



Research Brief for Resource Managers

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Without intervention, habitat for the California spotted owl is predicted to be lost to wildfire in 75 years

Stephens, S. L., J. D. Miller, B. M. Collins, M. P. North, J. J. Keane, and S. L. Roberts. 2016. Wildfire impacts on California spotted owl nesting habitat in the Sierra Nevada. *Ecosphere* 7 (11). [DOI: 10.1002/ecs2.1478](https://doi.org/10.1002/ecs2.1478).

How do land managers restore fire-prone landscapes and also provide habitat for old-forest species like the California spotted owl (CSO; *Strix occidentalis occidentalis*), which are associated with areas dominated by large trees and high canopy cover? One approach has been to protect these areas, by prohibiting management activities such as forest thinning and prescribed burning. However, a recent study conducted by Stephens and colleagues suggests that this type of static approach to management may not be effective. They found that CSO habitat has been, and is likely to continue to be, lost to high severity fire. As a result, a more comprehensive approach to restoration may be necessary to avoid significant losses of CSO habitat in the future, particularly if current climate and wildfire trends continue.

Stephens and others examined trends in wildfire impacts on potential CSO nesting habitat in the Sierra Nevada and adjacent mountain ranges (Figure 1). Within this large landscape, the historic fire regime in the majority of CSO habitat has been characterized as frequent (i.e. short intervals of 5-20 years) and of low-moderate intensity, with some small patches of high severity fire. Recent increases in the frequency of high severity fire within CSO habitat has prompted concern that wildfire may pose a substantial threat to the long-term persistence of the spotted owl.

Management Implications

- Future moderate and high-severity fires may pose a substantial threat to the long-term persistence of the California spotted owl (*Strix occidentalis occidentalis*).
- Regression predictions suggest that the total amount of nesting habitat burned at moderate to high severity ($\geq 50\%$ tree basal area mortality) will exceed the current total existing habitat after 75 years.
- The loss of dense forest could outpace the replacement rate if the current rate of moderate to high severity fire and increasing trend in area burned continues.
- To avoid significant loss of older forests that provide habitat for the California spotted owl, managers will need to consider a more active approach to management, including fire suppression, strategic fuel reduction, and increased use of prescribed and managed wildfire.

To examine the impact of wildfire on potential nesting habitat for CSOs, the authors examined trends in wildfire size and severity since the 1970s. They found that over the last 20-30 years, the rate at which high quality nesting habitat (defined as $> 70\%$ canopy cover) is being burned by moderate to high severity fire is increasing. Between 2000 and 2014, over 85,000 ha of

potential CSO nesting habitat was burned by fire that resulted in $\geq 50\%$ mortality of the existing live tree basal area, reducing the canopy cover on average to less than 25%.

The authors used predictive models to estimate the amount of CSO habitat that may be impacted by wildfire over the next century. They determined that the amount of habitat experiencing $\geq 50\%$ basal area mortality as a result of wildfire could exceed the total current (2014) amount of existing mature, dense forest area after 75 years (Figure 2). The authors also predicted that the loss of dense forest could outpace the replacement rate if the current rate of moderate to high severity fire and increasing trend in area burned continues.

