor D

All States are involved in active management of the species. The States' conservation agreements and strategies, while not regulatory documents, contain direction to help mitigate threats to the species.

Potential threats for which regulatory mechanisms may play a role include oil and gas development, grazing, fire suppression, poisoning, and recreational shooting. We have determined that these factors do not rise to the level of a significant threat to the white-tailed prairie dog or its habitat rangewide.

Our evaluation determined that these land uses may impact white-tailed prairie dogs on a localized basis. Existing regulatory mechanisms are adequate to reduce impacts at these localized levels. For example, seasonal shooting closures in Colorado and Utah are protecting white-tailed prairie dog populations in some areas during sensitive breeding and rearing time periods. The BLM's RMPs in Utah contain recommendations to avoid surface disturbance during oil and gas development, although this does not mediate the impact of habitat fragmentation from this threat. In addition, the historical threat of poisoning was curtailed when Federal regulation of pesticides was enacted, and is generally not permitted on Federal lands.

Further coordination between State and Federal agencies would be of benefit to this species, particularly in managing habitat fragmentation. More management would be of benefit to the species, but the available evidence does not indicate that limited management strategies are a significant threat to the species.

We conclude that the best scientific and commercial information available indicates that the white-tailed prairie dog is not now, or in the foreseeable future, threatened by inadequate regulatory mechanisms to the extent that listing under the Act as an endangered or threatened species is warranted at this time.

Factor E. Other natural or manmade factors affecting its continued existence.

The following potential natural or manmade factors may affect the white-tailed prairie dog: (1) Poisoning, and (2) competition with Wyoming ground squirrels. These factors are further discussed below.

Poisoning

Poisoning of white-tailed prairie dogs has historically occurred throughout the species' gross range (Seglund *et. al* 2006, p. 63). The USDA Biological Survey and the Agriculture Appropriations Act of 1915 (38 Stat. 1111) planned and authorized a Westside Plan to eliminate prairie dogs across western rangelands (Oakes 2000 in Seglund and Schnurr 2009, p. 140). Prairie dog poisoning campaigns began in all States across the gross range of the white-tailed prairie dogs by 1919 (Seglund and Schnurr 2009, p. 140).

The population-level impact of this practice is difficult to quantify due to our lack of knowledge of the species' historical distribution and our lack of information on the exact locations of poisoning efforts (Seglund and Schnurr 2009, p. 140). However, the extent of poisoning for all prairie dog species was extensive. For example, from 1915 to 1964, Colorado poisoned an area of 9,380,191 ha (23,178,959 ac), which was occupied by the Gunnison, black-tailed, and white-tailed species of prairie dogs (Forrest 2002 *in* Seglund and Schnurr 2009, p. 141). Black-tailed prairie dogs were the main target of eradication campaigns due to their visibility on the landscape, but Gunnison and white-tailed prairie dogs also were poisoned (Seglund and Schnurr 2009, p. 140).

Poisoning in all States became less common after Federal regulation of pesticides was enacted (Seglund *et al.* 2006, p. iv). State and Federal agencies are rarely involved in control efforts unless human health and safety are at risk. The BLM, in particular, has a restriction against poisoning prairie dogs unless required for human health and safety or if resource damage meets specified requirements. Control of white-tailed prairie dogs in this manner is rare, with the agency only reporting one small area currently under control (Keefe 2009, pers. comm.). Individual landowners may still control prairie dogs on their private property.

Poison applications can be an effective means to control prairie dog population size. Baited poisons can result in 75 to 85 percent mortality, and fumigants can result in 95-percent mortality of prairie dog populations when properly applied (Seglund and Schnurr 2009, p.141). Although poisoning was historically widespread, there is no information available to indicate that poisoning occurs at more than a localized scale today. We were unable to quantify amount of toxicants sold for white-tailed prairie dog control. The States within the gross range of the white-tailed prairie dog do not compile records of pesticide sales. There are 103 licensed dealers of restricted use toxicants in Utah and 288 licensed dealers in Colorado. The WGFD staff surveyed Wyoming dealers in 2003, and determined that toxicant sales were too small to warrant tracking, with a total less than would be required to treat 400 ha (1,000 ac) per year (Grenier 2009, pers. comm.).

