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The Prairie Dog Ecosystems and Endangered Species

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The prairie dog is no doubt one of the most controversial animals in the western United States. Public sentiment regarding this rodent runs the gamut from some livestock producers who are satisfied only with complete eradication of all prairie dogs, and some animal rights groups who would like to see all prairie dogs given complete protection from any form of harm. Between these two extremes lie the real truths surrounding this sometimes destructive, mostly biologically beneficial, creature.

The primary controversy involving prairie dogs, as is often the case with wild species, lies in its tendency to conflict with the financial interests of humans. It is widely believed that prairie dogs compete with domestic livestock for valuable forage. There is, in fact, considerable overlap in the diets of cattle and prairie dogs (Smith 1958), both grazers preferring grass over forbs. A single prairie dog may consume approximately 3 kg of vegetation per month during the summer, and prairie dogs also continuously clip taller vegetation within their colonies to remove visual obstructions, with vegetation at the edges of the town thinned at least partially (King 1955, Koford 1958). The result of this often is that grasses eventually become replaced by a higher percentage of forbs, particularly in the center of a colony.

In one of the only controlled experiments conducted to document the competitive effects of prairie dogs on cattle, there were slight reductions in weight gains of steers grazed on black-tailed prairie dog towns versus similar steers grazed on pastures with no prairie dogs (O'Meilia et al. 1982). While these reductions were not statistically significant, they did result in market values approximately \$14-24 per steer lower for the animals associated with this prairie dog species. This study occurred on pasture with a very high cattle stocking rate; the effects may have been less with moderate stocking rate. No correlation has been made with the less dense colonies formed by white-tailed or Gunnison's prairie dogs.

There are also studies which have reported the beneficial effects of prairie dogs on range condition, including increases in plant species diversity and richness in areas colonized by prairie dogs (Bonham and Lerwick 1976, Gold 1976, Archer et al. 1987). Prairie dog grazing produces higher nitrogen concentrations in the shoots of newly growing vegetation which results from stems repeatedly being clipped off (Whicker and Deding 1988). In response to higher forage quality represented by these tender new shoots, native grazers such as bison and pronghorn preferentially select prairie dog colonies over uncolonized sites (Krueger 1986).

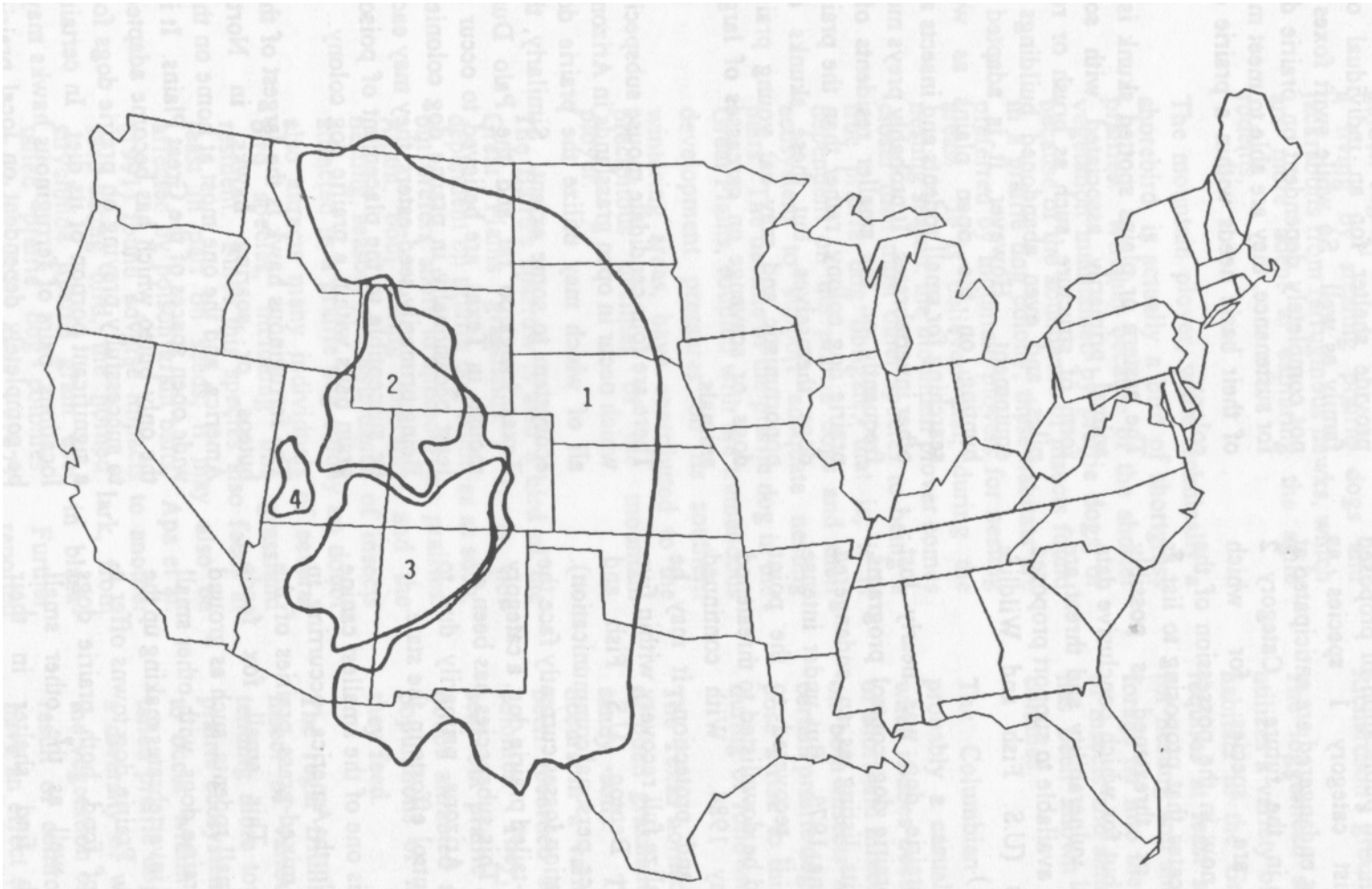
There are five recognized species of prairie dog in North America, with four of these occurring in the U.S. (Figure 1). These include the black-tailed prairie dog (*Cynomys ludovicianus*), white-tailed prairie dog (*Cynomys leucurus*), Gunnison's prairie dog (*Cynomys r. gunnisoni*), the federally-listed threatened Utah prairie dog (*Cynomys parvidens*), and the federally-listed endangered Mexican prairie dog (*Cynomys mexicanus*). Accurate reports of prairie dog numbers or densities during presettlement do not exist, but it is estimated that in 1919 there were approximately 40 million hectares (99 million acres) of occupied prairie dog colonies in the U.S. (Nelson 1919). Early naturalist Ernest Thompson Seton estimated that approximately 5 billion black-tailed prairie dogs occurred in North America in the early 1900s (Foster and Hygnstrom 1990). Control programs and conversion of prairie to other land uses were estimated in 1978 to have reduced this most widespread of prairie dog species to less than two percent of its population numbers of just a few decades before (Summers and Linder 1978).

