University of Idaho
College of Natural Resources

How-to: Use Fire Family Plus

Software: Fire Family Plus Version 5.0
Updated: June 2019 by Heather Heward

Overview

Fire Family Plus is a tool for organizing and displaying weather data. In order to produce the most usable output it is important to consider the following.

- Use local knowledge when selecting a RAWS station and picking the most meaningful NFDRS variable (BI, ERC, KBDI, SC)
- Fire Family Plus takes the weather information recorded from RAWS stations and applies models to calculate fuel moisture – the same limitations with models exist.

Visit firelab.org to download the latest version of FFP and refer to the users guide for more detailed instructions (see the options in the lower right of the page for downloads and documents).

Overview of Major Steps:

1. Find a RAWS station
2. Extracting historical weather and fire data
3. Summarizing the weather
4. Exporting weather data

This is a basic overview – Additional information can be obtained from the FFP help function.

Significant changes are expected for the next version of FFP

University of Idaho
College of Natural Resources

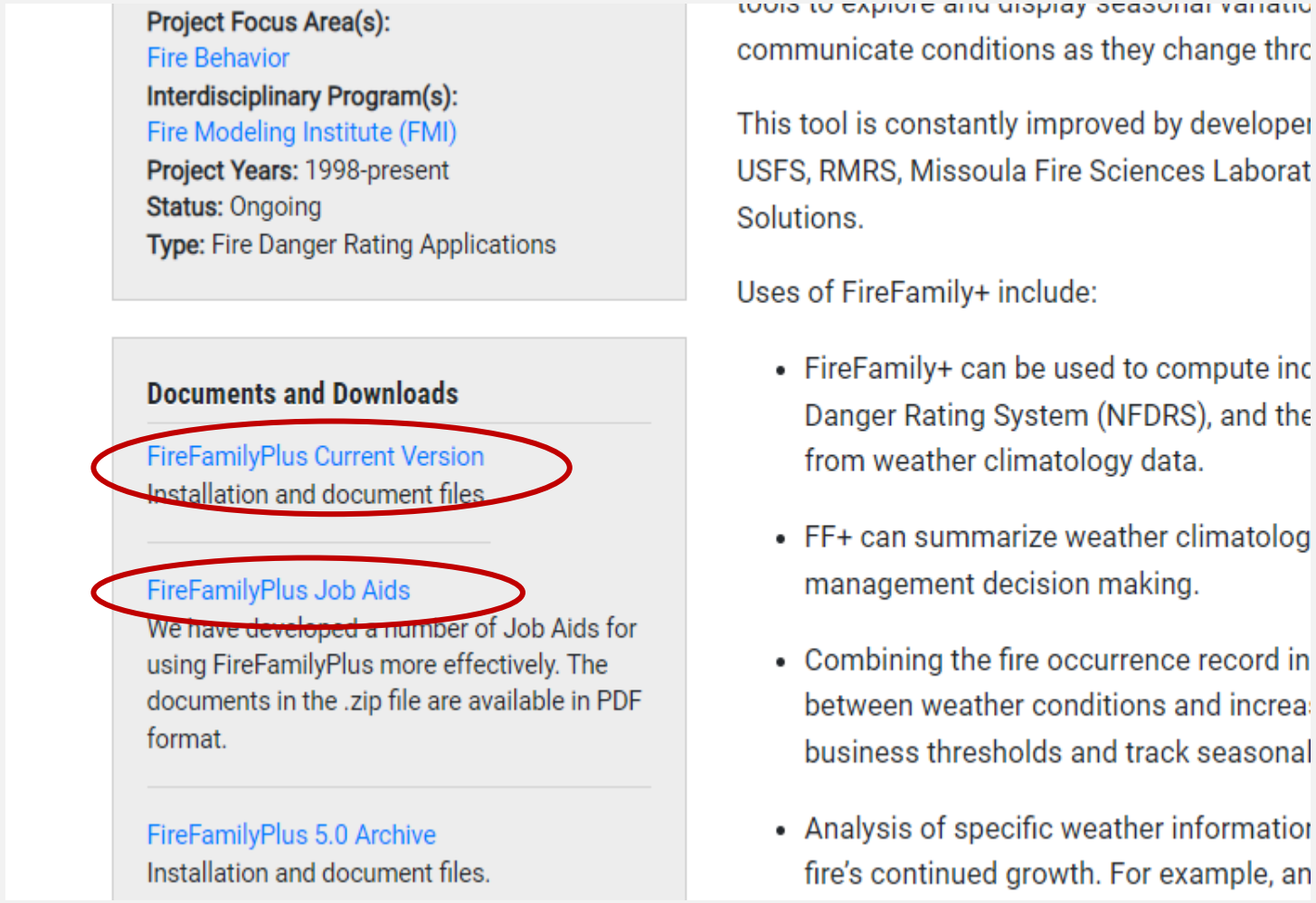
How-to: Use Fire Family Plus

Download Fire Family Plus

FF+ is a program that can be run by most computers and operating systems and does not need high speed processing.

This website is frequently being updated. If things look different just look around for the current version.

a. Go to https://www.firelab.org/project/firefamilyplus
b. Select **FireFamilyPlus Current Version**
c. Follow the download instructions.
d. See the FireFamilyPlus Job Aids for additional instructions.



Project Focus Area(s):
Fire Behavior
Interdisciplinary Program(s):
Fire Modeling Institute (FMI)
Project Years: 1998-present
Status: Ongoing
Type: Fire Danger Rating Applications

Documents and Downloads

FireFamilyPlus Current Version
Installation and document files.

FireFamilyPlus Job Aids
We have developed a number of Job Aids for using FireFamilyPlus more effectively. The documents in the .zip file are available in PDF format.

FireFamilyPlus 5.0 Archive
Installation and document files.

tools to explore and display seasonal variatio
communicate conditions as they change thro

This tool is constantly improved by developer
USFS, RMRS, Missoula Fire Sciences Laborat
Solutions.

Uses of FireFamily+ include:

- FireFamily+ can be used to compute inc
  Danger Rating System (NFDRS), and the
  from weather climatology data.
- FF+ can summarize weather climatolog
  management decision making.
- Combining the fire occurrence record in
  between weather conditions and increa
  business thresholds and track seasonal
- Analysis of specific weather informatio
  fire's continued growth. For example, an

University of Idaho
College of Natural Resources

How-to:

Getting data

2.1 Selecting a RAWS

1. Go to https://wfas.net/index.php/google-earth-map-data-weather-100
2. Download the WFAS Google Earth Map data file in KMZ format OR the auto-updating KML file if you want to use this as a way to monitor weather.
3. In Google Earth explore the location of the RAWS station.
4. The "right" RAWS station depends on your project objectives.
5. Variables to consider
    1. Proximity to project
    2. Elevation
    3. Aspect
    4. Topographic features (drainages)
    5. Fuel model
6. You may need more than one RAWS to represent your area.

