Black-Tailed Prairie Dog Study of Eastern Colorado

Colorado Department of Natural Resources

October 27, 2000

EDAW

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October 27, 2000

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CONTRIBUTORS

The EDAW Team

A number of EDAW employees were involved with this project and deserve mentioning here. The two primary contributors were Brian Hoffmann, Project Manager and Senior Wildlife Biologist, and Bruce Meighen, a Resource Management and Senior GIS Specialist. Brian directed all work related to species biology issues, and Bruce led all GIS mapping and data base tasks. Additionally, Tom Keith performed senior quality assurance and Principal-in-Charge roles, and Craig Severn served as a field surveyor.

There were two subconsultants that played key, crucial roles on the EDAW team for this project. Bill Lehman, a former long-term USFWS biologist who is now an independent subconsultant in Boise, provided a critical review of the document. Dr. Jim Fitzgerald, a nationally renowned prairie dog expert, provided advice and strategic direction throughout the project and helped write the conservation strategy recommendations section.

Finally, this effort would not have been possible without the diligent efforts of the field survey team. Special thanks go to three subconsultants whose knowledge of the short-grass prairie ecosystem proved invaluable: John Norman (surveyed the eastern counties), Darby Finley (the southern counties), and Ted Toombs (the southeastern counties). Also, thanks to Craig Severn (the northeastern counties) and Brian Hoffmann (parts of the Front Range) for rounding out the field survey billet.

Acknowledgements

Many agencies and organizations need to be thanked for contributing data to this study's baseline, except that there are too many to mention here. Two that must be recognized, though, because of their outstanding contributions are the Colorado Bird Observatory (CBO) staff, most notably Scott Hutchings, and the Colorado Division of Wildlife, particularly Jennie Slater. CBO went "above and beyond the call of duty" in their contributions, providing data that greatly expanded the project's state of knowledge concerning prairie dog town locations throughout the eastern plains of Colorado. Jennie Slater, the state's Grassland Species Coordinator, who is also chairing the state's Black-tailed Prairie Dog Working Group, helped guide this project to its successful conclusion.

Thanks to all!

INTRODUCTION, BACKGROUND and OBJECTIVES

Regulatory Background

On July 30, 1998, the National Wildlife Federation (NWF) filed a petition with the U.S. Fish and Wildlife Service (USFWS) to list the black-tailed prairie dog *(Cynomys ludovicianus)* as "threatened" under the federal Endangered Species Act (ESA). On February 4, 2000, USFWS published a notice in the Federal Register summarizing its 12-month Administrative Findings on the petition, within which it was cited that the species "warrants listing", but that higher priority species deserving of more immediate attention "precludes the listing of the black-tailed prairie dog at this time" (a.k.a., a "warranted but precluded" finding). So, for now, the species is officially considered a federal candidate for listing, and USFWS will review its status every 12 months. What this federal action has stimulated, though, is a response by the various states that make up the historic range of the black-tailed prairie dog to voluntarily develop conservation strategies for the species. The USFWS expects that state-implemented conservation programs will both forestall eventual listing and promote recovery of the black-tailed prairie dog.

Study Initiation

EDAW was contracted by the Colorado Department of Natural Resources (DNR) in March 2000 to complete a *Black-Tailed Prairie Dog Study of Eastern Colorado*, hereafter referred to as "the project". The focus of the project was to establish a baseline of what is known about this species in Colorado. This included contacting species experts, and locating sources of data pertaining to black-tailed prairie dog town locations in Colorado. The objective was to assemble the various data sets into a single GIS database to serve as the state's baseline for the species. The database would then be updated as part of this study using field surveys to verify the locations and status of prairie dog towns not visited in recent years. During the updating process, new prairie dog towns observed along the survey routes would also be mapped and included in the baseline. The overall goal of this project was to develop a baseline of known black-tailed prairie dog occurrences in Colorado that would be useful in setting the state's conservation strategy for the species.

History of Black-tailed Prairie Dogs in Colorado

Because the overall purpose of this study is to establish the range and amount of occupied black-tailed prairie dog habitat in Colorado, it would perhaps be useful to first summarize what is known about their historic range in the state. Also, the reader should be aware that the terms prairie dog "town" and "colony" are essentially interchangeable, and this report takes full advantage of both uses.

Historically, black-tailed prairie dogs were abundant throughout the eastern 1/3 of Colorado. While no early estimates of acreage exist, several naturalists and researchers offered observations of their extent in the state. Cary (1911) stated: *"There is probably not a county east of the foothills in which it is not present in considerable numbers, and colonies are found in some of the broader foothill valleys to an elevation of 6,000 feet."* Hollister (1916) indicated: *"… this species is very abundant on the plains of Colorado and often occurred in towns covering several square miles."* Lechleitner (1962) had the following to offer: *"There are prairie dogs in all but nine (Denver, Hinsdale, San Juan, Pitkin, Eagle, Summit, Grand, Clear Creek and Gilpin) of the 63 counties in Colorado. In the more than 50 years since Merritt Cary made his biological survey of the state – 50 years of the horse, cow, sheep, plow, irrigation ditch, strychnine, thallium, 1080, cyanide and carbon bisulfide – prairie dogs have been greatly reduced in number and all of the larger towns are gone, but still they persist, and the outlines of their geographic ranges are not greatly altered."*

The earliest published estimate of prairie dog occupied acreage in the state is from C.P. Gillette in 1919, the State Entomologist at the time. For all three species of prairie dog in the state (Gunnison's, white-tailed, and black-tailed), Gillette stated: "*Prairie dogs inhabit about 12 million acres in the State, and are distributed over more or less territory in 55 counties."* Based on species ranges, one could assume that about 60%, or 7 million acres, of this acreage represents black-tailed prairie dogs.

Regarding early estimates of prairie dog town size, Lechleitner (1969) found few colonies exceeded 49 acres in size, and Bissell et al. (1979) calculated a mean colony size of 43 acres.

Dr. James Fitzgerald provided the following excerpt from a 1919 C.P. Gillette report. It is actually from a letter to Mr. Gillette, written by Fred Warren of Warren Livestock Co. out of Cheyenne, Wyoming, dated September 4, 1919. It is offered here as a indication of how prairie dogs were viewed in the early part of 1900's, some of which persists today.

> *… "We were, therefore, very much astonished at the result we obtained by using the poison grain that you furnished us. The fact of the matter is we had such remarkable success that we kept one and sometimes two crews of poisoners busy during the spring, fall and winter, and have attempted to poison nearly every acre of land which we own or rent in Colorado, except where the land consisted of isolated areas situated outside pest districts, and where our neighbors were not poisoning. Practically all of the poisoning has been done at the contract rate of 15 cents per acre; the poisoners furnish their own poison, board themselves, and furnish their own transportation. Altogether in Colorado and adjacent lands in Wyoming, we have poisoned or contracted for over 60,000 acres and feel that we have made an exceedingly good investment. The results obtained*

have been astonishing. Parts of our land were very heavily infested with these dogs, whereas now a prairie-dog is a very unusual sight, although, of course, we do find an occasional dog that has not been poisoned …"

Some recent accounts of acreage occupied by black-tailed prairie dogs in the state are based on partial field surveys, and on mail surveys to landowners. A 1978 and 1979 survey of 12 counties in eastern Colorado mapped 24,600 acres 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 arrived an 89,000-acre figure of occupied black-tailed prairie dog habitat in the state. Using a landowner survey approach, the Colorado Department of Agriculture reported 1,553,000 acres of occupied prairie dog (all species) habitat in Colorado. Adjusting it so that it was reflective of only black-tailed prairie dogs, the Department of Agriculture estimated 930,000 acres of occupied habitat for the species. The recent NWF petition to list the species cites a 44,000-acre figure provided by Knowles (1998) for Colorado.

Consultations with Species Experts and Literature Review

EDAW began work on this task during our proposal preparation effort, and the consultations continued during the project's data acquisition phase of work. While it was not possible to contact every species expert, nearly all of those that were consulted with agree on a key point - that the black-tailed prairie dog faces numerous threats throughout most of its range. The effects of sylvatic plague, recreational shooting, and control efforts, when combined with an increasing trend towards land conversion and habitat fragmentation, are resulting in dramatic reductions of prairie dog towns and colonies, including local extirpation of the species from some areas.

Colorado researchers and land managers who were contacted nearly all reported overall declines in black-tailed prairie dog numbers on their property or within their study area, with most acknowledging that population levels are fluctuating widely from year-to-year due to plague outbreaks. Most species experts in Colorado also freely admit to not knowing how the species is doing in the more remote, rural areas of eastern Colorado. The species status in the Front Range counties is, however, better understood. This is where the bulk of the data being incorporated into this study will come from. The Front Range is also where habitat fragmentation from urban growth and agricultural conversion is on the rise, making it harder for black-tailed prairie dog towns to recover from plague epizootics. As native prairie habitat becomes more and more fragmented, it is becoming increasingly difficult for the species to reach and repopulate plague-decimated areas of suitable habitat.

On the extent of occupied black-tailed prairie dog habitat in Colorado, most researchers were not willing to speculate. In fact, most are hoping that this study, commissioned by Colorado DNR, will shed some light on that issue. Of

the few researchers that were willing to comment on the species occupied range in the state, several believed that the number was somewhere between that offered by Knowles (1998), which was 44,000 occupied acres, and that suggested by the U.S. Fish and Wildlife Service (12-month Administrative Finding document), which is 93,000 occupied acres.

Project Objectives

The objectives of this study are as follows:

1. Locate and assemble existing data sets of black-tailed prairie dog occurrences within Colorado.
2. Field-verify at least 25% of the "known" (previously documented) prairie dog town/complex locations.
3. Develop a GIS database that includes all new, verified, and older/unverified prairie dog town/complex locations.
4. Determine a number that best reflects the current total acreage of known, occupied black-tailed prairie dog habitat in eastern Colorado.
5. Provide other relevant/important statistics from the project's database.
6. Develop a map of potential black-tailed prairie dog habitat in Colorado.
7. Consult with species experts to develop a baseline understanding of black-tailed prairie dog threats in Colorado.
8. Provide recommendations that DNR and the Colorado Division of Wildlife (CDOW) can consider in developing the state's conservation strategy for the species.

Project Challenges

The challenges the EDAW team faced in completing this project are almost too numerous too mention. But, the reader should be aware of the top two that relate to accuracy. First, it was very difficult to assemble prairie dog data sets from a variety of sources in a way that promoted consistency and accuracy, and emphasized the most recent information. Sometimes data were contradictory, in other cases they just overlapped. In instances where prairie dog town data from different sources overlapped in time and space, then the most current and reliable sources were used to describe the town boundary and status. When outside advice was needed, EDAW consulted with CDOW personnel. The end result, though, was a compiled database that achieved the highest level of accuracy possible concerning "known" black-tailed prairie dog town locations and status in Colorado, with "known" including both previous and new records.

