BLACK-TAILED PRAIRIE DOG

CONSERVATION ASSESSMENT AND MANAGEMENT STRATEGY

for the

THUNDER BASIN NATIONAL GRASSLAND

October 2015

Medicine Bow Routt National Forests
and
Thunder Basin National Grassland

This non-decision assessment document was reviewed and approved by Michael Walker, District Ranger, Douglas Ranger District: _/s/ Michael Walker_____

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EXECUTIVE SUMMARY

The black-tailed prairie dog (*Cynomys ludovicianus)* is designated as a sensitive species by the Regional Forester in Region 2 of the US Forest Service and as a Management Indicator Species on the Thunder Basin National Grassland. It is one of the most controversial animals on the Northern Great Plains. There is widespread concern over its population viability due to control efforts and other natural occurrences (e.g., plague). There is also concern over the prairie dog's potential impact on public health, infrastructure, and the local agricultural economy.

This 'Black-tailed Prairie Dog Conservation Assessment and Management Strategy' (Strategy) was developed to provide overall guidance for prairie dog management on the Thunder Basin National Grassland (TBNG). It is a dynamic document outlining management strategies for maintaining and increasing black-tailed prairie dog (*Cynomys ludovicianus*) populations on the TBNG while providing for the long-term viability of the species and those associated with prairie dog colonies. Although the Strategy is intended to be flexible and to be updated as conditions warrant, management options are bounded by direction contained in the Revised Thunder Basin National Grassland Land and Resource Management Plan (2001 Grassland Plan) and the Record of Decision for the Thunder Basin National Grassland Prairie Dog Management Strategy and Land and Resource Management Plan Amendment #3 (2009).

This document summarizes relevant information and determines biological, geographic, and administrative priorities. It is not a "decision document." Certain on-the-ground actions identified in this document may first have to be approved through the National Environmental Policy Act (NEPA) process (e.g., prescribed burning or mowing).

INTRODUCTION

The 'Black-tailed Prairie Dog Conservation Assessment and Management Strategy' (Strategy[1]) was developed in 2009 to provide overall guidance for prairie dog management on the Thunder Basin National Grassland (TBNG). It is a dynamic document outlining management strategies for maintaining and increasing black-tailed prairie dog (*Cynomys ludovicianus*) populations on the TBNG while providing for the long-term viability of the black-tailed prairie dog and those species dependent on prairie dog colonies. The Strategy is designed to:

- Address unwanted colonization onto adjacent private lands;
- Provide information on the use of available tools to facilitate prairie dog colony expansion into currently unoccupied habitat;
- Provide adequate amounts and distributions of occupied prairie dog colonies to support species associated with prairie dog colonies including Mountain Plover(*Charadrius montanus*), Burrowing Owls (*Athene cunicularia*), Ferruginous Hawks (*Buteo regalis*), and swift fox (*Vulpes velox*); and
- Provide adequate amounts and distributions of occupied prairie dog colonies to support the reintroduction of the federally listed endangered black-footed ferret (*Mustela nigripes*).

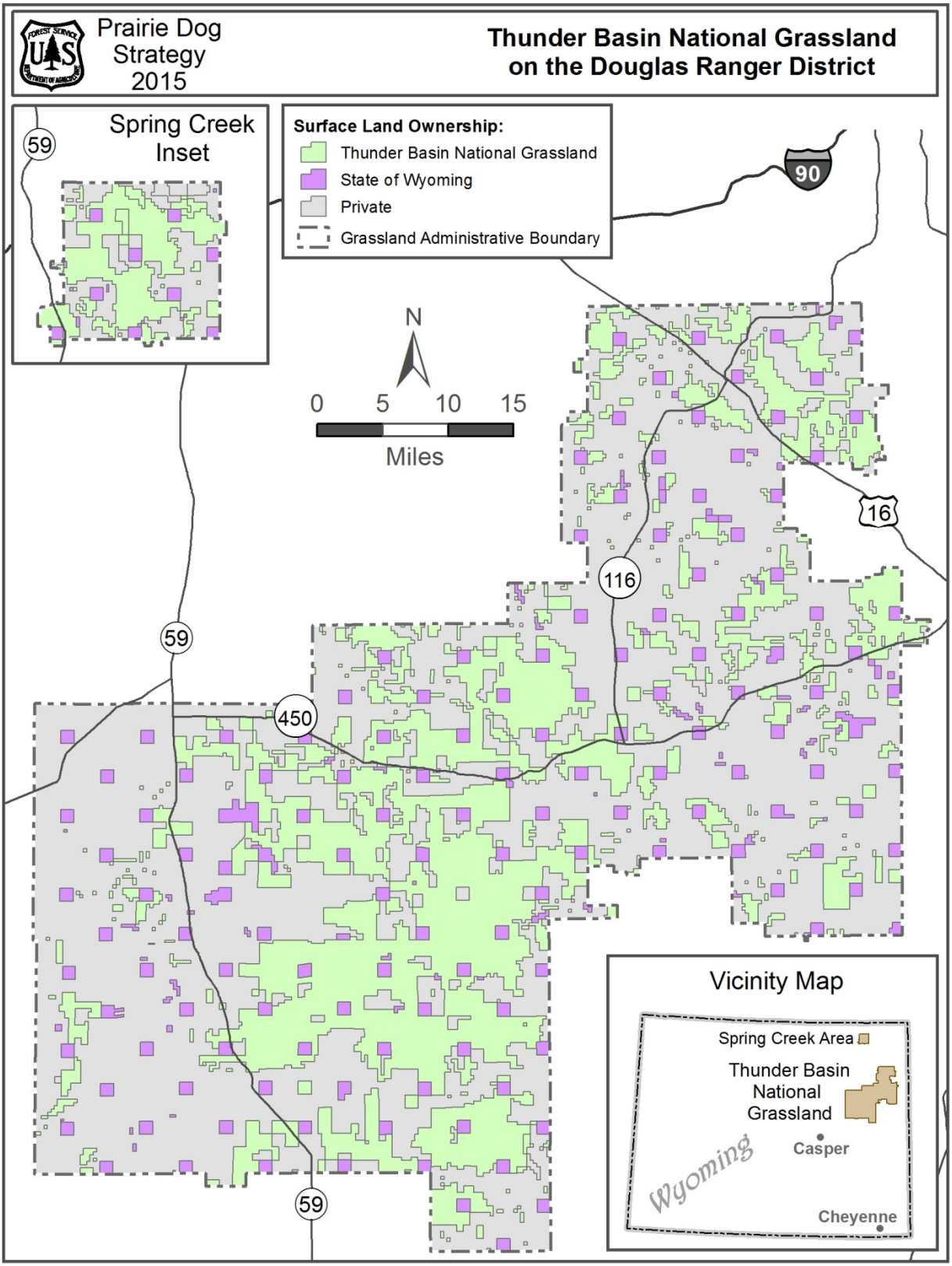
This document summarizes relevant information and determines biological, geographic, and administrative priorities. It is not a "decision document." Certain on-the-ground actions identified in this document may first have to be approved through the National Environmental Policy Act (NEPA) process (e.g., prescribed burning or mowing).

A. Area Covered by this Document

This document is specific to the TBNG on the Douglas Ranger District of the Medicine Bow-Routt National Forests and Thunder Basin National Grassland. The TBNG is located in northeastern Wyoming and encompasses approximately 553,000-acres in Campbell, Converse, Crook, Niobrara, and Weston counties, Wyoming; (Figure 1); it is dominated by mixed-grass prairie of the wheatgrass-needlegrass association. The land ownership pattern across the TBNG is characterized by intermingled private and National Forest System lands. Grazing allotments typically have mixed ownership. On private land, the landowner retains all property rights, including the right to control prairie dogs or post the land against trespass.

[1] Note that most conservation assessments and strategies contain an extensive overview of the treated species' ecology and biology. The Forest Service has omitted such information here, as it is readily available elsewhere.

FIGURE 1: VICINITY MAP



B. *Changes to the Strategy*

The Strategy was originally developed in 2009 to guide prairie dog management on the TBNG and has been implemented since 2010. In 2015, the Strategy was updated to:

- Move Category 2 boundaries to be entirely on National Forest System (NFS) lands and to be more closely associated with areas of current potential habitat and presence of associated species (see Figure 2 (p. 11) for Category 2 locations and pp. 9 - 15 for a description of Category Areas);
- Consolidate Categories 3 and 4 into a single Category 3;
- Incorporate new science;
- Incorporate new monitoring information;
- Indicate the dynamic nature of control colonies (i.e., locations will be determined based on decision screens);
- Incorporate information from two 'Letters of Interpretation'(2009 and 2010);
- Clarify language about translocation of prairie dog colonies;
- Incorporate a new Decision Screen (Screen 7) to address recreational shooting and potential risks to associated species; and
- Remove lands under Thunder Basin National Grassland Prairie Ecosystem Association (TBGPEA) jurisdiction.

C. *Adaptive Management Approach*

The strategies and options outlined in this document are based on an *adaptive management approach*. This approach recognizes that knowledge of natural resources and associated processes is often limited, unknown, or difficult to predict. Therefore, while still affording management flexibility, adaptive management requires:

1) Actions to be based on clearly identified goals and outcomes;
2) The use of monitoring to ensure actions are meeting the identified goals/outcomes;
3) The use of new information to re-evaluate management activities and goals; and
4) The use of new information to facilitate Strategy updates, as needed.

Since this document is intended to guide the long-term management of prairie dogs on the TBNG, it is essential to continually monitor its effectiveness, using information gained through the adaptive management process, and to incorporate new information into future Strategy updates. This will ensure that management goals and approaches are credible and that they reflect an increasing scientific knowledge base.

D. Purpose, Goals, and Need for the Strategy

The purpose of this updated Strategy is to outline an adaptable approach to cooperatively manage black-tailed prairie dog populations and habitat(s) through a variety of available methods and tools in a manner that poses the least possible risk to people, private and state property, and the long-term productivity and sustainably of grassland and prairie ecosystems.

The goals of implementing the Strategy are to:

- Provide prairie dog management that is consistent with the Thunder Basin National Grassland Land and Resource Management Plan (LRMP 2001) and the Record of Decision for the Thunder Basin National Grassland Prairie Dog Management Strategy and Land and Resource Management Plan Amendment #3 (ROD 2009);
- Address the potential for prairie dog movement from the TBNG to adjoining private and state lands;
- Proactively manage prairie dog populations on the TBNG in an environmentally, biologically, and socially acceptable manner;
- Provide for the long-term conservation of black-tailed prairie dogs and other species associated with prairie dog colonies;
- Manage prairie dog populations, colonies, and complexes on the TBNG in adequate acreages and distributions to support future reintroductions of black-footed ferrets; and
- Gain local landowner and State of Wyoming support for a prairie dog management on the TBNG that provides for the biological needs of the black-footed ferret and minimizes potential adverse impacts to adjacent non-federal landowners.

This Strategy is needed because:

Black-tailed prairie dogs continue to encroach onto private and state properties due to suitable habitat on NFS and adjacent non-Federal lands as well as population growth on designated NFS lands. Black-tailed prairie dogs have been known to be potential carriers of sylvatic plague (i.e., which, if transferred to humans, is known as bubonic plague) via fleas carrying the plague bacteria, *Yersinia pestis* (CDC, 2010). Although most public health officials believe that the chance of humans contracting plague from black-tailed prairie dogs or fleas is extremely low (because fleas are host specific and therefore avoid humans (Cully et al., 2006)), strategies are needed to manage prairie dog populations near human populations. Proactive and cooperative management of black-tailed prairie dogs is needed to ensure that encroachment does not create potentially unsafe or hazardous conditions that could affect human health and safety.

Black-tailed prairie dogs are considered pests by local ranchers and range managers because they consume forage plants similar to those eaten by cattle and they denude the vegetation within and around their colonies that could be utilized by cattle. Prairie dog burrows can also be hazardous to livestock and are viewed as property damage on private and state property. As a result, much money and time has been spent by Federal, state, and local governments and private land owners on controlling and/or eradicating black-tailed prairie dog populations from grasslands over the past century. Despite this concerted management effort, a formalized strategy, including cooperative working group participation, is needed to manage prairie dogs more effectively now and into the future.

Black-tailed prairie dogs are a keystone species for grassland and prairie ecosystems; they are colonial rodents that create shortgrass environments for a wide variety of grassland and prairie species. Black-tailed prairie dog colonies provide important habitats for many rare species,

such as Burrowing Owls, Mountain Plovers, swift fox, and others. Black-tailed prairie dogs are also an important prey species for a number of raptors as well as predatory mammals. Proactive and cooperative management in establishing vibrant and unobstructed populations and habitat(s) is needed to ensure the long-term productivity and sustainability of grassland and prairie ecosystems.

In the last decade, our understanding of grassland and prairie ecology, the importance of black-tailed prairie dogs, and the protections afforded by Federal laws has changed public opinion of prairie dogs. While some members of the public still view prairie dogs as a nuisance, they are now viewed more generally as a species of value. Consequently, a strategy that meets the needs of a varied public, is sensitive to local norms, and that is within the guides of Federal law is needed to more effectively manage black-tailed prairie dog populations and habitat(s) on intermingled NFS lands.

E. Reasons for Conservation Concern

Black-tailed prairie dogs (BTPDs) are a US Forest Service (USFS) Region 2 sensitive species and a Thunder Basin National Grassland Plan Management Indicator Species (MIS), requiring Forest Service management, as dictated by federal laws. They are also a keystone species that provide important habitat for many grassland species of conservation concern, such as Mountain Plover, Burrowing Owl, and black-footed ferrets.

Poisoning and plague, along with other known threats, can have a significant impact to prairie dogs and their habitat. When these threats are combined, eradication of entire prairie dog populations is possible which leads to reduced or eliminated habitat required by other species. Loss of prairie dogs or lack of management for prairie dogs on private and state land necessitates large areas of federal land to support prairie dog colonies and their associated species.

There is a declining population trend for both Mountain Plover and Burrowing Owl on the TBNG and in Region 2 of the USFS, and existing threats make viability of these species an ever increasing management challenge. In addition to poisoning, the presence of plague creates inherent unpredictably in prairie dog management on the TBNG and creates a major obstacle in the conservation of prairie dogs. The USFS is obligated by regulation to maintain viable populations of sensitive species which includes: black-tailed prairie dogs, Burrowing Owls, Mountain Plover, and other sensitive associated species. Fragmentation of habitat and reduction in prairie dog colonies could preclude any future reintroductions of the federally endangered black-footed ferret on the TBNG.

