About 30 years ago, Alaska (concurrently and independently of Michigan, Minnesota, and Wisconsin) began exploring the Canadian Forest Fire Danger Rating System (CFFDRS) and its Fire Weather Index (FWI) system as an alternative to the U.S. National Fire Danger Rating System (NFDRS). Fire managers found the FWI system to be simple, accurate, and understandable among firefighters and fire managers alike. By 1994, FWI codes and indices were being calculated, distributed for decision support, and stored for historic reference across Alaska. The system's simplicity allowed Alaska to pioneer forecasting fuel moisture and fire danger, integrating them with fire weather forecasts. Further advances led to agency support for a comprehensive online resource, Alaska Fire and Fuels (akff.mesowest.org).

There are at least 5 important factors that lead Alaska fire managers to continue their use of the CFFDRS system of fire danger and fire behavior tools for fire potential assessments in Alaska.

1. Alaska fires burn green landscapes, producing episodic fire activity.

Fire potential in much of the western U.S. is keyed to seasonal curing (Figure 1, Soberanes). In contrast, the highest flammability in Alaska occurs during peak greenup conditions in June and July (Bruno). Deep, flammable duff fuelbeds in Alaska hold moisture better than the sparse litter and grass fuels typical of warm arid ecoregions, but can dry rapidly during episodes of warm dry weather.

Management Implications:
Alaska’s fire managers use the indices of the Canadian Forest Fire Danger Rating System (CFFDRS) to assess fire danger for several reasons:

• Alaska’s fire season occurs during the growing season and burns duff as well as live fuels.
• Approaches to managing weather data and fire models used in the lower 48 are problematic in Alaska. Alaska fire managers will continue to meet national requirements, while seeking and finding the right tools to support best decisions for this distinctive landscape.
2. The interagency fire RAWS network is limited in Alaska.

Only about 80 stations in Alaska are available in the Weather Information Management System (WIMS) environment for NFDRS ratings. In contrast, Alaska Fire and Fuels (AKFF) is producing FWI ratings for nearly 250 stations, including ASOS, US Array, military cold climate research networks, and 5 manual stations that are operated by cooperators in the Copper River area.

3. Distributed weather data management hasn’t been successful in Alaska.

Resulting from a variety of factors, WIMS datasets for Fire Remote Automated Weather Stations (RAWS) in Alaska have been inconsistently maintained from area to area, station to station, and year to year. In some cases, observation time has changed based on the bias of the individual editor. Key inputs, such as precipitation duration, wet flags, and State of the Weather have not been universally understood and consistently applied. With the increasing importance of hourly observations in the new version of NFDRS that will require additional editing, this inconsistency will only increase due to missing and garbled reports. At the same time, the FWI system requires only 4 once-daily weather inputs, allowing all data management for the much larger AKFF network of stations to be managed by the Predictive Services meteorologist working from the Alaska Interagency Coordination Center (AICC).

4. NFDRS fuel moisture estimates do not reflect trends in Alaska flammability conditions.

NFDRS 2016 fuel moistures, components and indices do not effectively reflect the trends of ignition, growth and control difficulty for most of Alaska’s landscape. The NFDRS Energy Release Component (ERCg/ERCy) peaks too early in the season in Alaska, while the FWI Buildup Index (BUI) provides an excellent representation of whole seasonal severity, as shown here for 2005 (Figure 2). Those trends reflect individual years and overall histories for both specific locations and geographic areas that are highly correlated with trends in flammability and area burned.

2016 NFDRS fuel moisture estimates implemented for dead fuels and live fuels are higher than before, impacting ERC severity assessment and Wildland Fire Decision Support System (WFDSS) fire analysis results in Alaska.

- Dead fuel moisture estimates from the new Nelson fuel moisture model result in higher fuel moistures, impacting both ignition and spread thresholds. During the driest portions of peak burn periods fine fuel moistures are as much as 2-4% higher. As an example, raising fine fuel moisture from 7% to 11% pushes estimates to near the Moisture of Extinction levels for key Alaska fuel models, including many grass and grass shrub examples.

- Live fuel moisture estimates, now based on the Growing Season Index (GSI), may reflect overall greenup trends accurately during Alaska’s active fire season. However, the Rothermel fire spread models cannot produce estimates that match observed spread and intensity with those fuel moisture settings.

Figure 2. Alaska Boreal Interior Fire Season Storyteller using the Build Up Index (BUI). Grey shading indicates climatological range and grey line indicates climatological mean (1994-2017). Orange dotted line is 2005 BUI season trend. Bars are weekly MODIS fire detection totals.
5. Important meteorology issues require special approaches.

While most of the “lower 48” is monitored by the NWS NEXRAD Radar system, much of Alaska is without radar coverage (Figure 3), limiting gridded detection of precipitation and wind patterns critical to evaluating local fire potential. With very few first order climate weather observing stations assimilated, key reanalysis climatologies contain strong biases in critical weather elements that carry forward to derived values such as danger rating indices. The North American Regional Reanalysis (NARR), of primary importance for CONUS NFDRS climatologies, is not recommended for fire season analysis in Alaska.

Integration with national standards

While these factors have led to an interagency decision to utilize the CFFDRS in Alaska for day-to-day danger rating and fireline fire behavior assessments, agency partners are committed to national expectations. They have implemented WFDSS decision processes, utilizing embedded analysis tools with calibration factors derived from FWI codes and indices. Fire behavior and fire danger assessment skills continue to be based on NWCG training and qualification requirements, augmented by leveraged training in the CFFDRS FWI and Fire Behavior Prediction (FBP) systems. Alaska fire managers will continue working to meet national requirements, while at the same time seeking and finding the right tools to support best decisions for this distinctive landscape.