FWI2025 Excel Calculator Manual

The FWI system at your fingertips

Last updated: April 8th, 2026

Contents

Quick Start

This demo will show a new user how to quickly get started with the **Basic** version of the Excel calculator and a sample hourly weather dataset.

1. Download the Excel calculator and the sample PRF dataset

Download the standard calculator (*FWI2025_calculator_v6.xlsx*) from the Resources page on the NG-CFFDRS website. Download the hourly weather CSV file available on the GitHub repository (*PRF2007_hourly_wx.csv*). Open both files and in the standard calculator, navigate to the *Data-Basic* worksheet (bottom left tab).

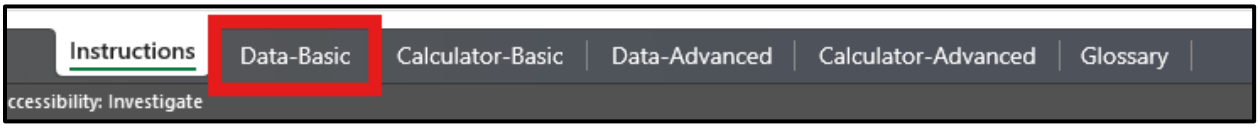

Figure 1. The different worksheets in the standard Excel calculator. Data-Basic is boxed in red.

2. Fill in the model parameters

From the weather data CSV, copy and paste the *lat*, *long*, and *timezone* columns from any row (all rows have the same value) into the first three orange initialization cells (D3:F3). Alternatively, manually type in 45.996 for latitude, -77.427 for longitude, and -4 for timezone (UTC offset). Filling the three required parameters while leaving the remaining three optional parameters as default (FFMC, DMC, and DC startup) completes the initialization, which should automatically flip its FILLED IN cell (J4) to TRUE.

	A	B	C	D	E	F	G	H	I	J
1	Basic			1. INPUT Model Startup Parameters						
2				Latitude [DD]	Longitude [DD]	Timezone (UTC offset) [h]	FFMC [ ] (Default 85)†	DMC [ ] (Default 6)	DC [ ] (Default 15)	FILLED IN
3			Initialize:	45.996	-77.427	-4	85	6	15	TRUE
4										

*Figure 2. The **Basic** version's startup parameters section. The required parameters have been pasted in, turning the FILLED IN cell to TRUE.*

3. Fill in the timestamp column

The Excel calculator expects the timestamp column to be in the format "yyyy-mm-dd hh:mm" even though our dataset splits time into four columns. Fill in the first timestamp cell (B8) corresponding to the first time in the dataset: 2007-05-10 08:00. To autofill the remaining hourly timestamps, place the following formula in the second timestamp cell (B9): =B8+"1:00". Then, you can use the Auto Fill feature in Excel from the second timestamp cell down (the only selected cell should be B9). Generate as many timestamps as you want, up to the maximum of 8 weeks at a time.

		2. INPUT Weather Stream							
		Timestamp (yyyy-mm-dd hh:mm)	Temperature [°C]	Relative Humidity [%]	Wind Speed [km/h]	Precipitation [mm]	Grassland Curing [%] (optional*)	Solar Radiation [kW/m^2] (optional*)	FILLED IN
7	Startup:	2007-05-10 07:00	N/A	N/A	N/A	N/A	DEFAULT	DEFAULT	N/A
8	Data:	2007-05-10 08:00							FALSE
9		=B8+"1:00"							FALSE
10									FALSE

*Figure 3. The **Basic** version's weather stream section. The timestamp column is being set up to autofill hourly timesteps.*

4. Fill in the rest of the hourly weather data

From the weather data CSV, copy and paste the *temp*, *rh*, *ws*, and *prec* columns starting from the first row of values down as many hours as you want into the first orange cell for Temperature (C8). Make sure the weather variables line up with the correct timestamps in its row according to the dataset. Filling the five required columns while leaving the two optional columns as default (leaving Grassland Curing and Solar Radiation columns blank) completes rows of hourly weather, which should automatically flip those rows' FILLED IN cells to TRUE.

