



NADM Continental Drought Indicators – An Update

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Asheville, North Carolina USA*

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* with contributions from AAFC & NCEI colleagues

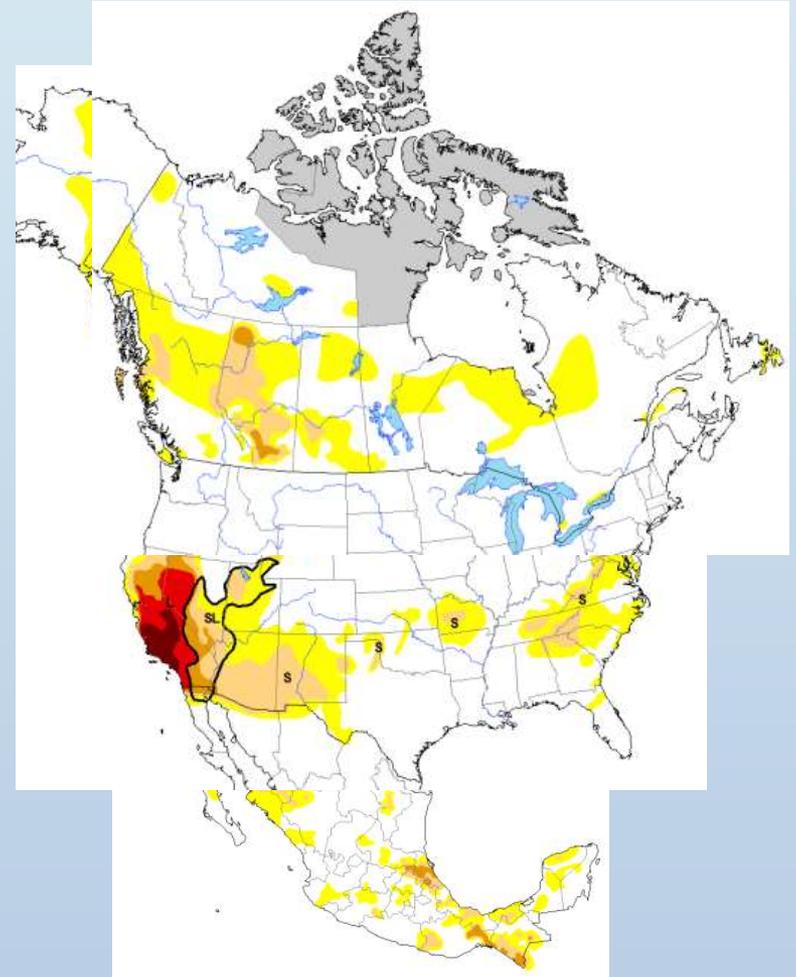


Overview

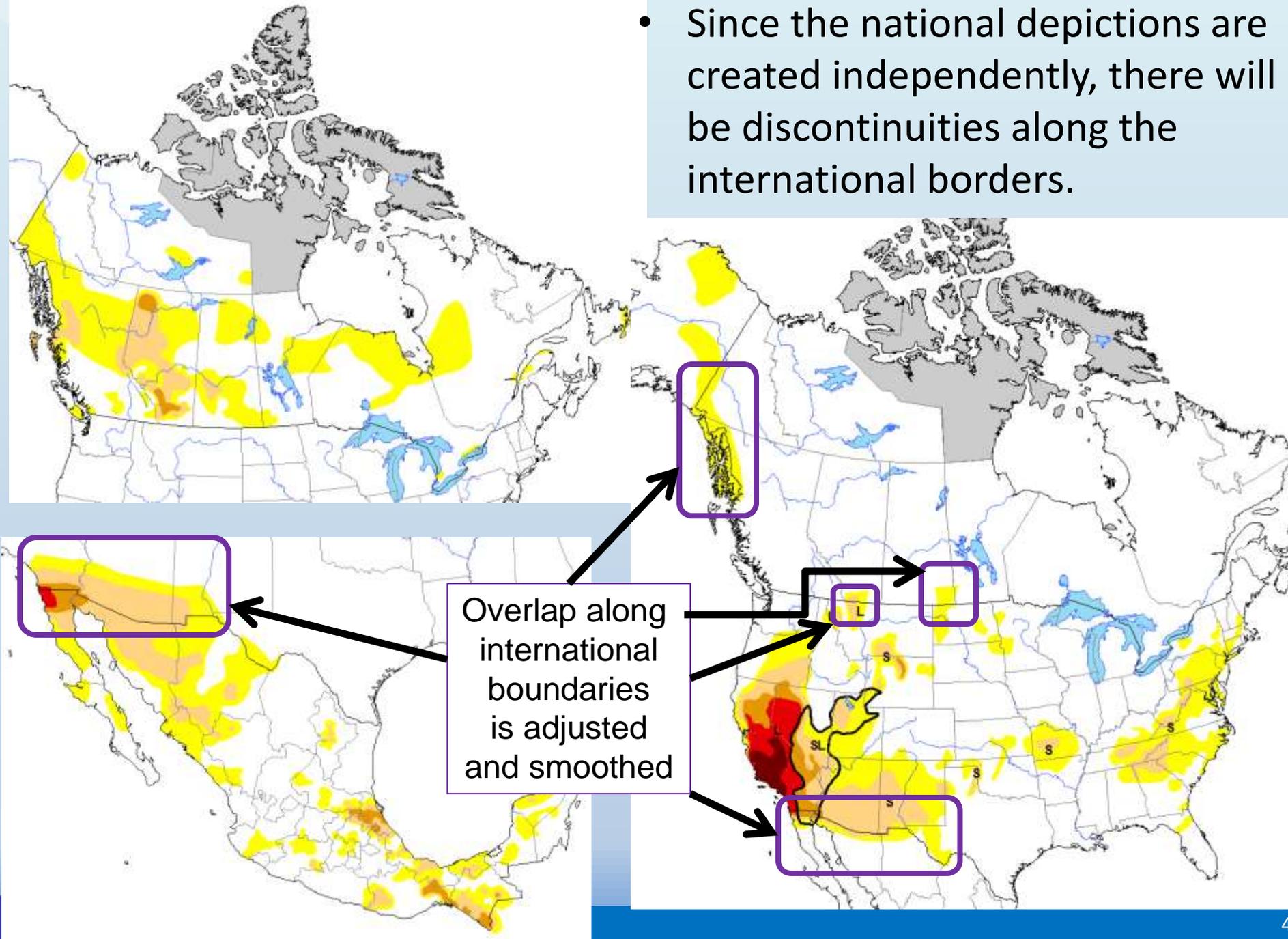
