

Interpretation

The following chart is a statewide generalized fire danger rating chart for the Canadian Fire Weather Index. It is based on a five class danger rating system, i.e., low, moderate, high, very high, and extreme. The distribution is based on weather records from 1985 - 1998. Low days occurred 45% to 50% of the time, moderate - 30 %, high days - 12% to 15%, very high days occurred 7%-8% of the time, and extreme days were 2%-3%. This is not meant to be used as a staffing guide. Each area needs to look at its own weather data coupled with its fire occurrence data. For instance, if you have a drought code of 380, it does not mean you are in extreme fire danger. It means that the drought code only gets that high on 2% of the days between April 1 and November 1.

Index	Low	Moderate	High	Very High	Extreme
FFMC	0.0 - 80.9	81.0 - 87.9	88.0 - 90.4	90.5 - 92.4	92.5+
DMC	0.0 - 12.9	13.0 - 27.9	28.0 - 41.9	42.0 - 62.9	63.0+
DC	0.0 - 79.9	80.0 - 209.9	210.0 - 273.9	274.0 - 359.9	360.0+
ISI	0.0 - 3.9	4.0 - 7.9	8.0 - 10.9	11.0 - 18.9	19.0+
BUI	0.0 - 18.9	19.0 - 33.9	34.0 - 53.9	54.0 - 76.9	77.0+
FWI	0.0 - 4.9	5.0 - 13.9	14.0 - 20.9	21.0 - 32.9	33.0+

Definitions

Fine Fuel Moisture Code (FFMC)

This provides a relative indicator of the moisture in the fine fuels. Like the 1 hour fuel moisture, it reacts directly with the air temperature and relative humidity.

Duff Moisture Code (DMC)

This is an index of the moisture of the loosely compact organic layers at a depth of 2-4 inches.

Drought Code (DC)

This measures long term dryness in the fuels. It is a longer term index than the NFDRS 1000 fuel moisture. It doesn't reflect the probability of fire occurrence by itself, but can be useful in predicting the level of mop up needed and the consumption of large fuels. It should be looked at in relation to peat fire starts.

Initial Spread Index (ISI)

CFFDRS Rules of Thumb for Fire Behavior Prediction

Fine Fuel Moisture Code (FFMC)

- 75** Surface fire – spreads some
- 80** Surface fire – spreads more continuous
- 90** High probability of spot fires
- 91** Onset of extreme fire behavior

Duff Moisture Code (DMC)

- 20** Duff available for ignition
- 30** Fires moderately intense
- 50** Extreme Fire Behavior
- 150** Loss of available moisture

Drought Code (DC)

- 15** Deep organics near saturation
- 300** Onset of smoldering combustion
- 500** Sustained deep smoldering

Initial Spread Index (ISI)

- 0** No spread
- 10** Threshold for Crowning
- 20** Extreme Fire Behavior
- 50** Rarely Exceeds this value

Build-Up Index (BUI)

- 30** Deeper, heavier fuels start to become involved
- 60** Potential for increased mop-up, safety concerns
- 90** Many fires have potential to escape IA

Fire Weather Index (FWI)

- 3** Fire Spreads
- 25** Onset of potentially extreme fire behavior
- 50+** Disaster Fires

MI DNR Fire Management CFFDRS Adjective Class Matrix

SPRINGTIME ADJECTIVE RATINGS

Begin with Table 1. Using **Fine Fuel Moisture Code (FFMC)** and **Initial Spread Index (ISI)** calculated for today, find the appropriate adjective class. If instructed to use Table 2, determine the adjective rating using the **Fire Weather Index (FWI)** and **Fine Fuel Moisture Code (FFMC)**.

TABLE 1	ISI = 0.0 to 1.9	ISI = 2.0 to 3.9	ISI = 4.0 to 7.9	ISI = 8.0+
FFMC = 0.0 to 74.9	LOW	MODERATE	HIGH	SEE TABLE 2
FFMC = 75.0 to 84.9	MODERATE	MODERATE	HIGH	SEE TABLE 2
FFMC = 85.0+		HIGH	HIGH	SEE TABLE 2

TABLE 2	FFMC < 92	FFMC = 92+
FWI Less Than 30.0	VERY HIGH	VERY HIGH
FWI = 30.0+	VERY HIGH	EXTREME

SUMMERTIME ADJECTIVE RATINGS

Generally, begin using the summer criteria on June 1. Begin with Table 3. Using **Buildup Index (BUI)** and **Initial Spread Index (ISI)**, find the appropriate adjective class. If instructed to use Table 4, determine adjective class using the **Fire Weather Index (FWI)** and **Fine Fuel Moisture Code (FFMC)**.

