Research Brief for Resource Managers

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A High Severity Fire in a Southern California Forest does not Adversely Affect Carnivore Species

Borchert, M.I. 2012. Mammalian carnivore use of a high-severity burn in conifer forests in the San Bernardino mountains of Southern California, USA. Italian Journal of Mammalogy (Hystrix) 23: 50-56.
http://dx.doi.org/10.4404/hystrix-23.2-5610

Stand-replacing fires are becoming more common in southern California forests with climate change. It is important to understand how mammalian carnivores will respond to a changing fire regime that may have increased amounts of high severity fire. Carnivores are secretive and difficult to monitor, so data are difficult to collect and most studies focus on a single species. This ambitious four-year study assessed fire effects on the diversity of ten carnivore species and frequency of the three most common carnivore species after a 5670-ha fire in 2007.

Carnivore species richness increased within the high severity fire (Table 1), but the responses of the three most common species changed over time (Fig. 1). Overall, bobcat (*Lynx rufus*) detections decreased significantly in the burned plots over the four years, but remained constant in the unburned plots. Coyote (*Canis latrans*) detections were more frequent in unburned plots while gray fox (*Urocyon cinereoargenteus*) detections were more frequent in burned plots; these

Management Implications:

- Mammalian carnivore species were not negatively affected in this medium sized, high severity forest fire.
- The response of fox, coyote and bobcat to the wildfire was complex, including shifts in diurnal activity and apparent competitive exclusion.
- More monitoring of carnivore response to fires is necessary to provide a complete understanding of fire's effects on this wildlife group.

Table 1 – Mammalian carnivores photo-captured in the high-severity burn and unburned area after 2976 camera days. Values are the total number of captures in four years.

Family and scientific name	High-severity burn area	Unburned area
Canidae		
Domestic dog	1	1
Coyote	16	58
Gray fox	39	11
Felidae		
Bobcat	8	10
Mountain lion	4	1
Mephitidae		
Striped skunk	1	0
Spotted skunk	2	3
Procyonidae		
Ring-tailed cat	1	0
Racoon	1	0
Ursidae		
Black bear	4	3

species were significantly associated with the presence (coyote) or absence (fox) of tree cover. Gray fox and coyote detections did not overlap for three of the four years. It was proposed that that the foxes were either avoiding coyote predation or following increased prey abundance in the burned area, or some combination of the two factors.

Methods

The study sites were located in and around the 2007 Butler 2 Fire in mixed conifer and pine/oak forest types near Fawnskin, CA, in the San Bernardino Mountains. Twenty four Cuddeback Excite cameras were placed approximately 1 km apart along unpaved USFS roads: half in the burned areas and half in the unburned areas. The camera traps were monitored for a total of 31 days in August and September from 2008 to 2011. Scent sticks were placed 2-4 m from each camera, and were replaced every six or seven days when photos were collected. Negative binomial regression (NBR), univariate analysis and chi-square analysis were used to relate photo captures to six covariates: post-fire % tree cover, number of years after fire, camera distance to burn perimeter, station elevation, average slope within 100m radius, and station distance-to-the-road.
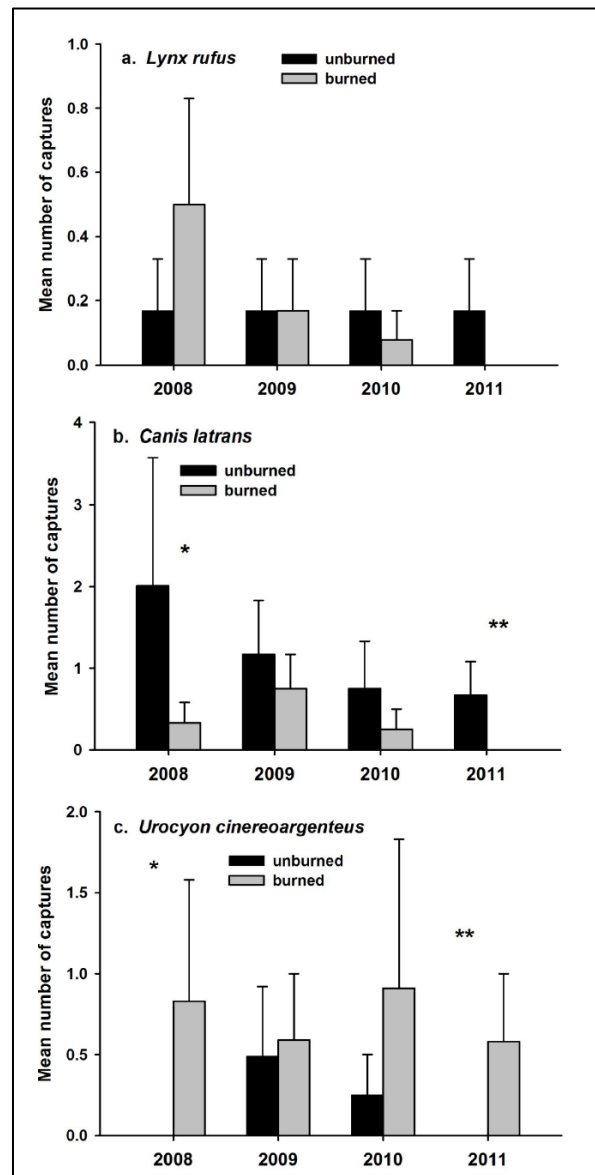

Figure 1 – Mean number of photographic captures of a) *Lynx rufus (bobcat)*, b) *Canis latrans (coyote)* and c) *Urocyon cinereoargenteus (gray fox)* in the unburned and burned areas. Significant differences in means were calculated using the Mann-Whitney U test. Error bars are 2 SE. Significant differences in means are indicated by * for $p < 0.05$ and ** for $p < 0.01$.