UTAH PRAIRIE DOG
INTERIM CONSERVATION STRATEGY

by

Utah Prairie Dog Recovery Implementation Team

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SUMMARY

Current assessment of the recovery of the Utah Prairie Dog suggests that new strategies for recovery need to be implemented. Existing data suggest that current recovery efforts and goals are unlikely to work, and the information necessary to modify recovery methods and goals is not yet available. This interim strategy, designed to be implemented over a period of approximately five years, has been proposed to complement the existing recovery plan and direct informational gathering efforts in three phases:

(1) habitat improvement in association with existing Utah Prairie Dog complexes and new prairie dog translocations,

(2) research to monitor translocation success and reevaluate recovery goals, and

(3) public involvement to build a more cooperative effort in Utah Prairie Dog recovery.

These new efforts should help improve the persistence of Utah prairie dog colonies and involve local citizens in recovery actions. The research phase will provide data to be used in amending the Utah Prairie Dog Recovery Plan. Actions should include habitat improvement at existing prairie dog complexes and at new sites associated with these complexes on public land. Utah Prairie Dogs will then be translocated to one or more new sites to help mitigate impacts of land development. Research will be conducted on the factors controlling population dynamics at existing complexes, the effects of range revegetation and grazing on the success of translocations, and the consequences of extinction of local populations for Utah Prairie Dog genetic diversity. These studies should help formulate new, achievable recovery goals that are more consistent with patterns in prairie dog population dynamics. Finally, an integrated program of involving schools, clubs, community groups, and businesses will be initiated to develop local awareness of prairie dogs and their habitat. This initiative will also inform local, State, and Federal government agencies, and agricultural producers of ways in which livestock and Utah Prairie Dogs might coexist. The participating agencies will summarize yearly efforts in a written annual report.

The proposed actions are short-term and most could be completed within a five year period provided actions are initiated concurrently. Some activities, such as monitoring and data analysis, may need to be continued beyond this period. Once the research phase is completed, knowledge gained will be used to revise recovery goals and amend the Utah Prairie Dog Recovery Plan. The

strategy provides direction for recovery efforts; specific implementation of proposed actions will involve additional detailed proposals that are in concert with actions permitted under the Endangered Species Act and other federal laws.

INTRODUCTION

In 1973, the Utah Prairie Dog, *Cynomys parvidens*, was declared an endangered species due to drastic reductions in its numbers due to plague, drought, pest control programs, and human-related habitat alteration resulting from cultivation, fire suppression, and grazing practices that favor shrub encroachment. By 1984, its status was reclassified to threatened due to rapid increases in numbers on private land. Recovery of the Utah Prairie Dog since 1973 has involved two efforts: (1) development of an official recovery plan completed in 1991, and (2) translocation of "surplus" prairie dogs from private land to suitable sites on public land to achieve these goals.

These recovery efforts, apparent lack of suitable habitat, new information on patterns of extinction of local populations, and strong public interest in recovery have heightened pressure to alter the manner in which the recovery plan is implemented. Consequently, the Utah Prairie Dog Recovery Implementation Team (Team) was formed in late 1994 to address these issues and make new plans for Utah Prairie Dog recovery. This team is interdisciplinary, and involves representatives of Federal agencies (Fish and Wildlife Service, Bureau of Land Management, Forest Service, National Park Service (Bryce Canyon) and USDA APHIS Wildlife Services), State agencies (Utah Division of Wildlife Resources), and universities (Utah State University, Brigham Young University, Southern Utah University). Currently, the Team recognizes that existing criteria for Utah Prairie Dog recovery are unlikely to work, but that the information necessary to define new and better criteria is not yet available. Thus, this document proposes an interim *conservation strategy* for management policy over the next five to ten years that promotes:

(1) *habitat improvement* for existing and new Utah Prairie Dog populations,

(2) *research* to determine more precise habitat suitability criteria and new recovery goals, and

(3) *public involvement* to facilitate a better environment for managing conflicts.

The overall goal of recovery efforts (U.S. Fish and Wildlife Service 1991) was to establish populations of greater than 813 adult animals on public land in each of three different recovery areas (West Desert, Paunsaugunt Area, and Awapa Plateau), as called for by a population viability analysis (Seal 1987). To achieve these goals, Utah Prairie Dogs from private land were translocated to several sites on public land within these three recovery areas, with translocations occurring for several consecutive years at most sites. Populations approached recovery goal levels in all three areas in the late 1980s, but declines in the early 1990s suggested that existing translocation sites probably could not sustain these levels. McDonald and Bonebrake (1994) evaluated success of translocations for the West Desert recovery area and found that, while Utah Prairie Dog populations persisted at some sites, only a small fraction of the number of prairie dogs translocated to these sites remained. These results suggest that previous translocation efforts are unlikely to produce recovery goal population levels of Utah Prairie Dogs.

