

2012 Fuel Moisture Monitoring and Fire Danger Indices

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The Problem

- Fire management community in Alaska has used the CFFDRS since 1992.
- The AWFCG has recognized the need for evaluation and has continued to rate it high on the list of fire research needs.
- Weak basis for calibrating DMC or DC value.
- Related knowledge gaps.
 - Default or over-winter the start-up DC value?
 - Given that Alaska's fire season begins shortly after snow-melt, poorly started indices may not reflect actual moisture conditions until the season is well underway or over.

The Problem

- Fire Danger Rating = $f(\text{Weather})$
 - Indices build daily-- Equilibration requires 12 (DMC) or 53 (DC) days
 - Fire season shortly follows snow-melt shortly follows station start-up
 - Default or over-winter?
 - Mid-season interruptions to weather stream
 - Mid-season deployment of portable RAWS
- Fire Danger Rating = $f(\text{Fuel Moisture})$
 - Best set indices to accurately represent conditions on the landscape

Soil Layers and Indices

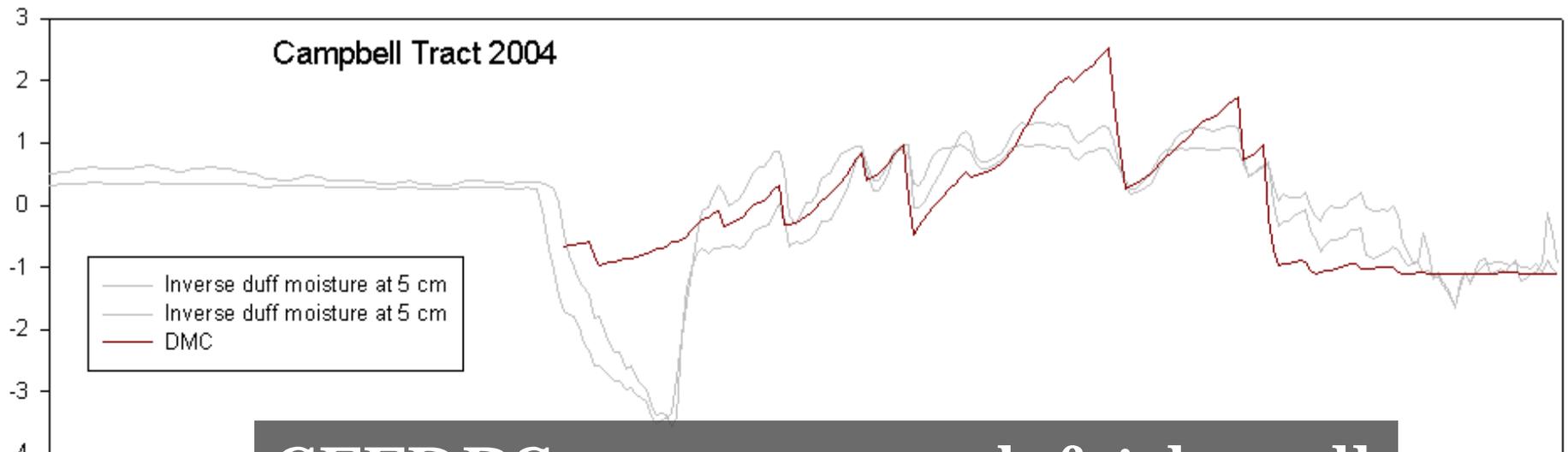


Live Moss = FFMC

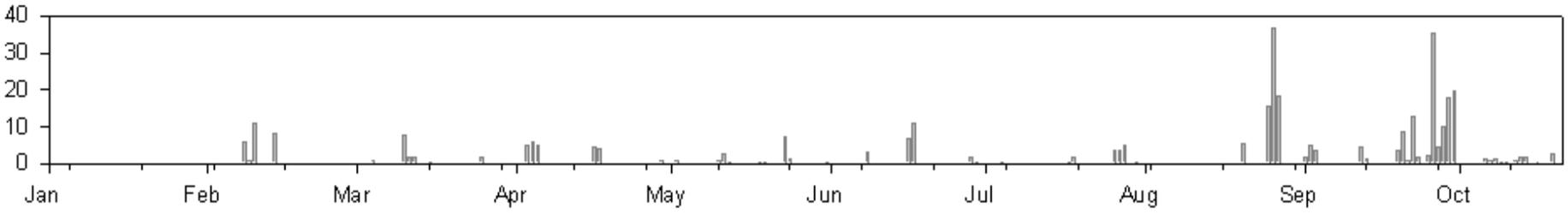
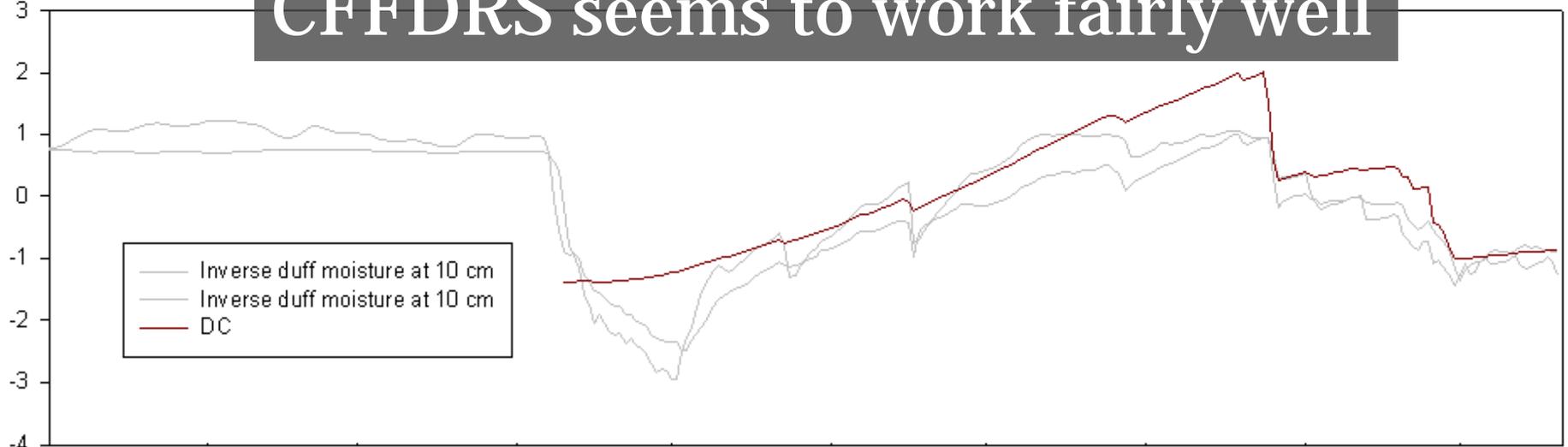
Dead Moss = DMC*

Upper Duff = DC*

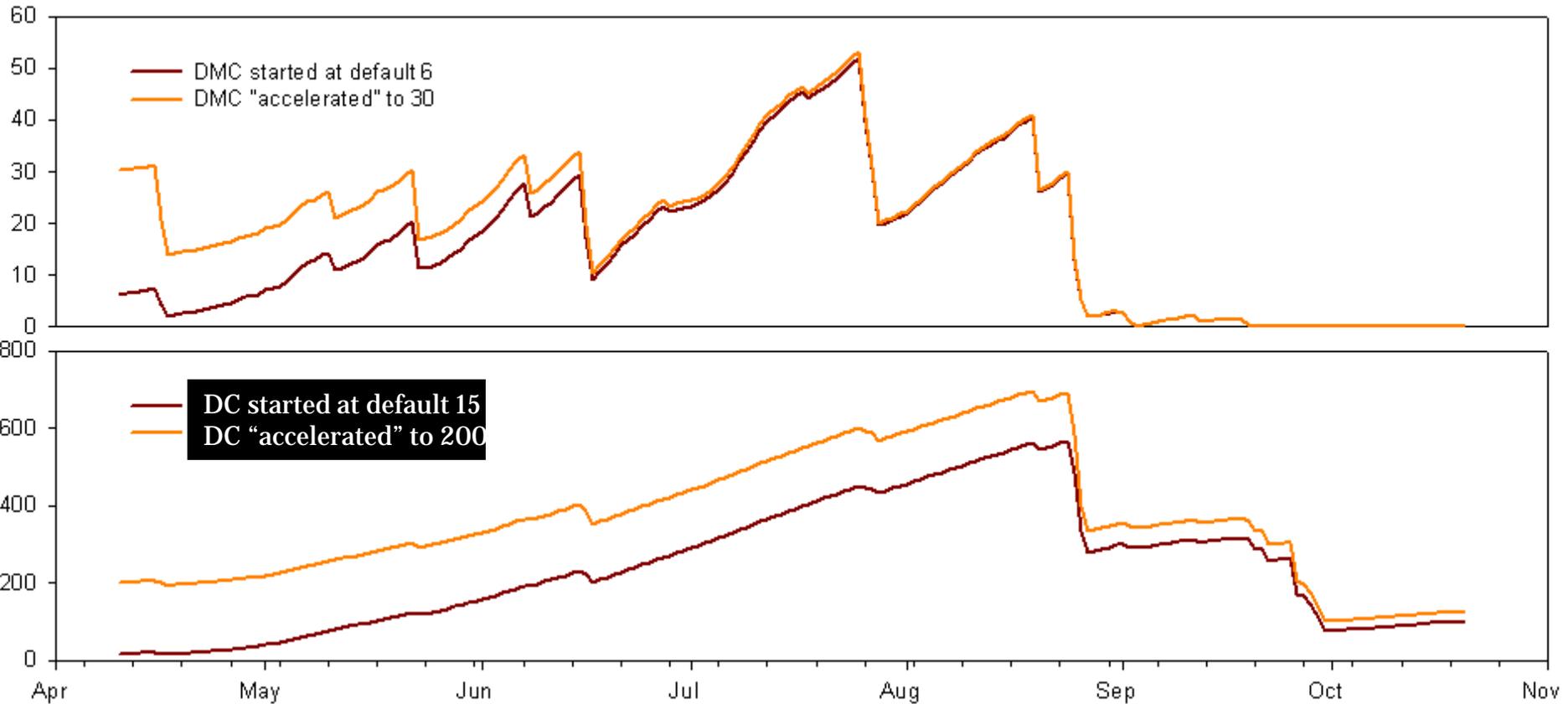
(Lower Duff)



