PRAIRIE DOG GONE

Myth, Persecution, and Preservation of a Keystone Species

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Prairie dogs have declined drastically since European settlement of the Great Plains because of human persecution and habitat destruction. Traditionally, prairie dogs have been viewed as competitors for forage with livestock. Today, an emerging scientific view of prairie dogs as "keystone" species indicates a need to alter attitudes toward and management of these important grassland animals.

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Black-tailed prairie dog.

Prairie dog (*Cynomys* sp.) decline began soon after Europeans began settling the Great Plains in the mid-nineteenth century. The twentieth century began with an estimated 41 million hectares of black-tailed prairie dog *(C. ludovicianus)* colonies spread across the western grasslands and grassland deserts of North America.[1] By 1960, that number had been reduced to about 600,000 hectares[2]—a decline of 98.5 percent in sixty years.

This trend continues. In 1995, approximately 540,000 hectares of black-tailed prairie dogs remained in the United States,[3] but by 1998 that number had dropped to 280,000–320,000 hectares.[4] This is a loss of 41–49 percent in three years and an overall decline of over 99 percent since 1900. Similarly, the area occupied by black-tailed prairie dogs in Mexico declined nearly 80 percent between 1988 and 1996.[5] The other species of prairie dogs have experienced similar declines. That prairie dog populations have been decimated throughout the western grasslands is undisputed among scientists.

Despite the dramatic decline of all five prairie dog species over the last century, it is only very recently that prairie dog management policy has taken into account any aim other than extermination, largely through poisoning. The Utah prairie dog *(C. parvidens)* did receive early protection in 1973 as an endangered species under the Endangered Species Act, but in 1983 the U.S. Fish and Wildlife Service downgraded its status to threatened, and over the past few years the species has experienced severe declines. As few as 1,500 remain today.[6] The Fish and Wildlife Service listed the Mexican prairie dog *(C. mexicanus)* as endangered in 1991[7] and began considering the black-tailed prairie dog as threatened in March 1999. The white-tailed *(C. leucurus)* and Gunnison's *(C. gunnisoni)* prairie dogs may also warrant listing.

The loss of prairie dogs can be attributed to the activities of one species—humans. People have caused tremendous damage to the prairie dog ecosystem.[8] Prairie dogs once existed in a matrix of colonies and off-colony habitat that shifted in space and time across the landscape of western grasslands of North America. As European settlers began colonizing the region in the late 1800s, they began converting prairies to farmland. Farther west, ranchers noted that prairie dogs ate grass, and in the early 1900s ranchers began

poisoning prairie dogs in an attempt to provide more forage for livestock.[9] A few visionaries, such as naturalist Ernest Thompson Seton,[10] predicted catastrophic outcomes from the massive prairie dog poisoning campaigns, but such voices went largely unheeded. In addition, at the turn of the century, people accidentally introduced plague *(Yersinia pestis)* to San Francisco. With no natural immunity to this new disease, prairie dogs began dying in large numbers as plague spread across the West.[11]

Today, real estate developers destroy prairie dog colonies and replace them with houses, businesses, and parking lots as western cities swell. Still, ranching and other agricultural interests—the major industries overlapping prairie dog habitat—continue to have the greatest influence on both prairie dog ecosystems and policy, on both private and public lands. Thus, as a result of poisoning and other forms of persecution, plague, and habitat destruction, the landscape matrix of prairie dogs has been destroyed. Today we are left with only small, isolated fragments of a once-vast system.

