
Alaska Fuels Drying & Data Entry Instructions

The following process can be used for drying duff, foliar, woody, and herbaceous fuel moisture samples along with entering data and calculating moisture content and the CFFDRS Indices.

Recording Data

Record all data on the **Fuel Moisture Data Sheet**. Be sure to complete all of the header information.

PLEASE REFERENCE THE EXAMPLE DATA SHEET ON THE LAST PAGE.

Items of Note:

- The *Sample #* will remain the same for each duff layer (i.e., LM, DM, UD) within the same plug (Figure 1).
- The *Thickness (cm)* column only applies to duff samples.
- Please record the feathermoss species in the *Comments* column.

Sample #	Type	Fuel Code
1	Duff	LM
1	Duff	DM
1	Duff	UD
2	Duff	LM
2	Duff	DM
2	Duff	UD
3	Duff	LM
3	Duff	DM
3	Duff	UD

Figure 1. Example of *Sample #* column for 3 duff samples.

Fuels Drying

Weigh all fuel moisture samples and record this in the **Wet Weight** column of the **Fuel Moisture Data Sheet**. Next, take the lids off of the containers and place the containers (with the lids underneath) in the oven. Set the oven temperature to 100°C (or 212°F). Foliar, woody, and herbaceous samples should dry for 24 hours. Duff samples should remain in the oven for 48 hours.

Note: If drying *ONLY spruce needles (foliar) samples*, set the oven temp to 80 °C (176 °F) to prevent the release of sticky resins in the sample containers.

Remove the containers from the oven and weigh the samples (with lids) to get the **Dry Weight**. Discard the fuel samples and weigh the empty containers (with lides) for the **Tare Weight**.

Data Entry

1. Data Entry Spreadsheet: FuelMoisture_DataEntry_Site_Year_Blank (2013v).xls

Open the spreadsheet and enter your sampling location information in the **SitelInfo** Tab.

Next, enter data from the paper data sheet into the **Moisture Data Entry** tab. The columns with red font (% Gravimetric, % Volumetric, and Bulk Density) are formulas. In general, samples are collected using gravimetric techniques (where moisture content is calculated by weight opposed to volume) therefore the % *Volumetric Moisture* and *Bulk Density* fields **will not be used**.

Note: The % *Volumetric Moisture* field will only be accurate if you do exact duff plug dimensions of 3" x 3" and record accurate thickness measurements. Gravimetric sampling is recommended when calculating bulk density is not needed.

2. Calculating Average % Gravimetric Moisture Content

Open the **Summary Grav MC** tab. Right click inside the pivot table and select **Refresh** to update the data. You must **REFRESH** the table every time you add data in the **Moisture Data Entry** tab. The average gravimetric moisture content will be highlighted in the right hand column.

The pull down arrows next to the **Site**, **Date**, **Type**, and/or **Fuel Code** columns can be used to filter the summary table (Figure 2).

The average gravimetric moisture content will need to be manually entered into the **Fuel Moisture Data Summary** tab.

Date	Type	Fuel Code	Sample # 1	Sample # 2	Sample # 3 (blank)	Average
5/22/2013	Duff	DM	202.355	254.635	118.119	191.70
		LM	34.477	71.587	47.345	51.14
		UD	216.042	331.783	208.409	252.08
	Foliar	PIGL	80.783	83.140	78.440	80.79
		PIMA	77.295	81.405	80.398	79.70
	Herb	CACA	56.184	27.000	26.000	36.39
		CAREX	17.606	25.316	33.043	25.32
	Woody	BEGL	86.891	93.623	88.462	89.66
		LEPA	96.581	93.011	88.636	92.74
						#DIV/0!

Figure 2. Screen shot of **Summary Grav MC** tab.