Recreational shooting of prairie dogs on the TBNG depresses colony productivity and health, fragments populations, and can reduce recovery of colonies from plague (Luce 2006). Shooting of prairie dogs can also reduce population densities, diminish body condition and reproduction, cause behavioral changes, and increase emigration (USFWS 2009). Non-target scavengers and predators have an increased potential of lead poisoning from consuming prairie dogs containing lead shot (Pauli 2005;USFWS 2009). Extensive poisoning or recreational shooting

can reduce the food supply for predators like coyotes, and, therefore, predators may be more likely to attack livestock (Reeve and Vosburgh 2006).

Prairie dogs are very sensitive to sylvatic plague, a disease foreign to the evolutionary history of prairie dogs, and mortality is often 100% (USFWS 2009; Cully et al. 2006). Plague exists throughout the range of the BTPD and has caused major population declines (USFWS 2009). According to the USWFS (2009), "Sylvatic plague remains a significant population stressor and the spread and effects of plague on the species [prairie dog] could be exacerbated by climate change in the future." The unpredictable nature of plague and its devastating mortality inhibits efforts to manage for prairie dogs (Cully et al. 2006) and their associated species. For example, the extent of prairie dog habitat used by nesting Mountain Plovers is directly affected by plague-driven fluctuations in the extent of active prairie dog colonies (Augustine et al. 2008). Mountain Plover nesting activity declined relatively quickly within 1-2 years of prairie dog declines from plague; therefore, the effects of plague on prairie dog colonies may have significant implications for Mountain Plover (Augustine et al. 2008).

Use of poisons to control prairie dogs on federal, state, and private lands has increased since 2004 when the BTPD was removed as a Candidate species for federal listing under the Endangered Species Act (ESA) (Forrest and Luchsinger 2006). Toxicants can kill non-target species other than prairie dogs such as granivorous birds, insects, and mammals, as well as scavengers that consume poisoned prairie dogs (Forrest and Luchsinger 2006). Anticoagulants, such as Rozol and Kaput, pose risks of secondary poisoning to non-target wildlife (USFWS 2009). Removing prairie dogs with toxicants can adversely affect the many associated animal and plant species that rely on prairie dog colonies for survival (Forrest and Luchsinger 2006). Identified threats to BTPDs include:

- Habitat loss
- Over-utilization for recreational purposes (shooting)
- Disease – sylvatic plague
- Pest status – Unregulated poisoning and shooting (USFWS 2011; Luce 2006)

F. Other Prairie Dog Management Efforts

Prairie dog management is not unique to the TBNG. In 1998, Arizona, Colorado, Kansas, Montana, Nebraska, New Mexico, North Dakota, Oklahoma, South Dakota, Texas, and Wyoming formed the "Interstate Black-tailed Prairie Dog Conservation Team" (Team) whose primary goal is to prevent the listing of the black-tailed prairie dog under the Endangered Species Act. As part of their mission, the Team published a range-wide Black-tailed Prairie Dog Conservation Assessment and Strategy in 1999 and a Multi-state Conservation Plan in 2004. They also encouraged all of the individual states involved, including Wyoming, to develop state-specific management plans to foster future prairie dog management. To date, South Dakota is the only state to have developed such a plan (Cooper and Gabriel, 2005).

The Nebraska National Forest (NNF), located in Nebraska and South Dakota, has made several changes to prairie dog management over the last several years. For example, on August 3, 2005, the NNF signed a Boundary Management Zone (BMZ) Amendment which changed how

prairie dogs are managed in BMZ's. On July 17, 2008, the NNF signed an Interior Management Zone (IMZ) Amendment, which changed management for prairie dogs located inside or outside of the BMZ's. Finally, in May of 2011, the NNF prepared a Supplemental Informational Report (SIR) to determine if the plague epidemic that hit the Wall Ranger District on the Conata Basin on the Buffalo Gap NG in South Dakota had created a "significant new circumstance" or resulted in "new information" that could necessitate a decision to correct, supplement, or revise the NNF Land Resource Management Plan (LRMP). The SIR determined that there was no need to correct, supplement, or revise the LRMP.

In August of 2006, the Arapaho and Roosevelt National Forests and Pawnee National Grassland completed a Prairie Dog Management Environmental Assessment for the Pawnee National Grassland. This plan increased the amount of prairie dogs allowed for on the Grassland and addressed lethal and non-lethal control for prairie dog boundary and interior management.

BLACK-TAILED PRAIRIE DOG MANAGEMENT STRATEGY

The Strategy outlined below is intended to help guide management of black-tailed prairie dogs on the TBNG now and in the future. Some Strategy components, such as Category objectives and shooting restrictions, cannot be changed without a Grassland Plan Amendment; however, many components afford management flexibility, as dictated by the Decision Screens (see Appendix A). Management flexibility and stakeholder participation will be essential to successful Strategy implementation.

Information supporting the Strategy and its components is provided in subsequent sections of this document.

A. General Strategy Components

- Recreational shooting of prairie dogs is prohibited on all NFS lands within TBNG LRMP Management Area 3.63 – Black-footed Ferret Reintroduction Area and the Category 1 Area; shooting is also prohibited in the five Category 2 Areas, unless objective acres of occupied prairie dogs have been met (then see Appendix A - Decision Screens for specifics).
- Prairie dog management tools are available, with emphasis given to the following:
  - Implementing vegetation management strategies to encourage prairie dog expansion where it is desired and discourage unwanted prairie dog expansion onto private lands. The appropriate prairie dog management tool will be selected to fit existing environmental conditions (e.g., drought) and the potential grassland community.
  - Where the existing plant community is capable, implement prescribed grazing within ½ mile of adjacent non-federal lands to create a visual barrier of high structure vegetation to discourage prairie dog colonization. To minimize breakthrough, an average vegetative height of 15-16 inches, a Visual Obstruction Rating (VOR) of 3-4 inches, and a barrier width of 130 feet would be needed. Wider barriers would be needed for shorter or less dense vegetation.
    i. Where livestock grazing strategies are used to encourage higher vegetation structure, prescribed burning and prescribed grazing will be used where appropriate to encourage expansion away from private land boundaries**.** Prescribed burning will be done in conjunction with prescribed grazing to achieve habitat objectives for prairie dogs and their associated species. Burning may have to occur in successive years to create desired habitat conditions. However, burning intervals will depend on fuel conditions and must be coordinated with grazing permittees to ensure timing of grazing and burning provide for desired habitat conditions.
    ii. Livestock grazing strategies that create low vegetation structure and enhance prairie dog habitat will be used to promote prairie dog expansion where it is desired.

- Use agency approved rodenticides on prairie dog colonies under site-specific conditions/situations (as outlined in the Strategy) following the Decision Screens.
- Translocations of prairie dogs on the TBNG from one area to another will also be an important tool to promote expansion of prairie dog colonies that have been adversely impacted by the plague or other disturbances. The primary objectives of this tool are to remove prairie dogs from colonies that are causing unwanted expansion, to augment prairie dog colonies affected by plague, or to create new colonies in suitable habitat. Translocation will occur from identified problem colonies on the TBNG to Category 1 and 2 Areas, with priority given to the Category 1 Area. Wyoming State law requires that the Wyoming Game and Fish Department (WGFD) approve all translocations of prairie dogs within the State, and the TBNG intends to follow this process. The TBNG intends to involve both neighboring private landowners and affected counties in these situations.
- Land exchanges or acquisitions will be pursued, where feasible and as opportunities arise, to create larger blocks of NFS lands and reduce the amount of intermingled private lands and shared boundaries to reduce conflicts with private landowners.
- Plague management tools (e.g., dusting and vaccination) will be used where practical and effective to control plague within prairie dog complexes.

B. Prairie Dog Control for Human Health and Safety and Protection of Facilities

Approved rodenticides (grain baits) for reducing prairie dog populations may continue to be used in the following situations (see Decision Screens pp. 42-55) regardless of the Category of prairie dog habitat involved:

- Public health and safety risks occur in the immediate area,
- Damage to private and public facilities, such as cemeteries and residences.

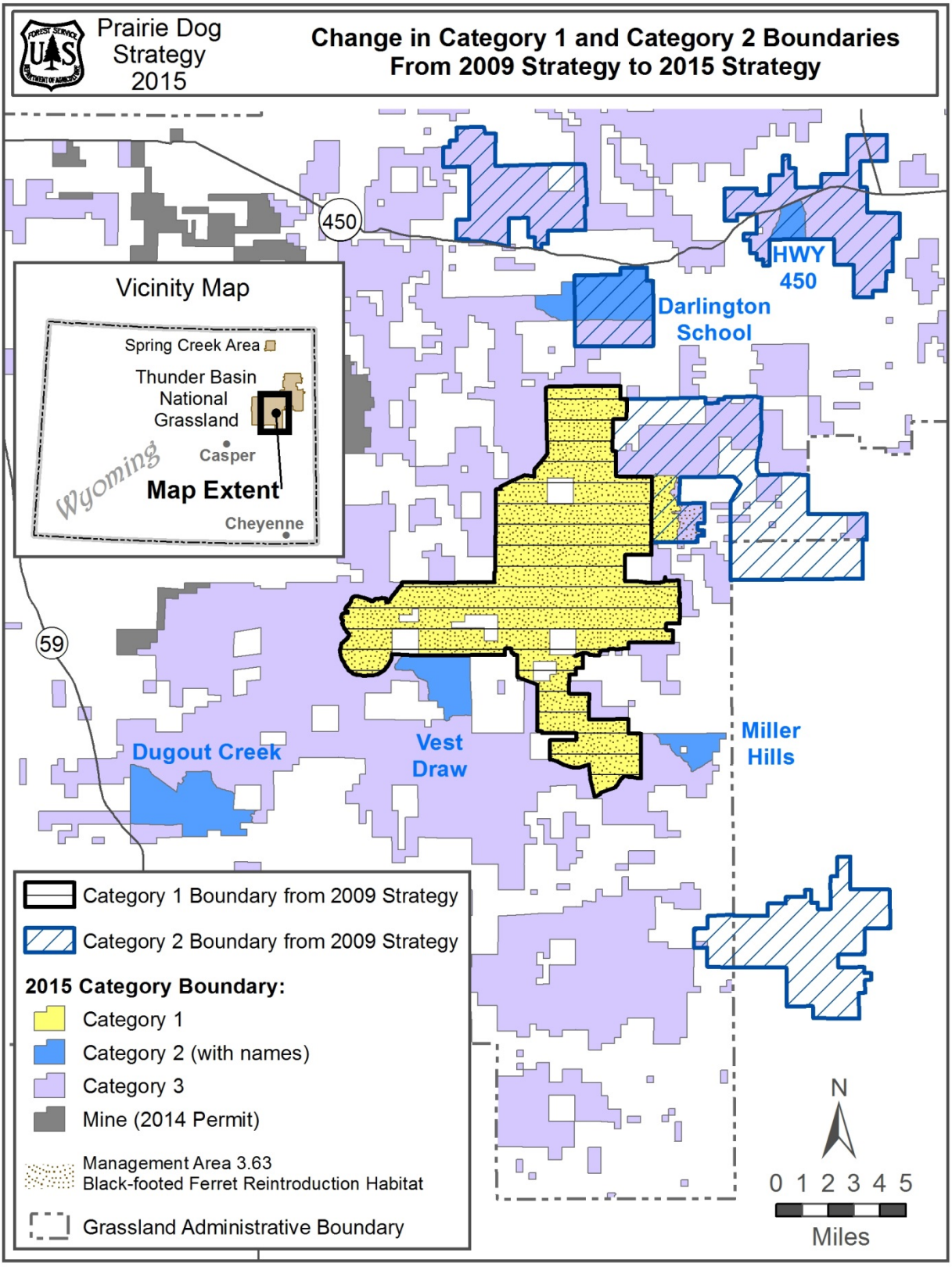
C. Category 1 Area

The Category 1 Area is intended to provide suitable habitat to support the reintroduction of black-footed ferrets (TBNG LRMP 2001) and to provide habitat for species associated with prairie dogs and prairie dog colonies. According to the Black Footed Ferret Recovery Plan (USFWS, 2013), the single most feasible action to benefit black-footed ferret recovery is to enhance prairie dog conservation.

Category 1 Area - Location

The location for the Category 1 Area is based on the current and historical distribution of prairie dogs across the planning landscape as well as the most potential and suitable prairie dog habitat (see Figure 2). It is also sited so as to utilize the largest block of public lands on the TBNG. Natural barriers to prairie dog expansion, such as large areas of unsuitable habitat (steep slopes, sandy soils, wetlands, etc.), were used to the maximum extent feasible to bound

FIGURE 2: PRAIRIE DOG CATEGORY AREAS



the Category 1 Area. Locatable features, such as fences, roads, and drainages, were also used to the greatest extent possible to bound the Category 1 Area. The Category 1 Area overlaps the TBNG LRMP Management Area (MA) 3.63 – Black-footed Ferret Reintroduction Area almost in its entirety.

Category 1 Area – Size and Population Objective

The Category 1 Area is approximately 50,000 acres in size. In 2014, roughly 24,700 acres of the Category 1 Area were considered 'current potential habitat' (see Appendix C).

The population objective in the Category 1 Area is 18,000 acres. Documentation of historical population levels indicates that the Category 1 Area has ranged from a maximum occupied prairie dog acreage of approximately 16,000 acres to a maximum modeled estimate in 2014 of 24,700 acres. Based on these estimates, and the availability of current potential habitat, it is reasonable to assume that the 18,000 acre objective can be achieved in Category 1.

It is anticipated that 18,000 acres will be sufficient habitat to allow ferrets to persist through a plague epizootic and recover naturally along with the prairie dog populations, particularly since a minimum of 10,621 acres of prairie dogs at a moderate density are needed to support a self-sustaining population of ferrets (Jachowski et al. 2011). An area of 9,884 acres for a colony or complex is also cited as the minimum area necessary for a fully functional grassland ecosystem that can provide suitable habitat for Burrowing Owls, Mountain Plover and other species that depend on prairie dogs for survival (Proctor et al. 2006).

Category 1 Area - Control and Management

Prairie dogs will be allowed to expand their distribution by colonizing new locations within the Category 1 Area. Any control efforts proposing rodenticides may only be initiated if cumulative acreage of active prairie dog colonies within Category 1 exceeds 18,000 acres, except in cases of human health and safety. Use of rodenticides on federal lands may only be employed within ½ mile of the TBNG boundary and only in cases where appropriate and available non-lethal options have been considered and used, unless they have been found to be ineffective for changing the rate and direction of colony expansion (see Decision Screens pp. 42-55).