2.2 Historic Hourly Data

a. Go to https://www.wfas.net/nfdrs2016/maps/
b. Zoom to area of interest.
c. Download any possible RAWS that could be representative to your area of interest (fig. 2) (1). (You can explore that data more fully in FF+ to determine the best match for your area)
d. Change the name of the downloaded file to indicate that it came from the WFAS site (this will help with the import process)
e. Record the station ID you will need it to download current data. (2)

If you know the station ID but not the location you can find this same data from the CEFA site. CEFA RAWS FW13

Fig. 1

Fig. 2

University of Idaho
College of Natural Resources

How-to

Getting data

2.3 Recent Hourly Data – https://famit.nwcg.gov/applications/FAMWeb This site also has historic daily data but not data but the download is slower. It is recommended that you download from WFAS first and fill in current dates with FAM-IT.

a. Select **Public Access Reports** – click **OK** to go to an external site
b. Team content tab on the left (fig. 1(1)

Weather data

a. Go to **Weather Data Extract** (fig. 1(2))
b. Select **Historical >> FW13**
c. Enter station ID
d. Select dates, either the whole range that you need or just the time that is not covered by the WFAS data. (fig.2)
e. Select **Hourly** and then **Finish** in the bottom left
f. The file will be saved in your downloads folder. Change the name to something meaningful AND add ".fw13" as the extension (fig. 3)
g. Add "DW" to the file name so that you know it came from the data warehouse.

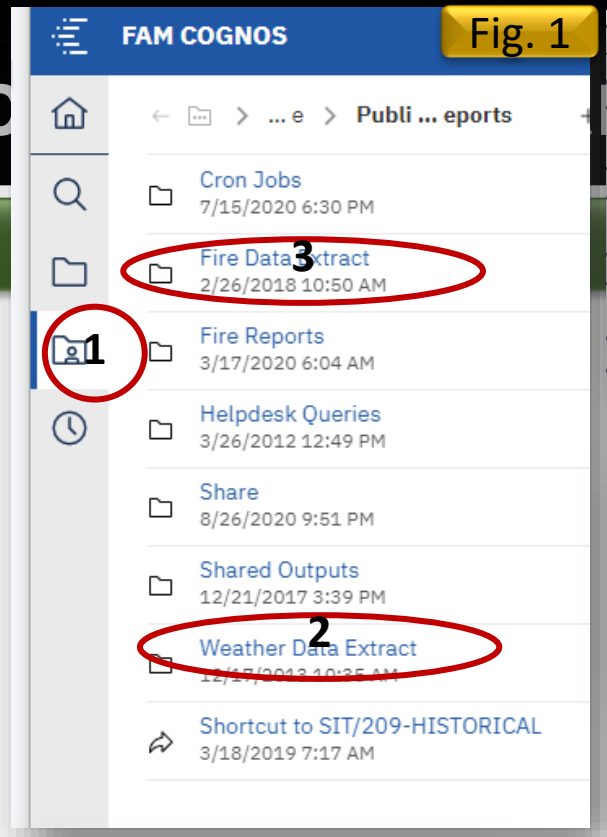
TIP, if you do not see the suffix of your other files. For Window, open your file explorer, choose the **View** tab and check **File name extensions** (fig. 4)

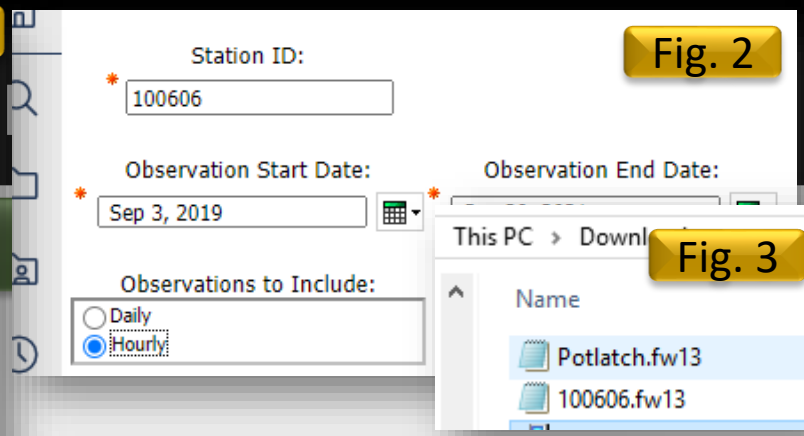
Station catalog data files

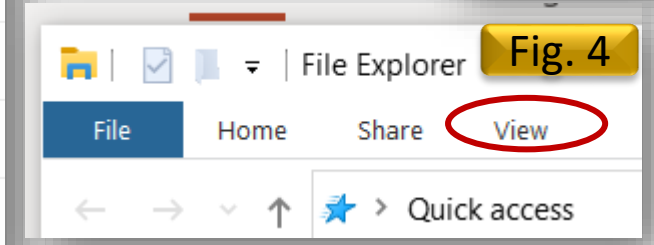
a. Weather data extract>>Station catalog data extract>>
b. Select **Station Information S..Catalog by Station**(fig. 5)
c. Enter RAWS **Station ID** and click **Finish** in the bottom left
d. Save the file with a .txt extension

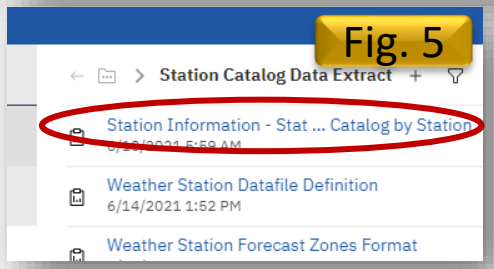
Fire data

a. Coming soon









University of Idaho
College of Natural Resources

How-to: Use Fire Family Plus

Getting started

3.1 – Importing

a. Open FFP

b. Select **File** >>**New** and name the project that you will be working on

c. Select **Data** >> **Import**

d. Weather - select **FW9/FW13 Files (**fig. 1)

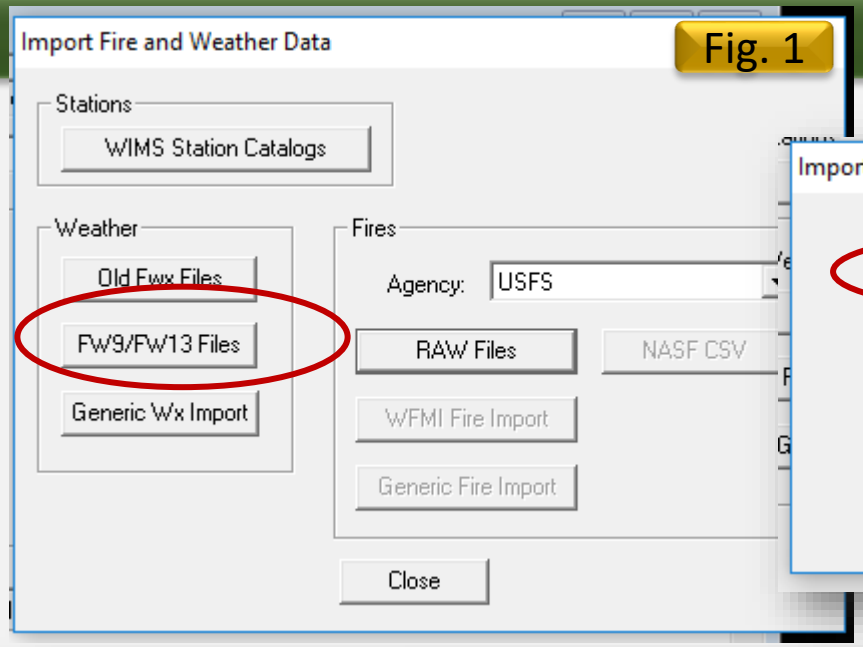
e. Select the FW13 file that you downloaded. Check that "0 errors were encountered" and some number of records were recorded (fig. 2). If you encountered errors, open the files in a notepad and remove or resolve the errors.