TABLE 3	ISI 0.0 to 1.9	ISI 2 to 2.9	ISI 3 to 3.9	ISI 4.0 to 5.9	ISI 6.0 to 7.9	ISI 8.0 to 9.9	ISI 10.0+
BUI=0.0 to 44.9	LOW			MODERATE		HIGH	
BUI=45.0 to 69.9	LOW		MODERATE		HIGH		VERY HIGH
BUI=70.0 to 99.9	LOW	MODERATE		HIGH		SEE TABLE 4	
BUI=100.0+	USE SPRING CRITERIA						

TABLE 4	FFMC < 92	FFMC = 92+
FWI Less Than 35.0	VERY HIGH	VERY HIGH
FWI = 35.0+	VERY HIGH	EXTREME

The Canadian Forest Fire Weather Index (FWI) System

The Canadian Forest Fire Weather Index (FWI) System consists of six components that account for the effects of fuel moisture and wind on fire behavior.

The first three components are fuel moisture codes and are numerical ratings of the moisture content of litter and other fine fuels, the average moisture content of loosely compacted organic layers of moderate depth, and the average moisture content of deep, compact organic layers.

The remaining three components are fire behavior indexes which represent the rate of fire spread, the fuel available for combustion, and the frontal fire intensity. All values rise as the fire danger increases.

Fine Fuel Moisture Code

The Fine Fuel Moisture Code (FFMC) is a numerical rating of the moisture content of litter and other cured fine fuels. This code is an indicator of the relative ease of ignition and flammability of fine fuel. **Values:** 75 -expect some surface fire spread; 80 -continuous surface fire; 90 -spot fire development, easy ignition; 92 -extreme fire behavior

Duff Moisture Code

The Duff Moisture Code (DMC) is a numerical rating of the average moisture content of loosely compacted organic layers of moderate depth (2 to 4 inches deep). This code gives an indication of fuel consumption in moderate duff layers and medium-size woody material.

Values: 20 -lightning starts become more likely; 40 -moderate fire intensity; 50 -extreme fire behavior; 150 -most available moisture in fuel is gone.

Drought Code

The Drought Code (DC) is a numerical rating of the average moisture content of deep, compact, organic layers (4 inches to 8 inches below surface). This code is a useful indicator of seasonal drought effects on forest fuels, and amount of smoldering in deep duff layers and large logs.

Values: 15 -deep organic layers are saturated; 300 -fires tend to be deep burning and persistent.

Initial Spread Index

The Initial Spread Index (ISI) is a numerical rating of the expected rate of fire spread. It combines the effects of wind and the Fine Fuel Moisture Code on rate of spread without the influence of variable quantities of fuel.

Values: 0 -no spread; 10 -fires will move quickly through boreal forest; 20 -extreme fire behavior; 50 -rare event.

Buildup Index

The Buildup Index (BUI) is a numerical rating of the total amount of fuel available for combustion that combines the Duff Moisture Code and the Drought Code. A BUI value of 80 or more indicates that control will be difficult (natural fuel breaks are no longer viable, extreme fire behavior, etc). **Values:** 30 -heavier fuels involved in combustion; 60 -anticipate mop up problems; 80 -extreme fire behavior likely in boreal forest, even with a moderate ISI.