The acreage in the Category 1 Area is not capped at 18,000 acres, but will be allowed to grow within the Category 1 and MA 3.63 boundaries. The 18,000 acre objective only serves as a potential trigger point for use of rodenticides if prairie dogs are expanding onto adjacent private lands. If nonlethal management techniques prove insufficient, rodenticides will be available for use to control prairie dogs that disperse outside of Category 1. If and when control becomes necessary within the Category 1 Area, selection of colonies to be controlled should be based on habitat values for associated species.

As previously mentioned, recreational shooting of prairie dogs will be prohibited within MA 3.63 and the Category 1 Area. Shooting has been found to leave prairie dog carcasses that contain high levels of lead fragments. These fragments could lead to secondary poisoning of other wildlife if consumed (Pauli 2005). Prairie dogs are susceptible to hunting related

disturbances and shooting has a cascading effect on population level processes (Pauli et al, 2007).

Initially, the capture and translocation of prairie dogs to suitable areas will be a preferred method for managing unwanted colonization on private lands. Prairie dogs that have been captured and removed to control unwanted movement onto private lands could be used to augment prairie dog populations in Categories 1 & 2, with Category 1 being the priority for translocations. If active prairie dog colonies fall below 10,000 acres within the Category 1 Area, translocations of prairie dogs from other categories, including Category 2, could be implemented.

Site-specific decisions on the use of the management tools will be made using the Decision Screens found in Appendix A.

D. Category 2 Areas

Category 2 Areas are intended to provide an adequate distribution of prairie dogs and their associated species across the landscape. The Forest Service will maintain five Category 2 Areas within the planning landscape.

Category 2 Areas – Location

Locations for Category 2 Areas are based on habitat potential, as well as the current and historical distribution of prairie dogs. Furthermore, areas that have a known presence of associated species were considered high value habitat for other reasons and are prioritized for Category 2 Areas. Habitat requirements and suitability of associated species such as Mountain Plovers, Burrowing Owls, Ferruginous Hawks, and swift fox will be considered in locating and maintaining any particular Category 2 Area. If information arises which suggests a specific colony configuration is more suitable for a desired species, Category 2 Areas can be adjusted to provide such conditions.

Category 2 Areas – Size and Population Objective

The size and configuration of each Category 2 Area may shift depending on the amount and availability of suitable and potential prairie dog habitat, prairie dog activity, new information, or other management objectives. Entire communities of animals depend on prairie dogs directly and indirectly, including Mountain Plovers, Ferruginous Hawks and Burrowing Owls (Nicholoff 2003); therefore, the location of these species will be an important consideration in the placement of Category 2 Areas.

The cumulative population objective within the five Category 2 Areas is 9,000 acres.

Category 2 Areas - Control and Management

Non-lethal methods of control are preferred in the Category 2 Areas. Initially, capture and translocation of prairie dogs to suitable areas will be a preferred method for managing unwanted colonization on private lands. Captured and removed prairie dogs could be used to

augment prairie dog populations in Categories 1 and 2, with Category 1 being the priority for translocations.

Translocations will be considered if the total Category 2 acreage falls below 1,500 acres. If the total Category 2 acreage exceeds 9,000 acres, control of colonies within Category 2 Areas would be considered. In such cases, colonies with lower habitat value for associated species would be prioritized.

Recreational shooting of prairie dogs is prohibited on all NFS lands within the five Category 2 Areas, with exceptions. Recreational shooting could be allowed: 1) with seasonal restrictions on all Category 2 Areas if the total Category 2 acreage exceeds 9,000 acres; or 2) on individual Category 2 areas prior to meeting the total Category 2 objective if expansion onto private lands is an issue and if appropriate and available non-lethal options have been considered, used, and found to be ineffective for changing the rate and direction of colony expansion. Use of non-toxic or non-expanding bullets is recommended to reduce possible secondary lead poisoning.

Site-specific decisions on the use of the management tools will be made using the Decision Screens found in Appendix A.

E. Category 3 Areas

Category 3 Areas are intended to provide a source for natural dispersal to Category 1 and 2 Areas and to provide a broad geographic distribution of prairie dog colonies and their associated species across the TBNG.

Category 3 Areas – Location

Category 3 Areas include small, isolated colonies that do not fall within the boundaries of Category 1 or 2 Areas; they also occur outside of permitted mine boundaries.

Category 3 Areas – Population Objective

Category 3 Areas have a management objective of 6,000 acres of active prairie dog colonies strategically located across the planning landscape.

Category 3 Areas - Control and Management

Prairie dog control efforts that propose to use rodenticides may only be initiated if cumulative acreage of active prairie dog colonies on Category 3 Colonies exceeds 6,000 acres, except for protection of human health and safety.

Recreational shooting of prairie dogs will be allowed on all Category 3 colonies on NFS lands, unless the colonies are located inside Management Area 3.63 – Black-footed Ferret Reintroduction Habitat. Information will be provided to encourage shooters to use non-toxic and non-expanding bullets to minimize the potential risk of exposing non-target wildlife to lead poisoning. Seasonal restrictions may be applied to those colonies where there is documented use by associated species.

Priority will be given to Category 3 Areas that can serve to recolonize Category 1 and 2 Areas as well as colonies with a documented presence of species of concern such as Burrowing Owls and Mountain Plovers.

F. Permitted Mine Boundaries

Colonies within permitted mine boundaries will not be scheduled for control and do not count toward category objectives; however, they will be maintained until they are impacted by mining.

G. New Colonies

New colonies will be designated within the appropriate category.

- New colonies within ½ mile of adjacent non-federal lands will be evaluated to determine their potential for causing unwanted encroachment.
- New colonies will be evaluated to determine their potential as one of the five Category 2 Areas.

H. Treatments

Colonies will be controlled (using a variety of management tools) on a priority basis as follows:

a. Colonies close to residences where health and safety are a concern.
b. Colonies expanding onto private land near boundaries of Categories 1, 2, or 3.
c. Colonies moving toward private land.

I. Population Objectives and Strategy Information by Category Area

Table 1 depicts acre objectives, when management actions may be taken, and which management tools may be used by Category Area. Appropriate management actions will be consistent with LRMP standards and guidelines and will be determined using the decision screens.

TABLE 1: ACRE OBJECTIVE, MANAGEMENT ACTIONS, AND MANAGEMENT TOOLS BY CATEGORY

Category	Acre Objective (Active Colonies)	When Management Actions are Taken	Management Tools (See pp. 30 – 34)
All	35,000	Review management strategy	All
Near Residences	NA	Within 1 mile of residence and landowner is concerned	Non-lethal and lethal
1	18,000	a. If less than 10,000 acres b. Along boundaries as needed, or if more than 18,000 acres total	a. Use non-lethal tools to enhance b. Non-lethal tools regardless of objective and rodenticide when objective is reached
2	9,000	a. If less than 1,500 acres total b. If more than 9,000 acres total	a. Use non-lethal tools to enhance b. Non-lethal tools regardless of objective and lethal tools when objective is reached
3	6,000	a. If greater than 6,000 acres total b. If significant risks to associated species from shooting are identified	a. Use Non-lethal tools and lethal tools when objective is reached b. Seasonally restrict shooting

STRATEGY DEVELOPMENT

A. Forest Service and Peer Review

The Forest Service regularly coordinated efforts with prairie dog experts from the Nebraska National Forest, Dakota Prairies Grassland, Wyoming Game and Fish Department, and the U.S. Fish and Wildlife Service when developing the original Strategy (2009). As part of this coordination, the Forest Service asked these agencies as well as the US Department of Agriculture (USDA) Wildlife Services to comment on a draft Strategy. Responses were received from the following Livestock Grazing Associations: The Thunder Basin, Inyan Kara, and Spring Creek. The Associations were kept informed of progress at regular intervals.

As part of the 2015 Strategy update, the Forest Service continued coordination with numerous groups including, but not limited to, state agencies, County Commissioners, private landowners, non-governmental organizations, and the Governor's Policy Office. These groups provided suggested edits to the document as well information regarding suggested locations of Category 2 areas.

Our goal, for future Strategy updates, is to make use of a formalized Working Group. In 2015, the Forest Service partnered with the University of Wyoming (Ruckelshaus Institute) to conduct a Situation Assessment to determine whether or not a Working Group of Thunder Basin stakeholders is feasible. The purpose of the Working Group would be to define the issues surrounding prairie dogs and related factors on the Grassland, find options that will improve conditions, and continue to implement and monitor effective treatments. The Working Group would provide recommendations to the Forest Service, Wyoming Game and Fish Department, and other entities regarding prairie dog management on the TBNG.

B. Grassland Plan Direction

The Land and Resource Management Plan for the TBNG (2001) provides management direction in the form of goals, objectives, standards, and guidelines. LRMP direction related to prairie dog management is summarized in Appendix B.

C. Current Potential Habitat Modeling for Black-tailed Prairie Dogs on the TBNG

When updating the Strategy, the Forest Service identified the location of 'current potential habitat' for NFS surface land ownership on the TBNG using a newly developed prairie dog model. The model and its results are described in Appendix C.

D. Existing Conditions

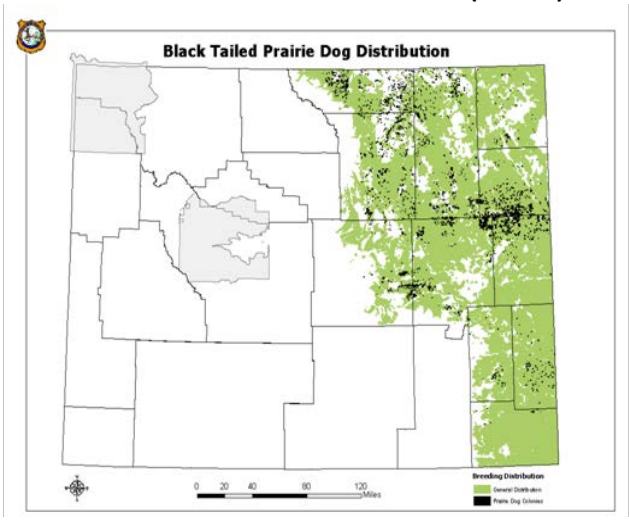
The area currently occupied by BTPDs has declined to approximately 2% of its historical range in North America. Conversions of habitat to other land uses, widespread prairie dog eradication efforts, and sylvatic plague have concomitantly caused significant population reductions. The species itself is not in immediate danger of extinction; however, the unique ecosystem that black-tailed prairie dogs create is jeopardized by continuing fragmentation and isolation (USFWS 2009).

National land ownership patterns presently inhabited by prairie dogs are as follows: 87% Private land; 8% Native American Reservations; 5% federal lands (Luce et al. 2006). Based on data collected from National Grasslands throughout the US, over 75% of habitat on National Grasslands is suitable for prairie dogs (Sidle et al. 2006); however, prairie dogs also inhabit less than 2% of National Grasslands (Sidle et al. 2006) and only 1.1% of the Great Plains managed by the USFS (Miller et al. 2007).

In Wyoming, it is estimated that BTPDs occupy 0.01% of their historic range (Buseck et al. 2005) with a reduction in habitat of over 80% from pre-settlement estimates (Van Pelt 1999). With the exception of approximately 24,000 acres on the TBNG, and small colonies occurring on Bureau of Land Management (BLM) lands, most prairie dogs occur on private land in Wyoming (Van Pelt 1999).

The following figure shows the distribution of BTPDs in Wyoming (WGFD 2005). The most current estimate of BTPDs (2006) in Wyoming is 229,607 acres (USFWS 2009).

FIGURE 3: DISTRIBUTION OF BTPD COLONIES (BLACK) IN WYOMING



In 2014, prairie dogs occupied more acreage on the TBNG than any other Grassland unit across the Nation with roughly 24,800 active acres (see Appendix C, p. 61). Despite this seemingly large figure, it should be noted that 24,800 acres represent only 4.5% of the TBNG's 553,000 total acreage. The Category 1 Area contained 15,950 of the 24,800 acres in 2014. This represented 64% of the total active prairie dog colonies on the TBNG. Table 2 depicts active prairie dog acreage by Category Area in 2014.

TABLE 2: ACTIVE PRAIRIE DOG ACREAGE BY CATEGORY IN 2014

Category	Total NFS Acres	Current Potential Habitat Acres	Acres of Occupied Prairie Dog Colonies in 2014	Objective Acres
Category 1	49,856	24,731	15,954	18,000
Category 2	15,218	9,518	2,402	9,000
Category 3	453,919	94,033	6,371	6,000

Note: All acres are for National Forest System surface land ownership.

Prairie dogs are considered a keystone species because the habitat they create cannot be duplicated by another species and is required, either directly or indirectly, by other wildlife. For these reasons, there continues to be widespread concern for the viability of species associated with BTPDs in Wyoming and on the TBNG. The following figures depict trends for black-tailed prairie dogs and associated species of immediate conservation concern on the TBNG.

