Utah Prairie Dog
(*Cynomys parvidens*)

Status of the Species

U.S. Fish and Wildlife Service

Utah Field Office

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Executive Summary

The purpose of this report is to summarize the status of the Utah prairie dog, a federally threatened species. For more information regarding the species, please contact the Utah Field Office by mail at 2369 West Orton Circle, Suite 50, West Valley City, Utah 84119, or by telephone at (801) 975-3330.

Literature Citations

Literature Citations should read:

U.S. Fish and Wildlife Service. 2017. Utah prairie dog (*Cynomys parvidens*) status of the species: September 2017. U.S. Fish and Wildlife Service, West Valley City, Utah. 15 pp.

1.0 Status of the Species

1.1 Species Taxonomy and Description

There are five species of prairie dogs native to North America (Hoogland 2003). Taxonomically, prairie dogs (*Cynomys spp*.) are divided into two subgenera: the white-tail and black-tail. The Utah prairie dog (*C. parvidens*) is a member of the white-tail group, subgenus *Leucocrossuromys*. Other members of this group, which also occur in Utah, are the white-tailed prairie dog (*C. leucurus*) and the Gunnison prairie dog (*C. gunnisoni*).

The Utah prairie dog is recognized as a distinct species (Zeveloff 1988; Hoogland 1995), but is most closely related to the white-tailed prairie dog. These two species may have once belonged to a single interbreeding species (Pizzimenti 1975). They are now separated by ecological and physiographic barriers and exhibit genetic differences. The type locality for the Utah prairie dog is Buckskin Valley in Iron County, Utah (Pizzimenti and Colllier 1975). The Utah prairie dog is the westernmost member of the genus *Cynomys*.

The Utah prairie dog is the smallest species of prairie dog. Individuals are typically 12 to 14 inches (in) long (Hollister 1916) and weigh 1.4 to 3.1 pounds (Wright-Smith 1978). Utah prairie dogs range in color from cinnamon to clay. The Utah prairie dog is distinguished from other prairie dog species by a relatively short (1.2 to 2.8 in) white- or gray-tipped tail and a black "eyebrow" above each eye (Pizzimenti and Collier 1975; Hoogland 2003).

1.2 Life History and Population Dynamics

Utah prairie dogs spend four to six months underground each year during harsh winter months (Hoogland 2001). Some observations suggest that Utah prairie dogs hibernate. However, other evidence suggests that at lower elevations Utah prairie dogs may enter torpor more intermittently at the beginning and end of the hibernation season and may be seen above ground in mild weather (Collier and Spillett 1975; Hoogland 1995, 2001; Lehmer and Biggins 2005). Torpor patterns of Utah prairie dogs might be influenced by environmental conditions, and may differ across the species' range (Lehmer and Biggins 2005).

Adult males usually cease surface activity during August and September, although this can be influenced by weather conditions. Adult females cease surface activity several weeks later (lactating females enter hibernation later than non-lactating females) (McDonald 1993, Hoogland 2003). Juvenile prairie dogs remain active as late as November. Temperature is thought to trigger emergence from hibernation beginning in mid-March to mid-April. Mating occurs soon after emergence.

One half to two thirds of Utah prairie dog's adult population is female (Mackley *et al.* 1988). Approximately 67 percent of females wean a litter each year (Hoogland 2001). Each female produces an average of 3.88 pups which are born in April after a 30 day gestation period (Pizzimenti and Collier 1975; Wright-Smith 1978; Mackley *et al.* 1988; Hoogland 2001). Young Utah prairie dogs appear above ground at five to seven weeks of age, are full grown by October of their first year, and reach sexual maturity at one year. Less than 50 percent of male and female Utah prairie dogs survive the first year (Hoogland 2001). Only about 20 percent of

females and less than 10 percent of males survive to age 4 (Hoogland 2001). Due to their limited reproductive rates, short life span and high mortality rates, numbers of individuals within a colony can fluctuate greatly throughout the year with low points in the spring and peaks in the late summer when adults and pups are above ground.

Traditionally, it was thought that natal dispersal (movement of first year animals away from their area of birth) and breeding dispersal (emigration of sexually mature individuals from the area where they copulated) were male-biased, leading to higher mortality rates to young males from predation (Hoogland 2003). However, recent genetic work in a range wide study showed that of the Utah prairie dogs that dispersed, 25 percent were adult females (Brown 2009).

