Boulder County Parks and Open Space

Prairie Dog Habitat Element
of the
Grassland and Shrubland Management Policy

October 16, 2012

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Boulder County Parks and Open Space

Prairie Dog Habitat Element

October 2012

The purpose of the Prairie Dog Habitat Element of the Grassland and Shurbland Management Policy is to provide guidance to staff on the policies and practices that should guide managing prairie dogs and their habitat and to set goals for the staff with respect to management.

Public comments on this draft management plan were accepted from May 17 – June 17, 2012. A public meeting was held at the Boulder County Fairgrounds on May 17 5:30 – 7:30 p.m. to kick off the public comment period, all public comments were analyzed and any necessary revisions to the draft plan were made. The draft plan was presented to the Parks & Open Space Advisory Committee on July 26, 2012, beginning at 6:30 p.m., and the final plan was presented to the Board of County Commissioners at a Public Hearing on August 28, 2012 at 4 p.m. Revisions followed and were presented to the Commissioners at 10:30 a.m. on October 16, 2012.

For questions about this document or to provide comments, write Jesse Rounds, Resource Planner, Boulder County Parks & Open Space, 5201 St. Vrain Road, Longmont, CO 80503; call 303-678-6271; or e-mail: jrounds@bouldercouny.org.

Parks & Open Space Department • Boulder County

ADOPTED:

Cindy Domenico

Chair, Board of County Commissioners

10/16/12

Date

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Boulder County Grassland Management Plan
Prairie Dog Habitat Element

Executive Summary

Boulder County Parks and Open Space (BCPOS) owns many acres in the plains region of Boulder County. This area, once dominated by mixed-grass prairie, is now home to most of the urban development, the majority of the agricultural land, and the remaining native and restored grasslands in the county.

This ecosystem is home to many familiar wildlife species along the Front Range of Colorado. One of those species is the black-tailed prairie dog (*Cynomys ludovicianus*), a vitally important native species. The black-tailed prairie dog has become controversial because over 95% of their habitat has been lost to development, including agriculture, and their life cycle needs are not compatible with many current human land uses. With the loss of prairie dog habitat, there is also a decline in many important associated species, like burrowing owls, ferruginous hawks, and black footed ferrets. Boulder County aims to maintain healthy and vital prairie dog populations and habitat on County owned land to preserve diverse grassland ecosystems.

The prairie dog plays a vital role in the grassland ecosystem, however, its incompatibility with agricultural uses and human development result in it being considered a pest by some residents. These divergent opinions make management necessary so that conflict can be reduced but prairie dog populations can be maintained.

With the approval of multiple sales taxes, the support of the community and the County Commissioners, BCPOS has become a significant landowner in the eastern part of the county. This ownership has given BCPOS the responsibility to properly manage grasslands and the wide variety of plants and animals that call grasslands home, including the prairie dog. From the beginning of this management, BCPOS has attempted to manage grasslands and prairie dogs in a comprehensive manner.

Purpose of the Prairie Dog Habitat Element

Boulder County Open Space lands are multiple use lands. Policies and management decisions of these lands are guided by the Boulder County Comprehensive Plan (Boulder County, 1999), which contains goals relating to preserving open space and wildlife habitat, protecting wildlife species, and promoting the county's agricultural heritage. Boulder County Parks and Open Space seeks to develop a prairie dog management strategy that results in prairie dogs thriving where appropriate on our properties.

The Prairie Dog Habitat Element attempts to strike a balance between the sometimes conflicting goals contained in the County Comprehensive Plan. In particular, this plan strives to achieve wildlife habitat protection goals while also preserving agriculture and maintaining good neighbor relations. The Prairie Dog Habitat Element reflects the values and vision of a broad cross-section of county residents, describes the main strategies for achieving the vision, and serves as a decision making guide for property-specific management plans.

The first draft of the Prairie Dog Habitat Element benefited greatly from the work of the Prairie Dog Task Force (PDTF). This fourteen member committee was convened in 1999, and consisted of representatives from neighboring land owners, agricultural lessees, Agriculture Extension Service, Soil Conservation Board, County Health Department, Sierra Club, Boulder County Audubon Society, Wild Places, and biological and range land specialists. The PDTF helped county staff develop a set of criteria to designate county owned open space into prairie dog management categories based on habitat and land use characteristics.

The Prairie Dog Habitat Element divides areas within the county open space system into three categories. The first contains the most suitable prairie dog habitat, called Habitat Conservation Areas (HCA), the second category is Multiple Objective Area (MOA) which can support prairie dogs along with other activities such as trails, grazing, etc. The third are areas that are not appropriate habitat by virtue of their land uses, known as No-Prairie Dog areas (NPD). This plan lays out the parameters and guidelines for maintaining appropriate habitat and guidelines for removing prairie dogs from NPDs using lethal and non-lethal means. The Element also provides guidelines for relocating prairie dogs to maximize the chance of a successful relocation. The Prairie Dog Habitat Element is used to provide guidance to staff for day-to-day activities and can be used by the residents of the county to understand management activities over the long term.

Parks and Open Space owns more than 324 properties totaling 25,507 acres on the plains. This presents an excellent opportunity for staff to help preserve grasslands, prairie dogs and many important wildlife species associated with grasslands on the Front Range. However, management of this large number of properties can be a challenge. On these plains properties there are 205 miles of perimeter therefore we must also consider impacts to neighbors.

This plan will be an element of the broader, and currently being developed, Grassland and Shurbland Management Policy. Ecosystem management is an evolving science, and for that reason, the Prairie Dog Habitat Element calls for regular monitoring and the ability to make adjustments in management strategies over time.

Reading the Prairie Dog Habitat Element

> *The goal of Boulder County is to preserve, protect, and enhance viable prairie dog populations on suitable grassland habitat.*

The first several sections of the Prairie Dog Element focus on the goals and policies, promulgated by the County Commissioners, which direct BCPOS staff to manage prairie dogs. This section reviews the Boulder County Comprehensive Plan, guidance and regulation from state and federal agencies, and direction from other related policies such as the Boulder County Cropland Policy. The integral role of prairie dogs in the grassland ecosystem makes it imperative that we manage them in accordance with these sources.

Section 5 of the Prairie Dog Element describes the life history of prairie dogs in the mixed-grass prairie habitat common in Boulder County. This section includes well-supported information about prairie dogs' natural history such as the habitat in which they thrive and their role in that habitat.

Sections 6 through 8 define the three designations for property owned by BCPOS with respect to prairie dogs. The majority of land within the county open space system is defined as unsuitable habitat. Unsuitable habitat for prairie dogs includes all areas of land higher than 7,000 feet, and areas below 7,000 feet that do not have appropriate soils, slope or vegetation for prairie dogs. Suitable habitat is further designated as Habitat Conservation Area, Multiple Objective Area, or No Prairie Dog Area.

Habitat Conservation Areas (HCAs) are defined in Section 6. These areas are of sufficient size and have the right habitat for prairie dogs. Most HCAs can be found in areas of large contiguous grassland habitat where prairie dogs can thrive and the habitat can sustain populations of prairie dogs over the long term.

Section 7 describes Multiple Objective Areas (MOAs) and the types of management that might occur in such areas. Multiple Objective Areas are generally properties where the habitat is not large enough for prairie dogs to thrive without regular management. Multiple Objective Areas have different management goals that coexist side-by-side and thus prairie dog habitation must be balanced with other management.

No Prairie Dog Areas (NPDs) are where BCPOS's land management direction does not allow prairie dogs. The vast majority of these areas are agricultural land that at one time might have been grassland, but is now dryland or irrigated cropland. In those areas, producing crops and supporting the agricultural community are the primary objective of the property. To that end, BCPOS is committed to removing prairie dogs and discouraging colonization through multiple strategies.

Section 9 discusses the specifics of the management strategies employed on all of these properties. This section defines the strategies for managing colonies in different situations, the criteria for relocating prairie dogs, and explains the process for balancing vegetation management and prairie dog colonies.

The final section, section 10, covers the process of updating the different sections of this plan in the future. Updating the plan allows the staff to adjust management to reflect the latest science and management for prairie dogs. The section also describes the parts of the plan that will be updated sooner to reflect on-going research efforts.

Significant Updates to the Element

The Prairie Dog element has been updated every three years since it was first drafted and approved by the Commissioners in 1999. Updates generally focused on confirming prairie dog colony locations, updating state and federal regulations, updating management designations for new properties, and approving BCPOS contribution of prairie dog donations to predator recovery programs. The 2012 update does not change the County's focus on preserving habitat for prairie dogs and their associated species, primarily on our HCAs, nor our management practices on these properties. Large HCAs were designated in the 1999 plan and remain as HCAs in this plan. The County has purchased additional properties adjacent to these HCAs where possible. This update focuses on altering text to better represent the science that underpins the proposed

management and the actual practices BCPOS employees use to manage prairie dogs. For example, in an attempt to represent the reality of our management methods, the reference to using relocation as a first option has been removed from this update. While the County remains committed to using relocation as a management technique, it is outlined as a single tool among several towards accomplishing management goals.

Edits in 2012 also focus on bringing prairie dog management in line with the Cropland Policy. In particular, the Prairie Dog Element now defines parameters that allow prairie dog management on No Prairie Dog Areas by BCPOS agricultural tenants on land they are leasing. Control by tenants will only occur after tenants meet requirements specified by staff and only during specific times of year.

The 2012 Prairie Dog Element introduces specific criteria for prairie dog relocation. While much of the criteria have existed in the past, the new criteria include minimum numbers of prairie dogs to be relocated and receiving-site vegetation requirements. These more specific criteria are intended to increase the chance of positive outcomes for relocation.

Also with respect to relocation, this draft of the Prairie Dog Element emphasizes the cooperation amongst staff required to support prairie dog habitat on Parks and Open Space property. On Habitat Conservation Areas in particular, the staff plans to work to maintain prairie dog populations and prairie dog habitat. In situations where prairie dog populations within suitable habitat on an individual HCA fall below 5% coverage , the staff will seek out relocation opportunities to rebuild the population. The plan provides one caveat in which population management can continue even in these situations if an area in the HCA is extremely impacted by prairie dogs and must be restored.

Finally, the Element proposes that the Board of County Commissioners review this plan in conjunction with the Grassland and Shrubland Policy, on a longer timeframe than the previous three year update requirement.

The Prairie Dog Habitat Element has been in use for the past 13 years and has been updated by the Board of County Commissioners periodically since its adoption. BCPOS staff regularly monitors prairie dogs and their habitat, and has modified practices based on new information and direction from the County Commissioners. This current revision is based on that experience, input from the public and the most recent research on prairie dog and grassland management.

1 Introduction

The black-tailed prairie dog *(Cynomys ludovicianus*) is native to Boulder County. They are diurnal, burrowing rodents that live in prairies of western North America. This species is colonial, with a complex social and communication structure. They do not hibernate, and are primarily herbivorous (Hoogland, 1995). Ecologically, this species is a keystone of the prairie ecosystem, whose presence is vital to the survival of many other wildlife species.

For the past century, however, they have become a symbol of the differences in lifestyle values. Many people who make their living on the land consider prairie dogs as pests, while others are proponents of the larger-scale ecological importance of this species. This paradox is reflected in the current laws. In Colorado, the prairie dog has some limited protections via the Colorado Department of Parks and Wildlife (CPW), such as limited hunting during pup-rearing. Alternately, they are classified as an agricultural pest by the Colorado Department of Agriculture (CDA). Concern for this species has prompted federal review of the population status over the past decade. Also, the Colorado Wildlife Action Plan (CWAP) recognizes the black-tailed prairie dog as a species of concern (CPW 2006). However, this designation does not result in any elevated protection for the species.

The black-tailed prairie dog was nominated for threatened status under the Endangered Species Act (ESA) in the summer of 1998. In 2000, the USFWS ruled that the black-tailed prairie dog was warranted but precluded from listing as an endangered species. Under this ruling, the USFWS directed the State of Colorado and all states within the historic range of this species to annually monitor populations to determine if future changes in this status need to be made. Subsequently, in 2003, the CPW developed a Conservation Plan for Grassland Species which gives guidelines for the local conservation of the species. The USFWS removed this species from consideration for listing in 2004. On December 2, 2008, the USFWS initiated a public process to reconsider this species for federal protection. However, USFWS determined that the species does not warrant protection under the ESA due to a steady increase in occupied habitat, although at a small fraction of its historical range, and that significant suitable habitat remains for the species. This decision was made in December, 2009.

As of 2012, prairie dog colonies are located on 1,692 acres on 62 properties owned by Boulder County Parks and Open Space (BCPOS). There are 199 agricultural properties within the Parks and Open Space system that are managed to be free of prairie dogs. All other communities within Boulder County have adopted prairie dog management strategies with varying degrees of success in efforts to reduce conflicts between prairie dog colonies and other uses. Boulder County Parks and Open Space strives to balance various and sometimes conflicting goals by prescribing management strategies.

In Boulder County, prairie dogs receive a great deal of attention due to ongoing land use and development that destroys prairie dog colonies in communities in the eastern and central portions of the county. Private lands are continuing to be developed in the region, resulting in loss of prairie dog habitat and existing colonies.

Boulder County's first prairie dog management plan, written in 1987, was specific to the few plains properties the County owned at that time. Since then, as a result of passage of the County open space sales and use taxes from 1993 to 2010, the County has acquired thousands of acres of

land in the plains of Boulder County. Some of this property remains in a fairly natural grassland condition, but the majority of it is under agricultural use. Prairie dogs are found on many of these properties. This gives us the responsibility to look at prairie dogs on a broader scale and in a more comprehensive manner on open space properties.

In 1998, BCPOS initiated a comprehensive Prairie Dog Management Plan. In the spring of 1998, a citizen advisory committee was convened. Called the Prairie Dog Task Force, the fourteen member committee consisted of representatives of a variety of groups with varying interests and expertise, ranging from neighboring landowners, agricultural lessees, the agriculture extension service, Soil Conservation Board, County Health Department, conservation and environmental groups, prairie dog advocates, biologists and rangeland ecologists. Their task was to assist Parks and Open Space staff to develop a set of criteria to designate County owned open space into three categories for prairie dog management: Habitat Conservation Areas (HCAs), Multiple-Objective Areas (MOAs), and No-Prairie Dog Areas (NPDs). This management plan sets forth the rationale for these designations and establishes policies for their management. See Appendix A for an outline of designation criteria.

This plan is a single element of a broader grassland ecosystem conservation program. To that end, BCPOS is in the process of developing a Grassland and Shrubland Policy. The Policy will consider all elements in grassland conservation, and will emphasize the protection of native biodiversity.

The development of over-arching grassland ecosystem management strategies can be challenging due to the numerous and conflicting uses of the land, including agriculture, urbanization and recreation. However, as land managers have found, natural system integrity cannot be maintained by the single species approach to management. Management will be guided by integrating principles of conservation biology, such as protection of large contiguous blocks of habitat, with Boulder County Comprehensive Plan goals.

2 Goals & Policies from the Boulder County Comprehensive Plan & Related Resource Policies

The Boulder County Comprehensive Plan was first adopted in 1978 and has been reviewed and updated many times since. The County Goal Statements are the cornerstone of the Comprehensive Plan since they form the framework for public and private decision-making. The Policies are more detailed statements that determine particular courses of action in order to move toward the attainment of particular goals. Whereas the goal statements indicate *where we are going* with our comprehensive planning approach, the policy statements determine *how we get there*. The following selected goals and policies are most pertinent to the conservation of grassland and prairie dog habitat, as well as the County's commitment to work with other landowners on issues of mutual interest and concern.

2.1 Goals

B.1 Unique or distinctive natural features and ecosystems and cultural features and sites should be conserved and preserved in recognition of the irreplaceable character of such resources and their importance to the quality of life in Boulder County. Natural resources

should be managed in a manner that is consistent with sound conservation practices and ecological principles.

B.3 Critical wildlife habitats should be conserved and preserved in order to avoid the depletion of wildlife and to perpetuate and encourage a diversity of species in the County.

B.4 Significant natural communities (including significant riparian communities) and rare plant sites should be conserved and preserved to retain living examples of natural ecosystems, furnish a baseline of ecological processes and function, and enhance and maintain the biodiversity of the region.

B.7 Productive agricultural land is a limited resource of both environmental and economic value and should be conserved and preserved.

M.1 Agricultural enterprises and activities are an important sector of the Boulder County economy and the County shall foster and promote a diverse and sustainable agricultural economy as an integral part of its activities to conserve and preserve agricultural lands in the County.

2.2 Policies

Environmental Resources Element Policies

ER 2.07 The County shall identify and work to assure the preservation of critical wildlife habitats, Natural Areas, natural landmarks, environmental conservation areas and significant agricultural land.

Environmental Resources Element Policies

ER 4.04 Boulder County, under the auspices of the Parks and Open Space Department, shall establish a critical wildlife habitat management program, in direct cooperation with landowners. The program shall deal with, but not be limited to, the following situations:

- ER 4.04.01 The use of buffer zones to further insulate critical wildlife habitats from detrimental human uses in instances of potential land use encroachments;
- ER 4.04.02 The retention of existing non-detrimental land uses and vegetative cover occurring within or adjacent to critical wildlife habitats; and
- ER 4.04.03 Mitigation where detrimental land uses currently exist adjacent to critical wildlife habitats.

Environmental Conservation Areas (ECA) Policies

ER 9.04 The County will encourage and participate with the various public and private owners in the development of coordinated management plans to conserve, protect or restore the values of ECA's.

ER 9.05 Management of ECA's shall encourage use or mimicry of natural processes, maintenance or reintroduction of native species, restoration of degraded plant communities, elimination of undesirable exotic species, minimizing human impacts, and development of long-term ecological monitoring programs.

Agricultural Policies

AG1.01 It is the policy of Boulder County to promote and support the preservation of agricultural lands and activities within the unincorporated areas of the County,

and to make that position known to all citizens currently living in or intending to move into this area.

AG1.02 The County shall foster and encourage varied activities and strategies that encourage a diverse and sustainable agricultural economy and utilization of agricultural resources.

AG1.03 It is the policy of Boulder County to encourage the preservation and utilization of those lands identified in the Agricultural Element as Agricultural Lands of National, Statewide, or Local Importance and other agricultural lands for agricultural or rural uses. The Boulder County Comprehensive Plan Agricultural Element Map shall include such lands located outside of the boundaries of any municipality or the Niwot Community Service Area.

AG1.07 The County shall continue to actively participate in state, federal, and local programs directed toward the identification and preservation of agricultural land.

AG1.08 The County shall encourage the development of resource management plans for significant native grassland ecosystems.

Open Space Policies

OS 2.01 County shall identify and work to assure the preservation of Environmental Conservation Areas, critical wildlife habitats and corridors, Natural Areas, Natural Landmarks, significant areas identified in the Boulder Valley Natural Ecosystems Map, historic and archaeological sites, and significant agricultural land.

OS 2.03 The County shall provide management plans and the means for the implementation of said plans for all open space areas that have been acquired by or dedicated to the County.

- OS 2.03.01 The foremost management objectives of individual open space lands shall follow directly from the purposes for which the land was acquired.
- OS 2.03.02 Management of County open space lands shall consider the regional context of ecosystems and adjacent land uses.
- OS 2.03.03 Management of individual open space lands, including those under agricultural leases, shall follow good stewardship practices and other techniques that protect and preserve natural and cultural resources.

OS 2.04 The County, through its Parks and Open Space Department, shall provide appropriate educational services for the public which increase public awareness of the County's irreplaceable and renewable resources and the management techniques appropriate for their protection, preservation, and conservation.

OS 2.05 The County, through its Weed Management Program, shall discourage the introduction of exotic or undesirable plants and shall work to eradicate existing infestations through the use of Integrated Weed Management throughout the County on private and public lands.

Public Decision Making Policies

OS 8.03 In developing management plans for open space areas, Parks and Open Space staff shall solicit public participation of interested individuals, community organizations, adjacent landowners and the Parks and Open Space Advisory

Committee. Plans shall be reviewed by the Parks and Open Space Advisory Committee, including public comment, and recommended for adoption after public hearing by the Board of County Commissioners.

Boulder County Parks and Open Space Resource Policies
As part of BCPOS's commitment to managing resources on a broad ecosystem level, Parks and Open Space is working to develop a number of resource-based policies to aid in management. These resource policies are designed to connect the vision of the Comprehensive Plan with the shorter term management and decision-making found in management plans and work plans.

In January 2012, the Boulder County Commissioners approved the BCPOS Cropland Policy. The Cropland Policy included a section on wildlife management with respect to Cropland and the following policies that directly impact prairie dogs:

9.6 All cropland shall be defined as a No Prairie Dog Area as outlined in section 6.3 of the Prairie Dog Element of the Grassland Management Policy.

