

**2004 Annual Report:**  
**Prairie Dog Colonies in Five National Grasslands**

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Challenge Cost Share Agreement  
Between  
United States Forest Service and Kansas State University  
Agreement Number 01-CS-11030300-052 and 01-CS-11021200-112

October 12, 2004

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## Introduction

In 1998, the U.S. Fish and Wildlife Service was petitioned by the National Wildlife Federation to list the black-tailed prairie dog (*Cynomys ludovicianus*) as threatened under the Endangered Species Act (Graber et al. 1998). The listing was found warranted but precluded; the black-tailed prairie dog is currently listed as a *candidate* species (U.S.D.I. 2000). Since the initial petition for listing, conservation efforts have increased dramatically in order to preclude the listing in the future. Prairie dogs are extremely important to the prairie ecosystem and have been established as a keystone species (Miller et al 1994, Kotliar et al.1999, Kretzer and Cully 2001) because they alter the plant community, provide shelter to numerous prairie-dwelling species, and serve as a food source to various predators such as coyotes and raptors. Over the past century, prairie dog populations declined steadily as a result of habitat loss caused by urban sprawl and agricultural conversion of grasslands, poisoning due to perceived conflicts with farmers and ranchers, and sylvatic plague (*Yersinia pestis*). At present, prairie dog populations cover only 2% of historic areas (Miller and Cully 2001). Sylvatic plague is perhaps the most severe threat to the persistence of the black-tailed prairie dog.

All prairie dog species show some level of susceptibility to sylvatic plague (Holdenried and Quan 1956). Previous research demonstrates that sylvatic plague is extremely devastating in Gunnison's (Cully et al. 1997; Lechleitner et al. 1968; Rayor 1985) and black-tailed prairie dog (Miles et al. 1952, Barnes 1982, 1993, Cully et al. 2000). Black-tailed prairie dogs are one of the most susceptible prairie dog species to sylvatic plague, while white-tailed prairie dogs show lower mortality when plague

strikes. This may be attributed to the dramatic differences in sociality among species, which in turn leads to different densities within the colonies and ultimately, the density of prairie dog colonies within complexes. Black-tailed prairie dogs are the most social of all species of prairie dog, which increases contact rates between prairie dogs within family groups or coterries and members of other coterries, and therefore increases the transmission of plague. This social contact provides an easy route for plague to rapidly move across a colony in a short amount of time.

Sylvatic plague has been found to affect >200 species of mammals worldwide (Poland and Barnes, 1979), 78 of which are found in North America (Barnes 1982). Sylvatic plague cannot be controlled over large areas with currently available methods and typically has a within colony mortality rate of >99% on black-tailed prairie dogs. This lack of control is attributed in part to a lack of knowledge of the spatial and temporal dynamics of sylvatic plague in the black-tailed prairie dog environment and those environments closely related to black-tailed prairie dogs.

Plague came into the United States at the beginning of the twentieth century in the San Francisco Bay area. The disease spread across the western U.S. to approximately 102° longitude, its current range, by about 1950. Plague was first documented on the Cimarron National Grasslands in 1945, and was subsequently confirmed in 1997 and 1999 (Cully et al. 2000, Cully unpublished records). Plague was documented on Thunder Basin National Grassland in 2001. Die-offs, attributed to plague were first documented on the Kiowa and Rita Blanca National Grasslands in 2002 and 2003. In 2004, plague was confirmed there and spread to neighboring colonies, producing a significant decrease in active colony area. Plague has not been positively documented on the Comanche

National Grassland, however it has been documented nearby. Plague is the only disease known to cause extensive die-offs among prairie dogs (Barnes 1993) so the extensive die-offs observed on these grasslands are assumed to be due to plague.

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Unfortunately, past research efforts only afford a limited amount of information concerning the dynamics of sylvatic plague. Because prairie dogs are so susceptible to plague, mortality rates in colonies often approach 100%; they are conspicuous diurnal mammals so that people often notice when a colony disappears. In this context, prairie dogs serve as public health sentinels to warn people when plague is present in an area. Prairie dogs are only one of several components of the ecology of plague. Other rodent species, which can provide long-term maintenance for plague between prairie dog epizootics, must also be involved. Our research is designed to gain information about the spatial distribution of plague on five National Grasslands: Thunder Basin, Cimarron, Comanche, Kiowa, and Rita Blanca. Our goal is to identify the landscape-scale dynamics of plague in complexes of prairie dog colonies on these grasslands. To accomplish this, we use mapping data to track the movement of plague and patterns of recolonization of colonies on the grassland each year. In a separate study we trap rodents each year to gain information about the spatial dynamics of plague in the nocturnal (enzootic) rodent community, which should provide clues on how plague is transmitted from the enzootic community to prairie dogs.

## Methods

Colonies were mapped on the five national grasslands between late May and early August 2003 and 2004. We used a hand-held Trimble GeoExplorer3 GPS unit set to

obtain positional readings every second. Colonies were accessed and traversed during mapping with an ATV. Active areas of colonies were determined by examining the area for active digging near and on burrow mounds, the presence of fresh prairie dog droppings, and clipped vegetation indicating foraging activity or the characteristic mowing of vegetation to enhance visibility at the colony. We did not intentionally map any prairie dog colonies on private land, however, in some cases we did map colonies on private land where there were no fences and private land could not be distinguished from forest service property. These colonies are included in the total area of active colonies on each grassland. In order to show year-to-year changes in abundance of prairie dogs, only the active areas of each colony were mapped.

