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Translocation Effects on the Behavior of Black-Tailed Prairie Dogs (*Cynomys ludovicianus*)

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ABSTRACT

We examined the effects of translocation on Black-tailed prairie dog (Cynomys ludovicianus) anti-predator behavior by recording response distances and response times to a human intruder in three colonies containing native, translocated, and combined native and translocated prairie dogs. The translocated prairie dogs barked alarms and concealed themselves at significantly greater intruder distances than mixed or native colonies. However, individuals in different colonies did not differ in the time taken to return to a burrow, to conceal themselves after a human approached the colony, or in the time elapsed after concealment until an animal reappeared. Translocated prairie dogs exhibited nearly twice the distance sensitivity to intrusion as native prairie dogs. Increased sensitivity to disturbance complicates management considerations of translocated populations that are subject to human traffic. This increase in sensitivity may necessitate translocation to isolated or undisturbed sites, protecting sites from disturbance, translocating larger groups of prairie dogs, or all three in order for translocated populations to persist.

INTRODUCTION

Black-tailed prairie dogs (*Cynomys ludovicianus*) are native to The Great Plains region of North America. Since the spread of agriculture and ranching on their former range, prairie dogs have been subjected to intense government extermination programs (Clark 1979). They now occupy only a small percentage of their former range: 600,000 hectares in 1960, compared to 100 million hectares in 1900 (Koford 1958, Miller et al. 1994). But even their current range is decreasing in size due to continued human development. Prairie dogs are now becoming recognized as an essential part of healthy prairie ecosystems (Whickler and Deitling 1988, Miller et al. 1994, Robinette et al. 1995). Wildlife advocacy groups such as Wild Places, Prairie Dog Rescue, Citizens Concerned for Wildlife, Loveland Prairie Dog Action, and several Humane Societies advocate methods of management less invasive than lethal control.

Black-tailed prairie dogs typically respond to an intruder such as a human by interrupting foraging or social interactions, barking alarm calls, returning to burrow entrances, and concealing themselves underground. As such, disturbance to prairie dog colonies may affect colony persistence and survival if foraging and social behaviors are significantly interrupted.

In a previous study, Adams et al. (1987) tested the differences between prairie dogs occurring in rural and residential areas in response to human approach and showed that rural prairie dogs responded to human approach at greater distances than did residential prairie dogs. In the present study we examined whether prairie dogs exhibit increased sensitivity to human intrusion subsequent to trapping, handling, and

adjusting to translocation to a new habitat. Specifically, we tested the hypothesis that sensitivity to a human intruder would be greater in colonies containing translocated prairie dogs than in native colonies (colonies inhabited only by prairie dogs that naturally dispersed into the colony or for whom this was their natal colony). Translocation is a popular alternative where residential and industrial development is likely to disrupt or destroy prairie dog colonies. However, the effects of the translocation process on the behavior of these animals are unknown.

METHODS

Study Sites

Due to pending construction of a laboratory for the National Oceanic and Atmospheric Administration (NOAA) on the United States Department of Commerce station in Boulder, Colorado, USA, the Wild Places group worked with Phyllis Gunn of the Department of Commerce to translocate part of a prairie dog colony to a protected site on City of Boulder Open Space.

We studied three colonies, designated *Native, Mixed*, and *Translocated.* The Native colony consisted of prairie dogs remaining in the colony that were not moved because of construction. These prairie dogs constituted our control group. The colony was bounded by service roads restricted to motor vehicles. Pedestrians regularly used these areas and roads and their dogs often accompanied them, both on and off leash. Therefore *Native* prairie dogs were accustomed to close proximity of vehicles, humans, and potential predators.

The second site was on Boulder Reservoir Open Space (adjacent to north 51st Street.) Eighty-three prairie dogs were released onto the periphery of an existing colony from 12 July to 8 October 1996. These prairie dogs came from an area approximately 10 kilometers away, near the 63rd St. Water Treatment Plant grounds east of Boulder. This site experienced traffic similar to that of the *Native* site. Thus, the colony contained native and translocated prairie dogs, and it served as an intermediate group due to their longer adjustment time and mixed population. This population is referred to as the *Mixed* site. To the north of the colony is a model airplane airport and planes often “buzzed” the prairie dogs for sport. People have reportedly plugged some burrows with newspaper to prevent interference with the model planes. This and the occasional (between one and five per day) jogger or cyclist along 51st street were the only human interactions experienced by these prairie dogs.

