
What Were the Canadian Fire Danger Indices?

Follow-up to the Spokane Area Firestorm '91 Report

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Vol. 6/No.4/1992

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The numerical values of the three fuel moisture codes and the three fire behaviour indexes comprising the Canadian Forest Fire Weather Index (FWI) System associated with the 1990 Stephan Bridge Road Fire in Michigan were documented in a previous issue of *Wildfire News & Notes* (Vol. 6, No. 1, p. 6). Obviously this same kind of information will also be of interest to Canadian readers and several overseas users of the FWI System (New Zealand, for example, has used the system since 1980) for the multiple wildfire situation (93 separate incidents) which took place on October 16, 1991 in the Spokane area of eastern Washington as described in the *Fire Storm '91 Case Study* publication prepared by the NFPA Fire Investigations Department.

Here we present the results of the calculations for the six components of the FWI System based on the daily weather data obtained from the National Climatic Data Center in Asheville, North Carolina for the National Weather Service meteorological station at the Spokane International Airport:

Fine Fuel Moisture Code (FFMC)	92
Duff Moisture Code (DMC)	339
Drought Code (DC)	1026
Initial Spread Index (ISI)	47
Buildup Index (BUI)	371
Fire Weather Index (FWI)	102

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In calculating these values it was felt that the relative humidity before and shortly after the dry cold front passed through Spokane should be used. Furthermore, the wind strength experienced in the outlying forest and rural areas was assumed to be approximately two-thirds of that recorded at the Spokane airport.

The DMC and DC values are certainly indicative of an extended dry spell (49 days since there was more than 0.6 mm of rain). As illustrated in the accompanying tabulation, the wildfires of October 16 were influenced by gale force winds but fairly cool air temperatures and moderately high relative humidities; the maximum temperature (19.4°C) for the day would have occurred at mid-morning. Nevertheless, the fire danger conditions which existed on October 16 would be rated as extreme according to the classification criteria used in adjacent areas of British Columbia based on the FWI and BUI components.

Highest mean wind speed: 72 km/h
 Highest wind gust: 93 km/h at 9:52 am
 High winds corresponded with period of lowest relative humidity



Local Time (PDT)	Dry-bulb Temperature (°C)	Relative Humidity (%)	10-m Open Wind Velocity		
			Mean Speed (km/h)	Gust* (km/h)	Direction (degrees)
am					
5:50	15.0	33	30	44	200
6:50	15.6	32	37	56	200
7:53	16.7	31	37	50	190
8:53	18.3	36	61	81	210
9:52	18.8	31	72	93	210
10:53	18.3	33	70	85	240
11:53	15.6	52	69	87	240
pm					
12:53	15.0	60	56	72	240
1:58	15.0	33	63	78	240
2:55	13.3	33	48	70	260
3:54	12.2	35	46	70	260
4:52	11.7	35	48	59	270
5:54	10.0	39	33	50	260
6:51	9.4	39	33	46	250

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The International System (SI) of units is used in the above tabulation, as is the practice in Canada and New Zealand. Conversion formulae: °F = (9/5 °C) + 32 and mph = km/h x 0.62137.

* Gusts are reported when the peak wind speed in the past 10 minutes reaches at least 30 km/h and the variation in wind speed between the peaks and lulls is at least 17 km/h.