

Your Fire Analysis Skills

Dust them off, tune them up, show them off

Outline

Information Resources

Tools to Apply

Producing an Alaska Analysis

Information Resources

- WFDSS Home PageLinks; WFDSS Modeling Tips, Updated 5/8/19, New!
https://wfdss.usgs.gov/wfdss/WFDSS_Home.shtml

The screenshot shows a web browser window with multiple tabs open. The active tab is titled "WFDSS" and displays the URL https://wfdss.usgs.gov/wfdss/WFDSS_Home.shtml. The browser's address bar and tabs are visible at the top. Below the browser window, the WFDSS Home Page is displayed. The page features a header with the "Wildland Fire Decision Support System" logo and a "Help" link. A left sidebar contains a navigation menu with links such as "Home", "About WFDSS", "What's New In WFDSS", "Training Resources", "NWCG Training WFDSS Courses", "Data", "Related References", "WFDSS Help", "Sign In to Production", "Sign In to Training", and "Request Account". The main content area begins with a "Welcome!" section, followed by a "Wildland Fire Decision Support System" heading. A note states: "Note: Click [WFDSS Known Issues](#) to see the list of the most current issues and suggested workarounds for WFDSS." Below this, a paragraph describes the system's purpose: "This system assists fire managers and analysts in making strategic and tactical decisions for fire incidents. It has replaced the WFS (Wildland Fire Situation Analysis), Wildland Fire Implementation Plan (WFIP), and Long-Term Implementation Plan (LTIP) processes with a single process that is easier to use, more intuitive, linear, scalable, and progressively responsive to changing fire complexity." Another paragraph states: "WFDSS integrates the various applications used to manage incidents into a single system, which streamlines the analysis and reporting processes." A third paragraph lists the advantages: "WFDSS provides the following advantages over previous systems:" followed by a bulleted list: "Combines desktop applications for fire modeling into a web-based system for easier data acquisition." and "Provides an easy way for fire managers and analysts to accurately document their decision-making process by allowing results of analyses to be attached to the decision point and included in the final incident report." On the right side of the page, there is a "Google Search" box with the option to "only search WFDSS Website". Below this is a "Hot Picks" section with a list of links: "UPDATED 5/8/19: 6.3 Release New Functionality and Enhancements", "WFDSS Modeling Tips", "6.2 Release New Functionality and Enhancements", "6.1 Release New Functionality and Enhancements", and "NEW! What You Need to Know About WFDSS - 2019".

Wildland Fire Decision Support System

Home

About WFDSS

What's New In WFDSS

Training Resources

NWCG Training WFDSS Courses

Data

Related References

WFDSS Help

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Welcome!

Wildland Fire Decision Support System

Welcome to the Wildland Fire Decision Support System ([WFDSS](#))!

Note: Click [WFDSS Known Issues](#) to see the list of the most current issues and suggested workarounds for WFDSS.

This system assists fire managers and analysts in making strategic and tactical decisions for fire incidents. It has replaced the WFS (Wildland Fire Situation Analysis), Wildland Fire Implementation Plan (WFIP), and Long-Term Implementation Plan (LTIP) processes with a single process that is easier to use, more intuitive, linear, scalable, and progressively responsive to changing fire complexity.

WFDSS integrates the various applications used to manage incidents into a single system, which streamlines the analysis and reporting processes.

WFDSS provides the following advantages over previous systems:

- Combines desktop applications for fire modeling into a web-based system for easier data acquisition.
- Provides an easy way for fire managers and analysts to accurately document their decision-making process by allowing results of analyses to be attached to the decision point and included in the final incident report.

Google Search

☐ only search WFDSS Website

Hot Picks

- [UPDATED 5/8/19: 6.3 Release New Functionality and Enhancements](#)
- [WFDSS Modeling Tips](#)
- [6.2 Release New Functionality and Enhancements](#)
- [6.1 Release New Functionality and Enhancements](#)
- [NEW! What You Need to Know About WFDSS - 2019](#)

Information Resources

- Advanced Fire Environment Learning Unit
<https://www.nwcg.gov/tags/afelu>

[Home](#) / [Tags](#) / [AFELU](#)

AFELU



Mission Statement

The Advanced Fire Environment Learning Unit (AFELU) provides leadership and technical expertise to the Fire Environment Committee on continuing education, training on technical tools, and outreach of new research.