9.7 Priority shall be given to discouraging prairie dogs from occupying cropland. Prairie dogs will be managed in accordance with Section 8.2 and 8.3 of the Prairie Dog Element of the Grassland Management Plan.

9.8 After training and with approval from Parks and Open Space, lease-holders may perform management of prairie dogs on their leased cropland through a system developed by BCPOS by July 1, 2012.

In 2014, Boulder County Parks and Open Space will begin the process of developing and drafting a proposed Wildlife Management Policy that, like the other resource policies, will address a system wide vision for managing wildlife in a manner that reflects the goals of the Comprehensive Plan.

3 Goals, Assumptions and Objectives for the Conservation of Prairie Dog Habitat

Boulder County Parks and Open Space developed the goals and objectives for the original plan and this update after reviewing the directives of the Prairie Dog Task Force and previous planning efforts. As the City of Boulder had already done extensive work on this issue, we referred to their Black-Tailed Prairie Dog Habitat Conservation Plan (City of Boulder, 1996) and their 2010 Grassland Management Plan for many of the assumptions, objectives and criteria.

3.1 Goal Statement

The goal of Boulder County is to preserve, protect, and enhance viable prairie dog populations on suitable grassland habitat.

3.2 Assumptions

- Black-tailed prairie dogs are an important part of the native fauna of certain grasslands of the

Colorado piedmont.

- Human-induced changes to the landscape since pioneer settlement have resulted in conditions under which natural processes no longer characterize the ecological function of these grasslands in general or prairie dog populations in particular.
- While these human induced changes are integral to the management of natural resources, it is important to recognize and appreciate the intrinsic value of the natural resources themselves, including prairie dogs.
- Species that use the same habitat and depend on black-tailed prairie dogs to some degree will decline as the prairie dog habitat declines.
- Agriculture remains an important economic and lifestyle force in Boulder County.
- The presence of prairie dogs can cause problems for crop production and other agricultural operations.
- The citizens of Boulder County have indicated strong support for preservation of wildlife habitat as well as preservation of agriculture in Boulder County.
- While acknowledging the importance of prairie dogs in the grassland ecosystem, Boulder County does not anticipate being able to retain all prairie dog colonies where they occur or to provide a place for all displaced prairie dogs in Boulder County.

3.3 Objectives

- To establish Habitat Conservation Areas to allow prairie dog colonies and their associated species to function naturally, sustainably and compatibly with other native grassland flora and fauna, with minimal human intervention, without causing or experiencing negative impacts to or from adjacent land uses.
- To identify areas where prairie dogs can coexist with other management uses.
- To identify areas where prairie dogs cannot live sustainably with other county open space land uses, and make wise management decisions concerning their removal.
- To continuously research the efficiency and expediency of all control methods to minimize undue stress on prairie dogs in all control situations.
- To take reasonable measures to reduce conflicts with neighboring land uses. To coordinate prairie dog management with other agencies, including the City of Boulder and other Boulder County municipalities, the Colorado Division of Parks and Wildlife, the U.S. Fish and Wildlife Service, and other interested entities or individuals.
- To continue public education efforts to expand the understanding and appreciation of the prairie dog's role in the prairie ecosystem and in the altered habitat and landscape of Boulder County.
- To identify and manage additional Habitat Conservation Areas with the objective of maintaining 5,000 or more acres of suitable Habitat Conservation Area habitat including acreage in Rock Creek Grasslands, additional acreage in the Rabbit Mountain/Dowe Flats area, and other appropriate areas. Areas converted to native grassland must qualify as suitable for prairie dog habitation.

4 Legal Requirements of Land Management Pertaining to Prairie Dogs

The success of this management plan will depend upon coordination and cooperation with other managing agencies and understanding their regulatory requirements. At the time of review, this

section will be adjusted to represent any changes in the legal requirements of managing prairie dogs or habitat for prairie dogs.

Since the original plan was adopted, there has been one considerable change in law that affects BCPOS prairie dog management: the passage of Senate Bill 111 into state law in 2000. This statute severely limits the inter-county transport of prairie dogs within Colorado. In effect, it prohibits the relocation of any prairie dogs from Boulder County sites to any other county without approval from the receiving county.

The legal conditions described in this management plan pertain only to Boulder County Parks and Open Space properties. Private properties may be subject to different regulations.

4.1 Boulder County

4.1 Boulder County Public Health

Boulder County Public Health (BCPH) will continue to work closely with City and County Open Space personnel to detect the presence of plague. If plague is suspected, BCPH will attempt to obtain flea pools or carcasses from the colony to test for plague. If plague is suspected or confirmed in an area, the public will be notified via press releases or postings/warnings at the infected site. See sections 5.8 and 7.6 for more information about prairie dogs and plague.

4.2 State of Colorado Agencies

4.2.1 Colorado Division of Parks and Wildlife (CPW)

BCPOS will continue to work closely with the CPW on strategies for habitat management and local population management. Any activities that involve handling wildlife will be coordinated with CPW, including trapping and/or relocation of prairie dogs. BCPOS will maintain current and valid permits from CPW for prairie dog management activity requiring permitting.

CPW prairie dog trapping and transport permit revisions were made in 2008. A permit is no longer required for trapping prairie dogs for contribution to a raptor rehabilitation facility if they are euthanized on the site where trapped. Instead, a report of each delivery must be made to CPW within 5 days of receipt by the receiving entity. Permits are still required for trapping and transporting live prairie dogs. This includes trapping where prairie dogs are taken to the black-footed ferret recovery program and for any relocation efforts.

4.2.2 Colorado Department of Agriculture

BCPOS will recognize and adhere to any regulations set forth by the Colorado Department of Agriculture regarding prairie dog control. BCPOS will maintain all necessary valid applicator licenses for BCPOS staff for prairie dog control with any state and/or federally controlled and registered compound. Tenants will be required to prove their licensure if utilizing restricted use pesticides.

4.3 Federal Agencies

4.3.1 United States Fish & Wildlife Service (USFWS)

BCPOS will coordinate, when necessary, with the USFWS on the use of restricted use pesticides with regard to non-target threatened and endangered species. BCPOS will maintain current and valid permits required by the USFWS.

The black-tailed prairie dog was nominated for threatened status under the Endangered Species Act (ESA) in the summer of 1998. In 2000, the USFWS ruled that the black-tailed prairie dog was warranted but precluded from listing as an endangered species (Federal Register 65:24, 4 February 2000). Under this ruling, the USFWS directed the State of Colorado and all states within the historic range of this species to annually monitor populations to determine if future changes in this status need to be made. Subsequently, in 2003, the CPW developed a Conservation Plan for Grassland Species which gives guidelines for local conservation of the species. The USFWS removed this species from consideration for listing in 2004. On December 2, 2008, the USFWS initiated a public process to reconsider this species for federal protection. However, USFWS determined that the species does not warrant protection under the ESA due to a steady increase in occupied habitat, although at a small fraction of its historical range, and that significant suitable habitat remains for the species (Federal Register 74:231, 3 December 2009).

4.3.2 United States Department of Agriculture

BCPOS will recognize and adhere to any regulations set forth by the U.S. Department of Agriculture in relationship to the management of prairie dogs. This will include, but not be limited to, pest management, soil loss and shared cost programs such as the Conservation Reserve Program.

4.3.3 United States Department of Transportation

BCPOS will recognize and adhere to any regulations set forth by the U.S. Department of Transportation in relationship to the transport of any licensed and controlled chemicals, such as aluminum phosphide. All federally registered controlled rodenticides are hazardous materials and have transport regulations that may require placarding and manifest information, including origin, destination and quantities transported.

5 The Prairie Dog's Role in Grassland Ecosystem

5.1 Historical Context

At the beginning of the last century, prairie dog colonies covered at least 100 million acres of native short and mixed grass prairies in western North America (Fig. 1). By 1960, prairie dog colonies had been reduced to approximately 1,500,000 acres or approximately 1.5% of their formerly occupied area (Marsh 1984). A significant part of that reduction in population was initially due to the direct control of prairie dogs for the advancement of the livestock industry and the loss of habitat from conversion of grassland to farmland. Recreational shooting has

contributed to the decline in population, while continued habitat loss through development has also contributed to the decline of the prairie dog habitat. The spread of sylvatic plague, a disease that is not native to North America, severely impacts this species, further reducing the numbers of prairie dogs.

Of the four prairie dog species known in the United States, only one species, the black-tailed prairie dog, is native to Boulder County (Fig. 1). Prior to European settlement, the majority of the Boulder Valley east of the lower montane life zone was suitable for the black-tailed prairie dog except for wetlands, tallgrass prairies, mesa escarpments, and riparian areas. Human changes to the landscape, including flood irrigation and annual cropping practices, altered or destroyed much of the suitable habitat for prairie dogs (OSMP 2010).

Prairie dog occupation in appropriate habitat is highly variable. Earlier research suggests that inhabited prairie dog towns historically occupied approximately 20% of suitable habitat throughout its range and distribution at a given time. More recent investigations into historic occupancy put the level of occupancy at between 2-15% at any given time (Hoogland 2006). Estimates of prairie dog occupancy vary widely in the literature from as low as 2% to as high as 29%. Boulder County Parks and Open Space has been collecting prairie dog occupancy data on individual properties since 1996. Occupancy rates of suitable habitat within our HCA system of land has varied from between 9.6-47.3%. Occupancy rates of our MOAs have varied from 10-28%. Occupancy rates on NPDs has varied from .5 to 4.3%.

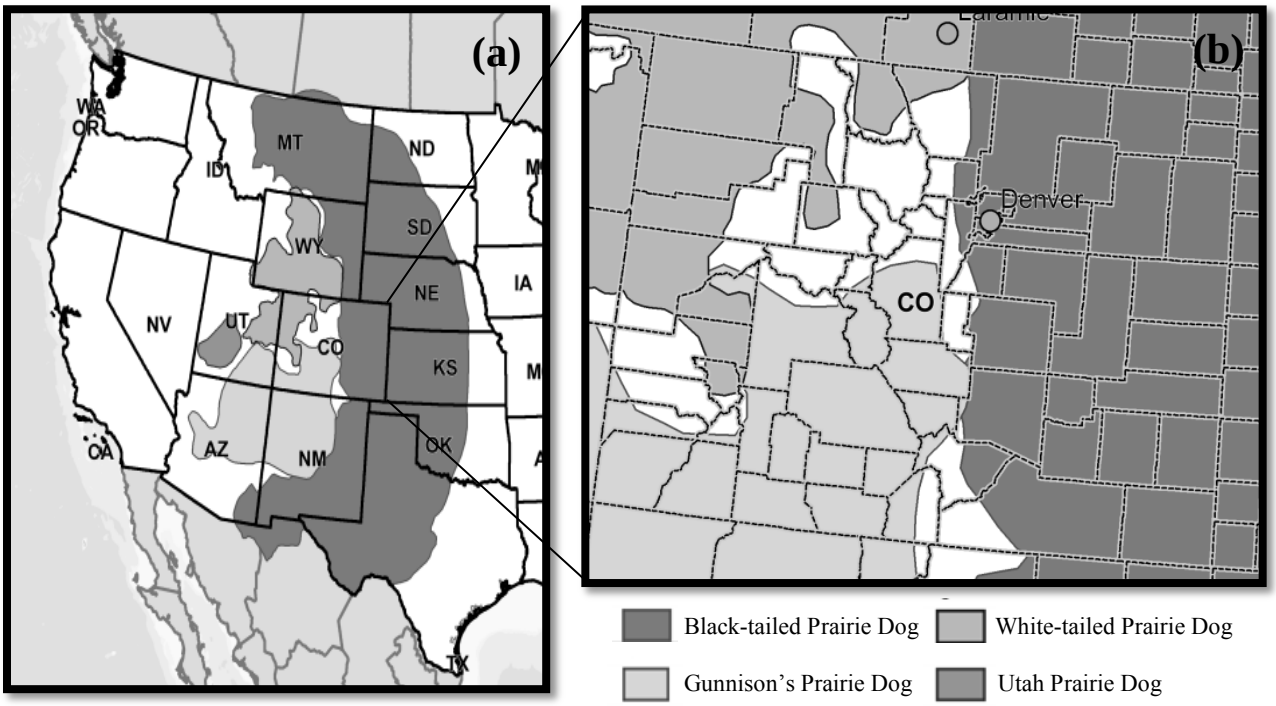


Figure 1. Historical range of prairie dog species throughout the American West (a) and in Colorado (b). Maps courtesy of Wild Earth Guardians.

5.2 Prairie Dogs: Ecological Effects

Prairie dogs are a critical species within the prairie ecosystem. They have far-reaching ecological effects within the landscape, providing food, shelter and a unique habitat for numerous other prairie species. Under optimal natural conditions, over 200 vertebrate species may use prairie dog colonies as habitat during some time in their life cycle (Clark et al. 1989; Sharps and Uresk 1990; Miller, Ceballos and Reading 1994). The prairie dog community can also support greater numbers of small mammals and arthropods, more terrestrial predators, and greater avian species diversity than surrounding areas (Hansen and Gold 1977; Agnew et al. 1986). The reduced number, size, and distribution of prairie dog colonies increase the risk of similar decline for all native species associated with that community. The near extinction of the highly specialized black-footed ferret (*Mustela nigripes*) is a striking example of the consequences of habitat fragmentation and intensive control activities.

The presence of prairie dog colonies in a grassland region adds to the diversity of species within it and it is the juxtaposition of these colonies with uncolonized habitat that leads to the overall species richness in the grassland prairie.

Prairie dog presence, burrowing and feeding shapes prairie ecosystems in the following ways:

- Providing breeding and nesting sites for a variety of species, including burrowing owls, rattlesnakes and lagomorphs (Koford 1958; Tyler 1968; Butts and Lewis 1982; Clark et al. 1987; Sharps and Uresk 1990);
- Increasing the palatability and nutritional value of some vegetation species by clipping foliage, (Coppock et al 1983; Whicker and Detling 1988);
- Influencing the composition and density of vegetation species (Uresk and Bjugstad 1983; Whicker and Detling 1988);
- Providing critical feeding and cover habitat for a variety of species including locally rare or declining birds such as mountain plover and McCown's longspur (Clark et al. 1982; Knowles et al. 1982; Olson 1985) as well as high densities of small prey mammals such as deer- and northern grasshopper mice (Agnew et al. 1986; Shipley and Reading 2006);
- Providing a prey base for predators such as ferruginous hawk and golden eagle (Sharps and Uresk 1990);
- Increasing soil development, organic content, and fertility and modifying soil structure and composition by burrowing, excreting and natural mortality (Koford 1958; O'Meilia et al. 1982; Agnew et al. 1986; Holland and Detling 1990; Ceballos, Pacheco and List 1999; Bangert and Slobodchikoff 2000).

Increased density and boundedness of colonies can reverse the positive impacts to associated soil, plants, and, animals in the grassland as well as the benefits to grazing livestock. This may lead to increased erosion, expansion of weed species, and the degradation of the grassland habitat in general.

While the importance of prairie dogs in grassland ecosystems is recognized, their presence poses problems for other land uses such as urbanization and agriculture. Prairie dogs are incompatible with most agricultural operations. Urbanization increases boundedness, reduces migratory

corridors, and causes landowner incompatibility. Today's fragmented habitat conditions are not ideal for good prairie dog ecological function (Lomolino and Smith 2003).

5.3 Ecological Requirements for Prairie Dog Habitat

Location of suitable habitat is the first step in designing a plan for the management of prairie dogs and the conservation of grasslands. Several aspects of habitat affect the population size, migration, and viability of prairie dogs: water areas, disturbances, livestock grazing, river bottoms, fires, drought, soil characteristics, slope, water table, drainage pattern, soil and bedrock depth, previous use by prairie dogs, physical barriers, temperature and elevation (Uresk et al. 1981). Short and mixed-grass prairies are considered suitable habitat in Boulder County, whereas coniferous forests, shrublands, tallgrass prairies, wetlands, and wooded riparian communities are considered unsuitable habitat. Size, soil type, and location of these grasslands, however, will factor in their ability to locally function as viable prairie dog habitat.

Habitat needs differ by species of prairie dog. Black-tailed prairie dogs prefer shortgrass and mid-grass, flat slope, sparse brush, and a history of disturbance. An unobstructed horizontal view is vital for their defense: it allows them to view approaching predators and return safely to their burrows. Optimal vegetation height for prairie dog habitat is between two to eight inches, and a minimum herbaceous cover of 25% is required (Clippinger 1989).

The conservation of any species must be centered on the habitat or ecosystem of which it is a part. Management and alteration of the habitat can affect prairie dog populations both positively and negatively. Many tools may be utilized for habitat management including but not limited to; grazing, fire, weed treatment and mowing. Methodologies for ecosystem management evolve and improve over time. By continuously researching developing methods, decisions on prairie dog ecosystem management will be made with the best information available.

5.4 Grassland Vegetation

The vegetation component of habitat appropriate for prairie dogs consists of native shortgrass and mid-grass prairie plant communities. Areas of tallgrass plant communities, forested land, wetland and riparian areas are not appropriate habitat for prairie dogs. Grasslands dominated by introduced grass species may or may not be appropriate depending on the characteristics of the plant community.

Prairie dogs are almost exclusively herbivorous and select graminoids[1] over forbs[2] except for an occasional meal of insects such as cutworms, ground beetles, and short-horned grasshoppers (Kelso 1939; Koford 1958; Summers and Linder 1978). Feeding preferences of black-tailed prairie dogs vary as availability, palatability and nutritional status of plants change with the season. The diversity of the prairie dog's diet will also vary depending on the location of the colony and plant variation within a colony. While prairie dogs will eat whatever is available to

[1]plant species belonging to the Gramineae plant family, which includes grasses and grass-like plants such as sedges and rushes

[2]any broad-leafed herbaceous plant not in the grass family

them, they prefer grasses over forbs when both are present. Grasses that are commonly eaten by prairie dogs are western wheatgrass *(Pascropyrum smithii)*, blue grama (*Bouteloua gracilis)*, and buffalograss *(Buchloe dactyloides)* (Fagerstone 1981). While grasses seem to be preferred, some prairie dogs will eat a high percentage of forbs, including scarlet globemallow *(Sphaeralcea coccinea)* (Summers and Linder 1978). Forbs may become more important in the fall, as green grass becomes scarce. Prairie dogs prefer actively growing plants compared to mature plants, and in the winter, will consume more underground roots.

Plant community types on a prairie dog colony are roughly indicative of the extent of herbivore disturbance and reflect the cumulative impact of grazing intensity, grazing duration, activities of other animals, soil characteristics, and weather. In short-grass prairies, the number of plant species, particularly forbs, increases because of digging and scratching activities of prairie dogs that disturb the soil (Coppock et al. 1983). While it has been established that grazing by domestic animals can change ecosystem processes such as primary production, decomposition, plant succession, and nutrient cycling (Ellison 1969; Floate 1981), documentation of similar large-scale effects by native ungulate grazers in relatively natural grasslands is less common.

However, prairie dogs can significantly alter vegetation. In Wind Cave National Park, Garrett et al. (1988) found that intensive prairie dog grazing in the middle of a prairie dog colony results in depletion of grasses; forbs subsequently invade these areas and become dominant. Because of these effects, vegetation zones in roughly concentric rings may be produced on prairie dog colonies. Whicker et al. (1988) observed that bison spend a disproportionately large amount of their time during the summer months grazing on areas such as this. Garret et al. (1982) also noted more frequent feeding in the outer edge area, a vegetation zone where graminoids initially are encouraged, than in more central areas. The observed pattern of spatial and temporal changes in plant communities in response to grazing by ungulates and prairie dogs on county open space properties may not always be similar. Many county open space properties are not large and contiguous enough to allow such long-term dynamics to occur under current land use and agricultural management practices and livestock grazing patterns will be different than those of bison.

Ecological disturbance is an integral part of grasslands. The response of an ecosystem following disturbance, and the frequency, magnitude, and intensity with which disturbance occurs, effects the biodiversity and heterogeneity of a system. In the prairie ecosystem, the disturbance provided by prairie dogs plays an important role. Literature suggests that species diversity is maximized under intermediate disturbance regimes (Collins and Barber 1985; Pickett and White 1985). The disturbance imposed by prairie dogs encompasses an entire spectrum of responses by the ecosystem, where total plant species diversity is greatest in areas that are occupied for an intermediate length of time or that have received moderate impact (Coppock et al. 1983; Archer et al. 1987). Considerable research is available on plant community response to the activities of prairie dogs in native prairie ecosystems. Little research, however, has focused on the impacts of prairie dogs in plant communities (or the ecosystem as a whole) where colonies are subjected to restrictions to expansion and other influences of urbanization. Work done by Johnson and Collinge (2004) indicated that urban prairie dog colonies can reach higher densities than are found in open environments. The ability of a given piece of land to provide habitat for prairie dogs varies from site to site and year to year based on many factors such as weather. This variability creates a significant challenge to simple management strategies.