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We visited all previously recorded locations of prairie dogs, many of which do not host prairie dogs at this time, and appear to have been devoid of prairie dogs for some time. These areas, however, represent suitable habitat and are revisited each field season in the event that recolonization has occurred. These areas are indicated on the maps in one of three categories; historic colony, which indicates a colony that is currently devoid of prairie dogs and shows little to no evidence of burrows; old colony, which indicates a colony where more than one half of the burrows are filled in and the colony probably has not been inhabited by prairie dogs for more than a year; or inactive colony, which represents a colony that has recently died out, but more than one half of the burrows are still open and appear useable. Additionally, colonies were observed for the presence of Burrowing Owls. An extensive search for Burrowing Owls was not made at each colony. However, when Burrowing Owls were spotted, a GPS reading was taken near the middle of the colony. No Burrowing Owl density data, only presence/absence data were

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collected. These data are an opportunistic record of Burrowing Owls inhabiting colonies at the study sites.

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Files were downloaded from the GPS unit to a laptop computer using GPS Pathfinder Office. All files were differentially corrected using base station files from the Bureau of Land Management base station in Casper, WY for colonies in the Thunder Basin and files obtained from the Forest Service base station in Elkhart, KS for the Comanche, Cimarron, Kiowa and Rita Blanca National Grasslands. The files were then exported to ESRI ArcView 3.2. Once in ArcView, files were combined by grassland and re-projected to NAD 1927, to be compatible with themes developed by the Forest Service. All data were then combined into an ArcView 3.2 project, which accompanies this report on a compact disk. Themes include: 1999 colonies, 2001 colonies, 2002 colonies, 2003 colonies, 2004 colonies, inactive colonies, old colonies, historic colonies, Burrowing Owl locations, roads, and Forest Service and private or state owned land.

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A Microsoft Access database including all records from 1999 and 2001-2004 was created. Tables include all data on colonies, including information about each colony, i.e. area, perimeter, time and date mapped, and maximum pdop. These tables are included on the accompanying CD. Annual change analysis was preformed on colonies mapped during 2003 and 2004. We did not include colonies that were missed or new colonies that were discovered from one year to the next that had an area of >10 ha.

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## Results

### ***Thunder Basin National Grassland (2003)***

On Thunder Basin National Grassland, which underwent a plague epizootic during 2000-2001, 140 colonies were located and mapped in 2003 covering 2278 ha; 144 colonies were mapped in 2002 that covered 1750 ha. For the change analysis we used colonies that were mapped in both 2002 and 2003, as well as new colonies discovered in 2003 that had areas <10 ha. The area was 1652 ha for 2002 and 2135 ha for 2003. Colonies mapped but not included in the change analysis (see Appendix A) comprise 98 ha of colonies mapped in 2002 that were subtracted from the 2002 area total. In 2003, 380 ha of new colonies (see Appendix A) were identified. Of these colonies, those that were >10 were not included in change analysis and comprise 144 ha. This area was subtracted from the total 2003 area. Colonies that were mapped in both years show an increase in total active area of 29%.

We also identified historic, old, and inactive colonies on the Thunder Basin in 2003 (see Appendix A). Three historic colonies, 14 old colonies, and 22 inactive colonies were recorded there in 2003. Additionally, seven colonies were inhabited by Burrowing Owls. Newly discovered colonies as well as newly recolonized areas of colonies (see Appendix A) that had been devastated by plague during the recent epizootic were mapped and contributed an additional 380.19 ha of active area on Thunder Basin in 2003.

### ***Thunder Basin National Grassland (2004)***

Despite the recent plague epizootic and current information concerning the continued occurrence of plague in the Thunder Basin system, colonies continue to rapidly

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increase in size. In 2004, 157 colonies totaling 3847 ha were mapped in Thunder Basin. To calculate annual change, we used the total area, 2278 ha, mapped in 2003 and 3847 ha of colonies mapped in 2004. Annual change analysis for the Thunder Basin National Grassland in 2004 shows a 69% increase in active colony area when compared with colonies present in 2003.

While mapping in Thunder Basin in 2004, 17 new colonies were located and mapped (see Appendix A). These colonies ranged from 0.14 to 12.87 ha and were all included despite that one colony, TB80, was >10.0 ha. This colony was first visited in 2002 and deemed inactive. We are able to conclude from annual visits to the colony that the area active in 2004 is in fact a result of a single recolonization year and should therefore be included in annual change analysis. Additionally, three historic colonies, five old colonies and 21 inactive colonies were mapped (see Appendix A). Burrowing Owls were observed on 24 colonies.

### ***Comanche National Grassland (2003)***

Colonies on the Comanche National Grassland showed a reduction in growth rate in 2003, as compared to 2002. Active colony area on the Comanche in 2003 was 2680 ha, whereas in 2002 we mapped 2497 ha. In 2003, 118 active colonies were mapped, in 2002, 110 colonies were mapped on the Comanche National Grassland. Seven new colonies were mapped in 2003, generating 67 ha; 38 ha of new colonies were subtracted from the 2003 total, yielding 2642 ha (see Appendix B). Area of colonies mapped both years increased only 116 ha from 2002 and 2003, a six percent growth rate. The Comanche National Grassland is host to 42 historic colonies (see Appendix B). Two



inactive colonies (see Appendix B), and two old colonies (see Appendix B) were located and point readings taken. Of the 118 colonies in the Comanche, 48 were occupied by Burrowing Owls.

#### **Comanche National Grassland (2004)**

The total active area of colonies present in Comanche National Grassland in 2004 increased by 79% from those present in 2003. In 2004, 4910 ha of active area was mapped at 137 colonies. We mapped 20 newly discovered colonies (see Appendix B) covering 146 ha, of which 46 ha were included in the 2003-2004-change analysis; four new colonies were >10 ha and were consequently not included. Area of colonies mapped both years increased from 2680 ha in 2003 to 4810 ha in 2004. Despite the radical increase in active area present in Comanche National Grassland, the numbers of historic, old and inactive colonies remained relatively stable. In 2004, 40 historic colonies, two inactive and two old colonies were revisited and their status confirmed (see Appendix B). Burrowing Owl presence was documented on 118 of 137 colonies.