FIGURE 4: OCCUPIED BLACK-TAILED PRAIRIE DOG COLONY ACRES BY YEAR

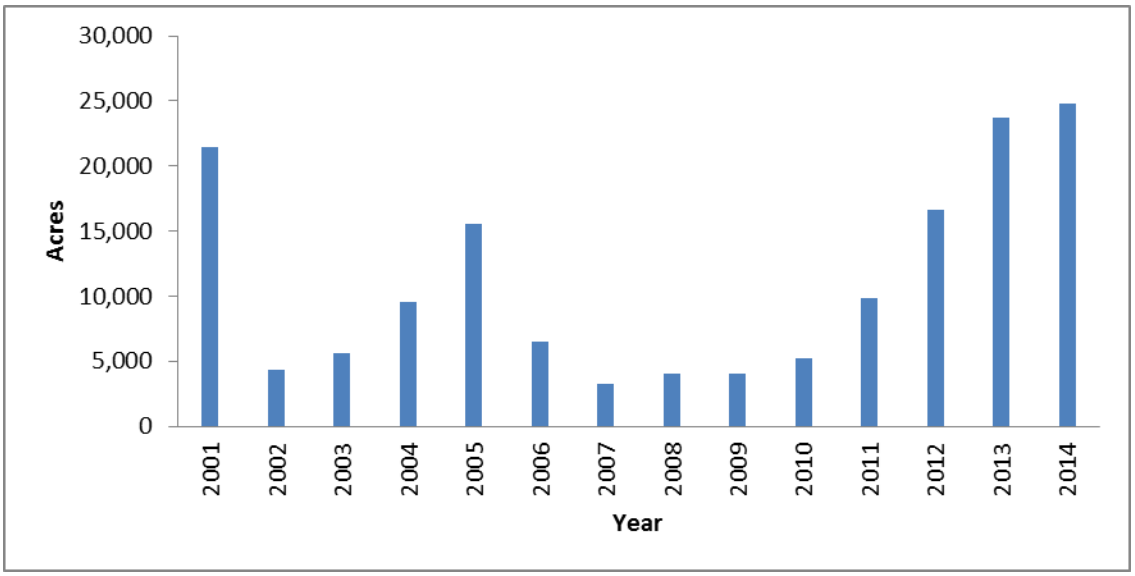


FIGURE 5: MOUNTAIN PLOVER PER ACRE BY YEAR (1993 – 2014)

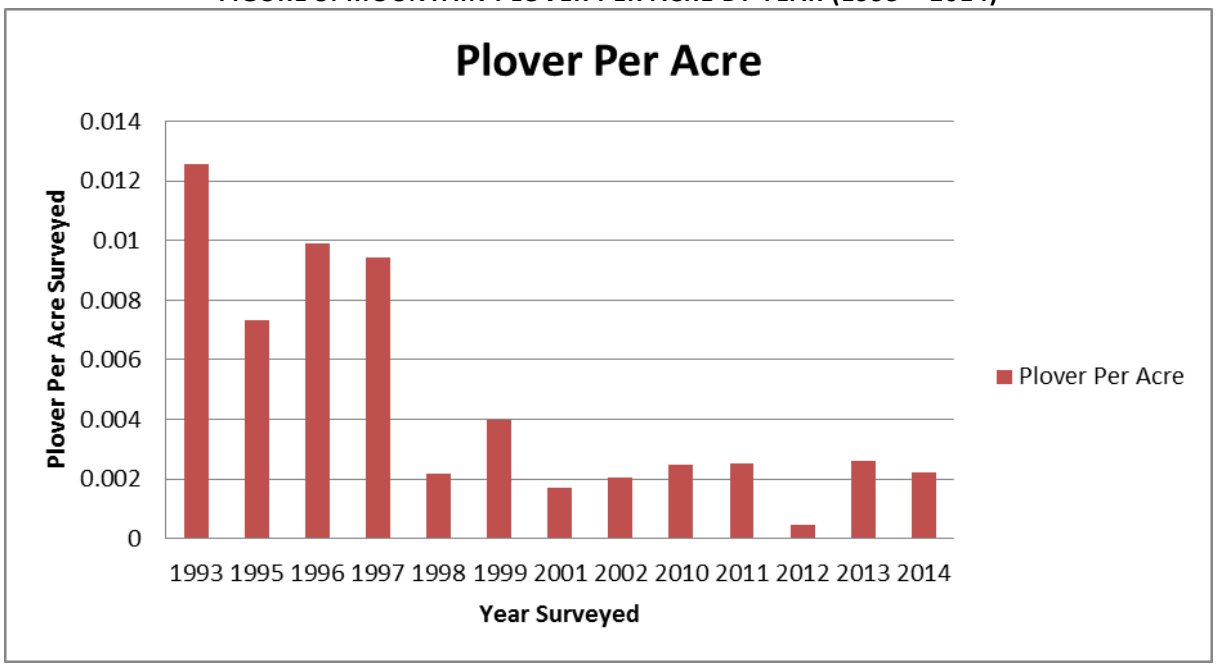


FIGURE 6: BURROWING OWLS PER ACRE BY YEAR (2010 – 2014)

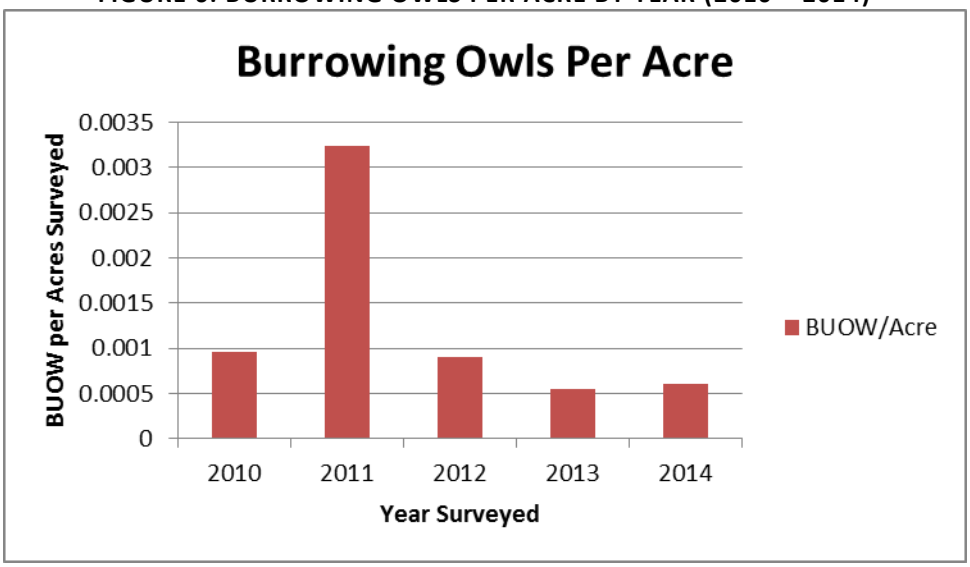
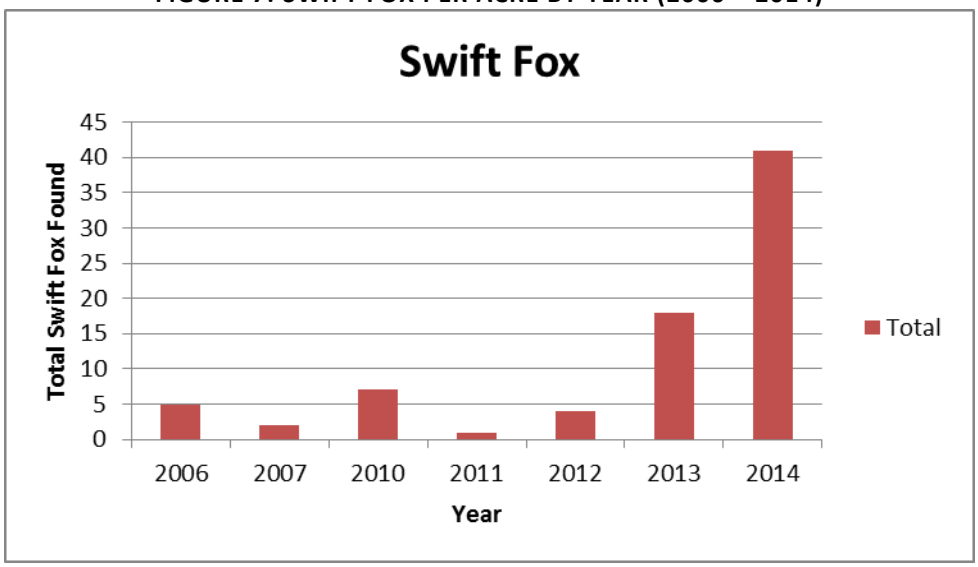


FIGURE 7: SWIFT FOX PER ACRE BY YEAR (2006 – 2014)

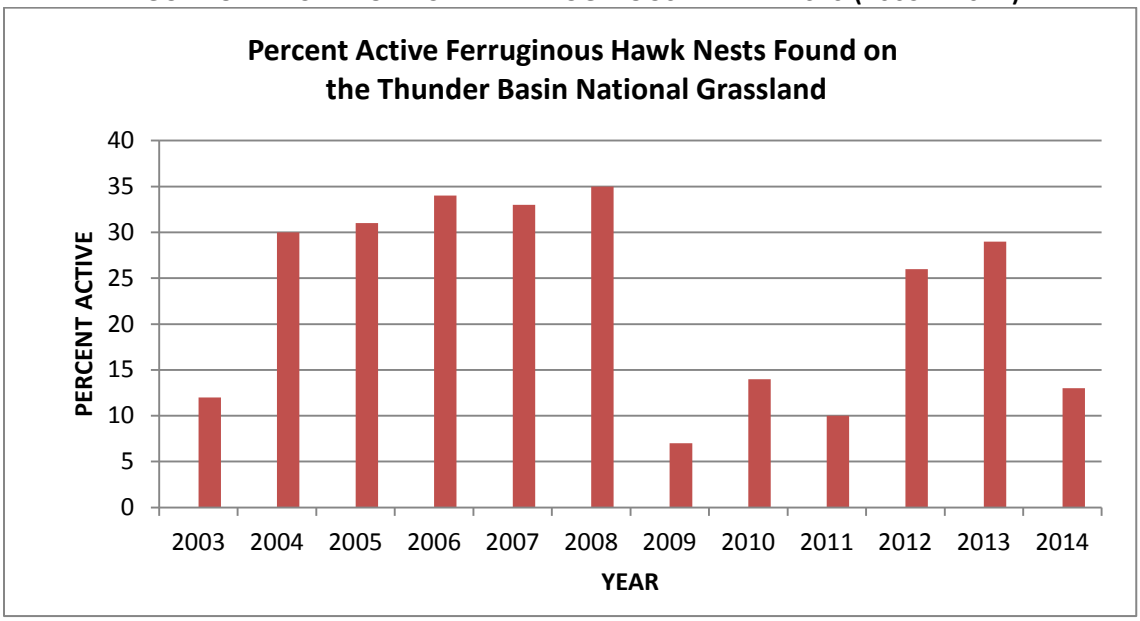


Ferruginous Hawk (FEHA)

The FEHA population on the TBNG is monitored through annual nest surveys. The population appears to be tracking along with prairie dog populations, with a 1-2 year lag time from declines and increases in population; this tends to be normal for predator/prey relationships.

Figure 8 reflects the percent of active ferruginous hawk nests for the survey year. The total number of nests checked may vary by year, but the percent active nests can provide a trend in nesting activity and reflect breeding population trends.

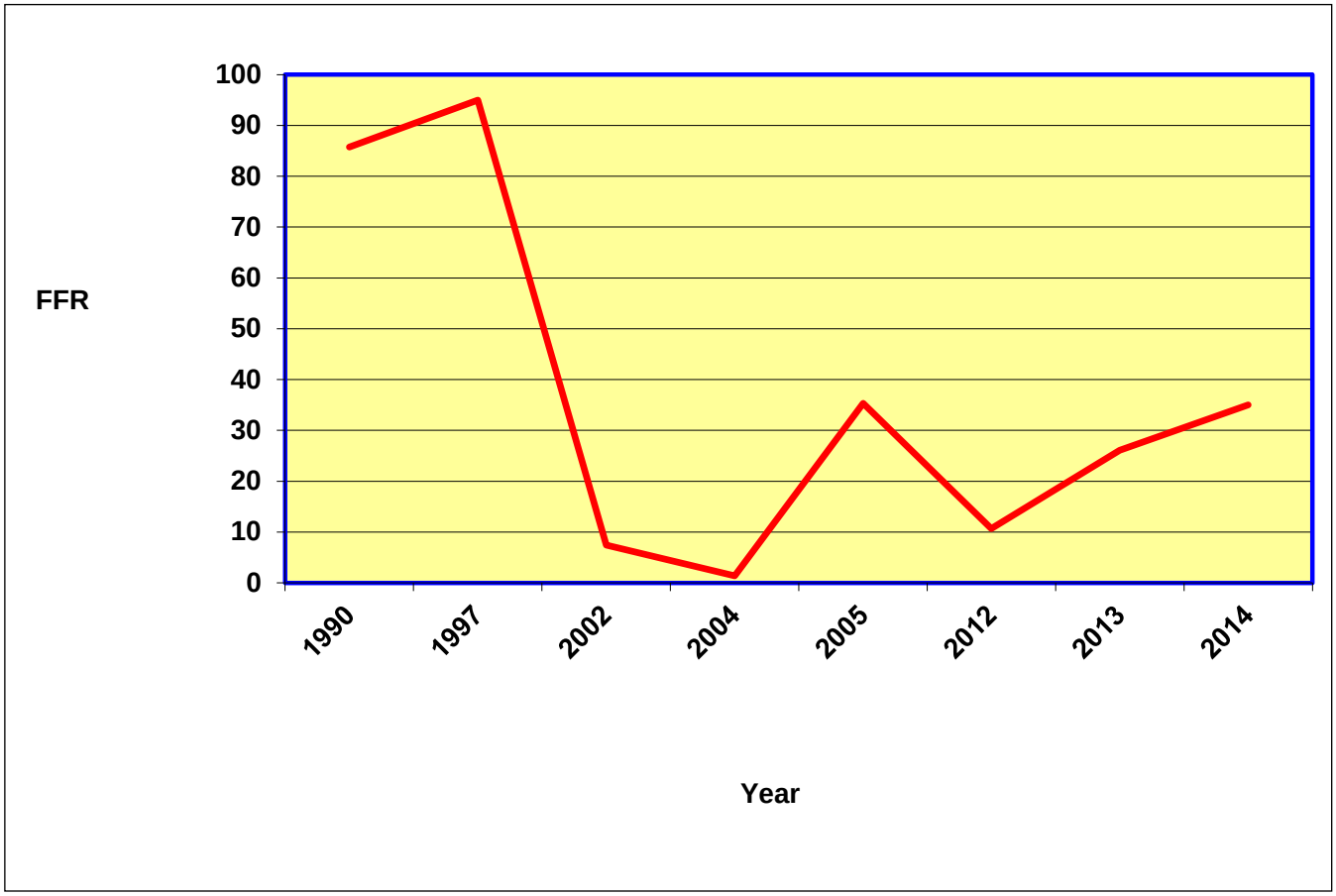
FIGURE 8: PERCENT OF ACTIVE FERRUGINOUS HAWK NESTS (2003 – 2014)



FERRET FAMILY RATING FOR TBNG

Ferret family ratings (FFR) are used to determine approximately how many ferrets a prairie dog complex can support over time. Occupied acres and burrow density data are used in the formula to determine a FFR. A ferret family is defined by Biggins (1993) as the number of ferret families a prairie dog complex can support for one year (1 female, 3.3 young and 0.5 male). Figure 9 depicts the FFR for the TBNG.

FIGURE 9: FAMILY FERRET RATING FOR THE TBNG (1990 – 2014)



MANAGEMENT ISSUES

The Forest Service engaged in a variety of efforts to identify issues affecting prairie dog management, both during the development of the original Strategy (2009) and during the update process for the 2015 Strategy. Efforts included: continued collaboration with Federal, state, and local agencies, environmental groups, livestock grazing associations, private landowners, and the public; a review of public comments received during the scoping process for the 2013 Prairie Dog Amendment; and a review of the Situation Assessment (see p. 17) prepared to determine whether or not a Working Group of TBNG Stakeholders is feasible.