Observations of prairie dog colonies subject to human imposed restrictions and influences indicate that long term occupation and disturbance of an area may have detrimental effects on the plant community and soil stability. Research has shown that long-term colonization of a site by black-tailed prairie dogs can reduce grass cover (Lerwick 1974; Hansen and Gold 1977; Coppock et al. 1983; Knowles 1986). Reduction of cover increases the susceptibility of the area to soil erosion and invasive weed species. Appendix H describes the ongoing monitoring of vegetation response on prairie dog colonies on BCPOS properties since 2001.

5.4.1 Invasive Weed Species

Invasive weed species are aggressive competitors for moisture, nutrients and sunlight. They grow unchecked by natural predators and diseases and some species do not succumb to later successional species, thereby disrupting the entire ecosystem in arid grasslands. Plant species diversity, composition and cover are generally negatively affected, as is quality of habitat for wildlife. The roots of native grasses provide better protection of the soil while the roots of weedy species have limited benefits. Erosion potential is increased where grasses are replaced by weedy species.

Once established, prairie dogs generally affect grassland vegetation by decreasing the amount of grass cover, increasing the amount of bare soil, and increasing the dominance by forbs. These conditions are often attractive for the establishment of weed species.

Disturbance of soil and reduction in vegetative cover in prairie dog colonies, make these sites particularly susceptible to colonization by invasive weed species. Knapweeds (*Acosta and Acroptylon spp.*), dalmation toadflax (*Linaria dalmatica*), Kochia (*Kochia scoparia)*, bindweed (*Convolvulus arvensis*), Mediterranean sage (*Salvia aethiopis*) and many others are serious threats to ecosystems and land uses countywide.

5.5 Associated Species

As mentioned above, over 200 vertebrate species may use prairie dog colonies as habitat sometime in their life cycle under optimal natural conditions (Reading 1993). The prairie dog community can support greater numbers of small mammals and arthropods, more terrestrial predators, and greater avian species diversity than surrounding areas under certain conditions. Many grassland birds, such as mountain plovers (*Charadrius montanus*), appear in greater numbers on prairie dog towns than in surrounding prairie, and some , such as the Western burrowing owl (*Athene cunicularia hypugaea*), depend on prairie dog colonies for their survival.

5.5.1 Burrowing Owls

The Western burrowing owl is an endemic grassland bird, and one of several species that use prairie dog towns as foraging habitat and breeding grounds. These owls are small ground-dwellers that typically nest in inactive prairie dog burrows. They show greater preference for inactive burrows within active prairie dog towns as compared to completely abandoned towns (Butts 1973; Hughes 1993). Fledgling success is higher, and predation is lower, on active verses inactive towns (Desmond et al. 2000; Sidle et al. 2001; McDonald et al. 2004). Within active prairie dog colonies, 12-19% of burrows are regularly inactive (CDNR 2000; Sidle et al. 2001), which presumably allows the owls access to established burrows. Burrowing owls prefer the open areas of low vegetation created on prairie dogs colonies (Hoogland 1995).

Burrowing owl fledgling success and the size of the prairie dog colony are important limiting factors in maintaining adult burrowing owl numbers (Desmond and Savidge 1996; Desmond, Savage and Eskridge 2000). Fledgling success increases with the scale (size) of the colony and colony size has a greater influence on success than the number of nests produced (Desmond, Savage and Eskridge 2000). This may be due to the owls utilizing the collective vigilance of the prairie dogs by "eavesdropping" on their alarm calls. Heterospecific eavesdropping has been shown in other species to allow for increased foraging time while decreasing danger, due to predation (Randler 2006; Magrath et al. 2007, 2009; Vitousek et al. 2007; Lea et al. 2008). Recent, local research has demonstrated that prairie dog alarm calls elicit greater responses in burrowing owls as compared to other audio stimuli (Bryan 2011).

Analysis of the Breeding Bird Survey (BBS) data has revealed that grassland birds, and endemic[3] birds specifically, have shown dramatic, consistent and widespread declines. Regional populations of burrowing owl are in decline due to habitat loss and degradation both on their breeding grounds and within their wintering habitat in Mexico and South America. This species was listed in 1998 as a threatened species in the State of Colorado**.** In the last century, the burrowing owl has gone from being common in Boulder County to its current ranking of Category 4 (Isolated or Restricted) by the Boulder County Avian Species of Special Concern List (Hallock and Jones 2010).

5.5.2 Raptors: Predator-Prey Association

The predator-prey relationship between raptors and prairie dogs is well studied and well established (Cameron 1907; Longhurst 1944; D'Ostillo 1954; Koford 1958; Bailey and Niedrach 1965; Campbell and Clark 1981; Cull 1988; Schmutz and Hungle 1989; Manci 1992; Coppolillo 1993). Prairie dogs are an important food source for raptors that either migrate through the area, or are resident and congregate around prairie dog colonies.

In Boulder County, extensive prairie dog colonies that once served as hunting grounds for wintering and nesting raptors in Boulder County have been replaced by urban development and agriculture (Jones 1987, 1989, 1993; Gietzen, Jones, and McKee 1996; BCNA 2011). This alteration of habitat and prey availability due to urban and agricultural development has led to changes in the overall composition of raptor species. These changes have been documented via annual (since 1983) long-term winter raptor surveys, conducted by Boulder County Nature Association. This survey effort has documented that some species have increased dramatically in numbers, such as red-tailed hawks (200% increase), while some have decreased precipitously, such as ferruginous hawks (93% decrease) and rough-legged hawks (90% decrease). While these surveys have documented that overall numbers of all raptors in Boulder County have shown no clear trend, this is attributable to the increase in human-adapted species (generalists) such red-tailed hawks and American kestrels and the decrease in human-intolerant species such as ferruginous hawks and rough-legged hawks.

[3]native to a particular region or location, generally referring to native species found only in certain specific locations

The overall increase in human-adapted species is attributable to human caused changes in landscape due to development and agriculture. An example of one such change is the increase in trees planted for aesthetics and growing along ditch corridors. Trees were uncommon in Boulder County historically, and they provide nesting opportunities for generalist species such as red-tailed hawks. Increases in generalist species typically leads to a decrease in more specialized species, since generalist use a variety of resources including those vital to specialized species.

Other trends documented in Boulder County include the establishment of breeding bald eagles and an increase in nesting osprey within Boulder County. In the case of bald eagles, nesting territories have been established only within the past 10 years. Again, this is likely explained by landscape changes such as the creation of ponds due to gravel pit mining. These ponds are stocked with fish for recreational opportunities and are utilized by bald eagles and osprey.

While all of the raptors mentioned above utilize prairie dogs as prey (with the exception of American kestrels), ferruginous hawks are dependent on prairie dogs in this part of their range.

5.5.2.1 Ferruginous Hawk

The Ferruginous hawk is the largest of North American hawks. It is an open-country species that inhabits flat and rolling terrain within grasslands and shrubsteppe regions. These hawks depend on only a few prey species and their choice of main prey varies by geographic location; west of the continental divide, jackrabbits (*Lepus*) or cottontail (*Sylvilagus*) rabbits; east, ground squirrels and prairie dogs (Olendorff 1993).

The reproductive success of nesting ferruginous hawks has been directly correlated to prey availability where jackrabbits are the primary prey (Woffinden and Murphy 1977). Presumably this is the same for populations east of the continental divide that are dependent mainly on prairie dogs and other ground squirrels. In winter, ferruginous hawks typically aggregate where ground squirrels, and especially prairie dogs, are numerous. Though ferruginous hawks have not been documented nesting in Boulder County, they reside here in winter, gathering around active prairie dog colonies (Boulder County Audubon Society 1979-2011; Jones 1989; Gietzen, Jones, and McKee 1996).

This species has declined precipitously across its range, and was petitioned for listing under the Endangered Species Act in 1991 (Ure et al. 1991). The USFWS rejected this petition in 1992 (USFWS 1992). It is listed as a U.S Forest Service and Bureau of Land Management Sensitive Species and a Boulder County Species of Concern. In Boulder County, wintering populations of ferruginous hawks have declined by 93% since 1983, as recorded by BCNA in wintering raptor surveys.

Olendorff (1993) attributed population declines to the effects of cultivation, grazing, poisoning and controlling small mammals (including prairie dogs), mining, and fire in nesting habitats, with cultivation (habitat loss) being the most serious. Urbanization (resulting in habitat loss) in Boulder County has decreased the value of grassland habitat for species associated with prairie dogs; ferruginous hawks avoid areas in proximity to urban or suburban development (Jones and Bock 2002). The loss of habitat due to urbanization in the past few decades, and conversion to agricultural lands over the previous 100 years, has resulted in the loss of habitat for prairie dogs, the main source of prey for ferruginous hawks in Boulder County. Additionally, ferruginous

hawks require spatial separation from human activities, since they are highly intolerant of disturbance. Thus the issue of increasing development across its range has led to detrimental impacts by removing prey populations and introducing human disturbance.

BCPOS recognizes the importance of maintaining prairie dogs populations for the benefit of ferruginous hawks. Management measures suggested to maintain populations of ferruginous hawks include enhancing nest substrates, maintaining prey populations, and mitigating development impacts from urbanization (Suter and Jones 1980; Olendorff 1993). While many of these impacts are outside the control of BCPOS, maintaining prairie dog populations and continuing to maintain or restore large, contiguous blocks of grassland habitat, is achievable on behalf of this species.

5.5.3 Black-Footed Ferret

The black-footed ferret is a member of the mustelid (weasel) family. It is the only ferret species native to the Americas (having no recognized subspecies) (USFWS 2008). Ferrets are habitat specialists and dependent solely on prairie dog colonies for survival. Over 90% of the black-footed ferret's diet is comprised of prairie dogs, and ferrets use prairie dog burrows as their sole source of shelter (Stromberg et al. 1983). Contrary to early records of natural history, the species was probably common historically, although its secretive habits (nocturnal and often underground) made it difficult to record and observe (USFWS 2008).

The black-footed ferret is now listed as endangered by the USFWS (Federal Register 32:4001, 11 March 1976). Currently, it remains listed as endangered throughout its range except at specific reintroduction locations in Arizona, Colorado, Montana, South Dakota, Utah and Wyoming where ferrets are designated as nonessential experimental populations under section l0(j) of the Endangered Species Act (USFWS 2009).

As the black-footed ferret is dependent on prairie dogs (*Cynomys spp.*) for food and on prairie dog burrows for shelter; most ferrets historically occurred in black-tailed prairie dog habitat (USFWS 2008). The black-footed ferrets' close association with prairie dogs was an important reason for its decline. From the late 1800s to approximately 1960, both prairie dog habitat and numbers were drastically reduced by the sequential and overlapping effects of habitat loss from conversion of native prairie to cropland, poisoning, and habitat modification due to disease (canine distemper and sylvatic plague). The North American ferret population declined precipitously as a result (USFWS 2008).

5.5.4 American Badger

American badgers (*Taxidea taxus*) are carnivores of open prairie lands, including the grasslands of Boulder County Open Space. The badger is a member of the mustelid (weasel) family. It is a specialized digger that feeds primarily on burrowing, ground dwelling rodents. Other than the black-footed ferret, the badger is probably the most effective natural predator of prairie dogs (Lindzey 1982). However, badgers are not totally dependent on prairie dogs as their food source, and will feed on almost any available prey (Minta and Marsh 1988).

Badgers have large home ranges and are able to disperse over long distances. An average of findings from five separate studies in the western U.S. (Wyoming, Utah, Idaho and Colorado) shows wide variability of home range sizes for badgers. Male home ranges varied from 2.4-33.0

km^2 (1.5-20.5 $miles^{2)}$ and female home ranges varied from 1.6-9.0 km^2 (1.0-5.5 $miles^2$) (Lindzey 1971; Messick 1981; Minta and Mangel 1989; Minta 1993; Goodrich and Buskirk 1998; Hoff 1998), and there is no evidence of territorial behavior. They are known to inhabit the HCA properties that encompass the contiguous grasslands of southern Boulder County and the North Foothills management area (Rabbit Mountain, Hall and Heil Valley Ranches). BCPOS will continue to record incidental sightings or sign of badgers, as well as investigate the development of surveys to determine presence/absence on BCPOS properties. Survey methods could include snow-tracking or remote cameras.

5.5.5 Other Associated Species

As further information becomes available on species partially or wholly dependent on conditions created by prairie dog presence, additional management direction will be included into this management plan. Those species, rare or abundant, will be addressed, and all efforts made to protect and perpetuate the species. Examples may include reptile and amphibian species, as diversity of herpetiles is increased within black-tailed prairie dog colonies (Shipley and Reading 2006; Shipley et al. 2008).

CPW attempted to reintroduce plains sharp-tailed grouse (*Tympanuchus phasianellus)* to the grasslands of south central Boulder County in 2003, without any confirmed success. Currently, CPW does not consider southern Boulder County and northern Jefferson County to be suitable habitat for grouse recovery due to the overall changes in the grassland ecosystem, including a lack of protective shrub vegetation and an increase in human-adapted predators such as coyotes, great-horned owls and red-tailed hawks. CPW will not investigate further release efforts here.

5.6 Population Dynamics of Prairie Dogs (Dispersal and Colony Structure)

Black-tailed prairie dogs are strictly colonial, and only rarely are individuals observed away from established colonies. A colony, or town, is composed of unrelated, territorial family units, called coteries, which do not cross the boundaries of other coteries. Coteries typically contain one adult male and several genetically related adult females (mothers, daughters, sister, etc.).Female prairie dogs usually remain with their natal coterie[4] throughout their lives, although some do disperse. Males generally spend their first year with their natal coterie and move to different coteries during their second year. Young males may disperse to other coteries may occur inter (outside of) or intra (within) colonially. This dispersal usually occurs May through June.

Another type of dispersal occurs in the fall months and is termed breeding dispersal. It occurs after the dominant adult males of a coterie have been on territory for more than two consecutive years, thereby ensuring the prevention of inbreeding with related females, which reach sexual maturity after two years.

Prairie dog breeding chronology varies annually, but mating in one South Dakota study typically occurred in late February to early March, annually (Hoogland 1995). Therefore, females were pregnant late February to mid-April, and were nursing from late March, into May. Nearly

[4]the coterie to which the prairie dog was born and remains

weaned juveniles emerged mid-May through early June (Hoogland 1995). This is consistent with observed behavior and juvenile emergence in Boulder County.

Prairie dogs are not prolific multiple litter breeders. Both sexes usually defer breeding until the second year, and only one litter is born per breeding female each year. Breeding occurs once per year and females are in estrus during one brief four hour period in late winter. Only about 50% of adult females rear emergent juveniles each year. The litter size is usually only three or four individuals. Males that survive their first year typically live two to three years, and females that survive their first year commonly live four to five years.

The physical area occupied by a colony of prairie dogs does not automatically increase over time. Natural mortality of prairie dogs ranges from 14-55% annually (Hoogland 2006), and therefore under normal conditions, population declines are expected to occur at some time following most colony expansions (Hoogland 1995). This is a general ecological pattern found in most small mammal species. However, local habitat conditions and constraints do not always allow this typical pattern to occur in many local colonies. Human control is the dominant cause of adult and juvenile prairie dog mortality (Armstrong et al. 2011). Infanticide is the major non-human cause of juvenile mortality in black-tailed prairie dogs, which can affect ~39% of all litters (Hoogland 2006). However, plague, which occurs episodically every few years, can be the greatest source of mortality, in excess of 95% (Johnson et al. 2011; See Section 5.8).

Prairie dogs populations will differ within colonies according to natural and man-made conditions, and disturbance factors. It is important to note that direct counts of burrow densities are weakly correlated with prairie dog density, and that 12-19% of colony burrows are generally found to be inactive (CDNR 2000; Sidle et al. 2001).

5.7 Connectivity: Distance between Habitat Areas

Connections between habitat areas are critical from a biological perspective. Connectivity provides opportunities for re-establishment of populations in the event of a population decline and allows continuous exchange of genetic information between prairie dog colonies. In Boulder County, prairie dog habitat areas are separated by urban development, roads, active agricultural land, water bodies and other obstructions that impede the dispersal of prairie dogs.

In non-urbanized habitat, prairie dogs commonly disperse 2-3 kilometers (1-2 miles), and sometimes as far as 6 kilometers (4 miles) (Hoogland, 2006). Travel between colonies apparently is mostly along seasonally dry drainages (Roach et al. 2001). During dispersal, prairie dogs are vulnerable to predation and other sources of mortality (Hoogland 1995). In Boulder County, prairie dogs have been observed crossing busy highways, swimming across creeks and irrigation ditches, and crossing plowed farmland. However, dispersal across fragmented habitat as it exists in Boulder County may subject these prairie dogs to higher levels of mortality from vehicles or predators than might be found in contiguous prairie. Some prairie dogs will obviously succeed and reestablish in other colonies, but it would be prudent to assume that this would be far fewer than in unaltered habitat.

Dispersal patterns of prairie dogs in Boulder County have been altered due to urban developments, roads and other obstructions. Under these circumstances, it would be ideal to

keep the distance between habitat areas to a maximum of 3 kilometers (1.8 miles), based on known dispersal distances of prairie dogs in non-urbanized habitat. This is a conservative estimate in response to the greater deterrent to dispersal that these constraints impose over open, non-urbanized habitat. The anticipated outcome will be that more of the dispersing prairie dogs will successfully reach another existing colony at an appropriate location. There is little scientific literature citing known dispersal distances in urbanized habitat such as Boulder County. Research has shown that this metric for dispersal and migration seems to hold for local prairie dog colonies along the Front Range as well as in more remote locations (Roach et al. 2001).

5.8 Prairie Dogs and Plague

Prairie dogs (all five species; Utah, Gunnison's, white-tailed, Mexican and black-tailed) are highly susceptible to plague where the disease is prevalent and often epizootic (large-scale disease outbreaks among animals as opposed to humans). Mortality of black-tailed prairie dogs from plague in affected colonies is extremely high, often greater than 95% (Hoogland 2006). This can occur in a relatively short time from the initial inoculation of the colony, generally in only two to three days.

Sylvatic plague (*Yersinia pestis*) is an exotic pathogen that is aggressively virulent in black-tailed prairie dogs (*Cynomys ludovicianus*) and results in extensive colony losses (Johnson et al. 2011). Small rodents are purported to be the most likely disease reservoirs (or hosts) of *Yersinia pestis* and may serve as sources of infection to prairie dogs or animal hosts by direct or flea-mediated transmission (Brinkeroff et al. 2008; Brinkerhoff et al.2010). *Oropsylla hirsuta* is the primary flea of the black-tailed prairie dog and may be a transmitter of the plague bacterium (Brinkeroff et al. 2011). Domestic dog, coyote, and fox are less likely to host, or transmit plague than small rodents. However, canine species (dogs, etc.) are able to transmit fleas, and do not succumb to plague. Cats (all species) are able to host, but succumb to plague quickly. It is important to note that the total number and kind of species involved in supporting plague overall, remains unclear (Markeson 2005).

Currently, science does not have a clear understanding of the epidemiology of plague in prairie dog colonies, and the best research can only purport that small rodents, prairie dogs themselves, and/or fleas, may be involved as reservoirs or vectors. Prairie dog movement does not appear to drive the spread of plague through the landscape (Snall et al. 2008), and flea dispersal among prairie dog colonies may not be dependent entirely on dispersal of prairie dogs (Brinkeroff et al. 2011). Prairie dog colonies do increase the number and diversity of fleas found on small mammals within colonies, suggesting that prairie dogs may facilitate the maintenance of plague by increasing flea occurrence on potential plague reservoir species (Brinkerhoff et al. 2008), although no correlation of flea abundance with plague has been found.

The influence of Colorado climate on plague occurrence in prairie dog colonies was examined using long term data (Collinge et al. 2005). This study was based on a model predicting that climate was highly influential on plague prevalence in the American southwest (Enscore et al. 2002). Analyses revealed that plague occurrences in prairie dogs were not associated with climatic variables (i.e. precipitation and temperature) in the Colorado study area. Although correspondence was found in a Montana study, it was suggested that the Colorado climate does not exert sufficiently strong climatic signals to elicit a plague response (Collinge et al. 2005).

However, other characteristics of the physical environment appear to modify plague dynamics. For instance, in Boulder County, plague occurrence increased with proximity to plague-positive colonies, and decreased with roads, streams and lake cover (Collinge et al. 2005). It was suggested that water bodies may affect the movement of or habitat quality for plague hosts or for fleas that serve as vectors for the pathogen. Interestingly, these same correlations were found in both urban and rural colonies, indicating plague dynamics may be similar in both kinds of environments (Collinge et al. 2005). Recent research has found that landscape context, such as roads and proximity to plague-positive colonies, are more important to local plague occurrence than are characteristics of rodent or flea species assemblages (Brinkerhoff et al. 2010).