⇒ Primary Objectives:

2018 Fall Webinar: Season AAR

Date: November 7, 2018


2019 Getting Ready For the Season Doc

<https://drive.google.com/file/d/1hG2vwTLXYhsSrT2mWzSzs6Gv-X6dh7/view?usp=sharing>

Information Resources

- NWCG Fire Behavior Subcommittee YouTube Library

<https://www.youtube.com/channel/UCVjWo5OPMMIzkNDCbXn-aww>

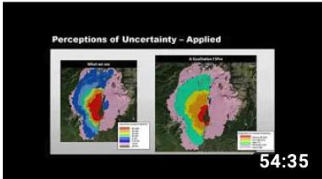


FireBehaviorSubcommittee
70 subscribers

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HOME


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54:35

AFELU Nov2018 AAR
Newman Pietruszka 416 Fire

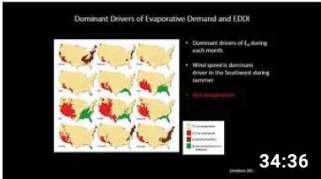
5 views • 2 weeks ago



13:27

AFELU November 2018 Vita
Wright Northern Rockies Fir...


8 views • 1 month ago



34:36

AFELU November 2018 AAR
Dan McEvoy - DRI...

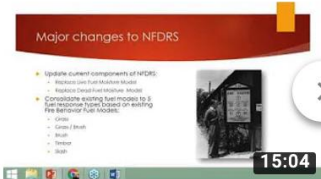
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6:06

AFELU 2018 Webinar -
Introductions, What is the...

14 views • 1 month ago

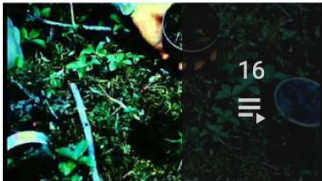


15:04

Part4 NFDRS2016 Cross
2018

93 views • 1 year ago

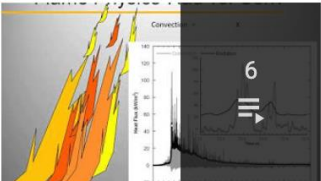
Created playlists



16

Canadian Forest Fire Danger
Rating System

VIEW FULL PLAYLIST



6

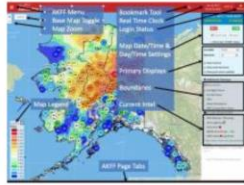
Extreme Fire Behavior Synthesis

VIEW FULL PLAYLIST

Information Resources

- AFSC Partner Sites/Fire Modeling & Analysis Cmte/Guides & Products

<https://www.frames.gov/afsc/partners/fmac/guides-products>



Alaska Fire & Fuels Users Guide 2018

Publisher: Alaska Fire Science Consortium

Year: 2018

Alaska Fire & Fuels (akff.mesowest.org) is the Alaska interagency Fire Weather (FWI) and Fire Behavior (FBP) monitoring system. It provides public access to fire weather that is collected hourly, processes FWI codes and indices, and provides them in a range of tools and displays to aid fire managers in assessing their fire potential each day. Data collected is stored in a database and is available for historic queries and data downloads as needed. This guide is reference for its users.



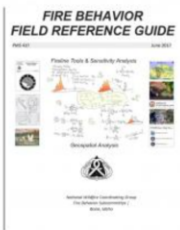
Fuel model guide to Alaska vegetation (2018)

Author: Jennifer L. Barnes , Peter Butteri , Robert L. DeVelice , Kato Howard , Jennifer L. Hrobak , Rachel A. Loehman , Nathan Lojewski , Charley Martin , Eric Miller , Bobette Rowe , Tom St. Clair , Lisa B. Saperstein , Bethany Schulz , Brian Sorbel , Wade Wahrenbrock , Larry Weddle , Alison D. York , Robert Ziel

Publisher: Alaska Fire Modeling and Analysis Committee

Year: 2018

This guidebook contains fuels and fire behavior information and vegetation characteristics for Alaska. Each fuel type (taken from 4th level Viereck classification names) is associated with up to three illustrative photos, the most appropriate fuel models, the primary carrier of fire, fire behavior notes, vegetation characteristics, individual 4th-level Viereck classes, and fuel types with similar characteristics. This document also contains a crosswalk from vegetation classes to various fuel models.



Fire Behavior Field Reference Guide (2017)

Author: National Wildfire Coordinating Group (NWCG)

Publisher: National Wildfire Coordinating Group (NWCG)

Year: 2017

The Fire Behavior Field Reference Guide describes a range of practices by which fire behavior assessments are conducted. It is a hands-on publication for use in the field, in training, and as a reference.