The loss of prairie dogs is also linked to the decline of several other species. The most prominent example is the black-footed ferret *(Mustela nigripes)*, one of the most endangered mammals in North America.[12] Ferrets depend on prairie dogs for about 90 percent of their diet and require prairie dog burrows for shelter and rearing young.[13] In addition, the swift fox *(Vulpes velox)*, a predator closely associated with prairie dogs, was recognized as warranting listing in 1995.[14] The ferret and fox join the ferruginous hawk *(Buteo regalis)*, the mountain plover *(Charadrius montanus)*, and the burrowing owl *(Speotyto cunicularia)* as species that have all experienced severe declines and that are all closely tied to the prairie dog.[15] Should prairie dogs reach a nonviable population level, a wave of secondary extinctions would likely follow.[16]

A range of federal and state government policies run counter to long-term viability of prairie dogs. Poisoning still occurs throughout the increasingly fragmented range of prairie dogs on both public and private land.[17] Government agencies at all levels permit and often encourage prairie dog shooting on public lands. The federal land management agencies administering public lands—the Bureau of Land Management (BLM), the U.S. Forest Service, the Fish and Wildlife Service, and the National Park Service—have all conducted poisoning to control prairie dogs.[18]

Although in 1999 the Forest Service issued a moratorium on poisoning black-tailed prairie dogs, agency policy mandated limiting prairie dog acreage on the national grasslands and national forests to 1 percent or less.[19] On BLM lands, poisoning can occur at the discretion of the U.S. Department of Agriculture Animal and Plant Health Inspection Service Wildlife Services (formerly known as Animal Damage Control) without the knowledge of BLM administrators.[20] Federal bureaucracies, including the National Park Service, carry out so-called "good neighbor" policies, whereby prairie dogs are poisoned to provide a buffer to adjacent private landholders. Prairie dog shooting is permitted on most national grasslands and BLM lands.

Most states within prairie dog range designate prairie dogs as pest species, and some try simultaneously to manage them as wildlife. Colorado, Kansas, Montana, New Mexico, North Dakota, Oklahoma, South Dakota, Texas, and Wyoming all have laws that mandate the poisoning of prairie dogs. Only Colorado restricts shooting; yet that restriction—which sets a daily bag limit of five animals—applies only to contest shoots.

The Cowboy Myth

To understand our continued persecution of prairie dogs since European settlement of North America, we must examine the origin and elements of anti–prairie dog sentiment. The dominant attitude held by traditional power holders in the policy process—ranchers—is that of intolerance, even hatred, of these animals.[21] This attitude persists despite substantial and growing evidence of the importance of prairie dogs to the ecosystems they inhabit and the relatively small impact they impose on ranching operations.

Ranchers argue that prairie dogs compete with cattle for forage, injure livestock that step in their burrows, pose a public health threat, and cause environmental damage. They further suggest that prairie dogs are abundant—even suffering from overpopulation—and deserve no legal protection. We can view these deeply entrenched beliefs as an outgrowth of a larger myth, "the cowboy myth," that governs the human relationship to the land and treatment of the environment.

A myth is rooted in fundamental assumptions, regardless of their truth, that are believed by a community to the extent that they no longer appear to be myths.[22] Myths are supported by powerful symbols. Myths help people understand and relate to a world far too complicated to understand in its entirety, they promote solidarity, and they are utilized by power holders who manipulate key symbols to explain and justify their use of power.

Generally, rancher attitudes about prairie dogs and other wildlife can be understood as an outgrowth of the cowboy myth that espouses human dominion over other living beings—the philosophy that guided European settlement of the West.[23] This myth is deeply rooted in Christian ethics,[24] as well as in liberal political and economic philosophy.[25] According to the myth, nonhuman animals are either commodified or controlled to minimize interference with human economic activity.

With some exceptions, members of the ranching community tend to view many wildlife species as potential economic threats and have little to no tolerance for potential loss due to depredation (for example, coyotes, *Canis latrans*, and gray wolves, *C. lupus*[26]); the risk of disease transmission from wild to domestic animals (e.g., bison, *Bison bison*,[27] and bighorn sheep, *Ovis canadensis*); or competition for forage (e.g., elk, *Cervus canadensis*, and prairie dogs[28])—this, despite the high affinity of ranchers for open space and some types of wildlife,[29] especially nonthreatening species at low densities, such as modest numbers of deer and grouse.