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#### **Cimarron National Grassland (2003)**

The Cimarron National Grassland in 2003 continued to show consistent annual growth as well as the presence of at least one newly inactive colony, potentially due to a plague epizootic, but not confirmed. In 2003, we mapped 1622 ha at 60 active colonies. In 2002, the active area at the Cimarron was 1344 ha. Newly formed colonies (see Appendix C) in 2003 account for 22 ha and were included in the annual change analysis. The active area in the Cimarron increased by 21% from 2002 to 2003. Most colonies on the Cimarron remained active each year, however in 2003, five historic colonies and one

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inactive colony (see Appendix C) were mapped. In addition, Burrowing Owls were observed on 42 of the 56 colonies at the Cimarron National Grassland.

#### **Cimarron National Grassland (2004)**

Fifty-five colonies totaling 2280 ha of active area were mapped at the Cimarron National Grassland in 2004. Colonies present in 2003 (1622 ha) and 2004 (2280 ha), showed a 41% annual increase in area. Two new colonies (see Appendix C) comprising approximately six ha were located and included in the change analysis in 2004. Historic and inactive colonies present at the Cimarron National Grassland remained unchanged from 2003-2004 (see Appendix C), and Burrowing Owls were located on 46 of 55 colonies.

#### **Kiowa and Rita Blanca National Grasslands (2003)**

The Kiowa and Rita Blanca National Grasslands showed a 15% increase in active colony area for colonies mapped both in 2002 and in 2003. In 2002, active colony area was 2186 ha, while 2003 generated 2740 ha of active colony area at 65 colonies. New colonies were located and mapped, contributing an additional 241 ha of active colonies. Therefore, the overall active area of colonies present on the Kiowa and Rita Blanca in both 2002 and 2003 as well as new colonies that are <10 ha is 2514 ha. Also located and mapped on the Kiowa and Rita Blanca in 2003 were six historic colonies, nine inactive colonies, and two old colonies (see Appendix D). There were five inactive colonies in 2002 and an additional four in 2003. The nine inactive areas represent colonies that were extirpated (presumable by plague) between 2001 and 2003. Burrowing Owls were observed on 42 of the 65 colonies.

#### **Kiowa and Rita Blanca National Grasslands (2004)**

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In 2004, 24 colonies on the Kiowa and Rita Blanca National Grasslands experienced substantial die-offs and plague was subsequently confirmed on six colonies (see Appendix D). Colonies that suffered die-offs decreased in area by 94%. Despite this large die-off, active colony area only decreased 34% across the entire grassland. Active colonies present in 2003 covered 2740 ha, while active colonies covered 1809 ha in 2004. Four new colonies were discovered and mapped in 2004, constituting 15 ha (see Appendix D). All new colonies were <10 ha and were therefore included in total active colony area when calculating annual growth. Also present on the Kiowa and Rita Blanca in 2004 were six historic colonies, two old colonies, and 14 inactive colonies (see Appendix D).

## **Discussion**

### 2003

The 2003 field season produced interesting results at every grassland. The Cimarron National Grassland near Elkhart, KS continued to be the most stable complex, exhibiting another large increase in active colony area of 19% in 2003. Every year we have worked at the Cimarron, at least one colony has been extirpated. Colony 28B was found to be inactive in 2003. This colony is located within one mile of two other colonies, 28B SOUTH and 28B SOUTH-B, both of which have experienced periods of inactivity since 2001. Fleas were collected from colony 28B SOUTH-B and analyzed by the Center for Disease Control and Prevention (CDC) in Ft. Collins, CO in 2002, but failed to yield plague positive results. It is therefore not known if plague is responsible for this die-off.

The Comanche National Grassland, which has consistently shown average annual increase of greater than 30%, only increased 6% during 2003. Conditions on this

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grassland presented problems for mapping during the 2003 season. ~~w~~Vegetation, especially purple threeawn (*Aristida purpurea*), was extremely high on some colonies, making it difficult to see the prairie dogs and the less active portions of the colony. 2002 was a dry year in which we observed a considerable increase in active colony area. The method we use to map includes examining the vegetation present on and near the colony for the occurrence of “clipping”, which indicates that area is indeed being utilized by prairie dogs for foraging. These areas almost always have burrows present, which the prairie dogs may use as safety burrows but not necessarily inhabit. The clipped areas were extremely difficult to identify in 2003. Prairie dogs probably did not have to venture far from their primary burrows to obtain forage or could not clip the vegetation fast enough to keep up with plant growth.

The Kiowa and Rita Blanca National Grassland continued to experience die-offs in the same area where they were first observed during the 2002 field season. Between 2001 and 2002, five colonies on the Kiowa and Rita Blanca were extirpated. In 2003, four colonies in addition to those identified in 2002 were recorded as inactive. All but one of the nine inactive colonies were close together (see Kiowa and Rita Blanca map). These colonies are located south and west of Felt, OK. One colony that was inactive in 2002, RB106, had two small pockets of activity in 2003, while a neighboring town, less than one km to the southwest was newly inactive. Colonies that experienced dramatic decreases in 2003 include RB124/125, which had four small pockets of activity in 2003, RB34/148, and RB89. Fleas were collected from the inactive colonies as well as from colonies that appeared to be experiencing a die-off. Fleas were sent to the CDC in Ft. Collins, CO for analyses. Results showed no plague positive flea samples.

