Fire Analysis in Alaska: A Quick Reference

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ALASK
FOR
WEATH

Com
Editing
Alaska Wildla
Fire Modelin

Version 1.1 - FSP

wth Analysis in the US Fire
ıdex (FWI) Codes and Indices as

wth analysis using the Wildland Fire Decision
cision Support System (IFTDSS) tools are
ɔm local weather stations and landscape fuel

tive inputs to their analyses, such as Initial Fuel
to use for wind and fuel moisture
ɔtting frequency.

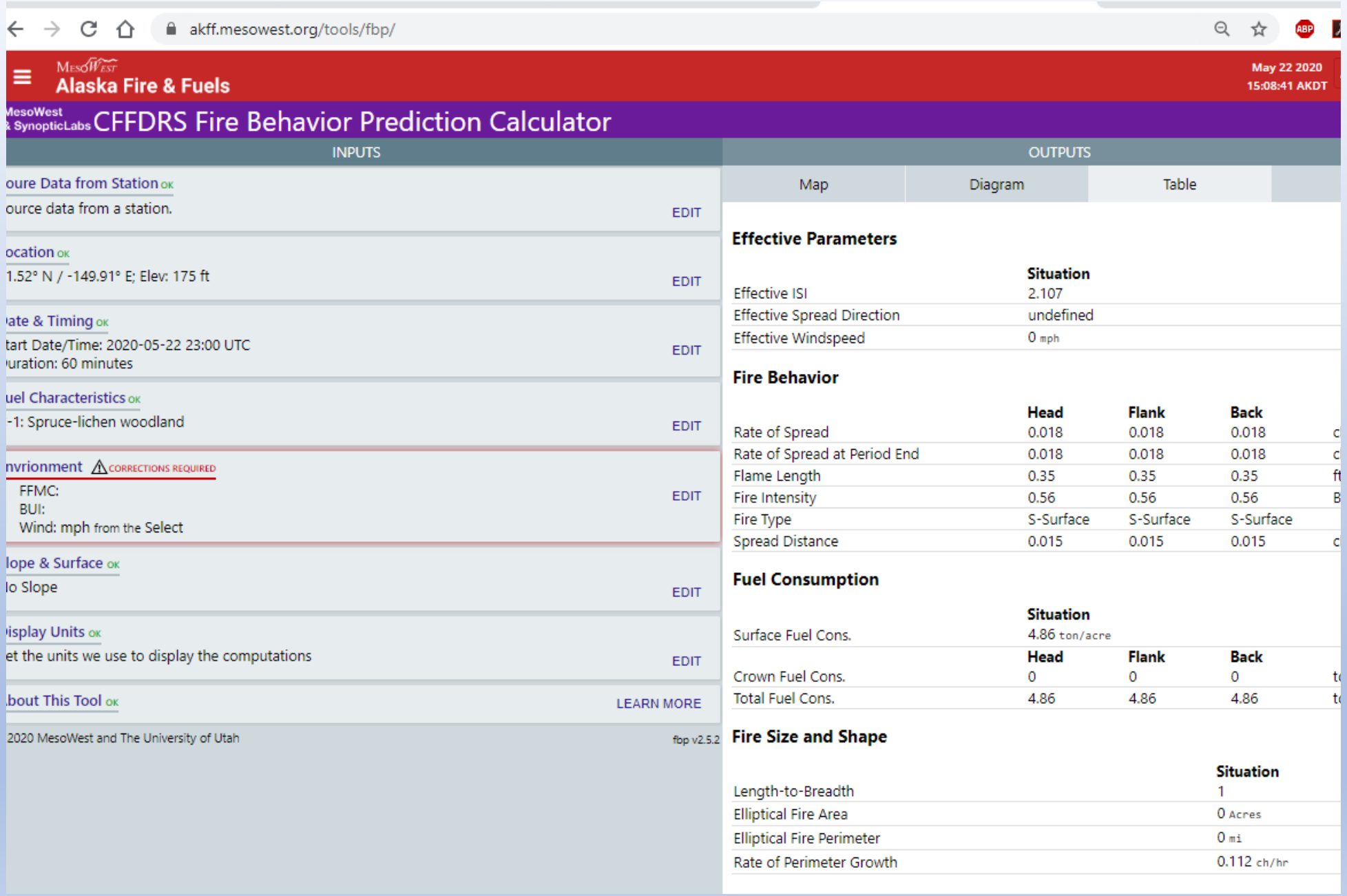
ir first analyses is to use default inputs as
vth events. This method can be time
ıe or more significant growth events, and
esponsible for changes observed on the

t Fire Danger Rating System (CFFDRS) fuel
ıer Index (FWI) system to provide objective
. The FWI system has been formally calibrated
ıificant thresholds for the Alaska landscapes as

