CALIFORNIA FIRE SCIENCE CONSORTIUM

Research Brief for Resource Managers

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Old-forest Species Threatened by Megafires

Jones, G. M., Gutiérrez, R. J., Tempel, D. J., Whitmore, S. A., Berigan, W. J., & Peery, M. Z. 2016. Megafires: an emerging threat to old-forest species. Frontiers in Ecology and the Environment 14(6): 300-306. DOI: 10.1002/fee.1298

The frequency and severity of large wildfires (megafires) in the dry forests of North America has increased after a century of fire suppression and climate warming. Although fuel treatments that include forest thinning can reduce fire risk, managers may hesitate to implement these treatments in later seral forests because of concerns over potentially negative effects to old-forest species. However, the potential short-term consequences of fuels-reduction treatments may be outweighed by long-term benefits of forest restoration if large, high-severity fires negatively affect old-forest species.

To examine this potential trade-off, Jones and co-authors evaluated the effects of the 2014 King Fire on spotted owls. The King Fire burned through an area used for a long-term (23 years) demography study of spotted owls in the central Sierra Nevada, allowing the authors to compare the number and distribution of owls both before and one year after the fire.

Management Implications

- Large, high severity fires pose a threat to old-forest species.
- Forest restoration may be more compatible with old-forest species conservation than previously believed.
- Treating fuels outside of key habitats (eg. nesting and denning areas) could minimize potential short-term impacts while ensuring that old-forest species persist until forest resiliency objectives are achieved.

*A female California spotted owl (*Strix occidentalis occidentalis*) within the study area in the central Sierra Nevada, California.*

They found that the probability of an owl leaving a site (site extinction) increased from 0.01 to 0.98 as the proportion of high-severity fire increased from 0 to 1. Extinction rates at severely burned sites increased sevenfold following the King Fire, whereas post-fire extinction rates were estimated to be zero at less severely burned and unburned sites. The authors observed that lower-severity fire appeared to be benign, and perhaps even moderately beneficial, to spotted owls. They pointed out that this is not surprising given that, within dry mixed-conifer forests, the spotted owl and other old-forest species evolved in association with such fire regimes. Study data was collected prior to any salvage logging thus supporting these extinction rates as fire-related rather than logging-related.

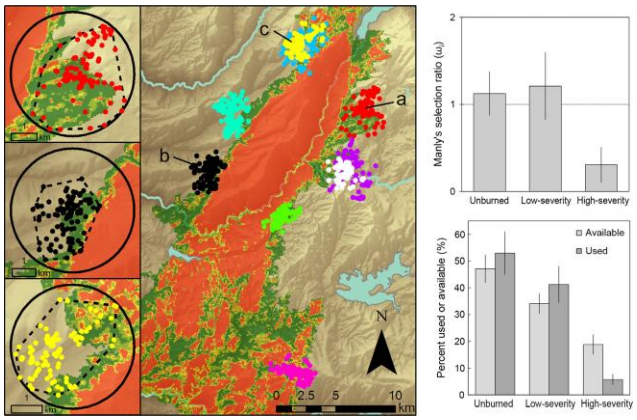

Figure 4. *Distribution of spotted owl foraging locations following a megafire developed from 985 GPS locations from nine owls (individuals represented by different colors) during the 2015 breeding season in relation to the 2014 King Fire (d). Inset examples (a–c) of foraging locations for three owls (small solid-colored circles) and the area defined as available habitat (large open black circles) compared to a minimum convex polygon (black dashed polygon) demonstrate the owls' apparent avoidance of the high-severity burned area.*

Jones and coauthors conclude that increasingly frequent megafires pose a threat to spotted owls and likely other old-forest species. This suggests that forest ecosystem restoration and old-forest species conservation may be more compatible than previously believed. Restoration practices that can reduce the frequency of large, high-severity fires and reintroduce low- to moderate-severity fire as the dominant disturbance regime will likely benefit both dry-forest ecosystems and old-forest species such as spotted owls.

The authors stressed that forest restoration efforts that remove key habitat elements or areas of suitable habitat could exacerbate the risk of extirpation in the short-term before the long-term benefits of restored fire regimes are realized, particularly in light of the present deficit in large and old trees in natural landscapes. The authors suggest that implementing fuels and restoration treatments outside of key habitats (eg. nesting and denning areas) is more likely to minimize short-term impacts and ensure that old-forest species persist until forest resiliency objectives are achieved.

Further Reading:

Stephens SL, Bigelow SW, Burnett RD, et al. 2014. California spotted owl, songbird, and small mammal responses to landscape fuel treatments. BioScience 64: 893–906. DOI: 10.1093/biosci/biu137

Tempel , D. J. , R. J. Gutiérrez , S. A. Whitmore , M. J. Reetz , R. E. Stoelting , W. J. Berigan , M. E. Seamans , and M. Z. Peery . 2014 . Effects of forest management on California Spotted Owls: implications for reducing wildfire risk in fire-prone forests. Ecological Applications 24: 2089 –2106 . DOI: 10.1890/13-2192.1