3. Fuel Moisture Data Summary

Fill out the table on the **Fuel Moisture Data Summary** tab with the site name and date (Figure 3). Record the average moisture content for each fuel type you collected. This information will come from the **Summary Grav MC** tab. If you didn't sample a specific fuel type – leave it blank. If you sampled additional fuel types, use the extra columns provided. Be sure to

Tip: You can use the copy and paste function to transfer average values from these two tabs. When pasting the average %MC into the **Fuel Moisture Data Summary** tab, you must **right click** in the cell, select **paste special**, and then select **values**.

	A	B	C	D	E	F	G	H	I
1									
2	Site	Date	Live Moss %MC	Dead Moss %MC	Upper Duff %MC	Bk Spruce PIMA %MC	Shrub Birch BEGL %MC	Labrador Tea LEPA %MC	Blue Joint-Calamagrostis CACA %MC
3	Site 1	26-May-11	12.5	65.09	95.52	80.2	152.15	90.64	20.46
4	Site 2	23-Jun-11	385.8	405.61	500.9	88.6	123.12	128.04	156.3
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									

Figure 3. Data entry table on the **Fuel Moisture Data Summary** tab.

4. Calculating CFFDRS Fuel Moisture Codes & RAWS Comparison

Open the **CFFDRS Data Summary** tab. The *Site*, *Date*, *Live Moss %MC*, *Dead Moss % MC*, and *Upper Duff % MC* fields will auto-populate from the data on the **Fuel Moisture Data Summary** tab. No need to copy and paste! (However, if you chose to sample Lower Duff, the averages will need to be manually transferred between tabs).

The equation to calculate the DMC from % moisture content and two options to calculate the DC from % moisture content have been entered into the table for you and will also auto-calculate (Figure 4). The equations (and descriptions) are provided above the table for your reference.

Enter the *RAWS* (Remote Automated Weather Station) *Name*, *RAWS FFMC*, *RAWS DMC*, and *RAWS DC* values from the nearest FWI (Fire Weather Index) reporting weather station to compare weather generated and moisture calculated CFFDRS Fuel Moisture Codes. All reporting stations can be found in the [FWI Database](http://fire.ak.blm.gov) on the AICC webpage (<http://fire.ak.blm.gov>) under [Fuels/Fire Danger](#).

18	Site	Date	Live Moss %MC	RAWS FFMC	Dead Moss %MC	RAWS DMC	Calc DMC from DM %Grv MC (EQ 2)	Upper Duff %MC	RAWS DC	Calc DC from UD Grv MC% (EQ 3)	Calc DC from UD Grv MC% (EQ 4)	Lower Duff % MC	Raws Station
19	Site 1	26-May-11	12.5	93.4	65.1		62.3	95.52	151.3	919.9	437.2	210.5	FBK
20	Site 2	23-Jun-11	385.8		405.6		24.1	500.90		21.6	-6.8		
21	#N/A	#N/A	#N/A		#N/A		#N/A	#N/A		#N/A	#N/A		
22	#N/A	#N/A	#N/A		#N/A		#N/A	#N/A		#N/A	#N/A		
23	#N/A	#N/A	#N/A		#N/A		#N/A	#N/A		#N/A	#N/A		
24	#N/A	#N/A	#N/A		#N/A		#N/A	#N/A		#N/A	#N/A		
25	#N/A	#N/A	#N/A		#N/A		#N/A	#N/A		#N/A	#N/A		
26	#N/A	#N/A	#N/A		#N/A		#N/A	#N/A		#N/A	#N/A		
27	#N/A	#N/A	#N/A		#N/A		#N/A	#N/A		#N/A	#N/A		
28	#N/A	#N/A	#N/A		#N/A		#N/A	#N/A		#N/A	#N/A		
29	#N/A	#N/A	#N/A		#N/A		#N/A	#N/A		#N/A	#N/A		
30	#N/A	#N/A	#N/A		#N/A		#N/A	#N/A		#N/A	#N/A		
31	#N/A	#N/A	#N/A		#N/A		#N/A	#N/A		#N/A	#N/A		
32	#N/A	#N/A	#N/A		#N/A		#N/A	#N/A		#N/A	#N/A		
33	#N/A	#N/A	#N/A		#N/A		#N/A	#N/A		#N/A	#N/A		

Figure 4. Screen shot of the *Duff CFFDRS Data Summary* tab.

