TECHNOLOGY TRANSFER NOTE

M-001

A BRIEF OVERVIEW OF THE CANADIAN FOREST FIRE WEATHER INDEX (FWI) SYSTEM

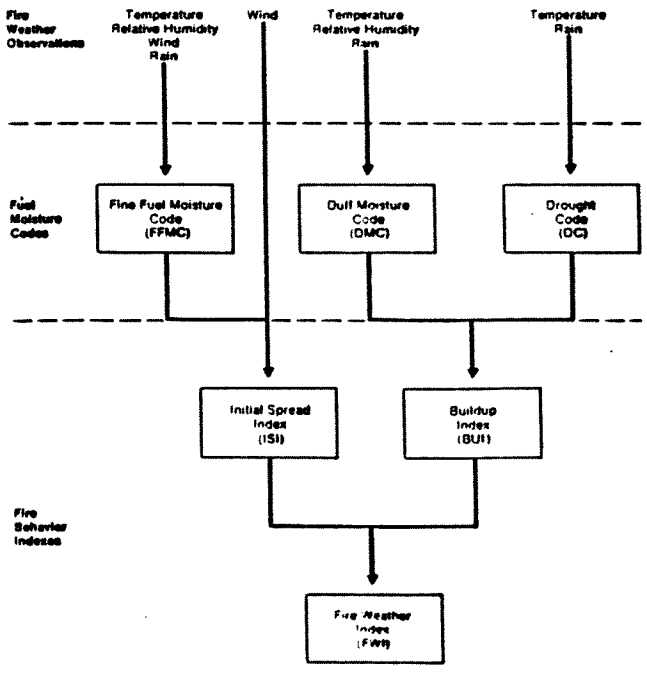
System Structure

The Canadian Forest Fire Weather Index (FWI) System is one of four sub-systems of the Canadian Forest Fire Danger Rating System. The FWI System is composed of three fuel moisture codes and three fire behavior indexes (see diagram). These six components are based on observations of temperature, relative humidity, wind speed and 24-hour precipitation, which are made daily throughout the fire season at 1300 h local daylight time (LDT). The FWI System component values are then calculated from these observations using either tables or a computer program.

The components of the FWI System provide numerical ratings of fire potential. Their values rise as the fire weather severity worsens, however, this information is expressed in relative terms rather than by quantified values (e.g., ISI = 15 rather than Rate of Spread = 19m/min). The FWI System also assumes a normal, diurnal daily weather pattern is followed and therefore predicts the conditions during the peak burning period (1700 h LDT).

The FWI System provides a uniform form method of rating fire danger across Canada. It is based on a standard fuel type (i.e., a mature pine stand) on level terrain and therefore, does not account for the effects of different fuels, topography and potential ignition sources. Local variations in these factors will therefore influence fire behavior, along with the severity of the weather.

Structure of the Canadian Forest Fire Weather Index System



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System Components

The fuel moisture codes relate to the moisture content of three different classes of fuel which are in turn associated to the probability of ignition and fuel consumption. The moisture codes are then used along with wind speed to calculate three fire behavior indexes which represent fire behavior after ignition has taken place. Below is a brief list of the information provided.

FFMC - Indicates the ease of ignition and flammability of fine fuels.

DMC - Indicates fuel consumption in duff layers of moderate depth and medium-sized woody fuels.

DC - Indicates the effects of seasonal drought on forest fuels and the amount of smoldering in deep duff layers and large logs.

ISI - Combines the effects of the FFMC and wind speed to indicate rate of fire spread without the influence of variable quantities of fuel.

BUI - Combines the DMC and DC to indicate the total amount of fuel available for combustion to a spreading fire front.

FWI - Combines the ISI and BUI to indicate frontal fire intensity of a spreading fire.

The FWI System has been used operationally since 1970 as the basis for a wide variety of fire management decisions. Knowledge of the FWI System, how it works and what each component means is a valuable asset which can assist both experienced and inexperienced fire management staff in their daily activities.

K. G. Hirsch

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Further Suggested Reading:

Turner, J.A.; Lawson, B.D. 1978. Weather in the Canadian Forest Fire Danger Rating System: a user guide to national standards and practices. Environment Canada, Canadian Forestry Service, Pacific Forest Research Centre, Victoria, B.C. Information Report BC-X-177. 40 p.

This note, if cited, should be referred to as personal communication with the author.

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