Proponents of the cowboy myth, especially western ranchers and agency personnel, generally reject data demonstrating that fears about prairie dogs are exaggerated.[30] In the 1970s, scientists began quantifying the impact of prairie dogs on livestock operations. Studies found that cattle averaged no significant changes in body weight when grazed on prairie dog towns.[31] In addition, the annual cost of maintaining control of prairie dogs through poisoning exceeds the annual value in forage gained.[32] Most research finds that total vegetative cover decreases after prairie dogs abandon the land.[33] Furthermore, one extensive review of the literature revealed that although plant biomass in patches created by prairie dogs was lower, it was of higher nutritive value than plant biomass on uncolonized prairie.[34] In other words, the loss in forage quantity was almost fully compensated by a large increase in forage quality.

In addition, public health data indicate that plague poses a more significant danger to prairie dogs than it does to humans. The incidence of plague in humans is negligible. For example, the Colorado Department of Public Health and Environment has documented forty-three cases of plague between 1957 and 1998; only five of those cases were linked to prairie dogs.[35]

The Keystone Role of the Prairie Dog

Despite ranchers' claims that prairie dogs cause environmental damage, a growing body of data suggests just the opposite: that prairie dogs are keystone species. As we use the concept, keystone species are those that enrich ecosystem function uniquely and significantly through their activities and whose impact is larger than predicted by their numerical abundance.[36] Evidence is mounting that prairie dogs fulfill these requirements.[37]

The changes induced by prairie dogs lead to the creation of a unique ecological system referred to as the prairie dog ecosystem.[38] Over 200 vertebrate species have been observed on prairie dog colonies.[39] Some of these species appear to depend on prairie dog colonies for their survival, and many appear to benefit, at least seasonally or opportunistically.[40]

Prairie dogs and the other animals inhabiting their colonies represent a rich prey patch for a large number of predators, including prairie rattlesnakes *(Crotalus viridis)*, golden eagles *(Aquila chrysaetos)*, great horned owls *(Bubo virginianus)*, long-tailed weasels *(Mustela frenata)*, bobcats *(Lynx rufus)*, and coyotes.[41] Some predators, such as black-footed ferrets, are dependent on prairie dogs specifically.[42] Other species, such as badgers *(Taxidae taxus)*, swift foxes, and ferruginous hawks, have been shown to derive substantial benefits from the presence of prairie dogs as prey and eat other prey species in prairie dog colonies as well.[43]

The benefits from prairie dogs extend well beyond simply providing food for predators.[44] Since prairie dogs excavate more burrows than they regularly utilize, they create homes for many animals, such as cottontails (*Sylvilagus* spp.), burrowing owls, and several species of reptiles and amphibians.[45] These species and more also use the burrows as refugia from predators or temperature extremes. As a result, researchers have found that desert cottontails *(S. audonbonii)*, thirteen-lined ground squirrels *(Spermophilis tridecemlineatus)*, and northern grasshopper mice *(Onychomys leucogaster)* exist in higher numbers on prairie dog colonies than in surrounding grasslands.[46] Similarly, studies in Mexico found higher rodent species richness, density, and diversity and higher avian species richness on prairie dog colonies compared with surrounding grasslands in Chihuahua, Mexico.[47] Most of the work to date has focused on birds and mammals, with considerably less on reptiles and amphibians. Similarly, little is known about prairie invertebrates, yet the burrows in a prairie dog colony should offer habitat advantages to invertebrates as well.

