

DISPERSAL ACTIVITIES OF THE BLACK-TAILED  
PRAIRIE DOG IN WIND CAVE NATIONAL PARK

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Objectives

In Wind Cave National Park, where prairie dogs are fully protected, their numbers have greatly increased over the past few years. Park managers are concerned over the prairie dog's tenacious ability not only to expand their colonies, but to pioneer and establish new ones. The seemingly unpredictable expansion of prairie dog towns has long amazed and alarmed resource managers. Since the Park's cessation of management efforts in the mid-1950's, prairie dog colonies have grown from less than 500 acres in surface area, to an estimated 1,600 acres. Within the past few years, at least eight new prairie dog colonies have been established in the park. The tendency of prairie dogs to colonize and inhabit productive grasslands on gently rolling terrain is believed to be reducing the range's capacity to support other herbivores such as elk and bison.

The mechanism of prairie dog dispersal from established colonies is poorly understood. Hoogland (1977) found that decreased predation is the primary advantage of prairie dog coloniality. The risk involved in leaving the security of their natal colony suggests that dispersal occurs only under some environmental or behavioral pressure. King (1955) found that both young (yearlings) and old (2 years old and older) might migrate in the early summer. The key to successful prairie dog colonization might lie with the migration of adults from their coterie (family group) to establish and dig new burrowing systems, while leaving the home territory with its existing burrows and food supply to subadults. We also lack an understanding as to what environmental traits encourage colonization. In King's words, if "positive information could be secured about the frequency, cause, and method of...migration, it would be of biological importance."

If the prairie dog colonization mechanism was better understood, we would be better equipped to predict and even encourage or discourage such expansion. If dispersing individuals could be behaviorally prevented from colonizing new areas, then traditional population management and control techniques, such as trapping, shooting and poisoning, would not have to be relied upon. The timeliness of such an approach is especially important with the opposition currently being encountered with poisoning programs.

The overall purpose of this project is to investigate black-tailed prairie dog dispersal and the application of this knowledge to their management. Specific research objectives are: 1) to determine the conditions which lead to the emigration of prairie dogs from their natal colonies, 2) to identify those environmental characteristics which favor one area over another for establishment of a new colony, and 3) to test the use of behaviorally based techniques to discourage the occupation of newly inhabited rangelands.

### Methods

A recently colonized area was located in May of this year and established as the primary study site. It is located on a relatively flat 5.1 hectare river bench in Wind Cave Canyon. The soil is a deep, moderately permeable silt loam. A blind was constructed on the south edge of the colony in order to make behavioral observations. The vegetation was analyzed and classified into three major vegetation types according to the degree of prairie dog modification. The 52 animals in the colony were trapped and marked with body dye and ear tags. Territorial boundaries were mapped from territorial interactions. Behavioral observations established prairie dog activity schedules. This baseline data will be used to assess the effectiveness of the behavioral techniques of control.

In late October, the animals in the study colony were recaptured and marked in preparation for the 1980 field season. This was necessary as trapping during the breeding season (March 1980) would constitute an unnatural disturbance to the social organization.

Field work will resume in March 1980 and continue through October 1981. The primary study site in Wind Cave Canyon will be remapped and colony expansion monitored throughout the field season. A second observation blind will be constructed since the colony has expanded beyond the effective view of the blind constructed last field season.

Behavioral observations will continue in order to investigate social behavior related to prairie dog dispersal (Objective #1). Primary hypotheses of why prairie dogs disperse include 1) expulsion of established coterie members by invading individuals, 2) flight to escape demanding young (King 1955), and 3) egress to prevent inbreeding (John Hoogland, pers. comm.). Establishing the validity of these hypotheses will aid us in determining the most effective methods of behavioral control.

Recently colonized areas will be located and environmental parameters measured, including topography, soil type, vegetation composition, past disturbance, and distance from the nearest colony (Objective #2). As well as identifying common characteristics of new colonies, these satellite dogtowns will be used to test behaviorally based control techniques. Predator silhouettes, predator scents, visual barriers, and hormone treatments are being considered. Techniques showing promise will be intensively investigated on the primary study site

(Objective #3).