5 analyses. Included are Short-term Fire
ıodeling system, Near-Term Fire Behavior
nd Fire Spread Probability (FSPro) based on
DSS. IFTDSS uses primarily FLAMMAP tools for

100hr, Woody, and Herbaceous fuel moistures.
for specific fuel classes. FSPro utilizes wind
allows the user to make both coarse and fine
on the Energy Release Component for fuel
cenarios for both deterministic (forecast) and
are finding that they need to edit the ERC
t the very least, these daily FWI fuel moisture

Class	LOW	MOD	HIGH	VHIGH	EXT	Interpretation
Max Temp	<50°	50° to 59.9°	60° to 69.9°	70° to 79.9°	80°+	Fire intensity and crown fire potential
Min RH	51% to 100%	41% to 50%	31% to 40%	21% to 30%	<20%	Fine fuel moisture and ignition potential
FFMC	0 to 79.9	80 to 85.9	86 to 88.9	89 to 91.9	92+	Below 74, little chance of ignition or surface fire spread with an open flame. Active spread in light fuels at 80. Ignition potential high at 90 and extreme fire behavior expected at 92.
DMC	0 to 39.9	40 to 59.9	60 to 79.9	80 to 99.9	100+	Duff layer not involved below 20. Influence of duff on surface fire noticeably increases at 40. Extreme fire behavior becomes possible above 60.
DC	0 to 149.9	150 to 349.9	350 to 399.9	400 to 449.9	450+	Minimal significant ground fire below 300.
ISI	0 to 1.9	2 to 4.9	5 to 7.9	8 to 10.9	11+	Expected spread potential. Used in fire behavior predictions.
BUI	0 to 39.9	40 to 59.9	60 to 89.9	90 to 109.9	110+	Fuel availability and flammability. Seasonal severity. Used in Fire Behavior Predictions.
FWI	0 to 8.9	9 to 17.9	18 to 27.9	28 to 34.9	35+	Fire intensity and extreme fire potential.
Daily Severity Rating (DSR)						A transformation of the FWI that emphasizes its higher values. Can be cumulated through the season to represent overall conditions.


akff.mesowest.org/tools/fbp/
MesoWest
Alaska Fire & Fuels
May 22 2020
15:08:41 AKDT
MesoWest
SynopticLabs
CFFDRS Fire Behavior Prediction Calculator
INPUTS
OUTPUTS
oure Data from Station OK
ource data from a station.
EDIT
ocation OK
1.52° N / -149.91° E; Elev: 175 ft
EDIT
ate & Timing OK
tart Date/Time: 2020-05-22 23:00 UTC
uration: 60 minutes
EDIT
uel Characteristics OK
-1: Spruce-lichen woodland
EDIT
nvrionment CORRECTIONS REQUIRED
FFMC:
BUI:
Wind: mph from the Select
EDIT
lope & Surface OK
lo Slope
EDIT
isplay Units OK
et the units we use to display the computations
EDIT
bout This Tool OK
LEARN MORE
2020 MesoWest and The University of Utah
fbp v2.5.2
Map
Diagram
Table
Effective Parameters
Situation
Effective ISI 2.107
Effective Spread Direction undefined
Effective Windspeed 0 mph
Fire Behavior
Head Flank Back
Rate of Spread 0.018 0.018 0.018
Rate of Spread at Period End 0.018 0.018 0.018
Flame Length 0.35 0.35 0.35
Fire Intensity 0.56 0.56 0.56
Fire Type S-Surface S-Surface S-Surface
Spread Distance 0.015 0.015 0.015
Fuel Consumption
Situation
Surface Fuel Cons. 4.86 ton/acre
Head Flank Back
Crown Fuel Cons. 0 0 0
Total Fuel Cons. 4.86 4.86 4.86
Fire Size and Shape
Situation
Length-to-Breadth 1
Elliptical Fire Area 0 Acres
Elliptical Fire Perimeter 0 mi
Rate of Perimeter Growth 0.112 ch/hr

F. Fire Behavior Forecasts using CFFDRS

For the most part, the incident action plan (IAP) specific fire behavior forecast is organized and formatted the same way as described in the Fire Behavior Field Reference Guide. These Alaska specific recommendations can help connect with other tools and briefings provided to firefighters before and while in the field.

