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Fuels Planning: Science Synthesis and Integration

Environmental Consequences Fact Sheet: 9

Fire and Fuels Extension to the Forest Vegetation Simulator (FFE-FVS)



Rocky Mountain
Research Station



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*Synthesizing
Scientific Information
for Fire and Fuels
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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 FFE-FVS?

FFE-FVS is a model linking stand development, fuel dynamics, fire behavior and fire effects. It allows comparison of mid- to long-term effects of management alternatives including harvest, mechanical fuel treatment, prescribed fire, salvage, and no action. Geographical variants use locally calibrated growth algorithms, decay parameters, fire effects relationships, and fuel modeling logic.

FVS simulates the growth of individual trees in a forest stand, although many stands can be simulated simultaneously. However, when many stands are simultaneously simulated, there is no interaction among the stands, and each stand develops independent of its neighbors. Designed to take the process to a broader view, FFE links the stand dynamics with a model of broader surface fuel accumulation and decay. Fire behavior is then predicted using surface and canopy fuels.

FFE-FVS allows users to design and simulate management alternatives at any point in the simulation. A wide range of treatments can be modeled, including precommercial and commercial thinning, salvage logging, jackpot, pile and broadcast burning, and mechanical fuel treatments.

FFE-FVS predicts fuel loads, stand structure, measures of fuel hazard including torching and crowning index, potential flame length, canopy fuel characteristics, canopy closure, mineral soil exposure, coarse woody debris, and snags over time. It produces output that can be used with the Stand Visualization System (SVS) to visualize stands.

Intended Users

- Fuel managers, silviculturists, planners

Intended Uses

- Prescription development—design integrated fire and silvicultural prescriptions.
- Design prescriptions to reduce the risk of stand replacement wildfire.
- Environmental assessment—compare alternatives for NEPA documentation.
- Planning—site specific and strategic.
- Hazard assessment—assess fire hazard and effectiveness of treatments on hazard mitigation.

Required Inputs

At a minimum, FFE-FVS requires a list of trees as input to describe a stand. Initial fuel loads can also be entered. Many stands can be modeled simultaneously.

What the Model Does

FFE-FVS provides site-specific predictions of snags, surface fuel loads, stand structure and composition, potential fire behavior, and indicators of fuel hazard over time. If a prescribed fire or wildfire is modeled, FFE-FVS predicts fire behavior, fuel consumption, tree mortality, and smoke production. FFE-FVS has been used to conduct broadscale hazard assessments, reconstruct historic forest structures, develop silvicultural and fuel treatment prescriptions, create FARSITE data layers, and support NEPA analysis.

How to Obtain the Model

FFE-FVS is available to download from the Forest Management Service Center, which also offers training for FFE-FVS: <http://www.fs.fed.us/fmsc/fvs/index.php>

For More Information

Reinhardt, E. D.; Crookston, N. L. 2003. The Fire and Fuels Extension to the Forest Vegetation Simulator. Fort Collins, CO: U.S. Department of Agriculture, Forest Service Service, Rocky Mountain Research Station. Gen. Tech. Rep. RMRS-GTR-116.



Environmental Consequences Fact Sheets

Look for fact sheet topics from the Environmental Consequences Team including information about the effects of fire behavior and alternative treatment strategies, Wildlife Response Model, weed responses, riparian systems, soil erosion, restoration objectives, treated spaces, the Fire Effects Information System (FEIS), and the First Order Fire Effects Model (FOFEM).

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.