CONSERVATION PLAN FOR GRASSLAND SPECIES IN COLORADO

COLORADO DIVISION OF WILDLIFE AND
COLORADO GRASSLAND SPECIES WORKING GROUP
APPROVED BY CDOW DIRECTOR RUSSELL GEORGE
NOVEMBER 2003

STATE OF COLORADO

Bill Owens, Governor
DEPARTMENT OF NATURAL RESOURCES

DIVISION OF WILDLIFE

AN EQUAL OPPORTUNITY EMPLOYER

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For Wildlife-
For People

November 26, 2003

To All Concerned About Colorado Grassland Species and Habitats:

It is with pleasure that I sign and present the Conservation Plan for Grassland Species in Colorado. This landmark multi-species plan will guide the Colorado Division of Wildlife's (CDOW) management of grassland areas and associated wildlife species (black-tailed prairie dog, swift fox, Ferruginous Hawk, Mountain Plover and Burrowing Owl) for the foreseeable future.

Joining the plans of the 10 other states that comprise the black-tailed prairie dog's range, Colorado's Plan is also part of the foundation of the multi-state Range-wide Black-tailed Prairie Dog Plan. All of these plans, which outline necessary surveying, monitoring and management objectives, are aimed at providing for the continued existence of the black-tailed prairie dog and thereby removing the need for this species to be listed under the Federal Endangered Species Act. The Plan also considers the needs of people – economics, tourism, development and private land concerns.

Colorado's 2002 black-tailed prairie dog survey, which was called for in the Plan and completed while the Plan was in progress, showed the state to have 631,000 acres of occupied black-tailed prairie dog range, a figure much higher than many had thought. The Plan calls for continued monitoring at regular intervals in the future.

I am indebted to the 18-member working group representing the interest areas of agriculture, development, environment, local government and agencies, who met monthly for a year and a half to forge the first Plan draft. I also appreciate the individuals and organizations that took time to review and comment on the Plan. I again thank the working group for considering and incorporating comments into the final copy attached to this letter. This plan will be dynamic, with periodic evaluation and adjustment in response to changes in grassland habitat conditions and wildlife populations.

I hereby approve the Conservation Plan for Grassland Species in Colorado on this 26th day of November, 2003.

Russell George

Russell George, Director
Colorado Division of Wildlife

BIBLIOGRAPHIC CITATION

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ACKNOWLEDGMENTS

The Colorado Division of Wildlife (CDOW) sincerely appreciates the time and effort that members of the Grassland Species Working Group (Working Group) devoted to developing this document. The goal, objectives and actions outlined in this plan were developed by the Working Group who met monthly starting in July of 2002 until the plan was completed in November of 2003. Working Group members include:

Name	Representing
Kim Burgess	Colorado Division of Wildlife - Policy and Regulation Manager
Dave Carlson	Colorado Department of Agriculture
Miles Davies	Colorado Cattlemen's Association
Mark Frasier	Colorado Livestock Growers Association
Catherine Johnson	National Wildlife Federation
Bob Leachman	US Fish and Wildlife Service
Jim McKee	Boulder County Nature Association
Pat Melhlop	US Fish and Wildlife Service
Susan Miller	Private Consultant – Wild Places
Ken Morgan	Colorado Division of Wildlife – Private Lands Coordinator
Rob Nanfelt	Colorado Association of Home Builders
Chris Pague	The Nature Conservancy
Francie Pusateri	Colorado Division of Wildlife – Grassland Species Coordinator
Chris Roe	Private Consultant – Roe Ecological Services
Carl Stogsdill	Colorado Farm Bureau
John Stulp	Prowers County Commissioner, State Land Board Member
Ted Toombs	Environmental Defense
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The Introduction and Background sections of the plan, as well as species accounts for the black-tailed prairie dog and swift fox were prepared by Chris and Kelly Roe of Roe Ecological Services, under contract to CDOW. Species accounts for the Mountain Plover, Burrowing Owl and Ferruginous Hawk, as well as recommendations of conservation strategies for grassland bird species, were prepared by Lee Grunau of Colorado Natural Heritage Program at Colorado State University, under contract to the CDOW.

CONSERVATION PLAN
FOR GRASSLAND SPECIES IN COLORADO

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EXECUTIVE SUMMARY

The shortgrass prairies of eastern Colorado have been an important component in our State's agricultural productivity, ecological diversity and unique character for more than 150 years. Early settlers of this region found a vast sea of productive grasslands suitable for raising livestock and a variety of wildlife species ranging from the black-tailed prairie dog (*Cynomys ludovicianus*) and Mountain Plover (*Charadrius montanus*), to herds of American bison (*Bison bison*), elk (*Cervus elaphus*), deer (*Odocoileus* spp.) and pronghorn (*Antilocapra americana*). Although livestock production remains high throughout most of the region, much has changed within the last century. Conversion of native grasslands to agricultural cropland and urban development has altered the look and character of the shortgrass prairie region. This alteration and fragmentation has changed the level of wildlife diversity once supported by the landscape. Concern has grown over the past several years for the long-term sustainability, diversity and integrity of many components of the shortgrass prairie grassland ecosystem. The Conservation Plan for Grassland Species in Colorado (Plan) offers objectives and actions for the conservation of the black-tailed prairie dog and associated shortgrass prairie species in Colorado. It focuses on high quality science, development of partnerships, voluntary non-regulatory incentives, and uses an adaptive management approach. This includes a continuous process of planning, acting, monitoring and evaluating designed to take into account changes in ecological and social systems, identify and evaluate new information, and make adjustments in actions to achieve specific goals and objectives.

GOAL OF THE PLAN

"The goal of the Plan is to ensure, at a minimum, the viability of the black-tailed prairie dog and associated species (Mountain Plover, Burrowing Owl, swift fox and Ferruginous Hawk) and provide mechanisms to manage for populations beyond minimum levels, where possible, while addressing the interests and rights of private landowners."

Objective 1: Meet occupied acreage and distribution target objectives as defined for Colorado in "*A Multi-State Conservation Plan For The Black-tailed Prairie Dog, Cynomys ludovicianus, in the United States, Addendum to the Black-tailed Prairie Dog Conservation Assessment and Strategy*" (Luce 2003).

Colorado currently exceeds all acreage and distribution target objectives defined in "*A Multi-State Conservation Plan For The Black-tailed Prairie Dog, Cynomys ludovicianus, in the United States, Addendum to the Black-tailed Prairie Dog Conservation Assessment and Strategy*" (Luce 2003). A tiered approach to defining actions for black-tailed prairie dog conservation was developed based on active occupied acreage. Current conditions are described and zones are defined based on a range of active acres for the black-tailed prairie dog. (See Table 3.) Zones are assigned colors and

descriptors based on active occupied acreages starting with the Blue Zone – Abundant (> 450,000 acres) to the Red Zone – Danger (< 150,000 acres). In general, when population levels are at or beyond the Green Zone – Secure (350,000 – 450,000), there are no or minimal restrictions or required actions. Actions focus on voluntary, non-regulatory, incentive-based partnerships with public and private landowners, ongoing monitoring and analysis, and implementation of management actions when populations drop below 250,000 acres.

Objective 2: The Colorado Division of Wildlife (CDOW) will continue its efforts to produce, encourage and support the best available science regarding monitoring long-term population trends and distribution of shortgrass associated species.

Data are inadequate to define specific target objectives for shortgrass associated species including the Mountain Plover, Burrowing Owl, Ferruginous Hawk, and swift fox. Population trend data are available for a number of grassland bird species. In many cases, however, data are inadequate for monitoring birds with broad distribution and low population densities. Standardized methodologies are being developed to estimate long-term population trends and distribution. This data will allow managers to identify populations or areas experiencing declines, evaluate reasons for declines and better identify areas for conservation.

Objective 3: Recognizing that private landowners provide critical habitat and act as stewards to the land supporting populations of the black-tailed prairie dog and other shortgrass associated species, voluntary, incentive-based, non-regulatory partnerships with private landowners will be used to ensure the conservation and management of these species and their habitats in Colorado.

Conservation efforts focus on providing secure, quality habitat in eastern Colorado to support viable populations of the black-tailed prairie dog and shortgrass associated species including the Mountain Plover, Burrowing Owl, Ferruginous Hawk, and swift fox. The concept of habitat conservation as envisioned in the Plan includes a broad suite of proven conservation tools including working with willing landowners to establish easements and/or management agreements, providing technical assistance on habitat improvements and developing partnerships with private landowners and other agencies/organizations with an interest in shortgrass prairie conservation. The Plan encourages the use of existing incentive programs: Conservation Reserve; Conservation Reserve Enhancement; Grassland Reserve; Wildlife Habitat Incentives; and Environmental Quality Incentives Program through USDA. In addition, the Plan calls for an increased focus on Colorado Species Conservation Partnership Program, Protecting Colorado's Landscapes, and other habitat conservation programs.

Objective 4: Raise awareness of grassland conservation needs within the private and public sectors. Maintain healthy populations of grassland wildlife in conjunction with economic development and viability, and protection of property rights. Raise awareness for grassland wildlife of high conservation concern including: how to identify the species, habitat needs and management recommendations. Familiarize private landowners with different grassland habitat incentive programs including state, federal and non-profit partners with which they can work. Promote long-term conservation and sustainable use of grassland wildlife and their habitats.

Working with private and public landowners is an important component of the Plan. Most of the untilled shortgrass prairie is owned and managed by private operators. Providing conservation guidance and information on grassland species to land managers over large areas not only has direct benefits to shortgrass prairie species but also is additive to more focused and intensive strategies that are usually applied to secured areas. Raising awareness of shortgrass prairie conservation needs also helps build partnerships between private land managers and others interested in shortgrass prairie conservation, and helps maintain viable, sustainable agricultural producers in eastern Colorado. A good example of this is the Mountain Plover Nest Clearing Project, which encourages landowners to call a toll free number prior to tilling their fields.

Technicians then survey the field and mark Mountain Plover nests so landowners can avoid them. The goal of the project is to increase nest success for the Mountain Plover on tilled agricultural fields. The Mountain Plover Nest Clearing Project is being implemented through partnerships with private landowners, the CDOW, the US Fish and Wildlife Service (USFWS), the USGS Biological Resources Division, the Rocky Mountain Bird Observatory, the Colorado Farm Bureau, The Nature Conservancy, the Playa Lakes Joint Venture and the Colorado Natural Heritage Program at Colorado State University (See Appendix G).

Objective 5: Collaborate with Colorado Department of Agriculture (CDA) to demonstrate through law, regulation, or cooperative agreement adequate regulatory authority and regard for black-tailed prairie dog conservation objectives as it relates to the use of toxicants or shooting to control black-tailed prairie dogs causing damage to private property.

The federal Endangered Species Act (ESA) places a premium on the need to have a regulatory framework in place that will serve to prevent extinctions or further endangerment of species. This Plan calls for the development of a Memorandum of Understanding between the CDOW and CDA which outlines each agency's authorities and responsibilities regarding the use of toxicants to control prairie dogs in Colorado as it relates to the conservation objectives described within this Plan by July 2005.

Objective 6: Adaptive management, including a continuous process of planning, acting, monitoring and evaluating designed to take into account changes in ecological and social systems, identify and evaluate new information, and make adjustments in actions to achieve specific goals and objectives will be used.

Adaptive management was one of the guiding principles used in the formulation of this Plan. As ecological or social systems change, adjustments in the objectives and actions outlined in this Plan may be needed. Currently, monitoring systems for the black-tailed prairie dog are on a 3-year schedule. By fall 2006, a technical committee will be selected to review new research information and analyze monitoring data as it is collected, identify changes that would move acreage and distribution targets from one zone to another and make recommendations to decision makers regarding the changes in management necessary to maintain viable shortgrass species populations.

Objective 7: The CDOW will initiate, continue ongoing and stimulate new research to identify and minimize, eliminate, or mitigate causes for declines when possible for short grass associated wildlife species.

The Plan calls for a strong research agenda that will support the commitment to adaptive management and effective strategies. It also includes a scientifically rigorous monitoring program. Such a program will evaluate changes in key areas of biology and allow for change of actions in a meaningful timeframe. In addition, this Plan calls for the collection of information that allows for the evaluation of cumulative impacts that result from multiple factors.

Objective 8: The CDOW will encourage significant contributions from publicly owned lands, particularly the National Grasslands, toward grassland species conservation and work with federal, state, county and municipal partners to support these efforts.

Significant shortgrass prairie habitat, which supports grassland-associated species in Colorado, is publicly owned and administered. While the State of Colorado cannot mandate how other federal, state, county and city governments manage wildlife habitat on their property, the Plan outlines recommended actions and encourages significant contributions from publicly owned lands, particularly the USDA Forest Service National Grasslands.

Objective 9: The CDOW will encourage the acquisition and management of city and county open space on suitable grassland habitat along the front range for the conservation of the black-tailed prairie dog and associated grassland species.

The black-tailed prairie dog and associated species that are the focus of this Plan reside in the greatest numbers on Colorado's eastern plains. As a result, many of the conservation objectives and strategies outlined in this Plan are focused on Colorado's eastern plains. Even so, the black-tailed prairie dog and associated species reside along the front range in urban areas and within the urban/rural interface. These species have considerable value for front range residents. The black-tailed prairie dog, Ferruginous Hawk and other associated species are valued not only as contributors to ecological balance in the ever-changing front range landscape, but also have inherent value as individual animals and are the focus of a wide range of wildlife viewing opportunities. While the biological significance of front range populations of the black-tailed prairie dog is limited with regard to the overall conservation of the species, conservation actions must consider the ecological impacts of changes in habitat and population numbers and the added social relevance of these species for people along the front range.

Objective 10: Establish shared responsibility (front range and eastern plains) for conservation of the black-tailed prairie dog and associated species.

The black-tailed prairie dog populations along the front range contribute to the statewide acreage and distribution target objectives defined in this Plan. Actions outlined in the Plan call for developing mechanisms for front range interests (developers, non-profit organizations, etc.) to mitigate the loss of prairie dog habitat along the front range and provide support for shortgrass prairie habitat conservation in eastern Colorado.

Objective 11: Support and encourage public education and wildlife viewing opportunities on suitable black-tailed prairie dog and grassland open space areas.

Public outreach will be a necessary part of the conservation effort along the front range for shortgrass prairie species. Raising awareness for grassland wildlife of high conservation concern including impacts to species by fragmentation, overall habitat needs and conservation objectives will be important in gaining support for additional open space lands, building mechanisms for mitigation, developing management strategies for open space lands and so forth.

Objective 12: The CDOW will work towards developing substantial increases in funding necessary for the conservation of grassland species in Colorado.

Traditional funding for species conservation work in Colorado includes three primary sources: Great Outdoors Colorado (GOCO), Species Conservation Trust Fund (SCTF) and Game Cash (GC), generated from the sale of hunting and fishing licenses. As this conservation Plan and others like it are completed and implementation begins, it is apparent that substantially more funding will be needed in the future. This argues for seeking a new funding source. This Plan calls for pursuing partnerships with other federal, state, county and municipal agencies, private foundations, private landowners and non-governmental organizations to increase funding for the conservation of grassland species and develop innovative ideas for funding of grassland species conservation in Colorado.

In summary, this conservation Plan outlines a conservation strategy for select shortgrass prairie species in Colorado and does so in the framework of commitment to the people making a living off of the land, adaptive management, high quality science and by fostering the institutional commitments of lead agencies and key partners. A fundamental part of this Plan is the development of habitat goals for the black-tailed prairie dog while at the same time committing to a larger conservation effort that supports the associated species as well as other elements of Colorado's natural heritage.

INTRODUCTION

The shortgrass prairie grassland region of the central United States has been an important component in our Nation's agricultural productivity, ecological diversity and unique character for more than 150 years. Across North America, this region stretches from southern Canada to northern Mexico, from the foothills of the Rocky Mountains to western portions of the Dakotas, Nebraska, Kansas, and Oklahoma. In the United States, this region occupies land found in eleven different western and central plains states - Montana, Wyoming, North Dakota, South Dakota, Nebraska, Colorado, Kansas, New Mexico, Oklahoma, Arizona and Texas.

Early settlers in this region found a sea of productive grasslands suitable for raising livestock and a vast array of wildlife species ranging from the black-tailed prairie dog (*Cynomys ludovicianus*) and prairie chicken (*Tympanuchus* spp.), to herds of American bison (*Bison bison*), elk (*Cervus elaphus*), deer (*Odocoileus* spp.) and pronghorn (*Antilocapra americana*). Although livestock production remains high throughout the region, much has changed within the last century. Conversion of native grasslands to agricultural cropland and urban development has changed much of the look and character of the shortgrass prairie region. This alteration and fragmentation of the landscape has changed the level of wildlife diversity once supported.

Because of these changes, concern has grown over the past several years for the long-term sustainability, diversity and integrity of many components of the shortgrass prairie grassland ecosystem. From Canada to Mexico numerous agencies, organizations and individuals are working toward long-term conservation of the shortgrass prairie ecosystem. In Colorado, the federally endangered black-footed ferret has been extirpated. Three additional mammal and 24 bird species (Rocky Mountain Bird Observatory staff, pers comm. 2003) found within the shortgrass prairie are in some way categorized as species in need of conservation assistance. While some of these species are officially listed for protection and recovery under the ESA, many are species of conservation concern with some being candidates for listing in the near future.

In order to preclude the need for formal listing of these species under the ESA, state wildlife and natural resource agencies are taking a proactive approach to conservation and recovery of candidate species and species of special conservation concern. In June 2002, CDOW Director Russell George appointed a Working Group charged with developing a draft grassland species conservation plan for the black-tailed prairie dog and associated species. The Working Group was made responsible for consensus recommendations, an interim and final draft conservation plan, and reviewing and considering feedback from interested agencies, organizations and individuals. The Working Group is made up of representatives from the following interests: agricultural, animal welfare, conservation, economic and governmental.

This conservation Plan is the result of work by the Colorado Grassland Species Conservation Working Group. This Plan offers direct actions for the conservation of the black-tailed prairie dog and associated species in Colorado. This conservation Plan uses an adaptive management approach that includes new science and understanding of conservation allowing for flexibility in responding to changing conditions, either in the status of the black-tailed prairie dog and associated species populations, or social and economic circumstances.

BACKGROUND

Colorado's Conservation Effort

In 1998, the National Wildlife Federation (NWF) and the Predator Conservation Alliance along with the Biodiversity Legal Foundation and Jon Sharps filed two separate petitions to the United States Fish and Wildlife Service (USFWS) to list the black-tailed prairie dog as threatened under the ESA (USFWS 1999). Those petitions listed several factors as major threats to the long-term viability and conservation of this species. Included were habitat loss, unregulated shooting, unregulated poisoning, the lack of regulatory control over shooting and poisoning, disease, and

combinations of these and other factors (USFWS 1999, Luce 2003). In February of 2000, the USFWS's 12-month finding was that the black-tailed prairie dog was warranted but precluded for listing under the ESA (USFWS 2000) as resources needed to complete the process were not available. The factors that were considered as part of the threat analysis under the ESA relative to the black-tailed prairie dog were identified in the USFWS's 12-month finding and (in order of listing) included:

1. The present or threatened destruction, modification, or curtailment of its habitat or range;
2. Over-utilization for commercial, recreational, scientific, or educational purposes;
3. Disease or predation;
4. Inadequacy of existing regulatory mechanisms;
5. Other natural or man-made factors affecting its continued existence.

In response to the petitions, the 11 states located within the range of the black-tailed prairie dog began a multi-state conservation effort by forming the Interstate Black-tailed Prairie Dog Conservation Team (Conservation Team) (Luce 2003). The belief was that a multi-state conservation effort would be more effective in providing long-term conservation and management of this species than federal listing under the ESA or individual state planning efforts. If accepted by the USFWS as the best approach for long-term conservation, the 11 states' management and conservation efforts could effectively eliminate the need for listing of the black-tailed prairie dog and remove it from the ESA candidate list. Although an active participant in the Conservation Team, Colorado did not officially sign on to the multi-state conservation Memorandum of Understanding (MOU). Rather than develop a single-species black-tailed prairie dog conservation plan, Colorado wildlife officials determined that a comprehensive, multi-species plan could better address the common conservation issues among a variety of shortgrass prairie species.

During the time of the formation of the Conservation Team, the CDOW and others believed Colorado had significantly more acres of active black-tailed prairie dogs throughout their historic range than originally estimated in studies by the NWF and the USFWS. Both entities estimated Colorado's active occupied acres of the black-tailed prairie dog to be less than 100,000 acres; the NWF cited studies by Knowles that found approximately 44,000 occupied acres (Knowles 1998) while the USFWS cited studies that estimated approximately 93,000 active occupied acres (USFWS 2000). After the USFWS published the results of their 12-month finding on the petitions in February of 2000, within which they listed the black-tailed prairie dog as "warranted but precluded," the Colorado Department of Natural Resources (CDNR) contracted EDAW, Inc. to conduct a "Black-tailed Prairie Dog Study of Eastern Colorado" (EDAW 2000). The objective of this project was to contact species experts around the state to locate all current data sources on the black-tailed prairie dog in Colorado and assemble all existing inventory data, which when field verified, could serve as baseline data for the species concerning the distribution and number of active occupied acres of the black-tailed prairie dog in Colorado.

EDAW (2000) reported an estimated minimum of 214,570 active occupied acres of black-tailed prairie dogs in eastern Colorado. Because the EDAW report was only to provide baseline information, and because the report indicated more than double the active occupied acres the USFWS estimated, the CDOW initiated a complete aerial survey of the black-tailed prairie dog acres throughout its entire historic range within Colorado in the summer of 2001. This survey was completed using aerial survey techniques described by Sidle et al. (2001).

In that same year, the CDOW signed an MOU with other state and federal agencies including: CDA, CDNR, Colorado State University Cooperative Extension, Colorado State Land Board of Commissioners, USDA APHIS Wildlife Services, US Bureau of Land Management, US DOD Fort Carson, US Environmental Protection Agency, USFWS and USDA Forest Service. The primary goal of the MOU was to "Develop and implement a program that achieves conservation of the black-tailed prairie dog in Colorado while recognizing that control is necessary and appropriate in

areas where prairie dogs conflict with agriculture and other human activities." A working group (MOU Group) made up of signatory agencies was created and over time expanded to include interested citizens, representatives of various conservation organizations and special interest groups. This MOU Group continued to meet periodically to share ideas concerning conservation efforts for the black-tailed prairie dog in Colorado and to receive updates as to the latest information and activities the CDOW and others were doing for prairie dog conservation. As an active extension of this MOU Group, the CDOW developed the Working Group in July of 2002. Members of the Working Group were appointed by the Director of the CDOW based on nominations received from members of the MOU group. The Working Group is made up of individuals from the CDOW, the USFWS, the CDA, the Colorado Farm Bureau, the Colorado Cattleman's Association, the Colorado Livestock Growers Association, the Nature Conservancy, the Rocky Mountain Bird Observatory, the NWF, the Boulder County Nature Association, the Colorado Association of Home Builders and representatives of the State Land Board and County Commissioners, Roe Ecological Services (a private wildlife consulting company) and prairie dog advocacy groups. This Working Group was responsible for developing Colorado's Draft Grassland Species Conservation Plan and met monthly starting in July of 2002, continuing through October of 2003 to discuss ideas and develop the goals and management strategies that will be used to ensure the long-term conservation of the black-tailed prairie dog and other associated species within Colorado's shortgrass prairie region.

In addition to the development of the Working Group in the summer of 2002, the CDOW completed the aerial survey initiated in 2001. Results of this survey indicated that Colorado currently has 631,102 total occupied acres of the black-tailed prairie dog ± 60,000 acres with a 95% confidence interval throughout the species' historic range (White et al. 2003) (See Table 1). Because the majority of these active acres reside on private lands, the CDOW and the members of the Working Group felt there was a tremendous opportunity and obligation to coordinate grassland species conservation efforts through voluntary, incentive-based conservation partnerships. By creating cooperative, voluntary partnerships between the private landowners currently harboring these species and the agencies, organizations and individuals interested in grassland species conservation, the hope is that more acres of quality habitat can be conserved than would be possible through legislative regulation.

Conservation actions outlined in Colorado's Plan are intended to be a model for multi-species conservation efforts and ultimately preclude the need for listing the black-tailed prairie dog and other grassland associated species under the ESA. This Plan may be used as a basis for applying for an umbrella Candidate Conservation Agreement with Assurances (CCAA) that would apply to all landowners in the state from the USFWS. By securing an umbrella CCAA with the USFWS, Colorado could ensure State control, management and conservation of the black-tailed prairie dog and other grassland species. The species included in the CCAA application would remain unaffected by a federal ESA listing as long as the CCAA terms were met. Landowners are also able to apply for CCAAs on an individual basis.

In addition to the black-tailed prairie dog, the Plan includes the Western Burrowing Owl (*Athene cunicularia*), Ferruginous Hawk (*Buteo regalis*), Mountain Plover (*Charadrius montanus*) and swift fox (*Vulpes velox*). All four of these additional species are grassland species of special conservation concern in Colorado and other parts of the U.S., and may benefit from the conservation efforts employed for the black-tailed prairie dog and grassland conservation as a whole. By incorporating these five species into one Plan, the CDOW and Working Group members hope to preclude the need for five separate conservation plans in the future. This will help to not only conserve monetary and logistical resources by the CDOW and other agencies, but also will likely help increase public and landowner acceptance of the conservation efforts needed for these species on private lands.

Participation in the recovery of the black-footed ferret (*Mustela nigripes*), a federally endangered, prairie dog-associated species that was extirpated from eastern Colorado prior to the 1970's, is not a specific objective of this Plan. We recognize that it is likely that there may be black-tailed

prairie dog complexes in eastern Colorado that meet the recovery criteria for the black-footed ferret. As we move forward with conservation efforts for grassland species in Colorado, consideration will be given to black-footed ferret recovery criteria.

Role of the Black-tailed Prairie Dog in the Grassland Ecosystem

Considered everything from a destructive rodent pest to a "keystone species," the black-tailed prairie dog is one of the most controversial wildlife species at the forefront of conservation in recent U.S. history. Since 1998, when petitions to list this species as threatened under the ESA were filed, state wildlife agencies have been working to develop conservation strategies for the black-tailed prairie dog that address its conservation needs while at the same time being publicly acceptable. Colorado's efforts to this end are no exception.

The concept of the black-tailed prairie dog as a "keystone species" in the grassland ecosystem is one that has been widely debated over the past few years in the scientific literature. The "keystone species" concept, as well as general statements relating to species abundance in relation to the black-tailed prairie dog, has been a fundamental argument in driving the black-tailed prairie dog conservation "movement" (Miller et al. 1994, Kotliar et al. 1999). A "keystone species" is defined as a species that has large effects on community structure or ecosystem function, whose effects should be large relative to abundance (Power et al. 1996). While many report that the black-tailed prairie dog and its function in the grassland ecosystem meet these criteria, others disagree. Mills, et al. (1993) provide a good discussion on the "keystone species" concept and its relationship to management policies regarding species conservation. They conclude that policy makers and managers should focus on the complexity of interactions in natural systems rather than the designation of a species as "keystone."

In looking at the black-tailed prairie dog, there is little doubt that the species impacts the overall shortgrass prairie ecosystem. Their herbivory, nutrient recycling, role as a prey species and so forth have played a role in shaping the shortgrass prairies of eastern Colorado. Reading et al. (1989), Barko et al. (1999), and Kotliar et al. (1999) identified numerous species thought to be associated with prairie dogs at some level. Kotliar et al. (1999) identified three species that showed a strong association, including the black-footed ferret (obligate), the Mountain Plover (strongly facultative) and the Western Burrowing Owl (strongly facultative). Additionally, six species were described as associated with prairie dogs; including the Ferruginous Hawk, Golden Eagle (*Aquila chrysaetos*), swift fox, Horned Lark (*Eremophila alpestris*), deer mouse and grasshopper mouse. Barko et al. (1999) noted that prairie dog colonies created patches of habitat that attracted grassland bird species particularly during the breeding season. There are other species that often are assumed to be associated with prairie dog colonies such as the badger, prairie rattlesnake and tiger salamander. Data to support this belief however is incomplete (Kotliar et al. 1999).

Regardless of whether or not the black-tailed prairie dog is a "keystone species," it is generally accepted that the black-tailed prairie dog does serve an important role in the grassland ecosystem. Several studies have shown that the black-tailed prairie dog alter the species composition and structure of plant communities on which they are found. Typically, there is greater cover and abundance of perennial short-grasses and annual forbs on prairie dog colonies. In contrast, perennial mid-height grasses and perennial forbs generally characterize non-prairie dog colonized sites (Bonham and Lerwick 1976, Coppock et al. 1983, Agnew et al. 1986, Archer et al. 1987, Whicker and Detling 1988, Weltzin et al. 1997, Witmer et al. 2002). Consequently, across large landscapes prairie dogs can contribute to overall landscape heterogeneity. They can also affect the rate of ecosystem processes, including disturbance and nutrient cycling (Ingham and Detling 1984, Whicker and Detling 1988) and can provide nest sites and shelter for wildlife such as the Burrowing Owl and rattlesnake. In addition, prairie dogs often either consume or clip the aboveground biomass to the ground surface and even denude the vegetation further by digging up the roots (King 1955, Koford 1958, Smith 1967).

Status of the Black-tailed Prairie Dog and Associated Species
Because the black-tailed prairie dog is an important wildlife species and component in Colorado's grassland ecosystem, and because several wildlife species of conservation concern are associated in some way with the black-tailed prairie dog, Colorado's Plan follows along the lines of ecosystem conservation rather than a single-species approach. Kotliar et al. (1999) found that, among others, the Burrowing Owl, Ferruginous Hawk, Mountain Plover and swift fox were dependent upon or closely associated with the black-tailed prairie dog in some way. These four species are also listed by the CDOW as having a status of either special conservation concern (Ferruginous Hawk, Mountain Plover, and swift fox) or State Threatened (Burrowing Owl). By concentrating on conserving quality grassland habitats that include the black-tailed prairie dog, Colorado wildlife officials hope to meet the conservation needs of the black-tailed prairie dog and these other wildlife species as well, and to do so all under one Plan. The hope is that not only will an ecosystem approach for the conservation of these five species be ultimately more successful, but that it will also be much more acceptable to various stakeholders.

STATEMENTS OF BROAD POLICY

Legislative Direction
"It is the policy of the state of Colorado that wildlife and their environment are to be protected, preserved, enhanced and managed for the use, benefit and enjoyment of the people of this state and its visitors. It is further declared to be the policy of the state that there shall be provided a comprehensive program designed to offer the greatest possible variety of wildlife-related recreational opportunity to the people of this state and its visitors and that, to carry out such program and policy, there shall be a continuous operation of planning, acquisition and development of wildlife habitats and facilities for wildlife-related opportunities." Colorado Revised Statutes 33-2-102.

"The general assembly finds and declares that it is the policy of this state to manage all non game wildlife, recognizing the private property rights of individual property owners, for human enjoyment and welfare, for scientific purposes and to insure their perpetuation as members of ecosystems; that species or subspecies of wildlife indigenous to this state which may be found to be endangered or threatened within the state should be accorded protection in order to maintain and enhance their numbers to the extent possible; that this state should assist in the protection of species or subspecies of wildlife which are deemed to be endangered or threatened elsewhere; and that adequate funding be made available to the Division annually by appropriations from the general fund." Colorado Revised Statutes 33-2-102.

Agency Mission
"The mission of the Colorado Division of Wildlife is to perpetuate the wildlife resources of the State and to provide people with the opportunity to enjoy them" CDOW 2002 – 2007 Strategic Plan

Vision for Species Conservation
"The Division will emphasize the development of management approaches encompassing multi-species communities across the landscape. The Division defines species conservation as conserving, protecting and enhancing Colorado's native wildlife, by taking the actions necessary to assure the continued existence of each species and thereby precluding or eliminating the need for state and/or federal listing."

"The Division will form partnerships with landowners, land management agencies and others to manage, protect, enhance and restore wildlife and their habitats. The Colorado Division of Wildlife will lead efforts to monitor wildlife communities and manage them as needed to prevent their decline. The Division will work aggressively with others to recover threatened and endangered species. The Division encourages partnerships to share in the vision to protect, enhance and restore wildlife communities that need assistance to survive."

GOAL OF THE PLAN

"The goal of this Plan is to ensure, at a minimum, the viability of the black-tailed prairie dog and associated species (Mountain Plover, Burrowing Owl, swift fox and Ferruginous Hawk) and provide mechanisms to manage for populations beyond minimum levels, where possible, while addressing the interests and rights of private landowners."

MANAGEMENT PRINCIPLES

The following are elements from several sources that may be considered as guidance for the development of Colorado's Grassland Species Conservation Management Plan.

Multi-State Conservation Plan for the Black-tailed Prairie Dog, *Cynomys ludovicianus,* in the United States (Luce 2003)

- 10 year population objective for Colorado – minimum of 255,733 acres of occupied habitat
- 1 complex of at least 5, 000 occupied acres
- 10% of complexes >= 1, 000 occupied acres
- Maintain distribution over at least 75% of the counties in the historic range
- Conduct monitoring every three years

Policy for Evaluation of Conservation Efforts when Making Listing Decisions (USFWS 2003)

Evaluation Factors:
- Staffing, funding and other resources identified and secured for implementation
- Authority to implement the Plan exists and procedural requirements are identified
- Level(s) of voluntary participation identified and secured
- Regulations are in place to implement the Plan
- Implementation schedule identified
- The Plan has approval of all parties to implementation
- Nature and extent of threats being addressed are described
- Explicit objectives and dates for achieving them are stated
- Steps to meet objectives are clearly identified
- Quantified parameters that will demonstrate achievement and standards for measurement are identified
- Provisions for monitoring and reporting are included
- Principles of adaptive management are incorporated

Listing Considerations:
- Present or threatened destruction, modification, or curtailment of habitat or range
- Over-utilization for recreational purposes
- Disease or predation
- Inadequacy of regulations to address recreational shooting and poisoning
- Other man-made factors (e.g. statutory status as a pest, unregulated control and poisoning)

Colorado Division of Wildlife 2002-2007 Strategic Plan (CDOW 2002)
- S1.1 – "The Division will strive to maintain, create and manage habitat to support the broadest-sustainable wildlife populations in Colorado."
- S1.2 – "The Division will expand wildlife conservation partnerships with private landowners to ensure the conservation and management of wildlife and their habitat in Colorado."
- S2.1 – "The Division will continue its efforts to preserve, protect and enhance wildlife species that may be at risk of becoming threatened or endangered."

Adaptive Management

Adaptive management is a continuous process of planning, acting, monitoring and evaluating designed to take into account changes in ecological and social systems, to identify and evaluate new information and to make adjustments in actions to achieve specific goals and objectives (Shindler et al. 1999).

Table 1: Results of CDOW Aerial Inventory - November 2002

Totals for State							
County	**Acres of Prairie Dogs**	**County CI (%)**	**Miles Flown**	**Acres in County**	**% County in PD**	**Acres Suitable Habitat**	**% Occupied Suitable Habitat**
Adams	9569	29.5%	1034	768099	1.25%	119568	8.0%
Arapahoe	10728	62.5%	378	514107	2.09%	157358	6.8%
Baca	71988	20.9%	1769	1638109	4.39%	745820	9.7%
Bent	80465	33.9%	1298	968918	8.30%	701455	11.5%
Boulder	17769	37.9%	577	480686	3.70%	22525	78.9%
Cheyenne	21352	20.0%	1087	1139829	1.87%	274460	7.8%
Crowley	22437	37.3%	679	512422	4.38%	339977	6.6%
Denver[1]				99617	0.00%	1037	
Douglas	3777	107.8%	432	538527	0.70%	149643	2.5%
Elbert	4248	114.8%	597	1182788	0.36%	798523	0.5%
El Paso	16652	58.4%	805	1362591	1.22%	760465	2.2%
Fremont	8535	73.1%	542	980558	0.87%	51803	16.5%
Huerfano	0	0.0%	485	1019181	0.00%	295093	0.0%
Jefferson	5162	76.3%	345	497077	1.04%	41762	12.4%
Kiowa	46722	63.5%	1116	1142545	4.09%	262717	17.8%
Kit Carson	18106	32.4%	1187	1384342	1.31%	386505	4.7%
Larimer	15761	40.7%	1049	1684129	0.94%	73562	21.4%
Las Animas	32450	56.1%	2460	3053720	1.06%	1701882	1.9%
Lincoln	16854	48.3%	1295	1654625	1.02%	879442	1.9%
Logan	16857	35.7%	993	1180965	1.43%	372218	4.5%
Morgan	5028	62.9%	537	828447	0.61%	141700	3.5%
Otero	23271	61.5%	461	810779	2.87%	623084	3.7%
Phillips	0	0.0%	161	440701	0.00%	22742	0.0%
Prowers	66895	25.9%	1185	1052516	6.36%	401554	16.7%
Pueblo	45481	31.1%	1871	1534410	2.96%	846180	5.4%
Sedgwick	1894	92.1%	158	350979	0.54%	88680	2.1%
Washington	3317	77.7%	1002	1618865	0.20%	382922	0.9%
Weld	52637	21.3%	3570	2570639	2.05%	880600	6.0%
Yuma	13146	43.2%	1027	1512499	0.87%	289432	4.5%
Totals	**631102**		**28100**	**32522670**	**1.94%**	**11812711**	**5.3%**
Lower CI	570947						
Upper CI	691258						
% CI[2]	95.3%						

[1] Suitable habitat in Denver County was not flown because of Air Space Closures around DIA.
[2] 95% sure that the mean (total) falls between Lower Confidence Interval & Upper Confidence Interval.

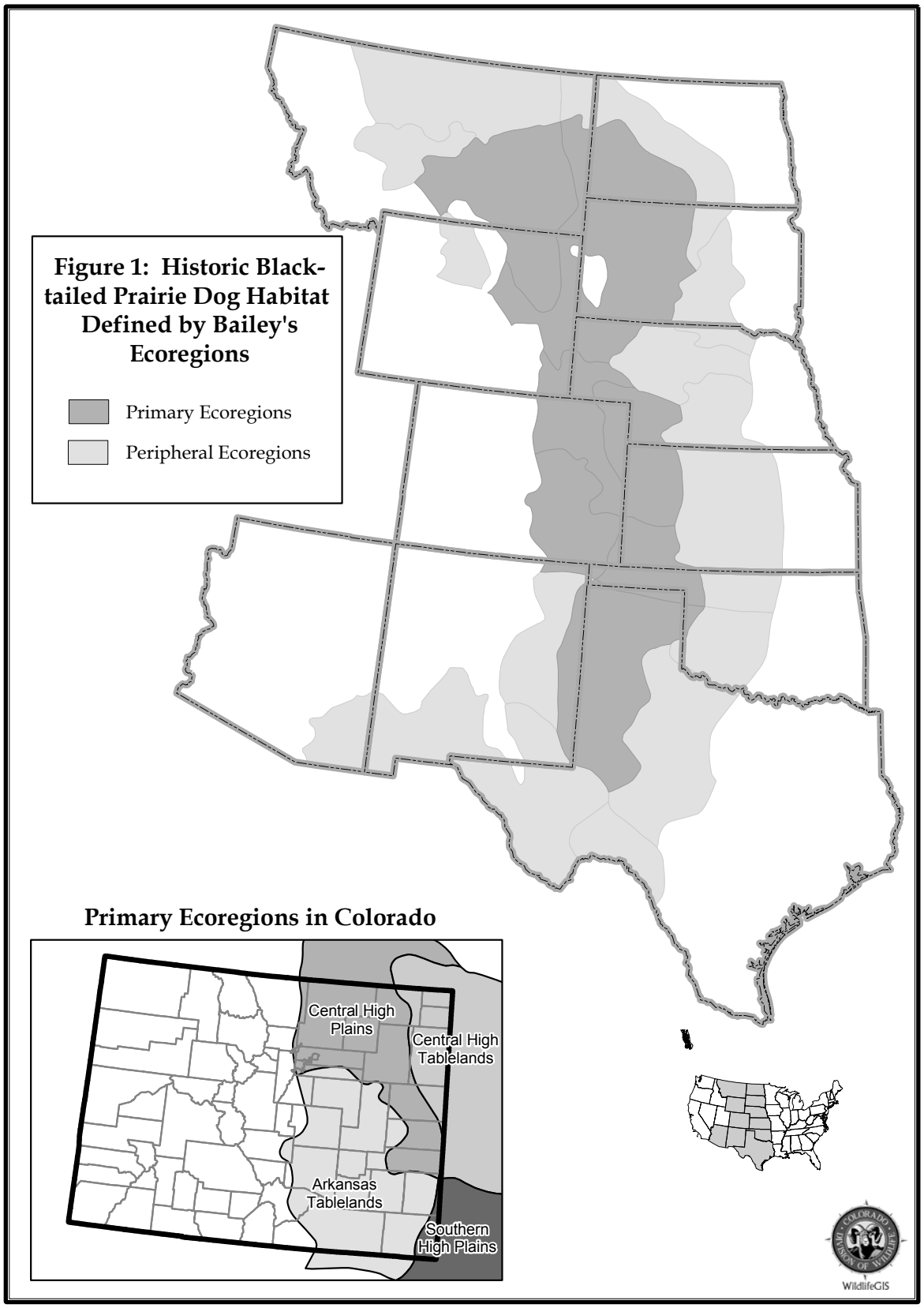
Figure 1: Historic Black-tailed Prairie Dog Habitat Defined by Bailey's Ecoregions
Primary Ecoregions
Peripheral Ecoregions
Primary Ecoregions in Colorado
Central High Plains
Central High Tablelands
Arkansas Tablelands
Southern High Plains
WildlifeGIS

OBJECTIVES AND ACTIONS

Black-tailed Prairie Dog Acreage and Distribution
In November of 2002, the CDOW completed an aerial survey of the black-tailed prairie dog throughout its historic range in Colorado as described in Luce 2003 (Figure 1). The survey is based on techniques described in Sidle et al. 2001 and is currently being submitted for peer review and publication (Appendix M - White et al. 2003). The survey found that, with 95% confidence, there are approximately 631,000 ± 60,000 active acres of the black-tailed prairie dog across its historic range in Colorado. Currently, prairie dogs occupy 100% of the counties in Colorado's historic range and approximately 1.94% of the total area of eastern Colorado. In 2001, the CDOW developed a model to estimate historic and current potentially suitable habitat for the black-tailed prairie dog. It is estimated that historically, there were approximately 24,000,000 acres of suitable habitat in Colorado (Figure 2) and that currently there are approximately 11,800,000 acres of potentially suitable grassland habitat for the black-tailed prairie dog (Table 2). Tying this back to the aerial inventory data, 2.6% of historic potentially suitable habitat and 5.3% of current potentially suitable habitat is occupied by the black-tailed prairie dog. In further analyzing these data with regard to complexes of black-tailed prairie dog colonies, based on a 7 km (4.4 mi) proximity between active black-tailed prairie dog colonies, Colorado has 18 complexes with a density greater than 10 colonies per 150 km² (excluding the Denver urban corridor) and 20 complexes with a density greater than 10 colonies per 150 km² (Figure 3).

Colorado is working with the multi-state conservation team to improve monitoring methodologies used by the states. The goal is to develop a common methodology across the range of the black-tailed prairie dog. The current aerial sampling methodology used in Colorado as well as several neighboring states gives us an estimate of the extent of black-tailed prairie dog colonies over an extensive area. Additional information, particularly more specific information on the percent occupancy of colonies identified as active and the density of active colonies, is needed. Additional research has been funded to begin gathering this information (Appendix G).

In February 2003, the multi-state black-tailed prairie dog Conservation Team completed the "*Multi-state Conservation Plan for the Black-tailed Prairie Dog, Cynomys ludovicianus, in the United States, Addendum to the Black-tailed Prairie Dog Conservation Assessment and Strategy*" (MSCP) (Luce 2003). This document, approved by the Directors of all 11 states, details proposed actions for the conservation of the black-tailed prairie dog over the next 10 years. The goal of the MSCP is to remove enough threats to the black-tailed prairie dog to ensure the long-term conservation of the species. Colorado currently exceeds all acreage and distribution target objectives (see Management Principles) defined in the MSCP. A tiered approach to defining actions for black-tailed prairie dog conservation was developed based on active occupied acreage as outlined in Table 3. Current conditions are described and zones are defined based on a range of active acres of the black-tailed prairie dog. The zones are assigned colors and descriptors based on active occupied acreages starting with the Blue Zone – Abundant (> 450,000 acres) to the Red Zone – Danger (< 150,000 acres). Zone ranges are based on a 33.3% disease and/or natural catastrophe buffer. Best available data suggest that in the absence of plague, natural populations fluctuate an average of ± 20% over roughly a 4-year cycle. This natural fluctuation can reach as high as ± 40%. Specific actions have been outlined for implementation in each zone. In general, when population levels are at or beyond the Green – Secure (350,000 – 450,000), there are no or minimal restrictions or required actions. Management focuses on voluntary, incentive-based partnerships with both public and private landowners to secure habitat for approximately 150,000 occupied acres. Adaptive management for the black-tailed prairie dog will require ongoing monitoring and analysis. Proposed objectives and actions are summarized below:

Objective 1: Meet occupied acreage and distribution target objectives as defined for Colorado in "*A Multi-State Conservation Plan For The Black-tailed Prairie Dog, Cynomys*

***ludovicianus*, *in the United States, Addendum to the Black-tailed Prairie Dog Conservation Assessment and Strategy*" (Luce 2003).**

Population Monitoring and Analysis

Action 1.1: Submit for peer review and publication, the methodology, discussion and results of the 2002 aerial survey of the black-tailed prairie dog in eastern Colorado.

Action 1.2: Implement a monitoring protocol to estimate the black-tailed prairie dog populations and distribution in eastern Colorado on a three-year interval (2002, 2005, 2008, 2011)

Action 1.3: Coordinate with the multi-state black-tailed prairie dog Conservation Team to implement a standardized monitoring protocol applicable in all 11 states of the black-tailed prairie dogs' range.

Action 1.4: If populations fall into the Yellow – Vulnerable zone (250,000 – 350,000 active acres) or below, frequency and intensity of monitoring will increase to determine the cause of the decline and management actions will be developed to stabilize or reverse the decline.

Table 2: Potential Habitat for the Black-tailed Prairie Dog in Colorado

Vegetation Type[1]	Acres (Slope < 10 and soil HSI > .33)	
Urban	397,482	
Dryland Ag.	8,340,731	
Irrigated Ag.	2,180,500	
	Sum of Urban, Dry and Irrigated Ag.	10,918,713
Tallgrass Prairie	486,631	
Midgrass Prairie	943,412	
Shortgrass Prairie	9,512,602	
Foothill/Mt. Grassland	214,684	
Sand Dune Complex	627,340	
	Sum of Grassland Types	**11,784,670**[2]
Xeric Upland Shrub	23,559	
Gambel Oak	80,820	
	Sum of Shrub Types	104,379
Sum of All Vegetation Types		22,807,761

[1]Includes all vegetation types with active prairie dog colonies identified from the EDAW report.

[2]Potentially suitable habitat for the black-tailed prairie dog in Colorado based on vegetation type, suitable soil conditions and slopes less than 10%.

Table 3: Active Occupied Acreage Zones for the Black-tailed Prairie Dog

Zones	Monitoring/Analysis		Statewide Regulations		Specific Management Tools		
Current Conditions							
Active Occupied Acreage is: 631,000 acres ± 60,000 acres (95% confidence)	Plague - Reports made to CDPHE when suspected outbreak may impact human health. Random testing, primarily coyotes in SE and West slope by APHIS.		Cartridges allowed for general use without a license or permit. Zinc and aluminum phosphide use is restricted and licenses required for all users	Sport shooting closed range wide. Control allowed on private lands to protect property.	SB-99111 requires county approval for relocations across county lines		
Acreage (thousands)	**Population**	**Plague**	**Toxicants[1] MOU-DOW/AG**	**Shooting**	**Incentives[2]**	**Repopulation[3]**	**Plague Management**
Blue - Abundant >450	-Inventory conducted every 3 years	-Public outreach -Voluntary reporting protocol	-Status quo	-Status quo	-Provide as necessary to ensure long term protection		-Public outreach activities ongoing
Green - Secure 350 - 450	-Inventory conducted every 3 years	-Public outreach -Voluntary reporting protocol -Mandatory reporting for all contracts on prairie dogs or associated species	-Gather and compile annual product sales data in Colorado by registrants	-Status quo	-Identify funding sources as necessary to ensure long-term protection		-Public outreach activities ongoing
Yellow - Vulnerable 250 – 350	-CDOW analyzes cause of decline with additional monitoring (i.e. increased frequency and/or additional tools)	See **Specific Management Tools** -Public outreach -Voluntary reporting protocol -Mandatory reporting for all state funded contracts on prairie dogs or associated species	-Gather and compile annual product sales data in Colorado by registrants and dealers	-Status quo	-CDOW - evaluate tools appropriate to address decline -CDOW - develop adaptive management agreement with counties in high decline areas		
					-Secure long-term funding	-Regulation- SB-99111 - no change -Funding - private and public	-Implement multi-state conservation protocols when plague is suspect
Orange - At Risk 150 – 250	-CDOW analyzes cause of decline with additional monitoring (i.e. increased frequency and/or additional tools)	See **Specific Management Tools** -Public Outreach -Voluntary reporting protocol -Mandatory reporting for all state funded contracts on prairie dogs or associated species.	-Gather and compile annual product sales data in Colorado by registrants, dealers and end-users	**Same as Yellow plus:** -Limited to landowner damage situations. -Take permit required to monitor	-Implement adaptive agreements		
					-Focus incentives on high need areas	**-**Regulation- SB-99111 - no change **-**Funding – private and public	**-**Implement multi-state conservation protocols when plague is suspect **-**Consider active control measures on lands in LIPS
Red - Danger <150	-CDOW analyzes cause of decline with additional monitoring (i.e. increased frequency and/or additional tools)	See **Specific Management Tools** -Public outreach -Voluntary reporting protocol -Mandatory reporting for all state funded contracts on prairie dogs or associated species	-Gather and compile annual product sales data in Colorado by registrants, dealers and end-users -Heavily restricted; permitting based on stringent criteria	-Special permit only	-County participation in adaptive agreements required for inclusion in CCAA		
					-Focus incentives on high need areas	-Regulation- SB-99111 - no change -Funding - private and public	-Implement multi-state conservation protocols when plague is suspect -Consider active control measures on lands in LIPS

[1] Product is defined as a pesticide product registered for use on the black-tailed prairie dog in Colorado.
[2] Relocation will be used primarily in the event of major die-off and based on an assessment of the potential for recovery utilizing other management actions.
[3] Goal for protected acreage through broad incentives and on public lands - 150,000 active occupied acres.