INPUTS

WEATHER SUMMARY:

- Emphasis on any critical fire weather factors (high pressure, chinook winds, etc.) in discussion.
- Highlight any critical thresholds in temperature and relative humidity from FWI interpretation table above.

OUTPUTS

FIRE BEHAVIOR-General:

Fuels & Terrain (highlight important factors):

- Emphasize terminology for fuels commonly used here. Black spruce, white spruce, MixedWood or mixed forest, aspen and/or paper birch, shrub and tussock tundra.
- Reference burn scars as a separate fuel category, reference how old they are and what fuels (black and/or sparse, heavy dead and down, grassy, or shrubs) are in them.
- You can identify fuel types or fuel models, but only in conjunction with more descriptive and identifiable distinctions in vegetation and fuel.
- Reference live vegetation conditions related to normal conditions. Has the landscape greened up? Is it showing yellowing or other indicators of drought-stress?

Fuel Moistures:

- Referencing recently observed and currently forecasted Fine Fuel Moisture Code (FFMC) levels from several nearby stations in AKFF is valuable in evaluating relative value of persistence or highlighting changing predictions.
- Referencing BUI (for Boreal) and DMC (for Tundra) landscapes and how they have changed over the last week or so can help interpret overall flammability of the fire area. Use graphs from stations in the area from AKFF to help evaluate and report how current conditions compare to historic trends and extremes.
- Use the FWI interpretation table above to help describe the current situation.
- Reference Tactical Analysis interpretation after rainfall events.

General Fire Behavior Descriptions and Predictions:

- Emphasize the daylength and how it affects the burn period for the current situation. Many firefighters from the lower 48 are unfamiliar with the influences of the midnight sun in current situation.
- Rates of spread could be referenced in miles per hour for tundra, spruce and MixedWood. Feet per minute make more sense for deciduous and recent burn scars.
- Flame lengths, in feet, are valuable descriptions and predictions. The fire type (surface, torching, and active crown fire) can be predicted and should be reported.
- Include Probability of Ignition and Spotting Distance predictions with reference to past conditions.

Figure 5: Fire Behavior Forecast Suggestions

4. Burn Period

This graph of Kanuti RAWS (AK03N Tanana Zone-North) Solar Radiation highlights the day length and solar radiation on sunny days that defines fire seasonality in Alaska. Solar radiation on sunny days is generally comparable among Wind-Driven, Duff-Driven, and Drought-Driven seasons. Only the Diurnally Limited season is significantly diminished.