Recent monitoring of several translocation sites suggests that translocations have been largely unsuccessful. Most approved translocation sites in Iron County did not meet suitable habitat criteria outlined in the recovery plan, and received no habitat monitoring following translocation of prairie dogs (McDonald and Bonebrake 1994). Specifically, few sites had the desired low cover of shrubs other than rabbitbrush (*Chrysothamnus viscidiflorus*), and both cool-season and warm-season grasses. Moreover, sites reseeded to a monoculture of crested wheatgrass (*Agropyron desertorum*) performed poorly as translocation sites. In both the Awapa Plateau and Paunsaugunt recovery areas, habitat was manipulated to benefit prairie dogs in association with translocations, but, again, no habitat monitoring was performed. McDonald and Bonebrake (1994) speculate that suitable translocation sites are rare, given the Recovery Plan guideline that sites should be more than one mile from private or Utah State Trust lands, and that most public land appears to have a greater shrub abundance than that allowed in the current recovery plan.

In addition to monitoring existing populations, other research suggests that stated recovery goals for Utah Prairie Dogs may be based on incorrect assumptions about their population dynamics. In an analysis of Utah Prairie Dog population trends since 1976, local complexes showed large fluctuations over time, such that any complex was likely to go extinct within a 20-year period

(Ritchie 1995a manuscript). Furthermore, changes in prairie dog numbers do not appear to be due to random fluctuations in environmental conditions (e.g., precipitation, snow depth, etc.), but rather to interactions among individuals within complexes, their food supply, and/or their predators and diseases. Evidence suggests that Utah Prairie Dogs represent a true metapopulation composed of smaller local populations that periodically drive themselves to extinction. The existing recovery plan alludes to the idea that Utah Prairie Dogs may exist as a metapopulation, but the population viability analysis upon which the recovery goals are based does not incorporate metapopulation dynamics into calculation of viable population size. Thus, current recovery goals may be unattainable due to inherent characteristics of Utah Prairie Dog population dynamics.

Several procedures need to be implemented to address three major initiatives. These initiatives will be carefully integrated so that each complements the other. Following the implementation of this conservation strategy, sufficient information should exist to revise recovery goals and list achievable criteria for recovery. In the meantime, these initiatives should provide new momentum for Utah Prairie Dog recovery and mitigation of human-prairie dog conflicts. Specifically, new areas for prairie dog translocation should be established in association with existing public land complexes (collections of colonies within two miles of each other that exchange individuals at least once every two generations). These sites will serve as research areas to determine the effects of major habitat manipulation or improvement practices (e.g., fire, seeding, and/or grazing) on the persistence of Utah Prairie Dog complexes. In addition, these associations of complexes can be used to study mechanisms of population decline (e.g., overexploitation of plant food, predation, plague) that will better predict both the impact of habitat on Utah Prairie Dog population dynamics and the patterns of extinction of local complexes. Finally, a program of public involvement is proposed to improve coexistence between Utah Prairie Dogs and human activities in urban and rangeland ecosystems.

HABITAT IMPROVEMENT

Reviews of the current status of Utah Prairie Dogs and their habitat on public land (McDonald 1993, McDonald and Bonebrake 1994) suggest that suitable habitat may be the most important factor limiting prairie dog recovery. Lack of habitat suitable for Utah Prairie Dogs on public lands is widespread (McDonald 1993, 1994); most areas within the species' range that were shrub-grassland mosaics in pre-settlement times have been converted to shrublands through long-term livestock grazing and fire suppression or to grass monocultures to maximize livestock forage production. Additionally, most of the best original Utah Prairie Dog habitat is now intensively farmed or has been converted to urban uses. Thus, much historical habitat of the Utah Prairie Dog has been lost. Consequently, active habitat management should be a potentially powerful way to recover the Utah Prairie Dog. Treating areas to remove shrub cover and re-seeding these areas with a diversity of plant species and growth forms will restore productive grasslands and provide new habitat. These manipulations can be used to enhance Utah Prairie Dog persistence at existing complexes or new translocation sites.

Habitat improvement seems especially crucial for enhancing both Utah Prairie Dog translocation efforts and the persistence of existing complexes. Existing translocation sites were selected based on qualitative vegetation criteria (Crocker-Bedford and Spillett 1981, Jacquardt et al. 1986, Coffeen and Pederson 1993) and political land ownership constraints (McDonald and Bonebrake 1994), but most existing public land complexes (the only ones applicable to recovery goals) occupy sites that do not meet the habitat criteria specified by the recovery plan (U.S. Fish and Wildlife Service 1991). Most of these sites contain a high abundance of tall shrubs such as sagebrush (*Artemisia tridentata*), rubber rabbitbrush (*Chrysothamnus nauseosus*), or saltbush (*Atriplex canescens*), which compete with grass forage species and provide cover for predators. In addition, within the past 30 years, many areas of habitat manipulation were seeded to a virtual monoculture of crested wheatgrass, which matures early and tends to outcompete other plants that are important forage later in the growing season, e.g., warm season grasses, perennial forbs (Pyke and Archer 1991, Crocker-Bedford 1976). Additionally, many existing complexes that were once grassland appear to have been invaded by shrubs during the past 15 years (McDonald and Bonebrake 1994). This suggests that habitat modifications are needed to maintain existing complexes. Expanding suitable habitat at existing complexes may increase their average size, which may then increase the likelihood of Utah Prairie Dog persistence.