Young male Utah prairie dogs disperse in the late summer with average dispersal events of 0.35 mi, long-distance dispersal events of up to 0.75 mi, and unusually long-distance dispersals of 4 mi (Mackley *et al.* 1988; Brown *et al.* 2011). In the summer of 2014 the Utah Division of Wildlife Resources documented a recently translocated individual traveling upwards of 10 mi, though unusual this drastically changes our understanding of their dispersal potential.

Utah prairie dogs are organized into social groups called clans, consisting of an adult male, several females, and their young (Wright-Smith 1978). Clans are loosely organized with no observable dominance hierarchy. Geographic boundaries of clans remain fairly constant within a colony, and young prairie dogs are the only ones to regularly cross boundaries. One or more clans can form prairie dog colonies. Social behaviors, especially vigilance and warning vocalizations, are important to survival of individuals in colonies and to the overall well-being of the colony. The adult females play the major role in caring for young; they are also the primary ones that provide warning of danger (Wright Smith 1978).

Mean home ranges sizes for Utah prairie dogs (adults and juveniles) are inversely related to density of Utah prairie dogs (Wright-Smith 1978). Higher density sites (similar to developed areas) have smaller home ranges (100 ft.), and lower density sites (similar to less developed areas) have larger home ranges (250 ft.). Daily movement distances for late summer foraging juveniles averaged 650 ft (Jacquart et al. 1986). Home ranges include common feeding grounds for prairie dogs. However, areas completely devoid of vegetation or other suitable habitat features would not be used for foraging and therefore are likely not used consistently by prairie dogs.

Utah prairie dogs forage primarily on grasses and forbs, and tend to select those with higher moisture content (Crocker-Bedford 1976). They often select colony sites in swales where the vegetation can remain moist even in drought conditions (Collier 1975; Crocker-Bedford and Spillett 1981). Vegetation must be of short stature to allow the prairie dogs to see approaching predators as well as have visual contact with other prairie dogs in the colony (Collier 1975; Crocker-Bedford and Spillett 1981). Prairie dogs will avoid areas where brushy species dominate, and will eventually decline or disappear in areas invaded by brush (Collier 1975; Player and Urness 1982). Well-drained soils are a habitat requirement for Utah prairie dogs to excavate burrow sites. Burrows must be deep enough to protect the prairie dogs from predators and environmental and temperature extremes.

Predators of Utah prairie dogs include badgers (*Taxidea taxus*), coyotes (*Canis latrans*), raptors (e.g., *Buteo* spp., *Aquila chrysaetos*), fox (*Vulpes vulpes*), long-tailed weasels (*Mustela frenata*), and snakes (*Crotalus* spp., *Pituophus* spp.). In an established prairie dog colony, predators do not have a significant impact on numbers of prairie dogs (Collier and Spillett 1972). However, predators likely have a large impact on translocation sites where an established social system or burrow system is not present.

Utah prairie dog populations are susceptible to sylvatic plague (*Yersinia pestis*), a bacterium introduced to the North American continent in the late 1800's (Cully *et al.* 1993). Plague is one of the primary threats to Utah prairie dogs (USFWS 2012). The disease occurs across the entire range of the species and has the potential to result in complete loss or severe reduction in colonies across the landscape (epizootics), and create chronic problems that could limit growth rates of Utah prairie dog populations (enzootics). Fleas are the most common vector for plague (Biggins and Kosoy 2001). Infected fleas can be brought into the vicinity of a prairie dog colony by a suite of mammals and fleas may survive for over a year after their hosts have died (Gage and Kosoy 2005). Occurrence of epizootic plague outbreaks may be dependent on the density of the host population (i.e., prairie dogs) or flea density (Barnes 1993, Biggins 2010).

1.3 Regulatory Status

The Utah prairie dog was listed as an endangered species on June 4, 1973 (38 FR 14678). At the time of listing, the species was threatened with extinction due to habitat loss, over exploitation, disease, and predation. By May 1984, Utah prairie dog populations had expanded in portions of their range, and we reclassified the species to threatened status with a special 4(d) rule under the ESA to allow regulated take of up to 5,000 prairie dogs on agricultural lands in Iron County, Utah (49 FR 2330). The special 4(d) rule was revised in 1991 (56 FR 27438) to allow regulated take of up to 6,000 animals annually on private lands throughout the species' range. The special 4(d) rule was again revised on August 2, 2012 (77 FR 46158), to provide limits to the allowable take (i.e., 10 percent of the annual range-wide population estimate), and new incidental take exemptions for standard agricultural practices. The 2012 4(d) rule revision also included take exemptions for areas where Utah prairie dogs create serious human safety hazards or disturb the sanctity of significant human cultural or human burial sites.

