

U.S. Fish & Wildlife Service
Utah Prairie Dog
(Cynomys parvidens)

DRAFT REVISED RECOVERY PLAN

Original Recovery Plan Completed in 1991



Prepared by:

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and

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for

Mountain-Prairie Region
U.S. Fish and Wildlife Service
Denver, Colorado

August 2010

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Approved: _____
Regional Director, U.S. Fish and Wildlife Service

Date: _____

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EXECUTIVE SUMMARY

Current Species Status: The Utah prairie dog (*Cynomys parvidens*), found only in southwestern and central Utah, was listed as an endangered species on June 4, 1973 (38 FR 14678). At the time of listing, the species was threatened by habitat destruction and modification, over-exploitation, disease, and predation. Subsequently, Utah prairie dog populations increased significantly in portions of their range, and on May 29, 1984 (49 FR 22330), the species was reclassified as threatened with a special rule to allow regulated take of the species. This special rule was amended on June 14, 1991 (56 FR 27438), to increase the amount of regulated take allowed throughout the species' range. Recent Utah prairie dog population trends appear to be relatively stable, although the species remains vulnerable to several serious threats. These include habitat loss, plague, changing climatic conditions, unauthorized take, and disturbance from recreational and economic land uses.

Habitat Requirements and Limiting Factors: Utah prairie dogs prefer swale-type formations where moist herbaceous vegetation is available even during drought periods (Collier 1975). Grasses and forbs are preferred food items during all seasons, and prairie dogs appear to select particular forage species rather than choosing foods based on availability (Crocker-Bedford and Spillett 1981). Vegetation quality and quantity are important in helping Utah prairie dogs survive hibernation, lactation, and other high nutrient demand times (Environmental Defense 2007). Plant species richness is correlated with increased weight gain, higher juvenile to adult ratios, and higher animal densities (Crocker-Bedford and Spillett 1981; Ritchie and Cheng 2001). Utah 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 1983). Open habitats are important for foraging, visual surveillance to escape predators, and intraspecific interactions (Player and Urness 1983). Well-drained, deep soils (at least 3.3 ft (1 m) deep) are needed for burrowing. Burrows provide the prairie dog with protection from predators and insulation from environmental extremes. Soil color may aid in disguising prairie dogs from surface predators and thus may be an added survival factor (Turner 1979; Collier 1975).

Recovery Strategy: The recovery of Utah prairie dogs will rely on effective conservation responses to the issues facing the species, which remain varied and complex. These issues include plague, urban expansion, grazing, cultivated agriculture, vegetative community changes, invasive plants, off-highway vehicle and recreation uses, climate change, energy resource exploration and development, fire management, poaching, and predation. Strategically, these issues can be reduced to two overriding concerns: loss of habitat and plague. The 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 extant colonies, many of which occur on non-Federal lands; establishing additional colonies on Federal and non-Federal lands via habitat improvement or translocations; controlling the transmission of plague; and monitoring habitat conditions.

Recovery Goals, Objectives, and Criteria

Goal: The goal of this plan is to recover the Utah prairie dog such that it no longer meets the Endangered Species Act's (ESA) definition of threatened and can be removed from the Federal List of Endangered and Threatened Wildlife (i.e., delisted).

Objectives: The recovery objectives for the Utah prairie dog are: 1) To protect suitable habitat that is of sufficient size to support a viable Utah prairie dog population and is spatially distributed to provide connectivity within each Recovery Unit (RU); 2) To establish and maintain viable Utah prairie dog populations in each RU.

Criteria:

1. At least 5,000 ac (2,023 ha) of occupied habitat are protected in each RU (West Desert, Paunsaugunt, and Awapa), with a minimum of 75% protected in perpetuity (3,750 ac (1,521 ha)) and the remaining habitat enrolled in conservation agreements. These occupied habitat criteria will be spatially distributed to provide sufficient connectivity and gene flow within each of the RU.
2. At least 2,000 adult animals (at least 1,000 counted adults in the spring counts) in each RU (West Desert, Paunsaugunt, and Awapa) within protected habitat for 5 consecutive years.
3. Management strategies are in place to respond to threats from disease.
4. Public education programs and state and/or local regulations are in place to minimize illegal take, manage legal lethal control post-delisting, and foster habitat management practices.
5. Utah prairie dog specific adaptive management strategies are in place on protected lands to improve suitable habitat in a manner that also will facilitate management responses to changing climatic conditions and other threat factors that are difficult to predict.

Actions Needed:

1. Continue to evaluate and update the occurrence and distribution of the Utah prairie dog across its known range.
2. Conserve occupied Utah prairie dog habitat on Federal, state, tribal, and private lands.
3. Minimize impacts of diseases to Utah prairie dogs via research efforts, a plague response plan, and a monitoring strategy.
4. Develop and implement the capability to respond to natural disturbances (e.g., drought, fire).
5. Continue the translocation of Utah prairie dogs to suitable habitat using approved protocols.
6. Develop and implement a public outreach program that promotes a better understanding and appreciation of the biological and habitat values of the Utah prairie dog as well as tolerance of the species.
7. Develop and implement research priorities to identify and evaluate threats and create tools to expand Utah prairie dog colonies where appropriate to assist with adaptive management and conservation of the species.
8. Incorporate monitoring into recovery actions to ensure efficacy of actions.

TOTAL ESTIMATED COST OF RECOVERY (in \$thousands)

	Action 1	Action 2	Action 3	Action 4	Action 5	Action 6	Action 7	Action 8	Total
FY01	90	3,110	150	-	150	220	110	40	3,870
FY02	60	3,050	200	-	130	90	60	50	3,640
FY03	60	3,040	200	-	130	40	30	80	3,580
FY04	60	3,030	200	-	130	40	30	50	3,540
FY05	70	3,210	250	50	170	190	140	70	4,150
FY06-FY30	800	71,030	6,250	1,250	3,450	1,750	1,300	1,620	87,450
Total	1,140	86,470	7,250	1,300	4,160	2,330	1,670	1,910	106,230

Estimated Date of Recovery

If the recovery actions are accomplished on schedule, full recovery of the Utah prairie dog can be achieved by the year 2040. However, it should be recognized that the recovery program may change over time or the timeframe to achieve the recovery actions may take longer than expected.

GLOSSARY

The consistent use of terminology is important when discussing the Utah prairie dog, particularly as several terms relating to prairie dog groupings and populations were used interchangeably in the past. The following definitions will be used in this Recovery Plan:

Clans or coteries are social groups consisting of an adult male, several adult females, and their offspring. These groups maintain geographic territorial boundaries, although they will use common feeding grounds.

Colonies are groups of animals with associated mounds, burrows, and food resources that are within calling distance. These units are genetically similar and vulnerable to local catastrophes including disease outbreaks. Colonies may contain one or several clans.

Complexes are groups of colonies that are generally within 2 mi (3.2 km) of each other, not separated by geographic barriers, and that will exchange migrants each 1 to 2 generations.

Enzootic refers to animal diseases that are restricted to a given geographical locality and are continually present at low levels in an animal community, but affect only small numbers of animals.

Epizootic refers to a disease cycle that under certain environmental conditions will affect many animals in a region at the same time and will affect animals at a frequency higher than expected in a given time period.

Historic Habitat is any area known to have supported Utah prairie dogs for 5 or more years prior to the current date, but currently unoccupied. Proof of historic occupancy can be derived from the official count database, published and other written records, or physical evidence (e.g., old burrow systems).

Mapped Habitat is any and all areas within the species' range that were mapped since 1972 as currently or historically occupied by Utah prairie dogs. Official maps of Utah prairie dog habitat are maintained by Utah Division of Wildlife Resources (UDWR) and are updated annually.

Occupied Habitats are areas of known Utah Prairie Dog Habitat that, at the time in question, support Utah prairie dogs. Occupancy is determined by: 1) visual observation of Utah prairie dogs, 2) auditory detection of Utah prairie dogs, 3) physical sign of Utah prairie dogs (i.e., fecal pellets, tracks, fresh digging/burrows), or 4) any combination of these proofs.

Populations are groups of complexes within a geographic area that are not separated by geographic barriers but are generally separated by distances greater than 2 mi (3.2 km). With colony growth and extension, the complexes can potentially exchange migrants every few generations. With a decline in numbers, a population has the potential for becoming a complex. Disease vulnerability will become greater if the population does become a complex.

Private Land is any private land with Utah prairie dog mapped or occupied habitat that is not protected through a mechanism such as a conservation easement.

Protected Habitat is Utah prairie dog habitat, and surrounding areas, that are set aside for the preservation of Utah prairie dogs and are managed specifically or primarily toward that purpose. Protective mechanisms can include conservation easements, fee title purchase, regulatory designation, etc. All landownership categories can qualify for this designation.

Public Land is that land administered by Federal land management agencies such as the U.S. Bureau of Land Management (BLM), National Park Service (NPS), and the U.S. Forest Service (USFS), as well as state-administered lands associated with navigable waters, state forests, and state parks. With regard to lands administered by the State of Utah, those lands known as School and Institutional Trust Lands Administration (SITLA) are considered as private land.

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1.0 BACKGROUND

1.1 Introduction

The purpose of this Recovery Plan is to guide implementation of actions that will lead to the long-term survival and conservation of the Utah prairie dog (*Cynomys parvidens*). Utah prairie dogs, found only in southwestern and central Utah, comprise the western most member of the genus *Cynomys* and have the most restricted range of the four prairie dog species in the United States. The Utah prairie dog was listed as an endangered species on June 4, 1973 (38 FR 14678), pursuant to the Endangered Species Conservation Act of 1969. On January 4, 1974, the species was listed under the Endangered Species Act (ESA) of 1973 (39 FR 1171).

At the time of listing, the species was threatened with extinction due to habitat destruction and modification, over-exploitation, disease, and predation. By May 1984, Utah prairie dog populations had expanded in portions of their range, and the U.S. Fish and Wildlife Service (USFWS) reclassified the species to threatened status with a special rule to allow regulated take of the species (49 FR 22330). Under the 1984 special rule, taking of up to 5,000 animals was authorized in the seasonal window of June 1 through December 31. This special rule was amended on June 14, 1991 (56 FR 27438), to increase the amount of regulated take throughout the species' range to 6,000 animals. In practice, take of Utah prairie dogs in association with this special rule is only permitted in cases where Utah prairie dogs are causing damage to irrigated agriculture or pasture lands; as implemented by the Utah Division of Wildlife Resources (UDWR) under authority of UDWR Rule R657-19 Taking Nongame Mammals.

The initial Recovery Plan for the Utah prairie dog was approved on September 30, 1991 (USFWS 1991). On August 25, 1997, an Interim Conservation Strategy was completed to complement the 1991 Recovery Plan and direct efforts toward habitat improvement projects, translocation research (see section 1.9, Conservation Measures and Assessment), and public involvement (Utah Prairie Dog Recovery Implementation Team¹ 1997).

This document constitutes the first revision of the 1991 Recovery Plan. It focuses on threats to the Utah prairie dog and recommends strategies for addressing them. The plan also includes revised recovery criteria and updated actions likely necessary to achieve recovery. The recovery program outlined in this revised plan is intended to adapt to new information and issues as they arise.

The recovery priority number for the Utah prairie dog is 8C (see Table 1). Recovery priority numbers, which range from a high of 1C to a low of 18, are based on degree of threat, recovery potential, taxonomic distinctiveness, and presence of an actual or imminent conflict between the species and development activities (C represents conflict). The rank of 8C is based on a moderate degree of threat (e.g., economic development activities and plague), high recovery potential, and taxonomic standing as a species.

¹ The Utah Prairie Dog Recovery Implementation Team was formalized into the Utah Prairie Dog Recovery Team in 2006.

TABLE 1. Recovery Priority Numbers

Degree of Threat	Recovery Potential	Taxonomy	Priority	Conflict
High	High	Monotypic Genus	1	1C
		Species	2	2C
		Subspecies/DPS	3	3C
	Low	Monotypic Genus	4	4C
		Species	5	5C
		Subspecies/DPS	6	6C
Moderate	High	Monotypic Genus	7	7C
		Species	8	8C*
		Subspecies/DPS	9	9C
	Low	Monotypic Genus	10	10C
		Species	11	11C
		Subspecies/DPS	12	12C
Low	High	Monotypic Genus	13	13C
		Species	14	14C
		Subspecies/DPS	15	15C
	Low	Monotypic Genus	16	16C
		Species	17	17C
		Subspecies/DPS	18	18C

The above ranking system for determining Recovery Priority Numbers was established in 1983 (48 FR 43098, September 21, 1983 as corrected in 48 FR 51985, November 15, 1983).

1.2 Taxonomy and Description

Prairie dogs belong to the *Sciuridae* family of rodents, which also includes squirrels, chipmunks, and marmots. There are five species of prairie dogs, all of which are native to North America and all of which have non-overlapping geographic ranges (Hoogland 1995, 2003).

Taxonomically, prairie dogs are divided into two subgenera (Hoogland 1995): white-tailed and black-tailed. The Utah prairie dog is a member of the white-tailed group, subgenus *Leucocrossuromys*. Other members of this group, which also occur in Utah, are the white-tailed prairie dog (*Cynomys leucurus*) and the Gunnison prairie dog (*Cynomys gunnisoni*).

The Utah prairie dog is recognized as a distinct species (Zaveloff 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. The type locality for the Utah prairie dog is Buckskin Valley in Iron County, Utah (Pizzimenti and Collier 1975).

The Utah prairie dog's color is cinnamon to dark buffy cinnamon mixed with small amounts of buff or blackish hairs. This species can be distinguished from the two other white-tailed species by a black spot above the eye (Pizzimenti and Collier 1975), a brown cheek patch, the cinnamon to clay coloration of the dorsum and the proximal half of the tail, and the all-white terminal half of the tail (Hollister 1916). However, color alone is not considered a reliable tool to differentiate between prairie dog species (Hoogland 2003).

Adult Utah prairie dogs range in total body length from 9.8 to 15.7 in. (24.89 to 39.88 cm) including a tail length of 1.2 to 2.6 in. (3.05 to 6.60 cm) (Hollister 1916; Hoogland 1995). Adult males weigh between 1.7 to 3.1 lbs (0.77 to 1.41 kg) and adult females weigh between 1.4 to 2.5 lbs (0.64 to 1.13 kg) (Wright-Smith 1978). Body weight varies by sex and season. For example, in spring, male body mass ranges from 0.7 to 2 lbs (0.32 to 0.91 kg) but by late summer or early fall, their body mass ranges from 1.1 to 3.3 lbs (0.50 to 1.50 kg) (Hoogland 1995).

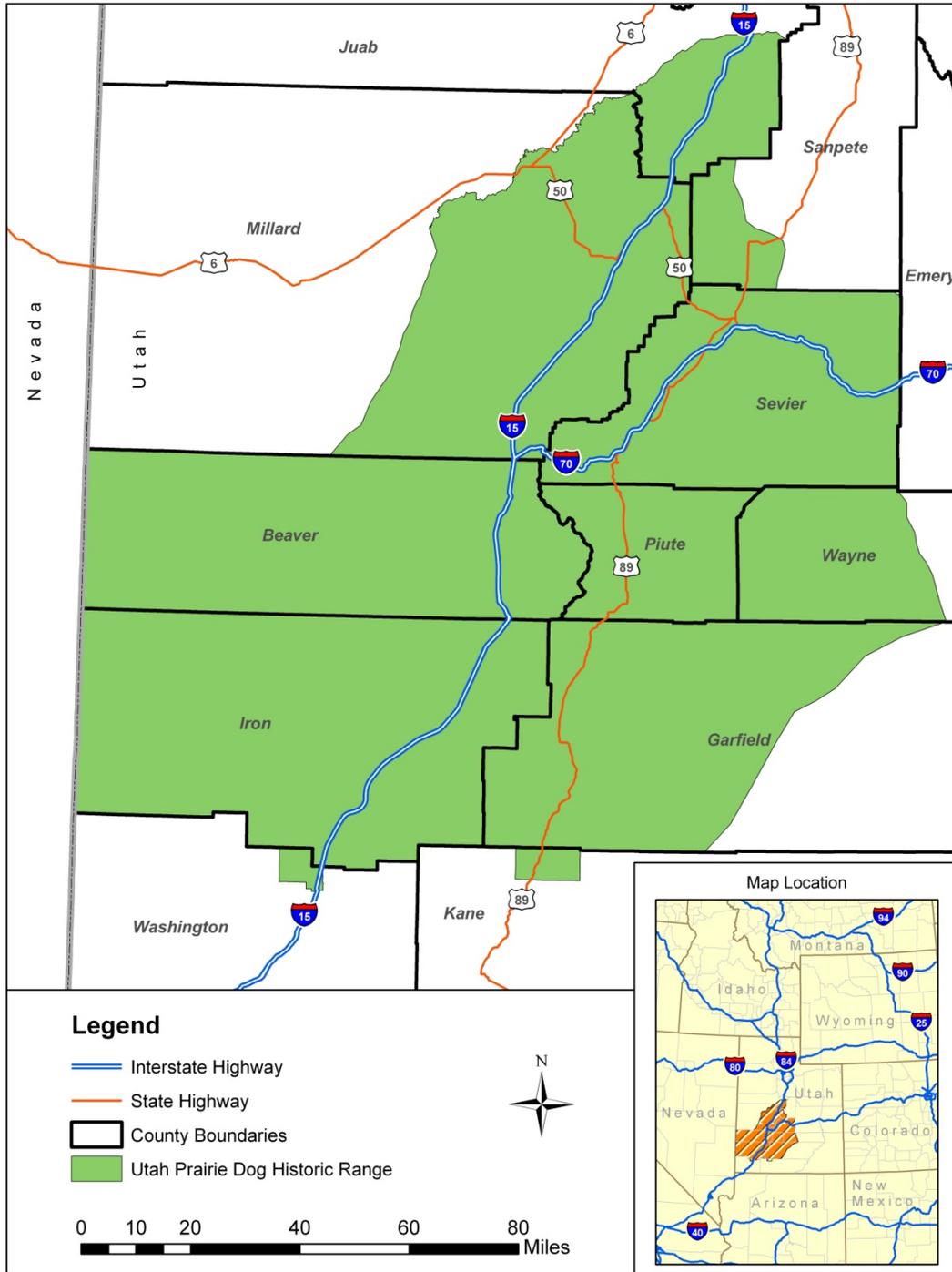
1.3 Distribution and Abundance

1.3.1 Historical Distribution and Abundance

Historically, the species' distribution included portions of Beaver, Garfield, Iron, Kane, Juab, Millard, Piute, Sanpete, Sevier, Washington, and Wayne Counties (see Appendix A and Figure 1) (Collier 1975). The Utah prairie dog may have occurred in portions of 700 sections in 10 areas of southwestern Utah (a county section is land unit equal to 1 m² (2.6 km²) or 640 ac (260 ha)) (Collier and Spillett 1973). While the historical abundance has been estimated at approximately 95,000 animals (Collier and Spillett 1973), these estimates are not considered reliable because they were derived from informal interviews, and not actual survey data.

Utah prairie dog populations began to decline when control programs were initiated in the 1920s, and by the 1960s the species' distribution was greatly reduced as a result of poisoning, sylvatic plague (a nonnative disease), drought, and habitat alteration induced by agricultural and grazing activities (USFWS 1991). The exact magnitude of this decline is not known. However, by the early 1970s, the Utah prairie dog had been eliminated from major portions of its historical range and had declined to an estimated 3,300 individuals distributed among 37 Utah prairie dog colonies (Collier and Spillett 1972).

FIGURE 1. Utah Prairie Dog Historic Range Map²

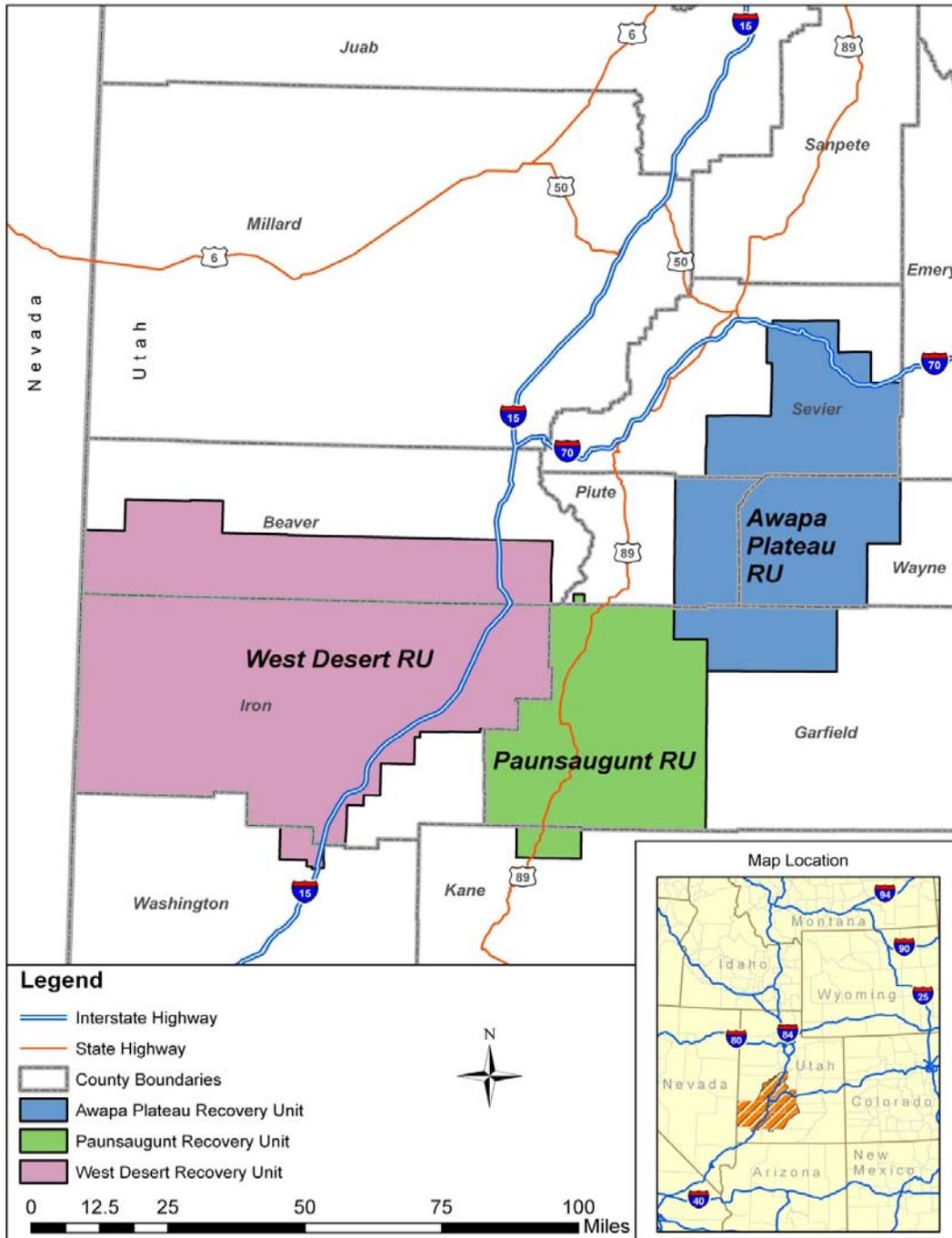


² This map illustrates the species' estimated historic range. However, it should be noted that not all areas within the historic range were likely occupied at all times as prairie colonies likely ebbed and flowed across this area as environmental variables shifted over time.

1.3.2 Current Distribution and Abundance

Today, Utah prairie dogs are limited to the central and southwestern quarter of Utah in Beaver, Garfield, Iron, Kane, Piute, Sevier, and Wayne Counties (Figure 2). They occur at 6,200 ft (1,890 m) to 9,180 ft (2,800 m) above sea level (McDonald 1993).

FIGURE 2. Utah Prairie Dog Recovery Unit Boundaries



Utah Prairie Dog Counts and Trends

The UDWR initiated biannual counts of Utah prairie dogs in 1976. Counts are conducted in April and May (Appendix C), when the adults have emerged from hibernation, but before the young are born (hereafter referred to as “counts” or “spring counts”).³

Utah prairie dog surveys are completed by visually scanning the colony area and counting the number of prairie dogs observed. Prairie dogs are counted several times during a visit, sometimes from several vantage points, to ensure coverage of the whole area. Counts are conducted during optimal weather conditions (e.g., no wind, little cloud cover, and no rain).

Prairie dog counts typically underestimate the actual number of adult animals because only 40 to 60% of individual prairie dogs are above ground at any one time (Crocker-Bedford 1975). In addition, terrain and vegetation can hinder a surveyor’s ability to see all prairie dogs that are present in an area. Access restrictions on some private lands make it impossible to survey all active prairie dog colonies every year.

Total population estimates can be derived by accounting for reproduction (Population Estimate = [(2 multiply by Spring Adult Count) multiply by 0.67 (proportion of adult females) multiply by 0.97 (proportion of breeding females) multiply by 4 (average number of young per breeding female)] + (2 multiply by Spring Adult Count)). Spring adult counts and population estimates provide population trend information, but are not accurate enough to determine actual population numbers.

Spring counts from the past 30 years show considerable annual fluctuations, but stable long-term trends in adult Utah prairie dog numbers (UDWR 2009). Range-wide counts were as high as 7,500 in the 1989 spring census count (Coffeen 1989) with a low count of 1,866 animals in 1976. Trends are stable to increasing for the last 10 years (see Figure 3, Tables 3 to 6).

Historically, Utah prairie dogs may have occurred in a more continuous pattern across the landscape. Today, Utah prairie dogs occur in colonies scattered across the landscape. Some of the scattered colonies function as metapopulations, while others function as isolated colonies (Ritchie and Brown 2005).

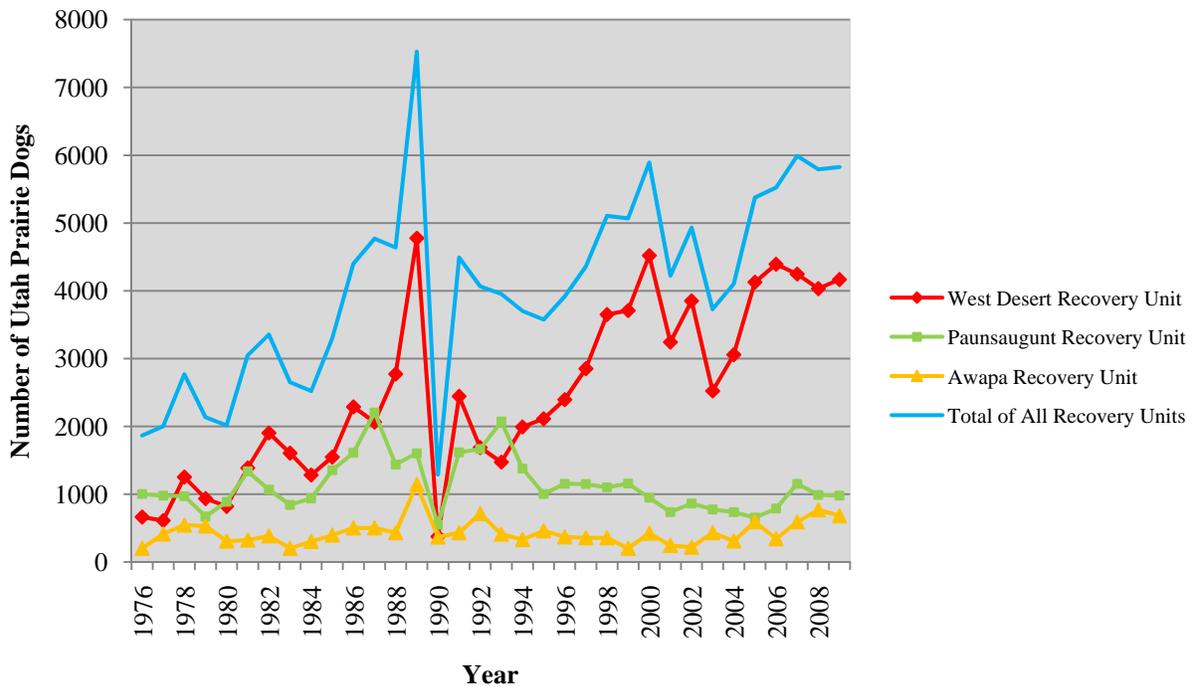
Observations over the past 30 years indicate that individual colonies “crash” and recolonize, in some cases repeatedly. Causes of crashes may be plague, forage competition with other herbivores, habitat alteration, self induced population regulation, and unlawful lethal control. Larger colonies (i.e., greater than 40 counted adults) are more likely to persist because they have a lower probability of crashing (Ritchie and Brown 2005).

³ 1990 surveys were incomplete (i.e., they did not include private lands) due to staffing and budget limitations.

