

Mixed Severity Fire Leads to Increased Bat Diversity in Fire Suppressed Sierra Nevada Forests

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Fire is a fundamental ecological process in Sierra Nevada forests. Over the last century humans have reduced the influence of fire across this ecosystem, resulting in increased tree densities. As the climate warms and dries, the area burning annually and severity of those fires is now increasing. Understanding how species living in these forests respond after they burn can help inform the use of fire as management tool and post-fire management.

In this study we evaluated how the bat community of Sierra Nevada forests responded to burn severity (a measure of vegetation mortality) and landscape variation in burn severity (aka pyrodiversity) within 3 landscapes in the Northern and Central Sierra Nevada. We sampled the bat community using autonomous acoustic devices that record bat echolocation calls at night while foraging. We compared the occurrence of species in burned forest to those in adjacent unburned forest to provide

context to occurrence patterns in burned areas.

Occupancy was higher in burned areas for the majority of the 17 species we evaluated. For 9 species, occupancy increased with increasing burn severity; one species likely responded negatively to burn severity. Four species had higher occupancy rates with increasing pyrodiversity. Two other species responded negatively to increasing pyrodiversity. When comparing community richness, a measure of diversity, we found unburned forests had significantly fewer species per survey location. Unburned forest averaged 8 bat species per sample location while sample locations where most or all of the trees were killed that exhibited high pyrodiversity averaged 11 species.

This research greatly improves our knowledge of a wildlife taxa of increasing management interest. Similar to our research on birds, bats support the theory that mixed severity fire, especially that which results in

high pyrodiversity, is important to the maintenance of wildlife diversity in the Sierra Nevada ecosystem. Further research is needed to understand how other aspects of bat ecology, such as roosting and maternity locations, are affected by fire in our forested landscapes.

Main Points

Moderate and high severity fire results in greater bat diversity than unburned forest in Sierra Nevada

Pyrodiversity, the spatial variation in burn severity, further increases bat diversity

A century of fire suppression resulting in overly dense forests appears to be deleterious for many bat species

Z. L. Steel, B. Campos, W. f. Frick, R. Burnett & H. D. Safford. 2019. [The effects of wildfire severity and pyrodiversity on bat occupancy and diversity in fire-suppressed forests.](#) Scientific Reports 9:16300.