Related to landscape context and plague occurrence is the concept of prairie dog dispersal between different colonies. Dispersal is an instinctive behavior of prairie dogs, with greater numbers of yearling males dispersing than females (Garrett and Franklin 1988; Hoogland 1995). Dispersal commonly occurs within low-lying drainages which connect urbanized colonies up to 1 mile away and also rural colonies up to 3 miles away (Garrett, Hoogland and Franklin 1982; Knowles 1985; Antolin et al. 2006). Dispersal is thought to discourage inbreeding and increase gene flow; however, it may also have the effect of increasing plague transmission between colonies (Antolin et al. 2006). As was shown, the closer healthy colonies are to plague-positive colonies, the greater the risk of plague transmission (Collinge et al. 2005). It has been suggested that more isolated colonies (i.e. urban colonies), with fewer dispersal corridors or connections to other colonies, may serve as plague refugia (Johnson et al. 2011). While dispersal and gene flow are perceived as natural processes, these isolated colonies should be considered for conservation to serve as sources of new colonists for colonies that may be eliminated completely by plague. These would be important for reestablishing populations in HCAs or other closely connected colony sites that may be heavily impacted from a plague outbreak.

Pets transporting infected fleas are the most common method for human exposure to plague. Humans are not likely to become infected directly from prairie dogs unless they spend significant time in prairie dog towns and are bitten by an infected flea during the short time that the disease is active in a particular prairie dog colony. The species of fleas that are most host-specific to prairie dogs have been shown to have a low propensity to move to human hosts and therefore do not pose a highly significant risk of exposure to most people from a brief encounter with a prairie dog colony (Hoogland 2006).

BCPOS recognizes that recent research has shown evidence of the ability of black-tailed prairie dogs (and Gunnison's prairie dogs) to develop genetic immunity to sylvatic plague (Rocke 2008; Rocke et al. 2012). As prairie dogs routinely disperse and immigrate, genes are continuously transferred throughout the population, which may allow for the evolution of natural plague resistance over time. Therefore, consideration will be given to the potential genetic make-up of individual prairie dogs, if any, that survive a known plague outbreak.

Boulder County has experienced intermittent plague outbreaks on prairie dog colonies. Some BCPOS properties have been impacted. These are listed below in Table 1.

Table 1 – Sylvatic Plague Impacts to Prairie Dog Colonies: 2000-2011

	Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Property													
Hall Ranch (Corona Hill)				X									
Colp						X	X						
Platt/Centennial/Wolf Run							X						
Heil Valley Ranch							X	X					
Beech								X					
Cushman								X					
Dodd								X					
Rabbit Mountain							X	X	X				
Brewbaker									X				
Dowe Flats									X				
Lagerman Reservoir									X				
Imel									X	X			
Bouzarelos/Keller/Knopf										X			
Mayhoffer										X	X		
Teleen/Superior Assoc.										X			
James Construction										X			
Hillside Estates										X			
Monarch Park										X			
South County Grasslands										X	X		

6 Designating Prairie Dog Habitat on Boulder County Parks and Open Space Land

The first Prairie Dog Habitat Element, adopted in 1999, developed a list of criteria which, when applied to Boulder County open space properties, result in designations into three management categories: Habitat Conservation Areas (HCA), Multiple-Objective areas (MOA), and No-Prairie Dog areas (NPD). The criteria encompass habitat characteristics (soils, vegetation, slope, elevation, connectivity and barriers) and land use characteristics (intent of purchase, history of use, current use, anticipated use, adjacent ownership and uses). The criteria are listed in Appendix A.

Non-Suitable Habitat (NSH)

Suitable and Non-Suitable Habitat (NSH) Within HCAs and MOAs

In 2005, by using more detailed Geographical Information System (GIS) information, BCPOS developed a model to define suitable habitat within HCAs and MOAs. This GIS modeling process was initiated in order to obtain realistic acreage accounts for HCAs and MOAs, and was further refined in 2008 and 2012. NSH is defined as wetlands, riparian and shrub/forest acreage, acreage above 7000 ft. elevation, areas in excess of 10% slope, rocky soil type, and rare plant alliances. (See Appendix E for further details). These parameters were selected using life history information for prairie dogs and local historical distribution.

NSH acreage is excluded from further calculations of habitat types and is **not considered a separate management category**. As in all modeling exercises, ground-truthing is required to validate the model. If prairie dogs are found in areas that our GIS model has identified as NSH, it does not lead to direct management. The identification of NSH using the above variables allows BCPOS to have a more accurate understanding of acreage in each management category that is

inhabitable by prairie dogs. It also informs our relocation efforts by allowing a better understanding of where, within HCAs and MOAs, suitable habitat exists.

6.1 Prairie Dog Habitat Conservation Areas (HCA)

Habitat Conservation Areas form the foundation of the prairie dog conservation strategy. HCAs will ideally allow prairie dogs to function with minimal human intervention without causing or experiencing impacts to or from adjacent land uses. HCAs will be managed so that prairie dogs may undergo natural processes of expansion and decline. These areas ideally will have appropriate soils, vegetation, slope, natural or man-made barriers and sufficiently large acreage to support prairie dog colonies and associated species over time. Prairie dogs will exist essentially undisturbed in an HCA to the extent it is ecologically or reasonably possible. Effects of prairie dog occupation will be monitored and evaluated annually. Non-lethal and lethal control may be implemented on HCAs if deemed necessary. Factors that may prompt control methods may include encroachment onto adjacent properties, or grassland restoration.

In 2012, our grasslands total 9,466 acres on our HCAs with 3,338 acres of habitable acres within (Figure 6.4.2). These acres are located within large blocks of protected open space. Habitat within these large blocks of open space have been designated HCAs since the original plan. Adjacent properties have been purchased in the last 13 years where possible, including the Dowe Flats open space.

In 2011, 12.5% of all suitable habitat within HCAs were occupied by prairie dogs. This equates to 418 acres of active colonies. In the past 15 years, occupation of suitable habitat within HCA acreage has fluctuated between 9.2% and 47.3% (371 acres to 1,508 acres).

6.2 Multiple-Objective Areas (MOA)

Multiple-objective areas will allow prairie dogs to coexist with other uses. MOAs are important in the overall prairie dog management strategy as a complement to HCAs. Some MOAs will function as important links between HCAs throughout the county to maintain a viable meta-population of prairie dogs. This is an important ecological consideration that will allow for reestablishment of colonies should they be decimated by plague. MOAs will support associated wildlife species outside of HCAs. MOAs will have a combination of management goals and require a more intensive management regime. Examples of MOAs are properties with noxious weed or soil erosion problems, or properties that contain suitable habitat but are simply too small to allow the kind of minimal management accorded to an HCA. Some of these properties may be reclassified from the MOA category to HCA or NPD categories over time as conditions change. Effects of prairie dog occupation will be monitored and evaluated annually. Reasonable measures will be taken to prevent prairie dog migration off of MOAs, unless to a neighboring HCA. Non-lethal and lethal control may be implemented as necessary to contain or restrict prairie dog population in these areas. In 2011, 15.9% of MOAs were occupied by prairie dogs, equating to 766 acres of active colonies. In the past 15 years, occupation of MOA acreage has fluctuated between 10.3% and 28%. (525 acres to 1,139 acres).

6.3 No-Prairie Dog Areas (NPD)

These areas are unsuitable for prairie dogs because of unsuitable conditions or existing incompatible land uses, such as irrigated or dryland crops. Prairie dogs will be removed from these areas in accordance with policies outlined in Section 9. Non-lethal and lethal control may

be implemented as necessary to remove prairie dog populations in these areas. In 2011, 2.2 % , or 371 acres of NPDs were occupied by prairie dogs. In the past 15 years, occupation of NPD acreage has fluctuated between .5% and 4.3% (90 acres to 690 acres).

6.4 Suitable and Non-Suitable Habitat (NSH) Within HCAs and MOAs

In 2005, by using more detailed Geographical Information System (GIS) information, BCPOS developed a model to define suitable habitat within HCAs and MOAs. This GIS modeling process was initiated in order to obtain realistic acreage accounts for HCAs and MOAs, and was further refined in 2008 and 2012. NSH is defined as wetlands, riparian and shrub/forest acreage, acreage above 7000 ft. elevation, areas in excess of 10% slope, rocky soil type, and rare plant alliances. (See Appendix E for further details.) These parameters were selected using life history information for prairie dogs and local historical distribution.

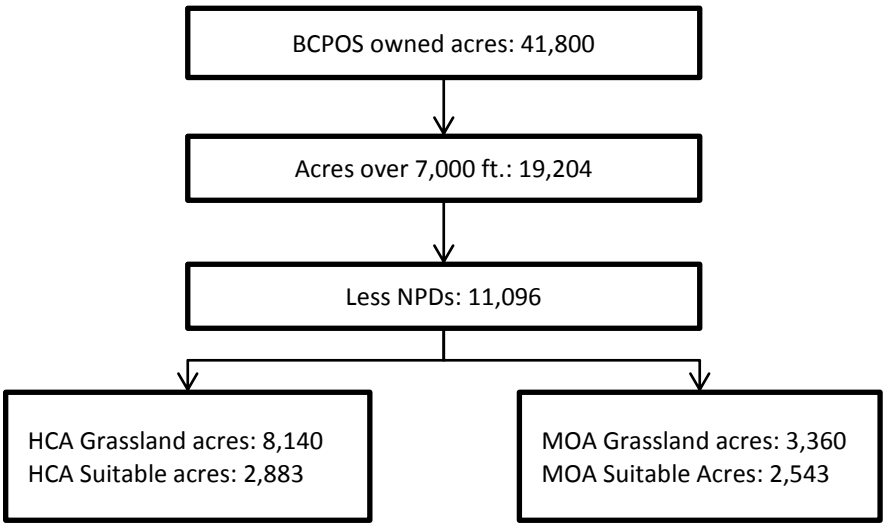
NSH acres are not considered a separate management category. As in all modeling exercises, ground-truthing is required to validate the model. If prairie dogs are found in areas that our GIS model has identified as NSH, it does not lead to direct management. The identification of NSH using the above variables allows BCPOS to have a more accurate understanding of acreage in each management category that is inhabitable by prairie dogs. It also informs our relocation efforts by understanding where, within HCAs and MOAs, suitable habitat exists.

6.5 Distribution of Open Space Land into Management Categories

Parks and Open Space staff apply the criteria developed by the Prairie Dog Task Force to designate open space properties into the three prairie dog management categories as illustrated by the first designations in 1998 (Figure 6a).

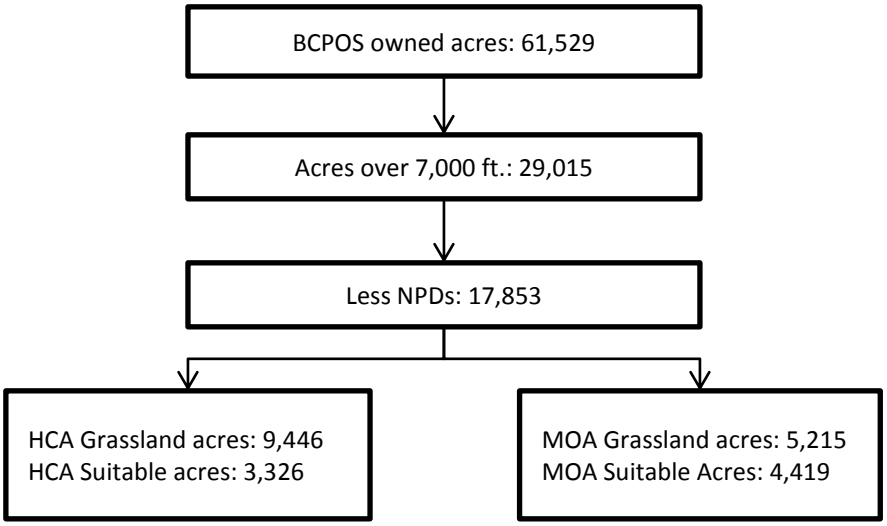
Between 1998 and 2011, BCPOS purchased approximately 9,900 additional acres of open space fee-simple on the plains. These properties sorted into management categories and most were cropland, thus categorized as NPD.

Figure 6a: 1998 Prairie Dog Habitat Acreage Estimates



In 2012 (Figure 6b), approximately 29,015 acres of are located over 7,000 feet. Nine thousand four hundred forty-six (9,446) acres of grassland are found within areas designated as HCA, of which 3,326 are suitable for prairie dog occupation. Similarly on MOAs, 5,215 acres are grassland, of which 4,419 are suitable for prairie dog occupation. NPD areas owned by BCPOS total 17,853 acres (Appendix F). This includes 113 HCA, 694 MOA and 982 NPD acres added since the last update in 2005 (Appendix D).

Figure 6b: 2011 Prairie Dog Habitat Acreage Estimates



A map of property management categorizations is included in Appendix B; all property-specific details are included in Appendix C. New property designations are tracked in Appendix D. Appendix E describes criteria for Non-Suitable Habitat.

Boulder County has purchased additional properties as HCAs in the past 13 years. Examples include the Mayhoffer Singletree in 2000, Dowe Flats in 2002 and Hall II in 2011. New HCA properties total more than 615 additional HCA acres. BCPOS has also added over 2000 acres of MOAs since 1999. This includes our projects converting unproductive agricultural land to native grassland. This effort has been underway for many years. A summary of the properties being converted is found in Appendix G. The county continues to look for and purchase grassland habitat, however, large privately owned parcels with suitable prairie dog habitat are rare in the county now.

6.6 Prairie dog population and habitat management definitions and strategies

Prairie dog management involves a variety of techniques, both lethal and non-lethal, to control the size and location of prairie dog colonies. BCPOS may use Population Management techniques, which involve the direct reduction of prairie dog numbers in a colony, or Habitat Management techniques, which involve the modification of the colony habitat to influence the size or location of the colony using prescriptive tools, fencing or similar strategies.

Population Management will commonly use live trapping as a means to remove prairie dogs for donation to a predator recovery program or for relocation to another colony site. Direct lethal control is another Population Management tool and will commonly be accomplished using a rodenticide within the burrow system. Direct lethal control may be used to remove new prairie dog activity in a NPD, actively control the relative numbers of prairie dogs in a colony, or to eliminate the colony completely.

Habitat Management will use a variety of techniques to non-lethally control individual prairie dog movement and/or colony movement and expansion. Fencing of various sizes and composition, livestock grazing rotation, controlled burns, and passive relocation and weed management are all examples of Habitat Management techniques BCPOS may attempt.

7 Management Direction for Habitat Conservation Areas and Multiple Objective Areas

This section outlines guiding principles for management of prairie dogs and prairie dog habitat within properties designated as HCAs and MOAs. Property-specific management plans are developed for each property or management unit (combinations of properties). The guidelines contained here are, or will be incorporated into those property-specific management plans.

Boulder County Parks and Open Space may manage prairie dog populations in HCAs to preserve ecosystem integrity.

7.1 Prairie Dog Occupancy

The percentage of occupied area on County open space HCAs and MOAs will vary depending on individual site characteristics. Occupancy rates on HCAs as reported from annual wildlife reports from 1996 to 2011 have ranged from 9.2% to 47.3% (BCPOS, 1997-2011). Parks and

Open Space staff anticipates occupancy in these ranges on HCAs. The percentage of occupied area may be lower or higher on MOAs, with more intensive management being implemented on these sites.

7.2 Soils

The characteristics of grassland ecosystems are determined to a great extent by the soils on which they exist. Soils are the foundation of these ecosystems, and soil conservation is fundamental to good stewardship. Loss of soil may permanently limit the capacity of an ecosystem to support biological activity. An objective of our HCA management is soil conservation.

If, within an HCA or MOA, a colony site exhibits indications that erosion could accelerate, measures will be implemented early on to attempt to preclude erosion. The approach of such measures would be primarily directed at maintaining vegetative cover of the disturbed site. These measures are discussed in Section 7.5, Prescriptive Management Tools. If these efforts are unsuccessful, management of prairie dogs may be necessary.

7.3 Prairie Habitat Restoration

Boulder County Parks and Open Space is committed to restoring native prairie habitat. This can be achieved by planting non-native pastures back to native species, by restoring degraded native habitats, or by restoring marginal croplands to native prairie. Staff has begun restoration on over 2000 acres of former agricultural land (Appendix G). BCPOS will regularly monitor these efforts and analyze the potential for creating additional grassland and will regularly report to POSAC and the BOCC to identify properties where grassland conversion will be initiated.

The overall goals for grassland restoration are to establish a permanent, diverse, native plant community that will function similarly to a native ecosystem and provide the values associated with native grassland such as wildlife habitat, soil conservation, and carbon sequestration. The first grassland restoration project began on POS in 1988. In 1996, the program expanded and now includes over 2000 acres. Appendix G summarizes past, present, and potential future projects. Many of these projects are or will be funded through the POS Capital Improvement Projects (CIP) budget. It should be noted that most large blocks of land suitable for restoration have been already been purchased by open space programs or preserved through the conservation easement program.

Land that is currently non-native grassland may be converted to native grassland species. The objective would be to replace the non-native grasses, such as crested wheatgrass (*Agropyron desertorum*) and Russian wildrye (*Psathyrostachys junceus*), with natives such as western wheatgrass (*Pascropyrum smithii*), buffalograss (*Buchloe dactyloides*), and blue grama (*Bouteloua gracilis*). In addition, native plants that are more tolerant of grazing by prairie dogs, such as three-awn (*Aristida purpurea*), fringed sage (*Artemisia frigida*), and scarlet globemallow (*Sphaeralcea coccinea*), could also be seeded.

Dryland agricultural croplands that may be deemed marginally productive could be converted back to prairie. Parks and Open Space staff will use the "Significant Agricultural Lands" map from the Boulder County Comprehensive Plan to identify areas not listed as having national, state or local agricultural significance as potential areas for conversion. Not all such properties

would necessarily be appropriate sites for prairie dog habitat, however. Some properties might be planted back to native prairie species but maintained free of prairie dogs due to erosion concerns and factors such as slope or soil type. Others that are selected for future prairie dog habitat may be planted with non-native species that have been shown to tolerate grazing pressure from prairie dogs. Agricultural fields to be restored for future prairie dog habitat would be selected according to the criteria followed in this management plan (Appendix A) and will rely on management plans should they exist for these properties.

Restoration will require many years to achieve. In a typical cropland conversion to native prairie, weed control in conjunction with cover crop plantings may take place for one to three years prior to seeding native grassland species. The timing prior to seeding of perennial native species depends on the severity of weed infestations. During this time, the soil is worked to break up compaction from previous farming activities, and amendments are added to the soil, if needed. Once native grassland species are seeded, additional weed control is necessary for several years. If precipitation is not timely, nor sufficient, seeding can fail, and the whole process may start all over again.

Once a native perennial seeding is successful, it may take ten years or longer to establish a sufficient sod and root mass to allow for prairie dog occupancy, depending on weather and other factors. Earlier occupancy by prairie dogs has resulted in failures of restoration projects from grazing grasses before they become robust enough to tolerate it. At the Aweida II property owned by the City of Boulder Open Space and Mountain Parks, a restored wheat field that showed good aboveground native grass establishment after three years collapsed to bare ground after one year of prairie dog recolonization (Buckner 2004). On the BCPOS Haselwood property, seeded native species that had two years establishment (2004-2005) disappeared after prairie dog grazing accelerated in late 2005, with the exception of tansy aster (*Machaeranthera tanacetifolia*), a forb that prairie dogs seem to avoid. A seeding experiment on the Doniphan property demonstrated that native restoration in an active prairie dog town is not possible (Murphy and Stone 2001). BCPOS staff will determine when and if restored grasslands have become established enough to allow for prairie dog occupancy based on criteria that will be adopted in the Grassland and Shrubland Policy.

7.4 Monitoring

7.4.1 Prairie Dog Inventory

Prairie dog colony size will be monitored on an annual basis. All colony locations will be mapped and measured with Global Positioning System (GPS) technology to determine area and boundary changes. Newly established colonies on existing properties and colonies on newly acquired properties will be included in annual mapping. Mapping will be conducted in early autumn, as by this time, the young-of-the-year will have emerged, and the yearling dispersal will have occurred. Analysis of prairie dog distribution patterns will allow staff to determine the amount of BCPOS property inhabited by prairie dogs and record annual changes.