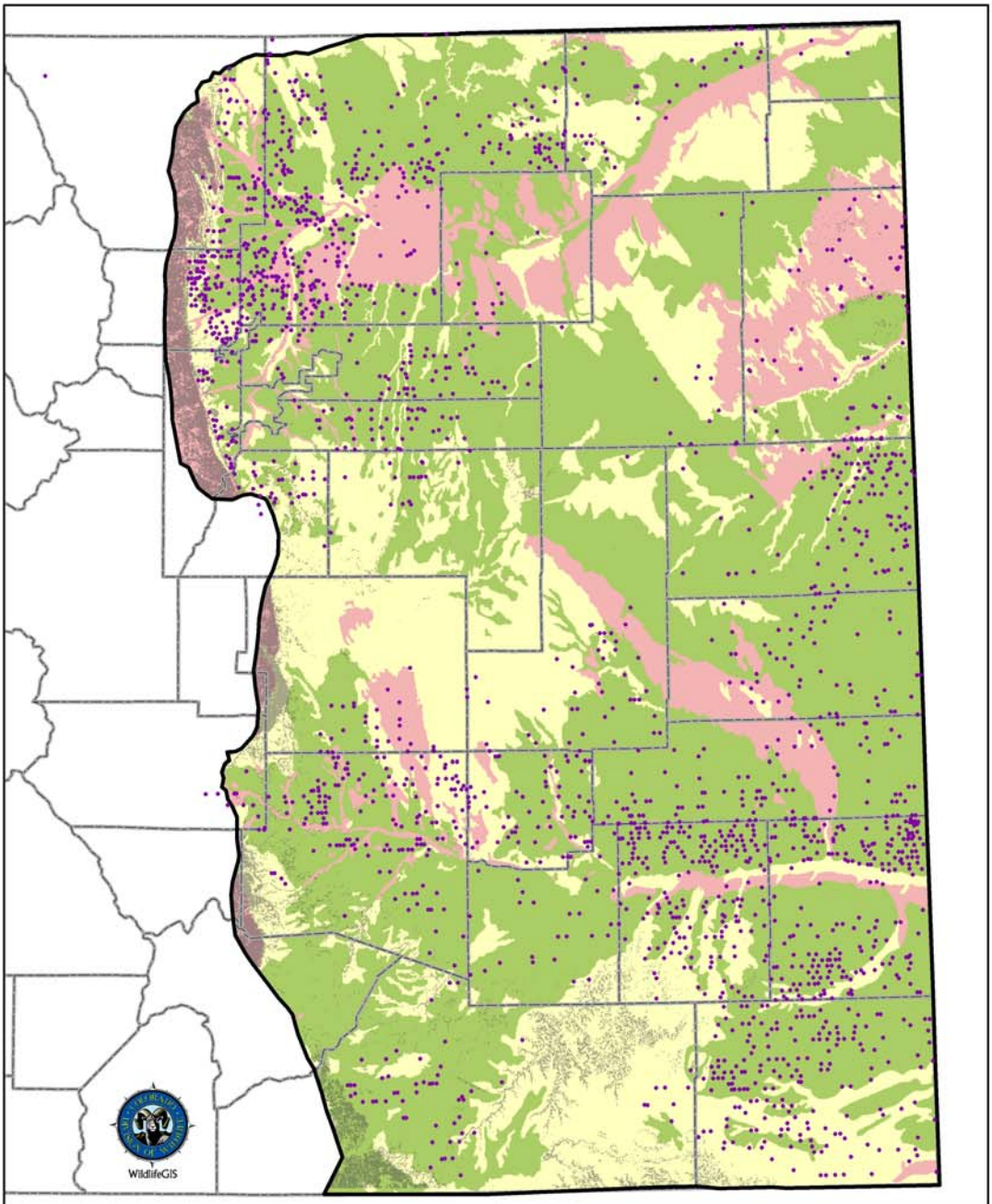

Figure 2: Modeled Historic Habitat and Potentially Suitable Black-tailed Prairie Dog Habitat in Colorado

SOIL TEXTURE (HSI)

- High (0.67 - 1)
- Moderate (0.34 - 0.66)
- Low (0 - 0.33)
- Slope > 10°
- Observed Prairie Dog Colony

20 0 20 40 60 80

Miles

Acreage of Suitable Habitat by Soil and Slope:

		SOIL TEXTURE SUITABILITY INDEX			
		High	Moderate	Low	TOTAL
SLOPE (in degrees)	0 - 5	15,351,688	7,621,044	3,414,132	26,386,864
	>5 - 10	511,970	667,010	197,111	1,376,091
	>10	165,485	443,576	447,701	354,168
	TOTAL	16,029,163	8,731,630	4,058,944	XXXXXXXX

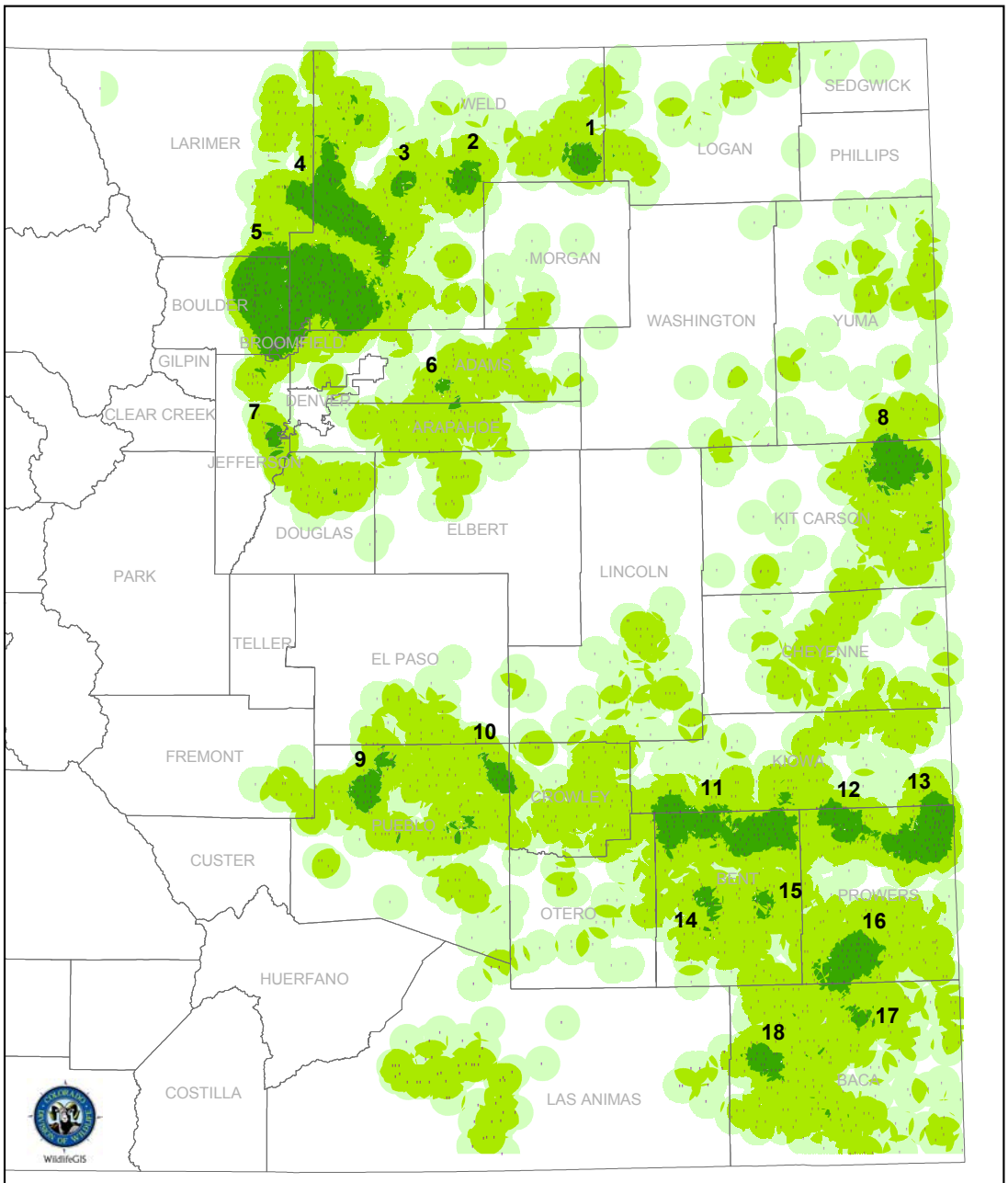

Figure 3: Black-tailed Prairie Dog complexes defined by densities of Prairie dog colonies on Colorado's eastern plains.

- Density >10 colonies/150Sq.Km.
- Density 3 - 10 colonies/150Sq.Km.
- Density 1 - 2 colonies/150Sq.Km.
- Observed Prairie Dog Colony

Number of colonies in complexes where Area > 5,000 acres and Density > 10 colonies/150SqKm:

1:	17 Colonies	10:	14 Colonies
2:	16 Colonies	11:	86 Colonies
3:	9 Colonies	12:	22 Colonies
4:	89 Colonies	13:	61 Colonies
5:	127 Colonies	14:	9 Colonies
6:	1 Colony	15:	5 Colonies
7:	6 Colonies	16:	39 Colonies
8:	38 Colonies	17:	4 Colonies
9:	24 Colonies	18:	17 Colonies

Plague Monitoring
Action 1.5: Initiate a public outreach program to inform landowners, hunters and other members of the public concerning the need to notify the Colorado Department of Public Health and Environment (CDPHE) and CDOW of die-offs of prairie dogs or ground squirrels.
Action 1.6: Develop and implement a voluntary reporting protocol.
Action 1.7: CDOW field personnel will report die offs of prairie dogs.
Action 1.7: If populations fall into the Green – Secure zone (3500,000 - 450,000 active acres) or below, a clause requiring the reporting of die-offs of prairie dogs or ground squirrels will be added to all CDOW contracts for work involving prairie dogs or associated species.
Action 1.8: If populations fall into the Yellow – Vulnerable zone (250,000 – 350,000 active acres) or below, plague monitoring protocols (see Appendix I) recommended in the "*A Multi-State Conservation Plan For The Black-tailed Prairie Dog, Cynomys ludovicianus, in the United States, Addendum to the Black-tailed Prairie Dog Conservation Assessment and Strategy*" (Luce 2003) will be implemented.

Associated Species Populations
Data are inadequate to define specific target objectives for shortgrass prairie associated species including the Mountain Plover, Burrowing Owl, Ferruginous Hawk and swift fox. Population trend data are available for a number of grassland bird species (Appendix F), but in many cases, data are inadequate for monitoring birds with broad distribution and low population densities. Populations of the Mountain Plover are thought to be declining, but data collected is inconclusive. Data clearly show reductions in Mountain Plover populations locally (i.e. Pawnee National Grassland). Surveys have been geographically restricted, however. Broader surveys could show local declines balanced by other local increases or at least maintenance. These birds are inconspicuous and easily overlooked and much of the data is based on low abundance and/or small sample sizes. Populations of the Burrowing Owl are thought to be stable or increasing in eastern Colorado (Hanni 2003). Along the front range of Colorado, the Burrowing Owl has disappeared from much of its historic range in response to habitat fragmentation and disturbance to its nesting areas by people, dogs, cats and activities associated with high urban densities. Workers for the Colorado Breeding Bird Atlas (Jones 1998) reported the Burrowing Owl breeding range to be primarily in eastern Colorado, despite their once having been widespread throughout the state. Populations of swift fox are considered abundant and wide spread in Colorado. Ferruginous Hawk populations are considered stable in Colorado (See individual species accounts, Appendices A – E).

Associated Species Population Monitoring and Analysis
Current Breeding Bird Survey (BBS) information for shortgrass associated species like the Mountain Plover, Burrowing Owl and Ferruginous Hawk are frequently based on small sample sizes or low abundance, resulting in uncertain conclusions. Low population densities and the patchy distribution of these species require the development and implementation of specialized monitoring methodologies. Standardized methodologies are being developed to estimate long-term population trends and distribution. This data will allow managers to identify populations or areas experiencing declines, evaluate reasons for declines and better identify areas for conservation. A summary of ongoing population monitoring and research projects is included in Appendix G.

Objective 2: The CDOW will continue its efforts to produce, encourage and support the best available science regarding monitoring long-term population trends and distribution of shortgrass associated species.

Action 2.1: Support ongoing efforts to monitor long-term population trends for the Mountain Plover on the Pawnee National Grassland (PNG) and in South Park.
Action 2.2: Support ongoing efforts to evaluate potential Mountain Plover and other shortgrass prairie bird monitoring methodologies in eastern Colorado.

Action 2.3: Implement best available monitoring methodologies for shortgrass associated bird species including Burrowing Owl and Ferruginous Hawk to determine long-term trends and distribution.
Action 2.4: Implement mark-capture monitoring protocol to estimate swift fox populations in eastern Colorado on a five-year interval (2003-04, 2008-09, 2013-14).

Management Response
Management activities listed in Table 3 are designed to address the listing factors relative to the black-tailed prairie dog; and to the extent possible, conservation of not only the black-tailed prairie dog, but also other shortgrass associated species. Management decisions will have their basis in sound biological science and will consider the interests of private landowners, local governments and other interests. Conservation efforts will focus on providing secure quality habitat in eastern Colorado to support viable populations of the black-tailed prairie dog and shortgrass associated species including the Mountain Plover, Burrowing Owl, Ferruginous Hawk and swift fox. Issues unique to management of front range grassland species populations are identified and addressed in a separate section of the Plan.

Habitat Considerations and Engaging Private Landowners

Objective 3: Recognizing that private landowners provide critical habitat and act as stewards to the land supporting populations of the black-tailed prairie dog and other shortgrass associated species; voluntary, incentive-based, non-regulatory partnerships with private landowners will be used to ensure the conservation and management of these species and their habitats in Colorado.

Action 3.1: Secure 150,000 acres of high quality shortgrass prairie habitat for the conservation of the black-tailed prairie dog and associated species through permanent (preferred) or long-term easements or conservation agreements by 2011.
Action 3.2: Work with other federal, state and municipal agencies as well as non-governmental organizations, state agricultural organizations and private landowners to identify high priority areas to implement partnerships.
Action 3.3: Map existing areas that provide secure quality native shortgrass prairie habitat and their spatial relationship to proposed areas for conservation easements/agreements.
Action 3.4: Promote coordination and partnering among existing entities that have land protection capacity and an interest in the shortgrass prairie (potentially including CDOW, The Nature Conservancy, Colorado Cattleman's Agricultural Land Trust, Colorado Open Lands, Douglas County Land Conservancy, Colorado Department of Transportation, etc.).
Action 3.5: Support efforts of the Interstate Coordinator for the Prairie Dog Conservation Team and others in building public/private partnership initiatives like the High Plains Partnership to provide federal funding for conservation efforts.
Action 3.6: Work in partnership with the Natural Resources Conservation Service (NRCS) to implement conservation programs under Farm Bill programs such as the Conservation Reserve, Conservation Reserve Enhancement, Grassland Reserve, Wildlife Habitat Incentives and Environmental Quality Incentives Programs (EQIP) to benefit grassland associated species.

- Specifically expand the use of USDA Farm Bill programs toward the goal of grassland species conservation.
- Raise awareness of land managers to the capability of various programs in meeting grassland species objectives and the mechanics of making programs work for grassland species.
- Explore alternative methods of implementing programs such as set asides under EQIP for grassland species projects.
- Investigate the potential for developing a Conservation Reserve Enhancement Project (CREP) that focuses specifically on grassland species.

Action 3.7: Implement Mountain Plover nest conservation in cultivated fields project to minimize the impact of agricultural cultivation activities on the nesting Mountain Plover.

Action 3.8: Develop Candidate Conservation Agreements with Assurances (CCAAs) and other cooperative agreements, as needed, with private landowners for species that are candidates for federal listing.
Action 3.9: Support the Colorado Department of Transportation's (CDOT) Shortgrass Prairie Initiative, which is designed to streamline regulatory compliance and fulfill CDOT's mitigation needs in the shortgrass prairie through the establishment of proactive perpetual conservation easements and active management.

Public Outreach and Education

Objective 4: Raise awareness of grassland conservation needs within the private and public sector. Maintain healthy populations of grassland wildlife in conjunction with economic development and viability, and protection of property rights. Raise awareness for grassland wildlife of high conservation concern including how to identify the species, habitat needs and management recommendations. Familiarize private landowners with different grassland habitat incentive programs including state, federal and non-profit partners they can work with. Promote long-term conservation and sustainable use of grassland wildlife and their habitats.

Action 4.1: Develop a standard presentation and "train-the-trainers" on delivery at local meetings.
Action 4.2: Build and expand partnerships for grassland conservation with Colorado Farm Bureau, Colorado Cattleman's Association, Colorado Livestock Association, Cooperative Extension, Resource Conservation & Development, Natural Resources Conservation Service, Soil Conservation Districts, County Commissioners, CDOW, private landowners and others through outreach.
Action 4.3: Use workshops as an outreach tool to:

- Discuss grassland conservation priorities and raise awareness for priority species and their habitat needs
- Discuss incentive programs for grassland habitats
- Provide a cooperative atmosphere for landowners to network with partners on the grasslands
- Raise awareness for Mountain Plover conservation efforts
- Provide outreach documents including Sharing Your Land with Shortgrass Prairie Birds, Shortgrass Prairie Resource Guide, Pocket Guide to Prairie Birds, CDOW's program booklet and so forth

Action 4.4: Attend annual Farm Bureau, Cattleman's, State Conservation District, County Commission and other agricultural-related organization meetings and give presentations on grassland conservation and/or have informational booths.
Action 4.5: Distribute the Mountain Plover video to agricultural organizations and other interested parties.
Action 4.6: Develop web pages on CDOW's web site with information on Colorado's Grassland Conservation Plan, including:

- Upcoming outreach activities
- Links to partners
- Links to other state plans and information
- Information on CCAAs

Action 4.7: Facilitate implementation of on-the-ground grassland conservation efforts through outreach, technical service and financial assistance.
Action 4.8: Develop press releases for local and statewide newspapers and radio stations on grassland conservation, ongoing projects and upcoming activities and meetings.
Action 4.9: Secure long-term funding for outreach, education and on-the-ground conservation.

Regulatory Considerations
While the CDOW is responsible for wildlife management in Colorado, the authority of the CDPHE, the CDA, and of Boards of County Commissioners (BOCC) directly impact the management of

the black-tailed prairie dog. State statutes outlining these authorities include: CRS 35-7-101 and 102: Department of Agriculture/Control and Eradication of Rodents; CRS 35-7-203: Prohibits release of prairie dogs into a county other than the county where they were taken unless expressly approved by the Division of Wildlife and the Board of County Commissioners; CRS 30-11-107: Powers of Board of County Commissioners; and CRS 25-1-107: Powers and Duties of CDPHE. These statutes can be accessed via the State of Colorado web site: http://www.colorado.gov/government.htm. Regulatory considerations for the conservation of grassland species will focus on the development of cooperative agreements between CDOW and other responsible state agencies, counties and municipalities.

Objective 5: Collaborate with Colorado Department of Agriculture to demonstrate through law, regulation, or cooperative agreement adequate regulatory authority and regard for black-tailed prairie dog conservation objectives as it relates to the use of toxicants or shooting to control prairie dogs causing damage to private property.

Action 5.1: Develop a MOU between the CDOW and CDA that outlines each agencies' authorities and responsibilities regarding the use of toxicants to control prairie dogs in Colorado as related to the conservation objectives described within this Plan by July 2005.
Action 5.2: If populations fall into the Green – Secure zone (350,000 – 450,000 active acres), gather and compile annual product sales information for Colorado by registrants for toxicants used to control prairie dogs to create a baseline on toxicant sales.
Action 5.3: If populations fall into the Yellow – Vulnerable zone (250,000 – 350,000 active acres), gather and compile annual product sales information for Colorado by registrants and dealers for toxicants used to control prairie dogs.
Action 5.4: If populations fall into the Orange – At Risk zone (150,000 – 250,000 active acres), gather and compile annual product sales information for Colorado by registrants, dealers and end users for toxicants used to control prairie dogs.
Action 5.5: If populations fall into the Red – Danger zone (<150,000), gather and compile annual product sales information for Colorado by registrants, dealers and end users for toxicants used to control prairie dogs. Use of toxicants heavily restricted and use by permit only. Permitting based on stringent criteria.
Action 5.6: If populations fall into the Orange – At Risk zone (150,000 – 250,000 active acres), shooting allowed for control of prairie dogs causing damage on private property. Permits will be issued to monitor take.
Action 5.7: If populations fall into the Red – Danger zone (<150,000), shooting will be allowed for control of prairie dogs causing damage on private property by special permit only.

The black-tailed prairie dog is classified as a small game species in Colorado. Currently the hunting seasons are closed by regulation east of Interstate 25, although prairie dogs may be taken year-round by landowners, members of the landowner's family, lessees, agents, designees, or any employee of the landowner under the provisions of 33-6-107(9) C.R.S. as necessary to protect private property. Biologically, recreational shooting has been demonstrated to reduce black-tailed prairie dog population densities at specific sites, but no information is available to demonstrate recreational shooting of the black-tailed prairie dog as a threat to the species on a broad scale. According to the USFWS 2002 Candidate Assessment and Priority Form for the Black-tailed Prairie Dog, "We now conclude that effects due to recreational shooting do not rise to the level of a threat pursuant to the definitions and constraints of the Act."

Management Tools
A broad array of management tools will be considered to address declines in prairie dog acreage and distribution when populations fall into or below the Yellow zone – Vulnerable (250,000 – 350,000). Declines will be analyzed at the local level to determine cause; then working with local landowners and decision makers, adaptive management agreements will be developed to reverse declines using the appropriate tools. Management tools could include but are not limited to:

- Focusing incentives in areas with declining populations

- Implementing plague mitigation protocols when plague is suspect including:
    - Use of pesticides for reducing flea populations, particularly in incentive areas
    - Supporting the development of and use of a plague vaccine
- Developing cooperative management agreements with counties and municipalities to outline management authorities and implement conservation measures
- Assessing the need for repopulation in the event of a major die off, particularly on publicly owned lands
- Monitoring and inventory range wide and on a local basis
- Assessing the need for and implementation of habitat restoration projects

Objective 6: Adaptive management, including a continuous process of planning, acting, monitoring and evaluating designed to take into account changes in ecological and social systems, identify and evaluate new information, and make adjustments in actions to achieve specific goals and objectives will be used.

Action 6.1: The CDOW will form a technical committee to review new research information and analyze monitoring data as it is collected on a three-year interval, identify changes that would move acreage and distribution targets from one zone to another, and make recommendations to decision makers regarding the changes in management necessary to maintain viable shortgrass species populations. The technical committee members will be nominated by members of the Working Group and approved by the CDOW.

Action 6.2: If populations fall into the Yellow zone – Vulnerable (250,000 – 350,000), evaluate and implement management tools to address the decline.
Action 6.3: If populations fall into the Yellow zone – Vulnerable (250,000 – 350,000), develop conservation agreements with counties and municipalities in high decline areas to implement management tools to address the decline.
Action 6.4: If populations fall into the Orange zone – At Risk (150,000 – 250,000), implement adaptive management agreements with counties and municipalities.
Action 6.5: If populations fall into the Red zone – Danger (< 150,000), implement adaptive management agreements with counties and municipalities in order to receive certificates of inclusion in statewide umbrella CCAA.

RESEARCH

Objective 7: The CDOW will initiate, continue ongoing and stimulate new research to identify and minimize, eliminate, or mitigate causes for declines when possible for shortgrass associated wildlife species (See Appendix G for summary of ongoing projects).

Action 7.1: Support ongoing research to develop habitat suitability models for the black-tailed prairie dog on the PNG. The models will be used to determine how much of the area has been used by the black-tailed prairie dog over time, establish relationships to black-tailed prairie dog population estimates and provide supporting data for ongoing work on black-tailed prairie dog genetics and plague surveillance.
Action 7.2: Support ongoing research for developing vaccines to control plague and on plague dynamics.
Action 7.3: Support ongoing research on vegetation manipulation by livestock to maintain a mosaic of successional stages in shortgrass prairie habitat.
Action 7.4: Support ongoing research to resolve conflicts of Mountain Plover breeding on private lands.
Action 7.5: Support ongoing research on using stable isotopes to document links between breeding and wintering locales for the Mountain Plover.
Action 7.6: Support ongoing research on the relationship between Mountain Plover breeding activity and prairie dog colonies.

Action 7.7: Identify, prioritize and seek funding for additional research needs in Colorado for shortgrass prairie associated species.

Management on Federal, State and Local Government Lands

The federal government owns and administers significant shortgrass prairie habitat supporting grassland-associated species in Colorado. The most significant of these areas include:

- The Pawnee National Grassland in northeast Colorado administered by the USDA Forest Service
- The Comanche National Grassland in southeast Colorado administered by the USDA Forest Service
- The Rocky Mountain Arsenal National Wildlife Refuge administered by the USFWS
- Fort Carson Army Base administered by the Department of Defense
- Buckley Air Base administered by the Department of Defense
- Pueblo Chemical Depot administered by the Department of Defense
- Piñon Canyon administered by the Department of Defense

While the State of Colorado cannot mandate how the federal government manages wildlife habitat on their property, the following are recommended objectives and actions from the Working Group to federal land managers that control significant grassland species habitat. The Working Group feels these actions are necessary to maintain habitat for the conservation of grassland species.

Objective 8: The CDOW will encourage significant contributions from publicly owned lands, particularly the National Grasslands, toward grassland species conservation and work with federal, state, county and municipal partners to support these efforts.

Action 8.1: An inventory of shortgrass prairie habitat occurring on CDOW State Wildlife Areas (SWAs) will be conducted and where appropriate shortgrass prairie habitat occurs, SWAs will be managed with the conservation of grassland species as a priority.
Action 8.2: Participate in planning efforts on publicly owned lands to integrate conservation measures for grassland species in public land management planning efforts.
Action 8.3: Work with public land managers to quantify active occupied acres of the black-tailed prairie dog on publicly owned lands.
Action 8.4: Encourage consolidation or creation of conservation buffers on publicly owned lands through conservation easements, land trades or acquisitions. Colorado Division of Wildlife incentive programs will give added consideration to projects adjacent to other publicly owned lands managed for grassland species conservation.

<u>Pawnee and Comanche National Grasslands</u>
Action 8.5: Recommend maintaining a minimum of 20% of the total acreage of shortgrass prairie habitats in low structure vegetation suitable for the nesting Mountain Plover and other shortgrass associated species with a long term goal of increasing this to 40%, particularly on the PNG which is predominantly shortgrass prairie habitat.
Action 8.6: Recommend maintaining low structure vegetation on suitable shortgrass prairie habitats by increasing range allotment carrying capacity and grazing intensity, encouraging expansion of black-tailed prairie dog colonies, or through prescribed burning as appropriate.
Action 8.7: Recommend positioning areas targeted for low structure vegetation based on historic records of concentrations of the nesting Mountain Plover.
Action 8.9: Secure funding to partner with the USDA Forest Service to implement changes in allotment infrastructure to return to or maintain low structure vegetation with no financial burden passed on to permit holders.

The Comanche National Grassland includes approximately 200,000 acres of shortgrass prairie habitat, which supports the black-tailed prairie dog, Mountain Plover and other shortgrass associated species. In addition, consideration should be given to managing midgrass/sandsage prairie habitats for the conservation of the Lesser Prairie-chicken and other declining species dependant on these habitat types.

State Land Board Lands

State Land Board (SLB) lands are considered private lands in Colorado to be managed for a reasonable and consistent income for SLB beneficiaries.

Action 8.9: The CDOW will work with the SLB to develop and implement a Threatened and Endangered Species Policy to address SLB involvement in species conservation issues and explore the fiscal feasibility of developing a conservation bank for the conservation of grassland species.

Management on the Front Range

The black-tailed prairie dog and associated species that are the focus of this Plan reside in the greatest numbers on Colorado's eastern plains. In addition, the fragmentation of the remaining shortgrass prairie habitat in areas of increasing urban growth along the front range do not support an intact shortgrass prairie ecosystem. For example, Jones and Bock (2002) note that in Boulder County, which manages one of the most extensive grassland open space systems in North America, shortgrass associated bird species declined significantly between the 1980's and 1990's amid rapid urban growth in the area. They conclude that grassland open space areas may support populations of mixed grassland birds, but sustaining species associated with the shortgrass prairie would be difficult. Many of the conservation objectives and actions outlined in this Plan are focused on management of eastern plains colonies and complexes where biologically it makes the most sense to focus efforts.

Even so, the black-tailed prairie dog and associated species reside along the front range in urban areas and within the urban/rural interface. These species have considerable value for front range people. The black-tailed prairie dog, Ferruginous Hawk and other related species are valued not only as contributors to ecological balance in the ever-changing front range landscape, but also have intrinsic value as individual animals, and are the focus of a wide range of wildlife viewing opportunities. While the biological significance of front range populations of the black-tailed prairie dog is limited with regard to the overall conservation of the species, management must take into account ecological impacts of changes in habitat and species numbers, and the added social relevance of these species for members of the public along the front range.

The Black-tailed Prairie Dog

Populations of the black-tailed prairie dog can be found within every county along the front range. Populations vary from less than one acre to several hundred acres in size. Individual populations not only occur in the rural areas of each county, but on the interior of urban areas as well in most counties. Depending on the size and location of these populations, black-tailed prairie dog colonies serve a variety of ecological and social roles within the front range. Larger, more rural populations of the black-tailed prairie dogs often serve as foraging sites for coyotes, foxes, badgers and a variety of hawks and eagles, as well as providing valuable wildlife viewing opportunities. In some areas, these larger, more ecologically significant populations also provide nesting areas for the Burrowing Owl. Within the more urbanized areas of the front range, black-tailed prairie dog populations often serve a much more limited ecological role, but are extremely important in providing the bulk of public viewing opportunities and enjoyment.

The Burrowing Owl

The Burrowing Owl is highly dependent upon black-tailed prairie dog colonies in Colorado. Along the front range, the Burrowing Owl is most often dependent upon large black-tailed prairie dog colonies relatively unaffected by urban development and habitat fragmentation. Examples of these areas include some of Boulder County Open Space properties and the Rocky Mountain

Arsenal. Although many existing Burrowing Owl populations reside on protected conservation areas or public open spaces, some populations reside on private lands.

The Ferruginous Hawk

The Ferruginous Hawk can be found along the front range throughout the year, especially in the more rural areas. While the front range is within its nesting range, the Ferruginous Hawk does not tolerate disturbance when nesting. As a result, its nests are primarily in rural areas in eastern Colorado, well removed from urban and suburban areas. Wintering Ferruginous Hawks are, however plentiful along the front range wherever there are substantial black-tailed prairie dog populations. While the Ferruginous Hawk utilizes a wide variety of small mammals for food, the black-tailed prairie dog is an extremely important prey species, especially during the fall and winter months. Similar to the Burrowing Owl, a large percentage of Ferruginous Hawk activity can be found within, and adjacent to, the large conservation areas and protected open spaces like those found in Larimer and Boulder Counties, and on the Rocky Mountain Arsenal.

The Mountain Plover

The Mountain Plover is a small shore bird highly dependent on shortgrass prairie and barren ground for nesting and foraging opportunities. Listed as a species of special concern in Colorado, conservation efforts for this species are important. While suitable Mountain Plover habitat exists on a very limited basis along the front range, the Mountain Plover occurs primarily on the eastern plains.

The Swift Fox

The swift fox is shy and reclusive, and depends on the shortgrass prairie grasslands and an assortment of small mammals and insects for its survival. Within the front range, it is unlikely that many swift fox exist except possibly in the rural areas of Pueblo and Fremont Counties. The swift fox often does not proliferate in areas of high habitat fragmentation and in urbanized areas.

Local Governmental Influence on Conservation Within the Front Range

Many city and county governments along the front range have policies or ordinances related to black-tailed prairie dog management within their jurisdictions. These policies range from simple unwritten policies that local governments recommend, to ordinances prohibiting the taking of the black-tailed prairie dog. Conservation efforts and recommendations outlined in this section must take into account these ordinances and policies and will encourage cooperation between local and county entities, non-governmental conservation organizations, the CDOW, the USFWS and other entities interested in grassland and species conservation.

In addition to black-tailed prairie dog ordinances and policies, many cities and counties have set aside open space areas within their jurisdictions for agricultural preservation, public recreation, protected view sheds and wildlife conservation interests. Regardless of the underlying management objectives for many of these open spaces, wide varieties of wildlife species utilize them for nesting, foraging and general cover. Excluding Roxborough, Lathrop, and Trinidad Lakes State Parks, the front range contains over 225,000 acres of protected habitat. Protected acres are generally distributed evenly across the front range from north to south along the eastern edge of the foothills and provide critical habitat for a variety of wildlife species, especially raptors and neo-tropical migratory songbirds. Of that protected acreage, there are more than 11,000 protected acres of black-tailed prairie dog colonies along the front range.

Over the last 150 years, changes to the front range landscape have resulted in conditions under which natural ecological processes within this zone no longer characterize natural historical habitat and wildlife interactions. Therefore, recommendations and guidelines concerning the black-tailed prairie dog and associated species along the front range are based upon the following assumptions:

1. For the species identified in this Plan, the ecological significance of conservation efforts for black-tailed prairie dog populations along the front range lies primarily in providing prey resources for the wintering Ferruginous Hawk and other raptors and to a limited extent, nesting habitat for the Burrowing Owl.
2. Wildlife viewing resources (to include black-tailed prairie dogs and raptors) are extremely important to many. Therefore, increased opportunities to enjoy these resources are highly desirable and should be encouraged.
3. Public support for, and acceptance of, additional conservation areas will be higher if conservation areas are developed as multiple-use objective areas to provide for public viewing, education and recreation.
4. Ecological significance and public acceptance of additional conservation areas will be greater if conservation areas are developed away from residential areas.
5. Public acceptance of additional conservation areas will be greater if associated management plans address, and strive to ensure, minimal conflicts with humans.
6. Larger conservation areas provide a greater potential for ecological significance. Public access to larger conservation areas should be limited to a few trails on the periphery of the property to maintain ecological integrity.
7. New conservation areas should provide for increased connectivity to existing conservation areas and important habitats along raptor migration corridors, and for increased wildlife viewing opportunities.
8. Conservation areas for black-tailed prairie dogs within the front range should not negatively impact critical habitat for other wildlife species of conservation importance.

Objective 9: The CDOW will encourage the acquisition and management of city and county open space on suitable grassland habitat along the front range for the conservation of the black-tailed prairie dog and associated grassland species.

Action 9.1: If populations fall into the Yellow zone – Vulnerable (250,000 – 350,000), develop conservation agreements with counties and cities in high decline areas to implement management tools to address declines.
Action 9.2: Provide scientific expertise and recommendations to front range open space managers on standardized monitoring methodologies developed by the multi-state black-tailed prairie dog Conservation Team.
Action 9.3: Develop science-based, best management practices for addressing grassland species management issues including relocation, maintaining corridors and so forth for use by managers of front range open space.
Action 9.4: Develop a consolidated resource of updated scientific information (biological and social) addressing grassland species conservation issues in urban and suburban areas.
Action 9.5: Conduct bi-annual symposia to provide an open forum for discussion and summarize new information on the conservation of grassland species.

Objective 10: Establish shared responsibility (front range and eastern plains) for conservation of the black-tailed prairie dog and associated species.

Action 10.1: Develop mechanisms for front range interests (developers, non-profit organizations, etc.) to provide funding for grassland species management.
Action 10.2: Develop and distribute (hard copy and electronic) informational materials that inform the public about the necessity of shared responsibility for management of grasslands species.
Action 10.3: Conduct urban wildlife and habitat conservation and management workshops.

Objective 11: Support and encourage public education and wildlife viewing opportunities on suitable black-tailed prairie dog and grassland open space areas.

Action 11.1: Provide scientific expertise and recommendations to local open space managers in the development and use of educational and interpretive materials.
Action 11.2: Assist in the development and enhancement of wildlife viewing opportunities

Funding Sources

Traditional funding for species conservation work in Colorado includes three primary sources: GOCO, SCTF and GC, generated from the sale of hunting and fishing licenses. For Fiscal Year 2003-04, these sources make up approximately 96% of the total funding, 52%, 21% and 23% respectively. The remaining 4% includes federal funds from Section 6 and the State Wildlife Grant program and 100% grants from federal and private sources. Another important financial contribution comes from private landowners who act as stewards for over 75% of all shortgrass prairie habitat for the benefit of all wildlife in the state of Colorado.

As this Plan and others like it are completed and implementation begins, it is apparent that substantially more funding will be needed in the future. This argues for seeking a new funding source. This has been the focus of the national Teaming with Wildlife initiative and the High Plains Partnership; but additional state, federal and private funding sources will be necessary for the success of species conservation in Colorado.

Objective 12: The CDOW will work towards developing substantial increases in funding necessary for the conservation of grassland species in Colorado.

Action 12.1: Pursue partnerships with other federal, state, county and municipal agencies, private foundations, private landowners, and non-governmental organizations to increase funding for the conservation of grassland species.
Action 12.2: Pursue innovative ideas for funding of grassland species conservation in Colorado.

Relevance to Listing Factors

"The goal of the Plan is to ensure, at a minimum, the viability of the black-tailed prairie dog and associated species (Mountain Plover, Burrowing Owl, swift fox and Ferruginous Hawk) and provide mechanisms to manage for populations beyond minimum levels, where possible, while addressing the interests/rights of private landowners." In doing this, there is a commitment to assure the continued existence of the target species and thereby preclude or eliminate the need for state and/or federal listing. Therefore, the successful implementation of this Plan, to the degree that it accomplishes the above goal should be of great relevance to the USFWS. We believe that this Plan provides strong direction and commitment to conservation of the pertinent grassland species and to a significant portion of other less rare species that occupy the same habitats.

Federal listing is determined by a detailed consideration of five key factors that are believed to cause a species to decline to levels that are considered endangered or threatened.

1. Present or threatened destruction, modification, or curtailment of the species' habitat or range;
2. Over-utilization for commercial, recreational, scientific or educational purposes;
3. Disease or predation;
4. Inadequacy of existing regulatory mechanisms; and
5. Other natural or manmade factors affecting the species' continued existence.

This Plan addresses each of the listing factors with direct and indirect efforts. As such, the strategies employed propose to reduce or eliminate the need for listing those species not already listed as a federally protected species. Furthermore, it will add significantly to the recovery of some species that are already listed.

1. Present or threatened destruction, modification, or curtailment of a species' habitat or range

Habitat loss or modification is generally agreed upon as a primary reason for species decline. This Plan focuses largely on the development of strategies and actions that will secure land, reduce or abate threats related to habitat and apply land management tools that stabilize or decrease the negative impacts of specific land management practices. The objectives and actions are developed in ways that consider and support the ongoing management of land by private landowners to the maximum extent possible. This is accomplished by using high quality scientific information, incentives and partnerships, focusing efforts on grasslands that will produce the most benefits, and creating flexibility for landowners throughout the area.

Habitat Conservation

Habitat Conservation is a key strategy of the Plan. This strategy effectively manages or abates the threats of grassland conversion, suggests alternatives for mitigating conflicts on agricultural and urban lands and addresses many of the current and future threats from fragmentation. Key elements of the Plan include:

- The concept of habitat conservation as envisioned in this Plan includes a broad suite of proven conservation tools including easements and management agreements.
- Habitat conservation will be achieved using voluntary, non-regulatory, incentive-based partnerships with private landowners and others with an interest in grassland species conservation.
- There is a specific intent to leverage resources expended to achieve the highest value conservation through focusing habitat conservation in areas of highest biological return.
- To strategically conduct conservation there is a need to establish biologically meaningful goals and criteria for successful protection efforts. The progress toward achieving these goals needs to be monitored and measured. Such a process supports not only leveraged conservation, but also provides a strong degree of accountability.
- The Plan recognizes the significance of conservation efficiency and effectiveness and calls for the consideration of the possible consolidation of secure habitat area boundaries (where willing landowners are found).
- Maintenance of potential habitat in addition to currently occupied habitat such that species have the opportunity for colonization/re-colonization. In addition, the availability of additional habitat may buffer against any potential impacts of biological or social change.

Land Management

Land management is noted as a major contributor to the status of targeted grassland species. A large part of this Plan focuses on maintaining or increasing compatible land management tools (e.g., many grazing practices) and decreasing or more suitably placing the practices that may have less desirable effects on the species considered in this Plan. Unlike habitat conservation, land management changes focus on incentive packages. While recognizing the value of changes made by landowners and managers, incentive packages can be highly cost-effective. Private operators manage most of the untilled shortgrass prairie. Influencing land management over large areas has direct benefits to species of concern and also provides a buffer to more focused and intensive strategies that are usually applied to protected areas.

The Plan recognizes a suite of tools that can be used to influence the management of lands to maintain or increase the habitat and food supply for species of concern which include:

- Encouraging the use of USDA incentive programs such as: Conservation Reserve, Conservation Reserve Enhancement, Grassland Reserve, Wildlife Habitat Incentives and EQIP. In addition, the Plan calls for an increased focus on CDOW's Colorado Species Conservation Partnership Program. While some of these programs are also considered

protection programs, their focus is in managing lands in a way that can also have large benefits to declining prairie species.

- The native prairie contained variable structure or grasslands and shrublands that existed due to substrate differences as well as the differential impacts of ecological processes such as grazing, insect outbreaks, precipitation and fire. Recognizing the importance of variability in the prairie, this Plan calls for management encouraging grazing and other management tools that result in a mosaic of grassland structure and types. Since habitat management recommendations for the creation and maintenance of variability are not readily available, the Plan calls for the development of habitat management recommendations for the purposes identified in this Plan. Incentive programs would encourage their use.
- The Plan also calls for specific management tools to be applied in areas where focal species have requirements that may be more difficult to achieve in a broad management strategy (e.g., the Mountain Plover).
- There is a concerted effort in this Plan to focus key efforts on larger black-tailed prairie dog towns, maximizing the benefits to associated species and black-tailed prairie dog goals. At the same time, there is a specific purpose to encourage compatible management of potential habitat for most species.
- In an effort to reduce management impacts and maintain conservation and landowner management options, the Plan calls for black-tailed prairie dog control efforts, where necessary, designed to reduce numbers rather than eliminate the black-tailed prairie dog. It also provides guidance and encouragement to control with tools that minimize or eliminate the negative impacts to associated species (e.g., conducting control efforts at times when associated species are not present or have completed nesting activities).
- Several tools minimize impacts to nesting birds. The Plan calls for the conservation of traditional nesting sites by specific nesting site identification, working with landowners to minimize impacts to nesting grassland birds (particularly the Mountain Plover) when possible and reducing disturbance of key species (especially raptors).

2. Over-utilization for commercial, recreational, scientific or educational purposes

This factor is considered to have low impact on the black-tailed prairie dog and the overall declines of grassland species (although historically it may have had disproportionately large impacts). Current commercial uses are highly limited. In response to existing uses, this Plan:

- Discourages poisoning and shooting on National Grasslands until target objectives are met and provides a system for evaluating the need to change from the use of discouragement to regulation or policy at specific population levels.
- Recognizes that while shooting of the black-tailed prairie dog (in particular) will occur at least as a recreational activity, there is a strong potential for negative effects on non-target species. The Plan calls for a focused effort to inform hunters of the presence and sensitivity of other species where shooting is allowed.

3. Disease or predation

Disease is a key issue for the black-tailed prairie dog throughout its range. While there are no means of preventing plague, the Plan calls for planning, implementation, and monitoring the threat such that effective proactive and defensive (i.e., adaptive) actions can be undertaken, therefore mitigating the impacts of plague.

- The first strategy is to work at a statewide scale to conserve the black-tailed prairie dog. Reducing conservation strategies to a few places would place any benefits at high risk. The Plan calls for maintaining the black-tailed prairie dog over a large portion of its historic range.
- There are design features that may benefit or mitigate the potential negative impacts of plague. The Plan calls for research in this area, a focus on large landscapes and maintenance of distances between colonies and towns.

- Finally, the Plan calls for a centralized monitoring of plague throughout Colorado's plains. Such monitoring will aid in adapting local and statewide management actions as well as providing important information on status and progress toward occupied town goals.

4. Inadequacy of existing regulatory mechanisms

The federal ESA places a premium on the need to have a regulatory framework in place that will prevent extinctions or further endangerment of species. This Plan documents the changes in regulations made and suggests that some new regulations may be needed under some circumstances. The Plan:

- Encourages CDNR to assume a lead role, primarily through CDOW. The CDOW has the mandate to act on most elements of this Plan and the CDNR provides direction to CDOW.
- Recognizes the need to maintain existing regulations (i.e., the increased regulations that are placed after the listing proposal).
- Develops a monitoring program (see references to populations occurring in the variously colored zones) to guide any changes in the regulations.
- Calls for collaboration between CDA and CDNR to demonstrate through law, regulation, or cooperative agreement, adequate regulatory authority and regard for black-tailed prairie dog conservation objectives as it relates to the use of toxicants or shooting to control the black-tailed prairie dog causing damage to private property
- Encourages the use of existing federal regulation or policy to facilitate the contribution of federal lands to grasslands conservation goals.

5. Other natural or man-made factors affecting the species' continued existence

The USFWS must consider any other factors that may contribute to species declines or stresses that have not been considered in the previously evaluated factors. The Plan contributes direction on these issues.

The Plan addresses the potential cumulative effects of multiple factors by minimizing negative impacts of all other factors. The Plan also monitors individual and combined effects through the call for a science-based monitoring plan.

In addition, individual factors and the effects of combined factors are made easier to address through several strategies that are included in the Plan. The Plan calls for a:

- Strong public outreach element. Such a program, effectively implemented, facilitates all aspects of the Plan (i.e. makes implementation and sustainability easier).
- Scientifically rigorous monitoring program. Such a program will evaluate changes in key areas of biology and allow for change of actions in a meaningful timeframe. In addition, this Plan will collect information that allows for the evaluation of cumulative impacts that result from multiple factors.
- Strong research agenda that will support the commitment to adaptive management and effective strategies.

In summary, this Plan addresses all key listing factors within the framework of commitment to the people making a living off the land. The Plan uses adaptive management and high quality science while fostering the institutional commitments of lead agencies and other key partners. A fundamental part of this Plan is the development of habitat goals for the black-tailed prairie dog while at the same time committing to a larger conservation effort that supports the associated species and other less well-known elements of Colorado's natural heritage. Under this Plan, we believe that an evaluation of the key listing factors would greatly reduce or eliminate listing concerns for the state of Colorado.

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APPENDIX A
SPECIES ACCOUNT: BLACK-TAILED PRAIRIE DOG

Black-tailed Prairie Dog (*Cynomis ludovicianus*)

Species Status

In 1998, two petitions were received by the U.S. Fish and Wildlife Service (USFWS) to list the black-tailed prairie dog (*Cynomis ludovicianus*) as threatened under the ESA of 1973, as amended (USFWS 1999). One petition, dated July 30, 1998 was from the National Wildlife Federation (NWF) and the second petition, dated August 26, 1998 was from the Biodiversity Legal Foundation, the Predator Project and Jon C. Sharps. In these petitions, several factors were listed as major threats to the long-term viability and conservation of this species. These included habitat loss, habitat fragmentation, disease, unregulated shooting and poisoning, and combinations of these, and other factors. In response to these petitions, in February 2000 the USFWS's 12-month finding was that the black-tailed prairie dog was warranted but precluded for listing under the ESA (USFWS 2000). The USFWS believed that a threatened listing was warranted. The black-tailed prairie dog was not listed at that time, however, as resources needed to complete the process were not available.

Description and Taxonomy

Prairie dogs are small, diurnal, burrowing rodents. Specifically, there are five species of prairie dog in North America, three of which are found in Colorado. The species found in Colorado are the black-tailed prairie dog, white-tailed prairie dog (*C. leucurus*) and Gunnison's prairie dog (*C. gunnisoni*). A subspecies of black-tailed prairie dog is sometimes mentioned (*Cynomys ludovicianus arizonensis*). Studies on evolutionary divergence, however, indicate that the black-tailed prairie dog is monotypic (USFWS 2000). Therefore, it is believed that the subspecies separation is not valid. Most skeletal and cranial measurements indicate that the black-tailed prairie dog is the largest species of prairie dog (Hollister 1916, Pizzimenti and Collier 1975). If one simply measures body mass during the breeding season, however, the white-tailed prairie dog is larger (Clark 1977, Hoogland 1995, Wright-Smith 1978).

The black-tailed prairie dog measures approximately 13-16 in and weighs 1-3 lbs when mature. Pelage color ranges from light tan to reddish brown above and whitish below with most individuals having a characteristic black-tipped tail. Summer pelage is short and relatively coarse and winter pelage is longer and more lax (Fitzgerald et al. 1994). Females are typically 10-15% smaller than males and have eight functioning mammae (Fitzgerald et al. 1994, Hoogland 1996). The dental formula is 1/1; 0/0; 2/1; 3/3; for a total of 22 teeth.

Historical and Current Distribution

Historically, the black-tailed prairie dog had the largest geographic range of all species of prairie dog, from extreme southern Saskatchewan through 11 states to extreme northern Mexico. Because no definitive historical account of the actual number of occupied acres of the black-tailed prairie dog exists, various individuals, organizations, and state and federal agencies have made estimates over the years. In its petition, the NWF stated that the black-tailed prairie dog once occupied as much as 100-200 million acres (USFWS 2000). Researchers estimate historic occupied habitat within this area for all five species of prairie dogs to be between 99-247 million acres (Mulhern and Knowles 1995, Miller et al. 1996). Anderson et al. (1986) estimated 104 million acres for all species of prairie dogs across their range in the early 1900's. Knowles (1998) estimated that the black-tailed prairie dog alone occupied between 79-111 million acres.

The black-tailed prairie dog currently exists in 10 of the 11 historically occupied states; it was extirpated from Arizona somewhere around 1932 (USFWS 2000). The USFWS 12-month finding estimated that the current occupied acreage within these 10 states is approximately 676,000 acres (USFWS 2000). Using the Bailey Eco-regions habitat model, the current estimated occupied acreage within these same 10 states is 1,093,000 acres (Luce 2003). These numbers represent only 1-6% of its original range (Fagerstone and Ramey 1995, Knowles 1995, Mulhern

and Knowles 1995, Barko 1997, Weurthner 1997, Knowles 1998, USFWS 2000). It is estimated that the black-tailed prairie dog historically inhabited approximately 20% of the shortgrass and midgrass prairies in Eastern Colorado (Laurenroth 1979) or approximately 4.6 million acres (Van Pelt 1999).

In its petition to the USFWS, the NWF estimated that the black-tailed prairie dog in Colorado occupied approximately 44,000 acres (Knowles 1998). In the 12-month finding, the USFWS estimated approximately 93,000 active occupied acres in Colorado (USFWS 2000). The Bailey Eco-region model estimated that Colorado had 255,773 acres of current suitable habitat (Luce 2003). In 1999, the CDNR contracted EDAW, Inc. to conduct a "Black-tailed Prairie Dog Study of Eastern Colorado" (EDAW 2000). After completing their work, EDAW (2000) reported an estimate of 214,570 active occupied acres of prairie dogs in eastern Colorado. The CDOW initiated a complete aerial survey of black-tailed prairie dog acres throughout its entire historic range within Colorado in the summer of 2001. This survey was accomplished using aerial survey techniques described by Sidle et al. (2001). Results of this survey indicate that Colorado currently has between 570,947 and 691,258 active black-tailed prairie dog occupied acres (White et al. 2003).