- Purpose of North America continental drought indices
- How it was done, and resulting issues
- How the issues were addressed, and how it is done now

Purpose of Continental Indicators

- NADM is constructed by merging the national drought depictions from USA, Canada, & Mexico in an ArcGIS environment.

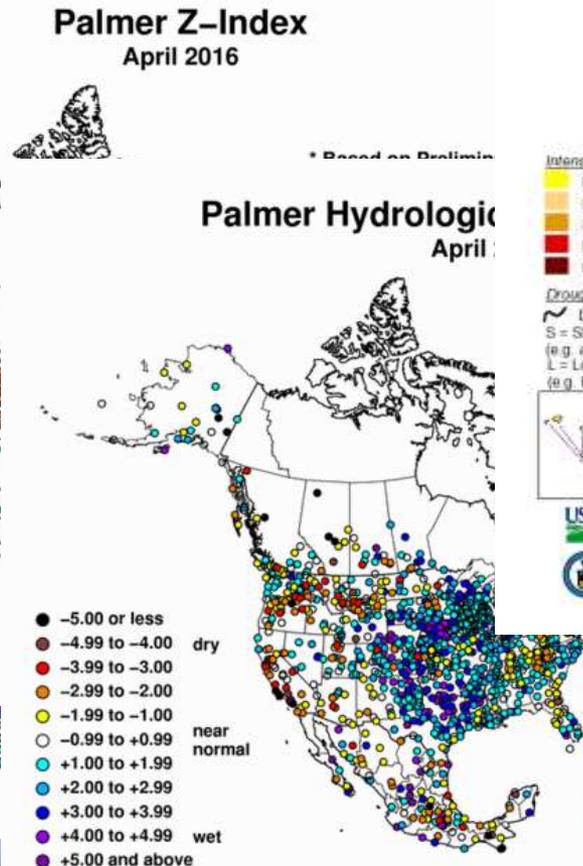
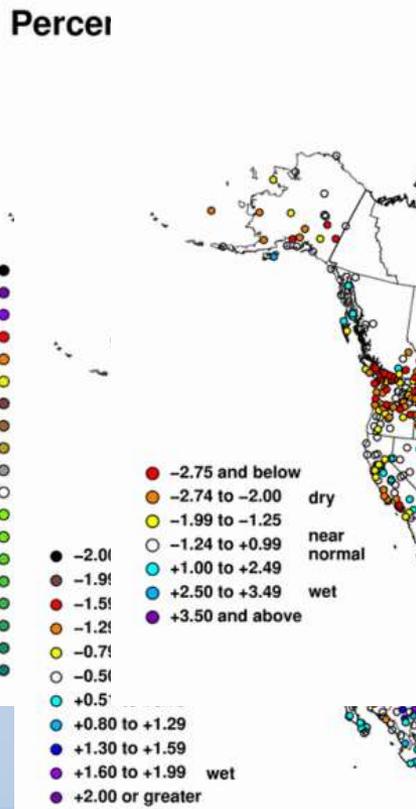


