

LONG-TERM RESPONSE OF SMALL MAMMAL COMMUNITIES TO THE 1988 HUCKLEBERRY MOUNTAIN FIRE

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♦ INTRODUCTION

Natural burns are common in the boreal forests of the Rocky Mountains. While a considerable amount of research has focused on post-burn responses of vegetation and, more recently, large mammals, there have been few studies on responses of small mammal communities in these forests. The primary objective of this study was to revisit study sites on Huckleberry Mountain established immediately following the 1988 Yellowstone fires (Stanton et al., 1991, 1992; Spildie, 1994) to assess small mammal population trends, community structure, and microhabitat preferences on adjacent burned and unburned study sites 9 years post-burn.

♦ METHODS

For four consecutive nights in June, July, and August we sampled the identical burned (2) and unburned (2) 1 ha trapping grids on Huckleberry Mountain studied by Spildie (1994) and Stanton et al. (1991,1992) (Fig. 1).

During each 4-day trapping period at each grid (100 stations/ha, 10 m apart) Sherman traps were baited with rolled oats and peanut butter, opened between 1530 and 1730, and checked between 0500 and 0830 the following day. Captured animals were ear-tagged with unique metal fingerling tags; classified by species, sex, age class (juvenile or adult) and reproductive condition; weighed to the nearest gram and released where caught. In addition, at every fourth trap station (25/ grid) we placed a pitfall trap (355 ml plastic cup) partially filled with propylene glycol to sample terrestrial invertebrates and shrews (*Sorex spp.*). Pitfalls were left open for three consecutive days and mammals were collected from the traps each morning and evening. Terrestrial invertebrates were collected at the end of the three day period, rinsed and stored in 70% EtOH + 5% glycerol, and are currently being identified to family. Randomly placed belt transects were used to measure seedling species density and basal area in each burned trap grid.

Population densities of small mammals were estimated using the program CAPTURE, model M_t (Otis et al., 1978).

◆ PRELIMINARY RESULTS

During the summer of 1998 during 4800 trap nights, we captured five small mammal species in 356 total captures. The deer mouse (*Peromyscus maniculatus*) and southern red-backed vole (*Clethrionomys gapperi*) were the most abundant species and the only species for which population estimates could be determined. Population estimates for each trapping grid for 1997 and for 1990 and 1991 (from Spildie, 1994) are presented in Figures 1a-1h. Other species trapped included the western jumping mouse (*Zapus princeps*, N = 4), montane vole (*Microtus montanus*, N = 2), and least chipmunk (*Tamias minimus*, N = 3). No shrews were captured in the Sherman traps.

Three species of shrew (N=49), the dusky or montane (*Sorex montanus*), masked (*Sorex cinereus*), and dwarf (*Sorex nanus*), were captured in pitfall traps. Table 1 presents data on shrew species captures by site.

Table 1. Shrew species captured in pitfall traps in different study sites on Huckleberry Mountain in 1997, N = 49.

Site	<i>Sorex cinereus</i>	<i>S. monticolus</i>	<i>S. nanus</i>
East facing burn	1	8	0
East facing unburned	7	7	1
West facing burn	1	6	0
West facing unburned	10	8	0
Total	19	29	1

Results of line-transect sampling in the burned areas to estimate conifer seedling density in the two burned areas are presented in Table 2. Results indicate that both regenerating stands are predominately lodgepole pine and these seedlings were denser and taller on the west facing burn.

Table 2. Results of line-transect sampling in burned study sites. Values are number seedlings/hectare and (mean height).

Site	Total conifer	Lodgepole pine	Subalpine fir	Aspen	Engelmann spruce
West facing burn	11,567	11,464 (0.81m)	33* (0.15m)	33* (0.46m)	33* (0.21m)
East facing burn	5,250	4,550 (0.73m)	100 (0.26m)	600 (0.66m)	

* Only one seedling observed.

◆ DISCUSSION

Results of the 1997 field season indicate that deer mice were present in all sites but the west facing unburned forest. Southern red-backed voles occurred in all sites. Deer mouse populations gradually increased over the summer in all sites where they were present. Southern red-backed vole populations gradually increased over the summer in the west facing unburned forest and increased then slightly declined in the east facing burned and unburned forest and the west facing burn. Comparisons of population estimates within sites between species indicate that deer mice are more abundant in the burned sites and southern red-backed voles are more abundant in the unburned forests.

Comparison of deer mouse and southern red-backed vole population trends with data from 1990 and 1991 (Spildie, 1994; Stanton et al., 1990, 1991) indicate that for both species populations peaked at all sites in August of 1991. This is particularly true for southern red-backed voles in the unburned forest grids and deer mice in the east facing burn and unburned forest. In addition, for all years, deer mice were more abundant in the burned forest and southern red-backed voles were more abundant in the unburned forest.