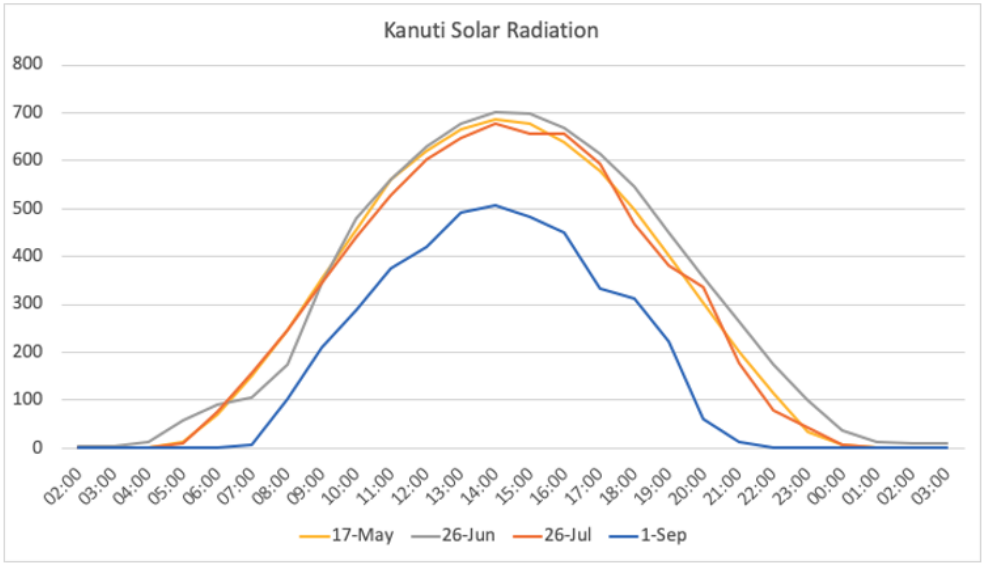


Figure 6: Kanuti RAWS Solar Radiation

The table below represents burn period in minutes. It is useful for initial analysis and to help calibrate analysis based on seasonality.

- **Short-Term** – Choose a burn period based on expected weather and season for each day.
- **Near-Term** – Start and stop hours should include peak hours, 1600-1700. If no fire growth is expected, use a zero hour burn period.
- **FSPro** – Hot, dry, and unstable conditions represent top bin burn period.

Season and ERC Table Row/Weather	Wind-Driven April 1- June 15	Duff-Driven June 15 - July 15	Drought-Driven July 15-Aug 15	Diurnal Limited Aug 15 and later
1st Row: Hot/Dry/Unstable	480	540-600	480	Should be based on which row the burn days fall into and how active the fire is expected to be in the analysis period. Less than 5 hours.
2nd Row: Hot/Dry	420	480	420	
3rd Row: Min RH 25% +	300	360	300	
4th Row: Clouds & Sun	180	240	180	
5th Row: Cloudy	60	120	60	

8. STFB and FSPro Spotting Probability

These spotting probabilities are displayed as prospective inputs to the FSPro Analysis ERC Table. Any of the individual recommendations (combination of season and current weather) could be considered as a recommendation for a single STFB analysis scenario.

Season and ERC Table Row/Weather	Wind-Driven Before Greenup	Duff-Driven Greenup-July 15	Drought-Driven July 15-Aug 15	Diurnal Limited Aug 15 and later
1st Row: Hot/Dry/Unstable	.20	.20-.25	.15-.25	Should be based on which row the burn days fall into and how much crown fire & spotting expected on those days.
2nd Row: Hot/Dry	.15	.15-.20	.10-.20	
3rd Row: Min RH 25% +	.10	.10	.05-.15	
4th Row: Clouds & Sun	.05	.05	.01-.05	
5th Row: Cloudy	.01	.01	.00 to .01	

Figure 8 Short-Term and FSPro Spotting Probability Guidance

9. NTFB Spotting Probability

Near-Term uses a different processor than Short-Term or FSPro. Spotting needs to be scaled appropriately in Near-Term or processing time will increase significantly or not complete.

Season and ERC Table Row/Weather	Wind-Driven Before Greenup	Duff-Driven Greenup-July 15	Drought-Driven July 15-Aug 15	Diurnal Limited Aug 15 and later
1st Row: Hot/Dry/Unstable	.10	.10-.15	.07-.13	Should be based on which row the burn days fall into and how much crown fire & spotting expected on those days.
2ndRow: Hot/Dry	.07	.08	.05-.1	
3rd Row: Min RH 25% +	.05	.05	.03-.07	
4th Row: Clouds & Sun	.03	.03	.02	
5th Row: Cloudy	0	0	0	

Figure 9 Near-Term Spotting Probability Guidance

B. Winds

Many RAWS stations report windspeeds that are lower than forecast estimates or those reported from nearby ASOS (Airport Automated Surface Observing Systems) stations. These RAWS windspeed measurements may produce underestimates of mid-flame windspeed used in fire behavior predictions.

This example from August 2019 compares estimates from the Palmer ASOS and Little Granite RAWS, using AKFF graphs to demonstrate the difference that can manifest between RAWS and ASOS measurements. A wind event pushed rapid spread and extreme fire behavior in the area over two days, August 17 and 18.

