CALIFORNIA FIRE SCIENCE CONSORTIUM

Research Brief for Resource Managers

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Influence of post-fire vegetation and fuels on fire severity patterns in reburns

Coppoletta, M., Merriam, K. E. and Collins, B. M. (2016), Post-fire vegetation and fuel development influences fire severity patterns in reburns. Ecol Appl, 26: 686–699. doi:10.1890/15-0225

Increasing incidence of large wildfires with extensive high severity effects across the western U.S. has shifted the focus of land management toward post-fire landscapes. Restoration of specific resources damaged by wildfire is often the primary focus of management efforts; however there is growing recognition that larger scale post-fire management may be needed to promote resilience to subsequent reburns. Results from a 2016 study by Coppoletta and others suggests that in areas where fire regimes and forest structure have been dramatically altered, contemporary fires have the potential to set forests on a positive feedback trajectory with successive reburns, one in which extensive stand-replacing fire could promote more stand-replacing fire.

The authors utilized an extensive set of field plots that were established following four fires that occurred between 2000 and 2010 in the northern Sierra Nevada and were subsequently reburned in 2012. The information obtained from these field plots allowed for a unique set of analyses investigating the effect of vegetation, fuels, topography, fire weather, and forest management on reburn severity. The authors also examined the influence of initial fire severity and time since initial fire on reburn severity.

Management Implications

- Fire may be reinforcing rather than restoring altered conditions in the Sierra Nevada.
- The risk of future high severity fire may be higher in areas that have already burned at high to moderate severity, especially in areas that have a high density of standing snags and regenerating shrubs.
- Management activities, such as thinning, prescribed fire, or managed wildland fire, should be considered as tools for moderating fire behavior not only prior to initial fires, but also before subsequent reburns.

The results of their study identified a positive relationship between initial fire severity and the severity of the subsequent reburn. The authors also found that beyond the overarching influence of fire weather, two of the most influential variables driving reburn severity patterns were snag density and shrub cover, both of which were influenced by initial fire severity and time since initial fire. Their results suggest that initial high to moderate severity fire led to an increase in standing snags and shrub vegetation, which – in combination with severe fire weather – promoted high severity fire in the subsequent reburn.

In the face of changing climatic regimes and increases in extreme fire weather, the results of this study suggest options to create more fire-resilient ecosystems. In areas where frequent high-severity fire is undesirable, management activities such as thinning, prescribed fire, or managed wildland fire may be used to moderate fire behavior not only prior to initial fires, but also before subsequent reburns.

Additional References for this topic:

Thompson, J. R., and T. A. Spies. 2009. Vegetation and weather explain variation in crown damage within a large mixed-severity wildfire. Forest Ecology and Management 258:1684-1694

van Wagtendonk, J., K. van Wagtendonk, and A. Thode. 2012. Factors associated with the severity of intersecting fires in Yosemite National Park, California, USA. Fire Ecology 8:11-31.

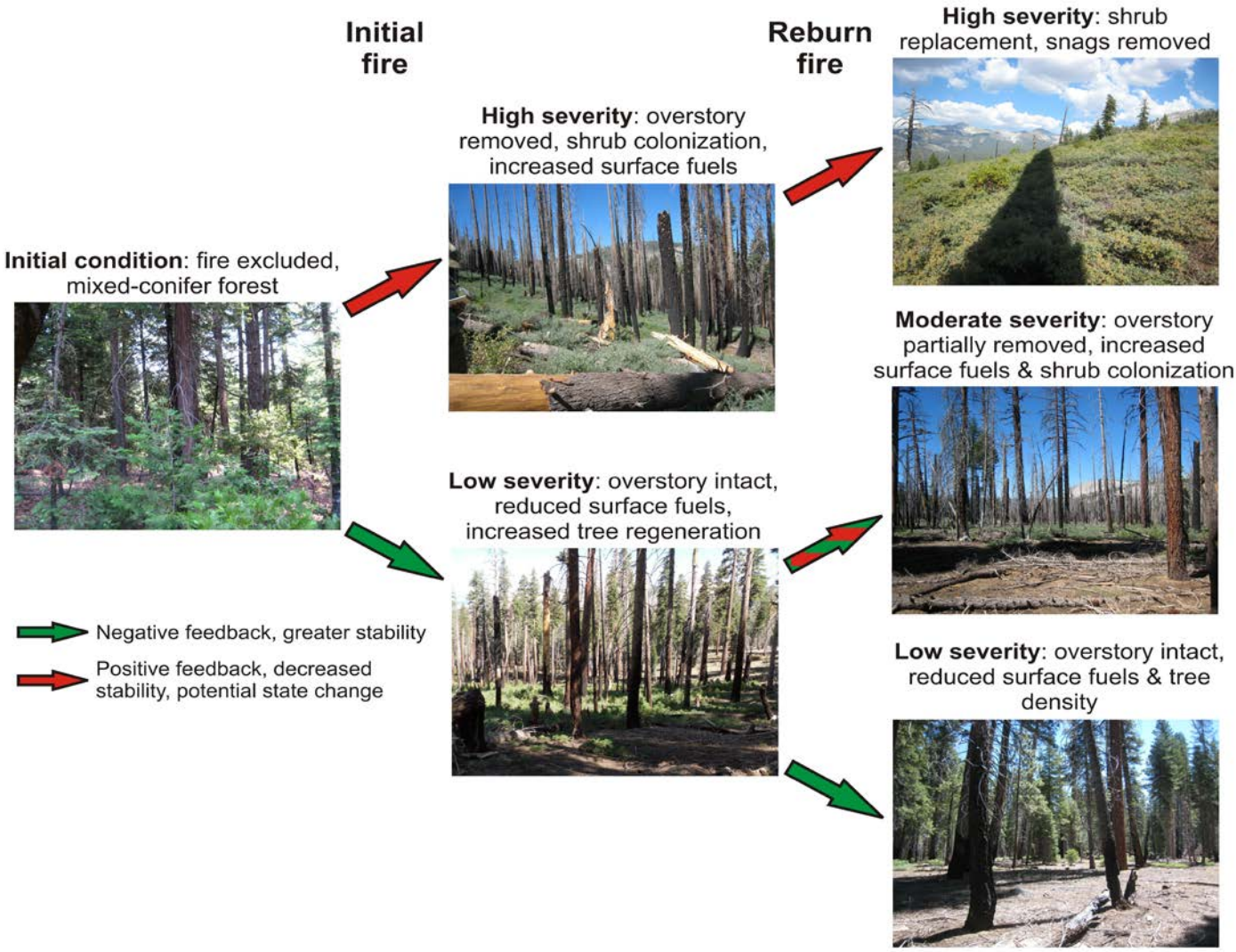

Fig. 1. Conceptual model of potential pathways for post-fire vegetation and fuel dynamics following initial fires and reburns. Time between initial fire and reburn is assumed to be relatively short (5-15 years). Pathways are coded for the type of ecological feedback based on expected change to the dominant vegetation in response to different fire severity levels and effects these vegetation changes would have on subsequent fires.