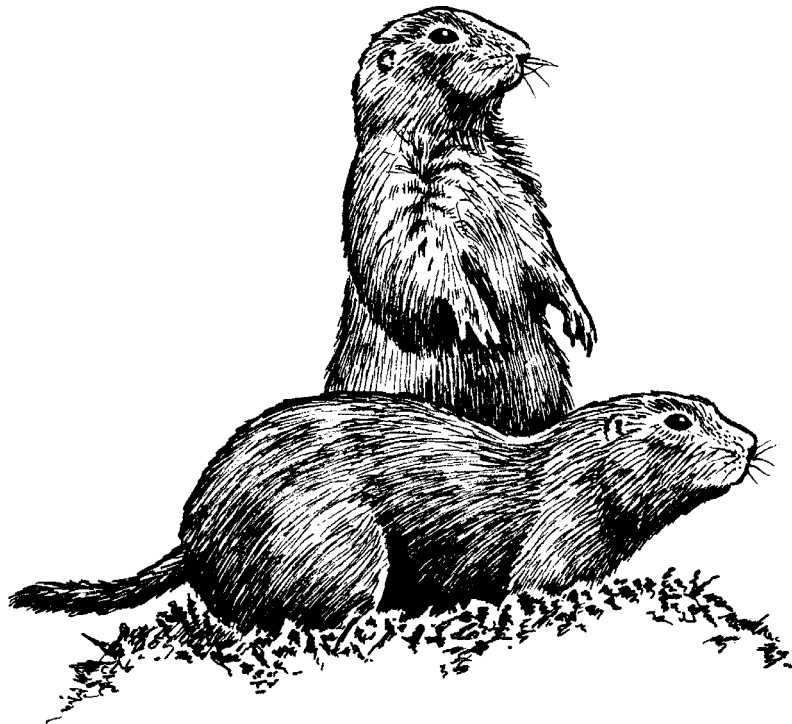


Texas Black-tailed Prairie Dog Conservation and Management Plan



Prepared by:

Texas Black-tailed Prairie Dog Working Group

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C. EXECUTIVE SUMMARY

Black-tailed prairie dogs (*Cynomys ludovicianus*) are an important part of the grassland ecosystems found in the western portions of Texas. Their burrows and surrounding low-cut vegetation provide habitat for a variety of species including western burrowing owls (*Athene cunicularia hypugaea*), mountain plovers (*Charadrius montanus*), and the endangered black-footed ferret (*Mustela nigripes*, currently extinct in Texas) (Hygnstrom and Virchow 2002, Tyler and Shackford 2002). A variety of threats have reduced numbers of prairie dogs from the vast numbers reported in Texas from the early 20th century (Bailey 1905) and across the range of the species. Potential threats include conversion of habitat to other uses, introduction of bubonic plague (*Yersinia pestis*), unregulated poisoning, trapping, and recreational shooting, lack of state and federal regulations to conserve the species, and over use for commercial, recreational, scientific, or educational purposes (U.S. Fish and Wildlife Service 2000, U.S. Fish and Wildlife Service 2002, Luce 2003).

This conservation and management plan was developed by the Texas Black-Tailed Prairie Dog Working Group (hereafter "Working Group"). Efforts to develop the Texas Black-tailed Prairie Dog Conservation and Management Plan (hereafter "Management Plan") were initiated in 1999 following petitions by the National Wildlife Federation as well as the Predator Conservation Alliance, the Biodiversity Legal Foundation, and John Sharps to list the black-tailed prairie dog as "threatened" under the Endangered Species Act (ESA). In recognition of the declining abundance of black-tailed prairie dog colonies and the various threats to this species, state wildlife agencies within the species' historic range drafted *The Black-tailed Prairie Dog Conservation Assessment and Strategy* (Van Pelt 1999) to guide conservation and management of the species. Texas, as a cooperating interstate member, also agreed to draft its own black-tailed prairie dog management plan as part of the coordinated interstate conservation effort. The Management Plan presented herein marks one contribution to that effort. The Management Plan is a step-by-step plan to reach the statewide goal of 293,129 acres (118,625 ha) of occupied

prairie dog habitat by 2011.

This Management Plan contains biological information and management recommendations necessary for conservation and management of the black-tailed prairie dog. It includes a review of the species over its historic range, and specific strategies designed to promote prairie dog conservation and long-term population sustainability. Components of the plan include a recent inventory, science-based recommendations for conservation and recovery of the species, and identification of realistic management strategies that will result in desired outcomes for all stakeholders. This plan is designed to be flexible, to respond to changing conditions in the status of prairie dog populations in Texas and the social and economic environment in which we live, and to preclude the need for listing under the ESA. Periodic review of this plan will provide opportunities to make adjustments in management to accommodate needs of the black-tailed prairie dog, its associated species, its grassland prairie habitat, and the changing needs, demands and expectations of the public and various agencies responsible for conservation of natural resources in Texas.

The main goals of the Management Plan are as follows:

(1) Determine the current population size of black-tailed prairie dogs in Texas and establish a long-term monitoring program. The statewide goal for area occupied by black-tailed prairie dogs that was proposed by Luce (2003) is 293,129 acres (118,625 ha) by 2011. Prior to determining where to focus management efforts, an inventory of all active prairie dog towns and how many acres they currently occupy was necessary. Additionally, Texas has the goal of establishing at least 1 complex >5,000 acres (2,023 ha) and possessing at least 10% of the occupied acres in complexes \geq 1,000 acres (405 ha). A prairie dog complex is a group of prairie dog colonies distributed such that individual prairie dogs can physically disperse from one colony to another. The Interstate Prairie Dog Conservation Team, for mapping and management purposes, has defined the black-tailed prairie dog movement distance that encompasses the majority of

inter-colony movement to be 4.3 mi (7 km). The inventory is near completion. In addition to the initial inventory efforts, a long-term monitoring program was deemed necessary in order to assess the success of the management activities.

(2) Develop and implement an effective education and outreach program. The Working Group determined that an education and outreach program would be necessary. Education and outreach materials will cover many topics including but not limited to prairie dog management, prairie dog ecology, plague, effects of prairie dogs on rangelands and agricultural land, etc. It is important that outreach materials and education programs are factual and represent interests of all stakeholder groups.

(3) Develop management options and guidelines that conserve prairie dogs at long-term sustainable levels. Several management options pertaining to prairie dogs towns and complexes have been available for years. However, it is important that more options are developed, such as assistance programs geared toward conservation and development of guidelines for managing complexes, rather than individual towns.

(4) Review and make recommendations for regulatory changes in the status of black-tailed prairie dogs. Prior to the formation of the Working Group, not all of the laws and regulations pertaining to prairie dogs were identified and summarized in a single location. Furthermore, it was unclear what agencies had regulatory control over prairie dogs. It was determined that laws and regulations pertaining to prairie dogs should be identified and reviewed, and necessary changes recommended.

(5) Identify research needs and establish a research program that facilitates long-term viability of black-tailed prairie dogs in Texas. It was determined that a comprehensive research program was important as little research on prairie dogs has been conducted in Texas compared to other states within the historical range. Research conducted in Texas will increase knowledge and improve management guidelines.

(6) Implementation of the plan. Once the Management Plan is finalized, the Texas Black-tailed Prairie Dog Program Coordinator (hereafter "Program Coordinator") will organize efforts to implement the Management Plan. While implementation is the

Program Coordinator's responsibility, it is likely that Working Group members as well as interested parties and subject matter experts will provide assistance.

D. RECOMMENDED CITATION

Texas Black-tailed Prairie Dog Working Group. 2004. Texas black-tailed prairie dog conservation and management plan. Texas Parks and Wildlife Department Publication PWD RP W7000-1100 (7/05).

E. ACKNOWLEDGMENTS

The format and information presented herein builds upon efforts and suggestions of many individuals within state and federal resource agencies that have contributed to development of *The Black-Tailed Prairie Dog Conservation Assessment and Strategy* (Van Pelt 1999), the *Conservation Plan for the Black-tailed and White-tailed Prairie Dogs in Montana*, (Knowles 2000) as well as numerous members of the Working Group who provided regionally specific recommendations. Paul B. Robertson, Robert M. Sullivan, John H. Young, Derrick P. Holdstock, and Heather A. Whitlaw (Wildlife Diversity Program, Texas Parks and Wildlife Department) composed, supplemented, incorporated comments provided by members of the Working Group, and edited this document. Appreciation is expressed to Niki Nichols for facilitation of Working Group meetings. Appreciation is expressed to Vicki Sybert for facilitation of Working Group meetings and production of this publication.

F. PURPOSE STATEMENT

The primary mission of the Working Group is to:

"Develop and Initiate a Statewide Plan That Will Conserve the Black-tailed Prairie Dog, While Simultaneously Protecting Personal and Property Rights."

As such, the Working Group will develop and assist implementation of a statewide prairie dog conservation and management plan for all citizens using reliable, scientific data that will (1) provide recommendations for conservation of sustainable populations of the black-tailed prairie dog and prairie ecosystems, (2) provide flexible, practical, and adaptive management strategies for land owners, and (3) develop educational programs in support of conservation and management efforts.

G. INTRODUCTION

1. National Situation

Black-tailed prairie dogs (*Cynomys ludovicianus*) occur in Montana, Wyoming, Colorado, New Mexico, Oklahoma, Texas, Kansas, Nebraska, North Dakota, South Dakota, as well as Canada and Mexico. They have been extirpated from Arizona since 1960. The current distribution is from southern Canada to northeastern Mexico and west from approximately the 98th Meridian to the Rocky Mountains (Figure 1) (Luce 2003).