- Since the national depictions are created independently, there will be discontinuities along the international borders.



Purpose of Continental Indicators

- Continental drought indicators are computed and provided to aid the lead author in adjusting the NADM's Dx depiction along the borders.



North American Drought Monitor

April 30th, 2016

Released: May 11th, 2016

<http://www.ndbc.noaa.gov/nadm.html>

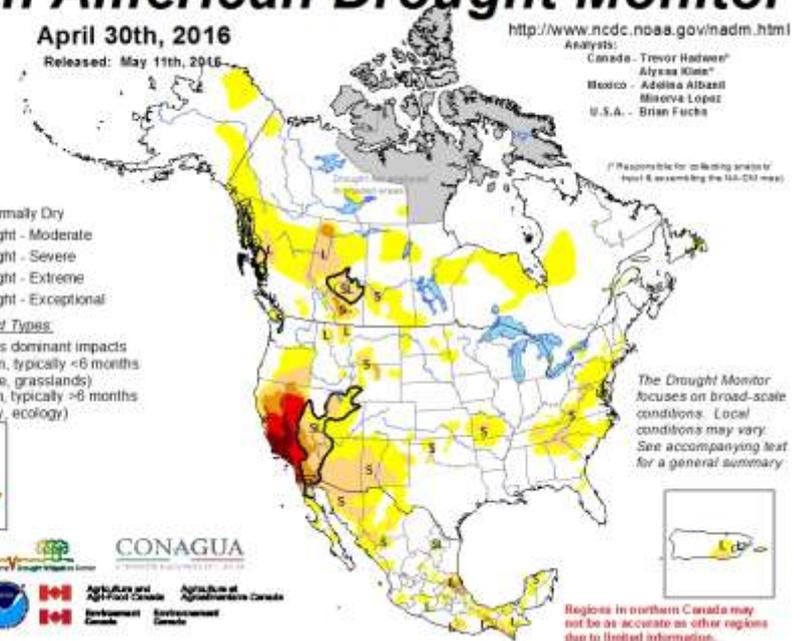
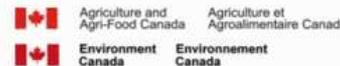
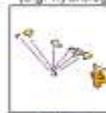
Analysts:
 Canada - Trevor Hadwin*
 Alyssa Kane*
 Mexico - Adeline Albasil
 Minerva Lopez
 U.S.A. - Brian Fuchs

Intensity

- D0 Abnormally Dry
- D1 Drought - Moderate
- D2 Drought - Severe
- D3 Drought - Extreme
- D4 Drought - Exceptional

Drought Impact Types

- S = Short-Term, typically <6 months (e.g. agriculture, grasslands)
- L = Long-Term, typically >6 months (e.g. hydrology, ecology)



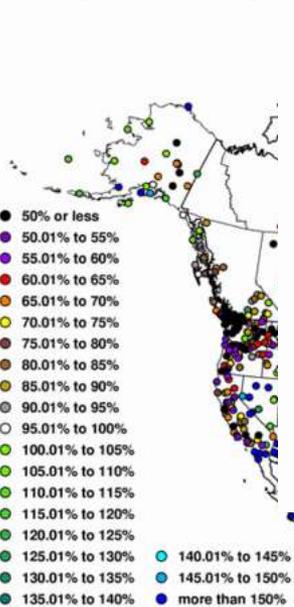
The Old Way

- 3 indices:
 - Standardized Precipitation Index (SPI)
 - Percent of Long-term Average Precipitation (PCTPCP)
 - Palmer Drought Indices (PHDI, PDSI, Z Index)
- For consistency, and to ensure spatial differences in indices reflect differences in drought and not in methodology, a common calibration period and common software are used.
 - 1951-2001
 - Data sent to NCEI to compute using common software.