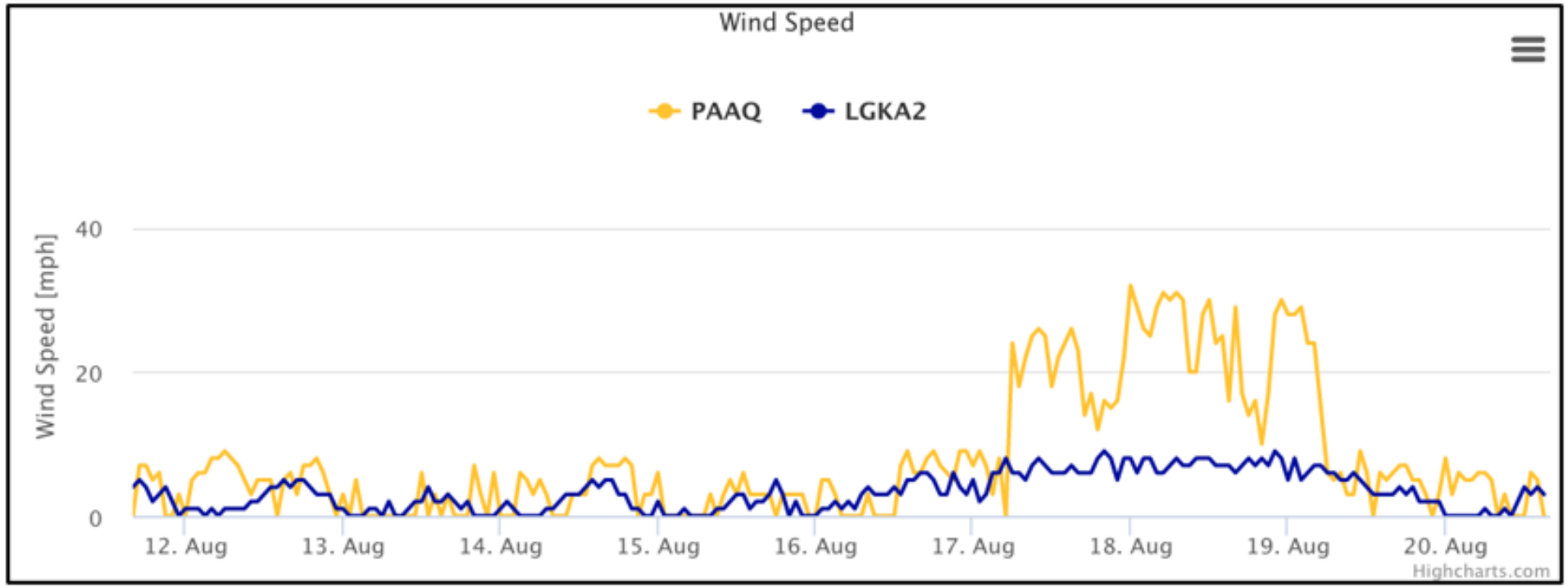
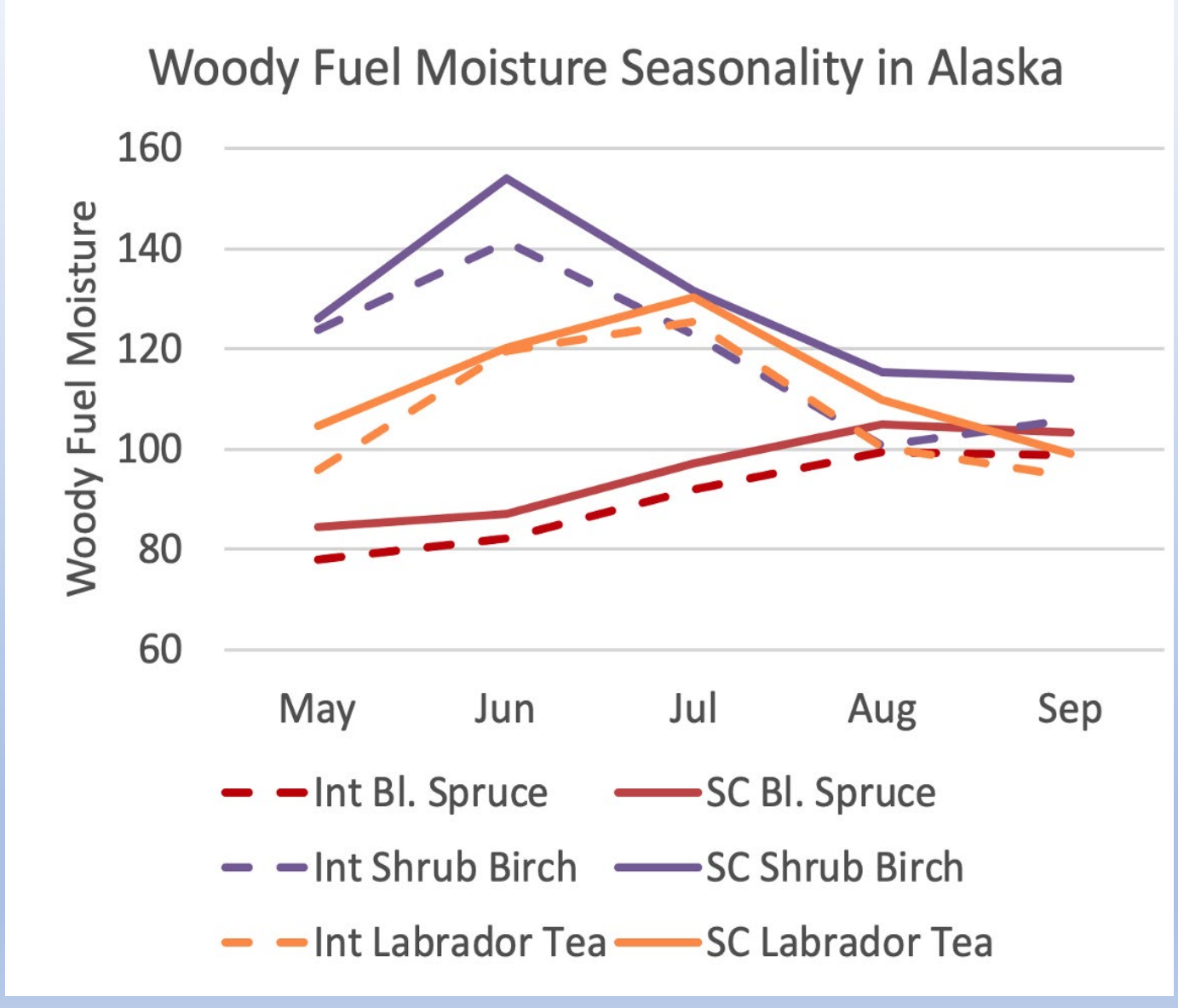


