CALIFORNIA FIRE SCIENCE CONSORTIUM

Research Brief for Resource Managers

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Fire and climate change: conserving seasonally dry forests is still possible

Stephens, S. L., A. L. Westerling, M. D. Hurteau, M. Z. Peery, C. A. Schultz, & S. Thompson. 2020. Fire and climate change: Conserving seasonally dry forests is still possible. Frontiers in Ecology and the Environment 18(6):354-360.
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Wildfires in the western US are increasingly large and more severe. After another record-breaking fire season, many managers have questioned if forests can be conserved at all in the face of ongoing climate change, high severity fire, drought, insects and disease. A recent paper by Scott Stephens and co-authors asserts that conservation of western forests is still possible, and describes sensible, evidence-based strategies to improve forest ecosystem resilience.

The authors explain how conventional treatments like fire use (including prescribed fires and managed wildfires) and restoration thinning can not only conserve seasonally dry forests, but also provide numerous co-benefits, including enhanced biodiversity, increased water availability, greater long-term and more sustainable carbon storage, improved forest resilience and adaptation to climate change, and reduced air pollution. Achieving these co-benefits will require designing prescribed fire and restoration thinning treatments to better mimic historical conditions, given that many contemporary treatments do not enhance forest resilience, especially at landscape scales.

Management Implications

- Wildfires in the western US are increasingly large and more severe.
- In some forests with a dry warm season, wildfires are damaging key services that those forests provide.
- However, actions such as the increased use of fire and restoration thinning, if taken today, may counter this problem.
- Restoring a more natural role for fire will help forests continue to provide needed services (e.g., water, clean air, carbon storage, habitat, wood products, recreation) over the long term, while at the same time making forests more resilient to climate change.

Fire use treatments include prescribed burning, when managers intentionally burn an area in accordance with a site-specific plan. Prescribed fires are effective at reducing the most hazardous fuel layers in seasonally dry forests, including downed dead wood and litter (surface fuels) and small-to medium-sized trees (ladder fuels) that can provide vertical continuity and the energy for fires to burn tree crowns. Managing wildfires ignited by lightning is an alternative fire use treatment that can also produce positive ecological outcomes, but poses challenges, such as smoke management and the risk of changing weather producing undesired fire outcomes.

Restoration thinning is another tool described by the authors to conserve seasonally dry forests.

Restoration thinning consists of activities such as chipping, shredding, and whole-tree removal. This treatment targets smaller trees to reduce ladder fuels and can be effective for reducing crown fire potential. Restoration thinning normally retains larger trees and is used to increase spatial heterogeneity, mimicking the forest structural characteristics resulting from low-to moderate- and mixed-severity fire regimes.

The authors explain that conserving forests may require a departure from conventional commodity production practices as a primary management goal in many places. Timber production can be better aligned with fire management goals by retaining large trees and removing logging debris from within treated stands to reduce fire hazard.

The paper describes how the strategic use of fire and restoration thinning can reduce the risk of high severity fire and promote biodiversity by increasing landscape scale heterogeneity.

Landscape-scale restoration activities that retain and promote large trees and snags, create complex canopied forest in topographically appropriate areas, and maintain hardwoods and shrubs could minimize short-term effects on species of concern so that the long-term benefits of restored forest ecosystems are realized. The paper also addresses how fire use and restoration thinning can promote water supply and improve water quality, promote carbon stability and sequestration, and reduce air pollution (see Figure 1).

The authors conclude that proactive fire use and restoration thinning will be key to the long-term conservation of seasonally dry western forests and the benefits they provide to society. Taking immediate actions today to promote positive ecological outcomes in seasonally dry forests should be a primary focus of management, particularly in the western US.

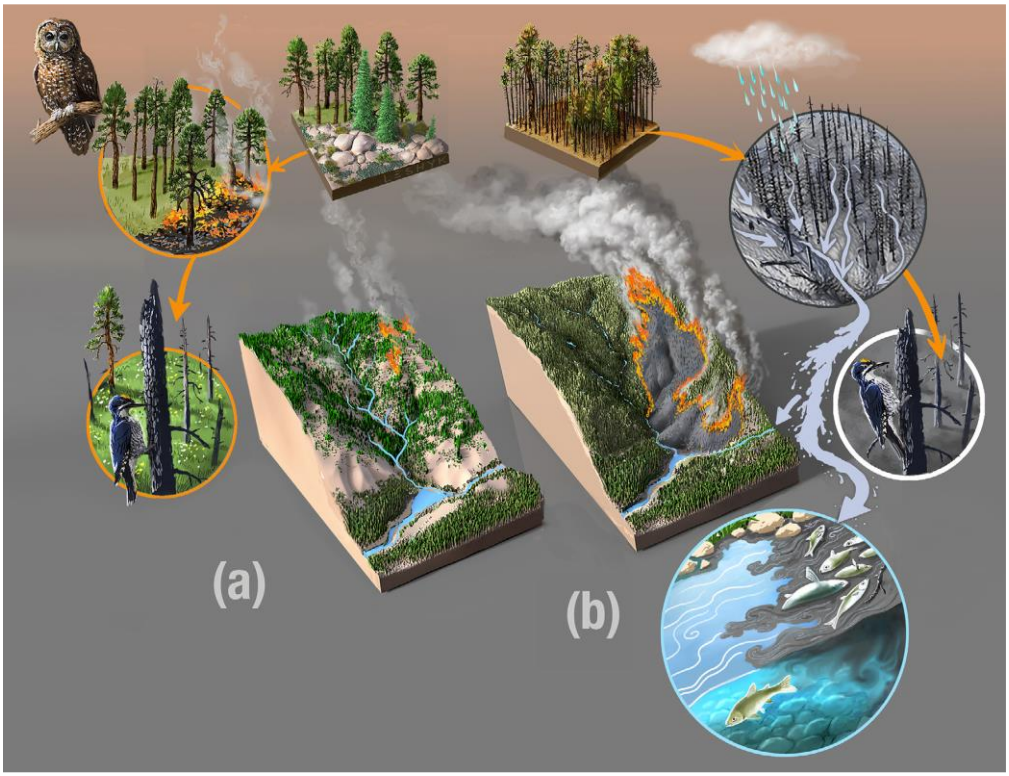

Figure 1. Depiction of two options for a fire-adapted forested watershed. (a) The fire-maintained condition creates forest heterogeneity, provides a range of habitat types, and increases water availability, whereas (b) the fire-excluded condition is at risk of high-severity wildfire because of homogeneous, hazardous forest conditions, which reduce the number of available habitat types and negatively affect water availability; in addition, associated fire emissions degrade air quality.