U.S. Fish & Wildlife Service

Utah Prairie Dog

(Cynomys parvidens)

FINAL REVISED RECOVERY PLAN

Original Recovery Plan Completed in 1991

Prepared by:

Utah Ecological Services Office
U.S. Fish and Wildlife Service
West Valley City, Utah

and

Utah Prairie Dog Recovery Team

for

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

March 2012

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

Date: 3·1·12

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U.S. Fish and Wildlife Service
2369 West Orton Circle, Suite 50
West Valley City, Utah 84119
Phone: 801-975-3330
Fax: 801-975-3331

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Recovery Team Members

Kate Novak	U.S. Fish and Wildlife Service (USFWS)
Nathan Brown	USFWS (previously with UDWR)
Ron Bolander	Bureau of Land Management (BLM)
Ron Rodriguez	U.S. Forest Service (USFS)
Sarah Haas	Bryce Canyon National Park
Karen Fullen	Natural Resources Conservation Service (NRCS)
Keith Day	Utah Division of Wildlife Resources (UDWR)
Nicole Frey	Utah State University Extension
Mark Petersen	Utah Farm Bureau
Ted Toombs	Environmental Defense

Recovery Team Participants

Laura Romin, USFWS; Elise Boeke, NRCS (previously with USFWS); Rebecca Bonebrake, BLM; Jake Schoppe, USFS; Lisa Church, BLM; Casey Burns, NRCS; Bonnie Bell, USFWS; Kristin Legg, Zion National Park; Neil Perry, UDWR; Teresa Bonzo, UDWR; Christopher Keleher, Utah Department of Natural Resources; Jan Andersen, Utah Farm Bureau;

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Mary Parkin, USFWS; Peer Reviewers—Dr. Mark Ritchie, Syracuse University; Dr. Dean Biggins, U.S. Geological Survey; Dan Licht, National Park Service; Dr. Gary White, Colorado State University; Dr. David Wilcove, Princeton University

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 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 stable to increasing, although the species remains vulnerable to several serious threats. These include habitat loss and fragmentation, 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 1982). Open habitats are important for foraging, visual surveillance to escape predators, and intraspecific interactions (Player and Urness 1982). 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, overgrazing, cultivated agriculture, vegetation 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 and fragmentation of habitat, and plague. Our recovery strategy for the Utah prairie dog focuses on the need to address habitat loss and fragmentation 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 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), and 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 perpetuity in each RU (West Desert, Paunsaugunt, and Awapa Plateau). These occupied habitat criteria will be spatially distributed to provide sufficient connectivity and gene flow within each RU.
2. At least 2,000 adult animals (at least 1,000 counted adults in the spring counts) are present in each RU (West Desert, Paunsaugunt, and Awapa Plateau) within protected habitat for 5 consecutive years.
3. Management strategies are in place to prevent and respond to threats from disease.
4. Education, outreach, and public relations programs and State and/or local regulations are in place and are sufficient to minimize illegal take, manage legal lethal control post-delisting, and foster habitat management practices.
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. Evaluate and update the occurrence and distribution data, maps, and survey efforts for the Utah prairie dog across its known range, as information becomes available.
2. Conserve sufficient acreages and distribution of 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 prevention and response plan, and a monitoring strategy.
4. Develop the capability and implement actions as needed 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 of and appreciation for 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)

Implementation Year	Action								Total
	1	2	3	4	5	6	7	8	
Y01	90	3,110	150	-	150	220	110	40	3,870
Y02	60	3,050	200	-	130	90	60	50	3,640
Y03	60	3,040	200	-	130	40	30	80	3,580
Y04	60	3,030	200	-	130	40	30	50	3,540
Y05	70	3,210	250	50	170	190	140	70	4,150
Y06-Y30	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, recovery of the Utah prairie dog can be achieved by the year 2042. 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. Similarly, recovery may occur in less time if adequate partnerships are formed and funding is available.

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 have been used interchangeably in the past. The following definitions will be used in this Recovery Plan:

Clans 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 epizootic 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.

Effective Population Size is a theoretical standard used to estimate the retention and loss of genetic variation in a real population of Utah prairie dogs. It is the size of the ideal, hypothetical population in which all individuals mate randomly and all contribute equally to reproduction (see Appendix G). In other words, the effective population size (N_e) is the number of individuals in a population that actually contribute genetic material to the next generation. The size of N_e determines the rate of inbreeding and the subsequent loss of genetic diversity. The concept of effective population size is used to account for the effects of: 1) uneven sex ratios, 2) variability in population size over generations, 3) variability in family size, and 4) overlapping generations. Thus, the effective population size is almost always smaller than the actual population size.

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 the UDWR and are updated annually.

Metapopulations are prairie dog populations connected by habitats such that prairie dogs can disperse and immigrate between colonies. Persistence of the metapopulation depends on the balance between local extinction and re-colonization of vacant habitat patches by individuals from occupied habitat patches.

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. Occupied habitat is determined by annual Utah prairie dog surveys, according to survey protocols approved by the Recovery Team. Occupied habitat includes the boundaries of the colony plus a 730 ft (222.5 m) buffer which represents the foraging distance of prairie dogs.

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).

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 mapped Utah prairie dog habitat and surrounding areas that are managed with emphasis to promote the recovery and conservation (self-sustaining populations) of the Utah prairie dog, while recognizing that other land uses may occur in these areas. Where feasible, protected habitat should include the mapped Utah prairie dog habitat plus an 1100 ft (335.3 m) buffer [730 ft (222.5 m) foraging distance plus a 350 ft (106.7 m) disturbance buffer)], however other ecological values of Utah prairie dog habitat may override a requirement for these buffers. Protected habitat will continue to be managed for ongoing prairie dog conservation after recovery goals have been met. All landownership categories can qualify for this designation. Protective mechanisms for Federal public lands include laws, policies, and regulations that provide specific guidance and management direction for Utah prairie dog conservation. Protective measures for non-Federal lands can include conservation easements, fee title purchase, and safe harbor or other voluntary agreements that include mechanisms to ensure conservation efforts are maintained long term.

Public Land is that land administered by Federal land management agencies such as the U.S. Bureau of Land Management (BLM), the 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 UDWR permitting process 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). Recovery criteria included establishing and maintaining the species as a self-sustaining, viable unit with retention of 90% of its genetic diversity for 200 years, by 1) establishing and maintaining one population each on public lands in the West Desert, Paunsaugunt, and Awapa Plateau, 2) maintaining each population with a minimum number of 813 adult animals in the annual spring census, and 3) establishing and implementing a formal Memorandum of Understanding for long-term management of each population. Recovery actions included determining and continually updating the species' historical range and distribution, determining factors that influence the viability of prairie dog colonies, conducting a translocation program, ensuring the protection and management of prairie dogs and their habitat, and conducting an information and education program.

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, and public involvement (Utah Prairie Dog Recovery Implementation Team[1] (UPDRIT) 1997). The Conservation Measures and Assessment section of this document describes many of the accomplishments that occurred under the 1991 Recovery Plan and the 1997 Interim Conservation Strategy (see section 1.9).

[1] In 2006, the UPDRIT was formalized into the Utah Prairie Dog Recovery Team.

This document constitutes the first revision of the 1991 Recovery Plan. In accordance with current policy, 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 that are 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), a high degree of controversy regarding the species and its recovery, high recovery potential, and taxonomic standing as a species.

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. The five species of prairie dogs [Utah prairie dog, white-tailed prairie dog *(Cynomys leucurus)*, black-tailed prairie dog *(C. ludovicianus)*, Gunnison's prairie dog *(C. gunnisoni)*, and Mexican prairie dog *(C. mexicanus)*], are all native to North America and 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 and the Gunnison prairie dog.

The Utah prairie dog is recognized as a distinct species (Zeveloff 1988; Hoogland 1995), but is most closely related to the white-tailed prairie dog. These two species may have once belonged to a single interbreeding species (Pizzimenti 1975). They are now separated by ecological and physiographic barriers. 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 (770 to 1,410 g) and adult females weigh between 1.4 to 2.5 lbs (640 to 1,130 g) (Wright-Smith 1978). Body weight varies by sex and season. For example, in spring, male body mass ranges from 0.7 to 2 lbs (320 to 910 g) but by late summer or early fall, their body mass ranges from 1.1 to 3.3 lbs (500 to 1,500 g) (Hoogland 1995).

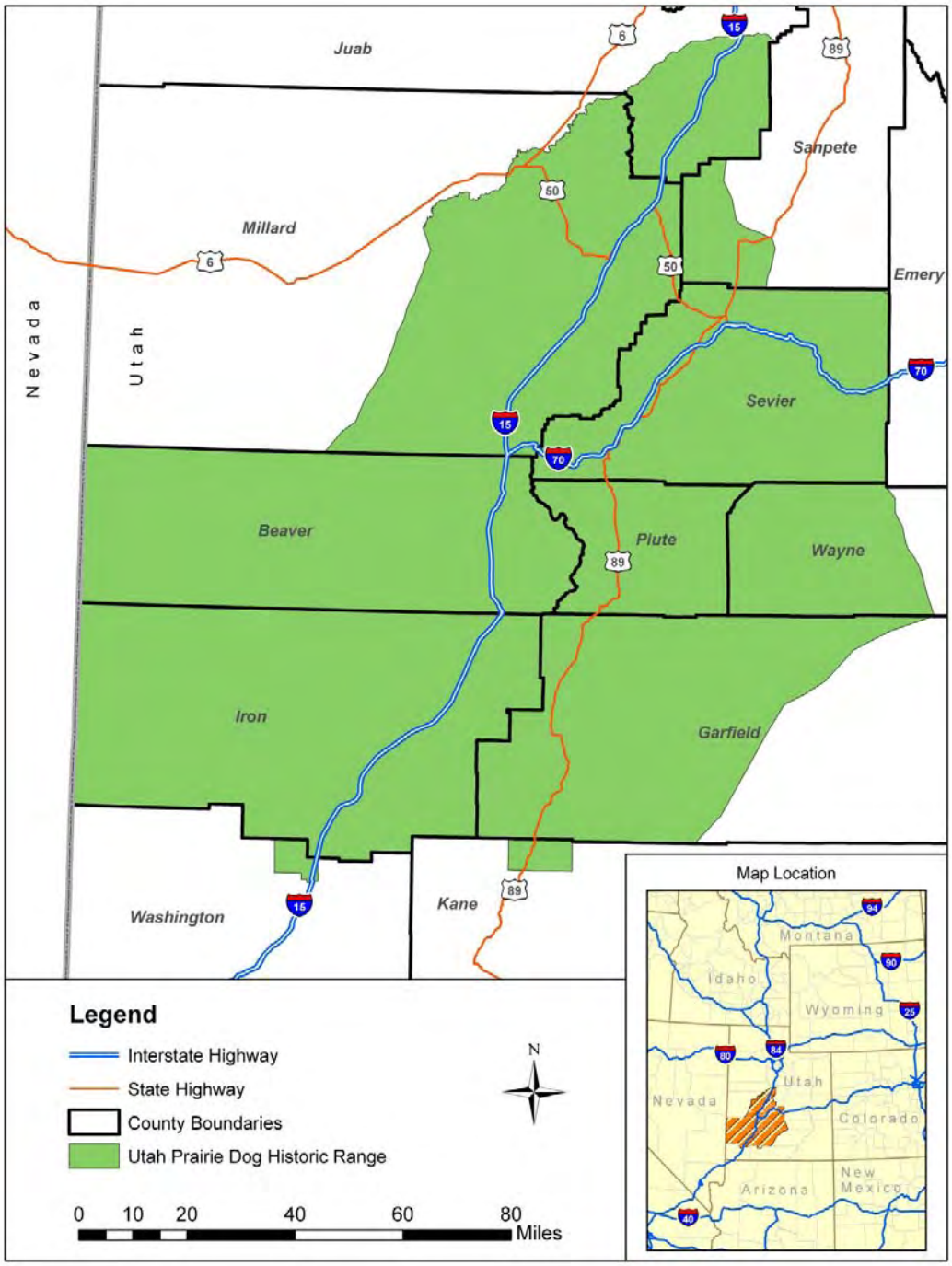
1.3 Distribution and Abundance

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 section is a land unit equal to 1 mi^2 (2.6 km^2) or 640 ac (260 ha)) (Collier and Spillett 1973). The historical abundance was estimated at approximately 95,000 animals (Collier and Spillett 1973). However, these estimates are not considered reliable because they were derived largely 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 was 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 Map[2]

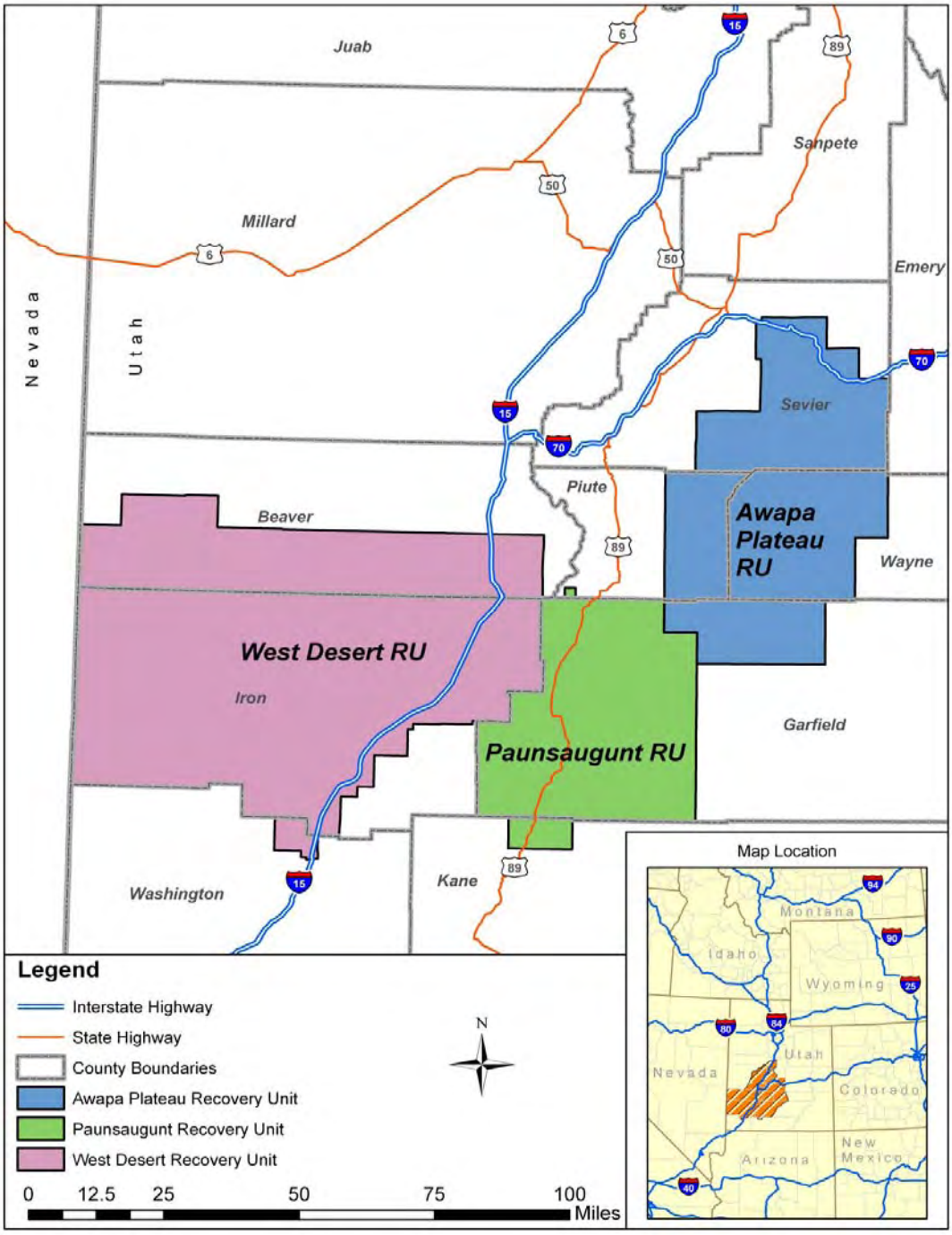


[2] This map illustrates the species' estimated historic range. However, it should be noted that not all areas within the historic range were likely occupied at all times. Utah prairie dog colonies likely ebbed and flowed across this area as environmental variables shifted over time.

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 annual 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 entire colony area and counting the number of prairie dogs observed. Prairie dogs are counted at least three times during a visit, sometimes from several vantage points to ensure coverage of the whole area, with an effort to avoid double-counting individuals. If the three counts lead to ever-increasing numbers, counting will continue until numbers reach a plateau. The highest count achieved using this method is recorded as the spring count for that colony. 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 40-60% of individual prairie dogs are above ground at any one time (Crocker-Bedford 1975). Therefore, over the range of the species, UDWR implements a 50% average rate for count accuracy. Thus, spring adult counts are multiplied by two to estimate the adult population. In addition to these counting variables, terrain and vegetation can hinder a surveyor's ability to see all prairie dogs that are present in an area. Furthermore, access restrictions on some private lands make it impossible to survey all active prairie dog colonies every year.

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

Population Estimate = [(2 × Spring Adult Count) × 0.67 (proportion of adult females) × 0.97 (proportion of breeding females) × 4 (average number of young per breeding female)[4]] + (2 × 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 to increasing long-term trends in adult Utah prairie dog numbers. Range-wide counts were as high as 7,527 in the 1989 spring census count with a low count of 1,866 animals in 1976 (UDWR 2005, 2011a, 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 (Brown 2009a).

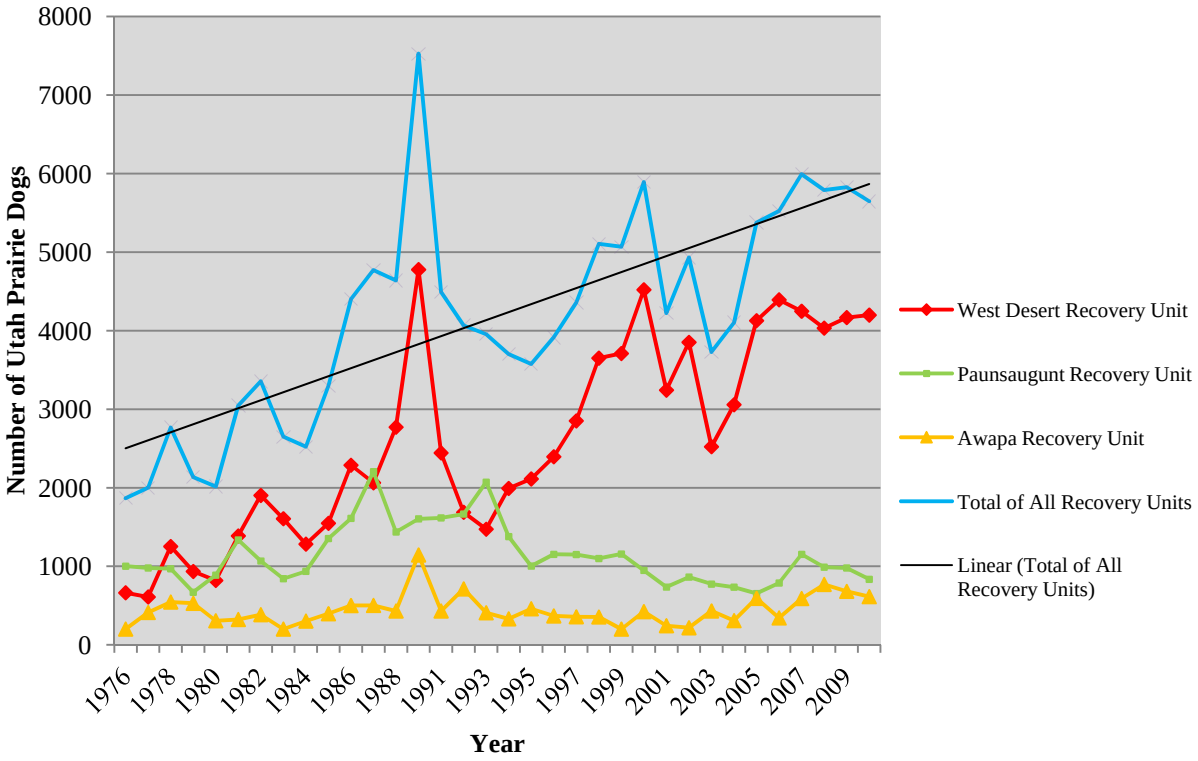
Observations over the past 30 years indicate that individual colonies "crash" and recolonize, in some cases repeatedly. Causes of crashes may be plague, unlawful lethal control, and habitat alteration. Population fluctuations also may be induced by forage competition with other

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

[4] Litter sizes range from one to seven pups; mean observed litter size after emergence of juveniles from their burrows ranges from 3.64 pups to 5.5 pups (Pizzmenti and Collier 1975; Elmore et al. 1976; Wright-Smith 1978; Mackley 1988; Hoogland 2001). For the purposes of calculating a population estimate, we use four as the average number of young per breeding female as it is conservative estimate within the range of the published literature and is consistent with past UDWR practice in calculating population estimates.

herbivores and self-induced population regulation. 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).

FIGURE 3. Adult Utah Prairie Dog Counts and Trend Line for Total of All Recovery Units (1976-2010)[5]



[5] Surveys from 1990 are not included, because they were incomplete (i.e., they did not include private lands), due to staffing and budget limitations.

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.

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 27,195 ac (11,005 ha) of mapped habitat in the Awapa Plateau RU (UDWR 2010a). Approximately 68% 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, 30-70% of the RU's individual adults occur on public lands (Table 4). Spring counts on the Awapa Plateau 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 2006-2008, the spring counts showed an increase from 343-769 adult prairie dogs, but decreased to 614 in 2010 (Table 3). Average prairie dog density in the Awapa Plateau RU was 0.06 prairie dogs per acre from 2000-2007 (USFWS 2007).