Prairie dogs from the *Native* site were translocated onto a third site, designated *Translocated.* The city of Boulder wishes to keep knowledge of this location secret due to past incidents of people leaving privately captured prairie dogs on open space without authorization (Clint Miller, pers. comm.). Personnel from Wild Places released 117 prairie dogs from 9 September to 6 November 1996 onto a colony that was extirpated by plague three years earlier. The prairie dogs were released in the same relative burrow positions in which they were trapped. This group constituted our experimental group.

Data Collection and Analysis

From 19 October to 20 November 1996, we recorded responses of prairie dogs to human intruders at varying times at each site according to the methods used by Adams et al. (1987). Data collection began as soon as all animals were translocated and continued until we obtained twenty-one samples per site. In some cases, multiple samples were taken on the same day. Owing to the size of these colonies (>100 hectares), spacing of sample sites within a colony, and time lags between samples, we believe that these samples were independent of each other. However, pseudoreplication is a possibility and our results must be interpreted with this in mind.

Before approaching the colony, we selected a focal animal to observe attempting to select a different animal each time at a given site. This was accomplished by changing the side of the colony that was approached and using the nearest visible animal to the human intruder.

Figure 1a.

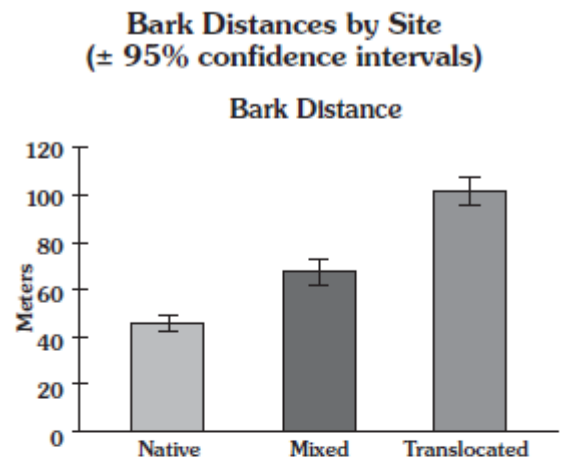


Figure 2a.

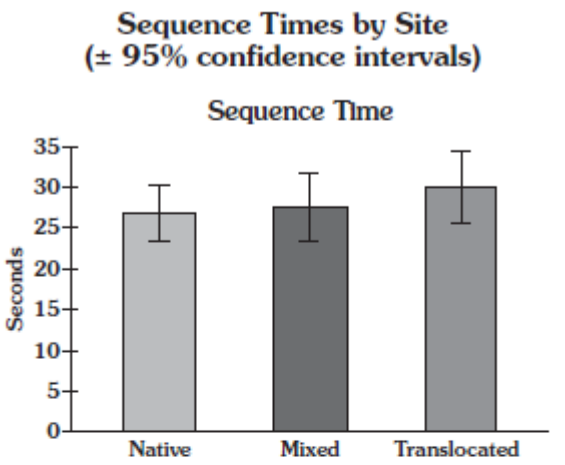


Figure 1b.

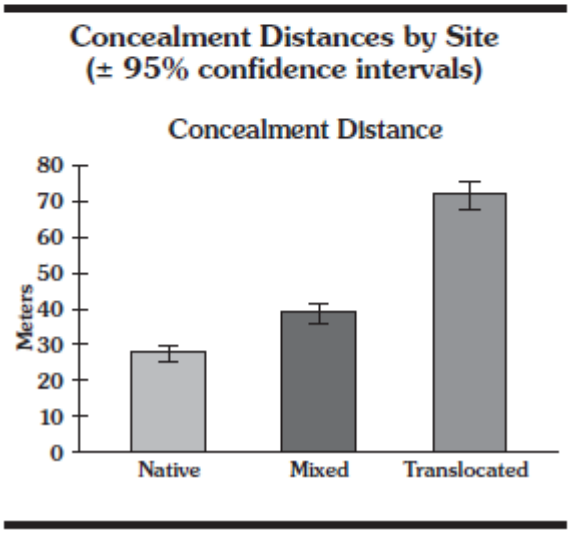
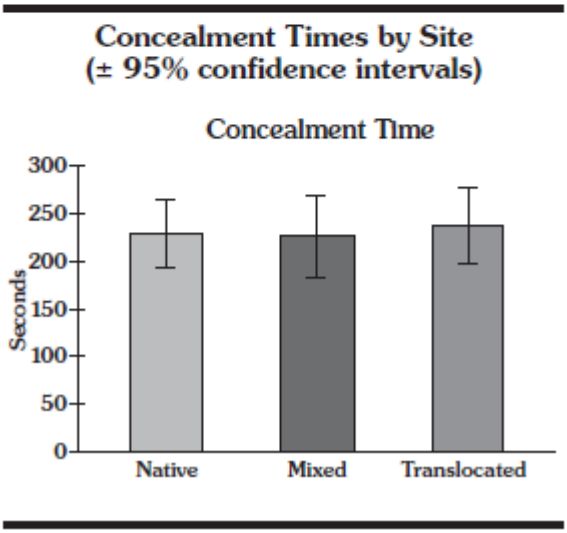