Second, regardless of the accuracy of the final database, some caution should be exercised in interpreting the results of this study. As most people who are familiar with this study's scope already know, it does not constitute, nor was it ever intended to constitute, a complete inventory of black-tailed prairie dog occurrences for the entire state. The objective here was simply to compile data

already collected by a variety of independent survey efforts, to update a portion of that data via field verification this year (2000), and to supplement it with records of new prairie dog town occurrences. Due to budget and time constraints, it was not possible for this study to attempt a thorough survey of all remote and inaccessible areas, and no concerted attempt was made to gain access onto private lands (accept to view them from public roadside edges).

Finally, the reader is reminded that, given the threats facing this species in Colorado and throughout its range, which are summarized in the next section of this report, prairie dog towns documented as currently active may not be present in the near future. This ephemeral nature is unfortunately due to the combined effects of sylvatic plague, recreational shooting, control programs, and land conversion.

REVIEW OF SPECIES THREATS IN COLORADO

Prairie dog biologists have long been aware of the threats facing this group of species. The NWF petition goes to great lengths to enumerate the threats facing black-tailed prairie dogs throughout its historic and current range. In this section of the report, a status summary of these threats as they exist in Colorado today is provided.

Habitat Fragmentation

Reductions in black-tailed prairie dog habitat and range have occurred in Colorado due to urban development and conversion of rangelands to farming. Historically, conversion of short grass prairie to agriculture was the major cause in the loss of black-tailed prairie dog habitat. Currently, the primary threat to the loss of occupied prairie dog habitat due to habitat fragmentation can be attributed to urban development along the Front Range corridor of Colorado. Many of the historic, large black-tailed prairie dog concentrations as well as most remnant populations of black-tailed prairie dogs existed in the piedmont areas along the Front Range (Fitzgerald, pers. comm. 2000). These piedmont areas are best suited for the burrowing activities of prairie dogs; however, most of these areas were lost to irrigated agriculture. Current land use trends in eastern Colorado show fairly rapid urbanization of areas that were once irrigated cropland. As a result, most black-tailed prairie dog colonies remaining along the Front Range are there because the area is either too marginal for intensive agriculture, or it is lying idle until appropriate economic conditions favor development of the property. Few large tracts of public/governmental or other landowner lands exist along the Front Range corridor that have potential for sustained prairie dog management. Furthermore, the vulnerability of remaining black-tailed prairie dog habitat to land use conversion is high due to the majority of occupied acreage occurring on private, unprotected land.

Major land use conversions to agriculture have taken place in Colorado in the past century contributing to the loss of black-tailed prairie dog habitat. Dry land farming first started in Colorado in the late 1800's and continued to expand through the 1950's. During this time, land used for cultivation expanded from 4.6 million acres to 40 million acres, with the majority of land use conversion occurring on the eastern plains. The development of center pivot irrigation systems during the 1960's and 70's allowed for the cultivation of land that normally would not have been suitable for farming. The most recent, significant conversion of grassland to farmland occurred in the late 1970's and early 1980's. These conversions of grassland to agriculture have resulted in a patchwork of grassland/cropland habitat and created small remnant black-tailed prairie dog colonies scattered across the eastern plains. Current government programs aimed at conserving grassland habitats, such as the Conservation Reserve Program (CRP), may not always be beneficial to prairie dogs because the land enrolled in CRP may be seeded to non-native grassland. However, with prairie

dogs being able to subsist on poor quality vegetation at times (such as fields of bindweed), the true effect of CRP programs on prairie dog management, or even the threat of losing remaining grassland habitat due to cropland conversion in Colorado, remains uncertain.

At present, urban development is a more substantial threat to the loss of occupied black-tailed prairie dog habitat compared to land use conversion to agriculture in Colorado. Rapid urban development is contributing to declines in black-tailed prairie dog occupied habitat in metropolitan areas along the entire Front Range, from Colorado City/Pueblo to Fort Collins/Wellington and the Greeley/Ault areas. Statistics from the Colorado Department of Local Affairs Demography Section indicate the 10 fastest growing counties in Colorado from 1990-1998 in terms of percent change in population included Denver, Jefferson, El Paso, Arapahoe, Adams, Boulder, Larimer, Weld, Douglas, and Pueblo counties, all of which are located along the Front Range. Many prairie dog colonies exist in these areas at the interface between urban areas and croplands; however, prairie dog colonies occupying these kinds of areas cannot be easily managed or conserved. Considering these types of areas appear to have high prairie dog occupancy rates (1.6-3.1%) and make up a significant percentage of occupied prairie dog habitat in the state (USFWS 12-month finding), urbanization should be recognized as one of the primary threats to the loss of occupied prairie dog habitat. However, the specific impacts of urban development to the loss of black-tailed prairie dog occupied habitat is difficult to assess due to recent plague occurrences in these same areas.

Sylvatic Plague

Sylvatic plague was first reported in prairie dogs in Colorado in the early 1940's and has been a major limiting factor for the species. Currently, plague is the primary threat to black-tailed prairie dogs in Colorado. Recent declines in prairie dog-occupied habitat statewide have been attributed to plague. The most notable declines have been in areas along the Front Range occurring between 1994 and 1998. These areas include a 90 percent loss of prairie dog occupied habitat on the Comanche National Grasslands, a 70 percent loss of prairie dog occupied habitat on the Rocky Mountain Arsenal National Wildlife Refuge, and a 50 percent loss of prairie dog occupied habitat in the Denver metropolitan area (USFWS 12-month finding). Although towns periodically recover from plague epidemics, they often do not reach densities that were present prior to the epidemic. When plague enters a prairie dog colony, it results in almost 100 percent mortality of the animals. Despite such high mortality rates and often-limited recovery from plague epidemics, prairie dogs have had sufficient natural resiliency in terms of reproductive potential and recolonization abilities to still occur in all areas of the eastern plains with a high endemic level of plague.

Known plague outbreaks in Colorado are primarily associated with Front Range habitats. The Center for Disease Control monitors approximately 700 black-

tailed prairie dog towns along the Front Range for plague infestations (Gage, pers. comm. 2000). Higher densities of possible enzootic hosts (i.e. ground squirrels, mice, wood rats, etc.) occupying diverse habitats along the Front Range may maintain plague in nature and facilitate the recurrence of plague outbreaks in prairie dog towns in these areas (Barnes 1993, in USFWS 12-month finding). Short-grass habitat of eastern Colorado, on the other hand, has less diverse small mammal populations and may not be as conducive to maintaining plague. The grasshopper mouse is thought by some experts to be a species host responsible for maintaining the disease in eastern Colorado, but deer mice, wood rats and ground squirrels likely play a role in keeping the disease viable. Plague organisms can also survive for several years in the soil of burrow systems and have the potential to reinfect prairie dogs that may recolonize a plagued-out town. Based on CDC maps for known plague positive black-tailed prairie dog towns in Colorado, prairie dogs on the far eastern plains, especially in the north and north-central areas of the plains, may be at slightly lower risk to plague than prairie dogs in southern Colorado. The Raton Mesa and eastern extensions of canyons in southern Colorado may have a higher occurrence of plague due to more diverse small mammal populations, which are capable of carrying and maintaining the disease. Insufficient records of plague history in northeastern Colorado may account for the low incidence of plague but South Dakota and Nebraska also have fewer demonstrated cases of plague in prairie dogs.

The complex ecology of plague, combined with the other threats facing black-tailed prairie dogs, makes it especially difficult for biologists to manage and conserve the species. Also, biologists are limited by the paucity of plague data for some areas of Colorado. In reality, plague probably occurs throughout Colorado (Gage, pers. comm. 2000). But, scientists generally only learn about it in the more urban areas of the Front Range where the denser human population results in a heightened awareness of the disease and more reports of potential plague enzootics.

Recreational Shooting

Little is known about recreational shooting of black-tailed prairie dogs in Colorado, but most experts and the Service recognize this threat as low. Impacts of recreational shooting on prairie dog populations are likely limited to local effects. Due to the extensiveness of the black-tailed prairie dog range in the state, shooting would have to be exceedingly intensive, persistent, and widespread to have significant range-wide effects. Shooting would most adversely affect small isolated prairie dog colonies where intensive shooting takes place. Reports indicate that most shooting takes place on large colonies on public and tribal lands in Wyoming and South Dakota where prairie dog colonies are 10,000 plus acres (USFWS, 12-month finding). Neither the NWF nor USFWS have reported recreational shooting resulting in the extirpation of, or permanent reduction of, black-tailed prairie dog colonies. Furthermore, the

recent petition filed by NWF has prompted many states, including Colorado, to reconsider hunting regulations with regard to prairie dogs.

Currently, Colorado still has no bag or possession limits for prairie dogs and there are no seasonal restrictions for hunting the species. However, Colorado does have a five prairie dog bag limit for hunters competing in hunting contests. The Colorado Division of Wildlife does not promote shooting or poisoning prairie dogs and the Wildlife Commission has recommended a ban on hunting black-tailed prairie dogs, with the exception that private landowners would still have the authority to control the species on their land (CDOW Wildlife Report, 2000).

Control Programs

Since the early 1900's, agricultural enterprises have carried out intensive and extensive programs to control and/or eradicate prairie dogs in Colorado. A number of state, federal, and private cooperators have engaged in poisoning prairie dogs across the eastern plains. These control efforts contributed to significant reductions in the range of black-tailed prairie dogs and habitat fragmentation by decreasing the quality of burrow systems and vegetation quality, making poisoned towns less suitable for recolonization. The Colorado Entomological Service coordinated early control efforts, often with federal support by the Bureau of Biological Survey and the Predator and Rodent Control Branch of the U.S. Fish and Wildlife Service. Presently, control efforts are under the supervision of the Colorado Department of Agriculture (CDA), with the Environmental Protection Agency regulating permitted toxicants. The CDA is currently staffed with one full time employee in charge of Rodent and Predator Control Programs who primarily provides technical assistance in advising private landowners on the use and application of various toxicants used to control prairie dogs and other pest species (Miller, pers. comm. 2000). At present, there are no statistical records on the use of toxicants used to control prairie dogs and/or any other pest species. Private, licensed animal control specialists carry out most physical control programs. Reports indicate proper application of poison grain baits and/or fumigants can be effective in controlling prairie dogs, with results of an 80 to 90 percent reduction in prairie dog numbers (Andelt and Hopper 2000). Andelt and Hopper (2000) stated shooting may also be another method used to control small prairie dog towns, if efforts are intensive and conducted during February and March. This causes increased vigilance within the town and disrupts reproductive activities and removes individual animals (Andelt and Hopper 2000).