Consequently, habitat manipulation to restore diverse grassland will be an important next step in recovery implementation. Specifically, removing shrub cover and re-seeding these areas with a diversity of plant species will restore productive grasslands and provide new habitat. Such manipulation mimics the processes that created the grassland - shrubland mosaic characteristic of pre-settlement habitat, in which large grassland patches were maintained by periodic fires. In addition, such manipulation is consistent with sound range management practices (Savory 1988, Coughenour 1991) and may benefit livestock production by increasing forage production. Thus, management of a threatened species may actually augment land use by livestock producers. Habitat manipulation should also benefit other wildlife species declining in southern Utah, including sage grouse (*Centrocercus urophasianus*), burrowing owl (*Athene cunicularia*), ferruginous hawk (*Buteo regalis*), pronghorn (*Antilocaprus americana*), and mule deer (*Odocoileus hemionus*). Overall, "active" habitat management for Utah Prairie Dog recovery serves as an example of ecosystem management, in which interests of a threatened species, human stakeholders, and other wildlife species are integrated in an ecosystem context.

There appears to be no single best method of habitat manipulation, because sites are likely to differ in their physical characteristics, precipitation, soils, existing desirable plant species, etc. A specific overall plan awaits the outcome of future research exploring these effects. However, habitats can be improved in the interim at several existing Utah Prairie Dog complexes and at new sites located near existing complexes. In cooperation with appropriate land management agencies and livestock permittees, vegetation manipulation in concert with recommended vegetation guidelines (Appendix 1), should be conducted to help preserve existing prairie dog colonies. In addition, it is recommended that vegetation be manipulated at a minimum of eight new 250+ acre translocation sites. Ideally, these sites would be located within three miles of an existing "successful" complex and greater than two miles from each other (Figure 1). Appendix 2 lists complexes considered by the Recovery Implementation Team as suitable for new translocations. These new sites will be used for research purposes (see page 10). Having at least eight sites will provide the necessary replication across the species' range. Also, establishing new sites near existing complexes should allow for genetic exchange of prairie dogs every few generations, while reducing the chances of devastating diseases which occur when colonies are too close.

Each complex proposed for vegetation manipulation and complexes with associated new site(s) will comprise an Analysis Area. Analysis areas will be the base unit for Utah Prairie Dog Management Plans (Appendix 2). These complexes are distributed among the Awapa Plateau, Paunsaugunt and West Desert Recovery Areas. Treatments such as prescribed burns, mechanical removals, and/or seeding will be employed, depending on what is practical for a given site and its existing vegetation. Many of these sites are currently dominated by shrubs or grass monocultures but may produce diverse grassland communities once the abundance of shrubs or introduced grasses is reduced. These sites are expected to demonstrate the positive effects of habitat manipulation on prairie dog populations as well as on forage production for livestock and other species, e.g., sage grouse, pronghorn, raptors, etc.

Prairie dogs will be translocated from private lands, per U.S. Fish and Wildlife Service permitted actions, to each of these new habitat manipulation sites. Established translocation methods will be followed (Crocker-Bedford and Spillett 1981, Jacquardt et al. 1986, Coffeen and Pederson 1993). Up to 200 prairie dogs will be translocated to each site in each of three consecutive years, with no more than 600 prairie dogs total to a site during the research phase. Prairie dogs will be translocated to two new sites each year. If four sites become available the each year for two consecutive years, then 4800 prairie dogs would be translocated to new sites over a four year period (Table 1). This spreads the risks of translocation success over different sequences of annual weather conditions. Appropriate predator control will be carried out by USDA APHIS Wildlife Services (WS) in conjunction with translocations as determined by the Team based on Utah Prairie Dog survival and reproductive rates, range conditions, precipitation, Utah Prairie Dog predator numbers, and other relevant habitat parameters. Number, level, and type of predator control will be incorporated into WS's annual work plans. Coyotes controlled will be made available, upon appropriate approval, to the Center for Disease Control to determine if diseases harmful to Utah Prairie Dogs are present in the Analysis Areas. Vegetation and population monitoring will occur at all sites being actively managed. Some exchange of prairie dogs between existing complexes and new translocation sites is expected, so that natural recolonization of new sites can occur. Each translocation site will be monitored annually.

Table 1. Utah Prairie Dogs to be translocated each year in conjunction with habitat improvement and research. Please note that each number of translocation sites, shown in the second and fourth columns, is cumulative.

Implem-entation Year	Number of Sites Accepting Translocations (Cumulative)	Number of Prairie Dogs per Complex	Proposed Locations (Cumulative)
1	4	800	BLM (2), USFS (2)
2	8	1600	BLM (4), USFS (4)
3	8	1600	BLM (4), USFS (4)
4	4	800	BLM (2), USFS (2)
Total		4800	

Translocation in combination with habitat manipulation is likely to improve chances of prairie dog persistence well above the rate previously observed for translocations (McDonald and Bonebrake 1994). Research conducted within each translocation site and its associated complex of existing prairie dogs should provide useful post-translocation monitoring information. In addition, each manipulation zone and translocation site should demonstrate the effectiveness of habitat manipulation in promoting prairie dog persistence and coexistence with livestock and other wildlife.

