

FFP Tech Tip: Weather Data Sources and Attributes (January 2009)

There are two standard formats for transferring fire weather observations from the National Interagency Fire Management Integrated Database (NIFMID) to other applications—FWX (Wxobs72) and FW9 (Wxobs98) formats. By default the FWX formatted observation is a once-daily (1300) NFDRS fire weather observation. The FW9 format allows for “O” and “R” type observations. There are currently two applications to access those data, KCFAST on FAMWEB¹ and a link to Fire and Weather Data on FAMWEB. Variants of these data and formats have become available from the Western Region Climate Center (WRCC). A 3rd format, the PC-Delimited (*.DAT) format from the WRCC *RAWS Data Lister* is an unedited listing of hourly sensor values which FireFamilyPlus tries to interpret and ingest based on header lines embedded in the file. It is currently the only source for wind gust data. The table below explains the data sources and the attributes of the different sources.

Attribute	FAMWEB-NIFMID			WRCC Data Lister ²			CEFA-FPA ³	
	WEB ⁴		KCFAST ⁵	DAT	FWX	FW9	FWX	FW9
	FWX	FWX	FW9					
Y2K Compliant			X	X		X		X
Hourly Data			X	X		X		X
NFDR “O/R”	X	X	X		X	X	X	X
State of Wx	X	X	X				X	X
Wet Flag			1993+					
Solar Radiation			2009	X		X		
Gust Data				X				
Data Current		X	X	X	X	X		
Password Req.		X	X	X	X	X		
NWS/WIMS ID	X	X	X				X	X
WRCC ID				X	X	X		

- Y2K (compliant).** FireFamily Plus uses a pivot year of 29. That is, when reading a 2-digit year, 00 through 29 is considered 2000 to 2029. Values of 30 to 99 are considered 1930 to 1999.
- Hourly Data.** Hourly data are available from RAWS stations. FAMWEB-KCFAST holds the last 18 months of hourly data for RAWS stations. The WRCC contains the period of record for RAWS stations, but only the sensor data – it does not have ‘touched’ data such as

¹ National Fire & Aviation Management Web Applications. <http://fam.nwcg.gov/fam-web/>

² WRCC – Western Region Climate Center, RAWS Data Lister. <http://www.raws.dri.edu/index.html>. The WRCC database contains RAWS sensor data from stations transmitting through the GOES satellite system. The earliest date of these records is generally the late 1970’s.

³ CEFA-FPA. Desert Research Institute’s *Climate, Ecosystem and Fire Applications* Program that performed RAWS Quality Control for the Interagency Fire Program Analysis (FPA). <http://www.wrcc.dri.edu/fpa/>. This dataset has a limited POR, generally from the mid 1980’s through 2004.

⁴ FAMWEB – Fire and Weather Data. <http://fam.nwcg.gov/fam-web/weatherfirecd/>

⁵ NIFMID. National Interagency Fire Management Integrated Database. <http://fam.nwcg.gov/fam-web/kcfast/mnmenu.htm>. Login ID and password required. The NIFMID database contains the entire period of record (POR) for a station. In many cases this is from the mid-1950’s.

wet flag or state of the weather. Nor does it have daily or 24 hour summaries (i.e. 24 hour rainfall).

3. **NFDR “O/R”.** By default the FWX formatted observation is a once-daily (1300) NFDRS fire weather observation. The FW9 format allows for “O” and “R” type observations. The FW9 “O” observation should also have a valid state of the weather code. WRCC *Data Lister* files may have the “O” designation at 1300 local time but will not have a valid state of the weather code (it is blank). FireFamilyPlus will interpret the blank to be zero (0). Non “O” type records are typed “R” (for Raws) and are not processed as NFDRS records in FireFamily.
4. **State of the weather (SOW).** This is an assessment of the sky conditions at the observing station used to indicate the amount of cloud cover and kind of precipitation at the fire weather station at observation time. Within the NFDRS processor, the SOW is used to establish the ground/fuel level temperature and relative humidity at the weather station. These values are used in the dead fuel moisture calculations. It also established some “values by rule” as noted in the table below.