Figure 11: Windspeed Comparison


Woody Fuel Moisture Seasonality in Alaska
Woody Fuel Moisture
160
140
120
100
80
60
May
Jun
Jul
Aug
Sep
Int Bl. Spruce
SC Bl. Spruce
Int Shrub Birch
SC Shrub Birch
Int Labrador Tea
SC Labrador Tea

*Analysis Name (Special Characters allowed EXCEPT backslash \ and apostrophe ')

Calib 1

*Burn Period (1-24 h

8

*Analysis Date

04/22/2020

*Hour

17

*Conditioning Days

0

*Spotting Probabilit

0.15

*Foliar Moisture Content (%)

100

*Crown Fire Method

Finney (1998)

*Direction from Ma

0

Analysis Shape Files

Ignition File

Barriers File

Fill Barrier Do NOT Fill

Station Information

*Station

500931 - PAXSON (43.4 miles)

Fire Danger Rating Graph

Green Up Month/Day	Grass Type	Climate Class	Slope Class
05/20	P : Perennial	2 : Subhumid	2: 26 - 40%

Latitude	Longitude	Elevation	Aspect	Avg Precipitation	Pos on Slope	Forecast Zo
62.9453	145.5014	2,670 feet	Flat	12.00 inches	Valley Bottom / Flat	7

Wind Information

*Speed

3

*Direction

230

Wind Type

- Generate Gridded Winds
- Static Direction
- Wind Blowing Uphill
- Wind Blowing Downhill

- Wind Direction is only necessary if you generate gr
- Gridded Winds use the resolution specified for the