A. Prairie Dog Conservation

Prairie dog conservation on the TBNG includes:

i. Prairie Dog Population Trend

The BTPD is one of five prairie dog species estimated to have once occupied more than 247 million acres in North America. The BTPD is a sensitive species in Region 2 of the USFS and is a Management Indicator Species (MIS) on the TBNG (USFS 2011). In Wyoming, it is ranked S2 (species ranked S1 are critically imperiled) by Wyoming Natural Diversity Database (WYNDD) and ranked NSS3 by the Wyoming Game and Fish Department (WGFD).

The USFS Region 2 Regional Forester classifies species as sensitive when they meet one or more of the following three criteria: 1) the species [population] is declining in numbers or occurrences and evidence indicates it could be proposed for federal listing as threatened or endangered if action is not taken to reverse or stop the downward trend; 2) the species' habitat is declining and continued loss could result in population declines that lead to federal listing as threatened or endangered if action is not taken to reverse or stop the decline; and 3) the species' population or habitat is stable but limited (USFS 2011, FSM 2670-2672).

Management Indicator Species (MIS) are defined by the USFS as "plant and animal species, communities or special habitats, selected for emphasis in planning, and which are monitored during forest plan implementation in order to assess the effects of management activities on their populations and the populations of other species with similar habitat needs which they may represent" (USFS 2011, FSM 2620.5). Therefore, important characteristics of MIS are that they have narrow habitat associations, representing ecosystem components important to multiple species, and are capable of being effectively monitored.

The BTPD Heritage Rank and Wyoming Natural Diversity Database's (WYNDD) significance ranking for Wyoming is based on the following factors (Buseck et al. 2005):

- Range encompasses a moderate portion of the state (State of Wyoming historic BTPD occupancy: 40%; State of Wyoming current BTPD occupancy: 0.01%).
- Abundance in Wyoming is unclear, probably declining.
- Low range occupation.
- Vulnerable due to disease and habitat specificity.

- Face threats including eradication programs, habitat fragmentation, and land conversion. Poisoning, shooting, and land conversion are a substantial threat to BTPDs. When threats are combined they can devastate entire populations to a point that they cannot recover.

The WGFD classifies the BTPD as a Native Species of Special Concern – NSS3. They identified the following problems with management of BTPDs: "The BTPD has been the objective of intensive lethal control programs and the necessity to start conservation efforts may not be well understood or supported. The exotic disease, sylvatic plague (*Yersinia pestis*), has the potential to have significant negative impacts on prairie dog populations (WGFD 2005)."

North American native grasslands have been reduced by 33-37% (Luce 2006), therefore limiting the available habitat for both prairie dogs and their associated species. Prairie dog colonies on National Grasslands are often fragmented and are more prone to eradication (Sidle et al. 2006). Currently, prairie dogs exist in small, isolated, and disjunct colonies and are, therefore, more vulnerable to genetic inbreeding, plague, human disturbance, and extirpation (Luce 2006).

Prairie dogs are considered a keystone species because they significantly affect the structure, function, and composition of the ecosystem and these effects cannot be duplicated by another species (Miller et al. 2000). Entire communities of animals depend on prairie dogs directly and indirectly, including Mountain Plover, Burrowing Owls, Ferruginous Hawks, and swift fox (Nicholoff 2003). There are at least nine species that are considered prairie dog obligates and another 170 species that rely on prairie dogs for survival on some level (Miller et al. 2000).

Prairie dogs create a matrix of different habitats which increase diversity across grasslands, they provide a ready source of prey for many predators, and they create shelter burrows for other animals (Miller et al. 2007). The swift fox, black-footed ferret, Ferruginous Hawk, and Golden Eagle use prairie dogs as a major food source, while Mountain Plover and Burrowing Owl depend on prairie dogs for nesting habitat (USFWS 2009). Species richness, density, and diversity are all higher on prairie dog colonies than on grasslands unoccupied by prairie dogs (USFWS 2009). The removal of a keystone species results in a domino effect of changes which can cause a rapid decline of species diversity (Nicholoff 2003).

Figure 10 illustrates how large complexes of prairie dog colonies occurring on the Northern Great Plains contribute to a significantly more diverse bird community than would occur in areas lacking prairie dogs (Augustine and Baker 2013).

Throughout the range of the BTPD, population declines have been so significant that they can no longer perform their historic ecological function (Miller et al. 2007). The minimal prairie dog colony size required to meet multi-species needs is 1,000 acres (VanPelt 1999). Since 2012, the TBNG contains only five colonies that meet this minimal acreage criterion. All five 1,000 acre colonies have Burrowing Owl and Mountain Plover occurrences. Prairie dogs may persist in low numbers and small, widely-distributed colonies, but scattered distributions and low densities will reduce their ecosystem functions and benefits (Miller et al. 2007).

FIGURE 10: PRAIRIE DOG CONTRIBUTIONS TO BIRD COMMUNITIES

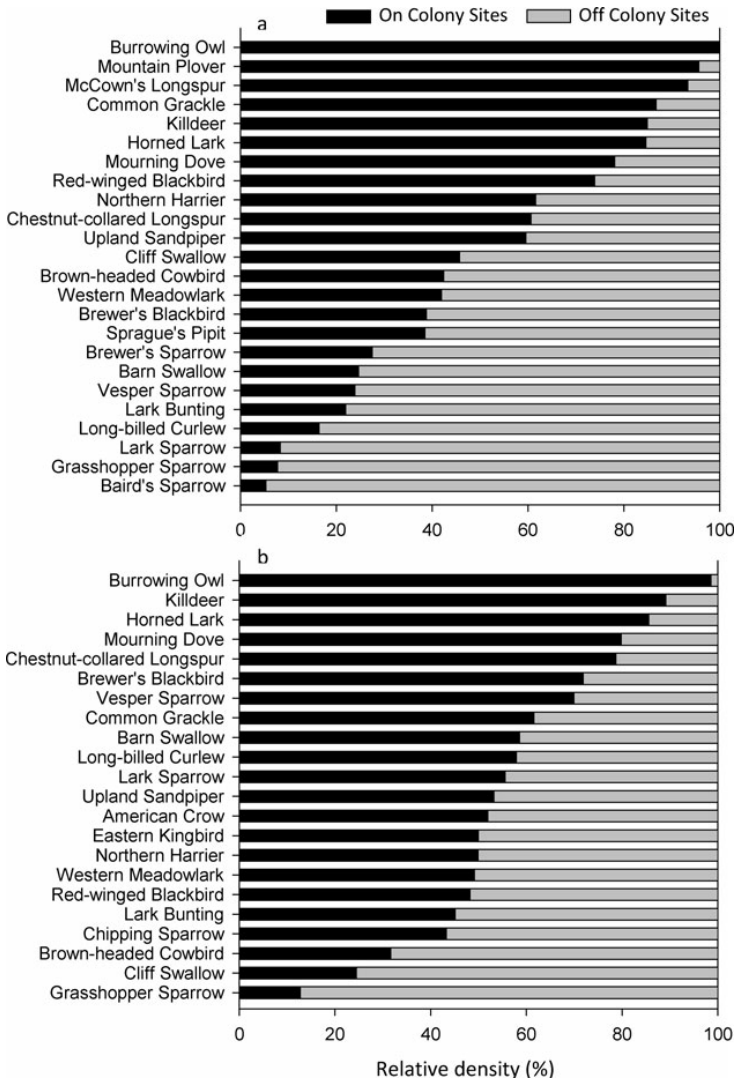


Figure 11: Comparison of relative bird density (%) on BTPD colonies and off BTPD colonies at (a) three western complexes in Wyoming and Montana and (b) four eastern complexes in South Dakota (Augustine et al., 2013).

ii. Habitat for Associated Species

Mountain Plover - The Mountain Plover is considered a sensitive species by the USFS (USFS 2011) and is found in open habitats, such as the short-grass and mixed-grass prairies of central and western Wyoming. Mountain Plovers prefer to nest in large, flat grassland expanses with sparse, short vegetation and bare ground. They are adapted to areas that have been disturbed by prairie dogs, heavy grazing, or fire (WGFD 2005). This small bird is a summer breeder on the TBNG and is most often found in prairie dog colonies where the short-grass habitat it prefers is maintained. Appropriate nesting habitat for Mountain Plovers contains approximately 30% bare ground (Dinsmore 2003). Mountain Plovers occur at a 10 times greater density on prairie dog colonies than on areas of grasslands unoccupied by prairie dogs (Augustine et al. 2008). Dinsmore (2003) identifies loss of native habitat, including prairie dog colonies, as the primary threat to Mountain Plover.

Mountain Plover populations have declined during the last century across their range, mainly as a result of threats to their breeding grounds. Because Mountain Plovers select active prairie dog colonies for nesting, activities such as poisoning, disease and recreational shooting of prairie dogs are viewed as direct threats to Mountain Plover populations, because they result in the continued loss of prairie dogs. . Hence, management activities that increase the distribution of prairie dogs will also serve to increase the distribution and abundance of Mountain Plover (Dinsmore 2003).

Burrowing Owl - The Burrowing Owl is dependent on underground burrows for nesting habitat. They are most often associated with prairie dog colonies, but can also be found in other isolated underground burrows. Prairie dog colonies provide ideal habitat as they create an abundance of nest burrows and they produce a short vegetation profile that is preferred for predator detection (McDonald et al. 2004). Burrowing Owls are summer residents on the TBNG where they forage for insects and small vertebrates. McDonald et al. (2004) identified the three primary threats to Burrowing Owl populations as habitat loss/fragmentation, anthropogenic disturbance, and losses on wintering grounds.

The Burrowing Owl is declining over much of its range. The fate of Burrowing Owls at a regional scale is largely tied to that of prairie dogs. Region 2 of the Forest Service lies roughly at the center of the Burrowing Owl's range and conservation of the species appears integral to overall species conservation (McDonald, et al. 2004). Habitat loss and degradation is identified as the single most important threat to persistence and, as such, discussion of threats to Burrowing Owls must be linked to threats and persistence of prairie dogs (McDonald et al. 2004).

Extensive burrow availability is critical to the persistence of Burrowing Owls. Livestock grazing and large-scale control and eradication efforts for prairie dogs have historically reduced the availability of habitat with suitable vegetation height and burrow density for Burrowing Owls. Large well-connected prairie dog colonies should be maintained in historical prairie dog and Burrowing Owl habitats (McDonald et al. 2004).

In the Great Plains, Burrowing Owls are strongly associated with colonial, burrowing mammals, particularly the BTPD. Surveys in eastern Colorado identified 423 Burrowing Owl locations

within short- and mixed-grass prairie, 80% of which were located within BTPD colonies (Lantz 2005). On the TBNG, few Burrowing Owl nest burrows have been found away from prairie dog colonies.

Both systematic and incidental Burrowing Owl surveys have been conducted on the TBNG. In 1998, prairie dog colonies on 17 National Grasslands were surveyed for Burrowing Owl. The percentage of occupied colonies varied from 75% occupied on the Grand River to 16% (11 of 68 colonies) on the TBNG (Sidle et al. 2001).

Lantz (2005) surveyed 73 prairie dog colonies within the administrative boundary of TBNG, as well as on private and NFS lands, and found 39 inactive colonies and 34 active colonies. A total of 57 colonies surveyed were occupied by Burrowing Owls. Of the occupied nests, 81% were within active prairie dog colonies and 19% of nests were within inactive prairie dog colonies. In both 2003 and 2004, Lantz identified 136 active Burrowing Owl nest burrows (Lantz 2005).

Swift Fox - The most limiting factors for swift fox are competition with coyotes and red fox and the conversion of shortgrass prairie. The key component in the restoration of swift fox is the provision of suitable habitat where they can obtain prey while avoiding predators (Stephens et al., 2005). Sasmal (2011) noted that habitat loss played a key role in the extirpation of swift fox populations and recommended maintenance of suitable habitat. She concluded that "even a stable population can be threatened with extinction by an increase in mortality rate, which can be caused due to habitat loss, decrease in prey availability due to spread of disease like plague, or increased predation." Finally, she recommended maintenance of connectivity with other neighboring populations to ensure genetic diversity maintenance (Sasmal 2011).

Ferruginous Hawks - Breeding population declines of Ferruginous Hawks may be due to loss of primary species such as prairie dogs, rabbits, and ground squirrels, which can force hawks to look elsewhere for better nesting habitat (Banasch et al 2005). It is likely that the Ferruginous Hawk was historically more abundant and widely distributed (Collins et al, 2005). Grasslands in Region 2 contain between 3 to 6 percent of total breeding populations of Ferruginous Hawks within the region (Collins, et al, 2005). Reducing prairie dogs as a food source for Ferruginous Hawks in locations where they nest could impact agricultural practices by reducing predation on other prey and rodent species (Cook et al. 2003).

McCown's Longspur - Compared to its historical distribution, the breeding range of McCown's Longspur has been drastically reduced. This is due to reduction in shortgrass prairie. Viability of McCown's Longspur could be impaired throughout Region 2 by continued fragmentation of habitats, which have altered natural expanses of shortgrass prairie (Sedgwick 2004).

The breeding range for Chestnut-collared Longspur has contracted and long-term population decline is evident. Viability of this species could be impaired throughout Region 2 by continued fragmentation of habitats. Region 2 parallels continent-wide risks, because much of the habitat of the Chestnut-collared Longspur falls within Region 2. This species is restricted to shortgrass and mixed grass prairies (Sedgwick 2004).

iii. Black-footed Ferret Recovery

The black-footed ferret (*Mustela nigripes*) was listed as endangered in 1967 pursuant to early endangered species legislation in the United States and was "grandfathered" into the Endangered Species Act of 1973 (ESA). The US Fish and Wildlife Service (USFWS) estimates that the average minimum number of breeding adult black-footed ferrets in the wild is 418 animals, with a minimum of 313 of those animals at four of the most successful reintroduction sites to date. Roughly 280 additional ferrets are managed in captive breeding facilities. At this time, the downlisting criteria may be 40% complete with regard to establishing 10 successful populations and approximately 24% complete with regard to the goal of 1,500 breeding adults at successful sites. The species remains vulnerable to several threats, including sylvatic plague and inadequate regulatory mechanisms (USFWS 2013).

The black-footed ferret depends on prairie dogs for food and on their burrows for shelter. The historical range of the ferret coincided with the ranges of the black-tailed prairie dog (*Cynomis ludovicianus*), Gunnison's prairie dog (*C. gunnisoni*), and white-tailed prairie dog (*C. leucurus*). The ferret's close association with prairie dogs was an important factor in the ferret's decline. From the late 1800s to approximately the 1960s, prairie dog occupied habitat and prairie dog numbers were dramatically reduced by conversion of native grasslands to cropland, poisoning, and disease. The ferret population declined precipitously as a result (USFWS 2013).