TABLE 2. Mapped Utah Prairie Dog Habitat by Land Ownership (acres)

LAND OWNERSHIP ⁴	RECOVERY UNITS		
	West Desert	Paunsaugunt	Awapa
USFS	140	3,776	8,591
BLM	6,372	602	9,367
NPS	0	301	60
Protected Habitat	266	0	566
Utah SITLA	428	4,778	6,850
Private	9,969	6,163	1,761
Total	17,175	15,620	27,195
Habitat Removed (Developed)	334		
Total Habitat Remaining	16,841	15,620	27,195

FIGURE 3. Graph of Adult Utah Prairie Dog Counts (1976-2009)⁵



⁴ The definitions used in these tables for public, protected, and SITLA lands are found in the glossary.

⁵ The 1990 count is artificially low because none of the private lands colonies were counted due to staffing and budget limitations.

TABLE 3. Adult Utah Prairie Dog Counts (1976-2009)

YEAR	RECOVERY UNITS			TOTAL
	West Desert	Paunsaugunt	Awapa Plateau	
1976	663	1,002	201	1,866
1977	610	979	412	2,001
1978	1,253	970	545	2,768
1979	935	670	530	2,135
1980	820	888	307	2,015
1981	1,387	1,337	323	3,047
1982	1,903	1,068	384	3,355
1983	1,606	843	201	2,650
1984	1,283	936	303	2,522
1985	1,548	1,354	397	3,299
1986	2,288	1,611	501	4,400
1987	2,064	2,205	502	4,771
1988	2,772	1,437	431	4,640
1989	4,778	1,604	1,145	7,527
1990⁶	375	549	367	1,291
1991	2,444	1,617	431	4,492
1992	1,688	1,666	713	4,067
1993	1,473	2,072	409	3,954
1994	1,992	1,379	331	3,702
1995	2,113	1,003	460	3,576
1996	2,395	1,153	369	3,917
1997	2,852	1,150	357	4,359
1998	3,651	1,100	355	5,106
1999	3,710	1,157	201	5,068
2000	4,521	948	424	5,892
2001	3,243	736	244	4,223
2002	3,852	863	218	4,933
2003	2,523	774	432	3,729
2004	3,058	735	309	4,102
2005	4,128	654	593	5,375
2006	4,393	788	343	5,524
2007	4,248	1,153	590	5,991
2008	4,033	989	769	5,791
2009	4,167	979	681	5,827

Source UDWR 2009, 2010

⁶ The 1990 count is artificially low because none of the private lands colonies were counted due to staffing and budget limitations.

TABLE 4. Awapa Recovery Unit Adult Utah Prairie Dog Counts per Year by Land Ownership

Land Owner⁷	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Public Lands	73	122	53	208	201	306	179	347	506	429
Private Lands	315	138	133	148	66	96	116	91	98	108
SITLA	50	15	22	59	28	41	25	64	63	99
Protected Lands	14	3	21	17	14	144	4	88	102	45
Total	452	278	229	432	309	593	343	590	769	681

Source UDWR 2009, 2010

TABLE 5. Paunsaugunt Recovery Unit Utah Prairie Dog Counts per Year by Land Ownership

Land Owner⁷	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Public Lands	223	121	165	155	257	124	205	436	480	337
Private Lands	711	560	626	518	420	366	464	582	369	465
SITLA	14	55	72	101	58	164	119	135	165	177
Total	948	736	863	774	735	654	788	1,153	1,014	979

Source UDWR 2009, 2010

TABLE 6. West Desert Recovery Unit Utah Prairie Dog Counts per Year by Land Ownership

Land Owner⁷	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Public Lands	861	571	553	461	452	887	953	457	218	280
Protected Lands	358	122	234	182	214	179	172	118	91	93
Private Lands	3,297	2,536	3,041	1,846	2,358	2,977	3,171	3,634	3,716	3,786
SITLA	5	14	24	34	36	85	97	39	3	1
Total	4,521	3,243	3,852	2,523	3,060	4,128	4,393	4,248	4,033	4,160

Source UDWR 2009, 2010

Habitat Mapping

In 1972, the UDWR began mapping Utah prairie dog habitat throughout the species' range. Any habitat that was occupied by prairie dogs at any time since 1972 is referred to as "mapped habitat." Mapping allows us to maintain an up-to-date record of current and historic Utah prairie dog habitat so that impacts to habitat can be tracked and evaluated, and conservation efforts can be focused on the most important colonies.

⁷ The definitions used in these tables for private, public, protected, and State Institutional Trust Lands Administration lands are found in the glossary.

Maps are updated annually to include colony expansions and new colonies. However, personnel resources are not available to annually delineate and map only the occupied portions of each colony. As a result, overall mapped habitat acreage can only remain the same or increase for each colony. The incremental increases in colony acreages over time can thus underestimate actual Utah prairie dog population densities. For example, if 50 adult Utah prairie dogs are counted throughout a 50-ac (20-ha) “mapped habitat” area, the density of prairie dogs for that colony would be 1 animal per acre, regardless of how much of the mapped habitat they actually occupy in that given year. If in the following year, the same 50 prairie dogs are counted, but they occupy an additional 40-ac (16-ha) parcel adjacent to the original 50-ac (20-ha) “mapped” colony – then the new “mapped habitat” is 90 ac (36 ha), still with 50 dogs for a density of 0.55 animals per acre.

Species Distribution

Significant concentrations of Utah prairie dogs occur in three areas, which we termed “recovery areas” in the 1991 Utah Prairie Dog Recovery Plan and designate as “recovery units” (RUs) here (see section 3.2, Rationale for Recovery Criteria). An RU is a special unit of the listed entity that is geographically or otherwise identifiable and is essential to the conservation and recovery of the species. The three RUs are: the Awapa Plateau; the Paunsaugunt; and the West Desert (Figure 2 and Appendix B).

The Awapa Plateau RU encompasses portions of Garfield, Piute, Sevier, and Wayne Counties. There are 13,183 ac (5,335 ha) of occupied habitat and 27,195 ac (11,005 ha) of mapped habitat in the Awapa Recovery Area (UDWR 2009). Sixty-six percent of the mapped habitat occurs on Federal lands (Table 2). The Awapa Plateau RU contains approximately 10% of all adult Utah prairie dogs (Table 3). In any given year, 30 to 70% of the RU’s individual adults occur on public lands (Table 4). Spring counts on the Awapa have varied since 1976 with low counts of 201 adult prairie dogs in 1976 and 1982 and a high count of 1,145 adult prairie dogs in 1989 (Table 3). From 2007 to 2009, the spring counts showed an increase from 367 adult prairie dogs in 2007 to 769 adult prairie dogs in 2008 and 681 adult prairie dogs in 2009 (Table 3). Average prairie dog density in the Awapa RU was 0.06 prairie dog per acre from 2000 to 2009 (UDWR 2009).

The Paunsaugunt RU is primarily in Garfield County, with small areas in Iron and Kane Counties. There are 9,670 ac (3,913 ha) of occupied habitat and 15,620 ac (6,321 ha) of mapped habitat in the Paunsaugunt Recovery Area (UDWR 2009). Approximately 30% of the mapped habitat occurs on Federal lands (Table 2), primarily the Dixie National Forest. The Paunsaugunt RU contains up to 20% of all adult Utah prairie dogs (Table 3). In any given year, 18 to 38% of the individual adults occur on public lands (Table 5). Spring counts vary from 652 to 2,205 adult prairie dogs (Table 3). The area experienced an overall downward trend from 1993 to 2005, but has since rebounded (Table 3). Average prairie dog density in the Paunsaugunt RU was 0.34 prairie dog per acre from 2000 to 2009 (UDWR 2009).

The West Desert RU is primarily in Iron County, but extends into southern Beaver County and northern Washington County. There are 10,172 ac (4,116 ha) of occupied habitat and over 16,841 ac (6,815 ha) of mapped habitat in the West Desert Recovery Area (UDWR 2009). Approximately 26% of the mapped habitat occurs on Federal lands. The West Desert RU contains over 70% of all adult Utah prairie dogs (Table 3). In any given year, 10 to 20% of the individual adults occur on public lands (Table 6). The West Desert population fluctuates

between less than 1,000 and 4,750 adult Utah prairie dogs (Table 3). Peaks of greater than 4,000 animals occurred in 1982, 1989, 2000, and 2005 to 2009. Between 2000 and 2003, the West Desert RU spring counts showed a decrease from 4,521 to 2,523 prairie dogs; however, the population rebounded from 2004 through 2009 (Table 3). Average prairie dog density in the West Desert RU was 0.78 prairie dog per acre from 2000 to 2009 (UDWR 2009).

In summary, the range-wide results of the spring counts from the past 30 years show considerable annual variation, but stable long-term trends in adult Utah prairie dog numbers (Table 2, Figure 3). The lowest range-wide count was 1,291 adult Utah prairie dogs in 1990, and the highest count was 7,527 adult prairie dogs in 1989. Spring counts and population estimates do not provide an accurate population census but are indicative of long-term trends.

It is important to note that approximately 30% of the animals rangewide occur on Federal or otherwise protected lands (e.g., conservation easements, conservation banks). The remaining 70% of Utah prairie dogs occur on non-Federal lands where they may be more vulnerable to threats associated with habitat loss (see section 1.7.1, Factor A). Of the three RUs, the Awapa RU has the highest percentage of the prairie dog counts (up to 70%) and mapped habitat (66%) occurring on Federal lands and the West Desert RU has the highest percentage of prairie dog counts (up to 90%) occurring on private lands.

1.4 Population Fluctuations and Impacts on Long-Term Stability

Range-wide adult counts suggest large annual variability in Utah prairie dog populations (see Figure 3). In addition to natural population dynamics, prairie dog numbers may be influenced by various environmental factors, including disease outbreaks, habitat changes, and climate cycles (discussed in the Threats Assessment Section). Despite these fluctuations, it appears that the overall Utah prairie dog population level is relatively stable with a population increase from 2003 to 2009.

A population viability analysis completed in 2000 concluded that long-term species survival in the three RUs is not assured given current abundance, geographic distribution, and threats (Roberts et al. 2000). However, management options exist to offset these risks, including the preservation of existing occupied habitat (Roberts et al. 2000). Catastrophic events related to plague can be managed through flea control or possibly vaccines (Roberts et al. 2000).

The long-term persistence of the Utah prairie dog will require protection of large colonies that exceed 40 individuals (Ritchie and Brown 2005). Having a greater number of Utah prairie dog colonies within 3.1 mi (5 km) of each other lowers the probability of population crashes because of an increased capability for individual animals to disperse and occupy adjacent habitats (Ritchie and Brown 2005). Thus, it is essential to maintain sufficient numbers of large colonies across the landscape, in relatively close association with neighboring colonies, within all three of the RUs.

1.5 Life History

Utah prairie dogs hibernate by spending 4 to 6 months underground each year during the harsh winter months, although they are occasionally seen sunning themselves on days with mild weather (Hoogland 2001). Adult males cease surface activity during August and September, and females follow suit several weeks later (lactating females enter hibernation later than non-lactating females) (Hoogland 2003). Juvenile prairie dogs remain above ground 1 to 2 months longer than adults and usually hibernate by late November. Adult females and juveniles likely go into hibernation later because they need more fat stores for hibernating than adult males (McDonald 1993). Utah prairie dogs emerge from hibernation in late February or early March, with males emerging 2 to 3 weeks prior to females (Hoogland 2003).

Mating begins soon after females emerge from hibernation (Hoogland 2003). Female Utah prairie dogs come into estrous and are sexually receptive for only a few hours on 1 day during the breeding season (generally mid-March through early April) (Hoogland 2001). Consequently, female prairie dogs wean a maximum of one litter per year. All female Utah prairie dogs copulate, but only two-thirds wean a litter (Hoogland 2001).

Utah prairie dog reproduction and survival are influenced by the availability of food and other resources. Adult females require twice as much energy during the lactation period than at other times of the year (Crocker-Bedford and Spillett 1981). Litter size varies directly with maternal body mass (Hoogland 2001). Heavy adult males are more likely to copulate and thus sire more offspring than lighter males (Hoogland 2001).

Litter size ranges from 1 to 7 pups and mean litter size is 3.88 pups (Pizzimenti and Collier 1975; Wright-Smith 1978; Hoogland 2001). The young emerge from their nursery burrow when they are 5 or 6 weeks old after a gestation period of 30 days. The young attain adult size by October and reach sexual maturity at the age of 1 year (Wright-Smith 1978).

Less than 50% of Utah prairie dogs, regardless of sex, survive to breeding age (Hoogland 2001). Male Utah prairie dogs frequently cannibalize juveniles, eliminating about 20% of litters before they first appear above ground (Hoogland 2003). After the first year, female survivorship is higher than male survivorship, although still low for both sexes. Only about 20% of females and less than 10% of males survive to age 4 (Hoogland 2001). Approximately two-thirds of the adult population is female due to the higher mortality rate for juvenile males. This high mortality rate for juvenile males is thought to be caused by conflicts with adult males and loss during dispersal (Wright-Smith 1978; USFWS 1991).

Natal dispersal (movement of first year animals away from their area of birth) and breeding dispersal (emigration of a sexually mature individual from the area where it copulated) are male-biased, which leads to the loss of young males from a colony and higher mortality through predation (Hoogland 2003). Young male Utah prairie dogs disperse in the late summer with average dispersal events of 0.35 mi (0.56 km), long-distance dispersal events of up to 0.75 mi (1.2 km), and unusually long-distance dispersals of 1.1 mi (1.7 km) (Crocker-Bedford 1976; Mackley 1988). We believe some rare dispersal events may exceed these documented distances.

Utah prairie dogs are organized into social groups called clans, consisting of an adult male, several adult females, and their offspring (Wright-Smith 1978). Clans maintain geographic territorial boundaries although they will use common feeding grounds. Utah prairie dogs spend approximately 59% of their time feeding, 25% of their time in alert behavior (including predator

watch and intruder monitoring), 2% of their time in social interactions between clan members, and the remainder of their time in various activities such as grooming, digging and burrow maintenance, and inactivity (Wright-Smith 1978).

Utah prairie dogs are predominantly herbivores, though they also eat insects (primarily cicadas (*Cicadidae*)) (Crocker-Bedford and Spillett 1981; Hoogland 2003). Grasses are a staple of the annual diet (Crocker-Bedford and Spillett 1981; Hasenyager 1984), but other plants are selected during different times of the year. Utah prairie dogs only select shrubs when they are in flower, and then only eat the flowers (Crocker-Bedford and Spillett 1981). Forbs are consumed in the spring, and there is a preference for alfalfa over grasses when both are present (Crocker-Bedford and Spillett 1981). This is important because many agricultural fields within the range of the prairie dog are planted in alfalfa crops – for example, Iron County (i.e., West Desert RU) was ranked second highest producing county for alfalfa in the state (Utah State University Extension 2005). Forbs also may be critical to prairie dog survival during drought (Collier 1975).

Prairie dogs discriminate between particular plant parts when feeding. Flowers and seeds are selected and preferred when they are available, and young leaves are selected over old leaves (Crocker-Bedford and Spillett 1981; Hasenyager 1984). Stems rarely are eaten (Crocker-Bedford and Spillett 1981). Utah prairie dogs eat almost all the green vegetation they cut, and by selecting flowers, seeds, and young leaves, they obtain high amounts of proteins and digestible energy.

Vegetation quality and quantity are important in helping Utah prairie dogs survive hibernation, lactation, and other high nutrient demand times (Environmental Defense 2007). Plant species richness is correlated with increased weight gain, higher juvenile to adult ratios, and higher animal densities (Crocker-Bedford and Spillett 1981; Ritchie and Cheng 2001).

Utah prairie dogs are subject to natural predation by coyotes (*Canis latrans*), badgers (*Taxidea taxus*), long-tailed weasels (*Mustela frenata*), various raptor species, and Great Basin rattlesnakes (*Crotalus oreganus lutosus*) (USFWS 1991; Hoogland 2001). In established colonies, predators probably do not exert a controlling influence on numbers of prairie dogs (Collier and Spillett 1972). Utah prairie dogs also are subject to natural competition with several species of ground squirrels, which can have population-level effects, such as competitive interactions impacting distributional patterns (Collier and Spillett 1975).

Utah prairie dog populations are susceptible to sylvatic plague (*Yersinia pestis*), a bacterium introduced to the North American continent in the late 1800s (Cully 1993). There is a limited understanding of the variables that determine when sylvatic plague will impact prairie dog populations (see section 1.7.3, Plague). Fleas are the vectors that spread the disease (Biggins and Kosoy 2001). Infected fleas can be brought into the vicinity of a prairie dog colony by a suite of mammals (Biggins and Kosoy 2001). Plague outbreaks generally occur when populations increase to high densities causing increased stress among individuals and easier transmission of disease between individuals (Gage and Kosoy 2005).

1.6 Habitat Characteristics

Utah prairie dogs prefer swale-type formations where moist herbaceous vegetation is available even during drought periods (Collier 1975; Crocker-Bedford 1976; Crocker-Bedford and Spillett 1981). Plentiful food and other resources enable prairie dogs to attain large body mass, thus enhancing survival and reproduction (Hoogland 2001).

Soil characteristics are an important factor in the location of Utah prairie dog colonies (Collier 1975; Turner 1979; McDonald 1993). Well-drained soils are a habitat requirement for Utah prairie dogs as burrows must be deep enough (at least 3.3 ft (1 m)) to protect the prairie dogs from predators and environmental and temperature extremes. Soil color may aid in disguising prairie dogs from surface predators and thus may be an added survival factor.

Utah prairie dogs generally avoid areas where brushy species dominate, and will eventually decline or disappear in areas invaded by brush (Collier 1975; Player and Urness 1983). Vegetation on prairie dog colonies is of short stature to allow the prairie dogs to see approaching predators and have visual contact with other members of the colony (Collier 1975; Crocker Bedford and Spillett 1981; Player and Urness 1983). However, we have observed Utah prairie dogs occupying pine fir forests in Bryce Canyon National Park.

As a keystone species, prairie dogs have a large effect on the ecosystem. Prairie dogs decrease vegetation height and increase landscape heterogeneity. Burrowing and excavation mixes the soil and promotes uptake of nitrogen by plants (Whicker and Detling 1993 in Miller et al. 2000; Hoogland 2001). The burrow and mound systems change soil chemistry by increasing the porosity of the soil to allow deep penetration of precipitation, and increasing the incorporation of organic materials into the soil (Munn 1993 in Miller et al. 2000). Several wildlife species such as burrowing owls (*Athene cunicularia*), rabbits (*Lepus* spp.), ground squirrels (*Spermophilus* spp.), weasels (*Mustela* spp), and badgers (*Taxidea taxus*) also rely on the habitat conditions created by Utah prairie dog colonies, and frequently use their burrows (Collier and Spillett 1975; Hoogland 2001).

1.7 Listing Factors and Continuing Threats

The set of listing factors set forth in Section 4(a)(1) of the ESA include: (A) the present or threatened destruction, modification, or curtailment of habitat or range; (B) overutilization for commercial, recreational, scientific, or education purposes; (C) disease or predation; (D) the inadequacy of regulatory mechanisms; and (E) other natural or manmade factors affecting the species' continued existence. The discussion under each listing factor, below, addresses the threats to the species at the time of the original listing, the revision to the listing, and the 1991 recovery plan as well newly identified or predicted threats that are likely to occur in the foreseeable future.

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

Habitat loss from urban development and agriculture and habitat degradation from over-grazing were considered threats to the Utah prairie dog in the 1984 downlisting (49 FR 22330, May 29, 1984) and the 1991 Recovery Plan (USFWS 1991). In this revised recovery plan we provide updated information regarding these threats, and also evaluate potential threats from off-highway vehicles (OHVs) and energy resource development (USFWS 1991).

To evaluate threats on Federal lands, we reviewed the land use plans associated with each BLM district, National Forest, or National Park that overlaps the current range and RUs of the Utah prairie dog. These areas include the Cedar City, Richfield, and Kanab BLM districts; the Dixie and Fishlake National Forests; and Bryce Canyon National Park (see Table 2 for the acreage distribution among these land management entities). We also evaluated information as it was available for threats occurring on non-Federal lands.

Urban Expansion

Urban expansion across the range of the Utah prairie dog was one of the factors that resulted in listing the species under the ESA and continues to be a primary threat to the species. Approximately 70% of all known Utah prairie dogs occur on private lands (UDWR 2010a), the same lands that are prioritized for residential and industrial development (see Cultivated Agriculture, below). The predominant effect of urban expansion is the permanent loss of habitat. Urban expansion also leads to fragmentation of Utah prairie dog colonies, which diminishes their ability to disperse, exchange genetic material, and increase genetic variability, all critical to maintaining a viable population (Chesser 1984; Cooke 1993; Ritchie and Brown 2005). Urban expansion also increases exposure to domestic and feral dogs and cats, which prey on prairie dogs and introduce fleas that act as a vector for plague (Center for Disease Control 2005).

The highest degree of Utah prairie dog habitat impacts associated with urban expansion occurs in Iron County, Utah. Iron County comprises over 95% of the West Desert RU and approximately 70% of the current Utah prairie dog population. Iron County also has the largest human population of the 3 RUs, with an expected 2.7% average annual growth rate through 2060; resulting in a population increase from approximately 50,600 in 2010, to 87,600 in 2030, and 168,380 in 2060 (State of Utah 2008).

As of October 2009, a total of 870 Utah prairie dogs were translocated from developing private lands to Federal lands, and 372 ac (150 ha) of occupied habitat were lost to urban development in Iron County (Entrix 2010). Future growth projections in the West Desert RU include the loss of approximately 3,040 ac (1,230 ha) of occupied Utah prairie dog habitat (Entrix 2010) – 38% of

the total occupied habitat and 25% of the mapped habitat in this RU (see section 1.3.2, Current Distribution and Abundance). The current threatened status of the Utah prairie dog results in the need to develop and implement habitat conservation plans (HCP) to mitigate impacts to the species from urban development on non-Federal lands. Ongoing development and the resulting incidental take of Utah prairie dogs in Iron County is authorized under an ESA Section 10(a)(1)(B) permit and the Iron County HCP through 2018; however, the amount of take is limited by the numbers of prairie dogs occurring on Federal and otherwise protected habitats (see section 1.9.6, Habitat Conservation Plans).

By comparison Garfield, Piute, and Wayne Counties, which make up the other two Utah prairie dog RUs (Paunsaugunt and Awapa), have a much smaller human population and are experiencing much slower growth rates. Projected growth rates through 2060 are 1.3%, 0.2%, and 1.3% for Garfield, Piute, and Wayne Counties, respectively (State of Utah 2008).

There is no current mechanism (i.e., no approved HCP) to authorize incidental take of Utah prairie dogs on non-Federal lands in the Awapa or Paunsaugunt RUs. However, a range-wide HCP is in development (Entrix 2010). Future growth projections include the loss of 1,247 ac (505 ha) of occupied Utah prairie dog habitat in the Awapa RU (Entrix 2010) – 30% of the available occupied habitat and 11% of the mapped habitat in this RU. Future growth projections in the Paunsaugunt RU include the loss of 232 ac (94 ha) of Utah prairie dog occupied habitat (Entrix 2010) – 2.7% of the total occupied habitat and 1.5% of mapped habitat in this RU (see Current Distribution and Abundance, section 1.3.2).

The projected loss of habitat among the three RUs will impact Utah prairie dogs, especially if the loss is not mitigated adequately. The valley bottoms of the West Desert RU, in particular are favored habitats by both humans and Utah prairie dogs due to the presence of deep soils and adequate moisture. Because the West Desert RU is experiencing the most rapid human population growth within the species' range and contains approximately 70% of the Utah prairie dog population, the urbanization facing this area poses the largest threat to the species in terms of loss of habitat and reduction in range, fragmentation, diminished dispersal, and lowered genetic variability. Urban expansion is in the top-tier of threats for Utah prairie dogs (see Table 6). The threatened status of Utah prairie dogs results in the issuance of ESA Section 10(a)(1)(B) permits to authorize incidental take and implement mitigation plans in response to urban development. Absent ESA protection, there are no other regulatory mechanisms that minimize or mitigate the impacts to Utah prairie dogs associated with urban expansion and consequent loss of habitat.

Cultivated Agriculture

As noted previously, the historical distribution and population numbers of the Utah prairie dog were broader than they are today (see section 1.3, Distribution and Abundance). 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 historic 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 2009). However, prairie dogs in agricultural fields are subject to negative factors including lethal control efforts to protect crops (Knowles 2002); habitat fragmentation from fences and roads; and urban predators (Seglund and Schnurr 2009).

Approximately 70% of Utah prairie dog habitat occurs on non-Federal lands. Many of these lands are in agricultural production. For example, Iron County (i.e., West Desert RU) was ranked third of all Utah counties in total cash revenue from crop production; it is the highest producing county for potatoes and second highest producing for alfalfa (Utah State University Extension 2005). The private ownership of agricultural lands also means that those lands not held in production are at risk of being converted to urban development in the future (see Urban Expansion, above).

Prairie dogs can cause conflicts for farmers because their colonies extend into agricultural fields (Elmore and Messmer 2006a, b), prairie dogs will eat crop vegetation such as alfalfa, and their burrows can create obstructions for the operation of crop equipment. Two programs exist under authority of the ESA to reduce human-prairie dog conflicts and promote conservation of the species on private lands: 1) special 4(d) rule, and 2) programmatic safe harbor agreement.

In an effort to minimize conflicts between cultivated agricultural activities and Utah prairie dog conservation, a special 4(d) rule (56 FR 27438, June 14, 1991) allows regulated take of Utah prairie dogs on private agricultural lands where damage from prairie dogs is observed. The current 1991 rule exempts the take of up to 6,000 Utah prairie dogs annually throughout the species' range; however, under the 4(d) rule an average of 864 animals were reported taken annually (UDWR 2010b).

A programmatic safe harbor agreement and ESA Section 10(a)(1)(A) incidental take permit was issued to the Panoramaland Resource Conservation and Development Council (Panoramaland) in June 2009 (Panoramaland 2009). The purpose of the programmatic safe harbor agreement is to provide a mechanism for partnering with private landowners, largely agricultural producers, to promote the conservation of Utah prairie dogs through the voluntary restoration, enhancement, and management of farms and ranchlands across the species' range, while providing regulatory assurances to landowners.

Cultivated agriculture is in the middle-tier of threats for Utah prairie dogs (see Table 6). Agriculture is a common use of private lands across the range of the species. Although prairie dogs can use agricultural lands, the use is associated with increased mortality from vehicles and legal and illegal control measures. In addition, there is a high potential for agricultural lands to be converted to urban uses in the future. Because the species is threatened, there are mechanisms such as the 4(d) rule and safe harbor agreements that help mediate the threats of agricultural use and encourage conservation participation by private landowners. Without ESA protection, higher levels of shooting and poisoning may occur on agricultural areas across the species' range, as happened historically (see section 1.3.1, Historical Distribution and Abundance).

Over-Grazing

Grazing occurs in almost all mapped and occupied Utah prairie dog habitat including private, state, and Federal lands. We do not have information on the acreage of Utah prairie dog habitat that is overgrazed so we do not fully understand the extent of this threat on the landscape.

Our best available information suggests that Utah prairie dogs can coexist with properly managed grazing systems. Livestock grazing may even benefit prairie dogs where grazing enhances primary production and reduces shrub invasion (Coppock et al. 1983; Holland et al. 1992). Higher vegetation quality and the proportion of nutrient-rich young shoots occur in

properly managed grazed habitats (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).

Impacts from over-grazing can include decreased habitat quality resulting from increases in invasive plants and decreased vegetation diversity (Collier and Spillett 1973). Historically, over-grazing in swale formation habitat led to erosion and reduced the amount of moisture available for grasses and forbs (Crocker-Bedford 1975). Over-grazing can decrease forage availability, with the potential to increase Utah prairie dog foraging time, and consequently decrease vigilance and survivorship (Ritchie 1998; Cheng and Ritchie 2006). These effects may be more likely during times of drought or in areas with low plant diversity (Elmore and Messmer 2006a, 2006b).

Many agricultural producers believe that Utah prairie dogs impact their operations through loss of forage for their cattle; equipment damage from driving across burrows; and livestock injury if animals step in burrows. They also disagree that prairie dog burrowing behavior is beneficial to soils (Elmore and Messmer 2006a, 2006b).

Because of these concerns, and similar to the previous discussion on Cultivated Agriculture, the conflicts between agricultural producers and Utah prairie dogs historically led to widescale eradication programs – without ESA protection, there are no other mechanisms to provide regulatory control of prairie dog poisoning or shooting. Safe harbor or other private landowner conservation efforts will be part of our recovery efforts to promote public education and foster proactive grazing practices that will simultaneously benefit Utah prairie dog habitats (see section 1.9.4, Safe Harbor agreements).

Grazing is in the middle-tier of threats for Utah prairie dogs (see Table 6). However, the threat is likely scattered among allotments with some being overgrazed and others being effectively managed. For example, the threatened status of the Utah prairie dog results in Section 7 consultations for grazing actions on Federal lands, and an ability to develop and implement conservation measures to avoid and minimize the effects of potential overgrazing on a site-specific basis.

