

Modeling Fire Spread and Intensity Across Bark Beetle-Affected Landscapes

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BACKGROUND

During the first year of this project (2007), we used our custom bark beetle fuel models, Forest Health Monitoring, aerial detection survey maps, and data from LANDFIRE (Landscape Fire and Resource Management Planning Tools Project) to create FARSITE/FlamMap fire growth and intensity simulations in bark beetle-affected landscapes in Intermountain lodgepole pine (*Pinus contorta Dougl. ex Loud*), Engelmann spruce (*Picea engelmannii Parry ex Engelm.*), and Douglas-fir (*Pseudotsuga menziesii var. glauca (Beissn.) Franco*) forest types (Figure 1).

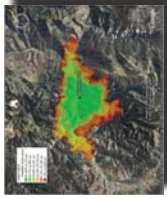


Figure 1. Probability of fire spread and output from 30 random simulations in a lodgepole pine forest.

These simulations provide fire planners, forest health specialists, forest health monitoring personnel and other land managers with information necessary to evaluate the ecological impacts of bark beetle activity based on fire risk, intensity and spread.

OBJECTIVE

Our present objective is to develop web-based, step-by-step instructions that will enable users to simulate fire growth and intensity specific to bark beetle-affected lands they manage.

Minimum requirements for running simulations include some familiarity with LANDFIRE and ArcGIS

Step 1: Define goal (i.e. compare probabilities of fire size in endemic vs epidemic stands)

Step 2: Download necessary programs and data

Step 3: Choose landscapes

Step 4: Obtain LANDFIRE data and shapefiles of FHM aerial detection survey maps

Step 5: Obtain weather data: Historic weather data input consists of 30 randomly selected three-day weather windows within the peak fire season (August and September).

Step 6: Analyze weather data

Step 7: Set-up FARSITE

Step 8: Calibrate: These simulations were calibrated with actual fire events that occurred in the bark beetle-affected areas

Step 9: Make FARSITE runs

Step 10: Analyze outputs in ArcGIS: Model outputs were exported into ARCMAP to display resulting FARSITE probability of spread projections.

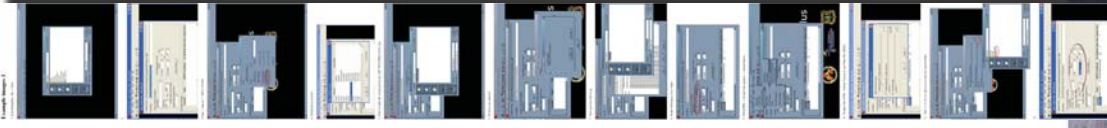


Figure 3. Screenshot of the FARSITE 'Fuel Size Setup' dialog box. <http://www.fs.fed.us/arcgis/technology/farsite/index.html>

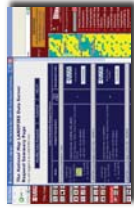


Figure 2. Data downloaded from LANDFIRE.

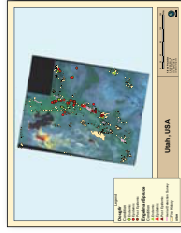


Figure 4. Some of the GIS data layers used to modify fuel models, canopy cover and stand height to custom values.



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