The Paunsaugunt RU is primarily in Garfield County, with small areas in Piute and Kane Counties. There are 15,620 ac (6,321 ha) of mapped habitat in the Paunsaugunt RU (UDWR 2010a). 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, 18-38% of the individual adults occur on public lands (Table 5). Spring counts vary from 654 to 2,205 adult prairie dogs (Table 3). The area experienced an increase to 1,153 prairie dogs counted in 2007, but decreased to 835 in 2010 (Table 3). Average prairie dog density in the Paunsaugunt RU was 0.34 prairie dogs per acre from 2000-2007 (USFWS 2007).

The West Desert RU is primarily in Iron County, but extends into southern Beaver County and northern Washington County. There are 16,841 ac (6,815 ha) of mapped habitat in the West Desert RU (UDWR 2010a). Approximately 39% 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, 10-20% of the individual adults occur on public lands (Table 6). The West Desert population has fluctuated between less than 1,000 and 4,778 adult Utah prairie dogs (Table 3). Peaks of greater than 4,000 animals occurred in 1989, 2000, and 2005-2010. Between 2000 and 2003, the West Desert RU spring counts showed a decrease from 4,521-2,523 prairie dogs; however, the population rebounded to over 4,000 adult prairie dogs counted each year from 2005 through 2010 (Table 3). Average prairie dog density in the West Desert RU was 0.78 prairie dogs per acre from 2000-2007 (USFWS 2007).

In summary, spring counts from the past 30 years show considerable annual variation, but stable to increasing long-term trends in adult Utah prairie dog numbers (Table 2, Figure 3). The lowest range-wide count was 1,866 adult Utah prairie dogs in 1976[6], 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.

Approximately 30% of the animals range-wide 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 Plateau RU has the highest percentage of the prairie dog counts (up to 70%) and mapped habitat (68%) occurring on Federal lands and the West Desert RU has the highest percentage of prairie dog counts (up to 90%) occurring on private lands.

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

	RECOVERY UNITS		
LAND OWNERSHIP[7]	**West Desert**	**Paunsaugunt**	**Awapa Plateau**
USFS	140	3,776	8,591
BLM	6,372	602	9,367
NPS	0	301	60
Protected Habitat	266	0	566
SITLA	428	4,778	6,850
Private	9,935	6,163	1,761
Total Mapped Habitat	16,841	15,620	27,195

Source: UDWR 2010a

[6] Surveys from 1990 are not included, because they were incomplete (i.e., they did not include private lands), due to staffing and budget limitations.
[7] The definitions for public and protected lands are found in the glossary.

TABLE 3. Adult Utah Prairie Dog Counts (1976-2010)[8]

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
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	452	5,921
2001	3,243	736	278	4,257
2002	3,852	863	229	4,944
2003	2,523	774	432	3,729
2004	3,060	735	309	4,104
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	1,014	769	5,816
2009	4,167	979	681	5,827
2010	4,199	835	614	5,648

Source: UDWR 2005, UDWR 2011

[8] Surveys from 1990 are not included, because they were incomplete (i.e., they did not include private lands), due to staffing and budget limitations.

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

Land Owner[9]	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Public	122	53	208	201	306	179	347	506	429	304
Private	138	133	148	66	96	135	91	98	108	215
SITLA	15	22	59	28	41	25	64	63	99	65
Protected	3	21	17	14	144	4	88	102	45	30
Total	278	229	432	309	587	343	590	769	681	614

Source: UDWR 2011

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

Land Owner	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Public	121	165	155	257	124	205	436	480	337	227
Private	560	626	518	420	366	464	582	369	465	423
SITLA	55	72	101	58	164	119	135	165	177	185
Total	736	863	774	735	654	788	1,153	1,014	979	835

Source: UDWR 2011

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

Land Owner	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Public	571	553	461	452	887	953	457	218	280	279
Private	2,536	3,041	1,846	2,358	2,977	3,171	3,542	3,647	3,691	3,778
SITLA	14	24	34	36	85	97	39	3	1	30
Protected	122	234	182	214	179	172	118	91	93	112
Total	3,243	3,852	2,523	3,060	4,128	4,393	4,156	3,959	4,065	4,199

Source: UDWR 2011

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

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, site-specific prairie dog numbers may be influenced by various environmental and human factors, including disease outbreaks (e.g., epizootic plague); climate cycles (discussed in section 1.8, Threats Assessment); habitat loss, alteration, and fragmentation from environmental or human activities; and unlawful lethal take. Despite these fluctuations, it appears that the overall Utah prairie dog population level has been stable to increasing for the last 30 years.

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. However, management options exist to offset these risks, including the preservation of existing occupied habitat. 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 the establishment and protection of large colonies that exceed a spring count of 40 individuals. 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 vacated habitats or “rescue” crashing colonies. While colonization may be aided by proximity of colonies with a greater number of dogs (Ritchie and Brown 2005), these same factors may aid in the spread of plague (Collinge et al. 2005) Thus, it is essential to manage plague and 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 spend 4-6 months underground each year during the harsh winter months. Some observations suggest that Utah prairie dogs hibernate. However, other evidence suggests that at lower elevations Utah prairie dogs may enter torpor more intermittently at the beginning and end of the hibernation season and may be seen above ground in mild weather (Collier and Spillet 1975; Hoogland 1995, 2001; Lehmer and Biggins 2005). Torpor patterns of Utah prairie dogs might be influenced by environmental conditions, and may differ across the species' range (Lehmer and Biggins 2005).

Adult males 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 1-2 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 2-3 weeks prior to females (Hoogland 2003).

Mating begins 2-5 days after females emerge from hibernation (Hoogland 2003). Female Utah prairie dogs come into estrous (period of greatest female reproductive responsiveness, usually coinciding with ovulation) and are sexually receptive for several hours for only 1 day during the breeding season (generally mid-March through early April) (Hoogland 2001). On average, 97% of adult female Utah prairie dogs are in breeding condition each year and successfully produce a litter (Mackley 1988). 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 sizes range from one to seven pups; mean observed litter size after emergence of juveniles from their burrows ranges from 3.64 pups to 5.5 pups (Pizzmenti and Collier 1975; Elmore et al. 1976; Wright-Smith 1978; Mackley 1988; Hoogland 2001). Young Utah prairie dogs are born after a gestation period of 28-30 days, and depend almost entirely on nursing while in their burrow (Hoogland 2003).

The young emerge from their nursery burrow when they are 5 or 6 weeks old. The young emerge above ground by early to mid-June, and by that time they primarily forage on their own (Hoogland 2003). 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 survive to breeding age (Hoogland 2001). Male Utah prairie dogs frequently cannibalize juveniles, eliminating 20% of the litter (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). The sex ratio of juveniles at birth is 1:1, but the adult sex ratio is skewed toward females, with adult female:adult male sex ratios varying from 1.8:1 (Mackley 1988) to 2:1 (Wright-Smith 1978). This skewed sex ratio is 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 to predation during dispersal (Wright-Smith 1978; USFWS 1991).

Natal dispersal (movement of first year animals away from their area of birth) and breeding dispersal (movement of a sexually mature individual away from the areas where it copulated) are comprised mostly of male prairie dogs. Thus, individual male prairie dogs have a high mortality

rate 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) and long-distance dispersals of 1.1 mi (1.7 km) (Crocker-Bedford 1976; Mackley 1988). Adult dispersal may be up to 3.1 mi (5 km) (Ritchie and Brown 2005). Most dispersers move to adjacent territories (Hoogland 2003).

Utah prairie dogs are organized into social groups called clans, consisting of an adult male, several adult females, and their offspring (Wright-Smith 1978; Hoogland 2001). Clans maintain geographic territorial boundaries, which only the young regularly cross, although all animals use common feeding grounds. Daily movement distances within these clans for foraging or other activities average 730 ft (223 m) —pups move further from their burrows as they get older (Jacquart et al. 1986). 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 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 *(Buteo spp., Aquila chrysaetos)*, and snakes *(Crotalus spp., Pituophus spp.)* (USFWS 1991; Hoogland 2001). Black-footed ferrets *(Mustela nigripes)* prey on other prairie dog species; however, their historic and current range does not overlap that of the Utah prairie dog (UDWR 2003). In established colonies, predators probably do not exert a controlling influence on numbers of prairie dogs (Collier and Spillett 1972). Utah prairie dogs also compete 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 1899 (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). Plague results in local extirpations, reduced colony sizes, increased variation in local population sizes, and increased distances between colonies (Cully and Williams 2001).

1.6 Habitat Characteristics

Utah prairie dogs occur in semiarid shrub-steppe and grassland habitats (McDonald 1993; Roberts et al. 2000; Bonzo and Day 2003). Within these habitats, they 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 high-quality food found in swales enables prairie dogs to attain a large body mass, thus enhancing survival and increasing litter sizes and juvenile growth rates (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 required 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.

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 1982). Vegetation on prairie dog colonies is of short stature to allow the prairie dogs to see approaching predators and to have visual contact with other members of the colony (Collier 1975; Crocker-Bedford and Spillett 1981; Player and Urness 1982). However, we have observed Utah prairie dogs occupying pine fir forests in Bryce Canyon National Park.

Prairie dogs are a keystone species, and thus an important component of the ecosystem (Kotliar et al. 1999; Hoogland et al. 2004). 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 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, the 1991 Recovery Plan, and 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 down-listing (49 FR 22330, May 29, 1984) and the 1991 Recovery Plan (USFWS 1991). Here, 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 Field Office, National Forest, or National Park that overlaps the current range and RUs of the Utah prairie dog. These jurisdictions include the Cedar City, Richfield, and Kanab Field Offices of the BLM Color Country District; 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. The predominant effect of urban expansion is the permanent loss of habitat. Urban expansion also leads to fragmentation of Utah prairie dog habitat, which diminishes the species' 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 distance at which disturbance from urban expansion or other human activities (including Cultivated Agriculture, Off-Highway Vehicle/Recreational Uses, Energy Resource Exploration and Development, activities as described below) affects a prairie dog's normal behavior is approximately 350 ft (106.7 m)(Ashdown 1995).

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 three 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).

From 1998- 2011, a total of 986 Utah prairie dogs were taken (i.e, incidentally killed, harmed, or translocated), of which 229 Utah prairie dogs were translocated from developing private lands to Federal lands under the Iron County HCP. In addition, 774.3 ac (313 ha) of occupied habitat were lost to urban development in Iron County (Kavalunas 2011a, pers. comm.). In addition, 2,906 Utah prairie dogs were translocated from the Cedar City golf course from 1998-2011 under the Golf Course HCP (Kavalunas 2011b, c, pers. comm.) (see section 1.9.6, Habitat Conservation Plans for more information).

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 (HCPs) 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 Plateau), have much smaller human populations 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 Plateau 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 Plateau 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 and fragmentation of habitat and reduction in range, diminished dispersal, and lowered genetic variability. Urban expansion is in the top-tier of threats for Utah prairie dogs (see Table 7). The threatened status of Utah prairie dogs prohibits take of Utah prairie dogs from urban development activities unless exempted through Section 7 of the act or permitted through Section 10(a)(1)(B). Absent ESA protection, no other regulatory mechanisms 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 impacts including unregulated 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 2005). The private ownership of agricultural lands also means that those lands not 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, 2006b), they eat crop vegetation such as alfalfa, and their burrows can create obstructions for the operation of crop equipment. However, damages are likely site-specific and can be managed under available ESA programs to reduce human-prairie dog conflicts and promote conservation of the species on private lands: 1) a special 4(d) rule, and 2) a programmatic Safe Harbor Agreement (SHA).

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 are taken annually (UDWR 2010b). A proposed amendment to the existing special rule proposes to establish direct take limitations including: where permitted take can occur; the amount of take that can be permitted; and methods of take that can be permitted; a new incidental take exemption also is proposed (76 FR 31906, June 2, 2011).

A programmatic SHA and ESA Section 10(a)(1)(A) incidental take permit was issued to the Panoramaland Resource Conservation and Development Council (Panoramaland RC&D) in June 2009 (Panoramaland 2009). The purpose of the programmatic SHA 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 7). 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 SHAs 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. The threatened status of the Utah prairie dog results in site-specific and programmatic 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 over-grazing on a site-specific basis (USFWS 2008a, b, c). Examples of conservation measures used in Utah prairie dog habitat include: restricting surface disturbing activities and facilities within 0.5 miles of occupied habitat, conducting restoration activities using native seed, and implementing monitoring and corrective actions via adaptive management (USFWS 2008a, b, c).

We do not have information on the amount of Utah prairie dog habitat, if any, that is over-grazed, 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 a higher proportion of nutrient-rich young shoots occur in properly managed grazed habitats as compared to ungrazed 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 (Hoogland 2003; Elmore and Messmer 2006a, 2006b). Although some of these impacts may be site-specific or uncommon (Hoogland 2003), the perceived impacts result in negative human perceptions of prairie dogs (Hoogland 2003; Elmore and Messmer 2006a).

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 wide-scale eradication programs. Without ESA protection, no other mechanisms provide regulatory control of Utah prairie dog poisoning or shooting on agricultural lands (e.g., 4d rule, see Cultivated Agriculture above). Safe Harbor or other private landowner conservation efforts will continue to 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).

Over-grazing is in the middle-tier of threats for Utah prairie dogs (see Table 7). However, the threat is likely scattered among allotments with some being over-grazed while others are effectively managed.

Off-Highway Vehicle/Recreational Uses

OHV recreation is an increasingly common use of public lands. OHV registrations in Utah increased 233% from 1998-2006 (Burr et al. 2008), 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).

Though not specific to Utah prairie dogs, OHV use affects soils, vegetation, and wildlife species (Ouren et al. 2007). Based on the available information, it is likely that OHV use results in habitat fragmentation and reduced connectivity across the species' range, increasing the likelihood of local extirpations. Direct mortality may occur as a result of collision or burrow collapse. Repeated OHV disturbances may reduce the foraging time of Utah prairie dogs and negatively affect weight gain, resulting in decreased overwinter survival. Loud OHV noises may cause hearing loss in prairie dogs, leading to a higher risk of predation. Physiological effects from disturbance can lead to declines in local population size, survivorship, and productivity of wildlife species in general (Ouren et al. 2007). OHV activities can crush vegetation, decreasing forage quality and availability for prairie dogs. OHV use also allows more human access to prairie dog colonies, which may increase the risk of illegal shooting (USDA 2009a).

On Federal lands, increased planning efforts direct 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 the Cedar City, Richfield, and Kanab BLM Field Office areas. The Dixie and Fishlake National Forests prohibit cross-country vehicle travel Forest-wide; motorized travel is restricted to designated open routes or areas (USDA 2006, 2009b). In addition, the Dixie Motorized Travel Plan includes conservation measures specific to Utah prairie dog, including surveys, avoidance (i.e., spatial and seasonal), and revegetation prescriptions for the species along roads proposed for closure (USDA 2009c).

Almost the entire Richfield BLM Field Office area is either closed to OHV use or limited to designated routes, and includes conservation measures (i.e., seasonal and spatial buffers) specific to Utah prairie dog (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) provides management direction for the Cedar BLM Field Office area, and 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. 2010). The BLM Cedar City Field Office has initiated a RMP revision process. In the revised RMP, they will designate all areas under the jurisdiction of the Field Office as either open to cross-country travel, limited to existing routes, or closed to all motorized travel. However, it is too early to determine how the revisions to this RMP will affect Utah prairie dogs.

While OHV use is not restricted on non-Federal lands, OHV activity in these areas is more likely to be utilitarian in nature (i.e., related to getting around private property) and of lower intensity and impact when compared to recreational use more common on Federal lands.

On the whole, OHV activities are in the middle-tier of threats for Utah prairie dogs (see Table 7).

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 and increased predation due to added perching locations for raptors. 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 (DOE 2010a). 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. Therefore, we do not consider wind power to be a threat to the Utah prairie dog.

Oil and gas development includes seismic activities, exploratory wells, and production facilities. Development also 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 and fragmentation 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). Potential impacts from seismic testing on Utah prairie dogs are negligible (Young and Sawyer 1981; Menkens and Anderson 1985).

The Cedar City BLM Field Office is the primary Federal land management entity in the West Desert RU. Oil and gas exploration in the Cedar City BLM Field Office area is expected to continue at a historical low pace, unless there is a new discovery or unless nationwide demand for onshore oil and gas dramatically increases (BLM 1986). The Cedar Beaver Garfield Antimony RMP (BLM 1986) and the Pinyon Management Framework Plan (BLM 1983), which cover the Cedar City Field Office area, both identified specific lands that were known at that time to be occupied by Utah prairie dog. These lands were identified as Category 3 lands (open to leasing subject to No Surface Occupancy stipulations). However, the majority of mapped Utah prairie dog habitat in the West Desert RU is non-Federal, and no conservation measures are in place to minimize the effects of energy development to Utah prairie dogs on these lands, should such development occur in the future.

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), where no Utah prairie dog conservation measures are in place to minimize energy development impacts to the Utah prairie dog. The Dixie National Forest is the primary Federal land management entity in the Paunsaugunt RU; the Kanab BLM Field Office also manages a small portion of the Paunsaugunt RU. The potential for energy resource development on the Dixie National Forest over the next 15 years appears low due in large part to discouraging results of previous tests, the remoteness of the area, and the questionable quality of the geologic strata for producing oil and gas (USDA

2007). At the time of this Plan, the Dixie National Forest was 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 2008a), thus minimizing the potential 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 Plateau RU have low energy resource potential in the areas occupied by Utah prairie dogs (USDA 2007, BLM 2008e). The Fishlake and Dixie National Forests and the Richfield BLM Field Office comprise the primary Federal land management entities in the Awapa Plateau RU, and the majority of the Awapa Plateau 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 on the Utah prairie dog. The Richfield BLM RMP provides specific conservation measures to minimize the effects of energy development to Utah prairie dogs (BLM 2008a).

In 2008-2011, we completed programmatic consultations with the BLM and USFS regarding oil and gas development on lands they manage. Through the consultation process, we worked with both agencies to develop a set of avoidance and minimization measures for Federal oil and gas leases within the range of the Utah prairie dog (BLM 2008a, 2008b; USFWS 2011). These measures are attached to all BLM and USFS leases with the range of the Utah prairie dog, and include no surface disturbance within 0.8 km (0.5 mi)) of active Utah prairie dog colonies, and no permanent disturbance within 0.8 km (0.5 mi) of potentially suitable, unoccupied Utah prairie dog habitat. Instruction Memorandum (IM) 2002-174 directs all BLM State Offices to "include the lease stipulation on oil and gas leases where threatened, endangered, or other special status species or critical habitat is known or strongly suspected."

The Department of Energy (DOE) and the BLM are working on a Draft Programmatic Environmental Impact Statement (DPEIS; DOE 2010b) to address utility-scale solar energy development in six southwestern States, including Utah. There are three solar energy zones proposed in Iron and Beaver Counties. Environmental considerations for the Utah prairie dog, at this preliminary stage, include consultation with USFWS and UDWR to identify appropriate survey protocols and avoidance measures. Impacts to the species are expected to be small overall—the DPEIS estimates 0.1% of suitable Utah prairie dog habitat occurs within the solar energy zones across the species range (DOE 2010b).

Energy resource exploration and development is in the lowest-tier of threats for Utah prairie dogs (see Table 7). 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

down-listing (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, and other lethal methods. There are no data to quantify these impacts. We have observed shell casings in Utah prairie dog colonies, and it is possible that prairie dogs are the target animals in some of these locations. Since the fall of 2007, three poisoning incidents and one shooting incident occurred in the West Desert RU. These unauthorized killings resulted in impacts to a few colonies, but these impacts did not extend to 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 7). Poaching likely occurs across the species' range; however, we only have a few confirmed cases, all in the West Desert RU. We believe that the continued use of the 4(d) special rule and expanded efforts to implement the new Programmatic SHA (Panoramaland 2009) (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 (epizootic) plague would likely not result in extinction of Utah prairie dogs, but that it could lead to the species becoming endangered again. The Recovery Plan concluded that plague may have played a significant role in extirpations of several colonies in the Cedar-Parowan Valley area (West Desert RU).

Plague occurs across the entire range of the Utah prairie dog, 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. Plague likely arrived in North America about 100 years ago via flea-infested rats on ships coming from Asia and Europe (Biggins and Kosoy 2001a, Hoogland et al. 2004).

Fleas are the most common vector for plague (Biggins and Kosoy 2001a). Infected fleas can be brought into the vicinity of a prairie dog colony by a suite of mammals (Biggins and Kosoy 2001a), and fleas may survive for over a year after their hosts have died (Gage and Kosoy 2005).

Much of the plague research available is for white-tailed prairie dogs; however, due to the similarity in life history and habitat use of white-tailed prairie dogs and Utah prairie dogs, we consider the research to be relevant to the Utah prairie dog. We use this information as well as any information specifically pertinent to Utah prairie dogs in the below discussion. Plague

occurs in prairie dog colonies as enzootic and epizootic events. Enzootic plague is an infection that is persistent in the population over time and causes a low rate of mortality. Epizootic plague occurs when the disease spreads from enzootic hosts to more susceptible animals, resulting in a rapidly spreading die-off cycle (Barnes 1993, Biggins and Kosoy 2001b, Cully and Williams 2001, Gage and Kosoy 2005). During epizootic plague events, large numbers of animals can die within a few days (Lechleitner et al. 1962; Cully 1993).

The factors that cause a change from an enzootic to epizootic cycle are still being researched, but may include host density, flea density, and climatic conditions (Cully 1989; Parmenter et al. 1999; Cully and Williams 2001; Enscore et al. 2002; Lomolino et al. 2003; Stapp et al. 2004; Gage and Kosoy 2005; Ray and Collinge 2005; Stenseth et al. 2006; Adjemian et al. 2007; Snäll et al. 2008; Biggins et al. 2010). More specifically, enzootic plague may be influenced by factors including genetics, prairie dog immunity and physiologic state, and interactions with other bacteria (Gage and Kosoy 2005). Occurrence of epizootic plague outbreaks may be dependent on the density of the host population and/or flea vector abundance (Barnes 1993), or flea density (Biggins 2010), which may be affected by climatic factors (Gage and Kosoy 2005). Epizootic plague outbreaks may occur when Utah prairie dog populations increase to high densities causing increased stress among individuals and easier transmission of disease between individuals (Gage and Kosoy 2005). However, plague also could occur when Utah prairie dogs are at lower densities but flea density is high (Biggins et al. 2010).

