



State Climatology Office
Ecological and Water
Resources

Historical Drought Overview and Current Conditions

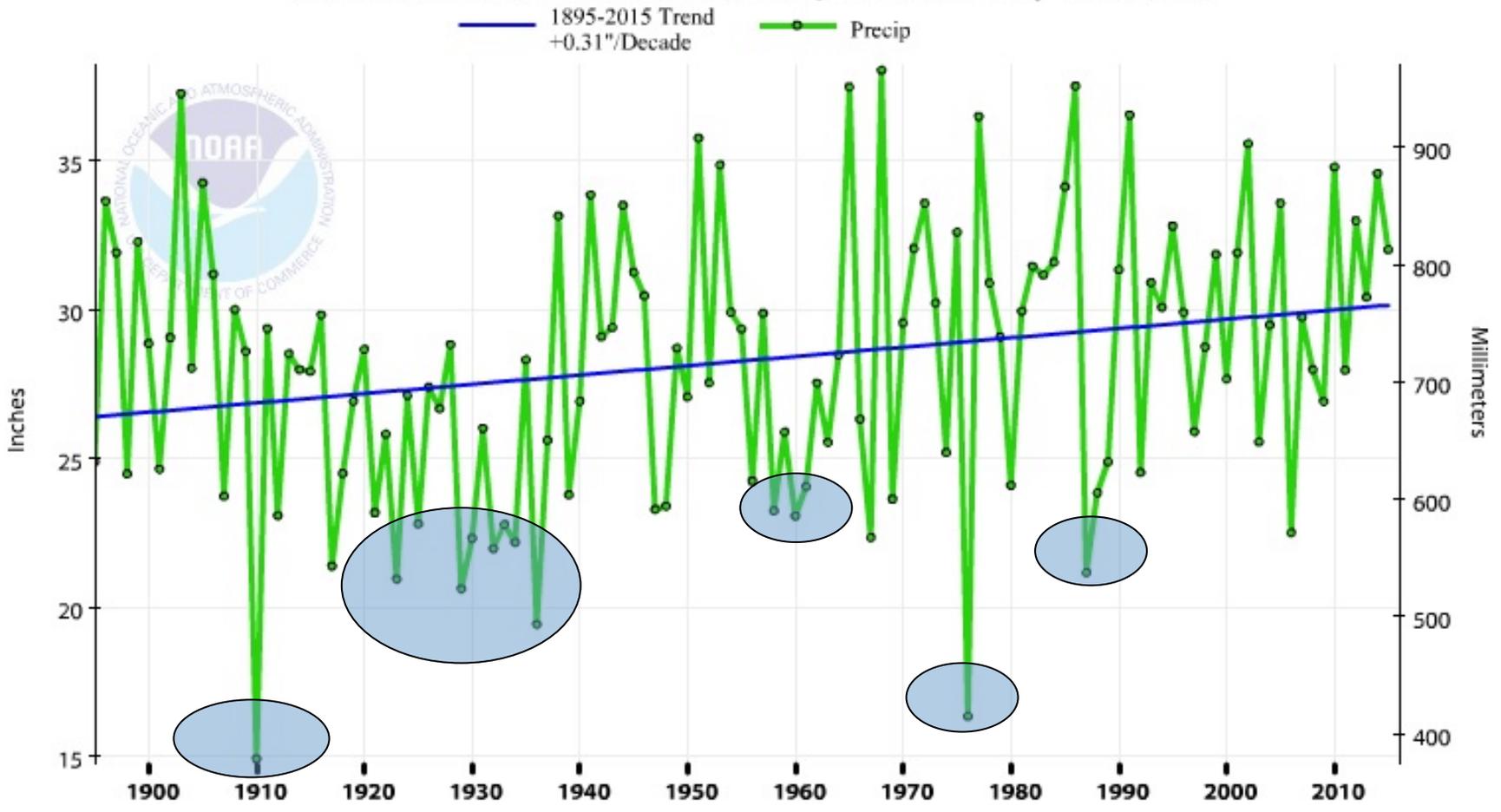
Pete Boulay

NIDIS and DEWS Workshop: Rochester, MN - November 2016