Existing Colorado laws and regulations still strongly reflect an agricultural bias against prairie dogs on private lands and an implied bias against their management on public lands. Prairie dogs are considered an "agricultural pest" by both the U.S. Department of Agriculture and the Colorado Department of Agriculture. A recent law passed by the Colorado State Legislature (Senate Bill 99-111), prohibits the relocation of prairie dogs <u>across</u> county boundaries without

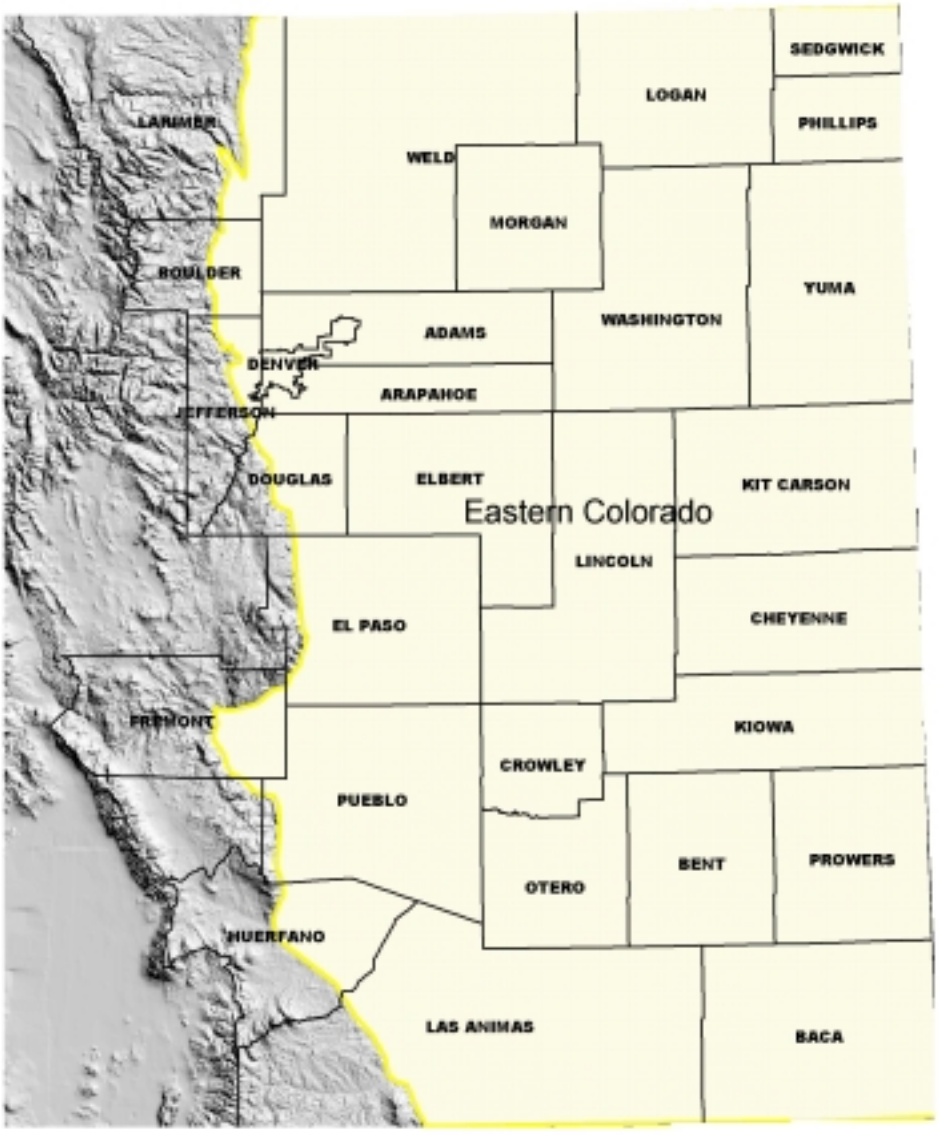
approval from the Board of County Commissioners. And, while relocations within county boundaries are somewhat easier (i.e., they no longer require County Board approval), CDOW still requires a permit for them.

Even though the desire to relocate prairie dogs may often be present, impediments to relocation probably results in a higher incidence of poisoning efforts on some prairie dog towns. The use of EPA-approved toxins, including poisons, to control prairie dogs is legal in Colorado. However, CDOW is proposing to institute a permit system, with input form the Colorado Department of Agriculture that would limit annual poisoning efforts of prairie dogs. In response to the recent NWF petition, actions have been taken by federal agencies to eliminate black-tailed prairie dog control programs on federal land (USFWS, 12-month finding). Continued poisoning of black-tailed prairie dogs on private lands is still a threat to the species in Colorado, but it is not as serious as the effects of urbanization and plague.

RANGE and POTENTIAL HABITAT IN COLORADO

Potential habitat in eastern Colorado for the black-tailed prairie dog consists entirely of short-grass and mixed prairie. Based on Fitzgerald et al. (1994), a total of 29 counties comprise the range of the species in Colorado (Figure 1).

Figure 1. Range of Black-tailed Prairie Dog in Eastern Colorado.

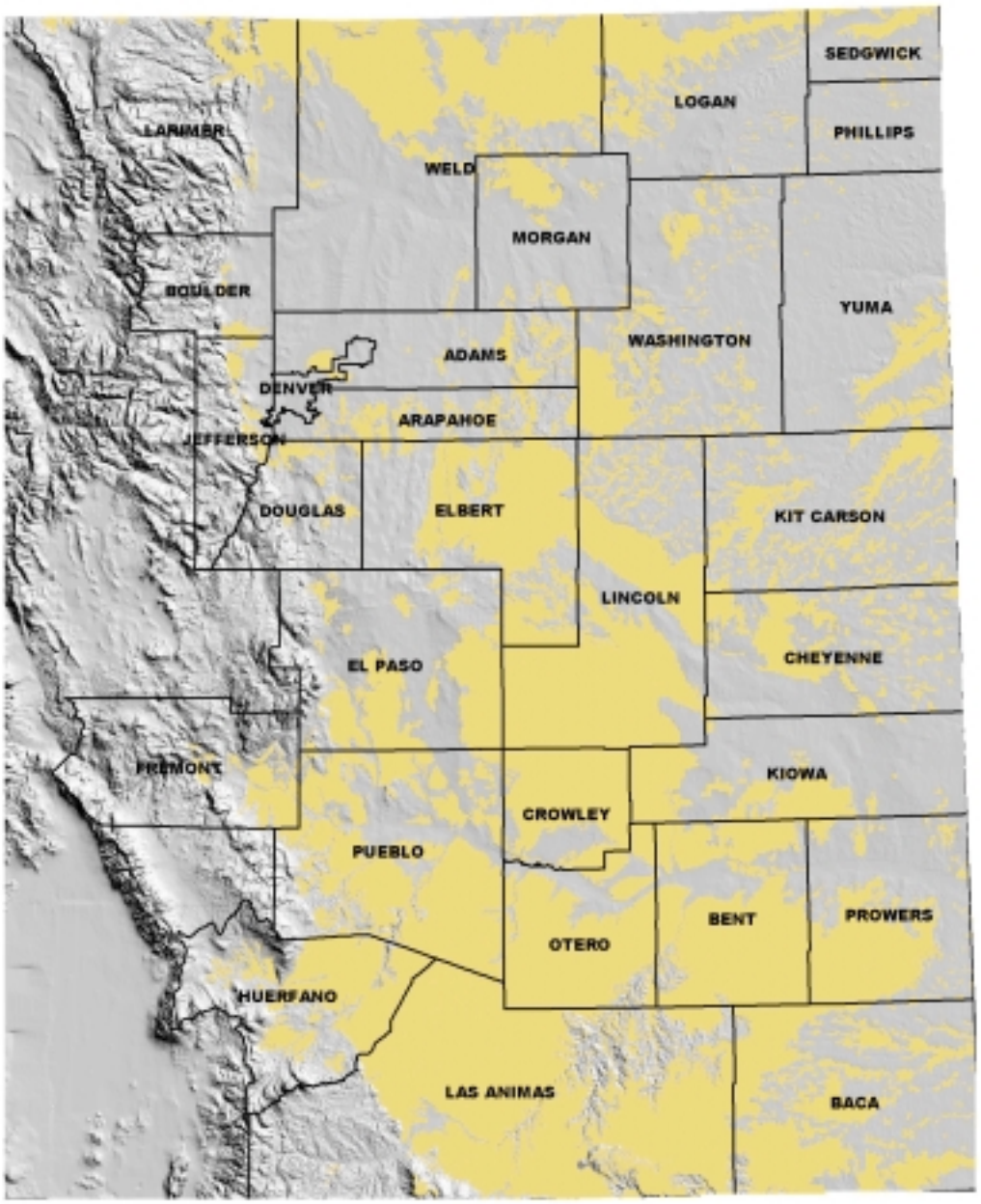


The only pre-existing database readily available that allows for GIS mapping of habitat types in Colorado is CDOW's GAP vegetation layer. Two mapping units were selected that best reflect the type of vegetation that could be occupied by black-tailed prairie dogs in the 29 eastern plains counties. These include short-grass prairie and mid-grass prairie, with the short-grass prairie type comprising the vast majority of available habitat within the species range. The following are the dominant species in these two mapping units:

> Short-grass Prairie (mapping unit attribute code: 31030) – Diagnostic species include buffalo grass *(Buchloe dactyloides)* and blue grama *(Bouteloua gracilis)*. Short-grass prairie usually consists of a short grass understory of buffalo grass and blue grama, with an overstory of western wheatgrass *(Pascopyrum smithii)*, needle-and-thread grass *(Stipa comata)*, or other mixed grass species.
>
> Mid-grass Prairie (mapping unit attribute code: 31020) – Diagnostic species sideoats grama *(Bouteloua curtipendula)*, galleta *(Hilaria jamesii)*, foxtail barley *(Hordeum jubatum)*, western wheatgrass, bluebunch wheatgrass *(Pseudiroegneria spicata)*, little bluestem *(Schizachyrium scoparium)*, New Mexico feathergrass *(Stipa neomexicana),* and green needlegrass *(Stipa viridula)*.

Based on a GAP vegetation layer using the short-grass and mid-grass prairie mapping units, a total of 11,184,397 acres of potential black-tailed prairie dog habitat currently exists in eastern Colorado (see Figure 2). Of the 11.2 million acres, 2.2 million acres, or 19%, occurs on state and federally owned lands. The remaining 9.0 million acres is in private or local government ownership.

Figure 2. Map of Potential Black-tailed Prairie Dog Habitat in Colorado.