Life History and Habitat

Behavior

The black-tailed prairie dog is diurnal and active above ground throughout the entire year. Unlike white-tailed and Gunnison's prairie dogs, the black-tailed prairie dog does not hibernate. It does, however, enter periods of torpor. Torpor is defined by Wang (1989) as the facultative lowering of body temperature to levels below seasonal euthermic norms. This lowering of body temperature facilitates the conservation of energy and body water (Bakko et al. 1988, Wang 1989). It is believed that the black-tailed prairie dog enters torpor over multiple days in response to shortages of food and water, and extremely low ambient temperatures (Lehmer et al. 2001). Lehmer et al. (2001) found that separate colonies would enter torpor simultaneously, indicating that the response to stimuli for entering torpor occurred at a large scale.

The basic social group of the black-tailed prairie dog is called a coterie. Coteries are generally made of one adult male, two or three adult females, and their offspring (Garrett and Franklin 1988, Hoogland 1995). Larger coteries may contain two breeding males, or one male may sometimes control two smaller adjacent coteries. Several coteries make up a colony or town. Depending on the size of the town, topographic relief and geographic features of the landscape, portions of the town may segregate into units called wards.

The black-tailed prairie dog has a highly complex system of communication within and between coteries. Communication between animals involves tactile, visual, olfactory and auditory stimuli (Fitzgerald et al., 1994). The most commonly recognized vocalizations out of a total of 12 categorically different vocalizations of this species are its alarm bark and the jump-yip (Hoogland 1995). In addition to vocalizations within coteries, there are a number of amicable tactile interactions including play, grooming and mouth-to-mouth contact. However, when females are pregnant or lactating, they can be very hostile in their defense of natal burrows (burrows used for rearing offspring). This hostility between coterie members usually ends once juveniles come above ground (King 1955, Hoogland 1986). Interactions between different coteries can result in a territorial dispute that involves staring, flaring of the tail, bluff charges, tooth chattering, anal sniffing, and may include chasing and fighting (King 1955, Hoogland 1995).

Although prairie dogs are territorial, individuals will disperse to different coteries or even different colonies throughout their life. Dispersal is defined as the movement of an individual from the natal burrow to another location where it is expected to reproduce assuming it survives and finds mates. Intracolony (within colony) dispersal is common and involves mostly yearling males before they begin to reproduce (Garrett and Franklin 1988). Intercolony dispersal (between colonies) also occurs, but is less common and typically occurs in late spring (Garrett and Franklin

1988). The reason for this timing is generally based on: 1) peak growth of cool-season grasses affording dispersing prairie dogs good food and cover; and 2) the emergence of new litters from the natal burrows and subsequent peak colony densities.

Another reason for dispersal may be to minimize inbreeding between close genetic relatives (Dobson et al. 1997, Halpin 1987, Hoogland 1995). Garrett and Franklin (1983) and Hoogland (1982) found that females only bred with an unrelated male. In situations where genetically related males are the only males available in a coterie, related females may not breed at all. However, Hoogland (1995) states that, "…on the day of estrus, females sometimes leave the home coterie territory in search of breeding males from other territories. Therefore, dispersal is sometimes the only way prairie dogs can continue to breed."

Reproduction

The black-tailed prairie dog has only one estrous cycle and one litter per year. In Colorado, breeding generally occurs in late February or early March (Fitzgerald et al., 1994). Gestation lasts approximately 30 to 35 days with pups emerging from the burrow four to seven weeks after birth (Fitzgerald et al. 1994). Pups are fully weaned when they come above ground and generally weigh between three and five oz (Fitzgerald et al., 1994). Females generally have four to six pups per litter (Knowles and Knowles 1994, Hoogland 1995). According to Hoogland (1996), survivorship for female pups is usually 54% and for male pups is 47% during the first year after emergence. Crosby and Graham (1986) state that the post-weaning natural mortality rate is approximately 44% for sub-adults and pups (juveniles). Hoogland (1995) has documented that females in the wild may live up to eight years, but males never lived more than five years on his study sites.

Some research into fertility control as a means of limiting local population growth has been done. Limits to any fertility control used for prairie dogs include: 1) an oral bait must be provided as it is too economically prohibitive to capture and sterilize each prairie dog; 2) it cannot have any secondary hazards to non-target species that either eat the bait or the treated animals; and 3) to be used commercially, it must be registered with EPA (a very expensive process). Contraception of prairie dogs is not currently a viable or commercially available method to control local prairie dog populations.

Diethylstilbestrol (DES) is a synthetic estrogen used to reduce fertility in female animals. Garrett and Franklin (1983) showed that DES stopped all reproduction in the black-tailed prairie dog. A few problems were noted, however. First, DES was difficult to administer because it needed to be administered at a precise time during the breeding cycle. Secondly, it accumulated in the body tissues and posed a secondary hazard to predators. As a result, DES was never registered with EPA and probably never will be.

Ornitrol (DiazaCon) is a compound that has the same chemical structure as cholesterol (Miller and Fagerstone 2000). It prevents the formation of testosterone and progesterone and can last up to several months. The compound may have undesirable side effects on the animal's health because cholesterol is important for many body functions. In addition, it is not species specific. Ornitrol is slowly cleared from the system after ingestion (Fagerstone et al. 2002) so hazards to non-target species are not permanent and not as severe as those from DES.

Diet

The black-tailed prairie dog eats a variety of grasses, sedges and forbs. Grasses are typically its preferred food (Koford 1958, Tileston and Lechleitner 1966, Costello 1970, Summers and Linder 1978, Fagerstone 1979, Ursek 1984, Garrett and Franklin 1988, Clippinger 1989). The grasses most frequently consumed include: western wheatgrass (*Pascropyrum smithii*), blue grama (*Bouteloua gracilis*) and buffalograss (*Buchloe dactyloides*) (Koford 1958, Tileston and Lechleitner 1966, Bonham and Lerwick 1976, Summers and Linder 1978, Fagerstone 1979). Other grasses that may be consumed include sand dropseed (*Sporobolus cryptandrus*), cheatgrass (*Bromus tectorum*), sixweeks fescue (*Vulpia octoflora*) and ring muhly (*Muhlenbergia*

torreyi) (Clippinger 1989). According to Uresk (1984), sedges (*Carex* spp.) may also compose up to 55-64% of prairie dog diets in late spring. Some forbs common in prairie dog diets include scarlet globemallow (*Sphaeralcea coccinea*) (up to 20-40% of their diet) and plains prickly pear (*Opuntia polyacantha*) (up to 58% of the winter diet) (Clippinger 1989).

The black-tailed prairie dog typically avoids sagebrush (*Artemisia tridentata*), threeawn (*Aristida purpurea*), horseweed (*Conyza canadensis*), diffuse knapweed (*Centaurea diffusa*), Mediterranean sage (*Salvia aethiopis*), buffalo bur (*Solanum rostratum*), inland salt grass (*Distichlis spicata*), tumblegrass (*Schedonnardus* spp.) and prairie dog weed or fetid marigold (*Dyssodia papposa*) (Hansen and Gold 1977, Koford 1958, Tileston and Lechleitner 1966, Summers and Linder 1978, Fagerstone 1979). On poorer habitats, the black-tailed prairie dog will consume bindweed (*Convolvulus arvensis*) and ragweed (*Ambrosia* spp.).

In some cases, grazing by prairie dogs can improve the plant nutritional quality through the constant clipping activity (Coppock et al. 1983, Krueger 1986, O'Meilia et al. 1982 and Whicker and Detling 1988). Clipping stimulates new growth, which often has higher protein content and greater digestibility than the more mature vegetative biomass (O'Meilia et al. 1982, Whicker and Detling 1988). In addition, Bonham and Lerwick (1976) found an increase in the total number of plant species and greater cover of perennial, grazing tolerant grasses such as buffalograss within prairie dog towns as opposed to surrounding areas in eastern Colorado. This increase in perennial grasses and forbs can be beneficial for livestock. Because of this, impacts to cattle may be minimal on good spring or summer range, when there is adequate soil moisture and precipitation to facilitate new vegetative growth. O'Meilia et al. (1982) believed that higher forage quality may compensate for reduced forage availability. In their study, they found no statistically significant difference between steer weight gains on pastures with and without prairie dogs.

The reduction in overall biomass resulting from clipping, however, may significantly and negatively affect cattle or native ungulates on winter ranges and pastures, or during drought years. Because prairie dogs have the ability to clip vegetation shorter than cattle and native ungulates can access, if no new growth occurs after initial clipping by prairie dogs, cattle may be unable to utilize the remaining forage.

Hansen and Gold (1977) stated, based on 35% dry matter content, an individual adult black-tailed prairie dog consumes approximately 3 oz of forage per day and 71.1 lbs per year. The amount of forage clipped or lost due to burrowing amounts to an additional 35.1 lbs per year. With regard to competition with cattle, there is approximately a 64% similarity index in forage preference between prairie dogs and cattle (Hansen and Gold 1977). Therefore, using the conversion factor of 19 lbs of forage-need to produce 1 lb of meat (Cook 1978), it is estimated that each prairie dog could result in a reduction of 3.58 lbs of meat production per year (Crosby and Graham 1986).

Habitat

The black-tailed prairie dog inhabits the short- and mixed-grass prairie grasslands located in the semi-arid Great Plains region of western North America. It desires habitats with vegetation shorter than 12 inches, which it will often clip to enhance visibility over the landscape (Turner 1979, Clippinger 1989, Coffeen and Pederson 1989, McDonald 1993, Fitzgerald et al. 1994, Hoogland 1995, Truett et al. 2001). Within this region, the black-tailed prairie dog usually prefers areas of less than 10% slope (Koford 1958, Tileston and Lechleitner 1966, Dalsted et al. 1981, Clippinger 1989, Truett et al. 2001). Hoogland (1995) states that the black-tailed prairie dog generally exists between elevations of 2,296 and 5,577 feet. Because it does not hibernate, as do the Gunnison's, white-tailed, and Utah prairie dog, which exist at elevations higher than 5,577 feet, it can only exist at elevations where foraging can continue throughout the winter.

Burrow Systems

Black-tailed prairie dog burrows are important for defense against predators and protection from inclement weather. Burrow entrances are typically 4-12 inches in diameter (Merriam 1902,

Sheets et al. 1971, King 1955), about 16-33 ft long and 6-10 ft deep. Typically, burrows have one or two entrances, but may have as many as six entrances (Sheets et al. 1971, Hoogland 1995).

There are three different types of burrow entrances. One type has no conspicuous mound and is typically found near the colony's periphery. These burrows are generally used only as escape cover to avoid predators or thermal cover to avoid midday heat (Hoogland 1996). The second type of entrance is wide, rounded and generally unstructured. These entrances are called dome craters (King 1955). The third type of entrance is a high, cone-like mound of dirt that resembles a volcano. This entrance is called a rim crater. Rim and dome craters may be used as: 1) cover from predators; 2) vantage points to scan for predators; 3) overnight cover; 4) cover for rearing young; 5) barriers to prevent flooding; and 6) facilitation for underground ventilation via Bernoulli's Principle (Vogel et al. 1973, Hoogland 1995).

Hoff (1998) and Apps et al. (2002) suggest that fine sand-loam soils with little gravel and good drainage are optimal for burrow systems. Treviño-Villarreal et al. (1997) state that the majority of the Mexican prairie dog (*Cynomys mexicanus*) colonies studied were found on silt-loam soils low in clay (less than 30%), medium in sand (approximately 50%), and medium to high in silt (greater than 70%). Burrows high in gravel may collapse and can impair the ability of burrowing animals to dig (Apps et al. 2002). Although the prairie dog may conduct exploratory diggings in rocky ground, these are not preferred sites and are typically abandoned (King 1955, Treviño-Villarreal et al. 1997).

Reasons for Decline

The USFWS 12-month finding (USFWS 2000) listed the major threats to the long-term viability and conservation of the black-tailed prairie dog in order of importance as:

1. Present or threatened destruction, modification, or curtailment of the species' habitat or range;
2. Overutilization for commercial, recreational, scientific, or educational purposes;
3. Disease or predation;
4. Inadequacy of existing regulatory mechanisms; and
5. Other natural or manmade factors affecting the species' continued existence.

1. Present or threatened destruction, modification, or curtailment of the species' habitat or range

The petitioners and the USFWS (2000) believe that habitat loss due to cropland conversion, urbanization, habitat modification and fragmentation have negatively affected populations of the black-tailed prairie dog across its range. The conversion of prairie habitat to cropland is asserted as being the most devastating loss. According to Laycock (1987), 104 million acres of the Great Plains were converted to cropland between 1880 and 1899. As of 1987, 57,700,000 acres of land in the Great Plains was still unplowed (Hexem and Krupa 1987), the loss of which would negatively impact the black-tailed prairie dog and other grassland species.

Urbanization has impacted fewer acres and likely will not cause the extinction of the black-tailed prairie dog in the future. The actual conversion or fragmentation, however, is permanent. According to the USFWS (2000), 42,500 acres of occupied habitat were present along the urban front range Corridor from Fort Collins to south Denver in 1994. By 1998, this acreage reportedly had already decreased by 8,000 acres (Knowles 1998)

2. Overutilization for commercial, recreational, scientific, or educational purposes

Shooting did not contribute as significantly to historical prairie dog declines as did habitat conversion and poisoning (Van Pelt 1999). All recreational hunting of the black-tailed prairie dog on public lands (state and federal) and all areas east of Interstate 25 is currently prohibited in

Colorado. Shooting of prairie dogs is still legal for private landowners and their agents to reduce damage to their properties.

3. Disease or predation

Sylvatic plague (*Yersinia pestis*) is not endemic to North America but was brought from China via ship to United States ports in 1899 (Dicke 1926, Link 1955). It was first recorded in wild rodents in San Francisco, California (Link 1955) and has extended eastward throughout the western, semiarid region of the United States (Barnes 1982). Sylvatic plague does not occur in the eastern part of the country. Of all of the factors that limit the abundance and distribution of prairie dogs, sylvatic plague is the only factor that is completely beyond human control and may continue to be the "wild card" in all management decisions and conservation strategies for the black-tailed prairie dog.

Epizootic hosts with little to no resistance to the disease, such as rock squirrels (*Spermophilus* spp.) and prairie dogs, are most often not responsible for the overall persistence of plague in the environment. Instead, plague breaks out when rock squirrels and prairie dogs are exposed to enzootic hosts (those species that have high resistance to the disease) such as deer mice (*Peromyscus maniculatus*) and kangaroo rats (*Dipodomys* spp.). The black-tailed prairie dog is highly susceptible to plague. Very few, if any, seem to have any immunity to plague at all regardless of health level. In addition, as populations increase, the greater densities of animals provide more opportunity for transmission of plague through the population (Barnes 1993, Cully and Williams 2001, Lomolino and Smith 2001). As population density increases, fleas have an easier time finding new hosts and pneumonic transmission can occur more frequently.

4. Inadequacy of existing regulatory mechanisms

Currently in Colorado, the black-tailed prairie dog is classified as a "destructive rodent pest" by the CDA (see Colorado Revised Statute (C.R.S.) 33-7-203) and as small game by the CDOW (see C.R.S. 33-1-102). The CDOW generally limits regulation of the black-tailed prairie dog to issues pertaining to hunting and relocation from one site to another. Relocations are authorized through a permit process and all recreational hunting of the black-tailed prairie dog on public lands (state and federal) and all areas east of Interstate 25 is prohibited. Shooting is still legal for private landowners and their agents to reduce damage to their properties, as is the use of various fumigants and toxicants. The CDA and EPA direct the types and manner in which fumigants and toxicants can be used.

The CDPHE also has jurisdiction over prairie dogs when issues of human health and safety are raised. This is most often with regard to suspected or confirmed outbreaks of sylvatic plague. State law (C.R.S. 35-7-203 (Senate Bill 99-111)) also provides that no person shall release prairie dogs into a county other than that from which they were taken unless such person has obtained prior approval of the CDOW and the BOCC of such receiving county. In addition, several Colorado counties and municipalities have localized ordinances and policies dictating how the black-tailed prairie dog is managed in the face of human conflict and urban development. Some ordinances or policies require that none be killed (e.g. City of Boulder Ordinance #7133 and municipal code section 6-1-12 and Town of Superior municipal code Article XXII Section 16-493). Other ordinances, general policies and recommendations call for good faith relocation efforts, or to make the prairie dogs available for either the ferret recovery program or other wildlife rehabilitation programs before the use of fumigants or toxicants is permitted (e.g. City of Thornton Ordinance #2628).

5. Other natural or manmade factors affecting the species' continued existence

Poisoning for control of prairie dogs and other ground squirrels has occurred to varying degrees since the late 1800's and early 1900's. Most commonly, prairie dogs were controlled to reduce competition for forage with domestic livestock and damage to agricultural crops such as alfalfa, grass hay and wheat. Beginning in 1915, the U.S. Federal Government began to assist landowners in control efforts throughout the Great Plains and the west. Between 1916 and 1920

an estimated 26 million hectares of prairie dog and ground squirrel habitat was poisoned (Bell 1921, Cook 1991).

From the 1920's to roughly 1972, a variety of toxicants was used in the control and/or eradication of prairie dogs and other ground squirrels. Although a variety of toxicants was used, none were used as widely as Compound 1080. This highly effective, but extremely toxic chemical was banned in 1972 (Fagerstone and Ramey 1995). Since then, a variety of new, more "environmentally friendly" chemicals have been developed to assist in the control of prairie dogs and other burrowing rodents. Common chemicals used today include 2 percent zinc phosphide poisoned oats and fumigants such as aluminum phosphide, magnesium phosphide and carbon monoxide gas cartridges.

Efforts to control prairie dogs in recent years have been far less than those experienced in the late teens and early twenties. Control activities, however, do continue. Today, not only do many livestock and agricultural producers continue to control prairie dogs on their properties, but a variety of new landowners are controlling prairie dogs as well. Urban and suburban landowners, developers, city and county land managers, and others are controlling prairie dogs that invade yards, occupy areas scheduled for development, damage school yards, cemeteries, parks and recreation areas, or simply inhabit areas not intended for prairie dogs and prairie dog conservation.

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APPENDIX B
SPECIES ACCOUNT: SWIFT FOX

SWIFT FOX (*Vulpes velox*)

Species Status

The Swift Fox Conservation Team (SFCT) was formed in 1994 and included members from Canada, Federal agencies and the 10 States (including Colorado) located in the historic range of the swift fox (*Vulpes velox*). In response to a 1992 petition by Jon C. Sharps to list the swift fox, the USFWS, in 1995, issued its 12-month finding that the swift fox was warranted but precluded for listing under the ESA (USFWS 1995). The USFWS believed that a threatened listing was warranted. The swift fox was not listed at that time, however, as resources needed to complete the process were not available.

Since 1994, the SFCT has produced the Swift Fox Conservation Assessment and Conservation Strategy (CACS) (Kahn et al. 1997) and seven annual reports (Allen et al. 1995, Luce and Lindzey 1996, Giddings 1997, Roy 1998, Schmitt 2000, Peeks 2002). The compilation of existing information, collection of new biological data and implementation of swift fox monitoring and management programs contained in these documents demonstrated that swift fox distribution was more widespread and continuous than originally thought at the time of the listing decision in 1995. The data also showed that the swift fox was more adaptable to various habitat types than previously believed. In the January 8, 2001 Federal Register (USFWS 2001) the USFWS stated:

> As a result of new information, originally identified threats are no longer applicable for the following reasons: 1) The swift fox is more abundant and widely distributed than previously thought; and 2) the species is more flexible in its habitat requirements than originally believed.

It was further stated that the USFWS did not believe that swift fox populations were limited by the commercial trapping of furbearers and found no indication that either parasites or disease was limiting the population. As a result, the USFWS reevaluated the threats and the five listing factors under section 4(1)(1), and stated that, "…the swift fox is not likely to become in danger of extinction throughout all or a significant portion of its range in the foreseeable future" (USFWS 2001). The USFWS thereby found the petition for listing to be unwarranted and removed the swift fox from the candidate list as of January 8, 2001. The swift fox is classified as non-game in Colorado and listed as a species of special concern.

Description and Taxonomy

An adult swift fox typically weighs between 2 and 3 kg and is approximately 30 cm tall and 80 cm long (Egoscue 1979, Scott-Brown et al. 1987). This equates roughly to the size of an average domestic cat. The swift fox is distinguishable from all other North American foxes, other than the kit fox (*Vulpes macrotis*), by its small size and black-tipped tail. The swift fox is differentiated from the kit fox by smaller, more widely spaced ears and a rounder head. The swift fox is light gray to buffy tan above with pale yellow to white coloring on its legs, sides and lower surface of the tail. The pelage color may be more orange during the summer months. The swift fox also has easily distinguishable black patches on either side of the snout and on the tip of the tail. The dental formula for the swift fox is: 3/3; 1/1; 4/4; 2/3; for a total of 42 teeth.

Historical and Current Distribution

The swift fox is native to the shortgrass and midgrass prairie ecosystems of the Great Plains region of North America (Kahn et al. 1997). Historically, its range was believed to be as large as 1.6 million km^2 (Scott-Brown et al. 1987, Sovada and Scheick 2000), and extended north to south from central Alberta to central Texas and east to west from western Iowa and Minnesota to central Colorado (Hall and Kelson 1959, Hall 1981, Samuel and Nelson 1982, Scott-Brown et al. 1987). The exact extent of historic distribution is difficult to determine based simply on limited fragmented and unverifiable historical information found in museum and fur trade records and

anecdotal accounts by early naturalists and explorers. Recent vegetation mapping that delineated grassland types in the central United States (Lauenroth 1996), however, indicates the historic range of the swift fox may be 20-25% less than previously estimated.

A dramatic reduction in the range of the swift fox occurred in the early 1800s to the mid 1900s due to human settlement, land-use conversion of prairies, predator control campaigns, unregulated trapping, hunting and rodent control programs (Samuel and Nelson 1982, FaunaWest 1991, Kahn et al. 1997). According to Hillman and Sharps (1978), habitat reduction was most dramatic in the northern and eastern portions of its range. Specifically in Colorado, the swift fox historically existed throughout the plains of eastern Colorado (Cary 1911, Armstrong 1972, Hall 1981). In the early 1900s the swift fox's range had decreased significantly and by the late 1960's, the species was reported as occurring "sparingly" (Cary 1911). It is believed that the current range of the swift fox is approximately 40% of its historic range (Kahn et al. 1997).

Annual surveys conducted by the USFWS from 1972 to 1981, however, showed populations of swift fox in the southeastern portion of Colorado to be stable to slightly increasing (Sovada and Scheick 2000). The 2001 Annual Report of the SFCT (Peeks 2002) stated that over the past 25 years swift fox distribution has increased on the eastern plains of Colorado. Many researchers have found there is a wide distribution of swift fox throughout eastern Colorado with many abundant local populations (Covell 1992, Kitchen 1999). Overall, an estimated population of 7,000 – 10,000 swift fox exists on the shortgrass prairie grasslands of eastern Colorado (Fitzgerald and Kahn 1997, Finley 1999, Covell 1992). Peeks (2002) stated that in addition to being found on the shortgrass prairie, swift fox also inhabit other areas such as agricultural and mixed grass prairie habitat which encompass about 30% of eastern Colorado. Therefore, it is likely that even more than 7,000 – 10,000 swift fox exist in eastern Colorado.

Life History and Habitat

Behavior

The swift fox is generally nocturnal, with daytime activities restricted to the den site (Egoscue 1979). Kilgore (1969) observed swift fox basking in the sun midday during the winter months and morning, late afternoon and early evening during the summer. The swift fox is generally "naive" as evidenced by its ready acceptance of poison baits (Bunker 1940), willingness to den near human settlements (Cutter 1958) and trapping ease (Bailey 1926).

The swift fox does not appear to exhibit any signs of territoriality (Kahn et al. 1997) as home ranges often overlap. Home ranges are often variable in size and in Colorado have been estimated to be 86 to 210 ha (Rongstad et al. 1989).

Reproduction

Except as noted, the information on reproduction is from Egoscue (1979). The swift fox typically lives in family groups of one male and two females (Covell 1992). It is monestrous and monogamous and apparently forms long-term pair bonds, breeding only once a year (Kahn et al. 1997). In Colorado, breeding generally occurs during late December to early January with a gestation period of approximately 50 days resulting in pups being born in March to early April. A litter is typically 3-6 pups. Pups are altricial at birth with eyes and ears remaining closed for 10-15 days. Pups remain below ground for approximately one month and are weaned at about six to seven weeks of age. The young occupy a separate den, but remain with the parents until August or September of their first year (Kilgore 1969, Hines 1980, Covell 1992).

Diet

The swift fox feeds opportunistically on a wide variety of small mammals, birds, reptiles, insects, plants and carrion (Cutter 1958, Kilgore 1969, Zumbaugh et al. 1985, Uresk and Sharps 1986, Hines and Case 1991, Roell 1999, Kitchen 1999, Sovada et al. 2001). Small mammals make up the majority of its diet (Cameron 1984, Scott-Brown et al. 1987, Eussen 1999, Kitchen 1999, Sovada et al. 2001). Kitchen (1999) found that this was particularly the case from October to

July. Sovada et al. (2001) found that mammals were the most frequently ingested prey during the spring in cropland and rangeland areas and in the summer in cropland areas. Specific mammals found in its diet include cottontail rabbits (*Sylvilagus* spp.), jackrabbits (*Lepus* spp.), ground squirrels (*Spermophilus* spp.), black-tailed prairie dogs (*Cynomys ludovicianus*), pocket gophers (*Pappogeomys* spp.), pocket mice (*Perognathus* spp.), kangaroo rats (*Dipodomys* spp.), harvest mice (*Reithrodontomys* spp.), deer mice (*Peromyscus maniculatus*), grasshopper mice (*Onychomys leucogaster*), prairie voles (*Miscrotus ochrogaster*) and woodrats (*Neotoma* spp.) (Cameron 1984, Eussen 1999, Kitchen 1999, Roell 1999, Sovada et al. 2001).

Kitchen (1999) and Sovada et al. (2001) state that insects were the most common food item in the fall for cropland and rangeland, and in the summer for rangeland areas. Other researchers, however, believe insects to be a much smaller contribution to diet and simply an alternative food source when other resources are scarce (White et al. 1995, Spiegel et al. 1996, White et al. 1996). This difference, however, may simply be attributed to habitat composition and the subsequent availability and abundance of insects.

Mortality

Direct mortality of the swift fox includes predation or death due to interference competition, vehicle collisions, hunting, trapping and rodent or predator poisoning campaigns. Predation is the most common type of direct swift fox mortality (Kahn et al. 1997, Roell 1999). Predators of the swift fox can include red fox (*Vulpes vulpes*), badgers (*Taxidea taxus*), large raptors and coyotes (*Canis latrans*) (Roell 1999). A large proportion of predation on swift fox is attributed to coyotes (Covell 1992, Kitchen 1999, Fox and Roy 1995, Sovada et al. 1998).

Habitat

Of all of the native North American foxes, the swift fox is the most “den-dependent” (Kilgore 1969, Scott-Brown et al. 1987), using dens year-round and life-long for such purposes as predator evasion, protection against inclement weather, and raising young. Typically excavating its own den, the swift fox may also utilize and enhance burrows made by other species such as badgers, ground squirrels and prairie dogs (Kilgore 1969, Hillman and Sharps 1978, Uresk and Sharps 1986, Carbyn et al. 1994). The swift fox dens are typically identified by a circular or slightly oval entrance approximately 17.5-22.5 cm in diameter with a dirt ramp leading from the entrance that may face any direction (Gilin 2002). Dens may have multiple openings (Hillman and Sharps 1978, Loy 1981, Uresk and Sharps 1986) and many dens may be used at any one time or throughout the year (Hillman and Sharps 1978, Loy 1981, Briden et al. 1987, Koopman et al. 1998). Dens are excavated in a number of different habitats including native shortgrass prairie, pastures, roadside ditches, fencerows, fallow fields and even cultivated fields (Cutter 1958, Scott-Brown et al. 1987, Covell 1992).

The swift fox very often chooses den sites close to roads (Hillman and Sharps 1978, Loy 1981, Hines and Case 1991, Jackson 1997, Kintigh 1999, Pruss 1999, Gilin 2002). It is believed that roads are not only travel corridors for swift fox (Loy 1981, Pruss 1999), but may also provide increased opportunity for hunting and foraging. Carrion along roads may be a very important food source (Hillman and Sharps 1978, Hines and Case 1991). In addition, the area along roadways is often higher in small mammal abundance as compared to surrounding grasslands (Pasitschniak-Arts and Messier 1999). A significant amount of swift fox mortality, however, may occur along roads. This may be due either to collisions with vehicles or coyote predation, as coyotes commonly use roads as travel corridors (Kilgore 1969, Kahn 1997, Roell 1999, Kamler 2002).

Dens are typically located in shortgrass and midgrass prairie habitats. However, the swift fox will also occupy cropland habitats (Kilgore 1969, Hines 1980, Jackson 1997, Sovada et al. 2001), pinon-juniper habitats in Colorado and Oklahoma, and the sandhills of Nebraska (Schmitt 2000). Den sites are generally found on relatively flat areas; however, they may not necessarily be selecting for any particular slope as habitat is already characterized as level to gently rolling topography (Kilgore 1969, Hillman and Sharps 1978, Egoscue 1979, Loy 1981, Jackson 1997).

Dens not only provide for swift fox needs, but can also provide cover for a number of other species of wildlife. Numerous invertebrates as well as the Great Plains toad (*Bufo cognatus*) were identified by Kilgore (1969) as inhabiting occupied dens. Kilgore (1969) found several other species of invertebrates, a prairie rattlesnake (*Crotalus viridis*) and deer mice living in abandoned dens. The Burrowing Owl (*Speotyto cunicularia*) and striped skunk (*Mephitis mephitis*) are also commonly found in abandoned dens (Cutter 1958 and Kilgore 1969).

Reasons for Decline

Historically, the swift fox inhabited the shortgrass and midgrass prairie ecosystems of the Great Plains region of North America (Kahn et al. 1997). It is believed that its range was up to 1.6 million km and extended through ten states and the south-central Canadian Prairie Provinces. The most commonly cited reasons for the swift fox decline include loss of native prairie habitat, predator control campaigns, rodent and predator control programs, unregulated trapping and hunting, and competition and predation by coyotes (Kilgore 1969, Samuel and Nelson 1982, Rongstand et al. 1989, FaunaWest 1991, Covell 1992, Kahn et al. 1997, Kitchen 1999).

A tremendous loss of native prairie habitat has occurred due to conversion to agriculture and urban and rural development. For example, according to McGinnies et al. (1991), between 1890 and the 1950's, habitat converted to cultivated crops grew from 4.6 million to 40 million acres. This conversion, however, is not the only form of habitat loss. Kahn et al (1997), made the point that land ownership, rangeland and cropland management practices, habitat fragmentation and limited movement corridors, and changes in wildlife composition that occur as a result of the conversion of prairie all play an important role in limiting swift fox distribution and abundance. Finley (1999) found that the swift fox was particularly abundant in areas dominated by continuous blocks of shortgrass prairie.

Recent information, however, suggests that the swift fox is capable of surviving and thriving in vegetation types other than native shortgrass and midgrass prairies. These habitat types can include sagebrush-grassland, sagebrush-greasewood, plains-mesa grassland, and cropland (Kahn et al. 1997, Peeks 2002). The swift fox, however, does not exist in tallgrass habitats (Kahn et al. 1997). Unfortunately, the Conservation Reserve Program (CRP), established under the 1985 Farm Bill, re-vegetated millions of cropland acres into tallgrass prairie species or non-native grasses within the shortgrass or midgrass prairies. It is hoped that CRP guidelines in the future may permit participants to plant native shortgrass or midgrass species.

The impact that hunting or commercial trapping has on swift fox populations and distribution is unknown. The USFWS stated in its decision to remove the swift fox from the candidate list (USFWS 2001) that, "…available information suggests that this harvest has not limited swift fox populations." Kahn et al. (1997) stated that over 55 years of documented harvest, swift fox populations in Colorado have remained stable and widespread. Additionally, in states that have protected the swift fox from harvest, there has been no increase in distribution or abundance over the same 55 years. Furthermore, Colorado Revised Statute 33-6-203 states that, "…it is unlawful to take wildlife with any leghold trap, any instant kill body-gripping design trap, or by poison or snare in the state of Colorado." This statute does have some exemptions for landowners trying to prevent depredation damage by predators. It can only occur on properties used for commercial livestock or crop operations, however, and for only one 30-day period per property per year and there must be irrefutable evidence of damage to livestock or crops.

Rodent and predator control campaigns, which primarily consisted of poison baits, resulted in a great deal of swift fox mortality (Kahn et al. 1997). Strychnine was the most lethal as it was non-selective in application (Kahn et al. 1997). Schitoskey (1975) reported that relatively low doses of strychnine or Compound 1080 were very lethal to the kit fox. The kit fox, however, could survive repeated doses of zinc phosphide.

It is also believed by some that predation or interference competition with coyotes and other canids may be an important limiting factor in the recovery of the swift fox (Scott-Brown et al. 1987). Kitchen (1999) found that there is a high level of spatial and dietary resource overlap between the swift fox and coyote, which could increase the potential for competition. The home ranges of swift fox were overlapped by coyote home ranges and all swift fox home ranges included some coyote sign. Although there was a high degree of dietary overlap in that the swift fox and coyote utilized the same prey items, the diets varied seasonally and in the volume of individual prey items. Interference competition was identified with 48% of swift fox mortality being attributed to coyotes. However, 58% of the mortality occurred during the breeding season when both species tend to travel much greater distances and all of the mortalities occurred outside of the fox's denning area. Kitchen (1999) believes that although predation or interference competition may occur, the swift fox may be better able to coexist with coyotes than other fox species due to year-round den use (escape cover) and some dietary partitioning. Therefore, mortality due to predation or competition may not be as limiting as previously believed.

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APPENDIX C
SPECIES ACCOUNT: MOUNTAIN PLOVER

MOUNTAIN PLOVER (Charadrius montanus)

Species Status

On May 3, 1993, the USFWS listed the Mountain Plover as a Candidate Species under the ESA. On February 16, 1999, a notice was published in the Federal Register proposing to list the Mountain Plover as a Threatened Species. In summarizing reasons for the proposed listing, the USFWS stated:

> "Breeding Bird Survey trends analyzed for the period 1966 through 1996 document a continuous decline of 2.7 percent annually for this species, the highest of all endemic grassland species. Between 1966 and 1991, the continental population of the Mountain Plover declined an estimated 63 percent. The current total population is estimated to be between 8,000 and 10,000 individuals. Conversion of grassland habitat, agricultural practices, management of domestic livestock and decline of native herbivores are factors that likely have contributed to the Mountain Plover's decline" (USFWS 1999).

On December 5, 2002, the USFWS reopened the comment period on the proposal to list the Mountain Plover, and proposed a special 4(d) rule that would exempt incidental take of the Mountain Plover during certain routine farming practices until research has been completed in 2004.

The Mountain Plover is listed as threatened in Canada and in Mexico (Commission for Environmental Cooperation 2000). U.S. states in which the Mountain Plover has recognized conservation status are: Colorado (species of special concern), Nebraska (listed threatened), Montana, Oklahoma, and California (species of special interest or concern), and Kansas (species in need of conservation).

The Commission for Environmental Cooperation (2000), established under the North American Free Trade Act, considers the Mountain Plover and the black-tailed prairie dog priority grassland species for conservation action. The U.S. Shorebird Conservation Plan has ranked the Mountain Plover in its highest conservation category (category 5) (USFWS 2002). Partners in Flight (PIF) ranks the Mountain Plover a "species of management concern" in Colorado, Kansas, Montana, Nebraska, New Mexico and Oklahoma (total PIF breeding priority score for the Southern Rockies/Colorado Plateau conservation region is 28). The Mountain Plover is listed as a sensitive species by the U.S. Forest Service and the Bureau of Land Management. The Colorado Natural Heritage Program ranks the Mountain Plover G2/S2B-SZN (imperiled globally because of extreme rarity; breeding season imperiled in Colorado) (CNHP 2003). In addition, the Mountain Plover is on the Audubon National Watchlist.

The USFWS (1999) interpreted BBS data for 1966-1991 as suggesting a decline of 2.7% annually. Breeding Bird Survey data presented in Sauer et al. (2001), however, are inconclusive; BBS data for the Mountain Plover should be interpreted with caution. These birds are inconspicuous and easily overlooked, and much of the data are based on low abundance and small sample sizes. Of the 12 regions for which BBS data are reported, five have a red credibility rating (important deficiency in the data), and seven (including Colorado) have a yellow rating (deficiency in the data) (Sauer et al. 2001).

Description and Taxonomy

The Mountain Plover is a comparatively large plover, approximately 9 in long (National Geographic Society 1987) and 8 in tall (Gillihan and Hutchings 2000). It is similar in size and appearance to a killdeer, but lacks the breast bands typical of the killdeer and other plovers (National Geographic Society 1987). Summer coloration is light brown on the back and along the side of the neck and chest, with bright white forehead, throat, breast and underwings (Knopf

1996). Breeding birds have a distinct black cap and thin black line between the eye and bill (Knopf 1996).

John K. Townsend described the Mountain Plover in 1837 from birds collected in Fremont County, Wyoming (Coues 1874; Luan 1957; Leachman and Osmundson 1990; Knopf 1996). Over the years, the Mountain Plover was known by eight different scientific names – *Charadrius montanus*, *Aegialitis montanus*, *Podascoys montanus*, *Charadrius* (Podascoys) *montanus*, *Aegialitis asiaticus* var. *montanus*, *Eudromias montanus*, *Aegialites montana*, and *Eupoda montana* (Leachman and Osmundson 1990). Other common names used or suggested included Rocky Mountain Plover (Bent 1929), Prairie Plover (Luan 1957), Bullhead Snipe (Grinnell et al. 1918), and Field Snipe (Shackford 1987). The American Ornithological Union Committee on Classification and Nomenclature officially adopted the scientific name *Charadrius montanus* in 1983 (AOU 1983). No subspecies are recognized (Oberholser 1974; Johnsgard 1981; Knopf 1996). According to the American Ornithological Union (1983), Mountain Plover, Oriental Plover (*C. Veredus*), and Caspian Plover (*C. asiaticus*) appear to constitute a superspecies.

Historical and Current Distribution

The historic breeding range of Mountain Plover included the shortgrass prairie of the western Great Plains from Saskatchewan and Alberta south to New Mexico and western Texas, and extended eastward into the Dakotas and Kansas (Graul and Webster 1976). While the Mountain Plover was once common throughout its range (Bailey and Niedrach 1965), populations have been significantly reduced in abundance and breeding range has clearly been constricted (Graul and Webster 1976; Ehrlich et al. 1992), particularly in the eastern portion (Knopf 1996). Current breeding populations are known primarily from Colorado, Montana and Wyoming, though birds are no longer found in three Montana counties where they once occurred (USFWS 2002). Breeding birds also occur in fewer numbers in Oklahoma, New Mexico, Kansas, Utah, Nebraska and Texas (Knopf 1996; USFWS 1999). In addition, nesting has been reported in Canada and confirmed in Mexico (USFWS 2002).

Historic winter distribution included California (including some coastal islands), Arizona, Texas and Nevada, as well as northern Mexico and Baja (Strecker 1912; Swarth 1914; Alcorn 1946; Jurek 1973; Russell and Lamb 1978; Garrett and Dunn 1981; USFWS 1999). Current winter distribution is primarily the Imperial and Central Valleys of California, but a few birds winter in southern Arizona and southern Texas (USFWS 2002). An unknown proportion of the Mountain Plover population winters in northern Mexico (AOU 1983; Knopf 1996).

The distribution of the Mountain Plover in Colorado once included many of the shortgrass prairie counties of the eastern plains, as well as the San Luis Valley, South Park, Middle Park (Bailey and Niedrach 1965; Graul and Webster 1976; Leachman and Osmundson 1990; Andrews and Righter 1992; Kuenning and Kingery 1998), North Park (one record) (Andrews and Righter 1992) and some western valleys (Davis 1969; Leachman and Osmundson 1990; Andrews and Righter 1992). Graul and Webster (1976) noted that Mountain Plover was no longer found in the front range counties surrounding Denver. More recently, Kuenning and Kingery (1998) reported the majority of breeding Mountain Plovers on the eastern plains and in South Park, with a few blocks represented in the San Luis Valley and one block in North Park. The PNG in Weld County, Colorado – formerly considered a stronghold for the breeding population – currently supports fewer than 100 birds (USFWS 2002; F. Knopf, pers. comm.). This decline from 1991 numbers (estimated by Knopf to be 1,280 birds) is attributed, at least in part, to unusually cold, wet weather during several years, which has altered the vegetation (USFWS 2002). On the other hand, recent data suggest that South Park (Park County) may be a more important breeding location than was previously thought, with the current population estimated at 1,500 to 2,000 breeding adults (Wunder et al. 2003 submitted; Grunau and Wunder 2001).

Life History and Habitat

Breeding habitat

The Mountain Plover nests in flat, dry landscapes characterized by very short, sparse vegetation (preferably less than 3 in), with at least 30% bare ground and a slope less than 5 degrees (less than 2 degrees optimal) (Graul 1973; Knowles et al. 1982; Leachman and Osmundson 1990; Parrish et al. 1993; Knopf and Miller 1994; Knowles 1996). A conspicuous object (e.g., manure pile, clump of vegetation, rock) is usually found near nest sites (Graul 1975; Knopf and Miller 1994; Olson and Edge 1985; USFWS 1999). In Colorado, the Mountain Plover is commonly associated with heavily grazed blue grama (*Bouteloua gracilis*) or buffalograss (*Buchloe dactyloides*) (Giezentanner 1970; Graul 1973, 1975; Graul and Webster 1976) on the eastern plains, but is also found in montane grasslands, sparse shrublands, and other heavily grazed grasslands in Colorado's mountain parks (e.g., South Park, San Luis Valley, Cochetopa Park).

Although nests are not established next to tall vegetation (Bradbury 1918; Graul 1975), areas of taller vegetation or other objects (e.g., fence posts, telephone poles) nearby may be necessary to provide shade (Graul 1975; Parrish 1988; McCaffery et al. 1984; USFWS 1999). Graul (1975) reported that chicks less than 2 weeks old can die if left without shade for 15 minutes in temperatures of approximately 81 degrees.

Use of Prairie Dog Towns

The Mountain Plover is strongly associated with black-tailed prairie dog towns in some parts of its breeding range (Tyler 1968; Knowles et al. 1982; Knowles and Knowles 1984; Parrish 1988; Shackford 1991; Knopf 1996; USFWS 2002). This is particularly true of Montana, where the Mountain Plover is believed to be dependent upon prairie dogs (Olson 1984; Olson and Edge 1985; Knowles 1996; Dechant et al. 2001; USFWS 2002).

The relationship between the Mountain Plover and prairie dogs in Colorado is less clear. Early research papers on the Mountain Plover in Colorado do not mention prairie dog colonies in descriptions of habitat (Graul 1973; Graul 1975; Graul and Webster 1976). Leachman and Osmundson (1990) noted that the Mountain Plover in northeastern Colorado used prairie dogs towns for feeding and courtship, but not for nesting. In documents that summarize existing data on the Mountain Plover (i.e., Leachman and Osmundson 1990; Knopf 1996; USFWS 1999; Dechant et al. 2001), citations used to support statements relating nesting Mountain Plover and prairie dogs are all based on research from other states (including the adjacent states of Wyoming and Oklahoma). Information from the PNG in Colorado suggest there were relatively few prairie dogs in the area at a time when Mountain Plover populations were at a peak there (late 1960s – early 1970s), but that there are currently ~1,000 acres of prairie dogs present on the PNG, while Mountain Plover populations are still very low. Other recent observations in Colorado, however, suggest that the Mountain Plover may be more commonly associated with black-tailed prairie dogs (F. Knopf, pers. comm.; C. Pague, pers. comm.). In 1995, black-tailed prairie dogs were successful in maintaining Mountain Plover habitat on the PNG in northeastern Colorado after record rainfall, while similar sites without black-tailed prairie dogs became unsuitable (USFWS 1999). In 2001, McCoy (V. Dreitz, pers. comm.) found slightly higher nest success on rangeland sites with black-tailed prairie dogs than on sites without black-tailed prairie dogs. Additional research is needed to determine the level of association between the Mountain Plover and black-tailed prairie dogs in Colorado. Researchers studying the relationship between the Mountain Plover and agricultural practices in 2003 plan to investigate Mountain Plover use of black-tailed prairie dog colonies as well (F. Knopf, pers. comm.).

In areas where the Mountain Plover does nest on prairie dog colonies, the size of the colony may be important. In Montana, the Mountain Plover occurs at higher densities on larger towns (6-50 ha) compared to smaller towns (Knowles et al. 1982; Olson 1984; Olson-Edge and Edge 1987;

Dechant et al. 2001). Nest sites within prairie dog towns had shorter vegetation, more bare ground, and higher forb density (Olson 1984; Olson and Edge 1985; Dechant et al. 2001). The Mountain Plover has also been found on white-tailed prairie dog (*Cynomys leucurus*) towns, on Gunnison's prairie dog (*C. Gunnisoni*) towns in New Mexico, and on prairie dog towns in Mexico (USFWS 2002). In Montana, Knowles et al. (1982) found that the Mountain Plover used only active prairie dog towns that were also grazed by cattle.

Use of Cultivated Fields

Breeding Mountain Plover adults, nests, and chicks have been observed on cultivated fields in Colorado, Kansas, Nebraska, Oklahoma and Wyoming (Shackford et al. 1999). Contribution of cultivated fields to population productivity, however, is unclear. Knopf (1996) suggested that if fields left barren until after the Mountain Plover has begun nesting are then plowed and planted or tilled for weed control, later in the season nests, eggs and young can be destroyed by farm machinery. Knopf (1996) further suggested that even if the Mountain Plover re-nests after plowing, it might abandon the nest once vegetation grows taller than approximately two in. Shackford et al. (1999) found that 31 of 46 nests on cultivated fields failed; 22 of these nest failures were due to farm machinery. The success of the remaining 15 nests was unknown, but there were no successes documented (Shackford et al.1999). In new field research into the effects of farming practices on the Mountain Plover in eastern Colorado, however, preliminary data suggest that nest success on cropland in eastern Colorado was not significantly different from success on rangeland in 2001 and 2002 (V. Dreitz, pers. comm.). Although nest success was similar in rangeland and cropland, the causes of mortality were different, with predation being the primary cause of nest failure on rangeland and agricultural practices being the primary cause of nest failure on cropland (T. McCoy unpubl. data; V. Dreitz, pers. comm.). The effect of drought in 2002 on the preliminary findings of McCoy and Dreitz is unclear. Final results of this research will be presented in 2004.

Wintering habitat

Winter habitat is very similar to breeding habitat – flat areas with short vegetation and bare ground, usually heavily grazed. Wintering sites include alkali flats, plowed or burned fields, heavily grazed grasslands and prairie dog colonies (Oberholser 1974; Knopf and Rupert 1995; Knopf 1996). Although wintering Mountain Plovers occur on cultivated lands and sod farms, research in the San Joaquin Valley, California, determined that birds preferred the remaining natural landscapes to the agricultural lands (Knopf and Rupert 1995). In the Imperial Valley, California, the Mountain Plover foraged in grazed alfalfa fields (especially those grazed by sheep), and also most burned fields (especially burned Bermuda grass) (Knopf and Rupert 1995). In fact, according to Wunder and Knopf (2003), irrigated fields and grazed alfalfa fields are now the predominant winter habitat in the Imperial Valley, due to the lack of natural habitat. Not all cultivated fields are considered suitable winter habitat for the Mountain Plover, however. Important characteristics are thought to include insect availability, depth of furrows, dirt clod size and vegetation of contiguous parcels (USFWS 2002). Additionally, fallow fields and barren desert outside the agricultural areas are used for roosting at night and during the day (Wunder and Knopf unpubl. data).

Migration habitat

Habitat used during migration is similar to that occupied during breeding and wintering seasons (e.g., grasslands, tilled fields, sod farms). Also noteworthy is the use of old buffalo wallows (playas) in southeastern Colorado during migration. Dry and wet playas are used at times during migration (R. Estelle, pers. comm.). Birds are also predictably seen in late summer foraging in tilled fields and roosting in flocks on alkaline or mud flats in southeastern Colorado, and are commonly observed on commercial sod farms in New Mexico (Knopf 1996).

Reproduction

The Mountain Plover arrives on breeding grounds in northern Colorado around mid-late March (Graul 1975; Knopf and Rupert 1996) and somewhat later at higher elevations (Knopf 1996). Peak breeding season in Weld County is mid-April to mid-July (Ball 1996; Dechant et al. 2001). In 2000 and 2001, the Mountain Plover arrived in South Park in mid-April, although in 2001, all areas were not occupied until mid-late May (Wunder unpubl. data). Males begin digging nest scrapes soon after arriving on breeding grounds (Knopf 1996) and are territorial during breeding season only. According to Knopf (1996), the territory of three males in Colorado measured roughly 16 ha each (approximately 39.5 acres), but there was abundant overlap at the boundaries.

One brood is raised per season per adult, with the male incubating the first clutch and the female incubating the second (Graul 1973). The second clutch may be produced with a different male (Graul 1975; Johnsgard 1979; Kuenning and Kingery 1998). The Mountain Plover is thought to begin breeding the first spring after hatching (Graul 1973) and continue every year thereafter (Knopf 1996). Egg laying begins mid-April through mid-June (May-July in South Park) and incubation is around 29 days (Graul 1975). If the first clutch or brood is lost before early June, the adult may re-nest (Knopf 1996). Typical clutch size is three (Graul 1975; Knopf 1996). Broods are quite mobile, moving an average of 300 m per day (Knopf and Rupert 1996), with necessary brood rearing area estimated at 28-91 ha (Knopf and Rupert 1996) to 147.9 ha (Dreitz et al., pers. comm.). Chicks fledge approximately 33-34 days after hatching (Knopf 1996).

Graul (1975) noted a “loose colonial tendency” in the nesting Mountain Plover in eastern Colorado. Plover nests are often found grouped in localized areas (Graul 1975) that may change in location from year to year. This shift in locations may be attributed to local weather patterns (e.g., birds may move to different nesting areas if original nests flood during spring storm events) (Leachman and Osmundson 1990). There is a high degree of site fidelity. Males and females have been documented to return to nest within several hundred meters of the previous year’s nest site, and banded chicks have returned to their natal areas (Graul 1973b, Knopf 1996). The colonial tendency has also been observed in South Park every year since 1995. Wunder (unpubl. data) found areas of nest aggregation, although in different areas of South Park, each year. These are places where six or more nests, each about 60-80 m (197-263 ft) from one another, have been found. Knopf describes similar observations as passively aggregated rather than as behavioral colonies (Knopf 1996).

