

“Life after Plague: Black-tailed Prairie Dog Demography in Repopulated Colonies”

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Katherine McClure

Department of Ecology & Evolutionary Biology,

University of Colorado, Boulder, CO 80309-0334

Introduction and Objectives.

Black-tailed prairie dogs (*Cynomys ludovicianus*) have experienced drastic population declines throughout their geographic range as a result of habitat loss from urban development and agriculture, poisoning and shooting by ranchers, and sylvatic plague (Miller et al., 1994, Biggins and Kosoy, 2001). Plague poses a particularly large challenge to prairie dog conservation because epizootics are difficult to predict and often lead to complete colony extirpations. This research treats plague primarily as disturbance events and asks the question: “what are the demographic characteristics of newly re-populated colonies recently extirpated by plague?” In order to investigate this question, we trapped prairie dogs during the summer of 2007 at 14 colonies in Boulder County. We sampled at five colonies that were recently extirpated by plague and at nine colonies that were unaffected by the most recent outbreak. Data collected summer 2007 as well as in previous years will help to explain variation in demographic rates of prairie dogs before, during, and after plague outbreaks. This report describes field methods, provides a summary of trapping data, and briefly discusses an expected time frame when analyses will be completed.

Methods.

We trapped at each colony for either 4 or 8 days using one of two sampling schemes. At colonies which were not affected by the most recent plague epizootic, we used a web trapping design and trapped for 4 days. The web design consists of 8 trap lines which radiate from the center point of the web; trap lines are reminiscent of the spokes of a wheel and are equidistant from one another. Eight traps were set per line. The first five were set 10 meters from one another, and the last three were set 20 meters from one another. In this fashion, 64 traps were set in which trap density was greatest at the center of the web and decreased toward the outside. This sampling scheme allows a distance sampling detection function to be fit to the trapping data, which is then used to estimate density (Anderson et al 1983).

At colonies which were newly re-colonized or recovering from plague, we generally invested a greater sampling effort (8 days). Since newly established or recovering colonies had such a low density of animals, we generally used target trapping instead of the web design. We observed colonies from afar and placed 1-4 traps around active burrows. For these colonies we set up between 70-72 traps. Although we will not be able to estimate densities at these sites, these captures provide crucial demographic data of newly re-colonized or recovering colonies, and individuals were likely only captured as a result of active burrow targeting.

Regardless of the trapping scheme used, all traps were baited and locked open for a period of three days prior to trapping, and between trapping hours on trapping days. Prairie dogs were initially anesthetized, weighed, and sexed following the approved protocols of Collinge et al. (unpublished). Newly captured animals were marked using PIT tags for subsequent recognition. The anesthesia chamber that we initially used proved difficult to use since it requires both extreme vigilance on the part of the observer as well as a long waiting period for the prairie dog to go under (5-10+ minutes). Midway through the season we began using a hand-made canvas bag which zips up and down from both ends and which we could easily shuffle animals into (Hoogland, 1995). While in this bag, prairie dogs remain immobile and relatively calm. Anesthesia was administered via a plastic cone placed directly over the animal's mouth. This proved to be an efficient method to putting prairie dogs under, although fleas were more difficult to collect since they were not anesthetized.

In addition to processing prairie dogs according to standard protocols established by Sharon Collinge and colleagues, we also took two dental measurements of animals in an effort to age them. The lower left first molar was scored for attrition and was measured (Hoogland and Hutter, 1982). The distance between the paraconid and the protoconid cusps of the lower left premolar was also measured ("premolar gap distance," Cox and Franklin, 1990). Teeth impressions of a subset of captured individuals were taken using custom-built impression trays and impression material (Sauter, 2001). Dental casts were created from the impressions using Dental Stone and provide a permanent record of tooth wear of individuals of known age (which were tagged when trapped during a previous year) as well as some individuals for whom age will hopefully be determined when the dental data is analyzed.

Summary of fieldwork.

We trapped at a total of 14 colonies on properties belonging to Boulder County, the city of Boulder, and the Parks and Recreation department. The four County sites which we sampled were Hall ranch, Dowe Flats, Zaharias, and Rock Creek Farm (see table 1).

Table 1. Colonies sampled during summer 2007. Bold faced type indicates Boulder county property, all others are City of Boulder or Parks and Recreation property. Colonies affected by plague in 2005-06 are distinguished with a *.

Site number	Property Name	Dates Sampled
106	Ute Industrial Park	6/18-22
17*	Belgrove	6/18-29
60	Klein	6/25-29
2	Hall	7/1-7/6
1* , 18	Dowe Flats & Andrus	7/9-13
19*	Beech	7/16-27
13	Kaufmann	7/16-20
6	Zaharias	7/23-27
3	Rock Creek Farm	7/30-8/3
12*	Dover Blacker	7/30-8/10
20	Waneka	8/6-8/10
9, 47*	Aweida & S. Dam Boulder Reservoir	8/13-16

We caught a total of 396 individuals, and processed 299 of them. The remaining individuals were released due to time constraints or occasionally due to heat stress. Recapture rate of individuals caught two or more times within a four to eight day session was 41.1%. Recapture rate of individuals captured summer 2007 and in a previous year (previously tagged) was 17.1%. Table 2 shows a capture summary for each of the colonies sampled. This data will be used to determine demographic characteristics of newly repopulated colonies such as sex ratios and age structure. We will also investigate any patterns in flea load and body size that may emerge. Analyses for this portion of the project are expected to be complete by spring 2008.

Table 2. Summary of prairie dog captures at each site sampled summer 2007.

Property Name	Unique Captures	Recaptured	Previously Tagged	Released Unprocessed
Ute Industrial	29	8	2	3
Klein	32	11	5	5
Belgrove	7	2	0	2
Hall Ranch	30	11	5	2
Dowe Flats	9	8	0	0
Andrus	22	11	9	16
Kaufmann	33	9	7	24
Zaharias	26	9	0	22
Beech	15	8	0	1
Rock Creek	11	2	4	5
Waneka	35	22	4	11
Dover/Blacker	12	11	0	1
Aweida	32	9	10	5
S. Boulder Res.	6	2	0	0
Total	299	123	46	97

Status of Pending Analyses

The research conducted this summer will be the topic of one of my Master's thesis chapters. Another chapter will focus on possible relationships between landscape structure and prairie dog demography. For this work, I will primarily analyze data that has been collected over the last 5 years to determine estimates of prairie dog survivorship in colonies in and around Boulder, including several BCOS properties. I am currently working on the landscape analysis portion of this project. I expect to finish these analyses by summer 2008. I intend to finish writing my thesis fall 2008 and graduate December 2008. I will provide a copy of my thesis upon completion.

Literature Cited

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