

Fire and mechanical forest treatments support different portions of the bird community in fire-suppressed forests

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In the Sierra Nevada, fire suppression and extensive logging over the past century have dramatically altered the structure and composition of Sierra Nevada forests. Fires create habitat conditions to which many wildlife species are adapted and set in motion ecological processes that last for decades. The deficit of these natural disturbances has had profound effects on wildlife communities. While mechanical timber harvesting and fuels treatments also impact habitat, it is unclear how important the differences in post-disturbance habitats are between fires and these other disturbances, and which bird species are dependent on each disturbance type.

We sought to understand how these different disturbance agents affected the abundance of forest birds in the Sierra Nevada in comparison to undisturbed forest. Specifically, we were interested in understanding how the avian community (71 species) responded to low-severity fire (<25% canopy cover loss), moderate- to high-severity fire

(>25% canopy cover loss), and mechanical forest treatments across a 20-year post-disturbance period.

We found that moderate- to high-severity fire resulted in the highest bird diversity, and that this group of species was unique compared to the species assemblages that were typical of other habitats. In fact, the most unique species assemblage was found in moderate- to high-severity fire 13-19 years following disturbance, indicating that the importance of post-fire habitat lasts for two decades or more. Relatively small proportions (8-16%) of the bird species analyzed reached their highest abundance in undisturbed forest, low-severity fire, or mechanically treated forest, while 48% of species had their highest abundance following moderate-high-severity fires.

Moderate- to high-severity fire is an irreplaceable component of the disturbance regime in the fire-starved Sierra Nevada. Restoring forests that are resilient to future ecological stressors will depend on

embracing fire in forest management policies.

Main Points

The Sierra Nevada avian community is adapted to a frequent-fire disturbance regime that has been suppressed for decades.

The highest bird diversity and the most unique community was associated with moderate- to high-severity fire.

The bird community in low-severity fire and mechanically treated forest was more similar to undisturbed forest.

Mechanical treatments, prescribed fire, and mixed-severity fire can be complementary tools to restore resilient forests and conserve biodiversity.

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