



Research Brief for Resource Managers

Release:

July 2015

Contact:

Jon E. Keeley
Marti Witter
Liz van Mantgem

Phone:

(559)565-3170
(805)370-2333

Email:

jon_keeley@usgs.gov
marti_witter@nps.gov
evanmantgem@usgs.gov

Central and Southern California Team, USGS Sequoia and Kings Canyon Field Station, Three Rivers, CA 93271

5-Years of Small Mammal Response to Fire Severity in a Southern California Mixed Conifer Forest

Borchert, M.I., D.P. Farr, M.A. Rimbenieks-Negrete, and M.N. Pawlowski. 2014. Responses of small mammals to wildfire in a mixed conifer forest in the San Bernardino Mountains, CA. *Bulletin of the Southern California Academy of Sciences* 113: 81-95.

<http://dx.doi.org/10.3160/0038-3872-113.2.81>

As in many other ecosystems worldwide, increased wildfire activity is expected to accompany climate change in the high elevations of the San Bernardino Mountains of southern California. To better protect and manage the local fauna, land managers need to understand how vertebrate species respond to wildfires, especially high severity fires.

In this 5-year study, the post-fire populations and microhabitat preferences of four small mammal species were compared. The study analyzed preferences in unburned, moderate and high-severity fire in mixed conifer forest. Pinyon mice (*Peromyscus truei*) were most numerous on unburned plots and 69-76% less common on moderate and high-severity fire plots (Fig.1a). Deer mice (*P. maniculatus*) displayed the opposite pattern, and were 72-82% more common on moderate and high-severity fire plots (Fig.1b). Chipmunks (*Neotamias merriam* and *N. obscurus*) showed no differences between burned and unburned areas until the fourth year, when their

Management Implications:

- Three of the four small mammal species responded to fire, but differences in fire severity did not affect the strength of the response.
- Species segregated according to different microhabitats associated with cover in burned but not in unburned forest.
- Five years after fire, small mammal populations still differed between burned and unburned forest.
- Research is needed on how animals respond to fire lags in relation to vegetation response; it is imperative to improve monitoring to include multiple fires across the southern California landscape and increase the length of study times.

numbers increased significantly in the unburned plots (Fig.1c). In contrast, ground squirrel (*Otospermophilus beecheyi*) numbers never differed amongst the three burn treatments within the five-year study (Fig.1d). There was no difference between moderate and high severity plots for any of these species.

None of the stand structure or microhabitat variables of the unburned forest were able to explain the species distribution of the studied species. However after fire there was a small but measurable effect of how species used

different microhabitats. In the burn areas, the mice were associated with rock or shrub cover and the chipmunks and ground squirrel with open areas. These findings suggest that the small mammal species of the San Bernardino Mountains are sorted by differing microhabitat preferences after forest structure is changed via wildfire.

Methods

At an elevation of 2068-2263 m in the San Bernardino Mountains near Fawnskin, CA,

twelve trapping grids were evenly divided among the three burn types (treatments). They were then trapped in late summer for each of the five years, resulting in a total of 60 trapping grids. The data were analyzed by regression and canonical correspondence analyses using time, treatment, and microhabitat as predictive variables.

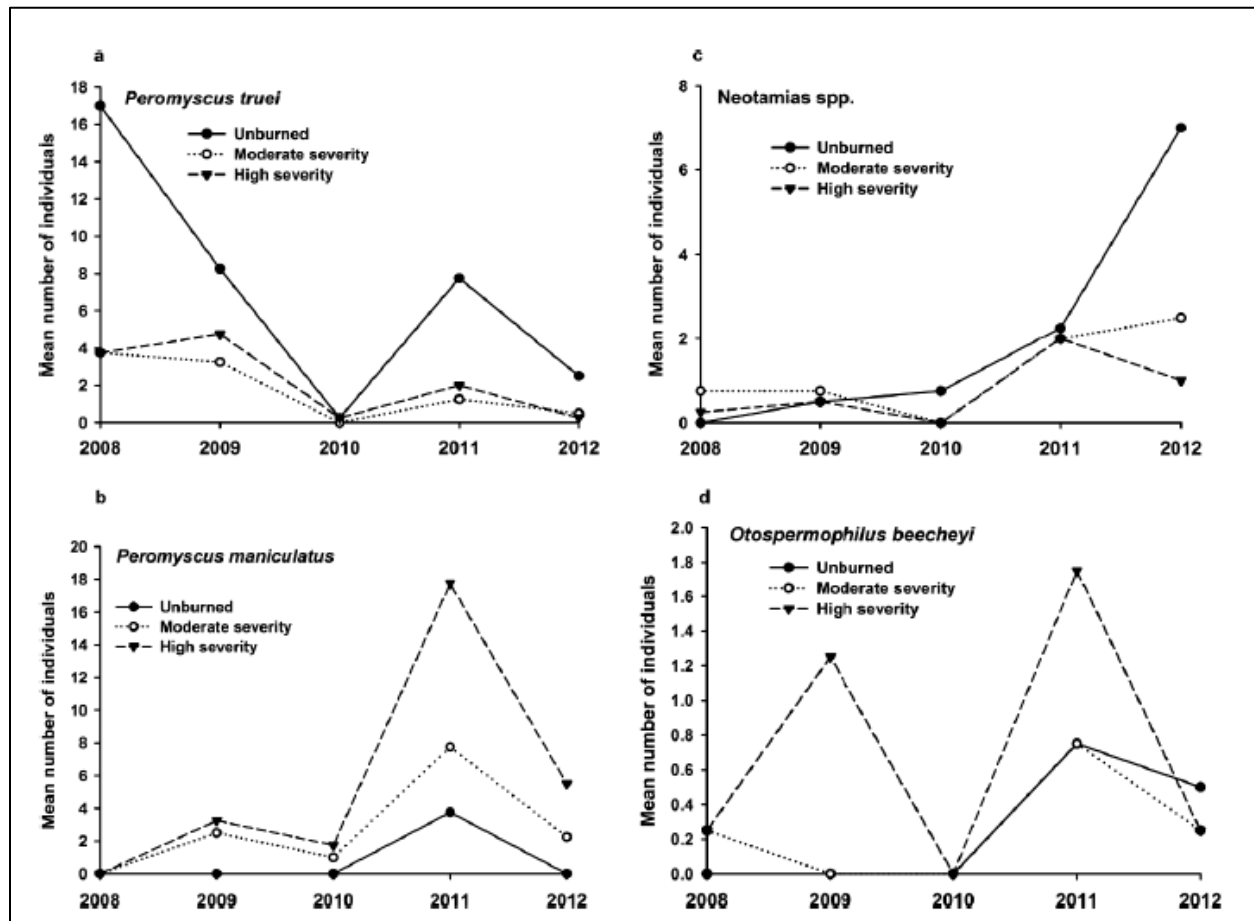


Fig. 1a. Mean number of pinyon mice (*Peromyscus truei*) in the three burn types: unburned, moderate severity and high severity. 1b. Mean number of deer mice (*Peromyscus maniculatus*) in the three burn types: unburned, moderate severity and high severity. 1c. Mean number of chipmunks (*Neotamias merriami* and *N. obscurus*) in the three burn types: unburned, moderate severity and high severity. 1d. Mean number of California ground squirrels (*Otospermophilus beecheyi*) in the three burn types: unburned, moderate severity and high severity.