Fuel moisture, seasonal severity and fire growth analysis in the US fire behavior analysis tools: using Fire Weather Index (FWI) codes and indices as guides in Alaska

Author: Robert Ziel

Year: 2017

This guide offers recommendations for using Canadian Forest Fire Danger Rating System (CFFDRS) fuel moisture codes and fire behavior indices from the Fire Weather Index (FWI) system to provide objective guidance for initial settings for many analysis inputs to WFDSS and IFTDSS. The FWI system has been formally calibrated for northern boreal ecosystems and effectively identifies significant thresholds for the Alaska landscapes as well as important trends in changing fire growth potential.

Tools to Apply

- Alaska Interagency Coordination Center Spatial Data Resources
<https://fire.ak.blm.gov/predsvcs/maps.php>

ArcGIS Online Resources

- Alaska Wildland Fire Maps replaces the old trusted ArcIMS map interface we've used in the past

AICC ArcGIS Server Services

- Access to all the layers you were used to on ArcIMS

Individual Fire Perimeters

- Already zipped up. Should be current all season.

The screenshot displays the AICC (Alaska Interagency Coordination Center) website. The header includes the AICC logo and navigation links: National, AICC Home, Alaska Fire Service, About Us, Links, and Contact Us. The main content area is divided into several sections:

- Incident Information:** Links to Alaska Fires, Interagency Newsroom, and InciWeb.
- Predictive Services:** Links to Intelligence / Reports, Maps / Imagery / Geospatial, Fire Weather, Fuels / Fire Danger, Air Quality, and Outlooks.
- Logistics and Dispatch:** Links to Interagency Mobilization Guide, Aviation, Crews, ROSS, AICC National Emergency Rental Vehicle Agreement, Overhead / Teams, New D110 Alternative Delivery Method, and Administration.
- Administration:** Links to Statewide Master Agreement, Agency Administrator's Guide, Incident Business Management, AWFCG, AWFCG Committees, and MAC Group.

On the right side, there are several highlighted sections:

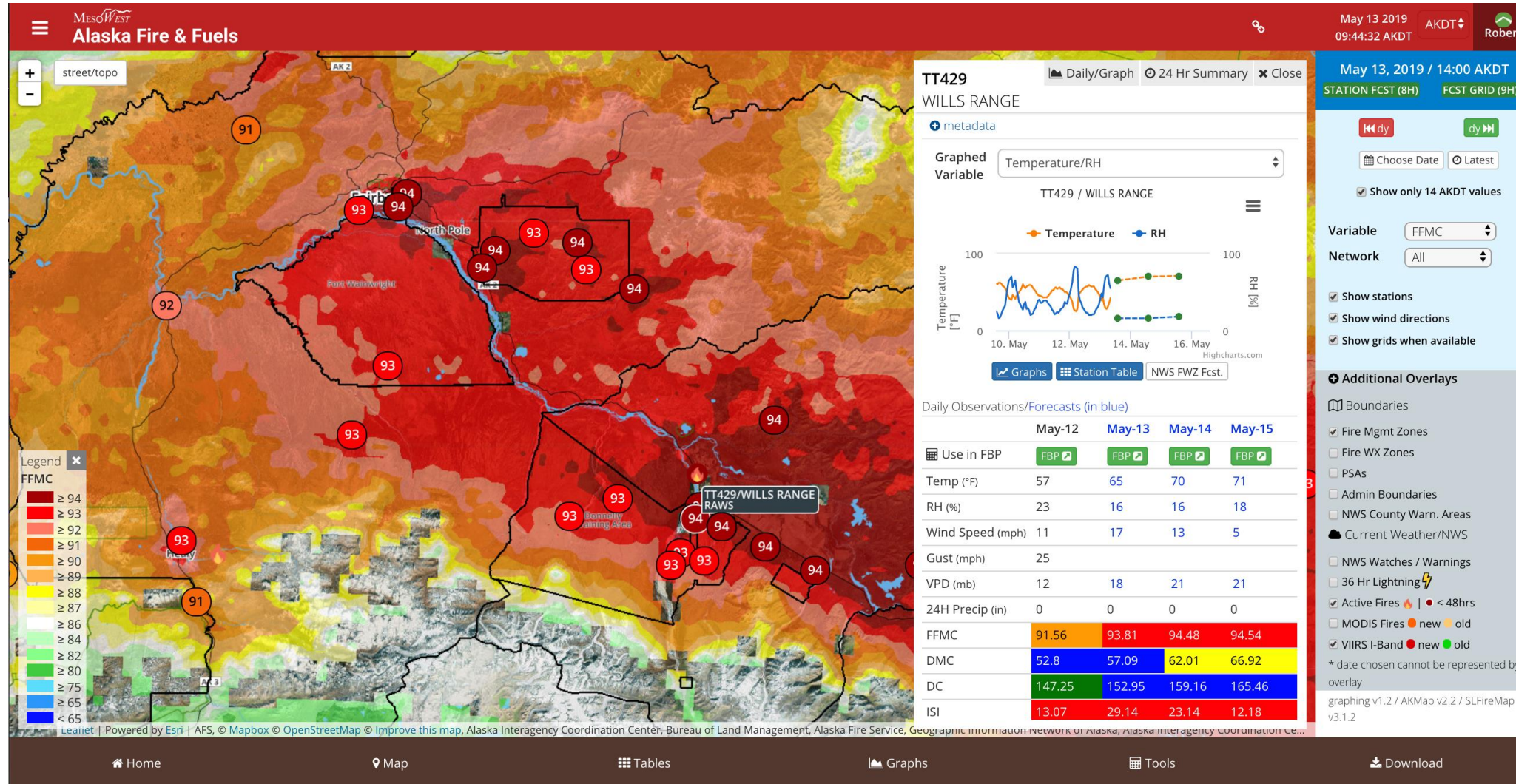
- Predictive Services - Maps/Imagery/Geospatial:** Includes a link to **Alaska Wildland Fire Maps** (highlighted in a blue box).
- User Guides:** Includes links to **Alaska Wildland Fire Information User Guide** and **Alaska Wildland Fire Perimeter Submission Guide 2019**.
- AICC ArcGIS Server Services:** Includes a link to **AICC ArcGIS Server Services** (highlighted in a blue box).
- National Interagency Fire Center ArcGIS Online:** Includes a link to **Alaska Known Sites DB Login (on NIFC-AGOL)**.
- AICC GeoPDF Map products:** Includes links to **GeoPDF Repository (Separate Page)**, **Alaska_Fire_History**, **Alaska_Fire_Management_Options**, **Alaska_Fire_Management_Options_with_Jurisdictions**, and **Alaska_Fire_Management_Zones**.
- AICC ArcIMS Mapping Products [requires JavaScript]:** Includes links to **Statewide Fires**, **Current Lightning**, **Fire History**, **Historical Lightning**, **Current Weather and Indices**, **Fire Spotter**, **Fire Markup**, and **Fire, Lightning, and Weather**.
- Data and Metadata:** Includes a link to **Individual Fire Perimeters (Separate Page)** (highlighted in a blue box).