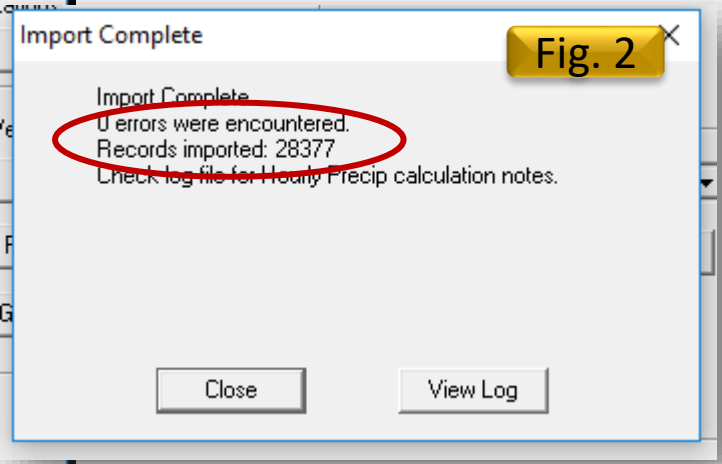
f. Fires – select each agency you have data for and import the RAW file.

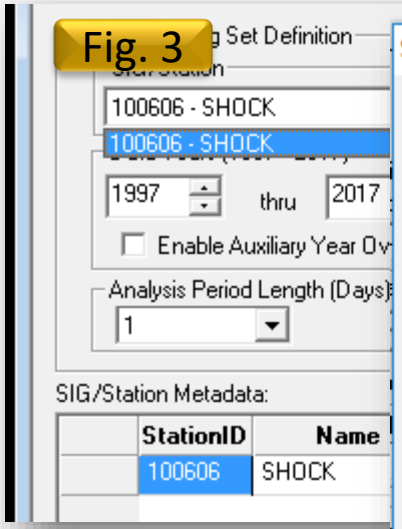
g. Close out the import windows

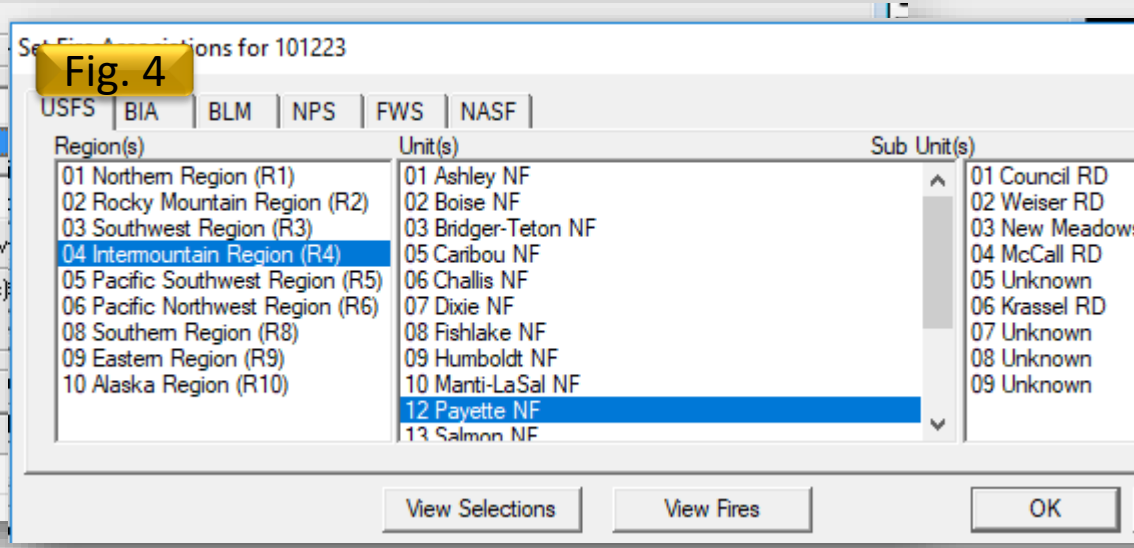
h. Under SIG/Station select the station that you just imported (fig. 3)

i. Fire Associations – for each agency, navigate to the national forest where you have data (fig. 4)









How-to: Use Fire Family Plus

Getting started

3.1 – Creating a SIG – Special Interest Group

a. Go to **Data>>SIG>>New**

b. Add name and description and move stations into *Included stations* using the side arrows (fig. 1). Click **OK**

c. Setting weights - Helpful if one station is more representative of an area than another. From the *Special Interest Group* Dialog box select **Set Weights**

Equal numbers mean equal weights, if one is higher then the values from that RAWS have more impact on the final numbers given from the SIG.

a. Click **OK** and then **Close** to save and exit.

e. To edit the SIG go to **Data>>SIG** and edit, delete, or export metadata.

