Overview of the Next Generation Canadian Forest Fire Danger Rating System Research

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Current CFFDRS

- Deeply entrenched in multiple levels of fire management
- Simple to use and understand
- Based on decades of field experiments and wildfire data
- Empirically-based models of key process
- Originally developed to support daily fire preparedness and suppression, and prescribed fire use
Why a new generation CFFDRS?

- Fire environment is becoming increasingly complex
- Ongoing advances in fire science
- Higher resolution data available (both temporal and spatial)
- New sources of information
- All of which is easier to access, synthesize and display
NG-Development Philosophy

- Not a complete overhaul, improvement of known issues and integration of new fire science and technological advancements
- Models will remain based on field studies that capture key processes that will be more explicitly characterized
- Maintain simplicity; limited physical parameters, readily available inputs, easy to use and understand tools and outputs
- Introduce greater flexibility
Approach

- Gather new data from field (where possible) and other available sources (i.e. remote sensing, FBAN and air attack observations)

- Reanalysis of existing data with newer model forms
Current CFFDRS

Ignition Risk

Weather

Topography Fuels

Fire Weather Index System

Fire Occurrence Prediction System

Accessory Fuel Moisture System

Fire Behaviour Prediction System

CFFDRS
CFFDRS

Fuel Moisture System

Fire Weather Index System

Fire Behaviour Prediction System

Fire Occurrence and Load System

Fire Management Tools and Applications

Input States/Observations

Input Models
Input States/ Observations (Ignition, Risk, Weather, Topography, Fuels)

Better accommodation of spatial weather inputs i.e. CaPA (Hanes et al. submitted)

Integration of WUI maps for risk analyses (Johnston 2016)

Fuels Characterization and Mapping
Input Models

DC overwinter model

Dynamic fuel models

Grass curing model/maps

Green up (leaf out) model/maps
Fuel Moisture System

- Pine forest standard moisture codes

Stand Specific Moisture Content
(Wotton and Beverly 2007)

- Specialized Peat Moisture Code
(Waddington et al. 2012)

- Grass Moisture Model
(Wotton 2009)

- Sheltered DMC
(Wotton et al. 2005)

Inclusion of evapotranspiration in moisture models (Thompson et al. 2015)
- Changes from above will improve temporal and spatial resolution

- Limited changes to the system itself; it remains a qualitative system that does a remarkably good job of capturing regional fire activity

- For landscape scale and international uses FWI remains a fully intact system
Fuel load specific consumption models

Dual equilibrium spread models

Fire Behaviour Prediction System

Addition of spotting
- National standardization of human and lightning caused fire occurrence that will be formally linked to the system

- Also planning on developing methods of assessing the potential occurrence of ‘large/problem’ fires and overall expected daily fire load
Input States/Observations

Input Models

Fuel Moisture System

Fire Weather Index System

CFFDRS

Fire Behaviour Prediction System

Fire Occurrence and Load System

Fire Management Tools and Applications
- These tools and applications are closely linked with core outputs and fire danger rating needs.

- Need to integrate with other fire modeling systems over a range of spatial and temporal scales.
Concluding Remarks

- Work in progress
  - Components delivered as completed
  - Modularity of the system permits release of interim products

- CFS is glad to partner on research opportunities

- Success of the system has and will continue to be based on teamwork collaboration with fire managers in system development and calibration
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