

FIRE EFFECTS MONITORING
SMALL MAMMALS
BRYCE CANYON NATIONAL PARK
August 1991

INTRODUCTION

Park staff at Bryce Canyon National Park are working toward re-establishing fire as a natural process in the environment. In 1990, plots were established in the Residence Area and Paria North prescribed burn study areas to determine fire effects on small mammals.

Preburn data were collected to represent existing conditions in 1990. These data should be compared with data collected following burning to evaluate fire effects. During fall 1990 and spring 1991 the Residence Area was partially burned. To date, postburn data representing conditions one season following the burn have been partially collected for plots in the Residence area. Additional postburn data will be collected in September 1991.

Our objectives are to determine small mammal species presence and relative abundance, and determine trends related to prescribed burning.

STUDY AREAS AND METHODS

Small mammal data were collected on two plots (Residence and Sunset) in the Residence Area prescribed burn study area (figure 1), and one plot (Paria) in Paria North prescribed burn study area. These study areas are described in the Fire Effects Monitoring Vegetation/Fuel Load report. Plot locations are described in Appendix A. The center of each plot is permanently marked with a brightly painted rebar stake. Brass tags on each stake identify the study area and plot name. A piece of pink flagging tape was tied around the tree nearest the center of each plot to aid in plot relocation.

Because of time constraints, no control transects have been established. However, prior to the 1991 field season the Residence Area study area had been burned only as far as a point just north of the mixing circle road. So, for 1991, data from the Sunset plot can serve as a control for data from the Residence Area plot. The area in and around the Sunset plot will be burned eventually, and will no longer provide control information. It is assumed that animal populations will be reacting to the entire burned area, not just the area covered by the plot. Therefore, control plots cannot simply be unburned patches located within the burned study area; they will need to be placed in entirely different study areas, that will not be

burned.

METHODS

Live trapping web procedures described by Anderson et al. (1983) were used. Detailed instructions are provided in Appendix B.

The live trap web consisted of 204 Sherman live traps (9-inch collapsible) placed so that 10 trap lines extend from the center point, forming a circle (figure 2). Each line consisted of 20 traps, one placed at each 5 meter mark along the line. The final 4 traps were placed in the center of the web.

Trap sets were run during dark phases of the moon in order to prevent variation related to mammal activity resulting from available light. Each trap set consisted of 4 consecutive trap nights. One trap set was run for Residence and Sunset plots in July and for the Paria plot in August. In addition, another set was run for the Sunset plot in September, representing conditions later in the season. The Residence plot was also run in September, however the data were collected for other purposes, and can not be used for these analyses because small mammals were removed from the area prior to September.

Data collected included species, trap location where caught, sex, and weight. Each individual was marked by clipping a small amount of hair from its side (marks need last only through the four trap days). Data were recorded for recaptured animals, however these animals were not tallied in total animal numbers.

RESULTS AND DISCUSSION

Preburn (1990) summary data on animal numbers by species for all plots are presented in table 1 (new captures only listed). Postburn summary data on animal numbers by species for Residence (burned) and Sunset (control) plots are presented in table 2. After additional postburn data have been collected they should also be considered.

Preliminary analyses show an increase in total animals captured on both the control (146% increase on Sunset) and burned (86% increase on Residence) plots in 1991 over 1990. Furthermore, in both cases the increase is attributable almost entirely to increases in deer mice (Peromyscus maniculatus).

A cursory look at the data does not appear to indicate an obvious change related to burning. Increased precipitation in 1990 may have contributed in improved conditions for mammals, and increased population numbers on both control and burn plots.

Existing data may be too limited for more rigorous analysis. It

is recommended that more data be collected in other study areas to allow additional analysis. In addition, this analysis indicates the importance of control data to indicate changes that are related to factors other than burning. It is therefore recommended that permanent control plots be established in areas that will not be included in the park's burn program.

The web technique is designed so that analysis can look at animal densities if enough data are collected. The program TRANSECT can be used to estimate and compare densities given adequate data. It does not appear that we currently have sufficient data to complete density analysis. The theory, assumptions and procedures involved have been described by Laake et al. (1979), Wilson and Anderson (1985a), Wilson and Anderson (1985b), Wilson and Anderson (1985c), and Parmenter et al. (1989).