Prairie dogs also have a large effect on vegetation structure, productivity, nutrient cycling, and ecosystem processes.[48] The activities of prairie dogs, especially their grazing and clipping of tall vegetation, result in changes in plant composition.[49] In general, the vegetation on prairie dog colonies is characterized by lower biomass (smaller quantity), a greater preponderance of annual forbs (broad-leaved, nonwoody plants such as wildflowers) and short grasses than tall grasses and shrubs, and higher nitrogen content than plants from surrounding areas.[50] Prairie dogs negatively impact some plant species, reducing the prevalence and controlling the spread of taller grasses and several shrubs, such as mesquite (*Prosopis* spp.), sagebrush (*Artemesia* spp.), and *Ephedra trifurca.*[51] Ironically, prairie dogs are poisoned for livestock interests, but these shrubs preempt grass from cattle, and mesquite makes roundups more difficult.[52]

Prairie dog burrowing activities modify ecosystem processes such as water, mineral, and nutrient cycling. Prairie dogs turn over approximately 225 kilograms of soil per burrow system, which translates to several tons of soil per hectare.[53] By mixing in nutrient-rich urine and manure, prairie dog digging can change soil composition, chemistry, and microclimate, facilitate belowground herbivory, increase porosity of soil to permit deeper penetration of precipitation, and increase the incorporation of organic materials into the soil.[54] As a result, prairie dog colonies support higher numbers of nematodes and higher levels of soil nitrogen.[55] All of these processes contribute to aboveground plants with a higher nutritional content, higher digestibility, and a greater live-plant to dead-plant ratio, creating favorable feeding habitat for other herbivores.[56] Indeed, pronghorn *(Antilocapra americana)* and bison preferentially graze on prairie dog colonies.[57] Scientific models predict that bison can gain weight faster by grazing on a prairie dog colony than on grasslands without prairie dogs.[58]

Prairie dog researchers have concluded that collectively these functions are large, not wholly duplicated by other species (either in form or extent), and that the loss of prairie dogs would lead to "substantial erosion of biological diversity and landscape heterogeneity across the prairie."[59] The prairie dog therefore fulfills the definition of keystone.

Toward an Integrated Preservation Strategy

Reversing the trend of prairie dog decline demands urgent attention. Without changes in prairie dog management, all five species will face extinction. We must now work to reduce prairie dog mortality, recover dwindling populations, and protect habitat across the range of these species. Yet, policy changes to achieve these biological goals are unlikely without addressing the social and political processes that now govern prairie dog management. This task will be one of the most formidable challenges to prairie dog preservation. Initiating effective policy reform means exposing and countering the myths that engender the negative attitudes and values so ingrained in the western agrarian community and among the land and wildlife managers responsible for prairie dogs. Instilling more tolerant attitudes toward prairie dogs may be the key to recovery and long-term viability of their ecosystem. By overturning or altering dominant myths that hold prairie dogs as pests, we can begin developing a new set of myths conducive to sustaining the prairie dog ecosystem.

Shifting policy toward prairie dog preservation will first require enforcing already-existing relevant laws, terminating policies aimed at reducing prairie dog numbers, and developing a more effective legal framework directed toward protecting the prairie dog ecosystem. Currently, three of the five species of prairie dogs enjoy no federal legal protection and only limited protection in a few states.

Despite the mixed success to date, federal and state legal protection for all species is crucial. But laws must be adequately implemented and enforced to achieve their intended effect. Policy does not end once laws and regulations

are promulgated.[60] Implementation is equally, if not more, important.[61] For example, properly enforcing prairie dog protection measures means devoting resources toward detecting and stopping illegal poisoning. Unauthorized poisoning has contributed to the decline of Mexican, black-tailed, and probably Utah prairie dogs.[62] We must also work to induce public land and wildlife managers to stop poisoning prairie dogs and start initiating proactive preservation programs. This will not be easy, as they are often proponents of continuing poisoning programs.

