ASSESSMENT OF POTENTIAL BLACK-FOOTED FERRET HABITAT IN NORTHERN ARIZONA

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INTRODUCTION

Once occurring in 12 western states, the black-footed ferret (*Mustela nigripes*) was listed as endangered by the U.S. Fish and Wildlife Service (USFWS) on March 11, 1967. The ferret is also included on the Arizona Game and Fish Department's (AGFD) list of *Threatened Native Wildlife in Arizona* (AGFD 1988), as endangered. Due to a successful captive breeding program, enough ferrets are now being produced to allow for reintroduction back into suitable habitat. As a result, matching funds have been made available to AGFD through Section 6 of the Endangered Species Act, and recently, the AGFD Heritage Fund, to assess habitats for possible reintroduction of black-footed ferrets in Arizona.

Black-footed ferrets feed almost exclusively on prairie dogs (*Cynomys* spp.). In Arizona, two species of prairie dogs occurred historically: Gunnison's (*C. gunnisoni*), which still exists in northern Arizona, and the black-tail (*C. ludovicianus*), which was extirpated by 1960. However, ferrets were recorded only within the range of Gunnison's prairie dog (Fig. 1). Extensive poisoning campaigns at and after the turn of the century effectively reduced prairie dog numbers statewide. Presumably ferret numbers also declined, apparently to extirpation.

METHODS

This project, which began in 1990, has focused on identifying and monitoring potential habitat in northern Arizona, examining sites for evidence, and recommending possible reintroduction sites for black-footed ferrets. Using 7.5 minute topographic maps, Gunnison's prairie dog towns were mapped in Yavapai, Coconino, and Navajo counties. Each town was named and assigned to a management area. Different groups of management areas make up the various prairie dog complexes, which are defined by using geography, vegetation, and colony juxtaposition. The eight complexes identified in Arizona are: Aubrey Valley, Seligman, Farm Dam, Navajo Army Depot, Government Prairie, San Francisco Peak, Wapatki, and Homolovi.

AGFD has applied the monitoring techniques, described by Biggins et al. (1989) to mapped towns to estimate prairie dog activity and densities. We have conducted diurnal and nocturnal surveys for ferrets, in accordance with procedures of Clark et al. (1984). With assistance from the Arizona Department of Health Services Vector and Zoonotic Diseases Division (VZD), the Department of Agriculture's Animal Damage Control (ADC), and the University of Arizona, we have also implemented a disease monitoring program similar to Williams (1991).

RESULTS

Prairie dog towns were mapped and transected between the months of May and October. Between 1990-1995, 215 active prairie dog towns, encompassing 13,846 hectares, were identified in northern Arizona. Early in the survey, an exceptional prairie dog complex in the Aubrey Valley was recognized by biologists as having a high potential for ferret reintroduction (Fig. 2). As a result, much of the monitoring effort was concentrated in this area.

Prairie dog activity and burrow density were sampled between May and August of each year (Tables 1, 2, 3). Biologists completed 2273 transects, which ranged from 0 to 127 active burrows per hectare, with an average of 33.

Biggins et al. (1989) proposed guidelines for analyzing such data based on studies of white-tailed prairie dog (*C. leucurus*) towns in Meeteetse, Wyoming. In a revised edition, Biggins et al. (undated) modified the proposed guidelines including results from additional studies on white-tailed and black-tailed prairie dogs. They define good ferret habitat, in white-tailed prairie dog towns, as the proportion of transects with at least 25 active burrows per hectare divided by the total number of transects.

In Arizona, an average of 63 percent (range 5-100%) of the transects completed produced densities classified as good habitat. Using the good habitat calculations, a prairie dog density estimate can be determined for northern Arizona. Densities ranged from 3.94 to 14.26 prairie dogs per hectare with an average of 7.13.

Biggins et al. (undated) also proposed a method for estimating the number of black-footed ferret families that could occupy a prairie dog town or complex of towns. The calculations resulted in an estimate of 87.62 ferret families for northern Arizona (Table 4).

