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Fuels Planning: Science Synthesis and Integration

Forest Structure and Fire Hazard Fact Sheet: 1 Forest Structure and Fire Hazard Overview



Pacific Northwest
Research Station



North Central
Research Station

*Synthesizing
Scientific Information
for Fire and Fuels
Project Managers*

The information for this fact sheet was provided by Kelly O'Brian, Fire and Mountain Ecology Lab, University of Washington.

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Fuels planning: Science synthesis and integration, an interagency research/management partnership to support the Ten-Year Fire Plan, led by Russell T. Graham, RMRS, and Sarah M. McCaffrey, NCRS.

Overview

Many managers and policymakers guided by the National Environmental Policy Act process understand that fuel treatments for reducing the size and severity of wildfires must be based on scientific principles. The Forest Structure and Fire Hazard Team is providing the science to assist this kind of decisionmaking in dry forest ecosystems in National Forests and other public lands of the Western United States. Because of past management and policy decisions, current forests have denser canopies, more fire-intolerant species, and fewer large trees. These conditions, coupled with fuel accumulations at higher than historic levels, increase the probability of surface fires developing into crown fires because understory ladder fuels lower the effective canopy base height of the stand.



Historical



Present

Estimating Fire Hazard

Fire hazard reflects the potential magnitude of fire behavior and effects as a function of fuel conditions. Understanding the structure of fuelbeds and their role in the initiation and propagation of fire is the key to developing effective fuel management strategies. Thus, based on forest structure, fuels have been traditionally characterized as *crown fuels* (live and dead material in the canopy of trees), *surface fuels* (grass, shrubs, litter, and wood in contact with the ground surface), and *ground fuels* (organic soil horizons, or duff, and buried wood). A more refined classification separates fuelbeds into six *strata*: tree canopy; shrubs/small trees; low vegetation; woody fuels; moss, lichens, litter; and ground fuels (duff). Modification of any fuel strata (layer) has implications for fire behavior, fire suppression, and fire effects.

Visualizing Fuel Treatments

The scenic impact of fuel treatments across large landscapes can be visualized with management tools such as the Landscape Management System, which uses stand inventory data (species, height, diameter, stem density), geospatial data, and forest growth models to project forest vegetation succession and changes in landscape pattern.

The use of other analytical tools can also be effective in scheduling fuel treatments over time. For example, the Forest Vegetation Simulator (FVS) and the

Fire and Fuels Extension of FVS can be used to quantify vegetation and fuel succession following fire or fuel treatments. Scheduling of fuel treatments will vary by species, elevation, aspect, climatic zone, and soil fertility. Broad spatial perspectives and tools are the key to planning and implementing management for a fire-resilient landscape.

Managing Forests to Reduce Crown Fires: The Role of Silviculture

The major goals of fuel reduction treatments are to reduce fireline intensities, reduce the potential for crown fires, improve opportunities for successful fire suppression, and improve the ability of forest stands to survive wildfire. Thinning and prescribed fire target crown, ladder, and surface fuels of a forest stand or landscape to modify vegetation in each stratum.

Thinning can reduce the probability of crown fire spread, because canopy and ladder fuels are modified by treatments that effect crown classes, stand basal area, or

canopy bulk density. Thinning may be expensive and poses a challenge for handling large amounts of woody material, much of which may be unmerchantable. Prescribed burning is a less precise management tool, although it can be highly effective at reducing surface fuels, and in some cases ground fuels. In some cases it can be used to reduce stem density and ladder fuels by killing smaller trees. Thinning followed by prescribed burning reduces canopy, ladder, and surface fuels, thereby providing maximum protection from severe fires in the future.

When, where, and how fuels are treated requires the combined skills of fire managers, silviculturists, and other experts. Individual stand treatments will have maximum effectiveness only if they are planned in the context of the broader landscape. The complex job of planning and implementing fuel treatments requires the best available scientific information—the Forest Structure and Fire Hazard Team will provide that information to resource managers and the general public in order to expedite fuels management in the United States.



Forest Structure and Fire Hazard Fact Sheets

Look for other fact sheet topics from the Forest Structure and Fire Hazard Team with information about fire hazard, visualization, silviculture, uncertainty, and larger scale treatments.

Fuels Planning: Synthesis and Integration

This fact sheet is one in a series being produced as part of a larger project supported by the USDA Forest Service to synthesize new knowledge and information relevant to fire and fuels management. Fact sheets address topics related to stand structure, environmental impacts, economics, and human responses to these factors. Information in the fact sheets is targeted for the dry forests of the Inland West, but is often applicable across broad regions of the country. For more information, please visit our Web site at: www.fs.fed.us/fire/tech_transfer/synthesis/synthesis_index

The Fuels Planning fact sheets are based on preliminary findings. Information from fact sheets will be synthesized in an upcoming publication.