

Red Flag

The adoption of the Red Flag Watch and Red Flag Warning nomenclature in AWCC fire weather forecasts

Background



The safety of wildfire suppression personnel is of paramount importance in wildfire operations. Extensive documentation and analysis of fireline injuries and fatalities has clearly identified weather and weather/topography interactions as primary causal factors in such events.

A key role of the fire weather meteorologist is to identify the development of critical fire weather conditions that can result in extreme fire danger and subsequently lead to extreme and dangerous fire behavior. Communication of such developments is critical for the situational awareness and safety of wildfire suppression personnel. In several wildfire fatality incidents, the failure to adequately communicate fire weather or fire behavior warnings was cited as a contributing factor that led to the fatalities (eg. Storm King Mountain, CO 1994).

The Alberta Fire Weather Section has provided guidance for the potential development and occurrence of extreme fire danger/behavior to wildfire management personnel through the use of a “Fire Weather Advisory” and an

associated risk of “blow up” fire potential incorporated within standard operational provincial fire weather forecasts. (The weather and fuel moisture conditions that would be associated with the issuance of a Fire Weather Advisory and a high risk of blow up fire are discussed in an article available on the Wildfire Management Branch website.) The Advisory was distinguished by visually distinctive graphics in both the web published version and online briefings as a method to enhance the impact of the Advisory through its communication and messaging.

For several years the Alberta Fire Weather Section has advocated at the national level for the adoption of a standardized terminology and messaging to be utilized by all provincial agencies to provide fire weather warnings in wildfire operations. This would facilitate a common messaging of the potential for extreme and dangerous fire behavior for fireline personnel exported to all provinces and territories.

An escalation approach to fire danger and behaviour

Red Flag Watch and Red Flag Warning

In order to move this important issue forward, the Alberta Fire Weather Section is adopting the recognized Red Flag concept established by the National Weather Service in the United States.

Fire weather / danger conditions associated with a Red Flag Watch or Warning

In determining the potential for extreme fire behavior, the fire weather meteorologist must recognize the development of critical fire weather patterns that lead to the two paths to extreme fire behavior, namely wind-driven versus convective fires or their combination. This analysis must consider a composite of several factors rather than the value of a single weather element or moisture code.

The Red Flag Watch is intended to provide situational awareness messaging for wildfire personnel and the public that a hazardous fire environment is developing and reinforce the need for heightened vigilance. Circumstances which would lead to a Red Flag Watch would include:

- Recognition of a critical fire weather pattern developing during the next 3-5 burning periods.
- Extended periods of extreme BUI/FFMC values over a large area for the fire regime (eg. values exceeding 90 in boreal areas and 130 in alpine areas). In such cases a Red Flag Watch may be in effect for several burning periods.
- Anticipation of significant changes in wind speed or direction during ongoing campaign fire operations.

The Red Flag Warning would be targeted at fire weather and danger conditions potentially leading to blow-up fire behavior that would pose a critical degree of danger to fire line personnel and the public. The Red Flag Warning would be issued at least 24 hours before an expected event.

Blow-up fire events in Alberta have been strongly correlated with:

- In the boreal forest, FFMC values of 92 or higher generally linked to temperature /humidity crossover conditions and sustained wind speeds exceeding 30 km/h,

particularly in spring. These scenarios may occur under relatively low BUI, DC and temperature conditions.

- Wind speeds exceeding 50 km/h under crossover conditions and BUI values over 130 in alpine fuels. Chinook downslope winds are strongly associated with these conditions.
- In the boreal forest, BUI values exceeding 80 over large areas subjected to drought with crossover or near crossover conditions rendering fuels highly responsive to minor changes in wind speed. Situations when BUI values have exceeded 120 in the boreal forest have generally led to large wildfires and extreme fire behavior incidents.
- Development of critical fire weather patterns characterized by rapidly moving frontal systems, low level jets, extremely low humidity values or high wind speeds.