The USA.gov logo is visible at the bottom left of the page.

Tools to Apply

- Alaska Fire and Fuels

<https://akff.mesowest.org/>



Views

- Map
- Tables
- Graphs
- Tools
- Download


New Tools

- RX Planner
- Adjective Grids
- Fuels layer later in yr

Tools to Apply

- WFDSS Short Term, Near Term, and FSPro

<https://wfdss.usgs.gov>



Wildland Fire
Decision Support System

National Preparedness Level: 1
Incident: Oregon Lakes

Robert Ziel on Production | [Sign out](#)

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Analysis List Filter

Filters

Analyses for Oregon Lakes

[Edit Filter](#) [Manage Filters](#)

Analysis List

New Analysis

☐ FSPro ☒ Basic ☐ STFB ☐ NTFB [Create Analysis for Incident Oregon Lakes](#)

[Generate KMZ for Completed Analyses](#) [Set Analysis List Preferences](#)

[View Information](#) [View Results](#) [View Report](#) [View Notes](#) [Return to Assigned State](#)

	Incident / Analysis Name	Type	Geographic Area	Status	Owner	Analyst	Created (CDT)	Completed (CDT)
<input type="radio"/>	Oregon Lakes / 05-10 Fcst v3 14d 1000f inputs same as v1	FSPro	Alaska	Review	Multiple	Ziel, Robert	05/10/2019 10:49	
<input type="radio"/>	Oregon Lakes / 05-10 Fcst v2 14d 256f all heat spreads	FSPro	Alaska	Review	Multiple	Ziel, Robert	05/10/2019 10:06	
<input type="radio"/>	Oregon Lakes / 05-10 Fcst v1 14d 256f some heat doesn't sprea	FSPro	Alaska	Complete	Multiple	Ziel, Robert	05/08/2019 19:21	05/10/2019 10:13
<input type="radio"/>	Oregon Lakes / 05-07 Fcst 1d 7h tu4-sh5 no conditioning	STFB	Alaska	Complete	Multiple	Ziel, Robert	05/06/2019 22:05	05/06/2019 22:26
<input type="radio"/>	Oregon Lakes / 05-07 Fcst 14d 256f tu4-sh5 3 erc bins	FSPro	Alaska	Review	Multiple	Ziel, Robert	05/06/2019 21:47	
<input type="radio"/>	Oregon Lakes / 05-05 Fcst v3 14d 256f tu4tosh5 3 erc bins	FSPro	Alaska	Complete	Multiple	Ziel, Robert	05/04/2019 22:11	05/04/2019 22:41
<input type="radio"/>	Oregon Lakes / 05-05 Fcst v2 14d 256f tu4tosh5	FSPro	Alaska	Rejected	Multiple	Ziel, Robert	05/04/2019 21:49	05/04/2019 22:19
<input type="radio"/>	Oregon Lakes / 05-05 fcst v1 14d 256f burnable days check	FSPro	Alaska	Rejected	Multiple	Ziel, Robert	04/30/2019 22:51	05/04/2019 21:57
<input type="radio"/>	Oregon Lakes / 05-01 Fcst 3d	NTFB	Alaska	Complete	Multiple	Ziel, Robert	05/01/2019 13:56	05/01/2019 15:48