The ecological significance of the prairie dog is exemplified by the fact that various surveys have reported from 64 to 107 vertebrate species and subspecies identified on prairie dog towns (Tyler 1968, Campbell and Clark 1981, Clark et al. 1982). What effect has the war on prairie dogs had on the natural ecosystem of which they are an integral part? How have other species which share this ecosystem fared during this period? In addition to the two listed prairie dog species, there are at least two species listed as endangered by the U.S. Fish and Wildlife Service which are known to utilize the prairie dog

ecosystem, the black-footed ferret (*Mustela nigripes*) and the bald eagle (*Haliaeetus leucocephalus*)

The black-footed ferret has long been known to be closely associated with prairie dogs, sheltering in their burrows and feeding on prairie dogs and other small mammals within a colony. Radiotelemetry studies of black-footed ferrets show that they generally leave prairie dog colonies only to travel to adjacent colonies, with one individual ferret even avoiding an area populated with ground squirrels (Biggins et al. 1985). Among the several factors contributing to its decline, the reduction in prairie dog habitat is cited as the principle reason for the near extinction of the black-footed ferret (U.S. Fish and Wildlife Service 1988). Conversely, loss of prairie dog habitat is not cited as a factor in the decline of the bald eagle, a species which is typically associated with aquatic habitats and feeds primarily on fish and waterfowl. However, observations by Fish and Wildlife Service personnel of wintering bald eagles in Colorado, and one nesting pair in Kansas, indicate that prairie dog colonies can provide a significant source of prey. Impacts to prairie dog colonies in particular areas may therefore potentially affect local bald eagle populations.

In addition to federally-listed species, a number of species which use prairie dog colonies have declined sufficiently for the Fish and Wildlife Service to have included them in a list of federal candidate species (Table 1). Category 1 candidate species are those species for which the Service has on file substantial information on biological vulnerability and threats to support proposals to list them as



1 = black-tailed prairie dog
2 = white-tailed prairie dog

3 = Gunnison's prairie dog
4 = Utah prairie dog

Figure 1. Distribution of prairie dog species in the United States.

endangered or threatened species. Development and publication of proposed rules to list category 1 species as threatened or endangered are anticipated at some point in the future. Category 2 candidates are species for which information now in the possession of the Service indicates that proposing to list as endangered or threatened is possibly appropriate, but for which conclusive data on biological vulnerability and threat are not currently available to support proposed listing rules (U.S. Fish and Wildlife Service 1991).

