

Publication Brief for Resource Managers

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Contacts:
Jon E. Keeley

Email:
jon_keeley@usgs.gov

Phone:
559-565-3170

USGS Western Ecological Research Center | Sequoia and Kings Canyon Field Station | 47050 Generals Hwy #4, Three Rivers, CA 93271

Fire Regimes Can Inform Control Strategies for Invasive Alien Plants

Temporal and spatial patterns of burning can affect the invasion risk and prevalence of alien plants in California, explains USGS scientist Jon Keeley, Janet Franklin of Arizona State University and Carla D'Antonio of University of California-Santa Barbara in a book chapter in *The Landscape Ecology of Fire*.

Different principles dictate the relationship between fire and the invasion process at the landscape scale across forests, shrublands and grasslands. Each ecosystem presents its own challenges.

Forests become vulnerable to invasions as fire regimes move away from a historical condition of low- or mixed-severity fires and towards larger, more severe crown fires, often due to anomalously high accumulation of woody fuels resulting from logging, grazing and fire suppression. These fires are outside the historical range of fire intensity and often contribute to invasions.

But pre-fire fuel treatments designed to restore historical fire regimes could create ideal invasion conditions as well — largely because they reduce surface fuels and open the forest canopy, both of which promote the spread of alien grasses and forbs.

Closed-canopy shrublands are relatively resistant to invasions, but increased fire frequency (<20 years) make them more vulnerable: natives have insufficient time to recover, and aliens may gain a foothold. High fire frequency favors alien invasions, and these invading grasses lower fuel volume and fuel intensity, which enhances alien seed survival. Other fire management activities that remove the native shrub cover, such as fuel breaks, may also promote alien invasions.

California grasslands already are heavily invaded by alien plants, and these often owe their origins to high fire frequency — although it is unclear whether more

Management Implications

- Fires are natural ecosystem processes on many landscapes. Perturbations to the fire regime, such as increased fire frequency and fire suppression, are the real “disturbances” to these systems and can lead to alien plant invasions.
- In forests, both too little fire and too much fire can enhance invasions. Restoration of historical fire regimes may not be the best way to balance these two risks.
- Repeated fires in shrublands decrease fuel volumes, decrease fire intensity and increase alien plan invasion. Decreasing fire frequency may be the best means of reducing alien invasions.
- Prescription burning that targets noxious species in grasslands is often not sustainable unless coupled with restoration.

THIS BRIEF REFERS TO:

Keeley, J.E., J. Franklin, C.D'Antonio. 2011. “Fire and Invasive Plants on California Landscapes” in D. McKenzie, C.S. Miller, D.A. Falks (eds). *The Landscape Ecology of Fire*. New York: Springer.

<http://www.werc.usgs.gov/seki>
<http://www.werc.usgs.gov/ProductDetails.aspx?ID=4199>

fires will enhance further invasions. Where native perennial grasses and forbs are present, prescription burning may favor natives over alien species.

Most grasslands now lack native plant species, and fire is sometimes used to target particularly noxious aliens. This appears to work if prescribed fires are repeated often enough.