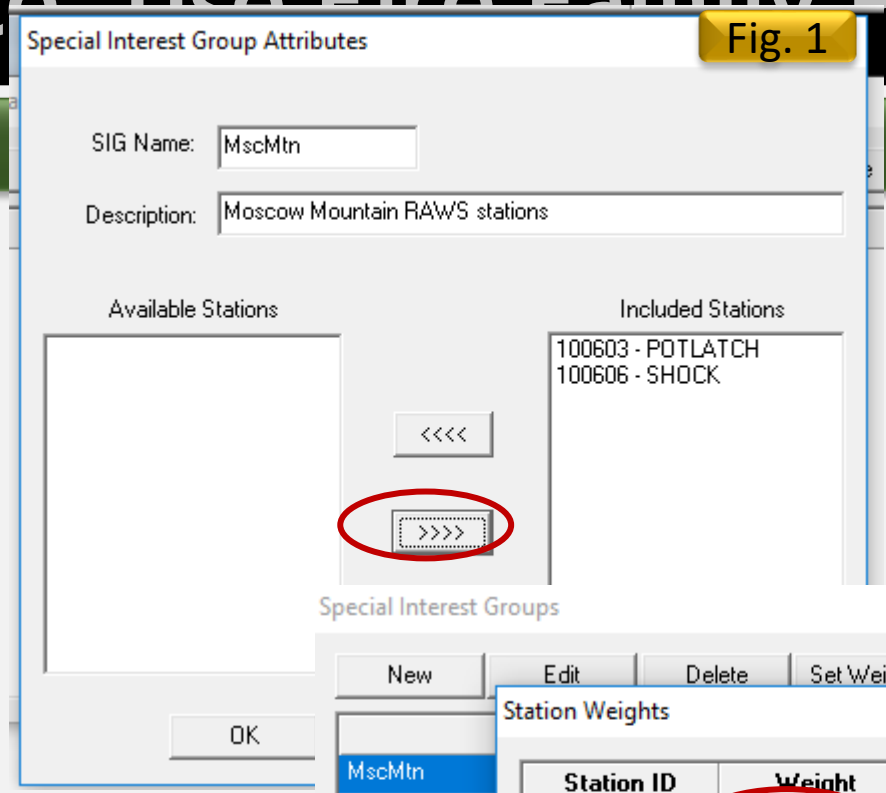


Fig. 1

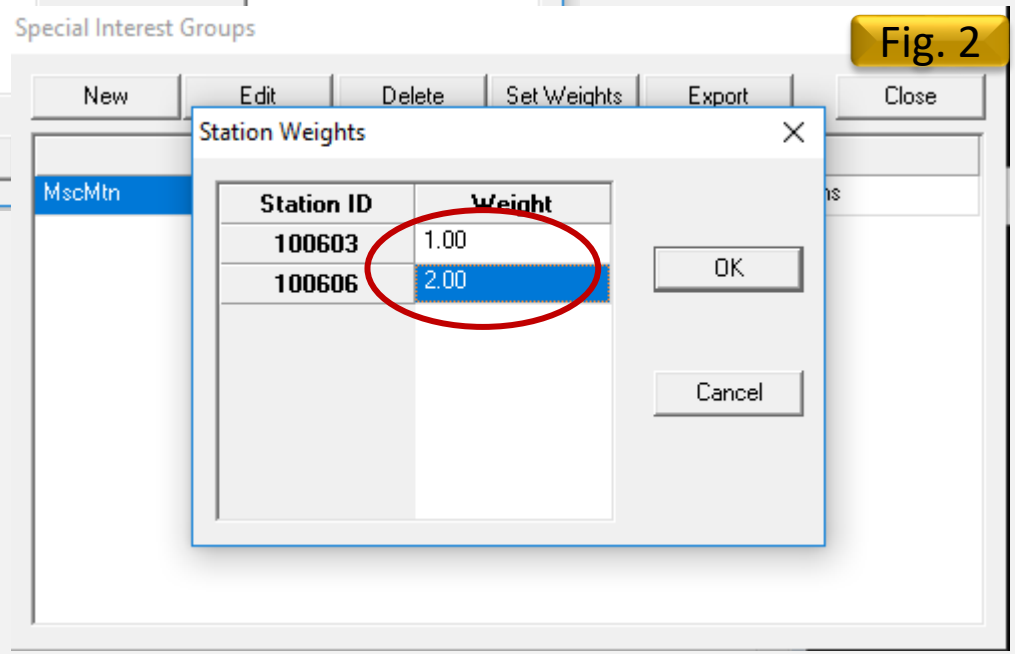


Fig. 2

What is a SIG? A Special Interest Group is a combination of weather stations for an area. A SIG can be useful if
1. You have an area that is too large to be represented by 1 RAWS station

University of Idaho
College of Natural Resources

How-to: Use Fire Family Plus

Getting started

a. Year range (fig. 1)(1)– To look at what may happen in the future only include 5 to 15 years of data depending on what you feel is representative of current conditions. If you are trying to understand trends from the past, then you will use all available data.

b. Annual Filter (Time of Year) (2) – Limit the months based on your modeling objectives. If you are modeling fire in August, then filter to just August.

c. Analysis Period Length (3)– If creating graphs in Climatology, using 3 or 4 days will even out the display. Using 1 day will give you the most accurate report of the actual values.

d. NFDRS Fuel Model– (4) NFDRS got a facelift. As part of that you can now use simplified NFDRS fuel models but you will need to **select the new NFDRS fuel model from the list**. Observe what the default fuel model is and then select the new fuel model based on the table 1.

Table 1

NFDRS 2016 Fuel Type	NFDRS 2016 Fuel Model	Equivalent NFDRS 1978 Fuel Model
Grass	V	A,L,T
Grass / Shrub	W	R,S,C,D
Brush	X	B, F
Timber	Y	G,H,N,P,O,Q,U,E
Slash	Z	I,J,K

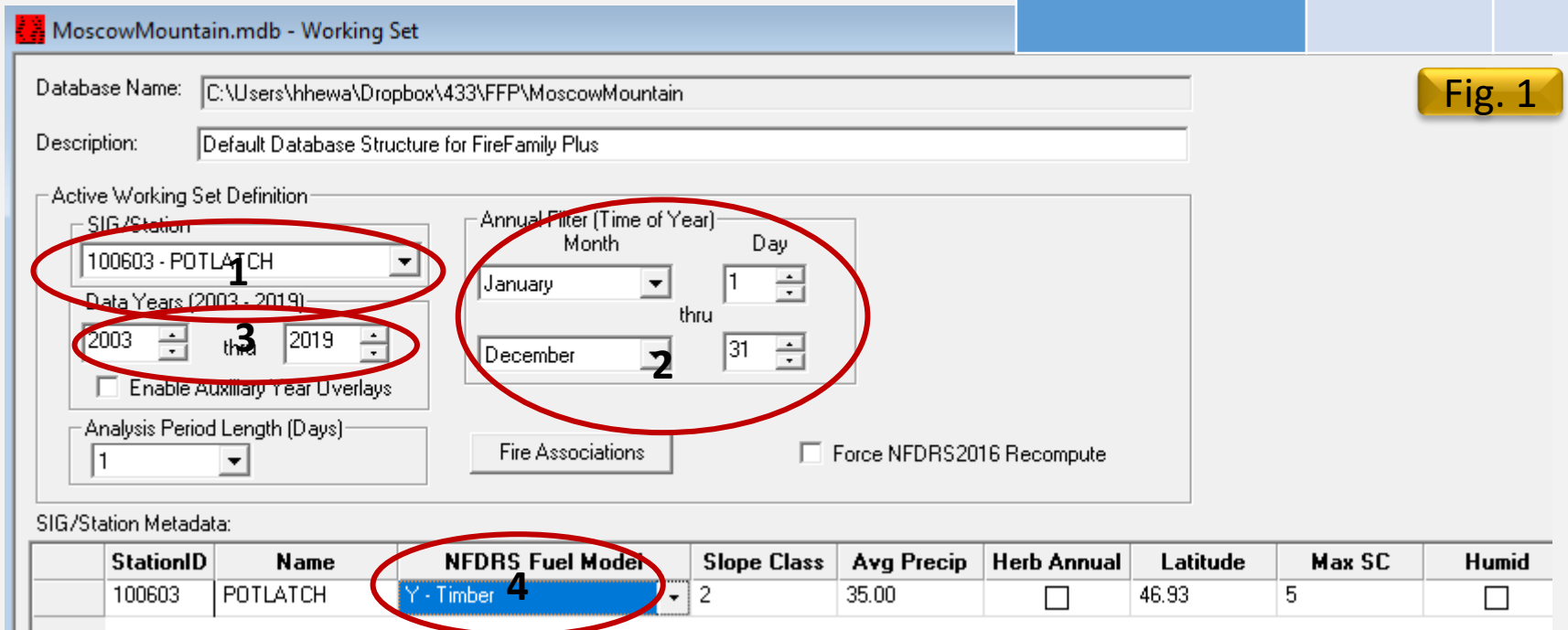


Fig. 1

University of Idaho
College of Natural Resources

How-to: Use Fire Family Plus

Climatology

See the FFP TechTips for detailed Climatology functions

4.1 – Exploring and displaying data

a. To view full weather record go to **Weather >> View Observations.**

b. To great data summaries go to **Weather >> Climatology** or click on the storm cloud icon (fig. 1 (1)

   a. Explore the available outputs, check a box and select **Run**

c. Changing the values in **CP #1** and **CP#2** (critical percentile) the display lines on the graph. (fig.2)

d. Select **Daily Freqs** for a summary of the number of observations in each percentile (fig. 3). Ex. if you selected an analysis period of 10 days and the frequency was 36 that means that between 1997 and 2017 there were 36 times where the average 10 day temperature was 92 degrees. Changing the years, analysis period and annual filter will change this number but each output will give you an idea of the broad scale weather patterns and percentiles.