Current estimates of the total number of black-tailed prairie dogs range from 8,000,000 to 9,000,000 individuals nationwide, inhabiting approximately 677,000 acres (273,972 ha) of occupied habitat or <0.5% of their original occupied habitat (U.S. Fish and Wildlife Service 1999a). Thirty-six percent of all occupied habitat in North America is in 7 complexes greater than 10,000 acres (4,047 ha). Three are located on tribal land in South Dakota, one on tribal land in Montana, one on National Grassland in South Dakota, one on National Grassland in Wyoming; and one on private land in Mexico (U.S. Fish and Wildlife Service 2000).

2. Petition for Listing

On 30 July 1998, the National Wildlife Federation (NWF) petitioned the U.S. Department of the Interior (USDI) U.S. Fish and Wildlife Service (USFWS or "Service") to emergency list the black-tailed prairie dog as threatened throughout its historic range (U.S. Fish and Wildlife Service 1999a). Another petition was later filed by the Predator Conservation Alliance, Biodiversity Legal Foundation, and John Sharps (U.S. Fish and Wildlife Service 1999a). The NWF argued that emergency listing was necessary because of unregulated shooting and poisoning of prairie dogs that would occur during the Service's 12-month listing evaluation process. By law, the Service was compelled to respond to the petition within 90 calendar days. In September 1998, the Service responded to the NWF that, although it did not believe the threshold had been met for emergency listing the black-tailed prairie dog, listing might be

warranted but further evaluation of the petition was necessary (U.S. Fish and Wildlife Service 2000).

In November 1998, state wildlife agencies and state agriculture departments in Wyoming, Montana, and South Dakota held a series of meetings with the Service and NWF to discuss the petition, as well as various options the states had regarding the petition. These agencies determined that involvement by all states, other resource management agencies, and tribal interest within the historic range of the black-tailed prairie dog was warranted and meetings were convened to begin developing an interstate effort to conserve the species (Van Pelt 1999).

On 17 March 1999, the Colorado Division of Wildlife invited various state, federal, tribal, and other entities interested in the black-tailed prairie dog to a meeting to assess the feasibility of a range-wide conservation agreement. It was agreed that pursuing a conservation agreement was the most reasonable approach for conservation of the species. Additionally, it was agreed that if strong partnerships could be developed, a significant step forward in bringing local governments, private landowners, and non-governmental organizations directly into the black-tailed prairie dog management plan would be achieved (Van Pelt 1999).

On 25 March 1999, the USFWS published notice of a *90-day Administrative Finding* on a petition to list the black-tailed prairie dog under the Endangered Species Act (ESA) of 1973, as amended (U.S. Fish and Wildlife Service 1999a). This action initiated a 9-month review process for the petition. In the *90-day Finding*, the Service determined that substantial information existed to indicate that listing of the black-tailed prairie dog might be warranted (U.S. Fish and Wildlife Service 1999a). The original comment period on this *90-day Finding* closed 24 May 1999 (U.S. Fish and Wildlife Service 1999b). However, to accommodate requests for additional time for public input, the comment period was reopened for an additional 45 days on 4 June 1999 and closed again on 19 July 1999 (U.S. Fish and Wildlife Service 1999b). Subsequently, the Service once again reopened the comment period on 4 October 1999 to allow for public

comment on the status review. Written comments were accepted until 3 November 1999 (U.S. Fish and Wildlife Service 1999c).

In February 2000 after an extensive biological review, the Service determined that the black-tailed prairie dog warranted listing under the ESA, but declined to list the species at that time because there were other species also awaiting listing that were in greater need of protection. As a result of this action, the species was placed on the candidate list of species. This action requires a review of its status annually (U.S. Fish and Wildlife Service 2000).

The Interstate Prairie Dog Conservation Team (Interstate Conservation Team) was formed in the early months of 1999 due to the efforts of Bill Van Pelt of Arizona Fish and Game Department. The Interstate Conservation Team was comprised of representatives from the eleven states that encompass the natural range of the species. One of the first actions of the Interstate Conservation Team was to request that each of the eleven states form a multi-stakeholder working group to develop a state conservation and management plan. Each state's natural resource agency was asked also to sign a Memorandum of Understanding with the Interstate Conservation Team relative to its intent to develop such a plan. Nine of the eleven states signed such a document and the two that were unwilling to do so at that time (Colorado and North Dakota) still engaged in the process of producing a state plan. With funding from the National Fish and Wildlife Foundation, Bob Luce was hired as the Interstate Conservation Team coordinator (Luce 2003).

3. Texas Working Group and Management Plan

The Texas Black-tailed Prairie Dog Working Group (hereafter "Working Group") met for the first time in April 1999, and has met approximately three times a year since then in efforts to achieve their primary mission of drafting The Texas Black-tailed Prairie Dog Conservation and Management Plan (hereafter "Management Plan"). The group is composed of private landowners, and representatives from commodity, ranching, farming, conservation groups, and state and federal agencies (Appendix A).

Since 1999, Texas Parks and Wildlife Department (TPWD) has supported this initiative in the forms of substantial personnel time, administrative support, and substantial funding for field research and an aerial map-based inventory of current prairie dog towns. The latter is scheduled for completion in 2004.

In the context of this document, inventory refers to a statewide count of the total number of occupied prairie dog acres in the state at the time of the survey. Monitoring refers to regular, strictly planned censuses of occupied acres at a specified site or sites within the range of the species. The purpose of monitoring is to detect changes in occupied acreage.

4. Threats

Major threats to the black-tailed prairie dog as specified in the *12-month Finding* (U.S. Fish and Wildlife Service 2000) and the *2002 Candidate Assessment* (U.S. Fish and Wildlife Service 2002) include:

- (1) The present or threatened destruction, modification, or curtailment of its habitat or range. This refers to conversion of habitat to farmland or urban areas, brush encroachment, and fragmentation. Habitat loss was considered a moderate threat in the Service's *12-month Finding* (U.S. Fish and Wildlife Service 2000). The Service considered habitat destruction to not be a threat and habitat modification to be a moderate threat in the *2002 Candidate Assessment* (U.S. Fish and Wildlife Service 2002).
- (2) Over-utilization for commercial, recreational, scientific or educational purposes. This refers mostly to unregulated shooting. Shooting was considered a low threat in the Service's *12-month Finding* (U.S. Fish and Wildlife Service 2000). In the *2002 Candidate Assessment*, the Service concluded that because they were "not aware of data that support a conclusion that reductions in density are sufficient to reduce population persistence at a given site" and that "no information is available that demonstrates that

any black-tailed prairie dog population has been extirpated or nearly extirpated by this activity", effects due to recreational shooting do not rise to the level of a threat pursuant to the definitions and constraints of the ESA (U.S. Fish and Wildlife Service 2002).

(3) Disease or predation. Bubonic plague (*Yersinia pestis*) is the major disease affecting black-tailed prairie dogs. Both the Service's *12-month Finding* and the *2002 Candidate Assessment* rated plague as a moderate threat (U.S. Fish and Wildlife Service 2000, 2002).

(4) The inadequacy of existing regulatory mechanisms. This refers specifically to black-tailed prairie dogs being classified as pests in 9 states as well as unregulated poisoning. Both the Service's *12-month Finding* and the *2002 Candidate Assessment* rated the lack of adequate regulatory mechanisms as a moderate threat (U.S. Fish and Wildlife Service 2000, 2002).

(5) Other natural or manmade factors affecting its continued existence. Control by poisoning represents the majority of this threat. Poisoning was considered a moderate threat in the Service's *12-month Finding* (U.S. Fish and Wildlife Service 2000). The Service downgraded poisoning to a low threat in the *2002 Candidate Assessment* (U.S. Fish and Wildlife Service 2002).

H. GOALS, OBJECTIVES AND STRATEGIES

GOAL 1 –Determine the current population size in Texas and establish a long-term monitoring program.

Although prairie dogs have been inventoried in a variety of ways at several times in the recent past, a thorough inventory of the state has never been attempted (Bailey 1905, Cheatham 1977, Lair and Mecham 1991, Ernst 2001). As part of our efforts to manage and conserve prairie dogs in Texas, an inventory of the entire range of the black-tailed prairie dog in Texas as well as periodic monitoring of a sample of its range is necessary to identify success of management and conservation activities. Given the length of time required for evidence of an extinct town to no longer be evident on an aerial photo, a 3 to 5 year interval between monitoring efforts appears to be the shortest time frame capable of detecting significant changes in prairie dog complexes. Additionally, mapping a sample of complexes that are strategically selected allows better understanding of regional patterns of prairie dog population trends, particularly as it relates to assessing impacts of plague and shooting, which vary across regions.

1.1. Objective 1 – Inventory prairie dog populations over the Texas range of the species.

Inventory – The historical range of the black-tailed prairie dog in Texas is large, covering approximately 1/3 of the state (Bailey 1905). Inventorying the entire range of the species in Texas, therefore is a major task. Recent advances in aerial photography may make that task less daunting. Although prairie dogs have been inventoried in a number of ways, including flight-line aerial surveys, use of U.S. Department of Agriculture (USDA) Farm Service Agency (FSA) crop slides, and satellite imagery, all of these methods have limitations. For example, FSA crop slides do not cover all areas of the known historical or current range of the species in Texas and aerial surveys are expensive and require considerable time and effort to conduct. Availability of recent high-resolution aerial photography, however, appears to provide a much more cost-effective and standardized

option for obtaining reasonably accurate estimates of prairie dog population sizes over their entire range.