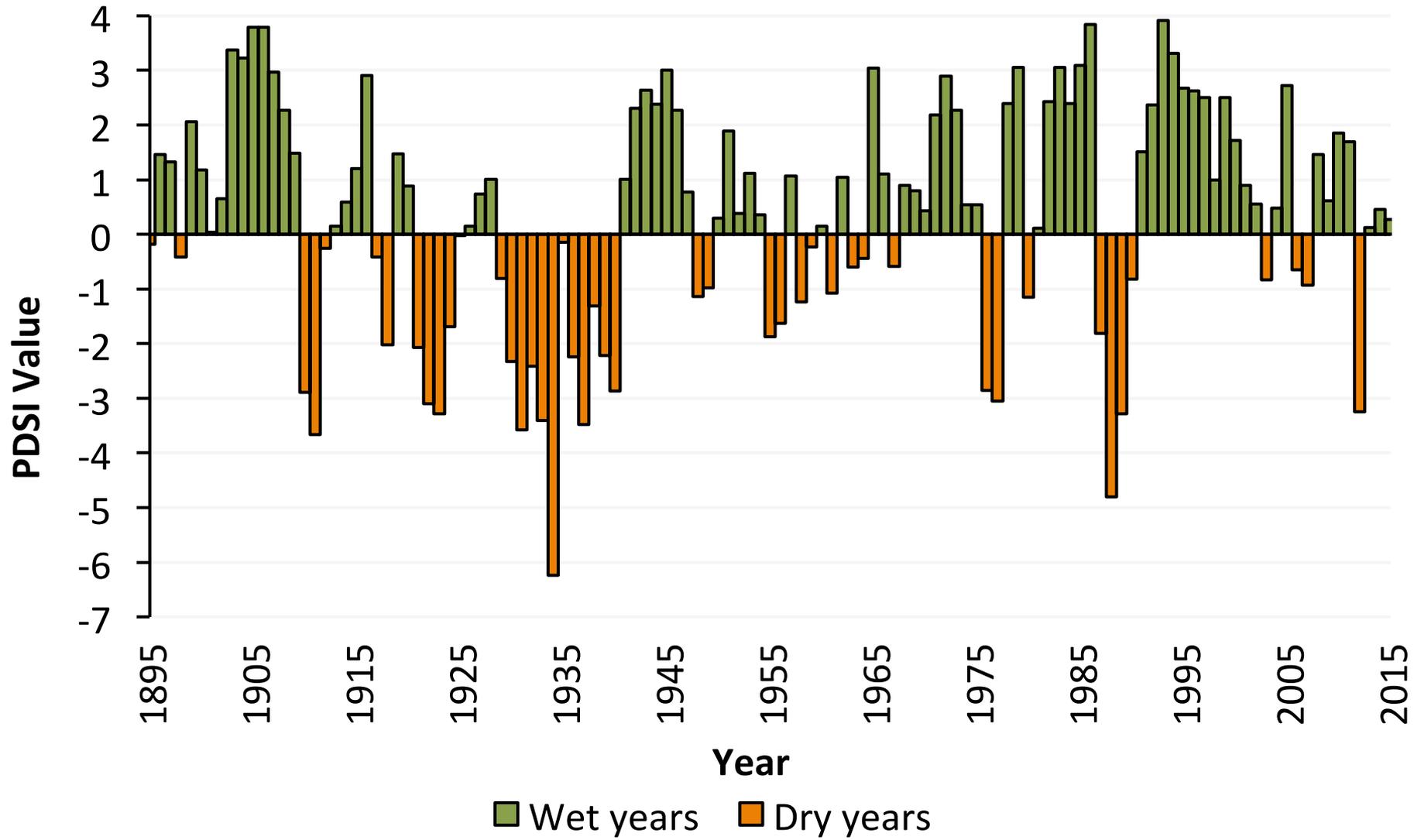
Drought History

Minnesota, Climate Division 6, Precipitation, January-December



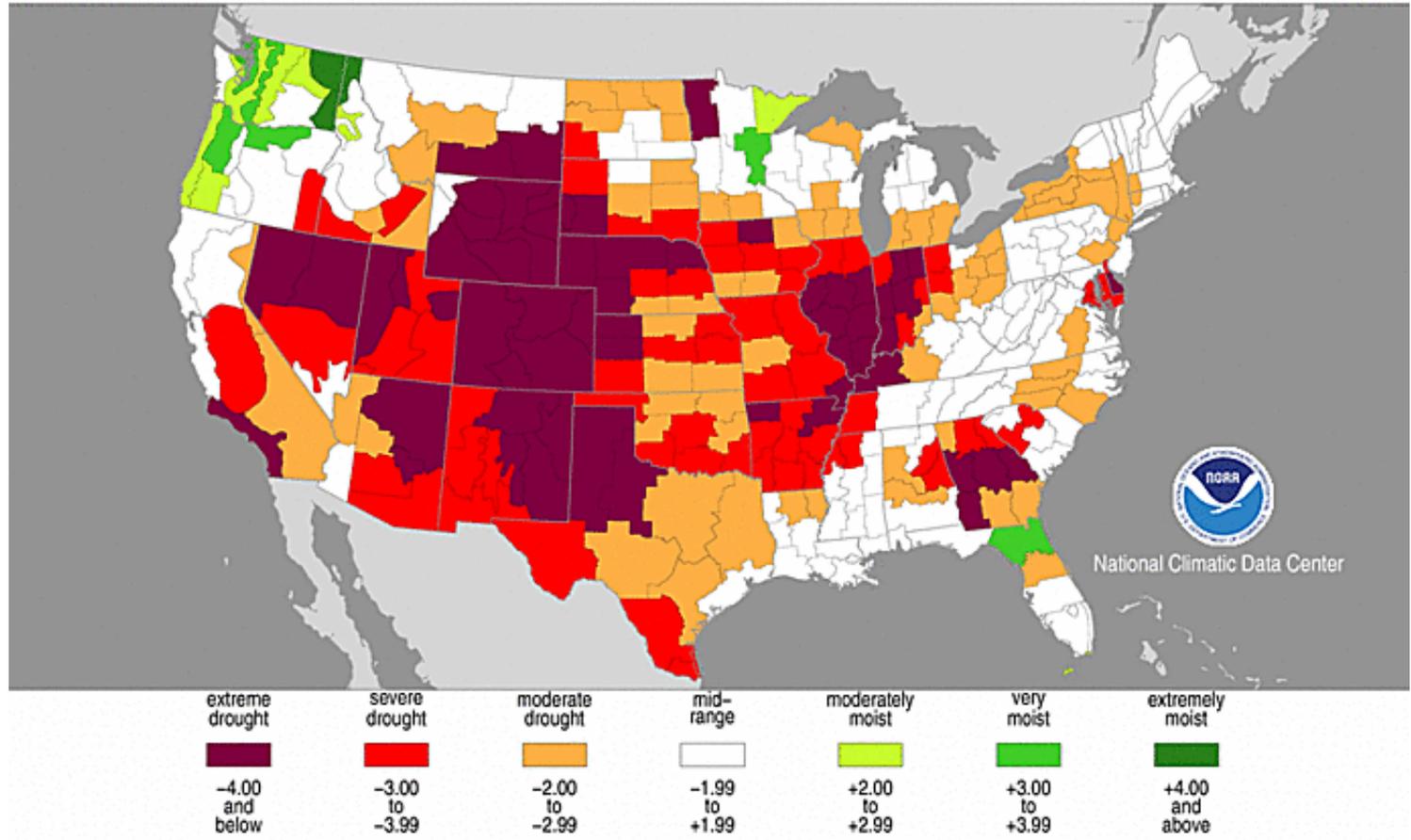


Minnesota Palmer Drought Severity Index, 1895-2015: no drought increase



2012 Drought

Palmer Drought Severity Index
July, 2012



2012 Drought

- December 2011- March 2013
- 81% of US in at least D0 on July 17, 2012
- March 2012 warmest in MN, WI and region.
- 2012 36th driest in WI and 58th driest in MN