e. To expand the graph window of a report, double-click on it.

f. To tile the many report window select **Window>>Tile Horizonal or vertical.**

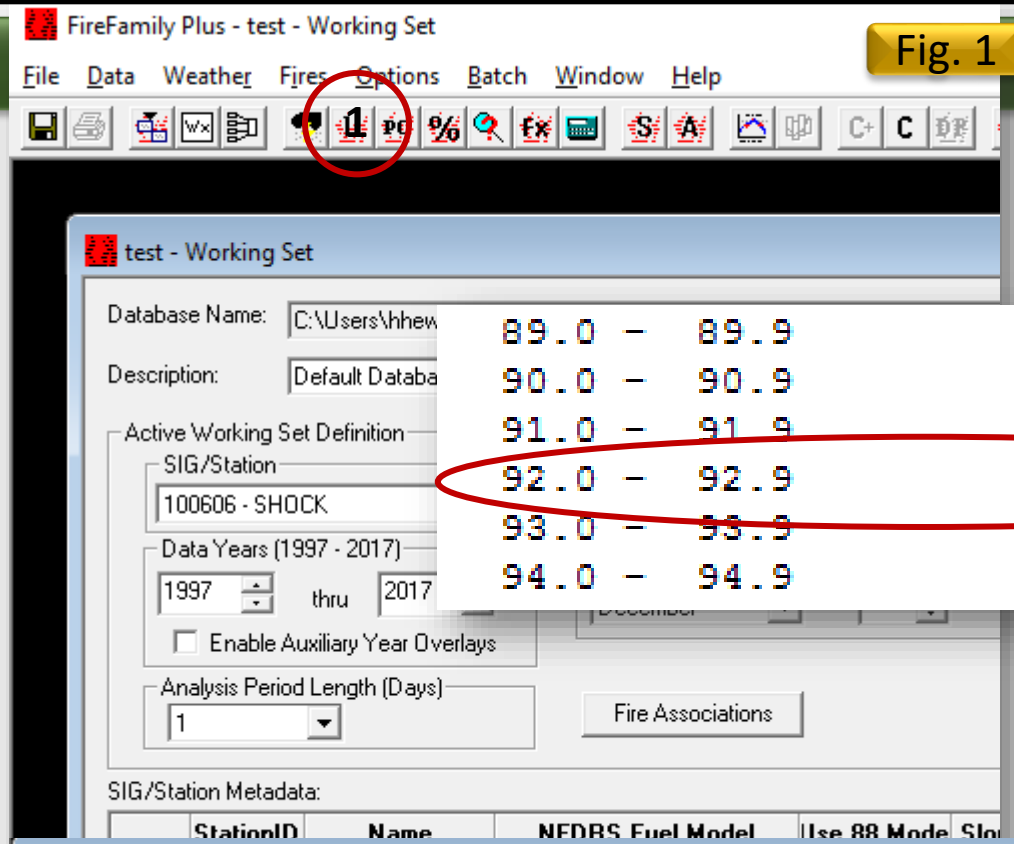


Fig. 1

Fig. 3

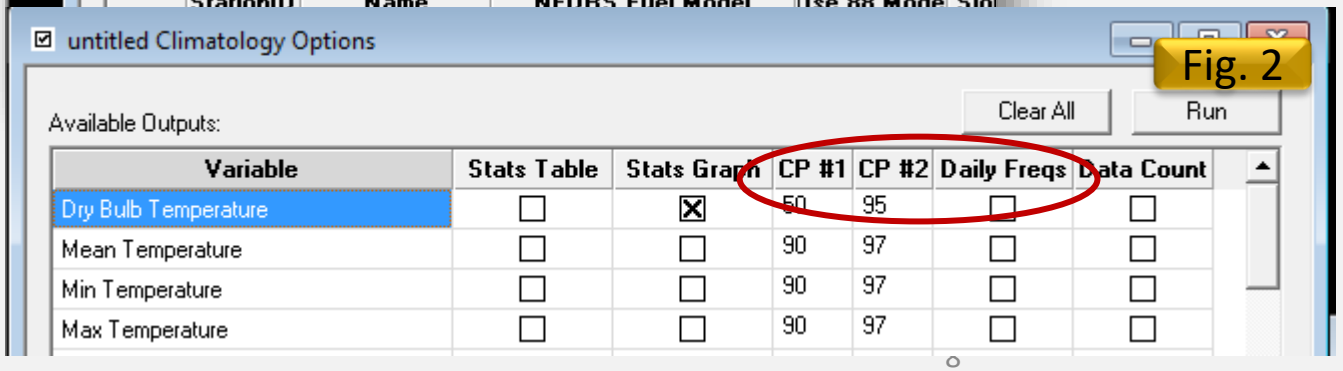


Fig. 2

University of Idaho
College of Natural Resources

How-to: Use Fire Family Plus

Climatology

See the FFP User's Guide 4.14 for detailed instructions on merging graphs

4.2 – Merging graphs

a. Once you have run the climatology tool and have several graphs created, you can create a combined graph for up to 4 variables of interest

b. Select **Option >> Merge**

c. Choose the years to graph, or select *Average (*fig. 1)

d. Specify the variables and style, click **OK (**fig. 2) Common combinations are:

   a. **Temp, RH, BI**

   b. **1 hr, 10 hr, 100 hr, 1000 hr.**

   c. **Herbaceous fuel moisture, woody fuel moisture**

4.3 – Overlay

a. After creating a Stats Graph go to **Options >> Overlays** and select **New** to add one or more overlays (fig. 3).