Epizootic and enzootic plague can have wide-reaching impacts to prairie dog populations. Although the impacts of enzootic plague may be less dramatic and obvious than epizootic outbreaks of plague, enzootics may be a constant threat to prairie dog persistence over moderate time spans (Biggins et al. 2010).

Plague likely persists in prairie dog colonies at enzootic levels even after an epizootic outbreak subsides. In the absence of epizootic events, plague antibodies and plague positive fleas and prairie dogs occur in colonies (Biggins et al. 2010). Other evidence of enzootic plague includes the increased survival of prairie dogs and black-footed ferrets exposed to flea control and experimental vaccines despite the lack of epizootic plague outbreaks (Matchett et al. 2010). Increased survival with these treatments indicates that enzootic plague is frequently present and suppressing prairie dog population levels in the absence of plague prevention measures.

Possible reasons for persistence of plague as an enzootic in the environment include survival of the bacterium in the soil, persistence of the bacterium in fleas, and the continued slow transmission of the bacterium within the prairie dog community (Gage and Kosoy 2006 in Biggins et al. 2010). Infected fleas can exist in burrows for up to 13 months following a plague event (Fitzgerald 1993).

Long-term enzootic plague infection may cause local extirpation of colonies, extreme fluctuations in population densities and occupied habitat area, and inbreeding (Seglund et al. 2006). Enzootic plague also may alter population dynamics and dispersal (Biggins et al. 2010).

For example, if plague results in higher mortality of adults than juveniles, the remaining juveniles would be less likely to disperse away from their native colonies, instead replacing the adults and resulting in a younger population (Biggins et al. 2010).

Recovery of colonies after plague outbreaks within localized white-tailed prairie dog populations can 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 reasons for the variability in recovery rates may be due to the continued existence of chronic enzootic plague within colonies, or lack of immigration (due to large distances between colonies) of prairie dogs to reestablish affected colonies (Barnes 1993). Many times, when a colony begins to regain its former population size, it again becomes susceptible to plague epizootics—high population densities provide greater opportunities for the exchange of fleas and thus affect the speed at which plague can move through the population (Barnes 1993).

The long-term consequence of repeated or continued 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 2001b).

Evaluation of plague over longer time periods may provide better insight into the ability of prairie dog populations 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 (Trudeau et al. 2004). Utah prairie dogs exhibit very low genetic variation (Chesser 1984) and little gene flow between colonies (Ritchie and Brown 2005), possibly due to plague and habitat fragmentation (see section 1.7.5, Genetic Diversity).

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 pyraperm are two insecticides used to successfully control fleas in colonies of many 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 *(C. ludovicianus)*, white-tailed, and Utah prairie dogs (Biggins et al. 2010).

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 also is under development (Poché 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, may reduce the number of source animals present to recolonize the area.

Plague is one of the primary threats to Utah prairie dogs (see Table 7). 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 (epizootics), and to create chronic problems that could limit growth rates of Utah prairie dog populations (enzootics). Management measures to control plague (i.e., vaccines, insecticides) are being developed and their success may influence long-term prairie dog conservation. Initial lab and field testing shows promise in the ability of these measures 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 the recovery of the species. If the methods prove successful in the wild, we will need substantial funds to employ these techniques at a scale able to benefit recovery.

Predation

Normal levels of predation are not considered 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, predation 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). In addition, badgers can disrupt translocations 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 augered holes to artificial burrows (Appendix D). The overall threat level for predation places it in the lowest tier of threats for Utah prairie dogs (see Table 7) 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 will likely be 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 section 1.9, Conservation Measures and Assessment).

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 lands.

The threatened status of the Utah prairie dog allows us to issue ESA Section 10(a)(1)(B) permits for incidental take associated with development activities on non-Federal lands. For us to issue a Section 10(a)(1)(B) permit, we must find that the development and implementation of the HCP would 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, urban expansion would result in the loss of large areas of Utah prairie dog habitat without consideration to minimizing or mitigating these impacts (see section 1.7.1, Urban Expansion). Therefore, our recovery criteria 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 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 assume the same would happen for Utah prairie dogs if the species was not listed as threatened. A special 4(d) rule 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 may 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 of Utah prairie dogs 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.

The State of Utah has the ability to implement regulations to limit or prohibit shooting Utah prairie dogs, absent ESA protection. For example, shooting of Gunnison's and white-tailed prairie dogs is prohibited by the State on public (but not private) lands from April 1-June 15. However, Utah State Statute (4-23-3, UCA) classifies other species of prairie dogs as "depredating animals," so there is no assurance that State regulatory mechanisms would be implemented absent ESA listing.

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) include 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).

Section 7 of the ESA requires Federal agencies to ensure that their actions do not jeopardize the existence of any listed species (see section 1.9.7, Endangered Species Act Interagency Conservation and Consultation). The listed status of the Utah prairie dog requires that Federal agencies 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 by working with Federal agencies to compensate for unavoidable impacts. If the Utah prairie dog was not listed, there would be no regulatory mandate to ensure this interagency coordination and effects analysis on a project-specific basis.

BLM and Forest Service lands and their resources are managed on the basis of multiple use and sustained yield (Federal Land Policy Management Act of 1976 as amended [P.L. 94-579]; Multiple-Use Sustained-Yield Act of 1960 [16 U.S.C. 528-531]). Such resource uses include recreation, water, range, timber, and wildlife. The primary Federal laws, regulations, and policies that consider the species' needs on these lands are: the National Environmental Policy Act of 1969 (NEPA), the National Forest Management Act of 1976 as amended (16 U.S.C. §§ 1600-1614), and Federal agency listed and sensitive species directives (i.e., BLM Manual 6840, FS Manual 2670).

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 land use plans. 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 action agency.

BLM manages listed and sensitive species under guidance provided by their Manual 6840 – Special Status Species Management. Manual 6840 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 the ESA; and cooperate with the planning and recovery of listed species. In accordance with Manual 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). The lease notices developed for the Utah prairie dog also apply to energy development on lands administered by the Cedar City Field Office, per Instruction Memorandum (IM) 2002-174. Upon delisting, the Utah prairie dog would be designated as a sensitive species for the BLM. Under Manual 6840, BLM sensitive species are designated to "initiate proactive conservation measures that reduce or eliminate threats to… minimize the likelihood of and need for listing of these species under the ESA."

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. 36 CFR 219.19 gives specific direction to "manage habitat to maintain viable populations of existing native…vertebrate species." 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 (FSM 2670).

Upon delisting, the Utah prairie dog would be designated as a USFS sensitive species to ensure that its recovery is maintained and monitored. USFS policy (FSM 2670.32) states that all programs and activities will be reviewed in a Biological Evaluation as part of the NEPA process to determine the potential effect of such proposed activities on sensitive species. Further, the policy states that the impacts of such activities must be avoided or minimized, and any permitted activities must not result in a loss of viability or create significant trends toward Federal listing. The objective of this policy is to conserve species so that they do not become endangered or threatened because of USFS actions, and their habitats remain well distributed throughout their geographic range on USFS lands (FSM 2670.22).

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 the species' status through habitat improvements and agency cooperation (USDA 1986a, b). 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 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 I species under the CWCS. Tier I species include federally threatened, endangered, and candidate species and State Conservation Agreement species. The CWCS does not provide any regulatory mandates, but aims to cooperatively implement actions from Tier I 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, based on Utah's ongoing efforts for the past 40 years to recover the Utah prairie dog, we anticipate that 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 prairie dogs are protected wildlife under Utah Code §23-13-2(35) and, as such, it is unlawful under Utah Code §23-20-3 for any person to "hunt, pursue, harass, catch, capture, possess, trap, or kill" a Utah prairie dog. Utah prairie dogs are further protected by the Utah Nongame Mammals Rule (R657-19-6). The nongame mammals rule also supports the Federal special 4(d) rule and the Safe Harbor program. Some of these protections may still apply if the species were delisted as evidenced by similar seasonal restrictions on shooting of the white-tailed and Gunnison's prairie dogs which are not federally protected. However, the State does not provide any regulatory protection for Utah prairie dog habitats, or protection from anything beyond direct harm or mortality.

In summary, the available Federal and State regulatory mechanisms would provide some protection, but are 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. Currently, we consider the primary natural or manmade factors affecting Utah prairie dogs to be genetic diversity, climate change, vegetation community changes, invasive plants, and fire management. 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; Brown 2009a). 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 such that they are spatially distributed to provide connectivity, which will help maintain genetic diversity.

Climate Change

In general terms, "climate" refers to the mean and variability of weather conditions, such as temperature or precipitation, over a long period of time (e.g. decades, centuries or thousands of years). The term "climate change" refers to a change in the state of the climate (whether due to natural variability, human activity, or both) that can be identified by changes in the mean or variability of its properties and that persists for an extended period, typically decades or longer (IPCC 2007b).

Changes in climate are occurring. The global mean surface air temperature is the most widely used measure of climate change and based on extensive analyses the IPCC concluded that warming of the global climate system over the past several decades is "unequivocal" (IPCC 2007a). Other examples include substantial increases in precipitation in some regions of the world and decreases in other regions (for these and other examples see IPCC 2007a, 2007c; Solomon et al. 2007). Various environmental changes are occurring in association with changes in climate (see IPCC 2007a, and Global Climate Change Impacts in the United States 2009).

The average temperature in the Southwest (including the range of the Utah prairie dog) has increased roughly 0.8°C (1.5°F) compared to a 1960-1979 baseline period. 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. 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. Some non-mountainous portions of southern Utah are projected to have up to 105 days above 90°F by the end of the century (U.S. Global Change Research Program 2009).

The southwest is projected to experience significant reductions in precipitation. 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) (U.S. Global Change Research Program 2009). A 10-30% 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. Spring precipitation in southern Utah is projected to decline by 25-35% by the end of the century under a higher emissions scenario (U.S. Global Change Research Program 2009).

Climate conditions can have direct or indirect effects on species and these effects may be positive or negative depending on the species and other relevant conditions. Some of the most notable changes observed to date have involved distribution, with some species moving toward the poles or to higher elevation in a way that tracks changes in temperature (e.g., Parmesan 2006; le Roux and McGeoch 2008). These changes are resulting in novel combinations of species, sometimes including reduced species diversity (e.g., Galbraith et al. 2010). Climate-related changes are identified as the most likely principal cause of recent observed range changes (including local extirpations) in several species, and there is recognition that in some cases the effects of climate are compounded by non-climate conditions (e.g., Brook et al. 2008; Myers et al. 2009; Forister et al. 2010; Chen et al. 2011; Franco et al. 2006).

Understanding the causes of climate change is crucial to projecting future conditions. Most of the observed increase in global average temperature since the mid-20th century is very likely due to the observed increase in greenhouse gas concentrations in the atmosphere as a result of human activities, particularly emissions of CO2 from fossil fuel use, i.e., the observed warming cannot be explained by natural variability in climate (IPCC 2007a, c; Solomon et al. 2007). Therefore, to project future changes in temperature and other climate changes, scientists use a variety of climate models (which include consideration of natural processes and variability) in conjunction with various scenarios of potential levels and timing of greenhouse gas emissions (Randall et al. 2007; Meehl et al. 2007; Carter et al. 2007 and references therein; Prinn et al. 2011).

Due largely to "lag effects" of greenhouse gases already in the atmosphere, the projected magnitude of average global warming is very similar under all combinations of models and emissions scenarios until about 2030. However, thereafter the projections show greater divergence across scenarios. Despite these differences in projected magnitude, the overall trajectory is one of increased warming throughout this century under all scenarios, including those which assume a reduction of greenhouse gas emissions (Meehl et. al. 2007; Ganguly et al. 2009; Prinn et al. 2011). Some of the IPCC's other key global climate projections, which they expressed using a framework for treatment of uncertainties (e.g., "very likely" is >90% probability; see IPCC 2007b) are: 1) it is virtually certain there will be warmer and more frequent hot days and nights over most of the earth's land areas; 2) it is very likely there will be increased frequency of warm spells and heat waves over most land areas; 3) it is very likely that the frequency of heavy precipitation events, or the proportion of total rainfall from heavy falls, will increase over most areas; 4) it is likely the area affected by droughts will increase, that intense tropical cyclone activity will increase, and that there will be increased incidence of extreme high sea level (IPCC 2007b).

Numerous studies have projected climate-related impacts and possible responses of ecological systems, habitat conditions, biological diversity, groups of species, or individual species at various spatial and temporal scales (e.g., Berg et al. 2009; Euskirchen et al. 2009; Lawler et al. 2009; Loarie et al. 2009; McKechnie and Wolf 2009; Stralberg et al. 2009; Beaumont et al.

2011). These and numerous other studies generally entail consideration of three types of information that are identified as components of vulnerability to climate change: exposure to projected changes in climate, sensitivity to such changes, and adaptive capacity (IPCC 2007; Glick et al. 2011). There is no single way to conduct such analyses for every species, and the relevant aspects of exposure (e.g., temperature, precipitation, frequency and intensity of extreme events), sensitivity, and adaptive capacity can vary by species and situation, as can interactions among climate and non-climate conditions. Therefore, we do not treat climate change as a single entity, nor do we necessarily use the same approach for our analyses of different species. Rather, we use the best scientific and commercial data available to identify potential consequences to species that may arise in association with different components of climate change, including interactions with non-climate conditions as appropriate.

Observed and projected changes in climate and related impacts can vary substantially across and within different regions of the world (e.g., IPCC 2007a). While projections from global climate model simulations are informative and in some cases are the only or the best scientific information available, to the extent possible, we use "downscaled" climate projections which provide higher-resolution information that is more relevant to the spatial scales used to assess impacts to a given species (Glick et al. 2011).

With regard to the area of analysis for the Utah prairie dog, climate change projects are available to the scale of the southwestern United States, as described above. We can make certain species-specific projections and recommendations based on our available knowledge of the species' distribution and life history. 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. Continued vegetation shifts 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 projected warmer atmosphere and intensified water cycle in the southwest is likely to increase the likelihood of drought, heavy precipitation events, and flooding (U.S. Global Change Research Program 2009). Impacts from drought include loss of succulent vegetation that is necessary for Utah prairie dog abundance (Crocker-Bedford and Spillett 1981). Increased drought may thus result in range constrictions for Utah prairie dogs, or they may shift their range northward and upward to cooler and moister climates (IPCC 2007). Drought was implicated in the historical loss and drastic decline of some Utah prairie dog 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 and climate change may increase the expansion of invasive plants (BLM 2011), particularly cheatgrass (see Invasive Species, below), and this could become a factor affecting Utah prairie dog recovery. Climate change is expected to result in large-scale range shifts in invasive plant species distributions with some species expected to experience range expansions (yellow starthistle, tamarisk) and others expected to experience range contractions

(cheatgrass, spotted knapweed, leafy spurge. Cheatgrass is anticipated to shift northward, with reduced invasion risk in Utah. However, these same areas may remain at risk from other invasive species that can tolerate the changed climate conditions (Bradley 2009).

Heavy precipitation events may result in temporary increases in soil moisture. Projected changes in soil moisture content could impact epizootic 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). Alternatively, prolonged drought conditions may reduce the frequency of plague.

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 7).

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 1982). 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 adverse and beneficial impacts may be associated with vegetation community changes (also see Fire Management section below). Some of the adverse 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. Utah prairie dogs clean out their burrows immediately after mechanical treatments and vegetation can begin regrowing within days after a fire. Some planned vegetation treatments also may have beneficial impacts; for example, fire and mechanical treatments can remove shrubs, allowing for more herbaceous plants and greater visibility for prairie dogs. Additionally, planned treatments and wildfire stabilization efforts often include the reseeding of grasses and forbs. Vegetation treatments can improve habitat conditions and plant species diversity from pre-treatment levels (Player and Urness 1982). 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 7). However, this threat level is reversible through planning efforts and management measures.

Invasive Plants

Invasive plants are nonnative plant species that have adaptive characteristics such as high seed production; are aggressive and difficult to manage; are capable of invading native habitats; and can often significantly change vegetation communities and affect ecological relationships. Noxious weeds are a subset of invasive plants. They are legally designated by State or Federal law to have these characteristics and require prevention and control measures to help contain or eradicate them (BLM 2008 b, e).

Invasive plants and noxious weeds occur throughout the range of the Utah prairie dog. Some areas have higher concentrations of invasive species due to historic vegetation disturbance (BLM 2008e). For example, invasive plant species occur throughout the Richfield BLM RMP Field Office area, but most infestations are small and sparsely scattered through Sevier, Piute, Garfield, and Wayne Counties, being most prevalent below 8,000 ft (2,440 m) (BLM 2008e). The areas with the highest noxious weed concentration in the Richfield BLM planning area are in Sanpete County. Similarly, there are a wide variety of noxious weeds in the Cedar City BLM Field Office area, most notably scotch thistle—many of these are a threat to range sites which are in poorer condition due to the occurrence of annual grasses and forbs (BLM 2011). There are small, dispersed populations of noxious weeds within the Kanab BLM Field Office area, including scotch thistle (1,000 ac (405 ha) in Kane County), musk thistle (500 ac (202 ha) in Panguitch Valley), spotted knapweed (20 ac (8.1 ha) in Kane County), and hoary cress (less than 100 ac (40.4 ha) in Panguitch Valley). The Kanab BLM Field Office also identifies cheatgrass as a concern in the southern half of their planning area (BLM 2008b). BLM manages weed infestations by spraying with herbicides and hand treatments (BLM 2008b, e).

Nearly 1.6% (about 27,500 ac (11,129 ha)) of the area administered by the Fishlake National Forest is infested with noxious or other key invasive plant species. The majority of the infestations occur in large contiguous areas. Of the noxious weeds, musk thistle and scotch thistle occupy the largest areas on the Forest and they are found primarily on the Richfield, Fillmore, and Beaver Ranger Districts. Whitetop is prevalent on the Fillmore and Beaver Ranger Districts (USDA 2011). Similarly, invasive plant species occur throughout the Dixie National Forest, but the highest concentrations (92%) occur within the Pine Valley Ranger District (USDA 2008b).

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). Cheatgrass also can alter fire-return intervals and dramatically expand its range after fire (Masters and Sheley 2001; BLM 2011).

Invasive plant species are promoted by intense levels of disturbance (Masters and Sheley 2001) such as oil and gas development, agriculture, wildfire, and urbanization. Irrespective of the original type of disturbance, invasive plants can cause decreased plant diversity, which can impact weight gain and survival of prairie dogs, particularly during drought conditions (Ritchie 1998). 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. However, juniper encroachments may be more site-specific compared to the widespread nature of cheatgrass invasions.

We consider invasive plants to be a middle-tier threat for the Utah prairie (see Table 7) 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. 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.

Site-specific fire suppression, prescribed fire, and vegetation restoration activities can impact Utah prairie dogs or their habitat if such activities occur within occupied colonies. Damage to burrows may occasionally occur as a result of using heavy equipment. Smoke, fire, noise, or other fire-related disturbances may result in harassment, displacement, injury, or possible mortality of prairie dogs, or immediate post-project alteration of key habitat components (e.g., forage or vegetation 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 individuals to forage and causing an unnecessary expenditure of energy in fleeing and alerting others.

The overall threat level for fire management places it in the lowest tier of threats for Utah prairie dogs (see Table 7). 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 fire 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, this threats assessment[10] 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 available data and expertise, the Team refined the threats under each listing factor and then used the ranking criteria to determine the magnitude, exposure, response, overall threat level, and reversibility of each one.

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

[10] 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 = signification 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 threat, based on sum of scores

2 = middle tier threat, based on sum of scores

1 = lowest tier threat, based on sum of scores

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 7). 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 because it is dependent on the presence of other threats, and therefore it is not included in the matrix. 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. Numeric values for each ranking criteria were summed to determine the overall threat level for each threat—if the sum of the numeric values was between 11-14, the overall threat level was a 1; if the sum of the numeric values was between 15-17, the overall threat level was a 2; if the sum of the numeric values was between

18-21, the overall threat level was a 3. A narrative summary of the results and their implications accompanies each matrix. 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 risk if left unabated. Since we do acknowledge the potential ramification of these lower-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 over-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:

<u>Top-tier Threats</u>

- plague
- urban expansion

<u>Mid-tier Threats</u>

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

<u>Lowest-tier Threats</u>

- 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** (sum of scores)	**REVERSIBILITY**
		Scope	Immediacy	Severity	West Desert	Paunsaugunt	Awapa Plateau			
Factor A. *Habitat destruction/ modification (including fragmentation) or range curtailment*	Urban Expansion	2	3	3	3	2	2	3	3 (18)	1
	Over-grazing	2	3	2	2	2	2	2	2 (15)	3
	OHV/Recreational Uses	2	3	2	2	2	2	2	2 (15)	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
Factor B. *Overutilization*	Poaching	2	2	2	2	2	2	2	1 (14)	2
Factor C. *Disease and Predation*	Plague	3	3	3	3	3	3	3	3 (21)	2
	Predation	2	3	1	1	1	1	2	1 (11)	2
Factor E. *Threats from other natural or man-made factors*	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	2	2	2	2	2	2	1	1 (13)	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

UDWR has conducted annual spring counts of adult Utah prairie dogs at every known colony site since 1976[11]. Counts are conducted in the spring between April 1 and June 1, before the young are above ground, by 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. Based on these counts, we conclude that Utah prairie dog populations show highly variable fluctuations from year to year but are stable to increasing over the long-term (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. First, we conduct habitat enhancements at selected translocation sites before live trapping Utah prairie dogs from existing colonies and moving them to these sites.

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. Some of this may be due to the difficulty in counting individual prairie dogs and their propensity to disperse from translocation sites. High rates of mortality also may occur due to severe weather conditions, predation, plague, and illegal poisoning (Jacquart et al. 1986, McDonald 1993).

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).

[11] 1990 surveys were incomplete (i.e., they did not include private lands) due to staffing and budget limitations.