From 1990-1995, biologists have expended 1305 hours surveying and examining prairie dog towns for black-footed ferret evidence. Nocturnal surveys were conducted between July and October and diurnal surveys were conducted as the conditions allowed but usually between December and March. No ferrets or sign of their activities were observed.

The VZD has monitored plague activity in Arizona since 1974. Outbreaks are monitored by documenting human cases, testing carnivore blood samples for titers (Table 5), and testing flea pools collected from prairie dog burrows (Table 6). To date, fleas collected from the Aubrey Valley have tested negative for plague.

Table 1. Transects completed in Audley prairie dog town, Aubrey Valley, Arizona.

Location	1991 Active burrows/ha	1992 Active burrows/ha	1993 Active burrows/ha	1994 Active burrows/ha	1995 Active burrows/ha	Transects completed 91/92/93/94/95	Site #
[redacted]							

Table 3. Transects ran in satellite prairie dog towns found within Aubrey Valley, Arizona.

Location	1991 Active Burrows/Ha	1992 Active Burrows/Ha	1993 Active Burrow/Ha	1994 Active Burrows/Ha	1995 Active Burrows/Ha	Transects completed 91/92/93/94/95	Site #
[redacted]							

Table 6. Plague monitoring in AVC and nearby prairie dog towns, Coconino County, Arizona. Prairie dog status includes: A=active, I=inactive, or not recorded. Data from Arizona Department of Health Services.

Locations within Aubrey Valley	Date	Prairie dog Status	Flea sample results
Grand Canyon Caverns Airport, MM[1] 114-115	08/04/80	A	Fleas found no test
	07/18/78, 09/07/78 09/01/81, 05/19/82 10/05/82, 08/30/84 04/16/86, 04/22/87 07/16/87, 04/05/88 04/20/89, 06/21/89 09/14/89, 05/24/90	A	-
	04/14/81, 04/11/84 06/18/92	A	Negative
	07/18/78, 11/28/78 04/16/86	I	-
	10/17/79	I	Negative
	01/25/84	-	No fleas found
	04/03/80, 01/18/83	-	Negative
Hyde Park, MM 117; Nelson and Yampai turnoffs	04/02/80, 09/01/81 05/19/82, 10/05/82 08/30/84, 07/17/85 04/05/88, 08/31/88 04/20/89, 06/21/89 09/14/89, 05/24/90	A	-
	06/18/92	A	Negative
	08/04/80	I	Negative
	04/14/81, 04/11/84 11/16/87	-	Negative
Pica Camp, MM 120	09/07/78, 04/02/80 04/10/84, 08/30/84 11/01/84, 07/17/85 09/18/85, 04/16/86 04/22/87, 07/16/87 11/16/87, 04/05/88 08/31/88, 04/20/89 06/21/89, 09/14/89 05/24/90	A	-

[1]Mile marker on State Highway 66

Canine distemper has been monitored by the AGFD since 1993. Samples have been collected as far east as Ashfork and as far north as Cataract Canyon. Blood samples and coyote specimens are sent to the University of Arizona for analysis and histological interpretation. To date, 25 coyotes have been submitted (Table 7). Titer counts indicate coyotes in northern Arizona have been exposed to canine distemper but the disease is not probably active now.

CONCLUSIONS

Historically, prairie dogs were considered vermin because they were thought to compete with livestock for forage on the open range. In the early 1900s, a widespread eradication program was initiated to rid North America's grasslands of all prairie dogs. However, recent studies indicate prairie dogs are important components in maintaining shortgrass ecosystems and their burrows provide shelter not only for prairie dogs but other species as well. One study identified more than 130 wildlife species, including black-footed ferrets, associated with black-tailed prairie dog towns (Clark et al. 1989). In Arizona, wildlife species such as pronghorn (*Antilocapra americana*), golden eagles (*Aquila chrysaetos*), and ferruginous hawks (*Buteo regalis*) were commonly observed foraging in Gunnison's prairie dog colonies (Belitsky et al. 1994).