Off-Highway Vehicle/Recreational Uses

The OHV recreation is an increasing use of public lands. The OHV registrations in Utah increased 212% from 1998 to 2004 (Hayes 2005), and new retail sales of OHVs increased 163% between 1995 and 2001, with most of these vehicles being used on public lands (Fischer et al. 2002).

The OHV use can result in habitat loss and degradation across the species' range. These activities can crush vegetation, decreasing forage quality and availability for prairie dogs. Repeated OHV disturbances may reduce the foraging time of Utah prairie dogs and negatively affect weight gain, resulting in decreased overwinter survival. The OHV use also allows more human access to prairie dog colonies which may increase the risk of illegal shooting (Bonebrake pers. comm. 2008).

On Federal lands, there is an increased planning effort toward directing OHV use to designated trails or play areas, and consequently away from Utah prairie dog habitats. The range of the Utah prairie dog overlaps the Dixie and Fishlake National Forests; and Cedar City, Richfield, and Kanab BLM field office areas. The Dixie and Fishlake National Forests prohibit

cross-country vehicle travel forest-wide (USDA 2006, 2009). Almost the entire Richfield BLM district is either closed to OHV use or limited to designated routes (BLM 2008a). The Kanab BLM Resource Management Plan (RMP) includes a conservation measure to preclude cross-country motorized use in occupied or inactive Utah prairie dog colonies (BLM 2008b). The Cedar Beaver Garfield Antimony RMP (BLM 1986) limits vehicle use to existing roads and trails near prairie dog colonies. This restriction is in effect at one Utah prairie dog complex (Three Peaks) and portions of four additional complexes totaling approximately 7% of Utah prairie dog mapped habitat in the West Desert RU (Bonebrake pers. comm. 2008). Enforcement of travel management plans is difficult.

While OHV use is not restricted on non-Federal lands, use 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.

On the whole, OHV activities are in the middle-tier of threats for Utah prairie dogs (see Table 6).

Energy Resource Exploration and Development

Energy resource exploration and development activities within the range of the Utah prairie dog primarily include wind and oil and gas development. Wind development projects include construction of wind towers, roads, and transmission lines. These facilities can result in the loss and fragmentation of Utah prairie dog habitat. The most likely areas for wind power development in Utah are the Raft River Mountains in western Utah and the Milford area in southwest Utah (Department of Energy 2010). The Raft River Mountains do not overlap the historical or current range of the Utah prairie dog. Suitable habitat for Utah prairie dogs occurs in the Milford area (in the species' current range) (BLM 2009), but we are not aware of any occupied habitats within 25 mi (40 km) of the wind development area.

Oil and gas development includes seismic activities, exploratory wells, and production facilities. Development includes the construction of roads, wells and pads, and energy corridors (i.e., long-distance pipelines or transmission lines). Resulting impacts to prairie dogs from oil and gas development may include direct mortality from vehicles; direct mortality associated with increased access by recreational shooters who use the new roads (Gordon et al. 2003); 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).

Oil and gas related activity was historically low in the West Desert RU; however, recent applications to conduct seismic work indicate a renewed interest in potential energy development (Bolander pers. comm. 2008). At present, we lack information on the extent of development that may occur in the future. The Cedar City BLM office is the primary Federal land management entity in the West Desert RU. The Cedar City BLM district has not revised its land use plan, and there are no specific conservation measures in the 1986 land use plan to minimize the effects of energy development to Utah prairie dogs (BLM 1986). The majority of mapped Utah prairie dog habitat in the West Desert RU is non-Federal, and there are no conservation measures in place to minimize the effects of energy development to Utah prairie dogs on these lands.

We do not anticipate extensive oil and gas development on areas that overlap Utah prairie dog habitat in the Paunsaugunt RU based on historic and current low levels of development (BLM 2008c, 2008d). However, where energy development may occur, we note that the majority of

the Paunsaugunt RU is comprised of non-Federal lands (see Table 2), and there are no Utah prairie dog conservation measures in place to minimize energy development impacts to the Utah prairie dog in these areas. The Dixie National Forest is the primary Federal land management entity in the Paunsaugunt RU; the Kanab BLM district manages a small portion of the Paunsaugunt RU. The potential for energy resource development on the forest over the next 15 years appears low due in large part to discouraging results of previous tests, remoteness of the area and questionable quality of the geologic strata to produce oil and gas (Dixie 2007). The Dixie National Forest is in the process of completing an Environmental Impact Statement (EIS) for oil and gas development. Although the preferred alternative is not yet selected, most of the possible alternatives include a no surface occupancy stipulation for Utah prairie dog colonies (USDA 2008), thus minimizing the loss of suitable and occupied habitats. The Kanab BLM RMP includes a conservation measure that precludes surface disturbance activities within 0.5 mi (0.8 km) of Utah prairie dog active colonies, suitable habitat, and potential reintroduction sites (BLM 2008b).

The majority of the BLM and USFS planning areas on the Awapa RU have low energy resource potential in the areas occupied by Utah prairie dogs (Dixie 2007; BLM 2008e). The Fishlake and Dixie National Forests and the Richfield BLM districts comprise the primary Federal land management entities in the Awapa RU, and the majority of the Awapa RU is in Federal ownership. As described above, the Dixie National Forest is in the process of completing an EIS for oil and gas development. Utah prairie dog conservation measures will be determined through that process. There are no conservation measures on the Fishlake National Forest specific to minimizing the effects of energy development to the Utah prairie dog. The Richfield BLM RMP does not provide specific conservation measures to minimize the effects of energy development to Utah prairie dogs (BLM 2008a).

Energy resource exploration and development is in the lowest-tier of threats for Utah prairie dogs (see Table 6). Although energy development may occur in some locations across the species' range, there has been a low level of exploration and development to date, and projections remain low for the majority of the species' range for the foreseeable future. Some land use planning documents include conservation measures to avoid and minimize impacts to Utah prairie dog habitats.

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

Overutilization was not considered in the 1973 listing (38 FR 14678, June 4, 1973) or 1984 downlisting (49 FR 22330, May 29, 1984) rules for this species. The 1991 Recovery Plan identified overutilization through extensive government-sponsored poisoning campaigns as the initial cause of the species' decline. As described above (see section 1.7.1, Cultivated Agriculture), a special 4(d) rule and implementing procedures allows regulated control of Utah prairie dogs on agricultural lands. This 4(d) rule is intended to minimize conflicts between Utah prairie dogs and agricultural uses across the species' range. Absent ESA protection, the potential for recurrence of widespread poisoning campaigns is increased. However, some unauthorized take of the species continues to occur, as described below.

Poaching

Poaching is any unauthorized killing of Utah prairie dogs, including: shooting, poisoning, trapping, vehicle strikes, and other lethal methods. There are no data to quantify these impacts. Instead, we have only qualitative information and assumptions based upon site-specific knowledge (Bonebrake pers. comm. 2008). Since the fall of 2007, three poisoning incidences and one shooting incident occurred in the West Desert RU. These unauthorized killings resulted in impacts to a few colonies, but did not extend as impacts at the population level. These incidents are currently under investigation (Bell pers. comm. 2008).

The overall threat level for poaching places it in the lowest-tier of threats for Utah prairie dogs (see Table 6). Poaching likely occurs across the species' range; however, we only have a few confirmed cases, all in the West Desert RU. It is hoped that the continued use of the 4(d) special rule and expanded efforts to implement the new programmatic safe harbor agreement (see section 1.7.1, Cultivated Agriculture) will increase voluntary conservation actions with private landowners, and reduce the potential for poaching to be a continuing threat to the species.

1.7.3 Factor C. Disease or Predation

Plague

Plague was identified as a threat to the species in the 1984 reclassification (49 FR 22330) rule and the 1991 Recovery Plan. The 1984 reclassification rule concluded that an outbreak of plague would likely not result in extinction of Utah prairie dogs, but that it could lead to its becoming endangered again. The Recovery Plan concluded that the disease may have played a significant role in extirpations of several colonies in the Cedar-Parowan Valley area (West Desert RU). Plague is now confirmed within all three Utah prairie dog RUs and is considered to be a primary threat to the species' survival and conservation.

Plague is caused by a bacterium (*Yersinia pestis*) not native to North America. Fleas are the most common vectors (Biggins and Kosoy 2001). Plague results in local extirpations, reduced colony sizes, increased variation in local population sizes, and increased distances between colonies (Cully and Williams 2001). Plague occurs across the entire range of the Utah prairie dog.

Once established in an area, plague becomes persistent and periodically erupts, with the potential to extirpate or nearly extirpate entire colonies (Cully 1989; Barnes 1993). The persistent presence and periodic eruption cycles of plague are referred to as "enzootic" and "epizootic" conditions (see glossary for definitions).

Most research on the effects of plague is on white-tailed prairie dog populations. Information specific to the Utah prairie dog is less prevalent. Some social and behavioral traits of white-tailed prairie dogs appear to favor their long-term persistence in a plague environment (Biggins and Kosoy 2001) as compared to other prairie dog species. For example, the rate of the spread of plague is dependent on the density of the host population (Barnes 1982). White-tailed prairie dog colonies' lower density and wider dispersal (compared to black-tailed or Gunnison's prairie dog colonies) may slow transmission rates (Eskey and Haas 1940; Cully 1993; Cully and Williams 2001). This benefit may apply to Utah prairie dogs, which have similar colony size and densities as white-tailed prairie dogs.

We do not have a complete understanding of the conditions that trigger a plague event. Without this information, it is not possible to predict the movement, impact, or timing of plague enzootics or epizootics. Recovery of colonies within localized white-tailed prairie dog populations are reported to occur within as little as 1 to 2 years (Menkens and Anderson 1991; Anderson and Williams 1997) or as long as 10 years (Cully and Williams 2001). Some of the difficulty in predicting recovery rates may be due to the continued re-infection of colonies over time or lack of immigration to reestablish affected colonies. Many times when a colony begins to regain its former population size, it again becomes susceptible to plague epizootics (Barnes 1982).

The long-term consequence of repeated exposure to plague in white-tailed prairie dogs may lead to selection of individuals that are genetically more resistant to the disease and are able to maintain plague in an enzootic form in the environment. However, populations of white-tailed prairie dogs thus far have remained highly susceptible to plague even after being subjected to repeated exposure (Biggins and Kosoy 2001).

Evaluation of plague over longer time periods may provide better insight into how prairie dog populations are able to cope with this introduced pathogen. Environmental stochastic events and anthropogenic disturbances in combination with plague could ultimately decrease the ability of a population to recover to historical densities and reduce the long-term persistence of prairie dog populations. In addition, a loss of genetic diversity due to periodic population bottlenecks caused by epizootics may occur. White-tailed prairie dogs have lower genetic variation than either black-tailed prairie dogs or ground squirrels. Reduced gene flow between populations could be a concern (Cooke 1993).

Plague will likely continue to be a threat throughout the range of western prairie dog species for the foreseeable future. Some tools are available to control plague. Deltamethrin and pyreperm are two insecticides used to successfully control fleas on colonies of different prairie dog species (Seery et al. 2003; Hoogland et al. 2004). Use of these insecticides has increased the number of juvenile Utah prairie dogs weaned (Hoogland et al. 2004) and resulted in higher survival rates for black-tailed, white-tailed, and Utah prairie dogs (Biggins et al. in press).

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 level of survival (Mencher et al. 2004; Rocke et al. 2008). A systemic flea control bait is also under development (Poche et al. 2008). The flea control bait reduces flea loads on animals, the primary vector in spreading plague in prairie dogs (Jachowski 2009).

Other threats may compound the impacts of plague, at least in the short term, and should be addressed where possible to lessen the impacts or duration of plague. The effects of plague may be exacerbated and recovery rates slowed when additional stresses such as shooting, poisoning, and habitat loss co-occur. These pressures acting together may increase the isolation of prairie dog populations, and if plague infiltrates isolated areas and localized populations are eradicated, source animals may not be present to re-colonize the area.

Plague is one of the primary threats for Utah prairie dogs (see Table 6). The disease occurs across the entire range of the Utah prairie dog and has the potential to result in complete loss or severe reduction in colonies across the landscape. Management measures to control plague outbreaks (i.e., vaccines, insecticides) are being studied and their success may influence

long-term prairie dog conservation. Initial lab and field testing shows promise in their ability to manage plague. Additional testing is needed at the landscape level to determine the ability of these methods to effectively manage plague and contribute to species' recovery.

Predation

Predation is not a threat to healthy Utah prairie dog colonies. Utah Prairie dogs are considered a prey species for many predators including coyotes, badgers, weasels, and raptors, but healthy prairie dog colonies can sustain normal predator pressures without adverse impacts to population structure. However, in unnaturally fragmented colonies or at new translocation sites, predation can have adverse impacts on Utah prairie dogs. For example, badgers can disrupt a translocation site by digging up Utah prairie dogs that have not had a chance to fully develop a burrow system.

This was one of the reasons that translocation release methods were changed from using augured holes to artificial burrows (Bonebrake pers. comm. 2008; Appendix C). Predation also may be an increased threat in urban areas where domestic dogs and cats are unnatural predators of the Utah prairie dog (see section 1.7.1, Urban Expansion).

The overall threat level for predation places it in the lowest tier of threats for Utah prairie dogs (see Table 6) primarily because it is a natural component of healthy prairie dog populations. Predation is only a threat in scattered, site-specific locations across the species' range – urban areas and translocation sites. These effects are likely manageable as we increase our knowledge and ability to implement better translocation methodologies, and as recovery actions are implemented to protect and restore important Utah prairie dog colonies on private lands (see Conservation Measures and Assessment section).

1.7.4 Factor D. The Inadequacy of Existing Regulatory Mechanisms

The inadequacy of existing regulatory mechanisms was not evaluated as a threat to the species in the species listing, reclassification to threatened status, or the 1991 Recovery Plan. Utah prairie dogs occur on private, tribal, State of Utah SITLA, BLM, USFS, and NPS owned lands.

The threatened status of the Utah prairie dog requires that an ESA Section 10(a)(1)(B) permit is obtained for any incidental take associated with development activities on non-Federal lands. Issuance of Section 10(a)(1)(B) permits requires the development and implementation of HCPs to mitigate the effects of urban expansion to the Utah prairie dog (see section 1.7.1, Urban Expansion and section 1.9.6, Habitat Conservation Plans). If the species was not listed as threatened, urban expansion would result in the loss of large acreages of Utah prairie dog habitat without consideration to minimizing or mitigating these impacts (see section 1.7.1, Urban Expansion). Our recovery criteria thus include ensuring the protection of Utah prairie dog habitat in perpetuity (see section 2.0, Habitat Protection), including existing colonies on non-Federal lands.

Many private lands also are in agricultural production. Agricultural users frequently view prairie dogs as a nuisance to their crops (see section 1.7.1, Cultivated Agriculture). Farmers poison and shoot other non-listed prairie dog species to control their populations in agricultural fields (Knowles 2002), and we can assume the same would happen for Utah prairie dogs if the species was not listed as threatened. The species' threatened status includes a special 4(d) rule that allows some control of Utah prairie dogs on private lands through a permit process managed by the UDWR (see section 1.7.1, Cultivated Agriculture). This permit process provides limits on the maximum allowed annual take and restrictions on the numbers of animals controlled on

individual properties. The 4(d) permit management process effectively ensures the maintenance of prairie dog populations on private, agricultural lands while allowing some control to minimize the impacts of prairie dogs to agricultural crops.

Without the species ESA threatened status, unregulated killing of Utah prairie dogs could occur due to the previously discussed conflicts with urban expansion and agricultural production. Even with ESA protection, violations result in the killing of prairie dogs by shooting, poisoning and habitat modification. Since the mid 1990s, two Federal civil cases involving shooting and habitat modification were resolved with fines. In the last 3 years, six Federal criminal cases and two state cases involving shooting, poisoning, and/or habitat modification have resulted in substantial fines and probation. Restitution in several of the Federal cases was directed into the National Fish and Wildlife Foundation's Utah prairie dog account for recovery actions (Bell pers. comm. 2008).

The ESA provides opportunities to work with private landowners to improve Utah prairie dog conservation through the safe harbor program (see section 1.7.1, Cultivated Agriculture). Conserving habitats on private lands will be important for long-term conservation of the species. In order to ensure long-term protections, our recovery criteria (i.e., acres of prairie dog habitat protected) includes finding a mechanism to continue the conservation of Utah prairie dogs on private lands after the species is delisted (see section 2.0, Habitat Protection).

Currently, there are limited Federal regulatory protections for the species outside of ESA and these regulations do not include mandatory compliance. The primary Federal regulations and policies that consider the species' needs are: the National Environmental Policy Act of 1969 (NEPA), Federal agency sensitive species directives (i.e., BLM Manual 6840), National Forest Management Act of 1976 as amended (16 U.S.C. §§ 1600-1614), NPS Organic Act of 1916 (39 Stat. 535, 16 U.S.C. 1, as amended), Federal land use plans, and state laws (i.e., Utah Rule R657-19). Thus, if the Utah prairie dog was not listed as threatened, we would be able to provide conservation recommendations under authority of these acts, but there is no certainty that the recommendations would be implemented.

The NEPA provides for cooperating agencies or interested parties to participate in evaluations of Federal projects and their potential significant impacts to the human environment. This participation includes the review of individual proposed actions and updates to RMPs. Cooperating agencies and the public can provide recommendations to the action agency for project or plan modifications to avoid impacts or enhance conservation of the Utah prairie dog and its habitat. Parties can do this for any wildlife species regardless of ESA listing status. The NEPA provides a venue for negotiating conservation measures, and land use plans provide direction to conserve listed and sensitive species (i.e., whether or not the Utah prairie dog is listed as threatened under the ESA), but the ultimate discretion on implementation of conservation recommendations remains with the lead Federal agency.

The BLM manages listed and sensitive species under guidance provided by their MS-6840 Manual – Special Status Species Management. The 6840 Manual directs BLM to: proactively conserve special status and ESA-listed species and the ecosystems upon which they depend; ensure that all actions authorized, or carried out by BLM are in compliance with ESA; and cooperate with the planning and recovery of listed species. In accordance with MS-6840, conservation measures for Utah prairie dogs were included in the Kanab and Richfield BLM RMP revisions, specifically for energy development and indirectly for OHV use (see

section 1.7.1; Factor A, Energy Resource and Development, and Off-Highway Vehicle Use/Recreation). Because these conservation measures were accepted as part of the record of decision for the RMPs, they are likely to remain in place regardless of the Utah prairie dog's listing status for at least the length of the planning period associated with the RMPs (10 to 15 years).

Under the National Forest Management Act of 1976, as amended (16 U.S.C. §§ 1600-1614), the USFS shall strive to provide for a diversity of plant and animal communities when managing national forest lands. Forest Plans consequently strive for maintenance of biodiversity and management of federally threatened, endangered, and USFS sensitive species as one component of their multiple use management mandates (USFS directive 2670.21, 2670). Forest planning processes generally include conservation planning for listed and sensitive species. The Dixie and Fishlake National Forests' existing planning documents identify the Utah prairie dog as a threatened species and provide general management direction to maintain and enhance species status through habitat improvements and agency cooperation (USDA 1986a; USDA 1986b). Both Forests are in the process of revising their forest plans.

The NPS biological resource management policy is "to maintain as parts of the natural ecosystems of parks all plants and animals native to park ecosystems" (NPS 2006, section 4.4). Associated management principles direct conservation measures for listed and non-listed species within park boundaries. This includes the Utah prairie dog at Bryce Canyon National Park. In addition, the NPS Organic Act of 1916 (39 Stat. 535, 16 U.S.C. 1, as amended), states that the NPS "shall promote and regulate the use of the Federal areas known as national parks, monuments, and reservations ... to conserve the scenery and the national and historic objects and the wildlife therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations." Where Utah prairie dogs occur in Bryce Canyon National Park, they and their habitats are protected from large-scale loss or degradation due to the Park Service's mandate. This management scenario would occur regardless of the species listing status.

The threatened status of the Utah prairie dog means that Federal agencies should consider conservation needs of the species under Section 7(a)(1) of ESA. Furthermore, under Section 7(a)(2) of ESA, we can: 1) provide alternatives to Federal agencies to avoid actions that are likely to jeopardize the continued existence of the Utah prairie dog, and 2) provide non-discretionary terms and conditions to minimize incidental take of Utah prairie dogs. The Section 7 consultation process provides a means to minimize impacts to Utah prairie dogs, and work with Federal agencies to compensate unavoidable impacts. If the Utah prairie dog was not listed as threatened, there would be no regulatory mandate to ensure this interagency coordination and effects analysis on a project-specific basis.

The UDWR developed a Comprehensive Wildlife Conservation Strategy (CWCS) to direct the development and implementation of management actions to conserve native species (Sutter et al. 2005). The Utah prairie dog is considered a Tier 1 species under the CWCS. Tier I species include federally Threatened and Endangered, Federal Candidate, and Conservation Agreement species. The CWCS does not provide any regulatory mandates, but aims to cooperatively implement actions from Tier 1 species' recovery plans and conservation agreements. We do not know if the state would maintain the species sensitive status if it was not listed as threatened

under the ESA. However, UDWR would likely continue to work with the other Federal and non-Federal partners to ensure the species status remains secure. Another goal of the CWCS is to ensure that species do not become federally listed.

Utah Administrative Code R657-19-6 “Taking Nongame Mammals; Utah Prairie Dog Provisions,” prohibits selling and purchasing and restricts the live capture and control (i.e., shooting) of Utah prairie dogs without proper authorization. However, there is no regulatory protection for Utah prairie dog habitats and it is unclear if this regulatory code would be retained if the species was delisted from ESA.

In summary, the available Federal or state regulatory mechanisms are, at present, inadequate to conserve the Utah prairie dog in the absence of the ESA’s protections.

1.7.5 Factor E. Other Natural or Manmade Factors Affecting the Species’ Continued Existence

Previously identified threats under this factor included: illegal control related to population pressures in agricultural areas (49 FR 22330); and climate change and its associated impacts (USFWS 1991). Illegal control was discussed above under Factor B and is not repeated here. Today, we consider the primary natural or manmade factors affecting Utah prairie dogs to be genetic diversity, climate change, vegetation community changes, and fire. Each of these is discussed below.

Genetic Diversity

Genetic variance within Utah prairie dog populations is low – less than half that commonly observed for black-tailed prairie dogs (Chesser 1984; Ritchie and Brown 2005). This may be the result of genetic drift in small populations (Chesser 1984). Genetic diversity can be negatively impacted by periodic population bottlenecks (e.g., caused by plague epizootics) and by land uses that fragment Utah prairie dog colonies decreasing dispersal and genetic exchange.

Reduced gene flow between populations could be a concern for long-term population viability (Cooke 1993). Because genetic diversity is shaped by other threat factors such as plague, habitat loss or changes in range, we do not specifically list it in the threats assessment and threats matrix below. Nevertheless, this recovery plan strives to maintain Utah prairie dog colonies across the landscape within all three of the RUs that are spatially distributed to provide connectivity.

Climate Change

The climate in southern Utah 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. This shift may result in reduced prairie dog habitat quantity and quality over time. Thus, climate change has emerged as a significant concern for the Utah prairie dog, particularly in regard to the potential for increasingly prolonged drought cycles.

The Intergovernmental Panel on Climate Change (IPCC) predicts that changes in the global climate system during the 21st century are very likely to be larger than those observed during the 20th century. For the next 2 decades a warming of about 0.2°C (0.4°F) per decade is projected (IPCC 2007). Afterwards, temperature projections increasingly depend on specific emission scenarios (IPCC 2007).

The average temperature in the Southwest has already increased roughly 0.8°C (1.5°F) compared to a 1960-1979 baseline period (Karl et al. 2009). By the end of the century, average annual temperature is projected to rise approximately 2.2 to 5.6°C (4 to 10°F) above the historical baseline, averaged over the southwest region (Karl et al. 2009). Extreme heat events (considered a 1 in 20-year event) are projected to occur every 2 or 3 years across the southwest under a higher emissions scenario by the end of the century (Karl et al. 2009). Some non-mountainous portions of southern Utah are projected to have up to 105 days above 90°F by the end of the century (Karl et al. 2009).

The southwest is projected to experience significant reductions in precipitation. A 10 to 30% decrease in precipitation is projected in mid-latitude western North America by mid-century (Milly et al. 2005). Reductions in precipitation are projected to be most pronounced in spring and winter (Karl et al. 2009). Spring precipitation in southern Utah is projected to decline by 25 to 35% by the end of the century under a higher emissions scenario (Karl et al. 2009).

A warmer atmosphere and intensified water cycle in the southwest is likely to increase the likelihood of drought, heavy precipitation events, and flooding (Karl et al. 2009). Increased drought may result in range constrictions for Utah prairie dogs. Drought was implicated in the historical loss and drastic decline of some Utah prairie dogs colonies, particularly at lower elevations with consequently drier vegetation conditions (Collier and Spillett 1975). Increased drought can reduce habitat suitability for prairie dogs directly and indirectly. Indirectly, drought may increase the expansion of invasive plants, particularly cheatgrass. Increased atmospheric carbon also increases invasive plant growth and pinyon pine/juniper expansion both of which reduce habitat quality and quantity for prairie dogs. Impacts from drought include loss of succulent vegetation that is necessary for Utah prairie dog abundance (Crocker-Bedford and Spillett 1981). Furthermore, it is possible that prairie dogs may shift their range northward and upward to cooler and moister climates (IPCC 2007).

Over the last 50 years, the southwest experienced a 9% increase in very heavy precipitation events (defined as the heaviest 1% of all daily events) (Karl et al. 2009). Heavy precipitation events may result in temporary increases in soil moisture. Projected changes in soil moisture content could impact plague outbreaks. Moist soil conditions enhance the conditions for flea reproduction and survivorship, thereby increasing the number of available fleas. This outcome would lead to a greater frequency of plague in wild animal populations if the fraction of plague infectious animals remains constant or increases (Thomas 1996 in Parmenter et al. 1999).

Although we have described some potential impacts to the Utah prairie dog under future climate change models, there is uncertainty in the scope and severity of this threat. There also is uncertainty in how the species will respond. Current information puts the overall threat for climate change in the lowest-tier of threats for Utah prairie dogs (see Table 6).

Vegetation Community Changes

Various types of vegetation management can be beneficial to Utah prairie dogs by providing more open habitats for foraging, for visual surveillance to escape predators, and for intraspecific interactions (Player and Urness 1983). Shrub height and density are negatively correlated with abundance of prairie dogs (Collier 1975). Vegetation that is low or sparse enough to see through enhances prairie dog survival (Crocker-Bedford and Spillett 1981).

Potential short-term negative impacts and positive impacts may be associated with vegetation community changes (also see Fire Management section below). Some of the negative impacts from planned vegetation treatments are disturbance to prairie dogs from people or equipment, the movement of small amounts of soil or vegetation into burrow entrances, the leveling of mounds, or the loss of forage in a colony. However, these impacts may be minor and short-term. Utah prairie dogs clean out their burrows immediately after mechanical treatments and that vegetation “greens up” or begins regrowing within days after a fire. Fire and mechanical treatments can remove shrubs, allowing for more herbaceous plants and greater visibility for prairie dogs. Additionally, planned treatments and wildlife stabilization efforts often include the reseeded of grasses and forbs. Research can improve habitat conditions and vegetative species diversity from pre-treatment levels. However, treatments occasionally fail to meet objectives for various reasons such as drought or improper implementation. Areas may experience an increase in invasive plant species, or a decrease of preferred species.

Changes also may occur to the vegetation community from a lack of, or suppression of, naturally ignited fires. Wildfires were important historically in maintaining open or grassy areas within the shrub steppe ecosystem. They also were important in controlling the expansion of pinyon pine and juniper trees into the shrub steppe during wetter climatic cycles.

The overall threat level for vegetation community changes places it in the middle-tier of threats for Utah prairie dogs (see Table 6). However, this threat level is reversible through planning efforts and management measures.

Invasive Plants

Invasive plant species are promoted by intense levels of disturbance (Masters and Sheley 2001) 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). 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).

Irrespective of the original disturbance, invasive plants can result in decreased plant diversity, which can impact weight gain and survival particularly during drought conditions (Ritchie 1998). Cheatgrass in particular is widely distributed across the range of the Utah prairie dog. Cheatgrass creates an altered fire regime, increasing the amount of fire and reducing native grasses and shrubs (Masters and Sheley 2001). Plant species richness is correlated with higher Utah prairie dog juvenile to adult ratios and densities (Crocker-Bedford and Spillett 1981; Ritchie and Cheng 2001). Utah prairie dog colony extinction rates may increase as the number of locally occurring plant species declines (Ritchie 1999).

Some invasive species can alter habitat structure (e.g., vegetation height), making it unsuitable for Utah prairie dog visual surveillance. For example, juniper species have invaded sagebrush habitat beginning with European settlement (Miller and Rose 1999), and may result in decreased Utah prairie dog habitat if forestation progresses. Juniper encroachments are more site specific compared to the widespread nature of cheatgrass invasions.