Dispersing prairie dogs are commonly observed along roadways in Wind Cave National Park far from established colonies. Park personnel have agreed to help in the capture of as many of these animals as possible. The dispersers will be examined, marked, and affixed with radio transmitters. Data collected will include age, sex, distance travelled, and the percent of these individuals that successfully colonize or become established in a new site. A minimum of 20 radiocollared prairie dogs will be necessary to reach definite conclusions about prairie dog dispersal (Objectives #1 and #2).

### Results

From 25 May to 16 August the colony increased in size from 0.47 to 0.66 hectares (40% growth) and 62 new burrow entrances were excavated (40% increase). At the end of the first field season the area contained 49 prairie dogs (74/ha.) and 217 burrow entrances (329/ha.).

Compared to the interior of the colony, a significantly greater proportion of feeding activity occurred on the edge and immediately outside the periphery of the colony ( $n=153$ ,  $t=3.62$ ,  $P<.001$ ). This reflected a feeding preference for grasses around the periphery over the forbs which dominated the interior. During the late-summer dry season, further increases in feeding activity occurred outside the periphery as the prairie dogs expanded the colony into the mixed-grass community. This difference was highly significant ( $N=153$ ,  $t=4.14$ ,  $P<.001$ ).

Prairie dogs rely greatly on their sense of vision to detect predators and territorial interlopers (King 1955). In an attempt to restrict colony expansion, visual barriers (burlap affixed to metal stakes) were constructed in an expansion area on the western edge of the colony. Due to adverse weather conditions, sample sizes were too small for statistical analysis. However, there was a 40% reduction in feeding activity in the area containing visual barriers with no habituation after a six-day period. This suggests that visual barriers merit additional experimentation to determine their effectiveness in controlling dogtown expansion.

Prairie dogs found away from colonies were considered dispersing individuals. A single adult female prairie dog was located 0.8 kilometers from the nearest colony in late May. A radiocollar was affixed and she was tracked to a small group of burrows 0.6 kilometers from the point of capture. This suggests that radiotelemetry can be an effective technique for obtaining information about prairie dog dispersal. The behavior of three individuals two to four weeks after being radiocollared was the same as uncollared individuals in the study colony.

Five new colonies established within the past three months were located in Wind Cave National Park and on adjacent rangeland. These satellite

colonies were all located on disturbed sites due to overgrazing by cattle, former cultivation, or bison feeding and loafing. In order to measure the extent of the disturbance prior to prairie dog colonization, these sites were mapped and the vegetation was analyzed. Compared to randomly selected prairie sites in the park, the recently colonized areas had significantly greater proportions of bare ground ( $n=150$ ,  $t=3.13$ ,  $P < .01$ ) and the vegetation height was significantly lower ( $n=150$ ,  $t=3.58$ ,  $P < .001$ ). Factors such as these may be responsible for the selection of sites by prairie dogs.

There was a close correlation ( $r=.96$ ) Between the percent increase in total area of dogtowns and the total size of the elk and bison herd within the park over the past 15 years. However, incomplete data for some years prevent conclusions about this relationship.

### Conclusions

Preliminary results of the first field season suggest that most colony expansion occurs during the late-summer dry season. This expansion could be further encouraged by the effects of drought and a large ungulate herd. Even though initial experiments with visual barriers show promise for the control of dogtown expansion, additional experimentation is needed to substantiate the effectiveness of this and other methods of control.

Analyses of recently colonized areas in the park suggest that prior disturbance may be a requisite to successful prairie dog colonization. Park records indicate that the sites of all major dogtowns within Wind Cave National Park have a previous history of some type of disturbance. The results of radiotelemetry work during the 1980 field season should prove valuable in addressing this relationship.

### Literature Cited

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