		2. INPUT Weather Stream									
		Timestamp (yyyy-mm-dd hh:mm)	Temperature [°C]	Relative Humidity [%]	Wind Speed [km/h]	Precipitation [mm]	Grassland Curing [%] (optional*)	Solar Radiation [kW/m^2] (optional*)	FILLED IN	Fine Fuel Moisture Code [ ]	Duff Moisture Code [ ]
7	Startup:	2007-05-10 07:00	N/A	N/A	N/A	N/A	DEFAULT	DEFAULT	N/A	85.00	6.00
8	Data:	2007-05-10 08:00	14.78	94.9	2.7324	0			TRUE	83.13	6.02
9		2007-05-10 09:00	17.44	79.11	3.6663	0			TRUE	83.12	6.10
10		2007-05-10 10:00	21.21	62.95	4.359	0			TRUE	83.54	6.27
11		2007-05-10 11:00	23.6	46.17	8.21	0			TRUE	84.90	6.55
12		2007-05-10 12:00	24.55	41.53	9.42	0			TRUE	86.27	6.87
13		2007-05-10 13:00	22.37	47.13	6.737	0			TRUE	86.77	7.14
14		2007-05-10 14:00	18.11	88.2	2.116	0.5			TRUE	85.24	7.18

*Figure 4. The **Basic** version's weather stream section. Weather variables have been pasted in, turning each row's FILLED IN cell to TRUE.*

5. Read outputs

Once the startup parameters and rows of hourly weather are complete, outputs will appear for the corresponding rows. For a row of outputs to appear, all preceding weather rows must be complete as well.

				3. OUTPUT FWI2025 Components									
		Timestamp (yyyy-mm-dd hh:mm)	FILLED IN	Fine Fuel Moisture Code [ ]	Duff Moisture Code [ ]	Drought Code [ ]	Initial Spread Index [ ]	Buildup Index [ ]	Fire Weather Index [ ]	Daily Severity Rating [ ]	Grassland Fuel Moisture Code [ ]	Grassland Spread Index [ ]	Grassland Fire Weather Index [ ]
7	Startup:	2007-05-10 07:00	N/A	85.00	6.00	15.00	N/A	N/A	N/A	N/A	N/A	N/A	N/A
8	Data:	2007-05-10 08:00	TRUE	83.13	6.02	15.41	1.88	6.09	0.88	0.02	79.99	0.00	0.00
9		2007-05-10 09:00	TRUE	83.12	6.10	15.86	1.97	6.22	0.93	0.02	81.82	0.85	3.22
10		2007-05-10 10:00	TRUE	83.54	6.27	16.36	2.15	6.41	1.20	0.04	85.99	3.93	13.02
11		2007-05-10 11:00	TRUE	84.90	6.55	16.91	3.14	6.66	2.51	0.14	88.73	19.48	24.46
12		2007-05-10 12:00	TRUE	86.27	6.87	17.46	4.04	6.93	3.53	0.25	89.68	27.71	26.98
13		2007-05-10 13:00	TRUE	86.77	7.14	17.98	3.79	7.16	3.33	0.23	90.03	17.21	23.58
14		2007-05-10 14:00	TRUE	85.24	7.18	18.44	2.42	7.28	1.80	0.08	42.85	0.00	0.00

*Figure 5. The **Basic** version's FWI2025 outputs section. A row of output reveals when the startup parameters are complete, its weather stream row is complete, and all its preceding rows are complete.*

Purpose

The FWI2025 Excel calculators are designed to give individual users a simple and interactive way to explore FWI2025. The calculators are also easily copied and shared because the system equations are built into the worksheets. Large-scale data systems that need to run many calculations should still use the code available on the GitHub repository. A limitation of the calculators compared to the code is that they can only calculate FWI2025 for one weather station at a time for up to 8 weeks at a time (continuation possible with advanced initialization options).

Choosing a Version

The Excel calculators are separated into two Excel workbooks that each contain two versions, for a total of four distinct versions (shown in Table 1). The workbooks are available for download on the Resources page of the NG-CFFDRS website. All calculator versions will produce the same outputs and differ only in initialization options and input data formatting.

If you're using the calculators for the first time, start with the Basic version (**Basic**). It is simplified to only show options that are required and that users of the old FWI1987 system would be familiar with. The Advanced version (**Adv**) includes additional, optional startup values ('Extra Startup') to enable mid-season calculations. The Basic and Advanced versions both use an input weather data format that is standardized for FWI2025.

The Spot Standard (**SS**) and Spot Prometheus (**SP**) versions are in a separate Excel workbook, include the advanced initialization options, and have weather input formats tailored to the outputs from the SpotWx website.

Table 1. The four different versions of the Excel calculator, which workbook they are found in, and their differences.

