

Science Application and Integration Program



Rocky Mountain Research Station

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National Fire Plan
Research Highlight
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*PROVIDING
SCIENTIFIC
KNOWLEDGE AND
TECHNOLOGY TO
SUSTAIN OUR
NATION'S FORESTS,
RANGELANDS, AND
GRASSLANDS*

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OptFuels: Fuel Treatment Optimization

Scientists at the USDA Forest Service, Rocky Mountain Research Station, in Missoula, MT, in collaboration with scientists at the University of Montana, are developing a tool to help forest managers prioritize forest fuel reduction treatments. Although several computer models analyze fuels and fire behavior, stand-level effects of fuel treatments, and priority planning for land management, OptFuels will be the first to integrate these into one decision support tool for strategic placement and maintenance of fuel treatments on national forests.

What is OptFuels?

OptFuels integrates spatial data from ArcGIS, land management planning methods from the Multi-Resource Analysis and GIS (MAGIS) program, stand growth simulation and estimation of fuel parameters with the Forest Vegetation Simulator–Fire and Fuels Extension (FVS-FFE), and fire spread and behavior modeling at landscape scales with FlamMap.

OptFuels provides automated data transfer between the programs and adds a fuel treatment optimizer to support long-term fuel management decisions. The optimizer recommends spatial and temporal location of fuel treatments to minimize expected loss from fire over time, while satisfying budget and operational constraints.

Using the Model

OptFuels works through several steps to recommend fuel treatments for the landscape of interest:

1. Forest stand polygons from ArcGIS are projected through time for both no treatment and user-defined management treatments and timing options using FVS-FFE.

2. Based on the FVS output and user-defined fuel moisture, wind speed and direction, and ignition points, the minimum travel time option in FlamMap simulates fire spread to predict flame lengths and arrival times, which is used by OptFuels to estimate the overall expected loss of values-at-risk.
3. The OptFuels treatment optimizer evaluates alternative treatment schedules (timing and location for treatments) and selects the best schedule for minimizing expected loss. The treatment schedule and fire behavior results are displayed in ArcMap.

Field Testing

Developers have tested OptFuels on two areas in the Bitterroot Valley in western Montana and a watershed near South Lake Tahoe in California. Field tests demonstrate the model's ability to assess the results of fuel treatments completed in multiple planning periods and recommend treatment options.

The most significant challenge to OptFuels is the limited availability of spatial FVS-ready forest regeneration and stand data, which are essential for reliable model outputs. In addition, the tool requires significant technical expertise and a full understanding of model inputs to ensure appropriate interpretation and application.

Developers continue to refine OptFuels and plan to release the tool in 2012.

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Tour the OptFuels web site at:
<http://www.fs.fed.us/rm/human-dimensions/optfuels/main.php>