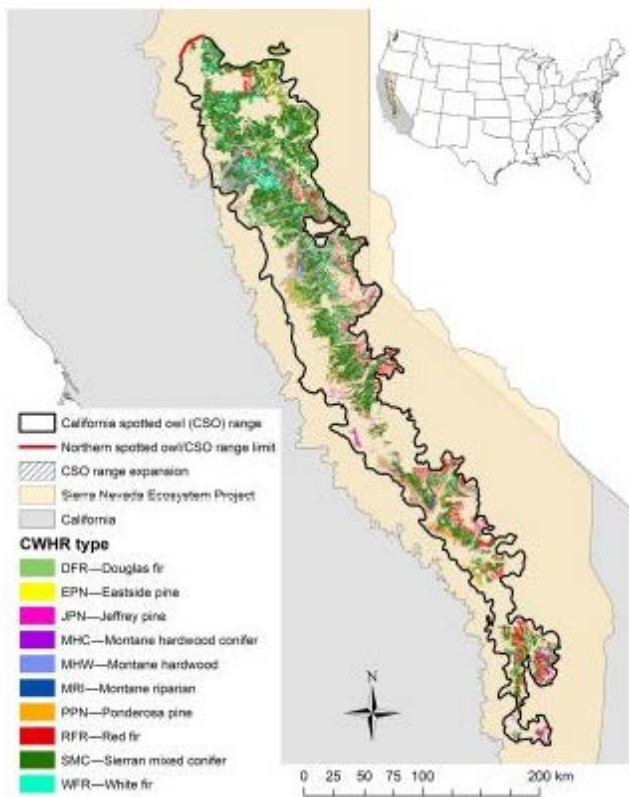


Figure 1. Study area. Suitable CSO habitat, as defined by California Wildlife Habitat Relationship [CWHR] vegetation types and forest structure, are displayed within National Forest boundaries. These habitats include overstory tree sizes that are either small, medium/large, or multilayered (CWHR 4, 5, or 6) and canopy cover that is defined as moderate (M) or dense (D).

The authors discuss four management approaches to conservation of CSO in fire-dependent forests, each with a distinct set of trade-offs that warrant careful consideration. For example, one approach is to increase the use of fire suppression and prevention to preserve mature, dense forests in the short-term. Another is to use mechanical treatments and/or prescribed fire to strategically reduce fire hazards in landscapes currently occupied by CSOs. A third approach is to increase the amount of managed wildfire in CSO habitat that is outside of the wildland urban interface (WUI). The authors also suggest development of a landscape strategy that uses historical forest structure information to identify areas where high-canopy cover forests may be more sustainable. For example, managing areas that would have sustained denser, mature forests under an intact fire regime so that they can support higher tree densities and biomass, while at the same time treating the remaining portions of the landscape with prescribed fire and mechanical thinning.

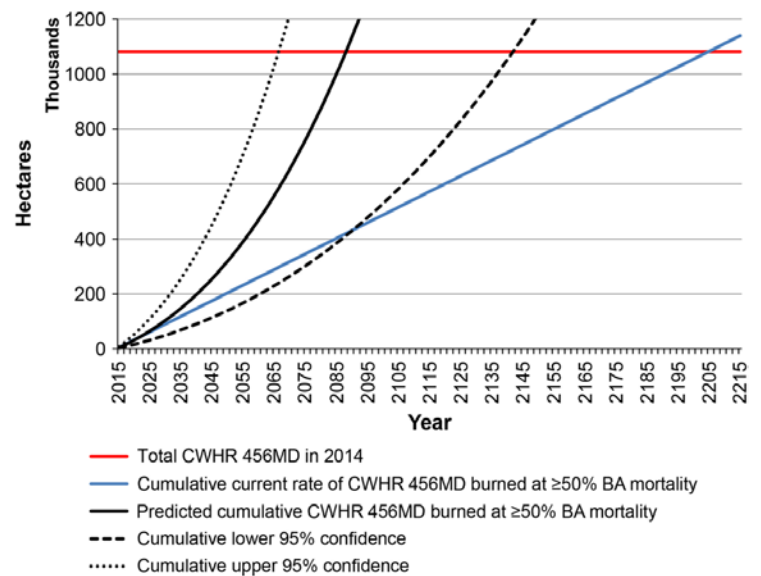


Figure 2. Predictive model for area of mature dense forest (defined as CWHR: 4, 5, 6, M, D) burned at $\geq 50\%$ basal area (BA) mortality within CSO habitat range on U.S. Forest Service lands. Predicted cumulative area exceeds total existing mature, dense forest area in 2014 by the year 2089 (2067 and 2142 for upper and lower 95% confidence limits, respectively).