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The Thunder Basin National Grassland, north of Douglas, in east-central Wyoming, underwent a plague epizootic between 1999 and 2001. Two large colony complexes located north of the Cheyenne River underwent extensive die-offs but are now being recolonized. In 2002, a plague positive prairie dog flea was collected from a deer mouse on colony TB3. A small population of prairie dogs was observed on this colony in 2003, but plague may still be in the system. This area is closely bordered by private land, on which active colonies are present. Rodent trapping data for 2003 is not available yet. Although it is possible that plague remains in this system, few events were seen in 2003 that would suggest the onset of a plague epizootic involving black-tailed prairie dogs. Colonies existing in both 2002 and 2003 show a much higher annual increase from 2002 to 2003 than was exhibited from 2001 to 2002; colonies mapped in 2002 showed a slight decrease of 0.04% while colonies mapped in 2003 show an increase of 15% from 2002.

#### 2004

The outcome of 2004 fieldwork was striking. Average active colony area increases for the Thunder Basin, Comanche, and Cimarron National Grasslands were 63% and were the largest active colony increases documented during the course of this study. Colonies on each grassland consistently show increases in active area in the absence of plague and following plague epizootics (figure 1). Colonies on the Cimarron National Grassland exhibited the largest annual area increase, 41%, since we began work there in 1999. While mapping in 2004, no recent die-offs or any evidence of plague was observed there. No evidence of prairie dogs was seen at colony 28B, which was inactive in 2003; nearby colonies 28B SOUTH and 28B SOUTH-B continued to grow and successfully merged to form a continuous colony in 2004.

Colonies on the Comanche National Grasslands expanded an astounding 79% in 2004. However, this growth was not uniform across the entire grassland. Conditions present at the Carrizo and Timpas Units differed greatly. Ecologically, the Carrizo Unit was much healthier than the Timpas Unit, which has experienced prolonged drought. Colonies on the Carrizo Unit experienced an 87% increase in active area, while colonies on the Timpas Unit displayed a decrease of 5% in active colony area. Some colonies in the southeastern portion of the Carrizo Unit were observed to have a lower density of prairie dogs than normal, however prairie dogs continued to inhabit every colony and no direct evidence of plague was present on any of these colonies. Colonies showing reduced activity in the Carrizo Unit include: 7A-1, 7A-2, 7A-5, and 7B-1.

Colonies in the Timpas Unit that displayed negative growth for 2003-2004 include COM11, COM12, COM15, COM19, COM30, COM31, COM32, PAST19.1A, PAST19.2, PAST19.3, and 17.1. These colonies showed an average decrease of 28%. No colony on the Timpas Unit was found to be completely extirpated; however density of prairie dogs was low. Because we did not find any colonies with characteristic die-offs commonly indicative of plague, flea samples were not collected from these colonies and plague is presumable not responsible for the reduction observed. Decreased fitness of the prairie dogs due to prolonged drought conditions in the Timpas Unit may explain the decline in active area observed in 2004.

The Kiowa and Rita Blanca National Grasslands experienced limited colony die-off in 2002 and 2003. Field mapping in 2004 revealed widespread colony die-off in the Rita Blanca National Grassland and some die-off in the Kiowa National Grassland. Colonies on the Rita Blanca decreased from 1681 ha in 2003 to 742 ha in 2004, a 56%

decrease in active area, colonies that experienced die-off decreased in active colony area by 94%. Colonies on the Kiowa showed a 1% increase in active area, from 1059 ha in 2003 to 1067 ha in 2004. The current plague epizootic appears to be mostly concentrated in the large continuous portion of National Grassland property east of Texline, TX, and north along the Texas/Oklahoma border. However, colony die-offs were also observed on the Kiowa National Grassland about 10 miles northeast of Clayton, NM. Flea samples were collected from all colonies exhibiting die-offs. Samples collected in Oklahoma and New Mexico were sent to the Center for Disease Control in Ft. Collins, CO, for analysis. In Texas, additional samples were collected by Texas Department of Health official, Dr. Alexander, and analyzed for the presence of plague bacterium. Thus far, plague has been positively confirmed on RB19A and B, RB9, RB35, RB40, RB24, and RB37.

Colonies on Thunder Basin National Grassland continue to recover from the recent plague epizootic, however die-offs in 2004 indicate that plague may in fact still be present in this system. Flea samples were collected from three colonies, TB1, TB1B, TB8, and TB9, and sent to the Center for Disease Control for analysis, but failed to produce any plague positive findings. A prairie dog with plague titer was discovered on private land near the grassland. Despite the lack of confirmation at our colonies, we believe that plague remains in this system.

Colonies mapped on the Comanche and Cimarron National Grasslands represent the largest area of active prairie dog colonies documented in these areas. Plague was documented in 2004 in Bent County, CO, just north of the Comanche National Grassland, and is currently present in the Kiowa and Rita Blanca National Grasslands, just south of the Comanche National Grassland. If plague is present in the enzootic host community at

these grasslands, we may see another outbreak of plague in the near future. Colonies on both the Comanche and Cimarron National Grasslands have grown substantially over the last few years. As these complexes of colonies continue to grow, colonies get closer to each other and the potential for plague to devastate this system increases. ▼

It is important to continue monitoring these populations in order to understand the large-scale dynamics of plague on the western Great Plains. Continued monitoring of these systems will provide valuable insight into the mechanisms that start plague epizootics in black-tailed prairie dogs. Recolonization of areas in Thunder Basin that were devastated by the recent plague epizootic provides valuable information on recolonization patterns and rates. This information will be beneficial to conservation planners as well as to the conservation efforts concerning the black-footed ferret (*Mustela nigripes*). Areas that may be currently undergoing an epizootic, such as areas of the Rita Blanca National Grassland and perhaps Thunder Basin, may provide insight on the movement pattern and rates of spread of plague through a prairie dog complex.

