



## Research Brief for Resource Managers

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# Wildfires Differences among Agencies and Ecoregions in the Sierra Nevada

Miller, Jay D., Brandon M. Collins, James A. Lutz, Scott L. Stephens, Jan W. vanWagtendonk, and Donald A. Yasuda. 2012. Differences in wildfires among ecoregions and land management agencies in the Sierra Nevada region, California, USA. *Ecosphere*3(9):80. <http://dx.doi.org/10.1890/ES12-00158.1>

Large wildfires are becoming more frequent and severe in the Sierra Nevada and other parts of the western United States as a consequence of climate change and past management activities, including extensive timber harvest, livestock grazing, and fire suppression. A 2012 study by Miller and others suggests that fire management approaches used by the National Park Service in Yosemite National Park could assist in the restoration and maintenance of Sierra Nevada forest ecosystems.

The authors compared wildfires that burned between 1984 and 2009 among ecoregions, forest types, and land management agencies in the Sierra Nevada, Southern Cascades, and Modoc Plateau of California. Their analysis examined fire size and satellite-derived estimates of fire severity, including percentage of high severity fire and high severity patch size. Wildfires burning at high severity exhibited  $\geq 95\%$  change in canopy cover. The authors evaluated a total of 280 and 72 wildfires that burned in national forestlands and Yosemite National Park, respectively.

Irrespective of forest type, high severity percentage and high severity patch size were lower in Yosemite National Park than on Forest Service lands. Yosemite fires were also smaller on average than fires on Forest Service lands.

### Management Implications

- Regardless of forest type, high severity patch size and percent high severity fire were lower in Yosemite National Park than on Forest Service lands.
- Yosemite fires were smaller on average than fires on Forest Service lands. However, when fires that crossed Park boundaries were included in the analysis, there was not a significant difference between the size of Yosemite and Forest Service fires on the westside of the Sierra Nevada.
- Land and fire management histories are likely the major factors driving the distinction in fire severity patterns among agencies in the region.



Fire management practices used by the National Park Service in Yosemite National Park could help restore or maintain old forest conditions within the Sierra Nevada. *Image Credit: National Park Service.*

As an exception, the average size of Yosemite fires on the west side of the Sierra Nevada was either smaller or not significantly different from Forest Service fires, depending upon whether fires that crossed boundaries were included or not. Interestingly, the authors observed that high severity patterns in Yosemite, compared with Forest Service land, were more similar to a historic fire regime.

The authors attributed differences in fire size and severity patterns to land management and fire management histories between the Forest Service and National Park Service in the Sierra Nevada. More active use of wildland fire (prescribed fire, wildfires) to achieve resource objectives and relatively fewer impacts of widespread timber harvest has facilitated smaller and less severe wildfires in Yosemite National Park. In contrast, sustained fire suppression on Forest Service lands that has led to an accumulation of forest fuels and subsequent higher percentages and patch sizes of high severity fire.

The authors suggest that restoring fire as an ecological process, including increased management of wildfires for resource benefit, would reduce fuel loads and stand densities across broad scales even under current climate conditions. This fire regime restoration could enhance the resilience of forest ecosystems and reduce the impacts of future wildfires on Forest Service lands in the ecoregion.

#### Additional references for this topic:

Collins, B., M. Kelly, J. van Wagtenonk, and S. Stephens. 2007. Spatial patterns of large natural fires in Sierra Nevada wilderness areas. *Landscape Ecology* 22:545–557.

van Wagtenonk, J. W., and J. A. Lutz. 2007. Fire regime attributes of wildland fires in Yosemite National Park, USA. *Fire Ecology* 3(2):34–52.

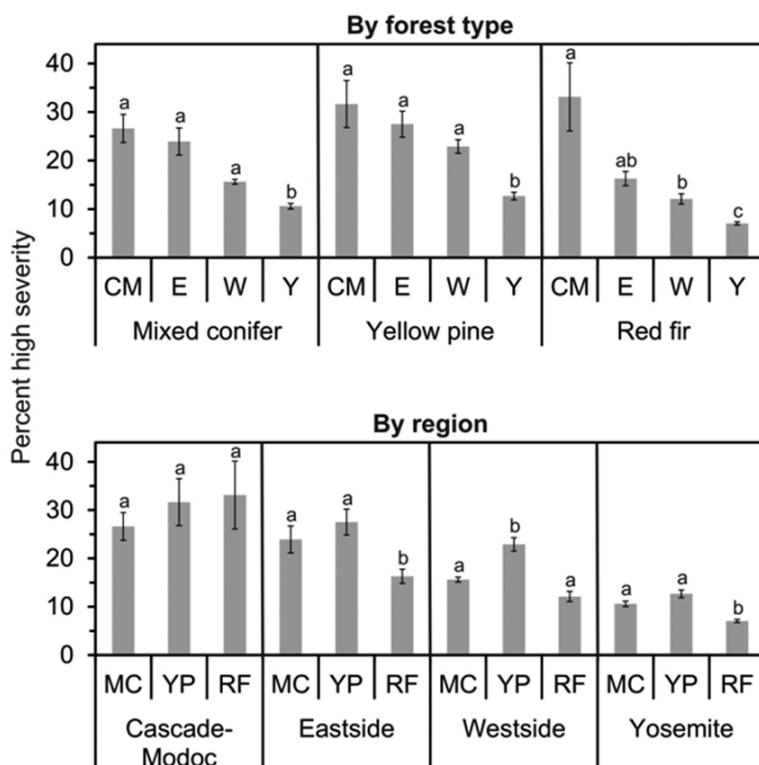


Figure 2. Analysis results comparing percentage of high severity by forest type (top) and region (bottom). Bars labeled with different letters indicate significant differences among forest types or regions. Abbreviations: CM = Cascade-Modoc, E = Eastside, W = Westside, Y = Yosemite National Park; MC = mixed conifer, YP = yellow pine, RF = red fir.