Visual counts will be utilized to provide a rapid approach for determining an estimate of the number of individuals per colony, as needed. With the exception of the capture/mark/recapture technique, calculating the maximum average of timed visual count data is considered the most accurate estimate of actual prairie dog density (Severson and Plumb 1998). Visual counts will be

used to determine numbers of prairie dogs at potential capture or receiving sites for relocation (Fagerstone and Biggins 1986), or to support decisions on the selection of control methods, as needed.

7.4.2 Avian Diversity and Abundance

Many birds, such as mountain plovers, appear in greater numbers on prairie dog towns than in surrounding prairie, and some (e.g. Western burrowing owls) depend on prairie dog towns for their survival in parts of their range. Other species, such as grasshopper sparrows and lark buntings, are more abundant off of prairie dog towns. Avian survey transects shall be established on prairie dog towns within HCAs, MOAs, and also NPDs. Data collected will track species composition and relative abundance. Cooperation in these efforts may occur with environmental organizations and universities to allow for increased accomplishment of surveys.

7.4.2.1 Raptors

BCPOS will coordinate with interested organizations, agencies or individuals to conduct annual county-wide monitoring of breeding resident and inventories of wintering raptor populations. The long-standing winter surveys will continue to be conducted in accordance with a protocol developed by BCPOS staff and Boulder County Natural Association (BCNA). The long-term dataset produced by this effort has allowed for the further understanding of the relationship between prairie dogs and raptors.

7.4.2.2 Burrowing Owls

Burrowing owl surveys occur annually on all active prairie dog colonies on BCPOS owned lands, due to a partnership with BCNA and Boulder County Audubon Society (BCAS). This effort has allowed for a comprehensive survey effort across all BCPOS lands, and has increased confidence levels in the discovery of all nesting attempts.

All nesting sites are protected immediately, as necessary, with measures such as seasonal trail closures. Agricultural tenants are informed on the requirement to avoid nest disturbance when nests are located on leased agricultural lands. Additionally, CPW may be consulted on any management action that has the potential to impact this species.

Prairie dog colonies with active burrowing owl nests will not be removed until at least three nesting seasons have passed without recurrent nesting. This period of inactivity reflects the strong nest-site fidelity exhibited by burrowing owls, as most territories are re-used within three years of previous occupation (Rich 1984; CDFG 2012). Burrowing owl habitat in Boulder County is protected in a similar manner by other land management agencies in Boulder County (OSMP 2010), with the intent to provide comprehensive protections across contiguous lands.

7.4.3 Black-footed Ferret

A recovery plan for the black-footed ferret was developed in 1988 (USFWS 1988). Recovery efforts by successful captive breeding methods have been underway and relocation of ferrets back to the wild has been initiated. To date, there have been no ferret releases along the Front Range, as under the conditions of the recovery plan, given the development pressures and trend in Boulder County and the presence of sylvatic plague, there is an insufficient amount of suitable habitat to support the black-footed ferret in Boulder County.

However, with time, land use condition changes, and advances in plague treatment strategies, the possibility of reintroducing black-footed ferrets will be reexamined. The potential for reintroductions will be reviewed on a 5 year schedule, at a minimum.

7.4.4 Vegetation

The goal of vegetation monitoring on HCAs and adjacent areas is to track the changes in the characteristics of the plant community over time. An initial inventory will establish the current condition of the area. Subsequent periodic monitoring will provide information on plant community trends, which will then be used to guide management decisions and to evaluate plant community response to management activities.

Plant communities will be mapped initially and the following aspects of those communities will be monitored:

- Species Composition - The proportion in which species of grasses, grass-like plants, forbs and shrubs exist in plant communities.
- Herbaceous Cover - The proportion of the ground that is occupied by perennial and annual forbs and grasses, shrubs, litter and bare ground. This parameter is particularly important as it is related to soil stability.
- Rare Plants - Identification of rare plants within or adjacent to HCAs and the impact thereon, if any, by the presence of prairie dog colonies.
- Invasive Weeds - Invasive weeds are disruptive in an ecosystem and are of particular concern in areas that are to be designated as prairie dog habitat. In addition, state law mandates that invasive weeds be managed to prevent weeds from spreading onto adjacent lands. For these reasons, monitoring for invasive weeds will be conducted to track currently infested land and for early detection in areas that have not yet been invaded. Areas will be mapped initially, and maps will be updated periodically.
- Photo monitoring - Permanent photo points will be established. Data compiled from the vegetation surveys will be evaluated with the visual record.

Once established, an HCA is intended to remain as such indefinitely. Monitoring will be especially critical as we manage for potential long-term occupation by prairie dogs.

A summary of the vegetation monitoring conducted on-colony and off-colony by consultants between 2001and 2011 is found in Appendix H. These monitoring efforts have found some general trends, including an overall reduced amount of cover at on-colony sites and less species diversity, with some exceptions. They also indicate that some invasive weed species actually decreased at on-colony sites.

7.4.5 Monitoring Soil Erosion

Erodibility is determined by physical and chemical characteristics of a soil, slope, and vegetative cover, as a soil is exposed to wind, water and other forces that dislodge soil particles. As managers, the factor we have the best ability to influence significantly is vegetative cover. Because vegetative cover is highly variable with weather and disturbance (natural or human-induced), it is important to monitor vegetative cover as an indicator of exposure to, or protection from, soil erosion. (See also Section 7.4.4)

Prairie dog colonies will be visually monitored for soil erosion. The purpose of monitoring will be to detect indicators of potential erosion, and to take steps that will preclude accelerated erosion from occurring. The first indicator of potential erosion is the lack of cover by vegetation and litter (dead plant material). Erosion begins with exposure of the bare ground to wind and water as soil particles are loosened and transported. Vegetation monitoring will provide information on the percent of bare ground and the trend in that percent.

Early signs of erosion can be found by close inspection of conditions at ground level. Some of the indicators of erosion are accumulations of litter that have been washed and caught in vegetation, rills cut into the soil, exposed roots of plants, presence of silt deposits, coarse pebble layers on the soil surface, pedastaled plants and drifts of soil.

Quantification of erosion may be determined by methods employed by the Natural Resources Conservation Service (NRCS). The point at which the amount of soil loss becomes unacceptable will vary from site to site under different conditions. For the soils and conditions on most of our HCAs and MOAs, the maximum amount of loss we can incur and remain sustainable (i.e. maintain ability to support plant communities over time) is two to five tons of soil per acre per year. These parameters, developed by NRCS, were determined for agronomic situations, not for rangeland situations. While the use of the soil loss equation will be useful, the values for the maximum soil loss may be difficult to apply to prairie ecosystems. Further investigation and research will be required to derive values we are confident in using as guidelines.

7.5 Prescriptive Management Tools

Prescriptive management tools are planned management activities that are intended to direct change in the ecosystem toward a desired objective or goal, such as, maintain or improve plant cover and vigor, soil conservation, noxious weed control, and prairie dog habitation. Through the use of management tools we impose a disturbance on an ecosystem. An ecological disturbance is a natural or human-induced event that disrupts an ecosystem and the organisms and resources within the system. Examples of natural disturbance are lightning ignited fire, grazing by native herbivores, drought, and flood. Human-induced examples are accidental or prescriptive fire, grazing by animals controlled by humans, reseeding, urbanization, noxious weed control, plowing, damming a river, etc. Human disturbance may be viewed as positive or negative based on objectives and values. A system's biotic response to disturbance causes shifts in the characteristics of that system. As we implement management activities, we attempt to direct these shifts in a desired direction toward specific goals that have been established based on our values.

The tools we are most likely to utilize include, but are not limited to: prescribed burning; grazing; and biological, herbicidal and mechanical means of noxious weed management. Inter-seeding or re-seeding of native species will be implemented to a lesser extent and probably on a smaller scale. (Burning, grazing and seeding are all an integral part of noxious weed management.) These tools will be considered for use on all HCAs and MOAs to accomplish specific objectives related to prairie dogs as well as prairie ecosystems in general.

Staff will develop proposals for changes in site management adaptively, based on current research. Additionally, the plant ecologist, invasive weeds coordinator, agricultural specialists and wildlife specialists will analyze the status of the plant communities in all prairie dog towns.

BCPOS retains the authority to make changes to individual site plans when necessary to avoid compounding negative environmental impacts or if ecological conditions will reach an unacceptable state if left unattended.

7.5.1 Fire and Grazing

Prior to large scale human induced changes to the Great Plains, the occurrence of fire and native ungulate grazing (e.g. bison, pronghorn and elk) were two of the most important modifying influences in prairie ecosystems. The relationship between the occurrence of fire and grazing and prairie dogs will play an important role in the management of HCAs and MOAs.

7.5.1.1 Prescribed Burns

Most range grasses tolerate fire during years of normal to above normal precipitation (Wright and Bailey 1980). When precipitation is adequate, a number of benefits from burning can result. One major benefit of prescribed range burning is the removal of large accumulations of litter and mulch which can increase utilization and herbage yield (McAtee et al. 1979). Burning releases plant nutrients for plant use, temporarily increasing the nutrient content of forage. Fire affects successional status and thus the composition of the grasses and forbs. Fire burning pattern mosaics can create diversity and heterogeneity or patchiness. All of these effects of burning may be used to influence distribution of colonies (Northcott et al. 2008).

Of our available management tools, the use of prescriptive fire has the potential to mimic natural disturbance more closely than any others available. Prescribed burns will be designed to meet clearly defined objectives. Burn timing, frequency, intensity, size, location and chronology of use with respect to other management tools are important factors of prescriptions. Prescriptive burns are implemented subject to limitations of resources required to conduct burns, adjacent land uses, weather, and air quality standards.

7.5.1.2 Livestock Grazing

Many HCAs and MOAs are, or may be, under agricultural lease for grazing. Grazing practices can be consistent with prairie dog habitat management.

Livestock grazing may also be used as a prescriptive management tool to achieve specific objectives such as maintaining grassland ecosystem health and manipulating vegetation for wildlife management, including prairie dogs. The condition of the range and the composition of plant species affect distribution of black-tailed prairie dogs (Uresk 1981).

Timing, duration and intensity of grazing as well as the opportunity for vegetation to recover from grazing are the key elements of good management and will be coordinated with lessees according to an annual grazing plan. Prairie dogs are taken into consideration when planning and implementing livestock grazing. Close monitoring of grazing is an absolutely essential component of implementation.

7.5.2 Integrated Weed Management

Prairie dogs have the ability to persist in a variety of habitats, including those containing weed species (Lehmer et al. 2010). However, colonies must be monitored very closely for establishment and spread of weed infestations. When invasive weeds are detected, a strategy that integrates multiple methods of weed control will be planned and implemented. Burning, grazing,

use of weed specific biocontrol insects, herbicides, mowing, pulling, and seeding are all tools that will be considered.

In cases where the presence of a colony severely hampers or prevents effective containment or control of weed infestations, control of the colony may be considered. To date, the presence of a colony has never precluded full utilization of invasive weed control methods nor has weed management required the removal of prairie dogs.

7.5.3 Vegetation Planting

In the case of MOAs, staff may determine that maintaining the colony on the MOA is desirable but the vegetation cover is not sufficient to prevent soil erosion. Revegetation with native or non-native plant material may be pursued to mitigate the impacts of soil loss, while providing food to maintain the prairie dogs on site.

7.6 Human Cases of Plague

In the past 54 years (1957 to 2011), there were 59 cases of human plague infection, with 10 fatalities, in Colorado (CDPHE 2011). Only one human case (non-fatal) has ever been reported in Boulder County (domestic cat-related). The known species reportedly implicated in plague infection were rock squirrel, prairie dog, rabbit and cat, in decreasing occurrence; rock squirrels are implicated at a higher level than prairie dogs, rabbits and cats which are all implicated equally. In some reported cases, the host was not identified, and therefore reported as having multiple or unknown animal origins (CDPHE 2011).

Human cases of plague resulting from prairie dogs and their fleas are few because humans rarely handle infected prairie dogs, and because prairie dog fleas tend to be highly host-specific and therefore avoid humans (Hoogland, 2006).

7.6.1 Plague Control Mitigations and Public Notification

If plague is suspected in an area, Boulder County Public Health (BCPH) will attempt to confirm the occurrence by collecting fleas and/or carcasses at the site. If plague is either suspected or confirmed in an area, the public will be notified via press releases or postings/warnings at the infected site. The area may be closed to the public, if advised by BCPH. Any plague mitigations shall be directed and coordinated by BCPH.

7.6.3 Population Recovery

Devastating plague epizootics (events) are common in black-tailed prairie dog colonies and small, isolated colonies may not recover on their own. Under suitable conditions (i.e. connectivity for immigration/dispersal), colonies that do recover usually require 4-5 years to regenerate to their former levels (Hoogland 2006). Relocation may occur from other prairie dog locations only after the plague epizootic has been confirmed to have run its course. A waiting period of at least one year from the confirmed completion of the epizootic is generally best, but ecological and political considerations may have to be considered as well. Criteria for deciding if prairie dogs will be relocated back onto a plague-impacted area are described in detail in Section 9.2.

7.7 Conflict Management

Values associated with human interests, such as public health or healthy rangelands dominate the public attitude towards prairie dog management. The two most frequently cited problems, plague transmission and competition with livestock for forage, have questionable significance based on available research data (Krueger 1987). The human cases of plague attributed to prairie dogs are so few as to be of no direct epidemiological consequence. Recent evidence indicates that humans must go out of their way to contract plague from prairie dogs. The fleas found on prairie dogs do not bite and infect humans as much as flea species found on other mammals such as rock squirrels (Hoogland 2006). Despite this evidence, prairie dogs continue to be viewed as a threat, no matter how small.

7.7.1 Conflicts with Adjacent Land Uses

BCPOS staff will strive to understand and respect the attitudes and perceptions of the public, and be open to discussions if concerns about adjacent prairie dogs arise. In the case of direct conflict with neighboring land uses, staff shall address all concerns and take measures to ameliorate any situations. Tools to address these situations may include methods such as control in buffer areas (see section 7.8), relocation or barrier construction.

7.7.2 Recreation

Most proposed MOA acreage exists on properties purchased for agricultural purposes and as such, no public access is allowed. HCA and MOA acreage exists, or is proposed, for some properties where recreational activities occur. For example, HCA acreage exists on Heil Valley Ranch, Hall Ranch, Rabbit Mountain, Carolyn Holmberg Preserve at Rock Creek Farm, Southeast Buffer and the Beech property. Each property has unique circumstances, but in all cases, care is taken to minimize the potential for conflicts between prairie dogs and humans.

- Dogs are required to be on leash on most County open space properties where they are allowed (Resolution No. 2011-59, 5(a)). Dogs are allowed on all BCPOS open properties with the exception of Heil Valley Ranch, Hall Ranch and Caribou Ranch. The leash requirement minimizes the potential for exposure of pet dogs to fleas. See section 7.6 for more information about plague monitoring and notification procedures.
- The Board of County Commissioners and the Director of BCPOS have the authority to require users to remain on the trail (Resolution No. 2011-59, 20(b)) or to close certain trails (Resolution No. 2011-59, 21(b)) for resource protection or safety concerns.

As new trails are developed, all efforts will be made to avoid routes that come in close proximity to prairie dog colonies, for purposes of maintaining effective use of colonies by associated species. However, BCPOS staff also recognizes the educational benefit of having some prairie dog areas available for public observation. Staff will continue to provide interpretive programming and signage to educate the public about prairie dogs.

7.7.3 Conflicts with Agricultural Operations: Grazing

On rangelands, prairie dogs have traditionally been thought to compete with livestock for forage. The extent of this competition is variable, due to compounding factors such as weather, forage preference, etc. Research has shown variable estimates of how much impact prairie dogs have on forage availability. Studies have found that when comparing biomass consumption of a single cow or cow-calf unit is roughly equal to that of 532 or 389 prairie dogs respectively (USDA 1968; Hansen and Cavender 1973). To add to the complexity of this issue, several studies have

shown that prairie dogs prefer areas grazed by herbivores, due to decreased vegetation height, for colonization (Knowles 1982; Cincotta 1985).

BCPOS staff recognizes the complexity of this issue and while grazing leases are in place on HCAs and MOAs, prairie dog presence and forage amount are taken into account when determining annual grazing regimes. On HCAs and MOAs staff generally manages livestock numbers as opposed to prairie dog populations.

7.7.4 Conflicts with Oil and Gas Development

In light of evolving regulations pertaining to oil and gas development at the local, state and federal level, BCPOS will continuously strive to ensure that all feasible precautions are undertaken to limit impact to wildlife populations, including prairie dogs, due to oil and gas development. At present, all new permit applications are reviewed by staff for potential impacts to plant and wildlife species. In cases where impacts may occur, mitigations are recommended, including full avoidance, seasonal timing and restoration. In cases where avoidance is not possible, the developer will be responsible for not harming any wildlife on site and may be required to use Reverse Dispersal Translocation.

7.8 Buffer Zone Management

Buffer zones will be used both to protect the integrity of HCA or MOA areas and to minimize conflicts with adjacent non-compatible land uses. Buffer zones are of particular importance in cases where the HCA or MOA boundary coincides with the open space boundary and adjacent properties have conflicting land uses. In these cases, buffer zones will be located on the borders of BCPOS properties that contain HCA or MOA locations to minimize the potential migration of prairie dogs from an HCA or MOA to the adjacent property.

Spatial Buffers will vary in size according to property size, colony size and other intrinsic factors such as distance to and type of adjacent property and existing physical barriers. The anticipated minimum buffer zone is 50 meters. However, the buffer should not exceed 10% of the total HCA or MOA.

The use of man-made physical barriers will be limited to situations of proximate property conflicts. Natural and existing man-made barriers shall be used where possible. Barriers such as land formations, lakes, wetlands and major highways are reasonable restrictions to the migration of black-tailed prairie dogs. However, there are situations where these are not available, and an artificial barrier may be successful.

Visual barriers may help control the spread of prairie dog colonies by providing a visual obstruction that prairie dogs are hesitant to cross. A visual barrier may be functional because prairie dogs are reluctant to cross into areas they cannot clearly view. Prairie dogs need an unobstructed horizontal view to remain visually vigilant against danger. Visual barriers are not a complete solution to the problem of confining prairie dogs to a certain area. They can, however, be an important buffer zone management tool under certain conditions. The construction of visual barriers is not formal or standard and many different types of material may be used. All light must be blocked from penetrating under the barrier or where two sections of barrier are joined to discourage exploration by dispersing prairie dogs.

In situations where colonies have already crossed over into an incompatible area, installing barriers is relatively ineffective. This is usually the case even after the prairie dogs have been removed from the encroached area. In these situations, physical barriers may be more effective in helping to reduce further dispersal into these areas. Materials used for physical barriers may include chicken wire, vinyl, or steel panels. Materials may be attached to existing fences or new fences may be constructed specifically for the barrier. In either case, material resistant to ultra-violet radiation and high wind conditions is very important.

Annual evaluation of the condition of the barrier and proper maintenance is important for the overall success of containment projects. Although this technique can be effective under certain conditions, the cost of materials and time requirements of installation, monitoring and repair may make it impractical for wide application. Recent research on the effectiveness of various barrier types against prairie dog colony expansion has also shown that all types of barriers used locally in recent years have had some level of failure. This is mostly the result of the lack of ability in many situations to maintain these barriers in peak effective condition once they are installed (Witmer et al. 2008). BCPOS staff shall evaluate the condition of barriers and perform maintenance as needed, on an annual basis.

Prairie dog management may be necessary if individuals occupy the buffer or migrate outside a barrier onto adjacent areas within BCPOS properties that have been designated as NPD, or are otherwise inappropriate. BCPOS staff will strive to contain prairie dogs to within BCPOS property boundaries and take reasonable measures to reduce conflicts with neighboring land uses.

7.9 Information and Education

Understanding prairie dog ecology and the value of grassland ecosystems are two of the most important issues in developing a successful program for prairie dogs. Environmental education programs provide staff the opportunity to relay scientifically validated information to the public, while responding to questions and concerns about the ecological importance of grassland and prairie dogs. Interpretive signs, nature programs, and school lectures are some of the tools that may be used to heighten the general awareness of ecosystem issues.

BCPOS has developed a Life Zone Educational Program that includes programs on the shortgrass prairie ecosystem and prairie dog function in that ecosystem. BCPOS education and outreach staff and volunteers offer these programs in public schools and other venues.

BCPOS will continue to work with appropriate conservation and education groups to expand the educational message of grassland ecology. Effective land stewardship practices may help prevent the migration of prairie dogs onto agricultural properties. Information and education will be used to help the agricultural community to manage and, if desired, avoid recruiting prairie dogs onto their property.

8 Management Direction for No Prairie Dog Areas

The objectives of this plan as outlined in Section 3.3 include identification of areas that are not appropriate habitat for prairie dogs and if prairie dogs exist in those areas, to remove them. This section will address the guidelines for management of prairie dogs inhabiting areas that fall under the NPD designation.

