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Fuels Planning: Science Synthesis and Integration

Forest Structure and Fire Hazard Fact Sheet: 6 Guide to Fuel Treatments in Dry Forests of the Western United States: Assessing Forest Structure and Fire Hazard



Rocky Mountain
Research Station



Pacific Northwest
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*Synthesizing
Scientific Information
for Fire and Fuels
Project Managers*

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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.

What is the Guide to Fuel Treatments?

The Guide to Fuel Treatments analyzes a range of potential silvicultural thinnings and surface fuel treatments for 25 representative dry-forest stands in the Western United States. These stands are the focus of potential management activities intended to modify forest structure and fuel to reduce crown-fire hazard on public lands. The guide provides quantitative guidelines and visualizations for treatment based on scientific principles identified for reducing potential crown fires. The guidelines cover a broad range of possible treatments and stand conditions; however, these representative cases are not comprehensive, and actual application of the guidelines may need to be adjusted based on local conditions and objectives.

Silvicultural treatments analyzed:

- No action
- Prescribed fire only
- Thin from below to 50 residual trees per acre, no tree more than 18 inch diameter at breast height removed
- Thin from below to 100 residual trees per acre, no tree more than 18 inch diameter at breast height removed
- Thin from below to 200 residual trees per acre, no tree more than 18 inch diameter at breast height removed
- Thin from below to 300 residual trees per acre, no tree more than 18 inch diameter at breast height removed

The following surface fuel treatments were implemented:

- No surface treatment
- Pile and burn
- Prescribed fire

Intended Users

The fuel treatment scenarios can be used by resource managers to examine alternatives for National Environmental Policy Act (NEPA) documents and other applications that require scientifically based information to quantify the effects of modifying forest structures and fuels. The guide is particularly useful for fire managers, silviculturists, and wildlife managers.

Intended Uses

- NEPA documents
- Assessments of ecological, economic, and sociological effects of silvicultural and surface fuel treatments
- Display of outcomes of alternative fuel treatments for public meetings

Required Inputs

The Forest Vegetation Simulator (FVS) uses forest inventory or stand exam data to simulate vegetation change. FVS is programmed to input stand data into “FVS-ready” format. Translation programs have been developed to convert the information contained in these databases into FVS-ready format. The Fire and Fuels Extension (FFE) of FVS calculates fuel loadings and



Before treatment

potential fire behavior for different stand conditions. Fuels data can be entered directly, although FFE-FVS assigns default values for fuels based on assumed stand-fuels relationships for different geographic locations. The FVS Web site (<http://www.fs.fed.us/fmfc/fvs/index.php>) contains specific information on data requirements and format for the FVS program.

What the Model Does

The guide examines the efficacy of treating representative dry-forest stands that have high stem densities and heavy ladder fuels. Quantitative and qualitative effects of each treatment are displayed for the 75th percentile (moderate) and 97th percentile (severe) historical fire

weather data. Quantitative results are presented in tabular format for pre- and posttreatment effects for potential fire behavior attributes such as crowning and torching potential, fire type (that is, surface, passive, active), canopy base height, and canopy bulk density. Qualitative results are displayed as pre- and posttreatment images rendered by EnVision visualization software immediately after the treatments were implemented. A



After treatment: thinned to 50 trees per acre from below with 18 inch upper dbh limit, resulting in a 23 percent reduction in basal area, and 52 percent reduction in stand density index.

graph of pre- and posttreatment effects on canopy bulk density is also provided.

How to Obtain the Model

The guide will be available in hard copy and online (<http://www.fs.fed.us/pnw/publications/index.shtml>) from the USDA Forest Service Pacific Northwest Research Station. It will also be posted online at: <http://www.fs.fed.us/pnw/fera>

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.