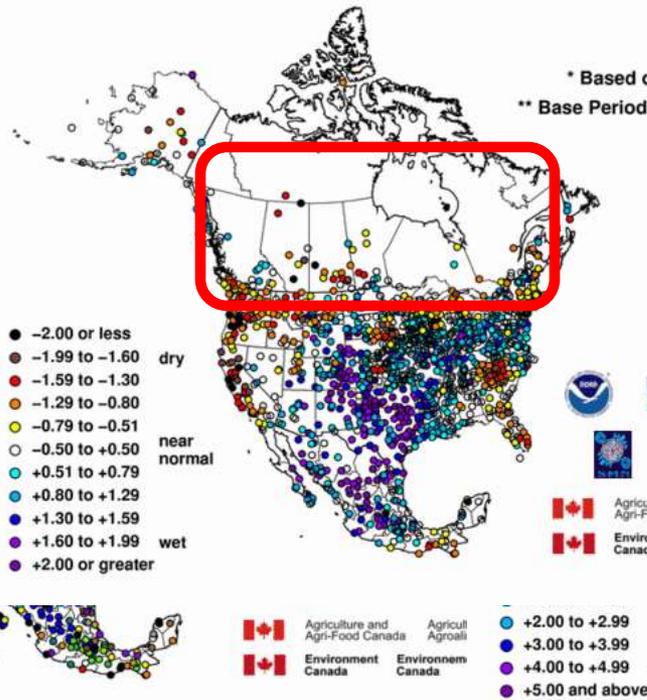
The Old Way – Issues

- A complete period of record is needed to compute some of the indices. Missing days or months result in a missing station. This became an issue for stations in Canada.

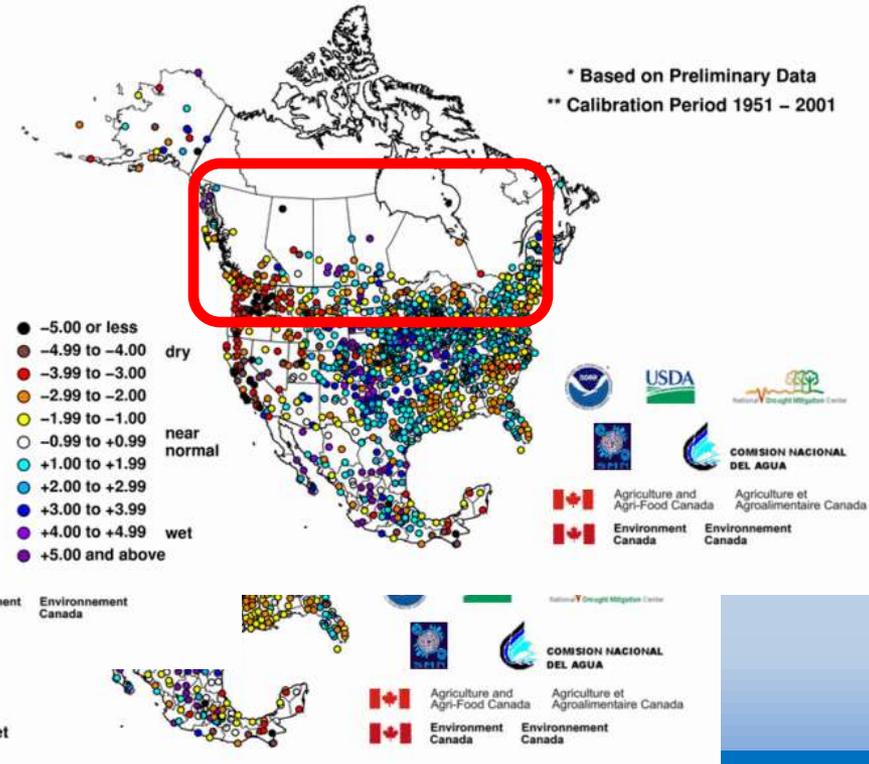
Percent of Long-



6-Month Standardized Precipitation January – June 2015



Palmer Hydrological Drought Index September 2015



The Solution

- Have Canada (AAFC) compute the 3 indices for the Canadian stations and send to NCEI; NCEI continue to compute them for USA and Mexico.
- Need to have a common calibration period and common methodology.
 - Calibration Period for all 3 countries:
 - 1951-present for SPI
 - 1951-2010 for PCTPCP & Palmer Indices
 - Software:
 - PCTPCP and SPI were straightforward
 - Palmer Software presented issues