Note: FFMC equations are not included in the comparison table. Values fluctuate throughout the day and localized weather, topography, and time of day will impact your calculated FFMC. However, if you want a “snapshot” of the FFMC at the time your samples were collected, equations are provided on the *Formulas* tab.

5. Equations and Data Sheets

The equations used to calculate CFFDRS Fuel Moisture Codes can be referenced on the *Formulas* tab. Indice calculation values are also available to compare Fuel Moisture Code equations, given the same % moisture content. The equations are written in an excel friendly format should you want to incorporate additional equations into the *Duff CFFDRS Data Summary* tab.

A blank field Fuel Moisture Data Sheet is on the *Blank Form* tab and can be printed directly from excel.

6. Expanding Tables with Formulas

The **Moisture Data Entry** and **Duff CFFDRS Data Summary** tabs contain formulas. If you need to add more rows to incorporate more data, you must highlight the cells with formulas and drag the formulas down. Make sure you “grab” and drag the corner of the highlighted cells with the “+” mouse symbol showing (Figure 5).

DO NOT use the “Insert Row” function (by right clicking on the numbered rows on the far left of the spreadsheet and selecting “Insert”). The excel formulas will not work.

The pivot table on the **Summary Grav MC** tab is built to accommodate up to 9 samples of the same fuel code on a single date. For example, the pivot table will calculate the average % MC for up to 9 PIMA samples collected on 26-May-11, 9 PIMA samples on 23-June-11, as so forth.

To expand the pivot table, **Insert** a column between the last sample in the table and the **Average** column (Figure 6). Repeat until you have enough columns to accommodate all of your samples. Generally, additional columns are not needed.

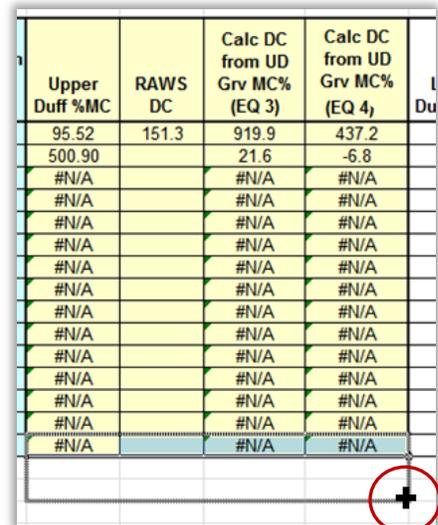


Figure 5. You must highlight and drag the formulas down with the “+” mouse symbol to expand tables on the **Moisture Data Entry** and **Duff CFFDRS Data Summary** tabs.