1.4 Distribution

Historically, Utah prairie dog colonies were found as far west as Pine and Buckskin Valleys in Beaver and Iron counties, and may have occurred as far north as Nephi, southeast to Bryce Canyon National Park, east to the foothills of the Aquarius Plateau, and south to the northern borders of Kane and Washington counties (Figure 1) (Pizzimenti and Collier 1975). Factors that resulted in the historical decline of Utah prairie dogs were poisoning; drought; ecosystem conversion (agriculture, overgrazing, urbanization); shooting; and disease (Collier and Spillett 1972).

The Utah prairie dog currently occurs in three areas within southwestern Utah, which are designated as recovery units (Pizzimenti and Collier 1975, USFWS 2012; Figure 2):

1) Awapa Plateau—portions of Garfield, Piute, Sevier, and Wayne counties;

2) Paunsaugunt—primarily in Garfield County, with small areas in Piute and Kane counties; and,
3) West Desert—primarily in Iron County, but extending into southern Beaver County and northern Washington County (no prairie dogs occur in Beaver and Washington counties).

Utah prairie dogs are found at elevations from 5,400 ft on valley floors up to 9,500 ft in mountain habitats. For more information on these recovery units, refer to our revised recovery plan for the Utah prairie dog (USFWS 2012).

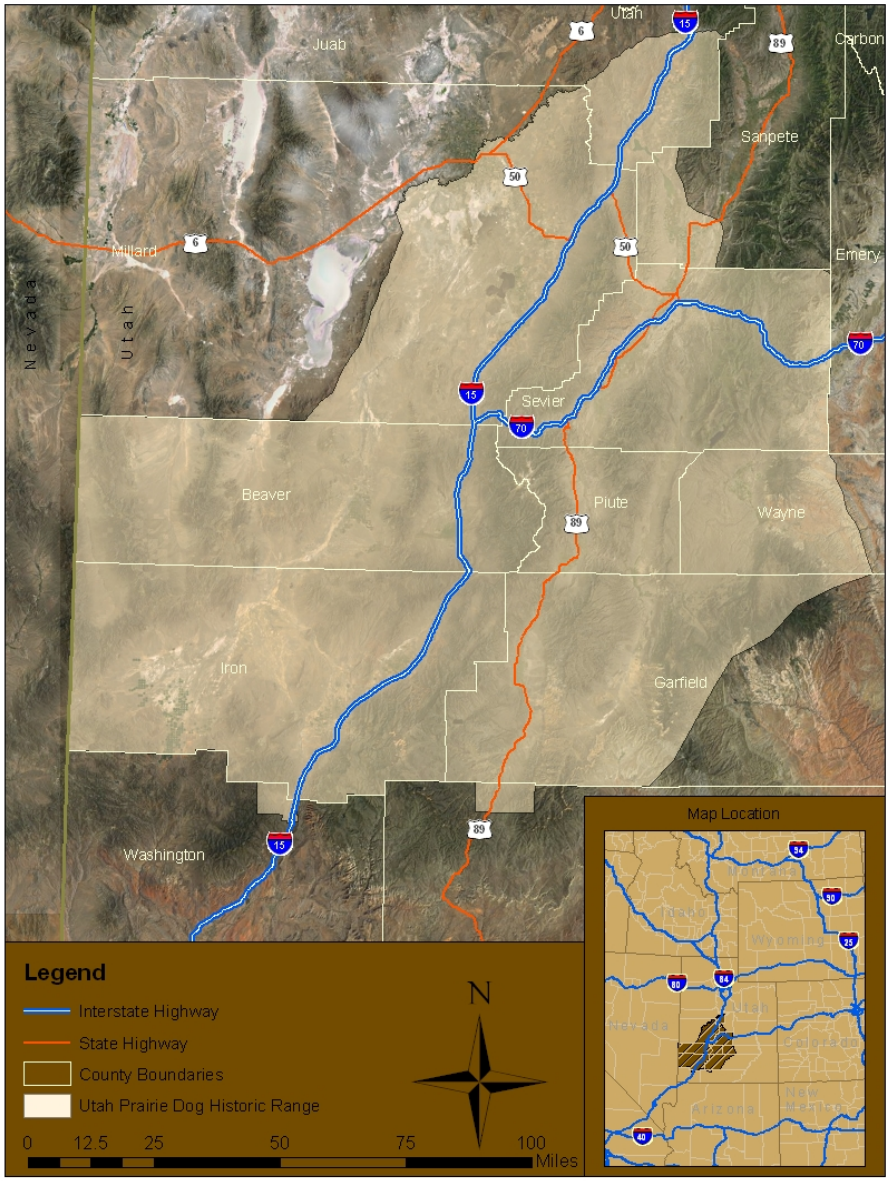

Figure 1. Utah prairie dog historical range.