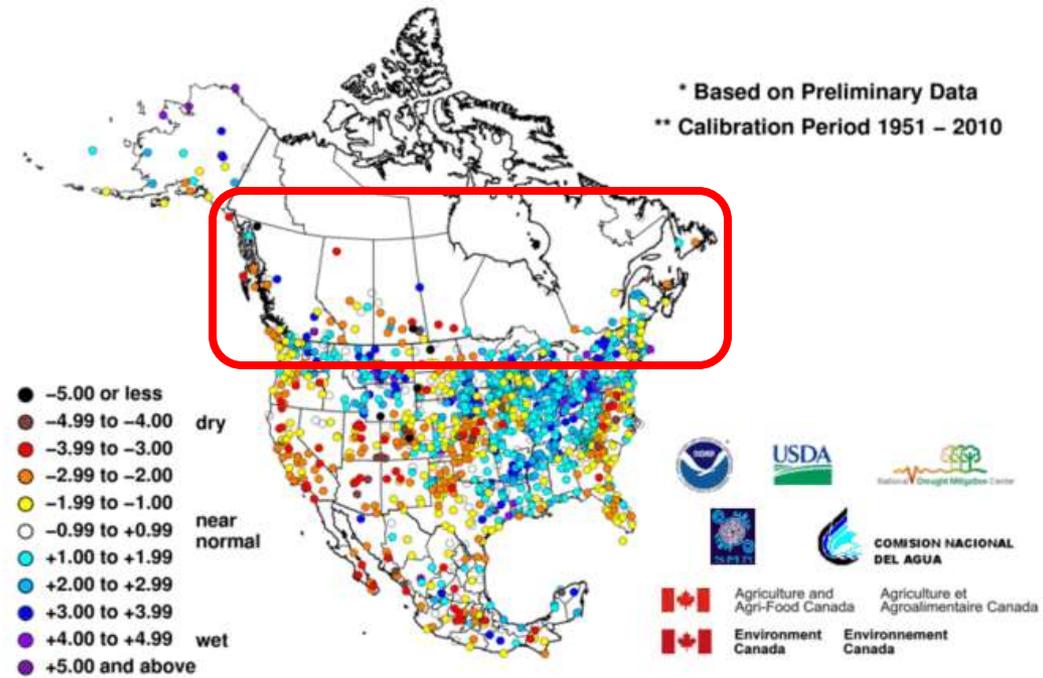
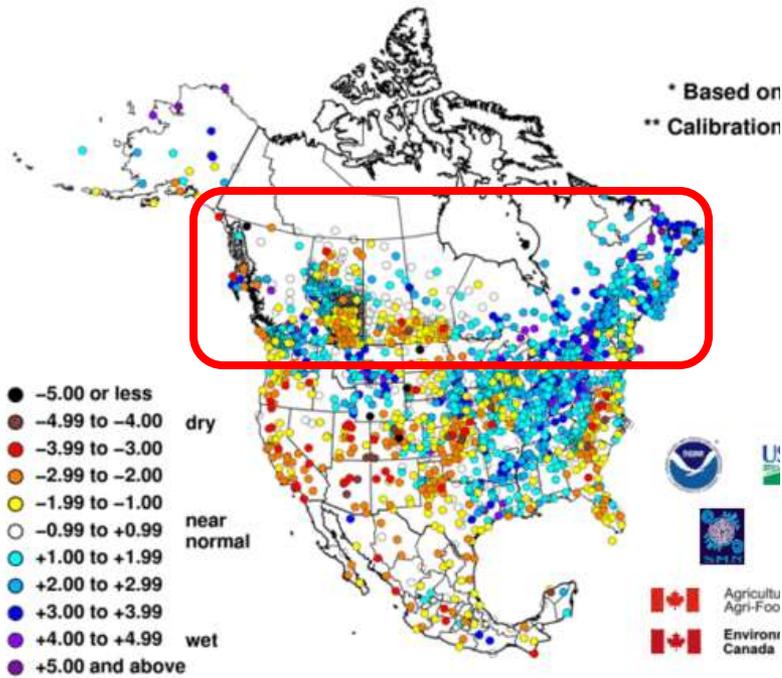
The Station Density is Much Better!