1.1.1. Strategy A – Cooperate with the Interstate Conservation Team to determine the most efficient and cost effective manner of inventorying prairie dogs over the species range in Texas (Figure 2).

Technique: Texas has developed its own prairie dog inventory technique that is credible, rigorous, and defensible (J. Singhurst and P. Robertson, TPWD, personal communication). The technique is comparable to other methodologies used to measure prairie dog densities. Digital photo interpretation of prairie dog towns within 78 counties will be completed by 2004.

- Digital ortho-photo quadrangles (DOQ), color infrared aerial photography at 1-m pixel resolution, were used to identify prairie dog towns. Prairie dog towns as small as an acre in size can be detected using this imagery.
- Polygon features of prairie dog towns were digitized using Erdas Inc. Imagine Software and Vector Module (Leica Geosystems, Atlanta, Georgia, USA). Field maps of each county were plotted showing identified prairie dog towns, background photography, and county roads.
- Plotted field maps were ground-truthed in each county with a minimum 25% of the towns assessed, where roadside access to this percentage was possible.
- Field visits included visual inspection for occupation via roadside surveys with the aid of binoculars and/or spotting scopes. Field data sheets included occupation status (currently occupied, historically but not currently occupied, or converted to other land use), presence or absence of prairie dogs, number of western burrowing owls (*Athene cunicularia hypugaea*) present, and interior and surrounding vegetation type.
- Information will be compared to DOQ interpretation to generate an average percent accuracy of occupied and historically occupied towns based on the number of sites visited in each county. Acreage and soil substrate will also be identified for each site.

- A final Section 6 report will be compiled representing prairie dog occupation maps for each county and include a summary of vegetation types, soil substrates, and occupation of prairie dogs and burrowing owl presence in each county.

1.1.2. Strategy B – Insure that inventory and data recording methods respect the confidentiality of private landowners. Data will be reported in a manner to quantify area distributions of prairie dog towns at the county level without indicating exact locations.

1.1.3. Strategy C – Use results of the TPWD-funded study by Andrea Ernst, Texas Tech University, to determine changes in prairie dog colony sizes and densities in portions of 29 West Texas counties and to compare her results to those of a study conducted in the same manner a decade earlier.

Ms. Ernst has completed her study (Ernst 2001) and found that the number of acres of prairie dog towns in her study area had decreased by approximately 10% over the past decade. In addition, it was determined that some towns had disappeared while others had emerged elsewhere. The portions of the counties not covered in Ernst (2001) are being assessed by TPWD staff to determine total prairie dog densities for the 29 counties. TPWD is reassessing all parts of the 29 counties using a refined and more sensitive aerial photo technique and also assessing an additional 49 counties that historically had prairie dogs to provide an inventory for the entire state.

1.1.4. Strategy D – Establish criteria for determining where prairie dog conservation, management, research, and education efforts could be concentrated.

1.1.5. Strategy E – Using data from the state inventory and established criteria, identify regions in the state for concentrated conservation and management efforts (Focus Areas).

A prairie dog focus area is defined as an area of more than 1,000 acres (405 ha) of suitable prairie dog habitat, encompassing either an existing complex of occupied prairie dog colonies or an area where a complex of colonies can be created to sustain a viable subpopulation of prairie dogs for long-term management. Focus areas may be entirely on public lands, partially on public lands, and, by voluntary agreement, adjacent private lands, or entirely on private lands under a voluntary agreement.

Choice of focus areas should be based upon habitat quality, prairie dog densities, proximity to large towns or complexes, and be geographically representative of the prairie dog range in Texas.

1.1.6. Strategy F – Identify potential prairie dog habitat in Texas.

- Use soil, vegetation, and occupancy (current or historical) to indicate potential prairie dog habitat.
- Use information on potential habitat to obtain a revised estimate of total potential habitat available.

1.2. Objective 2 – Establish monitoring protocol, timelines, and select sites.

Monitoring – Prairie dogs will be monitored in accordance with recommendations of the Interstate Conservation Team, which are currently being developed. It is unlikely that it will be necessary or financially feasible to monitor populations of prairie dogs over their entire range in Texas. Rather, it is more likely that 5 to 10 representative complexes across the range of the species in Texas will be selected for long-term monitoring. The purpose of monitoring is to detect significant changes in the size of populations that can be extrapolated to the entire range. Such monitoring will be conducted in accordance with USFWS recommendations.

1.2.1. Strategy A – Cooperate with the Interstate Conservation Team to establish monitoring protocol consistent and complementary to that of other states, with consideration at all times for personal and property rights.

1.2.2. Strategy B – Locate potential monitoring sites within focus areas and strategically throughout the species' historic range in Texas using the statewide inventory to refine site selection. Sites should be large enough to yield sufficient data, but small enough to be manageable from the perspectives of financial and personnel needs. Monitoring will be conducted by TPWD in coordination with the Working Group.

TPWD personnel time limitations preclude single monitoring areas larger than 1,000,000 acres (404,686 ha) and a total greater than 8,000,000 acres (3,237,485 ha), approximately 10% of the original range of the species in Texas. Monitoring of an

area of this size should produce results of high confidence provided that the monitoring areas are strategically located. TPWD estimates that approximately 30 person days will be needed to assess each 1,000,000 acres (404,686 ha). Suggested monitoring areas include but are not limited to:

- Rita Blanca and Black Kettle National Grasslands
- Area near San Angelo – represents southern edge of prairie dog distribution
- Area near Amarillo – represents high-density area
- Area near Lubbock – represents high-density area
- Trans-Pecos Colonies – represents the Trans-Pecos distribution
- Midland Area – represents a geographically intermediate area
- Northeastern Panhandle – represents northeastern edge of distribution
- Southern Rolling Plains – represents southeastern edge of distribution

1.2.3. Strategy C – Determine an appropriate time schedule for long-term monitoring.

- Initial Statewide Inventory – Will be completed 2004
- Monitor selected areas every 3 years
- Based on trends, reassess monitoring schedule at 10-year intervals.
- Conduct a second statewide inventory at 12 years.
- Species status report sent to the interstate committee every 3 years.

GOAL 2 –Develop and implement an effective education and outreach program.

2.1. Objective 1 – Develop and implement education and outreach programs that focus on the black-tailed prairie dog, related human health issues, and also the structure, function, and ecological and economic value of prairie ecosystems.

It is increasingly evident that numerous species of both wildlife and plants are closely associated with and often dependent upon prairie dogs and their burrow systems (Koford 1958, Agnew et al. 1986, Goodrich and Buskirk 1998, Bak et al. 2001, McCaffrey 2001, Hygnstrom and Virchow 2002, Tyler and Shackford 2002). Efforts to convey this knowledge to state and federal agency personnel, the general public, and the agricultural and ranching communities should foster a more realistic understanding of ecological,

aesthetic, and economic values of prairie dogs and prairie landscapes. Education initiatives should recognize that prairie dogs are sometimes a significant economic burden for ranchers and that their value to prairie ecosystems as a whole needs to be weighed against that commercial reality. A primary education objective should be to clearly define and quantify the ecological, aesthetic, and economic gains, versus the economic losses incurred by allowing prairie dogs to inhabit rangeland, and to assist landowners in finding a way to achieve an acceptable balance between the gains and losses that allows prairie dogs to fulfill their role in prairie ecosystems.

2.1.1. *Strategy A* – Identify target audiences and determine how best to reach them.

2.1.2. *Strategy B* – Prepare general and targeted information and educational materials.

- Options include but are not restricted to open houses, field days, educational programs, public meetings, trade newsletters, pamphlets, news releases, magazine articles, group presentations, public focus groups, regional workshops, ranch conversations, public attitude surveys, and a special prairie dog web page.
- Review materials prepared by other states within the Interstate Conservation Team. When appropriate, request permission to use in Texas and share materials generated in Texas with other states.
- Prepare and make available to private landowners information that contains options available for their voluntary assistance in conservation and management initiatives.
- Promote voluntary pro-prairie dog actions on private lands. Advertise that this could help prevent the necessity for listing the prairie dog under the ESA.

2.1.3. *Strategy C* – Assist individuals and wildlife cooperatives in developing educational materials and programs that promote ecotourism. Promote understanding of the potential economic value of prairie dogs, associated species, and prairie ecosystem conservation and management.

2.1.4. *Strategy D* – Identify an official spokesperson for the Working Group

2.1.5. *Strategy E* – Address human health risks related to plague in prairie dogs by developing and distributing a fact sheet.

2.1.6. *Strategy F* – Educate agency personnel within TPWD, USDA Natural Resources Conservation Service (NRCS), Texas Department of Agriculture (TDA), USDA/ (Animal and Plant Health Inspection Service (APHIS) Wildlife Services/Texas Wildlife Services, and USDA Forest Service, etc., on the components of the proposed Management Plan through a series of internal training workshops, briefings, and handouts for all involved agencies, entities, and signatories.

2.1.7. *Strategy G* – Investigate funding and economic strategies for management and social acceptance of prairie dogs and prairie ecosystems.

- Identify funding and potential funding sources, grant/proposal writers, and clearly delineate procedures for applying and handling administration of funds.
- Efforts should include agricultural, grazing, urban, and sport shooting interests.
- These efforts should be conducted at several levels:
 - Single species level,
 - Shortgrass prairie community level, and
 - Great Plains ecosystem level.
- Determine the compatibility level of humans and prairie dogs in an urban setting and aggressive urban growth typical of Amarillo or Lubbock, Texas.
- Develop a liaison with city agencies responsible for monitoring urban growth/sprawl, issuing building permits, and delineating "Open Space" areas.