As a part of the Northern Great Plains Land Management Plan revision process, the USFS designated ferret reintroduction sites (in addition to Conata Basin NG) on the Buffalo Gap National Grassland (NG), Little Missouri NG, and the TBNG (USFS 2009 and ROD Appendix B). In a letter dated May 8, 2007, the Regional Forester for Region 2 committed the USFS to providing habitat for future ferret reintroductions and said: "Despite our important contributions to the national recovery program to this point, recovery of the black-footed ferret still remains tenuous at best. Opportunities likely remain for the Forest Service to continue to be a leader in the national recovery effort (Cables 2007)."

In a letter dated March 16, 2007, the USFWS stated the following: "Perhaps no other agency or entity can contribute to more assured and rapid recovery of the ferret than the Forest Service. Ferret recovery cannot be achieved on National Grasslands alone, but likewise, the establishment of adequate numbers of ferret populations across the historical range of the species may not be possible without concerted support by the Forest Service and expansion of field recovery efforts across more of the Forest Service's vast western holdings. Even with more focused Forest Service Management and development of additional sites for prairie wildlife, the amount of managed land actually required to meet these needs would represent a small percentage of the almost 4 million acres of National Grasslands (USFWS 2007)."

The black-footed ferret is found almost exclusively in prairie dog colonies in grasslands. It is dependent on prairie dogs for all crucial aspects of its habitat (WGFD 2005). Problems identified in the Plan for Bird and Mammal Species of Greatest Conservation Need in Eastern Wyoming Grasslands (WGFD 2005) are the following (copied directly from the plan):

- Control efforts of prairie dogs by humans directly coincided with the demise of the black-footed ferret.
- Epizootics of sylvatic plague and canine distemper hamper and minimize the potential for successful reintroduction under current management paradigms.
- Successful reintroduction efforts are limited by the availability of captive-raised ferrets; inadequate funding; and protocol that is cumbersome, cost-ineffective, and out-of-date.
- Funding has been inadequate to annually monitor the ferret population and habitat in the Shirley Basin/Medicine Bow Black-footed Ferret Management Area.
- Prairie dog control efforts and the needs of many livestock producers limit the number of potential reintroduction sites for black-footed ferrets. Recent petitions to list prairie dogs under the Endangered Species Act caused localized increases in control efforts and disabled cooperative programs with some private landowners.

B. Unwanted Prairie Dog Expansion

Management issues regarding unwanted prairie dog expansion on the TBNG are summarized as follows:

i. Threats to Public Health

Prairie dogs are most commonly identified as a risk to public health due to the prairie dogs' susceptibility to sylvatic plague. The concern is that fleas from infected prairie dogs might vector the disease to humans.

ii. Damage to Public and Private Facilities

Prairie dog burrowing can damage facilities such as cemeteries, drainage ditches, and dams. Prairie dogs and their burrows can also reduce the utility of places such as picnic areas and campgrounds.

iii. Forage for Permitted Livestock

Competition between livestock and prairie dogs has been a longtime concern in the Western Great Plains. Widespread control programs for prairie dogs began in the late 1800's on the Great Plains when it was estimated that 256 prairie dogs ate as much as one cow (Merriam 1902). Today the concern over livestock and prairie dog grazing competition still exists. Potential competition between native and domestic herbivores is a major consideration influencing the management and conservation of native herbivores in rangeland ecosystems. In grasslands of the North American Great Plains, black-tailed prairie dogs are widely viewed as competitors with cattle but are also important for biodiversity conservation due to their role in creating habitat for other native species (Augustine, Springer 2013).

Prairie dogs change both the amount and type of vegetation found on their colonies (Agnew et al. 1986, Archer et al. 1987). The extent of this change is affected by soil and precipitation factors, as well as by the presence or absence of other herbivores, particularly bison (*Bison bison*) or livestock. The time period involved is also important, with older (> 7 to 10 years old)

colonies showing greater changes in vegetative conditions (Archer et al. 1987, Cincotta et al. 1989). While prairie dogs change the amount and type of vegetation their activities suppress plant phonological development, thus maintaining the plants in a vegetative state. Young vegetation is higher in nutritional qualities than mature plants (Sharps, Uresk 1990).

iv. Expansion onto Adjacent Private Land

Expansion of prairie dogs onto private land is an issue due to conflicts with livestock grazing management, physical damage to infrastructure, health issue concerns, and aesthetic concerns. Aesthetic concerns are the bare ground and short, cropped vegetation which is not appealing to many people.

MANAGEMENT TOOLS

There are a number of management tools that can be utilized to manage prairie dog populations. These tools, both lethal and non-lethal, can be used alone or in combination with each other to influence direction and rate of expansion; reduce or remove encroachment onto neighboring lands; or maintain or increase prairie dog populations in areas where prairie dogs are desired.

Conservation Agreements

A Candidate Conservation Agreement (CCA) is a formal, voluntary agreement between the USFWS, one or more federal agencies, and potentially additional non-federal landowners addressing the conservation needs of one or more candidate species or species likely to become candidates in the near future. Candidate species are those species eligible for listing under the ESA, but are currently not protected by the ESA. The primary objective of a CCA is to implement specific conservation actions designed to remove or reduce threats to the covered species, so that federal listing may not be necessary. The USFWS accomplishes this by: working with partners to identify threats to candidate species; developing conservation measures needed to address these threats and conserve the species and its habitat; identifying willing landowners; collaborating on agreements designed to implement conservation measures; and monitoring their effectiveness (USFWS 2009).

A Candidate Conservation Agreement with Assurances (CCAA) is similar to a CCA but is only between the USFWS and non-federal property owners. In return for implementing appropriate conservation measures, non-federal participants receive assurances that they will not be required to implement additional conservation measures should the covered species be listed under the ESA (USFWS 2009).

The CCA and CCAA can be very effective in conserving candidate species and their habitats, especially across multiple land ownerships. They can be instrumental in eliminating threats to candidate species. Although there are no direct monetary costs of a CCA or CCAA, there are some indirect costs incurred through the implementation of the management tools and conservation measures.

Conservation Easements

In the context of this document, a conservation easement is a voluntary agreement between two parties such as the U.S. Government or non-governmental organization and a private landowner, wherein a prairie dog colony on private land is tolerated in return for a payment to the landowner. The primary objective of this tool is to reduce or mitigate the conflicts involved with unwanted prairie dog colonization on private lands by having a long-term easement agreement which provides for such colonization.

A conservation easement agreement could be developed wherein a landowner agreed to allow a prairie dog colony to remain for a set number of years in exchange for an annual payment. The acreage involved would be determined by on-the-ground mapping, and the value of the annual payment would be negotiated. The presence of prairie dogs would not exclude the use of these acres by livestock.

Land Exchange or Purchase

The U.S. Forest Service can exchange like-value land parcels with willing landowners through a multi-step approval process. The primary objective of this tool is to create large blocks of NFS lands and reduce the amount of intermingled private lands and shared boundaries. It can assist in minimizing unwanted colonization onto adjacent non-federal lands and requires a willing landowner and available NFS lands that are mutually agreeable for exchange.

Plague Management

The use of pesticides to reduce flea populations, which spread sylvatic plague within prairie dog colonies and complexes, can reduce outbreaks of this disease. The primary objective of dusting prairie dog colonies with a pesticide is to reduce or eliminate flea populations that are transmitting the disease to prairie dogs and other mammals.

Deltamethrin can be used for conserving prairie dogs and their associated species and reduce the risk of human risk from plague (Seery, et al. 2003). Prairie dog survival rates are higher on dusted sites than non-dusted sites (Biggins, et al. 2009). Dusted colonies have increased migration rates from the first to the second year through an epizootic, which means dusted colonies serve as refugia for prairie dogs impacted by colonies. Genetic variability also tended to increase on dusted colonies (Jones et al. 2011).

In addition to preserving prairie dog populations and their associated species, protecting colonies with Deltamethrin or a plague vaccine could be an effective method for preserving genetic variability in prairie dogs (Jones et al. 2011). Associated species like Mountain Plover will decline when plague erupts (Augustine et al. 2008).

According to Jones et al, 2011, dusting prairie dog colonies using Deltamethrin might conserve biological diversity at three levels: by maintaining prairie dogs during plague, dusting benefits black-footed ferrets and other animals; the demographic and social structure of prairie dogs can be preserved, allowing re-establishment of more natural colony structures; by acting as refugia, dusted colonies might maintain a larger sample of pre-epizootic genetic diversity.

Results from other black-footed ferret reintroduction sites suggest that flea control from dusting may afford moderate protection for local prairie dog populations, but does not eliminate plague from the dusted area. Because of this, vaccination of ferrets may be necessary before and after reintroduction. Wild born ferrets in the Conata Basin in South Dakota are routinely captured and vaccinated. A similar plague vaccine is being developed for use in prairie dogs (USFWS 2008).

Prescribed Burning and Mowing

Burning prairie has been shown to facilitate prairie dog colony expansion (Augustine et al. 2007). The primary objective of prescribed burning is to improve habitat for prairie dogs, which encourages prairie dogs to fill in areas that are currently inactive, or to influence the direction of colony expansion. Expansion rates onto burned areas range from 38-42% (Augustine, et al. 2007). Prairie dogs will preferentially colonize both mowed and burned sites compared to untreated sites, indicating that direction of expansion of prairie dogs can be manipulated with fire and mowing. Burning and mowing create conditions conducive to colony expansion and increased burrow density (Northcott et al. 2007). For associated species like Mountain Plover, maintaining local disturbance regimes through prairie dog conservation and prescribed fire may contribute to sustainable Mountain Plover populations while in the face of declining plover populations (Augustine et al., 2013).

Prescribed Grazing

Black-tailed prairie dogs prefer areas with low vegetative structure. Prescribed livestock grazing can be used as a tool to manipulate that vegetative structure to induce prairie dogs to migrate into desired areas of colonization. Livestock grazing can be modified through different techniques to create mosaics of vegetation structural diversity and to reduce conflict between conservation and livestock production (Derner et al. 2009).

High-structure vegetation can be effective at limiting prairie dog colony expansion. Prescribed livestock grazing that insures high vegetative structure after grazing may help regulate prairie dog population's increase and expand. Smith (1958) and Snell and Hlavachick (1980) reported that resting pastures significantly decreased prairie dog populations.

Prescribed grazing can also be effective in creating visual barriers along private land boundaries to reduce prairie dog colony expansion and to influence direction of expansion. See *Vegetative Barrier* section below for more information.

Recreational Shooting

Public lands managed by the agencies like the USFS are under a multiple-use mandate and are expected to provide for livestock forage and recreational shooting for the public while maintaining the ecological integrity of biological communities (Vosburgh et al. 1998). Recreational shooting is a potential mechanism for the regulation of prairie dog populations. Recreational shooting of prairie dogs can be an effective control tool and could be more socially acceptable than poisoning in some cases. Shooting also has the advantage of limiting prairie dog populations rather than eliminating them. Recreational shooting does have detectable effects on prairie dogs by increasing their wariness toward humans and decreased population size (Vosburgh et al. 1998). Shooting of prairie dogs can be moderately effective in achieving

this objective on a relatively small scale, but is not practical or cost effective as prairie dogs often become gun-shy (Barbalace 2007). However, shooting can have more severe negative impacts on prairie dogs colonies when compounded with other factors like plague.

Because prairie dogs are a colonial species, they are susceptible to shooting-associated disturbances. When looking at shooting as a control mechanism, consideration should be given to reduce shooting intensity and duration where prairie dog colony growth is desired, and allow shooting where colony conflicts occur (Pauli et al. 2007). Consideration should also be given to allowing non-expanding bullets only to reduce the risk of lead poisoning to predators scavenging shot prairie dog carcasses (Pauli et al. 2007). There is also the increased disturbance from shooting to non-target species like nesting plover, and timing limitations may need to be considered on a site by site basis.

Rodenticide (Chemical Control)

Toxic grain bait is most commonly used to control prairie dogs. The effectiveness of poison grain baits is closely associated with the activity and food preference of prairie dogs.

The only rodenticide currently approved for use on prairie dogs on the TBNG is zinc phosphide. The TBNG LRMP restricts the application of zinc phosphide-treated oats to October 1 – December 31. Zinc phosphide is a restricted-use pesticide due to the hazard to other animal species. If advancement in research/technology takes place, the Forest Service has the option to include other rodenticides for use. Prior to using any additional rodenticides, they must go through the full decision-making process including a National Environmental Policy Act analysis and a Risk Assessment for a new product, as warranted.

Baiting should only occur when prairie dogs are active. Temperature and weather have great influence on activity. Some zinc phosphide will be lost as phosphide gas if exposed to rainfall or other moisture, so baiting should only occur during settled weather. When first exposed to the bait, prairie dogs may take a small taste, which will result in a rapid acute adverse effect. A prairie dog that survives this initial exposure will become 'bait-adverse' and won't attempt to feed on such bait again. Pre-baiting is essential for getting a lethal amount of bait consumption and to prevent bait aversion. When poison grain baits are applied according to directions, they usually result in an 80 to 90% reduction in prairie dog numbers. Unsuccessful control generally is due to the presence of green grass or failure to pre-bait. Retreatment of prairie dog colonies generally occurs on a 2-3 year basis.

Translocation

Translocation is a non-lethal tool that can be used to remove prairie dogs from sites where conflicts exist and move them into area where they are desired. Methods for translocation include live trapping and flooding of burrows (Long et al. 2006). Recently the Prairie Dog Coalition has begun developing and implementing a form of passive translocation that involves pushing prairie dogs out of areas by using techniques that don't allow for re-entry into burrows. Restoration of prairie dogs often requires translocation to previously occupied areas (Truett et al. 2001). Translocation has shown considerable promise for restoring prairie dog populations that have been decimated by plague (Dullum et al. 2005).

The primary objectives of this tool are to: 1) remove prairie dogs from colonies that are causing unwanted colonization; 2) augment prairie dog populations in colonies affected by plague, for example; and/or 3) create new colonies.

Visual Barriers

Expansion of prairie dogs from NFS property to private and/or state property often results in conflicts that need to be managed. Barriers are a non-lethal management strategy that could be used to reduce or resolve the conflict (Witmer et al. 2008). Visual barriers involve placing a barrier on the side of a prairie dog town to divert expansion. The barrier blocks the view of colony residents and discourages expansion past the barrier (Merriman et al. 2004). Prairie dogs prefer open views of their surroundings and can abandon areas where visual obstructions exist. Using visual barriers can cause prairie dogs to emigrate from or abandon a colony, or preclude them from colonizing an undesired area (Foster-McDonald et al. 2006). They can be used to slow colony expansion or to manage for directional expansion (Franklin et al. 1989).