New:

Old:

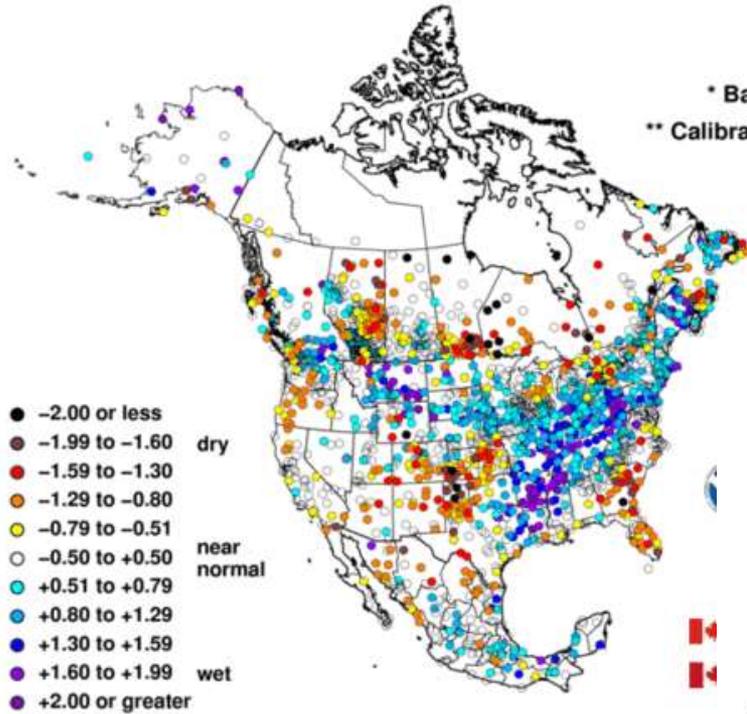
Palmer Hydrological Drought In
March 2018