Invasive species occur throughout the range of the Utah prairie dog. However, infestations are small and sparsely scattered, and are treated when they are identified (BLM 2008e). Cheatgrass is located throughout the species' range, and is most prevalent below 8,000 ft (2,440 m) (BLM 2008e). Cheatgrass monocultures are generally localized, and associated with post-fire or post-grasshopper invasions. Some areas have higher concentrations of cheatgrass due to historic vegetation disturbance (BLM 2008e).

We consider invasive plants to be a middle-tier threat for the Utah prairie (see Table 6) due largely to their widespread presence on the landscape. However, this threat may be reversible with additional research and management.

Fire Management

Fire management includes responses to human caused or naturally ignited wildfires (the frequency and intensity of which could be impacted by climate change), the use of fire as a vegetation management tool, and fire suppression efforts. Fire suppression on a landscape level can lead to the encroachment of trees and shrubs into grasslands which decreases habitat quality and can eventually render it unsuitable for prairie dog occupation. Site-specific fire suppression, prescribed fire, and vegetation restoration activities can impact Utah prairie dogs or their habitat if they occur within occupied colonies. Damage to burrows may occasionally occur as a result of: using heavy equipment and smoke, fire, noise, or other human-related disturbances may result in harassment, displacement, injury, or possible mortality; or immediate post-project alteration of key habitat components (e.g., forage or vegetative cover). Furthermore, increased human presence related to fire and vegetation management activities may alter Utah prairie dog behavior reducing the amount of time available for the species to forage and causing an unnecessary expenditure of energy in fleeing and alerting others. On the other end of the spectrum, fire can be valuable in maintaining a vigorous grassland community that favors prairie dogs by removing shrubs, trees, and old growth grass and stimulating nutritious new plant growth.

The overall threat level for fire management places it in the lowest tier of threats for Utah prairie dogs (see Table 6). Although site-specific effects may occur, we do not have information to suggest that these effects are occurring at a large scale across the species' range. In addition, some fire activities likely improve prairie dog habitat by reducing shrub cover. Additional research and development of management strategies should be considered in recovery of the species.

1.8 Threats Assessment

Recovery of the Utah prairie dog will require reducing risks to the point where this species is no longer likely to become endangered. This in turn requires an understanding of the relative level of risk posed by individual and combined threats to the species' continued survival. Using the following ranking criteria, the threats assessment⁸ considers: 1) the relative magnitude of the threats described in the preceding section, 2) the extent to which the Utah prairie dog is exposed to each threat, and 3) the level of risk posed by each identified threat. As stated previously, the threats assessment and matrix was completed by the Utah Prairie Dog Recovery Team (Team). Based on empirical data and expertise, the Team members refined the threats under each listing factor and then used the ranking criteria to arrive at magnitude, exposure, response, overall threat level, and reversibility.

1.8.1 Assessment Criteria

Scope

3 = pervasive

2 = widespread but scattered

1 = localized

U = uncertain

Immediacy

3 = threat is present and continuing

2 = threat is sporadic or is foreseeable within 1 to 3 generations of the species

1 = threat is phasing out or is foreseeable within 4 to 6 generations of the species

U = uncertain

Severity

3 = threat generally results in devastating and/or catastrophic effects

2 = threat generally results in significant effects

1 = threat generally results in insignificant or transient effects

U = uncertain

⁸ The threats assessment methodology was derived from the following source: The Nature Conservancy. March 2005. Conservation Action Planning Workbook User Manual, version 4.b. Washington, DC. 119 pages.

Exposure

- 3 = population-wide
- 2 = significant portion of population exposed
- 1 = few colonies exposed
- 0 = no exposure
- U = uncertain

Response

- 3 = lethal (system failure)
- 2 = sub-lethal (distress) and/or low level of mortality
- 1 = behavioral (stress) and/or minimal mortality
- U = uncertain

Overall Threat Level

- 3 = top tier of scores, summed
- 2 = middle tier of scores, summed
- 1 = lowest tier of scores, summed

Reversibility

- 3 = reversible through known management measures
- 2 = likely to be reversible with additional management-oriented research
- 1 = intractable

Below we present a matrix to assess the threats to the Utah prairie dog (see Table 6). The threats matrix covers those listing factors that have a foreseeable effect on the Utah prairie dog. It should be noted that Factor D, inadequacy of regulatory mechanisms, is not amenable to assessment as a direct threat to the species. However, it does become a consideration in assessing whether the necessary mechanisms for reducing and/or controlling direct threats exist.

1.8.2 Discussion

Threats were characterized based on their geographic extent (scope), the time frame within which activities or effects are occurring or are predicted to occur (immediacy), and the severity of their environmental impacts (severity). Matrices were used to assess each threat to the Utah prairie dog (Table 7). These matrices provide a quick overview of threats and the ability to assess where recovery efforts should be focused. The addition of ranking criteria, for example 3+3+3 gives the highest result, i.e., 9, which indicates an area where a threat is present and acting on the species, has high severity, and the potential to address this threat is well-known and success is highly likely. A narrative summary of the results and their implications accompanies each matrix. It should be noted that the threats assessments cover only those listing factors that have a foreseeable effect on each species.

Based on the draft assessment results, urban expansion and plague comprise the most serious threats to Utah prairie dog populations. Not surprisingly, these threats also pose some of the most difficult management challenges. Either of these threats could potentially lead to extirpation of entire complexes and significantly increase extinction probabilities. However, the effects of plague could possibly be felt more gradually, allowing for some Utah prairie dog adaptation to changing environmental conditions. Left unabated, these threats, especially in combination, would likely lead to long-term declines in range-wide population trends.

The threats that ranked in the lowest tier of concern include climate change, energy resource exploration and development, poaching, predation, and fire management. Despite being ranked as lesser concerns on an individual basis, in combination with other threats to the species they could substantially contribute to increased extinction risks if left unabated. As we do acknowledge the potential ramification of these lowered tiered threats, we will target conservation and management actions to reduce these issues. None of these threats can be readily remedied, based on their reversibility scores.

The threats in the middle tier of concern include grazing, OHV/recreational land uses, cultivated agriculture, vegetation community changes, and invasive plants. These activities also appear to be more amenable to management than those threats of greater and lesser concern.

As a general rule, recovery will proceed more effectively if management efforts focus on the most serious threats to the species. When threats score equally as overall concerns, the exposure of the population and the population response to the threats are overriding concerns. Management feasibility also may become a factor in ranking schemes. Based on the draft assessment and these considerations, threats to the Utah prairie dog are ranked in the following rough order of descending management priority:

Top-tier Threats

- plague
- urban expansion

Mid-tier Threats

- grazing
- cultivated agriculture
- vegetative community changes
- invasive plants
- OHV/recreational uses

Lowest-tier Threats

- climate change
- energy resource exploration and development
- fire management
- poaching
- predation

TABLE 7. Utah Prairie Dog Threats Matrix

LISTING FACTOR (Stressor)	THREAT (Source of Stress)	MAGNITUDE (of threat)			EXPOSURE (of population)			RESPONSE (individual & population)	OVERALL THREAT LEVEL	REVERSIBILITY
		Scope	Immediacy	Severity	West Desert	Paunsaugunt	Awapa Plateau			
<i>Factor A. Habitat destruction/modification (including fragmentation) or range curtailment</i>	Urban Expansion	2	3	3	2	2	1	3	3 (16)	1
	Grazing	2	3	1	2	2	2	2	2 (15)	3
	OHV/Recreational Uses	2	3	2	2	2	1	2	2 (14)	3
	Energy Resource Exploration & Development	2	3	2	2	1	2	2	1 (14)	2
	Cultivated Agriculture	2	3	2	2	2	2	2	2 (15)	3
<i>Factor B. Overutilization</i>	Poaching	2	3	2	2	2	2	2	1 (15)	2
<i>Factor C. Disease and Predation</i>	Plague	3	3	3	1	3	3	3	3 (19)	2
	Predation	2	3	1	1	1	1	2	1 (11)	2
<i>Factor E. Threats from other natural or man-made factors</i>	Climate Change	2	3	U	3	3	3	U	1 (14)	1
	Vegetation Community Changes	3	3	2	2	2	2	1	2 (15)	3
	Invasive Plants	3	3	2	2	2	2	1	2 (15)	2
	Fire Management	3	3	2	2	2	2	1	1 (15)	2

1.9 Conservation Measures and Assessment

Efforts to conserve the Utah prairie dog and its habitat have occurred since the time of listing. The aim of recovery is for conservation to outpace threats until the ability of the Utah prairie dog to persist within its natural ecosystems is assured. This section thus identifies ongoing conservation measures and informally assesses their contribution to recovery relative to the level of threat that still faces the species.

1.9.1 Annual Spring Counts

The UDWR has conducted annual spring counts of adult Utah prairie dogs at every known colony site since 1976. Counts are conducted in the spring between April 1 and June 1, before the young are above ground following the Survey Protocol for Annual Counts (see section 1.3, Current Distribution and Abundance). Spring counts provide information on long-term population trends, but are not accurate enough to provide actual population numbers. These counts indicate highly variable, but stable population trends for the Utah prairie dog (see section 1.3, Current Distribution and Abundance). The long-term Utah prairie dog spring counts provide valuable trend information and are important to continue.

1.9.2 Translocations

Translocations of Utah prairie dogs are used to increase the numbers of prairie dog colonies in new locations across the species' range. Translocation efforts include habitat enhancement at selected translocation sites and live trapping Utah prairie dogs from existing colonies to move them to the selected translocation sites.

The UDWR initiated the Utah prairie dog translocation program in 1972. Until 1977, the primary purpose of the translocation program was to remove animals from private agricultural lands to reduce the impacts of prairie dogs foraging on crops (USFWS 1991; McDonald 1993). From 1977 onward, the translocation program was reevaluated and emphasized establishing new colonies on Federal lands to meet recovery objectives (McDonald 1993). By 2007, translocations also were implemented as mitigation for development activities in association with HCPs. Translocation of Utah prairie dogs occurs within and between RUs in part to address the species' limited levels of genetic diversity (USFWS 1991; Roberts et al. 2000).

Admittedly, there is a low observed survival rate (less than 10%) of individual Utah prairie dogs after the first year of a translocation effort (McDonald 1993; Jacquart et al. 1986). Some of this may be due to difficulty in counting individual prairie dogs and their propensity to disperse from translocation sites (McDonald 1993; Jacquart et al. 1986). High rates of mortality also may occur due to severe weather conditions, predation, plague, and illegal poisoning (McDonald 1993; Jacquart et al. 1986).

However, the primary purpose of translocations is to establish new colonies across time. From 1972 through 1991, 15,937 prairie dogs were translocated to 38 different sites on public lands. Of those 38 translocation sites, 17 (45%) had prairie dogs present in 1992, with an average of 60 dogs counted at each site – with a range of 7 to 216 animals (McDonald 1993).

Importantly, we have observed improvements in translocation success across time. For example, 12 of 15 (80%) post-1986 translocation sites still had prairie dogs present in 1992 whereas only 5 of 23 (22%) of pre-1986 translocation sites were still occupied by prairie dogs in 1992. By 1992, post-1986 translocation sites had a significantly higher number of prairie dogs in per transplanted

site (840 animals) versus pre-1986 translocation sites (157 animals). Better success rates were achieved when colonies had a greater number of follow-up translocations and greater numbers of prairie dogs released at one time (McDonald 1993).

Through 2008, 23,359 Utah prairie dogs were translocated from private to public lands (McDonald 1993; Bonzo and Day 2003; Brown pers. comm. 2009). As of 2009, 14 of 20 translocation sites in the West Desert RU were occupied; 6 of 8 colonies in the Paunsaugunt RU were occupied; and 4 of 8 colonies in the Awapa RU were occupied (Brown pers. comm. 2009). These totals include many of the colonies where translocations were initiated in 1972.

This improvement in translocation success over time is the result of active study and modification of methods over time. In the 1980s, the UDWR initiated a study to monitor survival, dispersal, and habitat use by translocated prairie dogs (Jacquart et al. 1986). Based on this work, the translocation program incorporated predator control and limited the translocation of females to the months of July and August (Coffeen 1989). These efforts improved animal survival at some sites, but survival was still low overall.

Since the 1980s, we have continued to further study and modify translocation techniques with the goal to enhance survival of translocated prairie dogs. These additional improvements include: vegetation treatments; grazing management; restrictions on movements of certain age and sex categories; shortened holding times; food and water supplementation; use of retention cages; installation of plastic burrows; use of retention cages and nest boxes; fencing; and plague prevention techniques (Truett et al. 2001).

In 2006, the Team reviewed the translocation techniques and relevant literature and developed the 2006 Recommended Translocation Procedures. This document defines specific procedures for locating translocation sites; preparing the sites, live trapping, handling, transport, releasing, monitoring, and management of animals (see Appendix C). For example, current translocation procedures include restrictions on the timing for movements of certain age and sex categories (i.e., early translocation of males to aid in establishing burrows for subsequent female and juvenile released in late summer) (Jacquart 1986). Supplemental food and water are used at new translocation sites to increase survival because: increased energy expenditures are incurred during the trapping and transport procedures; the increased stimuli of a new environment; increased burrowing activity upon release; and increased vigilance of newly released prairie dogs (Truett et al. 2001). We also use retention cages to keep the newly translocated dogs at the intended release areas and exclude predators (Truett et al. 2001). Furthermore, in an effort to minimize the potential for plague transmission between colonies: prairie dogs are not translocated into already-established colonies; animals are not captured and moved from any colonies where plague is suspected; all animals are treated with an insecticide called Deltamethrin (Delta dust) prior to release at translocation sites; and translocation colonies are provided additional treatments of Delta dust as needed.

It is too early to determine if use of the 2006 translocation protocols will increase individual prairie dog survival rates and colony establishment success. However, initial results at a translocation site named Berry Springs (Paunsaugunt RU) are encouraging. The Berry Springs translocation effort incorporated many of the new provisions of the 2006 translocation protocols including: releasing greater numbers of prairie dogs at one time; increased predator management efforts such as trapping and shooting badgers; the use of nest boxes; improved pre-release habitat quality; and proximity to extant Utah prairie dog populations. Utah prairie dog spring counts at

the Berry Springs site subsequently increased from 8 adult Utah prairie dogs counted the first year of translocation to approximately 90 adult Utah prairie dogs counted the third year of translocation.

Continued monitoring and research is needed to continue to refine our translocation techniques. For example, incorporation of nest boxes at translocation sites may reduce Utah prairie dog dispersal post-release (Truett et al. 2001). In 2007, a pilot study was initiated to assess the incorporation of nest boxes into translocation procedures for Utah prairie dogs. Results from the pilot study are pending, but suggest nest boxes may increase survivorship at translocation sites by decreasing mortality due to predation (e.g., badgers).

In summary, the translocation program has met some success in establishing new colonies across the species' range. However, additional monitoring and research is needed to improve translocation success if we plan to rely on it as a primary recovery tool. The recent success at Berry Springs is an encouraging sign that translocations can still be a successful part of our efforts to attain Utah prairie dog recovery goals.

1.9.3 Plague Response

Deltamethrin and pyreperm insecticides (i.e., delta dust), systemic flea control, and experimental vaccine-laden baits are relatively new tools to control plague and increase Utah prairie dog survival (see section 1.7.3, Plague). Use of delta dust to control plague was initiated as a research project on the Powell Ranger District, Dixie National Forest in 2001 and determined to be an effective mechanism (Biggins et al. in press). The Dixie National Forest subsequently implemented a dusting program for Utah prairie dog colonies including: three colonies in 2005; one colony (Berry Springs) in 2007; and six colonies in 2009 (comprised most of the large colonies on the Dixie National Forest across 738 ac (299 ha) (Powell Ranger District 2009). In addition, the UDWR dusted one colony on BLM land in 2000 and an Iron County parcel (Wild Pea Hollow) in 2008. Dusting occurred on all active colonies at Bryce Canyon National Park in 2008. In general, treatments are applied to colonies that experience plague outbreaks and large colonies that are at high risk of plague (see Appendix D; Utah Prairie Dog Burrow Dusting Protocol).

We are developing a range-wide plague response plan for dusting. As part of the response plan, reports will be completed that include dates dusted, amount of dust used, number of burrows treated, the acreage of each colony treated, and a map of each colony treated. When possible, post-application monitoring of the colony should occur within the same season to determine effectiveness of application. Dead Utah prairie dogs found during post-application monitoring can be submitted for analysis of plague. We will use these reports to determine the long-term effectiveness of insecticide use and hopefully improve early plague detection.

In 2009, we investigated the effectiveness of a newly-developed systemic flea control (Imidacloprid) bait (Brown 2009; Jachowski 2009). Field applications of the bait resulted in reduced flea loads on Utah prairie dogs. However, the bait only appeared to reduce flea abundance for 1 to 3 months. We also observed a high degree of variability between treatment sites (between less than 10% to greater than 80% prevalence). We will continue to evaluate the effectiveness of the bait and experiment with the timing of bait application to increase effectiveness. Because flea abundances peak on Utah prairie dogs in March-April, earlier bait applications may increase effectiveness.

Plague is one of the primary threats to the Utah prairie dog (see section 1.7.3, Plague). Our long-term ability to effectively manage plague outbreaks and increase prairie dog survival is a recovery priority.

1.9.4 Safe Harbor Agreements

The Safe Harbor Agreement (SHA) program promotes voluntary agreements between the USFWS and private or other non-Federal property owners whose actions contribute to the recovery of species listed as threatened or endangered under the ESA. Because many endangered and threatened species occur exclusively, or to a large extent, on privately owned property, the involvement of the private sector in the conservation and recovery of species is crucial. Property owners are often willing partners in efforts to recover listed species. However, some property owners may be reluctant to undertake activities that support or attract listed species on their properties, due to fear of future property-use restrictions related to the ESA. To address this concern, a SHA provides that future property-use limitations will not occur without the landowner's consent. Central to this approach is that the actions taken under the SHA will provide a net conservation benefit that contributes to the recovery of the covered species. The program also may be coupled with economic incentives to assist landowners with the cost of management activities and technical guidance to design management activities.

The SHA tool is essential to the recovery of Utah prairie dogs because approximately 70% of the species' population occurs on private lands. The SHA program can promote the conservation of Utah prairie dogs through the voluntary restoration, enhancement, and management of farm and ranchlands in southwestern Utah and assurances provided to landowners can help gain support for species conservation efforts rangewide. As of 2010, five individual Utah prairie dog SHAs are in place with private landowners covering approximately 1,230 ac (497 ha). In addition, a range-wide programmatic SHA was completed in 2009, administered by Panoramaland. We anticipate individual landowners will participate in this programmatic SHA through certificates of inclusion in the coming years.

1.9.5 Protected Lands

Conservation Banks

Conservation banks are a means to collectively provide mitigation in an effective manner to offset the impacts of habitat loss. To date, two Utah prairie dog conservation banks are approved including the SITLA Conservation Bank and the Little Horse Valley conservation bank. These conservation banks are authorized through the Iron County HCP (West Desert RU) to offset incidental take. A proposed range-wide HCP may expand use of banking mechanisms into the other RUs (see section 1.9.6, below).

The SITLA conservation bank is located on Parker Mountain within the Awapa Plateau RU. The bank was finalized in 2005 between the USFWS and SITLA. The SITLA is an independent agency which manages 3.4 million ac (1.4 million ha) of trust land for the benefit of State Utah's schools and other public institutions. Under the conservation bank agreement, SITLA enhanced approximately 800 ac (324 ha) of habitat through burning, mechanical shrub removal, and seeding. A permanent conservation easement was placed on the property and is held by UDWR. The SITLA also provided an endowment for long-term management of the property which includes habitat management and treatment for plague.

In exchange for the management and perpetual protection of the conservation bank lands, SITLA earns credits which they use to offset impacts to Utah prairie dogs from their own projects or sell to other parties that are engaging in activities that impact Utah prairie dogs. Upon approval of the bank in 2005, 154 credits were available (calculated from the number of prairie dogs and habitat acreage on the property). All credits in the bank were sold in 2006. These credits offset development in Iron County and resulted in the take of 78 Utah prairie dogs and loss of 15 ac (6.1 ha) of habitat. Additional credits will be accrued by the conservation bank if the number of prairie dogs increases and is sustained for 2 consecutive years; this has not yet happened. This conservation bank offers high quality mitigation by protecting known occupied habitat and managing that habitat in perpetuity.

The Little Horse Valley conservation bank is a 220 ac (89 ha) parcel owned by Iron County, located west of Cedar City in the West Desert RU. The bank was finalized through a Memorandum of Agreement (MOA) between the USFWS and Iron County, and a Conservation Easement held by UDWR in 2009. The purpose of the MOA and associated Conservation Easement is to ensure the protection, in perpetuity, of the 220-ac (89-ha) Little Horse Valley parcel for the conservation of the Utah prairie dog and its habitat. The parcel does not currently support active Utah prairie dog burrows. However, it is surrounded by BLM lands and adjacent to the Minersville 3 Complex which is one of the largest, most persistent colonies of Utah prairie dogs in the West Desert Recovery Area. As such, the protection of this land will benefit the long-term conservation and recovery of the Utah prairie dog.

Because there are no prairie dogs on the parcel, credits were determined based on a 1:1 ratio of the habitat. This means there are 220 credits available. Debits from the bank are calculated based on a 10:1 or 12:1 mitigation ratio, dependent on the quality of prairie dog habitat at the impacted site. This means that credits from the 220 ac (89 ha) conservation bank can be used to mitigate for impacts on up to 22 ac (8.9 ha) of occupied prairie dog habitat in Iron County. The MOA provides incentives, in the context of additional credits and lowered mitigation ratios if habitat improvements are completed that result in Utah prairie dogs occupying the parcel.

In summary, conservation banks can mitigate Utah prairie dog habitat losses by permanently protecting other important habitat across the species' range. Because a high percentage of Utah prairie dog habitat occurs on private lands that are planned for urban development, particularly in the West Desert RU, conservation banking may be a useful tool to proactively mitigate impacts to prairie dogs and reach our recovery goals.

Utah Prairie Dog Habitat Credit Exchange

The Utah prairie dog habitat credits exchange program is a programmatic conservation mechanism with similarities to conservation banking and recovery credit trading systems. Its purpose is to provide a mechanism whereby developers and others, whose actions result in negative impacts to prairie dogs or their habitat are able to offset these impacts by funding conservation and management actions on private lands elsewhere. The credit exchange program is designed to provide a net benefit to the Utah prairie dog, not simply mitigation. If successful, every action will push the species closer to recovery (Environmental Defense 2009). The program is just beginning. A pilot program scheduled to begin in 2010.

Through the credit exchange program, an administrator (in this case Panoramaland) will purchase conservation easements from private landowners and in doing so accrue conservation credits. Once accrued, the program administrator sells the credits to a developer who is required

(see Habitat Conservation Plans, above) to mitigate their impacts to prairie dogs. The credit exchange program will enable us to promote mitigation in a way that provides a net benefit to the species by incorporating private lands into the Utah prairie dog recovery program (Environmental Defense 2009, p. 1).

Other Protected Lands

In 2001, the UDWR and Iron County purchased 180 acres in Parowan Valley for the protection of a large Utah prairie dog colony. This site was renamed the Parowan Valley Wildlife Management Area. At the time, there was some concern that neighboring landowners would be negatively impacted if prairie dog management activities resulted in the growth and expansion of the existing prairie dog colony. Therefore, to support the purchase and protection of this important colony, we issued a Section 10(a)(1)(A) permit that authorized the control of prairie dogs (above a 2001 baseline number on each property) for properties within 0.5 mile of the Parowan Valley Wildlife Management Area. Because of issuance of this permit, the local community supported the purchase and management of the property for conservation of the Utah prairie dog.

1.9.6 Habitat Conservation Plans

The HCPs are developed as part of the permitting process for incidental take on non-Federal lands. In order to receive an incidental take permit, an HCP must be developed to ensure that impacts to listed species from development or other land use activities are minimized and mitigated. The goal of the HCP program is to reduce conflicts between listed species and economic development through collaborative partnerships. The HCPs must ensure that permitted activities do not appreciably reduce the likelihood of the survival and recovery of the listed species.

In 1996, the first Utah prairie dog HCP was developed for a housing development project in Iron County under Section 10 (A)(1)(B) of the ESA. Since then, we have approved seven individual HCPs and one county-wide HCP. As of 2010, there are three active HCPs including: the Iron County HCP, the Golf Course HCP, and the Connell Gower HCP. Each of these are described below.

In addition, we are working with the Counties and local communities to develop a range-wide HCP that would replace the Iron County HCP. It is too early to describe specific mitigation scenarios under a new range-wide HCP other than to summarize our intent that a new HCP contributes to species recovery and simultaneously accommodates urban growth.

Connell Gower Habitat Conservation Plan

The Connell Gower HCP (SWCA 1996) and associated incidental take permit were issued in 1996 and remain effective through 2016. The HCP was developed to mitigate the loss of a prairie dog colony at a 63-ac (25.5-ha) industrial park. Mitigation included the translocation of prairie dogs prior to construction activities, and payment of a mitigation fee to the National Fish and Wildlife Foundation Utah Prairie Dog Compensation Fund. Mitigation fees total \$56,700 over the life of the permit. The funds can be used for the management and enhancement of prairie dog habitat off site.

Iron County Habitat Conservation Plan

The Iron County HCP (Iron County 2006) and associated incidental take permit were issued to the County and UDWR on June 26, 1998. The Iron County HCP mitigates incidental take of the Utah prairie dog (largely caused by urban development) primarily through translocations of prairie dogs from private developing lands to Federal lands. Conservation banks also can be established under authority of the Iron County HCP to mitigate impacts to prairie dogs (see previous discussion).

The Iron County HCP process includes an annual assessment of the amount of incidental take allowed each year. This annual assessment is calculated as 10% of the running 5-year average of prairie dogs counted on Federal or otherwise protected lands in the West Desert RU. As of 2009, the Iron County HCP permitted a total of 381 ac (154 ha) and 937 Utah prairie dogs to be taken since 1998. This is an average of 78 prairie dogs and 32 ac (12.9 ha) of habitat taken annually. The Iron County HCP expires in 2018. Using the average annual take (which is based on the average prairie dog annual counts), we estimate that an additional 702 prairie dogs and 288 ac (116.5 ha) of habitat may be taken through the life of the permit.

Golf Course Habitat Conservation Plan

The Golf Course HCP (Cedar City 2007) and associated incidental take permit was issued in 2007 and remains effective through 2026. The HCP was developed to manage the Cedar City golf course and Piute Tribal Lands (in the West Desert RU) free of prairie dogs because of conflicts between prairie dogs and the use of these lands for tribal gatherings and recreational purposes. Prairie dog management on these sites is accomplished by continued annual trapping and translocation of prairie dogs from the HCP properties to translocation sites on public lands.

The HCP and associated incidental take permit authorize the loss of 18 ac (7.3 ha) of Utah prairie dog habitat (largely through disturbance associated with ongoing trapping of the prairie dogs) and the translocation of all prairie dogs from the golf course. From 2007 to 2009, a total of 1,535 prairie dogs were translocated from the golf course to the Berry Springs translocation site. This effort appears to be a success (see section 1.9.2, Translocations). An additional 75 prairie dogs were translocated from the golf course to the Henrie safe harbor property in 2008 in order to establish a new colony. This translocation effort has not yet succeeded.

In addition to continued translocations, the HCP mitigated the loss of prairie dog habitat with the protection of Utah prairie dog habitat by fee title purchase. This resulted in 303 ac (122.6 ha) of protected habitat at Wild Pea Hollow within the West Desert RU. Wild Pea Hollow benefits Utah prairie dogs by providing long-term protection of an existing colony and habitat for expansion and dispersal to and from nearby colonies (the Wild Pea Hollow is within 3 mi (4.8 km) of the large Minersville 3 prairie dog complex). On the other hand, the golf course provides a highly unnatural environment for Utah prairie dogs due to watering and vegetation management associated with maintaining the fairways and greens. In addition, the golf course and Piute lands are surrounded by development and largely isolated from other prairie dog colonies.

In summary, development of HCPs for the Utah prairie dog have included two-fold mitigation strategies of translocating animals from developing areas and mitigating in the form of habitat enhancements and long-term protection at off-site locations. While translocations still play an important role in the establishment of prairie dogs in new locations (see section 1.9.2), the

protection and enhancement of off-site habitats can increase the speed at which recovery is achieved. Such protection and enhancement of off-site habitats should be emphasized in future HCP planning efforts.

1.9.7 Endangered Species Act Interagency Conservation and Consultation

Section 7(a)(1) of ESA directs Federal agencies to further the purposes of the ESA by carrying out conservation programs for listed species. Section 7(a)(2) of the ESA requires every Federal agency to ensure that any action it authorizes, funds, or carries out is not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of critical habitat (USFWS and National Marine Fisheries Service 1988).