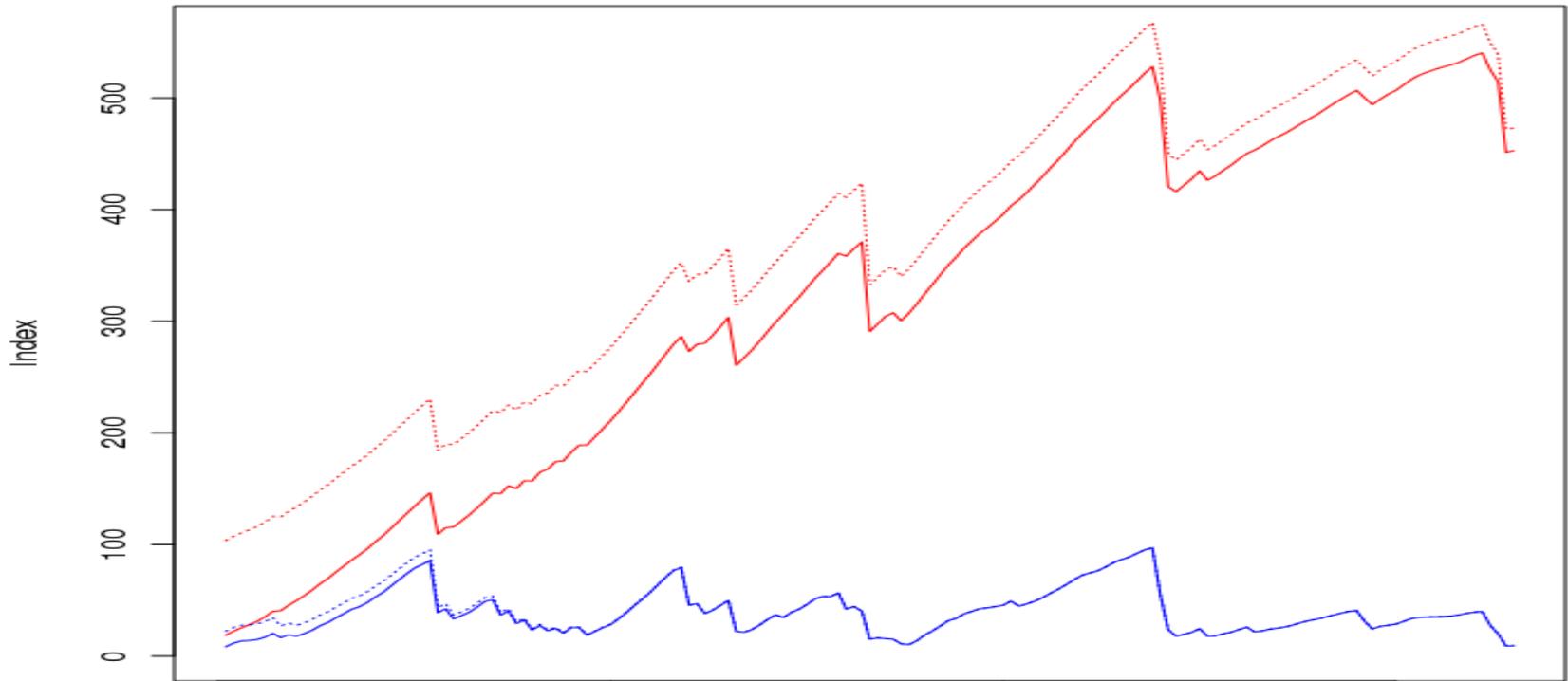
CFFDRS seems to work fairly well



Calibrate RAWS stations with field measurements



Calibrate RAWS stations with field measurements



28 April 2012

9 October 2012

Goal

- Model relationship between moisture content and DMC/DC using 2012 data
 - DMC ~ Dead Moss %
 - DC ~ Upper Duff %

