The Canadian Wildland Fire Information System

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The Canadian Wildland Fire Information System (CWFIS) is a fire management information system that monitors wildland fire danger conditions across Canada. Fire danger is a general term that encompasses factors such as the ease of ignifion and difficulty of control. Daily products include maps of fire weather, fire behavior, and even satellite detection of fires.

In addition, the system hosts monthly and seasonal forecasts, a national wildland fire situation report, historical analysis, links to fire management agency data, and a datamart of historical fire activity and fuels across Canada.

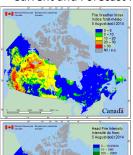
The CWFIS uses the Canadian Forest Fire Danger Rating System (CFFDRS) to rate the risk of wildland fires in Canada. Under development since 1968, the CFFDRS has been adopted by all Canadian provinces and territories and has been successfully exported to many countries around the world.

Sub-systems of the CFFDRS used (or under development) by the CWFIS, in Canada and internationally are the Canadian Fire Weather Index System (FWI), Fire Behavior Prediction System (FBP), Fire Occurrence Prediction System (FOP) and the Accessory Fuel Moisture System (AFM).

The FWI System uses current and forecast weather to calculate a variety of indices for Canada on a daily basis, forecasting the fire weather indices for 14 days into the future. Significant efforts are made to account for things like the effects of elevation and over-wintering of FWI values.

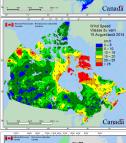
The FBP System, which was introduced in the early 1990s, uses FWI system outputs, geographical location, slope and aspect of the land, time of year, and tree species to refine fire behaviour in site-specific conditions. The FBP system products are being improved with more accurate forest classification methods and new ways to describe forest vegetation.

Current and Forecast Fire Danger in Canada



The Fire Weather Index is a numeric rating of fire intensity and is used as a general estimate of the danger posed by wildland fire in Canada. It combines the Buildup Index and Initial Spread Index, which in turn combine the Fine Fuel Moisture Code, the Duff Moisture Code, and the Drought Code. The codes are derived from fire weather observations (temperature, relative humidity, precipitation, and wind). Maps of all component indices, codes and weather observations are available on the CWFIS website.

The **Head Fire Intensity** is the predicted intensity or energy output (in kW/m) at the front of the fire is one of the Fire Behavior metrics calculated daily by the CWFIS and available as a map on the website. Other fire behavior metrics available as maps on the site are Fire Type, Rate of Spread, Crown Fraction Burned, Foliar Moisture Content, Surface Fuel Consumption and Total Fuel Consumption.



Fire weather is calculated from current (and forecast) weather data taken from hundreds of weather stations across Canada the northern United States. A wide variety of weather observations are available as maps on the CWPIS. In addition to Wind Speed (and direction), maps are available for Temperature, Precipitation, Relative Humidity, Atmospheric Dispersion Index, Mixing Height, Pasquill-Gifford-Truner Stability, Transport Wind Vector and Ventilation Index.



FireM3 Hotspots (short for Fire Monitoring, Modelling, and Mapping) are satellite detections of wildland fires. Not all fires generate hotspots, usually due to cloud cover obscuring the event. The CWFIS currently uses three satellite detection sources for this purpose: MODIS, AVHRR, and VIRS. The maps that are available on the CWFIS website are Daily Hotspots, Daily Hotspots/FWI, and Season-to-date Hotspots (pictured). The hotspots are used for many purposes such as fire detection, estimating fire size, and fire

Interactive Map



The newly updated Interactive Map is a mapping tool that allows the user to view a variety of fire information across Canada with pan and zoom functionality. Active fire data includes status and size, polygons include estimated size, and hotspots are tagged with a wide variety of weather and fire weather indices. More updates and additional data layers are planned for this tool.

Active Fires

Lat. Lon. Start Date Agency Fire Name Size (Ha) 62.0667 -116.983 2014-06-17 NT ZF020-14 593,479

Fire Perimeter Estimate
Size (Ha) Start Date

Fire M3 Hotspots and Weathe

ource	Lat.	Lon.	Sensor	Sat.	Temp.	RH	Wind Spd.	Wind Dir.	Precip.	FFMC	DMC	DC	ISI	BUI	FWI	Fuel Type	ROS	TFC	HFI	CFI
NOAA	62.08	-115.72	AVHRR	NOAA-18	21	56	7.4	271	0.01	86.3	67.9	656.4	3.7	107.9	16.1	C2	3.43	3.91	4029	45
NASA	62.089	-115.698	MODIS	Aqua	21	56	7.4	271	0.01	86.3	67.9	656.4	3.7	107.9	16.1	C1	0.09	1.23	32	nul
USFS	62.087	-115.689	VIIRS	S-NPP	21	56	7.4	271	0.01	86.3	67.9	656.4	3.7	107.9	16.1	C2	3.43	3.91	4029	45
USFS	62.084	-115.703	VIIRS	S-NPP	21	56	7.4	271	0.01	86.3	67.9	656.4	3.7	107.9	16.1	C2	3.43	3.91	4029	45
NOAA	62.09	-115.71	AVHRR	NOAA-19	21	56	7.4	271	0.01	86.3	67.9	656.4	3.7	107.9	16.1	C2	3.43	3.91	4029	45
AAOM	62.00	115 7	AVALIDE	MOAA 1E	21	2.0	7.4	271	0.01	963	67.0	CCC A	27	107.0	16 1	C1	0.00	1 22	22	and.

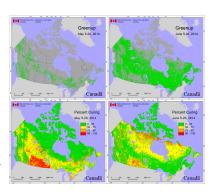
New and Upcoming Features

Greenup and Grass Curing

The most recent available MODIS NDVI is downloaded from the USGS every & days, and used to estimate **Greenup** and **Grass Curing**. NDVI maps are based on 16-649 MODIS composites and have a resolution (pixel size) of 1x1 km. Greenup and grass curing maps are then used in the production of FBP maps for the CWFIS.

A pixel is considered green when the NDVI is at or above 70% of its historic maximum (Kross et al 2011). Below the 70% threshold it is considered leafless. Maximum NDVI values were determined based on 5 years of NDVI data (2009-2013), also obtained from the USGS. Greenup is used by the FBP system to predict fuel consumption, rate of spread (ROS), and fire intensity in deciduous and mixedwood fuel types.

Grass curing is estimated according to Newnham at al 2010. Curing is used by the FBP system to predict ROS and fire intensity in grass fuel types.



Fire Occurrence Prediction

Lightning Fire Probability – the probability that, given an individual lightning flash, a lightning-caused fire will occur.

Probability of Ignition – the probability that a lightning flash with a long-continuing current will trigger a flaming or smoldering ignition in the forest fuels for a time period.

Probability of Smoldering – the probability that a smoldering ignition will continue to survive as a smoldering fire in the forest fuels.

Probability of Arrival – the final stage of a lightning-caused fire occurrence at which a smoldering fire changes into flaming combustion on the surface and becomes detectable by fire management agencies.