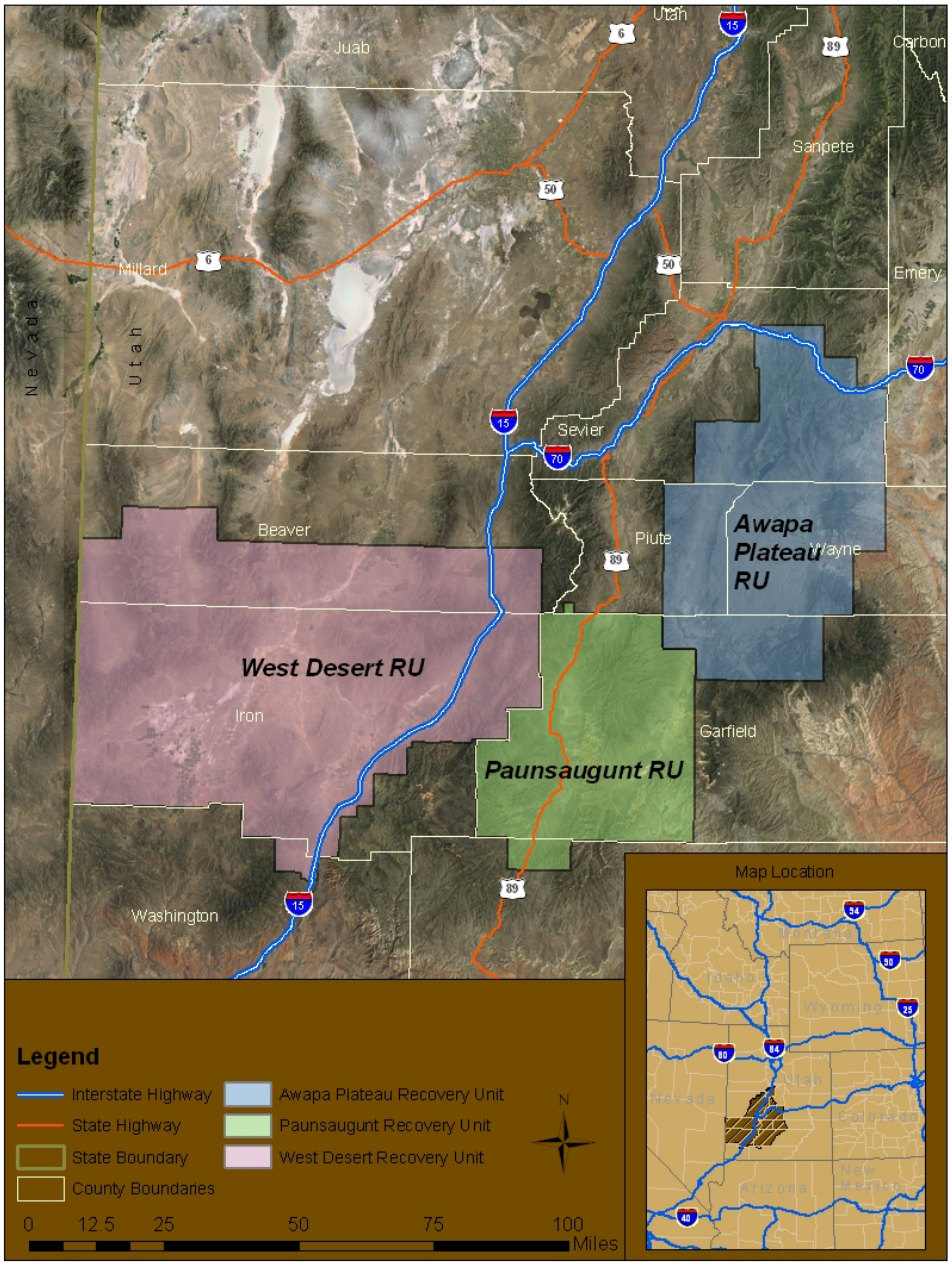

Figure 2. Utah prairie dog recovery unit boundaries.