The Utah prairie dog was nearly lost because of prairie dog control programs, resulting in its listing as an endangered species in June 1973. But under intense management, it recovered to the point where it could be downlisted to threatened status in May 1984. With continued management and protection, it may be possible to realize full recovery within five years (Robert Benton, U.S. Fish and Wildlife Service, personal communication). Similar population losses currently face the Arizona black-tailed prairie dog, a category 2 subspecies. This subspecies has been all but lost from Arizona, primarily due to prairie dog control efforts in the state.

The swift fox is one of the smallest canine predators in North America, occurring in the short and mixed-grass prairies of the Great Plains. This small fox feeds primarily on small rodents, such as ground squirrels and prairie dogs, with other small vertebrates and invertebrates making up the bulk of its diet. Prairie dog towns offer a ready supply of food, both prairie dogs themselves as well as the other small animals which find shelter in their colonies. And since this fox dens

underground, the prairie dog burrows may provide shelter for an individual or a family as well. So while swift foxes are not completely dependent on prairie dogs for sustenance, they are able to meet many of their basic needs within a prairie dog colony.

The eastern or plains spotted skunk is an animal primarily associated with some form of structure, such as brush or rock piles, and even abandoned buildings or equipment. However, it is adapted to hunting on the open plains as well, searching for small rodents and insects and other invertebrates. It probably preys more frequently on the smaller residents of a prairie dog colony, rather than the prairie dogs themselves, but these skunks are opportunistic and may eat young prairie dogs, or scavenge on carcasses of larger animals.

There are four candidate mouse subspecies which occur in open grasslands in Arizona, all of which may utilize the prairie dog ecosystem to some extent. Similarly, the Texas kangaroo rat and the Palo Duro mouse, in Texas, are believed to occur at least occasionally in prairie dog colonies. Being primarily seed-eaters, they may each be susceptible to the placement of poison grain baits within a prairie dog colony.

The ferruginous hawk is the largest of the buteos, or soaring hawks, in North America, and the one most at home on the wide open spaces of the Great Plains. It is the only buteo which has become adapted to successfully preying on prairie dogs for a significant portion of its diet. In certain locations, pairs of ferruginous hawks may be completely dependent on local prairie dog populations for their food supply.

Larger birds of prey, such as bald and golden eagles, have been known to make a living by stealing prairie dogs and jackrabbits from ferruginous hawks, which are more adept at capturing the agile rodents.

The mountain plover, while technically a shorebird, is actually a bird of shortgrass prairies. Whether because of the shorter vegetation maintained by prairie dogs, or because of the abundance of insects found in a prairie dog colony, these habitats are preferred by mountain plovers for nesting areas. It is believed that, during the nesting season, the mountain plover comes closer than most other species to being a true prairie dog obligate; that is, it is dependent on the prairie dogs and their ecosystem to support adequate nesting pairs. The decline of the prairie dog in the Great Plains, coupled with the tremendous development pressures on its southern wintering areas, have contributed to the precipitous declines of the mountain plover.

The Baird's sparrow is also a bird of the Great Plains grasslands. It is not dependent on prairie dog colonies as such, but prefers short to mixed-grass prairies. Again, both during migration and the nesting season, the abundance of insects attracted to a prairie dog colony no doubt also attracts many individuals of several bird ' species, including this grassland resident. Since this species also feeds at least in part on seeds, it may also be affected by poison grain baits. Apa et al. (1991), found adverse impacts to another seed-eating bird, the horned lark, from strychnine treated grain used in blacktailed prairie dog colonies. Further, Hegdal and Gatz (1977) reported

strychnine doses still lethal to birds two months following control measures for Richardson's ground squirrels.

The loggerhead shrike is a bird which utilizes a variety of grassland and shrubby habitats in the Great Plains. It usually requires at least some woody vegetation for nesting and shelter. However, it may forage far into the open prairies in search of insects and small rodents for food, and has been known to hunt in prairie dog colonies.

The Columbian sharp-tailed grouse is probably a casual visitor to prairie dogs when it does occur, as it utilizes a variety of short and mixed-grass habitats. It feeds on both insects and vegetation seeds, so certain prairie dog control techniques could pose a risk to this species if it is present during or following control measures.

The Texas horned lizard is a small reptile of open grasslands, especially those with sandy soils. The Texas garter snake occurs in a variety of habitats, and has been recorded from within prairie dog colonies. They, too, do not necessarily seek out prairie dog colonies, but are no doubt attracted somewhat by the higher populations of invertebrates upon which they feed.

The regal fritillary butterfly is a showy insect of various prairie habitat types, tending more toward mixed and tallgrass prairie ecosystems. However, it is known to occur within the range of the blacktailed prairie dog. It prefers prairies with a diversity of wildflowers, so changes in the vegetation of a prairie dog colony as a result of control methods may at times have an effect on this species.