Some considerations for creating the most effective barrier are: spatial placement of barriers with respect to colony edge; number of barriers, or rows of barriers; extending the length of the barrier past the edge of the colony; burying the base of the barrier (Merriman et al. 2004). Other considerations would be the type of material used, which can be anything from vinyl snow fence to corrugated metal.

Vegetative Barriers

Vegetative barriers are another non-lethal method of control and are one way to meet changing management objectives for the black-tailed prairie dog. The use of naturally occurring buffer strips as vegetative barriers may be effective in limiting prairie dog town expansion. Some management objectives include long-term, self-sustaining populations of prairie dogs while reducing landowner conflicts. Development of non-lethal control methods is increasingly necessary for areas where prairie dogs are desired, and/or where lethal methods are not allowed or limited in use (Terrall et al., 2005). Use of vegetative barriers has been proven successful on sites like the Conata Basin on the Buffalo Gap NG in South Dakota (Griebel 2014).

MONITORING AND REPORTING

Monitoring

The TBNG Prairie Dog Management Strategy was developed collaboratively with diverse interests; therefore, we intend to continue to work collaboratively with adjacent landowners, state and federal agencies, and non-governmental organizations on implementation of management tools described in the Strategy, as well as on monitoring and evaluation of the effects of that implementation on meeting the purpose and need for the Strategy. We intend to form a Working Group that may subsequently develop monitoring protocols that may form the basis of future monitoring requirements.

Monitoring for implementation and effectiveness will be completed as described below.

TABLE 3: IMPLEMENTATION AND EFFECTIVENESS MONITORING

Parameters	Information Needed	Method	Location	Frequency	Timing	Priority
Categories/ objectives	Colony size and distribution	Active Colony mapping	All categories	3-5 years[2]	May-Sept	3
Associated Species	Species Populations	Viability surveys for Burrowing Owl, Mtn Plover, swift fox, Ferruginous Hawk	stratified sample and others as time/ funding allows	Annual	March-Sept	1
Population control areas	Colony size and proximity to private or residences	Active colony mapping	Colonies with concerns	Year of identified concern	May-Sept	1
Vegetation amount and quality	Vegetation composition and amount	Veg species frequency, cover and photopoints[3]	Stratified sample	3-5 years[4]	June	4
Management tool effectiveness	Acres or amounts affected by mgt tool	Prairie dog activity, photopoints, mapping	Stratified sample	Year following treatment	Varies by mgt tool	2

Reporting

Monitoring information will be provided to the Working Group on an annual basis. The Forest Service will disclose the results of monitoring to the public in the biennial LRMP Monitoring and Evaluation reports for the TBNG.

A complete evaluation of the Strategy will be completed on a 5-year cycle based on full implementation of all management tools and monitoring protocols.

[2] more often depending on plague cycles, observed expansion rates, and available funding
[3] Forest Service personnel, in cooperation with research, permittees, and other parties, will determine monitoring methods
[4] More often depending on precipitation cycles and available funding

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Appendix A: Decision Screens for the Thunder Basin Prairie Dog Strategy

Appendix B: TBNG LRMP Direction for Prairie Dog Management

PAGE #	DIRECTION
1-2	1. As scientific information becomes available, jointly develop with the US Fish and Wildlife Service and other agencies conservation and recovery strategies for plant and animal species, listed as threatened or endangered under the Endangered Species Act, and implement established conservation or recovery strategies over the life of the Plan.
1-3	2. Within 15 years, demonstrate positive trends in population viability, habitat availability, habitat quality, population distribution throughout the species range within the planning area, and other factors affecting threatened, endangered, sensitive species and MIS.
1-3	3. Develop and implement conservation strategies for Forest Service sensitive species, as technical information becomes available.
1-3	4. Within 15 years, conserve populations of species at risk and rare communities by demonstrating positive trends in habitat availability and quality, or any other applicable factors affecting species at risk.
1-3	5. Identify rare plant and animal communities, inventory them, and develop associated management strategies to conserve them. Support the development and implementation of State and Regional Conservation Plans as they apply to the grassland or forest units.
1-3	6. Within 10 years, provide sufficient habitat for Management Indicator Species to reduce adverse impacts on populations during droughts.
1-3	7. Establish scientifically credible monitoring programs, develop survey methods, and initiate baseline and trend surveys for populations, habitats and/or ecological conditions to contribute to viability of threatened and endangered species, species at risk, and MIS.
1-14	18. In prairie dog colonies known or thought to be occupied by black-footed ferrets, limit oil and gas development to one location per 80 acres to help maintain suitable ferret habitat. **Standard**
1-15	19. To help provide suitable habitat for black-footed ferrets and their young during the breeding and whelping seasons, prohibit the following activities within prairie dog colonies, or those portions of larger colonies, occupied or thought to be occupied by black-footed ferrets from March 1 through August 31: • Construction (e.g., roads, water impoundments, oil and gas facilities), • Reclamation, • Gravel mining operations,

PAGE #	DIRECTION
	• Drilling of water wells, oil and gas drilling. **Standard**
1-15	20. To help provide suitable habitat for black-footed ferrets and their young during the breeding and whelping seasons, do not authorize the following activities within prairie dog colonies, or those portions of larger colonies, occupied or thought to be occupied by black-footed ferrets from March 1 through August 31: • Construction (e.g., pipelines, utilities, fencing), • Seismic exploration, • Permitted recreation events involving large groups of people. **Guideline**
1-15	21. Any net loss of suitable black-footed ferret habitat as a result of development of new facilities within colonies shall be replaced within the year. This is based on the amount of suitable habitat available prior to prairie dog dispersal in the year of the development. **Standard**
1-15	22. For routine maintenance, access to oil and gas facilities in prairie dog colonies occupied or thought to be occupied by black-footed ferrets should be limited to daylight hours. This does not apply to emergency repairs. **Guideline**
1-15	23. Prescribe burn selected large flats (a section or more in size) to evaluate the effectiveness of burns in attracting and inventorying mountain plover. Prescribed burns should be timed to provide large blackened areas in the spring. **Standard**
1-15	25. To help maintain suitable nesting habitat for mountain plover, prohibit development of new facilities within 0.25 miles of known mountain plover nests or nesting areas. This does not apply to pipelines, fences and underground utilities. **Standard**
1-15	26. To help maintain occupied nesting and brooding habitat on black-tailed prairie dog colonies, new oil and gas development will be limited to one well per 80 acres within occupied habitat. Cumulatively, structure and facility development will not occur on more than 2 percent of the occupied mountain plover nesting habitat in each prairie dog colony. **Standard**
1-16	27. Any net loss of suitable and occupied mountain plover habitat as a result of prairie dog poisoning or development of new facilities within prairie dog colonies will be replaced within the year by concurrent expansion of suitable plover habitat or in some cases, by enhanced management and protection of occupied plover habitat elsewhere on or near the national grassland. The amount of habitat loss is based on the amount of suitable and occupied habitat available prior to prairie dog dispersal in the year of the poisoning or development. **Guideline**
1-16	28. To help reduce disturbances and risks to nesting mountain plover, prohibit the following activities in plover nesting areas or within 0.25 miles of plover nests from March 15 through July 31: • Construction (e.g., roads, water impoundments, oil and gas facilities),

PAGE #	DIRECTION
	• Reclamation, • Seismic exploration, • Gravel mining operations, • Oil and gas drilling, • Drilling of water wells, • Prescribed burning. **Standard**
1-16	29. To help reduce disturbances and risks to nesting mountain plover, do not authorize the following activities in plover nesting areas or within 0.25 miles of plover nests from March 15 through July 31: • Construction (e.g., pipelines, utilities, fencing), • Workover operations for maintenance of oil and gas wells, • Permitted recreation events involving large groups of people, • Grasshopper spraying, • Prairie dog shooting (in consultation with state wildlife agencies and U.S. Fish and Wildlife Service). **Guideline**
1-16	30. To help reduce risks to mountain plover, access to oil and gas facilities in occupied mountain plover habitat for routine maintenance should be limited to once per 24 hour period and occur between 9 am and 5 pm. Duration of maintenance activities should not extend beyond 1 hour when possible. This does not apply to travel for emergency repairs. **Guideline**
1-16	31. To help reduce risks to mountain plovers from traffic, limit vehicle speeds in occupied mountain plover habitat to 25 mph on resource roads and 35 mph on local roads. **Standard**
1-16	32. Vegetation management projects in suitable mountain plover habitat will be designed to maintain or improve mountain plover habitat. **Standard**
1-16	33. To avoid attracting avian predators, new structures and facilities in occupied mountain plover habitat will be designed with low profiles and/or perch-inhibitors. This does not apply to structures and facilities less than 4 feet in height or those not expected to be used as hunting perches by raptors. **Guideline**
1-17	34. Use the following criteria at the project level to help determine where to use prescribed burning and high livestock grazing intensities (Appendix I) to provide low grassland structure and enhanced mountain plover nesting and brooding habitat: • Proximity to existing mountain plover nesting areas,

PAGE #	DIRECTION
	• Proximity to prairie dog colonies, • Presence of expansive and flat grassland areas. **Guideline**
1-19	61. Do not spray grasshoppers within 0.25 mile of known burrowing owl nests. **Standard**
1-19	62. To optimize habitat for burrowing owls, manage for active prairie dog colonies that are larger than 80 acres. **Guideline**
1-19	63. Coordinate and consult with the appropriate wildlife management agencies and local landowners to prohibit prairie dog shooting in areas where significant risks have been identified for other wildlife species or where shooting is preventing or slowing a desired prairie dog population expansion. Restrictions shall be year-long or seasonal, and dates of seasonal restrictions shall vary depending on the species at risk. **Standard**
1-20	64. Prohibit activities that would alter water flow regimes and flood prairie dog burrows. **Standard**
1-20	65. Evaluate prairie dog management 3 years after management plan approval. Evaluate prairie dog management again when the total acres of active prairie dog colonies expand to 35,000 acres (approximately 7%) of suitable habitat on the Thunder Basin National Grassland. **Standard**
	65b. Adopt and implement a black-tailed prairie dog management strategy. This strategy is made a part of this plan (Appendix N). **Standard**
1-20	66. To reduce risks and habitat loss for prairie dogs and other wildlife species closely associated with prairie dog colonies, align new roads outside prairie dog colonies. If it's necessary to place a new road in a prairie dog colony, minimize the amount of road within the colony to the extent that soil, drainage, topographical and other physical factors will allow. **Guideline**
1-23 (as modified in the Record of Decision)	1. Limit the use of rodenticides (grain baits) for reducing prairie dog populations to the following situations: • Public health and safety risks occur in the immediate area. **Standard** • Damage to private and public facilities, such as cemeteries and residences. **Standard** • On site-specific colonies where unwanted colonization onto adjacent non-federal lands is occurring and other tools are impractical, ineffective or have been proven to be unsuccessful. **Guideline** • Colonies outside Categories 1, 2, 3, and 4 (as identified in strategy) if the Forest Service determines they are not needed for habitat for prairie dogs, black-footed ferrets or other associated species. **Guideline**
1-23	2. In Consultation with the Wyoming Game and Fish Department, determine the appropriate response to complaints of unwanted colonization on adjoining private and state lands. A spectrum of management tools will be considered based on site-specific

PAGE #	DIRECTION
	evaluations. **Guideline**
1-23	3. Reduce conflicts with adjacent landowners over prairie dog management through an active landownership adjustment program. **Guideline.**
1-23	44. From January 1 through September 30, don't use rodenticides (above-ground baits) to reduce prairie dog populations. This is necessary to reduce risks to migratory birds. To reduce risk to other wildlife, don't use burrow fumigants in prairie dog colonies. **Standard**
1-27	3. Consider the following when opportunities to acquire lands occur (Reference 36 CFR 254): • Lands with important or unique resources, such as water frontage, wetlands, flood plains and associated riparian ecosystems, cave resources, essential big-game winter range, threatened or endangered species habitat and habitats needed for recovery, Forest Service sensitive species habitat, important paleontological or geologic sites, important historical, heritage resources or traditional cultural properties, outstanding scenic values, or critical ecosystems when these resources are threatened by change of use, or when management may be enhanced by public ownership. • Lands that include prairie dog colonies or that present opportunities to allow expansion of colonies that already exist on nearby National Forest System lands are a high priority. • Important botanical, wildlife and fishery management areas. This includes lands supporting rare plant communities. Lands with important value for outdoor recreation purposes. **Guideline.**
2-5 Broken Hills GA, 2-12 Cellars Rosecrans GA	1. Maintain an increasing trend of black-tailed prairie dog populations across the geographic area over the next 10 to 15 years. **Objective**
2-5 Broken Hills GA, 2-12 Cellars Rosecrans GA	2. Maintain and expand the current distribution of black-tailed prairie dogs across the geographic area over the next 10 to15 years. **Objective**
2-5 Broken Hills GA, 2-12 Cellars Rosecrans GA	3. Improve the Management Area of prairie dog colonies (10 or more colonies with distances between nearest colonies not exceeding 6 miles) in the central part of the Broken Hills GA and the Southwestern part of the Cellars Rosecrans GA over the next 10 to 15 years. This area has been designated as MA 3.63. **Objective**
2-5 Broken Hills GA, 2-12 Cellars	4. To help increase prairie dog populations and habitat for associated species, allow and encourage expansion of the prairie dog colony Management Area (10 or more colonies with a total colony acreage of at least 1,000 acres and intercolony distances of less