1.5 Population Trends

The Utah Division of Wildlife Resources (UDWR) initiated annual spring counts of Utah prairie dogs in 1976. Utah prairie dog spring counts are completed by visually scanning the entire colony area and counting the number of adult prairie dogs observed (USFWS 2012). Prairie dog spring counts underestimate the actual number of adult prairie dogs because only 40-60 percent of individual prairie dogs are above ground at any one time (Crocker-Bedford 1975). Thus, spring adult counts are multiplied by two to estimate the adult population.

Total population estimates are calculated using a formula that accounts for the adult population estimate derived from spring counts and the estimated reproduction:

> Population estimate = [(2 x spring adult count) x 0.67 (proportion of adult females) x 0.97 (proportion of breeding females) x 4 (average number of young per breeding female)] + (2 x spring adult count)

Spring counts and population estimates provide population trend information, but are not accurate enough to determine actual population numbers.

Overall, spring counts since 1979 show considerable annual fluctuations, but stable to increasing long-term trends in adult Utah prairie dog numbers (USFWS 2012). Range-wide adult counts for Utah prairie dogs were as high as 12,902 in the 2015 spring census count with a low count of 1,866 in 1976 (USFWS 2012, UDWR 2016, UDWR 2017).

Spring counts from the past five years (2012-2016) continue the trend of an overall stable population of Utah prairie dogs (Table 1).

Table 1. Spring Counts of Utah Prairie Dogs

Recovery Units	2012	2013	2014	2015	2016	5-Year Average
West Desert	5,678	4,809	7,597	9,098	7,770	**6,990**
Paunsaugunt	1,700	1,896	2,533	2,448	2,630	**2,241**
Awapa	601	565	1,318	1,356	1,084	**985**
TOTAL	**7,979**	**7,270**	**11,448**	**12,902**	**11,484**	**10,217**

Spring counts from the past 5 years show progress toward meeting the recovery criteria for this species (see *Recovery Efforts*), particularly in the Paunsaugunt recovery unit (Table 2).

Table 2. Spring Counts of Utah Prairie Dogs on Federal and Protected Lands

Recovery Unit	Year					
	2012	**2013**	**2014**	**2015**	**2016**	**5-Year Average**
West Desert	495	442	941	491	685	**611**
Paunsaugunt	573	798	1,500	1,430	1,338	**1,128**
Awapa	400	348	916	815	556	**607**
TOTAL	**1,468**	**1,588**	**3,357**	**2,736**	**2,579**	**2,346**

1.6 Habitat

In 1972, the UDWR began mapping occupied Utah prairie dog habitat throughout their range (USFWS 2012). Any habitat that was occupied by prairie dogs at any time since 1972 is referred to as "mapped habitat." Maps are updated annually to include colony expansions and new colonies, however colonies are never removed or deleted from the database. In addition, personnel resources are not available to annually delineate and map only the occupied portions of each colony. As a result, overall mapped habitat acreage only remains the same or increases for each colony across time. This is important to acknowledge because mapped habitat therefore does not necessarily provide an indication of species' status. Mapping allows us to maintain an up-to-date record of current and historical Utah prairie dog habitat and is informational for conservation planning purposes. The UDWR has mapped 59,656 acres as Utah prairie dog habitat (UDWR 2010b; Table 3).

Table 3. Mapped Utah Prairie Dog Habitat by Land Ownership (acres)

	2016 Mapped Habitat (Acres)			
Land Ownership and Location	**West Desert Recovery Unit**	**Paunsaugunt Recovery Unit**	**Awapa Plateau Recovery Unit**	**TOTAL**
Non-Federal Lands	12,547	10,731	8,673	**31,951**
Federal Lands	6,919	5,560	15,116	**27,595**
Other Protected Lands	357	602	531	**1,490**
TOTAL (acres)	**19,823**	**16,894**	**24,320**	**61,036**

2.0 Listing Factors and Threats

Our 2012 revised recovery plan for the Utah prairie dog (USFWS 2012) identified and characterized the primary threats to the Utah prairie dog based on their geographic extent, the time frame within which activities or effects are occurring or are predicted to occur, and the severity of their environmental impacts (i.e., top-tier, mid-tier, lowest-tier). Based on the recovery plan's assessment, urban expansion and plague comprise the most serious threats to

Utah prairie dog populations.

2.1 Top-tier Threats

Urban expansion

Approximately 77 percent of all known Utah prairie dogs occur on private lands, many of which are prioritized for residential or industrial development or are in agricultural production (*Mid-tier Threats, Cultivated Agriculture*; UDWR 2010, USFWS 2012, UDWR 2016). The predominant effects of urban expansion are the permanent loss and fragmentation of habitat. In addition, there is a desire to translocate or otherwise remove prairie dogs from many developing areas due to conflicts with human uses (USFWS 2012, UDWR 2015). The highest degree of Utah prairie dog habitat impacts associated with urban expansion occurs in Iron County because this area has the highest human population and growth rate of the three recovery units.