Two types of situations will be encountered as management of prairie dogs on NPD areas is considered:

1) NPD areas currently inhabited by prairie dogs.
2) NPD areas not currently inhabited, but which may become inhabited at some point in the future.

This section addresses management direction under each scenario.

Appropriate surveys for associated species, as required, will occur before any management action on NPDs. Management of burrowing owls on NPDs will follow guidelines set forth in section 9.1.3.2.

Prairie dog management near trails on NPDs will be managed as in Section 7.7.2 above.

8.1 History of Prairie Dog Management on NPDs

Before describing removal strategy under this revised plan, it is important to review how prairie dogs were removed from what was deemed inappropriate habitat before this management plan was implemented in 1999. The majority of situations where prairie dogs were removed occurred on agricultural lands. Other situations existed, such as buffer zones around prairie dog colonies adjacent to conflicting land uses.

Prior to 1999, when prairie dogs were encountered on BCPOS owned agricultural land, they were exterminated. Exterminations were carried out either by a contractor or an agricultural tenant licensed to apply restricted use pesticides. All exterminations were carried out under the supervision of BCPOS agricultural and wildlife resource staff.

Since the implementation of the 1999 Prairie Dog Element, all exterminations have been conducted only by BCPOS staff or contractors. The adopted BCPOS Cropland Policy (BCPOS, 2011), directs that tenant control will again be a tool for removal in some situations.

8.2 Tenant Control of Prairie Dogs on Leased NPDs

All tenant control of prairie dogs will follow BCPOS accepted practices and will receive direct oversight by BCPOS wildlife and agricultural staff. The protocol for tenant removal of prairie dogs will be developed by wildlife staff and repercussions up to and including lease termination, for improper or unauthorized implementation will be clearly outlined. Additionally, all new lease agreements will include language regarding consequences for unauthorized treatment of prairie dogs.

8.3 Removal Strategy for NPD Areas Currently Inhabited by Prairie Dogs

According to the criteria developed by the Prairie Dog Task Force, prairie dogs inhabit many areas that are not appropriate for ecological or land use reasons. Most of these areas are on agricultural lands. Other situations exist on non-agricultural lands. Examples are buffer zones whose function it is to protect adjacent neighbors and areas where revegetation projects are currently under way.

In order to determine the procedure for removal of prairie dogs from NPDs, areas will be evaluated by mapping the colony and estimating the number of prairie dogs via visual counts (Fagerstone and Biggins 1986). Prior to any removal decision, the wildlife resource staff will investigate the presence of burrowing owls (see section 9.1.3.2). Black-footed ferret clearance surveys are not required in Boulder County, as outlined in Section 9.1.3.3. Finally, staff will make a determination as to the most appropriate method of removing the prairie dogs. Prairie dogs will be removed from these areas in accordance with policies outlined in Section 9.

8.3.1 Relocation from NPDs

If relocation is pursued, procedures outlined in Section 9 of this plan will be followed. Once relocation is complete, the mounds of the burrows on the removal site will be leveled, if possible, to reduce the likelihood of recolonization. The area will then be monitored for prairie dog recolonization. The objective of follow up monitoring is to detect any returning prairie dogs immediately and remove them as soon as possible. Prairie dogs will be lethally controlled, in the burrows, in these situations rather than relocated because the numbers of prairie dogs in these cases will most likely be small and insufficient for attempting a successful relocation effort.

In addition to leveling mounds, other steps to discourage prairie dogs from returning to the area will be considered. Seeding leveled burrows, use of artificial barriers, planting vegetation barriers using tall species and accommodations in grazing management are all possibilities. BCPOS will place strong emphasis on closely monitoring removal sites.

8.3.2 Predator Recovery Program Contributions

BCPOS supports programs to rehabilitate injured birds of prey, as well as black-footed ferret (BFF) recovery programs. We will continue to support these programs with annual contributions**.** Procedures and guidelines for this action are described in section 9.

Predator recovery programs will include the black-footed ferret recovery program run by the USFWS, and raptor rehabilitation facilities in Boulder County, and throughout Colorado. The ecological dependence of these species on prairie dogs is described in section 5.5. The contribution of prairie dogs from BCPOS lands is an effective means of addressing many of the ecological needs of these native species under the habitat constraints that exist locally.

8.3.3 Extermination

BCPOS staff will continuously research the efficiency and expediency of all control methods in an attempt to minimize undue stress to the animals. Extermination substances may include lethal gases, such as CO_2 or CO, or chemical rodenticides. Prior to extermination, BCPOS staff will perform an on-site inspection of the area to identify precisely the area to be exterminated and the extent of the work to be done. Assessment of active burrows will occur, and only those deemed active will receive treatment. Any holes deemed inactive will not be treated, and may not be closed, in an attempt to minimize non-target species impacts.

Exterminations will not occur during the pup-rearing time period of March 1- May 31 annually. This timeframe was selected to capture the peak rearing season to limit the potential of young being left unattended in the burrows. The exception will be in cases where dispersing individuals attempt to colonize an NPD without prairie dogs. If these areas are free of prairie

dogs as of March 1 of each year, direct lethal control may be used to prevent recolonization during this time period.

After the initial treatment, follow-up treatments may occur within two to three days of each other, depending on weather conditions. When extermination has been completed, staff will inspect the site. Follow-up monitoring and management will strive to discourage recolonization.

Certified pesticide applicators are required by law to keep records pertaining to the use of any federally controlled rodenticide. Records include the dates and time of treatment, the number of holes treated, the rodenticide used and lot number, the amount of rodenticide used in each hole and the total amount of rodenticide used. BCPOS will record and archive this information.

BCPOS staff is aware that, though legal, the use of licensed rodenticides to exterminate prairie dogs is controversial. Objections to the use of pesticides, and to poisoning prairie dogs, are taken seriously. Our approach is to do all we can to prevent colonization of a NPD area so that relocation and exterminations can be avoided entirely. It is unreasonable to expect that we can accomplish this all of the time. Our most important tool then becomes monitoring for very early detection of colonization. Early detection and action will greatly minimize the overall number of individual animals negatively impacted.

8.4 Removal Strategy for NPD Areas Not Currently Inhabited, That Become Inhabited

Movement of prairie dogs into new territory occurs regularly as dispersal of young males is continuous and part of the life history of the species. When prairie dogs in search of new territory move to inhabit an NPD area that is not already inhabited, the approach and procedure to remove them will be the same as the procedures described previously for currently inhabited NPD areas. Again, as in monitoring for recolonization of removal areas, the key is early detection of the initiation of colonization by prairie dogs early on. Ideally, detection will occur when the first few burrows appear.

Most new burrows on previously uncolonized land have been detected when only a few prairie dogs existed. However, a few situations have occurred where a new territory was colonized without early detection. Tenants are most familiar with what happens on a day-to-day basis on the land they lease and are often the best means of monitoring. BCPOS staff closely monitors open space properties as well. We depend almost entirely on the observations of field staff for early detection on NPD areas that are not agricultural properties.

Because we usually detect new burrows when prairie dog numbers are very small, these situations can be addressed relatively quickly and easily. The staff wildlife resource specialists will make determinations on how to address these situations. In these cases, it is likely that the decision to use lethal control will be made, as the rate of successful relocation efforts is poor for small numbers of animals (see section 9.2). This exception may occur during the March 1- May 31 non-lethal period.

9 Prairie Dog Removal and Control

BCPOS staff will establish priorities for prairie dog removal on an annual basis. Notification will be made of any prairie dog management activities planned for colonies near trails on BCPOS properties. Signs will be posted at trailheads one week ahead of any action.

9.1 Methods of Removal and Control

Relocation, trapping for predator recovery programs, passive relocation, and extermination are the tools currently available for removal and control. Shooting shall not be considered as a control method. BCPOS staff will evaluate each removal situation on its own merit, considering cost, available resources and timing to determine which control technique to use.

9.1.1 Relocation

Relocation is another method we use for removal and control. The relocation criteria can be found in Appendix I and reasons for relocation can be found in section 9.2.

9.1.1.1 Passive Relocation

Passive relocation may occur in appropriate situations and at an appropriate scale. For example, small numbers of prairie dogs encroaching into unsuitable areas (NPDs, neighboring land), may be redirected to appropriate areas using this method.

9.1.2 Predator Recovery Program Contribution

BCPOS supports local predator recovery programs by contributing removed prairie dogs. Examples of programs to receive removed prairie dogs include the Black-Footed Ferret Recovery Facility in Carr, Colorado, and the Birds of Prey Foundation at Rock Creek Farm in Boulder, Colorado.

9.1.2.1 Black Footed Ferret Recovery Facility

BCPOS shall donate prairie dogs from our management program to the black-footed ferret recovery program facility in Carr, CO. Prairie dogs that are being donated to the USFWS black-footed ferret recovery program will be live trapped and held for up to five days in a BCPOS facility constructed for their maintenance. They will be dusted with Delta Dust, or similar insecticide, upon capture and sprayed with permethrin prior to being transported to the ferret facility in Carr, as required by USFWS and CPW regulations.

Prairie dogs being contributed to the black-footed ferret program must be delivered live to the USFWS facility. All prairie dogs coming in contact with captive ferrets must be quarantined for 21 days under USFWS guidelines prior to being used in the ferret recovery program. This timeline will begin upon delivery to the facility in Carr.

9.1.2.2 Raptor Rehabilitation Centers

Prairie dogs contributed to raptor rehabilitation facilities will be live trapped, euthanized with carbon dioxide gas on site and immediately frozen. Current CPW policy does not require a permit for this activity, but does require that BCPOS retain records of numbers contributed to the raptor rehabilitation facilities. No quarantine period is necessary before donation to raptor rehabilitation facilities. Plague is a mammalian disease that cannot be passed on to raptors.

9.1.3 Chemical Control

If lethal control is necessary, BCPOS staff will use aluminum phosphide, CO, or CO_2. Carbon monoxide shall be the preferred method of lethal control if it proves effective. Aluminum phosphide must be applied by licensed contractors, licensed BCPOS staff, or licensed agricultural tenants, if used on county open space properties. This product is labeled for use throughout the year, but is most effective when soil moisture levels are high and soil temperature is above 40 degrees F. The effectiveness of this rodenticide is enhanced by warmer and moister soil conditions.

Aluminum phosphide is considered a restricted use pesticide by the U.S. Environmental Protection Agency. In addition to being used only by a certified applicator and following application protocol consistent with labeling requirements, the use of this chemical must be in compliance with all state and federal regulations.

The use of carbon monoxide-producing gas cartridges or carbon dioxide gas does not require any special licensing for use in controlling prairie dogs. BCPOS will monitor and keep records on the use of these methods.

9.1.3.1 Mitigations for non-target species

Chemical controls are not species-specific agents, and as such will be lethal to most species that are present in a burrow when the rodenticide is applied. To minimize impacts to non-target species, all burrows will be assessed for activity, and those found inactive will not be treated.

9.1.3.2 Burrowing owl

Intensive surveys will be conducted for burrowing owls prior to any lethal control of prairie dog colonies. Surveys will be conducted before any treatments proposed from March 15 onward through October 31, annually. The CPW recommended protocol for burrowing owl surveys will be followed, and will include passive and broadcast call methods, as necessary (CPW 2008), as well as individual burrow assessment for burrowing owl sign.

Prairie dog colonies with active burrowing owl nests on HCAs or MOAs will not be removed for any reason, until at least three nesting seasons have passed without recurrent nesting. (See section 7.4.2.2).

If burrowing owls select a nest site on a colony within an NPD, agricultural tenants will be informed on the requirement to avoid nest disturbance when nests are located on leased agricultural lands. No prairie dog management will occur during that breeding season (March 15- Oct 31), in subsequent years, the host colony may be removed on a case by case basis.

9.1.3.3 Black Footed-Ferret

Currently, the CPW and USFWS have, “block cleared” all black-tailed prairie dog habitat in eastern Colorado (foothills eastward), meaning that USFWS surveys for black-footed ferret, and prairie dog habitat protection, are no longer required in those areas (USFWS 2009).

9.2 Relocation of Prairie Dogs Among Boulder County Parks and Open Space Lands

BCPOS will utilize relocation as a management tool for prairie dog control. Specific procedural details are outlined here and Appendix I. A general overview is outlined below:

- All potential relocations will undergo the process outlined by the CPW regarding these efforts.
- If 15% or less of the suitable habitat within an individual HCA is occupied, relocations can occur. If more than 15% of suitable habitat within an HCA is occupied, no relocations will occur.
- Relocation to sites without burrows, or historic occupancy, will not be considered, due to unacceptably low survival rates (Truett et al. 2001)
- Relocation site must meet minimum vegetation cover and diversity as outlined in Appendix I.
- BCPOS will conduct relocations starting July 1, and must begin no later than September 15, annually, as needed.
- As a guideline, the minimum number of prairie dogs to be relocated during each event shall be 60 (Robinette et al. 1995).
- No buffer distance from an existing colony is required (Coffeen and Pederson 2006).
- Live trapping of prairie dogs will be the primary capture technique for relocation efforts. Other effective methods, including burrow flushing, will also be considered on a case-by-case basis.
- Post release monitoring will occur to determine success of efforts.
- If prairie dog occupancy on an individual HCA fall below 5% and remains below 5% for 4 growing seasons, BCPOS will relocate prairie dogs into that HCA.

9.2.1 Reestablishing Colonies on HCAs

In an effort to maintain a minimum number of prairie dogs on HCAs, if active colony acreage on an individual HCA drops below 5% there will be no control of remaining individuals. However, where BCPOS is restoring habitat in the immediate area and the number of prairie dogs to be removed is not significant compared to the number in the entire HCA, some prairie dogs may be removed.

Colonies typically recover from plague to their pre-plague numbers in 4-5 years, (Hoogland 2006). If after four growing seasons (approximately March 1 to October 1) following a plague outbreak, recovery of colonies on an individual HCA has not reached 5%, BCPOS will relocate into that HCA. Boulder County Parks and Open Space may manage prairie dog populations in HCAs to preserve ecosystem integrity. Any sites selected for relocation due to this situation shall be a staff decision and will be the most appropriate habitat. As is always required, CPW criteria regarding relocation sites will be met.
Reestablishing colonies on HCA sites with existing colonies (active or inactive) will take priority when evaluating prairie dog relocation sites.

9.2.2 Relocation into MOAs

Relocation into an MOA may be considered only if no opportunities exist on an HCA property. The multi-use conflicts will be evaluated by staff, and the relocation will be approved only if potential conflicts can be mitigated. If the relocation criteria cannot be met, BCPOS may consider supplemental planting of vegetation for prairie dogs on a trial basis. The relocation

methodology will be the same as for an HCA. Any relocation efforts will undergo the process outlined by the CPW regarding their criteria and public input.

9.2.3 Determine Biological Needs of Other Species of Interest

If more than one HCA exists with a relatively equal amount of available colony sites, priority will be given to the site with the greatest need for prairie dogs to support other known species in the HCA which depend on them. Examples would be known golden eagle nest sites on HCAs and HCAs containing or near major wintering raptor roost sites. Other considerations could be historic burrowing owl locations where prairie dogs have died off. Consideration will also be given to the needs of other species, such as grasshopper sparrows and lark buntings that rarely inhabit prairie dog colony areas, in determining if relocation will be allowed.

9.3 Criteria for Relocating Prairie Dogs from Non-County Properties

Given the significant number of prairie dogs on county land, relocation from other entities is highly unlikely. In all cases, priority will be given to relocating prairie dogs from other County open space properties onto a relocation site before accepting prairie dogs from non-County property. All potential relocations will undergo the process outlined in Section 9.2 and Appendix I, including review by CPW.

9.3.1 Unapproved Relocation of Prairie Dogs

As per BCPOS Rules and Regulations, any relocation of prairie dogs to BCPOS lands that is not approved by the appropriate process will be evaluated as illegal (Title 33; 33-6-114 (3) Release of Live Wildlife).

10 Prairie Dog Habitat Element Review Schedule

This Element will be reviewed and updated by BOCC in conjunction with the Boulder County Grassland Policy, with the exception of the Relocation Vegetation Criteria, which will be reviewed after the first three years. This exception is to ensure suitability of these criteria and applicability to BCPOS lands, and allow for adaptive changes as needed.

All newly acquired properties will be given management designations and currently owned properties will be reviewed for possible recategorization annually. Most attention will be on the feasibility of converting MOAs to HCAs or NPDs, based on current land conditions at the time of review. All agricultural properties will be evaluated to determine if they are still sustainable as classified. For example, dryland agricultural property that is not sustainable could be reclassified as marginal agricultural land and be considered for reclamation. Properties falling into this situation could be recategorized at a future evaluation as being potential HCA or MOA locations. Restoration properties will also be evaluated to determine if the vegetation is restored to a state where the property can be reclassified to an HCA.

10.1 Annual Colony Mapping

Each known prairie dog town will annually be mapped using GPS technology. This will be done in late summer and fall after all dispersing prairie dogs have reestablished themselves and any new burrowing activity has ended. Mapping will delineate outer boundaries of current activity in

each town and be used to calculate acreage. This annual effort will allow assessment of expansion or contraction of prairie dog inhabited areas on all BCPOS owned lands.

10.2 Habitat Review and Analysis

The Plant Ecologist, Invasive Species Coordinator, Agriculture Specialist and Wildlife Specialists will regularly analyze the status of the ecological conditions in prairie dog towns. Recommendations for changes or management treatment to control invasive weeds or erosion, for example, will be made via this process. BCPOS staff retains the authority to make emergency changes to individual site management when necessary to avoid compounding negative environmental impacts or if ecological conditions will reach a critical state if left unattended until the next formal review process.

Contracted consultants have conducted most of the monitoring of prairie dog town vegetation under this management plan. A report summarizing the status of the vegetation surveys conducted on-colony and off-colony by ESCO Associates, Inc. between 2001 and 2011 is attached (Appendix H).

10.3 Updates and Public Process

Annual updates will be reported in Resource Management Annual Reports and Agricultural Division Annual Reports and periodically presented to POSAC and the Boulder County Board of Commissioners.

As part of the annual update process, BCPOS will schedule and conduct a stakeholder meeting. At the meeting, BCPOS staff will present facts and figures regarding prairie dog occupancy and management on BCPOS land.

The vegetation criteria adopted as part of the revised relocation criteria are scheduled for review by staff three years from the date of adoption of this Habitat Element. Staff will be developing criteria for re-estabilishing prairie dogs on lands converted to prairie. Staff shall seek input from stakeholders in the development of these criteria.

