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Gary W. Witmer
USDA-APHIS-Wildlife Services, gary.w.witmer@usda.gov

Mark Brennan
Boulder County Parks and Open Space Department; Boulder, Colorado

Donna Dees
U.S. Natural Resources Department

Brian Hoffmann
EDAW, Inc., Fort Collins, Colorado

Frances Pusateri
Colorado Division of Wildlife, Fort Collins

See next page for additional authors

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Authors

Gary W. Witmer, Mark Brennan, Donna Dees, Brian Hoffmann, Frances Pusateri, Cary Richardson, and David Seery

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Black-tailed Prairie Dog Management in Urban-Suburban Settings: Opportunities and Challenges

Gary Witmer
U.S. Wildlife Services, National Wildlife Research Center
Fort Collins, Colorado

Mark Brennan
Boulder County Parks and Open Space Department
Boulder, Colorado

Donna Dees
U.S. Natural Resources Department
Fort Collins, Colorado

Brian Hoffmann
EDAW, Inc.
Fort Collins, Colorado

Frances Pusateri
Colorado Division of Wildlife
Fort Collins

Cary Richardson
Open Space and Mountain Parks Department
Boulder, Colorado

David Seery
U.S. Fish and Wildlife Service
Commerce City, Colorado

Introduction

Among the many human-wildlife conflicts that occur across North America, some of the most contentious occur at the interface of urban and suburban lands and adjoining rural landscapes. Along the Colorado Front Range,

one of the more difficult situations faced by local governments and municipalities involves black-tailed prairie dog colonies. These colonies are relicts of the expansive colonies that once occurred across much of the prairies of North America. Although these colonies are relatively small and, usually, highly fragmented, they represent an important link to our natural history, provide a valuable wildlife-viewing experience and allow the promotion of public education about intact prairie ecosystems and their components. Some of the colonies, especially if eventually linked to other nearby ones, may help to prevent the federal listing of the black-tailed prairie dog as a threatened species and may play a role in the recovery of the black-footed ferret, perhaps the most endangered mammal in North America. Additionally, many of the urban-suburban colonies are being used by many of the wildlife species associated with prairie dog colonies. Most of these colonies are continuously under the threat of development or other disruptive human activities. On the other hand, as the colonies expand, there are conflicts with adjoining landowners who suffer damage to vegetation, damage to property by burrowing and gnawing, and the potential threat of plague exposure during outbreaks.

The people living along the Colorado Front Range represent many walks of life, and they vary tremendously in their perspectives, experiences and backgrounds. There is considerable variation in how they think the prairie dog situation should be handled and many special interest groups are very vocal in expressing their views, promoting their agenda and showing little interest or tolerance in the views or concerns of other groups or individuals. Yet, in theory, everyone has something to contribute, and it is essential to have the diversity of viewpoints represented if conflict resolution is to be achieved. Meanwhile, the various governmental agencies involved with prairie dogs in one way or another usually have differing objectives, authorities and available resources.

We felt that an informational, interactive forum was needed to provide the essential background information to interested parties and participants to level the playing field and to provide local governments and municipalities with the information and contacts that they needed to make better management decisions related to prairie dogs within their jurisdictions. A technical workshop was conducted in February 2001. The workshop was cosponsored by the U.S. Fish and Wildlife Service, U.S. Department of Agriculture-Wildlife Services, Colorado Division of Wildlife, EDAW Inc., Boulder County, Boulder and Fort Collins. Each of the sponsors had representation on the organizing committee.

The purpose of the workshop was to provide a forum to update municipal, county, state and federal employees, who are responsible for prairie dog management and decision-making, on a broad array of topics (Table 1). We also wanted the diverse viewpoints people have towards prairie dogs to be represented at the workshops, so agency personnel (and everyone present) would be aware of the views of their constituents and fellow citizens. Specialists and persons representing groups interested in—or potentially affected by—prairie dog regulation and management were invited to make presentations and provide a forum for interaction between managers, researchers and other involved parties, including the audience. Abstracts of oral presentations and posters, along with contact information and other, general information, were compiled in a workbook and distributed to all attendees as a future source of information, with the hope that partnerships would be formed to address the conflicts and potential solutions in the spirit of cooperation in the future. Based on the positive feedback of attendees and the requests for more information and updates on prairie dog status and management, we conducted the second workshop in February 2003. We provided an in-depth summary of the informational needs and issues in several key, topical areas, based on the first workshop (Witmer and Hoffmann 2002).