State of Weather (SOW) Codes	
0 - Clear, less than 1/10 cloud cover	5 - Drizzle
1 - Scattered clouds, 1/10 - 5/10 cloud cover	6 - Rain
2 - Broken clouds, 6/10 - 9/10 cloud cover	7 - Snow or sleet
3 - Overcast, 10/10 cloud cover	8 - Showers
4 - Fog	9 - Thunderstorms
NOTE - 5, 6, and 7 cause an internal wet flag to be set to “Y.” In this case, 1 and 10 hour fuel moistures are set to 35% and indices (BI, SC, IC) are set to zero because generalized precipitation over the protection unit is assumed. The ERC is computed as normal. Values 8 and 9 assume localized precipitation and the wet flag is <i>not</i> set to “Y.”	

5. **Wet Flag and Snow Cover.** This entry is used in the operational NFDRS (WIMS) to indicate when the fuels are wet at observation time. The Wet Flag is automatically set to "Y" by the danger-rating processor if SOW code "5", "6", or "7" is entered. *Only in FW9 Format from KCFast and from 1993 on.*

Both year round and seasonal stations should consider snow covered fuels. With the wet flag set to Y, but the SOW is not 5, 6, or 7, the NFDRS processor interprets the wet flag =Y to indicate snow-covered fuels. In this case, the NFDRS processor:

- Internally sets the fuel interface maximum and minimum relative humidity at 100 percent regardless of the ambient relative humidity.
- Invokes the “values by rule” of the wet flag setting.
- Internally estimates hours of snowmelt (precipitation duration) to add moisture to the 100- and 1000-hour fuels based on observation time temperature.

Observation Time Temperature	Hours Fuels Wet
<= 35	0
36 to 40	2
41 to 50	4
51 to 60	6
> 61	8

6. **Solar Radiation Data.** This value is used to compute hourly fuel moisture with the Nelson dead fuel moisture model.
7. **Gust Data.** RAWS stations record maximum wind gust and direction for the hour in addition to the 10-minute average wind that is reported to NFDERS. These data are only available from the WRCC. Their inclusion in the FireFamilyPlus database allows frequency distributions of 10-minute averaged, or gusts to be used when creating fire-risk tables.
8. **Data Current.** Yes means data source has current year-to-date data. For the FAMWEB source, it is updated yearly in January to include all data through the previous year. The FPA dataset has a limited POR, generally from the mid 1980's through 2004.
9. **Password Req.** Yes means a login and password are required to access the data.
10. **NWS Station ID.** WIMS and NIFMID use a 6 digit station ID, that at one time was issued by the National Weather Service. They are now issued by the appropriate Geographic Area Predictive Services Unit. There is some "intelligence" in the numbering system. The first two digits was the state code, the second two the county code, and the third two the sequential station number in that count. These codes do not follow standard FIPS codes and does not work in states with more than 99 counties.
11. **WRCC Station ID.** WRCC uses an internal station ID that is not related in anyway to the NWS station id. FireFamilyPlus 4 has an internal cross reference that will attempt to map a WRCC ID to the WIMS ID. This cross reference is based on a spreadsheet from CEFA developed during their FPA-RAWS quality control work. If a match is found it will use the WRCC ID to identify the station within FireFamilyPlus with the station metadata from the associated WIMS Station ID.

WxStation : Table			
	StationID	Name	WRCC_ID
	101019	HELLS HALF ACRE	
	101028	MOOSE CREEK	IMOO
	101031	POWELL	IPOW
	101037	SLATE CREEK	ISLA
	101043	CHAIR POINT	
	101044	LODGPL	ILOD
	101045	RED RIVER	IRED
	101048	GRANGEVILLE	
	101049	ROUNDTOP	IROU
	101090		
	101097	CHUCK'S TEST	
	101099	CORRAL	
	101100	PITTSBURG LANDING	IPIT
	101108	WEISRV	IWEI
	101109	SNAKE	ISNA
	101209	MCCALL	
	101220	TEAPOT	ITEA
	101221	BEARSKIN	IBEA

Additionally, WRCC may track stations by their NESDIS (satellite transmitter ID). FireFamilyPlus does not do anything with a station's NESDIS ID.

