

Fire leads to complex and dynamic responses by the avian community in Sierra Nevada forests

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Fire is widely recognized as a fundamental process in Sierra Nevada forests. Over the last century humans have reduced the influence of fire across this ecosystem, but as the climate warms and the amount of fuels in these forests increase, the area burning annually and severity of those fires has been increasing. Understanding how species that rely on these forests respond after they burn can help inform the use of fire and post-fire management strategies.

In this study we evaluated how the majority of species (44) in the breeding bird community of Sierra Nevada forests responded to fire severity, a measure of the effects of fire on vegetation mortality, and time since wildfire across 10 burned landscapes over the first 15 years after they burned. We then compared the maximum densities of these species in burned forest to those in unburned forest to understand the relative importance of post-fire habitat to their populations.

Wildfire had a strong effect on the density of most of the bird

species we studied. Of the 44 species, 18 reached their maximum densities in high severity fire, 10 in moderate severity, and 16 in areas affected by low-severity fire.

More than half the species reached maximum densities within the first 5 years after fire, and one quarter at more than 10 years following the fire.

When we compared densities to unburned forest, 30% had higher densities in burned forest, and all but one of them preferred areas burned at high severity. Only 11% reached greater densities in unburned forest. The remaining species showed no statistical difference.

The majority (61%) of bird densities varied in complex ways following fire, as evidenced by non-linear responses to severity, time since fire, or an interaction between the two.

Understanding the complex responses of wildlife to both the severity and the time since fire can help guide management decisions that must balance often competing

goals within burned landscapes of the Sierra Nevada.

Main Points

The avian community in forests of the Sierra Nevada respond to a wide range of fire severity and time since fire

Bird responses to fire are complex, but understanding them can help manage post-fire habitat and balance often competing objectives

Managing for a mixed severity fire regime may be the most effective way to promote high biodiversity and resilient forests in the Sierra Nevada

Taillie, P.J., Burnett, R.D. Roberts, L.J., Campos, B.R., Peterson, M.N., Moorman, C.E. 2018. Interacting and non-linear avian responses to mixed severity wildfire and time since fire. *Ecosphere* 9. Online: <https://doi.org/10.1002/ecs2.2291>