Section 7(a)(2) of the ESA requires Federal agencies to evaluate the impacts of their actions with respect to any species that is proposed for listing or is listed as threatened or endangered. Federal agencies are required to ensure that their activities are not likely to jeopardize the continued existence of a listed species or its habitat. If a Federal action is likely to adversely affect a listed species or its habitat, the responsible agency must enter into formal consultation with the USFWS.

In accordance with 7(a)(1) and 7(a)(2) responsibilities, Federal agencies often include species-specific conservation measures to avoid, minimize or reduce adverse impacts to federally listed species from implementation of the project. When “take” is likely, additional conservation measures, or other modified versions of the measures, may be applied for any given activity upon further analysis, review, coordination efforts, and/or appropriate levels of consultation with the USFWS.

Examples of conservation measures often implemented to reduce project related impacts to Utah prairie dogs include:

- Habitat surveys following the Occupancy/Habitat Survey Protocol (see Appendix E) prior to surface disturbance.
- Restriction of surface disturbing activities within 0.5 mi (0.8 km) of active Utah prairie dog colonies.
- Limitations to surface disturbing activities in Utah prairie dog habitat between April 1 and September 30 (the period when prairie dogs are most likely to be found above ground).
- Use of native seed during post-project reclamation and restoration.
- Ensuring OHV activities remain on designated routes that avoid occupied Utah prairie dog habitat.
- Ecological education information provided to project proponents.
- Restricted vehicle maintenance within occupied habitat.
- Cleaning of equipment and vehicles planned for use within Utah prairie dog habitat to minimize the spread of noxious weeds or other undesirable vegetation types.
- Temporary fencing to preclude prairie dogs from moving into active construction sites.

These measures are effective at avoiding and minimizing impacts within known occupied habitat. We also are working with Federal agencies to implement proactive conservation measures under Section 7(a)(1) of the ESA such as habitat acquisitions, in-lieu fee mitigation programs, habitat improvement projects, seedings, prairie dog translocations, and other conservation measures.

1.9.8 Research

Utah prairie dog research is important to understand biological and habitat requirements and implications of threats to the species. Research topics have included ecology, population dynamics, genetics, translocation, plague, social behavior, public perceptions, grazing, and habitat response. Results from research efforts are described throughout this document where applicable, and have helped us to achieve conservation benefits for the species and direct ongoing recovery actions.

1.9.9 Public Outreach and Education

The 1991 Recovery Plan made only a brief mention of public outreach and educational opportunities. The 1997 Interim Conservation Strategy recognized that recovery of Utah prairie dogs depends upon public involvement and cooperation. Three main goals highlighted in the 1997 Interim Conservation Strategy were community involvement, education, and extension. Community involvement 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 (Utah Prairie Dog Recovery Implementation Team 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 to 200 students per year were involved in this educational opportunity.

In 1997 and 1998, a program known as Wild Site was implemented in third grade classrooms in the three Cedar City elementary schools. The program taught ecological principals by emphasizing the important role of Utah prairie dogs in our environment. Though well received by teachers, students and administrators, the program was discontinued due to lack of funds.

Conservation outreach was initiated by Southern Utah University in 2003, including the use of live Utah prairie dogs as educational tools in schools and civic groups. The purpose of this program is to foster a more tolerant attitude and educate the local population regarding the Utah prairie dog. The use of live Utah prairie dogs in these presentations fosters education and promotes interest in these animals and their value to our environment.

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.

The 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. The Southern Utah University is a key player in agricultural education in southern Utah and programs initiated there are often well received by the surrounding community. We believe that some of the conflicts with Utah prairie dog recovery can be ameliorated by providing information on the value of the species within the ecosystem. When Utah prairie dogs are viewed as "pests," the species lacks conservation support and conflicts arise. The research focus for this project involves evaluating methods by which prairie dogs and agriculture can coexist.

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. As needed, more of these meetings will be conducted in the future as determined by the Team. The USFWS also has attended several county commissioner meetings to discuss general Utah prairie dog topics as well at outreach on the special 4(d) rule for prairie dogs.

1.10 Biological Constraints and Needs

The purpose of this section, which synthesizes information presented in previous sections of the plan, is to identify limiting factors that must be considered when designing a management program for the Utah prairie dog and when evaluating project effects on this species. Biological constraints for the Utah prairie dog include life cycle limitations, availability of food resources, soil restrictions, landscape level connectivity, and disease. An understanding of biological limiting factors will inform not only recovery recommendations, but also the development of HCPs, Section 7 consultations, SHAs, and any other ESA activities that could benefit Utah prairie dogs.

Although the Utah prairie dog is generally a hardy animal, seemingly able to withstand wide fluctuations in numbers and variable environmental conditions, a number of life history factors and habitat requirements have an essential bearing on its survival and conservation. The extremely short estrous period of individual females limits the reproductive capacity of the Utah prairie dog. Thus, it is important to minimize disruptions during the crucial breeding period of mid-March to early April (Hoogland 2003).

The availability of food and other resources plays a large role in Utah prairie dog survivorship and reproduction (Cheng and Ritchie 2006). Female body mass directly affects litter size, and adult females require almost twice the energy per day during the lactation period as compared to other times of the year (Hoogland 2003). Adequate fat stores must be developed to meet the prairie dog's hibernation needs. This need is especially critical for lactating adult females and juveniles. In fact, juveniles require an additional 1-2 months of foraging time prior to entering hibernation. The availability of plentiful food, which is dependent on adequate moisture and the presence of palatable plant species, is a critical factor in Utah prairie dog abundance and density.

Survival is contingent on the ability of Utah prairie dogs to build good burrow systems. These burrow systems require well-drained soils with depths of at least 3.3 ft (1.0 m) to provide protection from predators and insulation from environmental and temperature extremes (Collier 1975; Player and Urness 1983). Social structure also is a central factor in the reproduction and survival of Utah prairie dogs. Although Utah prairie dog clans use common feeding grounds, they maintain geographic territorial boundaries (Hoogland 2003). Therefore, protection of the entirety of existing colonies is necessary to maintain prairie dog population dynamics.

Habitat connectivity is necessary for genetic flow among colonies. Such connectivity plays an important role in population viability, and allows for natural recolonization following local extirpations. Genetic diversity is critical for population viability. The low genetic variability in Utah prairie dogs (Chesser 1984; Ritchie and Brown 2005) means that full recovery is dependent on protecting colonies across the landscape within all three of the RUs. If extirpations of individual colonies occur within RUs, populations may need to be re-established by translocating individuals between the RUs. All three of the Utah prairie dog RUs are necessary to the survival and recovery of the species because they conserve both genetic and demographic robustness and maintain redundancy.

Finally, traits that favor the long-term persistence of Utah prairie dogs in the presence plague are critical to long-term survival. Traits that slow transmission rates include a relatively low density and wide dispersal of prairie dog colonies (Cully 1993). Other traits that may affect response to plague include social structures, migratory abilities, and hibernation behavior. Looser social structures and hibernation behavior may reduce transmission among individual animals, although it also is possible that hibernation may simply delay the onset of symptoms. Migration within complexes could be advantageous by promoting recolonization of colonies previously impacted by plague. Conversely, intercolony movement also can contribute to disease transmission.

2.0 RECOVERY STRATEGY

2.1 Guiding Biological Principles

Conservation programs, including recovery programs for listed species, are strengthened by adherence to 3 primary principles of conservation biology – representation, resiliency, and redundancy (Shaffer and Stein 2000). Each concept focuses on a different aspect of ensuring a species' long-term survival. Representation involves conserving the breadth of the genetic makeup and natural variation across a species' range in order to conserve adaptive capabilities. Resiliency entails ensuring that each population is viable and sufficiently large to withstand stochastic events. Redundancy involves protecting an adequate number of populations to provide a margin of safety for the species to withstand catastrophic events (Shaffer and Stein 2000). The recovery program for the Utah prairie dog will take these principles into account when looking at population and conservation needs for the species.

2.2 Recovery Strategy

Recovery under the ESA is the process by which listed species and their ecosystems are restored and their future is safeguarded to the point that protections under the ESA are no longer needed. As implied, this means that population trends are favorable for long-term persistence of the species in the wild, that evolutionary and ecological processes are intact and will remain so, and that specific threats, including but not limited to all those that led to listing the species in the first place, no longer pose an unacceptable risk of extinction.

Using this definition and the principles outlined above as a conceptual framework for envisioning recovery of the Utah prairie dog, it is clear that the status of the species must be improved before it can be considered fully recovered. We believe it is important to establish and maintain viable prairie dog populations that adhere to our guiding biological principles of representation, resiliency, and redundancy. We envision a species with sustained and stable populations in each of the three RUs, positive population trends and maintenance of natural population dynamics in each of three RUs, and where the long-term conservation of the ecosystems is ensured.

Utah prairie dog populations that must be sustained in order to reach full recovery are designated as RUs. As previously described, these RUs include the West Desert, Paunsaugunt, and Awapa. Each RU must be managed to support a sufficient population of Utah prairie dogs to maintain genetic diversity and viability.

2.3 Recovery Solutions

Recovery solutions center on the removal of obstacles to the long-term viability of the Utah prairie dog. Recovery of the Utah prairie dog will depend on an effective conservation response to the issues facing the species, which remain varied and complex. Threats across the range of the Utah prairie dog include plague, urban expansion, grazing, cultivated agriculture, vegetative community changes, invasive plants, OHV and recreation uses, climate change, energy resource exploration and development, fire management, poaching, and predation. These issues can be reduced to two overriding concerns: permanent habitat loss and plague. Therefore, this recovery

strategy for the Utah prairie dog is predicated on the need to focus our attention on habitat loss and disease through a program that encompasses threats abatement, habitat protection, research, and monitoring.

While recovery of the Utah prairie dog was previously focused almost entirely on habitat enhancements and translocation of the animals to Federal lands (USFWS 1991), we now believe that increased conservation efforts on non-Federal lands (where the majority of the species occupied habitat occurs) will be necessary to achieve full recovery (see section 2.0, Recovery Strategy). We plan to make a concentrated effort to conserve more habitats on non-Federal lands and ensure that connectivity among colonies is maintained. Conservation of large complexes and the juxtaposition of those complexes to each other will be considered in recovery efforts. Concurrently, research into translocation methodologies and plague interventions will continue.

2.3.1 Permanent Habitat Loss

The key recovery solution to address permanent habitat loss is the protection or enhancement of occupied and suitable habitat in a manner that: 1) protects existing Utah prairie dog colonies in the long term, 2) increases the size and extent of existing Utah prairie dog colonies, 3) restores unoccupied Utah prairie dog habitats thus making them suitable for translocations and successful establishment of new colonies, and 4) protects corridors of connectivity between populations. We will consider the spatial distribution of the protected habitats to ensure that connectivity and gene flow is maintained across the species' range.

Based on the species' population densities, we determined that we need to protect at least 5,000 ac (2,023 ha) acres of occupied prairie dog habitat in each RU to achieve recovery of the Utah prairie dog (see section 3.2, Rationale for Recovery Criteria).

There are two primary mechanisms we will use to achieve this recovery solution:

- Occupied Habitat Protection and Restoration on non-Federal Lands
- Occupied Habitat Protection and Restoration on Federal Lands

It is possible that continued habitat management efforts and an increased ability to control plague might make it feasible for us to expand prairie dog populations and achieve recovery largely on Federal lands in the future (see Habitat Protection and Restoration on Federal Lands, below). However, at this time, we believe that a combination of protection on non-Federal and Federal lands will be needed to achieve full recovery.

Habitat Protection and Restoration on Non-Federal Lands

As previously discussed, approximately 70% of Utah prairie dog occurrences are on non-Federal lands (see section 1.3.2, Current Distribution and Abundance). Prairie dogs on non-Federal lands are most at-risk from habitat losses caused by urban development and agricultural uses. Because of the high percentage of prairie dogs on non-Federal lands, protection of some of these existing Utah prairie dog colonies is crucial to achieve species recovery. Protection of these habitats will help us maintain sufficient prairie dog population numbers and secure connectivity between colonies across the species' range.

We recognize that protection of Utah prairie dogs on non-Federal lands is dependent on the willingness of landowners and local communities to conserve the Utah prairie dog in the face of competing social and economic priorities. Therefore, we must provide economic and regulatory incentives to encourage non-Federal participation in Utah prairie dog recovery efforts. We can do this by working with local communities and developers to establish programmatic HCPs and conservation banks to ease their regulatory burdens and by working with landowners to conserve Utah prairie dog habitats on private lands for the long term through SHAs. Showing that these efforts are in fact helping to achieve species recovery to the point that the Utah prairie dog can be removed from the endangered species list will be important for encouraging ongoing landowner and local community participation.

Protection of occupied and suitable Utah prairie dog habitat can be accomplished through fee title purchases, conservation easements, safe harbor agreements, mitigation associated with HCPs, designated open spaces, and conservation banks. Habitat connectivity can be ensured by setting aside open space or corridors as part of local community land use planning efforts and HCP mitigation efforts. We will need to determine a strategy for prioritizing and protecting these habitats across the range of the species in a manner that will first secure large, persistent colonies and those that provide for important connectivity and dispersal corridors. Continued annual surveys and monitoring of prairie dog colonies and habitats will be necessary to allow us to frequently reevaluate our prioritization strategy and ensure that we are protecting the most important habitats.

Habitat protection associated with HCP mitigation efforts and conservation banks is normally in the form of fee title acquisitions or perpetual conservation easements. These land protection mechanisms have always been considered as “protected” habitat, and the prairie dogs on these properties have thus been counted towards meeting recovery criteria (USFWS 1991). Prairie dog numbers on most other private lands were not previously counted toward recovery, providing little incentive for landowners and local communities to pursue conservation efforts on these lands. This recovery strategy will incorporate mechanisms to account for these conservation efforts, and encourage additional support from local communities, in meeting our recovery criteria. We envision starting with the SHA program or other similar voluntary conservation mechanisms.

Recovery criteria are based on the acreages of habitat protected and the numbers of prairie dogs on these protected habitats to ensure protection from land-use threats (e.g., urban expansion) and maintain population viability. Protected habitats toward recovery will include Federal lands and other habitats protected in perpetuity (i.e., fee title acquisitions, conservation easements). Protected habitats also will include some portion of land maintained in voluntary private-land conservation mechanisms such as safe harbor agreements. Because conservation efforts such as safe harbors are not perpetual agreements (the safe harbors for prairie dogs usually expire after 15 years) our recovery strategy assumes that we will continue to have these types of agreements developed on individual properties into the foreseeable future, thus effectively having a shifting mosaic of temporarily conserved prairie dog habitats across the landscape. We envision developing a program for Utah prairie dog conservation efforts on private lands that remains active even after delisting of the species. This may include an entity such as the Resource Conservation and Development Council working under a Memorandum of Agreement with the

state, USFWS, and NRCS to continue conservation efforts for prairie dogs with private landowners to retain certain acreage of Utah prairie dog habitat in conservation status. There may be other available mechanisms that we can develop to achieve similar results.

The focus on private lands conservation will secure the available habitat for the species across its range and protect important colonies from impacts associated primarily with urban expansion. Because some of these conservation measures will be non-permanent, such as safe harbors, we believe it is appropriate to limit their contribution to the recovery criteria to some degree. Therefore, our recovery criteria will establish that up to 25% of the recovery criteria for occupied Utah prairie dog habitat can be achieved through voluntary private-land conservation mechanisms, as previously described. The majority, 75%, will need to be conserved in some form of permanent protective status.

Occupied Habitat Protection and Restoration on Federal Lands

Recovery efforts for the Utah prairie dog have to date been focused on enhancing habitats on Federal lands and translocating prairie dogs to establish new colonies at these sites. We have had mixed success in establishing new colonies (see section 1.9.2, Translocations), especially at a rate fast enough to achieve full recovery in the foreseeable future. However, we also believe that improved translocation methodologies will increase our success rate and lead to more reliable establishment of new colonies on Federal lands (i.e., as seen at the Berry Springs translocation site as discussed in section 1.9.2, Translocations above). Ultimately, if we are able to improve habitats and increase the numbers of colonies on Federal, protected habitats, we will achieve recovery at a faster pace and with less impact to urban development and agricultural needs.

Thus, our recovery strategy includes: continued efforts to identify suitable translocation sites on Federal lands; improve our ability to restore Utah prairie habitats and connectivity on Federal lands; study translocation successes and failures to improve our effectiveness; and continue translocation efforts.

We will achieve improved conservation on Federal lands by continuing to work with our Federal partners to use their authorities under Section 7(a)(1) of the ESA to conserve the species. Section 7(a)(1) authorities can provide opportunities to increase Utah prairie dog habitat restoration and management on Federal lands, and acquire important prairie dog habitats through conservation easements or fee title purchases. We will pursue funding opportunities to increase implementation of habitat improvement projects, plague research and management, and monitoring efforts on Federal lands. We also will continue to minimize the effects of land use activities on prairie dog habitats through ESA Section 7(a)(2) consultation. Research and monitoring will help us to ensure that minimization and mitigation measures are carefully selected and implemented in a manner that promotes Utah prairie dog conservation and recovery.

2.3.2 Increasing Translocation Success

As described above, the establishment of new prairie dog colonies on Federal lands is an important component of our recovery strategy. There also may be opportunities to translocate prairie dogs to non-Federal lands to establish new colonies.

Ongoing research and monitoring are needed to improve our success rates in the translocation of Utah prairie dogs and subsequent establishment of new prairie dog colonies. Our recovery strategy includes an emphasis on additional research and analysis of translocation methods, adaptive management to improve translocation success, and continued development and modification of translocation protocols based on the best available science.

2.3.3 Managing Plague

Plague management is key to Utah prairie dog recovery. Plague causes dramatic fluctuations in prairie dog populations and thus may hinder our efforts to establish new colonies and effectively increase the extent of existing colonies. The presence of plague also means that the long-term population stability of prairie dogs is always in question.

Our recovery strategy is to continue research and monitoring efforts to find effective mechanisms to control plague outbreaks (see section 1.9.3, Plague). Insecticides (delta dust) are being used on select prairie dog colonies that have either experienced plague outbreaks or are at high risk. Research has begun, and will continue, on field testing of insecticides (delta dust), systemic flea controls, and experimental vaccine-laden baits (see section 1.7.3, Plague). Based on our evaluation of field testing trials, we will expand testing to determine the effectiveness of these management techniques at a landscape level.

We also will devise and implement a strategy to evaluate plague outbreaks and conservation responses on a range-wide level so that we can be as effective as possible in our capabilities to respond in a manner that provides the most biological benefit. This strategy will take the form of a formal interagency plague response plan. A plague monitoring plan and database will be developed to help us track our responses and effectiveness. We do not assume that plague can be entirely eliminated from the landscape, but it is likely that improvements in treatment techniques will result in plague control to the point that prairie dog populations are more stable.

2.3.4 Monitoring

Monitoring will remain a strong component of the recovery strategy. We will monitor: 1) annual Utah prairie dog population counts; 2) threats to the species (both existing and new); and, 3) response of Utah prairie dog population to management interventions. As part of this strategy, we will keep the public informed about the status of the Utah prairie dog and ongoing recovery activities, and engage people in this effort. We are confident that, if fully implemented, the recovery program for the Utah prairie dog will allow the species to eventually be delisted.

3.0 RECOVERY PROGRAM

3.1 Recovery Goal, Objectives, and Criteria

Goal

The goal of this plan is to recover the Utah prairie dog such that it no longer meets the ESA's definition of threatened and can be removed from the Federal List of Endangered and Threatened Wildlife (i.e., delisted).

Objectives

The recovery objectives for the Utah prairie dog are:

1. To protect suitable habitat that is of sufficient size to support a viable Utah prairie dog population and is spatially distributed to provide connectivity within each RU.
2. To establish and maintain viable Utah prairie dog populations in each RU.

Criteria

Achievement of the recovery objectives for the Utah prairie dog will be measured by recovery criteria. We set recovery criteria to serve as objective, measurable guidelines to assist us in determining when a threatened or endangered species has recovered to the point that the protections afforded by the ESA are no longer necessary and the species may be delisted. However, the actual change in status (delisting) requires a separate rulemaking process based upon an analysis of the same five factors considered in the listing of a species (see section 1.7 above). The recovery criteria presented in this recovery plan thus represent our best assessment of the conditions that would most likely result in a determination that delisting of the Utah prairie dog is warranted as the outcome of a formal five factor analysis in a subsequent regulatory rulemaking. Achieving the prescribed recovery criteria is an indication that the species is no longer threatened or endangered, but this must be confirmed by a thorough analysis of the five listing factors.

The best scientific and commercial information available indicates that all of the below criteria should be met to satisfy our recovery objectives and to allow us to consider delisting the species. These criteria may change over the course of the recovery process if important new information becomes available.

1. At least 5,000 acres (2,023 hectares) of occupied habitat are protected in each RU (West Desert, Paunsaugunt, and Awapa), with a minimum of 75% protected in perpetuity (3,750 ac (1,521 ha)) and the remaining habitat enrolled in conservation agreements. These occupied habitat criteria will be spatially distributed to provide sufficient connectivity and gene flow within each of the RU.

2. At least 2,000 adult animals (at least 1,000 counted adults in the spring counts) in each RU (West Desert, Paunsaugunt, and Awapa) within protected habitat for 5 consecutive years.
3. Management strategies are in place to respond to threats from disease.
4. Public education programs and state and/or local regulations are in place to minimize illegal take, manage legal lethal control post-delisting, and foster habitat management practices.
5. Utah prairie dog specific adaptive management strategies are in place on protected lands to improve suitable habitat in a manner that also will facilitate management responses to changing climatic conditions and other threats factors that are difficult to predict.

3.2 Rationale for Recovery Criteria

3.2.1 Designation of Recovery Units

Significant concentrations of Utah prairie dogs occur in three areas, which were termed “recovery areas” in the 1991 Utah Prairie Dog Recovery Plan including: the Awapa Plateau recovery area; the Paunsaugunt recovery area; and the West Desert recovery area.

In this revised version of the Recovery Plan, we have designated these “recovery areas” as “recovery units” (RUs). A RU is a special unit of the listed entity that is geographically identifiable and is essential to the conservation and recovery of the entire population of Utah prairie dogs. We are implementing this name change to recognize the importance of each of these units. These RUs are individually necessary to conserve the genetic, demographic, and ecological diversity necessary for the long-term sustainability of Utah prairie dogs.

Designation of these RUs is based on the concept of the “three R’s”--representation, redundancy, and resiliency. Representation refers to spatially capturing the ecological elements of the species across its entire range to ensure the species’ adaptive capabilities are conserved. All three RUs are critical to the Utah prairie dog to encompass current and historic population and habitat distributions. The concept of representation is further supported by the species’ need to have suitable habitat this is spatially distributed to provide connectivity. The loss of genetically based diversity may substantially reduce the ability of the species to respond and adapt to future environmental changes. This recovery objective will require strategic placement of protected lands for Utah prairie dogs.

Redundancy is achieved through multiple representations across the landscape, and is necessary to reduce the risk of losing representative examples of Utah prairie dogs and to buffer against vulnerability and catastrophic losses such as plague. Redundancy will enhance maintenance of current genetic variability and possibly allow for increased gene flow and genetic fitness in the future.

Resiliency refers to the overall quality or health of the species and is the ability of the species to recover from periodic disturbance and to persist through severe hardships. The ability of Utah prairie dogs to be resilient throughout the environmental variabilities of their entire range will improve the long-term sustainability of the species.

This designation has implications on the consultation process under Section 7 of the ESA. If an RU is jeopardized, the species as a whole is jeopardized. This designation will streamline the jeopardy analyses because the value of each RU is already established. Recovery criteria will need to be met in all three RUs before delisting is considered.

3.2.2 Calculation of the Number of Adult Utah Prairie Dogs Needed for Recovery

Our goal of 2,000 adult prairie dogs in each RU is based on the need to achieve an effective population size (N_e) of 500 Utah prairie dogs (Ritchie pers. comm. 2009). Effective population size is the number of breeding individuals in the population necessary to maintain genetic diversity and viability. The correlation between the average annual number of Utah prairie dogs and estimated effective population size (number of breeding individuals in a population) is a line with slope of 0.25. This means that every four adult prairie dogs contributes one prairie dog toward the effective population size.

The effective population size of $N_e = 500$ to maintain genetic variance and diversity is thus equivalent to a population of 2,000 adult Utah prairie dogs. Because spring counts are believed to total about half of the actual adult population, achieving 2,000 adults per RU equates to an annual spring count of at least 1,000 adult dogs per RU. The criteria require at least 6,000 adult Utah prairie dogs, with at least 2,000 adults in each of the 3 RUs, for a minimum of 5 years.

3.2.3 Calculation of the Acres of Occupied Utah Prairie Dog Habitat Needed for Recovery

The amount of protected habitat needed for recovery was calculated using the average Utah prairie dog population density rangewide. Specifically, the goal of 2,000 adult prairie dogs in each RU divided by 0.4 prairie dog per acre (1 prairie dog per hectare) which equates to the need for 5,000 protected ac (2,023 ha) per RU.

The average population density was calculated by using the average number of dogs across all acres of habitat (occupied, unoccupied, private, and public). The annual prairie dog counts (see section 1.3, Distribution and Abundance) provide information to determine the species' distribution and trends. Hence, annual prairie dog densities provide the best available information from which we can calculate the number of acres necessary to meet our population-based recovery criteria. While densities vary widely across the range, we believe it is appropriate to use an average given our understanding of the available information.

Specifically, we do not believe the extremely high density estimates found in the West Desert RU are sustainable in all locations. The high densities in portions of this RU are likely due to the number of colonies that are maintained at artificially high levels on areas such as alfalfa fields and golf courses. Because these areas are managed with high amounts of water, they result in more consistent and productive vegetation resources than the natural environment that will support the species in the long run. Thus, it would be improper to use the actual density reported in this unit to calculate protected acreage needs.

Conversely, we believe the extremely low densities reported in the Awapa RU may be related, at least in part, to limitations in our survey techniques. For example, surveyor access to habitats on the Awapa Plateau is limited due to: the paucity of adequate roads and high percentage of private land ownership; the dominance of sagebrush communities (black sagebrush (*A. nova*) and big

sagebrush (*A. tridentate*)) making observation of Utah prairie dogs difficult and resulting counts lower than actual prairie dog occurrence; and spring weather patterns associated with the high elevation Awapa Plateau (e.g., high snowpack, later spring melt-off, poor daily weather conditions) which result in reduced accessibility and reduced survey suitability for spring counts. Our mapping techniques also increase the potential to underestimate the actual densities of Utah prairie dogs on the landscape, particularly in the Awapa RU (see section 1.3.2, Current Distribution and Abundance).

It should be noted that not all of the lower density estimates in the Awapa RU can be attributed to survey technique or limitations in our survey capacity. Because the Awapa Plateau occurs at a higher average elevation than the other recovery areas, it has a shorter growing season. This reduces habitat quality and may reduce colony size, litter size and density. This reduction in habitat quality, combined with likely underestimates associated with our technique, and overestimates in other portions of the range, suggest it is reasonable to use a range-wide average density in calculating occupied protected acreage recovery needs.

Even if we underestimated protected acreage needs in the Awapa RU, it would have little impact on the recovery of the Utah prairie dog. Our second recovery criterion calls for protecting 2,000 adult animals within protected habitat. Thus, even if 5,000 protected acres is not sufficient to support 2,000 adult animals in the Awapa RU, this criterion ensures we will not delist until sufficient acreage is protected that can support the population target. Furthermore, land ownership patterns and limited potential for permanent habitat loss in the Awapa RU (see Table 2) provide reasonable assurance even if 5,000 protected acres is not sufficient to support 2,000 adult animals in this unit, such an underestimate is unlikely to permanently set back the species' long-term recovery prognosis.

While we believe our protected acreage recovery criteria is reasonable given the available information, we will revisit this calculation should future data indicate our assumptions are incorrect.

3.3 Changes to Recovery Criteria

Recovery plans are not regulatory documents and are instead intended to provide guidance on methods of minimizing threats to listed species and on criteria that may be used to determine when recovery is achieved. There are many paths to accomplishing recovery of a species, and recovery may be achieved without all criteria being fully met. For example, one or more criteria may be exceeded while other criteria may not be accomplished. In that instance, we may judge that the threats are minimized sufficiently, and the species is robust enough to reclassify from endangered to threatened or to delist. In other cases, recovery opportunities may be recognized that were not known at the time the recovery plan was finalized. These opportunities may be used instead of methods identified in the recovery plan. Likewise, information on the species may be learned that was not known at the time the recovery plan was finalized. The new information may change the extent that criteria need to be met for recognizing recovery of the species. Recovery of a species is a dynamic process requiring adaptive management that may, or may not, fully follow the guidance provided in a recovery plan.