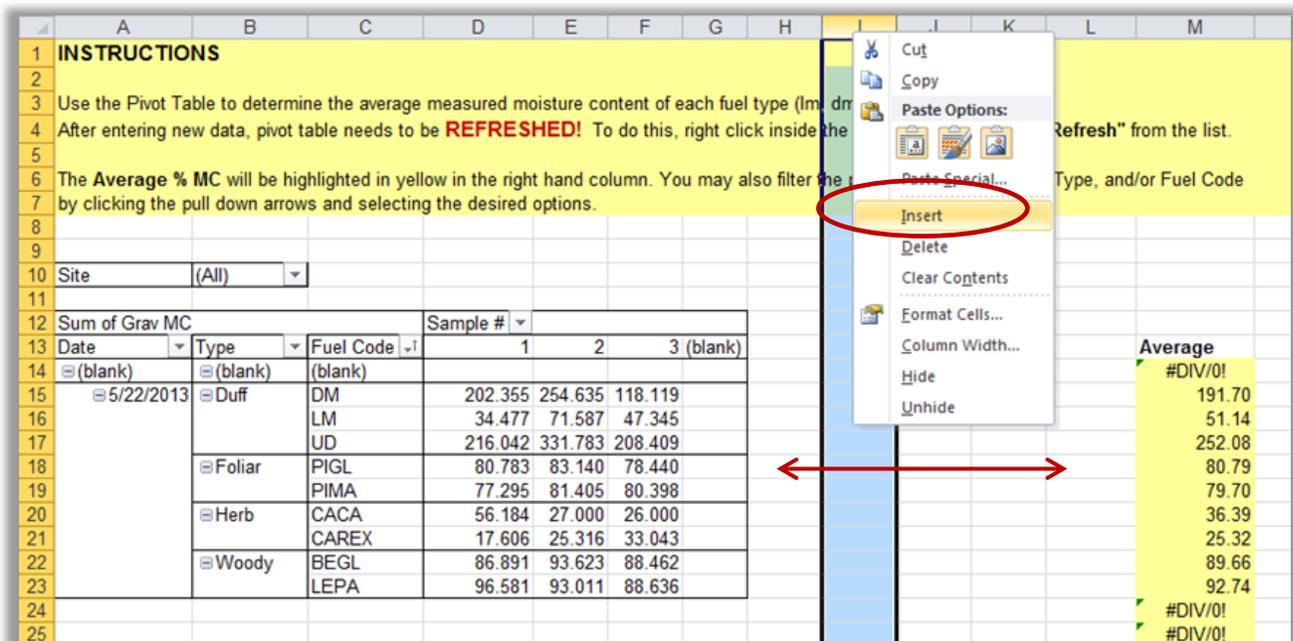


Figure 6. **Insert** a column between the edge of the pivot table (or last sample) and the **Average** column to accommodate more than 9 samples of a single fuel code on a single day.

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EXAMPLE - Fuel Moisture Data Sheet

Site Name: My Sampling Site **Recorders:** John Smith & Jane Jones **Date:** 5/16/2013
Unit: 12-2 **Fuel Type Sampling (Veg Community):** Black Spruce/Feathermoss **Phenology:** Pre-greenup **Time:** 1500
Latitude (DD): N 64.856708 **Longitude (DD):** W 147.888583 **Datum:** NAD83
Avg Slope: 2 % **Elevation :** 450 (ft/m) **Aspect:** 186° **Nearest RAWs:** FBK

Sample #	Type	Fuel Code	Thickness (cm)	Bottle #	Wet Wt	Dry Wt	Tare Wt	Comments
1	Duff	LM	3	23	75.3	58.7	52.9	HYSP
1	Duff	DM	2	22	80.5	58.7	52.9	
1	Duff	UD	8	13	73.4	57.2	52.8	
2	Duff	LM	2	52	75.3	58.7	52.9	PLSC
2	Duff	DM	2	89	80.5	58.7	52.9	
2	Duff	UD	5	36	73.4	57.2	52.8	
3	Duff	LM	4	102	75.3	58.7	52.9	HYSP
3	Duff	DM	3	77	80.5	58.7	52.9	
3	Duff	UD	10	7	73.4	57.2	52.8	
4	Duff	LM	2	34	75.3	58.7	52.9	HYSP
4	Duff	DM	4	25	80.5	58.7	52.9	
4	Duff	UD	6	21	73.4	57.2	52.8	
1	Foliar	PIMA	-	153	79.8	67.8	52.8	
2	Foliar	PIMA	-	121	78.0	66.9	53.0	
3	Foliar	PIMA	-	158	79.8	67.8	52.8	
4	Foliar	PIMA	-	129	78.0	66.9	53.0	

Type: Duff, Woody (shrubs), Herb (grass or forbs), Foliar (spruce)

Fuel Codes: Duff: LM =live moss, DM = dead moss, UD = upper duff, LD = lower duff

PIMA = black spruce, PIGL = white spruce, BEGL = shrub birch, LEPA = Labrador tea, VAVI = cranberry, VAUL = blue berry, CACA = blue joint grass,

ERVA = Tussock cotton grass, CAREX = Carex sedge

Comments: Include feathermoss species (HYSP = *Hylocomium splendens*, PLSC = *Pleurozium schreberi*)