Plague

Plague occurs across the entire range of the Utah prairie dog. Plague has the potential to cause the complete loss or severe reduction in colonies across the landscape (epizootics), and to create chronic problems that could limit growth rates of Utah prairie dog populations (enzootics (Biggins and Kosoy 2001, Hoogland 2004, Biggins et al. 2010). Management measures to control plague (i.e., vaccines, insecticides) are being used or developed and their success may influence long-term prairie dog conservation (USFWS 2012).

2.2 Mid-tier Threats

Over-grazing

Grazing occurs in almost all mapped and occupied Utah prairie dog habitat. Impacts from over-grazing can include decreased habitat quality resulting from increases in invasive plants and decreased vegetation diversity (Collier and Spillett 1973). However, our best available information suggests that Utah prairie dogs can coexist with properly managed grazing systems. Livestock grazing may benefit prairie dogs where grazing enhances primary production and reduces shrub invasion (Coppock et al. 1983, Holland et al. 1992, Cheng and Ritchie 2006). Prescribed rotational grazing may help to maintain suitable vegetation height for Utah prairie dogs, especially in highly productive sites like irrigated pastures or where shrub invasion has occurred (Ritchie and Cheng 2001).

We do not have information on the amount of Utah prairie dog habitat that is over-grazed. However, over-grazing is likely scattered among some allotments while most are effectively managed.

Cultivated Agriculture

Utah prairie dogs prefer areas with deep soils and moist vegetation – the same areas preferred for agricultural lands. Thus, one of the causes of the reduced historical range of Utah prairie dogs

was habitat alteration due to agricultural activities (Collier and Spillett 1972, Crocker-Bedford and Spillett 1981).

Agricultural crops can benefit prairie dogs by providing highly nutritious forage (Crocker-Bedford 1976, Seglund and Schnurr 2010). However, prairie dogs in agricultural fields are subject to negative impacts including lethal control efforts to protect crops (Knowles 2002), habitat fragmentation from fences and roads, and urban predators (Seglund and Schnurr 2010).

Vegetation Community Changes

Various types of vegetation management can be beneficial to Utah prairie dogs by providing more open habitats for foraging, visual surveillance to escape predators, and for intraspecific interactions (Player and Urness 1982). Generally, vegetation that is low or sparse enough to see through enhances prairie dog survival because the prairie dogs have increased visibility to see and warn other individuals of approaching predators (Collier 1975, Crocker-Bedford and Spillett 1981).

Beneficial and adverse impacts may be associated with vegetation community changes in prairie dog habitats. Vegetation treatments can improve habitat conditions and plant species diversity from pre-treatment levels (Player and Urness 1982). Impacts can include disturbance to prairie dogs from people or equipment, the movement of soil or vegetation into burrow entrances, the leveling of mounds or burrow collapses, the reduction in forage at a colony, or increases in invasive plant species. These benefits and impacts can be managed through planning efforts and conservation measures.

Invasive Plants

Invasive plants and noxious weeds occur throughout the range of the Utah prairie dog. Invasive plants can cause decreased plant diversity, which can impact weight gain and survival of prairie dogs, particularly during drought conditions, and negatively affect population structure and colony persistence (Ritchie 1998, Ritchie 1999, Crocker-Bedford and Spillett 1981, Ritchie and Cheng 2001). Ongoing research and habitat work can help manage invasive species across the prairie dog landscape.

Off-Highway Vehicle and Recreational Use

Off-Highway Vehicle (OHV) use is an increasingly common use of public lands. Though not specific to Utah prairie dogs, OHV use affects soils, vegetation, and wildlife species (Ouren et al. 2007). On Federal lands, increased planning efforts direct OHV use to designated trails or play areas, and consequently away from Utah prairie dog habitats. While OHV use is not restricted on non-Federal lands, OHV activity in these areas is more likely to be utilitarian in nature (i.e., related to getting around private property) and of lower intensity and impact when compared to recreational use more common on Federal lands.

2.3 Lowest-tier Threats

Climate Change

The climate across the range of the Utah prairie dog has become progressively drier over the last several thousand years, which has led to the gradual transition of grass-dominated ecosystems to those dominated by shrubs. Continued vegetation shifts may result in reduced prairie dog habitat quantity and quality over time. Thus, climate change has emerged as a concern for the Utah prairie dog, particularly in regard to the potential for increased prolonged drought cycles and heavy precipitation events (U.S. Global Change Research Program 2009, USFWS 2012).

