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An Evaluation of Shooting and Habitat Alteration for Control of Black-Tailed Prairie Dogs

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Abstract. - Shooting at two incipient black-tailed prairie dog (Cynomys ludovicianus) colonies removed from 12.8 to 17.3 prairie dogs/ha with reduction of adults averaging 69%. Habitat was physically altered in a portion of one prairie dog colony and activity levels between treated and non-treated areas did not show any consistent differences.

Introduction

Research on prairie dog (Cynomys sp.) control is usually directed towards the use of toxicants. Toxicants such as zinc phosphide, when properly applied, are considered efficacious (Tietjen 1976). Shooting of prairie dogs, because of its sporting value, has often been suggested as an alternative form of control. Recreational shooting of prairie dogs has been a part of a Bureau of Land Management (BLM) prairie dog management program in north-central Montana for several years now (USDI BLM 1982). Aside from anecdotal accounts there is little information on the population consequences of shooting on prairie dog numbers.

Habitat alteration of prairie dog colonies has also been considered as an alternative method of control. Fagerstone et al. (1977) treated a prairie dog colony with 2,4-D to alter plant species composition but found no effect on prairie dog activity levels. Snell and Hlavachick (1980) and Snell (1985) reported prairie dog numbers to decline following initiation of a deferred grazing system. In this case, increased vegetative cover was thought to result in increased predation. Physical treatment of a prairie dog colony to provide hunting advantages to predators may be a useful control technique in certain situations.

The purpose of this study was to examine the effects of shooting and habitat alteration on black-tailed prairie dog colonies on the Charles M. Russell National Wildlife Refuge in north-central Montana.

Study Area and Methods

This study was conducted on the Charles M. Russell National Wildlife Refuge in north-central Montana from 1978 to 1980. The Refuge was typified by rough, broken country interspersed with rolling prairie. Prairie dog colonies on the Refuge were restricted to the shrub-grassland and grassland habitats located on broad level ridge tops or on bottomlands of the major drainages. The management goal of the Refuge for prairie dogs at the time was to control the size of certain prairie dog colonies but not to exterminate them.

Shooting as a control technique was evaluated at two colonies (Colony A - 5.9 ha, and Colony B - 1.4 ha). Shooting was conducted in the last half of June 1978 using a 0.22 caliber rifle while in 1979 shooting started in mid-May and continued until early August using a 0.22 caliber magnum rifle. Shooting in Colony A was generally from a portable blind while shooting at Colony B was from a pit dug into a ridgeside overlooking the colony. Notes were made as to the beginning and ending times of a shooting period, number of shots taken, and number of prairie dogs deemed hit. Population surveys were made prior to, and immediately after shooting both years plus one additional survey in June 1980. Visual counts of prairie dogs were made five times at 15-minute intervals on each of three different morning or evening activity periods. The largest of the 15 counts was then selected as the count that most closely approximated the actual number of prairie dogs (Knowles 1986). Percentage reduction of prairie dogs was based on adults since the pre-treatment survey period in 1978 and the shooting period in 1979 occurred during a period of juvenile emergence.

During the summer of 1978, a 2-ha area of a 24.6-ha colony received a habitat alteration treatment designed to provide more hiding cover for mammalian predators and perches for raptors. About one dozen piles of driftwood logs from Fort

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Peck Reservoir, were placed in the treated area. Several freshly cut ponderosa pine (Pinus ponderosa) were dragged into the treated area and numerous small (0.5 m high, 1-2 m long) rock piles were placed in the colony. In addition, 10, 4.3 m telephone poles were placed in the treated area as raptor perches. In the fall of 1978, 18 depressions (0.3 m deep) and mounds (0.5 m high) were made with a bulldozer. In early May 1979, 40 bales of old hay were also placed in the treated area. Change in horizontal visibility as a result of this treatment was determined with a cover board (see Knowles et al. 1982). Efficacy of the habitat alteration was measured by plugging with soil 100 burrows in each the treated and non-treated sections of the colony. Burrows were examined 48 hr later making note of the number of burrows opened.

Results and Discussion

Approximately 17 prairie dogs per hectare were removed by shooting at Colonies A and B in 1978 (table 1). In 1979, a similar number of prairie dogs were removed from Colony A but considerably less were taken at Colony B as a result of an already reduced population. Percent reduction in adult prairie dogs for 1978 and 1979 were 67 and 62 for Colony A, and 46 and 100 for Colony B, respectively (table 2). Estimated density of all surviving prairie dogs in 1978 and 1979 were 8.8 and 5.6/ha at Colony A, and 10.0 and 0.7/ha at Colony B, respectively. Only one juvenile prairie dog remained in Colony B in 1979 after 6.1 hr of shooting effort. Densities during these two years at two untreated colonies where prairie dogs were trapped and marked (Knowles 1982) were estimated at 30.6 and 8.3/ha in 1978, and 24.6 and 19.3/ha in 1979.

Table 1. -- Shooting effort and prairie dogs removed at Colonies A and B in 1978 and 1979.

Colony Year	Hours at colony	Shots	Dogs hit	Dogs removed/ha
Colony A				
1978	22.8	503	99	16.8
1979	36.4	239	102	17.3
Colony B				
1978	17.5	217	23	17.0
1979	6.1	30	16	12.8

Table 2. -- Maximum number of adult prairie dogs present pre and post-shooting at Colonies A and B from 1978 to 1980.