Palmer Hydrological Drought Index
March 2018



3-Month Standardized Precipitation Index

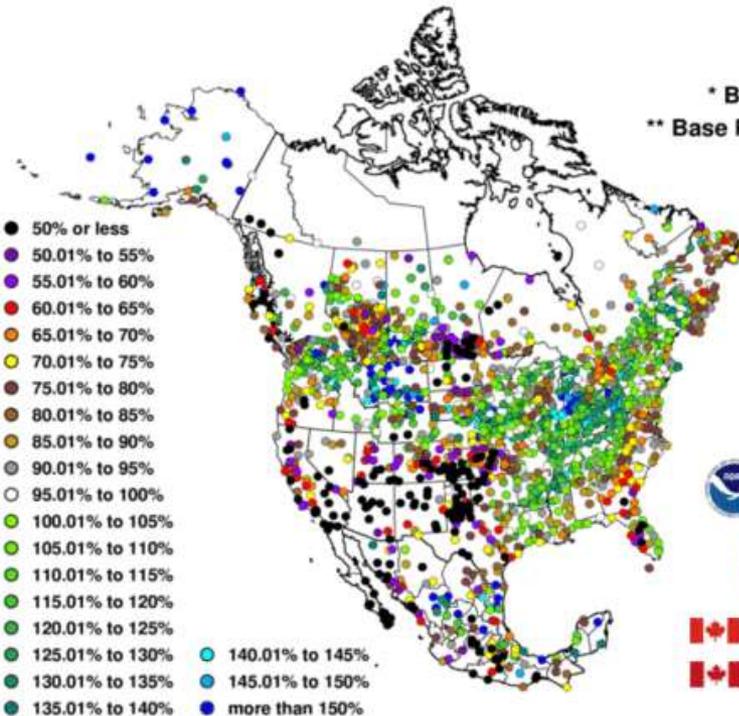
January – March 2018



* Based on Preliminary Data
 ** Calibration Period 1951–current year

Percent of Long-Term Average Precipitation, 6-Month

October 2017 – March 2018

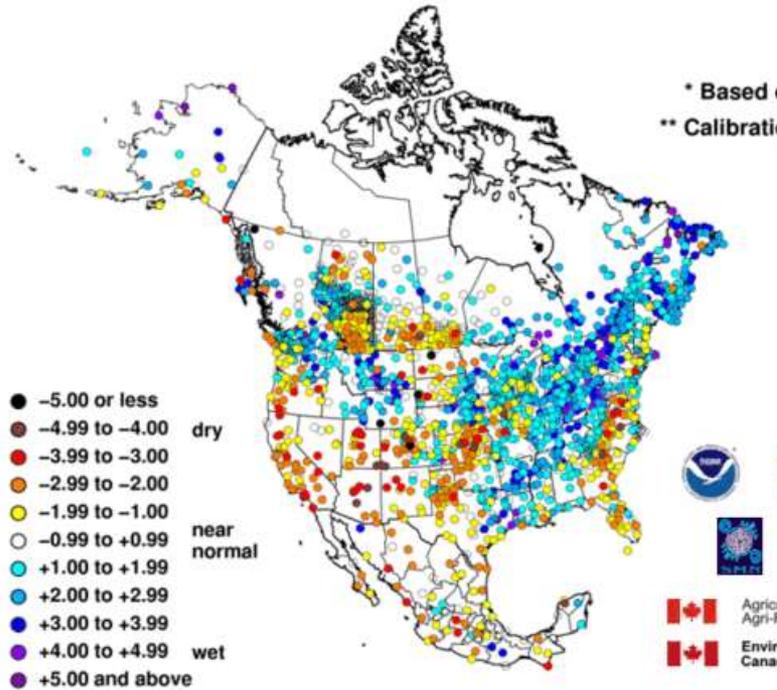


* Based on Preliminary Data
 ** Base Period for Averages 1951–2010

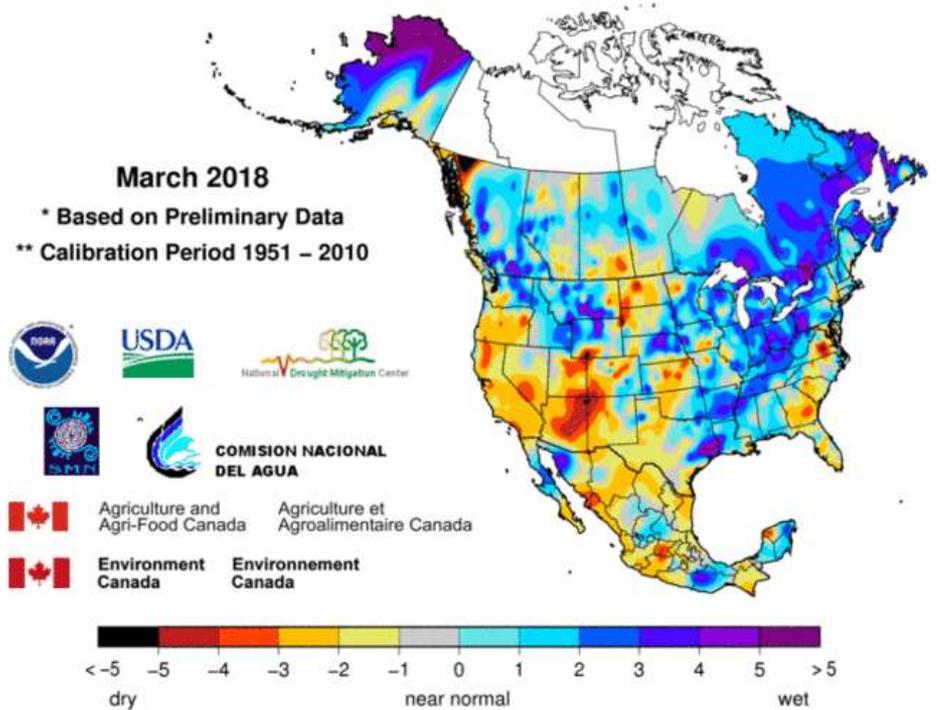


We Can Even Contour Canada Now!

