

SMALL MAMMAL COMMUNITIES AFTER TWO RECENT
NATURAL FIRES IN YELLOWSTONE NATIONAL PARK

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Objectives

As part of the National Park Service's goal of maintaining an area in as natural condition as possible, Yellowstone National Park in 1972 developed a fire policy whereby natural fires were allowed to burn in wilderness areas of the park. Several investigators have studied the relationship between small mammals and fire due to timber management practices (Gashwiler, 1970 and Tevis, 1956) but few studies have investigated the changes in abundance and composition of species of small mammals after recent natural fires (Bendell 1974).

The purpose of this ongoing study is to quantify the effects that recent natural fires have had upon small mammal communities. Two burn sites were studied, the Divide fire which burned in 1976 on the south arm of Yellowstone Lake, and the Trail Creek Fire which burned in 1974 on the southeast arm of the lake. The specific objectives of the research during the 1979 field season were to:

1. Resample the small mammal populations in both burn sites and adjacent unburned timbered areas along snap trap lines established last year.
2. Collect stomachs of *Peromyscus maniculatus* and *Clethrionomys gapperi* to increase sample size for food habits analysis.
3. Determine relative indices of pocket gophers in both the burned and unburned areas by mound counts.
4. Experimentally test the possibility of competition between *Peromyscus maniculatus* and *Clethrionomys gapperi* in the Divide Fire area.

Methods

Small mammal populations were sampled in each area, the Divide Burn (DB), the Divide Control (DC), the Trail Creek Burn (TCB), and the Trail Creek Control (TCC), by snaptrapping following Calhoun's methods (1948). A total of 120 traps were placed in each area and were checked for three consecutive mornings. Stomachs were removed from *P. maniculatus*, and *E. amoenus* and sent to the Composition Analysis Laboratory at Colorado State University for dietary analysis.

Relative indices of pocket gophers were determined by mound counts (Reid et al. 1966).

Three live trap grids (one control and two experimental) were established in the Divide Burn to test interspecific competition. *Clethrionomys* were removed from the experimental grids and densities of *Peromyscus* were sampled.

Results

The results of snap trapping are reported in Table 1. A total of 423 mammals were caught during a trapping effort of 2,503 trapnights.

Fifteen *Peromyscus maniculatus* and 20 *Eutamias amoenus* stomachs were collected and sent to Colorado State University for analysis. The results of the food habits analysis are reported in Tables 2 and 3.

Mound counts estimating relative numbers of pocket gophers in the Trail Creek areas resulted in the following:

10 mounds in TCB
12 mounds in TCC

No mounds were counted in either the Divide Burn area or Divide Control area.

Total numbers of animals caught during the competition experiment are reported in Table 4. All three grids were trapped simultaneously for four nights to gather baseline population estimates. For five days thereafter on the two experimental plots *Clethrionomys* were removed. All three grids were resampled for four days one month later.

Field work was completed by September 1. During the fall, the arthropod and soil samples collected during the 1978 field season were analyzed (see 1978 annual report on file with Yellowstone National Park for methods). Total numbers of arthropods collected from each area are reported in Table 5.

Seed population estimates were achieved from soil samples taken in the four study sites. Three layers of soil (0-2cm, 2-5cm, 5-10 cm) were sampled in each area (Table 6).

No conclusions will be reported at this time. Conclusions will be discussed in the final report that is expected to be completed by early spring 1980.

Literature Cited

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Table 1. Results of snap trapping in four areas sampled in Yellowstone National Park. Numbers are individuals captured.

SPECIES	AREA (TOTAL TRAP NIGHTS)			
	DB (651)	DC (571)	TCB (654)	TCC (627)
<i>Clethrionomys gapperi</i>	66	130	28	110
<i>Peromyscus maniculatus</i>	18	1	9	7
<i>Eutamias amoenus</i>	13	4	13	8
<i>Sorex</i> spp.	2	4	-	1
<i>Microtus</i> spp.	-	-	4	2
<i>Zapus princeps</i>	2	-	-	-
<i>Tamiasciurus hudsonicus</i>	-	-	-	1

Table 2. Mean percent dry weight and standard deviation (in parentheses) in the stomach contents of *Peromyscus maniculatus*.

Type of Food	AREA	
	DB n=10	TCB n=5
Arthropods	88.52 (24.78)	52.85 (36.30)
Grass	--	1.10 (2.47)
Forbs	11.06 (24.53)	18.54 (12.38)
Fungi	--	6.36 (8.74)
Seed	.24 (1.43)	21.25 (25.97)
Other	.12 (.37)	--

Table 3. Mean percent dry weight and standard deviation (in parenthesis) in the stomach contents of *Eutamias amoenus*.

Type of Food	AREA		
	DB n=10	TCB n=7	TCC n=3
Arthropods	44.92 (20.99)	30.30 (36.22)	16.34 (19.23)
Grass	10.84 (13.95)	4.50 (4.74)	--
Forbs	44.08 (23.58)	17.27 (12.03)	3.80 (2.7)
Fungi	--	5.71 (13.99)	--
Seed	--	49.05 (26.00)	79.87 (18.50)
Other	.33 (1.06)	.11 (.29)	--

Table 4. Results of live trapping during the interspecific competition study in the Divide Burn. Numbers are total numbers caught.

Species	Grid	TRAP PERIOD		
		Baseline	Experimental	Retrap
<i>Clethrionomys</i>	1 control	9	20	17
	2	11	16 removed	10
	3	5	9 removed	11
<i>Peromyscus</i>	1 control	5	7	5
	2	7	6 removed	4
	3	8	12 removed	12

Table 5. Total numbers of arthropods collected during the 1978 field season in the four study areas.

Taxa	AREA			
	DB	DC	TCB	TCC
Arachnids	123	559	143	442
Coleoptera	83	41	67	94
Diptera	326	62	427	133
Hemiptera	8	1	14	5
Homoptera	7	1	306	11
Hymenoptera	152	158	143	258
Lepidoptera	7	16	24	16
Orthoptera	-	-	3	3
Other	1	8	5	34

Table 6. Numbers of seeds found per 1 gram of soil in the three layers sampled from the four areas studied.

Area	Layer (cm)	Replicate		
		1	2	3
DC	0-2	.34	.09	.40
	2-5	.20	.11	.08
	5-10	--	--	.11
DB	0-2	.44	.15	.10
	2-5	.12	--	--
	5-10	--	--	--
TCC	0-2	.72	.88	1.09
	2-5	.17	.19	.77
	5-10	.89	.45	--
TCB	0-2	.46	.68	.26
	2-5	.11	--	.12
	5-10	--	.11	--