Appendix A: Land Classification Criteria for Prairie Dog Management on Boulder County Open Space

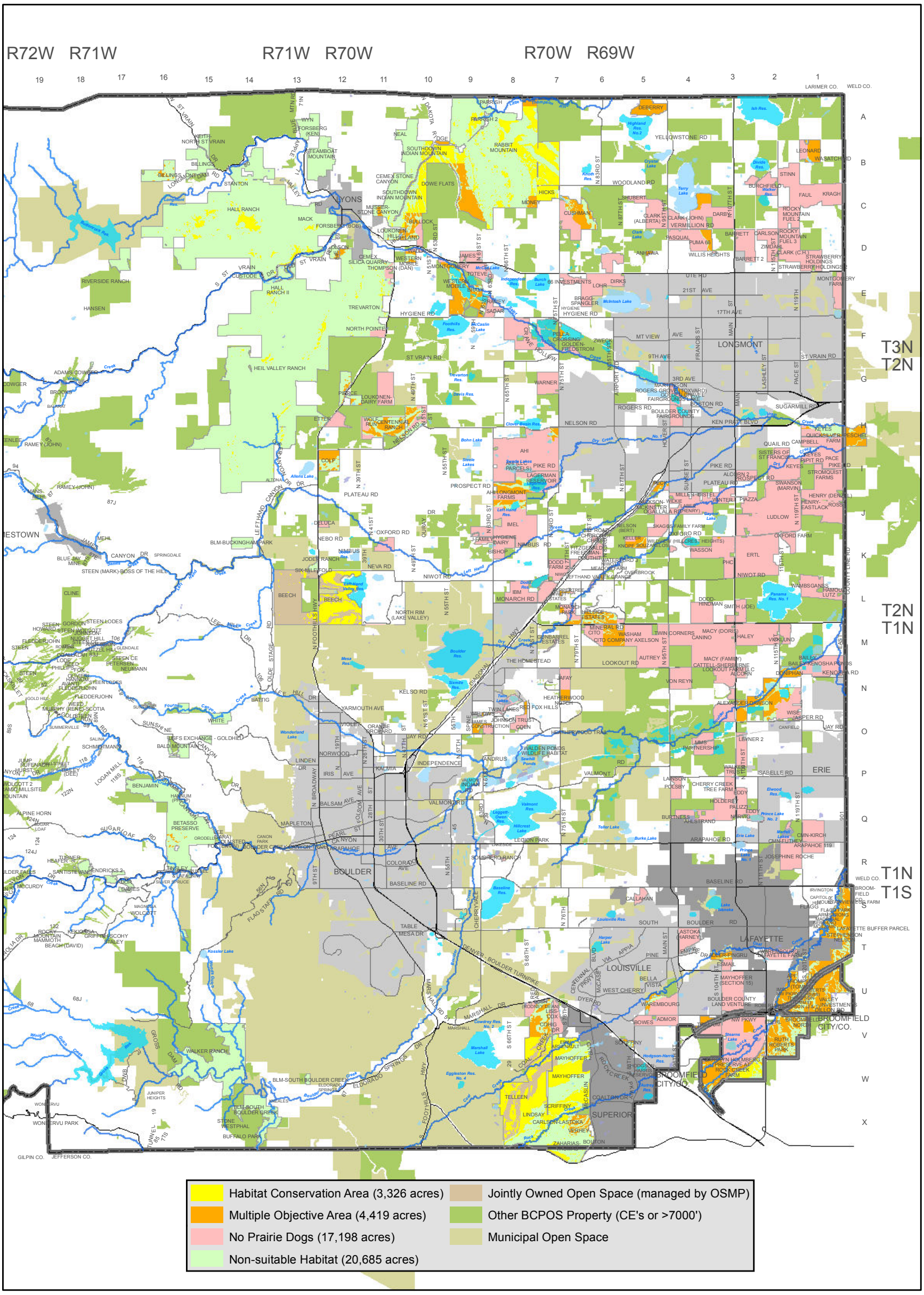
Criteria Variables	Prairie Dog Habitat Conservation Areas (HCA)	Multiple Objective Areas (MOA)	No Prairie Dog Areas (NPD)
Habitat Characteristics:	***Should allow prairie dog colony to function with minimal human intervention without causing or experiencing negative impacts to or from adjacent land uses.***	***Should allow prairie dogs to function in coexistence with other uses, without negative impacts.***	***Are unsuitable for habitation for ecological or land use reasons.***
Soils	**- stable, non-erodible, well-drained soils - Min. soil depth generally 4' & above caliche layer (below frostline; Coffeen & Pederson 1989; Hoogland 1995) - min 8 ft. water table**	**Stable, non-erodible, well-drained soils Min. soil depth generally 4' & above caliche layer (below frostline; Coffeen & Pederson 1989; Hoogland 1995)min 8 ft. water table**	**- Erodible or highly eroded soils - >8cm Rock particles - Class II soils**
Vegetation	**- Short grass prairie - Mid-grass prairie**	**Sufficient vegetation to support/sustain multiple uses**	**- Tall grass prairie currently in need of invasive weed control - rare plant species and/or communities**
Elevation	**up to 7,000'**	**up to 7,000'**	**N/A**
Size	**Sufficient size to support prairie dogs and associated species**	**Sufficient size to support/ sustain multiple uses. Will depend on size of parcel, condition of parcel, and the nature of uses.**	**N/A**
Slope	**10% or less**	**10% or less**	**>10%**
Connectivity	**Connectivity desirable within 1.8 miles**	**Connectivity desirable within 1.8 miles**	**N/A**
Barriers	**- Natural barriers are desirable, especially if buffer is inadequate - Introduced barriers may be necessary**	**- natural barriers are desirable, especially if buffer is inadequate - introduced barriers may be necessary**	**N/A**

Appendix A (cont'd)

Use Characteristics:			
Intent of Purchase	**Not restrictive**	**Not restrictive**	**Purchased for open agricultural purposes**
History of Occupation & Use	- Historical occupation by prairie dogs - Raptor use area - Other predators - Co-habitors	- Historical occupation by prairie dogs - Raptor use area - Other predators - Co-habitors - Grazing - Limited or no recreation	**Not restrictive**
Current Use	- Existing prairie dog towns - Raptors - Other predators - Co-habitors - Prescriptive management tools (fire, grazing, herbicides, etc.) - Limited or no recreation use	- Grazing - Limited or no recreation	- Crops - Revegetation/Rest. - Recreation Use
Planned Use	- habitat preservation - prairie grassland restoration - Prescriptive management tools (fire, grazing, herbicides, etc.) - limited or no recreation use	- grazing - prairie grassland restoration - limited or no recreation	- crops - other (e.g. recreation)
Adjacent Ownership & Uses	-grassland -existing towns -presence of natural barriers -acceptable public land -undeveloped land - acceptable private land	**Not restrictive**	**Likelihood of conflict due to encroachment**

Prairie Dog Habitat Element

Appendix B BCPOS Prairie Dog Managment Categories with 2011 Colonies



Boulder County

0 6,900 13,800 20,700 27,600 Feet

0 1 2 Miles

DISCLAIMER: This map is for illustrative purposes only, and is not suitable for parcel specific decision making. The areas depicted here are approximate. More site specific studies may be required to draw accurate conclusions. Based on data and information obtained by Parks and Open Space as of March 2012.

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Appendix C: Prairie Dog Management Property Categorization

Property Name	Total Acres	HCA Acres	MOA Acres	NPD Acres	NSH Acres
66 INVESTMENTS	54	0	0	54	N/A
ADAMS-COWGER	10	0	0	0	10
ADLER-FINGRU	56	0	44	0	12
ADMOR EAST	45	0	0	45	N/A
ADMOR WEST	33	0	0	33	N/A
ADOR	12	0	0	0	12
AHI	595	0	0	595	N/A
AHI (LLC PARCELS)	113	0	0	113	N/A
AHI LONGMONT FARMS	148	0	61	76	11
AHLSTRAND	13	0	0	13	N/A
ALCORN	34	0	0	34	N/A
ALCORN II	75	0	0	75	N/A
ALEXANDER DAWSON	652	0	257	250	145
AMERICAN PACIFIC FINANCIAL	88	0	73	0	15
ANDERSON (GOLDAMAY)	145	0	2	143	0
ANDERSON-BUTZEL HILL	5	0	0	0	5
ANHAWA	7	0	7	0	0
ARAPAHOE 119	79	0	0	79	N/A
ARCHDIOCESE OF DENVER	199	0	134	0	65
ARMSTRONG	35	0	24	0	11
AUTREY	236	0	0	236	N/A
AXELSON	76	0	0	76	N/A
BAILEY	16	0	0	16	N/A
BAILEY (DEE)	1	0	0	0	1
BAILEY-KENOSHA PONDS	234	0	0	234	N/A
BALD MOUNTAIN	70	0	0	0	70
BARRETT	144	0	0	144	N/A
BARRETT II	38	0	0	38	N/A
BATTIG	1	0	0	0	1
BEACHAM-ROBERTS	73	0	0	73	N/A
BECKY	73	0	0	73	N/A
BEECH	1,164	421	0	0	743
BEECH II	68	23	0	0	45
BENJAMIN	244	0	0	0	244
BETASSO HOMESTEAD	52	0	7	0	45
BETASSO PRESERVE	721	0	5	0	716

Property Name	Total Acres	HCA Acres	MOA Acres	NPD Acres	NSH Acres
BIELINS-HOCK	7	0	0	7	N/A
BILLINGS	321	0	15	0	306
BIRNBAUM	2	0	0	2	N/A
BISHOP	41	0	0	41	N/A
BLM-BUCKINGHAM PARK	76	0	0	0	76
BLM-FOURMILE CANYON CREEK	36	0	0	0	36
BLM-SOUTH BOULDER CREEK	463	0	0	0	463
BLUE JAY MINE	1	0	0	0	1
BOHN PARK	0	0	0	0	0
BOULDER CANYON TRAIL-FOX (ERVIN)	2	0	0	0	2
BOULDER COUNTY FAIRGROUNDS	79	0	0	79	N/A
BOULDER COUNTY LAND VENTURE	139	0	0	139	N/A
BOULDER CREEK CANYON TRAIL	1	0	0	0	1
BOULDER CREEK DEV ACCESS	2	0	0	2	N/A
BOULDER FALLS	0	0	0	0	0
BOUTON (MAURICE & MARY)	7	2	0	0	5
BOUZARELOS	52	0	48	0	4
BOWES	73	0	0	73	N/A
BRAGG-SPANGLER	39	0	0	39	N/A
BRALY	112	0	66	0	46
BRAND	158	120	0	0	38
BREWBAKER-SORENSSON	73	0	0	73	N/A
BRITTANY PLACE	1	0	0	1	N/A
BROOKS	3	0	0	0	3
BROOMFIELD NORTH	79	0	23	0	56
BUFFALO PARK	3	0	0	0	3
BULLOCK	80	0	11	59	10
BURCHFIELD	156	0	0	156	N/A
BURTNESS	20	0	0	20	N/A
BUSH (DONALD)	6	0	2	0	4
BUSH RODNEY DEAN	111	0	21	43	47
BUTLER	14	0	8	0	6
CALLAHAN	45	0	0	45	N/A
CAMPBELL	36	0	0	36	N/A
CANINO	279	0	0	279	N/A
CARLSON	74	0	0	74	N/A
CARLSON-LASTOKA	125	66	0	0	59
CATTELL-SHERBURNE	87	0	0	87	N/A
CEMEX SILICA QUARRY	122	2	0	0	120

Property Name	Total Acres	HCA Acres	MOA Acres	NPD Acres	NSH Acres
CEMEX STONE CANYON	68	3	0	0	65
CENTENNIAL RANCH	145	0	80	0	65
CENTREBRIDGE	16	0	0	16	N/A
CHERRY CREEK TREE FARM	73	0	0	73	N/A
CHURCHILL	28	0	0	28	N/A
CITO	102	0	0	102	N/A
CITO COMPANY	147	0	136	0	11
CLARK (ALBERTA)	155	0	0	155	N/A
CLARK (C.H.)	74	0	0	74	N/A
CLARK (JOHN)	94	0	0	94	N/A
CMN-FUTHEY	35	0	0	35	N/A
CMN-KIRCH	157	0	0	157	N/A
COEN	30	0	0	30	N/A
COHIG	216	0	96	60	60
COLP	145	0	84	0	61
COUNTRY CREEK	3	0	0	3	N/A
COWDERY COMPANY RR ROW	6	0	1	4	1
CUSHMAN	345	0	128	155	62
CUSHMAN-BROOKS-TOLTZ EXCHANGE	21	0	5	0	16
CUSTODE	20	0	0	0	20
DARBY	365	0	63	300	2
DAVIES	22	0	0	0	22
DEBERRY	140	0	137	0	3
DELUCA	21	0	0	21	N/A
DIRKS	32	0	0	32	N/A
DISTEL	72	0	0	72	N/A
DODD FARM	231	0	0	231	N/A
DODD RESERVOIR - BLYSTONE INTEREST	7	0	0	7	N/A
DODD-HINDMAN	152	0	0	152	N/A
DOLLAGHAN	100	18	0	0	82
DOLLAGHAN II	14	0	14	0	0
DONIPHAN	76	0	60	0	16
DOUGHERTY (DOROTHY)	54	0	0	54	N/A
DOUGHERTY-LITZENBERGER	142	0	0	142	N/A
DOWE FLATS	846	246	293	0	307
EBERL	10	0	0	10	N/A
ECHTERNACHT	75	0	0	75	N/A
EDDY	69	0	0	69	N/A
ENRIGHT	48	0	0	48	N/A

Property Name	Total Acres	HCA Acres	MOA Acres	NPD Acres	NSH Acres
ERIN ARSENAULT	169	93	0	0	76
ERTL	575	0	0	575	N/A
ESMAIL	35	0	0	35	N/A
ETTER	36	0	3	0	33
FAIRGROUNDS LAKE	23	0	0	23	N/A
FAUL	241	0	0	241	N/A
FITZGERALD	28	0	0	28	N/A
FLAGG PARK	5	0	2	0	3
FORSBERG (BOB)	22	0	0	0	22
FORSBERG (KEN)	87	0	0	0	87
FOURMILE CANYON CREEK	50	0	0	0	50
FREEDMAN-DOUTHIT	32	0	0	32	N/A
GAGE	186	0	0	186	N/A
GAGE GRAVEL AREA	73	0	0	73	N/A
GLACIER PARK	141	0	0	141	N/A
GOLDEN FARM	7	0	0	7	N/A
GOLDEN GRAVEL	25	0	18	0	7
GOLDEN-FREDSTROM	38	0	0	38	N/A
GUNBARREL ESTATES	10	0	0	9	1
HAHN	66	0	0	66	N/A
HALEY	154	0	0	154	N/A
HALL RANCH	3,462	216	0	0	3,246
HALL RANCH 2	63	2	0	0	61
HALL RANCH 2	507	16	0	0	491
HAMOUZ	20	0	0	20	N/A
HANNUM (PHILIP)	6	0	0	0	6
HANSEN	36	0	0	36	N/A
HASELWOOD	55	0	37	0	18
HEATHERWOOD NOTCH	38	0	38	0	0
HEATHERWOOD TRAIL	0	0	0	0	0
HEIL VALLEY RANCH	5,344	76	0	0	5,268
HENDRICKS II	38	0	0	0	38
HENRY (DENZEL)	66	0	0	66	N/A
HENRY-EASTLACK	262	0	0	262	N/A
HEPP	94	7	0	0	87
HICKS	104	95	0	0	9
HIDDEN TREASURE	8	0	0	0	8
HILLSIDE ESTATES	142	0	87	0	55
HIRSCHFELD	98	0	0	98	N/A

Property Name	Total Acres	HCA Acres	MOA Acres	NPD Acres	NSH Acres
HODGSON-HARRIS RESERVOIR	6	0	0	6	N/A
HOLDERBY	77	0	0	77	N/A
HYGIENE DAIRY	75	0	0	75	N/A
IBM	186	0	0	186	N/A
IMEL	573	0	41	486	46
IMEL-NW PKWY	45	0	37	0	8
JACKSON-MCKINSTER	28	0	0	28	N/A
JAFAY	75	0	0	75	N/A
JAMES	71	0	0	71	N/A
JAMES CONSTRUCTION	39	0	35	0	4
JAY ROAD CHURCH OF CHRIST	7	0	0	7	N/A
J-FAMILY	32	0	0	32	N/A
JODER RANCH	3	0	1	0	2
JOHNSON TRUST	31	0	0	31	N/A
JOSEPHINE ROCHE	196	0	0	196	N/A
KEITH-NORTH ST VRAIN	59	0	0	0	59
KELLER	20	0	0	20	N/A
KEYES	250	0	23	140	87
KNOPF	10	0	10	0	0
KRAFT	16	0	0	0	16
KRAGH	156	0	0	156	N/A
LABER (ALEX)	118	0	0	118	N/A
LABER (HENRY)	65	0	0	65	N/A
LAFAYETTE BUFFER PARCEL	4	0	3	0	1
LAGERMAN RESERVOIR	223	0	38	146	39
LAINSON	15	0	0	15	N/A
LASTOKA (HARNEY)	135	0	0	135	N/A
LEE SARA	1	0	0	0	1
LEFTHAND VALLEY GRANGE	12	0	8	0	4
LEGION PARK	0	0	0	0	0
LEONARD	146	0	92	47	7
LEYNER II	112	0	0	112	N/A
LILEY	214	0	170	0	44
LINDSAY	419	162	0	0	257
LISS	25	0	2	18	5
LISS-COX	13	0	0	13	N/A
LOBO TRAIL/KELLY	0	0	0	0	0
LoBoTrail Corridor	5	0	0	5	N/A
LOHR	142	0	0	142	N/A

Property Name	Total Acres	HCA Acres	MOA Acres	NPD Acres	NSH Acres
LOHR HOMESTEAD	29	0	0	29	N/A
LOHR HOMESTEAD EXC	29	0	0	29	N/A
LOOKOUT FARM LLC	38	0	0	38	N/A
LOUKONEN OUTLOTS	219	11	0	18	190
LOUKONEN-DAIRY FARM	257	0	0	257	N/A
LOUKONEN-HILL	77	0	16	0	61
LUDLOW	384	0	0	384	N/A
LUH	149	0	0	149	N/A
LUTZ	54	0	0	54	N/A
MACK	154	0	0	0	154
MACY (DORIS)	174	0	0	174	N/A
MACY (FAMILY)	173	0	0	173	N/A
MADRIGAL	2	0	1	0	1
MARTENSON	11	0	0	11	N/A
MAYHOFFER	549	290	0	0	259
MAYHOFFER (SECTION 15)	154	0	0	154	N/A
MAYHOFFER II	82	12	0	0	70
MC CLAIN	3	0	1	0	2
MILLER	15	0	0	15	N/A
MILLER II	19	0	0	19	N/A
MMS PARTNERSHIP	132	0	0	132	N/A
MONARCH PARK	106	0	29	67	10
MONEY	41	0	33	0	8
MONTGOMERY	12	0	0	12	N/A
MONTGOMERY FARM	126	0	0	126	N/A
MOTLEY	1,135	167	0	0	968
MOUNTAINVIEW EGG FARM	140	0	117	0	23
MUSSER	191	0	0	0	191
MUSSER-STONE CANYON	38	0	12	0	26
NEAL	36	0	0	0	36
NERVIG	20	0	0	20	N/A
NIWOT ESTATES	7	0	7	0	0
NIWOT MEADOW FARM	10	0	0	10	N/A
NORTH POINTE	117	1	0	0	116
NORTH RIM (LAKE VALLEY)	4	0	0	4	N/A
OLMSTED	1	0	0	0	1
OLSON	82	0	22	0	60
ORANGE ORCHARD	4	0	0	4	N/A
OVERBROOK	3	0	0	0	3

Property Name	Total Acres	HCA Acres	MOA Acres	NPD Acres	NSH Acres
OXFORD FARM	69	0	0	69	N/A
PACE	139	0	0	139	N/A
PALIZZI	37	0	0	37	N/A
PARRISH	310	93	0	0	217
PARRISH II	242	56	36	0	150
PASQUAL	77	0	0	77	N/A
PECK	44	0	32	0	12
PECK LOT	4	0	0	4	N/A
PELLA CROSSING	149	0	26	65	58
PEPER TRUST	319	53	0	0	266
PEPPERTREE	2	0	0	2	N/A
PESCHEL	130	0	116	0	14
PETERSEN	0	0	0	0	0
PIAZZA	44	0	0	44	N/A
PIERCE	132	0	20	0	112
PLATT	169	0	44	54	71
POLSBY	58	0	0	58	N/A
PUMA 66	158	0	44	108	6
QUICKSILVER FARM	153	0	0	153	N/A
RABBIT MOUNTAIN	40	17	0	0	23
RAMEY	20	0	0	20	N/A
RANCH AT CLOVER BASIN	8	0	0	0	8
RED FOX HILLS	14	0	11	0	3
RIVERSIDE RANCH	102	0	0	0	102
ROBERTS (SIMI)	55	0	38	0	17
ROCK CREEK FARM	967	99	291	431	146
ROCKY MOUNTAIN FUEL 2	153	0	0	153	N/A
ROCKY MOUNTAIN FUEL 3	155	0	0	155	N/A
ROGERS GROVE (TOXVARD)	9	0	0	9	N/A
ROSS	75	0	0	75	N/A
RUSSELL-ANDERSON-SCHMIDT	11	0	3	1	7
RUTH ROBERTS PARK	374	0	194	0	180
RUTH ROBERTS PARK (PARCEL 11)	37	0	31	0	6
SADAR	48	0	0	48	N/A
SANTISTEVAN	1	0	0	0	1
SCHMIDTMANN	3	0	0	0	3
SCRIFFINY	96	64	10	0	22
SERRANO	20	0	11	0	9
SHERWOOD	441	141	0	0	300

Property Name	Total Acres	HCA Acres	MOA Acres	NPD Acres	NSH Acres
SHUBERT	29	0	0	29	N/A
SISTERS OF ST FRANCIS	144	0	0	144	N/A
SIX-MILE FOLD	20	0	2	0	18
SKAGGS FAMILY FARM	0	0	0	0	0
SMITH (JOE)	96	0	0	96	N/A
SMITH MEADOW LANE	0	0	0	0	0
SOMBRERO RANCH	9	0	0	9	N/A
SOMERSET	11	0	0	11	N/A
SOUTHDOWN INDIAN MOUNTAIN	531	57	0	0	474
SPATH	159	100	0	0	59
SPRINGHILL	1	0	1	0	0
STANTON	47	2	0	0	45
STEAMBOAT MOUNTAIN	284	0	0	0	284
STEEN (MARK)-BOSS OF THE HILL	1	0	0	0	1
STEPHENSON NELSON	164	0	98	0	66
STINN	138	0	0	138	N/A
STONE	0	0	0	0	0
STRAWBERRY HOLDINGS	69	0	0	69	N/A
STRAWBERRY HOLDINGS II	79	0	0	79	N/A
STROMQUIST FARMS	221	0	0	221	N/A
SUITTS	140	0	25	104	11
SWANSON (ADELIA)	103	0	0	103	N/A
SWANSON (MARVIN)	337	0	0	337	N/A
TELLEEN	944	524	0	0	420
THE HOMESTEAD	2	0	0	0	2
THOMPSON (DAN)	38	0	2	17	19
THOMPSON (J & T)	32	0	19	0	13
THOMPSON (TOMMY)	128	0	79	0	49
TINSLEY	20	0	0	0	20
TOTEVE	80	0	0	80	N/A
TREVARTON	481	7	0	0	474
TRILLIUM	143	0	50	93	0
TURNER	50	0	0	0	50
TURUNJIAN	58	0	0	58	N/A
TWIN CORNERS	234	0	0	234	N/A
TWIN LAKES	17	0	0	16	1
TWIN LAKES II	21	0	0	21	N/A
USFS EXCHANGE - GOLDHILL	37	0	0	0	37
VALLEY INVESTMENTS	118	0	100	0	18