GOAL 3 –Develop management options and guidelines that conserve prairie dogs at long-term sustainable levels.

Conservation of black-tailed prairie dog populations throughout their historic range in Texas is, and will continue to be, a cooperative effort between private landowners, federal and state resource agencies, special interest groups, and the citizens of Texas. Although the following options focus on the black-tailed prairie dog, potential threats identified for prairie dogs also may affect other declining grassland species and the prairie landscape as a whole. Thus, conservation and management actions directed at the black-tailed prairie dog should also benefit other prairie associates (Appendix B). In order to follow through on efforts to use

incentives in a prairie dog conservation program, the following options, among others, will be investigated: (1) legislative action to establish a prairie dog shooting license and license fee as a source of funds; (2) political actions to implement incentives for prairie dogs and prairie dog habitat management; (3) funding from non-governmental organizations; and (4) prioritized locations to implement incentive programs.

3.1. Objective 1 – Develop science-based recommendations for viable populations – how many, where, and in what configuration – for conservation and recovery of the species using information from inventory and monitoring conducted under the plan and in cooperation with the Interstate Conservation Team. Recommendations will be developed and continually revised as the Management Plan is implemented, its failures and successes evaluated, and adjusted accordingly.

3.2. Objective 2 – Identify state and federal agencies involved in the management of prairie dogs in Texas and their current involvement and potential role in prairie dog management and conservation.

3.2.1. Strategy A – Determine actions that are currently being conducted and what actions are planned for the future by each agency, including but not restricted to the following entities:

- County Governments
- Municipalities
- Texas Cooperative Extension
- TDA
- Texas Department of Health
- Texas General Land Office
- TPWD
 - State Parks
 - Wildlife Management Areas
- Universities
- USDA

- APHIS Wildlife Services/Texas Wildlife Services
- FSA
- Forest Service - National Grasslands
- NRCS
- USDI
 - Bureau of Land Management
 - USFWS - National Wildlife Refuges
 - National Park Service
- Other Federal Lands, e.g. Department of Energy (DOE) BWXT Pantex and highway rights-of-way

3.2.2. *Strategy B* – Assess the effect each agency’s actions have singly and in sum on prairie dog populations.

3.2.3. *Strategy C* – Through collaboration, determine how the policies and actions of the agencies could be adjusted to fulfill their obligations to each of their constituencies while simultaneously addressing the population status of prairie dogs.

3.2.4. *Strategy D* – Develop a prairie dog handbook for agencies and communities.

3.2.5. *Strategy E* – Through collaboration, determine how the actions of each agency might be most efficiently and effectively coordinated and communication maximized.

3.2.6. *Strategy F* – The Working Group may form an ad hoc committee to work in close association with any entity, group, or agency particularly important to the success of the plan.

3.3. Objective 3 – Identify geographically well-defined conservation and management (or focus) areas that complement the interstate strategy

3.3.1. *Strategy A* – Focus incentives on the defined focus areas.

3.3.2. *Strategy B* – Facilitate interagency cooperation in the defined focus areas.

3.4. Objective 4 – Use current incentives and develop new ones to encourage conservation of prairie dog populations on private and public lands.

3.4.1. *Strategy A* – List and assess the potential usefulness of financial and other types of incentives currently in place. Prairie dog-related assistance of various sorts is currently available via the following programs:

- Conservation Reserve Program (CRP) - FSA
- Environmental Quality Incentives Program (EQIP) - NRCS
- Grassland Reserve Program (GRP) - FSA, NRCS
- National Fish and Wildlife Foundation
- Partners for Fish and Wildlife - USFWS
- Permanent Conservation Easements
- Playa Lakes Joint Venture
- Private Lands Initiative - TPWD
- Private Sources
- Section 6 Grants - USFWS
- State wildlife related tax incentives (Proposition 11)
- Technical guidance from USDA/APHIS Wildlife Services/Texas Wildlife Services, NRCS, Texas Cooperative Extension, USFWS, and TPWD
- Texas Landowner Incentive Program (LIP) - TPWD
- Wildlife Habitat Incentives Program (WHIP) - NRCS

3.4.2. *Strategy B* – Develop additional incentives, both monetary and otherwise, for all categories of landowners and other land stewards.

Potential forms of incentives include a federal-based land lease program, nature-based tourism enterprises, and the incorporation of research data that defines (1) the role of prairie dogs in controlling brush on rangelands, (2) better technical guidance for managing prairie dogs economically, and (3) the per acre economic cost of allowing prairie dogs to exist on rangelands in various parts of the state.

3.4.3. *Strategy C* – Assist groups of landowners in organizing wildlife cooperatives for ecotourism purposes and in managing prairie dogs on those properties.

3.4.4. *Strategy D* – Use the bulk of the monetary incentive funds in prioritized focus areas.

3.4.5. *Strategy E* – Develop individual strategies for each of the incentive focus areas.

3.4.6. *Strategy F* – Use data on the economic value of native prairie and prairie species to encourage management techniques and prairie restoration that promote the conservation of prairie dogs.

Develop a graduate student project to develop an economic model that will assess the value of (1) brush control, (2) prairie dog control by various methods (poisoning, shooting, use of visual barriers), and (3) competition between prairie dogs and cattle for forage.

3.5. Objective 5 – Determine the most effective manner of using ESA tools such as Candidate Conservation Agreements with Assurances (CCAA).

3.5.1. *Strategy A* – If deemed necessary by the Working Group, TPWD will be responsible for implementing and managing an umbrella CCAA and will have the discretion to issue individual certificates of inclusion.

3.6. Objective 6 – Establish guidelines and procedures including management recommendations for determining when, where, and under what circumstances translocation of prairie dog colonies is appropriate.

3.6.1. *Strategy A* – For full compliance with Management Plan recommendations pertaining to prairie dog translocation onto properties where translocated prairie dogs may disperse to other properties, adjacent landowners should be consulted prior to the translocation and the issue of control of interloping prairie dogs should be discussed.

3.6.2. *Strategy B* – Support the translocation of individuals to re-colonize areas that have been designated by TPWD staff as critical to preserving the integrity of the species in Texas. Once the state acreage goal is achieved and verified, translocation will not be supported by the Working Group.

Translocation will be supported by the Working Group under the following circumstances:

- The total state numbers are below the state goal; and
- The target property is within an incentives focus area; and
- The landowner is willing to enter into a long-term or perpetual agreement; and
- Translocation contributes to an existing prairie dog complex as opposed to creating a new isolated colony.
- Sites with recent prairie dog occupation will be given higher consideration for reintroductions.

3.7. Objective 7 – Provide technical guidance in the use of non-lethal and lethal methods for controlling the expansion of prairie dog towns into areas where they are not wanted.

3.7.1. Strategy A – Cooperate with USDA/APHIS Wildlife Services/Texas Wildlife Services and TDA to provide technical guidance on non-lethal and lethal techniques that are appropriate for the prairie dog, that do not threaten the viability of the town and associated non-target species, and are cost effective, yet accomplish the management objectives.

3.7.2. Strategy B – Explore controlled shooting of prairie dogs as an option where a need for management is indicated.

3.8. Objective 8 – Encourage formal, cooperative relationships with personnel at facilities with prairie dogs on their property, for example, Muleshoe National Wildlife Refuge, Buffalo Lakes National Wildlife Refuge, Rita Blanca National Grassland, West Texas A&M University, Texas Tech University, and DOE BWXT Pantex.

3.8.1. Strategy A – Encourage the development of management plans for cooperating federal and state resource agencies. When possible, these plans should include inventory and distribution, extent of occupied and potential habitat, and monitoring.

3.9. Objective 9 – Assess numbers and distributions of other species of concern that are found in each of the designated focus areas and consider their presence in management actions. In association with USFWS and The Nature Conservancy, TPWD will create a list of species of concern and incorporate this objective into any incentive that is created.

3.10. Objective 10 – Form an information exchange system and cooperative relationship with entities managing other prairie species of concern.

3.10.1. Strategy A – Explore and initiate cooperative plans and actions when appropriate.

3.10.2. Strategy B – Explore potential for joint funding initiatives targeted for prairies rather than individual species.

3.11. Objective 11 – Using available data sources, regularly evaluate the effect of a set of identified actions, such as sport shooting, poisoning, and take for the pet trade, on Texas prairie dog populations and make recommendations to TPWD as to actions that might be needed if such actions are deemed a significant threat to the success of the Management Plan.

GOAL 4 – Review and make recommendations for regulatory changes in the status of black-tailed prairie dogs.

4.1. Objective 1 – Review statutes to assure that all state and federal laws related to prairie dogs are known.

4.2. Objective 2 – Evaluate whether the current statutes allow for the effective conservation and management of the species in the state. If not, a special committee will be formed to address any necessary changes.

GOAL 5 – Identify research needs and establish a research program that facilitates long-term viability of black-tailed prairie dogs in Texas.

5.1. Objective 1 – Identify and conduct research to form solutions to short and long-term biological, economic, and social problems related to prairie dogs in Texas.

5.1.1. Strategy A – Determine the extent and effect of plague on wild populations of prairie dogs in Texas and how to manage the situation to conserve prairie dogs.

