III International Confer. on Forest Fire Research
14th Conference on Fire and Forest Meteorology
VOL II, pp. 2711 - 2712, Luso, 16/20 November 1998

A COMPARISON OF TECHNIQUES TO SPATIALLY ASSESS FIRE BEHAVIOUR POTENTIAL WITHIN THE SOUTHERN ROCKIES LANDSCAPE PLANNING PILOT PROJECT STUDY AREA IN SOUTHWEST ALBERTA, CANADA

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ABSTRACT

The Spatial Fire Management System (SFMS) was used to spatially assess fire behaviour potential within the Southern Rockies Landscape Planning Pilot Project study area in south-west Alberta, Canada. SFMS is a forest fire management information system developed by the Canadian Forest Service. It uses ARC/Info's GRID processing module to build output maps from the Canadian Forest Fire Behaviour Prediction (FBP) System. Three different procedures were used to evaluate fire behaviour potential. These approaches were evaluated and compared to identify their individual strengths and limitations for use in fire management planning.

In the first procedure, spatially-explicit historic head fire intensity (HFI) values were calculated using the Canadian Forest Fire Behaviour Prediction (FBP) System based on the 90th percentile values for Buildup Index (and indicator of fuel consumption), Initial Spread Index (an indicator of rate of spread), fuel type, dominant wind direction, percent slope, slope azimuth, latitude, longitude, elevation and date. The historic weather data for 14 years (1983 - 1996) was first partitioned into three seasons: spring (April - May), summer (June - July) and fall (August - September). The 90th percentile value was then calculated for 8 weather stations and season, and spatially contoured. Also, because the ISI is wind dependent and BUI independent of wind, each map output included a joint probability of occurrence. This approach provides a reasonable approximation of historic head fire intensity and can be computed in an efficient and timely manner.

In the second procedure, the 90th percentile of actual historic head fire intensity values for each grid cell were calculated for each day in the historic fire weather data base using the FBP System. Rather than build one output map of HFI using the first approach, a head fire

intensity map was built for each day of the study period and the 90th percentile HFI derived and mapped for every cell. Although this is the most accurate calculation of spatial fire behaviour potential, it is computationally demanding, thereby making it impractical in many situations.

The third procedure used a "rule-of-thumb" estimation of potential fire behaviour. This approach is based on the assumption that severe fire weather can be expected when the relative humidity is less than or equal to the temperature. The frequency of occurrence was used to categorise the fire season and compare the results with those from the other procedures. To spatially display fire behaviour potential, areas were assigned to representative weather stations (i.e. cell assignment rather than contouring). The "rule-of-thumb" estimation is the easiest procedure to use but is not as accurate because it does not use a direct calculation of fire behaviour potential.

Each of the procedures described in this paper are useful for fire management planning but will have considerably different applications depending on the objectives and capabilities of the fire management organisation. In Alberta, spatial fire behaviour potential based on the 90th percentile ISI and BUI values is being used for landscape planning, particularly in areas where natural disturbance regimes are used as templates for sustainable forest management.

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Proceedings
Volume II

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