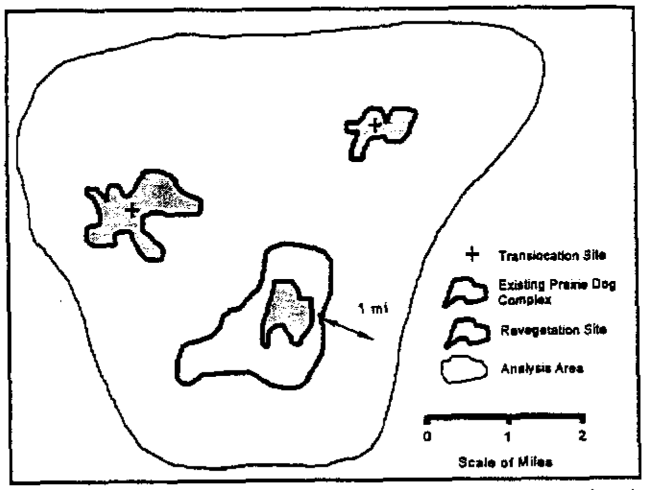

Figure 1. Habitat improvement (revegetation) sites and their association with new Utah Prairie Dog translocation sites and an existing Utah Prairie Dog complex.

RESEARCH

Several previous studies provide basic natural history information about Utah Prairie Dogs that has been useful in prescribing translocation sites (Collier and Spillett 1975, Crocker-Bedford 1976, Crocker-Bedford and Spillett 1981, Hasenyager 1983, Jacquardt et al. 1986). However, these criteria have not resulted in long-term success in increasing populations or finding appropriate translocation sites (McDonald and Bonebrake 1994). A major problem in translating Utah Prairie Dog biology into management has resulted from failure to monitor vegetation changes, grazing practices, disease, predation and prairie dog demography at established and translocated populations. In particular, scientists and managers still do not understand why complexes (local populations of prairie dogs separated from other populations by at least two miles) show such great fluctuation in numbers, and whether existing populations have a chance to reach recovery goals. Thus, future research is critical to revise and implement a recovery plan for the Utah Prairie Dog.

The reasons for persistently low Utah Prairie Dog numbers in recovery areas are unclear. Suitable habitats are naturally fragmented and foster multiple complexes that comprise the larger aggregate population (metapopulation). Unpredictable events, food exploitation, and plague may all cause Utah Prairie Dog numbers in such complexes to plummet. In addition, spatially isolated complexes may be more likely to crash or less likely to recover afterward. Repeated crashes of complexes may prevent the Utah Prairie Dog metapopulation from achieving consistently high numbers.

Existing Utah Prairie Dog complexes are associated with deep, loamy soils, production of cool season grasses well into summer, and a lack of shrubs, tall grasses and/or other visual obstructions (Jacquardt et al. 1986). Utah Prairie Dogs strongly select cool season grasses in their diet (Crocker-Bedford 1976), but juveniles may rely on warm season grasses during summer for sufficient food to survive over winter. However, it is still unclear how forage characteristics or habitat affect prairie dog dynamics. Other factors, such as predation or disease, that are potentially unrelated to habitat, may have stronger effects. Less information exists on the effects of land use practices, e.g., grazing, rangeland management, etc., on prairie dog population dynamics. Studies of other prairie dog species (Coppock et al. 1983, Cid et al. 1991) suggest that large grazers, such as bison and cattle, can coexist with prairie dogs. Sheep may also coexist easily with prairie dogs, especially if they graze in fall or winter, because they can feed heavily on shrubs. Thus, livestock grazing may benefit Utah Prairie Dogs if grazing enhances primary production and reduces shrub invasion (Coppock et al. 1983, Holland et al. 1992). However, the effects of grazing in any season on Utah Prairie Dogs remain unknown.

More recent research suggests that knowledge of mechanisms of Utah Prairie Dog population dynamics, e.g., food limitation, predation, disease, etc. may be crucially important for species recovery (Ritchie 1995b manuscript). Analysis of population trends since 1976 for 35 complexes suggest that any complex can be expected to crash once every 20 years. Moreover, crashes appear to be related mostly to interactions among individual prairie dogs, rather than random events. Thus, important within-species interactions, e.g., overexploitation of food, disease transmission, or stress-induced vulnerability to disease may best explain repeated crashes of complexes.

These previous results suggest that further research is needed to develop a long-term conservation strategy for the Utah Prairie Dog. Thus, this conservation strategy supports current studies of existing data and new field studies to address three research questions.

(1) What is the most likely explanation for the high rate of crashes of local populations, and how does this alter specific numerical goals for recovery of the species?

(2) Can rangeland revegetation and grazing practices improve the persistence of translocated populations?