Tan color denotes short-grass and mid-grass prairie habitat that, in Colorado, is the equivalent of potential black-tailed prairie dog habitat. *From CDOW's GAP vegetation mapping.*

DATA COLLECTION METHODOLOGY

Existing Data Compilation

Beginning with project initiation, and continuing for a period of several months, every effort was made to contact agencies and individuals in Colorado that might have data relating to prairie dog occurrences in the state. Over time, the list of contacts grew, to the extent that it is now believed that all existing prairie dog data sets covering large areas within the state have been obtained and assimilated as part of this study's baseline.

The following table summarizes the existing data sets assembled into this study. Refer to Appendix A for details regarding each of the data sets (summarized as metadata), including type and location of data and the time period when last field checked.

Table 1. A Summary of Data Sources[1].

Source Citation	Years Covered	Source Contribution
USFS – Comanche National Grasslands	1998	BTPD colonies for the Comanche National Grasslands.
USFS – Pawnee National Grasslands	1996 – 1998	BTPD colonies for the Pawnee National Grasslands.
USFWS – Rocky Mountain Arsenal National Wildlife Refuge	2000	BTPD colonies for the rocky Mountain Arsenal.
DOD – Fort Carson	1995 – 2000	BTPD colonies for Fort Carson.
Center for Disease Control – Fort Collins	1999	Point locations for BTPD colonies along the Front Range.
Colorado Division of Wildlife – Fort Collins	1979 – 1998	BTPD colonies for the northeast CDOW region. Includes information from CDOW volunteers, Weber, NEWRIS, and USFWS (Patton).
Colorado Division of Wildlife – Denver	1976 – 1983	BTPD colony data retrieved from archival data sets.
Colorado Division of Wildlife – Denver Area	2000	BTPD colonies for part of the Denver area, based on recent surveys.
DOD – Pueblo Chemical Depot	1999	BTPD colonies for the Pueblo Chemical Depot.

Source Citation	Years Covered	Source Contribution
Colorado Bird Observatory – all of eastern Colorado	2000	BTPD colonies mapped while surveying for burrowing owls, for all of eastern Colorado.
Boulder County Open Space	1997 – 1999	BTPD colonies surveyed on Boulder County Open Space lands.
Denver County Environmental Health Department	2000	BTPD colonies surveyed within Denver County.
City of Boulder	1999	BTPD colonies surveyed on City of Boulder open space property.
City of Fort Collins	2000	BTPD colonies surveyed on City of Fort Collins open space property and on Meadow Spring Ranch.
Fossil Creek Reservoir Resource Management Plan – EDAW	2000	BTPD colonies surveyed on open space areas surrounding Fossil Creek Reservoir in Larimer County.
Black-Tailed Prairie Dog Study of Eastern Colorado – EDAW	2000	Field verified and new towns surveyed as part of this study.
Boulder Mountain Parks	2000	Information surrounding Boulder Reservoir

1. Data sets were assembled into a seamless GIS database for Colorado.

Field Verification

Because of the number of prairie dog towns/complexes assembled as part of the baseline for this study, it was not possible to field verify them all. Realizing this at the outset, and being cognizant of budget limitations, DNR required that at least 25% be field checked. In this case, field checking means to simply verify whether the previously documented prairie dog town/complex was still there or not; note if it is currently active, inactive, or “converted” (to an urban or agricultural land use); and roughly determine if there has been any change to its size or shape.

A priority scheme was developed to make maximum use of, and achieve the maximum value from, the limited amount of field verification time that the project could afford. The following priorities were assigned to the oldest prairie dog town databases based on when the town was originally mapped and the date that it was last field checked:

Priority #1: *Highest Priority*. The town boundary or status has not been field checked in over 10 years (since 1990), and the town is large (> 40 acres). **There were 382 of these.**

Priority #2: *High Priority*. The town boundary or status has not been field checked in over 10 years (since 1990), and the town is small (< 40 acres). **There were 705 of these.**

Priority #3: *Moderate Priority*. The town boundary or status has not been field checked in over 5 years (since 1995). **There were 570 of these.**

Priority #4: *Low Priority.* The town status has been verified in the last 5 years (since 1995), but the boundary has not been verified in over 5 years. **There were only 9 of these.**

Priority #5: *No Priority*. Town status and boundary was verified within the last 5 years, or will be updated with more recent information within 1 year. These would only be field checked during this study if the field surveyor drove by them on their way to inspect another higher priority town. **There were 1,348 of these.**

Field Survey

Experienced field biologists conducted roadside surveys. Surveys were conducted over a two-week period. The eastern plains were subdivided into 5 areas. Each biologist was assigned an area and given 1:100,000-scale GIS-based maps of their respective areas. GIS maps contained polygons representing known/suspected prairie dog towns to be field truthed.

Biologists surveyed prairie dog towns based on the town's priority classification and whether or not the town was accessible. "Accessible" prairie dog towns were considered to be towns visible from the roadside with binoculars or a spotting scope. Field checking priority for each town was based on when the town boundary and/or status were last surveyed and the size (acreage) of each town. First, crews field checked all accessible towns assigned the status of Priority 1, followed by Priority 2, then Priority 3, and so on. All accessible prairie dog towns classified as Priority 1 or 2 were given highest priority and field checked first, towns designated as Priority 3, 4 or 5 were checked opportunistically.

The status of each prairie dog town field checked was determined as being "active", "inactive", or "no longer present". Towns classified as "active" were occupied by prairie dogs. Towns not currently occupied, but where burrows or other prairie dog sign were still visible, were classified as "inactive." Prairie dog towns were considered to be "no longer present" if there was no evidence of prairie dogs or burrows and/or the area had been developed or converted to agriculture. The status of a town was determined by surveying the colony from

the roadside using binoculars or a spotting scope. The status of each town was recorded directly onto GIS maps. Boundary adjustments were made to towns if significant expansion or contraction of the town's periphery had occurred. "New" (not previously documented) prairie dog towns that were opportunistically discovered along the survey routes were also mapped, although that was not the focus of this study. The presence of other sensitive species associated with prairie dog towns was also noted, including observations of burrowing owl (*Athene cunicularia*; state Threatened), mountain plover *(Charadrius montanus)*, and ferruginous hawk *(Buteo regalis)*.

GIS Database

Data sets from all sources were assembled into a seamless GIS database. New towns from the Colorado Bird Observatory (digitized by CDOW) and from this study's field survey effort were digitized and added to the GIS database. Boundary adjustments were also made based on field survey maps.

All colonies were coded as to their status (active, inactive, unknown status or no longer present), source, date last visited and any associated species seen near the colony. Information from the field survey and the original source information were used as reference information to verify the final GIS database. Specific information on the methodology used to develop the statewide database can be found in Appendix A.

RESULTS

Database Summary

Table 2 provides a summary of the 17 data sources that contributed to this study's baseline. The total prairie dog town acreage compiled in this study's GIS database is 314,114 acres. However, this includes all prairie dogs towns that were active and inactive, as well as towns that were "no longer present" (i.e., lost to agriculture land conversion, urbanization, or reverted to short-grass prairie).

As shown in Table 2, a total of 38% of the acreage contained in the baseline was field checked as part of this study. The other sources listed in Table 2 are for acreages that were either too recent to warrant field checking, or they represent prairie dog towns that could not be field-checked because of resource limitations (time and budget) and accessibility issues (no nearby roads, or on private land).

Table 2. Database Source Summary

Source Information		
Source	**Area in Acres**	**Percent of Area**
Black-tailed Prairie Dog Study (2000)	120,202	38.3%
Boulder County Open Space	1,021	0.3%
Boulder Mountain Parks	183	0.1%
Colorado Bird Observatory	85,754	27.3%
CDOW - Archival Data from Bissell et al. (1979)	34,496	11.0%
CDOW - Volunteer Contributions	2,739	0.9%
CDOW - Denver Area Study (Weber)	36,894	11.7%
City of Boulder	1,505	0.5%
City of Fort Collins	801	0.3%
DOD - Pueblo Chemical Depot	1,962	0.6%
DOD - Fort Carson	2,147	0.7%
Denver County Environmental Health Dept.	439	0.1%
Fossil Creek RMP (EDAW)	35	0.0%
CDOW - Northeast WRIS Data	10,498	3.3%
USFS - Comanche National Grassland	1,375	0.4%
USFS - Pawnee National Grassland	1,008	0.3%
USFWS - 1991 Northeast Colorado Study	11,081	3.5%
USFWS - Rocky Mountain Arsenal	1,975	0.6%
Total	**314,114**	**100%**

1. Includes <u>all</u> colonies; i.e., active, inactive, no longer present, and unknown status.

2. The "Black-tailed Prairie Dog Study" refers to prairie dog towns that were field checked as part of this study. The acreages shown from all other contributors represents prairie dog towns that were either too recent to require field checking, or that were <u>not</u> field checked because of accessibility and resource limitations.

2000 Field Survey Accomplishments

Surveys for this study were conducted during July through August 2000. The entire eastern plains and Front Range regions of Colorado were subdivided into 5 separate survey areas, with an experienced wildlife biologist assigned the role of field checking prairie dog towns in each. The reader is reminded that, due to resource limitations (budget and time), it was not possible to field verify every prairie dog colony included in this study's baseline. Through consultation with CDOW, it was decided to set an overall 25% field verification goal, with older data and larger towns being assigned higher priorities for field checking. The survey statistics presented in Table 3 demonstrate that, based on the 100,284 acres surveyed, a 31.9% level of field checking was achieved for previously documented towns. Also, EDAW surveyors were able to identify an additional 220 new prairie dog towns, comprising 20,444 acres of "new" (previously undocumented) active acreage. These two categories combined result in the overall total of 38% that was field checked.

Gratitude should also be expressed again to the Colorado Bird Observatory staff, which contributed details concerning 527 new prairie dog towns that they mapped as part of their ongoing statewide burrowing owl survey efforts.

Table 3. Survey Accomplishments in 2000

Survey Statistics			
Status	**Number of Colonies**	**Area in Acres**	**Percent of Area**
Surveyed in This Study	749	100,284	31.9%
Surveyed By Another Agency Within The Last 2 Years	1,367	38,557	12.3%
Surveyed By Another Agency Between 3 and 5 Years	1,335	22,756	7.2%
Not Surveyed (Not Visited in the Last 5 Years)	880	46,320	14.7%
New Colony Added As Part of Study - EDAW	220	20,444	6.5%
New Colony Added As Part of Study - CBO/CDOW	527	85,754	27.3%
Total	**5,078**	**314,114**	**100.0%**

Another important statistic not shown in Table 3 is the percent of "very old" information that was updated by this study's survey efforts. Prior to field survey, the acreage of black-tailed prairie dog towns that were over 10 years old was about 90,000 acres, or about 28% of the baseline. EDAW surveyors were able to field verify and update 60% of these.