PAGE #	DIRECTION
Rosecrans GA	than 6 miles) in the central portion of this GA over the next 10 to 15 years. Colonies protected by conservation agreements or easements on adjoining land jurisdictions, including private, may be considered part of a MA. **Objective**
2-7 Broken Hills GA, 2-14 Cellars Rosecrans GA	1. Emphasize an active landownership adjustment program adjacent to the Management Area, throughout the geographic area in an attempt to reduce private land conflicts over prairie dog management and to enhance long-term management opportunities for expanding prairie dog populations in this area. Landownership adjustments may need to be completed in some locations before implementation of some actions to accelerate prairie dog population growth. **Guideline**
2-7 Broken Hills GA	2. A range of 23,616 to 31,488 acres of low structure grasslands is prescribed for this geographic area. Much of this acreage should be located in the northeast portion of the geographic area in areas adjoining existing colonies and where prairie dog colonies are known to have occurred in the recent past. This will accelerate expansion of existing colonies and re-establishment of past colonies that are not along private land boundaries. **Guideline**
2-14 Cellars Rosecrans GA	2. A range of 36,324 to 42,378 acres of low structure grasslands is prescribed for this geographic area. Much of this acreage should be located in the northeast portion of the geographic area in areas adjoining existing colonies and where prairie dog colonies are known to have occurred in the recent past. This will accelerate expansion of existing colonies and re-establishment of past colonies that are not along private land boundaries. **Guideline**
3-9 (SIA MA)	***2.1b - Cheyenne River Zoological SIA***: This 5,980-acre site provides for approximately 3,000 acres of prairie dog Management Area, including occupied mountain plover habitat and potential black-footed ferret habitat. Management emphasis is on protecting and enhancing habitat conditions. **Additional Direction:** • Coordinate and consult with the appropriate state wildlife agency to prohibit prairie dog shooting and fur harvest within the SIA. **Standard** • Restrict motorized travel to locations and time periods when it would not reduce the optimum habitat effectiveness of the area. **Standard** • Allow oil and gas leasing; however, prohibit ground-disturbing oil and gas activities if they may have adverse effects on black-footed ferret reintroduction objectives. **Standard**. • Prohibit locatable mineral operating plans that would reduce effectiveness of the habitats emphasized. **Standard** • Prohibit new special-use facilities except for valid existing rights. **Guideline** • Manage livestock grazing and stocking rates to achieve the most rapid development of mature cottonwood willow riparian area while promoting best habitat conditions for mountain plover breeding, nesting, and brood rearing. **Standard**

PAGE #	DIRECTION
3-16 (3.63 BFF MA)	**General** 1. Authorize only those uses and activities in the reintroduction area that do not reduce habitat below the level needed to support a long-term sustainable black-footed ferret population. Until habitat is available to support a long-term sustainable black-footed ferret population, do not authorize uses and activities that would prevent annual increases in the prairie dog population. **Standard** 2. Manage all prairie dog colonies within this Management Area as though they were occupied by black-footed ferrets, and apply all Standards and Guidelines as though black-footed ferrets occupy all colonies. **Standard**
3-16 (3.63 BFF MA)	**Mineral and Energy Resources** 1. Oil and gas stipulations for black-footed ferrets (Appendix D) apply to all prairie dog colonies within this management area. **Standard**
3-16 (3.63 BFF MA)	**Livestock Grazing** 1. Prior to the U.S. Fish and Wildlife Service authorizing a black-footed ferret release, the Forest Service will coordinate and consult with the U.S. Fish and Wildlife Service, the state wildlife agency and other agencies that conduct, authorize or fund predator control to help ensure that predator control activities on the national grassland to reduce livestock losses do not pose significant risks to black-footed ferrets. **Standard**
3-16 (3.63 BFF MA)	**Fish and Wildlife** 1. Use of rodenticides in a colony to reduce prairie dog populations may occur only after consultation and concurrence of the U.S. Fish and Wildlife Service. The conditions when prairie dog poisoning may be authorized are presented in Chapter 3. **Standard** 2. Relocation of prairie dogs to establish new colonies and accelerate growth of prairie dog populations in selected areas may occur only after consultation with appropriate state and Federal wildlife agencies. **Standard**
3-16 (3.63 BFF MA)	**Recreation** 1. To help expand and maintain suitable black-footed ferret habitat, coordinate and consult with the state wildlife agency to prohibit prairie dog shooting within black-footed ferret reintroduction habitat. **Standard**
LRMP ROD (p. 40)	*If a statewide conservation plan is approved for Wyoming and allows for poisoning along private land buffers for some colonies or complexes, a future plan amendment may be needed to incorporate this direction.*

Appendix C: Current Potential Habitat Modeling for Black-tailed Prairie Dogs on the TBNG

When updating the Strategy, the Forest Service identified the location of 'current potential habitat' for NFS surface land ownership on the TBNG using a newly developed prairie dog model[5]. The model and its results are described in Appendix C. Current potential habitat for prairie dogs was determined using current ground conditions. The single exception was the removal of leased coal mine areas that have not yet been mined, since any potential habitat in these areas will be removed as the mines progress across the lease area. While we may be able to determine 'suitable habitat' in the future, existing data lends itself to the identification of 'potential habitat' only (see explanation of 'suitable' v. 'potential' habitat in Table 1).

Potential habitat was modeled in GIS using inputs from soils, terrain, water, energy, transportation, vegetation, and prairie dog colony locations. The model was field verified by Forest Service personnel by referencing 1:24,000 scale hard-copy maps of the modeled habitat potential while driving through the grassland and visually assessing the area for potential habitat based on professional knowledge and experience. Due to time and monetary restrictions, the field verification corrections were broad (or coarse) in scale in that not all small pockets of potential habitat were delineated; only NFS surface lands were field verified. Corrections from the field verification were combined with the original modeled layer and original inputs were then compared to the field verification to see if any of the original inputs were consistently poor indicators for potential. A final potential habitat layer was produced from the combination of the field verification data and the modeled data (see Figure 1).

Table 2 lists the original modeled inputs to the potential habitat layer. After review, all original inputs were considered acceptable, with field verification values overriding the original modeled value where differences existed. The vast majority of the difference between the original input model parameters and the field verification centered on shrub cover. The available existing vegetation database failed to adequately delineate areas of high or low shrub cover (primarily sagebrush) in a fashion that was useful for this analysis. The analysis chose to originally remove very few shrub-covered lands and instead relied on the field verification to correct for this issue.

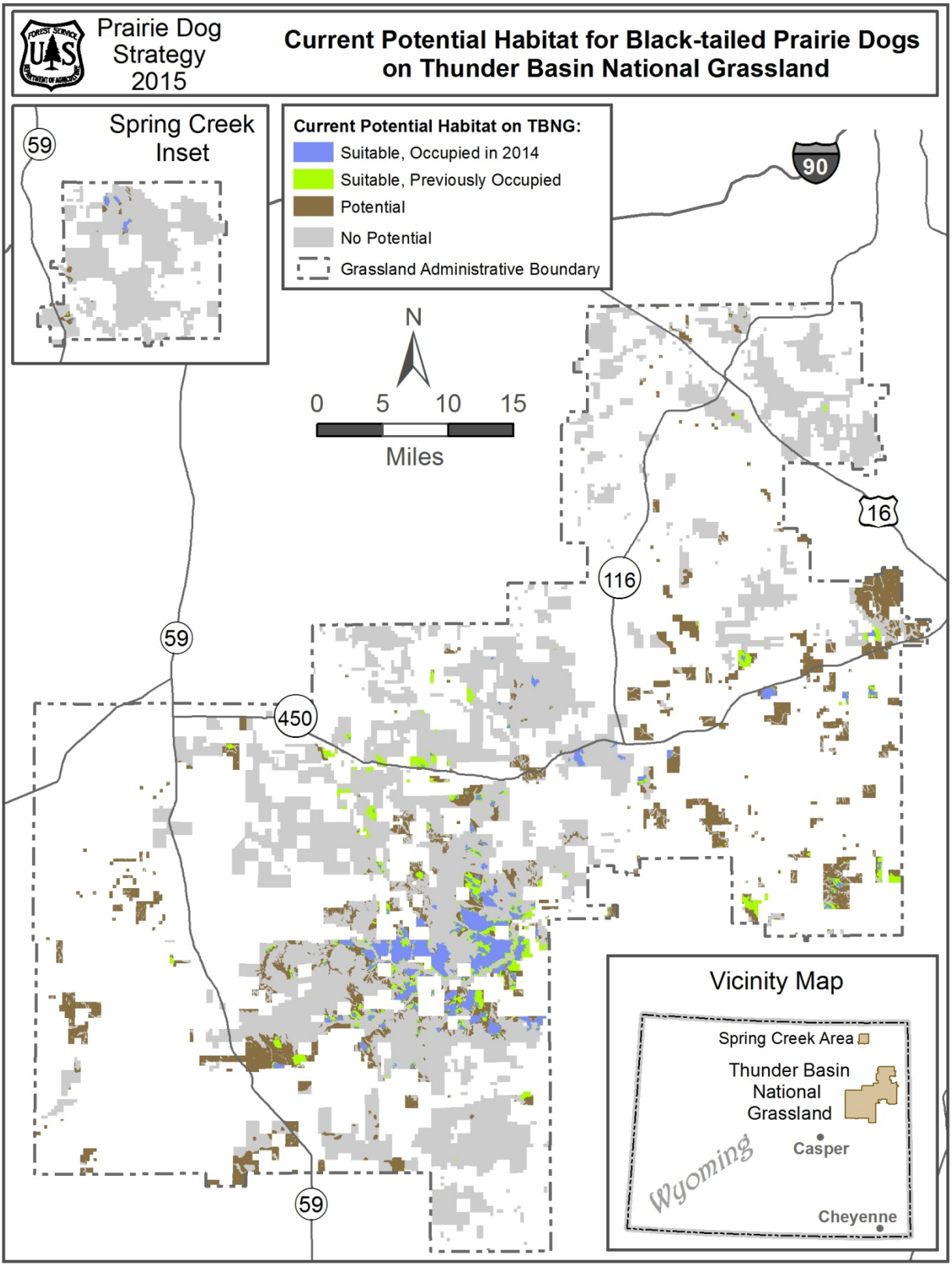
After the process was complete, the total number of NFS surface land ownership acres with potential prairie dog habitat was equal to 128,283 (this is 23% of all the NFS lands on the grassland). Approximately 1/3 of this area has been occupied by prairie dogs at some point since 1972 (based on FS colony data).

[5] While older information was available, it was deemed insufficient due to incomplete coverage of NFS lands, missing information, lack of field verification, and/or due to its broad geographic nature.

TABLE 1: CURRENT POTENTIAL PRAIRIE DOG HABITAT MODEL PARAMETERS

Resource Area	Parameters - Specific Resource Condition
Vegetation	No Potential: Shrub cover greater than or equal to 25 percent (all shrubs except greasewood). With a more finely delineated shrub layer, this percent would have been set considerably lower. Instead, this process relied predominantly on field verification for shrub cover.
Vegetation	No Potential: Shrub cover for greasewood only, cover greater than or equal to 30 percent.
Vegetation	No Potential: Tree cover greater than or equal to 5 percent.
Transportation	No Potential: 20 foot buffer around highways.
Transportation	No Potential: 50 foot buffer around railroads.
Energy	No Potential: Active and Reclaimed Mine Areas. Reclaimed mine areas continue to change as mines expand, contract and move, and do not currently appear to provide habitat that can sustain prairie dogs.
Energy	No Potential: Coal mine areas under lease in 2014. These areas overlap in part with item above. Leased but not yet mined areas have no potential in near-term future as mine progresses across area.
Water	No Potential: National Hydrography Dataset (NHD) Water bodies.
Water	No Potential: National Wetland Inventory (NWI) wetlands.
Soils	No Potential: All polygons identified as water.
Soils	No Potential: Soil pH strongly or very strongly acidic.
Soils	No Potential: Badlands, classified as 'steep'.
Soils	No Potential: Badlands, classified as 'less steep'.
Soils	No Potential: Gullied lands.
Soils	No Potential: Pits of various kinds including gravel, bentonite, dumps, mine spoil.
Resource Area	**Parameters - Specific Resource Condition**
Soils	No Potential: Rock outcrop
Soils	No Potential: River bottoms – saline, sodic, fluvents.
Soils	No Potential: Polygons coded as 'wooded'.
Terrain	No Potential: Slope degree over 10
Prairie Dog Occupation	Potential: All lands remaining after the 'No Potential' inputs were removed and field verification corrections were input. Potential lands are classified into 3 categories: 1. **Potential:** The model and field verification indicate the area has potential however the Forest Service prairie dog colony data does not indicate the area has been, or is, occupied by prairie dogs. 2. **Suitable, Currently Occupied:** The model and field verification indicate the area has potential, and the area is occupied by active prairie dog colonies in 2014. 3. **Suitable, Previously Occupied:** The model and field verification indicate the area has potential, and while not occupied in 2014, the area has been occupied by prairie dog colonies historically, based on Forest Service colony data.

FIGURE 1: CURRENT POTENTIAL HABITAT ON THE THUNDER BASIN NATIONAL GRASSLAND



Habitat Suitability Modeling v. Habitat Potential Modeling

Habitat suitability models use empirical relationships between a species' distribution and environmental variables (e.g., climate, topography, and soils) to predict potential suitable habitats across a landscape or region. Species habitat is affected by a range of environmental variables at varying scales. At regional to continental scales, suitability is most influenced by climate while, at landscape scales, climate suitability is modified by land use, land cover, and topography. Suitability is further modified at local scales by soil conditions, micro-topography, and vegetation. Unfortunately, continuous spatial measurements of these environmental variables can be difficult to acquire.

The potential habitat modeling completed for the TBNG was based on very limited and broad variables. This information provides a beginning point to look at where potential habitat is located and/or expected to occur. But a next step would be to look at habitat suitability by looking at finer scale variables. Some variables that could be considered in suitability modeling would be similar to the ones listed in Table 2.

TABLE 2: VARIABLES TO CONSIDER IN SUITABILITY MODELING

Research	Variables
Proctor et al 1998	Preferred vegetation types would include low cover, salt flats, mixed barren, desert shrub; preferred slope would be 0 – 4 percent. Suitability would be categorized (*categories not related to any Forest Service categories*) as Category 5 – preferred vegetation with 0-4% slope; Category 4 – preferred vegetation with 4-25% slope; Category 3 – secondary vegetation with 0-4% slope and clay/loam soil; Category 2 – secondary vegetation with 0-4% slope and other soils. Habitat variables needed for this analysis include vegetation types with sufficient information and detail to classify as preferred or secondary vegetation, slope, and soil texture and depth.
Clippinger 1989	Variables included vegetation type (grass vs shrub), percent cover (minimum of 25%), vegetation height (less than 13 cm), reproductive success/social structure of prairie dogs, density of prairie dogs, slope (less than 10%).
Augustine et. al. 2013	Variables included soil, water, ecological site descriptions, colony presence, colony expansion pattern, buffer distance to other colonies, colony status (stable, shifting/declining, expanding), plant communities, and topography.

Conclusion

Given the limited time and information/variables that went into the modeling process used in this analysis, the resulting current potential habitat data needs to be treated with caution, as it is general in its scope. Potential prairie dog habitat is not necessarily suitable habitat. This model should not be used to determine parameters such as "maximum extent" or "maximum viable populations" of prairie dogs since it is not adequate to predict them.