(3) What are the genetic consequences of high rates of crashes for local populations of Utah Prairie Dogs, and how does this affect the spatial arrangement of translocation sites and numerical goals for population recovery?

These three areas of research will be addressed by currently ongoing studies of existing data, planned studies of effects of habitat manipulation on Utah Prairie Dog success, and potential studies of genetic differentiation among local populations.

Current research is analyzing existing data relevant to prairie dog recovery, specifically annual counts at existing complexes (on both public and private land), precipitation and temperature data from weather stations near these complexes, vegetation and soils data from each complex, and spatial arrangement of complexes. For complexes with complete records (i.e. counted every year since 1976), annual changes in populations can be explained from the prior year's annual count and weather conditions by using modern time series analysis techniques (Box and Jenkins 1976, Turchin 1990, Turchin and Taylor 1992). For each complex, average persistence time, probability of extinction per year, and average population size can be calculated. These variables should then be related to whether complexes occur on private versus public land, distance to the nearest colony, and density of complexes within an arbitrarily defined large area (e.g., 100 km^2). Persistence probability of each complex can be related to the large-scale habitat type by plotting complex locations on a GIS habitat overlay. If funds allow, habitat types associated with successful complexes can be matched with a GIS public land overlay to help identify potential sites for Utah Prairie Dog translocation efforts. This analysis should show whether crashes of complexes are (1) due to random demographic events, weather, or deterministic density dependent interactions, (2) more likely on less suitable (e.g., shrubby, dry, high elevation) habitats, (3) more likely on geographically isolated colonies, and (4) more likely on public than on private land.

Proposed research will address whether habitat improvements and/or grazing schemes will improve success in establishing Utah Prairie Dog colonies. The following experiment would be ideal. Eight replicate research sites (see habitat improvement section) with existing sagebrush/desert shrub dominated plant communities on soils deep enough to support prairie dog burrow systems will be chosen. A factorial design of grazing and revegetation (shrub removal and grass reseeding) treatments on 40-acre plots within a 250-acre block will be established at each research site (Figure 2). All available data from earlier translocation efforts shall be considered in selection of research sites. The plot treatments will be: (1) spring livestock grazing with no revegetation, (2) summer/fall

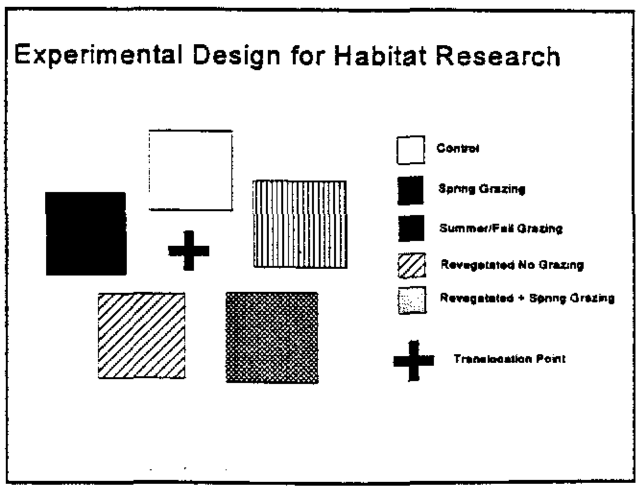

Figure 2. Schematic of experimental design at each new translocation site. Each plot is ¼ mile on each side or 40 acres in area. The translocation release point is represented by a plus sign.

livestock grazing with no revegetation, (3) spring grazing with revegetation, (4) no grazing and no revegetation (control), and (5) revegetation without grazing. The 40 acre plot size should be sufficient to allow about 20 translocated adult prairie dogs to colonize. Revegetation treatments will be implemented in accordance with recommended vegetation guidelines (Appendix 1). Treatments will be established at two research sites each year to spread their effects over different sequences of annual weather conditions. After the establishment of treatments, 200 Utah Prairie Dogs will be translocated to each research site, according to standard techniques (Jacquardt et al. 1986) each year for three years. Four main responses of Utah Prairie Dogs to these treatments will be measured: foraging rates and activity budgets for use in bioenergetics calculations, over winter survival rates, litter sizes, and juvenile growth rates. Responses will be measured for two to three years following translocation to evaluate success. These measurements should facilitate projection of population trends for translocated prairie dogs on different vegetation treatments. Overall, the experiment should show which grazing system should significantly improve the success of Utah Prairie Dog translocations.

Repeated crashes of local populations are thought to greatly reduce genetic diversity within total populations (Hastings and Harrison 1994). A unique potential exists to evaluate the genetic consequences of local crashes for the genetic diversity of Utah Prairie Dog because of the annual adult censuses since 1976 and corresponding population time series. Such information will be important in determining recovery goals for a genetically viable population. Using small amounts of genetic material, molecular analysis allows determination of even slight genetic differences among individuals within and between complexes. Blood or tissue samples of live individuals trapped from various complexes could be analyzed using these techniques.