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**Appendix A**  
**Thunder Basin National Grassland (2003)**

Colonies NOT mapped at Thunder Basin National Grassland in 2003

Colony	2002 Area (ha)	2003 Area (ha)	2003 Area Change (ha)	Comments
TB25	0.03	0.00	-0.03	not mapped, state section
TB25B	1.40	0.00	-1.40	not mapped, state section
TB25C	2.08	0.00	-2.08	not mapped, state section
TB25D	1.27	0.00	-1.27	not mapped, state section
TB49	37.60	0.00	-37.60	not mapped, private ground
TB81	1.03	0.00	-1.03	not mapped, private ground
TB24	1.30	0.00	-1.30	not mapped, on private land
TB24B	0.30	0.00	-0.30	not mapped, on private land
TB107B	4.02	0.00	-4.02	not mapped
TB112B	1.61	0.00	-1.61	not mapped
TB112A	3.50	0.00	-3.50	not mapped
TB107C	0.34	0.00	-0.34	not mapped
TB113	2.89	0.00	-2.89	not mapped
TB37C	0.05	0.00	-0.05	not mapped
TB37B	1.90	0.00	-1.90	not mapped
TB37	3.79	0.00	-3.79	not mapped
TB35C	0.94	0.00	-0.94	not mapped
TB35B	10.41	0.00	-10.41	not mapped
TB35	1.40	0.00	-1.40	not mapped
TB108	0.88	0.00	-0.88	not mapped
TB36	11.51	0.00	-11.51	not mapped

New colonies mapped in 2003 at Thunder Basin National Grassland

Colony	Area (ha)	Colony	Area (ha)	Colony	Area (ha)	Colony	Area (ha)	Colony	Area (ha)	Colony	Area (ha)
TB114I	2.10	TB103I	3.36	TB115E	2.89	TB135E	1.05	TB036	2.77	TB65C	0.75
TB12	3.64	TB107A	2.04	TB60A	2.53	TB130B	0.00	TB038	7.13	TB135F	5.71
TB118C	0.92	TB60B	1.38	TB59	0.31	TB103H	0.34	TB039	4.23	TB035	1.27
TB118B	0.16	TB103J	1.75	TB56B	8.55	TB0313	0.97	TB101B	3.75	TB037	5.81
TB118A	0.25	TB115B	3.40	TB127	1.32	TB115G	1.29	TB103F	4.68		
TB115H	4.05	TB51	20.03	TB43	32.78	TB0310	28.66	TB102B	3.00		
TB115F	4.60	TB99F	5.39	TB34	10.21	TB0312	1.42	TB0311	9.13		
TB115D	13.06	TB94	7.11	TB1C	9.67	TB0314	89.90	TB102C	2.76		
TB115C	12.06	TB82	1.27	TB1B	37.77	TB103G	9.22	TB114J	3.76		

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Historic colonies (2003) at Thunder Basin National Grassland

Colony	Condition
TB4	Historic
TB131	Historic
TB126	Historic

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Old Colonies (2003) at Thunder Basin National Grassland

Colony	Condition	Colony	Condition
TB40	Old Colony	TB032	Old Colony
TB53	Old Colony	TB30	Old Colony
TB125	Old Colony	TB33	Old Colony
TB0315	Old Colony	TB10	Old Colony
TB56A	Old Colony	TB63	Old Colony
TB88	Old Colony	TB56A	Old Colony
TB031	Old Colony	TB88	Old Colony

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**Appendix A**  
**Thunder Basin National Grassland (2004)**

Colonies NOT mapped at Thunder Basin National Grassland in 2004

<u>Colony</u>	<u>2002 Area (ha)</u>	<u>2003 Area (ha)</u>	<u>2003 Area Change (ha)</u>	<u>2004 Area (ha)</u>	<u>2004 Area Change (ha)</u>	<u>Comments</u>
TB133	2.05	7.59	5.54	0.00	-7.59	Not mapped, private
TB135A	1.39	18.06	16.66	0.00	0.00	Not mapped, state
TB135B	0.67	1.68	1.02	0.00	0.00	Not mapped, state
TB135C	0.43	0.00	-0.43	0.00	0.00	Not mapped, state
TB135D	1.49	0.00	-1.49	0.00	0.00	Not mapped, state
TB135E	0.00	1.05	1.05	0.00	0.00	Not mapped, state
TB24	1.30	0.00	-1.30	0.00	0.00	Not mapped, private
TB24B	0.30	0.00	-0.30	0.00	0.00	Not mapped, private
TB24C	0.10	1.49	1.39	0.00	0.00	Not mapped, private
TB24D	0.35	0.61	-0.26	0.00	0.00	Not mapped, private
TB25	0.03	0.00	-0.03	0.00	0.00	Not mapped, state
TB25B	1.40	0.00	-1.40	0.00	0.00	Not mapped, state
TB25C	2.08	0.00	-2.08	0.00	0.00	Not mapped, state
TB25D	1.27	0.00	-1.27	0.00	0.00	Not mapped, state
TB26	4.00	0.00	-4.00	0.00	0.00	active mine property, access denied
TB36	11.51	0.00	-11.51	0.00	0.00	not mapped
TB37	3.79	0.00	-3.79	0.00	0.00	not mapped
TB37B	1.90	0.00	-1.90	0.00	0.00	not mapped
TB37C	0.05	0.00	-0.05	0.00	0.00	not mapped
TB49	37.60	0.00	-37.60	0.00	0.00	Not mapped, private
TB81	1.03	0.00	-1.03	0.00	0.00	Not mapped, private

New colonies mapped in 2004 at Thunder Basin National Grassland

<u>Colony</u>	<u>2004 Area (ha)</u>	<u>Comments</u>	<u>Colony</u>	<u>2004 Area (ha)</u>	<u>Comments</u>
TB041	0.14	New Colony	TB115K	3.62	New colony
TB043	1.22	New Colony	TB115L	3.43	New colony
TB044	1.15	New Colony	TB130C	1.43	New colony
TB045	8.23	New Colony	TB80	12.87	New colony
TB103K	10.13	New colony	TB86	3.53	New colony
TB107D	8.55	New colony	TB96B	0.91	New colony
TB114K	2.37	New colony	TB97B	5.19	New colony
TB115I	8.32	New colony	TB99G	7.90	New colony
TB115J	5.99	New colony			