Version	Excel Calculator	Initialization Options	Weather Stream Format
Basic	*FWI2025_calculator_v6.xlsx*	Basic	Standard
Adv	*FWI2025_calculator_v6.xlsx*	Advanced	Standard
SS	*FWI2025_calculator_v6_spotwx.xlsx*	Advanced	SpotWx Standard Tabular
SP	*FWI2025_calculator_v6_spotwx.xlsx*	Advanced	SpotWx Prometheus Tabular

Layout

All FWI2025 calculator versions include multiple protected worksheets that provide information, display input/output tables, and contain the system equations. The worksheets are protected to steer users to the proper input cells and prevent users from changing equations that may invalidate the outputs.

- ✓ *Instructions*: Basic instructions and information.
- ✓ *Data-###*: Enter weather data here to calculate the FWI System components. The only cells you can/should change are in orange. The input format can vary depending on the calculator version.
- ✓ *Calculator-###*: Contains all the FWI System equations and is connected to the corresponding *Data-###* spreadsheet. You can look in here for intermediate steps including the matted and standing grassland moisture contents.
- ✓ *Glossary*: Definitions of the variables in the Calculator spreadsheets.
- ✓ *Grassland Curing Lookup Table* (Hidden): Table of values used to create default grassland curing inputs. Users have the option to edit this table.

After choosing a calculator and version, navigate to the corresponding *Data* worksheet by clicking its tab on the bottom left. No matter which calculator version you use, the *Data* worksheet is where you'll do most of the work inputting data and looking at outputs. It is broken into 4 sections: 1) inputting model startup parameters; 2) inputting the hourly weather stream; 3) viewing FWI2025 components; and 4) viewing FWI2025 utility.

Section 1: Model Startup Parameters

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	Adv			1. INPUT Model Startup Parameters						Extra Startup				
2				Latitude [DD]	Longitude [DD]	Timezone (UTC offset) [h]	FFMC [ ] (Default 85)	DMC [ ] (Default 6)	DC [ ] (Default 15)	Matted mc_{GFMC} [%] (Default 16.31)	Standing mc_{GFMC} [%] (Default 16.31)	Cumulative Precipitation [mm] (Default 0)	Canopy Drying [h] (Default 0)	FILLED IN
3			Initialize:				85	6	15	16.31	16.31	0	0	FALSE

Figure 6. The startup parameters section in the Data-Advanced worksheet. The same advanced initialization options are available in the Spot Standard and Spot Prometheus versions.

At the top of the *Data* worksheet, you will find the cells that set the model startup parameters (Figure 1). There are 6 columns for basic initialization options, and 4 columns for advanced initialization options (not available in the **Basic** version). See Table 2 for column details. Edit the orange cells to set the initialization parameters (all other cells should be protected). The first three columns for latitude, longitude, and timezone are

initially blank because they do not have default values. Once all the startup parameters are set, the FILLED IN cell on the right-hand side should automatically flip from FALSE to TRUE. All startup parameters must be defined before any outputs are shown.

Table 2. Descriptions of the startup parameters columns including their default values.

Column Name	Units	Default	Description	Version
Latitude	DD	None	Latitude of the weather station.	All
Longitude	DD	None	Longitude of the weather station.	All
Timezone (UTC offset)	h	None	Integer UTC offset corresponding to the collection time of the weather data.	All
FFMC		85	Startup value for the Fine Fuel Moisture Code (FFMC). The **Basic** version uses this as the GFMC startup too.	All
DMC		6	Startup value for the Duff Moisture Code (DMC).	All
DC		15	Startup value for the Drought Code (DC).	All
Matted mc_{GFMC}	%	16.31	Startup value for the Grassland Fuel Moisture Code (GFMC) when grassland fuels are matted. The transition from matted to standing is based on dates, however both are tracked throughout the year.	**Adv**, **SS**, and **SP**
Standing mc_{GFMC}	%	16.31	Startup value for the Grassland Fuel Moisture Code (GFMC) when grassland fuels are standing. The transition from matted to standing is based on dates, however both are tracked throughout the year.	**Adv**, **SS**, and **SP**
Cumulative Precipitation	mm	0	Startup value for the total precipitation fallen during the current rain event.	**Adv**, **SS**, and **SP**
Canopy Drying	h	0	Startup value for the number of consecutive hours without precipitation during the current rain event.	**Adv**, **SS**, and **SP**

