

Blow Up Fire Potential and Fire Danger Trend Components in the AWCC Fire Weather Forecast

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A good starting point in explaining the rationale behind the Blow Up Fire Potential and Fire Danger trend components of the Alberta Wildfire Coordination Centre (AWCC) fire weather forecast is the Canadian Glossary of Forest Fire Management Terms.

From the Glossary the following definitions are found:

Blow up: A somewhat sudden, and sometimes unexpected, major increase in rate of spread and frontal fire intensity sufficient to upset overall fire suppression action or plans. Blow ups can result from small or large fire situations.

Crossover: The point at which the relative humidity is less than, or equal to, the ambient air temperature. This may be used as an indicator of extreme burning conditions.

Weather plays a key role in determining the behaviour of wildfires. Extreme fire behaviour is closely linked to extremes in fire weather conditions. The case study literature contains numerous examples of the fuel and weather conditions that produce extreme fire behaviour (for example: Byram's conditions for blow up fires have become a standard reference in documenting wildfire behaviour and in fire behaviour education). It is imperative that fire weather meteorologists are able to recognise the extreme weather and fire danger conditions that are capable of supporting "blow up" fire events in their fire regimes.

Blow Up Risk Levels

The Blow up Fire Potential risk utilised in the AWCC forecast is categorised by three risk levels:

- Low (L), Moderate (M) and High (H)

The risk level is determined by the fire weather meteorologist's analysis of the critical weather elements that may produce extreme fire behaviour and the moisture state of the forest fuels. The ability of forest fuels to support combustion is reflected in the fuel moisture codes of the Fire Weather Index. The analysis of blow up potential is a composite of several elements rather than a determination of a single weather element or moisture code value. Examples of conditions that would be present in blow up fire scenarios are:

- Fine Fuel Moisture Code (FFMC) values of 92 or higher generally linked to "crossover" conditions particularly in spring. These scenarios may occur under relatively low Buildup Index (BUI) or Drought Code (DC) conditions in spring
- In boreal regions sustained wind speeds exceeding 25 km/h supporting similar Initial Spread Index (ISI) values. Winds speeds exceeding 50 km/h under crossover conditions in alpine fuels.
- BUI values exceeding 80 in boreal zones or 120 in the alpine fuels – these conditions render the fire environment highly responsive to relatively small variations in wind speed.
- Analysis must recognise the two paths to extreme fire behaviour, namely wind-driven versus convective fires or a combination of the two.

The inclusion of any blow up fire risk (for example, M appears in forecast) indicates the potential for blow up fire conditions exists and fire suppression staff should expect these types of events and plan strategies accordingly. A High (H) risk of blow up fire potential would indicate highly dangerous and extreme fire behaviour is expected posing a severe risk to fire line personnel. The inclusion of any risk of blow up fire conditions would generally lead to the issue of a Fire Weather Advisory for the area.

Fire Danger Trend

The Fire Danger Trend of the AWCC fire weather forecast is provided as a general trend indicator for FWI component values in a given area. It is intended as a situational awareness tool for fire personnel as forecast weather conditions support higher (UP) , lower (DN-Down) or no significant change (LC – little change) in the FWI components. The Fire Danger Trend will also be generally linked to the Head Fire Intensity (HFI) conditions. Drying conditions are also defined in the Canadian Forest Fire Danger Rating and provide a guideline for assessment of the drying conditions occurring or expected in an area.