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 Plateau RU were occupied (Brown pers. comm. 2009). These totals include many of the colonies where translocations were initiated in 1972.

Importantly, it appears that we have improved translocation success over 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 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).

This improvement in translocation success over time is the result of active study and modification of methods over time. Initial translocation techniques used a method in which water was flushed down the burrow with a hose and a fan of water was sprayed across the hole; when the prairie dog tried to exit the hole, it was captured by a noose. The prairie dogs were hauled immediately to a transplant site without any prior preparation of the site (Coffeen and Pederson 1989). This method was discontinued by 1979 because of concern that some prairie dogs drowned using this technique (Coffeen and Pederson 1989).

In the 1980s, the UDWR initiated studies to monitor survival, dispersal, and habitat use by translocated prairie dogs (Jacquart et al. 1986; Coffeen and Pederson 1989). Badgers were determined to be a primary cause of failure at transplant sites. In addition, the condition, age, and sex of the prairie dogs, and the dates of translocation were important to the success of the effort (Coffeen and Pederson 1989). Based on this work, the translocation program incorporated predator control methods; limited the translocation of females to the months of July and August after they completed lactation (Coffeen 1989; Coffeen and Pederson 1989); and no longer moved juvenile prairie dogs until they reached a minimum weight of 1.10 lb (500 g) (Coffeen and Pederson 1989). These efforts improved animal survival at some sites, but survival was still low overall.

Since the 1980s, we have continued to study and modify translocation techniques with the goal of enhancing 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; installation of plastic burrows; use of retention cages and nest boxes; fencing; and plague prevention techniques (Coffeen and Pederson 1989, Truett et al. 2001, Biggins and Godbey 2002).

In 2009, the Team reviewed the translocation techniques and relevant literature and developed the 2009 Recommended Translocation Procedures. This document defines specific procedures for locating and preparing translocation sites, and for live trapping, handling, transport, releasing, monitoring, and management of animals (see Appendix D, as revised September 2011). 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 females and juveniles released in late summer) (Jacquart et al. 1986). Supplemental food and water are provided at new translocation sites to increase survival because increased energy expenditures are incurred by newly released prairie dogs due to the trapping and transport

procedures, the increased stimuli of a new environment, increased burrowing activity upon release, and increased vigilance. 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 to be present, all animals are treated with Deltamethrin prior to release at translocation sites, and translocation colonies are provided additional treatments of Deltamethrin as needed.

It is too early to determine if use of the 2009 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 2009 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 selecting a site in closer 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 be a successful part of our efforts to attain Utah prairie dog recovery goals.

1.9.3 Plague Prevention and Response

Deltamethrin and pyraperm insecticides (dusting), 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 Deltamethrin to control plague was determined to be an effective mechanism for flea control (Biggins et al. 2010). The Dixie National Forest subsequently implemented a dusting program for Utah prairie dog colonies, treating three colonies in 2005, one colony (Berry Springs) in 2007, and six colonies in 2009 (comprising most of the large colonies on the Dixie National Forest across 738 ac (299 ha)) (USDA 2009c). 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 epizootic plague outbreaks and large colonies that are at high risk of plague (see Appendix E; Utah Prairie Dog Burrow Dusting Protocol).

We are developing a range-wide plague prevention and response plan for dusting. As part of the prevention and response plan, we will work to identify a preventative dusting strategy across the species range. Following dusting, 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 and in following years 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 (i.e., dusting) in managing enzootic plague and preventing epizootic plague outbreaks.

In 2009, we investigated the effectiveness of a newly-developed systemic flea control (Imidacloprid) bait (Brown 2009b; 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 of fleas). 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 and 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 enzootic plague and epizootic plague outbreaks and increase prairie dog survival is a recovery priority.

1.9.4 Safe Harbor Agreements

The 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 range-wide. As of 2010, five individual Utah prairie dog SHAs were in place on 1,230 ac (497 ha) of habitat. 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

In this section, we describe various types of existing land protection mechanisms that are used for Utah prairie dog conservation efforts, including Federal laws, regulations, land use planning, and conservation banks. We also have initiated the process of prioritizing lands for the management and protection of prairie dogs on Federal and non-Federal lands. Ongoing habitat management is important on all protected lands, because they must be able to support active Utah prairie colonies in order to contribute to recovery.

Federal Public Lands

As described in Factor D. The Inadequacy of Existing Regulatory Mechanisms (see section 1.7.4), the Federal land management agencies operate under a variety of laws, regulations, and policies that have allowed recovery efforts to proceed on their lands. Protected Federal lands are those that are managed with an emphasis to promote the recovery and conservation of the Utah prairie dog (see Glossary, Protected Habitat).

The BLM, USFS, and NPS implement conservation measures for Utah prairie dogs, including establishing translocation sites, implementing habitat treatment projects to enhance suitability for prairie dogs, dusting with Deltamethrin to prevent and manage plague outbreaks, and conducting research efforts to better understand prairie dog ecology. The agencies also manage Utah prairie dog habitats to ensure that other land uses are compatible with the conservation of the species. As described previously, conservation measures specific to the Utah prairie dog are included in the Dixie National Forest Motorized Travel Plan, and the Kanab and Richfield RMPs relative to OHV use and energy resource exploration and development (see section 1.7.1). The Richfield and Kanab RMPs (BLM 2008a, 2008b) also include conservation measures for actions that would affect Utah prairie dogs or habitat. These measures include wildfire response, translocation efforts, timing restrictions, and monitoring.

Conservation Banks

Conservation banks are a means to collectively provide mitigation in an effective manner to offset the impacts of habitat loss. Conservation banks allow us to mitigate small, isolated impacts with large, protected habitats that provide landscape level conservation for species, including the Utah prairie dog. To date, two Utah prairie dog conservation banks are approved: 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. SITLA is an independent agency which manages 3.4 million ac (1.4 million ha) of trust land for the benefit of 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. 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; as of 2011 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 the 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 an active Utah prairie dog colony; however, Utah prairie dogs were translocated to the site in 2011 (Kavalunas 2011d, pers. comm.), and we will monitor the success at that site. The bank 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 RU. As such, the protection of this land will benefit the long-term conservation and recovery of the Utah prairie dog.

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 help reach our recovery goals.

Utah Prairie Dog Habitat Credit Exchange

The Utah Prairie Dog Habitat Credits Exchange Program (HCEP) 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. HCEP 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).

Through the HCEP, an administrator (in this case the Panoramaland RC&D) 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, below) to mitigate their impacts to prairie dogs. HCEP 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). The pilot program began in 2011 with the purchase of two conservation easements.

Other Protected Lands

In 2001, the UDWR and Iron County purchased 181 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

Section 10 (A)(1)(B) of the ESA authorizes incidental take on non-Federal lands through development of HCPs. In order for a non-Federal landowner or project proponent 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 2011, there are three active HCPs including: the Iron County HCP, the Golf Course HCP, and the Connell Gower HCP. Each of these is 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 were issued in 2007 and remain 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 F) 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 specific seed mixes for post-project reclamation or habitat restoration projects.
- 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.

USFWS is 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.

For example, we recently completed a programmatic ESA Section 7 consultation with the Federal Aviation Administration (FAA) regarding effects of airport maintenance and development activities on the Utah prairie dog over the next 15 years. Through this programmatic consultation, we worked with FAA and Utah State Aeronautics Division to develop strategies that minimize impacts to Utah prairie dogs while allowing important maintenance (safety) and development projects to proceed in a streamlined manner. In addition, as part of the proposed action FAA provided $956,586 (calculated based on the acreage of anticipated habitat impacts) as mitigation to be used for Utah prairie dog conservation actions in other locations. We are working with SITLA and The Nature Conservancy to potentially use these funds to purchase SITLA properties in Garfield County that are important for Utah prairie dog recovery. The Nature Conservancy's involvement in this process will ensure that the County still receives tax payments on the property. This Section 7 consultation results in the ability of airports to continue their activities in a streamlined manner and provides funding to assist with species' recovery—an overall win-win scenario.

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 (UPDRIT 1997).

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

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.

UDWR employees regularly address Southern Utah University classes. Lectures at Southern Utah University have included presentations to biology, agriculture, social science, and English classes, and often incorporate visits to active Utah prairie dog colonies. Additional classroom visits are made to other local public schools as requested.

Southern Utah University is working to develop an experimental research and wildlife viewing program at the school's Valley Farm to coordinate agricultural operations and Utah prairie dog conservation. 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. USFWS also has attended several County Commissioner meetings to discuss general Utah prairie dog topics as well as outreach on the special 4(d) rule for prairie dogs.

1.9.10 Utah Prairie Dog Recovery Implementation Program

The Utah Prairie Dog Recovery Implementation Program (UPDRIP or "Program") is a public-private partnership to coordinate the recovery of the Utah prairie dog while balancing and accommodating land uses and needs of the human population throughout the species range. The UPDRIP partnership includes representatives from the USFWS, Utah Department of Natural Resources (UDNR), USFS, BLM, Natural Resources Conservation Service, NPS, UDWR, School and Institutional Trust Lands Administration (SITLA), Iron County, Garfield County, Wayne County, Piute County, Utah Farm Bureau, Panoramaland Resource Conservation and Development Council, Color Country Resource Conservation and Development Council, local municipalities, and environmental interests.

UPDRIP was formalized in 2010, and the partnership is still in its early stages. There is currently limited funding available to pursue landscape-level conservation efforts for recovery of the species. However, the Program has already become a valuable tool for increasing coordination efforts and is making initial strides to formulate annual and long-range work plans for Utah prairie dog conservation. In addition, the support of UPDRIP partners has already proven important in obtaining some funding from various grant programs. Supporting and building the UPDRIP partnership into the future is essential if we are to recover the Utah prairie dog. More information on the Program and current updates on its efforts can be found at the UPDRIP website: http://suu.edu/ad/regional/updrip/

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 1982). 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 recovery is dependent on protecting or establishing a sufficient number and distribution of colonies across the landscape within all three of 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 of 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. Loose Utah prairie dog 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 three 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 the three RUs, and where the long-term conservation of the ecosystems is ensured.

Utah prairie dog populations that must be sustained to reach recovery are designated as RUs. As previously described, these RUs include the West Desert, Paunsaugunt, and Awapa Plateau. 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 reducing 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, over-grazing, cultivated agriculture, vegetation community changes, invasive plants, OHV and recreational 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 fragmentation, and plague. Therefore, this recovery strategy for the Utah prairie dog focuses our attention on habitat loss and fragmentation 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 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 proximity 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 and fragmentation 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 in perpetuity 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 Management 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 Management and Restoration on Federal Lands, below). However, at this time, we believe that a combination of non-Federal and Federal lands will be needed to achieve 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 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, SHAs, 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 accomplished 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 thus contribute toward 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.

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 contributing toward recovery will include protected Federal lands and other habitats protected in perpetuity (i.e., fee title acquisitions, conservation easements). Temporarily protected habitats also may be included under certain conditions. For example, 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 a mechanism would be developed to continue these types of agreements 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 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 a certain acreage of Utah prairie dog habitat in conservation status. There may be other available mechanisms that we can develop to achieve similar results. This 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.

Habitat Management and Restoration on Federal Lands

Recovery efforts for the Utah prairie dog to date have 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 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., see the Berry Springs translocation site as discussed in section 1.9.2, Translocations). Ultimately, if we are able to improve habitats and increase the numbers of colonies on Federal lands, 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; to improve our ability to restore Utah prairie habitats and connectivity on Federal lands; to study translocation successes and failures to improve our effectiveness, and to 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. Epizootic 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 enzootic 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 prevent epizootic plague outbreaks and manage enzootic plague (see section 1.9.3, Plague). Insecticides (e.g., Deltamethrin) 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, 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 epizootic plague outbreaks and conservation responses on a range-wide level so that we can be as effective as possible in responding in a manner that provides the most biological benefit. This strategy will take the form of a formal interagency plague prevention and 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 perpetuity in each RU (West Desert, Paunsaugunt, and Awapa Plateau). These occupied habitat criteria will be spatially distributed to provide sufficient connectivity and gene flow within each RU.

2. At least 2,000 adult animals (at least 1,000 counted adults in the spring counts) are present in each RU (West Desert, Paunsaugunt, and Awapa Plateau) within protected habitat for 5 consecutive years.

3. Management strategies are in place to prevent and respond to threats from disease.

4. Education, outreach, and public relations programs and State and/or local regulations are in place and are sufficient to minimize illegal take, manage legal lethal control post-delisting, and foster habitat management practices.

5. Utah prairie dog-specific adaptive management strategies are in place on protected lands to improve suitable habitat in a manner that will facilitate management responses to changing climatic conditions and other threat 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). An 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 that 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. Therefore, recovery objective 1 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 despite the environmental variability that occurs throughout their range will promote the long-term sustainability of the species.

Designation of recovery units has implications for 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 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 for each population to achieve an effective population size (N_e) of 500 Utah prairie dogs (Ritchie pers. comm. 2007, 2009, 2011; see Appendix G for more information). Effective population size is a theoretical standard used to estimate the retention and loss of genetic variation in a real population of Utah prairie dogs.

Effective population size generally refers to an idealized population in which individuals mate randomly and all contribute equally to reproduction. In this hypothetical ideal population, all individuals pass on an equal number of their genes to subsequent generations. The actual

population size is almost always higher than the effective population size, because several characteristics of animals and populations act to make the genetic contribution of individuals to subsequent generations unequal. For example, some pairs or individuals may consistently produce more offspring than others, and some individuals live longer than others. It is mainly this variation in reproductive success that makes effective population size less than actual size.

Effective population size is the number of breeding individuals in a Utah prairie dog population necessary to maintain genetic diversity and viability. The effective population size itself is not measured directly; it is calculated using formulas based on genetic theory and demographic data collected from real Utah prairie dog populations. These estimates of effective population size account for both the female-biased sex ratios within Utah prairie dog populations and for the annual variability in adult counts (Ritchie pers. comm. 2011). The effective population size of N_e=500 also assumes that our other recovery objectives and criteria are successfully met, particularly that protected Utah prairie dog colonies are situated such that connectivity (Ritchie pers. comm. 2011) and genetic flow are maintained across the landscape.

We have calculated that an effective population size of N_e = 500 is sufficient to maintain genetic variance and diversity (see Appendix G). This is equivalent to an actual 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. While we believe our actual population size calculation of 2,000 individuals per population is reasonable given the available information, we will revisit this calculation should future data indicate our assumptions are incorrect.

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 range-wide, which is 0.4 prairie dogs per acre (~1 prairie dog per hectare). Specifically, the goal of 2,000 adult prairie dogs in each RU was divided by 0.4 prairie dogs 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 (e.g. higher densities are found in the West Desert RU, while lower densities are found in the Awapa Plateau), we believe it is appropriate to use an average given our understanding of the available information.

Specifically, we do not believe the 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 population levels on areas such as alfalfa fields and golf courses. Because these areas are managed with unnaturally high amounts of water, they result in more consistent and productive vegetation resources than support the species in their natural environment. 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 Plateau 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 (Artemisia nova) and big sagebrush (A. tridentata)), which make 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 Plateau RU (see section 1.3.2, Current Distribution and Abundance).

However, not all of the lower-density estimates in the Awapa Plateau 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 RUs, 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.

Given the lower density estimates in the Awapa Plateau, it is possible that a larger area of protected habitat could be needed to protect the number of adult animals needed for recovery. However, even if we underestimated the amount of protected acreage needed in the Awapa Plateau 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 are not sufficient to support 2,000 adult animals in the Awapa Plateau RU, this criterion ensures that we will not delist the species 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 Plateau RU (see Table 2) provide reasonable assurance that 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 criterion 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 be reclassified from endangered to threatened or to be delisted. 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, new information on the species may become available that was not known at the time the recovery plan was finalized. 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 Plateau 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 Plateau RU. Plague management also may play a role in our ability to increase Utah prairie dog populations in all RUs. Another scenario is that we may find that the Awapa Plateau 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 and habitat 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 of 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 recovery of the species.

3.5 Recovery Action Outline

1. Evaluate and update the occurrence and distribution data, maps, and survey efforts for the Utah prairie dog across its known range, as information becomes available.

1.1. Continue agency cooperation on Utah prairie dog surveys and annual population monitoring using existing protocols throughout the designated RUs. Consider other population monitoring techniques, such as occupancy modeling, as appropriate to improve our understanding of range-wide Utah prairie dog distribution and trends.

1.2. Cooperatively expand Utah prairie dog surveys to unmapped but potential habitat to document the species' distribution.

1.3. Continue to review and, if necessary, revise the boundaries of the three RUs.

2. Conserve sufficient acreages and distribution of occupied Utah prairie dog habitat on Federal, State, Tribal, and private lands.

2.1. Prioritize Utah prairie dog habitat for protection and management.

2.2. Conserve habitat on non-Federal lands.

2.2.1. Permanently protect habitat on non-Federal lands.

2.2.1.1. Protect habitat through conservation easements and fee acquisition from willing sellers.

2.2.1.2. Expand market-based and other financial incentives for private landowners who enter into permanent agreements to manage or restore habitat.

2.2.1.3. 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. Manage 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.

2.4 Work with State and local governments to provide regulatory and habitat protection for the species pre- and post- delisting

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

3.1. Develop and implement a plague prevention and response plan. This should include prioritizing focal areas and timeframes for preventative treatments.

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 the capability and implement actions as needed 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.

5.3. Implement translocations in accordance with the Recommended Translocation Procedures to increase the number of Utah prairie dog colonies throughout the species' range.

6. Develop and implement a public outreach program that promotes a better understanding of and appreciation for 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 use, seismic exploration activities).

7.6. Develop and implement research priorities to improve our understanding of dispersal habitat.

7.7. 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 the 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.

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. Emphasis will be placed not only on currently occupied habitat, but focus also on dispersal habitats that the species uses between colonies. Prairie dog colonies will be mapped and recorded in UDWR's database. This information is useful for continually assessing the status and distribution of the Utah prairie dog, the effects of ongoing and proposed land use activities, and the identification of high priority habitats for protection and management (occupied habitats and habitats important for dispersal). The database also can be used to assist with local, State, and Federal land use planning efforts.

1.1. Continue agency cooperation with Utah prairie dog surveys and annual population monitoring using existing protocols, throughout the designated RUs (Priority 2). Consider other population monitoring techniques, such as occupancy modeling, as appropriate to improve our understanding of range-wide Utah prairie dog distribution and trends.

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.

The Utah prairie dog monitoring program was recently reviewed in a report by the United States Geological Survey (McDonald et al. 2011). Their primary recommendation was to modify our survey protocol to accommodate occupancy surveys and modeling methodologies similar to white-tailed prairie dog and Gunnison's prairie dog programs. We will evaluate this recommendation in future reviews and revisions to existing protocols.

1.2. Cooperatively expand Utah prairie dog surveys to unmapped but potential habitat to document the 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 the RUs. In particular, the Awapa Plateau RU is an expansive area with small colonies spread over large distances with limited road access. As these surveys, methodologies, and monitoring techniques improve, underestimated density levels could 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 sufficient acreages and distribution of occupied Utah prairie dog habitat on Federal, State, Tribal, and private lands.

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

We will continue to prioritize Utah prairie dog habitats for protection, taking into consideration spatial distribution, colony size, colony persistence, and connectivity between habitats. Utah prairie dog habitats within developed areas or areas of human safety concern would likely not be prioritized due to their location in already fragmented landscapes and potential impacts to public support for prairie dog recovery.

2.2. Conserve habitat on non-Federal lands.

Due to the importance of private lands and the habitat they contain, it is likely necessary to conserve some 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, as well as regulatory assurances that will protect their interests.

2.2.1. Permanently protect habitat on non-Federal lands.

2.2.1.1. Protect habitat 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.

2.2.1.2. 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.

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

This fund will be used 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.

2.3. Manage and improve Utah prairie dog habitat on Federal lands.

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 1).

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 of this kind that focus on benefiting Utah prairie dogs.

Habitat improvements may be especially important on the Awapa Plateau RU. The Awapa Plateau RU has a large amount of dense sagebrush, which may limit colony size as well as hinder survey efforts for the species. Achieving the recovery goal of at least 2,000 adults on the Awapa Plateau RU may require an area larger than 5,000 acres of protected habitat due to the low densities of prairie dogs in this RU. However, 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 1).

Multiple uses on public lands need to be balanced with minimizing adverse 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 the guidelines in 2.3.2 when appropriate (Priority 1).

Incorporating guidelines that minimize adverse impacts to Utah prairie dogs into Federal land use plans is key to demonstrating that regulatory mechanisms are 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.

2.4 Work with State and local governments to provide regulatory and habitat protection for the species pre- and post- delisting (Priority 3).

Without the ESA's protection or mechanisms such as the 4(d) special rule, unregulated killing of Utah prairie dogs or habitat destruction may occur (see section 1.7.4). Thus there is a need to work with the local and State governments to ensure that shooting of Utah prairie dogs is regulated to an extent that would ensure the long term survival of the species post-delisting.

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

Disease threats to Utah prairie dogs include sylvatic plague *(Yersinia pestis)* and other diseases. Although little is known regarding long-term impacts of these diseases to Utah prairie dogs at the population level – and even less is known 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 treatments should occur (Priority 1).

The Team will develop and implement a plague prevention and response plan that will direct agency and private landowner response to potential enzootic plague presence and epizootic plague outbreaks throughout the species' range. This plan will define protocol methods to confirm the presence of plague, prevent plague occurrences, respond to plague presence and outbreaks, and track and record

plague-associated activities. The plan will include financial incentives to private landowners to treat plague 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 (focal areas), stockpile and maintain supplies for handling disease presence and outbreaks, training personnel to respond to presence and 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 the 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 enzootic plague presence and epizootic plague outbreaks. This information will be critical to dovetail with response efforts. This monitoring program will be a multi-agency effort that will involve scheduling regular visits to impacted sites to monitor populations; ensuring incident response is effective and adjusting protocols if necessary; and developing 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 and alterations to Utah prairie dog habitat (e.g., drought, fire) (Priority 3).

