PRAIRIE DOG DISPERSAL AND HABITAT PREFERENCE IN BADLANDS NATIONAL PARK

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Objectives

The objective of the research project is to create a conceptual model of blacktailed prairie dog (<u>Cynomys ludovicianus</u>) town ecology which provides information concerning habitat selection in terms of vegetation and soils along the periphery of Badlands National park. The study is designed, as well, to produce information on expansion and reinvasion rates along eradicated town edges, and to document the effect of this rodent upon range conditions in these areas. The study is presently in its 3rd and final year of research. The following report outlines an experiment which was designed to test a model which explains town expansion based upon some rather simple environmental variables. Though it will, no doubt, fall far short of explaining dispersal activities, the model provides a framework upon which management decisions can be based.

Methods

In 1981 a small (approximately 6 ha.) naturally expanding prairie dog town was chosen for study, covered by a 25 meter grid system, and staked accordingly. For three consecutive summers, trapping and vegetative data were collected in reference to this grid. Trapping was done using Tomahawk 32-inch live-traps (no. 206) baited with commercial sweet-chop (a molasses coated mixture of cracked corn, rolled barley and rolled oats). Traps were placed near burrow entrances, wired open and prebaited for two days. Prairie dogs were then trapped, toe-clipped (for identification), weighed, sexed and released. Vegetational cover and visibility were estimated per grid square. Cover for grasses, forbs, and rye (Secales cereale) was estimated using a 50 cm by 20 cm plot (Daubenmire 1959). Relative visibility was estimated using a visual gridded target.

Results and Discussion

From exploratory data gathered from numerous prairie dog towns in and around

Badlands National Park, we have selected a simple model for dog town expansion. This data revealed that settlement of new towns, areas adjacent to an established town without vacant burrows, and adjacent areas with vacant burrows differed greatly with respect to the amount of relative visibility which could be attained through surrounding vegetation (Fig. 1). Other authors (Koford 1958, Smith 1958, Snell and Hlavachick 1980, Garrett 1982) have referred to either the thickness of the vegetation or the amount of cattle grazing as having substantial effects upon prairie dog town expansion. Observations of newly settled family groups at town edges suggests that these families, generally consisting of 2 or 3 yearlings or adults, often rely upon the warning barks of other more interior families for their own protection against predation. For these families along the town edge, predation is more of a danger, since at least one side of their territory is exposed to open prairie. It is also clear that the advantage of sociality diminishes as families settle at greater distances from already established families. This model, therefore, proposes that the probability of settlement of an area is primarily a function of visibility through adjacent vegetation, population densities at town edges, and the distance of that area from the nearest population concentration, i.e.:

$$Ps = Kl \cdot V + K2 \cdot p/d + K3 \cdot V \cdot p/d$$

where:

Ps is the probability of settlement at a location

V is the relative visibility through the vegetation

d is the distance in meters from a dog town edge

p is the population density at the town edge

and:

K1, K2 & K3 are parameters which relate variables and interaction terms to Ps.

This model is strictly a simplification of a complex phenomenon. We are aware that there exists geographical constraints on settlement, as well as other interactions with the environment that are difficult to quantify. Adoption of this model, however, provides our study with a testable idea and provides the manager with information on the relative importance of two environmental variables, the knowledge of which we hope will prove useful.

Additional variables including cover of forbs, grasses, and crops will be included to provide a test against the intuitive model shown above. It is clear from a graphic representation of the study town (Fig. 2) that settlement of new family groups is not a random event. Subsequent statistical analysis of the three field seasons (1981-1983) of data will give us a test of our simple theoretical and observational suppositions.

For statistical comparison of settled areas and areas not settled, we will use a non-parametric technique, the multi-response permutation procedure (MRPP) (O'Reilly and Mielke 1980). Data are not ranked using this method. In addition, the probability that a subgroup, which must be chosen 'a priori', is strictly a



Figure 1. A histogram illustrating the relative visibility of plots sampled near burrows of newly settled dispersing blacktailed prairie dogs in new town areas, town edges without available vacant burrows, and in town edges where vacant burrows exist.

POPULATION DENSITY: July 1981



POPULATION DENSITY: July 1982

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HIGH BURROW DENSITY ()100/ha)

POPULATION DENSITY: July 1983

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random selection of the data is calculated using the Euclidean distances between the multi-dimensional cases. By removing variables from the model it is possible to relate an idea of the relative importance of these variables. In this way we hope to provide information which is applicable to management.

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