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APPLICATION AND STATUS OF THE *FARSITE* FIRE AREA SIMULATOR

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INTRODUCTION

Fire growth simulation is the modeling of fire spread and behavior across landscapes with heterogeneous fuels, weather, and topography. *FARSITE* is a computer program designed to simulate fire growth using existing models of fire behavior found in BEHAVE (Andrews 1986) and in the Canadian Forest Fire Behaviour Prediction System (Forestry Canada Fire Danger Group 1992). There are numerous uses for fire growth simulation, including planning for potential wildland fires, prioritizing and locating fuel treatments, tactical support on active fires, and fire incident reconstruction. Because *FARSITE* can generate spatial maps of fire behavior, it is useful for producing detailed analyses of fire behavior and fire effects on geographic information systems (GIS). This modeling capability however, requires digital maps of terrain and fuels in GIS formats, which is the main limitation for users wanting to do simulations. Nevertheless, *FARSITE* is widely used by State, Private, and Federal agencies in the U.S. who recognize the value of having GIS-based data on fuels and vegetation for a variety of applications. A national, interagency training course has been developed for *FARSITE* application and operation. Other special purpose workshops are also taught. This paper summarizes the uses, capabilities and data requirements for *FARSITE* and identifies some new features that are planned for a future release.

APPLICATION

Application of *FARSITE* falls into three main categories: simulation of past fires, of active fires, and of potential fires. Analysis of past fires reveals how well the simulation reproduces known fire growth patterns given available input data. Simulating past fires is critical in developing confidence for using *FARSITE* to project the growth of active fires.

FARSITE was originally developed for long-range projection of active prescribed fires, generally in National Parks or wilderness areas (Finney 1994). Fire simulations are run for general long-range weather scenarios to suggest possible outcomes of fire growth over many weeks. Potential fire growth is examined under various weather patterns such as persistence of current conditions or periodic frontal passage. A similar procedure using manual methods was reported by Mutch (1998) and Rothermel (1998). Recently *FARSITE* has also been used for short-range (1-2 day) projections on large wildfires, where simulation results are used in support of strategic fire fighting decisions. If only part of the fire perimeter is of immediate interest, *FARSITE* can be used to simulate partial sections of the fire front. This application of *FARSITE* is similar to manual methods described by Rothermel (1983).

Fire planning is an appropriate and currently the most common use of *FARSITE*. A potential fire can be simulated at various locations under a variety of fuel and weather conditions. Fire planning activities include, for example, analyzing spatial fuel management alternatives and examining suppression opportunities for fires starting in different locations or under various weather scenarios. Finney et al.(*in press*) used *FARSITE* to examine the economic consequences of potential wildfires occurring with and without fuel management activities.

CAPABILITIES

The fire behaviour models currently included in *FARSITE* calculate surface fire, crown fire, fire acceleration, spotting from torching trees, and fuel moisture (Finney 1998). The surface fire model (Rothermel 1972) is linked to the Van Wagner (1977, 1993) crown fire criteria to simulate transition to crowning and to the Rothermel (1991) crown fire spread correlation model. Spotting distance is simulated using the torching tree model by Albini