These results are somewhat consistent with Wood (1981) who trapped two burned (≤ 5 years) and adjacent unburned spruce/fir/lodgepole forests in Yellowstone National Park and found that trap success was higher in unburned forests for southern red-backed voles and higher in burns for the deer mouse. However, the red-backed vole was the most abundant species in both burned and unburned sites.

Results of pitfall trapping indicate that montane shrews are found evenly distributed in both burned and unburned forests. Nine years post-burn masked shrews are found primarily in the unburned forest. Spildie (1994) reported trapping masked and vagrant shrews (*S. vagrans*), with 84% of all shrews trapped in the unburned forest and no masked shrews trapped in the burned areas.

◆ FUTURE WORK

We will continue small mammal population sampling during the summer of 1998 at Huckleberry Mountain to see if patterns observed during 1997 continue. We will also collect additional microhabitat data for incorporation into a multinomial logistic model predicting small mammal trap success and habitat preference. In addition, we will examine the significance of coarse, woody debris to small mammal diversity and density and, in collaboration with U.S. Forest Service biologists, incorporate this information into the development of Habitat Suitability Models for small mammal species. Last, we will begin to investigate shrew species habitat and microhabitat preferences and the response of these species to fire.

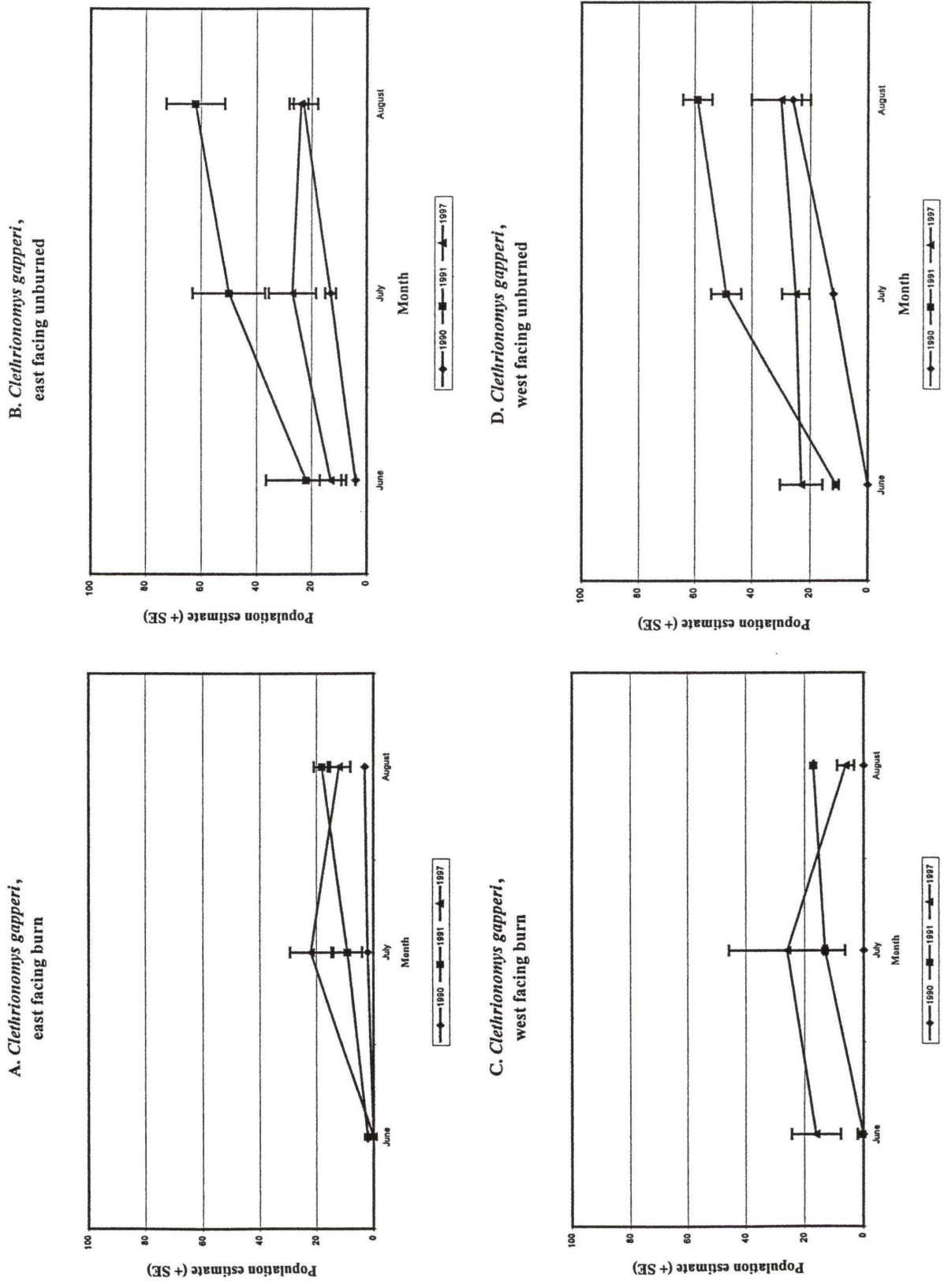
◆ ACKNOWLEDGEMENTS

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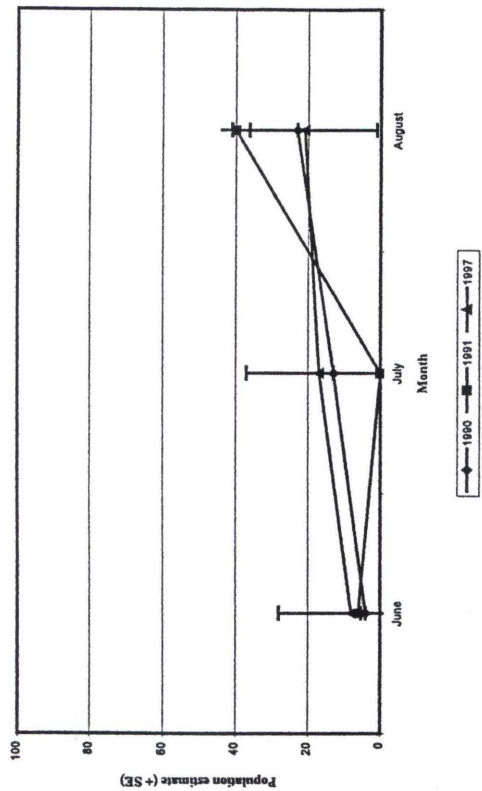
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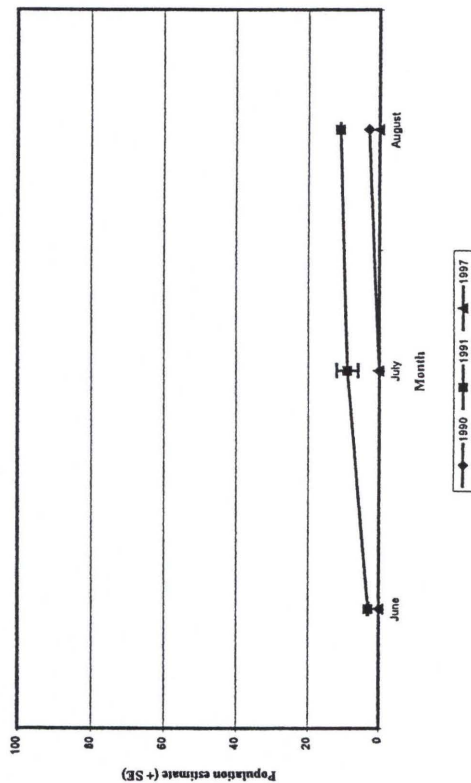
Figures 1a-1h. Population estimates and standard errors for red-backed voles and deer mice at burned and unburned forest sites on Huckleberry Mountain in 1990, 1991 and 1997. 1990 and 1991 estimates from Spildie (1994).



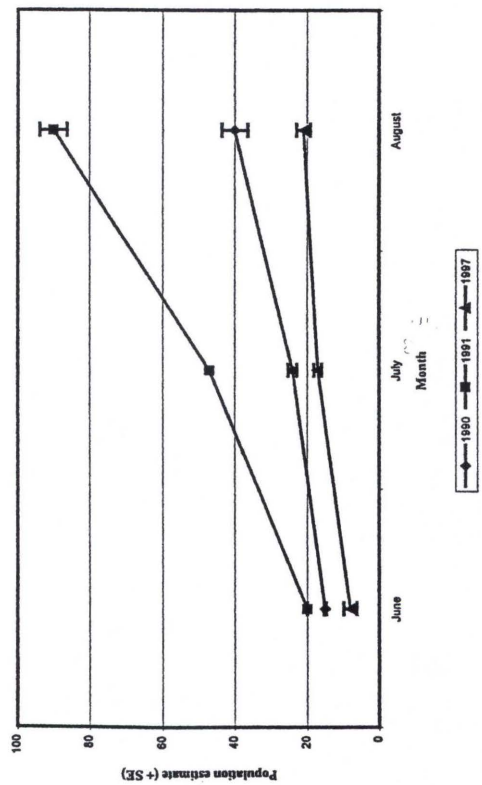
F. Peromyscus maniculatus,
east facing unburned



H. Peromyscus maniculatus,
west facing unburned



E. Peromyscus maniculatus,
east facing burn



G. Peromyscus maniculatus,
west facing burn