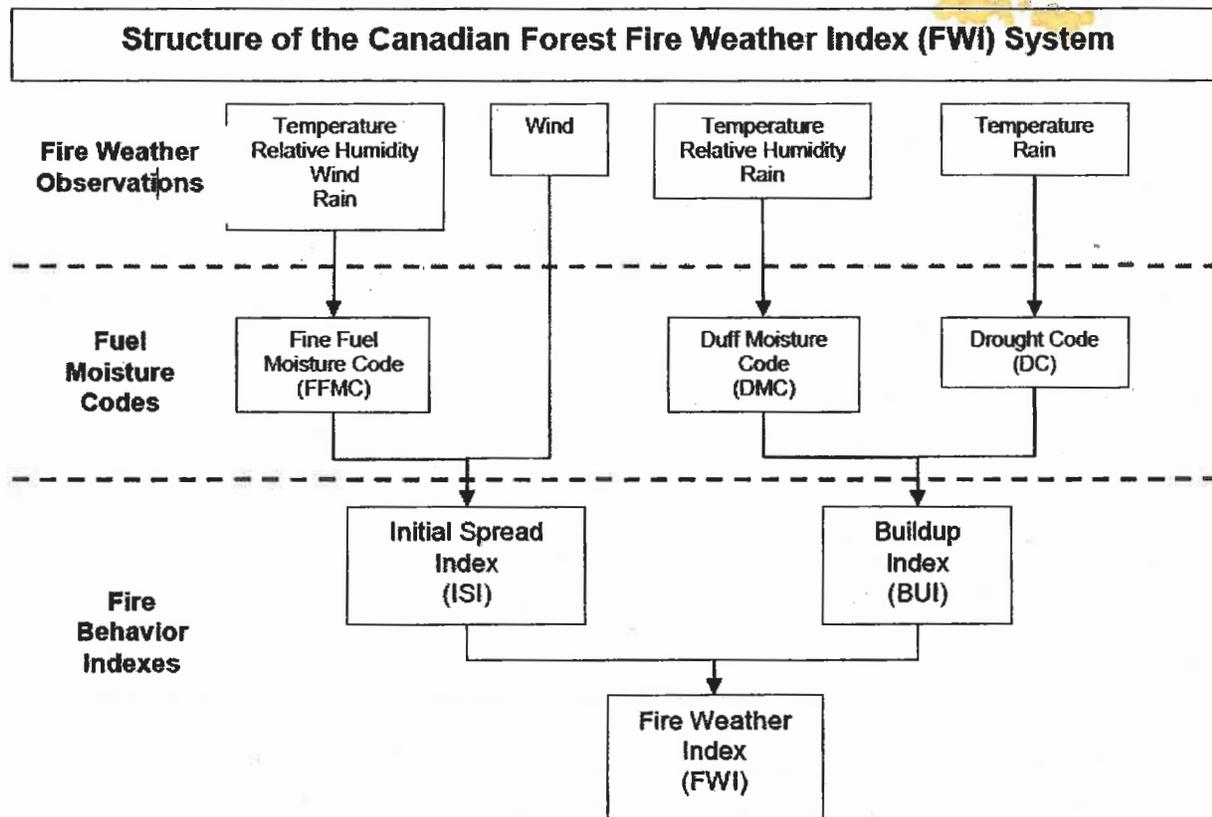
Fire Weather Index

The Fire Weather Index (FWI) is a numerical rating of fire intensity that combines the Initial Spread Index and the Buildup Index. It is suitable as a general index of fire danger (what kind of fire day you are facing) throughout the forested areas of Canada and parts of the United States.

Values: < 14 -fires spread slowly on surface; 24 -extreme fire behavior may occur; 50+ -major fire development is possible.

Structure of the FWI System

The diagram below illustrates the components of the Canadian Forest Fire Weather Index System. Calculation of the components is based on consecutive daily observations of **temperature, relative humidity, wind speed and 24-hour rainfall**. The six standard components provide numerical ratings of relative wildland fire potential.



Examples of Past Fire Conditions

Fire	Location	Date	FFMC	DMC	DC	ISI	BUI	FWI
Carlos Edge 8500 acres	Anoka County	October 19, 2002	92	71	568	22	108	54
Bypass 720 acres	Crow Wing County	May 31, 2002	96	59	101	34	59	54
Clementson 152 acres	Koochiching County	September 4, 2006	90	47	356	6	70	19
Ham Lake 36,400 acres	Cook County	May 5, 2007	93	39	248	27	56	46
Section 32 150 acres	Lac Qui Parle County	May 13, 2007	90	47	356	6	70	19