

Tactical Incident Analysis Tool

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Executive Summary

Weather events that slow or stop fires can produce challenges for fire overhead and managers alike in Alaska. Rain events don't always signal the end of fire growth. A Fire Ending Event Workshop was held in 2008 and defined a fire ending event as a 5 day period with 0.50 inches of rain and precipitation duration of 25 hours, and the average mean RH over 50%. This metric is not very easily verifiable for field or office personnel during a busy summer. This new tool is meant to be easily usable by field personnel and fire managers. It attempts to give a common operating picture for personnel to compare fuel conditions and rain event characteristics and their implications for staffing levels and long term fire strategy.

Alaska Tactical Incident Analysis Tool

Fire growth in Alaska happens in a very episodic nature. It is quite normal for fires to burn for the entire season with only short periods of large fire growth when weather and fuels align in burnable conditions. Periods of rain can slow and stop fire growth altogether but it is not uncommon for fires to become active again after long periods of smoldering and inactivity. On average, 30-40% of days in a fire season are conducive to large fire growth based on MODIS detection. How does that affect fire operations and the utilization of resources?

The following table is an attempt to summarize a combination of three factors and predict if and when a fire may become active again. Spruce Adjective Rating is used to summarize fuel dryness preceding the rain event. The amount of rain over 72 hours categorizes the weather event. An average temperature of 70 degrees and 30% RH was used as an average forecast to predict the days needed for fuels to dry to burnable conditions. If the weather following the rain event is warmer than 70 degrees and drier than 30% RH, the number of days for the fuels to reach burnable conditions will be less. The resultant days may also differ depending on the portion of the fire season that the rain event occurs. The early part of the fire season is mainly wind driven, so lesser, short duration events will have greater effect on the fire activity, though dormant fuels will dry quickly. During the middle, or duff driven phase of fire season, the upper layers of duff are the main drivers of fire spread and this layer needs less rain but also less drying time before it becomes burnable again.

Tactical Analysis Tool

Precipitation Spruce Adjective Rating at Event Start	Greater than 1.5" over 72 Hours	Between .75" and 1.5" over 72 Hours	Less than .75" over 72 Hours
Low	9-11 Days	7-9 Days	7-9 Days
Moderate	7-9 Days	5-7 Days	4-6 Days
High	7-9 Days	4-6 Days	2-4 Days
Extreme	5-7 Days	3-5 Days	1-3 Days

Table results represent "days since end of rain event." It is a guideline that estimates drying based on the number of days reaching an afternoon temperature of 70F and RH of 30% after the rain event.

The main question is how to determine whether fire growth has stopped or just temporarily slowed.

Large fire growth has been correlated with FFMC values above 88 and BUI above 80. The time it takes for indices to rebound to burnable levels is the combination of three factors:

- **Antecedent conditions:** How dry were the fuels before the rain event? FFMC is a measure of short term dryness of surface fuels and reacts very quickly to precipitation.

BUI is a measure of dryness in layers of duff below the surface. The Spruce Adjective Rating has combined these indices into one rating criteria.

- **Amount and Duration of Rain:** All three moisture codes in the Canadian system (FFMC, DMC, DC) are affected by different thresholds of rain. FFMC drops quite quickly and does not need much rain to start to decline. DMC and DC, the two codes that make up BUI, need greater amounts of rain to decrease. Combination of larger rain amounts spread out over long time periods has the greatest effect on these codes and indices. Rain of short duration or less than .11 inches does not penetrate to the lower duff levels to moderate seasonal drying.
- **Forecast Weather:** Weather following the rain event will affect how much drying the fuels need until they become burnable again. Tactical decisions are normally revisited after rain events to reassess tactics, staffing levels, and assess values threatened by fire spread. Each weather station on <https://akff.mesowest.org> provides a three day weather forecast that is updated every afternoon. A longer term seven day forecast is available for each Predictive Service Area (PSA) at <https://psgeodata.fs.fed.us/forecast/#/outlooks?state=sideBySide&gacclid=1> These two products, coupled with weather forecasts, can help determine the outlook for the fire area.

We believe that this analysis will provide users with a helpful tool for determining potential for future fire growth. However, variations in fuels and conditions necessitate a careful thought process for each fire and each fire season. Staff at AICC Predictive Services welcomes thoughts and observations, and is always willing to provide consultation and information on upcoming weather and its effect on fuels. Contact us at 907-356-5691.

SPRUCE (Summer)	BUI < 40.0	BUI 40.0 to 59.9	BUI 60.0 to 89.9	BUI 90.0 to 109.9	BUI 110.0+
FFMC Less than 80.0	LOW	LOW	LOW	LOW	LOW
FFMC 80.0 to 81.9				MODERATE	MODERATE
FFMC 82.0 to 83.9		HIGH	HIGH		
FFMC 84.0 to 85.9				VERY HIGH	VERY HIGH
FFMC 86.0 to 88.9	VERY HIGH	VERY HIGH	VERY HIGH		
FFMC 89.0 to 89.9			VERY HIGH	VERY HIGH	VERY HIGH
FFMC 90.0 to 91.9	VERY HIGH	VERY HIGH			VERY HIGH
FFMC 92.0 to 92.9			VERY HIGH	VERY HIGH	VERY HIGH
FFMC 93.0+ and Temp < 75.0	VERY HIGH if FWI < 40	VERY HIGH if FWI is less than 40.0			VERY HIGH if FWI is less than 36.0
FFMC 93.0+ and Temp 75.0 to 79.9		EXTREME if FWI is at least 40.0	EXTREME if FWI is at least 40.0	EXTREME if FWI is at least 36.0	EXTREME if FWI is at least 36.0
FFMC 93.0+ And Temp 80.0+	EXTREME if FWI is at least 40.0		EXTREME if FWI is at least 40.0	EXTREME if FWI is at least 36.0	EXTREME if FWI is at least 36.0