Section 2: Weather Stream

After initialization, the next step is to input the hourly weather data required to calculate FWI2025 outputs in Section 2 - 'INPUT Weather Stream'. The **Basic** and **Adv** versions have the same standard columns that only include weather variables required for FWI2025 (see

Table 3). The **SS** and **SP** versions have columns that follow the default layout of weather data from SpotWx (see Tables 4 and 5, respectively). When a row has all its required columns complete, the FILLED IN cell on the right-hand side should automatically flip from FALSE to TRUE. An output row will only show when: the corresponding weather stream row is complete, *all preceding weather stream rows* are complete, and all the startup parameters are set (see Section 1).

The Grassland Curing and Solar Radiation input columns are optional and behave differently from the other weather stream inputs. If an optional column is left completely empty, denoted in the startup cell as DEFAULT, the calculator will use values from an internal calculation. If the optional column is not empty, denoted in the startup cell as INPUT, the calculator will use the provided values. In this case, the optional column becomes required for each row's FILLED IN status. The calculator does not allow for a mix of default and user provided values to be used.

The default Solar Radiation calculation occurs in its own section in the corresponding *Calculator* worksheet. The default Grassland Curing calculation depends on curing progression from a standard year. These values are stored in a hidden worksheet called *Grassland Curing Lookup Table*. To unhide a worksheet, right click on any of the worksheet tabs on the bottom left and select "Unhide...".

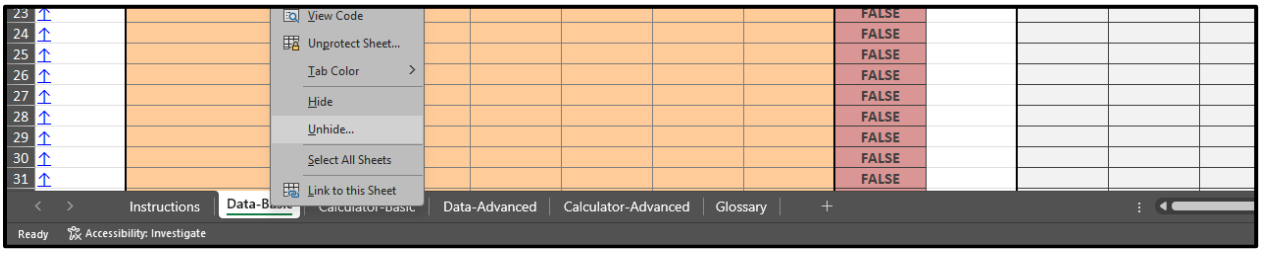

Figure 7. How to unhide the Grassland Curing Lookup Table *worksheet.*

Scrolling down in Excel lets you access more rows for inputting hourly weather data while the column headers and startup remain frozen in view. This can make it difficult to notice when you are not at the top of the weather data, so you can always go back to the top by clicking on any of the up arrows in the first column (A). The equations and formulae only extend to a total of 8 weeks of hourly data (up to row 1351).

Standard Weather Stream Format

The **Basic** and **Adv** versions expect hourly weather data in a format standardized for FWI2025. All the time data is built into the Timestamp column, which needs to be in "yyyy-mm-dd hh:mm" format. To generate hourly timestamps in Excel, first fill in the top orange cell (B8) in the Timestamp column. In the next cell (B9), set it to the formula: =B8 + "01:00".

Finally, Auto Fill from that formula (B9) down as many cells as required. It is important to autofill with the above formula that "adds one hour" instead of auto filling from two cells that are one hour apart because of possible rounding errors due to how Excel represents datetimes.

*Table 3. Descriptions of the weather stream columns for the **Basic** and **Adv** versions.*

Column Name	Units	Description
Timestamp (yyyy-mm-dd hh:mm)		Datetime (e.g. 2026-03-30 15:00).
Temperature	°C	Hourly temperature.
Relative Humidity	%	Hourly relative humidity.
Wind Speed	km/hr	Hourly wind speed.
Precipitation	mm	Hourly precipitation.
Grassland Curing (optional)	%	Percentage of vegetation in an open grassland that is dead (cured). If the column is blank, default values are used.
Solar Radiation (optional)	kW/m^2	Global horizontal irradiance. If the column is blank, default values are used.

Spot Standard and Spot Prometheus Tabular Weather Formats

The **SS** and **SP** versions have the same advanced initialization options as the **Adv** version, but with a weather stream format configured for tabular data from SpotWx.