While not a candidate species, the golden eagle is a species of high public interest which also utilizes prairie dog colonies. Unlike its more aquatic relative, the bald eagle, golden eagles are raptors of the Great Plains and mountains. They feed primarily on small mammals, including jackrabbits and prairie dogs. They both capture their prey live, as well as feed on road-kills and other carrion. In areas where they are readily available, prairie dogs may comprise a significant portion of a golden eagle's diet.

One other species of concern is the burrowing owl. While it has not been included on the list of candidate species, it has been identified through various survey results as a species in decline. It is also one of the most closely associated with prairie dog colonies of any bird species, occupying prairie dog burrows for shelter and feeding on invertebrates within the colonies. In many areas, populations of burrowing owls fluctuate depending on whatever happens to the prairie dogs of the area.

At least three of the candidate species discussed above, the swift fox, ferruginous hawk, and *mountain plover*, have received serious consideration in recent years for potential inclusion on the list of threatened and endangered species. Of these, the mountain plover appears to be most in need of some form of additional protection, and may very well be included on the official list before too many years. All three of these species, as well as the golden eagle and burrowing owl, are very closely tied to prairie dogs, and could be affected by changes in overall prairie dog acreages as well as adverse effects from certain toxic control efforts. The other,

more casual visitors to prairie dog colonies may suffer less direct impacts, although the specific control technique utilized in a given area may produce significant effects as well. For example, Baird's sparrows eat both insects and seeds, and may be susceptible to certain grain baits.

What the populations of many of these species indicate is that there is a serious problem with the habitat which supports them. For some, the prairie dog ecosystem is an integral, even critical, component of this habitat. Because of concern regarding the declines already noted, there has been informal discussion among some Fish and Wildlife Service biologists about the possibility of designating one or more of the unlisted remaining prairie dog species as federal candidate species. As much as 95 percent or more reductions in some prairie dog species no doubt qualifies them for such designation, if this were to be pursued. Such action would refocus conservation attention to the core animal which itself creates habitat favorable to so many others. While this would in all likelihood be a very controversial move, it may be biologically warranted, particularly if trends do not change.

Because of land use changes, prairie dogs today exist generally on poorer quality range; they therefore are often blamed for the condition of the prairie, when, in fact, this is all that remains intact for them. In the eastern part of prairie dog range, it is estimated that an overgrazed condition is more conducive for these rodents to become established (Smith 1958). Even where lethal control measures are applied to eliminate prairie dogs, it is possible for them to rebuild to pre-treatment levels in

application, if other land use changes are not enacted (Crosby and Graham 1986). In fact, it is estimated that the maintenance costs of typical control methods, poison grain baits and fumigants, may be greater than the annual value of the forage gained by these measures (Collins et al. 1984). Therefore, it may be in the best interests of the livestock industry to take a second look at this basic program.

What is required is a change in attitude; a change in the fundamental way land managers, producers, and regulatory agencies view prairie dogs and the ecosystem they sustain. While there are no doubt situations where prairie dogs indeed warrant control to prevent undue range destruction, there needs to be a change from the idea that control equates with eradication. It may be possible in some circumstances to reduce prairie dog numbers and densities while maintaining or even increasing overall acreages of prairie dog colonies. If some measure of legal protection for the prairie dog ecosystem is to be rendered unnecessary, prairie dogs need to be managed rather than eliminated. The public and private sector need to demonstrate that they can cooperatively manage a controversial species to serve the best interests of private landowners as well as wildlife concerns. If this is not accomplished, the number of federally listed species, with all the associated regulations and legal burdens, will only increase in the Great Plains. More importantly, if things do not change, this country will continue to see avoidable losses in its natural diversity.

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Table 1. Species designated as candidates for federal listing as endangered or threatened which utilize prairie dog ecosystems.

Arizona black-tailed prairie dog		n m
	ludovicianus arizonensis)	
Swift fox	(u nest	velox)
Plains spotted skunk	(il
	Putorius interrupt	
Coconino Arizona pocket mouse	I Perognathus amplus ammodytes	
Wupatki Arizona pocket mouse	I perognathus ma P usl in	
Silky pocket mouse	erognathus flavus good)	
Chiricahua western harvest mouse	(Reithrodontomys meelotis arizonensis)	
Texas kangaroo rat	(Dipodomys elator)	
Palo Duro mouse	(peromyscus comanche	
Ferruginous hawk	Buteo LUAU)	
Mountain plover	(Charge montanus)	
Baird's sparrow	(Ammodramus bairdii	
Loggerhead shrike , anius ludovicianus)		
Columbian sharp-tailed grouse	Tympanuchus phasianellus columbianus	
Texas horned lizard	phrynosoma cornutum	
Texas garter snake	Thamnophis sirtalis annectens	