

Job Aid 10 FireFamilyPlus Fires Analysis

Introduction

The goal of a fires analysis is to rate fuel model/NFDRS output combinations. Consider all three of the following factors when deciding which fuel model/NFDRS output to use for further fire analysis and Fire Danger application.

Fire Danger Application

Determine the answers to the following questions.

- What decision(s) are being made?
- Who is the target group?
- Do you need a “fast” or “slow” fuel model/NFDRS output combination?

Predictor Variable Range (Decision Space)

How many decision classes are needed? A large range of **Predictor Variables** allows more flexibility in setting levels for fire business.

- For example, a range of 0-45 allows more flexibility for 4 decision classes than a range of 0-2.

Goodness of Fit Text (Statistical Correlation)

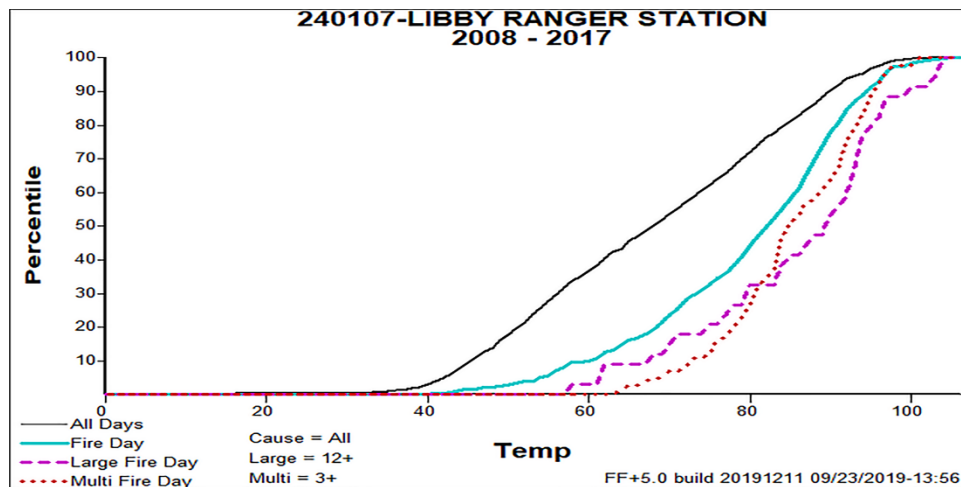
We use the **Chi-Squared** to determine goodness of fit. Lower is better.

The following values for **Chi-Squared** apply only to the logistic regression used in FireFamilyPlus.

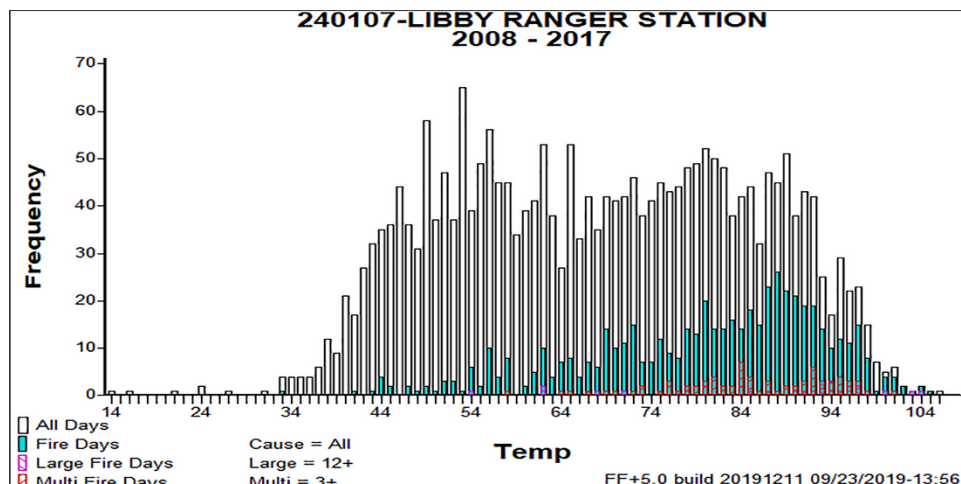
- 0 is a perfect fit
- < 13 is excellent
- < 20 is good
- > 26 is not so good

Creating a Fires Analysis in FireFamilyPlus

1. Set up the **Working Set** for your station of interest in the main FireFamilyPlus window.
2. Use **Interactive Batch (Batch > Interactive > Select Station > Run)** to examine the RAWs and fire occurrence data of interest.
3. Select a variable and look at the following graphs and reports. Do the graphs show the patterns that you expect to see?
 - a. **Fires Percentile Graph:** Is there separation between lines for All Days, Fire Days, Large Fire Days, and Multiple Fire Days? Does the curve of the line start at the lower values and rise as the output value increases (e.g., ERC)? Or, does the curve of the line start at higher values and rise as the output value decreases (e.g., 1000-hr fuel moisture). Is the range in values enough to make decision(s) (e.g., 0 to more than 60 in the ERC graph below)?