Page 1 of 1 Rows per Page: 25 [Accept](#) [Copy...](#) [Terminate...](#) [Delete...](#)

[View Information](#) [View Results](#) [View Report](#) [View Notes](#) [Return to Assigned State](#)

Tools to Apply

- FlamMap 6 is coming...with landscape editing and Near Term module!

<https://www.firelab.org/project/flammap>



Fire, Fuel, Smoke Science Program Rocky Mountain Research Station

HOME

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RESEARCH ▾

APPS & PRODUCTS ▾

CHARTERED PROGRAMS ▾

EXPERIMENTAL FOREST

Home » Apps & Products » Fire Behavior

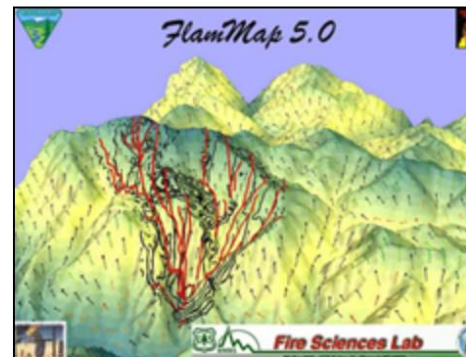


You have been successfully subscribed.

FlamMap

FlamMap is a fire behavior mapping and analysis program that computes potential fire behavior characteristics (spread rate, flame length, fireline intensity, etc.)

The FlamMap fire mapping and analysis system (Finney 2006; Stratton 2006) is a PC-based program that describes potential fire behavior for constant environmental conditions (weather and fuel moisture). Fire behavior is calculated for each pixel within the landscape file independently, so FlamMap does not calculate fire spread across a landscape. Potential fire behavior calculations include surface fire spread (Rothermel 1972), crown fire initiation (Van Wagner 1977), and crown fire spread (Rothermel 1991). Dead fuel moisture is calculated using the Nelson model (Nelson 2000) and FlamMap permits conditioning of dead fuels in each pixel based on slope, shading, elevation, aspect, and weather.



Principal Investigator(s):

Mark Finney

Contact(s):

- [Finney, Mark](#)
- [McHugh, Charles](#)

Contributor(s):

FlamMap is being developed by:

- U.S. Forest Service, Rocky Mountain Research Station, Fire, Fuel, and Smoke Science Program, and
- Stu Brittan; Alturas Solutions; Missoula, Montana