A Red Flag Watch may be escalated to a Red Flag Warning if expected weather and fuel conditions warrant, however, an extended period of increasing or elevated BUI/FFMC values with low ISI values could result in a Red Flag Watch remaining in effect for several burning periods. Such a scenario has most often affected the southern Rocky Mountain fire regime.

The Red Flag Watch also provides a mechanism to maintain an elevated state of awareness in the wake of a Red Flag Warning weather event that does not provide sufficient reductions in BUI or FFMC values (eg. chinook wind conditions that trigger a Red Flag Warning diminish but leave extreme BUI/FFMC values in place).

The published fire weather forecasts and online briefing presentations will be visually distinct when a Red Flag Watch or Warning is in effect for any forecast zone in the province. Under a Red Flag Watch, yellow highlighting will be utilized while the Red Flag Warning will have red highlighting.

Example of the Red Flag Warning provincial forecast format:

PM FIRE WEATHER FORECAST
Issued: 1500 Wednesday Aug 08 2018

RED FLAG WARNING IN EFFECT FOR CR WA

Red Flag Watch in Effect for RM

A very strong upper ridge is continuing to build over Alberta this burning period and Thursday generating extreme FFMC values in the east slopes and mountain parks as minimum RH values fall into the 15% range. The elevated BUI values in the far south are increasing the risk of extreme fire behaviour in these areas as fire intensities will be highly sensitive to wind speed. Temperatures will continue to trend higher Thursday in most zones particularly in southern Alberta. There is a risk of RH values near 10% at some stations in the advisory areas Thursday. Central and northern Alberta will see temperatures trend higher and will produce crossover conditions in some areas as max temperatures reach the low 30 deg range.

Indications are that the upper ridge will begin to breakdown Fri...

Outlook for Friday: Upper ridge beginning to breakdown as strong cold front pushes into the boreal regions from northeastern BC. Scattered TRW RW activity ahead of cold front. Strong and gusty W-NW winds following the frontal passage. Very dry conditions expected ahead of the front in the east slopes/mountain parks with a risk of minimum RH values below 10% and max temperature of 35-37 deg. Central and eastern boreal zones should reach max temperatures of 33-35 deg with RH values of 25-35%. Gustly W-SW winds developing in the southern east slopes and mountain parks.

Outlook for Saturday: Cold front continues to push into southern Alberta. Stronger and gusty N-NW winds in the BO/CR/WA zones following the frontal passage before noon generating a high risk of extreme ISI values. Risk of TRW RW remains along the front. RH values increasing to 30-40% during the burning period in the BO/CR/WA zones as temperatures begin to moderate to the 24-27 deg range. Boreal zones and the northern east slopes will see max temperatures of 21-24 deg and RH values in the 25-35% range accompanied by E-NE winds of 15-20 km/h

Forecast of Temp, RH, and wind for tomorrow afternoon; precipitation for next 24 hours

Fcst Zone	Max Temp	Low RH	Pcpn Covg / Amnt	Pcpn Type	Ltg today	Ltg tom	Fire Danger Trend	Blow-Up Fire Potential	Wind Tomorrow Afternoon
OJ	28	40	-	-	L	L	UP	L	S15
FV	30	35	-	-	L	L	UP	L	SW10
MA	28	35	-	-	L	L	UP	L	SW15
RE	30	35	-	-	L	L	UP	L	SW15
GP	30	25	-	-	L	L	UP	L	SW15
SH	31	45	-	-	L	L	UP	L	SW10
PY	29	35	-	-	L	L	UP	L	SE10
MM	32	35	-	-	L	L	UP	L	SW10
LB	32	25	-	-	L	L	UP	L	SW10
ED	32	15	-	-	L	L	UP	L	SW15
RM	32	15	-	-	L	L	UP	L	SW15
BO	33	15	-	-	L	L	UP	L	SW15-20
CR	34	15	-	-	L	L	UP	M	SW15-20
JA	33	15	-	-	L	L	UP	L	SW10
BA	32	15	-	-	L	L	UP	L	SW15
WA	34	15	-	-	L	L	UP	M	SW15-20