In this paper, we discuss some aspects of the workshops and our efforts to make them more successful. The ultimate measure of success will be in the partnerships formed and in the maintenance of abundant, healthy prairie dog colonies along the Colorado Front Range with reduced conflicts with humans. The achievement of success will require the careful, combined management of prairie dog populations and habitats, but also the "management" of people.

Setting the Stage: Presentation of Background Information

Workshop attendees were updated on the legal status and conservation activities surrounding the black-tailed prairie dog since the National Wildlife Federation's petition proposing its listing under the Endangered Species Act (Graber and France 1999). The U.S. Fish and Wildlife Service (FWS) issued a "warranted but precluded" declaration on the species (US Fish and Wildlife Service 2000) and encouraged state, tribal and federal agencies (and others) to work together on conservation plans to restore the species, so it would not need to be listed at a later date. This resulted in a considerable interstate effort and the formation of the Interstate Prairie Dog Conservation Team. Most of the states

Table 1. Topics covered in the Colorado Front Range Prairie Dog Technical Workshop (February 2001) and the Colorado Front Range Prairie Dog Technical Conference (February 2003).

Conservation	Biology/Ecology	Public Attitudes	Habitat and Vegetation Management	Population Management	Plague Management	Landowner Incentives
Status and range	Social behavior	Survey results	Habitat management tools	Conflict resolution	Exotic disease	Need for private lands
Ecosystem role	Reproduction and mortality	Opposing views	Vegetation impacts	Zoning	High susceptibility	Landowner rights
Proposed listing and findings	Population fragmentation	Knowledge levels, public education	Noxious weeds, native plant restoration	Relocation, natural predation	Prediction, management of plague	Economic incentive programs, NGO roles
Strategies	Dispersal, genetic variation		Barriers	Toxicants	Research needs	
Federal, tribal, state, private roles	Vegetation relationships					

involved signed a cooperative memorandum of understanding (MOU) with this group and participated in the drafting of a range-wide Conservation and Assessment Strategy (CAS; Van Pelt 1999). Many states began their own working groups, with public sector and stakeholder representation, to address the issues within their state. Meanwhile, the tribal governments, rather then becoming members of the interstate team, formed the Intertribal Prairie Ecosystem Restoration Consortium. The states and tribes began to work on Candidate Conservation Agreements with Assurances (CCAA) with the FWS.

There are also many conservation planning activities being conducted at the municipal and county levels. These governmental bodies are faced with many challenges because of the small sizes of properties and the frequent interface of urban/suburban/rural properties with very different stakeholders, attitudes and land uses. These governmental bodies often use the task force approach to identify stakeholders, problems and potential solutions to prairie dog issues that result in policy and management documents. Issues, options and activities at the municipal and county levels were summarized by Witmer et al. (2000). Again, the main objective of our technical workshops was to provide the basic informational needs of local governments of the Colorado Front Range to enable them to better deal with prairie dog issues.

Several speakers addressed the biology and ecology of prairie dogs because it is very important that managers and citizens have a good understanding of these topics before management plans and decisions are made. Prairie dogs live in colonies with a relatively complex social structure. Within a colony, there are coteries (extended family units), defining a dominant male's territory. It has been determined that, for rodents, prairie dogs have a relatively low reproductive rate. They also have high mortality rates because of infanticide, plague outbreaks and predation. Despite this, there are numerous examples of rapid expansion rates of colonies once protection is provided (e.g., Fagerstone and Ramey 1996). When detailed surveys are completed, it is often found that many more acres are occupied than had been originally estimated. Most populations are highly fragmented (i.e., metapopulations exist), and biologists fear that genetic variation may be low in these small, isolated populations. Studies have determined, however, that, because of the breeding strategy and good dispersal capabilities, most prairie dog populations maintain moderately high levels of genetic variation. Conservation biologists have conducted population viability analyses and are integrating reserve size and design considerations to provide essential information

to help assure population viability (i.e., to reduce the risk of extinction) despite the metapopulation situation. There has been heavy reliance on the book on the black-tailed prairie dog by John Hoogland (1995) and his other scientific publications for information on the biology and social ecology of the species. Hoogland and numerous other workshop speakers are currently working on an updated book that will include chapters on many other topics, such as prairie dog conservation and management.