The following individuals are working on

Tools to Apply

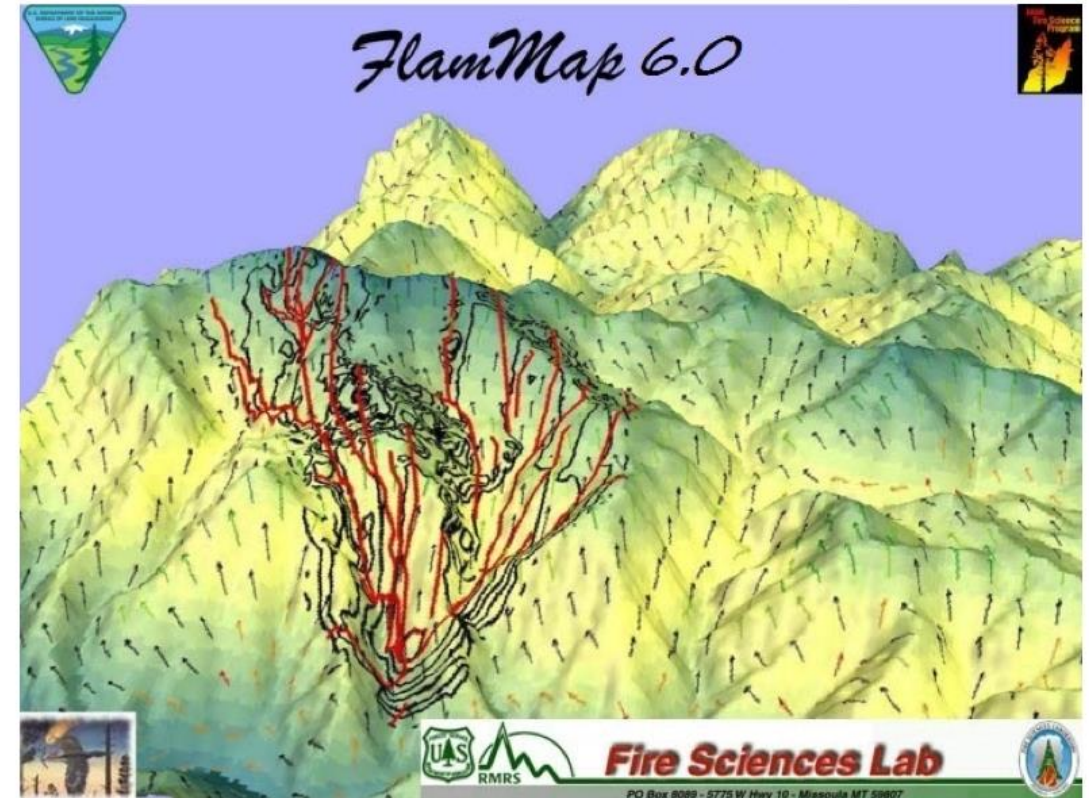
- FlamMap 6 resources to have on hand

https://drive.google.com/file/d/1V4VaUht_TL5rShnZXYBrUuzKo_oaobQ/view?usp=sharing

Obtaining Past Weather and Forecasted Weather for use in FlamMap6

1. From a completed Near-Term Fire Behavior Run in WFDSS
 - Provides the previous days weather so one can condition fuels if needed
 - Provides the forecasted weather used during the simulation
 - Provides the data so you can build a hourly weather stream
2. From the NWS NDFD Forecasts
 - Fire Weather Forecast Page
 - Map Point and Click Forecast data
3. FireFamilyPlus Database
 - Provides the previous weather so one can condition fuels if needed
 - Can be used for reconstruction events

FlamMap6 Workshop



PREPARING FOR THE FUTURE OF WILDLAND FIRE
MAY 21-24, 2018 • MISSOULA, MONTANA

Producing an Alaska Analysis

Fire Behavior Field Reference Guide

<https://www.nwcg.gov/publications/pms437/> or <http://www.fbfrg.org>

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PMS 437

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[Surface Fire](#)

[Crown Fire](#)

[Fire Assessment](#)

[Fire Danger](#)

[CFFDRS](#)

[Search PMS 437](#)

Fire Behavior Field Reference Guide, PMS 437

Fireline Tools & Sensitivity Analysis

Steady State
Homogeneous fuel bed
No Spotting or Crowning
Surface fire

Fuel moisture Q_{ig}
Size of particle \in
bulk density P_b

(1) →

(2)

(3)

(4)

$I_p = R \rho_b Q_{ig} A_f$
 $I_p = f_z^2 z_1^{-1} p' z_1^{-1}$
 $I_e = w h r_1 / q_1$
 $R = \frac{I_p}{\rho_b Q_{ig}}$

$I_g + I_e - \Delta I_x - \Delta I_y - \Delta I_z$

$I_g + \sqrt{\frac{dI_z}{dz}} dA = R \rho_b Q_{ig}$

$R = \frac{I_p}{R \rho_b Q_{ig}}$

$R C R o b i n s o n 3/5/90$

Geospatial Analysis

IFTDSS Can Help You...

- Develop a Burn Plan
- Conduct a Risk Assessment
- Model Fire Behavior

Fire Assessment Section

- Verification, Calibration and Validation page
- discusses key spatial analysis factors
- Discusses evaluating and adjusting spatial analyses.

Producing an Alaska Analysis

WFDSS Modeling Tips

[https://wfmrda.nwcg.gov/docs/ Reference Materials/WFDSS Modeling Tips July-2018.pdf](https://wfmrda.nwcg.gov/docs/Reference Materials/WFDSS Modeling Tips July-2018.pdf)

- Landscape Extent and Resolution
- Spotting Differences between NTFB and STFB/FSPPro.
- ***Ignition shapes, complexity and interactions.***
- NTFB: Try not to predict past 3 days...usually. Tell the requester why.

WFDSS Modeling Tips

Compiled by WFM RD&A with help from many other practicing fire behavior specialists, July 2018, Feedback to WFM RD&A appreciated (Tonja Opperman, tsopperman@fs.fed.us).