Historic colonies (2004) at Thunder Basin National Grassland

<u>Colony</u>	<u>Condition</u>
<u>TB126</u>	<u>Historic</u>
<u>TB131</u>	<u>Historic</u>
<u>TB4</u>	<u>Historic</u>

Old Colonies (2004) at Thunder Basin National Grassland

<u>Colony</u>	<u>Condition</u>
<u>TB032</u>	<u>Old Colony</u>
<u>TB109</u>	<u>Old Colony</u>
<u>TB125</u>	<u>Old Colony</u>
<u>TB33</u>	<u>Old Colony</u>
<u>TB63</u>	<u>Old Colony</u>

Inactive Colonies (2004) at Thunder Basin National Grassland

<u>Colony</u>	<u>Condition</u>	<u>Colony</u>	<u>Condition</u>
<u>TB0315</u>	<u>Inactive</u>	<u>TB2</u>	<u>Inactive</u>
<u>TB033</u>	<u>Inactive</u>	<u>TB41B</u>	<u>Inactive</u>
<u>TB037</u>	<u>Inactive</u>	<u>TB6</u>	<u>Inactive</u>
<u>TB046</u>	<u>Inactive</u>	<u>TB68A</u>	<u>Inactive</u>
<u>TB105</u>	<u>Inactive</u>	<u>TB7</u>	<u>Inactive</u>
<u>TB11</u>	<u>Inactive</u>	<u>TB70</u>	<u>Inactive</u>
<u>TB110</u>	<u>Inactive</u>	<u>TB8</u>	<u>Inactive</u>
<u>TB111</u>	<u>Inactive</u>	<u>TB91</u>	<u>Inactive</u>
<u>TB133B</u>	<u>Inactive</u>	<u>TB95</u>	<u>Inactive</u>
<u>TB17</u>	<u>Inactive</u>	<u>TB98</u>	<u>Inactive</u>
<u>TB1B</u>	<u>Inactive</u>		

**Appendix B**  
**Comanche National Grassland (2003)**

New colonies mapped in 2003 at Comanche National Grassland

Colony	2003 Area (ha)	Comments
17E	0.16	New colony
14M-2	10.40	New colony
5J-3	2.62	New colony
COM3	2.40	New colony
5E-3	5.22	New colony
11AS-1	7.97	New colony
14M-1	37.83	New colony

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Historic colonies (2003) at Comanche National Grassland

Colony	Condition	Colony	Condition	Colony	Condition	Colony	Condition
COM8	Historic	COM20	Historic	COM4	Historic	16AE-4	Historic
COM10	Historic	COM21	Historic	14C-2	Historic	16AE-3	Historic
COM19	Historic	COM22	Historic	16C-4	Historic	16FS-4	Historic
COM16	Historic	COM23	Historic	17BE-2	Historic	16FS-3	Historic
4J	Historic	COM28	Historic	1CN-1	Historic	16E-1	Historic
COM2	Historic	COM18	Historic	7A-4	Historic	COM6	Historic
4P	Historic	8GN-2	Historic	7A-3	Historic	14E-3	Historic
4G-1	Historic	8A-3	Historic	6I-1	Historic	5F-3	Historic
4B	Historic	8A-4	Historic	6L-1	Historic	2A-4	Historic
COM24	Historic	COM5	Historic	6L-2	Historic	COM7	Historic
4U-2	Historic						

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Old colonies (2003) at Comanche National Grassland

Colony	Condition
COM14	Old colony
COM17	Old colony

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Inactive Colonies (2003) at Comanche National Grassland

Colony	Condition
PAST14B	Inactive
5D-2	Inactive

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**Appendix B**  
**Comanche National Grassland (2004)**

New colonies mapped in 2004 at Comanche National Grassland

<u>Colony</u>	<u>2004 Area (ha)</u>	<u>Comments</u>
<u>1AE-2</u>	<u>2.62</u>	<u>New colony</u>
<u>3A-1</u>	<u>33.30</u>	<u>New colony</u>
<u>3A-2</u>	<u>33.79</u>	<u>New colony</u>
<u>5J-4</u>	<u>0.48</u>	<u>New colony</u>
<u>5P</u>	<u>0.74</u>	<u>New colony</u>
<u>8C-1</u>	<u>15.39</u>	<u>New colony</u>
<u>8C-2</u>	<u>17.92</u>	<u>New colony</u>
<u>8E-2</u>	<u>4.55</u>	<u>New colony</u>
<u>8GN-3</u>	<u>0.70</u>	<u>New colony</u>
<u>8GS-1</u>	<u>3.33</u>	<u>New colony</u>
<u>8GS-2</u>	<u>1.44</u>	<u>New colony</u>
<u>COM34</u>	<u>2.21</u>	<u>New colony</u>
<u>RC-3</u>	<u>0.24</u>	<u>New colony</u>
<u>T205B</u>	<u>3.32</u>	<u>New colony</u>