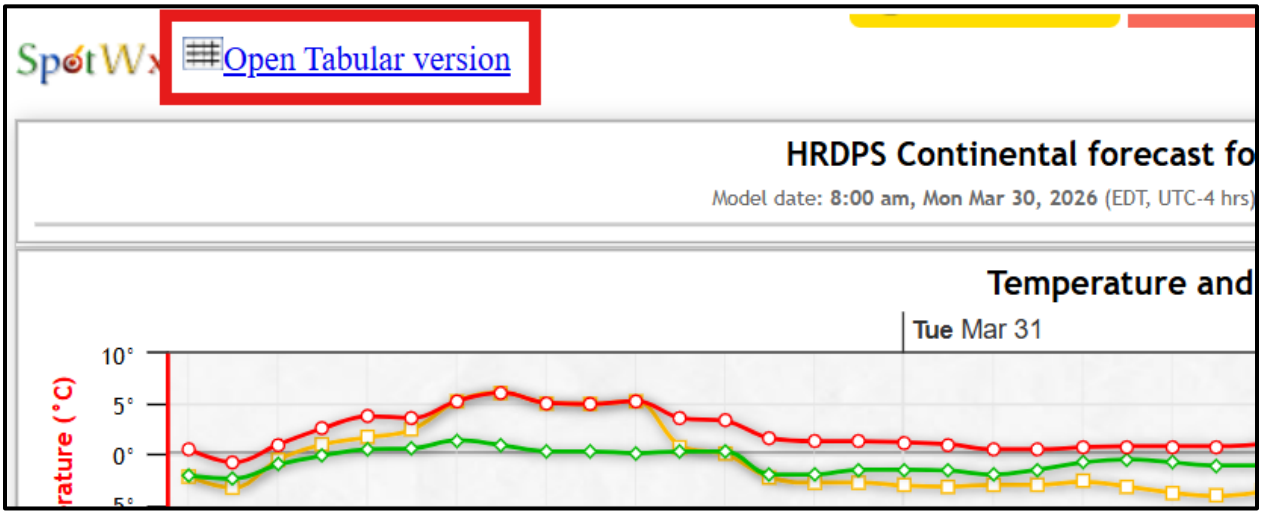

Figure 8. The data page on the SpotWx website after selecting a spot and forecast. The button to access the data in tabular form is boxed in red.

More specifically, users can copy and paste weather data from a CSV file generated on SpotWx directly into the weather stream section. When generating these CSV files, don't forget to keep track of the latitude, longitude, and UTC offset parameters that are displayed on the website but are not included by default in the CSV file.

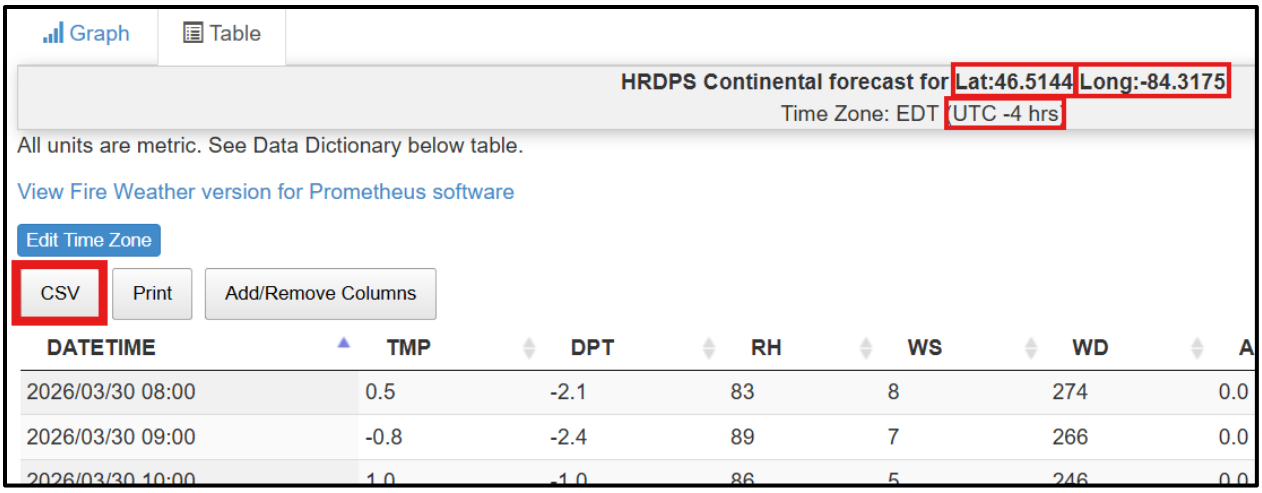

Figure 9. The tabular data page on the SpotWx website. The three values required for the startup parameters section of the Excel calculator are at the top of the page, while the button to download the data as a CSV is on the left, boxed in red.