White-tailed prairie dog biology may provide some protection from poisoning. Because they inhabit less dense, widely distributed colonies, they do not attract the amount of negative attention associated with black-tailed prairie dogs (Knowles 2002, p. 2; Grenier 2009, pers. comm.). In addition, the widespread nature of white-tailed prairie dog colonies makes control through the use of toxicants very labor intensive and unsuitable for widespread control. Black-tailed prairie dogs are known to rebound rapidly after control efforts (Seglund and Schnurr 2009, p. 140). White-tailed prairie dogs may have this capability as well (Seglund and Schnurr 2009, p. 140), particularly because they reproduce at a younger age than black-tailed prairie dogs.

In summary, today, poisoning generally occurs only on private land for site-specific control purposes rather than wide-spread population eliminations (Seglund *et al.* 2006, p. 65). White-tailed prairie dogs may have the capability to rebound from control efforts. Their scattered distribution and behavioral mechanisms may provide them with some protection from poisoning efforts. Therefore, we do not believe poisoning to be a significant threat to the species now or in the foreseeable future.

Competition

Competition may occur between Wyoming ground squirrels and white-tailed prairie dogs (Seglund and Schnurr 2009, p. 100). Their diets overlap and their burrows are often interspersed. Wyoming ground squirrels are found in some areas where plague has decimated Gunnison's prairie dogs (Seglund and Schnurr 2009, p. 100). However, white-tailed prairie dogs were observed to chase and kill Wyoming ground squirrels (Cooke 1990, p. 275). Given their size advantage and aggression, it seems unlikely that prairie dogs would be excluded by Wyoming ground squirrels (Hoogland 2009, pers. comm.). In addition, ground squirrels are vulnerable to plague, and epidemics reduce their numbers alongside prairie dogs. At this time there is no evidence to suggest that there may be other competitors or that competition is a threat to the white-tailed prairie dog.

Summary of Factor E

Available evidence does not suggest that control of prairie dogs through poisoning is a major or increasing threat to the while-tailed prairie dog. It seems unlikely that competition with Wyoming ground squirrels would threaten the species' persistence.

We conclude that the best scientific and commercial information available indicates that the white-tailed prairie dog is not now, or in the foreseeable future, threatened by other natural or manmade factors affecting its continued existence, to the extent that listing under the Act as an endangered or threatened species is warranted at this time.

Finding

As required by the Act, we considered the five factors in assessing whether the white-tailed prairie dog is endangered or threatened throughout all of its range. We have carefully examined the best scientific and commercial information available regarding the past, present, and future threats faced by the white-tailed prairie dog. We reviewed the petition, information available in our files, and other available published and unpublished information, and we consulted with recognized white-tailed prairie dog experts and other Federal, State, and tribal agencies.

In considering what factors might constitute threats, we must look beyond the mere exposure of the species 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 endangered or threatened under the Act.

We identified and evaluated the risks of the present or threatened destruction, modification, or curtailment of the habitat or range of the white-tailed prairie dog: (1) Oil and gas exploration and development; (2) oil shale, tar sands, and other minerals, (3) renewable energy development—wind and solar; (4) urbanization; (5) agricultural land conversion; (6) grazing; (7) fire occurrence and suppression; (8) invasive plant species; and (9) climate change. While oil and gas development is impacting the species, we have no evidence that it will significantly threaten the species in the foreseeable future. We concluded that oil shale, tar sands, and other minerals; renewable energy development; urbanization; agricultural land conversion; grazing; fire suppression; invasive plant species; and climate change are not significant threats to the species now or in the foreseeable future. Based on our review of the best available information, we find that the present or threatened destruction, modification, or curtailment of the white-tailed prairie dog habitat or range is not a significant threat now or in the foreseeable future.

We identified and evaluated the risks from overutilization for commercial, recreational, scientific, or educational purposes. While shooting results in some individual mortality and may affect easily accessible colonies, available evidence does not indicate that the magnitude or intensity is enough to significantly threaten the species rangewide. Therefore, we conclude that the white-tailed prairie dog is not significantly threatened by overutilization for commercial, recreational, scientific, or educational purposes now or in the foreseeable future.