- b. **Cumulative Fires Graph:** Does the output have more Fire Days, Large Fire Days, and Multiple Fire Days as the output values increase (or decrease with moisture (e.g., 1000-hr fuel moisture)? Is the range in values enough to make decision(s) (e.g., 0-66 in the ERC graph below)?



c. **Fires Analysis Report:** Are the statistics (Chi-Squared) valid?

Model:
Time Frame: 3/1 - 10/31
Data Years: 2008 - 2017
Cause = All
Large Fire Day (LFD)= 12 acres
Multiple Fire Day (MFD)= 3 fires

240107-LIBBY RANGER STATION - LIBBY RANGER STATION Model:

**** Created data for 18 records with missing values. ****
(Maximum of 5 consecutive missing days for replacement)
0 fires discarded due to no/missing weather.

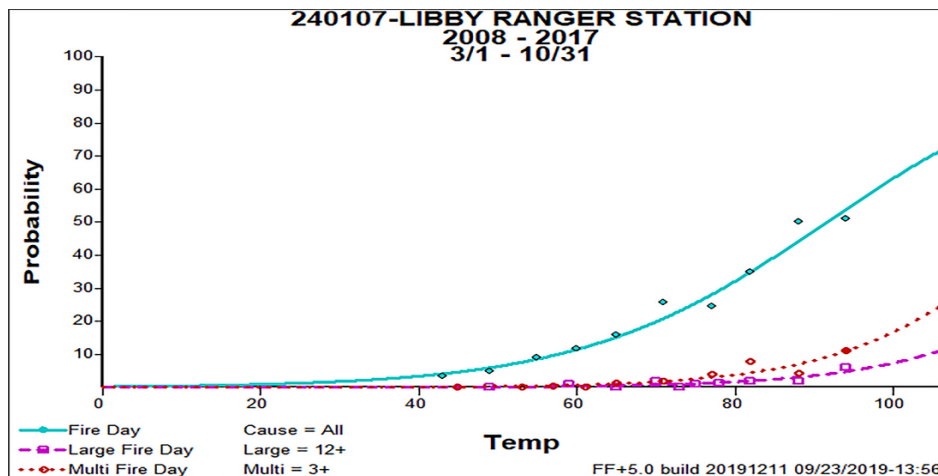
Fire-Day:
 $P(\text{Fire-Day}) = 1 / (1 + \exp(-1 * -5.9185 + (-1 * 0.0647) * \text{Temp}))$
Number of Weather-Days: 2409
Number of Fire-Days: 551

Chi-Squared Goodness of Fit Tests for Fire-Day



Prob. Range	Temp Range	Days	FD		No-FD		Chi-Square
			Pct	Obs	Obs	Exp	
0.01 - 0.05	14 - 46	262	3	9	10	253	0.2
0.05 - 0.07	47 - 52	246	5	12	15	234	0.8
0.08 - 0.10	53 - 57	254	9	23	22	231	0.1
0.10 - 0.13	58 - 62	212	12	25	25	187	0.0
0.14 - 0.18	63 - 68	228	16	36	36	192	0.0
0.19 - 0.24	69 - 74	250	26	64	54	186	2.5
0.26 - 0.31	75 - 79	229	24	56	65	173	1.6
0.32 - 0.40	80 - 85	274	35	96	98	178	0.0
0.41 - 0.48	86 - 90	213	50	107	95	106	2.9
0.49 - 0.72	91 - 106	241	51	123	132	118	1.4
		2409	23	551	551	1858	9.5

Chi Square DF P-Value R(L)-Sq.
9.5 8 0.3045 0.98

d. **Fires Analysis Graph:** Is the line (prediction) close to the points (observations)?



4. Once you have found a fuel model/NFDRS output combination that meets Goodness of Fit, Predictor Variable Range, and possible management application, add the potential candidate to the Candidates Table.

- Click on the **C+** button (). This button is *only active when* either the Fires Analysis Report or the Fires Analysis Graph is selected.
- View the Candidates Table from any screen by clicking on the **C** button (.
- When the Fire Business Candidates Table is open, you can view summary statistics for all selected candidates.

5. Document **why** you selected these variables.

- What was the Chi-Squared for a Fire Day?
- How responsive is this variable to changes in inputs?