Since the default SpotWx weather data includes more weather variables than is used in FWI2025 calculations, several columns are unused but are still present to have the correct spacing for the required weather variables. Tables 4 and 5 describe the mandatory weather columns for the **SS** and **SP** versions respectively.

*Table 4. Descriptions of the weather stream columns for the **SS** version.*

Column Name	Units	Description
DATETIME (yyyy-mm-dd hh:mm)		Datetime (e.g. 2026-03-30 15:00).
TMP	°C	Hourly temperature.
RH	%	Hourly relative humidity.
WS	km/h	Hourly wind speed.
APCP	mm	Hourly accumulated precipitation. This is converted to hourly precipitation for use in FWI2025 calculations (see column AD).

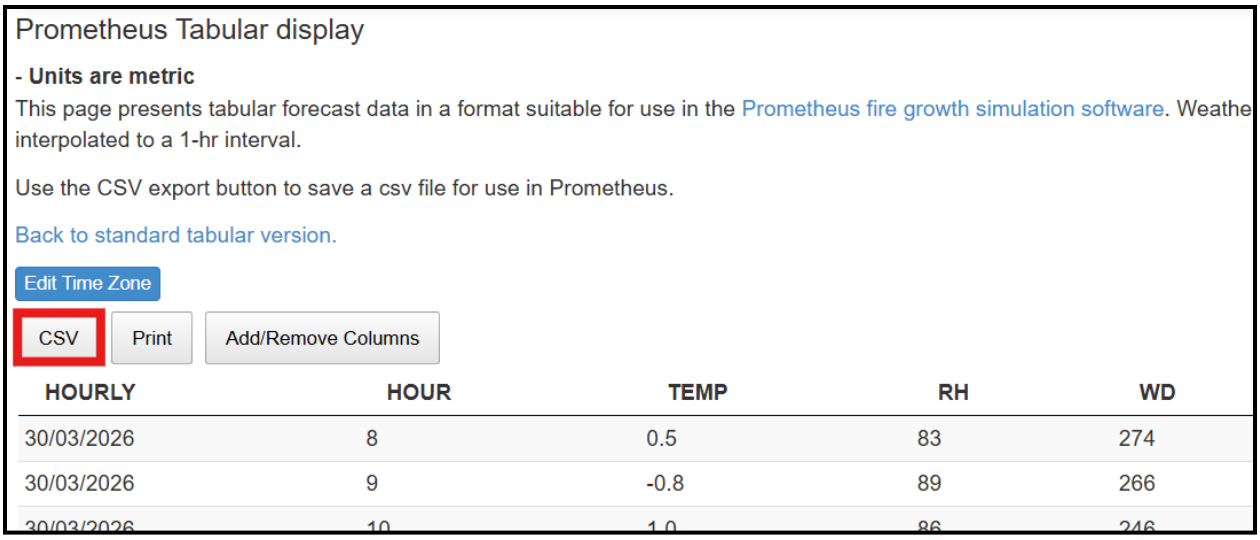

Figure 10. The Prometheus version of the tabular data page on the SpotWx website. The button to download the data as a CSV is on the left, boxed in red.

*Table 5. Descriptions of the weather stream columns for the **SP** version.*

Column Name	Units	Description
HOURLY (dd/mm/yyyy)		Date (e.g. 30/03/2026).
HOUR	h	The hour of the day in 24-hour clock notation.
TEMP	°C	Hourly temperature.
RH	%	Hourly relative humidity.
WS	km/h	Hourly wind speed.
PRECIP	mm	Hourly precipitation.

