FIRE BEHAVIOR FORECASTING IN THE BOREAL FOREST: TWO DECISION SUPPORT AIDS FOR CANADIAN FIRE MANAGERS
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Many fire management decisions and actions require the fire manager to estimate, as accurately as possible, how a forest fire will behave under defined burning conditions. The ultimate goal of fire behavior research is to provide simple, timely answers to the following questions (given an actual ignition or a simulated fire occurrence) for any specified fuel, weather, and topographic situation.

1) What will be the head fire rate of spread? What will be the area, perimeter length, and forward spread distance after 1 hour, 2 hours, 3 hours, and so on?

2) Will it be a high-intensity or low-intensity fire? Will it be a crown fire or a surface fire? How difficult will it be to control and extinguish? Will mechanical equipment and/or air tankers be required, or can it be handled safely by a suppression crew? Will the mop-up efforts require more time than normal?

3) Is there a possibility of it "blowing up?" If so, will it produce a towering convection column or have a wind-driven smoke plume? What will be the

spotting potential—short- or long-range? Are fire whirls and/or other types of wildland fire vortexes likely to develop? If so, when and where?

Satisfying these information needs and assessing the probable number of man-caused and lightning fire starts provides the scientific basis for informed and effective management or control and free-burning forest fires, whether of chance or of planned origin. The Canadian Forest Fire Danger Rating System (CFFDRS) represents the practical output of Forestry Canada's (formerly the Canadian Forestry Service) national program of fire behavior research. Two interpretive aids associated with the application of the CFFDRS were published recently. One, entitled *Fire behavior in jack pine stands as related to the Canadian Forest Fire Weather Index (FWI) System* (Alexander and De Groot 1988), deals with the general evaluation of fire potential on the basis of a relative fire danger index. The other, *Predicting fire behavior in the black spruce-lichen woodland fuel type of western and northern Canada* (Alexander and Lanoville 1989), is a guide to the quantitative prediction of wildfire behavior in a specific fuel type. These two publications are based on documentation of experimental fires conducted over a range of burning conditions in the jack pine (*Pinus banksiana* Lamb.) and black spruce (*Picea mariana* [Mill.] B.S.P.) forest cover types found commonly in the northwestern regions of Canada. The observed fire behavior varied from creeping surface fires spreading at 0.5 m/min to fully developed crown fires with frontal fire intensities of nearly 33,000 kW/m. Both of the experimental burning projects were undertaken in cooperation with provincial and territorial fire management agencies in support of continuing development of the CFFDRS in order to further extend its usefulness in fire control/use planning and operational decision making.

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