Figure 2b.



We recorded four behavioral measures as follows: 1. *bark distance* (BD) - distance from observer to the focal animal when it emitted the initial warning signal and retreated to its burrow entrance; 2. *concealment distance* (CD) – distance from observer to the burrow when the animal concealed itself; 3. *sequence time* (ST) - time the individual took to perform the avoidance sequence of running to the burrow, pausing at the burrow entrance, flattening down inside the lip of the burrow, tail-wagging, barking, and concealing itself underground; 4. *concealment time* (CT) - time from the moment that all individuals in the group concealed themselves until one reappeared above ground. At all sites J. P. Farrar approached the colony from a distance of two-hundred meters from the colony edge to control for variations in speed and the nature of the stimulus. All approach directions were determined using bearings derived from a random number table.

All response measures were log (n + 1) transformed to meet assumptions of normality and equal variances among sites. We analyzed the data using MANOVA and separate ANOVA tests to determine if significant differences occurred between sites. Missing values for some time measurements occurred when no prairie dogs resurfaced.

Our sampling scheme was designed such that individual animals were the experimental unit. True replication of the experimenttal unit would have us measure responses of prairie dogs from several colonies of each type (Translocated, Mixed, Native), however, this was not possible (see below).

RESULTS

Significant differences in response to a human intruder were detected using MANOVA (Wilks' Lambda=0.386, Exact F=6.858, df=8,90, p<0.001). Individual ANOVAs of the distance measurements showed highly significant differences between sites ({BD/CD} p<0.001/0.001, F=3.150/3.150, df=2,63/2,63; Figures 1a/1b). Prairie dogs at the *Translocated* site responded at greater distances for both concealment and barking distances. Sequence and concealment times did not vary significantly among colonies ({ST/CT} p=0.844/0.984, F=0.170/0.016, df=2,52/2,56) (Figures 2a, 2b). Natural predators were noted at the *Translocated* site but not at the other two areas. Prairie dogs responded to red-tailed hawks (*Buteo jamaicensis*) and a coyote (*Canis latrans*) by retreating underground.

DISCUSSION

Translocated prairie dogs responded to disturbance at the greatest distance, *Native* prairie dogs at the shortest distance, and *Mixed* prairie dogs at intermediate distances. These results support the notion that translocated prairie dogs have a greater sensitivity to human disturbance. While this sensitivity to human intrusion may decrease with time, it highlights an additional factor to consider in prairie dog management.

Robinette et al. (1995, p. 873) recommended releasing groups larger than 60 individuals in areas with no potential immigration "to minimize the effects of random genetic drift and inbreeding." This number was well exceeded at the release site. Though Robinette et al's study was focused on population genetics and minimum viable population size, our results indicate that heightened sensitivity to disturbance may explain why mortality is high in the first year after translocation (Robinette et al. 1995). While heightened sensitivity to disturbance may reduce predation and hence mortality, greater response distances might also mean that individuals spend more time avoiding potential predators which in turn reduces the time available for finding and consuming food. Presently, there are no data that address this suggestion.

The most rigorous examination of translocation effects would require repeated samples from several treatment groups, permits from state and federal agencies, and sites with similar physical, topographical, and biological features for capture and release. We were unable to meet these stringent requirements. Nonetheless, the present study is the first examination of the impacts of translocation on prairie dogs, an important and timely issue for the future management of this declining species.

In summary, our results showed that translocated prairie dogs show heightened sensitivity to human intrusion when compared to individuals who were not moved. Wildlife managers and advocacy groups must take into account this increased sensitivity to human traffic (and probably to natural predators) when considering possible release sites. How increased sensitivity influences the future behavior, including reproduction and survival of translocated prairie dogs, requires further study.

ACKNOWLEDGMENTS

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