Colony	1978 pre	1978 post	1979 pre	1979 post	1980 post
A	66	22	45	17	28
B	15	8	3	0	6

Both treated colonies showed strong population recovery trends in 1980 in the absence of shooting (table 2). Immigration into Colonies A and B probably augmented the population in all years as both colonies were located along a dirt road 1.0 and 2.8 km from a 100-ha colony (see Knowles 1985 concerning the relationship of roads to prairie dog dispersal). This was certainly the case for Colony B during the shooting period in 1979 and in June 1980. In the latter case, 6 adult prairie dogs were present when, at most, only one of these could have been a survivor from the previous year. The adult population in Colony A in 1980 was 42% of the 1978 pre-treatment population.

Effort levels between years were not comparable as shooting strategies changed. In 1978, the standard 0.22 rifle which was used for shooting caused only moderate wariness in the prairie dogs and allowed for many shots to be made at ranges where accuracy was poor (5.9 shots/prairie dog). In 1979, the 0.22 magnum used for most of the shooting increased accuracy greatly but resulted in increased wariness in the prairie dogs (2.3 shots/prairie dog). The BLM (USDI BLM 1982) estimated that with an average of 725 hunter days per year expended on shooting prairie dogs in Phillips County, Montana, 100,500 rounds of ammunition were fired resulting in the removal of 10,050 prairie dogs from about 400 ha.

Both Colonies A and B, which were established prior to 1973, were expanding before initiation of this study. Shooting appeared to be effective at lowering prairie dog densities to less than 6/ha and negating colony expansion. This was accomplished with only a moderate level of effort. In the case of the smaller colony, shooting appeared capable of removing all prairie dogs. Portions of both colonies were inactive during 1979 and 1980. However, by 1984, Colony A had expanded to 140% of its 1978 size and Colony B had expanded by 90%. In another small colony on the Refuge, 12 prairie dogs were removed by shooting in the spring of 1975. The three remaining prairie dogs were eliminated by natural causes by late fall of that year. This colony site had not been re-colonized by 1984 (year of last survey). Lewis et al. (1979) thought 10 - 20 prairie dogs were needed to start a colony.

Possibly the reduction of prairie dogs below a certain threshold number may have a negative population consequence (Allee's Principle, Allee et al. 1949) because fewer prairie dogs are available to watch for predators (Hoogland 1981) and keep the vegetation clipped around burrows.

Stockrahm (1979) reported on population structure of two colonies thought to be heavily shot at and two receiving little human exploitation. She found fewer males, smaller litters, and a low percentage of breeding among yearling females at the colonies that received heavy shooting. The latter two findings were opposite of what was expected (principle of inversity, Errington 1946), and she thought disruption of the social system might be responsible.

Shooting as a management program to contain specific prairie dog colonies (especially incipient colonies) may be effective if properly administered and a large number of shooting enthusiasts are available. A major advantage of this control technique would be its low cost, since labor and equipment are supplied on a voluntary basis. The following suggestions may make such a program more effective. 1) Shooting during spring while females are pregnant or lactating (March - May, see Knowles 1987), would have the greatest impact on the population with the least effort. 2) Use of accurate small caliber rifles are preferred to larger caliber guns. 3) Use of blinds (especially if entered at sunrise) reduces the wariness of prairie dogs, although prairie dogs ultimately learn to respond to the noise of guns. Additional research is needed to determine the effectiveness of this control technique on a management basis, and to evaluate its impact on non-target wildlife species using prairie dog colonies.

Horizontal visibility in the habitat alteration experiment was reduced from 89% to 78% in the treated portion of the colony. No consistent differences in activity levels were noted between the treated and non-treated sections (table 3). However, my general impressions in April of 1979 were that few prairie dogs were present in the treated area and that some prairie dogs moved into the treated area during the spring dispersal period. I was unable to visit this colony in April of 1980 to make comparable observations. The physical change of the treated portion of the colony did not appear to deter prairie dogs from using the area. Prairie dogs were frequently seen on top of rock or log piles and to use burrows under the raptor perches. A greater reduction in horizontal visibility was probably needed to truly impact prairie dogs. Elsewhere on the Refuge, prairie dogs were found to exist in areas with visibility values as low as 67%. Immigration into the treated area may also have served to equalize activity levels between sections of the colony.

Table 3. -- Number of burrows opened 48 hr after plugging 100 burrows each in the treated and non-treated portions of the colony receiving habitat alteration.

	1978	1979			1980	
	June	June	Aug.	Oct.	June	Aug.
Trt.	33	59	18	10	36	18
Non-trt.	37	55	31	15	40	23

American Kestrels (Falco sparverius) were the only raptors seen using the perches. The treated section of the colony was heavily used by Mountain Bluebirds (Sialia currucoides) and Mourning Doves (Zenaida macroura) which probably served to attract the Kestrels. Golden Eagles (Aquila chrysaetos) and Red-tailed Hawks (Buteo jamaicensis) were observed in the area but not in the colony. Northern Harriers (Circus cyaneus) hunted the colony in 1979 but they did not use the perches nor could they be considered a predator of prairie dogs. I did not observe any mammalian predators making use of the obstacles, although a Refuge employee did observe a bobcat (Felis rufus) hiding at the edge of the treated section.

Had the habitat alteration treatment been applied to the entire colony to reduce chances of immigration into the treated area, results of this experiment might have been different. It may be possible that more than two years are needed for predators to become accustomed to the treatment and learn to take advantage of it. Another major problem with the habitat alteration was its unnatural appearance. The Refuge quickly removed the experiment with termination of this study. Other forms of habitat alteration such as deferred grazing (Snell and Hlavachick 1980, and Snell 1980) may be more easily applied, more effective, and lack any negative aesthetic properties such as my experiment.

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