Post-Survey Summary of Database

The GIS database was updated with information gathered during the July/August 2000 field surveys. The updating involved changes to prairie dog town status, size, and number. It also included some "final compilation" adjustments, where towns from different sources that were nearby were either combined or split. The

updated database includes190,423 acres of active black-tailed prairie dog towns, as shown in Table 4.

Table 4. Colony Status Following 2000 Field Surveys

Post -Survey Colony Status		
Status	**Number of Colonies**	**Area in acres**
Active	2,578	190,423
Inactive	1,109	21,599
Unknown Status	1,022	57,056
No Longer Present	292	45,037
Total	**5,001**	**314,114**

Variability in Colony Status

Because it was not possible to update the status of all prairie dog towns included in the study's baseline, it was necessary to assign a portion to an "unknown status" category. As shown in Table 4, this category amounted to 57,056 acres, or 18% of the updated baseline. Although the "unknown status" towns were not field checked, trends from the 2000 field surveys would suggest that a large portion of this acreage was probably still active. Table 5 provides a breakdown of the changes in colony status since the time of last survey.

Table 5. Changes in Colony Status Since Last Survey

Colony Variability Since Last Survey[1]				
Status	**Number of Colonies**	**Percent of Colonies**	**Area In Acres**	**Percent of Area**
Colony Still Active	360	48%	42,441	42%
Colony Now Inactive	97	13%	12,806	13%
Colony No Longer Present	292	39%	45,037	45%
Total	**749**	**100%**	**100,284**	**100%**

1. Most of the older data sets compiled into the baseline did not include a "colony status" field, so it is assumed that those towns were active at the time they were mapped.

Total Active and Inactive Prairie Dog Acreage

Using data from Table 5, "pro-ratings" were applied to the unknown status colonies so that a portion of the older data that was not updated in 2000 could be reasonably included in total active and inactive acreage figures. Based on a finding that 42% of the previously documented colonies were found to be still active in the 2000 field survey, this factor was applied to the acreage of colonies with "unknown status" from Table 4. The results of this approach are shown in Table 6, which reports a total active acreage figure of 214,570 acres for the study. Because this study only addresses known prairie dog towns, the true active acreage figure for the entire state is certainly higher.

Table 6. Statewide Results – Active and Inactive Acreage

Statewide Black-tailed Prairie Dog Status[1]		
Status	**Number of Colonies**	**Acreage[2]**
Active	3,069	214,570
Inactive	1,241	28,884

1. Includes pro-rated portions of older, unchecked colonies that are of "unknown status".
2. Includes only prairie dog towns that were part of this study's baseline. These figures can, therefore, be viewed as a minimum known amount for the state.

Active Prairie Dog Town Size

Size statistics were generated for known active prairie dog towns. These numbers were generated directly from the database, using only recent (1995-present) information. The total number of active prairie dog towns involved in this analysis is 2,581.

The minimum active colony size is 0.04 acres. The maximum active colony size is 4,129 acres. The average colony size is 75 acres. Table 7 provides a breakdown of active colonies by size category.

Table 7. Black-tailed Prairie Dog Town Size

Active Prairie Dog Town Size		
Size	**Number of Towns**	**Percent**
Less than 1.0 acre	294	11%
Between 1.1 and 20.0 acres	1021	40%
Between 20.1 and 100.0 acres	794	31%
Between 100.1 and 200.0 acres	255	10%
Between 200.1 and 500.0 acres	152	6%
Between 500.1 and 1000.0 acres	45	2%
Greater than 1,000.0 acres	17	1%
Total	**2578**	**100%**

County-by-County Results

For the 29 counties that comprise the range of the black-tailed prairie dog in eastern Colorado, Table 8 provides a county-by-county summary of total active, inactive, and potential habitat acreage. Each statistic is further split by private and public land ownership, with public lands including only state and federal properties.

Table 8. County-by-County Summary of Black-tailed Prairie Dog Acreage[1]

County[3]	Active Towns		Inactive Towns		Potential Habitat	
	Private	Public	Private	Public	Private	Public
Adams	10,927	2,338	387	1,185	79,159	22,968
Arapahoe	2,663	1,700	152	3	110,562	31,817
Baca	11,776	2,584	190	43	501,281	199,283
Bent	12,782	4,288	259	122	581,990	134,772
Boulder	11,511	16	1,542	5	19,703	287
Cheyenne	8,145	1,032	171	17	260,760	24,495
Crowley	12,146	1,373	327	40	302,901	61,703
Denver	2,157	91	450	59	4,381	606
Douglas	6,679	203	515	2	55,919	2,348
Elbert	223	-	54	-	538,504	66,096
El Paso	748	1,250	278	695	290,690	131,225
Fremont	2,352	447	296	104	94,428	11,853
Huerfano	-	-	-	-	374,007	32,900
Jefferson	4,656	187	777	0	39,375	3,782
Kiowa	7,162	1,799	1,126	359	203,626	50,913
Kit Carson	8,106	136	51	2	298,753	29,688
Larimer	1,484	68	146	64	144,838	24,602
Las Animas	1,488	689	250	28	1,414,436	332,556
Lincoln	5,013	254	146	1	818,834	115,266
Logan	6,584	1,805	4,708	649	273,619	35,972
Morgan	6,297	495	995	84	96,355	17,026
Otero	2,324	1,047	66	99	360,807	267,351
Phillips	1,836	2	161	-	12,746	1,510
Prowers	10,951	1,793	83	2	358,920	30,739
Pueblo	12,100	10,096	2,967	4,021	664,124	203,768
Sedgwick	2,496	110	35	32	66,913	7,207
Washington	1,222	0	40	0	264,130	33,266
Weld	16,399	3,715	1,614	2,165	638,393	275,674
Yuma	4,320	2,266	717	528	149,607	14,844
TOTALS[2]	**174,549**	**39,783**	**18,503**	**10,309**	**9,019,759**	**2,164,517**

1. Includes all active and inactive acreage, as well as pro-rated portions of older, unchecked colonies of unknown status. Because data relating to local government ownership was not readily available, the public lands category includes only state and federal lands from BLM's 150,000 land ownership layer.
2. Totals here are slightly different from previous totals because of rounding errors and the number of calculations involved in generating 29 sets of county statistics.
3. County boundaries are from USGS 1:50,000 county topographic series.

As indicated in Table 8, there is a wide range of variability in prairie dog active, inactive, and potential habitat acreage between the 29 counties.

With regards to total active acreage, the top 10 counties were: Pueblo (22,196 acres), Weld (20,114 acres), Bent (17,070 acres), Baca (14,360 acres), Crowley (13,519 acres), Adams (13,265 acres), Prowers (12,744 acres), Boulder (11,527 acres), Cheyenne (9,177 acres), and Kiowa (8,961 acres).

With regards to total inactive acreage, the top 10 counties were: Pueblo (6,988 acres), Logan (5,357 acres), Weld (3,779 acres), Adams (1,572 acres), Boulder (1,547 acres), Kiowa (1,485 acres), Yuma (1,245 acres), Morgan (1,079 acres), El Paso (973 acres), and Jefferson (777 acres).

With regards to total potential habitat acreage, the top 10 counties were: Las Animas (1,746,992 acres), Lincoln (934,100 acres), Weld (914, 067 acres), Pueblo (867,892 acres), Bent (716,762 acres), Baca (700,564 acres), Otero (628,158 acres), Elbert (604,600 acres), El Paso (421,915 acres), and Huerfano (406,907 acres).

Caution should be exercised in reading too much into the county statistics. While the active and inactive acreages being reported are accurate, they reflect only what is known about prairie dog towns in a given area. And, what is known may simply be a function of level of survey effort. To help test this hypothesis, it was decided to total all active and inactive black-tailed prairie dog acreages for each county, and then express that number as a percent ratio of total available habitat. This number can be considered a "known percent occupancy rate", with occupancy referring to acreage surveyed and documented as having prairie dogs present at one point in time in recent years (i.e., thus, both active and inactive acreage is included).

The highest "occupancy rates" were recorded for the following six counties: Boulder (65%), Denver (55%), Adams (15%), Phillips (14%), Jefferson (13%), and Douglas (13%). The lowest "occupancy rates" were recorded for Washington, Las Animas, Elbert, and Huerfano, with each being less than 1%.

These numbers indicate that "occupancy rate" certainly can be a function of the level of historic survey effort applied to different geographic regions. For example, Baca County, a county traditionally considered as having a high density of prairie dogs, only rated a 2% rate; that was based on having 700,000 acres of potential habitat, but only 14,000 documented "prairie dog acres". In comparison, Boulder County is at 65%, having about 11,000 "prairie dog acres", but only 20,000 acres of potential habitat. Other obvious factors, besides survey effort, that could affect species occupancy in a given county are plague, control efforts, and habitat fragmentation.

Other Sensitive Species Sightings

While there were several observations of swift fox *(Vulpes velox)* and ferruginous hawks *(Buteo regalis)* by field survey staff, the only "other sensitive species sighting" worth reporting here is data related to burrowing owl *(Athene cunicularia)* occurrence. This is because it was the one species that was sighted quite frequently, and the sightings could be closely tied to a given location. Burrowing owls in Colorado are very dependent on black-tailed prairie dog colonies. Both live in the short grass prairie habitat of the eastern plains, and

burrowing owls use the prairie dog burrows and tunnels for nest sites and escape cover. During the process of field-checking prairie dog town locations and status, survey staff observed burrowing owls on 72 of the 756 towns that were visited, which equates to a 9.5% “occupancy rate”.

Considerations for Colorado's Black-Tailed Prairie Dog Conservation Strategy

The following is intended as "food for thought" for those involved with preparing the state's conservation management plan for black-tailed prairie dogs. These are not recommendations. They are simply the collective ideas of the EDAW team, with the majority coming from Dr. Jim Fitzgerald, a renowned prairie dog expert, and Brian Hoffmann, the senior EDAW biologist on this project. And, although they are numbered, these considerations are presented in no particular order.