Disturbance to occupied Utah prairie dog habitat can have adverse and beneficial 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 steps to evaluate the disturbance, respond to the disturbance, and develop 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.

Translocation efforts have been part of recovery efforts since listing of the species 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 (see Appendix D).

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

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

5.3. Assist with implementation of translocations in accordance with the Recommended Translocation Procedures to increase the number of Utah prairie dog colonies throughout the species' 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 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.

Having public support is a critical element to the successful recovery of the Utah prairie dog. The public education program should include information about the ESA and the laws that protect the Utah prairie dog and its habitat, but also focus on the beneficial role that this 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, vegetation height and density, vegetation 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 Utah prairie dogs can successfully 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 by having them educate other citizens about the ecological role of Utah prairie dogs, the value of species protection and methods to accomplish it, and responsible means of recreation. A good opportunity for this program may be to educate OHV users in popular OHV use 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.

This action will be an evolving process to assess research priorities based on current threats to the species and to implement 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 translocation success of Utah prairie dogs through continuing research to better understand vegetation requirements for release sites, the value of predator control, and methodologies to increase retention of prairie dogs at the release site (e.g., using nest boxes, moving animals in family groups).

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

As mentioned previously, a current research priority is the oral plague vaccine being developed by the U.S. Geological Survey and other Federal agencies. This vaccine 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. This is particularly important if isolated populations of Utah prairie dogs result in restricted gene flow and impact the effective population size criteria.

7.5. Develop and implement research priorities to assess impacts of various actions to Utah prairie dogs and their habitat (e.g., OHV, seismic exploration activity) (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. Develop and implement research priorities to improve our understanding of dispersal habitat (Priority 3).

Maintaining connectivity between Utah prairie dog colonies is an important aspect of supporting viable populations that are spatially distributed in a manner to facilitate recovery. Obtaining more information about what types of habitats Utah prairie dogs utilize for dispersal will assist in identifying corridors between colonies.

7.7. 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.

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 section 3.0 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 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 REVISED RECOVERY PLAN													
Priority#	**Action#**	**Action Description**	**Recovery Criterion #**	**Action Duration (Years)**	**Responsible Parties**	**USFWS Lead?**	**Total Cost $1000s**	**Year 1 $1000s**	**Year 2 $1000s**	**Year 3 $1000s**	**Year 4 $1000s**	**Year 5 $1000s**	**Comments**
1	2.1	Prioritize habitat for protection and management	1	30	Team	Y	310	20	10	10	10	10	Based on travel time for Team, help from GIS person, & an annual review. Y01 @ $20K & $10K every year after.
1	2.2.1.1	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	2.2.1.2	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	2.2.1.3	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 Y01 to Y10, then $25K annually.

IMPLEMENTATION SCHEDULE: UTAH PRAIRIE DOG REVISED RECOVERY PLAN													
Priority#	**Action#**	**Action Description**	**Recovery Criterion #**	**Action Duration (Years)**	**Responsible Parties**	**USFWS Lead?**	**Total Cost $1000s**	**Year 1 $1000s**	**Year 2 $1000s**	**Year 3 $1000s**	**Year 4 $1000s**	**Year 5 $1000s**	**Comments**
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 Y01 to Y05, then 50K annually thereafter
1	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
1	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 @ Y01 & Y02, $30K @ Y03, & $20K annually thereafter
1	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 Y01 to Y04, then $150k @ Y05 & Y06, then $40k every 5th year thereafter

IMPLEMENTATION SCHEDULE: UTAH PRAIRIE DOG REVISED RECOVERY PLAN													
Priority#	**Action#**	**Action Description**	**Recovery Criterion #**	**Action Duration (Years)**	**Responsible Parties**	**USFWS Lead?**	**Total Cost $1000s**	**Year 1 $1000s**	**Year 2 $1000s**	**Year 3 $1000s**	**Year 4 $1000s**	**Year 5 $1000s**	**Comments**
1	3.1	Develop & implement a plague prevention & response plan. This should include prioritizing focal areas and timeframes for preventative treatments	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 $ @ Y01, 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	Cooperatively expand surveys to unmapped but potential habitat to document the species' distribution	2	5	FB, RC&D, UDWR, USFS, BLM, NPS	Y	150	30	30	30	30	30	$30K for Y01 to Y05 then no $ 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

IMPLEMENTATION SCHEDULE: UTAH PRAIRIE DOG REVISED RECOVERY PLAN													
Priority#	**Action#**	**Action Description**	**Recovery Criterion #**	**Action Duration (Years)**	**Responsible Parties**	**USFWS Lead?**	**Total Cost $1000s**	**Year 1 $1000s**	**Year 2 $1000s**	**Year 3 $1000s**	**Year 4 $1000s**	**Year 5 $1000s**	**Comments**
2	5.3	Implement translocations in accordance with the Recommended Translocation Procedures to increase the number of Utah prairie dog colonies throughout the species' 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 Y03
2	7.1	Develop & implement research priorities to improve translocation efforts	2	7	Team	Y	140	20	-	-	-	20	Develop in Y01 & 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 Y02 & update every 5th year thereafter

IMPLEMENTATION SCHEDULE: UTAH PRAIRIE DOG REVISED RECOVERY PLAN													
Priority#	**Action#**	**Action Description**	**Recovery Criterion #**	**Action Duration (Years)**	**Responsible Parties**	**USFWS Lead?**	**Total Cost $1000s**	**Year 1 $1000s**	**Year 2 $1000s**	**Year 3 $1000s**	**Year 4 $1000s**	**Year 5 $1000s**	**Comments**
2	7.5	Develop & implement research priorities to assess impacts of various actions to species & its habitat	5	7	Team	Y	140	20	-	-	-	20	Y01 & every 5th year thereafter
2	8.1	Maintain technical working group to regularly review status of species & track effectiveness of recovery actions	5	29	Team	Y	1,450	-	50	50	50	50	Maintaining technical working group includes meeting annually & researcher time/travel, beginning Y02
2	8.2	Develop monitoring protocols to assess effectiveness of recovery actions	1, 2	7	Team	Y	160	40	-	-	-	20	Develop in Y01 & update every 5th year thereafter
2	8.3	Identify recovery applications of research results	all	10	Team	Y	300	-	-	30	-	-	Applicable every 3rd Y thereafter
3	1.3	Review &, if necessary, revise boundaries of three RUs	1	7	Team	Y	90	30	-	-	-	10	Y01 & every 5th year thereafter

IMPLEMENTATION SCHEDULE: UTAH PRAIRIE DOG REVISED RECOVERY PLAN													
Priority#	**Action#**	**Action Description**	**Recovery Criterion #**	**Action Duration (Years)**	**Responsible Parties**	**USFWS Lead?**	**Total Cost $1000s**	**Year 1 $1000s**	**Year 2 $1000s**	**Year 3 $1000s**	**Year 4 $1000s**	**Year 5 $1000s**	**Comments**
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	Y01 @ $50K & $30K every 5th year thereafter
3	2.4	Work with State and local governments to provide regulatory and habitat protection for the species pre- and post- delisting	4	30	Team	Y	150	5	5	5	5	5	Y01 @ $5K & every year thereafter
3	3.3	Identify other diseases that may impact species	3	6	Team	Y	1,300	-	-	-	-	50	Starting Y05 & every year thereafter
3	4.	Develop & implement capability to respond to natural disturbances and alterations (e.g., drought, fire)	5	26	Team	Y	1,300	-	-	-	-	50	Begin Y05 @ $50K annually thereafter

IMPLEMENTATION SCHEDULE: UTAH PRAIRIE DOG REVISED RECOVERY PLAN													
Priority#	**Action#**	**Action Description**	**Recovery Criterion #**	**Action Duration (Years)**	**Responsible Parties**	**USFWS Lead?**	**Total Cost $1000s**	**Year 1 $1000s**	**Year 2 $1000s**	**Year 3 $1000s**	**Year 4 $1000s**	**Year 5 $1000s**	**Comments**
3	5.2	Review &, as necessary, amend Recommended Translocation Procedures document	2	7	Team	Y	260	20	-	-	-	40	Y01 @ $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	Y04 @ $100K & $50K annually thereafter
3	6.3	Publish & distribute habitat management guidelines for private lands	4	10	ED, FB, RC&D, NRCS	N	1,350	100	80	30	30	80	$100K in Y01 for development & distribution of pamphlets; $30K annually for pamphlets, with $80K in Y02; & 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	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 @ Y01 & $10K annually for program support thereafter

IMPLEMENTATION SCHEDULE: UTAH PRAIRIE DOG REVISED RECOVERY PLAN													
Priority#	**Action#**	**Action Description**	**Recovery Criterion #**	**Action Duration (Years)**	**Responsible Parties**	**USFWS Lead?**	**Total Cost $1000s**	**Year 1 $1000s**	**Year 2 $1000s**	**Year 3 $1000s**	**Year 4 $1000s**	**Year 5 $1000s**	**Comments**
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	Develop and implement research priorities to improve our understanding of dispersal habitat.	1	30	Team	Y	140	20	-	-	-	20	Every 5th year
3	7.7	Review research & monitoring plans annually	all	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

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APPENDIX B

Utah Prairie Dog Recovery Unit Boundary Descriptions[12]

WEST DESERT

Beaver County C	All lands west of R5W and south of T27S; also including all lands within T27S R16W, T27S R17W and T27S R18W
Iron County C	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 C	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 C	All lands west of R1W, but excluding T31S R2W
Kane County C	T38S R4½ W, T38S R5W and T38S R6W
Piute County C	Sections 25, 26, 35 and 36 of T30S R5W

AWAPA PLATEAU

Garfield County C	All lands north of T33S, east of R2W and west of R4E; also all lands within T31S R2W
Piute County C	All lands east of R3W (R2½W)
Sevier County C	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 C	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

[12] 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 50ºF. 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 (1975). This research indicates that 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. Currently, UDWR implements a 50% average rate for count accuracy. Spring adult counts are thus multiplied by two to estimate the adult population.

APPENDIX D

Recommended Translocation Procedures for Utah Prairie Dogs

2009

(as revised September 2011)

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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 are also required by the State of Utah and/or the land management agency.*

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 substantial 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. A Revised Recovery Plan was completed and signed in 2012. Translocation of Utah prairie dogs was identified as a recovery action in the 1991 and 2012 Recovery Plans 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 (Jacquart et al. 1986, Truett and Savage 1998). In addition, the sex, age, and condition of the animals is taken into consideration. For example, 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 et al. 1986). Limiting the translocation of females to the months of July and August after they completed lactation and have recovered their weight to approximately 1.65 lb (750 g) (Coffeen 1989; Coffeen and Pederson 1989); and moving juvenile prairie dogs only after they reach a minimum weight of 1.10 lb (500 g) (Coffeen and Pederson 1989) appears to increase survival rates.

The incorporation of the aforementioned methods into the initial translocation protocol has improved translocation success since early 1970s efforts. For purposes of translocation recovery actions, which are 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 RUs and land management agencies. Deviation from these guidelines will be considered by the USFWS when 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 the risk of exposure to plague. Historic areas also can be considered for recolonization. "Vacant" colonies may be used the next season if the burrows and

the translocated dogs are dusted prior to translocation[1]. 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, such as dusting or vegetation treatments, to address declines.

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 - 20% ground cover

Cool season grasses: 12 - 40% ground cover

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

Shrubs: 0 - 8% ground cover and < 10% canopy cover

Minimum number of plant species: 10 (>20 plant species preferred)

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.

Old Colonies

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

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

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, plastic tubing with nest boxes, and augered 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).

Augered Holes

Augered 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 augered holes will be drilled using a 4 in. (0.10 m) diameter 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 by 2 ft (0.61 m) wide 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. TRAPPING[2]

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 should be documented, as well as the release cage receiving the animal.

Seasonal trapping guidelines are as follows:

- Adult male prairie dogs can be translocated to a site beginning April 1.

- Adult females and juveniles can be translocated July 1-August 31 (or the Friday of that week), but only when the prairie dogs meet the weight requirement of 1.10 lbs (500 g).

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 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.

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[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 for translocation and associated activities are required by the State of Utah and the administering land management agency.*

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). This requirement is to ensure that juvenile prairie dogs can survive the translocation. 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 the 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

In the second year, 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.

In the third year, 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.

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.

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

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 D-4. 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 two, 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 D-4 can be used to evaluate conditions at existing sites and determine the need for habitat improvement projects. Other information to consider would be the vegetation 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 D-4.

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 should be visited weekly from April 1 to June 30.

LITERATURE CITED for APPENDIX D

Jacquart, H.C., J.T. Flinders, M.P. Coffeen, and R. Hasenyager. 1986. Prescriptive Transplanting and Monitoring of Utah Prairie Dog (Cynomys parvidens) Populations. Unpublished Report. Utah Division of Wildlife Resources, Salt Lake City, UT. 70 pp.

Truett, J.C., J.L.D. Dullum, M.R. Matchett, E. Owens, and D. Seery. 2001. Translocating prairie dogs: a review. Wildlife Society Bulletin 29:863-872.

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LIST OF APPENDICES TO APPENDIX D

APPENDIX 1: Vegetation Definitions

APPENDIX 2: Diagram of Artificial Burrow Preparation

APPENDIX 3: Ear Tag Placement Procedures

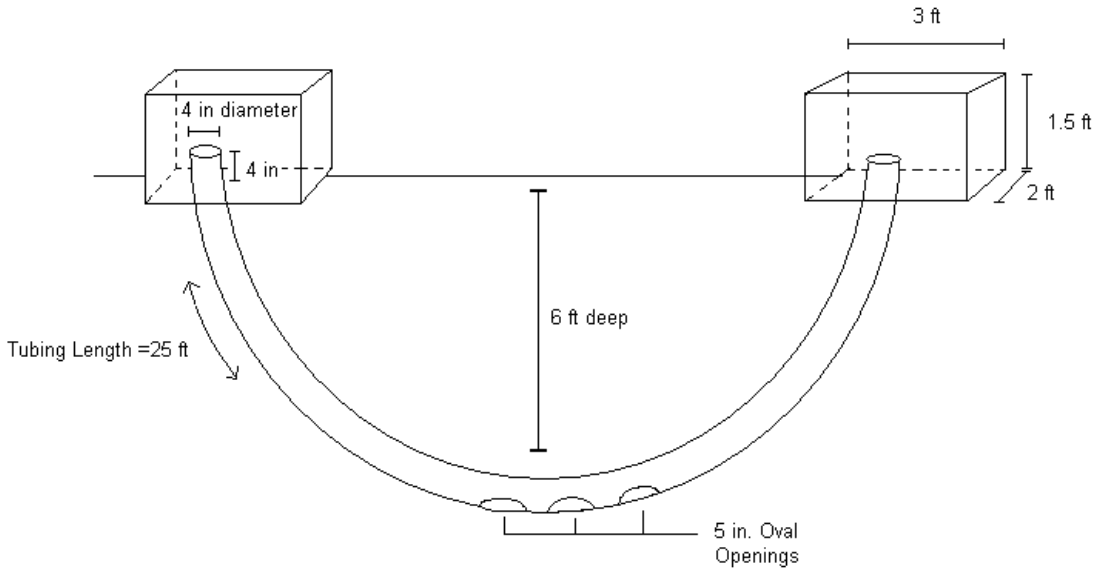
APPENDIX 4: Methods to Weigh and Age Utah Prairie Dogs

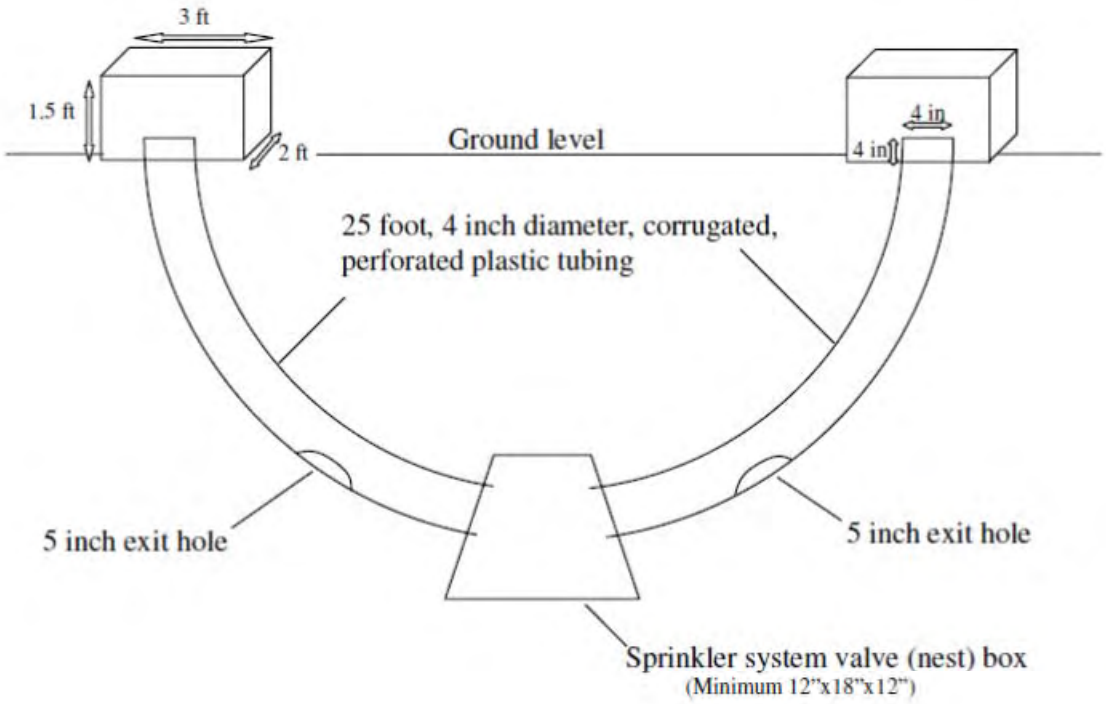
APPENDIX 5: Step-Point Method

APPENDIX 1: Vegetation Definitions

VEGETATION 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 plants other than those in the grass family (Poacae). Must be palatable and provide nutritional value to prairie dogs.	Astragalus, alfalfa, aster, Cymopterus spp., buckwheat, fleabane, Penstemon spp., cinquefoil, phlox, globemallow, vetch, Cryptantha 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 is made by visually inspecting the posterior portion of the ventral surface of the animal. If the sex organs are directly adjacent (anteriorly) to the anus, then the individual is a female. If the sex organs are separated by 1-2 inches from the anus in the anterior direction, then the individual is determined to be a male.

Age class determination of Utah prairie dogs can be extremely subjective. Age classes can be broken down by sex of the animal:

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

Other characteristics are used in the field to determine age class including breeding condition (i.e. lactation in females), coat condition, and time of year.

** 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 Interim 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 vegetation community, which is generally June and July.

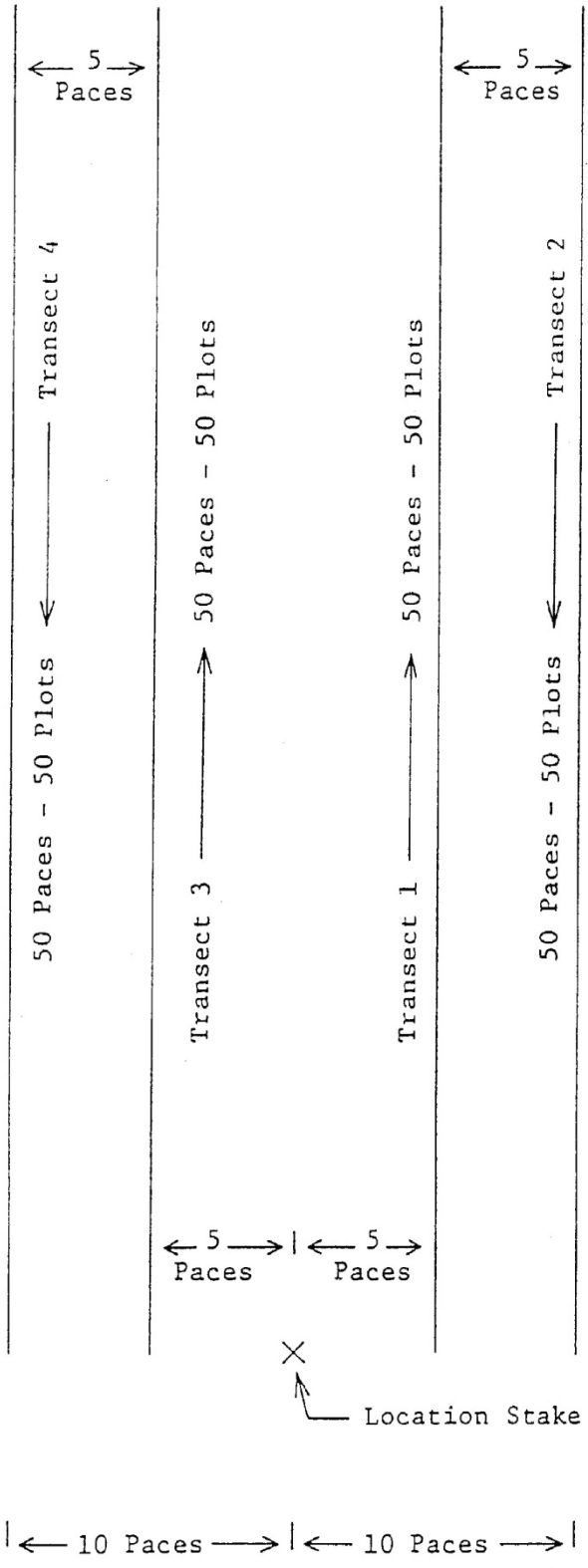
Procedures

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 five 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

STEP POINT METHOD STUDY LAYOUT



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. Due to the presence of enzootic plague and the potential risk of epizootic plague outbreak, responsible agencies may initiate preventative 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 Implementation 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 Office of Public Health in Albuquerque at (505) 248-7806. Also notify National Park Service, Biological Resource Management Division in Fort Collins, CO at (970) 225-3592.
- Bureau of Land Management: Threatened and Endangered Species Coordinator, Utah State Office, (801) 539-4001
- U.S. Forest Service: Wildlife Program Manager, Dixie National Forest, (435) 865-3700
- State: 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 Deltamethrin label (or other insectices that may be used). Deltamethrin is not a restricted-use pesticide and can be purchased over the counter (contact information below). The Deltamethrin label can be viewed at http://www.myadapco.com/res/pdf/labels/DeltaDust%20Label.pdf.