See the FFP User's Guide 4.16 for more information on changing the look of your graphs (fig. 4)

Fig. 1

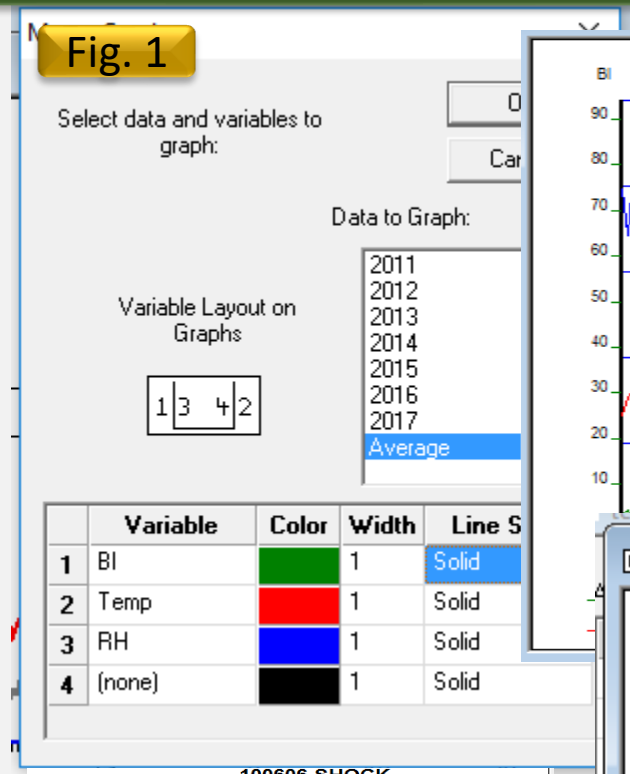


Fig. 2

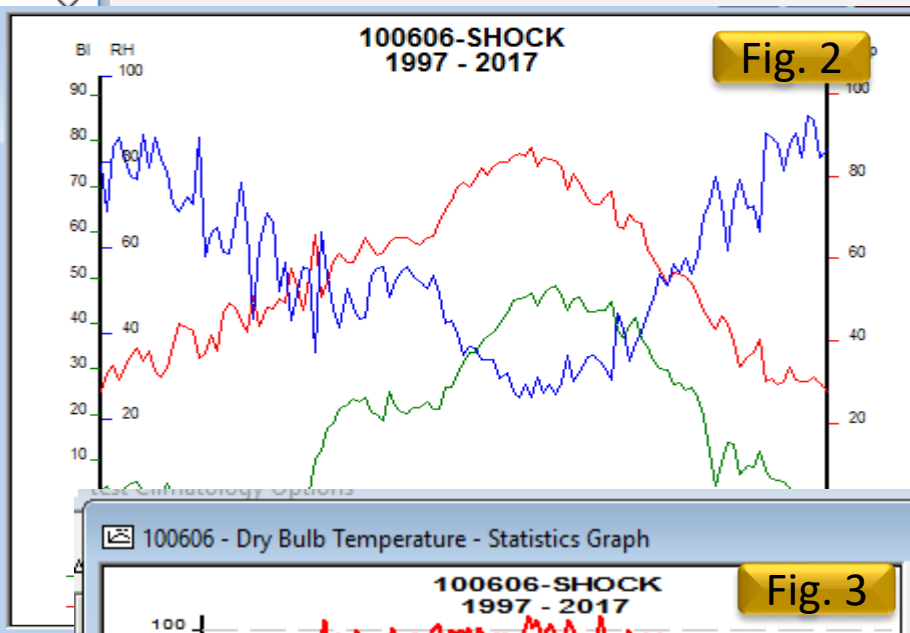


Fig. 3

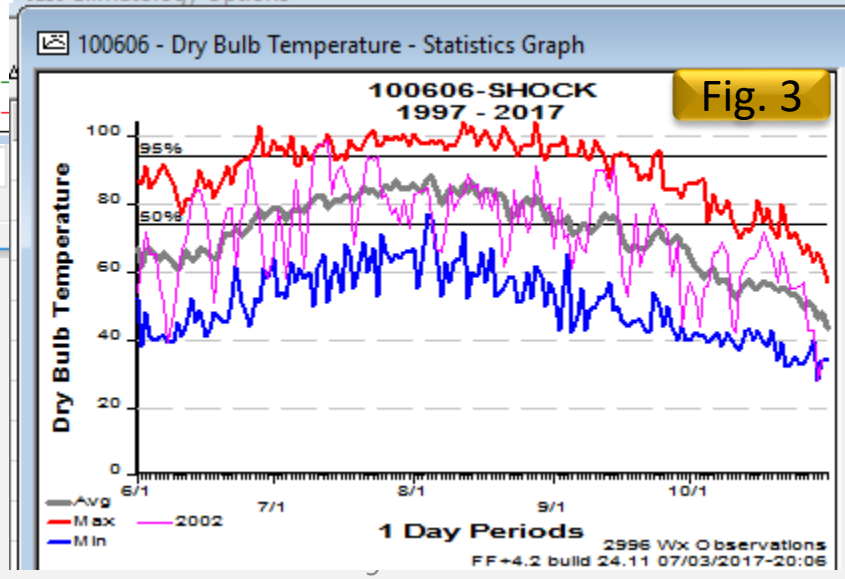
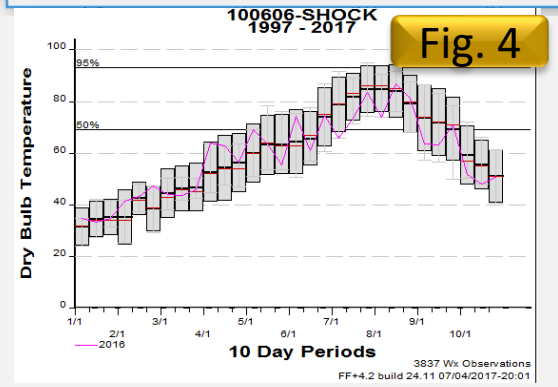


Fig. 4



University of Idaho
College of Natural Resources

How-to: Use Fire

Climatology

4.3 – Season Ending Event

Calculate the likelihood of a season ending event at any given time of year.

a. In **Climatology** change the CP#1 to 60 for ERC. An ERC of 60 is considered to be a season ending event (fig.1). Click **Run**.

b. Using the overlay option display at least 5 years and record the dates that the ERC went below 60. More dates will give you more accuracy. Occasionally it will go back up, use your best judgement on when the season really ended. You can display up to 3 overlays at a time (fig. 2). Make sure to select **Apply** (1). To pinpoint the date, click where the overlay crosses the 60% line and it will display in the lower right (2).

c. Go to **Weather >> Term >> General** and select **New.**

d. Select the station name or ID and select **OK**

e. Create a specific name and enter the days you recorded (fig.1) and select **Save & Run.**

f. The results show the key probabilities of the weather conditions for the days you inputted being met at given dates (fig. 4)

Fig. 1

Available Outputs:

Variable	Stats Table	Stats Graph	CP #1
Spread Component	☐	☐	90
Energy Release Component	☐	☒	60