Introduction

There is no intention to limit creativity--there are many ways to use models correctly. However, if you are unsure of how much you can push the system without breaking it, use the guidelines provided here. There is no shame in asking another fire behavior person (LTAN, FBAN) to look over your run and provide input! Ask someone you know, or call Analysis & Decision Content Support at 208-473-8107.

Content

- Modeling in General
- NTFB
- FSPPro
- Getting Help & Giving Feedback

Modeling....In General

- Understand the **question**
- This is a surface fire spread model; attempting to replicate **plume-dominated** fire spread violates the assumptions and limitations.
- Talk to locals or **observe** fire behavior to help you calibrate the model.
- Yes, **calibrate**.
- If spread is inconsistent, consider not using models at all and arrive at decisions using "**persistence**," especially if you find the models continually over-predicting for small amounts of growth. Remember, each pixel is 30-240m and if the fire isn't growing a lot it may not even grow one pixel wide in a burn period.
- Consider using Basic or ST to figure out what weather or fuel **triggers** are going to show active/passive crown fire before jumping right into NT modeling.
- Use Scott and Burgan's "Standard Fire Behavior Fuel Models" guide, Table 7 to remind you which fuel models are **dynamic**--the live fuel moisture values will impact how these fuels behave.
- The models assume no **suppression**.
- There is no modeled **interaction** among adjacent fires.



Figure 1. The Question: What movie should we watch tonight?

Landscape Extent and Resolution

- **30m** is default resolution for STFB and NTFB, **90m** for FSPro
- Use **60m** if **LCP is 10-20 miles** in extent.
- Use **90m-120m (or more)** for **20-30 mile** extent.
- Use **270m** if **>30-mile extent**; start at 270m for the initial run, see how it goes, then consider 120m....or 90m (minimum).
- If >30 mile LCP edge, consider modeling flanks in separate runs.

Spotting Inputs

Short Term Fire Behavior (STFB)

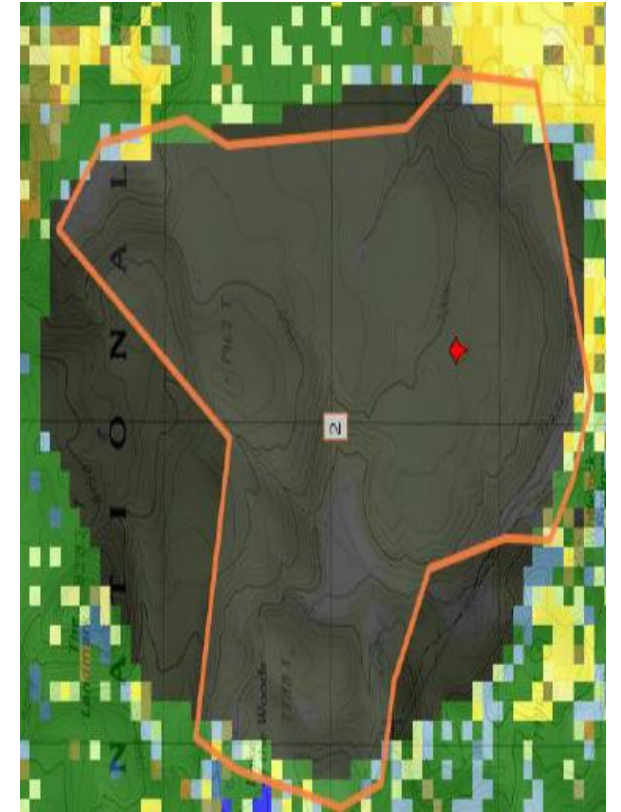
- Analyst sets spotting probability. **Can be higher than allowed for NTFB, generally less than 0.25.**
- For FSPro in AK under active burning analysis periods, we consider
 - .20-.25 for top Row
 - .15 for second row
 - .10 for third row.
- This can guide input for STFB run

Near Term Fire Behavior (NTFB)

- Analyst sets spotting probability. **Maximum setting needs to be less than 0.15.**
- For AK analyses, we recommend half of what is used for STFB and FSPro under similar conditions.

Ignition Shapes, Complexity and Interactions

- Polygons don't burn inward
- Don't use ignition polygon as landscape mask for unburnable. Only about 20% of ignition perimeter will ignite
- Don't let ignition shape cross barrier
- Don't use IR heat shape as ignition file. Display and simplify with manually drawn shape
- Use polygon that dips in and out of masked area instead of short lines for ignitions.