Minesweeper exposed by low water
in St. Louis, MO

Courtesy: Portland Press Herald (Dec 2012)



2012 Drought



2012 Drought



1984

ELECTORAL MAP
How each state voted

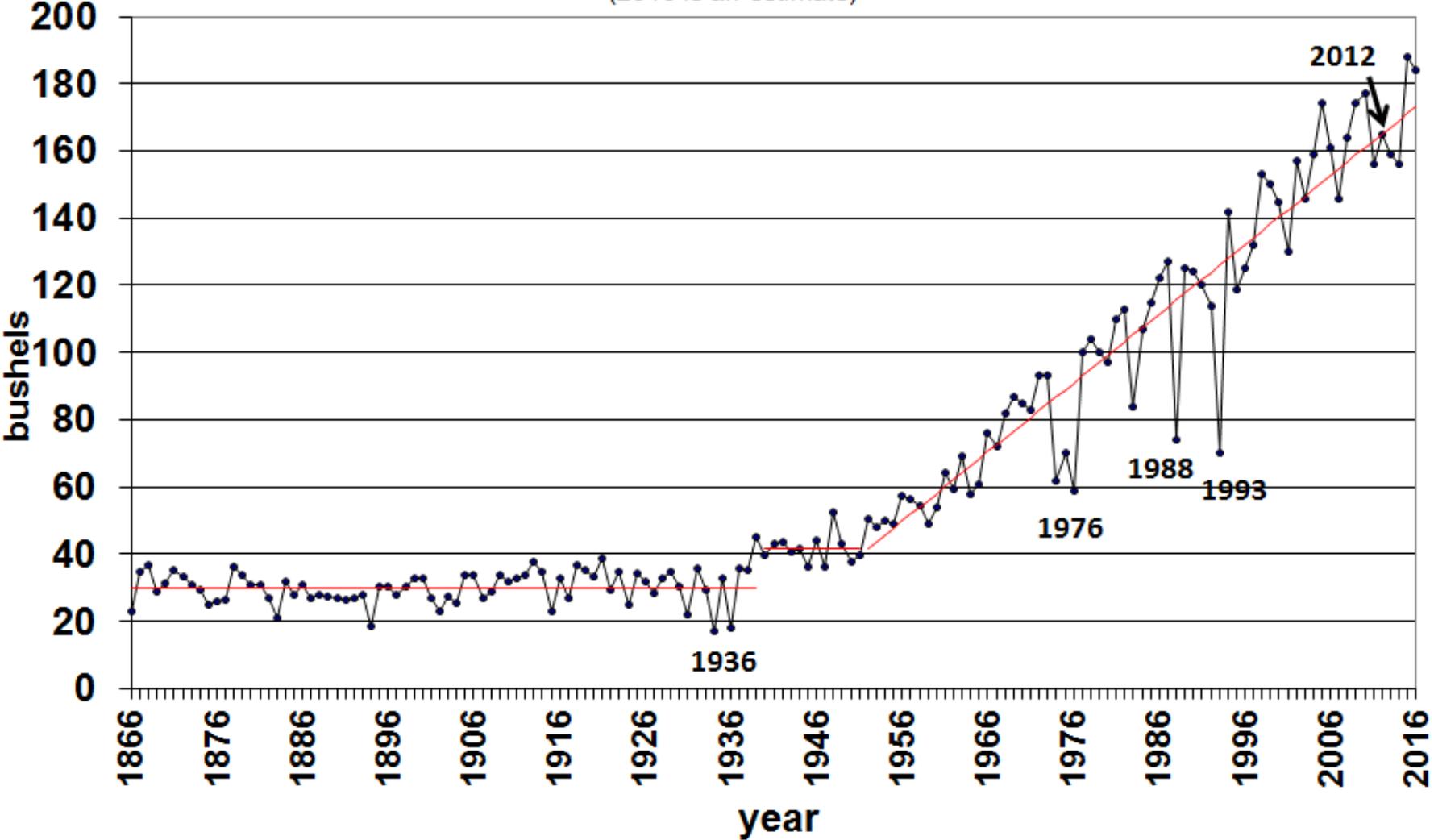


Wisconsin's Choice
REAGAN

Minnesota Average Corn Yield

1866-2016

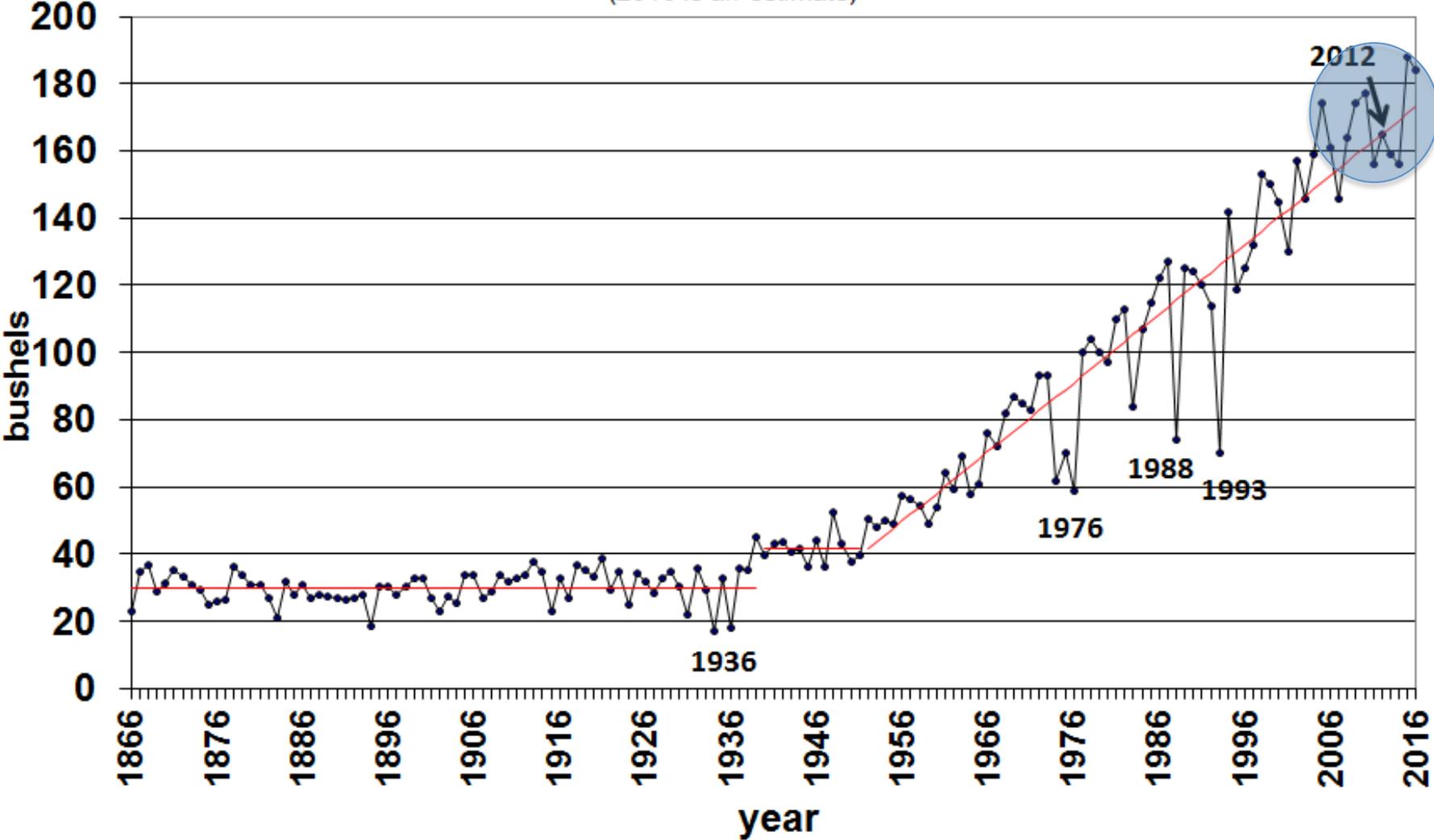
(2016 is an estimate)