Historic colonies (2004) at Comanche National Grassland

<u>Colony</u>	<u>Condition</u>	<u>Colony</u>	<u>Condition</u>	<u>Colony</u>	<u>Condition</u>	<u>Colony</u>	<u>Condition</u>
<u>COM8</u>	<u>Historic</u>	<u>COM20</u>	<u>Historic</u>	<u>14C-2</u>	<u>Historic</u>	<u>16AE-3</u>	<u>Historic</u>
<u>COM10</u>	<u>Historic</u>	<u>COM21</u>	<u>Historic</u>	<u>16C-4</u>	<u>Historic</u>	<u>16FS-4</u>	<u>Historic</u>
<u>COM19</u>	<u>Historic</u>	<u>COM22</u>	<u>Historic</u>	<u>17BE-2</u>	<u>Historic</u>	<u>16FS-3</u>	<u>Historic</u>
<u>COM16</u>	<u>Historic</u>	<u>COM23</u>	<u>Historic</u>	<u>1CN-1</u>	<u>Historic</u>	<u>16E-1</u>	<u>Historic</u>
<u>4J</u>	<u>Historic</u>	<u>COM28</u>	<u>Historic</u>	<u>7A-4</u>	<u>Historic</u>	<u>COM6</u>	<u>Historic</u>
<u>COM2</u>	<u>Historic</u>	<u>COM18</u>	<u>Historic</u>	<u>7A-3</u>	<u>Historic</u>	<u>14E-3</u>	<u>Historic</u>
<u>4P</u>	<u>Historic</u>	<u>8GN-2</u>	<u>Historic</u>	<u>6I-1</u>	<u>Historic</u>	<u>5F-3</u>	<u>Historic</u>
<u>4G-1</u>	<u>Historic</u>	<u>8A-4</u>	<u>Historic</u>	<u>6L-1</u>	<u>Historic</u>	<u>2A-4</u>	<u>Historic</u>
<u>4B</u>	<u>Historic</u>	<u>COM5</u>	<u>Historic</u>	<u>6L-2</u>	<u>Historic</u>	<u>COM7</u>	<u>Historic</u>
<u>COM24</u>	<u>Historic</u>	<u>COM4</u>	<u>Historic</u>	<u>16AE-4</u>	<u>Historic</u>	<u>4U-2</u>	<u>Historic</u>

Old colonies (2004) at Comanche National Grassland

<u>Colony</u>	<u>Condition</u>
<u>COM14</u>	<u>Old colony</u>
<u>COM17</u>	<u>Old colony</u>

Inactive Colonies (2004) at Comanche National Grassland

<u>Colony</u>	<u>Condition</u>
<u>PAST14B</u>	<u>Inactive</u>
<u>5D-2</u>	<u>Inactive</u>

Appendix C  
Cimarron National Grassland (2003)

New colonies mapped in 2003 at Cimarron National Grassland

Colony	2004 Area (ha)	Comments
7	1.41	Inactive 2002, active 2003
46B	0.32	Split from colony 46; new colony
23B	0.58	New colony
28B SOUTH-B	3.40	New colony
80A	6.251	New colony
80B	6.594	New colony
81	2.183	New colony
82	2.268	New colony

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Historic colonies (2003) at Cimarron National Grassland

Colony	Condition
CIM1	Historic
54	Historic
20B	Historic
13	Historic
CIM1	Historic

Inactive colonies (2003) at Cimarron National Grassland

Colony	Condition
28B	Inactive

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Appendix C  
Cimarron National Grassland (2004)

New colonies mapped in 2004 at Cimarron National Grassland

<u>Colony</u>	<u>2004 Area (ha)</u>	<u>Comments</u>
<u>24B</u>	<u>0.73</u>	<u>New colony</u>
<u>71</u>	<u>5.05</u>	<u>New colony</u>

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Historic colonies (2004) at Cimarron National Grassland

<u>Colony</u>	<u>Condition</u>
<u>CIM1</u>	<u>Historic</u>
<u>54</u>	<u>Historic</u>
<u>20B</u>	<u>Historic</u>
<u>13</u>	<u>Historic</u>
<u>CIM2</u>	<u>Historic</u>

Inactive colonies (2004) at Cimarron National Grassland

<u>Colony</u>	<u>Condition</u>
<u>28B</u>	<u>Inactive</u>

## Appendix D

### Kiowa and Rita Blanca National Grasslands (2003)

New colonies and split colonies mapped in 2003 at Kiowa and Rita Blanca National Grasslands

Colony	2003 Area (ha)	Comments
RB106	0.00	Two colonies (RB106A & B) in 2003
RB124/125D	2.79	Split from RB124/125
RB124/125C	1.16	Split from RB124/125
RB124/125B	2.05	Split from RB124/125
RB124/125A	0.37	Split from RB124/125
RB106B	2.49	Split from RB106
RB106A	1.24	Split from RB106
RB29	0.37	New colony
K36	4.79	New colony
RB34B	178.27	New colony
RB19C	9.21	New colony
RB25	48.37	New colony

Historic colonies (2003) at Kiowa and Rita Blanca National Grasslands

Colony	Condition
RB57	Historic
RB70	Historic
RB75	Historic
RB49	Historic
RB136	Historic
RB51	Historic

Old colonies (2003) at Kiowa and Rita Blanca National Grasslands

Colony	Condition
RB141	Old colony
RB48B	Old Colony

Inactive colonies (2003) at Kiowa and Rita Blanca National Grasslands

Colony	Condition	Colony	Condition
RB74	Inactive	RB113	Inactive
RB112	Inactive	RB120	Inactive
RB115	Inactive	RB119	Inactive
RB147	Inactive	RB122	Inactive
RB105	Inactive		

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**Appendix D**  
**Kiowa and Rita Blanca National Grasslands (2004)**

Colonies experiencing die-offs in 2004 at Kiowa and Rita Blanca National Grasslands