Deltamethrin applicators are required to be certified and obtain pesticide-use permits, 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 deltamethrin and the application equipment are stored in the appropriate storage facility with the USFS 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. The USFS Biologist in Panguitch at (435) 676-9300 is the contact to access the equipment once approval has been made by USFWS. For coordination with USFWS, contact (801) 975-3330.

If there is no Deltamethrin 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 (702-740-5320), 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 Deltamethrin is required.

DURING APPLICATION

Materials you will need:

* Appropriate PPE
* Deltamethrin 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 toward the person applying it.

To apply the Deltamethrin:

(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 Deltamethrin.

(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 Deltamethrin. Approximately 0.01 pounds (5 grams) of Deltamethrin are required to treat a single burrow (D. Biggins, pers. comm.). Pre-measure the 0.01 pounds (5 grams) of Deltamethrin into a container for a reference of application rate.

(5) Keep track of the amount of deltamethrin applied (in pounds) as well as the total number of burrows and acres treated.

POST APPLICATON

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 <u>not</u> 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 C 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 C 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%) of the 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.

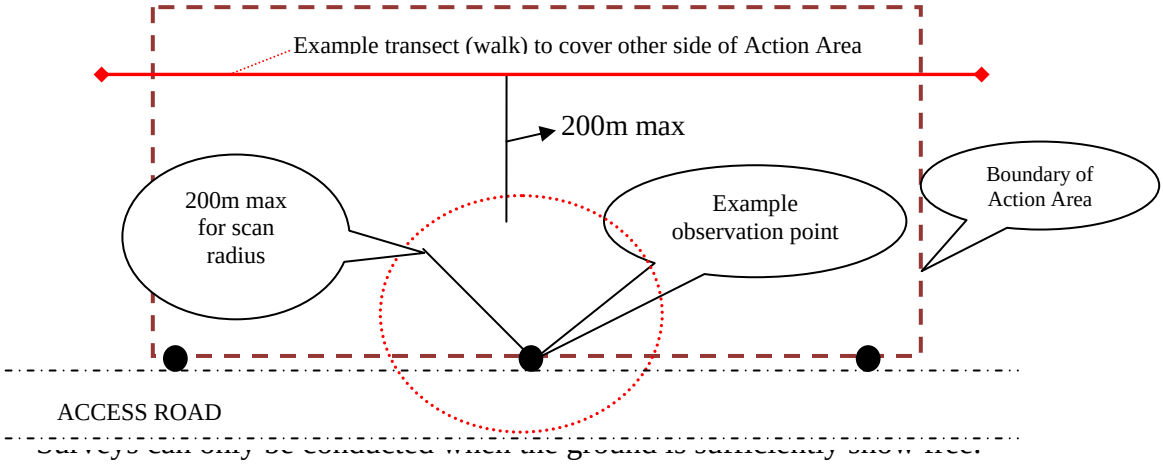
- Low Intensity Level Surveys:

  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 miles (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.



Surveys can only be conducted when the ground is sufficiently snow free.

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%) of the 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 F-1.

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 vegetation 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.

Utah Prairie Dog Occupancy / Habitat Survey Form **Page ____ of ____**

Summary Information:

Project Name:_____ Start Survey Date:____/____/_____ End Survey Date:____/_____/_____

Project Location: T.____ R.____ Section(s)_____ ¼ ¼ _____ County:_____

Acres of Suitable Habitat surveyed in Action Area:_____ Buffer Type (check one): ☐350-foot buffer ☐0.5-mile buffer

Survey Season (check one): ☐Active Season ☐Dormant Season

Surveyors:_____ Surveyor Organization/Agency:_____

Location Description:_____

Comments:_____

Site-Specific Information (fill out the information below only when Utah prairie dog habitat has been identified):

Polygon ID #	Polygon Status (O or U)	Start Time	Land Use	UPD Burrows & Other Sign (Y/N)					UPD Counts (Total #)	Cloud Cover	Wind Speed	NOTES (For each Utah prairie dog habitat polygon, note presence of other spp. burrows if known, and habitat description)
				Any Functional Burrows?	Vocalizations	Scat	Tracks	Digging				

- 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 17 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]).

APPENDIX G

Population Viability Analyses and the Determination of (N_e) Across Recovery Units in the Federally Threatened Species, The Utah Prairie Dog (Cynoomys parvidens)

By Dr. Mark Ritchie (Syracuse University- Syracuse, NY)
&
Nathan Brown M.S. (U.S. Fish and Wildlife Service- Cedar City, UT)
Technical Report- Submitted to the
U.S. Fish and Wildlife Service West Valley City, UT
August 2011

Introduction

The effective population size (N_e) is the number of individuals in a population that actually contribute genetic material to the next generation. The size of N_e is what determines the rate of inbreeding and the subsequent loss of genetic diversity. The loss of genetic diversity, and the potential corresponding reduction in a population's ability "to adapt by natural selection to changing environmental conditions within the predicted range of frequency and amplitude of change" (Soule 1987) is one of the greatest threats to the maintenance of a species on the landscape over ecological time. N_e is affected by four main variables: 1) uneven sex ratios, 2) variability in population size over generations, 3) variability in family size, and 4) overlapping generations. Maintaining an $N_e \geq 500$ will prevent the loss of genetic diversity due to genetic drift and increase the likelihood of long term persistence (Franklin 1980).

In order to change in response to environmental fluctuations, a population must have the ability to change gene frequencies. This change comes from having new alleles arise through mutation, which increases the total genetic variance or heterozygosity (H) each generation. However, existing variation is typically lost through more frequent than expected matings among homozygotes (individuals without variation in their genes) that happen by chance. This process is called random drift.

We can describe how the genetic variation in a population σ^2_g (this notation uses the standard σ^2 as a term for statistical variance that you would measure; true genetic variance is H for all genes, but this is impossible to measure in practice) changes as a function of drift and the variance added because of mutation σ^2_m.

Drift is affected by the effective population size. Lande and Barrowclough (1987) provide a nice summary of arguments for an equation to describe the change in genetic variation. Basically, drift is a negative term $-\sigma^2_g/2N_e$ because drift results in the loss of genetic variation and mutation is a positive term because it adds new variation. The term Δ just means "change in ____ over time"

$$\Delta\sigma^2_g = -\sigma^2_g/2N_e + \sigma^2_m \quad (1)$$

This also can be written as a differential equation:

$$d\sigma^2_g/dt = -\sigma^2_g/2N_e + \sigma^2_m \quad (2)$$

We can use this equation to ask, what is the effective population size that will allow genetic variance to be maintained, or even increase to some desired level. We can find the N_e that balances mutation and drift by setting $\Delta\sigma^2_g = 0$ (implying no change or a balance) and solving for N_e

$$N_e = \sigma^2_g/2\sigma^2_m \quad (3)$$

Mutation happens relatively rarely, and most estimates assume that it is a proportion of genetic variance, since if there are more alleles, or versions of each gene, in the population, there is greater opportunity for new mutations to arise each generation. Typically $\sigma^2_m = 0.001\sigma^2_g$ (Lande and Barrowclough 1987). If we substitute this into our equation for effective population size we get

$$N_e = \sigma^2_g/[(2)(0.001)\sigma^2_g] \quad (4)$$

The σ^2_g's cancel out, leaving $N_e = 500$. This means that species should have an effective population size of at least 500 in order to maintain genetic variation over a long period of time.

Census population size (N) (estimated or observed) is often the only data available for threatened and endangered species. The ratio between effective population size and census size (N_e/N) is important as it will help managers infer N_e if there is not enough data available to calculate N_e. In a meta-analysis (Frankham 1995) found the mean (N_e/N) ratio =0.11. The analyses included in the study calculated N_e accounting for variation in population sizes, variance in family sizes, and unequal sex ratios.

Population Viability analyses are conducted to determine the "minimum viable population," these types of analyses often use demographic/ecological data and are expressed in probabilities of persistence over X time period.

Methods

Several Population Viability analyses were conducted using roughly 30 years of demographic data (1976-2006) from populations of the Federally Threatened Species, the Utah Prairie Dog (Cynomys parvidens). The data were provided by the Utah Division of Wildlife Resources (UDWR).

a) The first analysis used a regression approach to predict the colony size necessary to yield a 95% probability of persistence for 200 years. Four variables were included in the first analyses; AAC-Average Annual Spring Count, COLDENS- Colony Density within a 5-km radius, ELEV- elevation, and PRECIP-precipitation). This analyses utilized data from all colonies across the range of the species (all three Recovery Units).

b) Using the same demographic data, a population viability analysis was conducted for each Recovery Unit individually. Under the assumption that there is some gene flow within each Recovery Unit, a regression model predicted the 95% probability of persistence over ecological time (200 year estimate) (6,000 years for the West Desert Recovery Unit). In this analysis N_e was calculated for the total population in each Recovery Unit. N_e was calculated incorporating unequal sex ratios and variability in population sizes.

c) Within the West Desert Recovery Unit the N_e/N ratio was calculated for most colonies on public and private land. This ratio was visualized by plotting the Average Annual Spring Count for each colony on the X-axis and the corresponding N_e for each colony on the Y-axis. The slope of the line represents the average N_e/N ratio across all of the colonies in the analysis N_e was calculated for each individual colony in the analysis, accounting for variation in population size and unequal sex ratios.

d) The N_e necessary to maintain the current level of genetic diversity was calculated (explanation below) using existing genetic data (from Utah Prairie Dogs in the West Desert (Brown 2009)).

Heterozygosity, H, for some subset of genes in the population can be used as an approximate measure of genetic variance in a population. Heterozygosity (H), based on 10 microsatellite regions of Utah prairie dog DNA, which yielded only 10 loci with different alleles, called "polymorphic" loci, estimate the average genetic variance across the Utah prairie dog population in the West Desert Recovery Unit to be H = 0.176. This is virtually identical to the estimate for the species across its range (H_o = 0.173) but less than half of that commonly observed for blacktailed prairie dogs (Chesser 1983, Jones et al. 2005), H = 0.4 to 0.5.

If we use this as an estimate of genetic variance and assume variance added due to mutation each year is 0.001 σ^2_g, then the rate of change in genetic variance (from equation 2 above-see Introduction) in this population is

$$d\sigma^2_g/dt = -\sigma^2_g/2N_e + 0.001\sigma^2_g \quad (7)$$

We can solve the differential equation to estimate how genetic variance would change over time for different effective population sizes

$$\ln[\sigma^2_g(t)] = \ln[\sigma^2_g(0)] + t(0.001 - 1/2N_e) \quad (8)$$

where ln refers to the natural logarithm of whatever is in parentheses, $\sigma^2_g(0)$ is the current level of genetic variation, and $\sigma^2_g(t)$ is the genetic variance at some time in the future.

Starting with equation 7, we can use $H = \sigma^2_g(0) = 0.176$ and set the change in genetic variance to zero, $d\sigma^2_g/dt = 0$.

$0 = -(0.176)/2N_e + 0.001(.176)$

$N_e = 500$

Results

Analysis (a)

In order for a single colony to have a 95% probability of persisting for 200 years, an annual spring count of $n \geq 50$ is necessary. At the time of the analyses (2007), only 5 Utah Prairie Dog colonies met this criterion. The analysis also showed that colonies with average annual spring counts of less than n=20 contribute little to the long term persistence of the species.

Analysis (b)

West Desert Recovery Unit

Including 42 colonies across the Recovery Unit, the population (all colonies combined) has a statistically significant chance of persisting for more than 6,000 years if an effective population size (N_e)= 545 is maintained.

Paunsaugunt Recovery Unit

Including 60 colonies across the Recovery Unit, the population (all colonies combined) has a statistically significant chance of persisting over ecological time. Calculated across all colonies combined (n=60), the population has a calculated effective population size (N_e) =218.

Awapa Plateau Recovery Unit

Including 32 colonies across the Recovery Unit, the population (all colonies combined) does not have a statistically significant chance of persisting over ecological time. Calculated across all colonies combined (n=32), the population has a calculated effective population size of (N_e)= 64.

Analyses (c)

The slope of the line in Figure 1 (below) demonstrates the relationship (ratio) between the Average Annual Spring Count and the calculated Effective Population size for most colonies in the West Desert Recovery Unit. The slope of the line 0.24 illustrates the fact that for every four adult Utah Prairie Dogs, one Utah Prairie dog is added to the Effective Population Size.

ACTUAL POPULATION SIZE VERSUS EFFECTIVE POPULATION SIZE

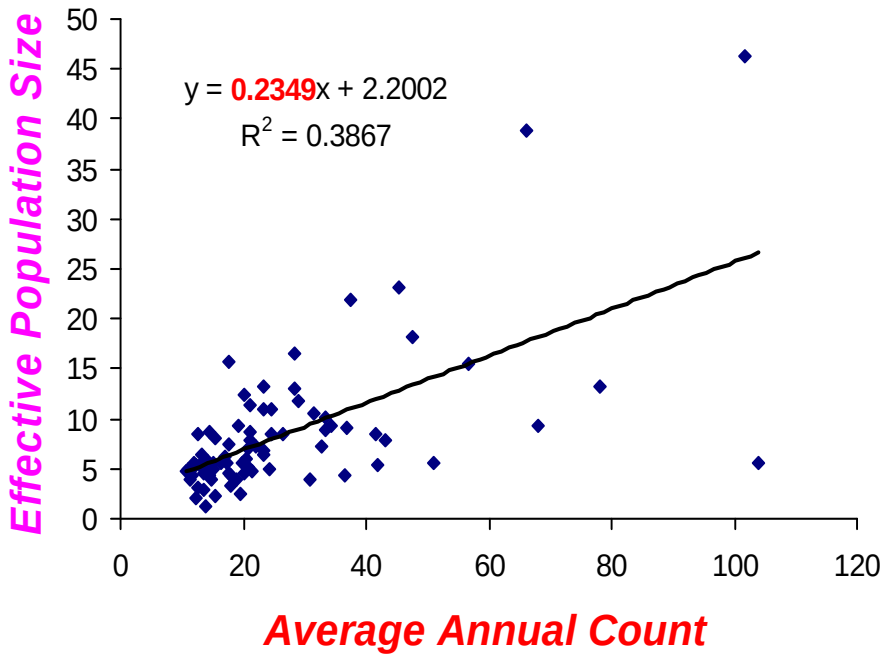


Figure 1. Correlation between average annual spring count and estimated effective population size for public and private colonies in Iron County, Utah. The slope of this line is very nearly 0.25, indicating that every 4 adult prairie dogs counted constitutes 1 prairie dog toward the effective population size.

Analysis (d) An effective population size of N_e =500 was calculated for the population of Utah Prairie Dogs in the West Desert Recovery Unit in order to maintain the CURRENT level of genetic diversity.

Conclusions

Preserving a few large N≥50 colonies in each Recovery Unit will help increase the persistence of the Recovery Unit population as a whole. Focusing management efforts to maintain colonies with n>20 also will yield valuable results.

Considering each Recovery Unit as a set of metapopulations with low levels of migration, currently (as of 2007-analysis used 1976-2006 data) there is a viable population in the Paunsaugunt Recovery Unit and the West Desert Recovery Area. Currently there is not a viable population on the Awapa Recovery Unit.

Based on analysis (c) (figure 1), maintaining an adult population four times greater (4x) than the desired effective population size should provide for a sustainable population. Assuming some level of gene flow within a Recovery Unit and using a 50% countability coefficient (see explanation below) (Crocker & Bedford 1975), an Annual Spring Count of n=1000 adult Utah Prairie dogs (estimated count of n= 2000) should yield an effective population size of N_e=500.

Prairie dog spring 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). Therefore, over the range of the species, UDWR assumes that only 50% of live, adult prairie dogs are counted during a survey. Spring counts are thus multiplied by two to estimate the adult population.

Based on these analyses' it is our recommendation that n=1000 Utah Prairie Dogs need to be COUNTED in EACH Recovery Unit to reach recovery. Using a 50% countability coefficient, this would result in an estimated 6,000 adult animals across the range of the species. Using our calculated N_e/N ratio of 0.24 (in the West Desert Recovery Unit), 6,000 adult animals would yield an estimated effective population size of N_e=1500 Utah Prairie Dogs across the range of the species. This is three times the minimum rule/calculated value of N_e=500. Although there is little exchange between Recovery Units, recent genetic work (Brown 2009), suggests that there has been some gene flow over evolutionary time. There are potential corridors between Recovery Units; the Buckskin/Bear Valleys connecting the West Desert Recovery Unit and the Paunsuaugunt Recovery Units, and the Black Canyon and its benches connecting Johns Valley on the Paunsaugunt Recovery Unit and Grass Valley on the Awapa Recovery Unit.

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APPENDIX H
Summary of Public Comments and Peer Review

The draft revised Utah Prairie Dog Recovery Plan was released on September 17, 2010, for a 60-day public comment period. At that time we requested independent peer review from five experts, including species and ecological experts. We received comments from four peer reviewers. We also received comments from State, Federal, and local government representatives, non-profit organizations, and private individuals. All comment letters are on file in our Utah Ecological Services Field Office, 2369 West Orton Circle, West Valley City, Utah 84119.

GENERAL COMMENTS

Comment—Some commenters expressed concern about our intent to conserve a species that carries plague, which can harm humans and domestic animals. Commenters suggested that prairie dogs should be removed from areas near houses, schools, and places of business such as the Paiute Tribal offices.

Response—The recovery plan discusses the plague virus, and our efforts to prevent and manage plague outbreaks in prairie dog populations.

Comment—Some commenters expressed their opinion that the ESA was put in place to provide a means for the Federal government to gain control over the use and application of private property. They believed that the Service is placing the importance of a destructive rodent above that of humanity.

Response—The purpose of the ESA is to protect and recover imperiled species and the ecosystems upon which they depend. The revised recovery plan discusses the importance of the Utah prairie dog to the ecosystem. We also believe that the recovery plan and the recent efforts of the Utah Prairie Dog Recovery Implementation Program (UPDRIP) provide a balance between conserving the species and meeting the needs of the local communities.

Comment—Some commenters believe that the estimate of $106.23 million and 30 years is too much time and money to spend for recovery of the Utah prairie dog. Some commenters also believe that the prairie dogs are having a large economic impact on Iron County.

Response—The number of years and dollars in the Implementation Schedule are estimates. These numbers will be revised as new information becomes available. It may cost less time and money to recover the Utah prairie dog if groups such as the UPDRIP are successful in leveraging partnerships toward recovery. We acknowledge that there are economic impacts associated with prairie dogs in some areas such as urban lots, agricultural fields, and recreational areas. However, there also are economic opportunities for landowners through programs such as safe harbor agreements, conservation banks, and conservation easements (see section 1.9, Conservation Measures and Assessment).

Comment—Some commenters requested that a DNA test be completed to determine if the Utah prairie dog is distinct from other prairie dog species.

Response—As the recovery plan describes, the Utah prairie dog is recognized as a distinct species based on physical characteristics, previous genetics work, and geographic distribution (Zeveloff 1988; Hoogland 1995). Utah prairie dogs are most closely related to the white-tailed prairie dog, and these two species may have once belonged to a single interbreeding species

(Pizzimenti 1975). However, they are now separated by ecological and physiographic barriers. Based in part on this information, the Utah prairie dog was listed as a distinct species in 1973. At this time, we do not believe further genetic testing is necessary, and we believe the best use of existing resources is to focus efforts on recovery actions for the Utah prairie dog.

Comment—Several commenters believe that Utah prairie dogs should be counted on private land as well as public land before allowing them to be considered threatened.

Response—When we list or delist a species, we consider five listing factors (i.e., threats) established by the ESA to determine if the species is endangered or threatened: 1) the present or threatened destruction, modification, or curtailment of its habitat or range; 2) overutilization for commercial, recreational, scientific, or educational purposes; 3) disease or predation; 4) the inadequacy of existing regulatory mechanisms; and 5) other natural or manmade factors affecting its survival. The prairie dogs that occur on private lands are under threat of losing their habitat to ongoing urban development (see section 1.7.1, Factor A. The Present or Threatened Destruction, Modification, or Curtailment of Habitat or Range), and thus these prairie dogs cannot be "counted" toward recovery unless they are protected through mechanisms such as conservation easements and fee title acquisitions (see section 1.9.5, Protected Lands).

Comment— Some commenters believe that the Utah prairie dog does not meet the definition of a threatened species because there are a lot of Utah prairie dogs and their populations explode in the spring. Other commenters expressed their opinion that the methodology of determining the listed status of the Utah prairie dog is flawed and driven by lawsuits. One commenter asked why the Utah prairie dog is listed when other prairie dog species survive.

Response—See our above response—the Utah prairie dog was listed based on an evaluation of the five listing factors. Overall population numbers can play a role in how threats affect the viability of a species, but are not the only factor in determining if a species is listed as endangered or threatened.

Comment—Some commenters requested that if the Federal government wants to preserve this animal, it should establish prairie dog sanctuaries on public land and allow use of private property within the city limits. Also, some commenters recommended that non-profit groups should purchase lands for the benefit of prairie dogs.

Response—We envision a two-tiered approach to our recovery effort that includes the establishment and management of prairie dogs on Federal lands, and the protection of existing colonies on private lands where willing landowners agree to conservation easements or fee title purchases. Because most of the Utah prairie dog population occurs on private lands, recovery will be achieved in less time if we are able to protect some of the most important colonies in these areas. The UPDRIP partnership will be important in developing and securing funding for conservation proposals to protect habitats from a variety of sources.

Comment—Some commenters expressed that people are being injured in prairie dog holes on the golf course, and the sanctity of at least one of our cemeteries is being violated.