We found that plague impacts populations throughout the species' range. We determined that colonies and complexes persist in the post-plague environment, which demonstrates a rangewide resiliency to the disease. We determined that the species' life-history characteristics provide some protection from the spread of plague and that epizootic plague only affects a small portion of the range at one time. The threat of plague may decrease across the range with the impacts of management and climate change. Tularemia, monkey-pox, and West Nile virus are not considered threats to the species. Additionally, we note that while white-tailed prairie dogs are prey for numerous species, available information does not indicate that predation has an overall adverse effect on the species. Therefore, we find that neither disease nor predation is a significant threat to the species now or in the foreseeable future.

Based on our analysis of the existing regulatory mechanisms, we determined the States are actively involved in managing the species through conservation agreements and strategies. Although these agreements are not regulatory, they provide an important mechanism for conservation, monitoring, and research efforts. The existing regulatory mechanisms in place on State and Federal lands are limited. However, we determined in the evaluation that other threats would not adversely affect the white-tailed prairie dog now or within the foreseeable future. Additionally, the white-tailed prairie dog receives some protection from shooting under State laws in Colorado and Utah, and from oil and gas development in Utah. Therefore, based on our review of the best available scientific information, we conclude that inadequacy of existing regulatory mechanisms is not a significant threat to the species now or in the foreseeable future.

We also assessed the potential risks to white-tailed prairie dogs from poisoning and interspecific competition, and we find that there is no evidence that indicates these factors significantly threaten the continued existence of white-tailed prairie dog now or in the foreseeable future.

We determined that energy development, urbanization, grazing, fire suppression, agricultural conversion, recreational shooting, poisoning, invasive plant species, and plague may impact the species in at least localized areas. White-tailed prairie dogs were impacted throughout history by each of these factors. We believe that, collectively, these activities have resulted in the presumed reduced abundance of white-tailed prairie dog from historical levels. We also believe that the ecological function of this species within western landscapes has been altered from its historical function. Many of these factors (grazing, urbanization, fire suppression, agricultural land use conversion, and poisoning) were at much greater magnitude in the past and are not currently impacting species with the same intensity. Other threats (oil and gas development, climate change, shooting, plague, and invasive plant species) can be expected to continue into the future. Of these, we consider plague and oil and gas development to have the greatest potential for cumulative impacts. Yet some of the most robust and resilient colonies exist in areas where both of these potential threats occur. Therefore, we do not believe these factors will cumulatively threaten the continued existence of white-tailed prairie dog now or in the foreseeable future.

Our review of the information pertaining to the five threat factors does not support a conclusion that there are independent or cumulative threats of sufficient imminence, intensity, or magnitude that would cause substantial losses of population distribution or viability of the white-tailed prairie dog that would result in the species being at risk of extinction. Therefore, we do not find that the white-tailed prairie dog is currently in danger of extinction (endangered), nor do we find it is likely to become endangered within the foreseeable future (threatened), throughout its range. Therefore, listing the species as endangered or threatened under the Act is not warranted at this time.

Distinct Vertebrate Population Segments

After assessing whether the species is endangered or threatened throughout its range, we next consider whether any distinct vertebrate population segment (DPS) exists and meets the definition of endangered or is likely to become endangered in the foreseeable future (threatened).

Under the Service's Policy Regarding the Recognition of Distinct Vertebrate Population Segments Under the Endangered Species Act (61 FR 4722, February 7, 1996), three elements are considered in the decision concerning the establishment and classification of a possible DPS. These are applied similarly for additions to or removal from the Federal List of Endangered and Threatened Wildlife. These elements include:

(1) The discreteness 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 (removal from the list), or reclassification (i.e., is the population segment endangered or threatened).

Discreteness

Under the DPS policy, a population segment of a vertebrate taxon may be considered discrete if it satisfies either one of the following conditions:

(1) It 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.

(2) It 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.

The predicted range of the white-tailed prairie dog encompasses 13,066,887 ha (32,288,981 ac) (Seglund *et al.* 2006, p. 91). We do not consider any population segment of white-tailed prairie dog to be markedly separated from other populations of the same taxon as a consequence of physical, physiological, ecological, or behavioral factors. As a colonial species, white-tailed prairie dogs are naturally distributed across the landscape in a discontinuous fashion. Occupied habitat changes rapidly, shifting on a landscape scale (Seglund *et al.* 2006, p. iii). The species spans Colorado, Utah, Wyoming, and Montana. Available information suggests while population areas within Colorado and Utah are not continuous with other populations areas within the same State, they are continuous between these States and with populations in Wyoming. Therefore, we do not consider any of these areas to be physically discrete. Because discontinuous distribution is the ''baseline'' condition for the species, for us to consider any geographic discontinuity as being evidence of marked separation (i.e., discreteness) under the DPS policy, we would need the best available information to indicate that the amount of discontinuity is over and above what is considered to be normal for the species.

