



Research Brief for Resource Managers

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The need to restore fire regimes in protected natural areas

Coppoletta, M., H.D. Safford, B.L. Estes, M.D. Meyer, S.E. Gross, K.E. Merriam, R.J. Butz, and N.A. Molinari. 2019. Fire Regime Alteration in Natural Areas Underscores the Need to Restore a Key Ecological Process. Natural Areas Journal 39(2): 250-263.
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Protected from direct manipulation, natural areas offer some of our best examples of minimally disturbed ecosystems on public lands. However, a new study by a group of California ecologists suggests that fire regime alteration can significantly impact the ecological integrity and long-term viability of some protected natural areas.

Coppoletta et al. (2019) used the California Fire Return Interval Departure database and fire severity data to compare modern and pre-Euroamerican (i.e. pre-1850) fire frequency and severity in 64 of California's Research Natural Areas (RNAs). This RNA network was established by the USDA Forest Service for research, baseline monitoring, education, and biodiversity and represents most of the state's dominant terrestrial vegetation types.

Their analysis revealed that 76% of RNAs currently exhibit high to moderate departure from their presettlement fire regime. Of these, 87% are burning less frequently than expected. Yellow pine forest, oak woodland, and both dry and moist mixed conifer forest types exhibit the greatest degree of departure, with current fire return intervals between five and eight times longer than estimated presettlement return intervals. When fires re-enter natural areas that

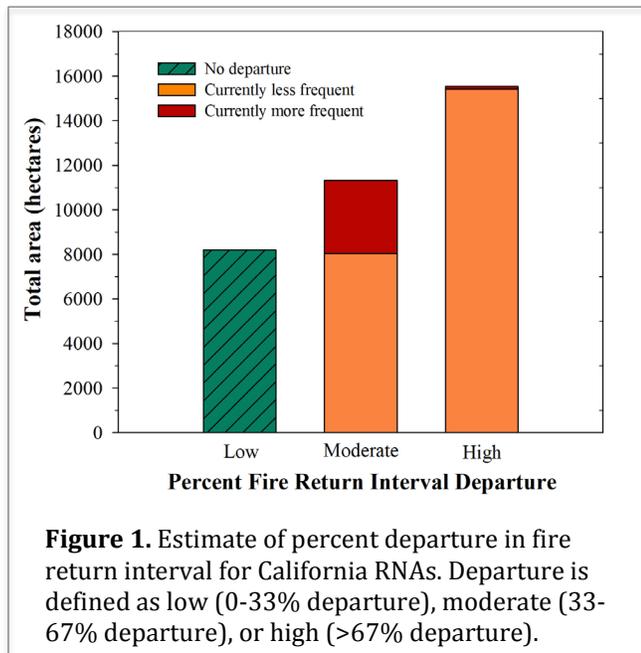
Management Implications

- Many of California's research natural areas exhibit high to moderate departure from their natural fire regime.
- Without restoration or maintenance of the natural fire regime, the ecological integrity of some natural areas could be lost.
- Scientific research and monitoring play a crucial role in informing and developing effective natural area management strategies.
- Wildfire management in natural areas requires site-specific planning, so that wildfires can occur at an ecologically appropriate frequency, scale, and intensity.
- In some places, proactive restoration (e.g., prescribed fire or thinning of small trees) may be needed to increase resilience to future wildfire.

were historically characterized by frequent, low-severity fire after a long fire-free period, the authors also found evidence of an increased risk of high severity fire effects.

Coppoletta et al. (2019) also found that 13% of areas exhibiting fire regime departure are currently burning more frequently than expected. Many of these RNAs were designated to protect vegetation types characterized by historically infrequent fire. Many also occur in southern-California, where an increase in human-caused ignitions, coupled with invasion by combustible nonnative annual grasses has increased the fire

frequency in highly flammable shrubland ecosystems like coastal sage scrub and chaparral.



These results suggest that many of California’s RNAs may require intervention to restore and maintain natural fire regimes. The authors present the following three strategies to help managers consider and address the potential for fire regime restoration on protected lands.

Encourage research and monitoring

The wide range of vegetation types and ecological conditions within protected natural areas, coupled with more restrictive management options, can make stewardship of these areas highly complex. Scientific research and monitoring can provide essential information to land managers, forming the foundation for science-based decisions and development of effective fire management strategies.

Develop wildfire management strategies

Wildfire management in natural areas requires scientific input and planning on a site-specific basis, so that fires can occur at an ecologically appropriate frequency, scale, and intensity. In areas where fire is likely to benefit ecological values, and suppression actions are not required to protect life, property, or significant resource values, management of wildfires for natural area objectives may be an appropriate course of action.

In other areas where ecological values may be threatened by too-frequent fire, suppression measures may be required to protect fire-sensitive ecosystems or habitats.

Consider proactive restoration to increase resilience to future disturbance

The small size of many research natural areas, their proximity to private lands where the risk of fire escape may be great, or a high degree of departure from the natural fire regime may prohibit the use of wildfire as a management tool in some areas. In these cases, prescribed fire or thinning of small trees might be implemented to reduce fuel loading and increase the likelihood that future wildfires burn at intensities consistent with the natural fire regime.

Summary

Although the focus of this study was California RNAs, the results and recommendations are likely applicable to many protected natural areas in the western United States. The long-term exclusion of fire from historically frequent-fire ecosystems, as well the increase in fire frequency in ecosystems adapted to long fire-free periods, puts many of the ecological values within RNAs at risk of degradation or loss. In many cases, monitoring and proactive resource stewardship are essential to ensure that disturbance processes, such as fire, can proceed in an ecologically beneficial manner.



Figure 2. Jeffrey pine stand within a prescribed fire unit in the Indiana Summit RNA, Inyo National Forest.