Response—We are aware of the situations at the golf course and the Paragonah cemetery. The UPDRIP partners are working with the local communities to translocate prairie dogs away from these areas to translocation sites on public lands. This effort will help reduce prairie dog numbers at the golf course and cemetery. In addition, the UPDRIP partners are working together

to identify long-term solutions such as fencing to preclude prairie dogs from reinhabiting these areas.

Comment—Some commenters expressed concern that private properties are overrun with prairie dogs, and this constitutes a "takings." Overall, the financial impacts of the ESA are not disclosed to the American people.

Response—The private property takings issue is a legal issue, in which the courts to date have upheld the ESA. This final recovery plan discloses the financial impacts of Utah prairie dog recovery.

Comment—Some commenters expressed concern that it takes considerable time and expense to develop properties inhabited by Utah prairie dogs. As evidence of this, they pointed to considerable bureaucratic hoops through the Iron County HCP system.

Response—We acknowledge that the Iron County HCP is not adequate to meet development needs. We are working with the counties to develop a new Utah Prairie Dog Rangewide HCP which will hopefully better meet the needs of the community and assist in prairie dog recovery efforts.

COMMENTS ON THE GLOSSARY

Comment—The definition for occupied habitat should specify that the determination is based on spring counts or current year surveys.

Response—We added the survey protocol to the definition of occupied habitat.

Comment—A couple of commenters requested clarification for the definition of Protected Habitat.

Response—We revised the definition of Protected Habitat, and identified possible mechanisms for protection on Federal and non-Federal lands, following discussions with the Utah prairie dog recovery team.

Comment—One peer reviewer was confused with the following wording used in the definition of population in the glossary: "with a decline in numbers a population has the potential for becoming a complex."

Response—The definition was reworded.

Comment—One peer reviewer noted that the definition of "complex" in the recovery plan (groups of colonies within 2 miles of each other) is different than what is typically used for black-tailed prairie dogs (groups of colonies that are within 1 mile).

Response—The definition of a Utah prairie dog complex is based on what has been historically used by UDWR in their extensive Utah prairie dog work. Our definition of Utah prairie dog 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. This definition is based in part on known dispersal distances of up to 1.1 mi (1.7 km) for young male Utah prairie dogs and up to 3 mi (4.8 km) for adult prairie dogs, as described in this Recovery Plan.

COMMENTS ON THE EXECUTIVE SUMMARY AND BACKGROUND INFORMATION

Comment—The executive summary identifies grazing as an impact to Utah prairie dogs. However, grazing is only harmful when it is too heavy or too light. Change term to "improper grazing," or something to that effect.

Response—We now use the term "overgrazing" throughout the document.

Comment—Additional information on the benefits and outcomes of the 1991 recovery plan would be helpful.

Response—We added information on the recovery criteria and recovery actions from the 1991 recovery plan to the Introduction (section 1.1). Section 1.9 (Conservation Measures and Assessment) describes many of the accomplishments that occurred under the 1991 Recovery Plan and the 1997 Interim Conservation Strategy.

Comment—A commenter suggested we list all five North American prairie dog species, including the Mexican prairie dog to provide the reader with complete information.

Response—All five prairie dog species are now identified in the Taxonomy and Description section (section 1.2).

Comment—One peer reviewer suggested that a map of the different colonies or complexes would be more informative than general recovery unit areas.

Response—Site-specific Utah prairie dog colony mapping information is managed by the UDWR, and is considered sensitive information. Therefore, we did not include the information in the Recovery Plan; however, this mapping is routinely used by the recovery team and other partners in Utah prairie dog recovery efforts.

Comment—A couple of commenters asked if the western boundary of historic habitat (at the Utah-Nevada State Line) is a biological or legal boundary. One commenter asked if there were any conservation opportunities for the species in Nevada.

Response—It is possible that the Utah prairie dog may have once extended across the State line into Nevada. However, we do not have any location information and thus for purposes of the background information in this recovery plan, we only evaluated the historical habitat within Utah. Habitats in Nevada are not considered necessary for species' recovery. However, if Utah prairie dogs are found in Nevada they would be protected as threatened species under the ESA. Similarly, if conservation measures in Nevada resulted in the restoration of large populations of Utah prairie dogs, these populations and habitats could help us achieve species' recovery more quickly.

Comment—One commenter was concerned that prairie dogs cannot recognize and adhere to the recovery unit boundaries, specifically at the Sevier/Emery County line. The commenter wanted to know what would happen if the prairie dogs cross into Emery County.

Response—If Utah prairie dogs cross into Emery County, they would be fully protected as a threatened species under the ESA. However, our recovery efforts are focused on the three recovery areas, which do not include Emery County.

Comment—A commenter suggested we add the definition for protected habitat as a footnote to Table 2.

Response—Definitions are in the Glossary.

Comment—A commenter requested that we revise the description of how prairie dogs are counted as it is confusing.

Response—We revised the description of prairie dog counts according to the commenter's recommendations.

Comment—A commenter recommended the draft plan should be changed to say that the UDWR initiated annual counts (rather than biannual counts) in 1976.

Response—The final plan correctly states that the UDWR initiated annual Utah prairie dog counts in 1976.

Comment—The draft plan states that the lowest range-wide count was 1,291 adults in 1990, but later it is explained that the 1990 counts were incomplete (i.e., they did not include private lands), due to staffing and budget limitations. Therefore, it is not accurate to say that 1990 was the lowest range-wide count.

Response—We changed the text to show that the lowest count occurred in 1976.

Comment—The plan should identify the existing acres of occupied habitat in each Recovery Unit.

Response—The text in section 1.3.2 (Current Distribution and Abundance, Habitat Mapping) identifies the acreages of both occupied and mapped habitat in each Recovery Unit.

Comment—One peer reviewer asked if prairie dogs truly hibernate if they come out to sun themselves in the winter. Another peer reviewer provided a citation regarding torpor in prairie dogs.

Response—We added clarifying language. Utah prairie dogs may be above ground in mild weather, particularly at lower elevations. Their capacity to hibernate or enter torpor may vary across the species range depending on environmental conditions. We added this information and citation to the Life History section of the document.

Comment—One peer reviewer asked if we were correctly using the terms "counts" versus "population estimates" throughout the document.

Response—We checked the use of the terminology throughout the document and it is correctly used.

Comment—One peer reviewer was concerned with our conclusion that Utah prairie dog populations are stable to increasing over the past 30 years. The concern was based on the large annual fluctuations in Utah prairie dog populations, and the severe perceived decline between 1989 and 1990.

Response—Population estimates are based on spring counts of adult Utah prairie dogs, in accordance with an established Survey Protocol (Appendix F of the document). We acknowledge that the spring counts do not provide accurate population estimates, but we believe they do provide long-term trend information. The perceived population crash from 1989 to 1990 did not occur—population counts in 1990 were artificially low because they did not include any private lands (where the majority of Utah prairie dogs occur) due to staffing and budget limitations. We removed the 1990 data point from the figures and tables in the Final Recovery Plan, and noted the lack of data in a footnote.

Comment—A few peer reviewers were concerned about the high variability in our annual population counts. The reviewers suggested modifications to the survey protocol, including the use of mark-recapture techniques, occupancy modeling, and multiple survey visits.

Response—The survey protocol uses multiple survey visits at each site to ensure accurate counts, but techniques such as mark-recapture are too intensive and costly to apply on a range-wide basis. However, we acknowledge in the document that counts are variable due in part to environmental conditions, observability of animals, and access restrictions on some lands. Our survey protocol takes these considerations into account, and we also acknowledge that the results of the surveys provide only trend information, and not actual population numbers. We consistently evaluate all of our field techniques for Utah prairie dogs. We added a statement to our Recovery Action Narrative 1.1 (Section 3.5.1) to better reflect our continued consideration of available techniques.

Comment—A commenter believed that the data do not support the conclusion that the numbers of Utah prairie dogs increased significantly prior to our downlisting of the species to threatened in 1984.

Response—Our long-term data shows stable to increasing Utah prairie dog population trends since 1976 (see section 1.3.2). The 1984 rule (49 FR 22330) to downlist the species to threatened stated that prairie dog populations increased from 1972-1984. However, we removed the word "significantly" from the statement in the recovery plan because it can be a subjective term and we believe the trend data provides the necessary supporting information.

Comment—One peer reviewer suggested that our population density estimates do not provide valuable information if mapping efforts do not include updating the areas that are occupied (i.e., mapped habitat either stays the same or grows). Another peer reviewer asked why contractions in prairie dog colonies are not mapped.

Response—We explain the limitations in habitat mapping and density estimates in the recovery plan (section 1.3). However, mapped habitat provides us with information on long-term Utah prairie dog use of areas and directs conservation efforts.

Comment—One peer reviewer asked for clarification if mapped habitat is the same as suitable, but unoccupied habitat.

Response—The definition for mapped habitat is in the glossary. 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. Therefore, mapped habitat may include suitable, but currently unoccupied habitat (if the habitat was occupied historically). However, currently occupied habitats also are considered mapped habitat.

Comment—One peer reviewer requested that we add a definition for metapopulation.

Response—We added a definition for metapopulation to the glossary.

Comment—A commenter recommended lethal removal should be added to section 1.4 as a reason for Utah prairie dog population fluctuations.

Response—We added unlawful lethal removal because it has the potential to result in declines and loss of site-specific colonies.

Comment—A commenter recommended that section 1.4 clarify that the long-term persistence of the Utah prairie dog will require the establishment of large colonies, in addition to their protection.

Response—We agree, and we modified the sentence accordingly.

Comment—One peer reviewer asked us to rewrite the last paragraph of section 1.4 to say that a greater number of colonies in close proximity allows prairie dogs to more quickly recolonize vacated or depleted populations and habitats.

Response—The paragraph was revised accordingly.

Comment—One commenter and one peer reviewer questioned if the Utah prairie dog is truly a keystone species.

Response—We retained the term "keystone species" and provided a citation.

Comment—One peer reviewer asked for clarification because the text says "only two-thirds wean a litter." However, the population estimate formula on page 1.3-4 suggests that all breeding females wean a litter.

Response—The population estimate formula is correct, and we revised the text accordingly.

Comment—One peer reviewer said that our dispersal information appears inconsistent with our definition of complex. Very few animals disperse more than 0.75 mile, but a complex includes colonies within 2 miles of each other.

Response—Adult Utah prairie dogs are known to disperse up to 3.1 miles. We added a citation to the document, and our definition for complexes remains the same.

Comment—One peer reviewer stated that the term coterie is used instead clan for black-tailed prairie dogs.

Response—We use the term clan for Utah prairie dogs. The glossary provides a definition.

Comment—One peer reviewer questioned if long-tailed weasels are a significant predator of Utah prairie dogs. The reviewer also recommended that we mention that the black-footed ferret is believed to have not occurred in the range of the Utah prairie dog.

Response—The recovery plan lists predators, including long-tailed weasels, but we do not identify them as being significant or not. We added the information about black-footed ferrets.

Comment—One peer reviewer questioned the estimated total population formula and why we multiplied the spring adult count by a factor of 2 at both the beginning and the end of the equation.

Response—The formula for total population estimate is correct. We multiply the spring adult counts twice in the equation: first, because we are calculating production, and second, to add the adult estimated population back into the total. We added an explanation in Section 1.3.2.

Comment—One peer reviewer noted that the regression based formula explained in Appendix C (Survey Protocol for Annual Spring Counts of Utah Prairie Dogs) is confusing.

Response—The formula was deleted from the recovery plan. We used another citation and experience of UDWR personnel in determining our survey accuracy for Utah prairie dogs.

COMMENTS ON LISTING FACTORS

Comment—A commenter requested we correct the naming used for the BLM offices. The correct terminology is that the range of the Utah prairie dog overlaps with the Color Country District of BLM. Within the district, Utah prairie dogs occur in three field offices: Cedar City, Kanab, and Richfield.

Response—The recovery plan was updated accordingly.

Comment—A commenter recommended factor A discuss fire management, solar, and wind development. In addition, the Fillmore BLM land use plan should be described throughout Factor A.

Response—Fire management is discussed in Factor E and wind development is discussed in the Energy Resource Exploration and Development section of Factor A. A discussion on solar energy was added. The Fillmore BLM Field Office area does not occur within the Utah prairie dog recovery unit boundaries, so it was not discussed in the document.

Comment—A commenter requested we add information on BLM conservation measures for Utah prairie dogs (i.e., lease notices).

Response—We added information to the Factor A, Energy Resource Exploration and Development discussion.

Comment—A commenter stated that the recovery plan defends the use of the special 4(d) rule despite Service statements that the 4(d) rule is in need of revision. The commenter also stated that because the draft recovery plan describes continued poaching of Utah prairie dogs, the assumption that legal killing is preventing illegal killing is not credible.

Response—We are in the process of revising the Utah prairie dog special 4(d) rule (76 FR 31906, June 2, 2011). However, the current special 4(d) rule, as it has been implemented through the UDWR permitting process, is necessary for the long-term conservation of the Utah prairie dog rangewide. One of the purposes of the special 4(d) rule is to reduce the potential for illegal take of prairie dogs on agricultural lands; however, we anticipate that some illegal take may still occur.

Comment—One commenter recommended edits regarding evidence of shooting in some prairie dog colonies.

Response—We added the suggested edits to Factor B, Poaching.

Comment—A commenter recommended we delete the paragraph describing the lack of data on grazing impacts because if we do not have data on how much habitat is overgrazed or the impacts of overgrazing, the paragraph is not necessary and may be counterproductive.

Response—We retained this paragraph. We believe it is important to identify information gaps. Collection of this information may be important to facilitate Utah prairie dog recovery.

Comment—One commenter asked if there is any documentation or data that quantifies the impacts of OHV use.

Response—We are not aware of information quantifying the impacts of OHV use to Utah prairie dogs specifically. However, there is abundant information on the impacts of OHV use to soils, vegetation, and wildlife species in general, as summarized in Ouren 2007. We added this citation to the Recovery Plan.

Comment—A commenter requested we remove the citation that "OHV use also allows more human access to prairie dog colonies which may increase the risk of illegal shooting (Bonebrake pers. comm. 2008)."

Response—We retained the information, but provided a different citation.

Comment—A commenter stated that the Forest Service also has "closed unless posted open" requirements, and this language should be added to the document.

Response—We added text to the Factor A, Off-Highway Vehicle/Recreational Uses discussion.

Comment—A commenter requested we add the Cedar City BLM RMP planning process to the discussion on OHV use.

Response—We added text regarding the Cedar City RMP.

Comment—One peer reviewer recommended including information that "undergrazing" can also be detrimental because high vegetation can reduce the ability of [black-tailed prairie dogs] to see predators.

Response—We agree with the reviewer's comment. The Listing Factors, Grazing section discusses the potential benefits and ability of Utah prairie dogs to coexist and be benefited by well-managed grazing.

Comment—The over-grazing section discusses rancher beliefs that Utah prairie dogs impact livestock operations, but the discussion does not clarify if these impacts really occur.

Response—We added clarifying text to this section.

Comment— A commenter requested we include more specific information on overgrazing such as stubble height or ground cover to assist land managers.

Response—We decided not to include additional information on specific grazing practices because recommendations vary based on elevation and site-specific habitat conditions.

Comment—One commenter expressed concern that 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. The commenter concluded this to be an admission that the USFWS is not properly monitoring livestock grazing and management on Utah prairie dog habitats.

Response—We added information regarding the results of some of our Section 7 consultations regarding grazing on public lands. In general, consultations on site-specific grazing permits and programmatic planning documents include stipulations for Federal land management agencies to implement monitoring and corrective actions to ensure that healthy range conditions are maintained in Utah prairie dog habitats. Our best available information suggests that Utah prairie dogs can coexist with properly managed grazing systems.

Comment—One commenter requested that we update the information for energy exploration and development in the Cedar City and Richfield BLM Field Office areas, specifically discussing avoidance and minimization measures used to protect the prairie dog, including the Category 3 Leasing stipulations and recent lease notices. In addition, the commenter requested we add information on the impacts of seismic testing to the Utah prairie dog.

Response—We updated the information as requested.

Comment—A commenter requested we include predation (from increased number of perching platforms) as a potential impact of energy development.

Response—We added clarifying language about predation in section 1.7.1, Energy Resource Exploration and Development.

Comment—A commenter requested we include a discussion on solar energy development.

Response—We included information on solar energy development within the species' range.

Comment—A commenter expressed concern that the draft recovery plan document seems to lump invasive species and noxious weeds.

Response—We added definitions for invasive plant species and noxious weeds at the beginning of the Invasive Plants section in the final recovery plan, and we more clearly identified information on the distribution and abundance of these plants in the BLM and Forest planning areas, where information was available.

Comment—A commenter pointed out that the statement that predation is not a threat to healthy Utah prairie dog populations seems contradictory to other statements in the document that predation can impact Utah prairie dogs.

Response—Healthy Utah prairie dog populations naturally occur with predators. We revised the statement to "Normal levels of predation are not considered a threat to healthy Utah prairie dog colonies." The remaining text in the Factor A, Predation discussion identifies "non-natural" occurrences or levels of predation that may result in impacts to Utah prairie dogs.

Comment—A commenter indicated that the BLM lease notices apply to Utah prairie dog populations in the Cedar City Field Office area per an Instruction Memorandum.

Response—We added this information to the text in Factor D.

Comment—One peer reviewer asked if there are any county regulations pertaining to management of the Utah prairie dog. For example, many counties in the Great Plains States have regulations that identify prairie dogs as a pest species, and some counties require landowners to control prairie dogs.

Response—Because the Utah prairie dog is protected by the ESA, it is not managed as a pest species by the State of Utah or local governments. As described in section 1.7.4 of the Recovery Plan, the species' federally 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 UDWR.

Comment—A commenter recommended the final recovery plan provide a discussion on the role of State rules and regulations to protect the Utah prairie dog.

Response—We added a discussion on State regulations to section 1.7.5, Factor D, The Inadequacy of Existing Regulatory Mechanisms.

Comment—One peer reviewer recommended that we discuss the relationship between climate change and invasive species.

Response—We added information on the relationship between climate change and invasive species, and included the citation provided by the peer reviewer.

Comment—A commenter thought it may be useful to acknowledge that different citations and viewpoints exist regarding climate change, and that additional information and citations are available. Additional citation references would be useful.

Response—We presented best available current information on climate change. The commenter did not recommend specific additional citations. Thus, we did not add citations. The document already acknowledges that there is uncertainty in the scope and severity of the threat of climate change, and the response of the Utah prairie dog to climate change.

Comment—The document describes the potential for Utah prairie dogs to shift their range northward and upward to cooler, moister areas in response to climate change. This potential underscores the need for a comprehensive GIS database and the importance of consulting with the Dixie and Fishlake National Forests—any upward movement of prairie dogs would likely increase the significance of higher-elevation USFS lands for recovery.

Response—The UDWR maintains a GIS database of all known prairie dog colonies and mapped habitat since 1976. We agree that USFS lands provide important Utah prairie dog habitats that may become increasingly important with climate change. We consult with the USFS regularly on projects that may affect Utah prairie dogs. In addition, the USFS is a member of the Utah Prairie Dog Recovery Team and the newly created UPDRIP.

These partnerships work together to plan and implement habitat restoration, plague management, and prairie dog translocation efforts to increase the distribution and improve the species' status rangewide.

Comment—A commenter recommended care be taken to ensure that well-intended habitat management projects do not inadvertently worsen cheatgrass or other invasive and noxious weed problems.

Response—We agree that invasive and noxious weeds should be considered in all land use projects. We routinely consult with the Federal land management agencies on any projects that may affect Utah prairie dogs, and invasive weed issues are considered in these consultations. In addition, the Federal land management agencies and local government entities have weed control policies to manage and prevent the establishment and spread of invasive and noxious weeds.

Comment—A commenter recommended we re-state subjective terms such as "short-term," "positive," and "negative" in Factor E, Vegetation Community Changes.

Response—We deleted the subjective time-frame terms and replaced "positive" with "beneficial" and "negative" with "adverse" in Factor E, Vegetation Community Changes.

Comment—A commenter recommended we include an additional statement on wildfire and invasive plants on the Dixie National Forest in Factor E, Invasive Plants.

Response—We made additions to this section that discusses the interaction of wildfire and invasive plants.

Comment—One commenter noted the plan is missing a water shortage discussion and how climate change and drought may limit future development plans.

Response—We presented the best available current information on climate change and its potential impacts to the species. The commenter did not recommend specific additional

citations, and we are not aware of studies on water shortage issues relative to future development in the range of the Utah prairie dog.

COMMENTS ON THREATS ASSESSMENT

Comment—One peer reviewer asked us to delete the term “endangered” from the first sentence of this section.

Response—The term “endangered” is correctly used in this sentence, so it was retained.

Comment—One peer reviewer asked if the data used for the threats assessment was really “empirical.”

Response—We replaced the word “empirical” with “available data.”

COMMENTS ON CONSERVATION MEASURES AND ASSESSMENT

Endangered Species Act Interagency Conservation and Consultation

Comment—One commenter stated that a mix of native and nonnative plants may result in better seeding establishment, and should be included in conservation measures.

Response—This section simply provides examples of conservation measures we have used in Section 7 interagency consultations. However, we changed “native” to “seed mixes” to acknowledge that the Federal agencies sometimes integrate nonnative seeds when appropriate. A preference for native seed mixes will remain a consideration in our interagency Section 7 consultations.

Translocations

Comment—One peer reviewer agreed that the success of translocations has probably improved over time, but felt that our citation showing pre- and post-1986 translocation success would need additional analysis to be stated with confidence.

Response—Our intent in this section was to provide information to the reader that generally translocations have improved over time, and that we continue to research and implement new techniques. We added the term “it appears that” to the sentence identified by the peer reviewer because it was not meant to be an absolute statement.

Comment—One commenter suggested a review of the long-term status and success of the translocation sites reported in the 1990s compared to changes in translocation methodologies.

Response—We used the available data (as of 2009) and indicated the numbers of dogs translocated and the numbers of sites occupied in each Recovery Unit following the information from the 1990s. A majority of the translocation sites from the 1970s to 1990s are captured in that information. However, specific comparisons of sites with dates of methodology changes were not analyzed. We agree that this would be a beneficial analysis for the Utah Prairie Dog Recovery Team to pursue in the future.