Several speakers addressed the effects that prairie dogs have on vegetation and ground cover both by foraging and by clipping plants to maintain a more open setting to reduce predation. Many persons mistakenly believe that prairie dogs live harmoniously with prairie vegetation, that a status quo exists. Speakers informed the attendees of some of the issues and difficulties of vegetation management on occupied sites. There can be shifts in plant species composition with forbs replacing grasses, unpalatable species replacing palatable species, reduction in shrub cover because of stem girdling and the loss of some plant species. There may be more plant cover overall, but it is only reduced litter and ground cover, contributing to the erosion of soils. On the other hand, some rare plant species may survive on the mounds of prairie dogs. Although lower of stature, some plants may have higher nutritional levels because of the continuous grazing and clipping. This may have resulted, historically, in the attraction of large, grazing herbivores to prairie dog colonies. The picture with nonnative cattle is less clear and there is a continuing concern by ranchers that prairie dogs remove too much livestock forage.

People Management

Presentations of the results of attitude surveys regarding prairie dogs add an important perspective for workshop attendees. A number of surveys have been conducted, both within individual states and on a regional basis. These surveys reveal the many dichotomies in attitudes and the polarized nature of the issues. They also reveal the relative lack of knowledge of the general public about prairie dogs. Typically, rural landowners and persons living near active prairie dog colonies have more negative attitudes towards prairie dogs than urban dwellers and wildlife conservation activists. Persons that live near prairie dogs or are wildlife conservation activists tend to be more knowledgeable about prairie dogs. Persons more knowledgeable about prairie dogs often support more holistic management of colonies, including some lethal control and not sole reliance on relocation as a solution to conflicts. Speakers representing segments of society (such as farm bureaus, cattleman's associations and home builders associations) most directly affected by prairie dogs and prairie dog listing and regulations were important contributors to the workshop.

The results of the surveys suggest the need for public education on matters concerning prairie dogs, their ecology and habitats, their role in the ecosystem, and the management issues and challenges faced by managers, land owners and health officials. People management can also result in more cooperation of landowners in prairie dog management and better acceptance and support for management policies and plans. There are many outlets available educating and involving the public. During the workshops, we also used breakout sessions, so panels of specialists could address specific management areas and allow audience participation. Finally, we presented the opportunity for workshop participants to attend a field trip to a nearby suburban prairie dog colony to view and discuss ongoing management and issues.

Another important part of people management is provision of incentives to landowners to provide land for prairie dog colonies and to be more tolerant of adjoining colonies. Because most of the current and former range is in private land ownership, it is essential to obtain the cooperation of landowners in the restoration of the prairie dog. This poses several challenges. Partly because rural economies are not strong across the country, much rural land is being converted to types of development (residential and commercial) that are not compatible with prairie dog colonies. Additionally, it is not easy to change the negative attitude that many rural landowners have towards prairie dogs. Landowners need economic incentives (e.g., compensation, tax relief) if they are to restrict the uses and productivity of their lands to accommodate prairie dogs. Incentive programs must have an adequate source of funding for cost-sharing to enhance the economic productivity of the private lands in the program. Many incentive programs involve land use leases or easement agreements. Several federal programs, mostly under the Farm Bill, are potential sources of assistance for private landowners. Several states within the historic range of black-tailed prairie dogs have begun incentive programs of their own.