Palmer Hydrological Drought Index
March 2018



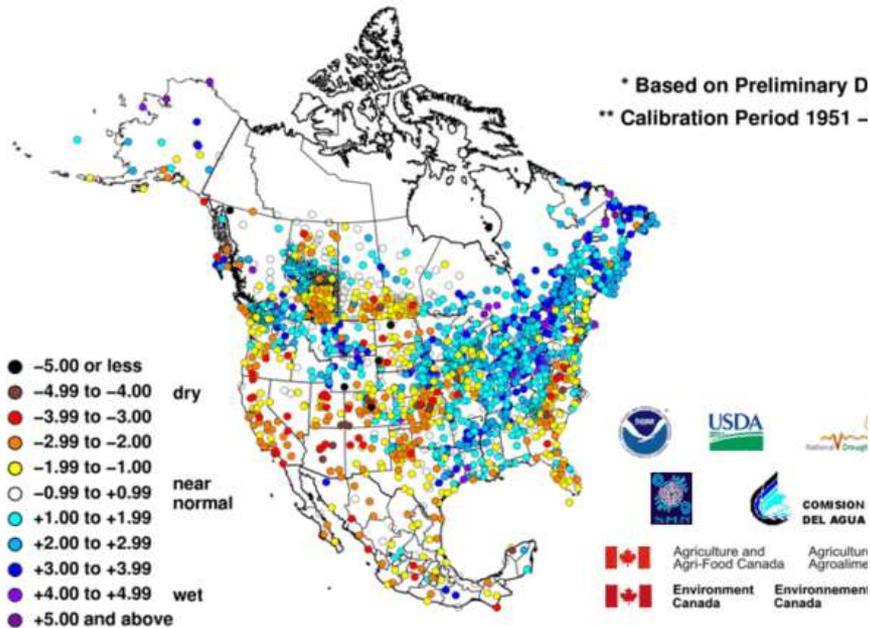
Palmer Hydrological Drought Index



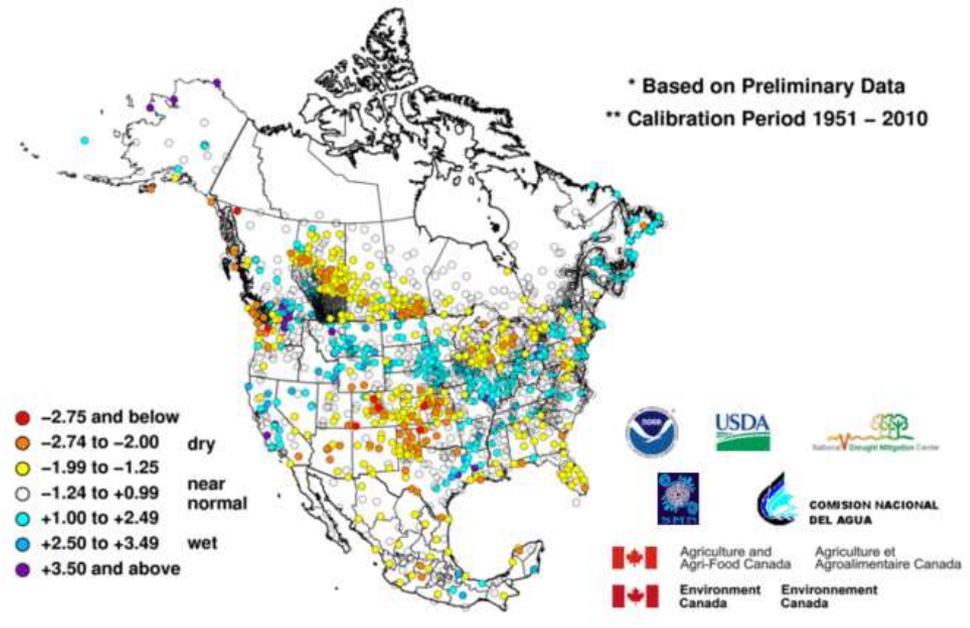
The Palmer Indices ...

- However, the Canadian Palmer programs computes only PHDI and Z Index for Canada, not PDSI.

Palmer Hydrological Drought Index
March 2018



Palmer Z-Index
March 2018



The Palmer Indices ...

- And ... the Canadian Palmer methodology is different from the Palmer methodology used for the USA and Mexico.
 - input data sets – time step – correction factor “k” – evapotranspiration – snow vs. rain, ice layer, soil temp – crop stage
- Extensive comparisons revealed similarities between the Palmer values and spatial patterns.
- “Caveat Emptor” (Buyer Beware) document to explain the differences and their relevance.

Summary

- Station density in Canada is much improved with conditions better represented across continent
- Differences in Palmer methodology are not a problem and are documented
- Calibration periods updated to include more recent extremes

Thank You!

- Acknowledgements – This effort would not be possible without the valuable work contributed by Richard Warren (AAFC) and Trevor Wallis (NCEI) and relentless encouragement by Trevor Hadwen (AAFC)



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