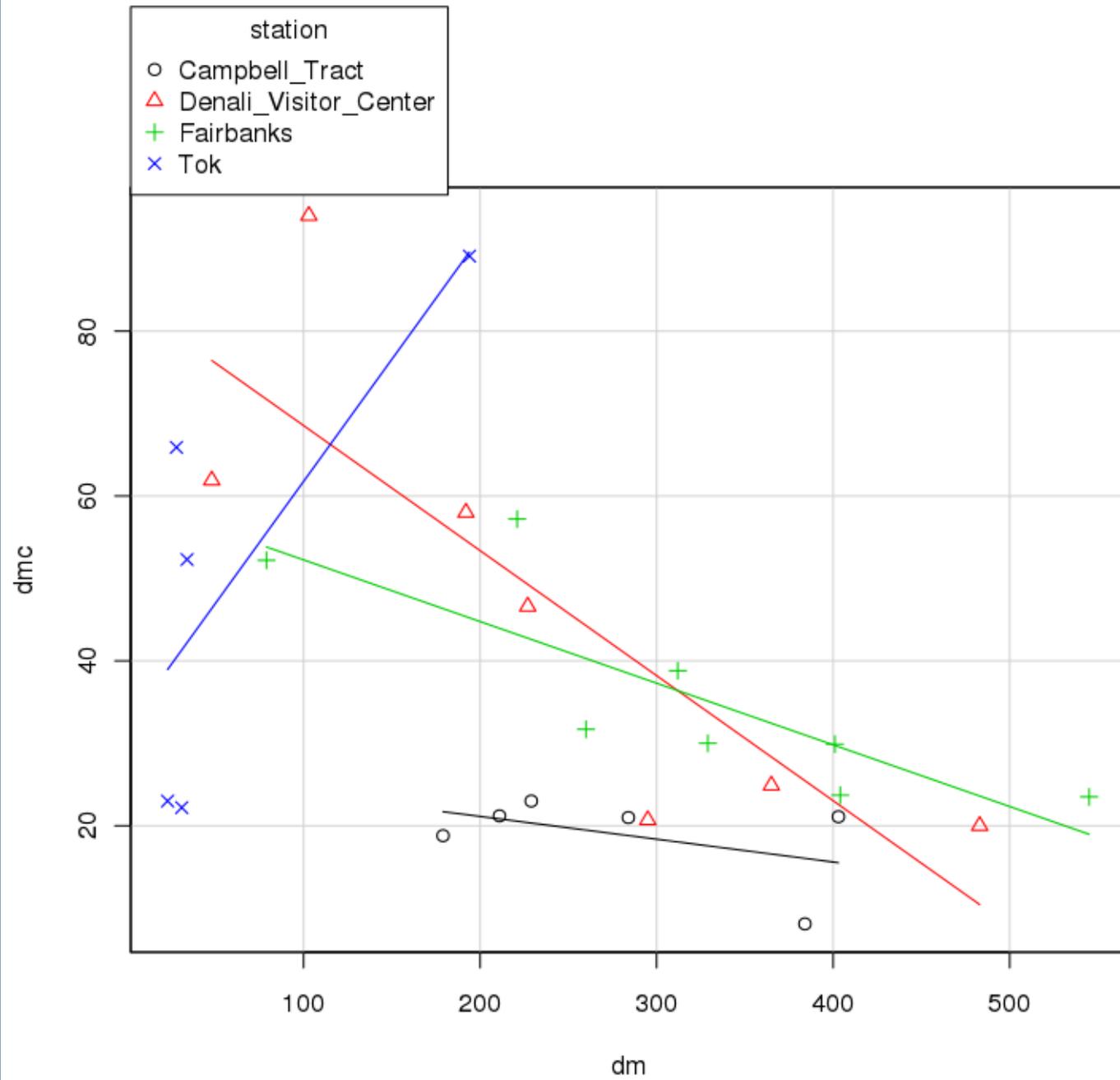


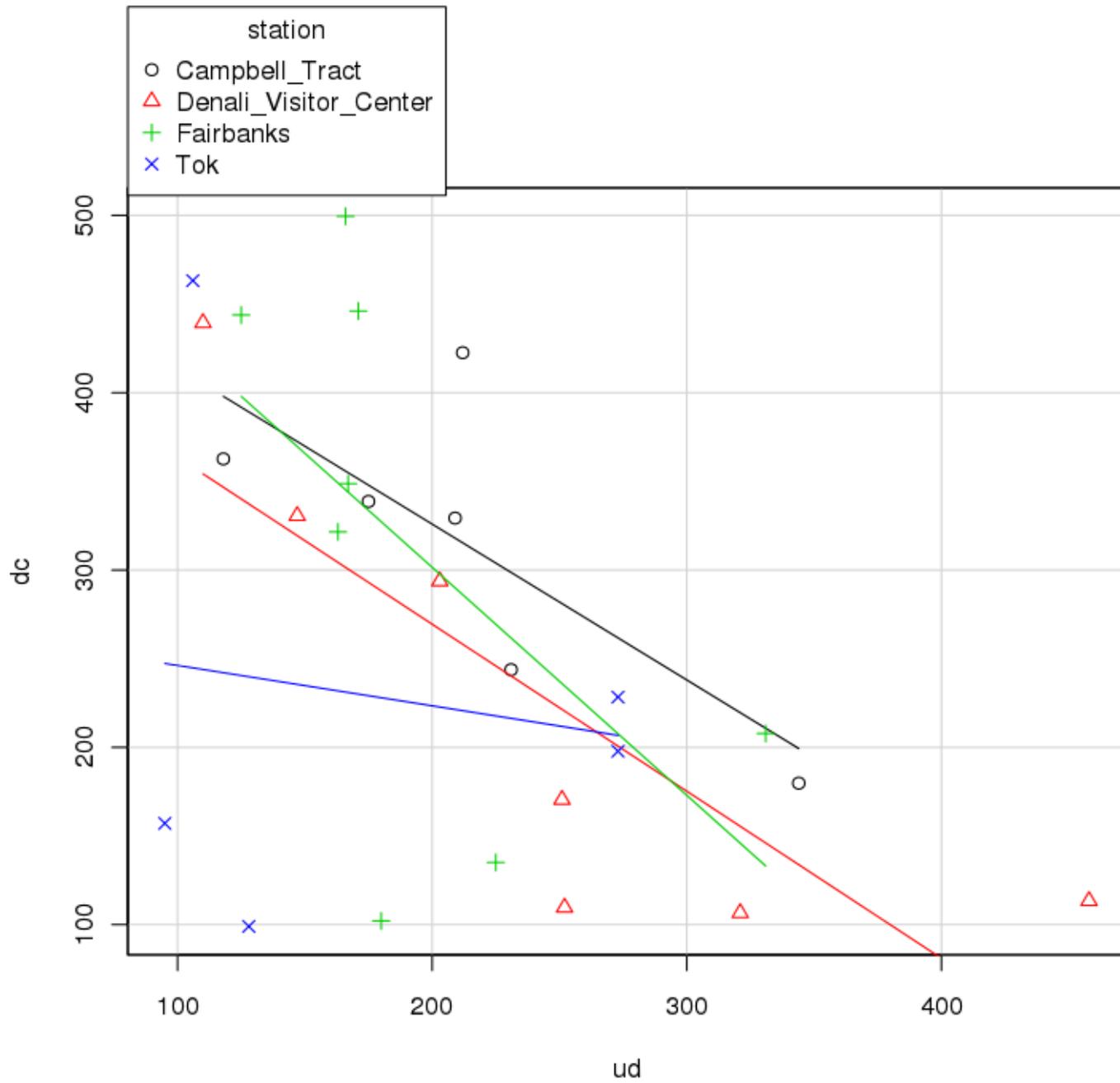
Kenai Duff Plug



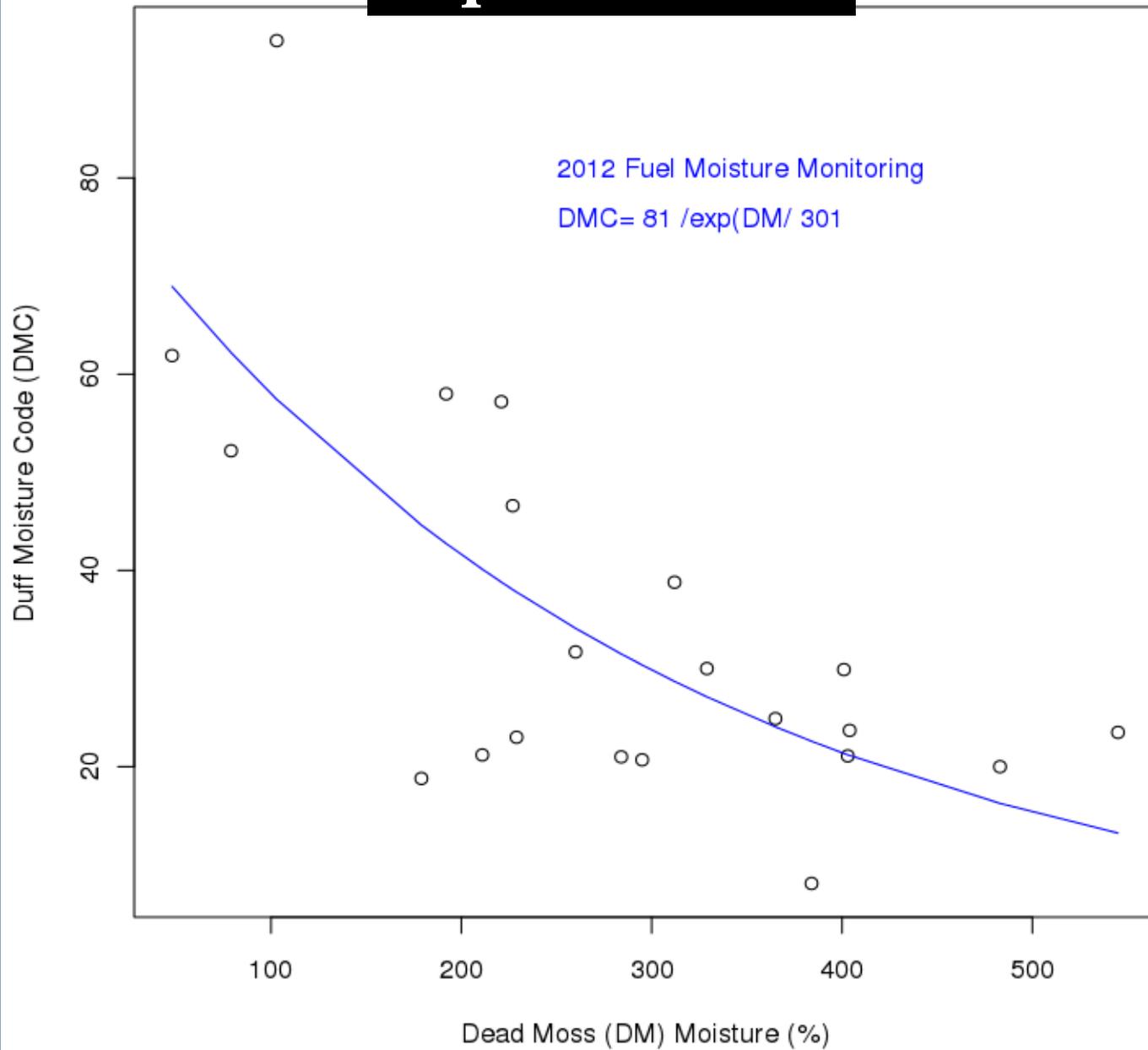
Correlation Coefficients

	DMC	DC
Dead Moss	-0.66*	-0.06
Upper Duff	-0.44	-0.70*

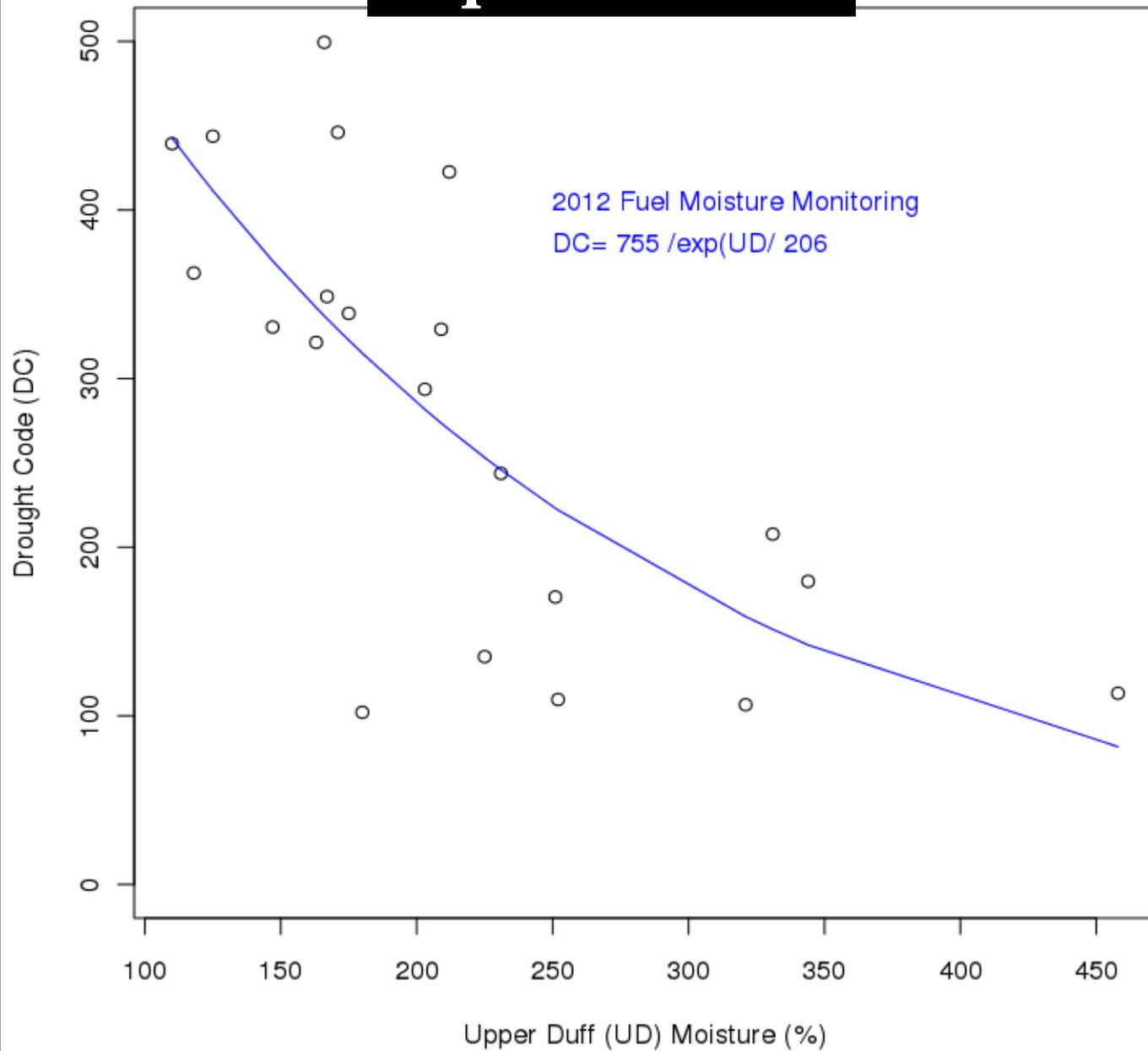


