Final Report

FuelCalc: A tool for calculating wildland fuel quantities and qualities and fuel supporting management decisions

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Project Summary

Fuel treatment is mandated by the need to protect communities and municipal watersheds and manage ecosystems. Analysis to support fuel treatment decisions is required by the National Environmental Policy Act (1969). As pointed out in the 1998 Joint Fire Science Plan, "managers need better information on the distribution and amount of fuels across vegetation types, as well as the impacts of these fuel structures and changing fire regimes on fire hazard, potential fire severity, and ecosystem structure and function." In order to use the best available fire science, managers need access to high-quality fuel information. This project developed new software—called FuelCalc—to address these issues.

The FuelCalc software provides two major capabilities. First, FuelCalc allows inventory data to be converted to fuel quantities and qualities, calculating surface fuel loads, fire behavior fuel models, and canopy fuel characteristics, which in turn can be used to model fire behavior, fire effects, and smoke production. Site-specific, inventory-based data greatly strengthens the scientific foundation of fuel treatment decisions. Second, FuelCalc provides a means of designing fuel treatment alternatives. A user can specify criteria such as: thin from below to a residual canopy bulk density of 0.05 kg/m^3, or thin from below to a residual basal area of 100 sq ft/acre, and FuelCalc identifies the number, volume, and characteristics of trees to be removed, as well as compute the activity fuels that would be generated by such a thinning. This analysis combines the work of the JFSP-funded Canopy Fuels Study (1999) with earlier work by Brown and Johnston (1976). Additionally, both a custom and a standard fire behavior fuel model are provided for the post-treatment fuelbed, allowing immediate calculation of the effects of the fuel treatment on expected fire behavior.

FuelCalc is linked to a number of other software systems. It can accept data from FFI (FIREMON/FEAT INTEGRATED) and FVS. It exports data in a format suitable for input to FOFEM and NEXUS. FuelCalc routines have already been used to compute LANDFIRE canopy data layers. A spatial version of FuelCalc is being planned to update LANDFIRE data layers following wildfire – this work will be funded by the Interagency Fuels Technology Transfer Team. Alan Ager (Western Environmental Threat Assessment Center) also plans to incorporate FuelCalc into his ArcFuels software to evaluate landscape level fuel treatments.

Deliverables Crosswalk

Work product	Status	Delivery
FuelCalc 1.0	A pre-alpha version of a full-featured interface is available now; the GUI interface sub-contractor would like to spend more time bug-fixing and testing before releasing the software.	Expected delivery: December 1, 2008
Batch mode	To accomplish this objective we designed FuelCalc to work inherently in "batch" mode; by default a FuelCalc project consists of any number of sample points that a user may have. In addition, the computer routines are being packaged for inclusion in other applications (see below).	done
Computer routines	The primary calculation routines in FuelCalc—for fuel treatment simulation and canopy fuel characteristic estimation—have been coded into a program separate from the GUI. The current form of these routines is a program that takes text file input and provides text file output.	done
tutorials	Development of the tutorials has been delayed due to the need for continued testing of the final GUI. Once the GUI sub-contractor has completed testing and delivered the final program, tutorials will be created immediately.	Expected delivery: December 31, 2008
Web page	As they become available, all downloadable FuelCalc products will be made available at the Fire Modeling Institute website—www.fs.fed.us/fmi.	Expected delivery: December 1, 2008
Helpfile	The delivery of help was split into two components: a help file available within the FuelCalc GUI, and a print-format reference guide. The help file describes the "button-pushing" operation of the program. As such, its completion has been delayed until the final completion and testing of the GUI.	Expected delivery: December 31, 2008
Reference Guide	A comprehensive document describing the technical content of FuelCalc 1.0 has been completed. A copy of the FuelCalc Reference Guide has been provided with this final report.	done
conference paper	Reinhardt, ED; Scott, JH; Lutes, DC. 2006. FuelCalc: a method for estimating canopy fuel characteristics. In: proceedings of the 1st Fire Behavior and Fuels Conference, Fuels Management: How to Measure Success.	done