In addition, through their burrowing and foraging activities, prairie dogs can enhance plant and soil composition (Foster and Hygnstrom 1990, O'Meilia et al. 1982). This would include the mixing of soil types and organic matter which stratifies soil formation, clipping vegetation from burrow entrances which prevents woody species from invading grasslands, and aerating the soil which enhances plant growth. Vegetation on soils aerated by prairie dog digging and fertilized by their droppings is among the first to green up, and the rodent habit of clipping grass short so they can see better keeps plants at a higher nutritious stage of early sprouting for some time (Chadwick 1993). Clark and Stromberg (1987) state "improved forage quality attracts grazers which may spend up to 90% of their time foraging on prairie dog colonies." Grasslands benefit from the presence of prairie dogs, but there are behavioral difference between the species. Before analyzing the data collected in Arizona, the taxonomy of this genus has to be considered.

Pizzimenti (1975) discusses the relationship of Gunnison's prairie dogs to other species of prairie dogs and considers Gunnison's prairie dog to be a member of the subgenus *Leucocrossuromys* or white-tailed prairie dogs. According to Pizzimenti (1975), *C. gunnisoni* have a looser form of organization than *C. leucurus*, which is the prairie dog species on which Biggins et al. (undated) based their calculations.

Biggins et al. (undated) found burrow densities in Meeteetse, Wyoming to vary from 39 to 108 burrows/ha and prairie dog densities ranging from 5.7 to 16.0 prairie dogs/ha. Studies in Arizona show similar ranges for the Gunnison's prairie dog. Therefore, Gunnison's prairie dog is assumed to compare closely to the white-tailed prairie dog.

The data collected from the eight prairie dog complexes identified in northern Arizona indicate Aubrey Valley should be ranked as the number one reintroduction site for black-footed ferrets. Over half (51%) of Arizona's known carrying capacity for black-footed ferrets has been identified within the Aubrey Valley. The Aubrey Valley is also the largest identified complex of Gunnison's prairie dogs. The next closest complex is about one third its size.

Disease monitoring by the Department has indicated the presence of both plague and canine distemper within northern Arizona. Despite the absence of documented occurrence of plague in Aubrey Valley, at least some fluctuation in the prairie dog population is likely. Plague is probably epizootic at times in locations adjacent to the valley, as is indicated by carnivore blood titer analysis. The carnivores may be exposed to plague as a result of preying on rock squirrels (*Spermophilus variegatus*), which may be the most widespread and consistent carrier of plague in Arizona (John Doll pers. comm. 1991).

Similar to plague, canine distemper is cyclic in nature. Canine distemper activity increases with dispersal of young animals which is related to dispersal (Roscoe 1993). Data collected from the Seligman area indicate past exposure to the disease but the disease is probably not active now.

Due to topography, the Aubrey Valley is easily discernable as a reintroduction site. The Juniper Mountains and the thousand-foot Aubrey Cliffs, located to the south and east of the valley provide a significant barrier to ferret movement. Unsuitable habitat hinders the possibility of ferrets establishing a population to the west and north.

RECOMMENDATIONS

1. Maintain current information regarding prairie dog town locations and densities is needed for sound management decisions on black-footed ferret reintroductions. Monitoring efforts should include mapping and density estimates for prairie dog colonies in northern Arizona. Encourage and support the Navajo and Hopi tribes in their prairie dog monitoring efforts.

2. Proceed with black-footed ferret reintroductions efforts in Aubrey Valley. Identify and priority rank additional black-footed ferret reintroduction sites and begin collecting information to accommodate a nonessential experimental designation.

3. Educate the public on the role of the prairie dog in the grassland ecosystem.

4. Assist in developing strategies for Section 7 clearances in northern Arizona.

Roscoe, D.E. 1993. Epizootiology of canine distemper in New Jersey raccoons. Journal of Wildlife Diseases. 29(3): 390-395.

Williams, E.S. 1991. Survey for diseases of carnivores in the Conata Basin Badlands, South Dakota. Report to South Dakota Game and Fish and Parks.