Information on pre- and post-plague data on prairie dog acreage in mapped prairie dog complexes should be obtained, along with information on incidence of plague titers in blood taken from carnivores and the occurrence of plague in fleas collected from prairie dog burrows (Cully et al. 1997). These data are needed to assess the dynamics of the interactions between plague and prairie dog populations. It may take

20-30 years of following epizootic and enzootic cycles to fully understand the implications of plague on prairie dog communities.

5.1.2. *Strategy B* – Document the degree of competition between prairie dogs and livestock in Texas systems and assess the economic impact in various regions of the state.

5.1.3. *Strategy C* – Determine what density patterns and spatial configurations of prairie dog towns are needed to support viable populations of prairie dogs and associated prairie species.

5.1.4. *Strategy D* – Assess the biologic, economic, and social impacts of sport shooting on prairie dogs and associated prairie species in Texas.

5.1.5. *Strategy E* – Assess the biologic, economic, and social impacts of other control methods on prairie dogs and associated prairie species in Texas.

5.1.6. *Strategy F* – Evaluate the role of prairie dogs in control of brush on rangelands.

5.1.7. *Strategy G* – Conduct an economic analysis to evaluate consumptive and non-consumptive use values of shortgrass prairie, as well as the feasibility of restoration and rehabilitation of prairie landscapes on range and agricultural lands as an incentive to allow private landowners to restore prairie habitat to maximize biological diversity, critical habitat for species-at-risk, and wildlife populations in general.

5.1.8. *Strategy H* – Produce an ecological risk assessment that will evaluate existing and future regional threats and deterrents to restoration and rehabilitation of existing prairie dog populations and associated shortgrass prairie landscapes in the Panhandle.

- Consider research that will develop and field test innovative models and simulations that address land factors that influence land carrying capacity with and without prairie dogs, for example.
- Consider basic and applied research that includes: methods of identification of impacts that have beneficial, neutral, and/or detrimental effects on grassland carrying capacity, identification of ways to offset potential negative trends, and methods for sharing information/capabilities with others.

- Efforts should be made to predict impacts of land-based use, determine risk associated with use, and analyze decisions to provide management flexibility, on a sustained basis, versus environmental or ecological damage associated with prairie dog towns.

5.2. Objective 2 – Establish a long-term research site that can be used as a baseline for future research and evaluation of prairie systems and associated assemblages of species.

GOAL 6 – Implementation.

6.1. Objective 1 – Prioritize actions and determine timelines and individual(s) or group(s) responsible for carrying out or supervising each action.

6.2. Objective 2 – Determine feasible administrative structure and funding for implementing the Management Plan.

6.3. Objective 3 – Provide for biannual written evaluation of each goal, objective, and strategy of this plan. The evaluation will be presented to the Working Group for approval and distribution as appropriate.

I. SPECIES ACCOUNT – BLACK-TAILED PRAIRIE DOG

1. Distribution in Texas

Field notes from early explorers, museum specimens, and turn-of-the-century accounts in the literature contain information upon which the historical range of the black-tailed prairie dog in Texas is based (Bailey 1905). Although these accounts provide useful information, they do not establish scientifically accurate estimates of pre-settlement population densities or the total number of acres that were inhabited. Regardless, there has been a dramatic decrease in the total number of prairie dogs and occupied habitat in Texas, and this species is now extirpated over much of its former range; however, the geographic limits of the species within Texas remains relatively unchanged from the earliest recorded accounts (Cottam and Caroline 1965, Cheatheat 1977). This decrease was due primarily to the conversion of grasslands to agriculture, but disease and poisoning also contributed to the loss (Luce 2003).

Bailey (1905) described the range of the prairie dog in Texas as extending from Henrietta, Fort Belknap, Baird, and Mason west to near the Rio Grande River, north through the Panhandle, and south to Devil's River, to 10 mi (16.2 km) south of Marathon and 25 mi (40.2 km) south of Marfa. This equates to approximately the northwest 1/2 of the state and includes all or portions of the High Plains, Rolling Plains, Edwards Plateau, and the Trans-Pecos Ecological Regions. Bailey (1905) estimated there were 800,000,000 prairie dogs covering an area of 90,000 mi² or 57,600,000 acres (233,100 km², or 23,310,000 ha). Although these historical numbers are the most reliable early estimates for Texas, caution should be exercised in using these numbers because they were based only on rough estimations and extrapolations. Such large concentrations no longer exist due to extensive use of poisoned grain to control prairie dogs and land conversion for agriculture grazing (Cottam and Caroline 1965, Davis and Schmidly 1994).

Three modern studies have been conducted to determine the status of black-tailed prairie dogs in Texas, but only one included the entire historic range. In a study by Cheatheat (1977), aerial

photographs of 108 central and western Texas counties were studied to determine size and distribution of prairie dog towns. Ninety-nine of the 108 counties were within the historical distribution described by Bailey (1905). Cheateam (1977) found 1,336 colonies covering 90,023 acres (36,431 ha) in 89 counties. He estimated the average colony size at 67.38 acres (27.27 ha).

The second attempt to determine the prairie dog's status in Texas was made by Lair and Mecham (1991) in an effort to evaluate and identify potential black-footed ferret (*Mustela nigripes*) reintroduction areas. They examined aerial photos (Agricultural Stabilization and Conservation Service [ASCS; now FSA] crop slides dated from 1978 to 1985) from 29 counties in the Panhandle to determine the existence, distribution, and status of prairie dog towns greater than 100 acres (40.5 ha). These particular counties were selected because Cheateam's work indicated that they had the highest densities of prairie dogs. Prairie dog towns in those counties were mapped and town sizes were measured using a compensating polar planimeter. Map work was supplemented by use of ASCS crop slides for eight counties (a subset of the 29) taken during the spring 1990. In total, they recorded more than 800 towns in the 29 counties and 297 towns in 22 counties were larger than 100 acres (40.5 ha), with the largest being 2,282 acres (923 ha). Total coverage was 67,907 acres (27,481 ha), with an average of 228 acres (92 ha) per town. They noted that many towns of less than 100 acres (40.5 ha) existed in close proximity to one another and probably acted as a complex, but these were not considered in their total estimate. In addition, several large towns were located by casual ground surveys in 1990, but were not documented in their study because they were not on older photographs, nor included in the area covered by ASCS crop slides. It should be noted that the ASCS crop slides covered less than 100% of most of the 29 counties, and as little as 15% of some (Lair and Mecham 1991).

Without reliable baseline or current information regarding distribution and status, it is impossible to accurately determine declines in population density or distribution. Although they show evidence of declines, comparison of Cheateam's (1977) and Lair and Mecham's (1991) studies

do not provide useful data on population trends, because the studies do not cover the same number of counties nor do they use the same criteria for assessing population status. The total of 90,023 acres (36,431 ha) from Cheateam (1977) included all prairie dog towns in 89 counties, whereas the 67,907 acres (27,481 ha) from Lair and Mecham (1991) included towns in only a portion of 29 counties, and towns of less than 100 acres (40.5 ha) were not considered. Results from Cheateam (1977) represented an estimated total from the mid 1970s, whereas those from Lair and Mecham (1991) represented an estimate of the minimum number of acres of prairie dogs known from 1978 to 1990.

Using 1998 FSA crop slides, Ernst (2001) inventoried the same 29 counties as Lair and Mecham (1991). She found that 86,040 acres (34,819 ha) of prairie dog towns were present. This total included all prairie dog towns, as opposed to just those larger than 100 acres (40.5 ha) as in Lair and Mecham (1991). This compared to 89,943 acres (36,399 ha) found, but not reported by Lair and Mecham, which included prairie dog towns of all sizes (Ernst 2001). When limited to prairie dog towns that were larger than 100 acres (40.5 ha), Ernst (2001) found 242 towns covering 59,817 acres (24,207 ha) compared to the Lair and Mecham (1991) estimate of 297 towns covering 67,907 (27,481 ha) acres. Furthermore, 42% of the towns delineated by Lair and Mecham (1991) were also found by Ernst (2001). The total acreage of these towns decreased slightly from 36,419 acres (14,738 ha) (Lair and Mecham 1991) to 30,926 acres (12,515 ha) (Ernst 2001).

2. Ecology

Prairie dogs are native to shortgrass prairie habitats of the Great Plains where they play an important role in the structure and function of prairie ecosystems. They usually avoid areas of heavy brush and tall grass, because the visibility they require to detect predators is considerably reduced. In the Trans-Pecos, favored habitat sites are alluvial fans at the mouths of draws, "hard pan" flats where brush is sparse or absent, and the edges of shallow valleys (Davis and Schmidly 1994). They serve as a food source for predators such as coyotes (*Canis latrans*), bobcats (*Lynx*

rufus), North American badgers (*Taxidea taxus*), black-footed ferrets, golden eagles (*Aquila chrysaetos*), prairie falcons (*Falco mexicanus*), accipiter hawks (*Accipiter* spp.), buteo hawks (*Buteo* spp.), bullsnakes (*Pituophis melanoleucus*) and rattlesnakes (*Crotalus* spp.) (Hoogland 1996). They leave vacant burrows that are often used by burrowing owls, black-footed ferrets (extirpated from Texas), cottontail rabbits (*Sylvilagus* spp.), small rodents, and a variety of arthropods and reptiles, including rattlesnakes (Hygnstrom and Virchow 2002, Tyler and Shackford 2002). In Texas, they are found in the western part of the state and the Panhandle. Although prairie dogs are still locally common in a few areas, much of their former habitat has been converted to agriculture and they have been poisoned out of most Texas rangelands (Davis and Schmidly 1994). In addition, it appears that bubonic plague has had a substantial impact on their populations in some areas (Hoogland 1996). Regardless of the accuracy of historical estimates, it is obvious that the total number of prairie dogs in Texas today is only a small fraction of their original numbers (Davis and Schmidly 1994).

