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An overview of different software for the Canadian Fire Effects (CanFIRE) model

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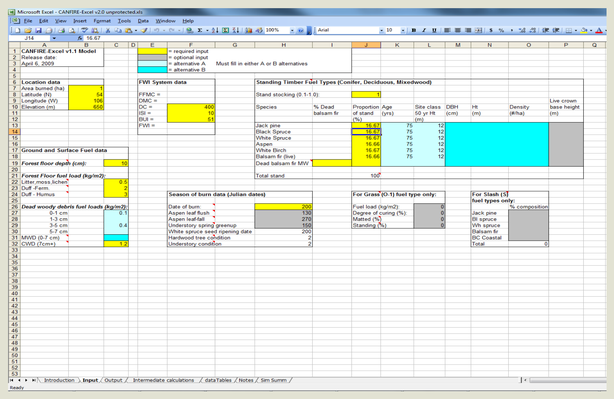
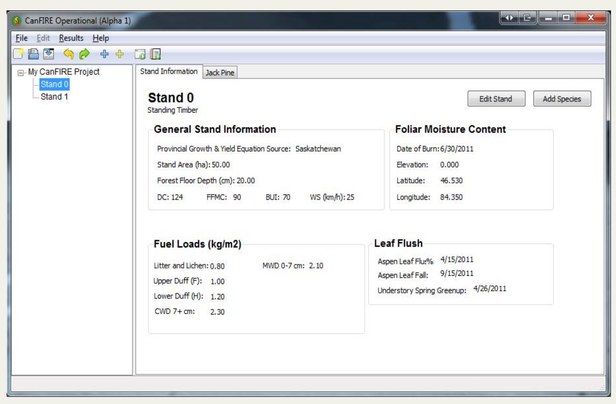
Introduction

The Canadian Fire Effects (CanFIRE) model is a fire behaviour-based model that simulates physical and ecological effects of fire at the stand level. It is driven by fire weather data input by the user and by fuels data, which are calculated from basic forest inventory or field data. The original model was developed using STELLA® modelling software, and multiple versions have been programmed since. A basic model was created in Excel to run single-stand scenarios. To run more complicated scenarios a core CanFIRE module was written in C++ with a command line interface, a desktop graphical user interface, and a web application interface programmed to interact with the core module.

CanFIRE
CANADIAN FIRE EFFECTS MODEL

http://www.glfc.forestry.ca/canfire/

Application	Method	Inputs	Outputs
Prescribed Burn Planning  Photo courtesy of: Lynn Gowman, NRCan	**CanFIRE Excel** 	Single Stand Data - Fuel Triangle Data (Surface Fuel Loads) - Stand Data / Timber Cruise - FWI System	- Rate of Spread - Head Fire Intensity - Fuel Consumption - Depth of Burn - Crown Scorch - Emissions - Tree Mortality - Regeneration
Wildfire Prediction  Photo courtesy of: Lynn Gowman, NRCan	**CanFIRE Desktop** 	Multiple Stand Data - Forest Inventory - FWI System	- Rate of Spread - Head Fire Intensity - Fuel Consumption - Depth of Burn - Crown Scorch - Emissions - Tree Mortality - Regeneration
Forest & Fire Management  Photo courtesy of: Doug Zarkovich, AFFES	**CanFIRE Web**  http://www.glfc.forestry.ca/canfire/	Single Stand Data - Forest Inventory or Stand Data - FWI System	- Rate of Spread - Head Fire Intensity - Fuel Consumption - Depth of Burn - Crown Scorch - Emissions - Tree Mortality - Regeneration - Forest Composition - Forest Succession

Sample of Output

Fuel Consumption (kg/m²)

Surface	Flaming	Smouldering	Total
Litter	0.760	0.040	0.800
Upper Duff	0.028	0.253	0.281
Lower Duff	0.000	0.000	0.000
Total Forest Floor FC	0.788	0.293	1.081
Dead Woody Debris, Slash	0.242	0.969	1.212
Total Surface FC	1.030	1.262	2.292
Crown			
	Flaming	**Smouldering**	**Total**
Jack Pine	0.381	0.020	0.401
Black Spruce	0.350	0.018	0.368
Total Crown	0.731	0.038	0.769
Total Fuel Consumption	1.761	1.300	3.061

Fire Summary

Fire Behaviour

Forest Floor Consumption	1.081 kg/m²
Dead Woody Debris Consumption	1.212 kg/m²
Total Surface Consumption	2.292 kg/m²
Rate of Spread	18.106 m/min
Surface HFI	5596.840 kW/m
Crown Fire?	Yes
Crown Fuel Consumption	0.769 kg/m²
Total Fuel Consumption	3.061 kg/m²
Final HFI	9565.980 kW/m
Depth of Burn	10.640 cm
Scorch Height	66.828 meters

Conclusions / Future

In the near future, the desktop GUI interface will be expanded to include postfire composition and succession, to match the web application and console interfaces. Multiple fire events, new tree species and automatic forest inventory translation are expected to be introduced as well, in phases. Future software includes the idea of a mobile application, to allow the user to work in the field with a mobile phone or tablet. By providing these different versions of the model, CanFIRE can be applied over a range of field and research uses.

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