Colony	2003 Area (ha)	2004 Area (ha)	2004 Area Change (ha)	Comments
K45	108.57	0.00	-108.57	Split into two colonies. K45A and B
K45A	0.00	0.38	0.38	Colony split from K45
K45B	0.00	0.25	0.25	Colony split from K45
RB105	0.00	0.00	0.00	Inactive 2004
RB113	0.00	0.00	0.00	Inactive 2004
RB115	0.00	0.00	0.00	Inactive 2004
RB120	0.00	0.00	0.00	Inactive 2004
RB120B	0.00	0.00	0.00	Inactive 2004
RB120C	0.00	0.00	0.00	Inactive 2004
RB122	0.00	0.00	0.00	Inactive 2004
RB124/125A	0.37	0.00	-0.37	Inactive 2004
RB14	48.38	0.00	-48.38	Inactive 2004
RB141A	0.00	0.00	0.00	Inactive 2004
RB141B	0.00	0.00	0.00	Inactive 2004
RB147	3.21	0.00	-3.21	Inactive 2004
RB17	3.01	0.00	-3.01	Inactive 2004
RB19A	133.60	0.00	-133.60	Split into RB19A.1, 2, 3
RB19A.1	0.00	2.12	2.12	Colony split from RB19A
RB19A.2	0.00	0.71	0.71	Colony split from RB19A
RB19A.3	0.00	1.92	1.92	Colony split from RB19A
RB19B	25.30	0.00	-25.30	Inactive 2004
RB19C	9.21	0.00	-9.21	Inactive 2004
RB21A	9.31	0.00	-9.31	Inactive 2004
RB22B	24.70	0.00	-24.70	Inactive 2004
RB33	23.64	0.00	-23.64	Split into RB33A and B
RB33A	0.00	0.43	0.43	Colony split from RB33
RB33B	0.00	0.28	0.28	Colony split from RB33
RB34	100.62	0.00	-100.62	Split into RB34A and C
RB34A	0.00	2.36	2.36	Colony split from RB34
RB34C	0.00	2.44	2.44	Colony split from RB34
RB34D	0.00	41.06	41.06	Colony split from RB34
RB34E	0.00	3.08	3.08	Colony split from RB34
RB40	121.00	0.00	-121.00	Split into RB40 A and B
RB40A	0.00	1.48	1.48	Colony split from RB40
RB40B	0.00	1.19	1.19	Colony split from RB40
RB46/137	132.07	0.00	-132.07	Split into RB46/137 A and B
RB46/137A	0.00	2.58	2.58	Colony split from RB46/137
RB46/137B	0.00	2.01	2.01	Colony split from RB46/137
RB48A	14.69	0.00	-14.69	Inactive 2004
RB9	28.39	0.00	-28.39	Inactive 2004

New colonies mapped in 2004 at Kiowa and Rita Blanca National Grasslands

<u>Colony</u>	<u>2004 Area (ha)</u>	<u>Comments</u>
<a href="#">K25</a>	<a href="#">5.05</a>	<a href="#">New colony</a>
<a href="#">K44</a>	<a href="#">1.12</a>	<a href="#">New colony</a>
<a href="#">K50B</a>	<a href="#">1.90</a>	<a href="#">New colony</a>
<a href="#">K65B</a>	<a href="#">6.49</a>	<a href="#">New colony</a>

Historic colonies (2004) at Kiowa and Rita Blanca National Grasslands

<u>Colony</u>	<u>Condition</u>
<a href="#">RB136</a>	<a href="#">Historic</a>
<a href="#">RB49</a>	<a href="#">Historic</a>
<a href="#">RB51</a>	<a href="#">Historic</a>
<a href="#">RB57</a>	<a href="#">Historic</a>
<a href="#">RB70</a>	<a href="#">Historic</a>
<a href="#">RB75</a>	<a href="#">Historic</a>

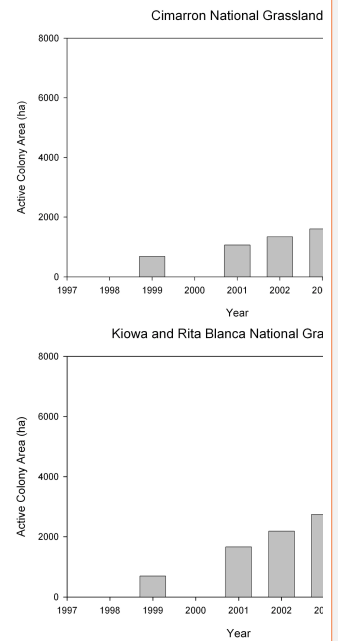
Old colonies (2004) at Kiowa and Rita Blanca National Grasslands

<u>Colony</u>	<u>Condition</u>
<a href="#">RB141</a>	<a href="#">Old colony</a>
<a href="#">RB48B</a>	<a href="#">Old Colony</a>

Inactive colonies (2004) at Kiowa and Rita Blanca National Grasslands

<u>Colony</u>	<u>Condition</u>
<a href="#">RB105</a>	<a href="#">INACTIVE</a>
<a href="#">RB112</a>	<a href="#">INACTIVE</a>
<a href="#">RB113</a>	<a href="#">INACTIVE</a>
<a href="#">RB115</a>	<a href="#">INACTIVE</a>
<a href="#">RB122</a>	<a href="#">INACTIVE</a>
<a href="#">RB14</a>	<a href="#">INACTIVE</a>
<a href="#">RB147</a>	<a href="#">INACTIVE</a>
<a href="#">RB17</a>	<a href="#">INACTIVE</a>
<a href="#">RB19B</a>	<a href="#">INACTIVE</a>
<a href="#">RB19C</a>	<a href="#">INACTIVE</a>
<a href="#">RB21A</a>	<a href="#">INACTIVE</a>
<a href="#">RB22B</a>	<a href="#">INACTIVE</a>
<a href="#">RB48A</a>	<a href="#">INACTIVE</a>
<a href="#">RB9</a>	<a href="#">INACTIVE</a>

Figure 1. Active black-tailed prairie dog colony areas for Cimarron, Comanche, Kiowa and Rita Blanca, and Thunder Basin National Grasslands. All areas show annual increases in active area when plague is not present. The Kiowa and Rita Blanca National Grassland shows a decrease in active area in 2004 due to a widespread plague epizootic occurring there.



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