We do not have detailed mapping of occupied habitat throughout the range of the species. We recognize the likely occurrence of some small, isolated white-tailed prairie dog colonies, but have very limited information available that identifies their locations. Therefore, we looked for other measures of discontinuity, such as measures of genetic or morphological differences as guided by the DPS policy, to determine whether any populations showed evidence of marked separation. The information available does not indicate that any ecological or physical factors have produced population segments that express any genetic or morphological discontinuity due to separation from other prairie dog populations. Gene flow via dispersal and migration may maintain genetic diversity in prairie dog species or help restore genetic diversity in prairie dog populations following plague epizootics (Trudeau *et al.* 2004, p. 206). The available information does not suggest that populations differ genetically or morphologically.

We determine, based on a review of the best available information, that no population segment of the white-tailed prairie dog meets the discreteness conditions of the 1996 DPS policy. Therefore, no population segment qualifies as a DPS under our policy and is not a listable entity under the Act.

The DPS policy is clear that significance is analyzed only when a population segment has been identified as discrete. Since we found that no population segment met the discreteness element and, therefore, no population segments qualify as a DPS under the Service's DPS policy, we will not conduct an evaluation of significance.

Significant Portion of the Range Analysis

We evaluated the white-tailed prairie dog's predicted range in the context of whether any potential threats are concentrated in one or more areas of the projected range, such that if there were concentrated impacts, those white-tailed prairie dog populations might be threatened, and further, whether any such population or complex might constitute a significant portion of the range. The potential threat factors we evaluated for possible geographic concentration were the most substantial factor(s) affecting the species (in this case, plague and habitat fragmentation due to oil and gas development).

Plague

We regard sylvatic plague as the most substantial factor affecting the white-tailed prairie dog. The disease is present throughout the species' range. We consider the entire range of the species to be operating in a post-plague environment. We documented variation between colonies and complexes in their ability to maintain observed peaks of abundance. However, this variation occurred in every portion of the range, and was not concentrated in any geographic location. At this time, there is no evidence to suggest that plague affects portions of the range differently, or will in the foreseeable future.

Oil and Gas Development

Oil and gas development is a widespread land use within the species' range. Our analysis indicated a concentration of oil and gas activity in Uintah County, Utah, and the Northwest IPA, located in adjacent Moffat, Mesa, and Rio Blanco Counties in Colorado. A similar concentration can be visually observed in Sweetwater County, Wyoming (Hotze 2010, p. 11). However, some of the most robust and resilient colonies are found within these areas of concentrated development. The available evidence does not indicate that oil and gas development activities are negatively impacting the species (see *Factor A*. Oil and Gas Exploration and Development). Given these factors, we do not believe the regional concentration of oil and gas development is threatening the species in these portions of its range.

On the basis of this review, we have determined that the magnitude and imminence of threats do not indicate that the white-tailed prairie dog is in danger of extinction, or likely to become endangered, throughout all or a significant portion of its range, within the foreseeable future. The species also does not meet the elements of our 1996 DPS Policy that would result in a DPS designation for any segment of the population. We conclude that no Significant Portion of the Range (SPR) exists for the white-tailed prairie dog. We do not find that the species is in danger of extinction now, nor is it likely to become endangered within the foreseeable future, throughout all or a significant portion of its range. Therefore, listing the white-tailed prairie dog as endangered or threatened under the Act is not warranted at this time.

We request that you submit any new information concerning the status of, or threats to, the white-tailed prairie dog to our Utah Fish and Wildlife Office (see **ADDRESSES**) whenever it becomes available. New information will help us monitor the white-tailed prairie dog and encourage its conservation. If an emergency situation develops for the white-tailed prairie dog or any other species, we will act to provide immediate protection.

References Cited

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

Authors

The primary authors of this document are the staff members of the Utah Field Office, West Valley City, Utah.

Authority

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

Dated: May 14, 2010

Daniel M. Ashe,

Acting Director, Fish and Wildlife Service.

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