Even nongovernmental organizations (NGOs) have begun programs, such as the Prairie Partners Program of the Rocky Mountain Bird Observatory. Other examples of services that NGOs can provide towards restoration of black-

tailed prairie dog populations include monitoring populations and trends, assisting the formulation of policies and development and implementation of management plans, devising mitigation banking frameworks, conducting research and public outreach, and consensus building. Thus, the private sector can provide valuable services to agencies and landowners in their efforts to conserve and manage prairie dog colonies.

Habitat and Vegetation Management

Several speakers addressed the importance of habitat, especially vegetation management on prairie dog colonies. The habitat occupied by prairie dogs can be managed in various ways, depending on the location and ownership of the property, the size of the parcel, the land manager's or owner's objectives, and the surrounding land uses. On federal and state lands, managers often use techniques, such as prescribed burning, managed livestock grazing, barriers between public and private lands, and land exchanges, to manage prairie dog colonies to reduce conflicts.

With protection, prairie dogs seem to thrive, even on urban-suburban sites with abundant noxious, nonnative weed cover. The animals may even encourage weed invasion and expansion by selective foraging on palatable native plant species. On the other hand, nonnative plants do not withstand the grazing by prairie dogs as well as native prairie plants; hence, the vegetation on some sites may degrade more quickly. It is difficult to control noxious weeds on occupied prairie dog sites, even with herbicide. Thus, it is difficult to practice integrated weed management and reduce herbicide use. The situation greatly hinders attempts to restore native prairie plant species, even with the use of weed control, seeding and irrigation. In some cases, managers remove the prairie dogs from the site, then attempt to restore native prairie plant species with the intent to reintroduce the prairie dogs at a later date. It is not known how much time native plants need to establish themselves before they can withstand prairie dog grazing.

Because prairie dog colonies can expand and cause conflicts with neighboring landowners, it is often necessary to contain the colony or to reduce colony expansion. Plastic barriers are a popular approach to the reduction of prairie dog-landowner conflicts because barriers, theoretically, provide a nonlethal solution to colony expansion. Barriers are often less attractive to resource managers because of their expense and high maintenance

requirements. Barriers are subject to sun, wind, erosion and animal (chewing and clawing) damage, and they are also considered unattractive to some members of the public. Generally, barriers are breached by some prairie dogs which burrow under or climb over the barrier, resulting in active burrow mounds outside the barrier. These individuals must then be removed and the burrow entrances plugged. Vegetative barriers, using shrubs, are difficult to establish and maintain because of the dry conditions of the prairie landscape and because of animal damage. Again, some prairie dogs will readily pass through the vegetative barriers. Information was provided on barrier construction and maintenance at the workshop.

Prairie Dog Population Management

Resource managers are often faced with the challenge of having prairie dogs populations where they don't want them, and of not having them where they do want them. Additionally, even in places where the managers have prairie dogs where they want them, the colonies often require control as they expand into bordering properties where conflicts arise. As such, a zoned management approach is often used once a planning activity is completed and a management plan developed and adopted.

In most situations, managers rely heavily on relocation and population control as parts of their management plan. Both of these approaches, however, present many challenges and these were addressed by workshop speakers and panelists. In particular, resource managers and landowners need to be aware of the many ordinances, regulations and laws that agencies, county commissioners and legislators have enacted on the local, county and state levels to dictate what can and cannot be done with prairie dog colonies.

Relocation is used to restock areas where prairie dogs are desired, but there are no nearby occupied areas to provide a founder population or because natural dispersal from nearby occupied areas is too slow or unsuccessful in establishing new colonies. Relocation is also used to remove excess individuals from expanding colonies, so the expansion does not result in land-use conflicts or increased human health risk from plague. Finally, relocation is used in an attempt to remove all individuals from an occupied area that is scheduled for development. Although lethal control can be, and often is, used in these latter situations, many prefer a nonlethal approach, i.e., relocation. Additionally, in some cases,

unwanted prairie dogs are used as a food source and for predation training for captive-reared, black-footed ferrets that are scheduled for use in reintroduction projects.