Property Name	Total Acres	HCA Acres	MOA Acres	NPD Acres	NSH Acres
VERHEY	154	0	66	0	88
VICKLUND	67	0	0	67	N/A
VON REYN	161	0	0	161	N/A
WALDEN PONDS WILDLIFE HABITAT	0	0	0	0	0
WALKER RANCH	799	0	0	0	799
WALKER TRUST	31	0	0	31	N/A
WALL STREET LOTS	0	0	0	0	0
WALLACE	7	0	0	7	N/A
WAMBSGANSS	156	0	0	156	N/A
WARD-HILLCREST HEIGHTS	2	0	0	2	N/A
WAREMBOURG	216	0	29	160	27
WAREMBOURG-LAFAYETTE FARM	106	0	0	106	N/A
WARNER	157	0	0	157	N/A
WASHAM	78	0	0	78	N/A
WASSON	85	0	0	85	N/A
WATERFORD 3	2	0	0	2	N/A
WESTERN MOBILE	351	0	194	43	114
WESTERN MOBILE LAKE 4	37	0	4	0	33
WESTPHAL	0	0	0	0	0
WHITE	20	0	0	0	20
WILDVIEW (HILLCREST HEIGHTS)	24	0	0	24	N/A
WILKIE	35	0	0	35	N/A
WILLIAMS (RUSSEL & LAFAUNN)	1	0	0	0	1
WILLIS HEIGHTS	3	0	0	3	N/A
WILLOWS	11	0	4	0	7
WINTER	95	0	0	95	N/A
WINTERVIEW	0	0	0	0	0
WISE	70	0	0	70	N/A
WISE (SLIVER)	0	0	0	0	0
WOLCOTT	1	0	0	0	1
WOLF RUN	162	0	51	48	63
WOOD-NW PKWY	6	0	0	6	N/A
WYN	63	0	0	0	63
ZAHARIAS-THOMAS	382	63	0	0	319
ZENOBIA	10	1	0	0	9
ZIMDAHL	76	0	0	76	N/A
Total Acreages	**46,836**	**3,326**	**4,419**	**17,198**	**21,893**

Appendix D: Prairie Dog Management Acreage of New Acquisitions (2009 - 2011)

Habitat Conservation Areas

PROPERTIES	ACRES
HALL 2	15
TOTAL	**15**

Multiple Objective Areas

PROPERTIES	ACRES
LOUKONEN HILL	15
TOTAL	**15**

No Prairie Dogs

PROPERTIES	ACRES
SADAR	48
PASQUAL	77
ZIMDAHL	75
HYGIENE DAIRY	29
LOUKONEN – DAIRY FARM	257
AHI	379
VICKLUND	66
WISE	.43
WALKER TRUST	30
TOTAL	**961.43**

Appendix E: Non-Suitable Habitat Definition and Areas

- Slope 10% or less
- Fee properties (COS, JOS, or Suitts CE) 7,000 feet or less
- No wetlands (United States National Vegetation Classification (USNVC) vegetation mapping data, Wright Water Engineers data, BCPOS wetland mapping data)No riparian areas (CPW riparian data)
- No rare plants or rare plant alliances[5]/communities with a Colorado Natural Heritage Program (CNHP) ranking of G3 S3 or rarer:
  - Bell's twin pod (*Physaria bellii*): G2G3 S2S3 (BCPOS rare plant mapping data-polygons and points buffered 20 feet)
  - No tallgrass prairie or other sensitive grasslands (USNVC vegetation mapping data correlated with CNHP rare plant communities), which excludes the following rare plant communities:
    - Needle-and-threadgrass (*Hesperostipa comata*): G1G2 S1S2
    - Big bluestem Xeric tallgrass prairie, Big bluestem-yellow indiangrass[6] (*Andropogon gerardii-Sorgastrum nutans*): G2 S1S2
    - Indian ricegrass (*Achnatherum hymenoides*): G2 S2
    - New mexico feathergrass (*Hesperostipa neomexicana*): G3 S3
    - Little bluestem (*Schzachrium scoparium*)-sideoats grama (*Bouteloua curtipendula*): G3S2 at Wolf Run property only.
      Note: this plant community is thought to have been xeric tallgrass prairie prior to prairie dogs removing the tallgrass prairie component.
- No Forests, Woodlands, Shrublands (USNVC vegetation mapping data)
- No Lakes (USGS lakes data)
- Suitable soils (excludes rock outcrop, gravel, or terrace escarpments)

5 USNVC Alliances were corresponded with appropriate CNHP plant communities.
6 The big bluestem Xeric tallgrass prairie alliance was not created in the USNVC system at the time of BCPOS vegetation mapping. The big bluestem-yellow indiangrass alliance mapped on BCPOS corresponds to this newly developed locally unique alliance.

Appendix F: Suitable Acreage and HCA Specifics for 2012

(Fee-simple acquisitions, only properties within prairie dog habitat range)

Suitable Acres

Management Category	1998 Grassland Acreage	1998 Suitable Habitat	2005 Grassland Acreage	2005 Suitable Habitat	2011 Grassland Acreage	2011 Suitable Habitat
HCA	8,141	2,883	9,139	3,296	9,466	3,326
MOA	3,360	2,543	4,593	4,005	5,215	4,419
Total Potential Habitat (HCA & MOA)	**11,501**	**5,426**	**13,732**	**7,301**	**14,661**	**7,745**
NPD	11,095		16,284		17,853	

- The suitable habitat acres for 1998 and 2005 were obtained using the habitat suitability criteria developed for the 2012 update of the Prairie Dog Habitat Element.

HCA Property Details 2012

HCA Property Group	Total Acres	Grassland Acres	NSH Acres	NPD Acres	MOA Acres	Suitable HCA Acres
Heil Valley Ranch	6,790	**1,475**	6,659	18	0	**113**
Cemex Silica Quarry, Hall Ranch 2, Heil Valley Ranch, Loukonen Outlots, North Pointe, Trevarton						
Hall Ranch	3,939	**996**	3,719	0	0	**220**
Forsberg (Bob), Hall Ranch, Hall Ranch 2, Mack, Stanton, Musser						
Rabbit Mountain	3,112	**2,226**	2,208	0	36	**868**
Brand, Dollaghan, Hepp, Hicks, Motley, Parrish, Parrish II, Peper Trust, Rabbit Mountain, Sherwood, Spath, Zenobia						
Southeast Buffer	2,752	**2,591**	1,476	0	0	**1,276**
Bouton (Maurice & Mary), Carlson-Lasktoka, Erin Arsenault, Scriffiny, Lindsay, Mayhoffer, Mayhoffer II, Telleen, Zaharias-Thomas*						
Rock Creek Farm	1,775	**415**	232	862	582	**99**
Rock Creek Farm						
Dowe Flats	1,481	**859**	882	0	293	**306**
Dowe Flats, Cemex Stone Canyon, Neal, Southdown Indian Mountain						
Beech*	1,232	**904**	788	0	0	**444**
Beech, Beech II						
TOTAL ACRES	**21,081**	**9,446**	**15,964**	**880**	**911**	**3,326**

*The Beech properties and Telleen properties were purchased in cooperation with the City of Boulder Open Space and Mountain Parks (OSMP). OSMP manages and maintains these properties and, as such, their prairie dog management program is in effect on these properties.

Appendix G: Prairie Habitat Restoration Acres

Time	Property	Initiation Year	Property Size	Approx. Acres For Restoration
Past:	Hillside Estates	1988	142	80
Present:	Tommy Thompson complex	1996	197	184
	Spath (Rabbit Mountain)	1999	158	88
	Flagg Properties	2000	149	56
	APF	2003	88	79
	Imel/Northwest Parkway	2004	45	41
	Cito Company	2003	147	40
	Dowe Flats/CEMEX (east)	2005	372	290
	Archdiocese of Denver	2005	199	135
	Liley	2005	212	145
	Platt	2006	168	30
	Ruth Roberts	2006	412	337
	Loukonen Outlots	2007	220	21
	Olsen	2007	93	39
	Valley Investments	2008	118	111
	Corona Hill (Hall Ranch)	2009	3,485	26
	Jafay	2009	80	80
	Carlson-Lastoka/Scriffany	2009	121	33
	Monarch	2010	105	16
	Mountain View Egg Farm	2011	140	33
Total Potential Restoration Acres				**1864**

Notes:
Flagg properties includes Flagg, McClain, Serrano, Madrigal, Armstrong, Haselwood, and Lafayette Buffer parcel.

Spath Property: Although considered part of Rabbit Mountain, the acreage is just on the Spath parcel.

Thompson complex-includes Thompson (Jerry Lynn), Butler, Thompson (Tommy) and Roberts (Simi)-only parcels to the west of 120th.

Appendix H: Prairie Dog Related Resource Surveys

Appendix H consists of annual wildlife surveys conducted by Boulder County Parks and Open Space, BCPOS volunteers, and partners as well as "Synthesis of Observations to Date on Effects of Prairie Dogs on Vegetation of Boulder County Open Space: 2001 to 2011". The appendix is located online and can be accessed from the following address:

Wildlife Reports: http://www.bouldercounty.org/os/openspace/pages/wildlife.aspx

Vegetation Surveys: http://www.bouldercounty.org/os/culture/posresearch/2012pdog.pdf

Appendix I: Relocation Methods and Procedures

- All potential relocations will undergo the process outlined by the CPW regarding these efforts. A relocation application will be submitted, which requires a thorough description of the receiving and capture sites, as well as ensures appropriate public outreach. In addition, all proposed receiving sites will be assessed by CPW personnel for appropriateness based on their outlined criteria.

- BCPOS will conduct relocations starting July 1, and ending no later than September 15, annually, as needed. By starting relocation efforts no sooner than July, juvenile and female survivorship is maximized (Jacquert et al. 1986). No relocation will be conducted after mid-September to allow for burrow acclimation and body conditioning for reduced winter foraging (Coffeen & Pederson 1986).

- Vegetation and habitat within receiving site meets the following minimum standards based upon data from at least four transects within each habitat type on the receiving site:
    - Average bare ground no more than 22% cover.
    - Average native species richness at least 18 species for native grasslands. Non-native grasslands, such as those dominated by crested wheatgrass (*Agropyron cristatum*) and Russian wildrye (*Psathyrostachys juncea)*, are excepted from this criteria.
    - Average relative cover[7] of perennial graminoid species at least 55%.

- Collection of prairie dogs from the capture site will occur using live trapping. Traps will be pre-baited for a minimum of 5 days. Other effective methods of capture (i.e. flushing) may be utilized on a case-by-case basis.

- If 15% or less of the suitable habitat within the HCA is occupied, relocations can occur. If more than 15% of suitable habitat within an HCA is occupied, no relocations will occur.

- Prairie dogs will be held for no more than 5 days, but priority will be given to transferring them on the day they are captured to the relocation site.

- Emphasis will be on capturing coteries as a group, but also on ensuring that a mixed group of adults and juveniles are relocated together (Shier 2006, Hoogland 2006).

- The minimum size of a relocation area is not pre-determined, but rather will be considered, among other criteria, by BCPOS staff on a case-by-case basis.

- The minimum number of prairie dogs to be relocated during each event shall be >60 (Robinette et al. 1995), although greater numbers may increase relocation success

7 Relative cover only looks at vegetative cover relative to a total of 100% cover. In contrast, absolute cover includes all aspects of cover, including bare ground, litter, rocks, etc. Most plant cover is reported as absolute cover, unless otherwise noted.

(Hoogland 2006; Dullem et al. 2005; Griffith et al. 1989; Roe & Roe 2003; Meaney 2001), particularly at areas without an existing active colony (Robinette et al 1995).

- Relocation to sites without burrows or historical occupancy will not be considered due to unacceptably low survival rates (Dullum and Durbian 1997.) Abandoned burrows indicate the presence of suitable vegetation and soils and may offer released animals immediate protection from predators (Jacquart et al. 1986, McDonald 1993) and dampen dispersal (Jacquart et al. 1986). Sites containing abandoned burrows will be selected based on site visits and historical knowledge of colony occurrence (i.e. recorded colonies and satellite imagery). The condition of pre-existing burrows will be assessed, and supplemental boring of burrow entrances may be conducted if deemed necessary. It is anticipated that prairie dogs will excavate even old, plugged burrow systems (Jacquart et al. 1986).

- A target release number of 4-7 prairie dogs per available burrow will be followed (Shier 2006), with the assumption that additional burrows will be constructed by the colony following release.

- Existing prairie dog colonies enhance the survivorship of relocated prairie dog colonies and there is no evidence of aggressive interactions causing relocation failure following two years of introduction (Coffeen & Pederson 2006), and therefore no buffer distance from an existing colony is required.

- Relocation efforts will not occur until at least one year has passed since the presence of active plague within the entirety of the HCA.

- Disease testing at capture site will occur to ensure no unintended negative impact to existing colonies at, or near a relocation site. Testing will entail collection of fleas to be tested for plague. Testing shall be coordinated with Boulder County Public Health.

- Disease prevention measures will occur via spraying or dusting all trapped prairie dogs intended for relocation. This is a requirement of the CPW for relocating prairie dogs in Colorado.

- HCAs will be priority relocation sites, although MOAs may be considered (see section 9.2.4).

- A program to track the retention of relocated prairie dogs (i.e. success) will be developed which may include assessment of relative abundance of relocated animals and percent occupancy of relocated burrows. Based on post-release monitoring, adaptive strategies may be implemented as necessary to ensure the greatest success in relocation efforts.

- Retention of prairie dogs upon relocation will occur using burrow “cap cages”, and supplemental food will be provided. The duration of this effort will be determined by site conditions, but will last no longer than 5 days.

- BCPOS will work closely with outside organizations to accomplish relocations. Relocation efforts are time and effort intensive, and the assistance of outside organizations with relocation skills will be essential for success.

- All relocation efforts result in some level of mortality, and even in natural processes, the mortality of prairie dogs ranges from 14-55% annually (Hoogland 2007). Therefore the final realized relocated population size will be less than the original numbers relocated.

Appendix J: Summary Responses to questions about Prairie Dogs in three public opinion surveys 1998, 2002, 2010

Prepared July 16, 2012 by Tina Nielsen

Dec 1998 Survey by Public Information Corporation

Q. 15. Prairie dogs have been in the news in Boulder County lately. I'll ask you some specific question about them in a minute, but first, please tell me what comes to mind when the subject of prairie dogs comes up?

Positive comments	35%
Neutral comments	23%
Negative comments	37%

Q 16. Have you personally seen prairie dogs in Boulder County in the past couple of years?

Yes	94%
No	5%
Not sure/NR	1%

Q. 17. News media reports quote some Boulder County residents as saying that prairie dogs are a nuisance and health hazard, and damage the land, and others as saying that prairie dogs are an important species in Boulder County's ecosystem and lifestyle. How do you feel?

Nuisance	33%
Important species	41%
Other	18%
DK/NR	8%

		Agree	Disagree	NR
Q. 18	Animals have rights, and prairie dogs are no exception	63%	32%	6%
Q. 19	City and county government has a responsibility to relocate prairie dogs as an alternative to eradication	50%	44%	6%
Q. 20	If prairie dogs are damaging the land, their population should be controlled	73%	19%	8%
Q. 21	Prairie dogs should be protected under Federal law as threatened species	20%	69%	11%
Q. 22	Prairie dogs do not merit any kind of Federal protection	52%	38%	10%

Q. 23 Who should pay costs of relocating?

Developers	61%
Tax dollars	2%
Don't worry about it	30%
DK/NR	7%

April 2002 Survey by National Research Center, Inc.

PRAIRIE DOGS

		Overall	Region of Boulder County: Boulder	Longmt	SE County
16. Do you think prairie dogs are…	A nuisance	36%	27%	46%	35%
	An important species	46%	54%	38%	45%
	Both a nuisance & important Species	4%	5%	2%	3%
	Other	4%	4%	3%	6%
	Don't know/no response	10%	10%	10%	11%
17a. City & County governments have a responsibility to relocate prairie dogs as an alternative to eradication..	Agree strongly	33%	34%	31%	35%
	Agree mildly	27%	26%	23%	30%
	Disagree mildly	18%	22%	14%	17%
	Disagree strongly	20%	15%	31%	15%
	Other	2%	3%	1%	3%
17b. If prairie dogs are damaging the land, their population should be controlled…	Agree strongly	43%	33%	54%	43%
	Agree mildly	34%	36%	29%	36%
	Disagree mildly	12%	18%	5%	11%
	Disagree strongly	8%	10%	10%	6%
	Other	3%	3%	2%	4%

Options to Control Prairie Dog Population

		Overall	Region of Boulder County: Boulder	Longmt	SE County
*Using captured prairie dogs in endangered species programs; feeding to black-footed ferrets or to birds of prey/raptor rehab programs.	Support strongly	41%	43%	40%	39%
	Support mildly	32%	31%	31%	32%
	Neither support nor oppose	7%	5%	5%	11%
	Oppose mildly	7%	8%	7%	5%
	Oppose strongly	11%	10%	14%	11%
	No opinion/response	2%	3%	3%	2%
*Relocating prairie dogs at a cost of about $75 to $100 per prairie dog if about half of them survive relocation.	Support strongly	8%	9%	6%	10%
	Support mildly	23%	26%	17%	25%
	Neither support nor oppose	9%	7%	8%	12%
	Oppose mildly	19%	21%	16%	20%
	Oppose strongly	39%	36%	52%	32%
	No opinion/response	2%	2%	2%	2%

			Region of Boulder County		
		Overall	Boulder	Longmt	SE County
*Poisoning prairie dogs at a cost of about $5 to $10 per prairie dog.	Support strongly	11%	5%	16%	13%
	Support mildly	19%	23%	18%	15%
	Neither support nor oppose	7%	3%	10%	8%
	Oppose mildly	15%	15%	14%	17%
	Oppose strongly	46%	52%	41%	44%
	No opinion/response	2%	2%	1%	2%

			Region of Boulder County		
AG LAND IMPORTANCE & PRAIRIE DOGS		Overall	Boulder	Longmt	SE County
			Boulder	Longmt	SE County
*Preserving the productivity of ag lands	Very important	53%	47%	65%	49%
	Fairly important	35%	36%	29%	39%
	Not very important	8%	13%	3%	8%
	Not at all important	2%	2%	2%	2%
	No opinion/no response	2%	2%	2%	2%
*Providing prairie dog habitat	Very important	16%	17%	12%	18%
	Fairly important	36%	39%	34%	35%
	Not very important	27%	28%	25%	26%
	Not at all important	19%	12%	25%	19%
	No opinion/no response	3%	4%	4%	2%
*When there is a conflict between existing ranching and farming operations on open space and prairie dogs, which is more important..	Preserve ranching & farming ops	76%	65%	87%	87%
	Provide habitat for prairie dogs	13%	20%	7%	7%
	No opinion/no response	11%	15%	6%	6%

2010 Survey by Talmey-Drake

15. I will now read you two statements about different uses of Boulder County open space land. After I read each one, please tell me if that use if very important to you, fairly important, not too important or not at all important.

	Important		Not important		
	Very	fairly	not too	not at all	DK/NS
a. Preserving the productivity of agricultural lands					
May 2010	43%	39%	11%	5%	2%
2002	53%	35%	8%	2%	2%
b. Providing prairie dog habitat					
May 2010	13%	39%	11%	5%	2%
2002	13%	35%	8%	2%	2%

16. When there is a conflict between existing ranching and farming operations on Boulder County open space and prairie dogs, which is more important, preserving ranching & farming operations or providing habitat for prairie dogs?

	May 2010	2002
Preserving ranching and farming operations	73%	76%
Providing habitat for prairie dogs	16%	13%
DK/NS	11%	11%

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