Western Ecological Research Center

Publication Brief for Resource Managers

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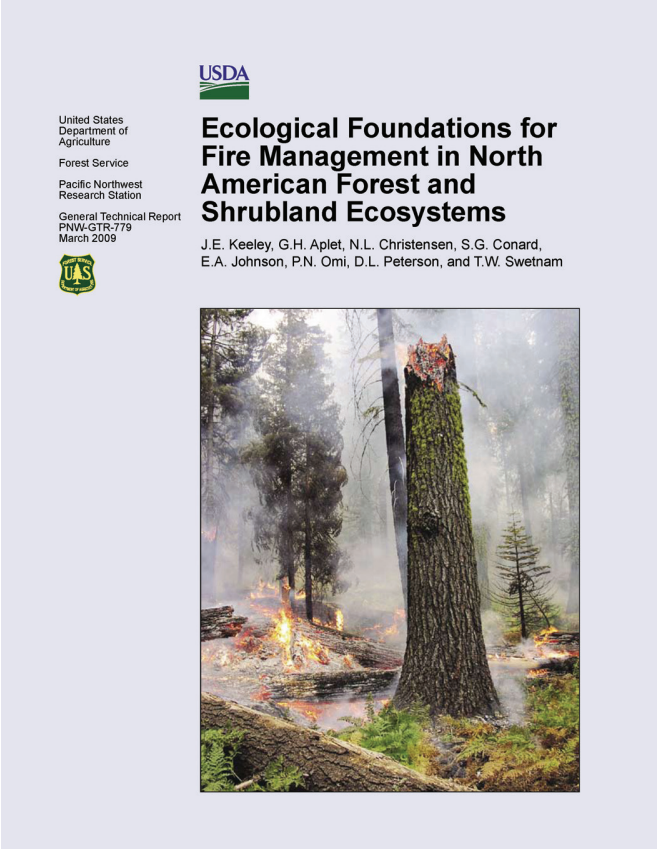
Ecological Foundations for Fire Management

Fire occurs in many North American ecosystems, and most of these systems are resilient to fires that occur within a broad range of variability in frequency and intensity. In a recent USFS publication, USGS scientist Dr. Jon Keeley led a team of scientists from various agencies and academic institutions in developing a framework that will inform fire management of ecosystems. Although their focus was on North America, the concepts developed in this paper have broader application.



Management Implications:

- Potential future management options and goals need to be consistent with current and past fire regimes of specific ecosystems and landscapes and be able to anticipate and adjust to future conditions.
- The effects of past management activities vary among ecosystems and fire regime types.
- Plant species in fire-affected ecosystems may be unable to adapt to alterations in fire regimes.
- Fire severity and ecosystem effects are not necessarily correlated.
- Fuel manipulations alter fire behavior but are not always reliable barriers to fire spread.

This review uses a scientific synthesis to provide an ecological foundation for management of diverse ecosystems. The authors discuss the roles fire has played in different ecosystems, and the range of human impacts, through fire exclusion in some cases and increased fire occurrence in other cases. Fire suppression has led to increased fire hazard in some ecosystems but due to naturally long fire return intervals or the inability of fire suppression to exclude fires, in other ecosystems fire suppression has not altered natural fire regimes. Ecosystem-based management requires different strategies on different landscapes, necessitating a regional approach to fire management.

Where fire hazard has increased, land management activities other than fire suppression often have played a greater role in increasing fire hazard. Activities such as logging and grazing, which are sometimes assumed to reduce fire hazard, have in fact exacerbated fire hazards on many landscapes.

In addition to the ecological conditions driving fire management, most organizations operate according to legal and regulatory mandates, some of which are compatible with ecologically-based fire management and some of which constrain potential options.

Finally, a warming climate and other dynamic changes in the biological, physical, and social environment are introducing new sources of complexity and uncertainty that influence strategic planning and day-to-day activities.

Sustainable ecosystem-based management will be successful only if fire policy and management are 1) based on ecological principles, 2) integrated with other resource disciplines (wildlife, hydrology, silviculture, etc.), and 3) relevant for applications at large spatial and temporal scales. Fire is such a pervasive disturbance in ecosystems, that failure to include it as part of managing large landscapes will inevitably lead to unintended outcomes.

Keeley, J.E., G. Aplet, N.L. Christensen, S.G. Conard, E.A. Johnson, P.N. Omi, D.L. Peterson, and T.W. Swetnam. 2009. Ecological foundations for fire management in North American forest and shrubland ecosystems. General Technical Report PNW-GTR-779. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 92 p.

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