3. Burrow Structure

Prairie dogs live in deep burrows 3-4 in (7-10 cm) in diameter with funnel-shaped entrances. Burrows typically descend at a steep angle for 7-16 ft (2-5 m) before leveling off. From the lower portion of the burrow, which itself may be 13 ft (4 m) long, extends blind side tunnels and nest chambers. The main burrow entrances are marked by mounds with parapets constructed around them. These mounds are often 12 in (30 cm) high and serve as dikes to keep flash floods from inundating the burrows. They also serve as lookout points (Davis and Schmidly 1994).

4. Behavior

Prairie dogs are highly sociable mammals that live in colonies or towns that vary in size from a few individuals to several thousand animals, and cover from <1 acre (0.4 ha) to >1,000 acres (405 ha). Towns are comprised of several to thousands of units called coterie which are made-up of 2-8 females. Each coterie is defended by a single, dominant male. Coterie are organized into larger population units called wards, which are often separated by unoccupied areas of

unsuitable habitat or a variety of geographic barriers. Movement between wards is uncommon. Normal daily activity and breeding are usually conducted within individual coterie; however, young males often disperse between coterie and wards. This complex social structure and dispersal pattern is thought to maintain high genetic variation and decrease potential for inbreeding (Davis and Schmidly 1994, Hoogland 1996).

Prairie dogs are diurnal and are most active during the cool hours of the day, when they engage primarily in foraging activities. During warm weather, the midday hours may be spent sleeping below ground (Davis and Schmidly 1994, Hygnstrom and Virchow 2002). When above ground, prairie dogs often perch on the volcano-like ring that surrounds many of the burrows. Should a predator or any other potential danger approach, prairie dogs will bark out a warning which may cause others to descend into their burrows (Hygnstrom and Virchow 2002).

5. Life History

Female prairie dogs produce one litter of approximately 4 to 5 young per year in March or April. Blind, hairless pups weigh about 15 g at birth (Davis and Schmidly 1994). By the 13th day of life, fine hair covers the cheeks, nose, and parts of the body; and weight is approximately 40 g. By the 26th day, the body is covered with hair and they can crawl. Between the 33rd and 37th day, their eyes open, at which time young squirrels are able to walk, run, eat green food, and "bark". Pups first emerge above ground at about 6 weeks of age and are weaned shortly thereafter. The family unit remains intact for about 1 month before the family disperses. Young reach sexual maturity by the second year. Young males usually move away from their natal group before their first breeding season while juvenile females may spend their entire lives in their original coterie. It is estimated that black-tailed prairie dogs can disperse a distance of least 5 miles (8 km) to join an existing town or to establish another. It is possible that they can move greater distances, on occasion. Female prairie dogs may live up to 8 years of age while male prairie dogs usually live to be no more than 5 years of age (Davis and Schmidly 1994, Hoogland 1996).

During summer, prairie dogs store up fat reserves to get them through winter (Davis and Schmidly 1994). Hoogland (1996) states that black-tailed prairie dogs do not hibernate in any part of their range. Instead, they often undergo brief periods of inactivity during prolonged periods of deep snow or extremely cold weather.

6. Conflicts with Humans

Prairie dogs have been displaced by urban sprawl, suburban development, and livestock and farming interests for approximately the past 100 years. Consequently, their former range and numbers have been considerably reduced (Davis and Schmidly 1994, Hoogland 1996, Hygnstrom and Virchow 2002). It has been shown that large concentrations of prairie dogs can damage cultivated crops or compete seriously with livestock, however it has not been demonstrated that eliminating them entirely from rangelands is desirable (Davis and Schmidly 1994). Recent studies have shown that prairie dogs are effective in controlling the spread of mesquite and other unwanted brush by feeding on new growth (Davis and Schmidly 1994, Hygnstrom and Virchow 1994).

7. Texas Management Guidelines and Actions

Several sources of financial incentives currently exist to help defer the costs of prairie dog conservation on private lands. Such incentives are available through the following programs and organizations: LIP (TPWD), Private Lands Initiative (TPWD), CRP (FSA), GRP (FSA, NRCS), EQIP (NRCS), WHIP (NRCS) Partners for Fish and Wildlife (USFWS), Section 6 Grants (USFWS), CCAA (USFWS), Habitat Conservation Plans (USFWS), National Fish and Wildlife Foundation, Playa Lakes Joint Venture, and various other programs and organizations. Many programs can include provisions for prairie dog control when an established prairie dog population ceiling is reached. Control can be by any legal form.

Management options to conserve and enhance prairie dog populations include: (1) increasing grazing pressure in localized areas which may require additional water development or an increased number of animal management units (AMU); (2) manipulation of grazing pressure through strategic placement of salt and water or water development; (3) controlled burning used to increase potential for prairie dog expansion; (4) take no action, allowing prairie dogs to expand naturally; (5) restriction on shooting seasons to prevent over-reduction of prairie dog density; (6) translocation of prairie dogs to formerly occupied sites that have been lost to plague, toxicants or other causes, or where density is very low.

Management options to reduce prairie dog populations include: (1) complete elimination of a given prairie dog town with registered toxicants, including necessary follow-up; (2) control with registered toxicants, short of elimination, with no follow-up; (3) density reduction of a given prairie dog town through a directed shooting program, or longer shooting season; (4) periphery control or fragmentation of large towns (>1000 acres, >405 ha), or elimination of some towns in a complex using registered toxicants; (5) habitat alteration, including chisel plowing, scarifying or planting which may be used in conjunction with other techniques; (6) reduced grazing pressure which may require additional fencing, fewer AMU's, or other livestock management methods.

There are only 3 products registered by Environmental Protection Agency for prairie dog control. Gas cartridges are general use incendiary devices that have not proven to be cost effective for large acreage. Zinc phosphide treated bait is the only legally approved toxicant bait. They are short-lived and require a pesticide applicator license from TDA. They can only be used from July through February. Aluminum phosphide pellets also require a pesticide applicator license. As the pellet degrades, it releases phosphide gas. Any single product is generally only about 80% effective in most situations. All other toxicant products used are illegal.

8. Food Habits

Prairie dogs have been described as voracious eaters. C. Hart Merriam estimated that 32 prairie dogs consume as much food per day as one sheep and 256 eat as much as one cow (Bailey 1905). Because prairie dogs range in size from 2.2-4.4 lbs (1-2 kg), 256 prairie dogs would be equivalent to a 564-1128 lb (256-512 kg) steer. Their diet is almost exclusively plant materials, particularly herbs and grasses, but they also feed on shrubs and young trees. Forage competition between prairie dogs and domestic livestock has always been a concern. Until recently, this competition was assumed to be severe and direct. Recent studies indicate that competition in prairie ecosystems may have a complicated ecological relationship and that compensatory factors are involved (Hansen and Gould 1977, O'Meilia et al. 1982, Knowles 1986, Whicker and Detling 1988).

Hanson and Gould (1977) found that prairie dogs have only a 64% forage overlap with cattle and were responsible for only 24% of forage intake in a system grazed by cattle, prairie dogs, and desert cottontails (*Sylvilagus audubonii*) in Colorado. Knowles (1986) found that about 1/3 of the available forage was consumed by prairie dogs where cattle were present in Montana. Steer weight gains were not significantly different between steers grazing on and off prairie dog colonies in Oklahoma (O'Meilia et al. 1982). Whicker and Detling (1988) found that grazing by prairie dogs may result in enhanced nutrient uptake which would result in increased crude protein availability and nutritional quality of forage. Most of the prairie dog/cattle competition studies have been done in relatively high precipitation regions of the black-tailed prairie dog's range and there is concern that in the drier climate of the Panhandle, the Trans-Pecos, and the Rolling Plains, levels of competition may be greater than reported in the literature.

9. Plague

Plague is an exotic disease in Texas and relatively new in the prairie dog ecosystem. In 1946, plague was first observed in black-tailed prairie dogs in Texas (Miles et al. 1952). Plague typically destroys all prairie dog colonies within a complex within a few years of its introduction

into the complex (Cully et al. 1997). The denser the complex is, the more complete the mortality (Barnes 1993). Plague infected fleas can remain alive in prairie dog burrows for up to one year following the death of prairie dogs (Lechleitner et al. 1968). Thus, prairie dog re-colonization following an epizootic is slow, and at times, does not reach the same densities as before the plague event. Once established in an area, plague becomes persistent and periodically erupts, with the potential to extirpate local black-tailed prairie dog populations (Knowles 1986). Prairie dog colonies virtually eradicated by plague require approximately 4-5 years to regenerate to their former levels and then again become susceptible to a plague epizootic (Barnes 1993).