As an example, we chose to use a range-wide average prairie dog population density to determine acreages of protected habitat necessary to achieve recovery. However, we also explained that prairie dog population densities are lower or estimated to be lower in the Awapa RU compared to the other RUs due to a variety of factors, including surveying difficulty and possibly lower habitat quality in this area. As more information becomes available, we may determine that habitat improvements such as mechanical sagebrush treatments or seedings will improve prairie dog density figures on the Awapa RU. Plague management also may play a role in our ability to increase Utah prairie dog populations in all recovery areas. Another scenario is that we may find that the Awapa RU is functionally different from the other RUs and can never achieve the same population densities as the other RUs. In this case, we may reevaluate the amount of protected occupied habitat needed to achieve recovery in this RU.

3.4 Recovery Actions

The recovery program for the Utah prairie dog is divided into three major areas of action: 1) species protection, 2) communication and outreach, and 3) research and monitoring. Overall, these sets of actions are tied directly to achievement of the recovery criteria for the Utah prairie dog, and they are arranged in hierarchical order, with more specific actions stepping down from the broad actions that link to the criteria.

Protection actions are geared toward conserving extant populations and habitat. Translocating animals will be used where appropriate as a threats-response strategy and, more importantly, as a way to improving demographic and genetic viability. Actions are focused primarily on alleviating significant threats, and although many of these actions can be carried out using currently available information, some will require scientific evaluation or action-based research prior to implementation. Communication and outreach actions are designed to inform interested parties of the species' recovery needs and to generate community participation, appreciation, and discussion.

The array of recommended actions is listed in the Recovery Action Outline and full descriptions of the actions are provided in the Recovery Action Narrative. In the narrative, a priority number of 1 to 3 has been assigned to each action. These priorities are based on the following criteria:

Priority 1: Actions that must be taken to prevent extinction or to prevent the species from declining irreversibly.

Priority 2: Actions that must be taken to prevent a significant decline in species population/habitat quality or some other significant negative impact short of extinction.

Priority 3: All other actions necessary to provide for full recovery of the species.

3.5 Recovery Action Outline

1. Evaluate and update the occurrence and distribution of the Utah prairie dog across its known range.
 - 1.1. Continue Utah prairie dog surveys and annual population monitoring using existing protocols throughout the designated RUs.
 - 1.2. Expand Utah prairie dog surveys to unmapped but potential habitat to document species distribution.
 - 1.3. Continue to review and, if necessary, revise the boundaries of the three RUs.
2. Conserve Utah prairie dog habitat on Federal, state, tribal, and private lands.
 - 2.1. Prioritize Utah prairie dog habitat for protection.
 - 2.2. Conserve habitat on non-Federal lands.
 - 2.2.1. Permanently protect habitat on non-Federal lands through conservation easements and fee acquisition from willing sellers.
 - 2.2.1.1. Expand market-based and other financial incentives for private landowners who enter into permanent agreements to manage or restore habitat.
 - 2.2.1.2. Establish an endowment fund to administer and manage protected property.
 - 2.2.2. Enroll private lands in temporary voluntary agreements using Federal and state conservation programs.
 - 2.3. Protect and improve Utah prairie dog habitat on Federal lands.
 - 2.3.1. Plan and implement vegetation treatments in strategic locations (including translocation sites) that benefit Utah prairie dogs and their habitat.
 - 2.3.2. Develop and implement guidelines to minimize adverse impacts to Utah prairie dogs and their habitat from various activities on Federal lands.
 - 2.3.3. Amend or update Federal Land Use Plans to include these guidelines when appropriate.
 - 2.3.4. Where appropriate, conserve Utah prairie dogs and their habitat through special Federal designations promoting the conservation of the species on Federal lands.

3. Minimize impacts of diseases to Utah prairie dogs via research efforts, a plague response plan, and a monitoring strategy.
 - 3.1. Develop and implement a plague prevention and response plan and prioritize where and when plague response should occur.
 - 3.2. Develop and implement a monitoring strategy and database for plague.
 - 3.3. Identify other diseases that may impact Utah prairie dogs.
4. Develop and implement the capability to respond to natural disturbances (e.g., drought, fire).
5. Continue the translocation of Utah prairie dogs to suitable habitat using approved protocols.
 - 5.1. Select and prioritize translocation sites across the range of Utah prairie dogs.
 - 5.2. Regularly review and, as necessary, amend the approved Recommended Translocation Procedures document.
 - 5.3. Implement translocations in accordance with the Recommended Translocation Procedures to increase the number of Utah prairie dog colonies throughout the range.
6. Develop and implement a public outreach program that promotes a better understanding of the biological and habitat values of the Utah prairie dog as well as tolerance of the species.
 - 6.1. Develop funding strategies to implement the outreach program.
 - 6.2. Establish Utah prairie dog viewing sites and educational kiosks.
 - 6.3. Publish and distribute habitat management guidelines for private lands.
 - 6.4. Establish a Utah prairie dog demonstration site balancing the species needs with agricultural needs.
 - 6.5. Initiate a volunteer Utah prairie dog stewardship program to inform and educate citizens.
7. Develop and implement research priorities to identify and evaluate threats and create tools to expand Utah prairie dog colonies where appropriate to assist with adaptive management and conservation of the species.
 - 7.1. Develop and implement research priorities to improve translocation efforts.
 - 7.2. Develop and implement research priorities to minimize impacts from plague/disease.

- 7.3. Develop and implement research priorities to improve population estimates.
- 7.4. Develop and implement research priorities to understand genetics.
- 7.5. Develop and implement research priorities to assess impacts of various actions to Utah prairie dogs and their habitat (e.g., OHV, seismic).
- 7.6. Review research and monitoring plans annually.
- 8. Incorporate monitoring into recovery actions to ensure efficacy of actions.
 - 8.1. Maintain a technical working group to regularly review the status of the species and track the effectiveness of recovery actions.
 - 8.2. Develop monitoring protocols to assess effectiveness of recovery actions.
 - 8.3. Identify recovery applications of research results.

3.5.1 Recovery Action Narrative

Species Protection

- 1. Precisely and accurately, determine occurrence and distribution of the Utah prairie dog across its known range (Priority 2).

The Team will continue to determine Utah prairie dog distribution and occurrence within the three designated RUs, as well as expand this effort to previously unsurveyed areas. The current Utah prairie dog count protocol will be used during counting activities and will be updated as needed.

- 1.1. Continue Utah prairie dog surveys and annual population monitoring using existing protocols, throughout the designated RUs (Priority 2).

The UDWR will continue performing annual Utah prairie dog counts in the spring between April 1 and June 1, before the young are above ground. This protocol ensures that only adult animals that survive the winter are counted.

- 1.2. Expand Utah prairie dog surveys to unmapped but potential habitat to document species distribution (Priority 2).

This effort was initiated in all three RUs in 2007 to 2009, and will likely continue in the future. The expansion of these survey efforts may increase the accuracy of our density figures within several RUs. In particular, the Awapa RU is an expansive area with small colonies spread over large distances with limited road access. As these surveys, methodology, and monitoring improves; underestimated density levels also should increase.

- 1.3. Continue to review and, if necessary, revise the boundaries of the three RUs (Priority 3).

The current boundaries of the three RUs are based on the occurrence of occupied habitat at the time of listing while considering logical geographical distinctions. Considerable suitable historic habitat and potential new habitat occurs outside of these boundaries. An ongoing review of these boundaries is necessary, based on continuing prairie dog survey information, to broaden recovery potential and identify opportunities to improve connectivity.

2. Conserve Utah prairie dog habitat on Federal, state, tribal, and private lands (Priority 1).

- 2.1. Prioritize Utah prairie dog habitat for protection (Priority 1).

We will prioritize Utah prairie dog habitats, taking into consideration spatial distribution, colony size, colony persistence, and connectivity between habitats.

- 2.2. Conserve habitat on non-Federal lands (Priority 1).

Due to the importance of private lands and the habitat they contain, it is necessary to conserve habitat on private lands for Utah prairie dog conservation and recovery within all RUs. The total amount of land to be protected will be based on the number of willing sellers and the number of participants enrolled in various conservation programs (at any one time); the acres of occupied habitat; and the amount of Utah prairie dogs and acres that are protected via these programs. A key component of this effort is continual outreach to private landowners to provide education on conservation agreements and easement programs.

- 2.2.1. Permanently protect habitat on non-Federal lands through conservation easements and fee acquisition from willing sellers (Priority 1).

This task can be accomplished using Federal, state, and/or private funds. Incentive-based programs and long-term funding mechanisms should be a strong component of this effort.

- 2.2.1.1. Expand market-based and other financial incentives for private landowners who enter into permanent agreements to manage or restore habitat (Priority 1).

It will be important to research incentives and cooperative solutions in order to increase the number of individuals we have participating in these conservation programs.

- 2.2.1.2. Establish an endowment fund to administer and manage protected property (Priority 1).

This fund will be for administration costs associated with land conservation projects that include fee title purchase and development rights.

- 2.2.2. Enroll private lands in temporary voluntary agreements using Federal and state conservation programs (Priority 1).

As with conservation easements and fee acquisition, expand available financial incentives, including market-based incentives, for private landowners who enter into voluntary agreements to manage or restore habitat (Priority 1).

- 2.3. Protect and improve Utah prairie dog habitat on Federal lands (Priority 1).

Continuing to maintain and improve habitat for Utah prairie dogs on Federal lands is a critical priority for the species. Habitat improvement projects may consist of increasing plant diversity with warm and cool season grasses, forbs, and shrubs; and altering ground cover and canopy cover to ensure optimum foraging and visual surveillance conditions. These activities also coincide with the goals of the translocation program.

- 2.3.1. Plan and implement vegetation treatments in strategic locations (including translocation sites) that benefit Utah prairie dogs and their habitat (Priority 2).

Currently occupied as well as historic Utah prairie dog habitat can be improved with vegetation treatments such as thinning of dense sagebrush via mechanical or other methods and reseeding with seed mixes beneficial to Utah prairie dogs. Both the USFS and BLM have completed several projects that focus on benefiting Utah prairie dogs.

Habitat improvements may be especially important on the Awapa RU. The Awapa RU currently has a large amount of dense sagebrush which may be limiting colony size as well as survey efforts for the species. Achieving the recovery goal of at least 2,000 adults on 5,000 ac (2,023 ha) of protected land will require densities of 0.4 prairie dog per acre. Habitat improvements may assist in achieving this desired density.

- 2.3.2. Develop and implement guidelines to minimize adverse impacts to Utah prairie dogs and their habitat from various activities on Federal lands (Priority 2).

Multiple uses on public lands need to be balanced with minimizing effects to Utah prairie dogs and their habitat. This goal can be accomplished via established guidelines for project proposals that can be incorporated into project descriptions and Section 7 consultations.

- 2.3.3. Amend or update Federal Land Use Plans to include these guidelines when appropriate (Priority 2).

Incorporating guidelines that minimize impacts to Utah prairie dogs into Federal Land Use Plans is key to documenting the agencies' contributions to continued Utah prairie dog conservation and is necessary to demonstrate that regulatory mechanisms would be in place to conserve the species after delisting.

- 2.3.4. Where appropriate, conserve Utah prairie dogs and their habitat through special Federal designations promoting the conservation of the species on Federal lands (Priority 3).

This type of designation will add further protection of the species on Federal lands. Examples of special designations include: Areas of Critical Environmental Concern designations and Conservation Agreements (Priority 3).

3. Minimize impacts of diseases to Utah prairie dogs via research efforts, a plague response plan, and a monitoring strategy (Priority 1).

Disease threats to Utah prairie dogs include sylvatic plague (*Yersiana pestis*) and other diseases. Although there is little known regarding long-term impacts of these diseases to Utah prairie dogs on the population level – and even less regarding cures or antidotes – effects can be devastating to local colonies and may negatively impact the long-term ability of the species to recover. Efforts to understand and minimize impacts of disease to Utah prairie dogs will be addressed through further research.

- 3.1. Develop and implement a plague prevention and response plan and prioritize where and when plague response should occur (Priority 1).

The Team will develop and implement a plague response plan that will direct agency and private landowner response to potential plague outbreaks throughout the species' range. This plan will define protocol methods to confirm the presence of plague, methods to respond to plague outbreaks, and methods to track and record plague associated activities. The plan will include financial incentives to private landowners to treat plague outbreaks on lands they control. The Team also will be working closely with the U.S. Geological Survey and other Federal agencies as they research a plague vaccine for the species to be administered via bait. The plan also will identify and prioritize at risk and high risk areas, stockpile and maintain supplies for handling disease outbreaks, training personnel to respond to outbreaks, and developing an educational handout to provide information to the public about Utah prairie dog disease issues. Implementation of this plague prevention and response plan will assist in minimizing population crashes due to plague and may increase densities across RUs.

- 3.2. Develop and implement a monitoring strategy and database for plague (Priority 1).

Monitoring and early detection is the key to knowing when and how to respond to plague outbreaks. This information will be critical to dovetail with response efforts. This monitoring program will be a multi-agency effort that will: schedule regular visits to impacted sites to monitor populations; ensure incident response is effective and adjust protocol if necessary; and develop a map with plague occurrence and dusting locations.

3.3. Identify other diseases that may impact Utah prairie dogs (Priority 3).

It is important to stay current with other disease impacts to Utah prairie dogs and to develop vaccines and delivery methods. For example, tularemia is a disease we should monitor and research.

4. Develop and implement the capability to respond to natural disturbances (e.g., drought, fire) (Priority 3).

Habitat disturbance to occupied Utah prairie dog habitat can have negative and positive long- and short-term effects on Utah prairie dogs. The Team will develop a response plan to address natural disturbances in occupied and historic habitat for use by land management agencies. The response plan will include the disturbance, potential responses to the disturbance, and a monitoring protocol to assess efficacy of responses. It will address both the response to disturbance and rehabilitation of habitat.

5. Continue the translocation of Utah prairie dogs to suitable habitat using approved protocols (Priority 2).

Translocation efforts have been part of recovery efforts since listing in 1973. Although the effort has evolved considerably throughout the years, efforts to improve and continue this action will be undertaken.

5.1. Select and prioritize translocation sites across the range of Utah prairie dogs (Priority 2).

Considerable research has been completed to identify appropriate parameters for translocation sites. Major components considered important for successful translocation sites include: vegetation, proximity to other occupied areas, and soil conditions.

5.2. Review and, as necessary, amend the Recommended Translocation Procedures document (Priority 3).

This document will be updated as needed to respond to new information.

5.3. Implement translocations in accordance with the Recommended Translocation Procedures to increase the number of Utah prairie dog colonies throughout the range (Priority 2).

The translocation program will continue in accordance with the Recommended Translocation Procedures document. It will be important to broaden this program with improved research, predator control programs, and identification and development of translocation sites.

Communication and Outreach

6. Develop a public outreach program that promotes a better understanding and appreciation of the biological and habitat values of the Utah prairie dog as well as tolerance of the species (Priority 3).

Having public support is a critical element to the successful recovery of the Utah prairie dog. The public education program should include the ESA and the laws that protect the Utah prairie dog and its habitat, but also on the beneficial role that this keystone species plays in the ecosystem. Providing educational opportunities to school groups by giving presentations in the classroom with live animals or conducting field trips to see Utah prairie dogs in their natural environment will be a key component of this program. Examples of ideas to use in this program are creating a radio program, website, and information in local papers on Utah prairie dogs. Further outreach opportunities exist in engaging landowners in conservation agreements and permanent easements or other similar programs.

- 6.1. Develop funding strategies to implement the outreach program (Priority 2).

Possible funding could be generated through an annual Utah prairie dog festival or an “adopt a Utah prairie dog” program. These ideas may be able to raise money to support the outreach program.

- 6.2. Establish Utah prairie dog viewing sites and educational kiosks (Priority 3).

We believe that viewing live Utah prairie dogs in their natural environment will foster a relationship between the public and the species and relay the species’ value to the ecosystem. This can be accomplished via designation of Southern Utah University as an experimental station or creating viewing sites and educational kiosks on public lands or highway pullouts.

- 6.3. Publish and distribute habitat management guidelines for private lands (Priority 3).

Private land owners can further improve their properties for Utah prairie dog conservation if provided proper educational materials on specific habitat requirements of the species, such as the Utah Prairie Dog Habitat Evaluation Guide (Environmental Defense 2007). This guide highlights the five primary factors that influence the suitability of habitat for the species as: soils, vegetative height and density, vegetative moisture availability, vegetation quantity, and vegetation quality.

- 6.4. Establish a Utah prairie dog demonstration site balancing the species needs with agricultural needs (Priority 3).

A Utah prairie dog demonstration site will be another opportunity to provide educational outreach to the agricultural community. A goal for this site will be to see how the needs of Utah prairie dogs can coexist with agricultural interests. This recovery action also could be accomplished via designation of Southern Utah University as an experimental station.

- 6.5. Initiate a volunteer Utah prairie dog stewardship program to inform and educate citizens (Priority 3).

This program would involve interested members of the community in active participation in Utah prairie dog conservation through their educating other citizens about the ecological role of Utah prairie dogs, the value of and methods to accomplish species protection, and responsible means of recreation. A good opportunity for this program may be to educate OHV users in popular areas that are within Utah prairie dog habitat.

Research and Monitoring

7. Develop and implement research priorities to identify and evaluate threats and create tools to expand Utah prairie dog colonies where appropriate and to assist with adaptive management and conservation of the species (Priority 2).

This action will be an evolving process to assess research priorities based on current threats to the species and to implement this research with management and conservation goals in mind.

- 7.1. Develop and implement research priorities to improve translocation efforts (Priority 2).

Focus will include improving retention rates of Utah prairie dogs at translocation sites via improved vegetation success, predator control, and other approaches to be determined by further research.

- 7.2. Develop and implement research priorities to minimize impacts from plague or disease (Priority 2).

As mentioned previously, one of the current research priorities relevant to disease impacts to Utah prairie dogs is the oral plague vaccine being developed by the United States Geological Survey and other Federal agencies. This could prove to be a highly effective preventative measure for the species. In addition to the plague vaccine, research priorities will include improving plague response efforts.

- 7.3. Develop and implement research priorities to improve population estimates (Priority 3).

The Team will continue to assess and improve the population estimates for the species. The spring counts will be performed on an annual basis and the protocol and implementation process will be reviewed and revised as necessary. The continued improvements to the spring counts will include an increased emphasis on density estimates.

- 7.4. Develop and implement research priorities to understand genetics (Priority 3).

Obtaining an improved understanding of Utah prairie dog genetics will benefit many aspects of other related programs for the species such as habitat protection and translocation efforts across RUs. The concepts of representation, redundancy, and resiliency will be further investigated to increase our knowledge of the extent of spatial distribution and connectivity needed to maintain viable Utah prairie dog populations.

- 7.5. Develop and implement research priorities to assess impacts of various actions to Utah prairie dogs and their habitat (e.g., OHV, seismic) (Priority 2).

In coordination with other Federal and state agencies, the Team will continue to review impacts to Utah prairie dogs and their habitat. Research priorities may be focused on specific activities that are increasing in frequency within the species' range and are causing harm to the species.

- 7.6. Review research and monitoring plans annually (Priority 3).

On an annual basis, the Team will review the research and monitoring plans and make any needed revisions to address changing conservation priorities and threats to the species.

8. Incorporate monitoring into recovery actions to ensure efficacy of actions (Priority 2).

These actions will be accomplished by working within an “adaptive management” framework wherein new information will be incorporated into recovery strategies as it becomes available.

- 8.1. Maintain a technical working group (a subcommittee of the Team) to regularly review the status of the species and track the effectiveness of recovery actions (Priority 2).

Consistent review of the recovery progress for the Utah prairie dog will assist in any necessary revisions to recovery actions, focusing research priorities, and tracking new or increased threats to the species.

- 8.2. Develop monitoring protocols to assess effectiveness of recovery actions (Priority 2).

Monitoring protocols will be developed by the Recovery Implementation Team to track effectiveness of recovery actions. This structure will enhance the scientific rigor of the program.

8.3. Identify recovery applications of research results (Priority 2).

Within the adaptive management framework, as research results are reviewed and analyzed by the Team, this information will be applied toward recovery actions and the overall conservation and management of the Utah prairie dog.

4.0 IMPLEMENTATION SCHEDULE

The following Implementation Schedule outlines actions and estimated costs for the Utah prairie dog recovery program over the next 5 years. It is a guide for meeting recovery objectives discussed in Part III of this plan. This schedule indicates action priorities, action numbers, action descriptions, links to recovery criteria, duration of actions, and estimated costs. In addition, parties with authority, responsibility, or expressed interest to implement a specific recovery action are identified in the schedule. The listing of a party in the Implementation Schedule neither requires nor implies a requirement for the identified party to implement the action(s) or secure funding for implementing the action(s). However, parties willing to participate may benefit by being able to show in their own budgets that their funding request is for a recovery action identified in an approved recovery plan and, therefore, is considered a necessary action for the overall coordinated effort to recover the Utah prairie dog. Also, Section 7(a)(1) of the ESA, as amended, directs all Federal agencies to use their authorities in furtherance of the purposes of the ESA by carrying out programs for the conservation of threatened and endangered species. The schedule will be updated as recovery actions are initiated and completed.

Key to Implementation Schedule Priorities (column 1)

- Priority 1:** An action that must be taken to prevent extinction or to prevent the species from declining irreversibly in the foreseeable future.
- Priority 2:** An action that must be taken to prevent a significant decline in species population/habitat quality or some other significant negative impact short of extinction.
- Priority 3:** All other actions necessary to provide for full recovery of the species.

Key to Responsible Parties (column 6)

- Team = Utah Prairie Dog Recovery Team
- USFWS = U.S. Fish and Wildlife Service
- UDWR = Utah Division of Wildlife Resources
- UDNR = Utah Department of Natural Resources
- NRCS = U.S. Department of Agriculture, Natural Resources Conservation Service
- RC&D = Panoramaland and Color Country Resource Conservation and Development Councils
- FB = Utah Farm Bureau
- ED = Environmental Defense
- USFS = U.S. Department of Agriculture, Forest Service
- BLM = Bureau of Land Management
- NPS = National Park Service
- SUU = Southern Utah University
- USU = Utah State University Extension

IMPLEMENTATION SCHEDULE: UTAH PRAIRIE DOG DRAFT REVISED RECOVERY PLAN

Priority#	Action#	Action Description	Recovery Criterion #	Action Duration (Years)	Responsible Parties	USFWS Lead?	Total Cost \$1000s	FY01 \$1000s	FY02 \$1000s	FY03 \$1000s	FY04 \$1000s	FY05 \$1000s	Comments
1	2.1	Prioritize habitat for protection	1	30	Team	Y	310	20	10	10	10	10	Based on travel time for Team, help from GIS person, & an annual review. FY01 @ \$20K & \$10K every year after.
1	2.2.1	Permanently protect habitat on non-Federal lands through conservation easements & fee acquisition from willing sellers	1	30	NRCS, USFWS, UDNR, UDWR, FB, RC&D, Counties	Y	60,000	2,000	2,000	2,000	2,000	2,000	Involve partnerships with private grant organizations & environmental groups. \$2,000K/year for 30 years.
1	2.2.2	Enroll private lands in temporary voluntary agreements using Federal & state conservation programs	1	30	NRCS, USFWS, UDNR, UDWR, FB, RC&D	Y	2,250	200	200	200	200	200	\$200K for FY01 to FY05, then 50K annually thereafter
1	2.2.1.1	Expand market-based & other financial incentives for private landowners who enter into permanent agreements to manage or restore habitat	1	30	NRCS, RC&D, FB, ED, USU	N	6,000	200	200	200	200	200	\$200K annually for 30 years
1	2.2.1.2	Establish an endowment fund to administer & manage protected property	1	30	RC&D, Counties	N	1,500	100	100	100	100	100	Include salaries & admin costs. \$100K for FY01 to FY10, then \$25K annually.
1	3.1	Develop & implement a plague prevention & response plan & prioritize where & when plague prevention & response should occur	3	30	Team	Y	4,500	150	150	150	150	150	\$150K annually for 30 years
1	3.2	Develop & implement a monitoring strategy & database for plague	3	29	Team	Y	1,450	-	50	50	50	50	No \$ @ FY01, then \$50K each year thereafter
2	1.1	Continue surveys & annual population monitoring using existing protocols, throughout designated RUs	2	30	USFS, BLM, NPS, UDWR	N	900	30	30	30	30	30	\$30K annually for 30 years
2	1.2	Expand surveys to unmapped but potential habitat to document species distribution	2	5	FB, RC&D, UDWR, USFS, BLM, NPS	Y	150	30	30	30	30	30	\$30K for FY01 to FY05 then no \$ thereafter

IMPLEMENTATION SCHEDULE: UTAH PRAIRIE DOG DRAFT REVISED RECOVERY PLAN

Priority#	Action#	Action Description	Recovery Criterion #	Action Duration (Years)	Responsible Parties	USFWS Lead?	Total Cost \$1000s	FY01 \$1000s	FY02 \$1000s	FY03 \$1000s	FY04 \$1000s	FY05 \$1000s	Comments
2	2.3.1	Plan & implement vegetation treatments in strategic locations (including translocation sites) that benefit species & its habitat	5	30	NRCS, BLM, USFS, NPS, UDWR	N	15,000	500	500	500	500	500	This is based on 1,000 acres/year at cost of about \$500/acre + planning costs. \$500K annually for 30 years
2	2.3.2	Develop & implement guidelines to minimize adverse impacts to species & its habitat from various activities on Federal lands	5	30	Team	Y	650	40	40	30	20	20	NPS has grant in place. \$40K @ FY01 & FY02, \$30K @ FY03, & \$20K annually thereafter
2	2.3.3	Amend or update Federal Land Use Plans to include these guidelines when appropriate	5	7	USFS, BLM, NPS	N	500	-	-	-	-	150	No \$ for FY01 to FY04, then \$150k @ FY05 & FY06, then \$40k every 5th year thereafter
2	5.1	Select & prioritize translocation sites across range of species	2	30	Team	Y	1,500	50	50	50	50	50	On the ground work will begin once priority areas are chosen. \$50K annually for 30 years
2	5.3	Implement translocations in accordance with Recommended Translocation Procedures to increase number of colonies throughout range	2	30	RC&D, NRCS, FB, ED, UDWR, NPS, BLM, USFS	N	2,400	80	80	80	80	80	This is based on establishing more burrows & dogs at 2 sites per year. \$80K annually for 30 years
2	6.1	Develop funding strategies to implement outreach program	4	28	Team	Y	280	-	-	10	10	10	\$10K annually beginning FY03
2	7.1	Develop & implement research priorities to improve translocation efforts	2	7	Team	Y	140	20	-	-	-	20	Develop in FY01 & update every 5th year thereafter
2	7.2	Develop & implement research priorities to minimize impacts from plague or disease	3	7	Team	Y	210	-	30	-	-	30	Develop in FY02 & update every 5th year thereafter
2	7.5	Develop & implement research priorities to assess impacts of various actions to species & its habitat	5	7	Team	Y	140	20	-	-	-	20	FY01 & every 5th year thereafter
2	8.1	Maintain technical working group of researchers to regularly review status of species & track effectiveness of recovery actions	1, 2	29	Team	Y	1,450	-	50	50	50	50	Maintaining technical working group includes meeting annually & researcher time/travel, beginning FY02
2	8.2	Develop monitoring protocols to assess effectiveness of recovery actions	1, 2	7	Team	Y	160	40	-	-	-	20	Develop in FY01 & update every 5th year thereafter

IMPLEMENTATION SCHEDULE: UTAH PRAIRIE DOG DRAFT REVISED RECOVERY PLAN

Priority#	Action#	Action Description	Recovery Criterion #	Action Duration (Years)	Responsible Parties	USFWS Lead?	Total Cost \$1000s	FY01 \$1000s	FY02 \$1000s	FY03 \$1000s	FY04 \$1000s	FY05 \$1000s	Comments
2	8.3	Identify recovery applications of research results	1, 2	10	USFWS	Y	300	-	-	30	-	-	Applicable every 3rd FY thereafter
3	1.3	Review &, if necessary, revise boundaries of three RUs	1, 2	7	Team	Y	90	30	-	-	-	10	FY01 & every 5th year thereafter
3	2.3.4	Where appropriate conserve species & its habitat through special Federal designations promoting conservation of species on Federal lands	1	7	BLM, USFS, NPS	N	230	50	-	-	-	30	FY01 @ \$50K & \$30K every 5th year thereafter
3	3.3	Identify other diseases that may impact species	3	6	Team	Y	1,300	-	-	-	-	50	Starting FY05 & every year thereafter
3	4.	Develop & implement capability to respond to natural disturbances (e.g., drought, fire)	5	26	Team	Y	1,300	-	-	-	-	50	Begin FY05 @ \$50K annually thereafter
3	5.2	Review & ,as necessary, amend Recommended Translocation Procedures document	2	7	Team	Y	260	20	-	-	-	40	FY01 @ \$20K (recently revised) & \$40K every 5th year thereafter
3	6.2	Establish species' viewing sites & educational kiosks	4	27	USFS, BLM, NPS, SUU, USU, ED	N	1,400	-	-	-	100	50	FY04 @ \$100K & \$50K annually thereafter
3	6.3	Publish & distribute habitat mgmt guidelines for private lands	4	10	ED, FB, RC&D, NRCS	N	1,350	100	80	30	30	80	\$100K in FY01 for development & distribution of pamphlets; \$30K annually for pamphlets, with \$80K in FY02; & every 5th year thereafter for printing & mailing
3	6.4	Establish species' demonstration site balancing species needs with agricultural needs	4	7	SUU, FB, RC&D, USFS	N	700	100	-	-	-	100	Every 5th year
3	6.5	Initiate volunteer stewardship program to inform & educate citizens	4	30	Team	Y	310	20	10	10	10	10	\$20K @FY01 & \$10K annually for program support thereafter
3	7.3	Develop & implement research priorities to improve population estimates	2	7	Team	Y	140	20	-	-	-	20	Every 5th year
3	7.4	Develop & implement research priorities to understand genetics	2	7	Team	Y	140	20	-	-	-	20	Every 5th year
3	7.6	Review research & monitoring plans annually	1, 2	30	Team	Y	900	30	30	30	30	30	\$30K annually for 30 years

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APPENDIX A
Utah Prairie Dog Historic Range

BEAVER COUNTY	All suitable habitats
GARFIELD COUNTY	All suitable habitats on the Aquarius Plateau and west of the Escalante Mountains, including Tropic Valley
IRON COUNTY	All suitable habitats
KANE COUNTY	All suitable habitats in the main stem Sevier River Valley and East Fork Sevier River Valley, including primary tributaries
JUAB COUNTY	All suitable habitats south and east of SR132
MILLARD COUNTY	All suitable habitats east of the San Francisco Mountains, Cricket Mountains and the Sevier River
PIUTE COUNTY	All suitable habitats
SANPETE COUNTY	All suitable habitats in the Sevier River Valley
SEVIER COUNTY	All suitable habitats west of, and including, the Old Woman Plateau and west of SR72, including the Tidwell Slopes
WASHINGTON COUNTY	All suitable habitats in the Kanarra Creek and Ash Creek drainages
WAYNE COUNTY	All suitable habitats west of the Water Pocket Fold

Citations: Allen 1905; Bureau of Biological Survey letter dated June 20, 1923; Hardy 1937; Collier and Spillett 1972, 1975; Collier 1975; Pizzimenti and Collier 1975.