Impacts from drought include the loss of succulent vegetation that is necessary for Utah prairie dog abundance and reductions in prairie dog distribution, particularly at lower elevations (Collier and Spillett 1975, Crocker-Bedford and Spillett 1981). Heavy precipitation events may result in temporary increases in soil moisture content which could increase epizootic plague events (Thomas 1996 in Parmenter et al. 1999). Our ability to maintain prairie dog populations through climate change events may be predicated on our ability to sustain populations at various elevations.

Energy Resource Exploration and Development

Energy activities across the range of the Utah prairie dogs primarily include wind and oil and gas development. Energy facilities can result in the loss and fragmentation of Utah prairie dog habitat, direct mortality from vehicles, illegal shooting from recreational shooters who use new roads (Gordon et al. 2003), increased disturbance responses to increased human activities, and increased invasive plant species (Seglund and Schnurr 2010). Overall, energy development across the species' range is expected to occur at a low pace.

Fire Management

Fire suppression on a landscape level can lead to the encroachment of trees and shrubs into grasslands, which decreases habitat quality for Utah prairie dogs. Properly managed fires can be valuable in maintaining a vigorous grassland community that is used by prairie dogs (USFWS 2012). Fire management can be a tool to promote suitable prairie dog habitats at a landscape level.

Poaching

Poaching is any unauthorized killing of Utah prairie dogs, including shooting, poisoning, trapping, and other lethal methods (USFWS 2012). Poaching likely occurs across the species range, however the extent of its effects on populations on a landscape level are not known (USFWS 2012). The existence of regulatory mechanisms to authorize legal killing of prairie dogs in certain situations (e.g., private developing lands, agricultural lands) has hopefully decreased the incidence of poaching of Utah prairie dogs.

Predation

Normal levels of predation are not considered a threat to healthy Utah prairie dog colonies. However, in unnaturally fragmented colonies or at new translocation sites, predation can have adverse impacts on Utah prairie dog populations. For example, predation may be an increased threat in urban areas due to the presence of domestic dogs and cats. Badgers can disrupt translocation sites by digging up prairie dogs that have not had a chance to fully develop a burrow system. These effects will likely be manageable as we continue to increase our knowledge of translocation methodologies and as recovery actions are implemented to protect and restore important Utah prairie dog populations in a manner that supports habitat and metapopulation connectivity.

3.0 Recovery Efforts

The recovery objective for the Utah prairie dogs is to protect suitable habitat that is of sufficient size to establish and maintain viable Utah prairie dog populations that are spatially distributed to provide connectivity within each recovery unit (USFWS 2012). We established recovery criteria that represent our best assessment of the conditions that would most likely result in a determination that delisting of the Utah prairie dog is warranted. The recovery criteria are (USFWS 2012):

- At least 5,000 acres (2,023 hectares) of occupied habitat are protected in perpetuity in each RU (West Desert, Paunsaugunt, and Awapa Plateau). These occupied habitat criteria will be spatially distributed to provide sufficient connectivity and gene flow within each RU.
- At least 2,000 adult animals (at least 1,000 counted adults in the spring counts) are present in each RU (West Desert, Paunsaugunt, and Awapa Plateau) within protected habitat for 5 consecutive years.
- Management strategies are in place to prevent and respond to threats from disease.
- Education, outreach, and public relations programs and State and/or local regulations are in place and are sufficient to minimize illegal take, manage legal lethal control post-delisting, and foster habitat management practices.
- Utah prairie dog-specific adaptive management strategies are in place on protected lands to that will facilitate management responses to changing climatic conditions and other threat factors that are difficult to predict.

Our recovery strategy for the Utah prairie dog focuses on the need to address colony loss and disease through a program that encompasses threats abatement, population management, research, and monitoring. We emphasize conserving existing colonies; establishing additional colonies on Federal and protected non-Federal lands via habitat improvement or translocations; controlling the transmission of plague; and monitoring habitat conditions. Our partners have completed significant efforts to conserve the Utah prairie dog since the time of listing. Completed and ongoing conservation efforts are described below.

3.1 Disease Management

Deltamethrin and pyraperm insecticides have been used on USFS, BLM, and NPS lands to manage plague and increase prairie dog survival since at least 2005 (USDA 2009). In general, the partner land management agencies and the UDWR have coordinated and jointly funded annual plague abatement on Federal and protected land. Plague dusting treatments have been emphasized at colonies that experience epizootic plague outbreaks and large colonies that are at high risk of plague (USFWS 2012).

