



Implications of large high-severity wildfire patches for bird diversity

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Wildfire is an essential disturbance agent in dry western conifer forests, with unique species assemblages associated with severe fire. Climate change and a history of fire suppression are driving wildfires to create increasingly large high-severity patches, on the order of thousands of acres in size. More than 75% of the trees are killed in these patches, but as vegetation growth recovers they become dominated by shrubs, tree saplings, and a diverse herbaceous layer. The interiors of these patches may have different vegetation composition than the edges as they are farther from less disturbed habitats that provide a seed source.

We evaluated how the size of high-severity patches impact bird communities by investigating the effect of internal distance from lower-severity areas (<25% tree mortality), patch size, and time since fire on bird diversity and community composition. Our study took place in the Sierra Nevada Mountains across 27 wildfires representing 1-30 years since disturbance. We included 94 species in our

analysis, grouping them by their characteristic nesting locations.

We found that the number of species (richness) decreased with distance from patch edge and with patch size, but increased with years since fire. Richness was higher near edges of high severity patches (23 species) compared to patch interiors (18 species), and importantly the interiors did not contain unique species, rather they were a subset of the edge community.

Among nesting guilds, tree and primary cavity nesters occurred closer to edges and were more common in small high-severity patches. Ground and shrub nesting species occurred evenly throughout patches.

As fire activity increases and if trends towards larger high-severity patches within fires continue, we may see shifts in bird occurrence away from forest-associated species towards shrub and ground nesters. Management actions that promote the full range of fire effects but limit high-severity patch size may best conserve bird diversity within fire-adapted forests.

Main Points

High-severity fire patch size is increasing in burned dry western conifer forests.

Bird species richness decreased with distance from lower-severity areas and within the interiors of the largest patches.

Tree and cavity nesters saw the largest declines, while ground and shrub nesters were relatively insensitive to high-severity patch size.

While high-severity fire creates important bird habitat, very large patches appear to have less value than small patches.

Steel, ZL, AM Fogg, R Burnett, LJ Roberts, HD Safford. 2021. [When bigger isn't better – Implications of large high-severity wildfire patches for avian diversity and community composition](https://doi.org/10.1111/ddi.13281). Diversity & Distributions. <https://doi.org/10.1111/ddi.13281>.