Northwest Fire Science Consortium
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SONGBIRD RESPONSE TO WILDFIRE

SPECIES ABUNDANCE AFTER A SOUTHWEST OREGON WILDFIRE

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Bird communities are affected by wildfires and the habitat changes they create. These effects vary between wildfires and over time, and are likely driven by a combination of post-fire changes in vegetation, predation, and prey availability. Understanding the effects of a mixed-severity fire on birds can be challenging: this type of fire burns at different intensities depending on the vegetation, creating a mosaic of habitats. In addition, because bird communities are dynamic over space and time, it can be difficult to relate changes in bird abundance to fire effects.

Yellow-rumped Warbler. Oregon BLM.

In this study, researchers gathered vegetation and songbird abundance data in the Little Applegate Valley of Jackson County, Oregon. After one year of data collection, a portion of the study area experienced a 6,177-acre mixed-severity wildfire (23% low, 36% moderate, 42% high severity). To better understand how the wildfire affected songbird abundance, they continued to collect data in the burned area as well as an unburned control area for four years after the wildfire.

KEY FINDINGS

- Abundance decreased for 8 species and increased for 2 species, but the majority of species had no significant response.
- Species responses were consistent with fire-created vegetation changes and habitat preferences.
- Species associated with mixed-conifer habitats did not have strong responses, while the majority of species that decreased were associated with mature coniferous forest.
- Changes in vegetation after the fire appeared to be the primary driver of songbird responses.

Species analyzed and responses

Positive response (1)
Lazuli Bunting

Positive short-term response (1)
Pine Siskin

Mixed response (3)
American Robin, Yellow-rumped Warbler, Black-headed Grosbeak

Negative short-term response (2)
Cassin's Vireo, MacGillivray's Warbler

Negative response (6)
Chestnut-backed Chickadee, Red-breasted Nuthatch, Hermit Thrush, Nashville Warbler, Black-throated Gray Warbler, Hermit Warbler

No significant response (14)
Olive-side flycatcher, Western Wood-pewee
Dusky Flycatcher
Pacific-slope Flycatcher
Warbling Vireo
Steller's Jay
Brown Creeper
House Wren
Golden-crowned Kinglet
Townsend's Solitaire
Western Tanager
Spotted Towhee
Dark-eyed Junko
Purple Finch

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RESULTS

Bird abundance changes

55 passerine bird species were detected in the burned area during at least one year of the study. Of these 55 birds, 27 species were detected at >15% of the survey stations during at least 1 year of the study and were used for further analysis.

Of these 27 species, 14 showed no significant changes in abundance in the burned area after the fire compared to the unburned area. The other 13 species experienced significant responses in abundance (see box on page 1). Eight species decreased in abundance, although 2 of these (Cassin's Vireo and MacGillivray's Warbler) were short-term decreases and recovered to pre-fire levels by the end of the study. Lazuli Bunting abundance increased after the fire, and Pine Siskin experienced a short-term increase for 2 years post-fire, possibly because, as a seed-eater, siskins may take advantage of newly available seed sources in burned areas. Three additional species (American Robin, Yellow-rumped Warbler, and Black-headed Grosbeak) exhibited varied responses between areas and from year to year in patterns that were difficult to interpret.

Vegetation changes

Before the fire, the study area included both conifer and hardwood species at a variety of elevations, aspects, soils, and disturbance histories. As expected, the wildfire had significant impacts on vegetation structure and composition. Total tree and shrub cover decreased in the burned area, but by the fourth year post-fire shrub cover had recovered and was similar between burned and unburned stations. Conifer cover (Douglas-fir) was most notably and immediately reduced following the fire, while changes among broadleaf plants (Ceanothus, Oaks, and Pacific Madrone) were much less pronounced. Broadleaf plants sprouted vigorously after the fire, and the burned area, relative to the unburned control area, became dominated by broadleaf vegetation.

There is good reason to believe that these changes in vegetation were the primary driver of songbird responses after the the wildfire since the responses of individual species were consistent with vegetation preferences. Most of the species that decreased were associated with mature coniferous forest, and species associated with mixed-conifer habitats did not have strong responses.

Predator and prey changes

Prior research has suggested that post-fire changes in predator abundance and food availability can also influence bird distribution. This research examined post-fire predator and arthropod prey abundance during the third and fourth years post-fire. There was no evidence to suggest that predator numbers changed, but there was a significant increase in beetles between the third and fourth years post-fire. Although the increase in beetles was difficult to correlate with observed songbird responses, it provides valuable information about the post-mixed-severity-wildfire environment and relevant habitat changes that may occur several years after a wildfire.

IMPLICATIONS

The effects of disturbances like wildfires on bird communities are difficult to measure because bird communities are dynamic in space and time. This study demonstrates the value of collecting pre-impact data to better understand bird distribution before the disturbance. For example, Western Wood-pewee, Dusky Flycatcher, Western Tanager and Spotted Towhee all exhibited variation between burned and unburned areas both before and after the wildfire. Without pre-fire data, this variation would have been misinterpreted as a fire effect. If multiple years of pre-fire data had been collected, a better understanding of the pre-fire variation among these species in burned and unburned areas would also be possible.

Spatial variation in fire severity is an important component of bird response to wildfire, and the responses of bird communities differ between wildfires. This research provides a valuable example of songbird response to a mixed-conifer, mixed-severity wildfire, where a mosaic of burn and vegetation patterns provides birds with a diversity of habitats. Based on this research, songbird abundance should be expected to change after wildfires in accordance with changes in vegetation, and potentially with changes in arthropod prey, but these changes may be varied and differ between wildfires.

Lazuli Bunting. U.S. Fish and Wildlife Service

MORE INFORMATION

This brief is based on the following article :

Seavey, N.E., and Alexander, J.D. 2014. Songbird response to wildfire in mixed-conifer forest in southwestern Oregon. *International Journal of Wildland Fire* 28(2): 246-258.

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