Section 3: FWI2025 Components

Section 3 holds the standard FWI2025 components for the standard pine and grassland fuel types. It is located to the right of the weather stream section in the *Data* worksheet. Scroll to the right to view all outputs. Each row of outputs is aligned with the timestamp and input weather variables on the same row. It is also aligned with the intermediate calculations in the corresponding *Calculator* worksheet. For a row of outputs to appear, the following three conditions must be met:

A. The startup parameters section (see Section 1) must be complete, shown by the FILLED IN cell automatically flipping to TRUE.
B. The corresponding weather stream row must be complete (see Section 2), shown by the row's FILLED IN cell automatically flipping to TRUE.

C. All preceding weather stream rows must be complete. Any weather stream row that is incomplete prevents future rows from appearing since FWI2025 calculations require a complete hourly weather record.

All outputs are rounded to two decimal places.

For a description of FWI System components, refer to *Information Report: The 2025 Update to the FWI System: Structure, Changes and Interpretation (GLC-X-42 EN)*.

Section 4: FWI2025 Utility

Section 4 contains additional outputs that are a part of calculating FWI2025. It is located to the right of the FWI2025 components section in the *Data* worksheet. More intermediate calculation values can be found in the corresponding *Calculator* worksheets.

Table 6. Descriptions of the output FWI2025 utility columns.

Name	Units	Description	Version
Grassland Curing	%	Percentage of vegetation in an open grassland that is dead (cured).	All
Solar Radiation	kW/m^2	Global horizontal irradiance (i.e. total amount of shortwave radiation received at ground level).	All
Cumulative Precipitation	mm	Cumulative precipitation this rainfall.	All
Canopy Drying	h	Consecutive hours of no precipitation. 5 hours or more resets cumulative precipitation to 0 mm.	All
FFMC Equilibrium Moisture Content	%	Equilibrium moisture content of FFMC.	**Adv**, **SS**, and **SP**
DMC Time Lag	h	Under current conditions, the time it will take for the DMC fuel layer to lose two-thirds (2/3) of its current available moisture.	**Adv**, **SS**, and **SP**
DC Time Lag	h	Under current conditions, the time it will take for the DC fuel layer to lose two-thirds (2/3) of its current available moisture.	**Adv**, **SS**, and **SP**

Starting up mid-season or from a previous run

If you don't have an hourly weather record from the beginning of a fire season, the calculator can start mid-season using FWI2025 components from a nearby station. This is the same process as restarting the calculator using a previous run (e.g. once the calculator

reaches the maximum of 8 weeks at one time). To start up FWI2025 calculations mid-season or from a previous run, you need all initialization options which are only available in the **Adv**, **SS**, and **SP** versions. The **Basic** version has a simplified set of initialization options and does not let users change extra startup. Startup parameters should be changed to reflect the conditions at the start of the weather data since the default values are generally used at the start of a fire season. See the following table for where to get the startup values to replace defaults (refer back to Table 2 for descriptions).

Table 7. Where to obtain startup parameters when starting up mid-season or restarting from a previous run.

Column Name	Mid-season startup	Restarting from previous run
FFMC	Value from nearest weather station.	Last value found in Section 3.
DMC	Value from nearest weather station.	Last value found in Section 3.
DC	Value from nearest weather station.	Last value found in Section 3.
Matted mc_{GFMC}	Field based estimates.	Last value under $mc_{GFMC,M}$ in the corresponding *Calculator* worksheet.
Standing mc_{GFMC}	Field based estimates.	Last value under $mc_{GFMC,S}$ in the corresponding *Calculator* worksheet.
Cumulative Precipitation	If available, sum of hourly precipitation since last 5 hour stretch of no precipitation.	Last value found in Section 4.
Canopy Drying	If available, the current number of consecutive hours of no precipitation, up to 4. Set to 0 if it is 5+ hours, or there was precipitation in the previous hour.	Last value found in Section 4.

After completing the model startup section, continue by filling in the hourly weather stream data like normal.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	Adv			1. INPUT Model Startup Parameters						Extra Startup				
2				Latitude [DD]	Longitude [DD]	Timezone (UTC offset) [h]	FFMC [ ] (Default 85)	DMC [ ] (Default 6)	DC [ ] (Default 15)	Matted mc_{GFMC} [%] (Default 16.31)	Standing mc_{GFMC} [%] (Default 16.31)	Cumulative Precipitation [mm] (Default 0)	Canopy Drying [h] (Default 0)	FILLED IN
3			Initialize:	45.996	-77.427	-4	82.1759	3.3503	220.0533	8.2403	15.0639	0	0	TRUE

Figure 11. The startup parameters section in the Data-Advanced worksheet with values from the end of a previous run.