Data on lifetime reproductive success are not available. The Mountain Plover is known to live and breed at eight years old (Dinsmore 2001; USFWS 2002). However, recent data suggest that the mean lifespan of the Mountain Plover is 1.92 years starting at 14 days post-hatch (Dinsmore 2001; USFWS 2002). If birds begin breeding at one year of age (Knopf 1996), then a life span of less than two years would suggest that an individual bird may have only one opportunity (one breeding season, up to two clutches) to contribute to population recruitment (USFWS 2002). Therefore, loss of nest(s), eggs, or young could greatly reduce or entirely negate an individual’s contribution to the population (USFWS 2002). This mean value for lifespan, however, does not take into account pre- and post-fledging mortality, and should be interpreted with caution.

Annual reproductive success has been studied on the PNG in northeastern Colorado (Weld County), and in South Park, Colorado. Success on the PNG seems to be quite variable from year to year, ranging from a low of 26% (Knopf and Rupert 1996) to a high of 65% (Graul 1975) for nests hatching at least one egg. Successful nests hatched an average of between 2.1 (McCaffery et al. 1984) and 2.7 (Graul 1975) eggs per nest. Fledging rates ranged from 0.26 (Knopf and Rupert 1996) to 1.4 (Graul 1975[1]) chicks per nest. Given post-fledging predation, chicks surviving until migration ranged from 0.17 to 0.74 per nest (Knopf and Rupert 1996). The

[1] This rate based on samples that included only nests that hatched at least one egg.

PNG, however, experienced unusually cold, wet weather into June for several consecutive years beginning in 1995, which resulted in taller, more dense vegetation. Successful nesting Mountain Plovers on the PNG declined from 77 in 1990 to only two in 2001 (Knopf in litt. 2001 cited in USFWS 2002). In 2002 (a drought year), Knopf's preliminary data from the PNG suggest that 13 nests on native prairie had a 69% success rate, and 50 nests on experimental burns had a 54% success rate (Knopf in litt. 2001 cited in USFWS 2002). Apparent nest success in South Park was approximately 63% (n=64 nests) in 2000, 50% (n=117 nests) in 2001, and 90% (n=68 nests) in 2002 (Wunder unpubl. data).

Mortality

The Mountain Plover is most vulnerable to predation as eggs and chicks, predation being the cause of most losses (Miller and Knopf 1993; Knopf and Rupert 1996). Adults are rarely killed by predators (USFWS 1999). Documented predators on the breeding grounds of Colorado's eastern plains include the swift fox (*Vulpes velox*), coyote (*Canis latrans*), thirteen-lined ground squirrel (*Spermophilus* sp.), Swainson's Hawk (*Buteo swainsonii*), Prairie Falcon (*Falco mexicanus*) and Loggerhead Shrike (*Lanius ludocivianus*) (Sutton and Van Tyne 1937; Graul 1973; Graul 1975; Miller and Knopf 1993; Knopf and Rupert 1996). In addition, bullsnake (*Pituophis melanoleucus*) may be a predator of Mountain Plover eggs (Knopf 1996). Predators observed taking adult birds are the kit fox (*Vulpes macrotis*) on wintering grounds (Knopf and Rupert 1995) and Prairie Falcon on breeding grounds (Knopf 1996). Data from the PNG from 1969 to 1994 indicate that rates of nest predation range from 15% to 74% (Graul 1975; Miller and Knopf 1993; Knopf and Rupert 1996; USFWS 1999). High rates of predation in 1993 and 1994 were attributed to the swift fox, but Knopf and Rupert (1996) believed this was related to a temporary reduction in prey. They did not believe that long-term declines in the Mountain Plover population were related to swift fox predation.

Causes of mortality besides predation documented for the Mountain Plover are: nest abandonment (Miller and Knopf 1993; Knopf and Rupert 1996); death of chicks by overheating in the sun (Graul 1973); death of eggs from flooding after spring storms (Knopf 1996); eggs or adults killed by hail (Graul 1973, 1975) loss of eggs because a cow stepped on the nest (only once between 1992-1994 on the PNG) (Knopf 1996); and being struck by aircraft (Knopf 1996). Some nests are abandoned each year, sometimes owing to infertile eggs, but not always for known reasons. In 2001, three nests in South Park were abandoned. Infertile eggs were the cause in each of these cases (Wunder unpubl. data). Nest abandonment and mortality on cultivated fields often occurs after fields are plowed or tilled (Knopf 1996).

There are no data to suggest that disease is a significant cause of mortality in the Mountain Plover.

Home Range

Knopf and Rupert (1996) found that adults with broods move an average of 300 m (984 ft) per day and range over an average of 56.6 ha (~140 acres). Dreitz et al. (unpubl. data; pers. comm.) found average daily movement of 369 m per day – similar to the findings of Knopf and Rupert (1996) – but estimated home range at 147.9 ha, almost twice the home range estimated by Knopf and Rupert. The larger home range estimate may reflect the effect of drought on food abundance during the chick-rearing period (V. Dreitz, pers. comm.). Wunder (unpublished data) estimated a home range size of 83.96 ha ($\pm$ 7.64ha) for adults with broods of chicks in South Park.

Migration

The Mountain Plover migrates in flocks annually between breeding grounds and wintering grounds. It begins arriving on breeding grounds in Colorado between early March and mid-April (Knopf 1996). Adults and juveniles begin forming fall flocks in mid-June, and start leaving the breeding grounds around early July in Colorado. By early August, most (often all) birds will have

left the area (Knopf and Rupert 1996). In South Park, post-breeding flocks begin forming in July, peak in August and leave by early September (Wunder, unpublished data.)

The Imperial Valley and the Central Valley in California are the main wintering areas for the Mountain Plover (Wunder and Knopf 2003). Migrating birds usually reach wintering grounds of California between mid-September and mid-October (Small 1994; Knopf 1996). Spring migration back to breeding grounds usually begins around mid-February to early March (Knopf and Rupert 1996).

It appears that the Mountain Plover migrates non-stop over the mountains to its breeding areas (Knopf and Rupert 1995), but may also exhibit a J-shaped pattern of movement flying south through Mexico and back north along the western high plains (Wunder and Knopf 2003). There is still much uncertainty, however, in current understanding of migration patterns. Wunder (unpublished data) observed two South Park birds in California's Imperial Valley, and one of the 65 birds banded in the Imperial Valley during the winter of 2000-2001 attempted to nest in South Park in June 2001. Very little is known about Mexican populations.

Diet

The Mountain Plover feeds almost exclusively on invertebrates. Grasshoppers and beetles have been reported as the most common prey (Wiens 1974; Graul 1976; Olson 1985). A study in Colorado by Baldwin (1971) looking at stomach contents of 13 birds (8 adult; 5 immature) revealed a diet of 99.7% invertebrates and 0.3% seeds. The most important prey items were beetles (60%), grasshoppers and crickets (24.5%), and ants (6.6%). Baldwin further noted that consumption of beetles was highest from late spring through mid-summer and consumption of grasshoppers and ants was highest during late summer. Research on the diet of the wintering Mountain Plover from three different locales in California indicated that the stomachs of 39 birds contained 2,092 different invertebrate food items (including representatives from 13 orders and at least 16 families) (Knopf 1998). The proportions of invertebrate orders represented varied among the three locales. Knopf (1998) concluded that the Mountain Plover may be more flexible in selecting food items than was previously believed and that it is an opportunistic forager, at least on wintering grounds.

Abundance

Currently, the global population is estimated at 8000-12,000 individuals (Knopf, pers. comm.; USFWS 1999, 2002). An estimated 7,000 Mountain Plovers breed in Colorado (Kuenning and Kingery 1998; USFWS 2002), of which an estimated 1,500-2,000 breeding adults occur in South Park (Wunder et al. 2003 submitted), with the majority of the remainder found on the eastern plains. The total populations for Montana and Wyoming are estimated to be fewer than 1,500 birds each (USFWS 2002). There are substantially fewer birds in other states where the Mountain Plover breeds. The status of the breeding population in Mexico is unknown.

Reasons for Decline

According to the USFWS proposed rule to list the Mountain Plover as a threatened species, there has been an estimated 63% decline in the continental population of Mountain Plover since 1966 (based on BBS showing a 2.7% annual decline from 1966 to 1996) (USFWS 1999). This decline is greater than declines shown in any other grassland species.

Habitat Conversion

Loss of habitat (both breeding and wintering) to cropland has generally been considered the most significant factor in the decline of the Mountain Plover (Dinsmore 1983; Graul & Webster 1976; Schulenberg 1983; Knopf 1988; Leachman and Osmundson 1990). Approximately 32% of the grasslands in the U.S. Great Plains have been converted to other uses (Samson and Knopf 1996;

USFWS 1999). Graul (1980) suggested that up to 45% of the buffalo-blue grama grasslands have been destroyed. Graul and Webster (1976) also suggested that plowed shortgrass prairie allowed to revert to grasslands do not provide suitable Mountain Plover habitat because these areas tend to revegetate with taller grasses.

An estimated 572,000 acres of native Colorado grassland were plowed during the 1970's and 1980's (USFWS 1999). Using NRCS data from 1982-1992, the USFWS concluded that 466,200 acres of Colorado rangeland believed to be currently or historically occupied by the Mountain Plover was converted to other uses (either cropland, development, or other rural land use) (USFWS 1999). Data were not available for all pertinent counties in Montana, but decreases in other states where the Mountain Plover breed ranged from 18,400 acres converted in Nebraska to 33,000 acres converted in Oklahoma (Fed Register 1999). According to NRCS data covering the period 1992 to 1997, conversion of rangeland continues, including a decrease of another 70,500 acres in Colorado, though it is unknown how much of this land was Mountain Plover habitat (USFWS 2002). Specific information on exactly how much of Colorado's Mountain Plover habitat has been lost to date, and the degree to which habitat conversion may continue to occur, are lacking. Conversion of native habitats to residential and commercial development will continue to occur in urban areas, especially along the front range of Colorado. The degree of future threat from conversion of the remaining habitat to cropland is uncertain (EDAW 2000). Economics and government programs can have a sizeable impact on the degree of future conversion of rangeland to cropland. Economic and government programs currently operating in Colorado do not favor additional cultivation, but this is highly unpredictable and could easily change (Dr. D. Hoag, Professor of Agriculture and Resource Economics, CSU, pers. comm.).

Habitat conversion to urban uses such as residential development is also of concern, especially on wintering grounds. According to Dinsmore (1983), most former wintering habitat for the Mountain Plover in southern California has been replaced by residential expansion.

Agricultural Practices

Conversion to cropland may have greater detrimental impacts than simple loss of habitat acreage. Plowed fields may be attractive to the nesting Mountain Plover, only to subject birds to nest failure or mortality when tilling or crop growth occurs (Knopf and Rupert 1999). This would be true whether the rangeland was originally suitable nesting habitat prior to conversion (i.e., even if the original grassland was not suitable for the Mountain Plover, the plowed field may attract breeding birds, which could then become subject to nest failure or mortality from farming practices). Preliminary results from current research in Colorado, however, suggest that nest success on native rangeland and on cropland are not significantly different (V. Dreitz, pers. comm.). Final results from this research are expected in 2004. Meanwhile, the USFWS believes that agricultural practices conflict with the nesting Mountain Plover, and may constitute a threat to reproduction (USFWS 2002).

Another potential threat related to agricultural activities involves the use of pesticides. Knopf (1996) noted pesticide application on plowed fields in California during the months that the Mountain Plover is present on wintering grounds. It appears that concentrations of pesticide chemicals are probably not affecting reproduction, but may pose threats to individual birds. The degree to which the Mountain Plover may be directly threatened by pesticides is not completely understood (USFWS 1999).

Concerns also exist regarding grasshopper control on breeding grounds. Grasshopper control can reduce abundance of grasshoppers by greater than 90%, and can reduce abundance in non-target insects as well (USFWS 1999). As grasshoppers represent one of the primary food sources for the Mountain Plover, severe reductions in availability of grasshoppers could influence productivity (Graul 1973; Knopf 1996; Knopf and Rupert 1996).

Rangeland Management

Grazing is not merely a compatible activity – it is an *essential* activity in maintaining Mountain Plover habitat (USDA Forest Service 1994). The Mountain Plover occupies habitat that was historically adapted to grazing disturbance, and is strongly associated with heavy grazing pressure (Knopf and Miller 1994; Warner 1994; Knopf 1996b). However, in present times, there are significant differences in herbivore communities as well as the spatial and temporal distribution of grazing pressure.

Historically, the primary fauna that influenced Mountain Plover habitat were bison, elk and pronghorn, as well as burrowing rodents (especially the prairie dog). Today, there are no remaining wild bison herds; elk have largely moved to foothills and mountain habitats; and pronghorn and prairie dogs are greatly reduced in numbers.

Currently, the dominant herbivores sustaining Mountain Plover habitat are the domestic cow and the black-tailed prairie dog. Whereas historic grazers such as bison were very nomadic, domestic cattle (and even domestic bison) are usually fenced within pasture allotments. This basic difference has caused a shift from a more heterogeneous mosaic of habitat types shifting in time and space to a more homogenous cover. In addition, modern grazing practices favor taller vegetation and less bare ground than was typical of historic landscapes. For example, introduction of exotic grasses, pitting to increase soil moisture retention, water improvement projects and fire suppression all encourage habitat that is less favorable to the Mountain Plover (Graul 1980; USFWS 1999). Although heavy grazing is considered necessary in maintaining Mountain Plover habitat, season-long heavy grazing may actually degrade Mountain Plover habitat if grasses increase tillering and rhizome production (i.e., form mats) in response, and thereby decrease the amount of desired bare ground (USDA Forest Service 1994).

Decline of Burrowing Mammals

The presence of prairie dog towns is an important component of Mountain Plover habitat in many parts of the breeding range (USFWS 1999). There is general agreement that the black-tailed prairie dog has experienced significant reductions in range and abundance (possibly up to 98% across their range), primarily from eradication efforts, habitat conversion, and sylvatic plague (USFWS 1999). Habitat conversion on private land continues, and prairie dog control is ongoing on public and private lands across the breeding range of the Mountain Plover. In addition, there are currently no measures available to counteract the adverse impact of plague on black-tailed prairie dog colonies (USFWS 1999). Absence of active black-tailed prairie dog towns could pose a significant threat to Mountain Plover in some parts of the breeding range (USFWS 1999).

Other Factors Contributing to the Decline of the Mountain Plover

Development of oil, gas and minerals is common across the breeding range of the Mountain Plover and could adversely affect the species. Access roads may attract adults and chicks for foraging and travel, thereby increasing the possibility of direct mortality from vehicles (USDA Forest Service 1994; USFWS 1999). In addition, disturbance from the presence of humans could lead to stress-related death in adults or increased vulnerability of chicks to overheating and other stresses (Graul 1975; USFWS 1999). On the other hand, NFS biologists on the PNG found highest Mountain Plover nesting densities on the same quarter-section that had an operational oil well and associated facilities for 15 years, and 50% of banded birds returned to this site the following year (USDA Forest Service 1994). Researchers on the PNG noted that these data were from only one study site and may not be representative, but concluded that low-density development was probably not incompatible with the Mountain Plover (USDA Forest Service 1994).

In general, the Mountain Plover seems to be relatively tolerant of disturbance, although response varies for individual birds. Incubation and brooding times are the most critical. Birds become

more sensitive to disturbance as eggs near hatching and for a few weeks afterward (USDA Forest Service 1994). Adults may abandon eggs if disturbed on the nest and may die from stress (Graul 1975; USFWS 1999). The Mountain Plover is generally tolerant of vehicles at close distances, but shows changes in behavior if people get out of vehicles. The furthest distance at which behavioral disturbance was observed was 200 m (USDA Forest Service 1994). Use of Mountain Plover habitat by off-highway vehicles, bikers and hikers could prove to be locally detrimental, but these activities do not occur at significant levels across Mountain Plover habitat on the eastern plains of Colorado.

According to the USDA Forest Service (1994), some studies have suggested that the Mountain Plover may be attracted to roads, especially at night. The possibility that roads may serve as predator traps by concentrating the Mountain Plover has been suggested. Other studies indicate that the Mountain Plover is widespread throughout its habitat, and may use roads but does not congregate on them. On the PNG, some birds were found to use graveled county roads, possibly suggesting that the temperature difference (the roads were 2 degrees warmer than surrounding prairie at night) may be attractive to brooding birds (Godbey 1992). Mortality from traffic was thought to be a potential conservation issue, especially just after hatching, when the response of chicks to a threat is to freeze rather than to run. Birds were not found to use two-track or ungraveled roads.

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APPENDIX D
SPECIES ACCOUNT: BURROWING OWL

WESTERN BURROWING OWL (*Athene cunicularia hypugaea*)

Species Status

In 1994, the Burrowing Owl[1] was included on the Category 2 list of species to be considered for federal listing by the USFWS. Since Category 2 designation was discontinued in 1996, the Burrowing Owl has not had legal status under the ESA. It is, however, listed in many U.S. states – including listings as endangered in Minnesota and Iowa, threatened in Colorado, and species of special concern in Washington, Oregon, California, Montana, Wyoming, Idaho, North Dakota, South Dakota, Utah and Oklahoma. The Western Burrowing Owl is a USFWS Non-game Avian Species of Management Concern (USFWS 1995), a sensitive species in Regions 1 and 2 of the U.S. Forest Service, and a CITES Appendix II species (Ehrlich et al. 1992). Mexico lists the Burrowing Owl as threatened and Canada changed its rank from threatened to endangered in 1995 (Commission for Environmental Cooperation 2000). The Commission for Environmental Cooperation, established under the North American Free Trade Agreement, has identified the Burrowing Owl as a priority grassland species for conservation action. The Colorado Natural Heritage Program ranks the Burrowing Owl G4/S4B (the species is apparently secure globally and in Colorado, but breeding birds may be rare in parts of the range) (CNHP 2003).

The BBS did not detect statistically significant trends for the Burrowing Owl survey-wide from 1966 to 1999, nor for the U.S. or Colorado. Oklahoma, Wyoming, Saskatchewan and Canada over-all showed significant declines, while Nevada, the Western BBS Region and Region 1 of the USFWS showed significant increases. Breeding Bird Survey trend information, however, should be interpreted with care. Of the 50 regions for which BBS data are reported, 32 regions (including Colorado) have a red credibility rating (important deficiency in the data) and 16 regions have a yellow rating (deficiency in the data) (Sauer et al. 2001).

Andrews and Righter (1992) report the species declining in Colorado, with complete or near extirpation in some areas. Along the front range of Colorado, Burrowing Owls have largely disappeared from much of their historic range (Jones 1998). Workers for the Colorado Breeding Bird Atlas (Jones 1998) found breeding Burrowing Owls almost exclusively in eastern Colorado, despite once having been more widespread throughout the state. DeSante and George (1994) suggested that Burrowing Owl populations in six U.S. states and Canadian provinces (including Colorado) have dropped by more than 50% over the last 100 years.

Description and Taxonomy

The Burrowing Owl is a comparatively small owl (approximately 8-10 in) distinguished by its long legs (National Geographic Society 1987; Gillihan and Hutchings 2000). This bird has a round head, no ear tufts, white spotting on brown wings and back, and dark barring on light brown breast and belly (Gillihan and Hutchings 2000). It has white margins around yellow eyes, a white throat patch and a pale-colored beak (Anderson et al. 2001).

The Burrowing Owl was described in 1782. It was originally named *Strix cunicularia*, and then moved to the genus *Speyota* and finally *Athene* (Clark et al. 1997; AOU 1998). There are two subspecies recognized in North America: *A. c. hypugaea* (western Burrowing Owl); and *A. c. floridana* (Florida Burrowing Owl). The Florida Burrowing Owl is restricted to the state of Florida. The Western Burrowing Owl occurs in western North America, from southern Canada (Manitoba to southeast British Columbia) to Panama (Haug et al. 1993).

[1] In this document, 'Burrowing Owl' refers to the Western Burrowing Owl only.

Historical and Current Distribution

The Burrowing Owl is distributed discontinuously throughout the western grasslands of North America. Historically it ranged from Alberta, Saskatchewan, Manitoba and southeastern British Columbia south to Panama (Haug et al. 1993). In the U.S., the Burrowing Owl breeds in all western states east to the Dakotas and south to Texas. The Burrowing Owl has been nearly extirpated from its former breeding range in western Minnesota, most areas east of the Missouri River in North Dakota, eastern Nebraska and Oklahoma, eastern and central Kansas, large areas around San Francisco in California, and the Rogue Valley in Oregon (Anderson et al. 2001). Burrowing Owls were extirpated from British Columbia in the early 1980's, but starting in 1983 were released there, with 13 birds returning in 1992 (Haug et al. 1993). It now appears, however, that the Burrowing Owl has been extirpated from its former range in British Columbia and Manitoba, as well as from northern portions of its former range in Saskatchewan and Alberta (Wellicome 1997; Anderson et al. 2001). This species could be extirpated from Canada entirely within a few decades (Wellicome and Haug 1995; Paige 1998; Anderson et al. 2001).

In Colorado, the Burrowing Owl is considered locally uncommon to fairly common on the eastern plains and rare to uncommon in mountain parks and on the western slope (Andrews and Righter 1992). The Colorado Breeding Bird Atlas documented breeding primarily throughout the eastern plains, but also in the Grand Valley and in very few blocks in extreme southwestern Colorado, North Park, and the San Luis Valley (Jones 1998). Burrowing Owls no longer occur in much of their historic range along the urban front range (Jones 1998). Major populations are found at the Rocky Mountain Arsenal in Adams County, and in Baca, Bent, Cheyenne, Crowley, Kit Carson, Kiowa, Lincoln, Logan, Morgan, Otero, Prowers, Pueblo, Weld and Yuma counties (Anderson et al. 2001).

Birds winter primarily in the southern part of their range, although occasional winter records occur as far north as Montana (Haug et al. 1993). Andrews and Righter (1992) report six winter records on the eastern plains of Colorado. The Christmas Bird Count (CBC) suggests that most wintering birds are found in California, Arizona, New Mexico, Texas and Mexico (James and Ethier 1989; Anderson et al. 2001); they are also found in lower numbers in Oklahoma, Kansas and other states further north (Anderson et al. 2001).

Life History and Habitat

Breeding habitat

The Burrowing Owl is a grassland specialist that is dependent on the presence of fossorial mammals. Burrowing Owls use well-drained, flat to gently sloping grassland habitats with sparse vegetation (usually less than four inches high) and a relatively large proportion of bare ground (Pezzolesi 1994; Gillihan and Hutchings 2000; Dechant et al. 2001). This species nests in underground burrows in grasslands and grazed pastures, as well as other dry, open habitats such as shrublands, deserts and grassy urban areas (including golf courses, airports, cemeteries, vacant lots, road rights-of-way) (Haug et al. 1993; Jones 1998; Dechant et al. 2001). Semi-desert shrublands are rarely used (Andrews and Righter 1992). Green (1993) found that nest sites were characterized by 40% - 50% bare ground where prey is abundant. A study area in Oregon with vegetation taller than five cm suggested that observation perches were required (Green and Anthony 1989; Anderson et al. 2001). According to studies in Colorado where vegetation was less than eight cm, observation perches were not used (Green and Anthony 1989), or were farther away from nests than would have been expected by chance (Plumpton and Lutz 1991; Plumpton 1992; Anderson et al. 2001).

In Colorado, over 70% of sightings by Breeding Bird Atlasers were in shortgrass prairie (Jones 1998). Jones (1998) stated that the Burrowing Owl in eastern Colorado favors prairie dog colonies, but did not specify how many observations were made in prairie dog colonies as opposed to other shortgrass habitats.

The Burrowing Owl is capable of excavating its own burrows if the soils are sandy, but most often use holes excavated by other animals (especially rodents). The Burrowing Owl on the Great Plains is not known to excavate its own burrows (Salt and Wilk 1958; Bent 1961; Berdan and Linder 1973; Stewart 1975; Desmond 1991; Haug et al. 1993; Stockrahm 1995; Desmond and Savidge 1996, 1998, 1999; Sidle et al. 1998; Dechant et al. 2001). The presence of burrows for nesting appears to be a critical component of Burrowing Owl habitat (Thomsen 1971; Martin 1973; Zarn 1974; Wedgwood 1978; Haug 1985; Haug et al. 1993). In the Great Plains, the Burrowing Owl is primarily associated with prairie dogs (Jones 1998; Paige 1998). Across its range, the Burrowing Owl uses burrows of various mammals, including the black-tailed prairie dog (*Cynomys ludovicianus*), American badger (*Taxidea taxus*), ground squirrel (*Spermophilus* spp.), white-tailed (*C. leucurus*) and Gunnison's (*C. gunnisoni*) prairie dog, yellow-bellied marmot (*Marmota flaviventris*), skunk (*Mephitis* spp.), squirrel (*Citellus* spp.), fox (*Vulpes* spp.) and woodchuck (*M. monax*), among others (Dechant et al. 2001).

The Burrowing Owl forages in a variety of habitats, ranging from the low structure plant communities of prairie dog colonies where it forages for insects, to areas of taller plant cover (rights-of-way and native grasslands) where small mammal prey is likely to be more abundant (Wellicome 1994). Generally, it uses shortgrass habitat typical of prairie dog colonies for nesting and roosting, and forages over areas of taller vegetation (at least 12 in) (Gillihan and Hutchings 2000; Dechant et al. 2001).

Use of Prairie Dog Towns

In eastern Colorado, the Burrowing Owl is usually found associated with black-tailed prairie dog colonies (Andrews and Righter 1992; Jones 1998). Black-tailed prairie dog colonies provide burrows for nesting and perching mounds, and the low vegetation structure provides a clear view of terrestrial predators (Jones 1998). In western Nebraska, 85% of Burrowing Owl nests occurred in prairie dog colonies (Desmond 1991). In the Oklahoma panhandle, 66% of nests occurred in prairie dog colonies, which comprised less than 20% of available habitat (Butts 1973; Butts and Lewis 1982).

Although the Burrowing Owl has been documented in relatively inactive prairie dog colonies (Bent 1961; MacCracken et al. 1984), Pezzolesi (1994) found that all nesting attempts in north-central Colorado were in active colonies. Burrowing Owls inhabiting larger colonies with higher densities of black-tailed prairie dogs were more likely to return to nest in subsequent years, and have higher rates of nest success and lower rates of nest depredation than Burrowing Owls inhabiting smaller colonies, or colonies with fewer black-tailed prairie dogs (Butts 1973; Desmond and Savidge 1996, 1998, 1999; Toombs 1997; Dechant et al. 2001). In western Nebraska, the size of prairie dog colonies was positively correlated with fledging success rates (Desmond 1991). On the Buffalo Gap National Grassland, reproductive success of the Burrowing Owl improved with increasing prairie dog colony size (Greibel 2000). Hughes (1993) found that black-tailed prairie dog colonies in northeastern Colorado having Burrowing Owls ranged in size from 1.9 to 167.6 ha, with >50% of the burrows active in 26 out of 27 colonies.

The Burrowing Owl does not use all available and apparently suitable habitat. Active prairie dog or ground squirrel colonies that were not used by the Burrowing Owl have been identified in virtually all states within its current range, including Colorado (Plumpton and Lutz 1993b; Anderson et al. 2001). Studies attempting to quantify the difference between used and unused colonies have failed to identify any parameters that are consistent over multiple years (Anderson et al. 2001). In Colorado, black-tailed prairie dog colonies containing Burrowing Owl nests had higher densities of burrows than did those not containing nests (Plumpton 1992; Plumpton and Lutz 1993b; Dechant et al. 2001). In 1993, Hughes found that the density of the Burrowing Owl in black-tailed prairie dog colonies in northeastern Colorado was positively related to the percentage of active burrows (Hughes 1993; Dechant et al. 2001), with 2.85 owls/ha in colonies with over 90% active burrows compared to 0.57 owls/ha in colonies with 70-80% active burrows. Toombs

(1997) found higher means for total burrow density, active burrow density and percent active burrows in black-tailed prairie dog towns with Burrowing Owl nests than in black-tailed prairie dog towns without Burrowing Owl nests. In Nebraska, Burrowing Owl density in black-tailed prairie dog colonies was negatively correlated with the density of inactive burrows (Desmond 1991) and positively correlated with density of active burrows (Desmond et al. 2000).

Nests are sometimes concentrated near the edges of prairie dog colonies (Butts 1973; Desmond et al. 1995; Toombs 1997; Anderson et al. 2001). Burrowing Owls nesting near the edge of a prairie dog colony may benefit from increased perch availability, higher insect populations and closer proximity of foraging areas (Butts 1973; Rich 1986; Dechant et al. 2001).

When a prairie dog colony is eradicated or greatly reduced, the vegetation in the colony grows taller than the Burrowing Owl will tolerate and the burrows begin to deteriorate. Under these circumstances, the Burrowing Owl will abandon its nest burrows (Grant 1965; Butts 1973; MacCracken et al. 1985; Plumpton and Lutz 1993b). Black-tailed prairie dog colonies in Oklahoma became unsuitable for the Burrowing Owl within one to three years after abandonment, because of the encroachment of dense vegetation (Butts 1973). While mowing can be used to control the growth of vegetation after prairie dogs have been eliminated, prairie dogs may be required to maintain long-term suitability of burrows for the Burrowing Owl (MacCracken et al. 1985; Dechant et al. 2001). Biddle (1996) offered anecdotal evidence that black-tailed prairie dog towns only recently vacated, but still containing suitable burrows, did not contain the Burrowing Owl. She noted that one black-tailed prairie dog town in Logan County, Colorado, did not have black-tailed prairie dogs or Burrowing Owls in 1994, but that both breeding Burrowing Owls and black-tailed prairie dogs were present in 1995 (Anderson et al. 2001).

Use of Cultivated Fields

Olendorff (1973) found that the Burrowing Owl was uncommon in cultivated land in northcentral Colorado. Plumpton and Lutz (1993b) found that nest burrows in cultivated land in Colorado were closer to roads, further away from perches and had more bare ground and shorter grasses/forbs than non-nest burrows. A study in Alberta, Canada, found that all nest sites were in native pasture and no nest sites occurred in re-seeded pasture or cultivated lands (Clayton and Schmutz 1999; Dechant et al. 2001). This same study further found the majority of roost sites were in native pasture. The Burrowing Owl nesting in cropland probably experiences nest failure during cultivation (Haug et al. 1993; Dechant et al. 2001). Gleason (1978) found that seven out of nine nests were adjacent to alfalfa fields in an agricultural region of southern Idaho. Nesting near cultivated fields may be due to higher prey populations and closer foraging areas (Butts 1973; Rich 1986; Dechant et al. 2001).

Wintering and Migration Habitat

No specific information on wintering and migration habitat is available. Habitat used during these times is presumed to be similar to breeding habitat (Haug et al. 1993; Anderson et al. 2001).

Reproduction

The Burrowing Owl arrives on its breeding grounds in the Great Plains around mid-March (Haug et al. 1993) to early April, and remains until September (Bent 1961; Grant 1965; Maher 1974; Wedgwood 1976; Gleason 1978; Haug 1985; Ratcliff 1986; Haug and Oliphant 1990; De Smet 1992; Dechant et al. 2001). In Colorado, breeding season safe dates are April 21 to August 10 (Nelson 1993; Yanishevsky and Petring-Rupp 1998). Pair formation usually occurs by April (Grant 1965; Butts 1973), followed by nest site selection. Average clutch size is 6.5 within a range of 4-12 (Haug et al.1993). Incubation lasts 28-30 days (Coulombe 1971; Thomsen 1971; Haug et al. 1993). The female incubates the eggs (Coulombe 1971; Thomsen 1971; Haug et al. 1993), while the male provides food during the incubation and early nestling stages (Haug et al.

1993; Anderson et al. 2001). Females are rarely active above ground during egg laying and incubation (Butts and Lewis 1982; Yanishevsky and Petring-Rupp 1998).

The Burrowing Owl averages three to five nestlings per brood. The young appear above ground approximately two weeks after hatching (Johnsgard 1988), can run and forage (assisted by the female) at three to four weeks (Martin 1973) and achieve sustained flight by six weeks. Once the young reach three to four weeks of age, families may move to satellite burrows every 10-15 days (Haug et al. 1993; Dechant et al. 2001), possibly to reduce predation (Desmond and Savidge 1998) or avoid nest parasites (Dechant et al. 2001). They remain a family group until the young begin to disperse to nearby burrows in the early fall (Haug et al. 1993; Dechant et al. 2001).

The Burrowing Owl typically begins breeding at one year of age; some females may either not breed the first year after hatching, or breed in a different locale the first year and then return to their natal site to breed in the second year (Lutz and Plumpton 1999). One brood is produced per year (Haug et al. 1993), but birds may re-nest if the first nest is lost early in the season (Thomsen 1971; Butts 1973; Wedgwood 1976; Haug et al. 1993). There are no records of second broods (Haug et al. 1993). Reproductive success may be limited by the availability and abundance of small mammal prey (Wellicome 1998).

Average fledging rates are from two to five young per burrow (Johnsgard 1988), but as many as ten fledglings have been reported at one burrow (Jones 1998). Annual reproductive success ranges from 33% to 100% in the U.S. (Thomsen 1971; Haug et al. 1993), and from 45% to 97% in Canada (Hjertaas et al. 1995; Anderson et al. 2001). Fledging rates for the Burrowing Owl are high relative to rates for other small owls and may reflect the advantage of nesting underground as much as a need to compensate for high post-fledging mortality (Johnsgard 1988). Pezzolesi (1994) found that, of 326 birds banded at the Rocky Mountain Arsenal in Colorado in 1991 and 1992, only 28 returned to nest in 1992 or 1993.

Colonial nesting has been reported for this species (Ehrlich et al. 1988) and may reduce predation risks as Burrowing Owls may alert one another to threats (Desmond 1991; Desmond et al. 1995). Jones (1998), however, suggests this may be a recently developed behavior reflecting a scarcity of nest sites as much as a lack of territoriality. In northeastern Colorado, Hughes (1993) found that pairs breeding in large black-tailed prairie dog colonies nested further apart than did pairs nesting in small colonies.

The Burrowing Owl exhibits a moderate to high level of site fidelity, not only to general breeding areas, but also sometimes to prairie dog colonies or even nest burrows (Anderson et al. 2001). Martin (1973 in Pezzolesi 1994) found that every male reused the same burrow it had previously used, unless the original burrow was destroyed (in which case, a burrow in close proximity was chosen). The Burrowing Owl typically reuses traditional nesting areas, but not necessarily the same burrows (Haug et al. 1993; Dechant et al. 2001). The highest documented annual return rate was 39% for adults in Colorado, compared to 5% return rate for chicks (Plumpton and Lutz 1993b). Plumpton and Lutz (1993b) found 90% of prairie dog towns and 20% of nesting burrows in their Colorado study area were reused between 1990 and 1991, and 66% of returning adults reused the same prairie dog town as the previous year. The Burrowing Owl is more likely to reuse burrows and nest sites if it reproduced successfully the previous year (Haug et al. 1993). Pezzolesi (1994) found 84% of returning individuals had successful nests the previous year, compared to 16% of returning individuals with unsuccessful nests the previous year. No such difference was found between sexes or age classes, but males had a return rate almost three times the return rate of females (Pezzolesi 1994). Observations of lag time in response to declines in the density of active prairie dog burrows (Desmond and Savidge 1998) may indicate a strong nest site fidelity (Paige 1998).

Diet and Foraging

The Burrowing Owl is an opportunistic feeder, subsisting largely on insects, small rodents, amphibians, reptiles, and on occasion, small birds (Haug et al. 1993). In general, more vertebrates are taken in winter and more invertebrates are taken in summer (Errington and Bennet 1935; Butts 1973; Green 1983; Tyler 1983; Haug 1985; MacCracken et al. 1985; Haug et al. 1993). Common prey in northeastern Colorado included ground and dung beetles, crickets, short-horned grasshoppers, deer mice, meadow voles and cottontail rabbits (Zarn 1974; Yanishevsky and Petring-Rupp 1998). Invertebrates constitute the major prey item (92% in Colorado) (Marti 1974), but represent low biomass by weight (Haug et al. 1993) compared to vertebrates, which may be the more important prey item (Wesemann and Rowe 1987; Pezzolesi 1994; Yanishevsky and Petring-Rupp 1998). The deer mouse was the most important prey species at the Rocky Mountain Arsenal in Colorado (Plumpton 1992; Plumpton and Lutz 1993). Mammals are taken in proportion to their availability (Green 1983; Haug et al. 1993). In northern Colorado, arthropods are consumed disproportionately with respect to their abundance (Plumpton 1992; Plumpton and Lutz 1993; Dechant et al. 2001). Invertebrates may be especially important when mammal abundance is low (LeClerc 1990; Yanishevsky and Petring-Rupp 1998).

Researchers note that pellets may not be reliable indicators of food habits (Thomsen 1971; Haug 1985). Grant (1965) observed the Burrowing Owl taking at least as many amphibians as mammals, but found only mammal remains in pellets.

The Burrowing Owl forages in native grassland, cropland and pasture, prairie dog colonies, fallow fields and other areas that are sparsely vegetated (Butts and Lewis 1982; Thompson and Anderson 1988; Desmond 1991; Haug et al. 1993; Wellicome 1994; Dechant et al. 2001). Areas with vegetation less than one m tall are avoided (Haug and Oliphant 1990; Wellicome 1994). During the nesting season the Burrowing Owl is active throughout the day and night, hunting insects when it is light and rodents at night (Bent 1938; Marti 1974; Plumpton 1992; Plumpton and Lutz 1993). Feeding areas are not defended (Haug et al. 1993).

Survivorship and Mortality

The oldest known Burrowing Owl was eight years, eight months old (Kennard 1975; Clapp et al. 1983; Anderson et al. 2001). Minimum survival rates (based on return rates of banded adults) in Canada range from 29% to 58% (Haug et al. 1993). These rates are considered minimum because migrating Burrowing Owls may change breeding locations between years. A non-migrating population in California showed survival rates of 30% for juveniles and 81% for adults (based on banded adults) (Thomsen 1971). Butts (1973) estimated an annual mortality rate in Oklahoma of 62% for young and adults combined. Clayton and Schmutz (1997) found that adult females had a mean survival of 0.83, compared to 0.46 for adult males and 0.48 for juveniles, with mortality occurring after fledging when activity around the nest peaked.

Causes of death in breeding areas include predation, vehicle collisions, human disturbance (especially from agricultural activities, construction and shooting), toxic chemicals (either direct mortality or loss of prey) and weather (severe hail) (Haug 1985; Haug et al. 1993). Known and suspected predators include the badger (*Taxidea taxus*), domestic and feral cat and dog, opposum (*Dedelphis virginiana*), weasel (*Mustela* spp.), skunk (*Mephitis* spp.), coyote (*Canis latrans*), bobcat (*Lynx rufus*), snake, Swainson's Hawk (*Buteo* swainsoni), Ferruginous Hawk (*B. regalis*), Merlin (*Falco columbarius*), Prairie Falcon (*F. mexicanus*), Peregrine Falcon (*F. peregrinus*), Great Horned Owl (*Bubo virginianus*), Red-tailed Hawk (*B. jamaicensis*), Cooper's Hawk (*Accipiter cooperii*), Northern Harrier (*Circus cyaneus*) and American Crow (*Corvus brachrhynchos*) (Bent 1938; Butts 1973; Martin 1973; Zarn 1974; Wedgwood 1978; Evans 1982; Green 1983; Konrad and Gilmer 1984; Haug 1985; Millsap and Bear 1988; Martell 1990; Desmond 1991; Haug et al. 1993; Low and Leupin 1998; Yanishevsky and Petring-Rupp 1998; Anderson et al. 2001). The badger is considered a major predator (Haug et al. 1993). Desmond

and Savidge (1998) observed higher rates of predation by the badger in prairie dog colonies that had a lower density of prairie dogs.

Vehicle collisions are considered a serious cause of mortality in some locations because the Burrowing Owl tends to sit and hunt on roads at night (Bent 1938; Ratcliff 1987; Haug et al. 1993). Researchers have reported three of five known deaths (Konrad and Gilmer 1984), 25% of known mortality (Millsap and Bear 1988), and 37% of Burrowing Owl remains (Haug and Oliphant 1987) at their study sites, all attributed to vehicle collisions.

Abundance

James and Espie (1997) estimated the total U.S. population as 20,000 – 200,000 breeding pairs, and the Colorado population as 1,000 – 10,000 breeding pairs. The Rocky Mountain Bird Observatory documented 468 Burrowing Owl colonies and 2,675 individuals in eastern Colorado in 1999 (Hutchings et al.1999).

Area Requirements

In general, the Burrowing Owl remains close to nest burrows during the day and forages farther away at night (Haug 1985; Haug and Oliphant 1990; Dechant et al. 2001). Grant (1965) found nest area requirements ranged between 4.1 and 7.3 ha in the northern part of the U.S. breeding range. Thompson (1984) found the average diurnal range in Wyoming to be 3.5 ha. Mean home range size for males in Canada was 2.41 km² (0.9 mi²), within a range of 0.14 km². (0.05 mi²) to 4.81 km². (2 mi²). These values were considered minimum size for breeding home range. Birds with larger home ranges fledged more young, while birds with smaller home ranges lost most or all of their young to predators (Haug and Oliphant 1990).

Average territory size has been estimated at 1.98 acres, within a range of 0.1 acres to 4.0 acres (Thomsen 1971; Zarn 1974). Haug and Oliphant (1990) found that defense of territories is largely limited to the immediate area around the nest burrow, with 95% of all movements occurring within 600 m of the nest burrow.

Distance between nest burrows ranges from <14 m (Ross 1974) to 900 m (Gleason 1978). Green and Anthony (1989) found that the mean nearest-neighbor distance differed between successful and deserted nests. For pairs of nests with <60 m between, both nests out of two pairs were abandoned; at distances of 60 to 110 m, at least one of two nests was abandoned for nine pairs; at distances of >110 m, only 14% of 21 pairs of nests resulted in the abandonment of at least one of the two nests. The mean distance between nests on black-tailed prairie dog colonies in north-central Colorado was 101 m (Plumpton 1992).

Burrowing Owls sometimes cluster their nests within prairie dog colonies (Butts 1973; Desmond 1991; Desmond et al. 1995, 2000; Desmond and Savidge 1996), perhaps to reduce the risk of predation by making it easier to warn one another when predators approach (Dechant et al. 2001). In Nebraska, Burrowing Owls nesting in prairie dog colonies >35 ha had a mean nearest-neighbor distance of 125 m, with nests in clusters, whereas Burrowing Owls nesting in colonies <35 ha had a mean nearest-neighbor distance of 105 m with nests randomly distributed (Desmond 1991; Desmond et al. 1995; Desmond and Savidge 1996).

Dispersal distances for juveniles in Canada ranged from 984 ft to 16.4 mi, with females dispersing shorter distances than males (Yanishevsky and Petring-Rupp 1998).

Migration

Very little is known about Burrowing Owl migration, but most Burrowing Owls in North America, including Colorado, are considered migratory (Bailey and Niedrach 1965; Andrews and Righter 1992; Haug et al. 1993). Most Burrowing Owls breeding in the northern U.S. and Canada are

believed to migrate south during September and October, and to return north in March and April (Haug et al. 1993). The Burrowing Owl is believed to be non-migratory in southern California, but migratory in northern California (Thomsen 1971; Haug et al. 1993).

Patterns of migration are not well understood. Burrowing Owls banded in the extreme western U.S. migrated south along the coast (Haug et al. 1993). Burrowing Owls banded in the northern Great Plains migrated through Nebraska and Kansas to Oklahoma, Missouri, Texas and points south (Haug et al. 1993). Burrowing Owls banded in the central U.S. mountains and plains (including Colorado) migrated through (or to) Oklahoma, Arkansas, Texas and Mexico (Haug et al. 1993). James (1992) suggested that Burrowing Owls from Canada migrate further south than do Burrowing Owls in the U.S.

Reasons for Decline

Decline of the Burrowing Owl is primarily attributed to loss of habitat as populations of prairie dogs and grounds squirrels decline due to control and eradication efforts, and as prairies are converted to cropland, urban uses, and pastures with taller, non-native grasses (Grant 1965; Konrad and Gilmer 1984; Ratcliff 1986; Haug et al. 1993; Dundas and Jensen 1995; Sheffield 1997; Barclay et al. 1998; Rodriguez-Estrella et al. 1998; Anderson et al. 2001; Dechant et al. 2001). An estimated 98% of native prairie has been altered or converted to other uses. This intensification of land use has resulted in loss and fragmentation of nesting habitat. These activities are expected to continue (Ostlie et al. 1997).

Decline of Burrowing Mammals

In many areas, including Colorado, the fate of the Burrowing Owl is tied to that of active black-tailed prairie dog colonies. The elimination of burrowing rodents (prairie dogs and ground squirrels) has been identified as the primary factor in Burrowing Owl declines (Butts and Lewis 1982; Evans 1982; Ratcliff 1986; Pezzolesi 1994; Desmond and Savidge 1996, 1998, 1999; Toombs 1997; Barclay et al. 1998; Dechant et al. 2001). Loss of prairie dog colonies through poisoning and plague outbreaks has eliminated nest sites (Butts 1973; Jones 1998) and may reduce reproductive success of the Burrowing Owl. A 63% decline in Burrowing Owl numbers in Nebraska over a seven-year period was associated with prairie dog control activities and subsequent declines in prairie dog densities (Desmond and Savidge 1998; Desmond et al. 2000). Reproductive success of the Burrowing Owl was positively correlated, and predation was negatively correlated, with density of prairie dogs (Dechant et al. 2001). Butts (1973) documented a 71% decline in an Oklahoma breeding population of Burrowing Owls after the prairie dog colony they occupied was treated with sodium fluoroacetate.

Control of prairie dogs can result in direct mortality to the Burrowing Owl as well. Ingestion of as little as one prey item poisoned by a rodenticide has been shown to cause mortality in many different owl species (Sheffield 1997b; Anderson et al. 2001). The Burrowing Owl is known to scavenge dead prey and is highly susceptible to secondary poisoning (Sheffield 1997b; Anderson et al. 2001). In addition, the tendency for the Burrowing Owl to stand at burrow entrances makes them susceptible to shooting (Marti and Marks 1989; Yanishevsky and Petring-Rupp 1998). At one study site in Oklahoma, 66% of the known mortality was due to shooting (Butts 1973). Wedgwood (1978) documented three colonies that were completely destroyed by shooting.

Almost 80% of eastern Colorado's prairie dog colonies occur on private land (EDAW 2000). Due to ongoing control and eradication efforts, it is likely that prairie dog colonies on private land will tend to be small, and therefore will not offer the higher quality nesting habitat that large colonies and complexes provide.

Agriculture

Haug (1985) noted that intensive agriculture led to loss of nesting sites and foraging habitat, and creation of sub-optimal nesting habitat. In addition, conversion of native grassland to cropland may have other impacts beyond direct loss of habitat. According to Wellicome and Haug (1995), cultivation of grassland habitat and increased tree cover on native prairies have resulted in increased numbers of other mammalian and avian species that prey on the Burrowing Owl. In addition, higher post-fledging mortality due to collisions with vehicles has been documented in agricultural landscapes compared to unfragmented rangeland (Clayton and Schmutz 1997; Paige 1998).

Agricultural operations also expose the Burrowing Owl to the toxic effects of pesticides (Haug et al. 1993). Pesticide use targeting the large insects on which the Burrowing Owl depends during the nesting season (grasshoppers, crickets and beetles) depletes the prey base and may impact reproduction. The Burrowing Owl has been observed foraging for insects on ground littered with poison grains (Butts 1973; James et al. 1990). The Burrowing Owl in pastures treated with strychnine-coated grain weighed less than those in control pastures, suggesting either a sub-lethal effect on the birds themselves, or reduction in prey availability (James et al. 1990). James and Fox (1987) observed a 54% reduction in young per nest after carbofuran (an insecticide used to control agricultural pests) was sprayed within 50 m of nest burrows. They attributed this reduction in productivity to direct toxicity. An 83% reduction in brood size and an 82% reduction in nest success were observed when the same insecticide was sprayed directly over nest burrows (James and Fox 1987; Fox et al. 1989). The granular form of carbofuran is banned in the U.S. and Canada, but the liquid form is certified for specific uses in both countries (Dechant et al. 2001).

Fragmentation

The Burrowing Owl appears to be sensitive to fragmentation and isolation of habitat. Warnock and James (1997) documented larger home range sizes in fragmented landscapes. Fragmentation and isolation of habitat may reduce the chances that unpaired Burrowing Owls will find mates (Haug et al. 1993; Sheffield 1997; Paige 1998). In Canada, the Burrowing Owl chose the highest quality sites (suitable soils, presence of burrowing mammals and proximity to other occupied sites) in a fragmented landscape over the largest or least fragmented habitat patches (Warnock 1997; Warnock and James 1997). Crowding into smaller habitat patches could lead to increased competition for food, reduced nest success and increased nest abandonment (Green and Anthony 1989; Warnock and James 1997). Paige (1998) found that Burrowing Owl persistence for more than four years increased at sites that had more neighboring occupied sites, more continuity with natural habitats within 20 km, and less patch edge. Fragmentation and isolation of habitat patches may also result in decline or local extirpation of prairie dog colonies if dispersal and colonization is hampered (Benedict et al. 1996).

Rangeland Management

The Burrowing Owl prefers grasslands of low structure typical of grazed grasslands (MacCracken et al.1985). Cessation or drastic reduction of grazing, either through loss of prairie dogs or removal of native ungulates or domestic livestock, can negatively impact the Burrowing Owl. In Saskatchewan and Alberta, the Burrowing Owl nested in pastures with shorter vegetation than occurred in randomly chosen pastures and preferred native or tame pastures over cultivated land (Clayton 1997). In North Dakota, the Burrowing Owl nested in moderately or heavily grazed mixed-grass pastures, but not in hayed or lightly grazed mixed-grass pastures (Kantrud 1981). In Colorado, Montana, Nebraska, North Dakota, South Dakota and Wyoming, optimal habitat occurred in heavily grazed areas (Kantrud and Kologiski 1982). In Oklahoma, grazing of taller grasses may attract burrowing mammals, resulting in increased nest site availability (Butts 1973). Declines of Burrowing Owls in North Dakota may be attributable to reduction in sheep grazing (Anderson et al. 2001).

In addition, availability of horse or cow manure for nest lining may be important, possibly to mask odors and reduce predation (Martin 1973; Green and Anthony 1989; Desmond et al. 1997; Dechant et al. 2001). In Oregon, 72% of successful nests (n=32) were lined with manure, but only 13% of depredated nests (n=15) were lined (Dechant et al. 2001).

Urban Development

The Burrowing Owl no longer occurs in much of the area it formerly occupied along the urban corridor of Colorado's front range (Jones 1998). Millsap and Bear (1988) found that reproductive success is reduced significantly on sites where home construction occurred compared to sites adjacent to construction or absent construction. Thomsen (1971) reported that humans caused 65% of observed damage to burrows and domestic dogs caused 20% of burrow damage on a municipal airport site. It was noted that the dogs elicited a frenzied defense.