Include only what you think could grow over analysis period in your ignition shape

Producing an Alaska Analysis

Fuel Moisture, Seasonal Severity, and Fire Growth Analysis

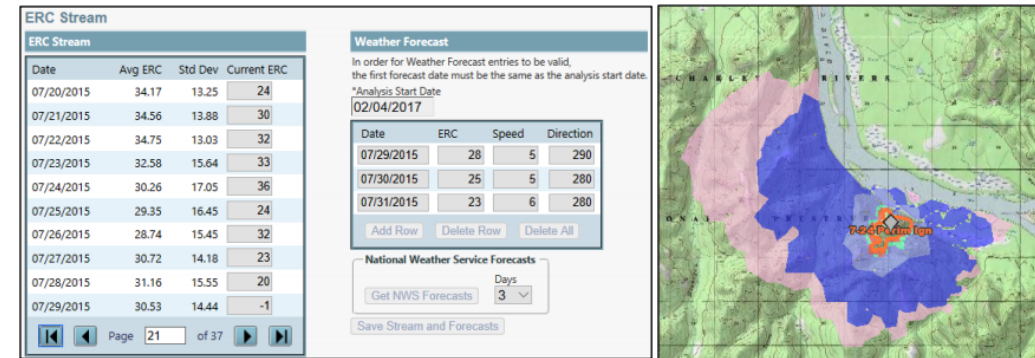
<https://www.frames.gov/catalog/56054>

- Dead Fuel Moisture considerations.
- Live Fuel Moisture considerations.
- Fuel Moisture conditioning in Basic, STFB, and NTFB analyses: Review weather streams. High cloud cover, high overnight rh recovery, and precip amounts push fine fuel moistures (1hr and 10hr) up, impede spread predictions. Edit them down or consider “0” conditioning days in STFB
- ERC trends, streams, classes, and fuel moisture climatology

ERCg performs several critical functions in the FSPro analysis. First, as a default, it provides a frequency distribution of 5 fuel moisture and fire behavior scenarios based on its whole season climatology. Second, that climatology provides day-to-day streams of those fuel moisture and fire behavior scenarios to model fire spread probabilities weeks into the future. The process explained below will demonstrate how knowledge of observed FWI elements can inform adjustments to both the frequency distribution and the ERCg streams used in those analyses.

3.2 Editing the ERC Stream to Reflect FFMFC and BUI Trends

In FSPro analysis, the ERC Stream is displayed as a sequence of days in the recent past and the estimated ERCg values for those days. A forecast stream, based on the National Digital Forecast Database (NDFD) weather forecast, can be included. And after those days, climatology approaching the average ERCg trend provides a range of ERC sequences further into the future for the analysis period.



In this example, with the minimum burnable ERCg value at 38, all of the observed and forecast ERC stream falls below that threshold. Given that, the map shows the result, with a very low probability of any significant fire spread. That may be correct in this case, but with ERCg exaggerating the influence of live fuels, it may be a serious underestimate.

Setting ERCg Levels for FSPro Analysis

80 to 82.9	83 to 85.9	86 to 88.9	89 to 91.9	92+	FFMC	BUI
5 th Bin	4 th Bin	2 nd Bin	2 nd Bin	Top Bin	110+	
5 th Bin	4 th Bin	2 nd Bin	2 nd Bin	Top Bin	90 to 109.9	
5 th Bin	4 th Bin	3 rd Bin	3 rd Bin	2 nd Bin	60 to 89.9	
5 th Bin	4 th Bin	4 th Bin	3 rd Bin	3 rd Bin	40 to 59.9	
5 th Bin	5 th Bin	4 th Bin	4 th Bin	3 rd Bin	< 40	

%ile	Min ERC
96 Top	61
89 2 nd	54
76 3 rd	49
67 4 th	43
58 5 th	38

Use FFMFC and BUI to adjust/set ERC values in ERC stream, both observed & forecast

Accurately portraying the observed and forecast ERC stream are critical to the accuracy of FSPro output. It is possible to use FFMFC and BUI from the FWI system to adjust the ERC stream when preparing initial analyses. The table to the left shows FFMFC and BUI classes and suggests how they are combined to identify where in the ERC frequency distribution each day falls.

Analysts should evaluate ERC values using FFMFC and BUI values observed from representative local weather stations and find the cell that represents that combination of values. ERCg levels can be derived from the class level the table suggests.

For example, if the FFMFC is 91 and the BUI is 80, the combination suggests that the ERC value should be in the third ERC Class, with a value between 49 and 53. Because 91 and 80 are both intermediate within their classes, the ERC might be best represented as 51 or 52. Consider estimating ERC values for up to 3 days in the observed ERC stream and all the forecasted ERC values before conducting the initial FSPro analysis.