Comment—One peer reviewer provided an additional citation on the effectiveness of plastic tubes at prairie dog translocation sites.

Response—We added the citation to the recovery plan, section 1.9.2.

Comment—One peer reviewer suggested discussing the regulatory mechanisms necessary to conduct translocations.

Response—This section is intended to describe ongoing conservation efforts for the Utah prairie dog. Thus, we do not believe it is necessary to add this information to this section. The Federal and State agencies involved conduct the necessary permitting and NEPA analyses as needed when implementing translocation efforts for the Utah prairie dog.

Comment—One commenter asked why supplemental water was used at Utah prairie dog translocation sites when prairie dogs get their necessary water intake from vegetation.

Response—Supplemental food and water are used at new relocation sites to increase survival because increased energy expenditures are incurred during the trapping and transport process.

Comment—A commenter states that nest boxes should be used at translocation sites.

Response—We updated Appendix D, Recommended Translocation Procedures for Utah Prairie Dogs, to include nest boxes.

Comment—A commenter recommended the USFWS and UDWR coordinate with those who implement prairie dog translocations elsewhere, to learn techniques that would lower mortality levels.

Response—We agree, and the recovery plan outlines a strategy of additional research, monitoring, and use of the best available science to continually improve our translocation success.

Comment—One commenter recommended adding language to Appendix D that translocation sites should not be located on significant cultural resources, and that a cultural inventory of the translocation area should be required.

Response—Appendix D (page D-9) states that management of translocation sites will be coordinated between all affected agencies including USFWS, BLM, USFS, NPS, and UDWR to ensure that the intent of the translocation site is not compromised and the management needs of the land management agencies are met. Site management will occur in accordance with approved land use plans where applicable. Thus, impacts to important resource issues, including cultural resources, are evaluated at translocation sites by the land management agencies.

Comment—One peer reviewer identified that Appendix D says “additional permits are required by the State of Utah and/or the land management agency. The reviewer asked if permits are required for translocation activities by all land management agencies.

Response—We revised the statement in Appendix D to say, “Additional permits for translocation and associated activities are required by the State of Utah and the administering land management agency.”

Plague Prevention and Response

Comment—One commenter felt that our plague discussion (section 1.7.3, Factor C, Disease or Predation) was focused on white-tailed prairie dogs, but instead should include information on plague management efforts in Utah prairie dog habitats.

Response—Most of the available research on the effects of plague is on white-tailed and black-tailed prairie dogs, so we used this information in section 1.7.3. Section 1.9.3 (Plague Prevention and Response) then discusses specific plague management responses in Utah prairie dog habitats.

Comment—One peer reviewer commented that our plague discussion in the threats section was oversimplified, and that we should increase our emphasis on the effects of enzootic plague. This reviewer provided citations to use in our discussion.

Response—We added substantive information, and emphasized enzootic plague, in the Threats section of the Recovery Plan (see section 1.7.3, Factor C, Disease or Predation). We included additional citations including those provided by the peer reviewer.

Comment—One peer reviewer requested that we add plague prevention to our recovery action number 3. Another peer reviewer requested that we add plague monitoring.

Response—We agree that plague prevention and monitoring are important recovery efforts, and there are numerous ongoing plague prevention measures (i.e., dusting with pesticides to reduce fleas in prairie dog colonies) occurring across the species' range. Plague prevention and monitoring were added to the text in several places throughout the document.

Comment—One peer reviewer recommended qualifying the use of the term "outbreak" with the addition of "epizootic" to distinguish outbreaks from enzootic plague.

Response—We included the term "epizootic" throughout the document.

Comment—One peer reviewer believes it is premature to conclude that maintaining large colonies in close proximity to each other is essential for the species' recovery because this close proximity may increase the spread of plague.

Response—We believe that management of plague through an effective plague prevention and response effort will allow us to maintain sufficient numbers of large Utah prairie dog colonies in relatively close association with neighboring colonies. We added the assumption that plague prevention and management is important for prairie dog colony distribution and dispersal of animals in section 1.4.

Comment—One peer reviewer thought that we mischaracterize our observations of prairie dog population fluctuations in that the text assumed that the causes of population crashes included a variety of threats, including plague, forage competition with other herbivores, habitat alteration, self-induced population regulation, and, and unlawful lethal control.

Response—We revised the text (section 1.3.2) to show that plague and unlawful lethal control may result in population crashes, while the other factors likely result in population fluctuations.

Comment—One peer reviewer suggested removing the term "Delta Dust" and replacing it with "deltamethrin" to avoid using trade names in the document.

Response—We made this change throughout the document.

Comment—One peer reviewer stated that the list of contacts for dusting (Appendix E-1) is incomplete. For example, it is critical that the NPS-Wildlife Health Program in Fort Collins be contacted. This reviewer also recommended that we delete the names of individual personnel, and provide office contact information because personnel change over the years.

Response—We updated the lists of contacts.

Comment—One peer reviewer stated that in Appendix E the text suggests the Recovery Team will remain functional even after completion of the Recovery Plan. The peer reviewer would

like us to clarify if it would be the same team or would it be more accurate to say a RIT will be formed.

Response—Footnote #1 on p. 1.1-1 shows the history of the Utah Praire Dog Recovery Implementation Team becoming the Utah Prairie Dog Recovery Team in 2006. However, once the recovery plan is finalized the Team will likely become an implementation team once again. We edited Appendix E to show the Utah Prairie Dog Recovery Implementation Team as the entity handling disease management and monitoring.

Protected Lands

Comment—One peer reviewer stated support for using safe harbor agreements and conservation banks to promote recovery of Utah prairie dogs on private lands. However, this peer reviewer commented that we should consider increasing the number of years required for conservation bank credits to accrue from 2 (as proposed in the plan) to 5 (the same time period as the running average used to determine allowable take in the Iron County HCP). This recommendation was made because of the tendency for Utah prairie dog populations to fluctuate heavily.

Response—Each conservation bank is established independently. The SITLA bank referenced by the peer reviewer was one of the initial Utah prairie dog conservation banks in the State. We are working on more consistent bank evaluation and credit usage measures with the establishment of the Utah Prairie Dog Habitat Credit Exchange Program.

Public Outreach and Education

Comment—A commenter expressed that, if Hogle Zoo still has Utah prairie dogs, this could be considered public outreach and education.

Response—Hogle Zoo currently has black-tailed prairie dogs on display, but not Utah prairie dogs.

COMMENTS ON RECOVERY STRATEGY AND CRITERIA

Comment—One commenter suggested that recovery of the Utah prairie dog could occur much sooner than the 30-year timeframe proposed in the plan by increasing the allocation of USFWS resources and placing a dedicated USFWS staff person in southern Utah. However, another commenter was concerned that USFWS funding for Utah prairie dog recovery may be flat or declining in coming years, forcing the agency to make triage decisions about which recovery actions receive funding. As such, the final recovery plan should provide a clearer set of criteria for how those triage decisions would be made. The recovery plan revision may also give USFWS an opening to seek some level of funding commitments from relevant Federal and State agencies, and non-profit groups.

Response—We agree that recovery actions will need to be prioritized and a wide array of funding opportunities sought if we are to successfully recover this species. As such, the Recovery Strategy and Implementation Schedule prioritizes recovery actions. In addition, the Recovery Team and newly created UPDRIP partnerships allow a large group of Federal, State, and local entities to work together to develop and fund recovery actions. We added a new section on UPDRIP to the final revised recovery plan. In addition, the USFWS Utah Ecological Services Field Office recently placed a staff person in Cedar City dedicated Utah prairie dog issues.

Comment—A commenter stated that habitat fragmentation is a critical factor in the management and recovery of the Utah prairie dog, and should be identified as such in the recovery plan.

Response—We agree. Habitat fragmentation was discussed in the threats section of the draft revised recovery plan. We added habitat fragmentation to the Executive Summary and Recovery Strategy in the final revised recovery plan.

Comment—A commenter stated that the revised recovery plan should recognize and use Distinct Population Segments (DPS) as a tool and viable option for conserving Utah prairie dogs and removing them from the protections of the ESA by individual recovery unit (or DPS). The USFWS has de facto acknowledged that Utah prairie dogs exist in DPSs in the existing Recovery Plan and the Draft Revised Recovery Plan by dividing the species range into three separate recovery units.

Response—Three elements are considered in a decision regarding the listing, delisting, or reclassification of a DPS as endangered or threatened under the ESA: discreteness of the population segment in relation to the remainder of the species, significance of the population segment to the species, and conservation status (61 FR 4721, February 7, 1996). A formal DPS evaluation and designation would involve a proposed rulemaking, public review and comment, and a final rulemaking, which is a separate consideration to this Recovery Plan. We do not have information at this time that would lead us to conclude that Utah prairie dog could be subdivided into independent viable DPSs satisfying the DPS policy's criterion (summarized above; see also: 61 FR 4722, February 7, 1996). If the public has information pertinent to determining that a viable DPS is appropriate for the Utah prairie dog, then we welcome the submittal of this information. Thus, we are not proposing a formal DPS designation as part of this Recovery Planning effort. However, if the recovery units are determined to meet the definition of a viable DPS, the potential to delist these areas individually could still be considered at a future date.

Comment—A commenter believed that the habitat recovery criterion of 5,000 acres of occupied, protected habitat is too low. One peer reviewer questioned our use of an average density of prairie dogs for the calculation of the habitat criterion.

Response—Our habitat criterion of 5,000 acres was based in part on the densities of prairie dogs (and population recovery criterion) in each of the recovery units (discussed further in the following comment/response section), as described in section 3.2.3 of the document. The habitat criterion of 5,000 acres represents a minimum habitat protection target, as identified by the terminology of "At least 5,000 acres…" presented in section 3.1. In addition, as suggested by one of the commenters, it is important to note that the habitat criteria (and population criteria, as further described in the next comment/response section) are only one segment of recovery; the other recovery criteria include the maintenance of the population numbers criteria within protected habitat for a period of 5 consecutive years; protection of occupied habitat in perpetuity, and the establishment of long-term management strategies. In addition, species' recovery must ultimately be confirmed by a thorough analysis of the five listing factors in a regulatory rulemaking in order to propose removal of the species from the List of Threatened and Endangered Species. Thus, the recovery criteria represent our best assessment of conditions that would most likely result in a determination that delisting of the Utah prairie dog is warranted, but this must be confirmed through a thorough analysis of the species status. We thus conclude that this is a supportable approach to developing recovery criteria, and it includes numerous "safeguards" to ensure that the Utah prairie dog would remain viable following a future delisting.

Comment—A commenter stated that fulfillment of the 5,000 acre occupied habitat recovery criterion will be difficult to evaluate because occupied habitat acreage is not measured annually under the current Utah prairie dog survey protocol.

Response—As described in section 1.3.2, Habitat Mapping, we acknowledge that current UDWR survey protocol does not always document the actual acreage of occupied habitat in each colony. However, to meet recovery goals, we will need to show that 5,000 acres of occupied habitat are protected in perpetuity. We revised the definition of "occupied habitat" in the Final Recovery Plan to reflect this intent. In addition, the habitat recovery criterion does not stand alone. We will also need to achieve the population recovery criterion of 2,000 adult prairie dogs (1,000 adults in the spring count) on protected habitats in each recovery unit.

Comment—A couple of commenters, including one peer reviewer, expressed concern that our population recovery criterion of 2,000 adult prairie dogs (1,000 adults in the spring count; or an effective population size (N_e) of 500) is too low. One commenter provided specific information showing that the 2009 Utah prairie dog spring counts were 4,167 animals in the West Desert Recovery Unit, seemingly 4 times the number required by our recovery criteria. In addition, one commenter recommended considering the age distribution of the population.

Response—We based our population recovery criteria on the best available information, which concluded an effective population size (N_e) of 500 will allow sufficient continued genetic variance and diversity for Utah prairie dog populations. This is based on the number of adult prairie dogs, without consideration to age distribution. We added a technical report that describes how we determined N_e=500 for the Utah prairie dog—found as Appendix G in the final recovery plan.

As noted by one of the commenters, this population recovery criterion is lower than some of the current spring counts, particularly in the West Desert Recovery Unit. However, over 75% of the prairie dogs identified during spring counts occur on private lands in the West Desert Recovery Unit—an area where densities of prairie dogs are higher than elsewhere across the species' range due in part to the availability of forage and lack of predation for prairie dog populations occurring in agricultural fields. Thus, we do not believe that the densities of animals occurring on many private lands in the West Desert Recovery Unit are sustainable in all locations, as described in section 3.2.3 of the document. In addition, the recovery criteria for populations and habitat require that those animals be on protected lands—currently, over 75% of prairie dogs occur on non-Federal lands.

Comment—One peer reviewer concluded that we need to count 1,330 animals to have a population of 2,000 adults because the male:female ratio of prairie dog populations is 1:2.

Response—Spring counts are doubled because we estimate that only half of the adults are above ground at any one time. The conversion from counted animals to the actual adult population estimate is not related to the male:female population ratio. However, our estimates of effective population size do account for female-biased sex ratios and for annual variability in adult counts. We clarified Section 3.2.2 with the above information on our effective population estimates.

Comment—One peer reviewer stated the recovery goals should include criteria defining recommended spatial distances for prairie dog populations so that they will maintain connectivity and be able to disperse.

Response—The habitat-based recovery criterion states that occupied habitat (at least 5,000 acres in each RU) will be spatially distributed to provide sufficient connectivity and gene flow within each of the RUs. While the criterion does not provide specific distances, information in the background section describes the available information on population fluctuations and long-term stability, including the conclusion that having a greater number of prairie dog colonies within 3.1 mi (5 km) of each other lowers the probability of population crashes because the individual animals can successfully disperse and occupy new habitats (see section 1.4 of the document). We believe the Recovery Plan adequately addresses the comment.

Comment—One peer reviewer provided observational evidence, based on the occurrence of old prairie dog mounds, that the Awapa Plateau Recovery Unit may have once supported more dense Utah prairie dog populations than it does today.

Response—We believe this observational evidence further supports our use of an average rangewide density for calculating the areas of occupied Utah prairie dog habitat needed for Recovery (section 3.2.3), and supports pursuing recovery efforts on the Awapa Recovery Unit including habitat treatments and plague management.

Comment—Some commenters and a peer reviewer expressed concern that the draft Plan allowed us to "count" private lands toward recovery if Utah prairie dogs were managed on those properties through voluntary, non-permanent (e.g., 15-year) agreements with private landowners. One peer reviewer also asked for additional descriptions of the types of agreement that would contribute toward recovery.

Response—We removed the voluntary private lands mechanisms language (i.e., 25%) from the habitat recovery criterion. However, further information is provided and the intent of incorporating private lands conservation efforts in long-term recovery is described in the revised definition of Protected Habitat (see Glossary). We believe that private lands conservation is essential for the recovery of the Utah prairie dog, and where appropriately protected (e.g., conservation easements, fee title acquisitions, or other voluntary conservation agreements with long-term assurances), these areas can "count" toward recovery. Thus, private lands conservation efforts remain a large component of our recovery actions in the final recovery plan, and are described in section 1.9 and 3.5.1.

Comment—One commenter was concerned that we considered the Little Horse Valley Conservation bank as protected habitat when there are no prairie dogs currently occupying the site.

Response—The section that describes the Little Horse Valley Conservation Bank is intended only to summarize existing conservation actions for the Utah prairie dog. Any of these sites would need to be occupied by Utah prairie dogs in order to contribute to the population recovery criteria—5,000 acres of protected, occupied habitats. However, for clarification purposes, we added language at the beginning of section 1.9.5.

Comment—A commenter recommended we revise recovery criterion 4 to emphasize the need for outreach and public relations.

Response—We revised the criterion.

Comment—One commenter recommended that we either remove the word "occupied" from the habitat recovery criterion of 5,000 acres of occupied, protected habitat; or that we define occupied habitat such that prairie dogs are present at least 1 out of 5 years.

Response—The habitat recovery criterion is worded as follows: "At least 5,000 ac (2,023 ha) of occupied habitat are protected in perpetuity in each recovery unit." The definition of occupied habitat includes areas of known Utah prairie dog habitat that, at the time in question, support Utah prairie dogs. Based on this comment, the definition of occupied habitat was revisited by the Utah prairie dog recovery team, and revised slightly for the Final Recovery Plan, but still retains the component that occupied habitat supports Utah prairie dogs "at the time in question." The recovery plan also clarifies our intent that the occupied habitat be distributed in a manner that supports habitat and population connectivity, dispersal, and persistence (sections 2.2 and 3.2). Specifically limiting occupied habitat to a time period such at 1 out of every 5 years does not ensure the long-term protection of habitat connectivity and population persistence. However, the population cycles of Utah prairie dogs are accounted for, because the same parcel of occupied habitat does not need to remain occupied for 5 consecutive years- but a net total of 5,000 acres of occupied habitat must be protected on the landscape. Because prairie dog populations exhibit large annual fluctuations, it is likely that a landscape level approach will be needed to achieve recovery of the Utah prairie dog. This methodology may necessitate managing more than 5,000 acres of habitat for the species to achieve 5,000 acres of protected occupied habitat.

COMMENTS ON RECOVERY ACTIONS

Comment—Some commenters stated that the Plan should go further in promoting protection of the species on public lands. For example, the Draft Plan considers the strategy of protecting and improving Utah prairie dog habitat on Federal land to be a top priority (Priority 1); however, it relegates amending Federal land use plans to Priority 2 and the special designation of Federal lands for Utah prairie dogs to Priority 3.

Response—The new revised recovery plan is intended to promote a two-tiered approach to Utah prairie dog recovery—protection and management of prairie dog habitats on non-Federal and Federal lands. As the commenter noted, a Priority 1 item is to "Protect and improve Utah prairie dog habitat on federal land." However, we revisited other Federal lands recovery actions, and have re-prioritized a few of these to Priority 1—recovery actions 2.3.1, 2.3.2, and 2.3.3 are now considered Priority 1 actions because they provide management direction for on-the-ground conservation of the species and its habitat on Federal lands. We retained the special designation of areas for Utah prairie dogs as a Priority 3 item. However, we do not consider Priority 3 items to be unimportant as suggested by the commenter. In fact, Priority 3 items are defined as actions necessary to provide for recovery of the species. While we believe that special designations would go a long ways toward achieving recovery of the Utah prairie dog, we also recognize that there are various mechanisms available in which Federal land management agencies can achieve species protection and recovery.

Comment—Commenters expressed concern that the recovery efforts do not include historic habitat or translocation efforts in Millard County. One commenter asked if the Utah prairie dog can be recovered without including habitat in Millard County.

Response—The recovery plan envisions that recovery of the Utah prairie dog will occur if recovery criteria are met in each of three Recovery Units: West Desert (Iron and southern Beaver Counties), Paunsaugunt (Garfield and northcentral Kane Counties), and the Awapa Plateau (portions of Piute, Wayne, Garfield, and Sevier Counties). Habitats in Millard County are not considered necessary for species' recovery. However, if Utah prairie dogs are found in

Millard County they would be protected as threatened species under the ESA. Similarly, if conservation measures in Millard County resulted in the restoration of large populations of Utah prairie dogs, these populations and habitats may help us achieve species' recovery more quickly.

Comment—One commenter believes that we need a more comprehensive GIS database for the Utah prairie dog to allow us to better identify Utah prairie dog habitat resources, threats, and opportunities for conservation.

Response—As the commenter indicates, the UDWR maintains a database of all mapped Utah prairie dog habitats since 1976. We have successfully used this database when evaluating and minimizing proposed project effects to Utah prairie dogs, working with land use planning efforts for species' conservation, and identifying priority habitats for Utah prairie dog conservation. We added text to Recovery Action Narrative number 2 (section 3.5.1) to better explain the importance of the existing database.

Comment—A commenter recommended we add information to the recovery narrative that translocation sites must meet vegetation guidelines.

Response—Appendix D of the Recovery Plan is the Translocation Guidelines, which include vegetation guidelines. We added a reference to Appendix D in the relevant section of the recovery narrative.

Comment—One commenter requested a few editorial changes to the recovery actions to emphasize that the actions would occur as cooperative efforts among various partners.

Response—We made the recommended edits as appropriate.

Comment—A commenter stated that the recovery actions should provide a timeline for completion of the plague prevention and response plan by 2012.

Response—Completion of the plague prevention and response plan is a Priority 1 Action. The implementation schedule does not further define completion dates for any actions, and thus we did not add a completion date for the plague prevention and response plan.

Comment—One peer reviewer recommended that we consider maintaining a captive population just in case a catastrophe were to occur.

Response—Our recovery strategy includes the designation of three Recovery Units (West Desert, Paunsaugunt, and Awapa Plateau) that must each be managed to support a sufficient population of Utah prairie dogs to maintain genetic diversity and viability. We believe this strategy provides redundancy for the Utah prairie dog's long-term survival—by providing a margin of safety for the species to withstand catastrophic events (see section 2.0). Thus, we do not believe that captive populations are necessary to sustain or recover the Utah prairie dog.

Comment—One peer reviewer recommended that we should conduct research on dispersal habitat to improve our understanding and ability to conserve habitat connectivity between colonies.

Response—We added dispersal habitat research to section 3.5.3, Recovery Action narrative #1, and a new recovery action #7.6.

COMMENTS ON IMPLEMENTATION SCHEDULE

Comment—A commenter thought that the fiscal year (FY) title for the columns in the implementation schedule table is confusing. Please change to year of implementation.

Response—We changed the implementation schedule table to show Year 1, Year 2, etc., rather than fiscal years.

Comment—A commenter stated that the USFWS should not have the lead responsibility for implementation of recovery actions. Those responsibilities should be listed with the appropriate land management agencies.

Response—We did not change the responsible parties in the implementation schedule. We believe the appropriate parties are identified for their responsibility in implementing actions, many of which do not occur solely on Federal lands.

Comment—A commenter believed that the Forest Service should not be identified as a responsible party for recovery action 6.4.

Response—We removed the Forest Service as a responsible party for this recovery action.