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APPENDIX E
SPECIES ACCOUNT: FERRUGINOUS HAWK

FERRUGINOUS HAWK (*Buteo regalis*)

Species Status

The Ferruginous Hawk is listed as a threatened species in Utah and is considered a species of special concern in Colorado, Arizona and Oklahoma, but the USFWS rejected a petition to list the Ferruginous Hawk under the ESA (USFWS 1992). This species is listed as a USFWS Species of Concern (USFWS 1996), a USFS Region 2 sensitive species, a BLM sensitive species, and a CITES Appendix II species. The Partners in Flight Watchlist identifies the Ferruginous Hawk as a "High Priority" species for Wyoming, North Dakota, South Dakota and Nebraska. The Commission for Environmental Cooperation (2000) established under the North American Free Trade Agreement, has identified the Ferruginous Hawk as a priority grassland species for conservation action. In Canada, the Ferruginous Hawk was downlisted from threatened to vulnerable in 1995. It is considered a species of conservation concern in Mexico (Commission for Environmental Cooperation 2000). The Colorado Natural Heritage Program (CNHP) has ranked the Ferruginous Hawk G4/S3B-S5N (apparently secure globally; breeding birds vulnerable in Colorado) (CNHP 2003).

The breeding distribution of Ferruginous Hawks in Canada has declined to about 50% of its former range (Houston and Bechard 1984; Schmutz et al. 1992; Preston 1998). During the past ten years, however, population declines have only been documented in eastern Nevada and northern Utah (Olendorff 1993; Preston 1998). Increases have been reported for Canada (Schmutz and Hungle 1989), California (Warkentin and James 1988), Montana and North Dakota (Dobkin 1994). Olendorff (1993) reported Ferruginous Hawk numbers stable in Colorado during the 1979-1992 time period. Breeding Bird Survey data for the U.S. and Canada indicate an average annual increase of 0.5% for 1966-1989 (Droege and Sauer 1990). Breeding Bird Survey data from 1966-1996 for Partners in Flight Physiographic Area 36 (the Central Shortgrass Prairie) do not show a statistically significant change (Colorado Partners in Flight 2000). Data from all BBS regions for the Ferruginous Hawk, however, have a suitability index of red (data with an important deficiency) or yellow (data with a deficiency)(Sauer et al. 2001). In addition, BBS data cover only 37 years, but changes to Ferruginous Hawk habitat have been taking place for a considerably longer period of time (Preston 1998).

Christmas Bird Count data from 1952-1984 indicate a significant increase in wintering Ferruginous Hawk numbers, with the most pronounced increase occurring between 1973 and 1984 (Warkentin and James 1988; USFWS 1992).

Description and Taxonomy

The Ferruginous Hawk is one of the largest North American hawks, measuring approximately 23 in, with a wingspan of 53 in. This bird is distinguished by its pale head, rust coloring on back, shoulders and legs, and white underparts. When seen from below, the rust-colored legs form a dark V-shape and flight feathers lack barring. Immature birds lack the rust-colored leggings. The dark morph is rare and can be distinguished by its lack of dark tail bands (National Geographic Society 1987).

The Ferruginous Hawk was originally described in 1844 by G.R. Gray as *Archibuteo regalis* (AOU 1998). There are no subspecies recognized, but there are two separate sub-populations east and west of the Rocky Mountains (Bechard and Schmutz 1995).

Historical and Current Distribution

The breeding range of the Ferruginous Hawk is discontinuous throughout most of the western U.S. and in southern Alberta and Saskatchewan, and extreme southwestern Manitoba (National Geographic Society 1987; Bechard and Schmutz 1995). Breeding range in the U.S. includes the Pacific coastal states of Washington and Oregon, and extends eastward to the western portions

of Texas, Oklahoma, Kansas, Nebraska and the Dakotas, and south to Arizona and New Mexico (National Geographic Society 1987). Year-round range includes Colorado, portions of Utah, southeastern Nevada, northern Arizona and New Mexico, western Texas, Oklahoma, Kansas, Nebraska and southwestern South Dakota. Winter range extends from southcentral Oregon through California, western Nevada, southern Arizona and New Mexico, southwestern Texas and northern Mexico (National Geographic Society 1987). Ferruginous Hawks in Washington, Montana, North Dakota and Canada are migratory, while those in the southern part of the breeding range appear to migrate short distances or are sedentary (Bechard and Schmutz 1995).

The Ferruginous Hawk still occurs broadly in most historically reported areas, but its range has retracted in Alberta, Saskatchewan and Manitoba (Bechard 1981; Houston and Bechard 1984; Schmutz 1984), and it has been nearly extirpated from the northeast quarter of North Dakota (Stewart 1975; Bechard and Schmutz 1995). The Ferruginous Hawk historically wintered in the Los Angeles area (Wyman 1914; Bechard and Schmutz 1995).

In Colorado, about three-quarters of Breeding Bird Atlas latilong blocks in which the Ferruginous Hawk was detected were scattered across the eastern plains, with the remaining reports originating in the San Luis Valley, South Park and Colorado Plateau (Preston 1998). Andrews and Righter (1992) considered the Ferruginous Hawk a rare to uncommon summer resident and a fairly common to common winter resident on Colorado's eastern plains. Occurrences on the western slope, mountain parks and San Luis Valley were considered uncommon to rare (Andrews and Righter 1992).

Life History and Habitat

Breeding habitat

The Ferruginous Hawk is a bird of open grasslands and shrub steppe communities (Bechard and Schmutz 1995). These birds nest in flat, rolling or rugged terrain in open areas, including shortgrass prairie, canyons with cliffs or rock outcrops and areas with isolated trees or small groves in grasslands, shrublands or riparian areas (Smith and Murphy 1973; Woffinden 1975; Lokemoen and Duebbert 1976; Cottrell 1981; Roth and Marzluff 1989; Olendorff 1993; Bechard and Schmutz 1995; Dechant et al. 2001). The Ferruginous Hawk avoids areas of intensive agriculture or high human disturbance (Gilmer and Stewart 1983; Schmutz 1984, 1987; Bechard et al. 1990; Schmutz 1991), high elevation, interior forests and narrow canyons (Ensign 1983; Bechard et al. 1990; Restani 1991). Gilmer and Stewart (1983) found lands within 1.0 km of nests were mostly (76.5%) pasture and haylands. Kantrud and Kologiski (1982) found highest densities of the Ferruginous Hawk in heavily grazed areas in the northern Great Plains. In South Dakota, nests were preferentially placed in lightly grazed pasture or idle areas (Lokemoen and Duebbert 1976; Blair 1978; Blair and Schitoskey 1982).

The structure of Ferruginous Hawk nests suggests that ground nesting was predominant in the past (Bechard and Schmutz 1995). Selection for nest sites now appears to depend on a combination of available substrates and surrounding land use. The Ferruginous Hawk appears to prefer elevated nest sites, but will nest on the ground if elevated sites are not available (Bechard and Schmutz 1995). Elevated nest sites include boulders, creek banks, knolls or low cliffs, buttes, large shrubs, trees in isolated areas or around old homesteads (Olendorff 1973; Schmutz 1984; Gaines 1985), haystacks adjacent to hayfields (Rolfe 1896; Davy 1930; Lokemoen and Duebbert 1976; Gilmer and Stewart 1983), and utility structures (Gilmer and Wiehe 1977; Gilmer and Stewart 1983; Steenhnof et al. 1993; Bechard and Schmutz 1995). Nests on the ground are typically located far from human activities and on elevated landforms within grassland areas (Blair 1978; Gilmer and Stewart 1983; Preston 1998) such as slopes, knolls and crests of ridges (Palmer 1988). When trees are the nesting substrate, lone or peripheral trees are preferred to densely wooded areas (Weston 1968; Lokemoen and Duebbert 1976; Gilmer and Stewart 1983; Woffinden and Murphy 1983; Palmer 1988; Bechard et al. 1990; Leslie 1992; Hansen 1994; Dechant et al. 2001). Ferruginous Hawks nesting in trees appear to be less sensitive to

disturbance than those nesting on the ground, but they still avoid areas of intensive agriculture or high levels of human disturbance (Gilmer and Stewart 1983; Schmutz 1984, 1987, 1991; Bechard et al. 1990).

Documented nest height ranges from ground level to greater than 20 m above ground (Bechard and Schmutz 1995). Olendorff (1993) found that 49% of 2,119 nests described rangewide were in trees and shrubs, 21% were on cliffs, 12% were on utility structures and 10% were on ground outcrops. In Colorado, approximately 41% of nests were in human-made settings (Olendorff and Stoddard 1974; Gaines 1985). Johnsgard (1979) found approximately 50% of 61 nests in North Dakota were on the ground in prairie vegetation. Gilmer and Stewart (1983), however, found 64% of nests in trees and only 21% of nests on the ground in North Dakota.

Use of Prairie Dog Towns

Prey availability influences habitat selection. The Ferruginous Hawk appears to avoid dense vegetation limiting visibility of prey (Howard and Wolfe 1976; Wakeley 1978). Grazing by large herbivores and prairie dogs benefits the Ferruginous Hawk by reducing plant cover and making prey more visible (Wakeley 1978; Gilmer and Stewart 1983). Plumpton and Andersen (1997) found that the black-tailed prairie dog was the most important prey species for the Ferruginous Hawk in Colorado, and that Ferruginous Hawk winter habitat was characterized by extant black-tailed prairie dog colonies. Berry et al. (1998) found counts of the Ferruginous Hawk in Boulder, Colorado were positively correlated with proximity to the nearest black-tailed prairie dog colony. Plumpton and Andersen (1998) found Ferruginous Hawks at the Rocky Mountain National Wildlife Refuge in Colorado were most numerous where black-tailed prairie dogs were most plentiful.

Roth and Marzluff (1989) found approximately 86% of nests in western Kansas (n=99) were not in direct view of black-tailed prairie dog towns, but most were within 8 km of towns. The infrequent occurrence of nests further away from prairie dog towns was attributed to a behavioral response to prey abundance (i.e., placement of nests close to sources of prey). Numbers of the Ferruginous Hawk decrease when local prairie dog populations die off (Andrews and Righter 1992), but the relationship between prairie dogs and Ferruginous Hawk survivorship is unknown. When black-tailed prairie dog towns at the Rocky Mountain Arsenal National Wildlife Refuge were reduced by up to 99% during a plague epizootic, a significant relationship was found in the numeric response of the Ferruginous Hawk to changes in the area of black-tailed prairie dog towns and in the minimum estimated population of black-tailed prairie dogs, but not to estimated black-tailed prairie dog density (Seery and Matiatos 2000).

Use of Cultivated Fields

The Ferruginous Hawk will nest in cropland and hayland if coverage is less than 50% (Blair 1978; Wakeley 1978; Gilmer and Stewart 1983; Konrad and Gilmer 1986; Schmutz 1989, 1991; Bechard et al. 1990; Faanes and Lingle 1995; Leary et al. 1998), but avoids areas of intensive agriculture for nesting. In most states, including Colorado, Ferruginous Hawks prefer grasslands and pastures to cultivated areas (Olendorff 1973; Janes 1985; Konrad and Gilmer 1986; Roth and Marzluff 1989; Atkinson 1992; Black 1992; Leslie 1992; Preston 1998; Bechard et al. 1990; Dechant et al. 2001). Olendorff and Stoddardt (1974) found only 1 out of 71 nests in northeastern Colorado were in cultivated lands. In Kansas, Roth and Marzluff (1989) found 59 Ferruginous Hawk nests in areas where rangeland was the predominant land use, but only 5 nests in areas where cropland constituted over 50% of the area. In Oregon, Cottrell (1981) found only one Ferruginous Hawk nest out of 46 in farmland. Gilmer and Stewart (1983) found only 8% of 629 occupied nests in North Dakota in areas where cultivated lands were predominant, and that pasture was the only land use within 100 m of ground nests. Cultivated areas in Alberta, however, had higher densities of nesting Ferruginous Hawks than were found in grassland areas (Schmutz 1989), and Podany (1996) found no significant difference in the number of fledglings produced in unfragmented rangeland compared to a mixture of rangeland and cropland.

Cultivated lands are used for foraging by the Ferruginous Hawk. Leary et al. (1998) found agricultural fields were important foraging areas when prey densities were low in native habitat. The Ferruginous Hawk foraged extensively in cultivated fields in Washington and Idaho during the breeding season (Wakeley 1978; Leary et al. 1998). Zelenak and Rotella (1997) attributed higher nest success in nests closer to cultivated fields and roads to the higher prey densities associated with the edge habitat. Intensive agricultural activities such as yearly plowing and biennial fallowing, however, preclude many prey species (Wakeley 1978; Houston and Bechard 1984; Dechant et al. 2001). Schmutz (1989) found that when an area of cultivation is below 30%, prey abundance increases, but abundance decreases once the area of cultivation exceeds 30%.

Wintering and Migration Habitat

The Ferruginous Hawk east of the Rocky Mountains winters primarily in grasslands, particularly those where prairie dogs are abundant (Bechard and Schmutz 1995). In Texas, Schmutz (1987) found patches of grassland supporting prairie dogs intermixed with extensive cultivation attracted many wintering Ferruginous Hawks. Schmutz concluded that agricultural practices and human activity did not have a negative effect on the Ferruginous Hawk during winter. Migrating birds east of the Rocky Mountains follow grasslands where ground squirrels and prairie dogs are available, while western birds use desert habitats where lagomorphs are abundant (Schmutz and Fyfe 1987).

Reproduction

The Ferruginous Hawk arrives on breeding grounds in late February or early March in southern portions of the breeding range, and in late March to early April in northern areas (Olendorff 1973; Smith and Murphy 1973; Lokemoen and Duebbert 1976; Schmutz et al. 1980; Bechard and Schmutz 1995). Nest building usually occurs in March in Utah and Colorado, and in April in North Dakota, Alberta and Saskatchewan (Schmutz et al. 1980; Bechard and Schmutz 1995).
The male and female share in nest site selection, which typically involves visiting several nests from previous years (Bechard and Schmutz 1995). A pair may repair two or three nests before selecting one for egg laying (Olendorff 1973; Powers 1981). If interrupted during nest building, the Ferruginous Hawk may choose another site (Smith and Murphy 1973).

Brood dates range from mid-March to mid-May (early to mid-April in Colorado) (Olendorff 1993). Average clutch size is two to four, but ranges from one to eight, depending on abundance of prey (Smith and Murphy 1978; Smith et al. 1981; Palmer 1988; Bechard and Schmutz 1995). One clutch is produced per season (Bechard and Schmutz 1995). Re-nesting is rare (Woffinden 1975; Palmer 1988). Though the male does some incubating, the majority of incubating is done by the female while the male hunts and guards the nest (Powers 1981; Bechard and Schmutz 1995). The incubation period is 32-33 days (Palmer 1988).

The female broods the young for three weeks post-hatching and then begins to hunt again (Bechard and Schmutz 1995). Young leave the nest at 38-50 days (Powers 1981; Konrad and Gilmer 1986), but remain less than 200 m from the nest for some time (Powers 1981). In Colorado, fledglings have been recorded from late June to late July (Preston 1998). Fledglings can kill prey at 52 days (Angell 1969) and although they are proficient flyers by two weeks post-fledging (Bechard and Schmutz 1995), they remain dependent on their parents for several weeks (Blair and Schitoskey 1982).

Fidelity to nesting locations from year to year is high and several nests may be built in an area and used in alternate years (Davy 1930; Weston 1968; Olendorff 1973; Blair 1978; Smith and Murphy 1978; Palmer 1988; Roth and Marzluff 1989; Schmutz 1991; Atkinson 1992; Houston 1995). Reoccupancy of nest sites may be related to nest success in prior years. De Smet (1992) found that 52% of successful nests were reused (n=71), but only 14% of unsuccessful nests were

reused (n=63). Bechard and Schmutz (1995) reported one nest site that fledged young for 32 consecutive years.

Lifetime reproductive output is unknown, but one male in Alberta contributed to the fledging of at least 20 young over a seven-year timeframe (Bechard and Schmutz 1995). Mean annual reproductive success ranges from 1.3-3.2 fledglings per breeding pair per year rangewide (Lokemoen and Duebbert 1976; Fitzner et al. 1977; Smith and Murphy 1978; Thurow et al. 1980; Gilmer and Stewart 1983; Roth and Marzluff 1989; Houston 1991). Mean rates reported for states in the eastern portion of the breeding range are 2.1-2.2 (Lokemoen and Duebbert 1976; Gilmer and Stewart 1983; Roth and Marzluff 1989). The Ferruginous Hawk begins breeding at two years of age (Bechard and Schmutz 1995), but the number of pairs breeding in a particular area during any given year is dependent upon prey availability (Thurow et al. 1980; Woffinden and Murphy 1989; Bechard and Schmutz 1995). Olendorff (1978) estimated nest success on the PNG at 69.8% (n=35 nests). Nest failure in northwest Colorado and northeast Utah was estimated at 25% during a year of high prey abundance and at 74% during a year of low prey abundance (USFWS 1992).

Diet

The Ferruginous Hawk is restricted in its selection of prey. It feeds primarily on prairie dogs and ground squirrels east of the Continental Divide, on jackrabbits or cottontail rabbits west of the Divide (Olendorff 1993) and less frequently on locusts, crickets, birds, amphibians and reptiles (Weston 1968; Gilmer and Stewart 1983; Ehrlich et al. 1988; Finch 1991; Gillihan and Hutchings 2000; Dechant et al. 2001). In Colorado, Preston and Beane (1996) reported that the Ferruginous Hawk feeds most often on prairie dogs, especially in winter. Olendorff (1993) reported ground squirrels as the most important prey item in Colorado, followed by pocket gophers and jackrabbits. Data from 20 studies indicate that ground squirrels and prairie dogs are taken most frequently, but that rabbits and hares represent most of the biomass (Olendorff 1993).

Density and productivity of the Ferruginous Hawk is closely associated with cycles of prey abundance (Woffinden 1975; Smith et al. 1981; White and Thurow 1985; Schmutz 1989; Schmutz and Hungle 1989; Bechard and Schmutz 1995). Abundant prey populations and stability of prey habitat are necessary to maintain high breeding densities, high rates of reproductive success and recruitment in Ferruginous Hawk populations (USFWS 1992). Local influxes of the Ferruginous Hawk have been documented in response to prey availability (Gilmer and Stewart 1983).

Survivorship and Mortality

Maximum longevity is 20 years (Lloyd 1937; Houston 1984). Schmutz and Fyfe (1987) estimated a first-year mortality rate of 65% based on banding data from the 1970s and 1980s. Bechard and Schmutz (1995) considered this an over-estimate because most mortality was human-related. Woffinden and Murphy (1989) estimated adult mortality at 25% based on reoccupancy of nest sites. This may also be an over-estimate given the species' potential for dispersal (Bechard and Schmutz 1995).

Causes of mortality include exposure, predation, shooting, vehicle collisions, other injuries and collisions with towers or high-tension wires (Gossett 1993; Bechard and Schmutz 1995). Eggs and young may be blown or pushed from the nest (Olendorff 1993). Gilmer and Stewart (1983) found that summer storms were a major cause of nest loss, with nests in trees being particularly vulnerable. The primary predator of nestlings is the great horned owl, but eggs and nestlings may also be preyed upon by common ravens and crows (*Corvus* spp) (Bechard and Schmutz 1995). Coyotes (*Canis latrans*), badgers (*Taxidea taxus*), and foxes (*Vulpes* spp) may represent a serious predation threat to fledglings and pairs that nest on the ground (Bechard and Schmutz 1995). According to the USFWS (1992), however, predation is not known to be a widespread problem throughout the range of the Ferruginous Hawk.

Abundance

Olendorff (1993) estimated the continent-wide population at 5,842-11,330 birds. Schmutz et al. (1992) estimated 14,000 birds on the Great Plains. Because between-year movement of these birds is common, estimation of abundance is difficult.

In Colorado, Ferruginous Hawk numbers have been stable from 1979-1992 (Olendorff 1993). Although the Ferruginous Hawk is found in Colorado year round (Preston 1998; Gillihan and Hutchings 2000), it is most common in winter in eastern Colorado. Johnsgard (1990) estimated that about 1,200 birds winter in Colorado, which comprises about 20% of the total winter population in the United States. Preston (1998) documented about 150 nest sites in Colorado, primarily on the eastern plains. Past estimates of abundance for breeding Ferruginous Hawks in Colorado include 150-175 pairs in 1979, and 300-400 pairs in 1991 (USFWS 1992). According to Leslie (1990), Ferruginous Hawk numbers on the PNG decreased by 38.5%, down from 26 pairs in 1972 to 16 pairs in 1990.

Area Requirements

Like other raptors, the Ferruginous Hawk is widely dispersed and found at low densities, especially during the nesting season (Fuller et al. 1995; Preston 1998). Olendorff (1993) found an average nearest-neighbor distance of 13.4 km (range 0.8-7.2 km) over 11 study areas in the U.S. On the PNG, the Ferruginous Hawk been found at an estimated breeding density of one pair per 108 km^2 (Olendorff 1972). Estimates of home range are 5.9 km^2 in Utah (Smith and Murphy 1973; Wakeley 1978), 7.6 km^2 for breeding males in Idaho (McAnnis 1990), and 3.14-8.09 km^2 in the Columbia River Basin and Great Basin (Janes 1985). Leary et al. (1998) reported an average home range size of 90.3 km^2 in Washington, with the variability in home range size significantly related to distance between the nest and the nearest irrigated agricultural field. Wakeley (1978) estimated that one pair might require up to 21.7 km^2 for hunting.

Migration

Very little is known about migration of the Ferruginous Hawk in the southern portion of the breeding range, but they are believed to be sedentary or to migrate only short distances (Bechard and Schmutz 1995). Populations from the northern breeding range (Washington, Montana, North Dakota and Canada) are completely migratory. Southward migration begins in August, late September or early October (Schmutz and Fyfe 1987). The Ferruginous Hawk returns to South Dakota in late March to early April, and to Utah and Colorado in late February or early March (Lokemoen and Duebbert 1976). Most birds breeding in the Great Plains winter in Texas and northern Mexico (Bechard and Schmutz 1995). There is some crossover between the population east of the Continental Divide and west of the Continental Divide. Gossett (1993) documented 4.1% of eastern birds were recovered west of the Divide and 27.5% of western birds recovered east of the divide.

Reasons for Decline

Primary concerns are loss of nesting habitat (especially conversion of grasslands to cropland and urban development), reduction in prey availability through control programs targeting primary prey species (i.e., prairie dogs, ground squirrels) and human disturbance at nest sites (Preston 1998; Colorado Partners in Flight 2000; Commission for Environmental Cooperation 2000; Gillihan and Hutchings 2000).

Conversion of Grasslands

Conversion of grasslands to row crops, at least locally, has been implicated in declines of the Ferruginous Hawk (Lokemoen and Duebbert 1976; Gilmer and Stewart 1983; Finch 1991; Ostlie et al. 1997; Preston 1998; Commission for Environmental Cooperation 2000; Gillihan and Hutchings 2000). Intensive agricultural development renders native habitat such as grasslands essentially useless for Ferruginous Hawk nesting (USFWS 1992). The Ferruginous Hawk will avoid frequently plowed fields due to lower densities of prey in monotypic agricultural fields, absence of nest trees and higher rates of human disturbance during springtime (i.e., the nesting season) (USFWS 1992). In addition, although cropland is used as foraging habitat by the Ferruginous Hawk, reduced access to prey may result if crops grow too tall or dense to allow it to see prey. Ability of remaining grasslands to support viable populations may be reduced in areas invaded by exotic annuals such as cheatgrass (*Bromus tectorum*) (TNC 1999).

Decline of Burrowing Mammals

Reductions in ground squirrel and prairie dog populations, either through habitat conversion or through poisoning and control programs, result in loss of prey base for the Ferruginous Hawk. Although pesticides are not known to pose a serious direct threat to the Ferruginous Hawk (Bechard and Schmutz 1995), use of strychnine to poison ground squirrels is a possible threat (Schmutz et al. 1989). Almost 80% of eastern Colorado's black-tailed prairie dog colonies occur on private land (EDAW 2000). Due to continued control efforts, it is likely that black-tailed prairie dog colonies on most private land will tend to be small and thus not provide the higher quality foraging habitat of large colonies and complexes.

Sensitivity to Disturbance

The Ferruginous Hawk is easily disturbed during the breeding season (Olendorff 1973; Gilmer and Stewart 1983; Schmutz 1984; White and Thurow 1985; Bechard et al. 1990; Preston 1998; Gillihan and Hutchings 2000). Nest abandonment may occur, particularly during incubation (Davy 1930; Weston 1968; Fitzner et al. 1977; Gilmer and Stewart 1983; White and Thurow 1985). White and Thurow (1985) found that the Ferruginous Hawk did not increase its tolerance to repeated disturbance over time, but rather became more sensitive, flushing at greater distances until just before eggs hatched. Their data further suggested that when a pair deserted a nest after disturbance, it moved completely out of the area the following year, rather than nesting in an alternate nest in the same territory. Only 52% of the territories that contained disturbed nests were occupied the following year, compared to 93% of territories containing control nests (White and Thurow 1985). Intensity of disturbance response depended on whether the disturbance was familiar, regardless of whether humans were associated with the disturbance. Adults subjected to disturbance appeared to be less attentive to the young and fledged significantly fewer young. The presence of humans near nests might also raise the mortality rate of young by causing them to fledge prematurely. Sensitivity to disturbance also increased during low prey abundance (White and Thurow 1985).

In eastern Colorado and South Dakota, nests in remote locations exhibited higher productivity than did nests in more accessible locations (Olendorff 1973; Blair 1978). The Ferruginous Hawk avoids nesting in cropland and in areas near farmyards and occupied buildings (Schmutz 1984; Gaines 1985). Olendorff (1993) reported nest abandonment related to mining disturbance. Nesting does occur, however, near active railroads and gravel roads (Rolfe 1896; Gilmer and Stewart 1983; MacLaren et al. 1988). Gilmer and Stewart (1983) found that pairs nesting within 500 m of interstates or well-traveled roads acclimated to activity on the roads and exhibited similar rates of nest success to other pairs.

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APPENDIX F
SPECIES OF CONCERN FOR SHORTGRASS PRAIRIE BIRDS (RMBO PRAIRIE PARTNERS)

ROCKY MOUNTAIN BIRD OBSERVATORY – PRAIRIE PARTNERS, SPECIES OF CONCERN
SHORTGRASS PRAIRIE BIRD CONSERVATION REGION (BCR18)

Species	PIF priority level*	% of population in BCR18	BCR Trend	P-value
Northern Harrier	II.	4.37	-2.8	0.25
Swainson's Hawk	I.	20.94	-0.7	0.69
Ferruginous Hawk	I.	21.11	1.46	0.37
Prairie Falcon	I.	10.17	5.72	0.08
Greater Prairie-chicken	I.	7.58	54.96	0.16
Lesser Prairie-chicken	I.	No Data	No Data	
Scaled Quail	I.	8.37	-2.95	0.05
Mountain Plover	I.	73.6	-1.06	0.78
Upland Sandpiper	II.	1.37	-5.46	0.22
Long-billed Curlew	I.	14.08	-3.32	0.15
Burrowing Owl	I.	34.95	-3.37	0.36
Say's Phoebe	II.	10.44	0.79	0.63
Chihuahuan Raven	II.	24.42	-1.33	0.26
Loggerhead Shrike		7.82	-0.18	0.93
Horned Lark	III.	21.49	-1.89	<0.01
Cassin's Sparrow	I.	38.55	-1.68	0.01
Brewer's Sparrow	III.	1.09	-5.99	0.12
Lark Sparrow	II.	17.73	-1.48	0.06
Lark Bunting	I.	36.44	-1.97	0.01
Grasshopper Sparrow	II.	19.65	-1.53	0.17
McCown's Longspur	I.	18.42	2.5	0.69
Chestnut-collared Longspur	I.	2.66	9.4	0.26
Dickcissel	II.	1.85	4.26	0.11
Western Meadowlark	III.	18.44	-0.64	0.06

* Tier I. High Overall Priority. This tier includes species that are typically of conservation concern throughout their range.
Tier II. High Regional Priority. This tier includes species that are of moderate overall priority, but are important to consider for conservation within a region.
Tier III. Additional Watch List Species. This tier includes species that are on the U.S. Watch List (see Pashley et al. 2000), but are not included in the above tiers.

This list was composed by compiling the priority upland species from the Partners in Flight database within BCR 18. The species were reduced further by selecting species that use shortgrass prairie and shrubland habitats during the breeding season, and greater than 1% of the population breeds within BCR 18. The list includes the common name, the PIF priority level, % of the breeding population estimated to occur in BCR 18, the population trend (based on BBS data within BCR 18 1966-1999), and the associated P-value.

APPENDIX G
SUMMARY OF ONGOING GRASSLAND SPECIES MONITORING AND RESEARCH PROJECTS

LONG-TERM MOUNTAIN PLOVER MONITORING
Objectives of Study:

- Nest searches on Pawnee National Grasslands and in South Park
- Trap and band all located nesting adults
- Determine embryonic development during incubation
- Determine reproductive success
- Conduct line transects/point variation on Pawnee NG South Park
- Compare data across years and geography to determine population trend

MOUNTAIN PLOVER ISOTOPE STUDY AND WINTERING GROUND SURVEYS
Objectives of Study:

- Document link between breeding and wintering locales for individual birds
- Identify proportion of plover population that is using native versus non-native habitats during the breeding season and during the wintering season.
- Document individual developmental stress associated with different habitats and seasons.

RELATIONSHIP BETWEEN MOUNTAIN PLOVER BREEDING ACTIVITY AND PRAIRIE DOG COLONIES
Objectives of Study:

- Investigate interaction between the Mountain Plover and prairie dogs on short-grass prairie in eastern Colorado in Crowley, El Paso, Pueblo and Weld Counties.
- Monitor nest success on prairie dog colonies and compare to that of cultivated lands and grasslands.
- Examine the relative importance of prairie dog colonies to breeding activity of the Mountain Plover in eastern Colorado.
- Determine movements of radio-marked adults between prairie dog colonies, cultivated land and grasslands.

MOUNTAIN PLOVER NEST CONSERVATION IN CULTIVATED FIELDS
Objectives of the Project:

- Establish toll free number landowners can voluntarily call before cultivation requesting technicians to survey for and mark mountain plover nests on agriculture fields during the Mountain Plover nesting season -- mid-April through the end of June. Landowners voluntarily cooperating in this effort will be exempt from prosecution for incidental take occurring as a result of standard agricultural practices under the ESA should the Mountain Plover become listed. With current questions about Mountain Plover population trends, and the use of cultivated fields by the Mountain Plover for breeding habitat, this project will serve as a proactive tool to help increase success of Mountain Plover nests on private agricultural lands in Colorado.
- Develop a public outreach program for landowners to better inform them of the species' needs and reach other landowners unfamiliar with the species and CDOW programs for their conservation.
- Implement Mountain Plover surveys by county to obtain better population estimates and distribution information on the eastern plains of Colorado. (Protocols including a call playback and an intensive county wide effort will be considered to maximize results in surveying for this low density species.)

PRIVATE LANDOWNER OUTREACH INITIATIVE
Objectives of the Project:

- Implement outreach efforts with private landowners throughout the shortgrass prairie region of eastern Colorado to work towards long term viability of grassland species, grassland habitats, and the long-term economic viability of the private landowners who own or manage 80% of all lands in the Great Plains.
- Develop partnerships between federal and state agencies and non-profit organizations to provide support for this effort

EASTERN COLORADO SWIFT FOX INVENTORY
Objective of the Project

- Estimate population size and occupancy rates for Colorado's Swift Fox in eastern Colorado using the established mark-recapture protocols.

MONITORING PRAIRIE DOGS AND ASSOCIATED BIRD SPECIES IN EASTERN COLORADO DURING BREEDING AND NON-BREEDING SEASONS
Objectives of the Project:

- Testing potential monitoring protocols for prairie dogs and associated low-density bird species
- Estimating and tracking population sizes of prairie dogs and associated low-density bird species, particularly the Burrowing Owl and Mountain Plover, across prairie dog colonies in eastern Colorado
- Documenting colony location, size, activity (including proportion of each colony that is active/inactive), prairie dog density, burrow density, surrounding habitat, and other pertinent information such as evidence of plague

RESOLVING CONFLICTS OF CHARADRIUS MONTANUS BREEDING ON PRIVATE LANDS
Objectives of the Project:

- Identify relative impacts of common tillage practices upon Mountain Plover production in eastern Colorado.
- Identify potential conflicts on the landscape and critical areas of impact.
- Describe how potential or realized reproductive losses can be either avoided or mitigated with cost-effective alteration of farming practices.
- Describe how the Mountain Plover can be discouraged from nesting on private lands if such are identified as a detriment to annual recruitment.

MAPPING PRAIRIE DOG HABITAT ON PNG
Objectives of the Project:

- Develop suitable habitat models for the black-tailed prairie dog on PNG
- Compare habitat models developed on PNG and other predicted black-tailed prairie dog habitat across eastern Colorado
- Determine how much suitable habitat is currently occupied on PNG
- Test technologies for prairie dog mapping and evaluation of the potential for using DOQQ aerial photography and/or other high-resolution satellite imagery.

APPENDIX H
GRASSLAND SPECIES WORKING GROUP MEMBERS

Grassland Species Working Group Participants

Name	Representing
Kim Burgess	Colorado Division of Wildlife - Policy and Regulation Manager
Dave Carlson	Colorado Department of Agriculture
Miles Davies	Colorado Cattlemen's Association
Mark Frasier	Colorado Livestock Growers Association
Catherine Johnson	National Wildlife Federation
Bob Leachman	US Fish and Wildlife Service
Jim McKee	Boulder County Nature Association
Pat Melhlop	US Fish and Wildlife Service
Susan Miller	Private Consultant – Wild Places
Ken Morgan	Colorado Division of Wildlife – Private Lands Coordinator
Rob Nanfelt	Colorado Association of Home Builders
Chris Pague	The Nature Conservancy
Francie Pusateri	Colorado Division of Wildlife – Grassland Species Coordinator
Chris Roe	Private Consultant – Roe Ecological Services
Carl Stogsdill	Colorado Farm Bureau
John Stulp	Prowers County Commissioner, State Land Board Member
Ted Toombs	Environmental Defense
Tammy Vercauteren	Rocky Mountain Bird Observatory

APPENDIX I
SYLVATIC PLAGUE MONITORING PROTOCOL (DRAFT)
BLACK-TAILED PRAIRIE DOG CONSERVATION TEAM - MARCH 2002

Black-tailed Prairie Dog Conservation Team
March 2002 Draft Sylvatic Plague Monitoring Protocol

Dowd Stukel, E. South Dakota Game Fish and Parks Department
Bob Luce, Interstate Coordinator, Black-tailed Prairie Dog Conservation Team

BACKGROUND: Since its documented appearance in wild rodents on the Pacific Coast of North America in the early 1900s, sylvatic plague has spread eastward, affecting sciurid and cricetid rodents, insectivores, lagomorphs, carnivores, and humans (bubonic plague) (Barnes 1982, Cully 1993). Prairie dog species are extremely susceptible to this typically flea-borne disease and may serve as "amplifying hosts" (Barnes 1993).

Plague epizootics may originate from focal areas, with possible maintenance in non-focal areas between epizootics. During epizootics, plague can spread over great distances and in the process affect humans, most often during and shortly following epizootics (Cully 1993). Several wildlife species are considered enzootic or maintenance species for sylvatic plague, meaning individuals have some or considerable resistance to the disease. Examples include the California vole (*Microtus californicus*) in San Mateo County California, kangaroo rats (*Dipodomys* spp.), deer mice (*Peromyscus maniculatus*), and northern grasshopper mice (*Onychomys leucogaster*) (Cully 1993).

As part of a range-wide commitment to black-tailed prairie dog management, the Interstate Black-tailed Prairie Dog Conservation Team is developing specific strategies to monitor occupied habitat and threats to prairie dogs, including sylvatic plague (Van Pelt 1999). This document contains a framework for the design of a disease monitoring protocol for the black-tailed prairie dog.

PROPHYLACTIC TREATMENT: A technique used prior to prairie dog relocation in plague-affected towns is application of Deltadust Insecticide, which is labeled for control of fleas and ticks in rodent burrows (Dave Seery, pers. comm.).

PLAGUE SURVEILLANCE TECHNIQUES: Interest in monitoring sylvatic plague originated for two main purposes; protection of human health and protection of prairie dog populations for ecosystem values, in particular protection of reintroduced populations of black-footed ferrets. Potential sylvatic plague surveillance methods are summarized below.

Technique	Comments
"Windshield surveys"	General observations of prairie dog towns can be useful in detecting plague die-offs, with follow-up evaluations needed to confirm. Coordination with health professionals, field personnel, and private landowners important. Refer to CDC protocol.
Collection and analysis of dead prairie dogs	Prairie dogs often die in burrows. High mortality rate makes collection of live animals difficult. Refer to handling and shipping protocols.
Collection and analysis of fleas from prairie dog burrows	CDC recommendation; widespread applicability of this surveillance technique for human health concerns, included in the Shirley Basin/Medicine Bow black-footed ferret plague contingency plan (Luce and Oakleaf 1994). Young et al. (abstract only) reported on usefulness of this technique on Fort Belknap Agency, Montana, and the Pueblo Chemical Depot in central Colorado. Refer to CDC protocol (Enscore, pers. comm.)
Collection of blood samples from members of Order Carnivora likely to inhabit prairie dog towns	Although such species as badgers and coyotes can become infected with plague, their primary role in the disease cycle is the transport of plague-infected fleas (Poland and Barnes 1979 cited in Gage et al. 1994). Nobuto blood-sampling papers have been used extensively, since the technique does not require access to refrigerators and requires only 0.2 ml of blood (Wolff and Hudson 1974, Gage et al. 1994). Recently used extensively in association with black-footed ferret reintroduction, either via collection of blood samples from live animals or use of animals sacrificed for this purpose or killed during animal damage control activities (Anderson et al. no date, Williams et al. 1998, Matchett 2001). In addition, black-footed ferrets captured for removal of radio collars, for implantation of transponder chips, or for canine distemper vaccination can be bled for disease analysis samples. Technique can easily be incorporated into blood collection for other purposes, such as genetic analyses (NPWRC 1999).
Collection of blood samples from domestic dogs	Barnes (1982) reported on use of domestic dogs as sentinels for exhibiting antibodies to plague with little risk of death. Effective on Native American reservations in the Southwest in detecting seroconversion before plague was observed in rodents or humans.
Collection of blood from potentially resistant small mammals	Certain rodent species appear to be resistant to plague and may serve as maintenance or enzootic hosts that maintain plague between epizootics (Cully 1993, Gage et al. 1994). The Wyoming Game and Fish Department has monitored small mammals for plague seroconversion in Shirley Basin, Wyoming (Luce et al. 1996, Luce et al. 1997). Trapping efforts focused on deer mice and grasshopper mice, with the assumption that active plague would be detectable by antibodies produced during the short life spans of these rodents. These investigations detected a relationship between seroprevalence of plague in deer and grasshopper mice and status of prairie dog populations in Shirley Basin.

ACTIONS:

1. State wildlife agencies will initiate a public information program to inform landowners, hunters, and other members of the public concerning the need to notify the agency of die-offs of prairie dogs or ground squirrels.

2. State wildlife agency prairie dog coordinators, in cooperation with state public health officials, will take the lead to inform Department of Agriculture, USDA-Wildlife Services, NRCS, veterinarians, and local government personnel that deal with animal control, or have regular contact with landowners and the public, of the need for reporting die-offs.

3. State wildlife agency prairie dog coordinators, in cooperation with state public health officials, will take the lead in providing information and training for Department of Agriculture, USDA-Wildlife Services, NRCS, veterinarians, and local government personnel that deal with animal control, on protocols for collection of dead prairie dogs and ground squirrels, packaging, record keeping.

The CDC and Wyoming State Veterinary Laboratory (WSVL) both have extensive experience conducting disease surveillance in wild mammals. CDC does not charge for diagnostic services, but has limited laboratory capacity. The 11 black-tailed prairie dog states will use CDC, individual state diagnostic labs, or WSVL diagnostic services for examination of prairie dog and ground squirrel carcasses for disease detection. Although other laboratories can provide a similar service as the WSVL, there is significant advantage in having all of the diagnostic examination done at a lab that is familiar with the procedures, will produce consistent results, and will report them state by state for the 11-states as the WSVL has done for black-footed ferret reintroduction sites for several years. In addition to testing for plague, specimens will be tested for tularemia, pasteurellosis, undetected poisoning, drowning, and predator kill.

4. State prairie dog coordinators will coordinate development of windshield survey routes to be conducted annually by wildlife agency or other personnel in each county, or smaller unit, where prairie dogs occur, during March and April. Windshield surveys will follow the Centers for Disease Control and Prevention (CDC) protocol (Enscore pers. comm.)(Appendix 1). Significant decline in any colony or complex should be immediately reported to the state prairie dog coordinator.

5. Each state will have a contingency plan to put into effect immediately if a windshield survey route reports a potential die-off of prairie dogs or ground squirrels)(Appendix 2).

A. Make inquiries to determine whether or not the colony was poisoned, and whether mortalities were due to heavy shooting.

B. If neither shooting nor poisoning occurred, the colony or complex should be searched for prairie dog and ground squirrel carcasses as soon as possible after discovery of the population decline. Carcasses should be handled in the field according to protocol (Appendix 2).

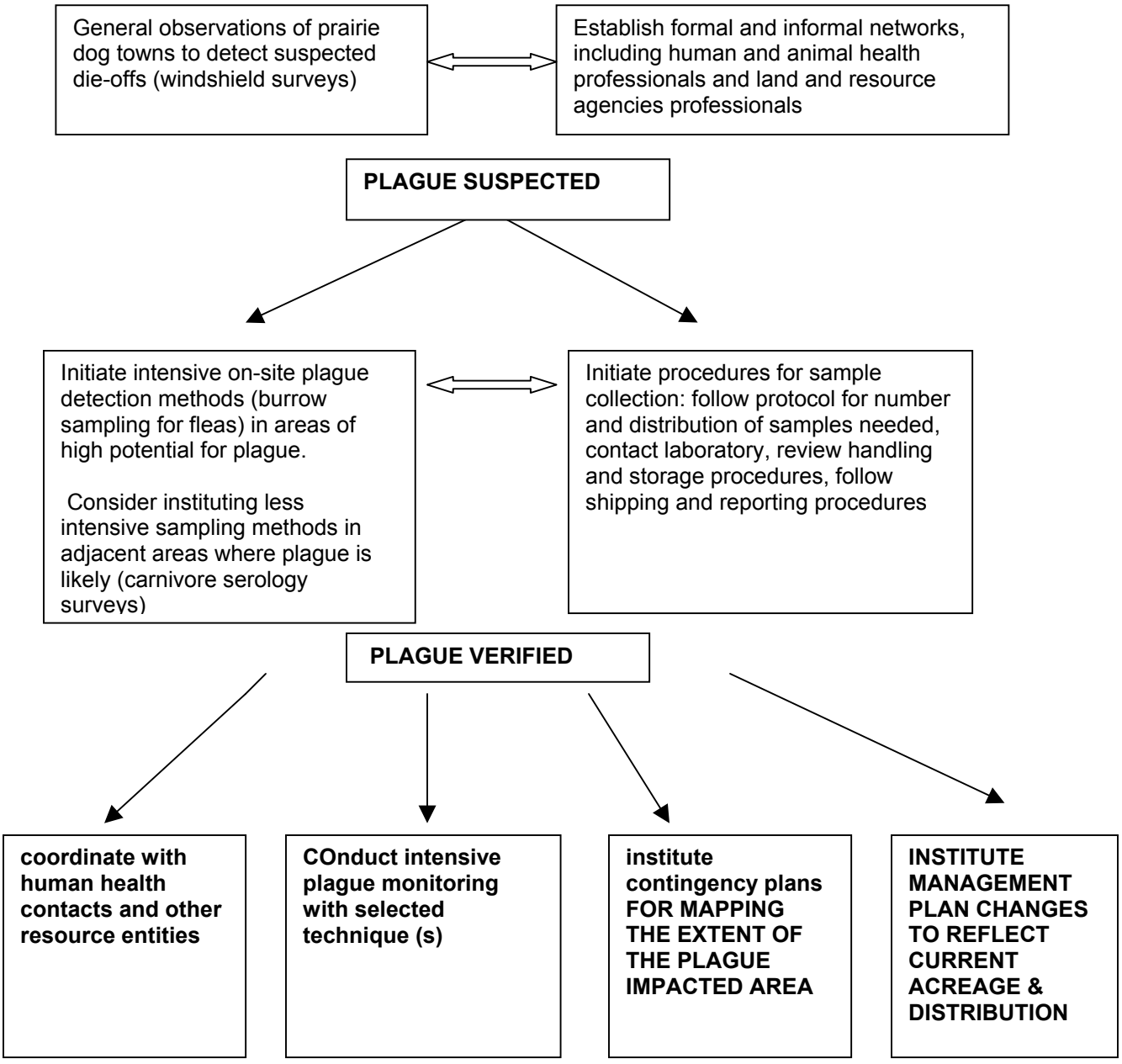
C. In the event that carcasses cannot be found, and the disappearance of prairie dogs is verified as recent, burrow swabbing should be conducted to collect fleas according to CDC protocol (Appendix 3).

6. If plague is verified, the prairie dog coordinator, in cooperation with state public health officials and CDC, should immediately notify the following: landowners and wildlife agency personnel in the affected area, department of agriculture, USDA-Wildlife Services, NRCS, veterinarians, and local government personnel that deal with animal control, the general public through local media sources.

7. Post-plague monitoring of prairie dog colonies should be conducted annually in March or April to document the rate of re-colonization and verify occupied acreage. Initial monitoring, which will take place from one to several years, should consist of windshield surveys. When visual surveys indicate prairie dog colonies are recovering, a quantitative survey method should be initiated. The recommended method, due to widespread use, particularly on black-footed ferret reintroduction sites, is transecting using the Biggins method (Biggins et. al. 1993), which equates active and inactive burrow densities to population density.

8. The prairie dog coordinator and the prairie dog working group should evaluate the extent of impact of the epizootic as it effects the acreage and distribution objectives in the management plan. The group should determine whether or not there is a need to modify prairie dog management in the plague area, and potentially elsewhere in the state, if occupied acreage is below the objectives in the management plan.

General Plague Monitoring Framework



- Consider managing the plague outbreak using chemical methods if the circumstances warrant (on a site by site basis)
- Consider translocation when post plague data collection indicate that recovery has begun (on a site by site basis)

Appendix 1

Centers for Disease Control
Procedure for Visual Evaluation of Prairie Dog Colonies for Plague in the Southwestern United States

Citation: Enscore, R. personal communication. Undated. Centers for Disease Control and Prevention, NCID, Division of Vector Borne Infectious Diseases, Plague Section, Fort Collins, Colorado. 3pp.

A. HEALTHY COLONY

OBSERVATION: The vast majority of burrows show signs of recent use, unless it has rained within the past 24 hours – in which case the colony should be reexamined following a period of at least 24 hours without precipitation. Active prairie dogs are observed during periods of acceptable weather conditions. Only a relatively few (<10%) burrow openings appear inactive (lack of disturbed dirt, presence of cobwebs or wind-blown vegetation over the entrance). An occasional carcass or dried bones may be present as a result of non-plague death or predation.

EVALUATION: Unless recently (days) introduced, plague is not likely to be present. Fleas are not likely to test positive.

SAMPLE RECOMMENDATIONS: No samples recommended.

B. DEAD COLONY

OBSERVATION: The colony appears completely inactive. Burrows show no signs of recent use (re-examine if it has rained within 24 hours). An occasional desiccated carcass and bones may be present, and have likely been scavenged.

EVALUATION: 1) Make inquiries to determine if the colony was poisoned. This is especially likely if it appears that dirt was shoveled into the burrows. If there is no evidence of poisoning and the food supply appears ample: 2) it is likely that plague or some other zoonotic disease killed the colony. An experienced observer can usually make an estimate (recently, 1 season, or 2 seasons) on how long the colony has been inactive by considering the soil type and degree of burrow degeneration.

SAMPLE RECOMMENDATIONS: Sample only if there is no evidence of poisoning. A recent (same season) die-off might produce many fleas through burrow swabbing. Older die-offs will likely produce few or no fleas. Typically, many burrows (dozens or even hundreds) may be swabbed with only a few producing fleas. If burrowing owls are using the inactive burrows, small black stick-tight fleas may be present in large numbers (in contrast to the larger, reddish-brown prairie dog fleas). Fresh or desiccated prairie dog carcasses may also be collected for analysis.

C. SCATTER PATTERN:

OBSERVATION: Inactive burrows constitute an unusually high (typically 20-90%) percentage of the total burrows. Active burrows however are clearly evident and active prairie dogs are observed during periods of acceptable weather. Active and inactive burrows are scattered amongst each other in no particular pattern (see below), keeping in mind that family units may have multiple burrow openings and hence an inactive unit may produce a small cluster of 2-5

inactive burrow openings. An occasional carcass (fresh or desiccated) and bones may be present.

EVALUATION: Several scenarios could account for these observations – and more than one scenario may be in play at the same place and time. Presented in order of likelihood: 1) Make inquiries to determine if the colony was poisoned. This is especially likely if it appears that dirt was shoveled into the burrows. This scatter pattern could be produced if the application of poison was scattered and not comprehensive, 2) If there is no evidence of poisoning, assess the available food supply. Such a pattern of death could also be attributable to a population crash as a result of lost carrying capacity of the site or over-population, 3) If there is no evidence of poisoning or population crash, hunting by humans or excessive predation by carnivores or birds of prey are highly likely. Human hunting usually produces physical evidence such as footprints, tire tracks and spent ammunition shells. Depending upon the local culture, human hunters may collect their prey (many Native American groups regard prairie dogs as a delicacy) or leave it for scavengers. Experienced observers can often spot carnivore tracks and recognize hunting and attack patterns in these tracks near burrow entrances, 4) Finally, a zoonotic disease could be responsible, but given this mortality pattern, a disease with a lower mortality rate than plague is more likely.

SAMPLE RECOMMENDATIONS: If there is no evidence of poisoning, population crash, or excessive human hunting: collect fleas by swabbing burrows – especially inactive burrows – and collect fresh or desiccated prairie dog carcasses if available.

D. DEAD ZONE

OBSERVATION: Within an otherwise healthy appearing colony, there is a zone of inactive burrows. This zone may encompass a relatively small or large proportion of the colony, and may be located anywhere in the colony. Eventually it spreads to encompass a section of the colony and appears to be spreading, along a discernable line of demarcation over the remaining section of the colony. Experienced observers can often clearly distinguish and mark (flagging tape) this demarcation line between active and inactive regions. Marking allows for periodic re-examination to assess the rate of spread and facilitates sampling. Fresh or desiccated carcasses may be present. Near the demarcation line, recently inactive burrows may reveal the odor of decaying carcasses and flies may be common at burrow entrances.