1. **Additional Field Survey and Monitoring** – The EDAW team was able to accomplish much with the funds available and within the time frame required for completion of this study. However, much more remains to be done to establish a solid baseline for species occupancy in the state. Furthermore, with the threat of sylvatic plague and other population pressures, prairie dog towns are proving to be an ephemeral component of Colorado's landscape. Thus, there will probably always need to be some annual updating of the baseline in order to keep it as current as possible.

    a) Consider further field checking of the unverified portion of the baseline compiled in this study.
    b) Attempt to obtain landowner cooperation in order to expand this study's baseline beyond what is easily viewable from public roadsides.
    c) Consider obtaining aerial photography for the eastern plains counties to help identify prairie dog towns on private, more remote lands.
    d) Request that the data contributors who supported this study continue their support of CDOW prairie dog mapping efforts by sending in annual updates, as additional surveys are completed.
    e) If the state attempts to apply Sidle's aerial survey technique in Colorado, then compare those results (occupied acreage) to this study's baseline in order to determine what percent coverage this study was able to achieve. If the percent coverage is determined to be relatively high, perhaps consideration should be given to maintaining this study's GIS-based mapping as the baseline for future prairie dog planning efforts in the state. After all, mapped and verified polygon data is going to prove a more useful tool than the "total occupied acreage" and "point-intercept" results that Sidle's technique limits us to.
    f) A detailed baseline that is annually or periodically updated will enable the state to continue documentation of further species losses, or even recovery of the species. The baseline may also prove to be an integral part of the Candidate Conservation Agreement with Assurances (CCAA) that the state is likely to negotiate with USFWS, because a stable "acreage of occupied habitat" number will be needed to demonstrate successful management and species recovery in the state. An accurate

baseline will also help with monitoring of plague epizootics and other mortality sources.

2. **Need for Species Research** – There are many aspects of black-tailed prairie dog biology that require further study. While the list of research needs is literally too long to mention here, several topics that would greatly assist in the state's conservation planning for the species include:

   a) Some form of "radio-telemetry," or mark/recapture studies to evaluate the extent of movement between nearby towns, within complexes, and between complexes.
   b) More studies to evaluate the applicability and success of large-scale relocation efforts.
   c) More research to document the effects of prairie dog towns on rangeland quality and cattle grazing competition.
   d) Studies to help document the re-occupancy rate of plagued-out towns, and to help identify the important variables controlling re-occupancy.
   e) Work with CDC and USDA/APHIS/WS to foster research on plague ecology in prairie dogs, including whether or not prairie dogs will eventually reach some level of resistance to infection, and to work towards practical methods for "vaccination" of towns against infection.
   f) Continue to foster and research non-lethal controls of prairie dog populations, including use of contraceptives, mechanical barriers, vegetative barriers, etc.

3. **Recreational Shooting** – CDOW is currently considering a ban on hunting black-tailed prairie dogs within the state. If adopted, this regulation would still not prevent private landowners from exercising their option to hunt the species for the purposes of controlling damage to crops, real or personal property, or livestock. Nevertheless, a ban on most hunting would reduce the impact of recreational shooting on black-tailed prairie dog populations. In the event that a complete ban on hunting is not politically feasible, then CDOW could consider instituting a hunting season and bag limits, with the season being closed during the species peak reproductive period.

4. **Control Programs** – CDOW is already considering a permitting system for prairie dog poisoning efforts, one that would set limits to the total number of prairie dogs, or the total acres of prairie dogs, that are poisoned each year. CDOW might also consider setting limits based on geographic area (e.g., by county), so that control efforts do not jeopardize the geographic diversity inherent in the state's population of the species.

5. **Landowner Incentives Program** – CDOW and a sub-group of the state's Black-tailed Prairie Dog Working Group (the "Landowner Incentives Committee") are currently working on a pilot version of a Landowner Incentives Program. The intent of this program is to encourage landowners,

via monetary reward, to voluntarily protect and manage for prairie dogs on private lands. In order to set priorities for which prairie dog towns to include the program, CDOW and the Committee are in the process of developing a ranking scheme for this purpose. Because the landowner incentives program is still being formulated, the following could be considered:

a) An important aspect of the incentives program should be monitoring, which will be needed to ensure that landowners are in compliance with the conservation strategies. CDOW may need to request 1-2 new hires just to oversee the landowner incentives portion of the state's conservation strategy for black-tailed prairie dogs.
b) As a form of mitigation, the state may want to consider paying landowners for grazing losses caused by prairie dogs, similar to Defenders of Wildlife payments for wolf damage claims.
c) Consider using conservation easements/agreements as a mechanism for protecting short-grass prairie habitat and prairie dogs on private lands.

6. **Prairie Dog Preserves** – The state is going to need to identify areas where it intends to preserve prairie dogs and manage for all short-grass prairie species. Given the preponderance of active black-tailed prairie dog acreage on public lands in this state, CDOW should consider placing a higher priority for management of the species on public lands (e.g., Pawnee and Comanche National Grasslands, Pinyon Canyon Maneuver Site, Rocky Mountain Arsenal, State Land Board lands, etc.), followed by management on large, privately-held lands (The Nature Conservancy, county/city open space lands, cooperative ranchers, etc.). Some factors to consider when identifying potential preserve areas include:

a) Focus first on preserving the species in the far eastern plains where plague epizootics are less frequent (or, at least, not as well-documented), and where the threat of habitat loss from urbanization is less.
b) Even though the focus should be on preserving large tracts of habitat in the eastern plains, consider maintaining gene pool diversity by preserving some black-tailed prairie dog towns in each of the counties where they are prevalent.
c) Preserve areas should not be so large that they represent a significant portion of the total preserved acreage in the state. The risk of having preserve areas be too large is that a single plague epizootic could result in the demise of the entire preserve.
d) Preserve areas should be close enough to allow for animal dispersal between them, but not so close that plague epizootics can be easily transmitted.
e) In planning for preserves, consider their connectivity. Ensuring that open space connections (of suitable habitat) exist between preserves will at least provide for an opportunity for animals to disperse between them. It

will also provide for the opportunity to re-populate areas that have been "plagued-out".

7. **Public Outreach and Education** – Much remains to be done with regards to public education over the plight of the prairie dog, including outreach programs directed at both the urban and agricultural publics. An excellent series of public outreach tasks are presented by Van Pelt (1999) in the "conservation activities" section of the multi-state strategy document. Because these tasks are certainly applicable to Colorado, they are summarized here, along with several others to consider:

   a) Develop informational brochures targeting the general public and land managers. The brochures should emphasize the need for prairie dog conservation, and contain natural history details for the species that include beneficial and detrimental management practices.
   b) Consider creating fact sheets that explain the effects of plague on prairie dog colonies, and health risks to humans.
   c) Create a Colorado newsletter that can be updated with information on the state's management activities, recent plague outbreaks, new technologies and management tools, statewide mapping efforts, countywide or citywide program updates, etc. The newsletter can be distributed to public and private land managers within the state's prairie dog range. As an alternative to the newsletter, or in addition to it, consider making this type of information available on a Internet web site.
   d) Consider preserving and managing some prairie dog towns in the Front Range urban areas, solely for the purposes of public education and outreach. These "demonstration towns" might be well suited for a system of board walks, interpretive signage, and informational brochures.
   e) Other tools to consider using in a public outreach could include local newspaper, radio, and television stories/segments; informational packets suitable for inclusion in school curricula; a data base that contains a current, annotated bibliography of prairie dog information; and watchable wildlife maps that include some locations of prairie dog towns intended for public viewing.
   f) To help with funding all of the above, consider developing partnerships with various NGO's, including the National Wildlife Federation (the most recent petitioner), Rocky Mountain Animal Defense, Defenders of Wildlife, etc.

8. **Reintroductions** – Much remains to be learned about the usefulness and success rate of prairie dog relocation efforts. Nevertheless, relocation may prove to be an appropriate management tool in the long-term conservation strategy for the species, even in spite of the regulatory restrictions imposed by state Senate Bill 99-111. The suggestion here is simply to consider using relocation as a tool to achieve reintroduction and public outreach objectives. Managers may have the need and desire to physically

reintroduce animals into areas that have been plagued-out, or into unoccupied or restored short-grass prairie habitat. Also, given the strong public sentiment regarding salvaging animals from colonies destined for destruction, relocations may be essential in achieving public outreach goals.

9. **Countywide Conservation Planning** – Encouraging countywide, or even citywide, black-tailed prairie dog planning efforts will achieve three objectives. First, it will help foster local government awareness of the plight of short-grass prairie species. Second, it will help to maintain the geographic diversity and gene pool for the species in Colorado. Third, it could be a regulatory, and hence financial, mechanism to ensure that land developers help to implement and fund the state's management strategy for the species. Consider the following:

   a) Local government efforts to plan for prairie dog conservation could be enabled as "sub-agreements" under the state's "umbrella" CCAA with USFWS. Thus, the state will be extending to participating counties (or cities) the same assurances it is receiving under its umbrella agreement.
   b) Because developer fees will likely be the primary funding mechanism for the countywide planning efforts, then the Front Range counties should be assigned a higher priority for instituting these plans.
   c) The basic components of the countywide management plans should include: identification of high priority preserve areas, identification of areas approved for current/future development, a management strategy for preserve areas, and a funding strategy that calculates the appropriate "per acre fee" for mitigating development impacts "offsite" in the preserve areas. The mitigation approaches could include/discuss acquisition, preservation via easement agreement, salvaging animals (trans-locating) from development areas, preserve buffers, preserve connectivity, etc.

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APPENDIX A

Metadata

BLACK-TAILED PRAIRIE DOG COVERAGE

Identification Information
- Citation:
  - Citation Information:
    - Originator: EDAW
    - Publication Date: 20000927
    - Title: Black-tailed Prairie Dog Colonies - Known Locations
    - Edition: 1
    - Geospatial Data Presentation: Map
    - Series Information:
      - Issue Identification: BTPD
    - Publication Information
      - Publication Place: Denver, Colorado, USA
      - Publisher: Colorado Department of Natural Resources

Description
- Abstract:

Database of known Black-tailed Prairie Dog colonies in the State of Colorado. This information was derived only from existing sources and is not a full survey of the status of the species in the state. This information was compiled from existing Black-tailed Prairie Dog databases varying in date and scale. Road surveys were used to visit over 32 percent of the resulting acreage. In addition 20,000 acres were added by EDAW field biologists and 85,000 acres were added by CBO biologists. The database allows colonies to be queried on their status, date last visited, associated species and the source of the information.

It is important to note key information relating to the accuracy of any wildlife database. First, it was very difficult to assemble prairie dog data sets from a variety of sources in a way that promoted consistency and accuracy, and emphasized the most recent information. Sometimes data were contradictory, in other cases they just overlapped. In instances where prairie dog town data from different sources overlapped in time and space, then the most current and reliable sources were used to describe the town boundary and status. When outside advice was needed, EDAW consulted with CDOW personnel. The end result, though, was a compiled database that achieved the highest level of accuracy possible concerning “known” black-tailed prairie dog town locations and status in Colorado, with “known” including both previous and new records.

Second, regardless of the accuracy of the final database, some caution should be exercised in interpreting the results of this database. As most people who are familiar with this study’s scope already know, it does not constitute, nor was it ever intended to constitute, a complete inventory of black-tailed prairie dog occurrences for the entire state. The objective here was simply to compile data already collected by a variety of independent survey efforts, to update a portion of that data via field verification this year (2000), and to supplement it with records of new prairie dog town occurrences. Due to budget and time constraints, it was not possible for this study to attempt a thorough survey of all remote and inaccessible areas, and no concerted attempt was made to gain access onto private lands (except to view them from public roadside edges).