APPENDIX B
Utah Prairie Dog Recovery Area Boundary Descriptions⁹

WEST DESERT

- Beaver County – All lands west of R5W and south of T27S; also including all lands within T27S R16W, T27S R17W and T27S R18W
- Iron County – Beginning at the NE corner of Iron County and proceeding southward; all lands within and west of T31S R6W, T32S R6W, T33S R6W, T34S R7W, T35S R10W, T36S R11W, T37S R12W and T38S R12W; also including Section 6 of T35S R9W and Sections 4 through 9 of T37S R11W.
- Washington County – All lands within: T38S R13W; Section 1 of T39S R13W, Sections 5 and 6 of T39S R12W; and Sections 19, 20 and 29-32 of T38S R12W

PAUNSAUGUNT

- Garfield County – All lands west of R1W, but excluding T31S R2W
- Kane County – T38S R4½ W, T38S R5W and T38S R6W
- Piute County – Sections 25, 26, 35 and 36 of T30S R5W

AWAPA

- Garfield County – All lands north of T33S, east of R2W and west of R4E; also all lands within T31S R2W
- Piute County – All lands east of R3W (R2½W)
- Sevier County – All lands east of R2W and south of T24S; also beginning at the meeting with Emery County and Wayne County and proceeding westward and northward, all lands within: T24S R5E, T23S R4E, T22S R3E, T24S R2E, T23S R2E, T22S R2E, Sections 1 and 12 of T23S R1E; Sections 12, 13, 24, 25 and 26 of T22S R1E
- Wayne County – Beginning at the meeting with Sevier County and Emery County and proceeding southward: all lands within and west of T26S R5E, T27S R5E, T28S R5E, T29S R4E and T30S R4E

⁹ All cadastral descriptions are based on the Salt Lake Base and Meridian survey lines.

APPENDIX C

Survey Protocol for Annual Spring Counts of Utah Prairie Dogs

1. Counts will be conducted in the spring following the emergence of adult Utah prairie dogs from winter hibernation and should be completed prior to emergence of young-of-the-year. Generally, this will be between March 1 and June 1, but exact dates may vary from year to year.
2. Surveyors should begin counts at lower elevation colonies first and advance to higher elevations as the season progresses.
3. Counts will be conducted on calm, sunny days with temperature above 50EF. Surveys should be discontinued if winds exceed 3 on the Beaufort scale, if cloud cover exceeds 15%, if clouds cast moving shadows across the colony, or if otherwise inclement weather is encountered. Counts can be made between 0800 and 1800 hours, but are best made mid-morning through early afternoon.
4. Surveyors should approach colonies to be counted in a vehicle and in such a way that they avoid disturbing the resident Utah prairie dogs. Counts should be made from a vantage point which provides unobstructed viewing of the entire colony. If this is not possible, surveyors should choose a few good vantage points from which to count easily identifiable portions of the colony, count each of these subdivided areas and arrive at a composite count for the colony by summing these partial counts. In this latter case, special care should be taken to avoid over counting.
5. At least three counts will be made at each colony. After waiting a brief time to allow Utah prairie dogs to acclimate to observer arrival, the surveyor will slowly scan the colony from one end to the other with binoculars or spotting scope and count all adult Utah prairie dogs visible in the colony. Do not count juveniles! Two additional counts will be made immediately thereafter. However, if the three counts lead to ever increasing numbers, counting will continue until numbers reach a plateau. Once a consistent count has been obtained, the observer should slowly approach the colony until an alarm call is elicited and count one more time. Often times “barking” will incite other Utah prairie dogs to assume an erect posture, making them much easier to count. The highest count achieved using these methods shall be recorded as the colony total.
6. Colonies which are inactive for 5 consecutive years will not be surveyed annually. These shall be surveyed on a serendipitous basis until Utah prairie dogs recolonize. Recolonized locations will be added back to the annual survey rolls.
7. Direct counts will be used in trend analysis between years. If population estimates are required, they will be calculated from direct counts by making adjustments suggested by Crocker-Bedford (1976) and Mackley et al (1988). The former suggested that 40 to 60% of Utah prairie dogs are above ground at any one time. The latter developed the following regression-based formulas for converting direct counts to a population estimate. If count is less than 8, then $N = (\text{count}) (1.403)$; if 9 count is less than 30, then $N = (\text{count}) (1.583)$; and if 23 is less than count and less than 62, then $N = (\text{count}) (1.682)$.

APPENDIX D
Recommended Translocation Procedures for Utah Prairie Dogs
January 2006

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INTRODUCTION

Utah prairie dogs were listed as endangered under the Endangered Species Act (ESA) in 1973 due to plague, drought, pest control programs, and human-related habitat alterations. Following significant population increases on private lands, the species was down-listed to threatened in 1984.

The U.S. Fish and Wildlife Service (USFWS) signed a recovery plan for Utah prairie dogs in 1991. The Interagency Recovery Implementation Team (RIT) oversees implementation of recovery actions. In 1997 the Interim Conservation Strategy (ICS) was written to direct research to update the 1991 Recovery Plan. That revision is now underway and will incorporate ongoing research that was directed by the ICS. Translocation of Utah prairie dogs was identified as a recovery action in both the Recovery plan and the ICS.

Translocation of Utah prairie dogs has been ongoing since 1972. With low initial survival success, research was initiated on methods to improve translocation survival success. Research has found that supplemental food and water may increase survival because increased energy expenditures are incurred from trapping, transport, new environment stimuli, burrowing, and increased vigilance (Truett et al. 2001). In addition, use of retention cages to keep the newly translocated dogs inside the intended areas and keep predators out may be useful (Truett et al. 2001). Translocated dogs prefer established burrows over augered burrows (Truett et al. 2001; Player and Urness 1982; Jacquart 1986). Early translocation of males to sites without established burrow systems may aid in establishing burrows for subsequent female and juvenile releases in late summer (Jacquart 1986).

The incorporation of the aforementioned methods to initial translocation protocol has improved translocation success since early 1970s efforts. For purposes of translocation recovery actions, subject to change with research information, these guidelines focus on refinement and emphasis of various aspects of the protocols to increase translocation success rates. In addition, these guidelines will provide consistency across recovery areas and land management agencies. Deviation from these guidelines will be considered by the USFWS as necessary or when new data suggest that changes are necessary.

1. SITE LOCATION AND CHARACTERISTICS

Location of Site

Translocation sites must be located on public land or on other land protected under an agreement with the USFWS. The selection of translocation sites should be carefully considered. New sites should be located close enough to existing colonies to allow for genetic mixing and recolonization yet far enough to limit risk of exposure to plague. Historic areas also can be considered for re-colonization. “Vacant” colonies may be used the next season if the burrows

and the translocated dogs are dusted prior to translocation¹. Desired site size is at least 200 ac (81 ha), but all sites will be considered on a case-by-case basis. Adjacent land uses should be considered when selecting translocation sites.

Supplementation of active colonies also may be considered if the receiving colony has a documented significant decrease in the spring count. Supplementation of active colonies will be considered only under defensible biological principles that support conservation and recovery of the species. This action will be undertaken on a case by case basis in consultation with the USFWS. Supplementation of active colonies may require additional treatments to address declines such as dusting or vegetation treatments.

Site Characteristics

Translocation sites should be selected which meet the criteria for the following characteristics.

Vegetation

The vegetation objectives represent best current knowledge of ideal parameters. Individual locations may vary from these parameters; however, each deviation from the vegetation objectives should be noted and explained. For example, shrub ground cover at site xyz = 10%. Of this 10%, 8% are subshrubs (generally less than 6 inches in height), and only 2% is big sagebrush. Other vegetation objectives are met at site xyz. Since the amount of subshrubs is not expected to interfere with Utah prairie dog visibility or compete with the herbaceous understory, site xyz is recommended as a translocation site.

Refer to **APPENDIX 1** for definitions and examples of the vegetation parameters. Habitat manipulation may be required at sites not meeting the vegetation objectives.

Warm season grasses: 1 to 20% ground cover

Cool season grasses: 12 to 40% ground cover

Forbs: 1 to 10% ground cover (perennial, non noxious)

Shrubs: 0 to 8% ground cover and less than 10% canopy cover

Minimum number of plant species: 10

Soils

Generally, Utah prairie dogs require loamy soil textures that are not prone to flooding. Soils must be deep, well drained and must not easily cave in or have too much sand. Prairie dogs must be able to inhabit burrows approximately 3 ft (0.91 m) deep without reaching groundwater. Although caliche does not seem to be limiting, bedrock is uninhabitable by Utah prairie dogs. Utah prairie dogs are generally found on flat to moderate slopes. Efforts should be made to select sites that demonstrate these characteristics.

¹ Whether a colony is vacant will be determined on a case by case situation in consultation with the Service depending on the size, density and acreage of the colony in question.

Old Colonies

Historical habitat, especially if there is still evidence of old mounds, should be considered a priority for reestablishment through translocations.

Elevation

Elevation does not appear to be a limiting factor in translocations. Utah prairie dogs currently occupy habitat from approximately 5,100 ft (1,554 m) to 10,000 ft (3,048 m) in elevation. Historically, they occupied habitat from 5,100 ft (1,554 m) to 11,300 ft (3,444 m) in elevation. Translocation of Utah prairie dogs from significantly different elevations will be considered on a case by case basis and will be monitored closely to verify efficacy of such actions.

2. TRANSLOCATION SITE PREPARATION

Site Preparation Treatments

If identified translocation sites do not meet vegetation recommendations established in this document, they can be treated with various methods prior to use. Any treatments used should be completed early enough to allow for plant establishment prior to the translocation of animals. Treatments including but not limited to, prescribed burns, mechanical shrub removal, pesticides, seeding and fencing can be used as necessary. Prior to the release of animals, the site should be assessed to assure suitability for translocation.

Burrow Preparations

All sites will be assessed for burrow preparation needs and the necessary treatments used. Two types of artificial burrows are available for use (plastic tubing and augured holes), either separately or in conjunction with each other. Artificial burrow systems will be constructed at new translocation sites prior to release of animals. No preparation is needed at vacant colonies if the burrows remain open. If the burrows are not open, have collapsed, or if the burrows cannot be reopened with a shovel, then the site will be treated as a new release site. Release sites should have 1 burrow system available per 10 animals to be released.

Plastic Tubing

Plastic tubing should be 4 in. (10.16 cm) in diameter and approximately 25 ft (7.62 m) in length. The tubing should be corrugated, perforated, flexible ABS tubing. Each plastic tube will be placed in an arch-shaped trench approximately 6 ft (1.83 m) deep at its deepest point. Tubing should extend above the ground but not more than 4 in. (10.16 cm). Approximately 5 in. (13 cm) long oval openings should be created at three points along the underside of the tube to allow the animal to expand the burrow. Predator deterrents should be installed on each end of the tubing. Suggested materials include fencing panels anchored to the tube and the ground with rebar (**APPENDIX 2**).

Augured Holes

Augured holes encourage dispersal of released animals. Such holes may be constructed in conjunction with the double entranced burrows described above, or with vacant burrows. Paired augured holes will be drilled using a 4-in. (0.10-m) diameter wide bit to a depth of approximately 6 ft (1.83 m) at intersecting 45-degree angles.

Release Cages

Release cages will be placed at each artificial burrow entrance site prior to prairie dog releases. To discourage premature dispersal of animals, release cages should be placed at both ends of double entranced burrows. Cages should be at least 1.5 ft (0.46 m) high multiply by 2 ft (0.61 m) wide multiply by 3 ft (0.91 m) long and fashioned out of a rebar frame with chicken wire sides and tops. Cages should be anchored to the ground and sealed around the bottom perimeter of the cage with soil (**APPENDIX 2**).

3. TRAPPING²

The number of animals translocated to a site appears to influence the success of establishing a colony. Although no research has been conducted to support this theory, observations by field personnel conducting translocations in Utah suggest that releases of large numbers of animals leads to higher retention rates at translocation sites. Therefore, efforts should be made to release a target of 400 animals at each site for 3 consecutive years at new translocation sites. Additional releases may be necessary to ensure success based on monitoring results. Numbers to be released at active colonies will be determined on a case-by-case basis in consultation with the USFWS.

When translocating prairie dogs, detailed records must be kept. Always document the colony where the trapping is occurring, the number of traps set and the number of animals trapped. The weight, age and general health of each animal should be recorded. Ear tags should be placed in all translocated animals (**APPENDIX 3**). The translocation site where the animal is released also should be documented as well as the release cage receiving the animal.

Setting Traps

Utah prairie dogs will be trapped using live traps baited with items such as peanut butter, rolled oats, and/or fruits and vegetables. The traps are placed around the entrance to their burrows with the opening of the traps facing the burrow entrance. Traps will be checked at least every hour to ensure that prairie dogs in traps are not exposed to undue stress (e.g., heat exhaustion or extended exposure to cold). Any and all exposure to extreme heat or cold should be avoided or lessened to every extent possible. If a prairie dog is in a trap, the trap will be placed in a

² **NOTE:** *Utah prairie dogs are a listed species under the Endangered Species Act. Trapping of Utah prairie dogs must be carried out under a valid U.S. Fish and Wildlife Service permit which must be in the possession of the personnel carrying out trapping activities. Additional permits also are required by the State of Utah and/or the land management agency.*

protected location until the trapping day has ended and all trapped dogs are collected and processed. Prairie dogs in cages should be provided with fruit or vegetables to lessen the impacts of dehydration.

4. HANDLING

All prairie dogs must be handled in a manner that minimizes the stress experienced by the animals in order to increase the potential for successful translocation.

At Capture Site

Each prairie dog will be weighed to determine if they meet the weight requirement of 1.10 lbs (500 g). If they do not, they must be released at the location of capture. All captured prairie dogs will be treated with an insecticide to kill fleas which serve as a vector in the spread of plague. When applying the flea powder, care should be taken to minimize any contact of powder with the eyes, nose, and mouth of the prairie dog.

At Release Site or Processing Site

All animals suitable for release will be ear tagged (**APPENDIX 3**), sexed, aged (**APPENDIX 4**), weighed, and evaluated for general health conditions prior to release. Particular things to note include, but are not limited to:

- * Areas on prairie dogs with any distinguishing marks
- * If the prairie dog appears to be sick or extremely stressed (i.e., diarrhea), - if it is a lactating female
- * Any other pertinent data

If the prairie dog trapping ends early in the afternoon, the prairie dogs eligible for translocation will be transported to the release site the same day. If the trapping ends too late for release, the prairie dogs will be held in a quiet, covered building overnight, given water and food, and then transported to the release site the following morning.

5. TRANSPORT

Transport of prairie dogs should be carried out in a manner that minimizes stress to the animals. If possible, hand carry cages to and from the trap site to the truck and release site. Cages should be kept upright and not swung under any circumstances. If multiple cages must be carried, use of a backpack should be considered.

Transport of caged prairie dogs in vehicles should minimize exposure, jostling, close exposure to other caged prairie dogs (especially males), and stress. When transported, traps should be secured to provide separation of cages and to avoid jostling. Stacking of cages should be avoided. An open weave netting cover should be placed over the top of all cages to minimize sun exposure and keep the dogs as cool as possible. If necessary, the cover should be dampened to further cool the prairie dogs.

6. RELEASING

The release of prairie dogs should be done in a manner that minimizes stress to the animals. Prairie dogs will be placed into a release cage at each burrow location by opening one end of the trap and lifting the opposite end of the trap. Attempts will be made to place family groups into the same release cage.

All release cages will be supplied with supplemental food at least through the period of active translocation. Food items include but are not limited to alfalfa, alfalfa cubes, grains, fresh fruits and vegetables. Supplemental food must be certified weed free. Water will be provided at each release site at least throughout the active translocation.

New Sites

First Year Releases

Dispersing males create burrows as they move, developing a system of established burrows favorable for subsequent releases, especially for juveniles and females (Jacquart et al, 1986). Therefore, a target of 40 adult males will be translocated no earlier than April 1 and no later than 30 days prior to additional animals (male, female, and juveniles) being released at the site. Additional animals will be translocated beginning July 1 through August 31, or the Friday of that week.³ These animals will be released into the constructed burrow systems described in section 2.

Second and Third Year Releases

Evaluate previous year's efforts in April and determine if there is a need for additional artificial burrows. A minimum of 40 usable vacant burrows must be available to accommodate transplants. If an artificial burrow system from the previous year is unoccupied, it may be reused. If new or additional artificial burrow systems are necessary, they will be constructed within earshot of vocalizations from the artificial burrows constructed the first year. Spring release of adult males will be included for the second year. Additional animals will be translocated beginning July 1 through August 31, or the Friday of that week.

Evaluate the previous 2 years efforts in April to determine if there is a need for additional artificial burrows. Again, a minimum of 40 usable vacant burrows must be available to accommodate transplants. If an artificial burrow system from the 2 previous years is unoccupied, it may be reused. If new or additional artificial burrow systems are necessary, they will be constructed within earshot of vocalizations from the artificial burrows constructed in the previous 2 years. Third year releases of males should be considered if previous releases have not established an adequate burrow system. Additional animals will be translocated beginning July 1 through August 31, or the Friday of that week.

³Juvenile and lactating females suffered an immediate high mortality (juveniles 100 percent; adult females 72 percent) when translocated before July, most likely due to loss of energy reserves (Jacquart et al. 1986).

Existing Vacant Sites

First Year Releases

If the site has an established usable burrow system, artificial burrows are not required. Augering to access existing burrows may be necessary. Release cages as described above should be placed over an existing burrow system to minimize immediate dispersal from the area and encourage the use of the burrow system. Spring release of males at existing sites will be carried out as described for new translocation sites. Additional animals will be translocated beginning July 1 through August 31, or the Friday of that week.

Second and Third Year Releases

Same as second and third year releases described for new translocation sites. Release cages as described above should be placed over an existing burrow system to minimize immediate dispersal from the area and encourage the use of the burrow system. Spring release of adult males and subsequent release of animals is the same as that for a new translocation site.

7. MONITORING AND MANAGEMENT

Translocation Site Management

Management of translocation sites will be coordinated between all affected agencies including USFWS, BLM, USFS, NPS, and UDWR to ensure that intent of the translocation site is not compromised and the management needs of the land management agencies are met. Site management should occur in accordance with approved land use plans where applicable. In addition to stipulations identified in land use plans, the following stipulations should be applied to translocation sites:

- (1) Artificial burrow systems will be left in place indefinitely. If the end of the tube becomes exposed the land management agencies will be notified and it will be trimmed as necessary.
- (2) Maintenance of translocation sites associated with researchers should be coordinated between the land management agency and the researcher and addressed in the necessary permits issued by the State of Utah and the USFWS.
- (3) Release cages may be left on-site over winter or removed for security reasons. All cages will be removed after translocations cease.
- (4) Translocation sites should be restored as necessary in coordination with the land use agencies.
- (5) Access to translocation sites should be coordinated with the land use agencies.

Predator Management

Predator control, primarily for badgers and coyotes, can occur in conjunction with translocation and up to 3 years after translocations have ceased as determined by the land management agency and UDWR.

Disease Management

As needed, prairie dog colonies will be dusted with an insecticide to kill fleas and prevent the spread of sylvatic plague. Use of any insecticides must be approved by the appropriate land management agency.

Monitoring

Monitoring of translocation activities is imperative to understanding success rates and improving techniques. Monitoring should include the following:

Vegetation Monitoring

The Step Point (see **APPENDIX 5**), or other appropriate method as determined by the RIT will be used for habitat monitoring to determine conformance with the vegetation objectives listed on page 2. Sampling should occur during a period representative of the peak production of the vegetation community, which is generally in June and July. A minimum of 2, 200-point transects per 200 ac (81 ha) of mapped habitat should be established. Ideally, data would be collected during the 3 years of active translocations, and every 3 to 5 years thereafter. Land management agencies have the lead responsibility for vegetation monitoring on lands under their jurisdiction.

The vegetation objectives on page 2 can be used to evaluate conditions at existing sites and determine the need for habitat improvement projects. Other information to consider would be the vegetative trend (such as decreasing grass cover or increasing shrub cover), Utah prairie dog population trends, and precipitation patterns. Monitoring should be used to identify complexes where there is less than 200 ac (81 ha) of habitat meeting the vegetation objectives. Habitat manipulation should focus on improving vegetation parameters that do not meet the stated objectives. If the land managing agency determines that manipulation is not required, then the reasons should be documented, following the example on page 2.

Due to the burrowing activity of prairie dogs, soils can support a variety of annual and perennial forbs within colonies. All noxious weeds should be controlled immediately with hand methods or according to approved Land Use Plans. Other forbs may be present that are commonly referred to as weeds and they will need to be evaluated on a site-specific basis. If the site is dominated by a single species, then it may be a weed that needs control. However, at times certain plants appear to dominate a site after a favorable precipitation event. The site potential, including presence of perennial grasses and desirable forbs, should be evaluated before initiating control efforts.

Prairie Dog Monitoring

Post release counts of active translocation sites will occur weekly during the month of September. Spring counts will be completed at translocation sites according to accepted protocol. Active translocation sites should be visited weekly from July 1 to September 30 to assess supplemental food and water needs, predator activity, and other pertinent observations. If possible, all active translocation sites also will be visited weekly from April 1 to June 30.

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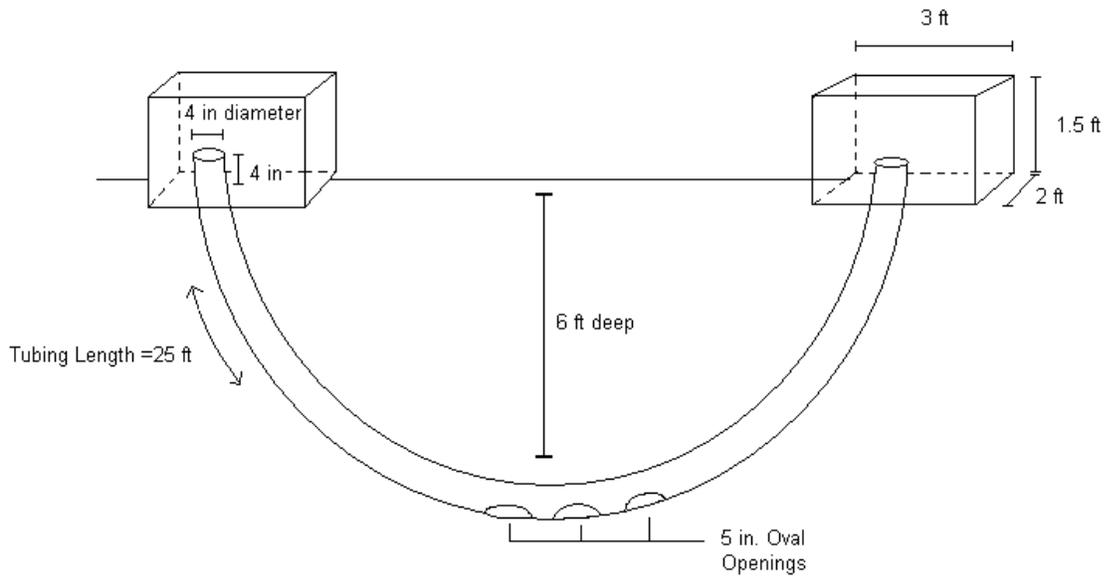
APPENDIX 4: Methods to Weigh and Age Utah Prairie Dogs

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APPENDIX 1: Vegetation Definitions

VEGETATIVE TYPE	DEFINITION	EXAMPLES
Warm season grasses	Grasses which “green up” and do most of their growing during the warm summer months.	Sand dropseed, curlygrass, mountain muhly, and grama grass.
Cool season grasses	Grasses which “green up” and do most of their growing during the cool spring months.	Indian ricegrass, squirreltail, western wheatgrass, crested wheatgrass, needle and thread grass, cheatgrass, bluegrass, and wildrye.
Forbs	Included are any herbaceous plant other than those in the grass family (<i>Poaceae</i>). Must be palatable and provide nutritional value to prairie dogs.	Astragalus, alfalfa, aster, <i>Cymopterus</i> spp., buckwheat, fleabane, <i>Penstemon</i> spp., cinquefoil, phlox, globemallow, vetch, <i>Cryptantha</i> spp., lupine, crazyweed, clover, and goosefoot or pigweed.
Shrub	A plant with persistent, woody stems and a relatively low growth form, compared to trees, and that generally produces several basal shoots.	Sagebrush, big rabbitbrush, greasewood, four-wing saltbush, and broom snakeweed. Desirable subshrubs include forage kochia, winterfat, Gardiner saltbush, and little rabbitbrush.

APPENDIX 2: Diagram of Artificial Burrow Preparation



APPENDIX 3: Ear Tag Placement Procedures

Herd animal from the cage into the cloth cone to restrain them. Gently unzip the cone to expose the head taking care to not catch the fur of the dog in the zipper. While the dog is restrained, place a single #1 monel ear tag in each ear with pliers. Place animal's ear into the opening of the tag with the point positioned as far down toward the skull as possible so that when the pliers are closed and the tag attached it will puncture the ear at the base where the cartilage is thickest. Close the pliers with a firm, but gentle squeeze and watch to make sure the point on the tag should puncture the ear (Be careful!! The animal may squirm) and pass through the hole in the tag. The pliers should bend the point and lock the tag on the ear. Place tag so that the number is readable from the top of the animal's head (i.e., number positioned dorsally). Return the animal to the cage for delivery to translocation site.

APPENDIX 4: Methods to Weigh and Age Utah Prairie Dogs

Prairie dogs are weighed using a spring scale while in their cage. The weight of the cage is then subtracted from the total weight and the weight is recorded on the data sheet.

Sex determination of Utah prairie dogs can be made by.....

Age class determination of Utah prairie dogs can be extremely subjective. Age classes can be broken down to juvenile and adult animals.

- ◆ juvenile male less than 900 grams
- ◆ adult male greater than 900 grams
- ◆ juvenile female less than 800 grams**
- ◆ adult female greater than 800 grams

** Occasionally, there will be very small adult females that weigh less than 1.76 lbs (800 g). The only way to determine that it is an adult female is if she is lactating. If she is not, then it can be safely assumed that she is a juvenile.

APPENDIX 5: Step-Point Method

This is the recommended method in the Conservation Strategy for determining whether or not occupied Utah prairie dog habitat conforms with the Vegetation Composition Guidelines. Therefore, the goal is to sample ground cover. This method also is used when inventorying habitat to determine future potential or suitability. Sampling should occur during a period representative of the peak production of the vegetative community, which is generally June and July.