EVALUATION: 1) There is a high probability that plague is active in such a colony. Although other zoonotic diseases are possible, plague is most likely, 2) Depending upon the location of the dead zone with respect to other human activity (homes, barns, etc.) poisoning is also a possibility and should be investigated.

SAMPLE RECOMMENDATIONS: Collect fleas by swabbing burrows immediately along both sides of the demarcation line, concentrating a majority of your efforts immediately along (within 10meters) the inactive (dead) side of the line. Fleas are likely to be numerous. You may wish to apply extra insect repellent but be extremely cautious not to directly or indirectly get repellent on your burrow swab! (If this happens: discard it, wash your hands, and start with a new one). If others in a group are getting fleas and you are not, and you are swabbing essentially the same area, you likely have repellent on your swab. Collect any available rodent carcasses (fresh or desiccated, prairie dog or other rodent) for testing.

Additional Notes: Please include GPS coordinates for all samples. One set of coordinates per colony is acceptable. Specify the type of inactivity pattern noted for each sampled colony: dead colony, scatter pattern, dead zone. Analysis of samples from “dead zone colonies” will receive laboratory priority.

The above activity patterns are typical for the warm months. Visual examination during winter months is more difficult due to decreased daily activity among even healthy animals.

Appendix 2

Field Procedures for Collecting and Handling Carcasses as Diagnostic Specimens

1. Search prairie dog colonies systematically using walking or 4-wheeeler transects spaced at about 50 meters.

2. When a carcass is discovered, ascertain if possible, whether or not the animal was shot. If mortality by shooting is confirmed there is no need to collect the specimen.

3. Before you collect a carcass, prepare a tag with the following information: species, date, location (both legal description and UTM is recommended), name of collector, agency or affiliation of collector, telephone number and address of collector, brief description of circumstances for collection.

4. When collecting a carcass, the collector should wear leather or latex gloves, and a long sleeved shirt or jacket that is tight at the wrist, to ward off fleas.

5. Invert a one-gallon plastic ziplock freezer bag over your hand, grasp the carcass in your hand, quickly fold the bag over the carcass, roll the bag on the ground, away from your body, to expel the air, and seal the ziplock.

6. Immediately place in a second ziplock bag, put in the tag, roll and seal the second bag.

7. As soon as possible after collection, freeze the specimen.

Sample Size:

1) If specimens are from a single sample area (one prairie dog colony or area) collect as many specimens as is practical up to 15, but initially ship only the freshest five specimens to the diagnostic lab.

2) Freeze the additional specimens that were collected, up to ten, and save for further testing needs, depending upon the results from the testing of the first five specimens. Keep the samples until notified by the WSVL or other lab that results were obtained form the first five samples and that the additional specimens will not be needed.

Ship the frozen specimen to WSVL, CDC, or designated lab.

(DO NOT USE UPS). U.S. Postal System or FEDEX can ship carcasses that are sealed in plastic bags and a cardboard box. Their regulations require:

1) Carcasses must be individually labeled and bagged in watertight bags (minimum triple bag in ziplocks)
2) Placement of absorbent packing material around the carcass (crumpled newspaper, etc.

3) Use of approved laboratory shippers or hard-sided containers, adequately taped closed

4) Marking of the container with “Biomedical Material” label (for U.S. Postal Service) or shipped as hazardous material by Federal Express (requires a special form and should be labeled as Diagnostic Biomedical Material on the form. Labels and forms may be obtained from the U.S. Postal Service or Federal express.

5) Carcasses should be frozen or packed with frozen ice packs (no wet ice).

Cost: WSVL cost for testing for plague, tularemia, pasteurellosis, undetected poisoning, and predator kill is a maximum of $60.00 per specimen. CDC testing is free but the Ft Collins laboratory has limited capacity and can handle no more than 50 specimens per year.

Contact before shipping:

Dr. Beth Williams
Wyoming State Veterinary Lab
1174 Snowy Range Road
Laramie, WY 82070
307-742-6638

or

(Shipment by U.S. Postal System)
CDC/Bacterial Zoonoses Branch
c/o Mr. Leon Carter
P.O.Box 2087
Ft. Collins, CO 80522

(Shipment by FEDEX)
CDC/Bacterial Zoonoses Branch
c/o Mr. Leon Carter
Rampart Road (CSU Foothills Campus)
Fort Collins, CO 80521

Appendix 3

Centers for Disease Control
Procedure for Flagging (Swabbing) Rodent Burrows

Citation: Gage, K. Personnel Communication. Undated. Centers for Disease Control, Ft. Collins, CO. 3pp.

Leon Carter: 970-221-6444 (Biologist, Diagnostic and Reference Section - Responsible for handling specimens and doing much of the plague-associated laboratory work at CDC.)
Ken Gage: 970-221-6450 (Plague Section Chief - Responsible for CDC's plague surveillance And control program. Trained as medical entomologist/zoologist)
Rusty Enscore: 970-221-6452 (Environmental Health Specialist IV, Plague Section - Registered Sanitarian)
John Montenieri: 970-221-6457 (Biological Technician, Plague Section - GIS specialist)

Some important flea vectors of plague infest rodent species that live in burrows. Although these fleas usually can be found in abundance on live hosts, they also can be collected by a procedure known as burrow flagging or burrow swabbing.

This procedure requires:

1) **Burrow swabbing device** consisting of a flexible cable, wire, or strong rubber hose with spring-loaded clip attached to the end. We prefer a steel plumber's "snake" that has an alligator clip screwed on the end as a means of attaching the flag. A simple burrow swab can be made by attaching a flag to the end of a piece of wire (about the thickness of a coat hanger), but this primitive swab allows only the top 2 or 3 feet of a burrow to be swabbed and will miss some fleas. Despite the shortcomings of the latter technique, it can be useful when die-offs are encountered unexpectedly and more sophisticated means of swabbing fleas are not available.

2) **Flags** consisting of white flannel cloth squares (approx. 25 cm^2 or 10 in^2). We prefer white flannel because it is easier to see the fleas on white cloth than on cloths of other colors. Flannel is better than most other cloths because of its deep nap, which increases the likelihood that fleas will continue to cling to the cloth flag after it is removed from the burrow.

3) **Plastic bags** (approx. 20-40 cm^2 or 8-15 inches)(Zip-loc type are best)

4) **Insect repellent** (DEET) to spray on clothes and exposed skin on arms, legs, etc. Although this is recommended for safety reasons, care must be taken not to apply repellents to hands because the repellent is likely to transfer to the flagging material, thus preventing fleas from jumping onto the flag. Note: Clothing also can be treated with permethrin-containing sprays but these sprays should not be applied directly to the skin.

Procedure:
1. Attach a flag to the clip on the end of the burrow swab.

2. Force the flag as far as possible down the burrow. The fleas confuse the flag with their normal host and cling to it as it passes through the burrow.

3. Slowly withdraw the flag from the burrow after approximately 30 seconds.

4. Quickly place the flag in a plastic bag.

5. Seal the bag to prevent the fleas from escaping.

6. Keep track of the number of burrows swabbed so that a burrow index can be calculated.
   Burrow index = no. fleas collected/no. burrows sampled - This value often increases dramatically during die-offs among prairie dogs, rock squirrels, California ground squirrels, or other ground squirrel species)

7. Place another flag on the swab and repeat steps 1-6 for each burrow.

8. Transport flags back to laboratory in the plastic bags. Keep the bags in a reasonably cool place to prevent dessication of the flea samples (*Yersinia pestis* is very susceptible to death by dessication) or death of the plague bacilli due to excessive heat (remember pick-up hoods can get very hot in direct sunlight! Fried samples will come back negative for plague everytime!).

9. Place bags in freezer overnight to kill the fleas.

10. Place the flags and loose contents of the plastic bags in a white enamel pan. Fleas may be picked from the flags and bottom of the pan with forceps.

11. Place fleas in vials containing 2% saline and a very small amount of Tween-80 detergent (<0.0001% of solution). Remember the detergent is added to reduce surface tension and allow the fleas to sink to the bottom of the vial. Too much detergent will kill the plague bacteria and prevent successful isolation. Fleas can be submitted in 2% saline without Tween-80, but an effort should be made to submerge the fleas. If the fleas have been killed by freezing, this should not be a problem. Although not recommended for routine collecting, some investigators occasionally remove live fleas directly from the flags and place them in vials of saline. Live fleas placed in saline containing the Tween-80 detergent will be unable to float on the surface of the liquid, thus ensuring that they will drown soon after being placed in the saline. Without the detergent, surface tension can become a problem because the numerous bristles and setae found on fleas enable them to remain afloat on the surface of saline. This can be a potential safety problem because floating fleas often survive shipment and arrive at the laboratory ready to jump from onto lab personnel. Rapid freezing of the fleas obviously eliminates this problem, but adding Tween-80 to the saline also helps reduce the growth of fungi on flea samples. Dead fleas trapped in the surface tension at the air-saline interface rapidly become overgrown with fungi making identifications more difficult.

12. Vials containing 2% saline and fleas can be shipped to CDC for taxonomic identification and analysis of the fleas for *Yersinia pestis* infection. The fleas can be shipped at ambient temperature in the vials of 2% saline. For best results, ship the specimens as soon as possible because the fleas will start to decay soon after collection. Be sure and double wrap the vials in a leak-proof material and then place them in a crush-proof box or metal mailing tube for shipment to CDC.

13. CDC Address:

(Shipment by U.S. Postal System)
CDC/Bacterial Zoonoses Branch
c/o Mr. Leon Carter
P.O.Box 2087
Ft. Collins, CO 80522

(Shipment by FEDEX)
CDC/Bacterial Zoonoses Branch
c/o Mr. Leon Carter
Rampart Road (CSU Foothills Campus)
Fort Collins, CO 80521

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APPENDIX J
IMPLEMENTATION PLAN

Implementation Plan for Colorado Grassland Species Conservation Plan		
Objective / Action	**Status**	**Completion Deadline**
Objective 1: Meet occupied acreage and distribution target objectives as defined for Colorado in "*A Multi-State Conservation Plan For The Black-tailed Prairie Dog, Cynomys ludovicianus, in the United States, Addendum to the Black-tailed Prairie Dog Conservation Assessment and Strategy*" (Luce 2003).	**Complete**	
Action 1.1: Submit for peer review and publication, the methodology, discussion and results of the 2002 aerial survey of black-tailed prairie dogs in eastern Colorado.	**Ongoing**	**July 2004**
Action 1.2: Implement a monitoring protocol to estimate black-tailed prairie dogs populations in eastern Colorado on a three year interval (2002, 2005, 2008, 2011)	**Complete 2002**	**2005, 2008, 2011**
Action 1.3: Coordinate with the multi-state black-tailed prairie dog conservation team to implement a standardized monitoring protocol applicable in all 11 states of the prairie dogs range.	**Ongoing**	**2005**
Action 1.4: If populations fall into the Yellow – Vulnerable zone (250,000 – 350,000 active acres) or below, frequency and intensity of monitoring will increase to determine the cause of the decline and management actions will be developed to stabilize or reverse the decline.	**Monitoring**	**If Warranted**
Action 1.5: Initiate a public outreach program to inform landowners, hunters, and other members of the public concerning the need to notify the CDPHE/CDOW of die-offs of prairie dogs or ground squirrels.	**New Program**	**December 2004**
Action 1.6: Develop and implement a voluntary reporting protocol.	**New Program**	**December 2004**
Action 1.7: If populations fall into the Green – Secure zone (350,000 – 450,000 active acres) or below, a clause requiring the reporting of die-offs of prairie dogs or ground squirrels will be added to all CDOW contracts for work involving prairie dogs or associated species.	**Monitoring**	**If Warranted**
Action 1.8: If populations fall into the Yellow – Vulnerable zone (250,000 – 350,000 active acres) or below, plague monitoring protocols (see Appendix X) recommended in the "*A Multi-State Conservation Plan For The Black-tailed Prairie Dog, Cynomys ludovicianus, in the United States, Addendum to the Black-tailed Prairie Dog Conservation Assessment and Strategy*" (Luce 2003) will be implemented.	**Monitoring**	**If Warranted**
Objective 2: The CDOW will continue its efforts to produce, encourage and support the best available science regarding monitoring long-term population trends and distribution of shortgrass associated species.	**Ongoing**	
Action 2.1: Support ongoing efforts to monitor long-term population trends for the Mountain Plover on the Pawnee National Grassland and in South Park.	**Ongoing**	**Annually**
Action 2.2: Support ongoing efforts to evaluate potential Mountain Plover and other shortgrass prairie bird monitoring methodologies in eastern Colorado.	**Ongoing**	**2005**
Action 2.3: Implement best available monitoring methodologies for shortgrass associated bird species including the Burrowing Owl and Ferruginous Hawk to determine long-term trends and distribution.	**Ongoing**	**Annually**
Action 2.4: Implement mark-capture monitoring protocol to estimate swift fox populations in eastern Colorado on a five-year interval (2003-04, 2008-09, 2013-14).	**2003-04**	**2008-09, 2013-14**
Objective 3: Recognizing that private landowners provide critical habitat and act as stewards to the land supporting populations of the black-tailed prairie dog and other shortgrass associated species, voluntary, incentive-based, non-regulatory partnerships with private landowners will be used to ensure the conservation and management of these species and their habitats in Colorado.		
Action 3.1: Secure 150,000 acres of high quality shortgrass prairie habitat for the conservation of black-tailed prairie dogs and associated species through permanent (preferred) or long-term easements or conservation agreements by 2011.	**Ongoing** **Currently negotiating agreements on ~20,000 acres under CSCP**	**2011**
Action 3.2: Work with other federal, state, and municipal agencies as well as non-governmental organizations, state agricultural organizations, and private landowners to identify high priority areas to implement partnerships.	**Ongoing**	**2005**
Action 3.3: Map existing areas that provide secure quality native shortgrass prairie habitat and their spatial relationship to proposed areas for conservation easements/agreements.	**Ongoing**	**July 2004**
Action 3.4: Promote coordination among existing entities that have land protection capacity and an interest in the shortgrass prairie (potentially including CDOW, The Nature Conservancy, Colorado Cattleman's Agricultural Land Trust, Colorado Open Lands, Douglas County Land Conservancy, etc.).	**Ongoing**	
Action 3.5: Support efforts of the Interstate Coordinator for the Prairie Dog Conservation Team and others in building public/private partnership initiatives like the High Plains Partnership to provide federal funding for conservation efforts.	**Ongoing**	
Action 3.6: Work in partnership with the Natural Resources Conservation Service to implement conservation programs under Farm Bill programs such as the Conservation Reserve, Conservation Reserve Enhancement, Grassland Reserve, Wildlife Habitat Incentives, and Environmental Quality Incentives Programs to benefit grassland associated species.	**Ongoing**	
Action 3.7: Implement mountain plover nest conservation in cultivated fields project to minimize the impact of agricultural cultivation activities on nesting mountain plovers.	**Ongoing**	**Annually**
Action 3.8: Develop Candidate Conservation Agreements with Assurances (CCAA's) and other cooperative agreements, as needed, with private		**December 2004**

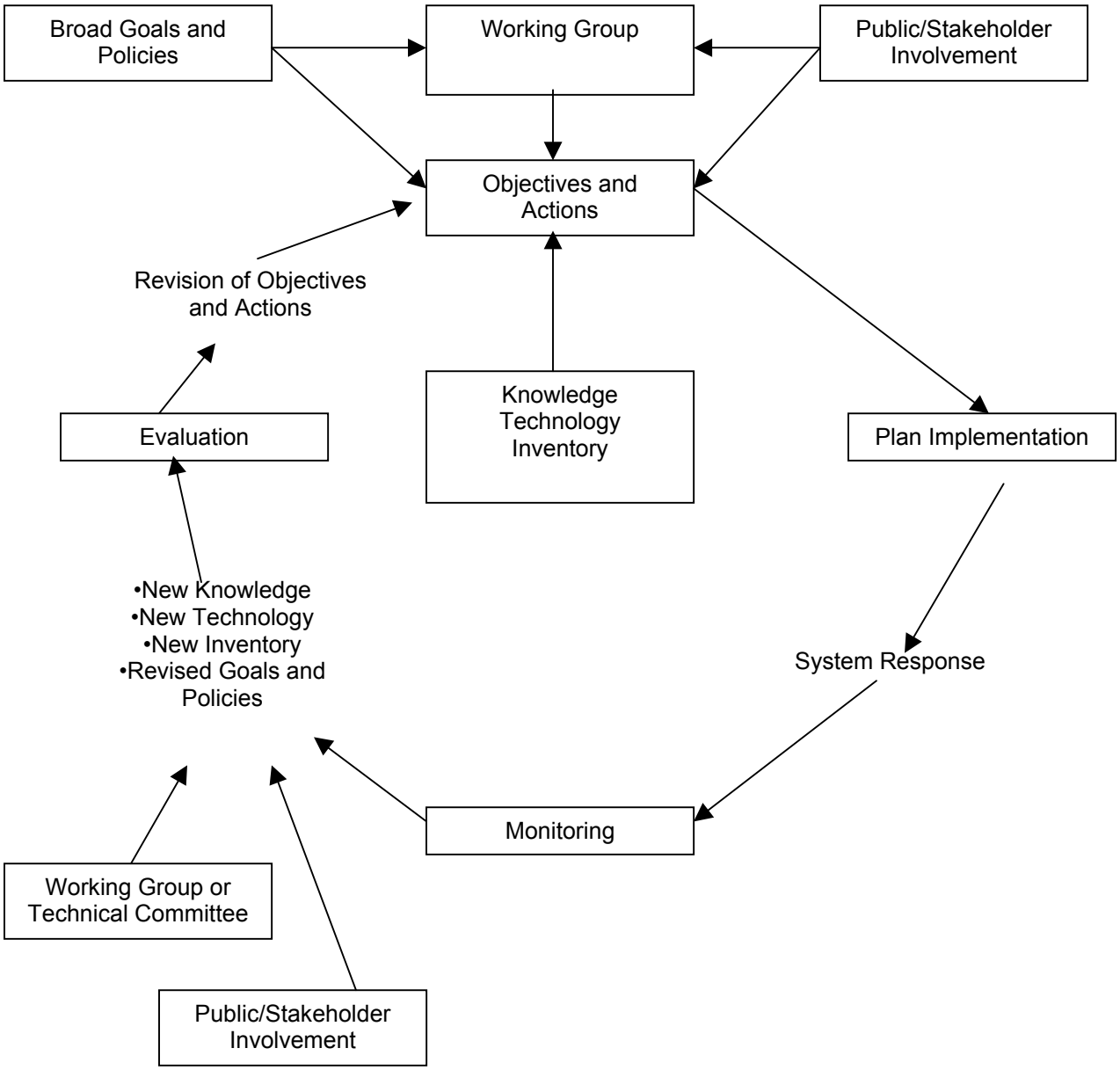
landowners for species that are candidates for federal listing. Action 3.9: Support the Colorado Department of Transportation's (CDOT) Shortgrass Prairie Initiative, which is designed to streamline regulatory compliance and fulfill CDOT's mitigation needs in the shortgrass prairie through the establishment of proactive perpetual conservation easements and active management.	**Ongoing**	**December 2006**
Objective 4: Raise awareness of grassland conservation needs within the private and public sectors. Maintain healthy populations of grassland wildlife in conjunction with economic development and viability, and protection of property rights. Raise awareness for grassland wildlife of high conservation concern including: how to identify the species, habitat needs and management recommendations. Familiarize private landowners with different grassland habitat incentive programs including state, federal and non-profit partners with which they can work. Promote long-term conservation and sustainable use of grassland wildlife and their habitats.		
Action 4.1: Develop a standard presentation and "train-the-trainers" on delivery at local meetings	**New Program**	**July 2004**
Action 4.2: Build and expand partnerships for grassland conservation with Colorado Farm Bureau, Colorado Cattleman's Association, Colorado Livestock Association, Cooperative Extension, Resource Conservation & Development, Natural Resources Conservation Service, Soil Conservation Districts, County Commissioners, Colorado Division of Wildlife, private landowners, and others through outreach.	**Ongoing**	**Annually**
Action 4.3: Use workshops as an outreach tool to: • Discuss grassland conservation priorities and raise awareness for priority species and their habitat needs • Discuss incentive programs for grassland habitats • Provide a comfortable atmosphere for landowners to network with partners on the grasslands • Raise awareness for Mountain Plover conservation efforts • Provide outreach documents including Sharing Your Land with Shortgrass Prairie Birds, Shortgrass Prairie Resource Guide, Pocket Guide to Prairie Birds, Colorado Division of Wildlife's program booklet, etc.	**Ongoing** **Completed 5 Summer 2003. 3 additional workshops scheduled.**	**Annually**
Action 4.4: Attend annual Farm Bureau, Cattlemen, State Conservation District, County Commission and other agricultural related organization meetings and give presentations on grassland conservation and/or have informational booths.	**Ongoing**	**Annually**
Action 4.5: Distribute the Mountain Plover video to agricultural organizations and other interested parties.	**Ongoing** **Video under production, available Spring 2004**	**October 2003**
Action 4.6: Develop web page on CDOW's web site with information on Colorado's Grassland Conservation plan, include: • Upcoming outreach activities • Links to partners • Links to other state plans and information • Information on Candidate Conservation Agreements with Assurances	**Ongoing**	**December 2004**
Action 4.7: Facilitate implementation of on-the-ground grassland conservation efforts through outreach, technical service, and financial assistance	**Ongoing**	**Annually**
Action 4.8: Develop press releases for local and state-wide newspapers and radio stations on grassland conservation, ongoing projects, and upcoming activities and meetings	**Ongoing**	**As Needed**
Action 4.9: Secure long-term funding for outreach, education, and on-the-ground conservation	**Ongoing**	**Annually**
Objective 5: Collaborate with CDA to demonstrate through law, regulation, or cooperative agreement adequate regulatory authority and regard for black-tailed prairie dog conservation objectives as it relates to the use of toxicants or shooting to control black-tailed prairie dogs causing damage to private property.		
Action 5.1: Develop a Memorandum of Understanding between the CDOW and CDA which outlines each agencies authorities and responsibilities regarding the use of toxicants to control prairie dogs in Colorado as it relates to the conservation objectives described within this plan by July 2005.	**New Project**	**July 2005**
Action 5.2: If populations fall into the Green – Secure zone (350,000 – 450,000 active acres) or below, gather and compile annual product sales information for Colorado by registrants for toxicants used to control prairie dogs.		**As Needed**
Action 5.3: If populations fall into the Yellow – Vulnerable zone (250,000 – 350,000 active acres) or below, gather and compile annual product sales information for Colorado by registrants and dealers for toxicants used to control prairie dogs.		**As Needed**
Action 5.4: If populations fall into the Orange – At Risk zone (150,000 – 250,000 active acres) or below, gather and compile annual product sales information for Colorado by registrants, dealers, and end users for toxicants used to control prairie dogs		**As Needed**
Action 5.5: If populations fall into the Red – Danger zone (<150,000) or below, gather and compile annual product sales information for Colorado by registrants, dealers, and end users for toxicants used to control prairie dogs. Use of toxicants heavily restricted and use by permit only. Permitting based on stringent criteria.		**As Needed**
Action 5.6: If populations fall into the Orange – At Risk zone (150,000 – 250,000 active acres) or below, shooting allowed for control of prairie dogs causing damage on private property. Permits will be issued to monitor take.		**As Needed**
Action 5.7: If populations fall into the Red – Danger zone (<150,000) or below, shooting will be allowed for control of prairie dogs causing damage on private		**As Needed**

property by special permit only.		
Objective 6: Adaptive management, including a continuous process of planning, acting, monitoring and evaluating designed to take into account changes in ecological and social systems, identify and evaluate new information, and make adjustments in actions to achieve specific goals and objectives will be used.		
Action 6.1: CDOW will form a technical committee to review new research information and analyze monitoring data as it is collected on a three-year interval; identify changes that would move acreage and distribution targets from one zone to another and make recommendations to decision makers regarding the changes in management necessary to maintain viable shortgrass species populations. The Technical committee members will be nominated by members of the Grassland Species Conservation Working Group and approved by the Division of Wildlife.	**Necessary to review 2005 Inventory Data**	**September 2006**
Action 6.2: If populations fall in the Yellow zone – Vulnerable (250,000 – 350,000), evaluate and implement management tools to address the decline.		**As Needed**
Action 6.3: If populations fall in the Yellow zone – Vulnerable (250,000 – 350,000), develop conservation agreements with counties and municipalities in high decline areas to implement management tools to address declines.		**As Needed**
Action 6.4: If populations fall in the Orange zone – At Risk (150,000 – 250,000), implement adaptive management agreements with counties and municipalities.		**As Needed**
Action 6.5: If populations fall in the Red zone – Danger (< 150,000), implement adaptive management agreements with counties and municipalities in order to receive certificates of inclusion in statewide umbrella Candidate Conservation Agreement with Assurances (CCAA).		**As Needed**
Objective 7: The CDOW will initiate, continue ongoing and stimulate new research to identify and minimize, eliminate, or mitigate causes for declines when possible for shortgrass associated wildlife species.		
Action 7.1: Support ongoing research to develop habitat suitability models for prairie dogs on the PNG which will be used to determine how much of the area has been used by prairie dogs over time, how the models relate to prairie dog population estimate, and provide supporting data for ongoing work on prairie dog genetics and plague surveillance.	**Ongoing**	**Final Report Due June 2004**
Action 7.2: Support ongoing research for developing vaccines to control plague and on plague dynamics.	**Ongoing**	**As Funding is Available**
Action 7.3: Support ongoing research on vegetation manipulation by livestock to maintain a mosaic of successional stages in shortgrass prairie habitat.	**Ongoing**	**As Funding is Available**
Action 7.4: Support ongoing research on resolving conflicts of Mountain Plover breeding on private lands.	**Ongoing**	**Final Report Due January 2004**
Action 7.5: Support ongoing research on using stable isotopes to document link between breeding and wintering locales for individual Mountain Plovers.	**Ongoing**	**Scheduled for Completion 2005**
Action 7.6: Support ongoing research on the relationship between Mountain plover breeding activity and prairie dog colonies.	**Ongoing**	**Scheduled for Completion 2005**
Action 7.7: Identify, prioritize, and seek funding for additional research needs in Colorado for shortgrass prairie associated species.	**Ongoing**	**Annually**
Objective 8: The CDOW will encourage significant contributions from publicly owned lands, particularly the National Grasslands, toward grassland species conservation and work with federal, state, county and municipal partners to support these efforts.		
Action 8.1: Inventory shortgrass prairie habitat occurring on CDOW SWAs and, where appropriate shortgrass prairie habitat occurs, manage SWAs for the conservation of grassland species.	**Ongoing**	**Inventory Completed by Summer 2004**
Action 8.2: Participate in planning efforts on publicly owned lands to integrate conservation measures for grassland species in public land management planning efforts.	**Ongoing**	**As Needed**
Action 8.3: Work with public land managers to quantify active occupied acres of prairie dogs on publicly owned lands.	**New Project**	**December 2004**
Action 8.4: Encourage consolidation of or creation of conservation buffers on publicly owned lands through conservation easements, land trades or acquisitions. CDOW incentive programs will give added consideration to projects adjacent to other publicly owned lands managed for grassland species conservation.	**Ongoing Priority given in both CSCP and Protecting Colorado's Landscapes Programs**	**As Needed**
Action 8.5: Recommend maintaining a minimum of 20% of the total acreage of the Pawnee National Grassland in low structure vegetation suitable for nesting mountain plovers and other shortgrass associated species with a long term goal of increasing this to 40%.	**Ongoing**	
Action 8.6: Recommend maintaining low structure vegetation by increasing range allotment carrying capacity and grazing intensity, encouraging expansion of black-tailed prairie dog colonies, or through prescribed burning as appropriate.	**Ongoing**	
Action 8.7: Recommend positioning areas targeted for low structure vegetation based on historic records of concentrations of nesting Mountain Plovers.	**Ongoing**	
Action 8.8: Secure funding to partner with the USDA Forest Service to implement changes in allotment infrastructure to return/maintain low structure vegetation	**Ongoing**	**$50,000 funding**

with no financial burden passed on to permittees.		**available FY0304 and FY0405**
Action 8.9: CDOW will work with the SLB to develop and implement a Threatened and Endangered Species Policy to address SLB involvement in species conservation issues.	**Ongoing**	**July 2005**
Objective 9: The CDOW will encourage the acquisition and management of city and county open space on suitable grassland habitat along the front range for the conservation of the black-tailed prairie dog and associated grassland species.		
Action 9.1: If populations fall in the Yellow zone – Vulnerable (250,000 – 350,000), develop conservation agreements with counties and cities in high decline areas to implement management tools to address declines.		**As Needed**
Action 9.2: Provide scientific expertise and recommendations to front-range open space managers on standardized monitoring methodologies developed by the multi-state black-tailed prairie dog conservation team.	**Ongoing**	**When Available**
Action 9.3: Develop science-based best management practices for addressing grassland species management issues for use by managers of front-range open space.	**Ongoing**	**July 2004**
Action 9.4: Develop a consolidated resource of updated scientific information (biological and social) addressing grassland species conservation issues in urban/suburban areas.	**New Project**	**July 2005**
Action 9.5: Conduct bi-annual symposia to provide an open forum for discussion and summarize new information on the conservation of grassland species.	**Ongoing**	**February 2005**
Objective 10: Establish shared responsibility (front range and eastern plains) for conservation of the black-tailed prairie dog and associated species.		
Action 10.1: Develop mechanisms for front-range interests (developers, non-profit organizations, etc.) to provide funding for grassland species management.	**New Project**	**January 2005**
Action 10.2: Develop and distribute (hard copy and electronic) informational materials that inform the public about the necessity of shared responsibility for management of grasslands species.	**New Project**	**January 2005**
Action 10.3: Conduct urban wildlife and habitat conservation and management workshops.	**Ongoing**	**One Completed Spring 2003, Additional Workshops scheduled 2004**
Objective 11: Support and encourage public education and wildlife viewing opportunities on suitable black-tailed prairie dog and grassland open space areas.		
Action 11.1: Provide scientific expertise and recommendations to local open space managers in the development and use of educational/interpretive materials	**New Project**	**January 2005**
Action 11.2: Assist in the development/enhancement of wildlife viewing opportunities.	**Ongoing**	**As Requested**
Objective 12: The CDOW will work towards developing substantial increases in funding necessary for the conservation of grassland species in Colorado.		
Action 12.1: Pursue partnerships with other federal, state, county, and municipal agencies, private foundations, private landowners, and non-governmental organizations to increase funding for the conservation of grassland species.	**Ongoing**	
Action 12.2: Pursue innovative ideas for funding of grassland species conservation in Colorado.	**Ongoing**	

APPENDIX K
PROCESS FOR PLAN MODIFICATION

GRASSLAND SPECIES CONSERVATION PLAN
ADAPTIVE PROCESS FOR PLAN MODIFICATION



APPENDIX L
AREA OF BLACK-TAILED PRAIRIE DOG COLONIES IN E COLORADO
WHITE, ET AL. *"IN REVIEW"*

24 October 2003

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RH: Colorado Black-tailed Prairie Dog Colony Area • White et al.

Area of Black-Tailed Prairie Dog Colonies in Eastern Colorado

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Abstract: Acreage of active black-tailed prairie dog (*Cynomys ludovicianus*) colonies was estimated in eastern Colorado during June-August, 2002, using aerial line intercept methods. We stratified the survey by county boundaries based on imperfect prior knowledge of colony areas by county, and computed the proportion of each line intersecting active prairie dog colonies. Active colonies were defined as colonies with prairie dogs observed from the air, or fresh digging at burrow entrances. Estimated area of active colonies was 255,398 ha, with a 95% confidence interval of ±9.5%. This estimate may be biased low because some active colonies may have been misclassified as inactive, or because some active colonies may not have been spotted when flown over. In contrast, this estimate may be biased high because some active colonies included in the

survey may be active in only a portion of the colony considered as intersecting the survey line.

Key Words: aerial surveys, line intercept sampling, monitoring, optimal allocation.

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In Colorado, the black-tailed prairie dog occurs in the plains and grasslands east of the foothills, and was historically found in all eastern counties except the County of Denver (Lechleitner 1969) up to an elevation of about 1850 m (Armstrong 1972). In 2001, the Colorado Division of Wildlife (CDOW) began writing a conservation plan for shortgrass prairie species including the black-tailed prairie dog, partly in response to a petition having been filed to list the black-tailed prairie dog as a Threatened Species and a finding having been made by the United States Fish and Wildlife Service (USFWS) that a listing was warranted but precluded (USFWS 2000). As part of the conservation plan, CDOW needed information on the area occupied by black-tailed prairie dogs in eastern Colorado. The estimate ranged widely, depending on the interest group making the estimate and the methods used. A 1978 and 1979 survey of 12 counties in eastern Colorado mapped 9,955 ha of black-tailed prairie dog towns (Bissell et al. 1979). Van Pelt (1999) extrapolated from this to estimate the size of the species' entire range in Colorado, and estimated 36,000 ha of occupied black-tailed prairie dog colonies in the state. Using a mailed survey to landowners, the Colorado Agricultural Statistics Service (1990) surveyed 9,046 farmers and ranchers and obtained nearly 3,000 responses to estimate that 628,500 ha of occupied prairie dog (all species) range in Colorado. Adjusting this estimate for only black-tailed prairie dogs, the Department of Agriculture estimated 376,500 ha of occupied range. Knowles (1998) estimated only 17,800 ha for

Colorado, based on ground observations made mainly from roads. EDAW (2000) estimated 86,740 ha of active prairie dog colonies in eastern Colorado, based on historical records and updating information on a portion of the historical colonies with site visits.

In response to the controversy created by these vastly different estimates, CDOW conducted an intensive aerial survey of eastern Colorado to determine the area of active black-tailed prairie dog colonies.

Methods

Sampling Scheme

Line intercept surveys were conducted following the protocol of Sidle et al. (2001). A stratified simple random sample of lines was taken. Potential black-tailed prairie dog habitat in eastern Colorado was stratified by the 28 counties to disperse the sample across the sampling frame, and to allocate sampling intensity. EDAW (2000) summarized then available data on area and location of prairie dog colonies in eastern Colorado. From the area of each county and the estimated area of prairie dog towns within the county provided by the EDAW (2000) survey, we predicted the proportion of the lines in each county i that would intersect dog towns (r_i) as:

$$r_i = \frac{\text{Area of Active Towns in County } i}{\text{Area of County } i} = \frac{C_i}{A_i}.$$

From 8 data points in Table 1 of Sidle et al. (2001), we estimated an approximate relationship between the standard deviation of r [SD(r)] and the value of r as a linear relationship of SD(r) = 0.0087 + 1.0804r. With this relationship and an estimate of r for each county, and hence an estimate of SD(r) for each county, we used the theory from Cochran (1977) on optimal allocation of a sample to best estimate the total for the

sampling frame to allocate the number of lines to fly in each county. Counties were assumed to be square, so that the length of lines flown in each county, given the number of lines allocated, could be used to determine cost. Cost of the survey for a county was computed as the length of line to be flown plus 2 times the square root of county area in km^2 (to account for ferry time), all divided by a flight speed of 145 kmph, times $180 per hour of flight time. The flight costs of the survey were estimated as $60,000 to achieve a precision of ±20%.

Aerial Surveys

Black-tailed prairie dog colonies are conspicuous from the air because most burrow entry mounds, 2-3 m in diameter, are barren of vegetation and because of the contrast between excavated soil and undisturbed areas surrounding the mound (Cincotta 1989, Hoogland 1995). Herbivory by black-tailed prairie dogs causes significant zonation and other changes in plant cover near burrows (Bonham and Lerwick 1976, Cincotta 1985, Garrett et al. 1982, Gold 1976, Koford 1958, Whicker and Detling 1993). Bare ground and erosion increases in colonies, and vegetative structure decreases, resulting in a markedly different appearance between colonies and adjacent areas undisturbed by prairie dogs (Munn 1993, Whicker and Detling 1993). Areas of pocket gopher (*Geomys bursarius* and *Thomomys talpoides*) activity do not show the loss of vegetation characteristic of black-tailed prairie dog colonies, and their mounds of pushed-up dirt are smaller and lack a burrow entrance, making these areas distinguishable from prairie dog colonies (Sidle et al. 2001). Likewise, mounds of harvester ants (*Pogonomyrmex occidentalis*) were distinguished from mounds of prairie dogs by a ring of vegetation around the mound, absence of a burrow hole, and lack of a grazed

appearance (Sidle et al. 2001). Ground squirrel colonies, such as the Richardson's (*Spermophilus richardsonii*) and Wyoming (*S. elegans*) do not occur in eastern Colorado (Fitzgerald et al. 1994), so thus would not be confused with black-tailed prairie dog colonies. There are two other ground squirrels that occur commonly in eastern Colorado, spotted (*S. spilosoma*) and thirteen-lined (*S. tridecemlineatus*) ground squirrels. Neither species is colonial. Spotted ground squirrels occupy habitat associated with sandy soil typical of the sand sage mid-grass areas. Thirteen lined ground squirrels habitat overlaps with prairie dogs and they can occupy prairie dog towns, but are considered to be solitary and their single burrow entrances have little soil deposited around them, making them difficult to find.

East-west aerial survey lines in each county were flown parallel at county-specific equal intervals from a starting point on the north edge of the county in a Cessna 185. Because the interval between lines was not a multiple of the land survey system, i.e., the interval between lines was not exactly 1 mile, this semi-systematic sampling procedure would not be expected to incur biases. The offset between lines was computed to provide the number of lines needed as estimated by the optimal allocation procedure. Two GPS units were used in the aircraft: 1) a panel-mounted unit was used for aircraft navigation (Garmin 150 and later Garmin 250 XL), and 2) a yoke-mounted unit was used for recording colony boundaries and county boundaries (Garmin 295). The navigational GPS was capable of flying parallel offsets of a predetermined distance or a "ladder search". A personal computer and mapping software (*Terrain Navigator V5.03* and *MapSource V4.09*) were used to create maps of county boundaries prior to flights and to download data after the flights.

During the survey, the aircraft was flown at about 55 m above ground level (AGL) and approximately 160 kmph. The pilot and observer would watch ahead of the aircraft for colonies. When a colony was detected, the aircraft continued its path along the transect line over the colony. The colony would be counted only if burrows occurred on both sides of the aircraft. Colonies were designated as active if prairie dogs were observed, or if fresh diggings around burrows were observed. Few colonies were determined to be active solely by seeing diggings, however. When a colony was to be counted, as the aircraft reached the proximal edge of the colony, a waypoint was entered in the yoke mounted GPS. The next waypoint was entered as the aircraft passed over the distal edge of the colony. If time allowed before reaching the next colony, the pair of waypoint names were edited to couple them for the observed colony. As the aircraft traveled along the transect line, the observer operating the yoke-mounted GPS would watch the GPS screen for the approaching county boundary. As the aircraft passed over the county boundary, a waypoint was entered in the yoke-mounted GPS to mark the end of the current transect. The pilot then flew to the start of the next transect, where a new waypoint was entered as the plane passed the county boundary.

Data Analysis

After all transect lines for a particular county had been flown, the yoke mounted GPS was removed from the aircraft, and all waypoints were downloaded from the GPS to a computer. From the waypoint file, the length of each transect and the length of that transect intersecting active prairie dog towns was computed, to provide a ratio (r_i) of active colonies to total length for transect *i*. The mean ($\bar{r}$) across the *n* transects in the county times the county area (*A*) gives an estimate of the area of active prairie dog

colonies in county *j* ($\hat{C}_j$). The variance of $\hat{C}_j$ was computed from the *n* transects in the county, following Sidle et al. 2001, as

$$\hat{\text{Var}}(\hat{C}_j) = \frac{A^2 \sum_{i=1}^{n} (r_i - \hat{r})^2}{n(n-1)}.$$

The estimated total acreage of prairie dog towns ($\hat{C}_T$) in eastern Colorado was computed as the sum of the county estimates, with the variance computed as the sum of the variances across the counties, i.e., SE($\hat{C}_T$) = $\left(\sum_j \hat{\text{Var}}(C_j) \right)^{1/2}$. The 95% confidence interval for C_T was computed as percentage of C_T as ±100×1.96×SE($\hat{C}_T$)/$\hat{C}_T$.

Results

The estimated area of active prairie dog colonies in eastern Colorado was $\hat{C}_T$ = 255,398 ha, with a 95% confidence interval of ±9.5% (Table 1). Precision of the estimate was considerably better than the ±20% designed for because the estimate was about 2.9× larger than the values from EDAW (2000) used in the design process. Cost of flight time in the survey was approximately $70,000 for 475 total hours.

Although the EDAW (2000) survey was useful for design of our survey, the correlation between our results by county and their estimates was not strong: $r = 0.71$, meaning that their results only explained 50% of the variation between our county estimates.

The correlation between line length and length of the line intersecting active colonies was only 0.148 ($P = <0.0001$). Thus, we are justified in using the simple

average-density estimator of Sidle et al. (2001), because the ratio estimator would not provide improved performance with this low correlation.

Discussion

Sidle et al. (2001) found the correlation between line length and length of line intersecting active colonies to be higher for the 4 high-density strata (>0.48) than observed here, although they found a negative correlation for one of the low-density strata. They recommend using the average-density estimator for surveys with low correlation, as we have done here. The number of lines flown per stratum was considerably less than the 175 – 287 flown in their high-density strata. Hence, we did not consider computing a composite estimator as Sidle et al. (2001) did because of the generally low sampling intensity per stratum in our survey.

Counties provided a useful instrument for stratification for 3 reasons. First, a reason specific to this study is that rough estimates of the active colony area were available from EDAW (2000). Second, a more general reason is that we expected differences between counties because of differences in the philosophies of county extension agents about prairie dog control. County agents emphasizing prairie dog control would assist landowners with obtaining state and federal monies for poisoning of prairie dogs, whereas other agents might actually deemphasize prairie dog control. Therefore, given an expected difference in the proportion of counties in prairie dog colonies, stratification by county improves the precision of the state-wide estimate. Third, counties provide an appropriate level of stratification in Colorado in that much of the reporting and investigation (and perhaps management) of plague (*Yersinia pestis*) is done at the county level, so that again we might presume differences between counties.

We believe our estimate of 255,400 ha to be a reliable estimate of prairie dog active colony area in eastern Colorado for several reasons. First, the survey was based on a replicable, rigorous survey sampling approach (Sidle et al. 2001, Miller and Cully 2001), and conducted according to a precise protocol. All of eastern Colorado was included in the sampling frame, and the sample allocated to optimize the variance of the state-wide estimate. Second, our aerial survey protocol was conservative on classifying a colony as active or inactive. Either prairie dogs were observed, or fresh active digging was noted. In general, observers likely erred on the conservative side in calling a colony active, i.e., probably some colonies with few prairie dogs were not included in this survey because no animals were observed and no fresh digging was present.

However, we do expect 2 sources of bias of opposite direction to occur in our estimate of prairie dog area. First, some small colonies were likely missed because of observer fatigue. Long hours of flying, constantly looking at the ground, results in fatigue and observers missing the objects of interest, and results in underestimating the active colony area. Second, colonies were considered either active, and included in the survey, or classified as inactive and not included. However, some portions of the active colonies included in the survey may have had inactive sectors, resulting in a slight overestimate of the active colony area. Possible reasons for inactive sectors in otherwise active colonies include poisoning and plague. Prairie dogs are highly susceptible epizootic hosts and suffer high mortality, often >99% (Antolin et al. 2002, Cully 1997, Cully et al. 1997). We do not expect that plague would leave a significant number of colonies with portions of a contiguous colony active and other portions inactive, but

certainly recent poisoning of a portion of a colony by a single landowner could create such a scenario.

Our estimate provides the basis of a long-term monitoring program for black-tailed prairie dogs in eastern Colorado, although at this time, only the single estimate is available. The relatively tight confidence interval we achieved in this survey means that future surveys can have adequate statistical power to detect a change in the area of active colonies. However, an issue that will require multiple surveys to address is the amount of temporal variation in the area of active colonies. Plague may cause substantial declines in active colony area during short time periods (<1 yr) in localized areas, whereas colonies might expand at other locales during the same time period. The combination of growth and contraction of existing colonies, plus extinction and settlement of new colonies, creates a potentially highly variable temporal process. The variation in this stochastic process should be considered in determining the amount of decline to consider "normal" before the current estimate of active prairie dog colony area is used to justify intervention or other required management practices to promote prairie dog colony areas (Thompson et al. 1998). Because of this variable temporal process, the trend in acreage through time is the variable of most interest.

Acknowledgments. D. J. Younkin and A. Keith provided expert piloting skills during this survey. J. A. Yost acted as an observer for 10 southern Colorado colonies. C. J. Bishop and M. W. Miller provided useful comments on the manuscript. Funding for this survey was provided by the Colorado Division of Wildlife and the U. S. Bureau of Land Management.

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Associate editor: _____

Table 1. Results of aerial line intercept stratified simple random sample of black-tailed prairie dogs in eastern Colorado, 2001-2002.

County	County Area (ha)	Active Colony Area (ha)	SE	95% CI (%)	Distance Flown (km)	Lines Flown
Adams	310,838	3,873	582	29.5%	1,665	15
Arapahoe	208,052	4,341	1,385	62.5%	608	6
Baca	662,919	29,132	3,108	20.9%	2,847	31
Bent	392,107	32,563	5,629	33.9%	2,088	36
Boulder	194,527	7,191	1,390	37.9%	929	18
Cheyenne	461,272	8,641	881	20.0%	1,750	18
Crowley	207,370	9,080	1,726	37.3%	1,092	24
Douglas	217,934	1,528	841	107.8%	695	15
Elbert	478,657	1,719	1,007	114.8%	961	15
El Paso	551,421	6,739	2,006	58.4%	1,296	21
Fremont	396,818	3,454	1,288	73.1%	872	11
Huerfano	412,448	0	0	0.0%	781	15
Jefferson	201,160	2,089	813	76.3%	556	24
Kiowa	462,372	18,908	6,128	63.5%	1,796	15
Kit Carson	560,223	7,327	1,211	32.4%	1,911	20
Larimer	681,543	6,378	1,325	40.7%	1,688	20
Las Animas	1,235,797	13,132	3,758	56.1%	3,959	29
Lincoln	669,603	6,821	1,681	48.3%	2,084	36
Logan	477,920	6,822	1,244	35.7%	1,599	21
Morgan	335,261	2,035	653	62.9%	864	15
Otero	328,111	9,417	2,954	61.5%	742	16
Phillips	178,345	0	0	0.0%	259	5
Prowers	425,938	27,071	3,574	25.9%	1,907	31
Pueblo	620,954	18,406	2,923	31.1%	3,011	42
Sedgwick	142,036	767	360	92.1%	253	5
Washington	655,131	1,342	532	77.7%	1,612	24
Weld	1,040,301	21,302	2,318	21.3%	5,745	61
Yuma	612,087	5,320	1,173	43.2%	1,653	26
Total	13,161,458	255,398	12,420	9.5%	45,222	615

APPENDIX M
COMPILATION OF PUBLIC COMMENTS

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
Colorado Field Office
755 Parfet Street, Suite 361
Lakewood, Colorado 80215

IN REPLY REFER TO:
ES/GJ/State of CO
MS 65412 GJ

October 10, 2003

Mr. Russell George
Director
Colorado Division of Wildlife
6060 Broadway
Denver, Colorado 80216

Dear Mr. George,

This letter responds to an August 29, 2003 email request from Ms. Francie Pusateri of your Fort Collins office for our comments on the draft 'Conservation Plan for Grassland Species in Colorado'. The U.S. Fish and Wildlife Service (Service) was selected by you to participate on the Grassland Species Working Group, and have therefore been involved in the plans development. We have attended most meetings, and regularly provided comments to the Colorado Division of Wildlife regarding conservation of the black-tailed prairie dog and associated species, as well as process issues such as the 'Candidate Conservation Agreement with Assurances' (CCAA) program, and our 'Policy for the Evaluation of Conservation Efforts When Making Listing Decisions (PECE). We appreciate the opportunity to comment on the plan.

GENERAL COMMENTS

The Service has been actively involved in prairie dog conservation in Colorado since 1987. The Colorado Division of Wildlife's attention to prairie dog conservation has notably increased in recent years, and we believe the conservation plan represents an important effort to ensure the viability of the black-tailed prairie dog in Colorado in the future. We therefore fully support the efforts by the Colorado Division of Wildlife, and we look forward to helping you implement the plan when Federal incentive programs or authorities may be beneficial.

As you know, the Service has no authority for management of black-tailed prairie dogs at the present time. Therefore, our only authority to provide some management direction would be triggered by a request for a Candidate Conservation Agreement with Assurances, and application of the relevant PECE policy criteria. Viewed broadly, we believe each of the action items in the conservation plan will contribute to the conservation of the black-tailed prairie dog. The effectiveness of each action item will only be known following implementation. We therefore

have given more attention to CCAA and PECE criteria, rather than attempting to refine or modify each action item.

The conservation plan appropriately emphasizes the significant role of private landowners in the conservation of grasslands and prairie dogs, given the preponderance of private lands within the range of the prairie dog and other associated species. The thirteen objectives itemized in the implementation plan seem to be thorough and comprehensive, and if implemented, will undoubtedly contribute to the conservation of the prairie dog and associated species. We do note however, that there is no ranking of geographic areas within Colorado where the management tools should be implemented specifically, other than the comment we found stating that the larger prairie dog colonies would be a priority.

While Colorado did not sign the 11-state agreement, we are pleased that objective 1 of the implementation plan nonetheless commits Colorado to the 256,000-acre target in the 11-state conservation plan. The plan also appropriately acknowledges the difficulty of ensuring viable populations of associated species given the fluctuation in prairie dog abundance, distribution, and density.

We believe there should be more discussion of SB 99-111 and individual county autonomy to potentially compromise the implementation and effectiveness of the conservation plan. SB 99-111 is mentioned in the acreage zone matrix, and the issue of county authorities is briefly discussed in the section relating to the management of prairie dogs along the Front Range. The plan seems to concede that county authorities may preempt any conservation measures the Colorado Division of Wildlife may want to implement, which may influence the plans eligibility for a CCAA.

The 2002 Candidate Notice of Review for the black-tailed prairie dog identifies poisoning and sylvatic plague as threats of moderate magnitude, although not presently imminent throughout the species entire range. Nonetheless, these threats can be important to black-tailed prairie dog viability in Colorado, and throughout its range. The matrix and the implementation plan address these threats, but rely on the incentive program to offset threats unless prairie dog acreages have declined to very low levels.

During some Grassland Species Working Group discussions, informal comments were occasionally made that all occupied prairie dog acreage above the 256,000 target of the 11-state conservation plan is 'surplus'. This view seems somewhat endorsed by the implementation of management actions only when the population falls below 250,000 acres. The goal of 150,000 acres protected by the voluntary, incentive based approach represents about 24 percent of the current estimated occupied acres in Colorado, and would leave a deficit of 106,000 acres to reach the 11-state plan target of 256,000 acres. We believe the plan should explain how the additional 106,000 acres would be attained, whether by direct management or perhaps some rationale relating to black-tailed prairie dog current abundance and future threats.