WXOBS72A, Weather Station Inventory (Wxobs72--*.FWX)

Field	Field Name	Columns
1	STATION NUMBER	1-6
2	YEAR	7-8
3	MONTH	9-10
4	DAY	11-12
5	STATE OF WEATHER (CODE)	13
6	DRY BULB TEMPERATURE (F)	14-16
7	RELATIVE HUMIDITY (%)	17-19
8	HERBACIOUS GREENNESS FACTOR	20-22
9	HERBACEOUS VEGETATION CONDITION	23-24
10	HUMAN-CAUSED RISK	25-27
11	WIND DIRECTION (8 POINT)	28
12	WIND SPEED (MPH)	29-31
13	WOODY VEGETATION CONDITION	32
14	10-HR FUEL MOISTURE (%)	33-35
15	WOODY GREENNESS FACTOR	36-38
16	MAXIMUM TEMPERATURE (F)	39-41
17	MINIMUM TEMPERATURE (F)	42-44
18	MAXIMUM RH (%)	45-47
19	MINIMUM RH (%)	48-50
20	SEASON CODE	51
21	PRECIPITATION DURATION (HRS)	52-53
22	PRECIPITATION AMOUNT (IN)	54-57
23	LIGHTNING ACTIVITY LEVEL	58-60
24	RELATIVE HUMIDITY VARIABLE INDICATOR 1 = Wet bulb, 2 = RH%, 3 = dew point	61

Weather Observation Data Transfer Format, (WxObs 98 -- *.FW9)

Item	Cols	Type	Description
1	01-03	3A	Record type (W98). All records begin with this record type identifier code.
2	04-09	6N	Station Number.
3	10-17	8N	Observation date (YYYYMMDD).
4	18-21	4N	Observation time (0000-2359).
5	22	1A	Observation type (O=NFDRS, R=RAWS other than at the standard NFDRS observation time, F=Forecast, X=Other).
6	23	1N	State of weather code.
7	24-26	3N	Dry bulb temperature (degrees Fahrenheit or degrees Celsius based on Measurement Type code [col. 63]).
8	27-29	3N	Atmospheric moisture (wet bulb temperature, relative humidity (percent), or dew point temperature based on Moisture Type code [col. 62]).
9	30-32	3N	Wind direction azimuth measured from true north. 0 (zero) means no wind direction, 360 is north.
10	33-35	3N	Average winds peed over a 10-minute period (miles or kilometers per hour based on Measurement Type code).
11	36-37	2N	Measured 10-hour time lag fuel moisture.
12	38-40	3N	Maximum Temperature (degrees Fahrenheit or degrees Celsius based on Measurement Type code [col. 63]).
13	41-43	3N	Minimum Temperature (degrees Fahrenheit or degrees Celsius based on Measurement Type code [col. 63]).
14	44-46	3N	Maximum relative humidity (percent).
15	47-49	3N	Minimum relative humidity (percent).
16	50-51	2N	Precipitation duration (hours).
17	52-56	5N	Blanks=no precipitation. <i>U.S. measurement:</i> inches with implied decimal nn.nnn format; trace shown as 00005.
18	57	1A	Wet flag (Y/N).
19	58-59	2N	Herbaceous greenness factor (0-20).
20	60-61	2N	Shrub greenness factor (0-20).
21	62	1N	Moisture Type code (1=Wet bulb, 2=Relative Humidity, 3=Dew point).
22	63	1N	Measurement Type code: 1=U.S.,2=Metric. Affects temperature (Fahrenheit or Celsius), wind (miles or kilometers per hour), and precipitation (decimal inches or millimeters).
23	64	1N	Season code (1=Winter, 2=Spring, 3=Summer, 4=Fall).
24	65-68	4N	Solar radiation (watts per square meter).