Initial Fuel Moistures

Model	1 Hour FM	10 Hour FM	100 Hour FM	Herb FM	Woody FM
default	4	6	7	60	90

Delete

*Fuel Model

Add Fuel Models

or FSPro Analysis

Station Information

*Station ID

500931 - PAXSON (43.4 miles)

Fire Danger Rating Graph

*Green Up Month/Day

05/20

*Grass Type

P : Perennial

*Climate Class

2 : Subhumid

*Slope Class

2: 26 - 40%

Latitude	Longitude	Elevation	Aspect	Avg Precipitation	Pos on Slope	Forecast Zone	Station Type
62.9453	145.5014	2,670 feet	Flat	12.00 inches	Valley Bottom / Flat	7	4 - NFDRS Satellite

Date Filter

*Start Year 2000 to End Year 2020 and *Start Month/Day 01/01 to *End Month/Day 12/31

ERC Correlation Parameters

*Max Lag 30 *Max Degree of Fit 9

Generate ERC Classes

%ile	Min ERC	1 Hour FM	10 Hour FM	100 Hour FM	Herb FM	Woody FM	Burn Period	Spot Prob	Delay
97	53	3	5	6	50	80	540	2	0
90	47	4	6	7	60	90	480	.15	0
80	41	5	7	8	70	100	420	.1	0
69	35	6	8	9	80	110	360	0.05	0

Add Row Delete Row Delete All Rows Recalculate Fuel Moistures

Save Download FWX... View Percentiles... Generate ERC Time Series... Season Ending Graph...