There are many considerations to assure the success of a relocation effort (Truett et al. 2001). An appropriate site must be found that is ecologically suitable and will not result in land-use or legal conflicts. It is best if the site has been previously occupied by prairie dogs and old burrow systems still exist. Otherwise, considerable site preparation may be necessary. This could include reducing vegetation height, drilling starter burrows and predator (e.g., coyote, fox) management. With a selected site ready for animals and the appropriate permits in hand, the prairie dog capture work can begin. Live-trapping is usually time consuming and expensive, especially when the objective is to capture and move every individual of the source population. Some private environmental consulting firms, wildlife conservation organizations or animal control companies will provide relocation services. Workshop attendees were given a list of resources and vendors where services and supplies could be obtained. A real challenge to managers has been to locate adequate numbers of suitable and acceptable sites for relocation efforts. Adequate landowner incentive programs may help resolve that situation.

Natural predation can be encouraged by the creation of artificial perches for use by raptors in an effort to slow colony expansion into neighboring ownerships. In some cases, nest boxes are also placed near colonies on poles or perches. These measures are taken because perches and nesting cavities are often in short supply on the prairies. Resource managers have also experimented with the placement of hay bales to provide cover and protective habitat for mammalian predators. While these structures are sometimes used by predators, it has not been established that the increased predation limits colony expansion.

Several toxicants, registered by the U.S. Environmental Protection Agency, help to control or to eliminate prairie dog populations where serious conflicts occur or development is to begin. These include the fumigants, aluminum phosphide, gas cartridges and zinc phosphide, a rodenticide. Workshop attendees were provided an overview document of the use of toxicants in prairie dog management. Private animal damage control companies are usually licensed to apply toxicants for rodent control and can be contracted to provide that service. The use of toxicants remains very controversial in the public sector, resulting in many agencies being reluctant to use this tool.

There have been several fertility control trials, dating back to 1983, to test the potential of chemical solutions to prairie dog population control. While some of these trials showed promise, there are many difficulties to overcome before these tools become available, including the need for a remote delivery system and the need to get a federal registration that would allow the use of the compounds in the environment, especially given that they would probably not be species-specific in their effect.

A Big Challenge: Plague and Its Management

An important health consideration where prairie dog colonies occur at the urban-suburban interface is bubonic plague (plague). Plague is a nonnative disease caused by the bacterium, *Yersinia pestis*. Prairie dogs are very susceptible to this disease and mortality rates are nearly 100 percent in infected colonies. Currently, plague is considered the wild card of prairie dog colony viability and, relatedly, a major hindrance to the successful reestablishment of black-footed ferrets (Antolin et al. 2002). There are also health concerns for humans and their pets where prairie dog colonies, which may become infected with plague, occur near suburban housing developments, schools, and city and county parks. We need to know more of how plague is transmitted between colonies, the ecology of insect vectors and the possible role of other wildlife vectors. This information would allow us to better predict and manage plague outbreaks. Research is underway on efficient and effective ways to prevent or slow plague outbreaks by the use of insecticides on burrow-dwelling fleas. Other research is directed at development of an oral vaccine for plague that could be placed in colonies for consumption by prairie dogs. Meanwhile, managers can educate the public on the use of flea collars on dogs and cats, monitor colonies for plague outbreaks, post warning signs when outbreaks occur and, in some cases, apply insecticides to burrow openings when an outbreak starts in an attempt to slow or stop the outbreak and potentially save the colony.

Summary

Resource managers face many challenges in providing for the needs of prairie dogs as an important prairie ecosystem component. While many of them would like to avoid federal listing of the species, they must also resolve the

conflicts that arise between humans and prairie dogs. Technical workshops provide essential information and updates to these resource managers and other interested parties, so the agencies, parties and landowners can better work together to find and implement solutions to provide for the needs of the species, the prairie ecosystem and human neighbors of those areas. Impressive progress is being made through the many cooperative efforts throughout the range of the black-tailed prairie dog. This is a shifting arena; however, periodic, updated information transfer is essential to the needs of resource managers and landowners alike. Continued research is needed to provide additional tools and answers to difficult questions that will allow us to resolve the conflicts between prairie dogs and urban-suburban communities. Upon request, we will provide interested persons with contact information on the various specialists and parties that have been involved in the workshops, vendor information and access to pertinent literature on specific topics.

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