In 2009, a research project was initiated by the National Wildlife Health Center (USGS) in Madison, WI to develop an oral sylvatic plague vaccine for prairie dogs. Beginning in 2013, the UDWR participated in field trials to test the efficacy of SPV in preventing plague outbreaks in prairie dog colonies over a wide geographic range in all four prairie dog species. For Utah prairie dogs, study sites ranged from 5,700 ft. to 10,000 ft. elevation, with three low elevation study sites, and four high elevation study sites. As of the writing of this Strategy, we are awaiting results of the field trials and a determination of the effectiveness of SPV for plague management in prairie dogs.

3.2 Habitat Protection

Federal, state, local government and non-governmental organization partners have worked to protect prairie dog habitats since the species was listed. The BLM, USFS, and NPS implement conservation measures for Utah prairie dogs, including managing the use of OHVs and applying seasonal and spatial buffers to actions in prairie dog habitats (USFWS 2012).

Approximately 77 percent of Utah prairie dogs occur on non-Federal lands. Because of high percentage of Utah prairie dogs on non-Federal lands, protection of some of these existing colonies has been an important conservation effort for our partners. To date, we have secured 2,548 acres of non-Federal land from willing sellers as conservation areas that are protected in perpetuity for Utah prairie dogs. Some of these protected properties were conservation banks or purchased lands meant to provide mitigation for habitat losses associated with development; including properties held by SITLA, The Nature Conservancy, and the Utah Prairie Dog Habitat Credit Exchange (USFWS 2012).

The USFWS also developed a programmatic safe harbor agreement for Utah prairie dogs in 2009, administered by the Panoramaland Resource Conservation & Development Council. As of 2017, five individual Utah prairie dog SHAs were in place on 1,230 acres of habitat.

3.3 Habitat Management

Federal, State, local government and non-governmental organization partners have worked to manage and improve prairie dog habitats since the species was listed. The partners implement conservation measures for Utah prairie dogs, including establishing translocation sites, implementing habitat treatment projects, dusting with insecticides to manage plague, and conducting research efforts to better understand prairie dog ecology.

3.4 Information and Education

The 2012 recovery plan identified a need for continued public education associated with prairie dog ecology and conflict management. Community involvement has included incentives to develop educational programs, use of Utah prairie dogs in public outreach settings, and Utah prairie dog demonstration sites near urban areas. Educational outreach focused on student field trips to learn the importance of Utah prairie dogs in rangeland ecosystems. Extension goals highlighted the formation of working groups to provide information on the recovery process and how to dovetail these efforts with effective management of agriculture (UPDRIT 1997).

Beginning in 1995, Southern Utah University provided educational opportunities for students by using Utah prairie dog colonies around Cedar City for outdoor classrooms and field activities. These activities often involved agency personnel and included conservation information and wildlife management techniques such as counts, behavioral observations, vocalization experiments, and GIS mapping of colonies. Approximately 100-200 students per year were involved in this educational opportunity.

The UDWR employees regularly address Southern Utah University classes. Lectures at Southern Utah University have included presentations to biology, agriculture, social science, and English classes, and often incorporate visits to active Utah prairie dog colonies. Additional classroom visits are made to other local public schools as requested. Southern Utah University is working to develop an experimental research and wildlife viewing program at the school's Valley Farm to coordinate agricultural operations and Utah prairie dog conservation.

Extension work with Utah prairie dog issues has primarily taken the form of community meetings. The Utah Farm Bureau sponsored several landowner meetings in 2007 to inform and educate landowners on the Utah prairie dog and private lands conservation programs for the species.

3.5 Colony Establishment and Supplementation

Translocations of Utah prairie dogs are used to increase the numbers of prairie dog colonies in new locations across the species' range. The UDWR initiated the translocation program in 1972 with mixed success over the years (USFWS 2012).

In the 1980s, the UDWR initiated studies to monitor survival, dispersal, and habitat use by translocated prairie dogs (Jacquart et al. 1986, Coffeen and Pederson 1989). Based on this work, the translocation program incorporated predator control methods, and recommended seasons and optimal prairie dog weights for the most successful translocations. Since the 1980s, we have continued to study and modify translocation techniques with the goal of enhancing survival of translocated prairie dogs. In 2009, the Utah Prairie Dog Recovery Team developed the 2009 Recommended Translocation Procedures based on best available information. Translocations remain an important component of recovery efforts for the Utah prairie dog.

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