REFERENCES

- Anderson D.R., K. P. Burnham, G. C. White, and D. L. Otis. 1983. Density estimation of small mammal populations using a trapping web and distance sampling methods. *Ecology* 64 (4):674-680.
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Table 1. Preburn small mammal data for Residence, Sunset, and Paria North plots in 1990.

<u>Species Caught</u>	<u>Code</u>
<u>Eutamias umbrinus</u>	EUUM
<u>Eutamias minimus</u>	EUMI
<u>Glaucomys sabrinus</u>	GLSA
<u>Peromyscus boylei</u>	PEBO
<u>Peromyscus maniculatus</u>	PEMA
<u>Peromyscus truei</u>	PETR
<u>Spermophilus lateralis</u>	SPLA

Plot: Residence Area
Date: July 25-28, 1990

<u>Species</u>	<u>Day 1</u>	<u>Day 2</u>	<u>Day 3</u>	<u>Day 4</u>	<u>Total</u>
EUUM	12	4	3	1	20
EUMI	4	2	2	1	9
PEMA	2	3	1	0	6
PETR	1	0	0	0	1
SPLA	0	0	1	1	2
TOTAL	19	9	7	3	38

Plot: Sunset
Date: June 28-30, July 6, 1990

<u>Species</u>	<u>Day 1</u>	<u>Day 2</u>	<u>Day 3</u>	<u>Day 4</u>	<u>Total</u>
EUUM	1	5	2	0	8
PEMA	1	2	1	1	5
TOTAL	2	7	3	1	13

Plot: Sunset
Date: September 12-15, 1990

<u>Species</u>	<u>Day 1</u>	<u>Day 2</u>	<u>Day 3</u>	<u>Day 4</u>	<u>Total</u>
EUUM	6	5	1	2	14
EUMI	1	0	0	1	2
PEMA	1	1	1	1	4
GLSA	1	0	0	0	1
TOTAL	9	6	2	4	21

Table 1 (continued).

Location: Paria
Date: August 22-25, 1990
New Captures

<u>Species</u>	<u>Day 1</u>	<u>Day 2</u>	<u>Day 3</u>	<u>Day 4</u>	<u>Total</u>
EUUM	1	2	0	2	5
EUMI	2	0	0	0	2
PEMA	5	2	3	1	11
SPLA	<u>0</u>	<u>0</u>	<u>1</u>	<u>0</u>	<u>1</u>
TOTAL	8	4	4	3	19

Table 2. Postburn small mammal data for Residence and Sunset plots in 1991.

<u>Species Caught</u>	<u>Code</u>
<u>Eutamias umbrinus</u>	EUUM
<u>Eutamias minimus</u>	EUMI
<u>Peromyscus maniculatus</u>	PEMA
<u>Neotoma cinerea</u>	NECI

Plot: Residence Area
Date: July 16-19, 1991

<u>Species</u>	<u>Day 1</u>	<u>Day 2</u>	<u>Day 3</u>	<u>Day 4</u>	<u>Total</u>
EUUM	4	6	6	5	21
EUMI	3	2	2	3	10
PEMA	<u>13</u>	<u>10</u>	<u>8</u>	<u>9</u>	<u>40</u>
TOTAL	20	18	16	17	71

Plot: Sunset
Date: July 9-12, 1991

<u>Species</u>	<u>Day 1</u>	<u>Day 2</u>	<u>Day 3</u>	<u>Day 4</u>	<u>Total</u>
EUUM	1	2	3	2	8
PEMA	<u>7</u>	<u>8</u>	<u>6</u>	<u>3</u>	<u>24</u>
TOTAL	8	10	9	5	32

APPENDIX A

SMALL MAMMAL WEB Plot Locations

Residence Area: Start at residence number 19 in the employee housing area. From the center point of the patio in back of the house follow a compass bearing of 345 degrees for approximately 164 meters. The center of the plot is marked with a rebar stake, labelled with a brass tag.

Sunset: Start at the first paved pull-out area past Rainbow gate. From the center of the pull-out follow a compass bearing of 275 degrees for approximately 335 meters. The center of the plot is marked with a rebar stake, labelled with a brass tag.