observed & forecast

ALASKA INTERAGENCY FIRE DANGER OPERATING PLAN

Vegetation / Landcover Class and Ecoregions

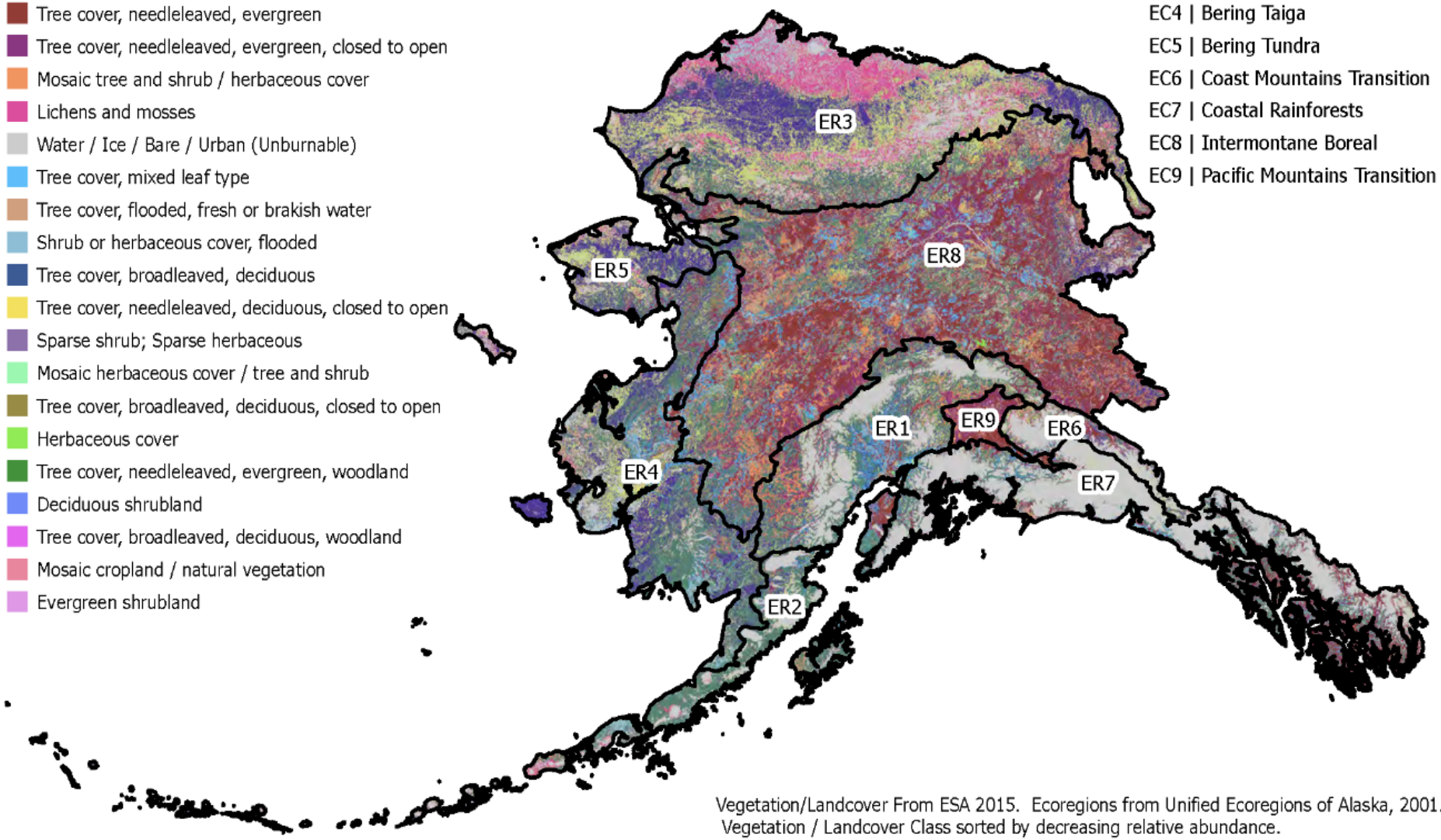
Alaska Interagency Coordination Center

Vegetation / Landcover Class

- Shrubland
- Sparse vegetation (tree, shrub, herbaceous cover)
- Grassland
- Tree cover, needleleaved, evergreen
- Tree cover, needleleaved, evergreen, closed to open
- Mosaic tree and shrub / herbaceous cover
- Lichens and mosses
- Water / Ice / Bare / Urban (Unburnable)
- Tree cover, mixed leaf type
- Tree cover, flooded, fresh or brakish water
- Shrub or herbaceous cover, flooded
- Tree cover, broadleaved, deciduous
- Tree cover, needleleaved, deciduous, closed to open
- Sparse shrub; Sparse herbaceous
- Mosaic herbaceous cover / tree and shrub
- Tree cover, broadleaved, deciduous, closed to open
- Herbaceous cover
- Tree cover, needleleaved, evergreen, woodland
- Deciduous shrubland
- Tree cover, broadleaved, deciduous, woodland
- Mosaic cropland / natural vegetation
- Evergreen shrubland

Level II Ecoregions

EC1 | Alaska Range Transition
EC2 | Aleutian Meadows
EC3 | Arctic Tundra
EC4 | Bering Taiga
EC5 | Bering Tundra
EC6 | Coast Mountains Transition
EC7 | Coastal Rainforests
EC8 | Intermontane Boreal
EC9 | Pacific Mountains Transition



Vegetation/Landcover From ESA 2015. Ecoregions from Unified Ecoregions of Alaska, 2001.
Vegetation / Landcover Class sorted by decreasing relative abundance.

Windspeed, mph	FFMC 70-75 (Temps 50-80	FFMC 76-84 (Temps 50-80)	FFMC 82-85 (Temps 50-80)	FFMC 86-89 (Temps 50-80)	FFMC >90, (Temps 50-80)
10 mph	0.25 miles 20-23 %	0.25 miles 27-32 %	0.25 miles 37-42 %	0.25 miles 50-56 %	0.25 miles 67-74 %
15 mph	*0.4 miles* *20-23 %*	*0.4 miles* *27-32 %*	*0.4 miles* *37-42 %*	**0.4 miles** **50-56 %**	**0.4 miles** **67-74 %**
20 mph	*0.5 miles* *20-23 %*	*0.5 miles* *27-32 %*	**0.5 miles** **37-42 %**	**0.5 miles** **50-56 %**	**0.5 miles** **67-74 %**
25 mph	*0.7 miles* *20-23 %*	**0.7 miles** **27-32 %**	**0.7 miles** **37-42 %**	**0.7 miles** **50-56 %**	**0.7 miles** **67-74 %**
30 mph	**0.8 miles** **20-23 %**	**0.8 miles** **27-32 %**	**0.8 miles** **37-42 %**	**0.8 miles** **50-56 %**	**0.8 miles** **67-74 %**

Contact:

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907 482-0161