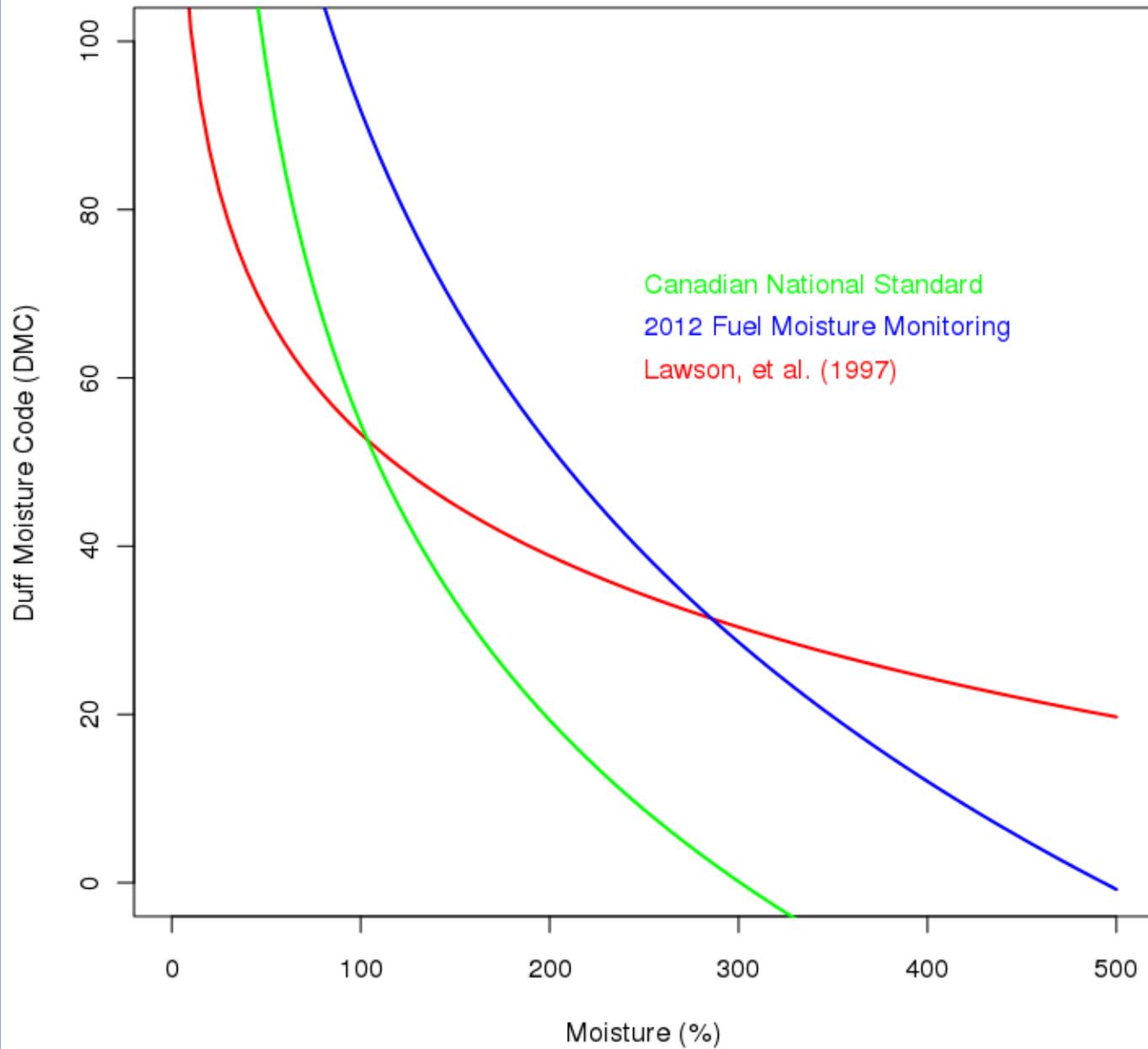


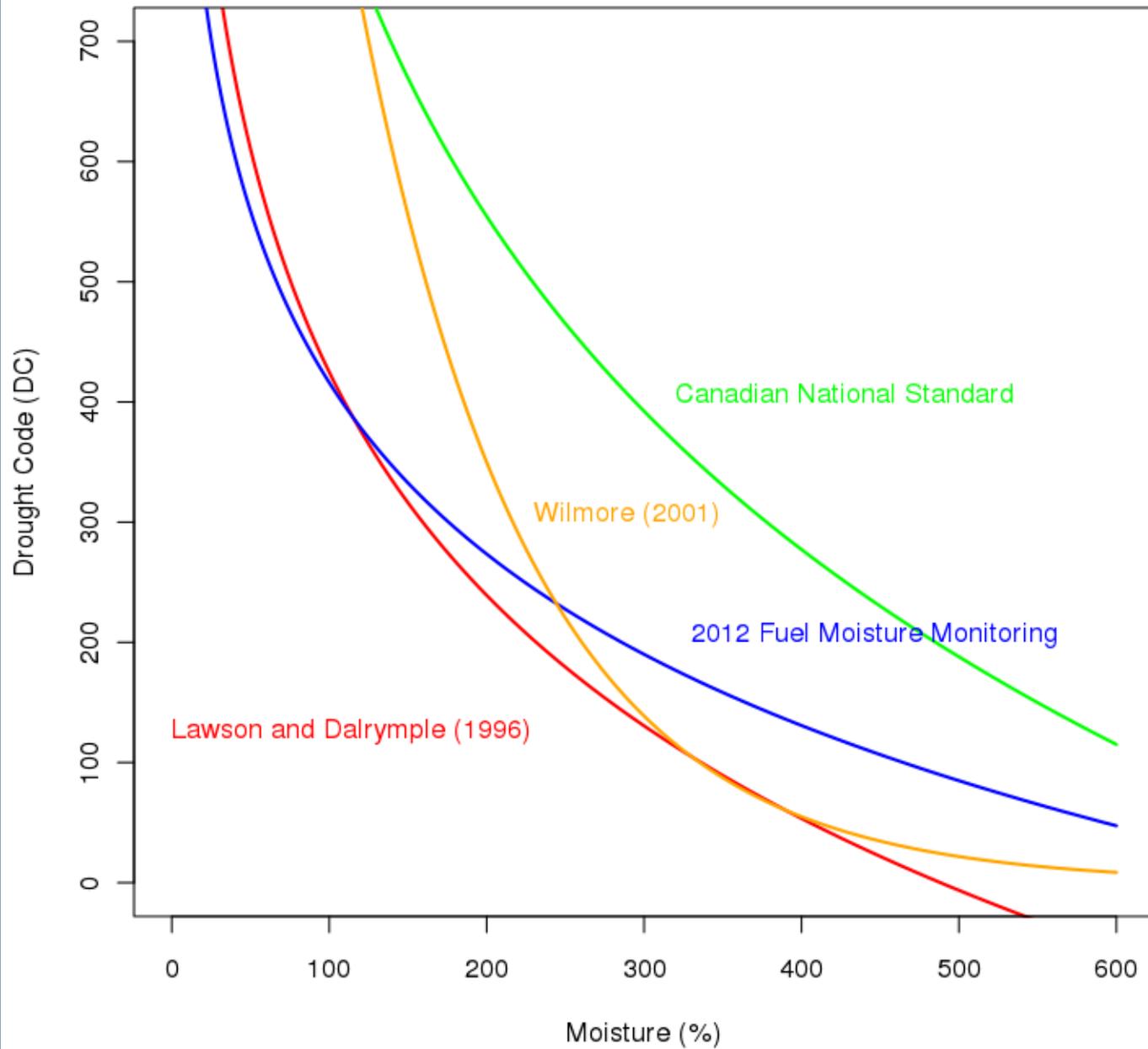
Equation Fit



Equation Fit







2012 Regression Equations

a	b	
493.2	57.51	$DM = a / \exp(DMC/b)$
383.6	467.4	$UD = a / \exp(DC/b)$
80.85	301.1	$DMC = a / \exp(DM/b)$
755.4	205.8	$DC = a / \exp(UD/b)$

DM= Dead Moss, UD= Upper Duff, DMC=Duff Moisture Code, DC=Drought Code

- Caution! Modelling with regression analysis:
 - Reverse the analysis, not the coefficients
 - $Y = f(X)$ will have different coefficients from $X = f(Y)$

Next

- Continue sampling in 2013
 - Capture a (possibly) drier year
 - Tease out regional differences
- Data loggers
 - Far more efficient and better data
 - \$20k



References

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- Jandt, R., J. Allen, and E. Horschel. 2005. Forest floor moisture content and fire danger indices in Alaska. Bureau of Land Management Alaska Technical Report 54. 30 pp.
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