Meteorologist: Nimchuk

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SH	31	45	-	-	L	L	UP	L	SW10
PY	29	35	-	-	L	L	UP	L	SE10
MM	32	35	-	-	L	L	UP	L	SW10
LB	32	25	-	-	L	L	UP	L	SW10
ED	32	15	-	-	L	L	UP	L	SW15
RM	32	15	-	-	L	L	UP	L	SW15
BO	33	15	-	-	L	L	UP	L	SW15-20
CR	34	15	-	-	L	L	UP	M	SW15-20
JA	33	15	-	-	L	L	UP	L	SW10
BA	32	15	-	-	L	L	UP	L	SW15
WA	34	15	-	-	L	L	UP	M	SW15-20

Meteorologist: Nimchuk

Example of the Red Flag Watch provincial forecast format:

AM FIRE WEATHER FORECAST
ISSUED: 1000 AUGUST 07 2018

Red Flag Watch in Effect for : SH LB

A strong upper ridge over the BC interior continues to gradually build into the province this burning period and will generate intense crossover conditions in most east slope/mountain park areas. The winds aloft over most of Alberta remain from the northwest this morning and this flow is bringing mid level cloud mixed with smoke into the boreal regions. A weak cold front is grazing zones along the NWT border and will produce a slight risk of isolated TRW later this afternoon otherwise stable conditions are forecast in most areas of the province. Gustly W-SW winds are expected in the boreal zones this burning period and will generate some patches of high ISI values. Moderate SW winds in the southern Rockies will support low RH values in the 15-20% range this afternoon and produce FFMC values of 93-96 at some stations in the CR/WA zones.

On Wednesday the strong upper ridge will build over Alberta. Stable conditions are expected in all areas as maximum temperatures reach the 29-32 deg range in all forecast zones. Intense crossover conditions are expected in the east slopes and mountain parks as strong subsidence and moderate SW winds will drive minimum RH values into the 15% range with a risk of 10% at some stations in the BO/CR/WA zones. BUI values will continue to trend higher during the next several days as the ridge remains stationary over the province. Risk SW winds will also persist in the boreal zones accompanied by moderate RH values of 30-40%.

Forecast for Today and Tonight

Forecast Zone	Maximum Temp	Low RH	Pcpn Covg / Amnt	Pcpn Type	Ltg Prob	Afternoon Wind	
OJ	24	45	10L-M	-	TRW RW	M	W20G40
FV	24	50	10L-M	-	TRW RW	M	W20G40
MA	25	45	-	-	-	L	W20G45
RE	25	40	-	-	-	L	W20G35
GP	28	30	-	-	-	L	W30G50
SH	29	35	-	-	-	L	SW20G45
PY	24	50	10L	-	-	M	SW20G40
MM	26	40	-	-	-	L	SW20G35
LB	29	35	-	-	-	L	SW20
ED	29	25	-	-	-	L	SW25G45
RM	28	20	-	-	-	L	W15-20
BO	29	15	-	-	-	L	W15-20
CR	30	15	-	-	-	L	SW15-20
JA	30	15	-	-	-	L	W10-15
BA	30	15	-	-	-	L	W10-15
WA	30	15	-	-	-	L	SW15-20

Meteorologist: Nimchuk

Example of the Red Flag Watch and Warning briefing introduction RH slides:

RED FLAG WARNING
IN EFFECT

For: CR / BO / RM

AM AWCC Weather Briefing

Sat Pic

SFC

PCPN

LTG

Radar

500

850

RAW3

Prog

2_500

2_500

3_500

3_500

FWI

RED FLAG WATCH IN EFFECT FOR:

OJ MA RE ZONES

AWCC Fire Weather AM Briefing

Jul 12 2019