We recognize that black-footed ferret recovery has not been a specific objective of the Grassland

Species Working Group or the conservation plan. However, there are likely several prairie dog complexes in southeast Colorado that may be suitable for black-footed ferret recovery in the future. The Forest Service is beginning to revise forest plans for grasslands in southeast Colorado and Kansas, which will likely consider black-footed ferret recovery opportunities. We therefore ask that the Colorado Division of Wildlife give consideration to future black-footed ferret recovery criteria when implementing the conservation plan.

We do not consider this request for comments on the conservation plan a formal application for a Candidate Conservation Agreement with Assurances. The conservation plan has some of the details needed for a CCAA application, but is not complete in its present form. Should the Division seek a CCAA, we suggest a meeting between us to better determine what is needed in an application.

SPECIFIC COMMENTS

Page 4, objective 9: The CDOW's inability to mandate how other federal or state agencies manage wildlife may need to be considered when evaluating a request for CCAA. I don't understand the point of this comment.
Page 4. There is no objective 10.
Page 8, paragraph 3: A CCAA application will require attention to our PECE policy and the Service's ability to make a determination that the conservation actions in this plan are sufficient to preclude listing if the actions were carried out on other necessary properties. The Service will not make that determination until it has received an enhancement of survival permit application from CDOW and provided appropriate notice to the public.
Page 12, PECE: We did not find any explanation of how the conservation plan satisfies the Service's PECE evaluation factors.
Page 17, table 3: The table has received a lot of discussion, and we have provided verbal and written comments on several occasions. The table clearly emphasizes monitoring and reporting, but seems to lack specific regulatory commitments to ensure that the goal of the plan is realized. Because the incentives approach depends to a large extent on the approval of counties, we believe their participation in adaptive agreements should be required to be able to enter into a CCAA once occupied acres fall below the 256,000 named in the Multi-State Conservation Plan (essentially the orange zone). If the level of toxicant use is discovered to be extremely high while occupied acres are in the orange zone, restrictions may need to be implemented at acreages above the red zone. The final plan should include the length of the seasonal shooting closure in this table.
Page 19 and 20, Figure 3: This is a good diagram of prairie dog distribution. As has been discussed at several meetings, prairie dog viability may also be influenced by colony distribution and individual density of prairie dog colonies, rather than occupied acres only. We didn't find any mention of prairie dog density and its importance to the conservation of prairie dogs or associated species. We also believe that some ground truthing may be important to better establish colony distribution and complexes.
Page 21, objective 2. There need to be specific monitoring actions for Burrowing Owl and

Ferruginous Hawk. If CDOW wants a CCAA that includes assurances for associated species, it will have to be more specific about monitoring protocols and conservation measures to be undertaken for them.
Page 22, objective 3: It may be best to choose another word for 'critical'.
Page 23, action 5.6. See our comment above about table 3.
Page 24, action 6.1: We believe the rationale for opening the shooting season needs some clarification. Would this seasonal closure apply to all lands, or public lands only? We assume sport hunting and the seasonal closure would be applied when prairie dogs exceed 250,000 acres. We support a seasonal closure, and the commitment to close the season when the population falls below 250,000 ac. We would like to remind the CDOW, however, that while the Service did conclude that shooting is not a threat throughout the range of the black-tailed prairie dog, there is evidence from some locales that shooting can impede recovery of towns that have been impacted by plague or poisoning. It may be useful to consider seasonal or yearlong closure on selected prairie dog towns or complexes that are targeted for the conservation efforts (perhaps similar to the big game unit management strategy), rather than considering the closure equally applied in all of eastern Colorado.
Page 24, management tools: Does this mean that management objectives will not be implemented until occupied acreage falls below 250,000 (i.e., the orange zone)? It might help to 'highlight' some of the appropriate tools mentioned - perhaps indent them to make them more visible to the reader. Because the plan relies on voluntary efforts, it is important to convey to the reader the types of actions that will be implemented. It may also be helpful to have some text to explain to the reader how implementation of each tool will help. We assume these are the management tools mentioned in objective 7 and its action items.
Page 26, Action 9.5. Does CDOW have acreage estimates of shortgrass prairie on their State Wildlife Areas? Without them, the reader has no sense of what this action can accomplish.
Page 26, Comanche National Grassland. Parts of the Comanche NG do not support sand sage habitat for lesser prairie chicken, but do support shortgrass prairie that is or can be made suitable for prairie dogs and other species. DOW should work with the Comanche NG to encourage appropriate management of that habitat.
Page 30, relevance to listing factors: This section is important in assessing whether the conservation plan will satisfy CCAA criteria. We will use our annual candidate assessment for the black-tailed prairie dog and information in the multi-state conservation strategy and plan to assess the eligibility of the plan under our CCAA criteria.

We are providing the following comments relating to the PECE policy.

PECE Criteria Applied to the Conservation Plan for Grassland Species in Colorado

CERTAINTY THAT THE CONSERVATION EFFORT WILL BE IMPLEMENTED:

1. Identify parties, staffing, resources needed, and funding levels and funding sources.

The plan identifies numerous potential parties from other agencies and non-governmental organizations, but there are no commitments from other entities to assist with plan implementation. Required staffing needs are not identified. Potential funding sources are identified, and existing funding levels are reported, but future funding needs are not estimated. The plan makes a commitment to seek additional substantial funding to accomplish objectives. We are confident that some level of funding will be provided, but it is unknown whether the level will be adequate to accomplish each action element on schedule.

2. Describe the legal authority necessary to implement the conservation effort and the commitment to proceed.

The conservation plan states the broad legal authority of the Colorado Division of Wildlife under the Colorado Revised Statutes, and cites the Division's commitment to wildlife conservation as stated in their mission statement, vision statement, and strategic plan. Objective 5 acknowledges that the authority for management of prairie dogs in Colorado is shared with the Colorado Department of Agriculture. Objective 5 therefore makes a commitment to enter into an MOU with the Department of Agriculture to ensure that prairie dog control actions do not compromise the conservation goal. The plan acknowledges, but does not thoroughly discuss, the autonomy of individual counties, and the potential for individual county ordinances to compromise the implementation and/or effectiveness of conservation objectives. The plan acknowledges SB 99-111 as a potential influencing authority, but does not elaborate on how conservation objectives can be implemented and effective within this constraint.

3. Describe the legal procedural requirements (environmental review) necessary to implement the conservation effort.

None provided.

4. Identify the authorizations that are necessary (permits, landowner permission) and ensure a high level of certainty that these authorizations will be obtained.

None provided, with exception of noting SB 99-111, and the autonomy of individual counties. There is some discussion of future restrictions (including possibly permits), for shooting, prairie dog control, and state authorized actions that may impact prairie dog habitat.

5. Identify type and level of voluntary participation necessary to implement the conservation effort and ensure a high level of certainty of obtaining that level.

The plan emphasizes a voluntary, incentive based approach to prairie dog conservation, and minimizes regulatory approaches until prairie dog abundance has declined to precipitous levels. The plan mentions long-term conservation easements as the priority tool, and lists several programs that may provide necessary funding. Specific authorities required for the conservation easements are not mentioned. The level of participation is defined only as a commitment to have 150,000 acres of occupied prairie dog towns protected by conservation easement by 2011, but does not mention how the 106,000-acre deficit from the 11-state plan will be achieved. Given the inherent issues associated with wildlife conservation on private lands, combined with the influence and autonomy of individual counties, a high level of certainty that 150,000 acres will be protected is not evident.

6. Ensure that all regulatory mechanisms are in place.

The broad authorities of the Colorado Division of Wildlife are stated, but specific authorities to enter into conservation agreements are not identified. There is no discussion to clarify how the Division's authority and intention may be influenced by SB 99-111, or ordinances passed by individual counties.

7. Ensure a high level of certainty that parties will fund the conservation effort.

Based on funding received in the past, we believe there is a high level of certainty that the Colorado Division of Wildlife will continue to receive funding from Great Outdoors Colorado, the Species Conservation Trust Fund, and Game Cash. There are no commitments from other potential funding sources (e.g., section 6 of the ESA, High Plains Partnership). While the conservation plan gives financial credit to private landowners for stewardship of grasslands, it is questionable whether this can qualify as 'funding' under the PECE policy. Therefore, while there is certainty of some level of funding, it is not known whether the funding level provided will be adequate to accomplish each of the conservation plan objectives as described or scheduled, particularly if occupied prairie dog acreage falls below 250,000. Therefore, it cannot be known whether the plan will be fully implemented or effective.

8. Provide an implementation schedule (including completion dates) for conservation effort.

The conservation plan includes the column titled 'Completion Deadline' for each of the conservation plan action elements. Those 'action elements' that can be implemented now do provide a specific year for completion, while others that will be implemented when necessary or warranted, obviously cannot provide a deadline. As with any conservation plan, the deadlines are dependent on adequate staffing, funding, authority, and agency commitment.

9. Make certain the conservation effort is approved by all the parties.

There is no approving authority mentioned. During Grassland Species Working Group meetings, it was stated that the Director of the Colorado Division of Wildlife would be the sole approving authority. There is no discussion regarding the need for approval of the plan by other cooperating state agencies that may influence plan implementation and effectiveness (e.g., Colorado Department of Agriculture), or any of the potential cooperators among the non-governmental organizations (e.g., Colorado Counties, Incorporated).

CERTAINTY THAT THE CONSERVATION EFFORTS WILL BE EFFECTIVE:

1. Describe the nature and extent of the threats.

Pages 30-33 address the threats based on the ESA listing factors. The CNOR for the BTPD identifies sylvatic plague and poisoning as threats that continue to influence the conservation of the BTPD. The conservation plan includes a commitment to identify and perhaps implement management tools to prevent or minimize the effects of control or plague, but there are no specific measures identified. The plan emphasizes monitoring the status of the BTPD, but there is no commitment to implement currently known practices effective in preventing or minimizing the effects of sylvatic plague until acreage levels have declined below 250,000 acres

2. State explicit objectives for the conservation effort and dates for achieving them.

Each of the thirteen objectives lists action items that are necessary to accomplish the objective. Some of the action elements are specific (e.g., 'implement a monitoring protocol on 3-year intervals' while others are only broadly described (e.g., 'Support efforts...'). Specific prairie dog colony complexes are not ranked for conservation priority, and there is no ranking of areas in Colorado that may be more important than others (i.e., where should we start first). Deadlines are given for those actions likely to be implemented now, while deadlines for some future circumstances cannot be determined yet. Obviously meeting the deadlines is dependent on adequate funding, staff, and other resources.

3. Identify all steps necessary to achieve the objectives in detail.

An implementation plan is included in the conservation plan as a table and as text in the body of the plan. A matrix of prairie dog color-coded acreage zones (e.g., blue, green, etc.) is also provided to establish when more rigorous monitoring, poisoning, and shooting activities should be considered. The plan commits to a technical committee to assess progress of the plan, and determine the need for other measures.

4. Identify quantifiable parameters/standards by which progress to objectives are achieved.

The only quantifiable parameters in the plan are the objectives of 150,000 occupied acres of prairie dogs acquired by voluntary, incentive based programs, and the commitment to manage for the 256,000 acres of prairie dogs, as suggested in the 11-state conservation plan. There is no discussion of how the 106,000 acres above the 150,000-acre target will be acquired. As appropriately acknowledged in the plan, it is not feasible at this time to establish standards for the associated species, but the plan acknowledges the importance of the associated species and their conservation, the need for their continued monitoring, and the application of an adaptive management approach.

5. Include provisions for monitoring and reporting progress in implementation and effectiveness.

The plan emphasizes monitoring to assess the viability of prairie dogs and associated species, and apply an adaptive management approach to modify plan requirements. A technical committee will assess the ongoing needs for monitoring and adaptive management. The technical committee is to be formed no later than the fall of 2006, evidently to coincide with the 3-year monitoring interval.

6. Incorporate principles of adaptive management.

Objective 7 of the conservation plan commits to the implementation of an adaptive management approach. The plan also commits to a 3-year survey interval to monitor prairie dog status. The progress/effectiveness of conservation plan action items will be monitored on an ongoing basis by a technical committee.

We appreciate the opportunity to review the draft plan. We are confident that the Colorado Division of Wildlife is committed to the conservation of the black-tailed prairie dog, and we look forward to future cooperation. Please contact me (303-275-2370) or Al Pfister (970-243-2778) if you have any questions.

Sincerely,

Susan C. Linner
Field Supervisor, Colorado

cc: ES, Grand Junction
ES, Regional Office (Attn: Pat Mehlhop)

Reference: Linner\COgrsplncmt92603.doc

United States Department of Agriculture
Forest Service
Pike and San Isabel National Forests
Cimarron and Comanche National Grasslands
Comanche Ranger District
P. O. Box 127
27204 Highway 287
Springfield, CO 81073
(719) 523-6591
www.fs.fed.us/r2/psicc

File Code: 2620-1
Date: October 17, 2003

Grassland Species Conservation Plan
Colorado Division of Wildlife
Policy and Regulation Section
6060 Broadway
Denver, CO 80216

To Whom It May Concern:

Thank you for the opportunity to comment on the Colorado Division of Wildlife's Draft Grassland Species Conservation Plan. The Forest Service recognizes the importance of the National Grasslands in supporting shortgrass prairie habitat and associated wildlife species in eastern Colorado. As a result, we hope to work closely with the state of Colorado as you develop this conservation plan for black-tailed prairie dogs (BTPD) and other closely associated species such as the mountain plover. Your Grassland Species Conservation Plan will also provide important direction to the Comanche NG as we revise our Land Management Plan over the next two years.

Your present plan acknowledges the importance of the Comanche National Grassland for the conservation of lesser prairie chickens and their sand-sage habitat (page 26), but does not recognize the importance of shortgrass prairie habitats on the Comanche. We believe this is most likely due to the CDOW's lack of information on these habitats on the Comanche NG. Our wildlife biologist, Dr. David Augustine, recently completed an assessment of potential BTPD habitat on the Comanche, where potential habitat was defined as lands with loamy or clay soils and slope <5%. He identified 203,237 acres of potential BTPD habitat, with 114,554 acres on our Carizzo Unit near Springfield and 88,683 acres on our Timpas Unit near La Junta. He has also analyzed the results of a complete GPS inventory of BTPD colonies conducted on the Comanche during 2002, which showed 5702 acres of occupied BTPD colonies (5127 acres on the Carizzo Unit and 575 acres on the Timpas Unit). This occupied acreage increased from 2002 to 2003, but exact acreages are not yet available. In addition to the substantial acreage of BTPD colonies, we have documented nesting by mountain plovers on the Comanche NG during surveys conducted periodically from 1979 to 2003. Mountain plovers have nested both on prairie dog colonies, and especially on prescribed burns conducted in collaboration with CDOW during 1997-1999.

For these reasons, we recommend that your Grassland Species Conservation Plan acknowledge the importance of the Comanche NG in supporting black-tailed prairie dogs and associated wildlife species in eastern Colorado. We believe that the actions identified in your plan for the Pawnee NG (see Actions 9.5 – 9.9 on page 26) are also appropriate for the ~200,000 acres of suitable prairie dog and mountain plover habitat on the Comanche. If you have any further questions concerning habitat acreage, BTPD colonies, mountain plover populations, or other

associated wildlife species, please contact our wildlife biologist (David Augustine, 719-523-1711). He would also be happy to further discuss how your Grassland Species Conservation Plan can provide management recommendations that are specific to the Comanche National Grassland. Thanks again for this opportunity to comment on the Plan, and we look forward to working closely with you in the future.

Sincerely,

/s/ Thomas Peters
THOMAS PETERS
District Ranger

PRAIRIE DOG CONSERVATION TEAM

Representing the states of Arizona, Colorado, Kansas, Montana, Nebraska, New Mexico, North Dakota, Oklahoma, South Dakota, Texas, Utah, and Wyoming

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October 13, 2003

Francie Pusateri
Grassland Species Coordinator
Colorado Division of Wildlife
317 West Prospect
Ft. Collins, CO 80526

Dear Francie,

Thanks for the opportunity to review the Draft Conservation Plan for Grassland Species in Colorado. First, let me say that the Prairie Dog Conservation Team (Conservation Team) is very appreciate of the continuing efforts of the Colorado Division of Wildlife (CDOW) and the Colorado Grassland Species Working Group (Work Group) to cooperate with the Team to address national issues important to all of the 11 states. It is especially significant, in terms of support of the national effort, that the draft plan for Colorado incorporates the concepts and goals of the Conservation Team's Black-tailed Prairie Dog Conservation Assessment and Strategy and addendum, A Multi-state Conservation Plan for the Black-tailed Prairie Dog in the U.S (MSCP).

Also important is the fact that the Work Group has built upon the above mentioned documents, as well as the efforts of the six states that have already completed management plans specific to the black-tailed prairie dog, to produce the first multi-species conservation plan, a step, in my opinion, that all of the states will eventually need to take if grassland conservation is truly to be accomplished at a landscape scale.

Specific comments are as follows:

Page 2, Objective 2: I think it is valuable that the Plan recognizes the need for using best available science to conduct long-term monitoring of population trends and distribution; and identify areas for conservation. I noted several places in the Plan that refers to eventual recognition of "priority areas" for grassland conservation. I believe that it is important to grassland conservation that a biological approach is used to identify "priority areas" at a coarse scale, and that this must be followed by a fine filter that incorporates social, economic, land ownership, and other factors into management.

Page 2, Objective 3: You refer to the role of private landowners several times in the Plan. I agree that private landowners are key to the effort, and must be a part of the

team effort if conservation is to succeed. I think you have made a true effort not to "cooperate with private landowners" but rather to make the Plan one that they are a partner to, because with a that approach you will succeed. As you know, the Conservation Team, particularly myself as Coordinator, has expended considerable effort at the state and national level to promote incentives programs for private landowners, most recently through the High Plains Partnership (HPP). Your Plan recognizes that there are a broad array of incentive programs being developed and it is important to continue to develop these at the state and national level, and use the most applicable program(s) for the needs of individual landowners in Colorado.

Page 3, Objective 5: Your objective to develop a MOU between CDOW and Colorado Department of Agriculture (CDA) to outline the responsibilities of the agencies regarding use of toxicants to control prairie dogs is excellent. As the Conservation Team stated in the MSCP, the U.S. Fish and Wildlife Service has said only that unregulated use of toxicants is a threat to the black-tailed prairie dog, not general use of toxicants. First and foremost, each of the 11 states must develop methods to document the amount and location of control measures before it can estimate the impact of control on prairie dogs. Secondly, if the threat of unregulated control is to be addressed, each state must be able to regulate control where necessary to meet acreage and distribution goals in their respective management plans. Colorado has recognized this need an addressed it.

Page 3, Objective 6: I agree with your goal to allow sport shooting that is compatible with the objectives in your Plan. Sport shooting is a traditional use of wildlife resources, will help to control prairie dog populations thus reducing the need for use of toxicants, and will allow landowners that choose to do so the opportunity to have an income from shooters. I recommend that you consider making the seasonal closure in effect at least for the period March 1 to July 15 (rather than June 30) to insure that the whelping season and dependent young period is fully encompassed.

Page 3, Objective 7: I support your goal to incorporate adaptive management into the Plan. The Conservation Team made a similar recommendation in the MSCP. You have gone a step further in recommending a "technical committee" to review new information and make recommendations. An excellent approach, and I suggest that your Work Group consider not only pioneering this effort in Colorado, but also taking the lead for the Conservation Team on setting up a similar effort on an 11-state scale since each of the states is going to face similar problems and needs.

Page 4, 26, Objective 9: Your objective to maximize efforts on public lands is similar to that recommended in the MSCP. Public lands are not currently supporting a proportionate share of grassland species-at-risk, including black-tailed prairie dogs, compared to private lands. CDOW and the Working Group should continue to work with the National Grasslands and Bureau of Land Management to identify "priority conservation areas" where management of public lands, or public lands and private lands together in a large block will provide significant conservation benefit. Also, through grassland plans, CDOW and the Working Group can ensure that management on all public lands addresses the needs of grassland wildlife species. An objective to manage a

minimum of 20% of Pawnee National Grassland in low structure vegetation for mountain plover, presumably including prairie dogs, is very appropriate.

Page 15, paragraph 1,2: Colorado certainly has the biological capability to meet all of the objectives in the MSCP for large and medium-sized complexes, and distribution over 100% of the counties in the state. With 18 complexes greater than 5,000 acres, many of which are outside of the Front Range, Colorado has the basis for identifying a number of "priority areas for conservation." The opportunity also exists to cooperate with federal land management agencies and willing private landowners, using the incentive programs referred to in your Plan, to maximize management efforts in those areas without economic or other impact to private lands, or impacting multiple use management objectives on federal land.

Page 16, Action 1.3: I strongly agree with your recommendation to develop a standardized monitoring protocol to document prairie dog acreage and distribution over the 11 states (landscape scale). A multi-state monitoring effort conducted every 3 years by a neutral entity such as a university or federal agency such as USGS-BRD, supported financially by each of the entities involved, including 11 states (wildlife agencies, department of agriculture, state land board), Bureau of Land Management, U.S. Forest Service, Department of Defense, and others, will be unbiased and scientifically credible, and will help all entities to meet long-term objectives for grassland species. I encourage CDOW and the Working Group to continue to coordinate with the Conservation Team to begin this effort in 2005.

Page 21, Paragraph 2: I agree that data are not adequate to set target objectives for prairie dog associated species. This further indicates the need for development of inventory and monitoring protocols at a scale below landscape level such as the one recently initiated for grassland birds by the Rocky Mountain Bird Observatory. It is crucial that we all think in terms of habitat, bird, and prairie dog monitoring in a single program that avoids duplication of effort.

Page 22, Action 3.1-3.9: This list of actions is excellent and I support all of them. Action 3.8 related to Candidate Conservation Agreements with Assurances (CCAA) may be especially significant in light of the emphasis of the Colorado Plan on incentive programs. Incentive programs are logically followed with providing the opportunity for regulatory assurances to private landowners. Please be aware that the potential exists for removal of the black-tailed prairie dog from the Endangered Species Act Candidate List, perhaps as early as 2004, and that CCAAs will still be possible for the black-tailed prairie dog, and any of your Plan's target species that remain species-at-risk by general definition.

Page 27, Mountain Plover: I recommend deleting the word "shore" from the first sentence.

Page 29, Objective 12: This is an excellent recommendation. A cooperative effort between willing landowners in the eastern plains and front range interests is the most

logical way to address both prairie dog and associated species management, and help alleviate conflicts between development and prairie dogs along the Front Range.

Page 31, paragraph 2: Your Plan recognizes the value of consolidation of secure habitat areas. I believe that this "priority area" concept is crucial to effective conservation because it allows concentration of incentive and management resources. I agree that a high percentage of these "priority areas" should focus on large prairie dog complexes since these address both the prairie dog and associated species, but certainly there can be grassland "priority areas" that do not include the prairie dog.

Page 31, paragraph 5: I agree that incentive programs are key to partnering with private landowners. The Conservation Team appreciates the support CDOW has given the efforts of the High Plains Partnership team to provide an umbrella effort that begins a dialogue with the Natural Resource Conservation Service and private landowners to incorporate grassland species conservation into Farm Bill programs. I encourage CDOW and the Working Group to view HPP as a means to that end and continue to work with HPP at a national level.

Thanks again for the opportunity to comment.

Sincerely,

Bob Luce
Interstate Coordinator

NATIONAL WILDLIFE FEDERATION®
People and Nature: Our Future Is in the Balance

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October 17, 2003

Kim Burgess
Working Group Coordinator
Colorado Division of Wildlife
6060 Broadway
Denver, CO 80216

Re: Comments on Draft Conservation Plan for Grassland Species in Colorado

Dear Ms. Burgess,

I was glad to meet with your working group on October 16 and offer my comments verbally on the draft plan. As you requested, I am sending you this letter outlining again the comments I made at that time.

The Division of Wildlife and the working group have put together a credible plan which correctly emphasizes the importance of conservation of grassland species and identifies general directions as how to accomplish this.

I was impressed by the level of consensus among working group members and recognize that this level of consensus can rarely be met except by maintaining a certain level of vagueness in the plan about where and what will be done specifically to accomplish the plan's objectives. Recognizing this as a limitation, I nevertheless think that there are a number of places where the plan could be improved without sacrificing this valuable consensus.

As I mentioned on the 16th, the most obvious shortcoming of the plan is the absence of commitment to recover black-footed ferrets anywhere in Colorado. The primary reason the multi-state plan, which provided the baseline for the objectives in the Colorado plan, indicates that Colorado should maintain at least 2 large complexes of prairie dogs >5,000 acres, is because such large complexes are essential for recovery of species associated with prairie dogs. Black-footed ferrets are certainly the species most dependent on prairie dogs. The ferret is the most endangered mammal species in Colorado. The plan correctly recognizes the importance of large prairie dog complexes for other species such as mountain plovers, burrowing owls, and other species; this makes the absence of similar explicit concern for black-footed ferrets very noticeable. It was also clear to me from comments by Miles Davis (Colorado Stockgrowers Association), Rob Nanfelt (Colorado Assoc. of Home Builders), and others in the Working Group, that there was support for including an objective in the plan of creating and maintaining

viable populations of ferrets in Colorado. I also gathered from your comments that you agreed and would work to include ferrets in the final draft of the plan.

I also suggest that the plan be as specific as possible about where the priority areas are for maintaining large prairie dog colonies and restoring ferrets. It is advisable that it be specified that these ferret-recovery complexes be at least 100 km apart to reduce the likelihood that plague events will simultaneously affect both complexes. There is not good science supporting 100 km as an adequate or appropriate spacing but it is intuitive that some significance distance between these complexes is desirable.

I also suggested that the monitoring protocol be modified to include periodic monitoring of prairie dog colony size (polygons not just intercepts). This is important to assure that in areas, for example where ferrets are going to be recovered, that colonies forming a complex be spaced no more than a mile apart. This colony spacing is based on a reasonable dispersal distance for black-footed ferrets rather than the maximum distance of 7 km which is mentioned in the multi-state plan. Modern research developed by Randy Matchett of the FWS that has been presented orally at a number of venues suggests that 7 km is too far to permit relatively unimpeded movements of ferrets between colonies.

Also relative to the monitoring protocol, I recommend that the line transect technique protocol used in 2001 and 2002 be modified to include intercepts of recently inactive colonies or inactive portions of colonies. Information on inactive colonies is critical to evaluation of trends in decimating factors such as plague or poisoning that may require a management response. Additionally, data on intercepts of inactive colonies may be an indicator as to whether observers are correctly distinguishing between active and inactive towns or portions of towns.

Jim Dennis has the experience and knowledge necessary to develop an appropriate definition of inactive colonies or portions of colonies. Absence of recent trails and fresh diggings will be a component of this definition as will absence of direct observations of prairie dogs. The paper by Sidle et al. (1999, J. Mammalogy 82:928-936) reported that in the northern great plans about 24% of the intercepts of prairie dog colonies were inactive. The percentage inactive varied between states and strata with, generally, a higher proportion of inactive colonies in low density strata and in states with fewer prairie dogs. The range of colonies classified as inactive was from approximately 3% to 35% (Average density estimate, Table 1 of Sidle's report).

Another suggestion relative to the report is to include a distribution objective for prairie dogs within Colorado. This is to avoid a situation where the entire objective of the plan might be achieved in only one portion of Colorado and prairie dogs largely eliminated elsewhere. Within the area impacted by plague, like all of Colorado, it is important to have prairie dogs widely distributed to avoid catastrophic events. Currently, Figure 3 of the draft report indicates that there are at least some colonies in each county in Colorado within the original range with the exception of Huerfano and Phillips Counties. An appropriate distributional objective may be difficult to derive without more discussions by the Working Group so it may be that the best that can be done at this point is to clarify that prairie dog colonies with at least the lowest density category (e.g. currently 1-2 colonies/150 km^2) will be maintained within each county that

currently has prairie dogs. Additionally, it may be a worthwhile distributional objective to attempt to restore prairie dogs to Huerfano and Phillips if suitable habitat exists.

I also note that the units used to describe colony density are atypical (number per 150 km^2). It would be more conventional to express density in units of number per 100 km^2).

As a final comment, I would suggest deletion of the paragraph on page 41 of the draft that leads to the conclusion that each prairie dogs "could result in a reduction of 3.58 pounds of meat production per year." I don't believe this conclusion is supported by available data some of which indicate that cattle benefit by grazing on prairie dog colonies or, at least, have neutral impact. This paragraph is inappropriate without at least discussing some of the contradictory studies many of which were authored by Dan Uresk and none of which are cited (see listing petition and the USFWS finding). Rather than go into the contradictory, however, the simplest solution would be to just eliminate this paragraph.

Thank you for consideration of these comments.

Best wishes,

Sterling Miller Ph.D.
Senior Wildlife Biologist

From: Tom Bender [tbender@larimer.org]
Sent: Thursday, October 09, 2003 4:33 PM
To: comments.gscp@state.co.us
Cc: ikallenberger@ccionline.org
Subject: CDOW Draft Conservation Plan for Grassland Species in Colorado

After review of the Colorado Division of Wildlife draft "Conservation Plan for Grassland Species in Colorado," I have only a couple points to comment on.
Page6: There is reference that some of the species officially listed according to the Endangered Species Act are also listed for recovery. I have no knowledge of the ESA being amended to include recovery plans and the criteria necessary for delisting or establishing a recovery as complete. I believe that proposals have been made to correct that ESA deficiency during the EAS reauthorization, but no action has been taken.
Page 12: Add to Listing Considerations - Absence and inadequacy of Recovery Plans with havitat and delisting population criteria.
Page 27: The latest information that I have received is that the Mountain Plover is no longer a candidate species. I believe the attempt to list the Mountain Plover was found to be based on fabricated "proof" that came out of thin air. Hopefully, President Bush's insisting that environmental decisions and policy be based on good science and not emotion will correct the misguided listings, put emphasis on recovery, and establish more effective and responsible environmental policy for the future.
Thank you for the opportunity to rleview and comment on your draft plan.
Tom Bender
Larimer County Commissioner Dist#2

From: STROM, Ken [KSTROM@audubon.org]
Sent: Friday, October 10, 2003 3:58 PM
To: comments.gscp@state.co.us
Subject: Grasslands Species Conservation Plan

Comments from:
AUDUBON COLORADO
1966 13th Street, Suite 230
Boulder, CO 80302

October 10, 2003

Submitted to:
Colorado Division of Wildlife
Policy and Regulation Section
6060 Broadway
Denver, CO 80216

ATTN: Grassland Species Conservation Plan
We appreciate the opportunity to review and comment on CDOW's Grassland Species Conservation Plan. We consider the Plan to be an important step toward maintaining healthy and sustainable populations of birds and other wildlife in Colorado's shortgrass prairie grassland ecosystem. We believe the goals of the Plan are sound and appreciate CDOW's necessary expressions of commitment to increased funding for the conservation of grassland species.
We strongly support the Plan's identification of conservation strategies based on high quality science and an adaptive management approach. We are pleased that while the Plan focuses on 5 wildlife species for specific attention and planning, it also recognizes that there are 4 species of mammals and 24 species of birds found within the shortgrass prairie that are in some way categorized as species in need of conservation assistance. We urge CDOW and the Working Group to not lose sight of this broader array of species as you identify opportunities for

implementation of the Plan. This approach will also help in your outreach efforts for support and participation by a broad cross-section of Colorado citizens. In particular, we recommend that the Plan make note of the historic declines in range of various prairie birds which are now on the fringes of Colorado's prairie landscape, including all of the prairie grouse of the region: the Greater and Lesser Prairie-Chicken and the Sharp-tailed Grouse. We strongly endorse the Plan's emphasis on partnerships among CDOW, other government agencies, private landowners and other private entities. As the Plan makes clear, we will not succeed in our efforts to conserve Colorado's shortgrass prairie ecosystem except by all working collaboratively to make it happen. In summary, we support the general approach and strategies for implementation described in this draft of the Plan and look forward to working with all parties concerned to achieve the goals of conserving Colorado's shortgrass prairie ecosystem and its associated wildlife species.
Please call on us at any time for input and comments as you proceed with your planning and implementation. We look forward to continuing as an active participant in delivering effective conservation actions on the ground. Through our IBA Program, Grasslands and Grouse campaign, and other initiatives, we expect to make major contributions toward achieving the goals of the Plan and welcome your suggestions for collaboration. If at some point the Colorado Grassland Species Working Group would like to include an additional partner, we would be glad to participate. Thank you again for the opportunity to review and comment on the draft Grassland Species Conservation Plan. We request that we be kept on your distribution list for future notices about the development and implementation of the Plan.
Respectfully submitted on behalf of Audubon Colorado,

Ken Strom
Director of Bird Conservation and Public Policy
Audubon Colorado

From: Brennan, Mark [mbrennan@co.boulder.co.us]
Sent: Monday, October 13, 2003 2:44 PM
To: comments.gscp@state.co.us
Subject: Grasslands Species Conservation Plan

I have had the opportunity to read and review most of the GSCP draft (8/27/03) and find that it is very thorough and comprehensive. I am particularly impressed with the detailed level of descriptive actions that are proposed, including timelines, to meet the various objectives stated. It is apparent that the principles of adaptive management have guided the development of this plan, which treats urban population management objectives differently from rural/agrarian populations. This type of approach will hopefully allow the Division to fulfill some meaningful management needs without facing excessive detrimental conflict from different shareholders.
I would like to thank the Division for having had the opportunity to work with the original, larger task force group and for the opportunity to review and comment on this draft. Please contact me directly if you would like further participation or input from my perspective as a wildlife resource manager in Boulder County.

Mark Brennan
Wildlife Specialist
Boulder County Parks and Open Space Dept.
PO Box 471
Boulder CO 80306
303-516-9361
mbrennan@co.boulder.co.us

From: Brennan, Mark [mbrennan@co.boulder.co.us]
Sent: Monday, October 13, 2003 3:08 PM
To: comments.gscp@state.co.us
Subject: Grasslands Species Conservation Plan

I had just submitted my initial comments on the GSCP, but realized that I neglected one important issue that I had made note of:

I did not find any reference to black-footed ferret conservation efforts in this plan (please correct me if I did not see anything included due to oversight) and feel that it is important to include. Hopefully, there will be an effort to eventually recover a population in the eastern part of the state, which this plan generally focuses on. I believe that the plan should have addressed this species' status in CO, including a brief description of the ongoing restoration efforts in Moffatt county. It also should describe the current status of habitat in eastern CO, including a reason as to why there currently are no sites meeting the FWS criteria for restoration, and what would need to be done in order to eventually achieve this in the future. I did not read the entire document, including all appendices, but I suspect that this would have merited a separate appendix for the ferret, if it was one of the plan's goals, and I would have read some passage regarding the species' status in the background and/or policy text.
Again, it was essentially an excellent job, and I applaud the task force members for their work. I would like to be considered for inclusion in any technical review or revision committees formed in the future, if planned.
Mark Brennan
Wildlife Specialist
Boulder County Parks and Open Space Dept.
PO Box 471
Boulder CO 80306
303-516-9361
mbrennan@co.boulder.co.us

From: tsullivan@environmentaldefense.org
Sent: Thursday, October 09, 2003 9:57 AM
To: comments.gscp@state.co.us
Cc: Theodore_Toombs/EnvironmentalDefense@environmentaldefense.org
Subject: Grasslands Species Conservation Plan

Environmental Defense commends the Colorado Division of Wildlife for taking the lead in developing a multi-species plan for grassland species. We are pleased that you are looking to encourage actions to increase and improve available habitat for these species. Please accept the following recommendations as potential additions to the Conservation Plan For Grassland Species In Colorado.

In the background section of the document, the language regarding Candidate Conservation Agreements with Assurances seems misleading. The current language suggests that if Colorado obtains a permit pursuant to a CCAA, and the species is subsequently listed, then no additional restrictions will be placed on any landowner in the State. Our understanding of the CCAA policy is that the State can be issued an umbrella permit, under which it could then sign up individual landowners with certificates of inclusion for those landowners willing to undertake conservation actions consistent with the actions needed to prevent listing of the species in the future. Thus, under an umbrella CCAA, individual landowners who undertake specific conservation actions can be insulated from future new regulatory restrictions, but the permit cannot relieve landowners in the State as a whole from possible regulatory restrictions.

Under Objective 3, "Habitat Considerations and Engaging Private Landowners," we recommend that the plan include an Action item for the development of a specific strategy to target and expand the use of USDA Farm Bill programs toward the goal of grassland species recovery. As currently worded, this objective is so general that it is difficult to understand what improvements are possible and would be sought. This strategy would include participation on the State

Technical Committee and on Local Working Groups (EQIP) in order to improve ranking criteria and allocation of funds so that grassland species projects become more competitive with other resource concerns. The strategy should also include raising the awareness among land managers (local NRCS agents, non-profit organizations, and CDOW employees) of the capability of various programs to meet grassland species objectives, and the mechanics of making programs work for grassland species. Other alternative methods of targeting programs should also be considered such as set-asides under EQIP for special grassland species projects.

Also under Objective 3, the plan should include a special Action to draft a Conservation Reserve Enhancement Program (CREP) proposal that focuses specifically on grassland species. Since States initiate CREPs, unlike the other Farm Bill programs, it is appropriate to consider this as a separate action. A CREP offers significant advantages over other Farm Bill programs, in that it allows targeting of resources to address the highest priority conservation concerns. Further, a CREP would be the most effective way to have Farm Bill funds leverage the resources available from existing State programs such as the CSCP. Any CREP proposal should include a grassland restoration component, as well as, management components, and consider how to target available long-term and permanent protection programs (such as GRP and FRPP) to benefit grassland species. The proposal should be coordinated through High Plains Partnership to potentially link to grassland CREPs in other plains states should they come about.

Under Objective 9, "Comanche National Grasslands," we recommend that CDOW not exclusively focus on sand sage prairie on these public lands. While we agree that sand sage prairie is an important focus, we encourage CDOW to also make specific management recommendations regarding grassland species. Since most of this Grassland is native short-grass prairie, it does not make sense to make specific grassland species recommendations to Pawnee National Grasslands and not do the same for Comanche is equally as important for grassland species as Pawnee. In fact, two of the targeted species in the plan, the Burrowing Owl and Black-tailed Prairie Dog, have much higher populations on Comanche than Pawnee. And, while the importance of Comanche to the Long-billed Curlew is correctly mentioned, it is the short-grass habitat, not the sand sage that is most important for this species.

Also under Objective 9, "State Land Board Lands," the CDOW should encourage the SLB in developing threatened and endangered species policy that includes the development of a conservation bank for black-tailed prairie dogs along Colorado's Front Range. A conservation bank for the Utah Prairie Dog developed by Utah State Institutional Trust Lands Board could serve as an excellent model for this effort.

Under Objective 12, "Establish shared responsibility (front-range and eastern plains) for conservation of the black-tailed prairie dog and associated species," we recommend including a specific Action item to guide efforts to develop conservation banking as a tool. Use of this tool can provide relief from regulatory burden and expedition of development projects saving developers money, while increasing black-tailed prairie dog colony acreage. In addition, prairie dogs can then become an income source for landowners who agree to increase prairie dog acreage, thus making a listed or candidate species an asset rather than a liability. There is an excellent opportunity for the State Land Board to enter into this type of effort (see above comment).

Thank you for considering our comments for inclusion into the final draft of the Conservation Plan For Grassland Species in Colorado.

Sincerely,

Ted Toombs, Wildlife Ecologist, and Tim Sullivan, Regional Director, Environmental Defense, Rocky Mountain Regional Office, 2334 N. Broadway, Boulder CO 80304 Phone: 303-440-4901

October 13, 2003

To whom it may concern,

Thank you for the opportunity to comment on the Draft "Conservation Plan for Grassland Species in Colorado." I urge to consider the following points:

1) The plan discusses the role of black-tailed prairie dogs (hereafter simply prairie dogs, for ease of reference) as keystone species. This discussion remains incomplete and demonstrates many of the same weaknesses that other critics of this designation suggest. First, even as the only published critic of designating prairies (Stapp 1998; which interestingly was not even cited in the plan) states, prairie dogs deserve keystone status on the basis of their impacts to the floral community alone. Strangely, many critics of keystone designation seem to regard plants as somehow inferior to animal, or at least as not deserving the same consideration.

   Second, I suggest the drafters of the plan actually *read* Reading et al. (1989) before discussing it. As many critics of that paper do, they assume that we suggested that all species listed benefited from prairie dogs. In fact, we make clear in the manuscript that not all do, and that several are likely accidentals. Let's try starting a new trend and citing that paper appropriately.

   Third, the plan ignores the continually growing body of literature that suggests that prairie dogs and their activities are either beneficial or detrimental to many species (e.g., Barko et al. 1999, Manzano-Fischer et al. 1999, Kotliar 2000, Miller et al. 2000, Seery and Matiatos 2000, Kretzer and Cully 2001a, 2001b, etc. – I have not check more recently). Both are important; detrimental impacts are just as important as beneficial ones. In addition, we have just completed a 3-year study comparing reptiles and amphibians on and off of prairie dogs colonies in Colorado and are writing up our results. Those results suggest that several species benefit from the presence of prairie dog colonies, while others are negatively impacted. As continually more studies are conducted, we find impacts to mammals, birds, reptiles, amphibians, and invertebrates. Indeed, the impacts are broad and significant. Simply recording numbers of species that benefit or associate with prairie dogs is not the point. The point is that increasingly, the data demonstrate that prairie dogs play a keystone role on the ecosystems they inhabit.

   Finally, it might be noted that, ironically, if we could actually recover prairie dogs to somewhat historical levels, they might no longer be considered keystone species. This is because if prairie dogs were abundant, their impacts might be proportional to their abundance! The important point here is that at increasingly low levels of abundance and distribution, prairie dogs become increasingly important, especially for species that benefit from them or their actions.

2) The results of the 2002 Colorado Division of Wildlife aerial survey are suspect at best. While aerial survey methodologies show great promise to monitoring prairie dogs, there are several potential sources of error that were not addressed during that work. Ground truthing of the data is desperately needed, but unfortunately, the CDOW appears to be unwilling to

undertake the important initiative (despite offers of financial and technical assistance by both the Denver Zoological Foundation and the National Wildlife Federation). Since sighting of a single prairie dog or active digging rendered an entire colony as active, the aerial survey likely over-estimated active colony acreage (and that is the important variable). Plague and poisoning by land owners are both common and on-going in Colorado. Indeed, my friends and I own land in Baca County and our neighbors are frequently out poisoning colonies on their properties. Since both plague and poisoning often leave some animals alive, this is potentially significant source of error. Ground work in other states found significant differences between ground and aerial colony estimates (C. Knowles, pers. commun.). Likely, those differences occur in Colorado as well. One of my staff visited 36 center points of purported colonies identified in the aerial survey (he could not access/see 18 purported colonies) and could not find prairie dogs on a substantial proportion of these sites (19.4% inactive and 16.7% only partially active; D. Stern, pers. commun.). Finally, the aerial survey was conducted during the worst drought in Colorado's history, thus making if more difficult to distinguish active vs. inactive colonies and performing the survey when colonies are at their maximum extents (colonies tend to expand during droughts).

At a bare minimum, CDOW should conduct ground surveys coupled with the aerial surveys to 1) determine the proportion of colonies misidentified from the air, 2) determine the ratio of active to inactive area of each colony identified from the air, and 3) get an estimate of prairie dog densities. The last point is crucial, because we are really concerned about numbers of prairie dogs, not just the area they inhabit.

3) Related to point #2, the plan does not discuss the opportunities to recover the critically endangered black-footed ferret (*Mustela nigripes*) anywhere in eastern Colorado. Surely, given the purportedly large number of colonies and expansive acreage of prairie dog colonies in eastern Colorado, there are a number of potential reintroduction sites. Indeed, the map on page 20 indicates that there are currently 18 complexes of colonies over 5,000 acres in size. These should be assessed more carefully for ferret reintroduction and enhancement activities undertaken for the best sites. How could CDOW not consider ferret recovery in this document?

4) The current plan proposes to actually *decrease* the current level of protection offered to prairie dogs within Colorado by removing restrictions on shooting. It also proposes to allow continued unrestricted poisoning of the species. While such a move might be politically expedient, this situation will closely resemble the situation that led to the dramatic decline of the species in the first place. At a bare minimum, the state should seek to identify 3 or (ideally) more complexes of prairie dog colonies that would be managed primarily for this species and those species that benefit from it and its activities. These complexes will likely be based primarily on public lands, but they should include a substantial acreage of prairie dog colonies (>5-10,000 ac. or about 2-4,000 ha) sufficiently close to allow migration and effective utilization by black-footed ferrets (new data suggests that colonies should be no more than 1-2 miles or about 1.6-3.2 km apart). These areas should be managed for wildlife primarily (i.e., not shooting or poisoning and active plague management) to insure the restoration and continued existence of a healthy prairie dog ecosystem in Colorado.

Thank you for considering these comments.

Sincerely,

Richard P. Reading, Ph.D.

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October 13, 2003

Kim Burgess
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Re: Conservation Plan for Grassland Species in Colorado

Dear Ms. Burgess:

Thank you for accepting these comments on behalf of the members and affiliates of Prairie Preservation Alliance and Friends of Broomfield Open Space. We sincerely appreciate the opportunity to provide the Colorado Division of Wildlife with our concerns during this public process. We feel that the scope of the Conservation Plan for Grassland Species in Colorado should be broadened to include concerns that were not addressed in the plan and provide you with the following ideas and input.

EXECUTIVE SUMMARY

The goal of the Conservation Plan for Grassland Species in Colorado (Plan) is to "ensure, at a minimum, the viability of the Black-tailed Prairie Dog and associated species (Mountain Plover, Burrowing Owl, Swift Fox and Ferruginous Hawk) and provide mechanisms to manage for populations beyond minimum levels, where possible, while addressing the interests/rights of private landowners." (Conservation Plan for Grassland Species in Colorado, p. 1).

As written, the Plan "promotes coordination and partnering among existing entities that have land protection capacity and an interest in the shortgrass prairie (potentially including CDOW, Great Outdoors Colorado, The Nature Conservancy, Colorado Cattleman's Agricultural Land Trust, Colorado Open Lands, Douglas County Land Conservancy, Colorado Department of Transportation, Counties and Municipalities, etc.)." (Briefing Document, Grassland Species Conservation Plan, October 9, 2003, p. 1).

Although the Plan addresses the interests of many stakeholders, it fails to include the following entities: Bureau of Land Management (BLM), U.S. Forest Service (FS), U.S. Fish and Wildlife Service (FWS), private development companies (home builders, commercial developers, etc.), and the citizens of Colorado—the "public", who own the wildlife in the State of Colorado that is entrusted to the CDOW for management. We suggest the inclusion of the stakeholders mentioned to achieve a more comprehensive management plan.

Objective 1 of the Plan states that, "Colorado currently exceeds all acreage and distribution target objectives defined in "*A Multi-State Conservation Plan For The Black-tailed Prairie Dog, Cynomys ludovicianus, in the United States, Addendum to the Black-tailed Prairie Dog Conservation Assessment and Strategy*". We request that the working group divulge the reason that this plan was selected as the foundation upon which all other approaches to management are based.

The Objective continues by stating that, "Actions focus on voluntary, nonregulatory incentive based partnerships with both public and private landowner, ongoing monitoring and analysis, and implementation of management actions when populations drop below 250,000 acres." Does the survey technique employed have the ability to discern active vs. inactive occupied acres? Is it not true that 600,000 acres of occupied black-tailed prairie dog (BTPD) habitat still qualifies the species for listing with FWS? Why wait until the occupied acreage drops to such a low rate before management actions are implemented?

Objective 2 states, "CDOW will continue its efforts to produce, encourage, and support the best available science regarding monitoring long-term populations trends and distribution of shortgrass associated species." and later states, "Data are inadequate to define specific target objectives for shortgrass associated species". If the objective is to monitor long-term population trends, but the data to do so is inadequate, then how can this objective be met? What is the plan to obtain adequate data? Without a means of determining when the objective is met, the working group lacks the ability to measure its success.

Objective 3 focuses on private landowners, who "provide critical habitat and act as stewards to the land that supports populations of black-tailed prairie dogs and other shortgrass associated species". We request that the same attention be focused on public landowners, who also provide critical habitat and have the charter to act as stewards to the land. Included in this group should be the State Land Board, with nearly 1,000,000 acres of land, much of which provides critical habitat to the BTPD and other shortgrass associated species. This land is defined as private land on page 26, but since the public funds the purchase of these properties, we recommend they be classified as public land and included as a separate group.

Has the working group researched the most prudent methods/plan of addressing the right of private landowners to destroy populations/species at will? If not, why not? If so, what are their conclusions?

How does the CDOW intend to make the results of habitat conservation with its "broad suite of proven conservation tools" available to the public and FWS?

Objective 4 presents the admirable goal of raising awareness of: "grassland conservation needs within the private and public sector" by "[p]roviding conservation guidance and information on grassland species to land managers". The Objective references Appendix G, but the only reference to BTPD in the appendix is to "test potential monitoring protocols for prairie dogs … [t]o estimate and track population sizes of prairie dogs … [and t]o document colony location, size, activity" and reference to mapping suitable habitat modes on Pawnee National Grassland. We request a more robust approach to describing the task of raising awareness of conservation needs for the BTPD, including measurement tools to enable the working group, FWS, and the public to determine when the objective has been met.

Objective 5 sounds like a powerful tool if used successfully. But it is difficult to understand from the Objective and following paragraph, what this really means and how it will be accomplished. Although the federal Endangered Species Act places a premium on the need to have a regulatory framework in place, it is unclear how a memorandum of understanding (MOU) will provide this framework. The BTPD receives no protection from the state or its regulatory agencies. How then, can an MOU provide a prevention mechanism when none is in place?

During a public meeting (the precursor to the working group) members of the Department of Agriculture (DOA) admitted that there was no method in place to track the sale, use, or storage of toxicants. Additionally, although application requirements are written on the label of the toxicant, they are not always observed or enforced. Labeling instructions for using RIDALL – ZINC II are as follows:

> Rangeland
>
> Use Restrictions: For control of prairie dogs, black-tailed (*Cynomys ludovicianus*), white-tailed (*C. leucurus*), and Gunnison's (*C. gunnisoni*) on rangeland in Western United States: (Arizona, Colorado, Kansas, Montana, Nebraska, New Mexico, North Dakota, Oklahoma, South Dakota, Texas, Utah, and Wyoming).
>
> Prebaiting: To increase acceptance of treated pellets by prairie dogs, prebait with one teaspoon of untreated wheat per mound, one or two days prior to using toxic pellets. Establish observation period during prebaiting.
>
> Baiting: After all or most of the prebait has been eaten, apply pellets only to areas where prebait was consumed. Apply pellets by hand as a six-inch bait spot on edge of each mound or in adjacent feeding area. Apply at the rate of one teaspoon

per bait spot, during late summer or fall (July-December). Do not apply more than once during this period. Dispose of spilled or unwanted pellets by burial.