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Figure 1. 1981 North American range of the black-tailed prairie dog

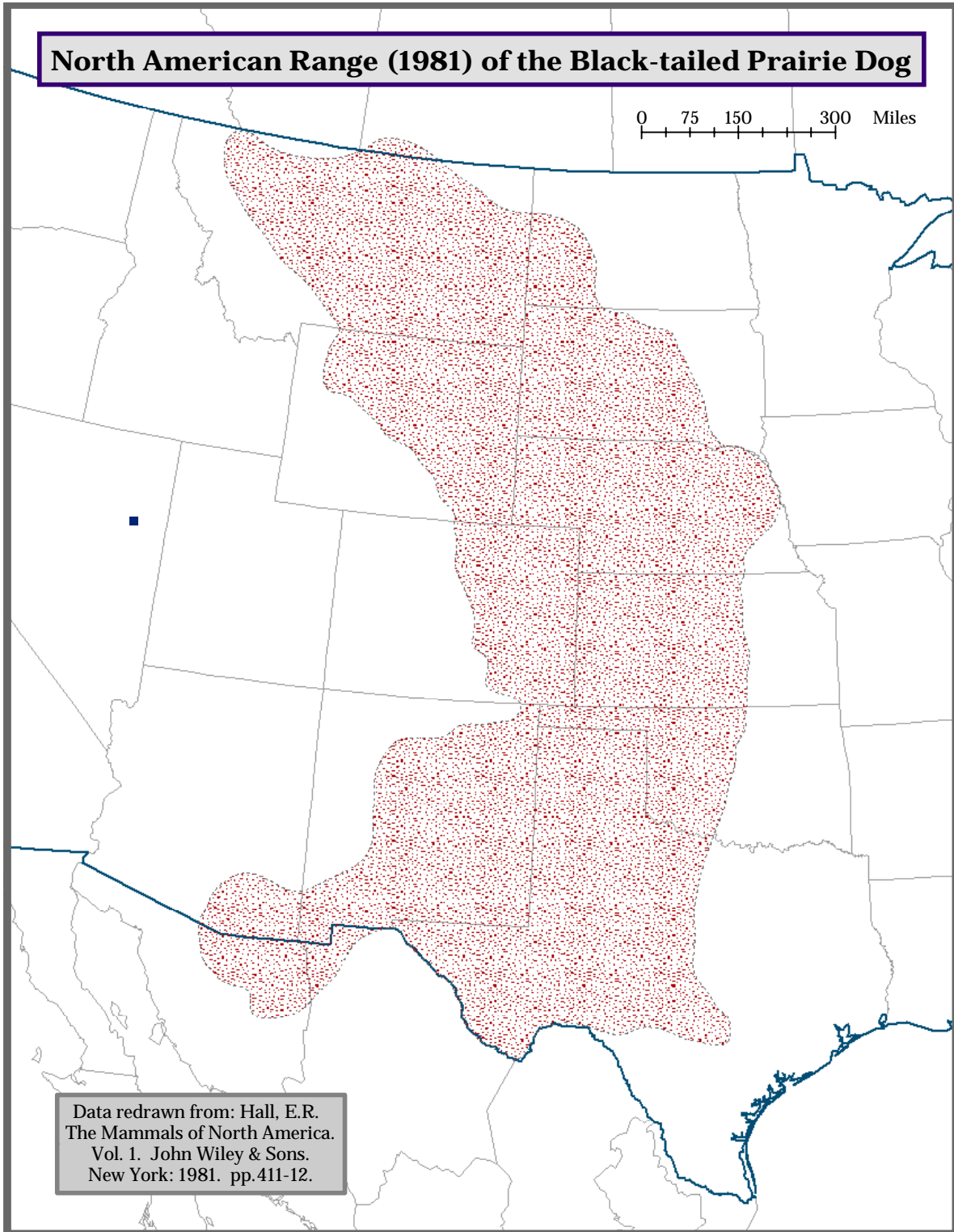
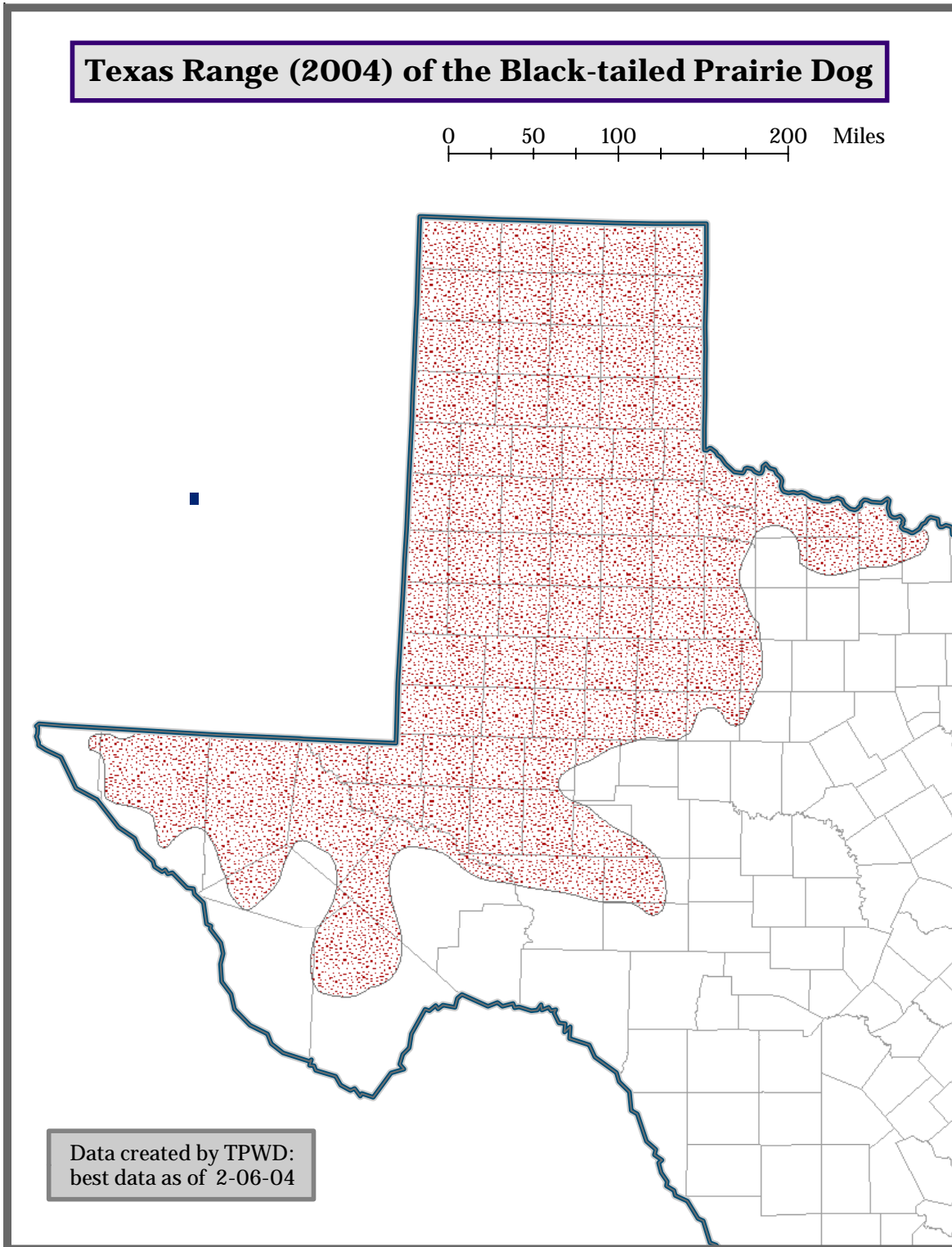


Figure 2. 2004 Texas range of the black-tailed prairie dog



K. APPENCICES

Appendix A: Texas Black-Tailed Prairie Dog Working Group Members

Pam Allison, Texas Panhandle Audubon Society

Jim Bill Anderson, Private Landowner

Matt Brockman, Texas Cattle Raisers Association

Charles Coffman, Natural Resources Conservation Service

Lee Elliott, The Nature Conservancy

Dan Garcia, USDA Forest Service-Kiowa Rita Blanca National Grasslands

Rick Gilliland, USDA/APHIS Wildlife Services/Texas Wildlife Services – Panhandle Office

Roger Haldenby, Plains Cotton Growers

Myron Hess, National Wildlife Federation

Derrick Holdstock, TPWD

John Hughes, U.S. Fish and Wildlife Service

Mike McMurry, Texas Department of Agriculture

Lynn Nymeyer, Buffalo Lake National Wildlife Refuge

Keith Pate, Texas Wildlife Association

Don Petty, Texas Farm Bureau

Jim Ray, Department of Energy BWXT-Pantex

Paul Robertson, TPWD

Bob Stafford, Texas Wildlife Association

Bob Sullivan, TPWD

Hoppy Turman, USDA/APHIS Wildlife Services/Texas Wildlife Services – Trans-Pecos Office

L.H. Webb, Private Landowner

Ben Weinheimer, Texas Cattle Feeders Association

Heather Whitlaw, TPWD

Ross Wilson, Texas Cattle Feeders Association

John Young, TPWD

Appendix B: Associated Species

B.1. Associated Species

Many species are associated with prairie dogs or the habitat they provide. Burrowing owls, mountain plovers (*Charadrius montanus*), and black-footed ferrets will be discussed separately below, as each are very much affected by prairie dog management activities. Other species often found in greater numbers on prairie dog colonies include Cassin's sparrows (*Aimophila cassinii*), lark buntings (*Calamospiza melanocorus*), horned larks (*Eremophila alpestris*), ferruginous hawks (*Buteo regalis*), golden eagles, northern grasshopper mice (*Onychomys leucogaster*), deer mice (*Peromyscus maniculatus*), cottontails, North American badgers, swift foxes (*Vulpes velox*), mule deer (*Odocoileus hemionus*), bison (*Bos bison*), elk (*Cervus elaphus*), and pronghorns (*Antilocapra americana*), as well as many species of invertebrates and amphibians (Agnew et al. 1986, Goodrich and Buskirk 1998, Bak et al. 2001, McCaffrey 2001, Hygnstrom and Virchow 2002). Tyler and Shackford (2002) found 72 species commonly on, over, or near prairie dog towns in Oklahoma. In Wyoming, Campbell and Clark (1981) found 62 species of vertebrates commonly on black-tailed or white-tailed (*C. leucurus*) prairie dog towns.