PUBLIC INVOLVEMENT

Any recovery program for a threatened and endangered species in a democratic society depends on agreement by the public that recovery should occur. For the Utah Prairie Dog, past and present conflicts among stakeholders make this a special concern. Consequently, continued implementation of the recovery plan must include specific goals for involving the public in recovery. A three-pronged approach might be:

(1) *Community involvement.* Establish incentives for the development and management of mascot Utah Prairie Dogs, and demonstration sites near urban areas, to be developed and managed by community members, clubs, businesses, ranchers, or other organizations.

(2) *Education.* Involve elementary school, high school, and university students in field trips, habitat improvement opportunities, and research projects to learn about Utah Prairie Dog behavior and habitats, their importance in rangeland ecosystems, and human-prairie dog interactions.

(3) *Extension.* Use collaborative learning sessions to develop site specific management plans. Working groups should include county agents, representatives from land management agencies and USDA APHIS Wildlife Services, and agricultural producers. Sessions should feature information about the recovery process, recovery goals, and agricultural needs toward a goal of identifying feasible and desirable improvements for management of agriculture-prairie dog interactions.

Each of these efforts should be based on an analysis of the sustainability of local rangeland ecosystems that includes both prairie dog and human concerns. This analysis should identify incentives to encourage management practices that benefit both prairie dog recovery and multiple use.

Informing the public about prairie dog biology and its importance to ecosystem health and public livelihood is vital to forging management policy that benefits people and prairie dogs (Figure 3). With increased biological knowledge, management goals and actions become more meaningful to the public. Integrating public concerns into management plans based on biological understanding should help reduce conflicts between people, their land-use activities, and prairie dog persistence.

Currently, many local community members perceive prairie dogs as forage competitors with livestock, crop depredators, and disease vectors. Managers, on the other hand, are concerned with the loss of the prairie dog and its roles as a keystone species, component of species diversity, and manipulator of primary productivity. A keystone species is one whose presence and activities significantly increase the number of species living in an area. Consequently, there are some specific public involvement goals that should help short-term recovery efforts:

(1) Obtain assistance from conflict management specialists to develop collaborative learning sessions, and identify affected community groups for these sessions. The collaborative learning sessions will involve the public in a site specific systems analysis of areas of concern. Systems analysis will consider the human dimension as well as basic biology of prairie dogs and their role in ecosystems.

(2) Conduct these collaborative learning sessions with land and wildlife agency personnel, agricultural producers, and other affected community groups to identify feasible and desirable improvements for the current situation.

(3) Incorporate these improvements into the implementation of the Recovery Plan. Assess results and use for further collaborative sessions. This feedback loop should continue for the duration of the recovery effort.

(4) Train local facilitators to conduct additional and follow-up sessions.

These efforts should establish a process for management of conflicts and lay the groundwork for broader-based public involvement efforts.

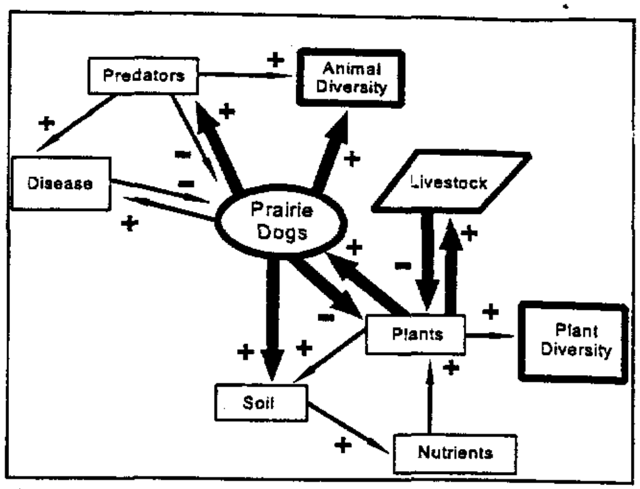

Figure 3. Major ecological connections involving Utah Prairie Dogs. Thicker arrows indicate stronger effects. Note positive effects and interconnectedness of seemingly disparate effects.

Recovery efforts related to the Utah Prairie Dog must also seek some longer-term goals that develop public ownership and involvement in prairie dog recovery. A key to success in public ownership is to *involve* the community in recovery and in the fate of specific prairie dogs or local populations. Prairie dogs have an advantage in this regard because they live in open spaces and are diurnal. For example, demonstration or "watchable wildlife" populations could be established near roadways in urban areas (e.g., Cedar City, Panguitch). In addition, individual prairie dogs at the site could be "adopted" by people. For many people, this may offer their first close-up experience with the prairie dog in a natural environment. Moreover, such demonstration sites offer the opportunity for people to perceive the prairie dog as something other than an economic threat or rifle target. Such sites would also offer easy, direct access for primary and secondary school students as part of a special public school program (see below). Perhaps most importantly, demonstration sites would provide "ownership" in the fate of prairie dogs for local citizens.