Finally, the user is reminded that given the threats facing this species in Colorado and throughout its range (summarized in the next section of this report), prairie dog towns documented as currently active may not be present in the near future. This ephemeral nature is unfortunately due to the combined effects of sylvatic plague, recreational shooting, control programs, and land conversion.

Purpose:
Provide a baseline GIS database of existing spatial data for the Black-Tailed Prairie Dog.

Time Period of Content:
Time Period Information:
Multiple Dates/Times:
Calendar Date: 1976
Calendar Date: 2000
Currentness Reference: Ground condition

Status
Progress: In Work
Maintenance and Update Frequency: Annual

Spatial Domain:
Bounding Coordinates:
West Bounding Coordinate: -109.067
East Bounding Coordinate: -102.037
North Bounding Coordinate: 41.008
South Bounding Coordinate: 36.987

Keywords:
Theme:
Theme Keywords: Prairie Dog
Place:
Place Keyword Thesaurus: Colorado
Place Keyword: Colorado
Place Keyword: CO

Access Constraints: Data is available with permission from CDOW or DNR.
To insure data are accompanied by proper documentation on data standards and potential errors, data should not be redistributed without written permission.

Use Constraints:
Limitations/Warnings/Comments: The Black-tailed Prairie Dog cover layer has been developed at a relatively coarse scale (1:100,000) for the entire state and is not suitable for detailed studies. Not all information has been field verified and reliance on data accuracy is dependent on the source information. Therefore, this data set can be used appropriately for coarse-scale (1:100,000 scale) applications, or to provide context for finer-level maps or applications.

Data Quality Information:
Attribute Accuracy:
Attribute Accuracy Report: Identification and corrections of attribution during field surveys provided the most accurate method for verifying the status of prairie dog towns. Other polygons were attributed using information obtained in the source information. A formal accuracy assessment would be difficult to perform since it is highly dependent on the status of prairie dog town activity.

Quantitative Attribute Accuracy Assessment:
Attribute Accuracy Value: Attribute Accuracy Explanation:

Logical Consistency Report:
All polygons are closed, and no label errors are present. No arc undershoots or overshoots are present and adjacent polygons do not have identical attributes.

Completeness Report:
This map represents all known colonies at the present time based on existing data.

Positional Accuracy: Horizontal Positional Accuracy:
Horizontal Positional Accuracy Report: Base information consisted of USGS 100,000 DRGs. Digitized polygon boundaries were made on-screen and no rigorous accuracy assessment has been made aside from the windshield survey. A full assessment would also be difficult since the extent of prairie-dog colony boundaries change constantly and scale of source information varied.

Lineage
Source Information:
Source Citation
Originator: USFS – Comanche National Grasslands, supplied by CDOW SE Region
Publication Date: 2000
Title: Black-tailed Prairie Dog Colonies
Geospatial Data Presentation Form: Digital Data
Source Time Period of Content
Single Date/Time: 1998
Source Currentness Reference: Publication Date
Source Contribution: BTPD Colonies for the Comanche National Grasslands
Directory: 001datadirectory

Source Citation
Originator: USFS – Pawnee National Grasslands
Publication Date: 2000
Title: Black-tailed Prairie Dog Colonies
Geospatial Data Presentation form: Digital Data
Source Time Period of Content
Single Date/Time: 1996 - 1998
Source Currentness Reference: Publication Date
Source Contribution: BTPD Colonies for the Pawnee National Grasslands
Directory: 002datadirectory

Source Citation
Originator: USFWS- Rocky Mountain Arsenal
Publication Date: 2000
Title: Black-tailed Prairie Dog Colonies
Geospatial Data Presentation Form: Digital Data
Source Time Period of Content
Single Date/Time: 2000
Source Currentness Reference: Publication Date
Source Contribution: BTPD Colonies for the Rocky Mountain Arsenal
Directory: 003datadirectory

Source Citation
Originator: DOD – Fort Carson
Publication Date: 2000
Title: Black-tailed Prairie Dog Colonies
Geospatial Data Presentation Form: Digital Data
Source Time Period of Content
Single Date/Time: 1995-2000
Source Currentness Reference: Publication Date
Source Contribution: BTPD Colonies for Fort Carson
Directory: 004datadirectory

Source Citation
Originator: Center for Disease Control
Publication Date: 1999
Title: Black-tailed Prairie Dog Colonies
Geospatial Data Presentation Form: Digital Data
Source Time Period of Content
Single Date/Time: 1999
Source Currentness Reference: Publication Date
Source Contribution: BTPD Colonies Point Locations for Colonies Along the Front Range
Directory: 008datadirectory

Source Citation
Originator: CDOW
Publication Date: 2000
Title: Black-tailed Prairie Dog Colonies
Geospatial Data Presentation Form: Digital Data
Source Time Period of Content
Single Date/Time: 1979 - 1998
Source Currentness Reference: Publication Date
Source Contribution: BTPD Colonies for the Northeast CDOW Region. Includes information from CDOW Volunteers, Weber, NEWRIS and USFWS (Patton).
Directory: 046datadirectory

Source Citation
Originator: CDOW
Publication Date: 2000
Title: Black-tailed Prairie Dog Colonies from Archival Data
Geospatial Data Presentation Form: Digital Data
Source Time Period of Content
Single Date/Time: 1976 - 1983
Source Currentness Reference: Publication Date
Source Contribution: BTPD Colonies for Colorado
Directory: 048datadirectory

Source Citation
Originator: CDOW - Weber
Publication Date: 2000
Title: Black-tailed Prairie Dog Colonies from Denver Survey
Geospatial Data Presentation Form: Digital Data
Source Time Period of Content
Single Date/Time: 2000
Source Currentness Reference: Publication Date
Source Contribution: BTPD Colonies for Part of the Denver Area based on a recent survey
Directory: 060datadirectory

Source Citation
Originator: DOD – Pueblo Chemical Depot
Publication Date: 2000
Title: Black-tailed Prairie Dog Colonies for the Chemical Depot
Geospatial Data Presentation Form: Digital Data
Source Time Period of Content
Single Date/Time: 1999
Source Currentness Reference: Publication Date
Source Contribution: BTPD Colonies for the Pueblo Chemical Depot
Directory: 067datadirectory

Source Citation
Originator: CBO
Publication Date: 2000
Title: Burrowing Owl/Black-tailed Prairie Dog Colonies (Colorado Bird Observatory)
Geospatial Data Presentation Form: Map
Source Time Period of Content
Single Date/Time: 2000
Source Currentness Reference: Publication Date
Source Contribution: BTPD Colonies and Burrowing Owl Locations for Eastern Colorado
Directory: 069datadirectory

Source Citation
Originator: Boulder County
Publication Date: 2000
Title: Black-tailed Prairie Dog Colonies for Open Space Areas
Geospatial Data Presentation Form: Digital Data
Source Time Period of Content
Single Date/Time: 1997-1999
Source Currentness Reference: Publication Date
Source Contribution: BTPD Colonies for Boulder County Open Space
Directory: 084datadirectory

Source Citation
Originator: Denver County Environmental Heath Department
Publication Date: 2000
Title: Black-tailed Prairie Dog Colonies from Denver County Survey
Geospatial Data Presentation Form: Digital Data
Source Time Period of Content
Single Date/Time: 2000
Source Currentness Reference: Publication Date
Source Contribution: BTPD Colonies for Denver County
Directory: 087datadirectory

Source Citation
Originator: City of Boulder
Publication Date: 2000
Title: Black-tailed Prairie Dog Colonies
Geospatial Data Presentation Form: Digital Data
Source Time Period of Content
Single Date/Time: 1999
Source Currentness Reference: Publication Date
Source Contribution: BTPD Colonies for the City of Boulder
Directory: 138datadirectory

Source Citation
Originator: City of Fort Collins
Publication Date: 2000
Title: Black-tailed Prairie Dog Colonies
Geospatial Data Presentation Form: Digital Data
Source Time Period of Content
Single Date/Time: 2000
Source Currentness Reference: Publication Date
Source Contribution: BTPD Colonies in the City of Fort Collins
Directory: 140datadirectory

Source Citation
Originator: City of Fort Collins
Publication Date: 2000
Title: Black-tailed Prairie Dog Colonies
Geospatial Data Presentation Form: Digital Data
Source Time Period of Content
Single Date/Time: 2000
Source Currentness Reference: Publication Date
Source Contribution: BTPD Colonies for Meadow Springs Ranch
Directory: 143datadirectory

Source Citation
Originator: Fossil Creek Reservoir RMP - EDAW
Publication Date: 2000
Title: Black-tailed Prairie Dog Colonies
Geospatial Data Presentation Form: Digital Data
Source Time Period of Content
Single Date/Time: 2000
Source Currentness Reference: Publication Date
Source Contribution: BTPD Colonies Surrounding Fossil Creek Reservoir in Larimer County
Directory: 144datadirectory

Source Citation
Originator: Black-tailed Prairie Dog Study - EDAW
Publication Date: 2000
Title: Black-tailed Prairie Dog Colonies from Field Survey
Geospatial Data Presentation Form: Map
Source Time Period of Content
Single Date/Time: 2000
Source Currentness Reference: Publication Date
Source Contribution: Field verification and new colonies from field survey
Directory: 148datadirectory

Source Citation
Originator: Boulder Mountain Parks
Publication Date: 2000
Title: Black-tailed Prairie Dog Colonies from Field Survey
Geospatial Data Presentation Form: Map
Source Time Period of Content
Single Date/Time: 2000
Source Currentness Reference: Publication Date
Source Contribution: Colonies around Boulder Reservoir
Directory: 149datadirectory

Process Step
Process Description:
Potential data sets were determined by a phone survey of local, state and federal government agencies. Existing Black-tailed Prairie dog data was requested with appropriate metadata (if available). Base data development began with the CDOW's retrieval of GIS data sets from magnetic tapes that were compiled in the 1970's and 1980's. This archival data was compiled based on a data accuracy assessment conducted by CDOW using the original reference information if it was available. Since multiple overlapping data sets existed, this assessment provided the structure for the assembly of this data set.

Based on this assessment, archival information was used for the following counties: Baca, Cheyenne, Crowley, Fremont, Kiowa, Kit Carson, Pueblo, Teller, Boulder, Las Animas, Lincoln, Prowers, Washington, Bent, Otero, Yuma, El Paso. Where no date was assigned in the database, the date was assumed to be the oldest of all information provided in the data set. A modification to the location of some of these colonies was performed based on direction from CDOW. In cases where no data existed from this study or when a more comprehensive county data set existed no data from this source was used. No archival data was used for the following counties: Logan, Sedgewick, Phillips, Larimer, Morgan, Weld, Adams, Arapahoe, Denver, Elbert, Douglas and Jefferson.