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B.2. Western Burrowing Owl

The western burrowing owl is a small (7.5-10 in; 19.5-25.0 cm), ground dwelling owl that is chocolate brown in color with white or buff-white spots on its back and wings and barring on its breast (Gillihan et al. 2001). Its head lacks ear tufts but has buff-white margins around the eyes and has a white throat patch (Klute et al. 2003). Burrowing owls occur throughout prairie dog range in Texas (Gillihan et al. 2001).

The burrowing owl is listed as a Bird of Conservation Concern throughout the western portions of prairie dog range in Texas (U.S. Fish and Wildlife Service 2002). Primary threats to burrowing owl populations include habitat loss due to land conversion to agriculture and urban development, habitat degradation and loss due to reductions in burrowing mammal populations, habitat fragmentation, predation, illegal shooting, and pesticides (Klute et al. 2003). Currently, in Texas, they are protected by the Migratory Bird Treaty Act of 1918 and relevant state nongame regulations.

Burrowing owls are present in Texas during the breeding season and winter. Both migrants and year-round residents are known to exist. Courtship and pair formation occur in March and April and they rear young after a 28-30 day incubation period (Martin 1973, Klute et al. 2003). At 4

weeks, young can run and forage and by 6 weeks are capable of sustained flight (Klute et al. 2003).

Burrowing owls prefer open areas with short vegetation and bare ground in desert, grassland, and shrub-steppe environments (Klute et al. 2003). They are dependent on the presence of fossorial mammals such as ground squirrels and prairie dogs, whose burrows are nearly exclusively used for nesting and roosting (Klute et al. 2003). Of 582 prairie dog towns located on Great Plains National Grasslands, 322 (55.3%) supported owls. Of these 322 towns, only 15 (4.7%) were inactive prairie dog towns (Sidle et al. 2001). They are also common residents of prairie dog towns throughout the southern Great Plains. In a recent study in Oklahoma, 66% of adult burrowing owls lived in prairie dog towns despite prairie dog towns only comprising 0.16% of available habitat (Butts and Lewis 1982). They also documented that nearly half of mid- to late-summer feeding occurred in prairie dog towns. Burrowing owl numbers were positively correlated with the density of active prairie dog burrows in Nebraska (Desmond et al. 2000). They also raised more young where there were higher densities of prairie dogs (Gillihan et al. 2001).

Control of prairie dogs can often lead to mortality in burrowing owls. While in some parts of the country chemical control of prairie dogs can be done when owls are not present, this is not a option in Texas where burrowing owls are often present year-round. Instead, poisoning must be done only in active prairie dog burrows to limit the effects on owls (Gillihan et al. 2001). Other practices that will benefit owls include leaving vacant burrows open to provide perches and future nesting sites, protecting current nesting burrows because burrowing owls have been shown to possess strong nest site fidelity, and cattle grazing in the absence of prairie dogs to provide low vegetation needed by burrowing owls (Gillihan et al. 2001).

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B.3. Mountain Plover

The mountain plover is an upland ground-nesting shorebird whose breeding distribution in Texas covers only the northwestern-most counties in the Texas Panhandle (Gillihan et al. 2001, Natural Resources Conservation Service 2001) except for a small breeding population in the Davis Mountains that is thought not to migrate (Knopf 1996). Wintering distributions occur in south Texas, outside of black-tailed prairie dog range (Gillihan et al. 2001, Natural Resources Conservation Service 2001). Mountain plovers are approximately 8 in (20 cm) tall and light

brown with a white throat and breast and white under the wings. They have white foreheads, a white line over their eyes, and dark brown caps, but lack the black band found on the chest of their relative, the killdeer (*Charadrius vociferus*) (Gillihan et al. 2001).

Between 1966 and 1991, mountain plover populations declined by 63% (Knopf 1994). Factors contributing to the decline include conversion of shortgrass prairie to agricultural uses, declining prairie dog populations, loss of chicks and eggs to predation, and encroachment of tall woody species in preferred grassland habitats (Natural Resources Conservation Service 2001). The mountain plover is listed as a Bird of Conservation Concern throughout its Texas current and historical ranges (U.S. Fish and Wildlife Service 2002). It has also been petitioned to be listed as a threatened or endangered species throughout its range (Biodiversity Legal Foundation 1997, U.S. Fish and Wildlife Service 1999).

Mountain plovers are presently found in the northwestern counties of the Texas Panhandle from Mid-February or March through July or August (Gillihan et al. 2001), however breeding has rarely been documented in Texas (Leachman and Osmundson 1990). They winter in south Texas, New Mexico, California, or Old Mexico from September through February (Gillihan et al. 2001). A non-migratory population is also believed to exist in the Davis Mountains (Knopf 1996). Other sightings (throughout the western 3/4 of the state) have occurred out of their usual range (Leachman and Osmundson 1990).

Mountain plovers feed primarily on insects (Baldwin 1971, Gillihan et al. 2001). Mountain plovers nest in level to nearly level areas with $\geq 30\%$ bare ground, especially areas that have been heavily grazed by livestock, native ungulates, or prairie dogs (Graul 1975, Gillihan et al. 2001, Natural Resources Conservation Service 2001). Most nests are in buffalograss (*Buchloe dactyloides*)-blue grama (*Bouteloua gracilis*) dominated areas (Graul 1975). They also use cultivated or recently burned areas (Shackford 1996, Gillihan et al. 2001, Natural Resources

Conservation Service 2001). Knopf and Rupert (1996) found that average breeding home range size of mountain plovers in Colorado was 140 acres (56.6 ha).

Mountain plovers have been shown to prefer prairie dog towns during the nesting season in some areas (Knowles et al. 1982, Flowers 1985, Olson and Edge 1985, Shackford 1991). Furthermore, like burrowing owls, mountain plovers using prairie dog towns were found predominantly in active towns and rarely in inactive towns (Knowles et al. 1982).

Prairie dog control can be damaging to mountain plover habitat if prairie dogs are completely eradicated from an area (Knowles et al. 1982, Gillihan et al. 2001). Furthermore, control to the point that the remaining prairie dogs can not keep vegetation clipped low could reduce suitability of an area to mountain plovers (Gillihan et al. 2001). However, reasonable control of prairie dogs during times of the year when mountain plovers are absent may have only slight negative effects on mountain plovers. Management practices that favor mountain plovers include moderate to heavy grazing between late summer and early spring to create short vegetation, burning outside of the nesting season, preserving or planting shortgrass prairie species, controlling non-natives as well as mid- and tall-grass species, protecting known nest sites, and delaying discing and other disruptive activities until after the nesting season (Gillihan 2001, Natural Resources Conservation Service 2001).

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B.4. Black-footed Ferret

The black-footed ferret is an endangered species that is believed to be extinct in Texas (Davis and Schmidly 1994). The last recorded observations of black-footed ferrets in Texas were in 1953 in Dallam County and in 1963 in Bailey County (Davis and Schmidly 1994). Black-footed ferrets depend upon prairie dogs for food and their burrows for shelter and denning (Hillman and Clark 1980, Davis and Schmidly 1994). A sign of black-footed ferret occupation of a prairie dog burrow is a 3.1-4.7 in (8-12 cm) wide trench extending as far as 11.5 ft (3.5 m) from the burrow opening (Davis and Schmidly 1994).

Reintroductions of black-footed ferrets in Texas (Linam 1992) and Oklahoma (Shaw et al. 1993) have been investigated and are currently taking place in other states (Davis and Schmidly 1994). Although no reintroductions have taken place in Texas, prairie dog management guidelines should consider needs of black-footed ferrets in an attempt to create suitable reintroduction sites.

Biggins et al. (1993) devised a technique for evaluating potential reintroduction sites for the black-footed ferret. The basis of the model is the estimate of the number of black-footed ferret families a prairie dog complex could support for a year. This estimate was based upon approximate energetic requirements of 1 female, 3.3 young, and 0.5 males, the average ferret home range size, the average portion of each prairie dog not wasted by black-footed ferrets, mortality of prairie dogs as the year progresses, and the number of prairie dogs required to make up for this mortality. The following formula is proposed for estimating this number:

$$R = \sum_{i=1}^n (A_i \times P_i) / 763 \text{ for } (A_i \times P_i) \geq 272.5$$

where

R = the number of ferret family groups that could be supported by the prairie dog complex,

A = the area of the colony with at least 1.47 prairie dogs per acre (3.63 prairie dogs per ha),

P = the density of prairie dogs in A ,

763 = the number of prairie dogs, under typical conditions, required to support 1 ferret family group for 1 year,

272.5 = the minimum number of prairie dogs needed to support 1 ferret family group for 1 year,

i = colony number, and

n = the number of colonies in the complex.

A complex was defined to be a group of colonies not separated by more than 4.3 mi (7 km).

Biggins et al. (1993) recommends colonies ≥ 988 acres (400 ha) in size. Other elements in the model were qualitative and included spatial arrangement of the colonies, potential for plague and canine distemper, potential for prairie dog expansion, abundance of predators, future resource conflicts and ownership stability, and public and landowner attitudes toward prairie dogs and black-footed ferrets. Each of these factors may affect success of reintroduction and should be considered prior to releasing black-footed ferrets into the wild. Poisoning of prairie dogs would have to cease after a reintroduction.

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