In the development and implementation of demonstration sites, school groups and clubs [e.g., 4-H club, Future Farmers and Ranchers of America (FFRA), scouts], university students (e.g., at SUU), community groups (e.g., Kiwanis or Rotary Clubs), and business groups (real estate organizations, Chamber of Commerce) would be involved through collaborative development of incentives. Incentives may result if demonstration sites include opportunities to improve rangeland sites and potentially increase productivity for livestock grazing as well as prairie dogs and/or test techniques that re-distribute prairie dogs to avoid crop damage. These groups might provide volunteer labor for habitat improvements, sign construction, donation of land, etc. A broad-based involvement might convey knowledge about prairie dogs and interest in their recovery to a diverse cross-section of the community.

Educational institutions offer another opportunity to involve the public. A program of special presentations, literature distribution, and field trips in local primary and secondary schools and university classes might have significant impact. Local agency members, extension personnel, or university educators could present videotapes, slide shows, demonstrations of captive prairie dogs, or visits to colonies. Involvement of parents in these activities might have a particularly strong impact. Inter-agency education, e.g., instruction of general agency personnel by other agency members that are experts on prairie dog recovery, may also be important. Such an effort would increase the number of knowledgeable agency personnel and facilitate the liaison between land or wildlife management agencies and the public.

Agricultural producers and rangeland managers are influential groups which will be key players in managing prairie dogs and their role in rangeland ecosystems. A major collaborative effort should use demonstration sites (e.g., proposed habitat improvement sites) and research results to involve agricultural producers and rangeland managers. Such efforts will encourage habitat improvements that favor prairie dogs and increased productivity of rangeland. Other efforts might include distributing information packets both locally and statewide (e.g., through UDWR's Project Wild), conducting field trips, and meetings at field demonstration sites ("windmill chats"). These activities will ultimately be targeted at identifying incentives for agricultural producers and other citizens to participate in prairie dog recovery.

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APPENDIX 1.

Interim Vegetation Composition Guidelines for Utah Prairie Dog Habitat

These guidelines have been developed to replace the vegetation guidelines in the Utah Prairie Dog Recovery Plan (1991). These guidelines are approved by the Utah Prairie Dog Recovery Plan Implementation Team for use by all land managers, and should be used in the management of the vegetation portion of Utah Prairie Dog habitat during the interim from the date this document is signed until the Utah Prairie Dog Recovery Plan is amended. The guidelines for vegetation parameters found on pages B-1 and B-2 of the Recovery Plan are considered inadequate because the units of measurement are unclear or unknown, the wide ranges for minimum and maximum values, and the different recommended parameters for the same elevations (feet vs. meters). The following guidelines were developed based on a literature review and best professional knowledge. The Utah Prairie Dog Recovery Plan Implementation Team approves these guidelines for vegetation composition and recommends their use by all land managers.

These guidelines are recommended for vegetation management of Utah Prairie Dog habitat rangewide. The guidelines may be modified in the future if it is found that they do not meet the needs of the prairie dog or that Recovery Area specific guidelines are needed. Sites with vegetation within these parameters should be considered suitable habitat, or the desired plant community, for this species. These guidelines apply to habitat <u>not</u> associated with urban or agricultural areas.

Vegetative Type	Percentage of Ground Cover	Additional Requirements
Warm-season grasses	3% - 10%	If warm season grasses are less than 3%, then forbs must be 11% - 20%.
Cool-season grasses	12% - 40%	A minimum of three species are required, with at least one native species present.
Forbs	1% - 10%	Non-annual, and a minimum of 1% of forbs must be species as defined below.
Shrubs	0% - 3%	

Soils are an important component of prairie dog habitat, but at this time we do not have enough information to recommend parameters.

Monitoring

The toe pace or step method will be used for monitoring sites to determine conformance with these guidelines. Sampling should occur during a period representative of the peak production of the vegetative community, which is generally June and July.

Definitions

Vegetative Type	Definition	Examples
Warm season grasses	Grasses which "green up" and do most of their growing during the warm summer months.	Sand dropseed, curlygrass, mountain muhly, and grama grass.
Cool season grasses	Grasses which "green up" and do most of their growing during the cool spring months.	Indian ricegrass, squirreltail, western wheatgrass, crested wheatgrass, needle and thread grass, cheatgrass, bluegrass, and wildrye.
Forbs	Included are any herbaceous plant other than those in the grass family (*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.

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APPENDIX 2. Management Status of Utah Prairie Dog Complexes* Located on Public Lands.

