TECHNOLOGY TRANSFER NOTE

M-002

AN EXAMPLE OF THE SENSITIVITY OF THE CANADIAN FOREST FIRE WEATHER INDEX (FWI) SYSTEM TO SMALL FIRE WEATHER OBSERVATION CHANGES

The Canadian Forest Fire Weather Index (FWI) System has been used operationally since 1970 as the basis for a wide variety of fire management decisions. In Manitoba it is used by fire managers to:

(1) determine pre-suppression or man-up levels through the ALERT System,

(2) inform the public of the current and forecasted fire danger,

(3) regulate aerial detection patrols and determine when lookouts should be manned,

(4) determine if burning permits should be issued or cancelled,

(5) restrict access to areas and enforce other regulations under the Fire Prevention Act,

(6) calculate initial attack requirements and response times,

(7) plan and conduct prescribed burning projects.

Since such a great deal of importance is placed on the value of the FWI System components, it is critical that accurate and reliable weather readings are taken. Errors in the fire weather observations need to be minimized to ensure the calculated indices are accurate so that proper decisions can be made.

The following example will illustrate the sensitivity of the FWI System and the effect that small differences in the fire weather observations can have on the table calculated index values.

Date: July 7, 1987

Yesterday's Values:

FFMC	85	ISI	4
DMC	35	BUI	52
DC	270	FWI	12

	CASE 1	CASE 2	DIFFERENCE
Temperature	27°C	25°C	- 2°C
RH	27%	34%	+ 7%
Wind Speed	15 km/h	10 km/h	- 5 km/h
Rain	0	0	---
FFMC	93	89	- 4
DMC	40	38	- 2
DC	279	278	- 1
ISI	14	6	- 8
BUI	61	57	- 4
FWI	31	16	- 15

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When the two cases are compared it becomes clear that the weather conditions in Case 1 are only slightly more extreme than in Case 2, but after the FWI System calculations are made there is a large difference in most of the indices. These differences would have a major impact on the fire management decisions for that day.

For example, the extreme FWI value in Case 1 could result in:

- increased aerial detection patrols and/or extending the hours for tower observations,

- crews and aircraft being placed at a higher alert status,

- burning permits having to be cancelled, and

- extra fire fighters being hired.

Also, from the FFMC and ISI values in Case 1 it could be assumed that the ignition potential is very high and that fire spread would be rapid, with the possibility of crown fires occurring in some fuel types. Finally, even though the differences in the DMC, DC, and BUI seem small, their cumulative error effects after a few days could become significant and influence the number of resources (e.g. water bombers and helicopters) assigned to a region.

In contrast, Case 2 would not be considered a serious burning day with potential for control problems. The more moderate values for the components of the FWI System would probably not cause any special action to be taken with respect to prevention, detection, pre-suppression, or suppression activities.

The apparent result of this would therefore be, that a region or a district may be inadequately prepared for the potential fire activity on that particular day.

In summary, the FWI System is very sensitive to small differences in temperature, RH, wind speed and precipitation measurements. This means that fire weather observations must be both accurate and reliable so that fire management decisions can be made correctly and with confidence.

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August, 1987

This publication is funded by the Canada-Manitoba Forest Renewal Agreement

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