Procedures

1. Person establishing the transect will select the most representative spot within an area of similar vegetation.
2. A location stake is driven into the ground at a random point.
3. Four parallel transects are offset from the location stake, two to the right and two to the left. The distance between the location stake and transects 1 and 3, and between each pair of transects, is 5 paces. (See attached illustration).
4. Document the location, starting point, bearing (north if possible), and other pertinent information concerning the study on the Utah Prairie Dog Study Area Location form.
5. Take a general view photo from the stake, including a photo card in the picture.
6. Run the transects. The surveyor should put a mark on the tip or side of their shoe, which will be the recording point. Walk the transect, recording sample points at each one pace interval along the transect bearing (1 pace is 1 full stride or 1 step with each foot). A hit is recorded at each point as whatever the mark on the shoe hits directly, while taking extreme care to avoid bias. We are collecting ground cover on shrubs, not canopy cover. *However, if you hit a plant or other ground cover overshadowed by a shrub--document the plant (or litter, etc.) for ground cover AND document the shrub hit too.* Annual plants are counted whether green or dried.
7. Make notes of other plant species seen, but not hit on the transect.

Equipment

1. Utah Prairie Dog Study Area Location Information Form
2. Utah Prairie Dog Vegetation Studies/Step-Point Data Form
3. Photo Identification Cards
4. Field maps
5. Flagging
6. Stakes to mark transects.
7. Light weight post pounder
8. Camera: 35-mm with a 28-mm wide angle lens
9. Film
10. Easel for holding photo labels
11. Rubber bands
12. Black felt-tip pen
13. Pencils
14. Compass

APPENDIX E

Utah Prairie Dog Burrow Dusting Protocol

December 2006

If plague is suspected in the deaths of prairie dogs, then the responsible agency may immediately start treatment of affected burrows before confirmation of plague. If a plague outbreak is expected to occur, but no Utah prairie dog deaths are documented, responsible agencies may initiate treatment with approval by the U.S. Fish and Wildlife Service (USFWS).

In areas where there is an immediate public health concern, emergency dusting may occur while consultation is underway with the USFWS. These areas may or may not be within Utah prairie dog colonies.

PRIOR TO APPLICATION

Through a collaborative effort, the Utah Prairie Dog Recovery Team and associated agencies need to identify the colonies that require treatment and will prioritize these based on public health concerns and protection of the species.

These cooperators will contact the USFWS to notify them that dusting will be occurring in the identified areas. This will initiate the consultation process.

Each agency can notify a lead contact official as appropriate and follow the procedures outlined by the agencies' policies.

- National Park Service: Notify the Public Health Officer of Center for Disease Control-PHS-National Park Service in Denver at (303) 421-4144 to apprise them of our decision to apply pesticide to the burrows and the methods we will use to accomplish the task.
- Bureau of Land Management: Threatened and Endangered Species Coordinator, Utah State Office, (801) 539-4001
- U.S. Forest Service: Ron Rodriguez, Dixie National Forest, (435) 865-3732
- State: Doug Messerly, Regional Supervisor, Cedar City (435) 865-6100
- U.S. Fish and Wildlife Service: Utah Field Office Supervisor, Salt Lake City (801) 975-3330

Review the necessary job hazard analysis or other safety documentation prior to application. For safety precautions and first aid reference the Delta Dust label. Delta Dust is not a restricted use pesticide and can be purchased over the counter (contact information below). The Delta Dust label can be viewed at <http://www.myadapco.com/pdf/DELI.pdf>.

Delta Dust applicators are required to be certified and obtain pesticide use proposals, per individual agency requirements. It is advised that the person applying the powder be familiar with all safety protocols and take the necessary steps to prevent being exposed to the powder.

Currently Delta Dust and the application equipment are stored in the appropriate storage facility with the Forest Service in Panguitch, Utah. An agreement is in place that all agencies have access. Prioritization will be made by USFWS for the application equipment and dust when necessary. Jake Schoppe (435) 676-9300 is the contact to access the equipment once approval has been made by USFWS. For coordination with USFWS, contact Elise Boeke (801) 975-3330, ext. 123.

If there is no Delta Dust on hand, it can be ordered in 1-lb (~\$11) or 5-lb (\$50) containers from the Steve Regan Company in St. George (725 North Industrial Road, 435-656-0030). It also can be ordered from Helena Chemical in Las Vegas (contact Larry Jensen, 702-498-9855), but this takes about 1 week to arrive from the time you place your order. The size of the colony in which the outbreak occurs will determine how much Delta Dust is required.

DURING APPLICATION

Materials you will need:

- * Appropriate PPE
- * Delta Dust insecticide
- * Applicator
- * Insect repellent
- * Method to record the amount of dust applied, number of burrows and acres treated



All burrows will be treated within a colony and along its perimeter. These include burrows that are created by other animals. If all burrows are not treated, then the burrows not treated should be monitored in the event that dead prairie dogs begin appearing in or around them.

Personal protective equipment will be worn as required by each agency's policies and regulations (please read and follow the label). Care should be taken when applying the insecticide on windy days to prevent the dust from blowing towards the person applying it.

To apply the Delta Dust:

- (1) Ensure you are wearing the proper PPE and have applied insect repellent to keep fleas off of your body.
- (2) Fill the applicator to the appropriate level with Delta Dust.
- (3) Identify colony area and boundaries. Strategize with all applicators how the colony will be treated uniformly to ensure maximum treatment of burrows.



- (4) Thoroughly apply the dust by placing the duster nozzle approximately 12 inches (305 millimeters) into the burrow entrance and dispensing the Delta Dust. Approximately 0.01 pound (5 grams) of Delta Dust are required to treat a single burrow (D. Biggins, pers. comm.). Premeasure the 0.01 pound (5 grams) of Delta Dust into a container for a reference of application rate.
- (5) Keep track of the amount of Delta Dust applied (in pounds) as well as the total number of burrows and acres treated.

POST APPLICATION

Prepare a report that includes the following information: dates dusted, amount of dust used, number of burrows treated, the acreage of each colony treated, and a map of each colony treated. This report will be provided to the USFWS upon completion. When possible, post application monitoring of the colony should occur within the same season to determine effectiveness of application. Any dead Utah prairie dogs found during post application monitoring should be submitted for analysis of plague.

APPENDIX F
Utah Prairie Dog Occupancy and Habitat Survey Protocol
for Federal Section 7 Consultations
March 2010

The purpose of Utah prairie dog occupancy and habitat surveys is to determine if Utah prairie dogs inhabit a proposed project Action Area (see glossary), and determine if a proposed action may affect this species. Surveys provide management agencies and developers with sufficient resource information to help ensure that proposed projects are planned and implemented to avoid and minimize impacts in compliance with the Endangered Species Act (ESA). Please note that Occupancy and Habitat Surveys are not the same as pre-construction actions intended to protect or further define Utah prairie dog habitat. If Utah prairie dog habitat is identified within the Action Area, the subsequent consultation with the U.S. Fish and Wildlife Service (USFWS) may identify other needed actions or additional surveys to be completed prior to construction.

It is important to note that this survey protocol expresses our scientific opinion on adequate Utah prairie dog survey methods. Our knowledge is continuously developing and changing; therefore, this protocol, based upon the best scientific and commercial data available, is a work in progress. This protocol will be modified as new information becomes available. Circumstances may dictate that Utah prairie dog surveys be conducted differently on a case by case basis. If surveys cannot be accomplished pursuant to this protocol, please contact the Utah Ecological Services field office for guidance on survey methods before proceeding.

Results of Utah prairie dog surveys must be entered on the approved Utah Prairie Dog Occupancy/Habitat Survey Form (see last page).

Surveyor Qualifications

- Surveys may only be conducted by certified individuals. Certified surveyors (see glossary) are those who have completed a USFWS approved Utah prairie dog survey training course. Results of surveys conducted by non-certified personnel will not be acceptable as the basis for assessing potential impacts to Utah prairie dogs.
- The surveyor training course must be successfully completed at least once every 4 years. Significant changes in the protocol may require re-certification before the end of a surveyor's 4-year authorization period. The USFWS will notify certified surveyors of the need for early re-certification should such changes occur. Certified surveyors must carry training certification cards when conducting surveys.

Pre-Survey Coordination

- Prior to conducting surveys, certified surveyors must coordinate with the authorizing Federal agency (see glossary) to identify the Action Area and survey details. The USFWS requires surveys of all suitable habitat (see glossary). The authorizing Federal agency may identify areas, if any, that will be exempt from surveys based on habitat suitability. Survey results will not be considered valid if they are not collected following this protocol and any specific stipulations identified by the authorizing agency(ies). Authorizing Federal agencies that are not land management agencies must coordinate all survey details with the USFWS.

- Certified surveyors must survey all suitable habitat in the entire Action Area, including both public and privately owned lands. Written permission from the legal landowner or lessee is required to legally access privately owned lands. If access cannot be obtained to privately owned lands in the Action Area, the surveyor must use other accessible vantage points, optics, aerial photos, audio cues, other technology, and interviews of knowledgeable land managers and agency biologists to assess prairie dog occupancy and extent of suitable habitat. If the above methods are not available or do not provide adequate data for the Federal authorizing agency to make a conclusive decision concerning occupancy, then the inaccessible land in question must be assumed occupied by Utah prairie dogs.

Surveyors must note on the survey forms and in completion reports those properties for which legal access could not be obtained and the method(s) used to assess the same.

Survey Season

- **Active Season** – Generally April 1 through August 31; dates may vary depending on site-specific conditions. Active season surveys can only be conducted when the ground is sufficiently snow free.
- **Dormant Season** – Generally September 1 through March 31; dates may vary depending on site-specific conditions. Dormant season surveys can only be conducted when the ground is sufficiently snow free.
- The determination of the applicable Active/Dormant Season and whether conditions are “sufficiently snow free” will be made by the authorizing Federal agency, based on site-specific conditions. Additionally, the authorizing Federal agency may determine that site conditions are not conducive to accurate and reliable dormant season surveys, and may require surveys to be conducted only during the active season. If the authorizing Federal agency is not a land management agency, these determinations will be made by the USFWS.

Habitat Assessment Survey

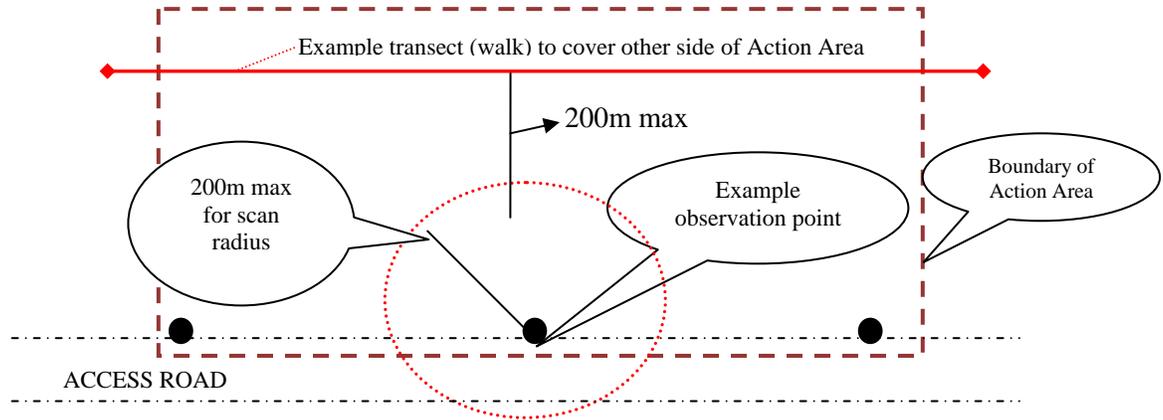
This protocol will be applied to all (100%) suitable habitat. There is a two-tiered level of intensity for habitat surveys: Low Intensity and High Intensity. The required survey level will be determined by the authorizing Federal agency. If the authorizing Federal agency is not a land management agency, this determination will be made by the USFWS.

- **Low Intensity Level Surveys:**

Surveys of suitable habitat that are intended to identify any previously unknown Utah prairie dog habitat (see Utah Prairie Dog Habitat Classification below) areas within the historic range. Generally conducted in locations greater than or equal to 5 mi (8.05 km) from any known and/or mapped Utah prairie dog habitat, where previous surveys or professional knowledge of the local management biologists indicate that the likelihood of occupied Utah prairie dog habitat is low.

- i. All suitable habitat in the Action Area must be surveyed by foot and/or vehicle (on established roads only) to ensure 100% visual coverage.
- ii. Aerial methods are not allowed.

- iii. Vehicle surveyors must stop every 0.25 mi (0.46 km), or more frequently, and get out of the vehicle to walk and obtain clear views in order to scan surrounding areas with suitable optics for the presence of prairie dogs. The surveyor also must listen for Utah prairie dog vocalizations throughout the survey to locate prairie dogs. Scans should not attempt to clear more than 12 mi (22 km) (using binoculars or scopes) in either direction – if suitable habitat exists beyond 12 mi (22 km) from the observation point, additional transects should be driven, or walked if no road access, (see diagram for example). The surveyor should spend a minimum of 5 minutes at each observation point scanning and listening for Utah prairie dogs.



If no Utah prairie dogs or their sign are observed within the entire Action Area, the results of the Low Intensity Level survey will be considered valid for two (2) years from the following March 31 (e.g., if a survey is completed May 15, 2010, the survey is valid until March 31, 2013). If any new biological information becomes available during this time which indicates the potential presence of Utah prairie dogs in the Action Area, or if any changes are made to the size, scope, and/or nature of the proposed project before or during implementation, survey expiration dates may change and additional surveys may be required during the course of the project.

- iv. If any Utah prairie dogs or their sign are observed anywhere within the Action Area during the Low Intensity Level Survey, then High Intensity Level Surveys (see below) will be required in those areas of Utah prairie dog activity.

- **High Intensity Level Surveys:**

Surveys of suitable habitat intended to identify the extent of Utah prairie dog habitat in areas suspected of containing Utah prairie dogs. Generally conducted within less than 5 miles of known and/or mapped Utah prairie dog habitat areas where previous surveys or professional knowledge of the local management biologists indicate that occupied prairie dog habitat may occur.

- i. All (100%) suitable habitat in the Action Area must be surveyed.

- ii. The surveyor must walk parallel transects no more than 2 mi (3 km) apart through the entire area of suitable habitat searching 16 yds (15 m) on both sides of the transect for burrows and other prairie dog sign. Surveyors must walk transects using a compass or GPS unit for orientation, ensuring that all suitable habitat within the entire action area is adequately surveyed. Care must be taken as to not trample burrows.
- iii. Surveyors must stop periodically and scan surrounding areas with suitable optics for the presence of prairie dogs. The surveyor also must listen for Utah prairie dog vocalizations throughout the survey to locate prairie dogs.
- iv. The results of the High Intensity Level survey are only valid from the date conducted through to the following March 31 (e.g., if a survey is completed May 15, 2010, the survey is valid until March 31, 2011). If a project is not implemented until after the following March 31, and/or if there are gaps in construction activity within the same year (generally 1 week or more), new surveys may be required.

Utah Prairie Dog Habitat Classification

Portions of suitable habitat that support Utah prairie dog burrows or other sign of the presence (past or recent) of Utah prairie dogs are considered “Utah prairie dog habitat” and will be classified as follows:

- **Occupied Utah Prairie Dog Habitat:**

- i. Active Season: Utah prairie dogs are seen or heard, or Functional Burrows (see glossary) are found and show evidence of recent activity (fresh digging, scat, fresh tracks).
- ii. Dormant Season: Any Utah prairie dog burrows are found (functional or not functional), even if no other signs of Utah prairie dogs are present.
- iii. If legal access cannot be obtained to any portion of the Action Area, please refer to the instructions under the Pre-Survey Coordination section on page 2.

- **Unoccupied (previously supported) Utah Prairie Dog Habitat:**

- i. Active Season: No Utah prairie dogs are seen or heard and burrows are found but are not Functional; or Functional burrows are found but there is no evidence of prairie dogs: such as fresh digging, scat or tracks.
- ii. Dormant Season: Unoccupied habitat cannot be determined during the dormant season. If any Utah prairie dog burrows are found (functional or not functional), they must be assumed occupied.

Utah Prairie Dog Counts

If occupied Utah prairie dog habitat is found, those areas will be counted according to the following Utah Prairie Dog Count Protocol:

- Counts will be conducted only on calm, sunny days when cloud cover is less than 40% and the ground is snow free. Avoid extremes of heat and cold. Surveys should be discontinued if winds exceed 3 on the Beaufort scale (greater than 12 mph (19 kph), if cloud cover exceeds 40%, if clouds cast moving shadows across the colony, or if otherwise inclement weather is encountered. Counts are generally made between 0800 and 1800 hours, but should be timed to coincide with periods when prairie dogs are most active above ground according to the

season and elevation. For example, avoid counting at mid-day at low elevations during mid-summer. Peaks in Utah prairie dog activity generally occur from half an hour after sunrise to 10:00 a.m., and then from 3:00 p.m. to half an hour before sunset.

- Counts should be made from a vantage point which provides an unobstructed view of the entire colony. If this is not possible, surveyors should choose a few good vantage points from which to count easily identifiable portions of the colony, count each of these subdivided areas and arrive at a composite count for the colony by summing these partial counts. In this latter case, special care should be taken to avoid over counting. At least three counts will be made at each colony. If the counts continue to rise, counting must continue until the number of prairie dogs reaches a plateau or begins to decrease. The surveyor should record the maximum total number of prairie dogs observed (see survey form).
- Surveyors should approach colonies to be counted in such a way that they avoid disturbing the resident prairie dogs. However, there is wide variability in prairie dog behavior between locations. In areas where the prairie dogs are habituated to people, such as in town, it may be helpful to wait a brief time after arriving to allow Utah prairie dogs to acclimate to the observer. The surveyor can then slowly scan the colony from one end to the other with binoculars or spotting scope and count all prairie dogs visible in the colony. This method often does not work in areas where people or vehicles may be perceived as a disturbance or predator by the prairie dogs. In these cases, it is preferable to park vehicles out of sight of the colony and walk closer. Often it is best to conduct the first count as soon as prairie dogs are visible. The surveyor should progressively move closer and count each time they move until prairie dog numbers begin to decline. As stated above, record the maximum number of prairie dogs seen on the survey form.

Utah Prairie Dog Habitat Mapping

- The surveyor must determine the perimeter of all Utah prairie dog habitat encountered, whether occupied or unoccupied. The perimeter burrow locations will be used to define the boundary of all Utah prairie dog habitat polygons. The surveyor shall assign each Utah prairie dog habitat polygon a unique Polygon ID # (see glossary). All data pertaining to a polygon and recorded on the Survey Data Form and subsequent GIS attribute data will be tied to its unique Polygon ID#. All survey results will be provided to the authorizing agency as an ESRI compatible product (shapefile or personal Geodatabase) that is in the UTM Zone 12 North NAD 1983 datum. Spatial data must be attributed in a table (see Table 1 for example attribute table), and include metadata following ESRI standards.

TABLE 1. Example Attribute Table for the Polygon Shapefile

Polygon ID #	Surveyor	Land Use	Polygon Status	Total # of UPDs	Date of Survey
KRP01	J. Cliff; S. Rubt; K. Kirken	US	Unoccupied	0	5/18/2009
KRP02	J. Cliff; S. Rubt; K. Kirken	RP	Occupied	8	5/18/2009
KRP03	J. Cliff; K. Kirken	DC	Occupied	14	5/18/2009
KRP04	S. Liner; B. Box	IP	Unoccupied	0	5/18/2009
KRP05	S. Liner; B. Box; R. Sunner	IC	Unoccupied	0	5/18/2009
KRP06	S. Liner; B. Box; R. Sunner	BG	Occupied	5	5/19/2009
KRP07	B. Box; R. Sunner	US	Unoccupied	0	5/19/2009

Data/Report Submission

- Survey data must be provided to the authorizing Federal agency in the approved format within the timeframe determined by the authorizing agency. The authorizing Federal agency may accept, reject, or ask for additional information on the surveys. The authorizing Federal agency will coordinate results with USFWS. Authorizing Federal agencies are responsible for providing copies of data to UDWR.
- Complete data/report submission includes a written report summarizing methodology and results, completed survey forms, maps and geospatial data. Methodology sections and maps must clearly define low intensity and high intensity level survey areas. Vehicle and foot survey areas must be delineated within the low intensity survey areas. Reports must include both positive and negative survey results. Negative data includes all areas in the Action Area that were determined to be unsuitable habitat; and suitable habitat that was surveyed but showed no evidence of Utah prairie dogs or their burrows. Reports must identify the action area, all suitable habitat that was surveyed, and the presence of all identified Utah prairie habitat areas (occupied and unoccupied). Survey forms submitted with negative data only need the top portion of the form completed.
- The authorizing agency will make the appropriate effects determination of the proposed action.

GLOSSARY

Action Area: The entire right-of-way (ROW) or exterior boundary of a proposed action plus the appropriate buffer (see definition of Buffer Type).

Active Season Survey: Surveys that occur generally from April 1 through August 31 when prairie dogs are most active above ground, including breeding and rearing of young. The determination of the applicable Active Season will be made by the authorizing Federal agency. If the authorizing Federal agency is not a land management agency, the U.S. Fish and Wildlife Service (USFWS) will make this determination.

Authorizing Federal Agency: For projects on Federal lands; the authorizing agency is the agency which administers the lands where the proposed project occurs and from whom a permit or other authorization is needed before the project may be implemented. This is most commonly the Bureau of Land Management, U.S. Forest Service, or National Park Service.

For projects on private lands with a Federal nexus, the authorizing Federal agency is the Federal agency connected to the private lands action (see definition of Federal Nexus). If the authorizing Federal agency is not a land management agency, it must coordinate all survey details with the USFWS.

Buffer Type: For projects that temporarily impact Utah prairie dog habitat (do not extend into the following breeding season and the habitat can feasibly be restored), or those projects with small permanent surface or buried structures that do not substantially alter Utah prairie dog habitat or behavior, the buffer is a 350-ft (107-m) zone extending out from the proposed project ROW or exterior boundary. For projects with large permanent surface or buried structures that may substantially alter Utah prairie dog habitat or behavior, or extend into the following breeding season, the buffer zone extends outward 0.5 mi (0.80 km) from the proposed project ROW or exterior boundary. The buffer type will be determined by the authorizing Federal agency in coordination with the USFWS.

Certified Surveyor: An individual who has completed a USFWS approved Utah Prairie Dog Surveyor Course within the last 4 years.

Dormant Season Survey: Surveys that occur generally from September 1 through March 31 when prairie dogs are less active above ground and are often below ground for long periods of time. The determination of the applicable Dormant Season will be made by the authorizing Federal agency. If the authorizing Federal agency is not a land management agency, the USFWS will make this determination.

Federal Nexus: A Federal nexus may occur for projects on private lands. Any private actions that are federalized for purposes of NEPA through a key Federal decision must be considered as connected actions and included within the scope of the Federal agency's decision making. A "federalized" project is one for which the agency has discretion to authorize or permit the action, or proposes to contribute substantial funds, equipment or staff to implement.

Functional Burrow: Any Utah prairie dog burrow that is structurally suitable to house Utah prairie dogs (entirely open, partially filled with dirt, or open but blocked by sticks, weeds, cobwebs, or other debris). Burrows that are less than 3 in. (7.62 cm) in diameter are not considered potential prairie dog burrows.

Historic Utah Prairie Dog Range: All suitable habitats in the following areas: all of Beaver, Iron and Piute Counties; Garfield County – the Aquarius Plateau and west of the Escalante Mountains, including Tropic Valley; Kane County – the main stem Sevier River Valley and East

Fork Sevier River Valley, including primary tributaries; Juab County – areas south and east of SR132; Millard County – areas east of the San Francisco Mountains, Cricket Mountains and the Sevier River; Sanpete County – the Sevier River Valley; Sevier County – areas west of, and including, the Old Woman Plateau and west of SR72, including the Tidwell Slopes; Washington County - all areas in the Kanarra Creek and Ash Creek drainages; Wayne County – west of the Water Pocket Fold.

High Intensity Level Surveys: Surveys of suitable habitat intended to identify the extent of Utah prairie dog habitat in areas suspected of containing Utah prairie dogs. Generally are conducted within less than 5 miles of known and/or mapped Utah prairie dog habitat areas where previous surveys or professional knowledge of the local management biologists indicate that occupied prairie dog habitat may occur.

Land Use: Surface management of the area being surveyed. Classifications include Rangeland/Dry Pasture (RP), Irrigated Pasture (IP), Irrigated Cropland (IC), Dryland Crop (DC), Bare/Fallow Ground (BG), and Urban/Suburban (US).

Low Intensity Level Survey: Surveys of suitable habitat that are intended to identify any previously unknown Utah prairie dog habitat areas. Generally conducted in locations greater than or equal to 5 mi (8 km) from any known and/or mapped Utah prairie dog habitat where previous surveys or professional knowledge of the local management biologists indicate that the likelihood of occupied prairie dog habitat is low.

Occupied Utah Prairie Dog Habitat: During the Active Season: Any area where Utah prairie dogs are seen or heard, or where Functional Burrows (see definition of Functional Burrow) are found and show evidence of recent activity (fresh digging, scat, fresh tracks). During the Dormant Season: Any Utah prairie dog burrows are found (functional or not functional), even if no other signs of Utah prairie dogs are present.

If legal access cannot be obtained to any portion of the Action Area, please refer to the instructions under the Pre-Survey Coordination Section on page 2.

Polygon ID #: The ID number is a unique identifier for each Utah prairie dog habitat polygon that is defined by the surveyor and provides a means to link the spatial data of that polygon with the data captured on the survey form.

Polygon Status: Utah prairie dog habitat polygons are classified as occupied or unoccupied.

Suitable Habitat: Habitat capable of supporting Utah prairie dogs including grassland or low-density sagebrush sites, agricultural fields, vacant lots, and other areas as identified by the authorizing Federal agency. Habitat previously mapped by the Utah Division of Wildlife Resources (UDWR) must be treated as suitable, regardless of current vegetative status.

Unoccupied (previously supported) Utah Prairie Dog Habitat: During the Active Season: No Utah prairie dogs are seen or heard and burrows are found but are not Functional (see definition of Functional Burrow); or Functional burrows are found but there is no evidence of prairie dogs: such as fresh digging, scat or tracks. During the Dormant Season: Unoccupied habitat cannot be determined during the dormant season. If any Utah prairie dog burrows are found (functional or not functional), they must be assumed occupied.

Utah Prairie Dog Habitat: Portions of suitable habitat that support Utah prairie dog burrows or other sign of the presence (past or recent) of Utah prairie dogs.

- Project Name: Defined by Surveyor
- Start Survey Date: DD/MM/YYYY
- End Survey Date: DD/MM/YYYY
- Project Location: Township, Range, Section, Quarter Quarter
- County: County name
- Action area: Entire ROW or exterior boundary of the proposed action plus the appropriate buffer
- Buffer Type: See Glossary
- Survey Season: Active or Dormant (see Glossary)
- Surveyors: Write out full name(s) (e.g., John Doe)
- Survey Organization/Agency: write out full name
- Location Description: (vegetation type, landmarks, etc.)
- Polygon ID#: Required unique identifier for each Utah Prairie Dog habitat polygon; this field must link to the associated shapefile
- Polygon Status: Is either Occupied or Unoccupied
- Start Time: Military time (i.e., 0900 to 1300)
- Land Use:
- RP - Rangeland/Dry Pasture
- IP - Irrigated Pasture
- IC - Irrigated Cropland
- DC - Dryland Crop
- BG - Bare/Fallow Ground
- US - Urban/Suburban
- Utah prairie dog Burrows and Other Sign:
- Any Functional (not collapsed) Utah prairie dog Burrows observed?(Y/N)
- Any Utah prairie dog vocalizations heard? (Y/N)
- Any Utah prairie dog scat observed? (Y/N)
- Any Utah prairie dog tracks observed? (Y/N)
- Any Utah prairie dog digging observed? (Y/N)
- Utah Prairie Dog Counts: Total Number observed
- Cloud Cover: 1 = 0 to 20%; 2 = 21 to 40%; 3 = greater than 41%
DO NOT SURVEY IF CLOUD COVER = 3
- Wind Speed (Beaufort Scale)
- 0 = 0 to 1 mph (1.61 kph): Smoke rises vertically.
- 1 = 1 to 3 mph (2 to 5 kph): Wind motion visible in smoke.
- 2 = 3 to 7 mph (4 to 11 kph): Wind felt on exposed skin, leaves rustle.
- 3 = 8 to 12 mph (13 to 19 kph): Leaves and smaller twigs in constant motion.
- 4 = 13 to 17 mph (21 to 27 kph): Dust and loose paper raised, small branches begin to move.
- 5 = 18 to 24 mph (29 to 39 kph): Branches of a moderate size move, small trees begin to sway.
- 6+ = greater or equal to 25 mph (40 kph): Large branches in motion through hurricane force.
DO NOT SURVEY IF WIND SPEED greater than 3 (greater than 12 mph [19 kph])