Recovery Area	Management Complex	Site No.	Site Name	Land Management Agency	Management Category	Management Plan Date
West Desert	Rush Lake	0104	Rush Lake	BLM-Beaver River RA	1	N/A
West Desert	Summit	0106	Road Side	BLM-Beaver River RA/UDWR	1	N/A
West Desert	Buckskin Valley	0110	Buckskin	BLM-Beaver River RA	2	10/97
West Desert	Buckhorn Flat	0113	Buckhorn Flat	BLM-Beaver River RA	2	10/97
West Desert	Black Mountains	0114	Long Hollow	BLM-Beaver River RA	2	10/97
West Desert	Black Mountains	0115	Willow Spring	BLM-Beaver River RA	1	
West Desert	Horse Hollow	0116	Horse Hollow	BLM-Beaver River RA	3	10/97
West Desert		0117	Three Peaks	BLM-Beaver River RA	1	N/A
West Desert		0118	Jockey Springs	BLM-Beaver River RA	1	N/A
West Desert		0119	Bear Valley	USFS-Dixie NF-Cedar RD	1	N/A
West Desert		0120	Pine Valley	BLM-Beaver River RA	1	N/A
West Desert		0121	West Lund	BLM-Beaver River RA	1	N/A
West Desert	Black Mountains	0122	Minersville #3	BLM-Beaver River RA	3	10/97
West Desert		0123	West of Rush Lake	BLM-Beaver River RA	1	N/A
West Desert	Monument Peak	0124	Adams Well	BLM-Beaver River RA	3	10/97
Paunsaugunt		0201	Dog Valley	BLM-Kanab RA	1	N/A
Paunsaugunt	Mud Springs/Johnson Bench	0202	Ahlstrum Hollow	USFS-Dixie NF-Powell RD	2	12/15/97

Recovery Area	Management Complex	Site No.	Site Name	Land Management Agency	Management Category	Management Plan Date
Paunsaugunt	Johns Valley	0205	John's Valley	BLM-Escalante RA	1	N/A
Paunsaugunt	Mud Springs/Johnson Bench	0206	Tom Best Springs	USFS-Dixie NF-Powell RD	1	N/A
Paunsaugunt		0207	Panguitch Lake	USFS-Dixie NF-Cedar City RD	1	N/A
Paunsaugunt	Mud Springs/Johnson Bench	0209 A&B	SR12-Bryce Airport	USFS-Dixie NF-Powell RD	1	N/A
Paunsaugunt	Mud Springs/Johnson Bench	0210	Johnson Bench Coyote Hollow	USFS-Dixie NF-Powell RD	3	12/15/97
Paunsaugunt	Mud Springs/Johnson Bench	0212	Berry Springs	USFS-Dixie NF-Powell RD	3	12/15/97
Paunsaugunt	Bryce Canyon	0213	Bryce Canyon NP	NPS-Bryce Canyon NP	2	10/97
Paunsaugunt	Bryce Canyon	0215	Bryce Canyon Visitor's Center	NPS-Bryce Canyon NP	2	10/97
Paunsaugunt	Mud Springs/Johnson Bench	0218	East Creek	Dixie NF-Powell RD	2	12/15/97
Awapa Plateau	Boulder Complex	0300	Pollywog Top	Dixie NF-Teasdale RD	2	12/15/97
Awapa Plateau	Boulder Complex	0301	Lost Knoll East	Dixie NF-Teasdale RD	2	12/15/97
Awapa Plateau	Boulder Complex	0302	Dry Lake	Dixie NF-Teasdale RD	2	12/15/97
Awapa Plateau	Boulder Complex	0303	Big Lake	Dixie NF-Teasdale RD	1	N/A
Awapa Plateau		0304	Doctor Creek	Fish Lake NF-Richfield RD	1	N/A
Awapa Plateau		0305	Pelican Point	Fish Lake NF-Richfield RD	1	N/A
Awapa Plateau	Parker Mountain	0306	Square Reservoir	State Inst. Trust Lands	1 or 2	9/99

Recovery Area	Management Complex	Site No.	Site Name	Land Management Agency	Management Category	Management Plan Date
Awapa Plateau	Parker Mountain	0308	Dog Lake	UDWR	1	12/97
Awapa Plateau	Parker Mountain	0310	Flossie Lake	State Inst. Trust Lands	2	9/99
Awapa Plateau	Parker Mountain	0311	Hare Lake	BLM-Richfield, State Inst. Trust Lands	2	9/99
Awapa Plateau	Parker Mountain	0312	The Tanks	BLM-Richfield	2	9/99
Awapa Plateau	Parker Mountain	0313	Mud Lake	BLM-Richfield	2	9/99
Awapa Plateau	Parker Mountain	0314	Smooth Knoll	BLM-Richfield	2	9/99
Awapa Plateau	Parker Mountain	0315	Sage Hen Draw	USFS-Dixie NF-Teasdale RD	2	12/97
Awapa Plateau	Parker Mountain	0316	Big Hollow-Flat Top	BLM-Richfield	2	9/99
Awapa Plateau	Parker Mountain	0317	Terza Flat	BLM-Richfield	2	9/99
Awapa Plateau	Parker Mountain	0318	Moroni Peak Reservoir	BLM-Richfield	2	9/99
Awapa Plateau	Tidwell Slope	0322	Tidwell Slope	USFS-Fish Lake NF-Loa RD	3	12/97
Awapa Plateau	Tidwell Slope	0328	Forsyth Reservoir	USFS-Fish Lake NF-Loa RD	2	12/97

*Includes colonies that are currently active, have been active in the past five years, or have excellent potential as a translocation/management site.

Management Category Definitions:

1 - Population Monitoring and Habitat Assessment Only
2 - Active Habitat Management/Improvement plus Population and Habitat Monitoring
3 - Research Sites (Includes Habitat Management and Monitoring)