Fig. 2

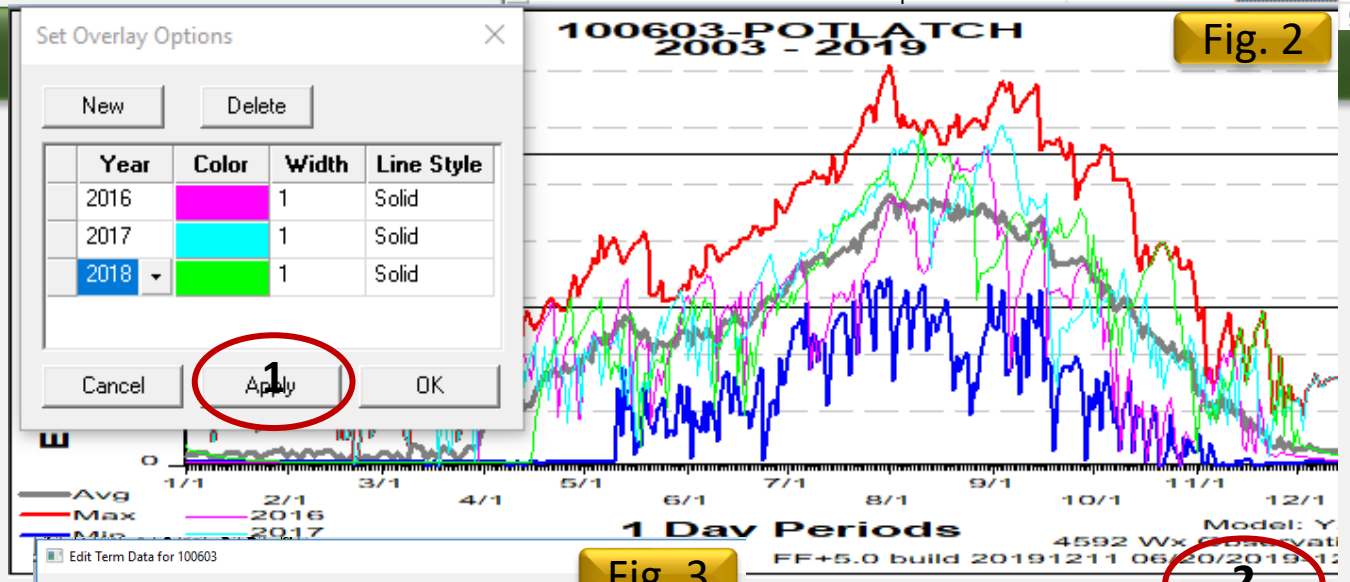


Fig. 3

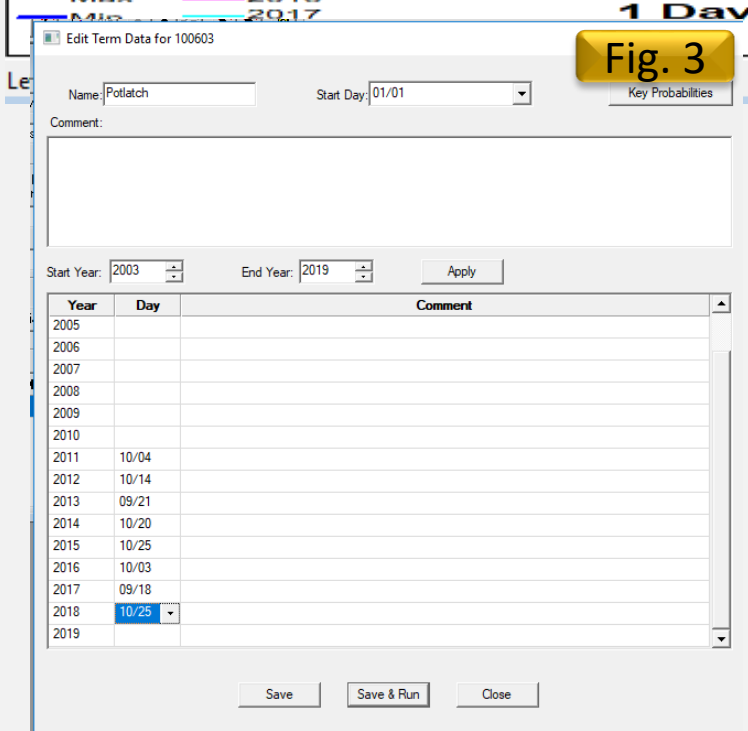
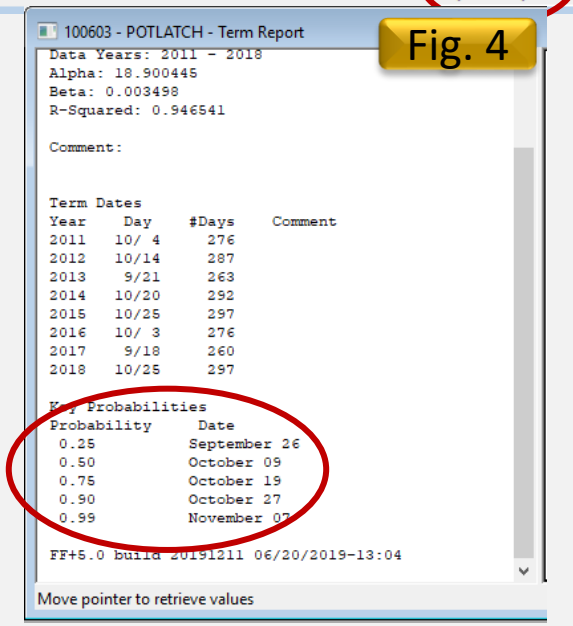


Fig. 4



University of Idaho
College of Natural Resources

How-to: Use Fire Family Plus

Other tools

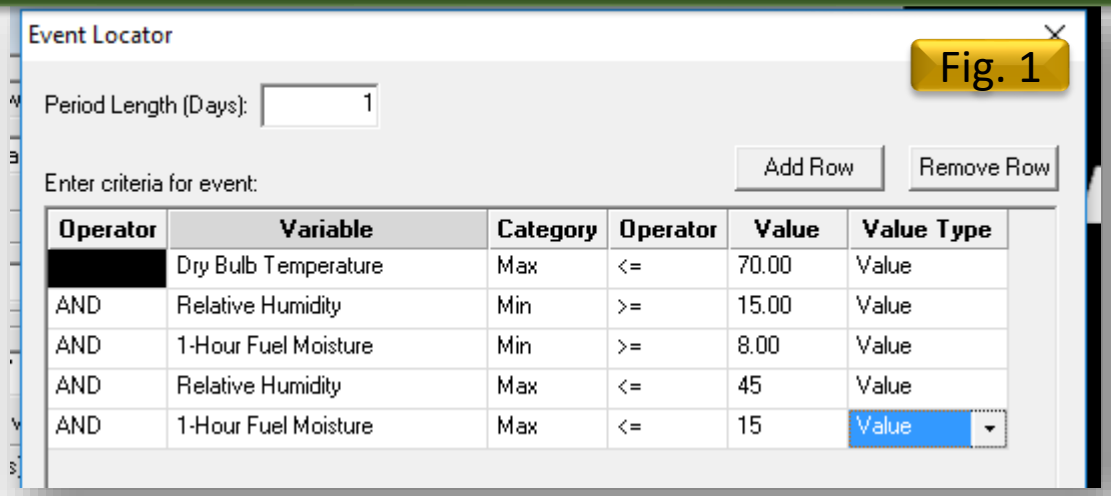
5.1 – Event locator

After determining the acceptable ranges for a prescription in BehavePlus, use the event locator to see how many days have met that prescription in the past. If there are very limited days that fit your criteria you many need to go back to Behave to test other input possibilities.

a. Go to **Weather >> Event Locator**

b. Specify the period length or consecutive days that need to meet the criteria. (figure 1)

   a. For best results specify upper and lower values for each variable.



