

# Tactical Incident Analysis Tool

Updated April 2020

Chris Moore, AFS, Tanana Zone

Kato Howard, AFS, Fuels

Heidi Strader, AICC-Predictive Services

Sharon Alden, AICC-Predictive Services

Robert Ziel, Alaska Fire Science Consortium

## Executive Summary

Weather events that slow or stop fires can produce challenges for fire overhead and managers alike in Alaska. Rain events do not 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 is very episodic in 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 when a fire may become active again. The Buildup Index (BUI) is used to summarize fuel dryness below the surface 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 fewer. The resultant days may also differ depending on the portion of the fire season in which the rain event occurs. The early part of the fire season is mainly wind driven. In this phase 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 BUI 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. As rain amounts increase, moisture can penetrate deeper into the duff layer. FFMC can rebound quickly after short duration rain events. These kinds of events will only temporarily pause fire operations. Longer duration precipitation events will pause operations longer, causing fire managers to weigh the benefits of demobilizing resources or continuing to staff incidents.
- **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. The combination of larger rain amounts spread out over longer time periods has the greatest effect on these codes and indices. Rain of short duration or less than 0.11 inches does not penetrate 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 to 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). These two products, combined 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. The AICC Predictive Services staff 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.