The resulting information was unioned with CDOW's northeast WRIS data set from the 1990's. These two data sets, due to their age, would be targeted for the windshield survey. This information was coded as to the status, year and source of the data. Point information from the Center for Disease Control (CDC) was used to upgrade information and identify polygons recently surveyed (1999) by the CDC. The status and year surveyed were adjusted to reflect this recent survey if a CDC point fell within an older polygon.

Because of the number of prairie dog towns/complexes assembled as part of the baseline for this study, it was not possible to field verify them all. Realizing this at the outset, and being cognizant of budget limitations, DNR required that at least 25% be field checked. In this case, field checking means to simply verify whether the previously documented prairie dog town/complex was still there or not; note if it is currently active, inactive or "converted" (to an urban or agricultural land use); and roughly determine if there has been any change to its size or shape.

A priority scheme was developed to make maximum use of, and achieve the maximum value from, the limited amount of field verification time that the project could afford. The following priorities were assigned to the oldest prairie dog town data bases based on when the town was originally mapped and the date that it was last field checked:

Priority #1: Highest Priority. The town boundary or status has not been field checked in over 10 years (since 1990), and the town is large (> 40 acres). There were 382 of these.

Priority #2: High Priority. The town boundary or status has not been field checked in over 10 years (since 1990), and the town is small (< 40 acres). There were 705 of these.

Priority #3: Moderate Priority. The town boundary or status has not been field checked in over 5 years (since 1995). There were 570 of these.

Priority #4: Low Priority. The town status has been verified in the last 5 years (since 1995), but the boundary has not been verified in over 5 years. There were only 9 of these.

Priority #5: No Priority. Town status and boundary was verified within the last 5 years, or will be updated with more recent information within 1 year. These would only be field checked during this study if the field surveyor drove by them on their way to inspect another higher priority town. There were 1,348 of these.

Experienced field biologists conducted roadside surveys. Surveys were conducted over a two-week period. The eastern plains were subdivided into 5 areas. Each biologist was assigned an area and given 1:100,000-scale GIS-based maps of their respective areas. GIS maps contained polygons representing known/suspected prairie dog towns to be field truthed.

Biologists surveyed prairie dog towns based on the town's priority classification and whether or not the town was accessible. "Accessible" prairie dog towns were considered to be towns visible from the roadside with binoculars or a spotting scope. Field checking priority for each town was based on when the town boundary and/or status were last surveyed and the size (acreage) of each town. First, crews field checked all accessible towns assigned the status of Priority 1, followed by Priority 2, then Priority 3, and so on. All accessible prairie dog towns classified as Priority 1 or 2 were given highest priority and field checked first, towns designated as Priority 3, 4 or 5 were checked opportunistically.

The status of each prairie dog town field checked was determined as being "active", "inactive", or "no longer present". Towns classified as "active" were occupied by prairie dogs. Towns not currently occupied, but where burrows or other prairie dog signs were still visible, were classified as "inactive." Prairie dog towns were considered to be "no longer present" if there was no evidence of prairie dogs or burrows and/or the area had been developed or converted to agriculture. The status of a town was determined by surveying the colony from the roadside using binoculars or a spotting scope. A maximum of 15 minutes was spent surveying each town. The status of each town was recorded directly onto GIS maps. Boundary adjustments were made to towns if significant expansion or contraction of the town's periphery had occurred. "New" (not previously documented) prairie dog towns that were opportunistically discovered along the survey routes were also mapped, although that was not the focus of this study. The presence of other sensitive species associated with prairie dog towns was also noted, including observations of burrowing owl (Athene cunicularia; state Threatened), mountain plover (Charadrius montanus), and ferruginous hawk (Buteo regalis).

Data sets from all sources were assembled into a seamless GIS database. New towns from the Colorado Bird Observatory (digitized by CDOW) and from this study's field survey effort were digitized and added to the GIS database. Boundary adjustments were also made based on field survey maps. All colonies were coded as to their status (active, inactive, unknown status or no longer present), source, date last visited and any associated species seen on or near the colony. Information from the field survey and the original source information was used a reference information to verify the final GIS database.

Data sets gathered from local, state and federal governmental agencies were added to the data set. Due to the high resolution of these data sets, they took precedence over most data occupying the same geographic extent. In some cases data was provided for a number of years. The most recent data was assumed to be the active colonies, earlier data covering a different geographic extent was coded as inactive. Data from 1999 to 2000 was consider equivalent since survey dates are relatively close and many of the most recent surveys from most agencies concluded in 1999. Therefore data from a GPS source in 1999 may replace data with a 2000 date based on an accuracy assessment by the GIS technician.

Data added included:

- USFS – Comanche National Grasslands
- USFS – Pawnee National Grasslands
- USFWS – Rocky Mountain Arsenal National Wildlife Refuge
- DOD – Fort Carson
- Center for Disease Control – Fort Collins
- Colorado Division of Wildlife – Fort Collins
- Colorado Division of Wildlife – Denver
- Colorado Division of Wildlife – Denver Area
- DOD – Pueblo Chemical Depot
- Colorado Bird Observatory – all of eastern Colorado
- Boulder County Open Space
- Denver County Environmental Health Department
- City of Boulder
- City of Fort Collins
- Fossil Creek Reservoir Resource Management Plan – EDAW
- Black-tailed Prairie Dog Study of Eastern Colorado – EDAW
- Boulder Mountain Parks

Data was verified to ensure there were no conflicting or duplicate attributes and that information was entered correctly. Dangles and polygons that were less than 200 square meters were removed.

Spatial Reference Information:
Horizontal Coordinate System Definition:
Planar:
Grid Coordinate System:
Grid Coordinate System Name: Universal Transverse Mercator
Universal Transverse Mercator:
UTM Zone Number: 13
Transverse Mercator:
Scale Factor at Central Meridian: implied
Longitude of Central Meridian: implied
Latitude of Projection Origin: implied
False Easting: implied
False Northing: implied

Planar Coordinate Information:
Planar Coordinate Encoding Method: coordinate pair
Coordinate Representation:
Abscissa Resolution: not determined
Ordinate Resolution: not determined
Planar Distance Units: METERS

Geodetic Model:
Horizontal Datum Name: Unknown
Ellipsoid Name: Clarke 1866
Semi-major Axis: 6378206.4
Denominator of Flattening Ratio: 294.98

Geographic:
Latitude Resolution:
Longitude Resolution:
Geographic Coordinate Units:

Entity and Attribute Information:
Overview Description:
Entity and Attribute Overview:
Entity and Attribute Detail Citation: none
Detailed Description:
Attribute:
Attribute Label: AREA
Attribute Definition: area of polygon on square meters.
Attribute Domain Values:
Range Domain:
Range Domain Minimum: 200
Range Domain Maximum: 29530012
Attribute:
Attribute Label: PERIMETER
Attribute Definition: Perimeter of polygon in meters.
Attribute Units of Measure: Meters
Attribute Domain Values:
Range Domain:
Range Domain Minimum: 53
Range Domain Maximum: 7257671
Attribute:
Attribute Label: BTPD-ID
Attribute Definition: Unique identifying integer for each polygon.
Attribute Domain Values:
Range Domain:
Range Domain Minimum: 1
Range Domain Maximum: 34590
Attribute:
Attribute Label: PDOV
Attribute Definition: Code for the overall range of the Black-tailed Prairie Dog.
Attribute Domain Values:
Enumerated Domain:
Enumerated Domain Value: 1
Enumerated Domain Value Definition: An area that encompasses all known seasonal activity areas within the range of populations of prairie dogs.

Attribute:
Attribute Label: PDAC
Attribute Definition: Code for active Black-tailed Prairie dog colonies.
Attribute Domain Values:
Enumerated Domain:
Enumerated Domain Value: 1
Enumerated Domain Value Definition: An area where a colony has become established and has been documented to be active within the past 5 years.

Attribute:
Attribute Label: PDIC
Attribute Definition: Code for inactive Black-tailed Prairie dog colonies.
Attribute Domain Values:
Enumerated Domain:
Enumerated Domain Value: 1
Enumerated Domain Value Definition: An area where a colony has become established and has been documented to be inactive within the past 5 years.

Attribute:
Attribute Label: PDCUS
Attribute Definition: Code for unknown status Black-tailed Prairie dog colonies.
Attribute Domain Values:
Enumerated Domain:
Enumerated Domain Value: 1
Enumerated Domain Value Definition: An area where a colony has been documented, but has not been revisited within the past 5 years.

Attribute:
Attribute Label: PDNLP
Attribute Definition: Code for unknown status Black-tailed Prairie dog colonies.
Attribute Domain Values:
Enumerated Domain:
Enumerated Domain Value: 1
Enumerated Domain Value Definition: Area where a colony use to exist, but no observable traces of the colony remain.

Attribute:
Attribute Label: PDYEAR
Attribute Definition: Code for the date the colony was last visually surveyed.
Attribute Domain Values:
Enumerated Domain:
Enumerated Domain Value:
Range Domain:
Range Domain Minimum: 1976
Range Domain Maximum: 2000
Enumerated Domain Value Definition: The last year the prairie dog colony's status was visually surveyed for its activity.

Attribute:
Attribute Label: SOURCE
Attribute Definition: Code for the source of the data.
Attribute Domain Values:
Enumerated Domain:
Enumerated Domain Value: See Source Contributions.
Enumerated Domain Value Definition: Source of information.
Enumerated Domain Values: Source names

Attribute:
Attribute Label: Notes
Attribute Definition: Notes about data if appropriate.
Attribute Domain Values: Variable

Distribution Information:
Distributor:
Contact Information:
Contact Organization Primary:
Contact Organization: Colorado Division of Wildlife
Contact Position: Wildlife Inventory Coordinator
Contact Address:
Address Type: mailing and physical address
Address:
Habitat Resources Section
Colorado Division of Wildlife
6060 N. Broadway
City: Denver
State or Province: CO
Postal Code: 80216
Country: USA

Distribution Liability:
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Metadata Reference Information:
Metadata Date: 20000927
Metadata Review Date: 20010927
Metadata Contact:
Contact Information:
Contact Organization Primary:
Contact Organization: Colorado Division of Wildlife
Contact Position: Wildlife Inventory Coordinator
Contact Address:
Address Type: mailing and physical address

Address:
Habitat Resources Section
Colorado Division of Wildlife
6060 N. Broadway
City: Denver
State or Province: CO
Postal Code: 80216
Country: USA
Metadata Standard Name:
FGDC Content Standards for Digital Geospatial Metadata
Metadata Standard Version: Version of June 8, 1994
Metadata Access Constraints: none
Metadata Use Constraints: none