Operator	Variable	Category	Operator	Value	Value Type
	Dry Bulb Temperature	Max	<=	70.00	Value
AND	Relative Humidity	Min	>=	15.00	Value
AND	1-Hour Fuel Moisture	Min	>=	8.00	Value
AND	Relative Humidity	Max	<=	45	Value
AND	1-Hour Fuel Moisture	Max	<=	15	Value

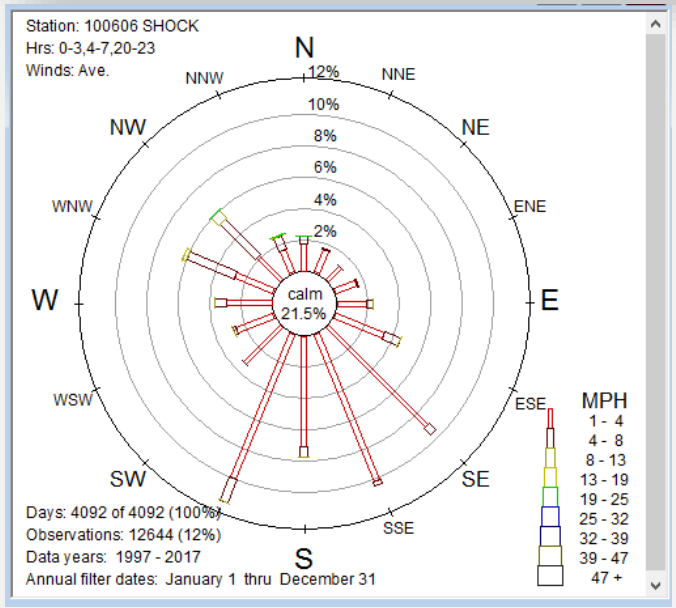
5.2 – Wind rose

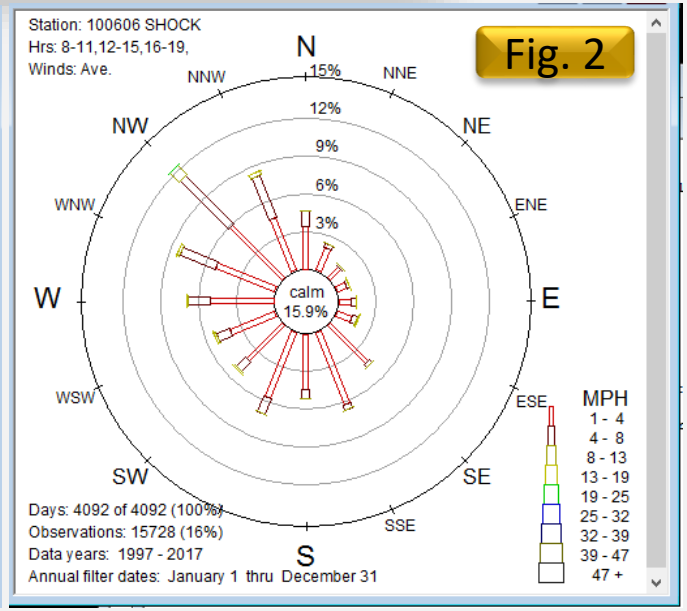
a. Go to **Weather >> Winds**

b. Specify *Wind record type* and *Diurnal wind filters*

Explore each individual wind rose first to observe general patterns. It may be useful to then group by day vs. night. You many need to adjust which hours are included in day and night depending on when winds change in your area. It is also helpful to view average winds and wind gusts separately.

TIP: To view multiple outputs you can select **Window >> Tile Horizontal**. To close all reports and graphs go to **Window >> Close all >> Reports and Graphs.** For higher quality figures you can go to **File>> Save as** and specify the file type.





This indicates where the wind is coming FROM – ex. for the SHOCK RAWS station the wind comes from the south at night and the north west during the day

How-to: Use Fire Family Plus

Other tools

See the FFP User's Guide 6.14 for other options in Season Reports

5.3 – Probability analysis

Reports the chance that tomorrow's variable will be the same as today's. The higher the percentage more likely it is that you will see the same weather (FFP UG 2009)

a. Go to **Weather >> Seasonal Reports >> Probability analysis**

b. You may need to type in the display ranges as shown in the UG

Fig. 1

	Relative Humidity					
Dry Bulb Temperature	0.00 – 45.00	45.00 – 50.00	50.00 – 70.00	70.00 – 80.00	80.00 – 90.00	90.00 – 120.00
0.00 – 47.00	1	0	9	11	12	2
47.00 – 77.00	100	33	87	11	0	1
77.00 – 80.00	31	0	0	0	0	0
80.00 – 85.00	46	1	2	0	0	0
85.00 – 90.00	36	0	0	0	0	0
90.00 – 130.00	6	0	0	0	0	0

5.4 – Percentile weather

"Identifies the frequency of occurrence of a particular variable of your choice" (FFP UG 2009)

a. Go to **Weather >> Seasonal Reports >> Percentile weather**

b. Select a variable

c. Choose predominant wind direction(s)

d. Click **Calculate (1), Calculate (2), Done (3)**

Fig. 2

Percentiles, Probabilities, and Mid-Points

Variable/Component Range	Low	Mod	High	
Percentile Range	0 - 15	16 - 89	90 - 97	98 - 100
Climatol. Probability	15	75	7	3
Mid-Point BI	0 - 0	28 - 28	54 - 54	60 - 60
Num Observations	0	14	9	4
Calculated Spread Comp.	0	0	0	0
Calculated ERC	0	0	0	0
Fuel Moistures				
1 Hour Fuel Moisture	0.00	7.90	2.81	2.94
10 Hour Fuel Moisture	0.00	9.12	3.64	3.55
100 Hour Fuel Moisture	0.00	14.01	6.99	5.95
Herbaceous Fuel Moisture	0.00	44.91	30.36	42.48
Woody Fuel Moisture	0.00	90.41	75.41	70.56
20' Wind Speed	0.00	2.71	4.33	5.25
1000 Hour Fuel Moisture	0.00	16.71	9.42	9.24

3838 Weather Records Used, 280 Days With Wind (7.30%)

University of Idaho
College of Natural Resources

How-to: Use Fire Fam

Exporting data

FireFamily Plus has the basic functions needed to understand the weather but further analysis can be performed using other more computationally intensive programs like Excel, R and Python.

Exporting data →Go to **Weather>>Hourly Listing** and select the data that you want and how you want it to be formatted (fig. 1)

6.1 – Hourly summary in Excel

a. Once the table is created select **File>> Save as**

b. Open Excel. Select **Open** and navigate to the folder of the.txt file.

c. In the bottom right of the Open box select **All files**

d. Select **Delimited** then **Next** and choose **Space** and click **Next** and **Finished**

e. Delete the Station information rows so that the top row is the column title

f. From the *Insert* tab select **Pivot table**

g. For Table/Range click the up arrow and select all the data columns (fig. 2).

h. For location use the up arrow and select the cell where you want the table to go. (use ctrl+shift+down arrow to highlight them all)

i. In the Pivot table options to the right Check **YYYY/MM/DD** and **hh:mm** (fig. 3(1)

j. For *Values* insert **1 h, 10 h** and change to **Average** (2)

k. Place curser on a cell with a date listed. On the *Analyze* tab select **Ungroup** and then **Group Selection** and select **Months** and **Hours**

l. Copy and paste all the data for the month you are interested out of the pivot table and add column labels.

m. Create a line graph comparing 1, 10, 100, and 1000 hr fuel moistures

n. Add and adjust figure elements.