In a recent movie,[1] landowners (or their agents) are shown driving all-terrain vehicles through prairie dog colonies and scattering grain throughout the area. When the DOA was contacted and asked if application requirements are enforced, the representative responded that they are not.[2]

Objective 6 is a step backward from the conservation efforts now in place! The supporting paragraph for the objective states that while "recreational shooting has been demonstrated to reduce black-tailed prairie dog population densities at specific sites, … no information is available that demonstrates that recreational shooting of black-tailed prairie dog populations is a threat to the species on a broad scale." We strongly urge the working group to obtain data that demonstrates the effects of recreational shooting of black-tailed prairie dog populations before it recommends the implementation of an action that the state previously banned.

A brief review of prairie dog shooting literature follows:

- ✓ Stockrahm (1979): fewer males; smaller litters, lower percentage of breeding yearling females.
- ✓ Knowles (1988): decreased prairie dog density; decreased colony expansion rates; spring shooting especially detrimental; behavioral response to gunfire.
- ✓ Reading *et al*. (1989): decreased colony expansion rates.
- ✓ Miller *et al*. (1993): decreased colony expansion rates.
- ✓ Irby and Vosburgh (1994): altered behavior – higher prairie dog retreat rates with increasing shooting pressure; shooters preferred colonies with high prairie dog densities.
- ✓ Vosburgh and Irby (1998): population declines; altered behavior – prairie dogs spent more time below ground on shot colonies, higher percentage of prairie dogs displaying alert postures on shot colonies.
- ✓ Keffer *et al*. (2000): emigration after shooting; altered behavior – prairie dogs spent more time below ground and less time foraging on shot colonies; changes in sex ratio and age class after shooting.

[1] National Wildlife Federation. November 15, 1998. Underdogs, Prairie Dogs Under Attack.
[2] Don Brooks, Colorado Department of Agriculture. March 2003. Personal communication.

- ✓ Knowles and Vosburgh (2001): impacts are related to shooting pressure; risk of lead poisoning; spring shooting especially detrimental.

- ✓ Wyoming Cooperative Fish and Wildlife Research Unit (2001): risk of increased predation – more frequent visits by raptors on shot colonies; risk of lead poisoning.

- ✓ Livieri (undated): possibility of precipitous declines, extirpation.

- ✓ Interviews with Professor Stan Anderson of Wyoming Coop and Pete Gober of the U.S. Fish and Wildlife Service resulted in agreement that all of the prairie dog shooting studies they were familiar with **did** find that prairie dogs were affected by shooting.

Prairie dog shooting in the two black-footed ferret Management Areas is especially problematic because it directly conflicts with ferret recovery. Every other black-footed ferret reintroduction site that exists has a prairie dog shooting closure:

- ✓ The Shirley Basin/Medicine Bow site in Wyoming includes a conservation easement between a private landowner and The Nature Conservancy where white-tailed prairie dog shooting is closed on 13,000 acres year-round.

- ✓ White-tailed prairie dog shooting is closed year-round on approximately 40,000 acres of federal, state, and private land at the Coyote Basin reintroduction site in Utah.

- ✓ Gunnison's prairie dog shooting is closed on all lands in the state of Arizona from 1 April to 15 June. Shooting in the Aubrey valley reintroduction site is also constrained by a regulation prohibiting hunting of other species besides elk in units where elk occur during the elk-hunting season. This effectively prohibits prairie dog shooting in the majority of wildlife units where black-footed ferrets are found from August through November.[3]

Supporting evidence for the Objective quote the FWS statement that "effects due to recreational shooting do not rise to the level of a threat pursuant to the definitions and constrains of the Act". However, the BTPD is an official candidate for ESA listing, and one of the five criteria for listing is overutilization for commercial, recreational, scientific, or educational purposes. In its twelve-month finding on the petition to list the BTPD under ESA, FWS stated, "…small local populations already depressed by disease and other adverse influences may suffer additive losses from shooting impacts. Shooting impacts also may contribute to population fragmentation and preclude or delay recovery of colonies reduced by other factors, such as sylvatic plague" (65 Federal Register 5483 (2000)).

[3] Robertson, Erin. 2002. Biological effects of prairie dog shooting. Unpublished.

In the absence of data convincing the working group that shooting has negative effects on black-tailed prairie dog colonies, and in the presence of data and experience demonstrating the negative effects of shooting, we urge reliance upon the *precautionary principle* until data is available that demonstrates that recreational shooting of black-tailed prairie dog populations is not a threat to the species on a broad scale. The "*precautionary principle*" warns that is imprudent to wait for "incontrovertible scientific evidence of harm before preventive action is taken" because we may cause "irreversible harm" to human health, ecosystem health, and to the economy.[4]

Conclusion

While the list of conservation and collaborative efforts is extensive, it lacks clarity and measurability, and is not time-bound. We suggest that the means of achieving success must include objectives (or sub-goals), the best indicators of achievement; and that each objective include strategies that indicate how the plans to deploy resources will aid in the achievement of the objectives. For example, the objective of collaboration with Colorado Department of Agriculture, "calls for the development of a Memorandum of Understanding between the CDOW and CDA which outlines each agencies authorities and responsibilities regarding the use of toxicants and shooting to control prairie dogs in Colorado." Lacking is the following:

- What is the measurable goal of the objective? (In other words, how will outlining the authorities and responsibilities regarding the use of toxicants to control prairie dogs in Colorado directly demonstrate "adequate"—not a measurable term—regulatory authority and regard for prairie dog conservation objectives? Regulations and requirements exist, but are not currently enforced.)
- When will the project begin?
- How will the developers know when the Memorandum is complete?
- Who will implement the plan of action that is derived from the Memorandum?
- How will the success of the Memorandum be measured?

Without the clarity, measurability, and time-bound elements, the objective cannot be achieved and the plan remains—a plan.

The Conclusion lacks any commitment to the public, for whom the State holds all wildlife species in sacred trust. It makes a commitment to the "people making a living off of the land", does not mention public land or the vast majority of Coloradoans and visitors to Colorado who do not farm or ranch. Land developers are not addressed in the conclusion either. The Colorado Public Interest Research Group (CoPIRG) asserts that 10 acres per hour are lost to development along the Front Range, and yet the staggering loss of native wildlife habitat included in this data is not considered in the conclusion. It is in many of these fragmented and isolated habitats that visitors have the opportunity of

[4] "Final Statement from the Lowell International Summit on Science and the Precautionary Principle," http://www.biotech-info.net/final statement.html, August, 2003.

viewing and photographing wildlife. Their loss is our loss. We recommend the addition of this important segment of grassland species. We remind the working group that while much of Colorado's natural heritage is agricultural in nature, the history of Colorado resides in her western alpine ecosystems and her eastern plains, which were devoid of farms or ranches until recent history.

While no one will argue the monumental task of addressing the development of the Front Range, the working group is one of the entities that can tender solutions that result in the coexistence of native flora and fauna in the midst of urban development. We look to the working group for guidance in this arena as well as the rural eastern plains.

INTRODUCTION

The last paragraph of the introduction discusses the use of an "adaptive management approach that includes new science and understanding to conservation ". This concept is defined as a Management Principle on page 12. To aid the reader, a short definition would be helpful at the point of its first use.

BACKGROUND

The first paragraph (page 8) lists the affiliations of the individuals on the working group. We take issue with the term "prairie dog special interest groups". With the possible exception of the Rocky Mountain Bird Observatory and their Prairie Partners program which focuses solely on birds, it was our belief that all the individuals who comprise the working group take a special interest in prairie dogs. We recommend the term "prairie dog special interest groups" be stricken and the individuals representing wildlife interests (rather than livestock, farming interests, etc.) replace the term.

Please include information regarding the approach to conservation on public land. We applaud your interest in working with private landowners, but caution the group to remember that 10-20% of the grasslands in Colorado are on public land, and they must also be addressed.

The Black-tailed Prairie Dog

Its Role in the Grassland Ecosystem

While controversy rages regarding the role of the black-tailed prairie dog, the notion of "keystone species" and the number of species associated with prairie dog colonies, the page-long digression does not seem to relate to the conservation of the species. The intent appears to be a lessening of the status of the BTPD. If this is the case, it seems unnecessary, since the species does not enjoy protection from the state regardless of its status. The goal of this publication is to ensure, at a minimum, the viability of the species, rather than a document that contains the type of discussion found in a scientific journal. The decision to include a discussion of whether or not the BTPD is a keystone species appears to be incongruous with the mission. We recommend the removal of the discourse in its entirety.

Status of the Black-tailed Prairie Dog and Associated Species

The word "hope" is used twice in reference to the conservation plans (page 11). Trivial though it seems, we would prefer the word "plan" or "goal" instead of a word that implies lack of control. With this plan, CDOW has every reason to believe that the goals will be met, and it has very little to do with hope and much to do with planning, partnering, implementation, and follow up.

STATEMENTS OF BROAD POLICY

Vision for Species Conservation

The quoted statements under this sub-heading are powerful (page 11). We suggest a footnote informing the reader of the source of the statements.

MANAGEMENT PRINCIPLES

Policy for Evaluation of Conservation Efforts When Making Listing Decisions (USFWS 2003)

Because of the importance of the following factors (page 12), we reiterate the ones we feel are most significant:

- authority to implement the plan exists and procedural requirements are identified
- level(s) of voluntary participation identified and secured
- regulations are in place to implement the plan
- implementation schedule identified
- explicit objectives and dates for achieving them are stated
- steps to meet objectives are clearly identified
- quantified parameters that will demonstrate achievement and standards for measurement are identified

It is of great concern to us that many of the objectives of the plan do not contain all of the factors used by FWS for determining listing decisions. We will identify specific and perceived lack of measurability later in these comments (by individual objectives), but the following list contains a summary of our interests in this area:

Implementation schedules,
Explicit objectives and dates for achieving them,
Quantifiable parameters and standards for measurement,
Provisions for monitoring and reporting.

We also have concerns over the ability of the working group to exert sufficient authority to implement the plan. Additionally, we question the working group's ability to identify and secure voluntary participation for conserving the BTPD on private lands. It would be of great value to us if the working group could give an indication about how these factors will be achieved and continue to keep the public informed as these factors are completed.

Colorado Division of Wildlife 2002-2007 Strategic Plan (CDOW 2002)

We applaud CDOW for having such admirable goals (page 12), but without the inclusion of information detailing the measurability and time frames of the goals, they are merely words on a page. How will the Division maintain, create, and manage habitat? How will the Division expand wildlife conservation partnerships? How will the Division continue its efforts to preserve, protect and enhance wildlife species?

Table 1: Results of CDOW Aerial inventory – November 2002
Although the table contains useful information, it could be enhanced with the addition of private vs. public acres of prairie dogs. We recommend the working group include this data in its final plan.

OBJECTIVES AND ACTIONS

Prairie Dog Acreage and Distribution
It would be useful to put the data recounted in the first paragraph (page 15) into graph form to make it easier to visualize the information.

Please review the reason why "*A Multi-State Conservation Plan For The Black-tailed Prairie Dog, (Cynomys ludovicianus, in the Untied States, Addendum to the Black-trailed Prairie Dog Conservation Assessment and Strategy*" (Luce 2003), was selected as the baseline against which all other goals and objectives are based.

We suggest the working group define the "incentive based partnerships with both public and private landowners to secure habitat" in a more detailed manner. The way it is presented on page 15 is unclear in the sense that there is no means of understanding what will be done, how it will be accomplished, who is responsible for it, and how the public will know when it is successfully completed.

Objective 1 contains no responsibilities and no subsequent actions based on the results of the monitoring. After the results of the three-year monitoring is obtained, who will do what with them? Monitoring will increase if the populations "fall into the Yellow", but what actions (by whom, and in what time frame) will be taken to assure return to an acceptable level?

Table 3 reiterates the same actions—"gather and compile annual product sales data in Colorado by registrants (dealers and end-users) as a statewide regulation for dealing with populations that fall from "acceptable levels". How will gathering and compiling data stem the decline of populations?

Specific management tools appear to be reiterative and useless when populations fall into unacceptable regions. We urge the working group to utilize the authority they wrote of earlier in the plan to augment the populations when they are found to be in decline. To restate that SB111 requires approval for relocation across county lines is not a management tool, but a hindrance to managing the species.

The entire table is a compilation of regulations that hinder management and possible monitoring mechanisms, none of which actually enhances populations without intervention. We recommend the table be rewritten to accurately describe the tools available to manage BTPD populations.

Plague Monitoring
This section is lacking in measurable actions. Who will initiate outreach? How? When? How will the working group know that the outreach has been successful? Who will administer the voluntary reporting protocol? What action will take place if populations fall into the Orange or Red?

Objective 2 states that the CDOW will "continue its efforts to produce, encourage, and support the best available science". What are those efforts? How will they be continued? How will the working group know that those efforts have been sufficient? How will ongoing efforts be supported?

Objective 3 recognizes private landowners contributions to supporting BTPD populations. By what means will 150,000 acres of habitat be secured? By when and by whom? Who and by what means will agencies be identified as potential partners? Again, the objective lacks time frames and responsibilities in achieving measurable success. Please add these items to the Objective to make it realistic.

Objective 4 contains aggressive goals, but once again, it lacks any means of measuring the success of its goals. Adding the action item of requiring reports when populations fall into "unacceptable zones" does nothing for the recovery of the population. We recommend a more stringent set of action items that will immediately address the repopulation of areas where populations fail.

Who will "train the trainer" (page 23) and who will select the trainer? How and when will this be accomplished? How will partnerships with Colorado Farm Bureau, Colorado Cattleman's Association, etc. be built and expanded? Why aren't public landowners, non-profit landowners and conservation organizations included in this action?

How will **Objective 5** be accomplished? Actions 5.2 – 5.7 discuss the actions that will be implemented in the event populations fall into unacceptable ranges, but no time frames or responsible entities are identified. Without clear elucidation of responsibilities, we fear the actions will not follow the events in a timely manner.

Objectives 6 - 14 all lack definitive actions that include measurable actions, time frames, and responsible parties. Without the inclusion of these details, it is difficult to ascertain whether the objectives have been met.

In summary, Prairie Preservation Alliance sees much value in the Conservation Plan for Grassland Species in Colorado. We would like to see more inclusion of the public's interest and more measurable action items to assure the success of the objectives.

Finally, we strongly disagree with the recommendation to reinstitute sport shooting of the black-tailed prairie dog. This is not a management tool, but a recreation that serves an ever-decreasing portion of the population. To pander to their wishes at the expense of the 61 million people who spend $38.6 billion annually in the pursuit of wildlife viewing and photography flies in the face of reason.

Sincerely,

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13 October 2003

Colorado Division of Wildlife
Policy and Regulation Section
Attn: Grassland Species Conservation Plan
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VIA ELECTRONIC MAIL AND POSTAL MAIL

Dear Colorado Division of Wildlife Staff,

Thank you for the opportunity to respond to the draft Grassland Species Conservation Plan (Plan). I write on behalf of Forest Guardians, Center for Native Ecosystems, and Rocky Mountain Animal Defense. We have acute concerns over the contents of this Plan. In particular, we question the Plan's 1) assumption that there are currently 631,000 acres of black-tailed prairie dogs (BTPDs) in Colorado; 2) threat management scheme; 3) assessment of the threat of shooting on prairie dogs and their associates and proposal to relax shooting restrictions; 4) Assessment of ecological importance of urban prairie dog colonies; 5) assessment of the keystone role of prairie dogs in native ecosystems; 6) goal of precluding Endangered Species Act (ESA) listing for the species it covers; 7) associated species habitat requirements and species accounts; 8) partiality toward landowners and industry groups; and 9) other comments.

In addition, we have attached an errata sheet of straightforward grammatical or factual corrections.

I. Assumption of 631,000 acres of black-tailed prairie dogs in Colorado

The Plan states that, "Colorado currently exceeds all acreage and distribution target objectives" in the black-tailed prairie dog interstate plan (Plan at p. 1). We seriously question this assertion. Despite repeated requests, the Colorado Division of Wildlife (CDOW) within the Colorado Department of Natural Resources (CDNR) has not provided its raw survey data to independent scientists for verification. In fact, it has stonewalled on providing this data. It seems more than likely that 631,000 acres is an inflated estimate. Independent scientific review of the survey data should address the following questions:

- How many of these acres are actually prairie dog towns (and not, for example, ant hills)? How many of the acres that are actually prairie dog towns are active?
- How many of the active prairie dog towns have low densities as a result of sylvatic plague, poisoning, shooting, or other threats?

- What is the spatial arrangement of these active, normal- to high-population density colonies? I.e., are they isolated or part of complexes?

The Plan does not provide any basis for answering these questions, as it provides the reader only with an acreage table at p. 13 and two maps at pp. 19-20. We are apparently supposed to accept, as have the Plan's authors, this study as definitive.

The maps, however, are especially problematic, as it appears that Boulder and Weld Counties boast a staggering 448,465-acre complex! Elsewhere in Weld County, there is apparently a 189,740-acre complex! In addition, Bent County is described as containing a 206,099-acre complex! For its part, Prowers County appears to contain a 125,767-acre complex!

These acreages are simply bizarre. The black-tailed prairie dog complex at Janos in Chihuahua, Mexico, measures 90,000 acres and it is considered to be the largest of its kind in the world. Perhaps part of the problem is that the map codes density according to the number of colonies per 150 sq. km. Yet, those colonies could be extremely small, and/or have very low densities of prairie dogs, and/or not even be active prairie dog colonies, so the density classification system and consequent map at Figure 3 appear flawed.

It is also interesting to us that, given the large complexes described in Colorado, there is no mention of black-footed ferret recovery in the Plan. While black-footed ferrets are a listed species and therefore should not be included in a candidate conservation agreement, grassland species recovery in Colorado immediately brings to mind ferrets. Please explain this omission.

Most importantly, while the Plan mentions that the DOW survey is in the process of being peer-reviewed, it does not specify by whom. The survey data and analysis should be submitted to independent, leading prairie dog ecosystem scientists, such as John Hoogland, Brian Miller, and Rich Reading. Review by government biologists alone is not sufficient, as those biologists may be constrained by political factors within their agencies. It is our understanding that biologists at the Denver Zoological Foundation have repeatedly requested the survey data and CDOW has failed to provide them the data needed for rigorous ground-truthing.

II. <u>Scheme for addressing threats to BTPDs</u>

The Plan tiers its regulatory scheme to the estimated BTPD acreage in Colorado. At the presently assumed level of 631,000 acres of BTPDS, the Plan classifies BTPD acreage as within the "Blue Zone." Consequently, plague will be addressed via public outreach and voluntary reporting; poisoning will continue without state restrictions (beyond licensing); the current restrictions on shooting will be loosened to allow seasonal sport shooting; no measures are set forward for repopulation; and incentives are only "provided as necessary to provided long term protection" (See Plan at p. 18, Table 3).

In fact, the Plan largely preserves the status quo, and even regresses in regard to shooting, until BTPD acreage enters the "at risk" Orange Zone, in which there are 150,000-250,000 acres of BTPDs in the state. Even at this level, the only substantive change is that shooting will be limited to landowner damage situations. It is unclear what "landowner damage situations" means, as, at all greater levels of acreage, namely the Blue, Green, and Yellow Zones, shooting is to be allowed "to protect property" (See Table 3). Meanwhile, no restrictions will be placed on poisoning in the Orange Zone.

In fact, the Plan does not place significant restrictions on poisoning and shooting, the principal anthropogenic threats, until there are below 150,000 acres of BTPDs in the state, i.e., the "Danger" Red Zone. While the Plan stipulates that population surveys will be slated for three-year intervals, without the type of rigorous ground-truthing mentioned above, we anticipate inflated estimates of BTPD acreage in Colorado in the future. These inflated estimates may ensure that the restrictions on threats at the Orange and Red Zones are never triggered.

Poisoning. The Plan fails to provide protections for BTPDs and their associates from the threat of poisoning at present. Instead, it calls for the development of a Memorandum of Understanding (MOU) between CDOW and the Colorado Department of Agriculture outlining the regulatory authority of each. The timeframe for completing this infinitesimal step, which provides no protection to grassland species in itself, is July 2005 (See Plan at p. 3). These two agencies, housed in the same city (Denver, Colorado) and within the same administration (Governor Bill Owens) need nearly two years to draw up a merely descriptive MOU? This is indicative of the lengths to which the state of Colorado will go to avoid any real conservation action on behalf of the BTPD and its associates.

As mentioned above, no restrictions will be placed on poisoning until there are fewer than 150,000 acres of BTPDs in the state. Not only is this unwise biologically from the standpoint of BTPD persistence, it utterly fails to adequately protect the associated species covered by the plan. As the Species Accounts indicate, continued BTPD poisoning will further reduce the prey base of ferruginous hawks and swift foxes and will further reduce habitat for mountain plovers, burrowing owls, and swift foxes. Yet, nothing in the Plan reduces this threat in the foreseeable future.

The Plan is very misleading in stating that it discourages poisoning on National Grasslands (See Plan at p. 32), as the U.S. Forest Service has already restricted poisoning on its grasslands.

Shooting. As discussed below, the Plan provides for immediate loosening of restrictions on shooting. It also overstates the current restrictions and underestimates the biological and ecological significance of this threat. The Plan is misleading in stating that it discourages shooting on National Grasslands (See Plan at p. 32), as shooting is presently illegal on these areas under the very shooting restrictions to Plan seeks to reverse.

Habitat loss. Habitat conservation, while described as "a key strategy" of the Plan (See Plan at p. 30) will be achieved only through voluntary, non-regulatory measures. There is in this Plan nothing to discourage farmers from converting grassland to croplands or discouraging urban builders from replacing grasslands with stripmalls and asphalt. As we discuss below, voluntary, future conservation plans cannot be used to avoid ESA listing. In addition, the lack of guaranteed funding makes a private landowner incentive program little more than a fleeting promise.

Moreover, one of the incentive programs cited to improve land management is the Conservation Reserve Program (See Plan at p. 31). Yet, this program is at odds with shortgrass species conservation, as is correctly stated in the species account for the swift fox at p. 53.

Plague. The Plan calls largely for monitoring for plague. It is not until p. 119 that there is any mention of the potential for limiting a plague epizootic through the use of insecticide. Dr. John Hoogland has significantly limited the extent of plague epizootics using insecticides. While precaution should be applied to limit environmentally damaging repercussions of insecticides, they should in some cases be considered as a means to prevent large-scale BTPD extinction events.

We applaud the Plan's acknowledgement that preserving BTPDs over a large portion of their historic range can help mitigate the impact of plague (See Plan at p. 32). Yet, the Plan's implementing provisions will fail to achieve this end.

Cumulative impacts. The Plan professes to address the potential cumulative effects of the above threats by minimizing each of them (See Plan at p. 33). As we have shown, those threats will not be minimized – nor even altered – until we are in a "Danger" "Red Zone" situation, where there are fewer than 150,000 acres of BTPDs left in the state. How does a plan that primarily promotes the status quo reduce threats against the prairie dog ecosystem when the status quo is peppered with threats against that ecosystem?

We note that the Plan fails to provide specific safeguards for the mountain plover, swift fox, ferruginous hawk, and burrowing owl. Their protection, it would seem, will be achieved through the regulatory structure provided at Table 3. However, as discussed, this threat management scheme preserves the status quo, and its suite of threats against prairie dog associates, into the foreseeable future. We therefore do not believe the Plan provides adequate safeguards for these four prairie dog associated species or for the BTPD itself.

See our attached comments to FWS on the continued significance of the above threats to the BTPD (Attachment: Forest Guardians et al. 2003, Comments to FWS on black-tailed prairie dog).

III. Assessment of the threat of shooting on prairie dogs and their associates & proposal to relax shooting restrictions

The Plan states that the BTPD hunting season is closed east of I-25 (See Plan at p. 3). In reality, shooting can still legally occur on private and state lands. Indeed, it is occurring, at startling rates, as indicated by the state Division of Wildlife's Harvest Information Program (HIP). The HIP estimates do not distinguish between the different species of prairie dogs in CO. In total, HIP estimates that 229,502 prairie dogs were shot by 3,369 small game license-holders during 32,851 hunter-days for the 2000-2001 season. One way to gauge shooting pressure on BTPDs is by examining HIP data for those counties within the range of the BTPD in CO (Table 1a, 1b).

Table 1a. Prairie dog shooting statistics for Colorado counties within the range of the BTPD, 2000-2001. (Counties with the greatest BTPD acreage are highlighted)

County	**Number of prairie dogs shot**	**Standard Error (Number of prairie dogs shot)**	**(Number of prairie dogs shot) Lower Confidence Interval**	**(Number of prairie dogs shot) Upper Confidence Interval**
Adams	32397	13991	4975	59819
Arapahoe	1004	9	986	1022
Baca	12959	1119	10766	15152
Bent	19795	3586	12766	26824
Boulder	632	2	627	637
Cheyenne	324	1	321	327
Crowley	405	1	403	407
Douglas	1458	12	1434	1482
Elbert	243	1	241	245
El Paso	4892	157	4584	5200
Fremont	324	1	321	327
Jefferson	972	9	954	990
Kiowa	30178	10727	9153	51203
Kit Carson	810	5	801	819
Larimer	14222	1181	11908	16537
Las Animas	1539	16	1508	1570
Lincoln	648	6	637	659
Logan	14093	631	12857	15329
Morgan	2300	26	2249	2351
Otero	4082	59	3966	4198
Prowers	4309	108	4098	4520
Pueblo	7014	113	6793	7235
Sedgwick	5184	155	4881	5486
Weld	13947	335	13291	14603
Yuma	437	2	433	442

Source: HIP program report, 2000-2001. There are 29 counties within the range of the BTPD in Colorado (EDAW 2000). However, HIP does not provide data for all of those counties.

This data is undoubtedly flawed, as indicated by the wide confidence intervals. In addition, the data are extrapolated from a small sample (4,486 out of 72,677 hunters). Moreover, multiple species of prairie dogs are found in the same counties. For example, Las Animas, Douglas, El Paso, and Jefferson counties ware within the range of both the Gunnison's prairie dog and BTPD. However, the shooting statistics do provide an approximate gauge of the magnitude of the shooting threat to prairie dogs in the state.

The total take of prairie dogs in the range of the BTPD in Colorado from shooting in 2000-2001 was 174,168. In addition, as would be expected, shooting is especially high in those counties that EDAW calculated to have the greatest total active acreage. The counties with the greatest active BTPD acreage are highlighted in the table. Of these counties, all but three are experiencing BTPD take in the thousands. In total, seven counties are experiencing BTPD take in the tens of thousands. Many of these are BTPD strongholds and shooting in the state should therefore be cause for concern.

While continuing to take into consideration the aforementioned provisos on the quality of these data, it appears that shooting pressure on prairie dogs increased in the state in the 2001-2002 season. HIP estimates that 452,772 prairie dogs were shot by 3,703 small game license-holders during 54,305 hunter-days for the 2001-2002 season.

Table 1b. Prairie dog shooting statistics for Colorado counties within the range of the BTPD, 2001-2002. (Counties with the greatest BTPD acreage are highlighted)

County	Number of prairie dogs shot	Standard Error (Number of prairie dogs shot)	(Number of prairie dogs shot) Lower Confidence Interval	(Number of prairie dogs shot) Upper Confidence Interval
Adams	513	3	508	518
Arapahoe	367	2	363	370
Baca	102,394	108,976	-111,198	315,987
Bent	23,999	6,273	11,704	36,294
Boulder	1,833	43	1,748	1,918
Cheyenne	2,347	32	2,285	2,409
Crowley	238	1	237	240
Douglas	367	2	363	370
Elbert	10,450	1,096	8,302	12,598
El Paso	11,184	1,563	8,120	14,247
Fremont	367	2	363	370
Jefferson	917	11	895	938
Kiowa	4,308	83	4,145	4,472
Kit Carson	1,155	11	1,133	1,177
Larimer	4,583	70	4446	4721
Las Animas	935	5	926	944
Lincoln	28417	4654	19296	37539
Logan	1632	8	1616	1647
Morgan	5922	97	5731	6113
Otero	4015	59	3900	4131
Prowers	16500	749	15033	17968
Pueblo	8452	706	7069	9835
Sedgwick	4437	181	4083	4791
Weld	2237	9	2219	2254
Yuma	238	0	238	239

Source: HIP program report, 2001-2002. There are 29 counties within the range of the BTPD in Colorado (EDAW 2000). However, HIP does not provide data for all of those counties.

The total take of prairie dogs in the range of the BTPD in Colorado from shooting in 2001-2002 was 237,807, an increase of some 26.8% from a year prior. It is clear that shooting continues to be a threat to BTPDs in the state and appears to be, in fact, an increasing threat.

In addition, Figure 1, by the Center for Native Ecosystems, provides a startling depiction of the continued shooting of prairie dogs (all three species) in Colorado. This graph was generated using HIP data.

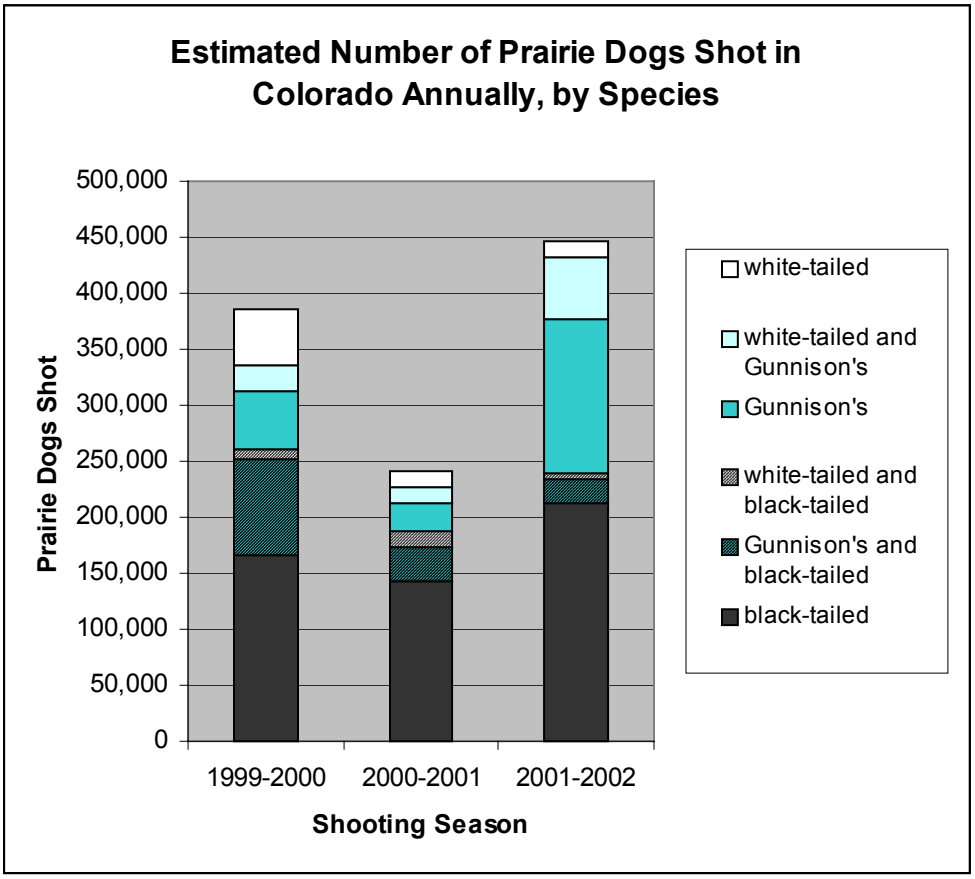

Figure 1. Graphical Depiction of Continued Shooting Threat in Colorado, using CDOW data.

The Plan goes on to cite FWS's argument that shooting does not constitute a threat to BTPD (See Plan at p. 3, 24). Alternatively, we are not swayed by FWS's position on this issue. We urge the Plan's authors to be more analytical about this issue, as well. We have provided extensive documentation on the shooting threat to FWS, and they have failed to consider this information in formulating their position (See Attachment: Forest Guardians et al. 2003, Comments to FWS on black-tailed prairie dog).

Based on this flawed understanding of current BTPD shooting in Colorado, and based on the presumption that FWS is correct in negating the shooting threat, the Plan calls for the loosening of restrictions on BTPD shooting (See Plan at p. 3). The currently closed season (on federal lands) would be replaced with a seasonal closure, from March 1-June 30 (See Plan at p. 24). This is precisely the opposite of where policy direction should be headed. How will allowing more BTPD shooting assist in the recovery of BTPDs and associated grassland species? Isn't the conservation of these grassland species the stated

goal of the Plan? We strenuously object to this provision to reduce the restrictions on shooting.

Furthermore, the only provision to protect prairie dog associates from the threat of shooting is to "inform hunters of the presence and sensitivity of other associated grassland species" (See Plan at p. 3, 32). We are not assured that this attempt at information dissemination, if implemented, will be effective in protecting prairie dog associates from either direct mortality from shooting or from the loss in prey or habitat that shooting can cause. For instance, in the Burrowing Owl Species Account, the author describes studies demonstrating direct mortality of burrowing owls from shooting (See Plan at p. 82).

IV. Assessment of ecological importance of urban prairie dog colonies

We appreciate that the Plan recognizes the importance of urban prairie dog colonies, and we support Objective 11's encouragement of open space acquisition for BTPDs and their associates (See Plan at p. 4). However, the Plan understates the value of urban colonies to associated species (See Plan at pp. 4, 27). Yet, the Plan cites a series of studies at p. 10, among which at least one (D. Weber unpublished report) show unequivocally that prairie dogs play an important role in sustaining urban raptors. In addition, the Plan acknowledges that wintering ferruginous hawks, in particular, are sustained by urban prairie dog colonies (See Plan at p. 27).

Furthermore, with routine poisoning and shooting in rural areas, it may well be that many rural colonies tend to suffer from low population density, while urban colonies can feature moderate and high population densities. In terms of prey biomass, this is undoubtedly important. In addition, exceedingly low densities in rural areas make those populations more vulnerable to extinction events. Urban colonies may therefore prove important to the long-term persistence of the BTPD itself.

Of course, bulldozers cause routine extinction events in urban areas, and the Plan should therefore provide substantive protection for BTPDs and their associates from municipal habitat destruction. Instead the Plan only references the need for mitigating loss of prairie dog habitat in urban areas by supporting "shortgrass prairie habitat conservation" in eastern Colorado (See Plan at p. 4). The Plan provides no details on how this mitigation scheme will be structured, nor are we even informed of whether "shortgrass prairie habitat conservation" will mean the protection of actual prairie dog colonies in rural areas, or merely the conservation of non-colonized shortgrass rangeland. The latter could be accomplished, one might suppose, by paying ranchers to run cattle on areas they're already ranching. We are not convinced this the right policy direction for recovering the prairie dog ecosystem. The Plan should provide more specific, biologically defensible plans for urban development mitigation measures.

V. Assessment of the keystone role of prairie dogs in native ecosystems

The Plan understates the ecological importance of prairie dogs overall. In particular, the Plan's authors have selectively reviewed the scientific literature on prairie dogs as a keystone species. The role of prairie dogs as a keystone species is now well-established scientifically (Kotliar et al. 1999; Kotliar 2000; Miller et al. 2000). Indeed, prairie dogs probably qualify under multiple categories of keystone species – as prey and for their modification of habitat (Mills et al. 1993). More studies are regularly coming forth reporting strong relationships between prairie dogs and other wildlife. For example, Barko et al. (1999) report greater avian abundance on prairie dog colonies than on uncolonized areas and Manzano-Fischer et al. (1999) urge the protection of prairie dogs in order to mitigate against further decline of many grassland birds. These findings are particularly important for biodiversity, as grassland birds are suffering the sharpest decline of any other group of birds since the early 1970s (Knopf 1994). Miller et al. (2000) report more studies along these lines. Of the studies above, the only one cited by the Plan is Kotliar et al. (1999).

Moreover, the Plan's authors were highly selective in their description of the findings of Kotliar et al. (1999). The Plan doesn't mention that, in addition to the nine species found to be dependent on prairie dogs at some level, Kotliar et al. 1999 noted that twenty species benefited from opportunistic use of prairie dog colonies. The Plan also omits Kotliar et al.'s (1999) suggestion that some 117 additional species have life history characteristics indicating that they benefit from prairie dogs and their colonies, but there is insufficient data about those species.

Indeed, it may be that scientific research will never be able to determine all historic prairie dog associates, as research in this area has largely been post-1960. By 1960, an estimated 98% of prairie dog acreage had already been destroyed. In the face of scarcity of prairie dog acreage, associated wildlife may have altered their behavior in order to survive. For example, while the northern aplomado falcon was extirpated from its range in the southwestern U.S. by 1950, it is only recently that scientists have articulated the view that BTPD-extermination campaigns may have played a role in the disappearance of this rare falcon (See Truett 2002).[1]

The Plan's section on the keystone role played by prairie dogs should be re-written to include the above-cited information.

VI. Goal of precluding ESA listing for the species the Plan covers

Future conservation plans not a substitute for listing. The Plan's major thrust is for voluntary, nonregulatory incentives for private landowners to conserve prairie dogs and associated grassland species. In addition, a primary purpose of the Plan is for use in applying for a candidate conservation agreement with assurances (CCAA), which would

[1]The northern aplomado falcon is beginning to recolonize its former U.S. range through natural recolonization and reintroduction efforts.

ensure state control over BTPDs and their associates even if ESA listings occurred (See Plan at p. 8). However, there is overwhelming case law indicating that it is illegal for the U.S. Fish and Wildlife Service to consider future, voluntary conservation actions even of government agencies, not to mention the non-governmental parties emphasized in the Plan.

Several courts have held that future conservation efforts by federal and state agencies do not justify further delay in listing candidate species. First, district courts struck down FWS's reliance on possible future actions of the U.S. Forest Service as a basis for not warranted determinations for both the Alexander Archipelago wolf (Canis lupus ligoni) (Biodiversity Legal Foundation v. Babbitt, 943 F.Supp. 23 (D.D.C.1996) and the Queen Charlotte goshawk (Accipiter gentilis laingi) (Southwest Center for Biological Diversity v. Babbitt, 939 F.Supp. 49 (D.D.C.1996)). The U.S. District Court in Texas also rejected an FWS determination that listing was not warranted for the Barton Springs Salamander (Eurycea sosorum) because of a conservation agreement between FWS and Texas state agencies (Save Our Springs Legal Defense Fund, Inc. v. Babbitt, Civ No. 96-168-CA (W.D.Tex., Mar 25, 1997)). The court held that the efficacy of the conservation agreement was speculative (Id. at 9).

In addition, the U.S. District Court in Oregon went one step further in 1998 by holding that the National Marine Fisheries Service could rely neither on future or voluntary conservation measures within the Oregon Coastal Salmon Restoration Initiative Plan to deny listing of the Oregon Coast evolutionarily significant unit of coho salmon (Oncorhynchus kisutch) (Oregon Natural Resources Council et al. v. Daley et al., 6 F.Supp.2d 1139 (D.Or.1998)). Because they are unenforceable, the court maintained that voluntary conservation measures, like future measures, "should be given no weight in the listing decision" (Id. at 1155).

Similarly, the Oregon district court rejected FWS's reliance on the Northwest Forest Plan as a justification for finding that the bull trout (Salvelinus confluentus) faced only a "moderate" threat and was therefore warranted but precluded (Friends of Wild Swan, Inc. v. U.S. Fish and Wildlife, 945 F.Supp. 1388 (D.Or.1996)). The court stated that FWS "cannot rely upon its own speculations as to the future effects of another agency's management plans to put off listing a species" (Id. at 1398).

There is wisdom to this case law, as it would be speculation to assume that these future actions will adequately conserve species to such a degree that they no longer warrant ESA protection. In other words, we cannot gamble on the survival of imperiled species. The goal of precluding ESA listing (See Plan at p. 6) is therefore wrong-headed, as ESA listing, and importantly, critical habitat designation, at minimum prevent species extinction and can be highly effective at conserving species.

Plan's failure to meet FWS conservation guidance. The Plan makes mention of FWS's Policy for Evaluation of Conservation Efforts When Making Listing Decisions (PECE). Yet, the Plan does not apply the PECE to the voluntary, nonregulatory incentives for grassland species. Understandably so, as these incentives would fail on

both of the PECE's major thrusts: 1) it is not clear they will be effective in adequately safeguarding grassland species; and 2) the Plan can provide no guarantees of stable, adequate funding source for the incentives touted.

On the latter issue of funding, the Plan calls for "pursuing partnerships" with governmental and non-governmental entities and "developing innovative ideas" for grassland conservation (See Plan at pp. 4, 5, 29, 30). We are very unconvinced by these embryonic promises. As a side note, we are amazed that such non-substantive assertions regarding the crucial issue of funding would find their way into a Plan submitted for public comment. At this stage, there should be a well-developed, rigorous, and persuasive (to the public) set of strategies for assuring the CDOW can garner the funds required to implement the Plan.

While we regard the PECE as a thinly veiled attempt by FWS to shield itself from judicial review of its abysmal listing program, it is telling that the Plan cannot even fulfill the standards set forward in this guidance.

State hostility to prairie dog conservation. The need for federal protection of imperiled species is especially acute in Colorado, when one considers the Owens' administrations hostility to prairie dog conservation. We remind CDOW of the state's 1999 threat, under the present gubernatorial administration, to sue FWS if the latter listed the BTPD under the ESA.[2] Management of this species, and its associates, should not be kept in the hands of this hostile state. Moreover, reviews of state management of endangered species have found state protections to generally be deficient (e.g., Goble et al. 1999).

The very origins of the present working group, which are described in the Plan at pp.7-8, bring the whole grassland species conservation planning process into question. The Plan states that the working group is an extension of the interagency group which signed an earlier MOU, the goal of which was to "Develop and implement a program that achieves conservation of the black-tailed prairie dog in Colorado while recognizing that control is necessary and appropriate in areas where prairie dogs conflict with agriculture and other human activities" (See Plan at p. 8). This goal is worded so as to be meaningless in terms of restricting threats to BTPDs. Most threats arise because of conflicts with human activities – e.g., the perceived need of ranchers to shoot or poison prairie dogs. Therefore, if threats are only addressed when there aren't conflicts, it doesn't seem likely many threats will be addressed.

Indeed, in the Ferruginous Hawk Species Account, the author describes how "About 80 percent of eastern Colorado's prairie dog colonies occur on private land (EDAW 2000).

[2]The threat was in a November 3, 1999 letter by the State of Colorado (Greg Walcher (DNR Director), Ken Salazar (Attorney General), and Don Ament (Commissioner of Agriculture)) to Pete Gober, FWS. This letter states, "Under the circumstances, and given the obvious impacts to its citizens, it appears Colorado would have little choice than to move forward with litigation to protect its interests should the pending petition ultimately result in a final rule listing the black-tailed prairie dog as 'threatened.'"

Due to continued control efforts, it is likely that prairie dog colonies on most private land will tend to be small, and thus not provide the higher quality foraging habitat of large colonies and complexes" (See Plan at p. 99). This is a succinct way of stating that the status quo will not adequately conserve the grassland species covered in this Plan.

We therefore strongly recommend that the conservation plan be written with the goal of adequately addressing the threats against BTPDs and their associates and accomplishing their recovery. We recognize this would be a paradigm shift, away from using this highly objectionable conservation plan to encourage a CCAA for these species, and toward responsible, biologically sound stewardship, to which the Plan only pays empty lip-service.

VII. Associated species habitat requirements and species accounts

Associated species habitat. The Plan continually shies away from discussing the habitat requirements of BTPD-associates (see Plan at p. 2, 21). Yet, in the species accounts, there are at least some data disclosed on the habitat needs of these associates (See Plan at p. 61, 64, 77, 81, 98). This information could be useful as a lens through which to inspect the actual suitable habitat that exists in Colorado and to effectively plan for recovery of the BTPD associates covered in the Plan.

We question the assertion that swift foxes are abundant and widespread in Colorado (See Plan at p. 21). It is our contention that this species was prematurely removed from the candidate list by FWS. Indeed, as is pointed out in the swift fox species account, the species only exists on 40% of its historic range (See Plan at p. 51).

As mentioned above, we question why black-footed ferret recovery is not mentioned in this document. Clearly with such potentially extensive BTPD complexes, Colorado could be a flagship for recovering this critically imperiled mammal.

Species Accounts. There are several deficiencies within the Species Accounts attached as appendices to the Plan.

1. BTPD Species Account. The reproduction discussion in the species account for the BTPD fails to mention Hoogland (2001). Hoogland found that, for those females how successfully wean offspring, the mean litter size at first juvenile emergence is only 3.08 pups for BTPDs. Moreover, the probability of weaning a litter is only 43% for female BTPDs. These, and other findings in Hoogland (2001) should be integrated into the final Plan. Similarly, the cattle/grazing discussion in the BTPD species account should be buttressed with more recent studies, including Collins et al. (1984) and Uresk (1985), which both counter the perception that prairie dogs cause a significant economic harm to cattle ranching. In addition, other studies (e.g., Weltzin et al. 1997) indicate that prairie dogs can improve rangelands by controlling brush encroachment.

2. Mountain Plover Species Account. The "Habitat Conversion" discussion fails to mention the threat of municipal development to the Plover breeding population in South Park, Colorado.

As mentioned above, we believe the Plan fails to protect the BTPD and the four associated species it covers.

VIII. Partiality toward landowners and industry groups

Although you'll be pleased to know you've not injured our self-esteem, the Plan describes only prairie dog advocates as "special interests" (See Plan at p. 8). How is the rancher lobby not a special interest? Or the farm lobby? Or developers? Please delete this petty euphemism from the Plan. In addition, in the highly flawed review of the keystone status of the BTPD, as discussed above, the Plan states that the keystone concept has been applied to this species "to the public advertisement campaigns of special interest groups" (See Plan at p. 9). Again, sheer pettiness and unprofessionalism such as this should not be codified in the final Plan. Moreover, the keystone species discussion in the Plan stands to be improved, as described above.

The flip side of this obvious prejudice toward prairie dog advocates is the endless bowing to private landowners. At one point, the Plan makes the contention that "Another important financial contribution comes from private landowners who act as stewards for over 75% of all shortgrass prairie habitat for the benefit of all Wildlife in the state of Colorado" (See Plan at p. 29). What qualifies all of these landowners as "stewards"? In terms of biodiversity protection, some may act favorably toward native wildlife, while others may not. We point out that habitat destruction – including that of these presumed "stewards" in Colorado, when the incentives are right – factors in the imperilment of each of the five species covered in this Plan. This tenuous assertion should therefore be deleted from the Plan.

In addition, as discussed above, the threat management scheme presented at Table 3 in the Plan refuses to place constraints on poisoning, shooting, and habitat destruction, out of excessive deference to private landowners and to avoid any disruption of the status quo.

IX. Other comments

Private Landowner Conservation Agreements. We are concerned that emphasis is put on private landowner conservation and yet the formula for this is not detailed in the Plan. For instance, the reader is told that 150,000 acres of highly quality shortgrass prairie habitat will be protected through permanent or long-term conservation easements or conservation agreements by 2011 (See Plan at p. 22). However, the contents of these easements or agreements are not disclosed. Will BTPD shooting or poisoning still be allowed within these areas? The answer to this question is not provided in the Plan. It should be, otherwise, meaningful public input on the potential for such easements or agreements to achieve prairie dog conservation will be precluded.

State Land Board Lands. We object to the CDOW's neglect of grassland species conservation on state land board lands. Promises of future policy planning between the state land board and CDOW are insufficient (See Plan at p. 26). The Plan's refusal to address state land board lands indicates, it would seem, CDOW's desire to preserve the status quo and avoid ESA listing, notwithstanding the continued decline of BTPDs and their associates.

Comanche National Grassland. For some reason, the Plan glosses over the need to protect and restore BTPDs and their associates on the Comanche National Grassland in southeast Colorado. Instead, the reader is told that the Comanche's leadership should focus on sand sage species (see Plan at p. 26). While the lesser prairie chicken and long-billed curlew are deserving of protection, there is also extensive blue grama-buffalograss habitat within the Comanche that would accommodate the curlew and the species covered by the Plan. Moreover, the Comanche National Grassland is commencing scoping for its long-range management plan revision, which is an opportunity for CDOW and the working group to help ensure the revised plan for this grassland promote conservation of grassland species.

Conclusions

The status quo needs to change. Yet, this Plan buttresses the status quo. It assures would-be poisoners and shooters that it will not disrupt their plans. It tells the private landowner that they don't have to change the way they "steward" their lands. After all, muses the Plan, we have 631,000 acres of BTPDs in the state. In addition, we are told, the Plan will be funded through gossamer notions of "pursuing partnerships" and "developing innovative ideas."

These thin tendrils of speculative policy provide us no assurance that the species the Plan covers will even survive, much less recover. Fundamentally, we question the assumption that nothing has to change for the prairie dog ecosystem to persist and flourish. The ESA itself offers us words of wisdom here. The law tells us that the extinction crisis in the U.S. is the "consequence of economic growth and development untempered by adequate concern and conservation" (16 U.S.C. § 1531(a)(1)). The Plan does nothing to temper destructive human activities or to infuse adequate concern and conservation into this policy debate. We are profoundly disappointed with the draft Plan and urge substantial overhaul before it is finalized.

Sincerely,

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for:

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David Crawford
Executive Director
Rocky Mountain Animal Defense

Attachments: Forest Guardians et al. 2003 Black-tailed Prairie Dog Comments to FWS <fwsreview2002.pdf>

cc: Steve Torbit, National Wildlife Federation
Jim McKee, Boulder County Nature Association
Bob Luce, Interstate prairie dog coordinator
Pat Melhop, U.S. Fish and Wildlife Service
Bob Leachman, U.S. Fish and Wildlife Service
Pete Gober, U.S. Fish and Wildlife Service
Dave Hanni, Rocky Mountain Bird Observatory

Errata sheet

p. 3, paragraph after "Objective 5" paragraph, 2nd sentence. "develop a" should be replaced with "development of a".

p. 3, paragraph after "Objective 6" paragraph; 1st sentence. This sentence is factually incorrect. Prairie dogs can be shot on private or state lands east of I-25.

p. 4. Objective 10 is missing.

p. 10, last paragraph, last sentence. The Mountain Plover listing proposal has been withdrawn by FWS, but we (Forest Guardians et al.) filed a 60-day notice of intent to sue FWS over this action, on which we plan to act.

p. 27, last full paragraph, 2nd sentence. The Mountain Plover listing proposal has been withdrawn by FWS, but we (Forest Guardians et al.) filed a 60-day notice of intent to sue FWS over this action, on which we plan to act.

p. 29. Objection 10 is missing.

p. 38, 1st paragraph under "Description and Taxonomy." There are four species of prairie dogs in the U.S., not five. There are five species of prairie dogs in North America.

p. 43, 1st full paragraph & first full paragraph under "Inadequacy of Regulatory Mechanisms." BTPD shooting on state land is not prohibited in Colorado. Nor is it banned in "all areas east of Interstate 25," given the provision for private landowners or their agents to shoot BTPDs on private lands.

p. 44, 1st full paragraph under "Poisoning." Neither aluminum phosphine nor gas cartridges are listed as toxicants legal for use on BTPDs – this is an omission.

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