Along with legal measures, government agencies should initiate other actions to help reduce prairie dog mortality, recover populations, and protect prairie dog habitat. Agencies should support research focused on preventing outbreaks of plague and reducing mortality rates from plague infestations on prairie dog colonies.[63] Public lands within prairie dog range, such as national grasslands, wildlife refuges, and BLM land, should permit expansion of prairie dog colonies. A somewhat radical proposal, but one that is gaining support among certain members of the public, entails the eventual replacement of livestock with native ungulates, especially bison, on public lands.[64]

Another step toward prairie dog and prairie dog ecosystem preservation entails reconceptualizing and managing prairie dogs as keystone species. Keystone species conservation can be a sound basis for conserving entire natural areas efficiently and effectively, because the keystone helps regulate the entire system.[65] Thus, effectively managing prairie dogs as keystone species would aid efforts to switch from a single species strategy to an ecosystem approach.[66]

Focusing on prairie dog preservation makes not only biological sense but economic sense as well. Protecting prairie dogs and prairie dog habitat is a cost-effective means of protecting other species dependent on prairie dogs or otherwise associated with the prairie dog ecosystem. The black-footed ferret recovery program illustrates this point. The U.S. government is spending millions of dollars on black-footed ferret captive breeding and reintroduction. The Fish and Wildlife Service alone spent $1.5 million in 1991.[67] Ensuring an adequate number of prairie dogs by protecting prairie dog complexes remains a condition of success for black-footed ferret recovery.[68] Therefore, the greatest challenge facing ferret recovery is the lack of sufficient prairie dog populations to support even modest populations of ferrets.[69] Some of the resources now supporting single-species approaches to conservation and protection could be redirected to prairie dog preservation, as prairie dog habitat preservation equates to protection for many other species.

The social and political constraints facing the initiation of a comprehensive prairie dog preservation program are formidable. More integrated, interdisciplinary approaches are desperately needed. A more comprehensive program should identify all of the key stakeholder groups and devise separate strategies for each. In particular, local, state, and federal wildlife, land management, and agriculture agency personnel have demonstrated little concern for prairie dog preservation,[70] yet these individuals exert powerful influence on all phases of the policy process.[71] Broader public relations programs are unlikely to succeed in the face of opposition by agency personnel, especially local officials.

Similarly, the ranchers likely will resist any outside proposal that does not simultaneously bolster their own interests. Yet the economic and social crises of many ranching communities today may be a door to change. As family ranches become a thing of the past and the once "self-reliant" and libertarian rancher increasingly looks for government assistance to stay in business, prairie dogs serve as convenient scapegoats for the deeper, more complex problems of the livestock community.

On the other hand, in times of stress, such as economic downturns, communities are often most likely to seek out new ideas and embrace new myths.[72] Old myths may no longer work to justify traditional practices, including the control of native wildlife. Thus, some ranchers are indeed seeking out new ways, even trying to adopt more environmentally conscientious practices. If such innovators are successful, we may see others open to alternative techniques. Such a transformation is unlikely to occur among those who have grown up with the belief that prairie dogs are pests; however, younger generations may indeed reach out to new ideas. And if ranchers as a group are to be persuaded to adopt more tolerant attitudes toward prairie dogs, the best chance is for individuals among them to initiate and promote the change.

Outside the ranching industry, it will be up to prairie dog supporters—preservationists, wildlife biologists, and policymakers working with prairie dog-friendly ranchers—to promote symbols that will help forge more tolerant attitudes toward prairie wildlife. The symbols most likely to resonate with the ranching community are symbols that already hold meaning within this group. Preserving prairie dog habitat also means maintaining open space, practicing land stewardship, and retaining a sense of wildness to the western plains—all ideas that are already embraced by the traditional ranching community.

Beyond confronting the major myths that have helped reduce the prairie dog ecosystem from a once-rich network of biodiversity to a fragmented patchwork, American grasslands and the prairie dog ecosystems they include need a national public relations campaign. Unlike wolves and whales, prairie dogs do not muster the great charisma that the large mammals and predators enjoy. Moreover, grasslands as wild places lack resonance in the public's consciousness. Yet the Great Plains were once teeming with wildlife, rivaling the Serengeti Plains of Africa.[73] Along with the roving herds of bison, America's grasslands were also rife with wolves, elk, pronghorn, and grizzly bears. We must work to promote this image of the western plains as a place for wild nature, not just cowboys.

Black-tailed prairie dog pup.