Minnesota Average Corn Yield

1866-2016

(2016 is an estimate)

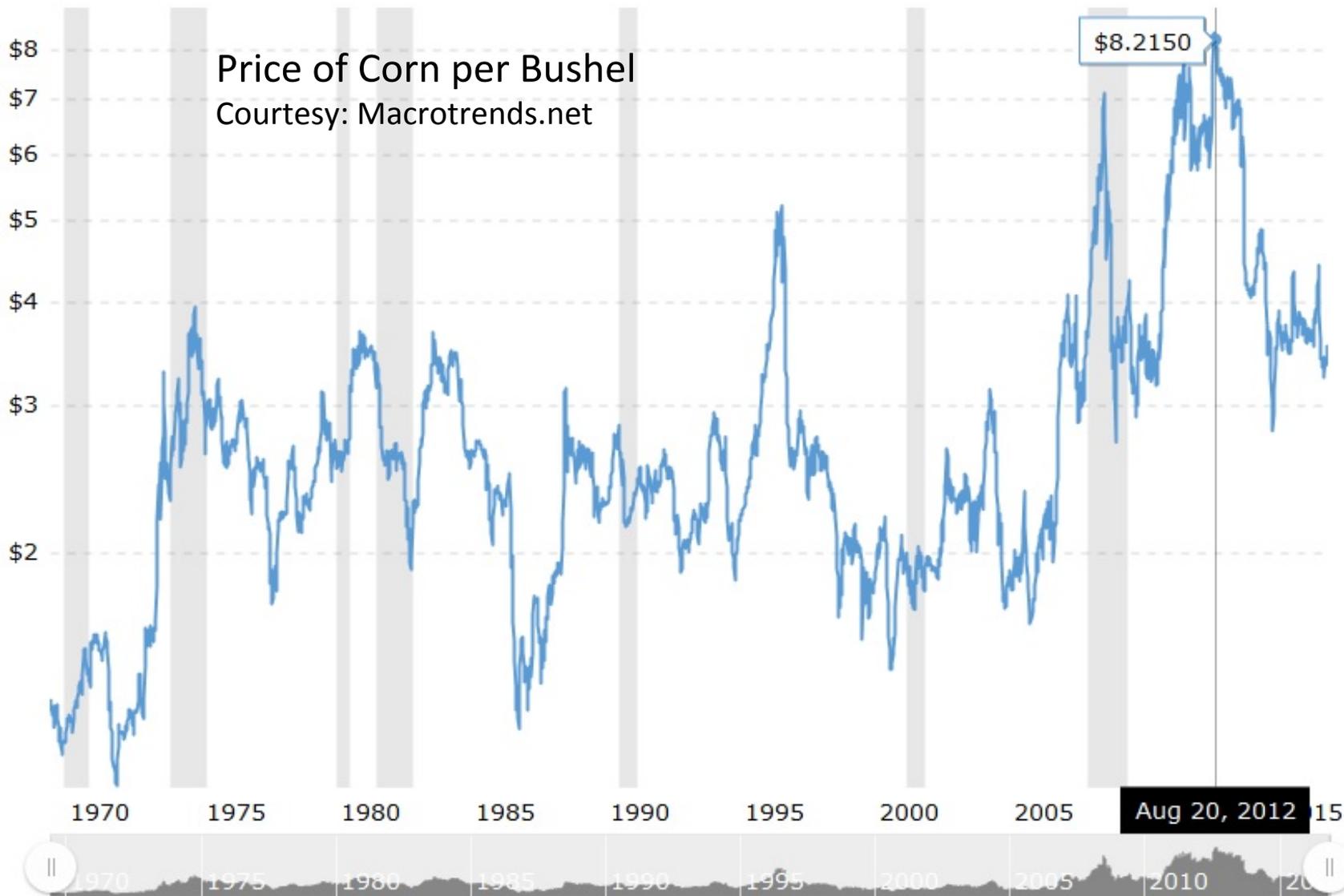


Show Recessions Log Scale

[Download Data](#)

[Export Image](#)

Click and drag in the plot area or select dates: [YTD](#) | [1 Year](#) | [3 Years](#) | [5 Years](#) | [10 Years](#) | [20 Years](#) | [All Years](#)

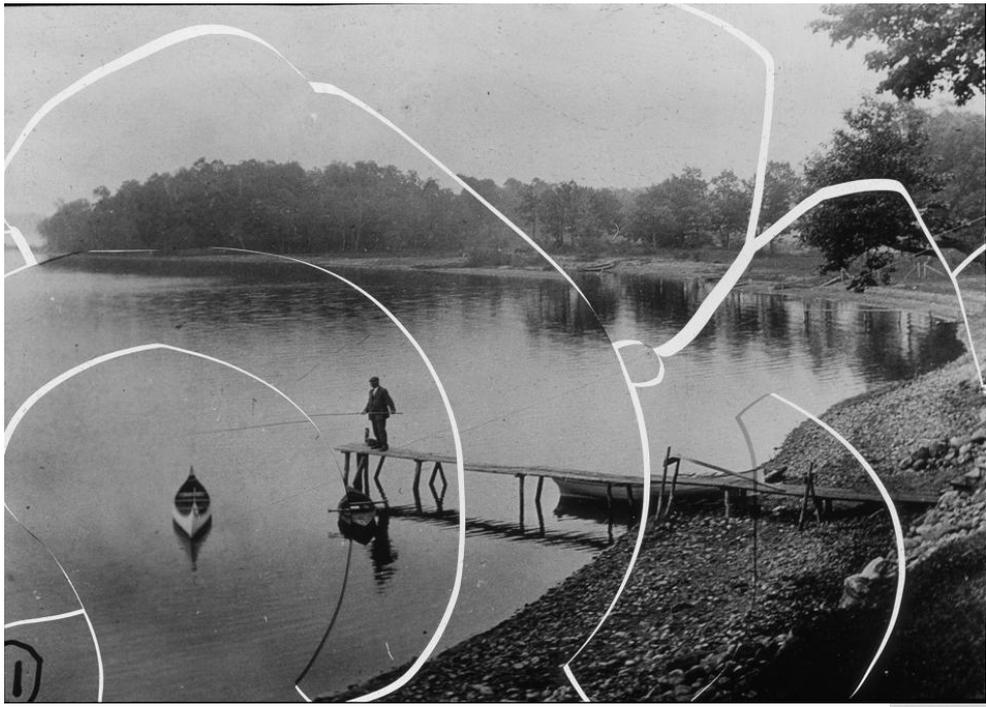




Courtesy: Truck Trend Network



A One Hit Wonder: 1910 Drought



Minnetonka@ 926.58 Sept 1910



Minnetonka@ 928.57 May 1912



A One Hit Wonder: 1910 Drought

- Record low annual MSP precip: 11.54 in
- Water shortage in St. Paul
- Outbreak of forest fires
- Price of lemons doubled
- 1976 drought similar

Drought In Minnesota Said Worst Since 1910

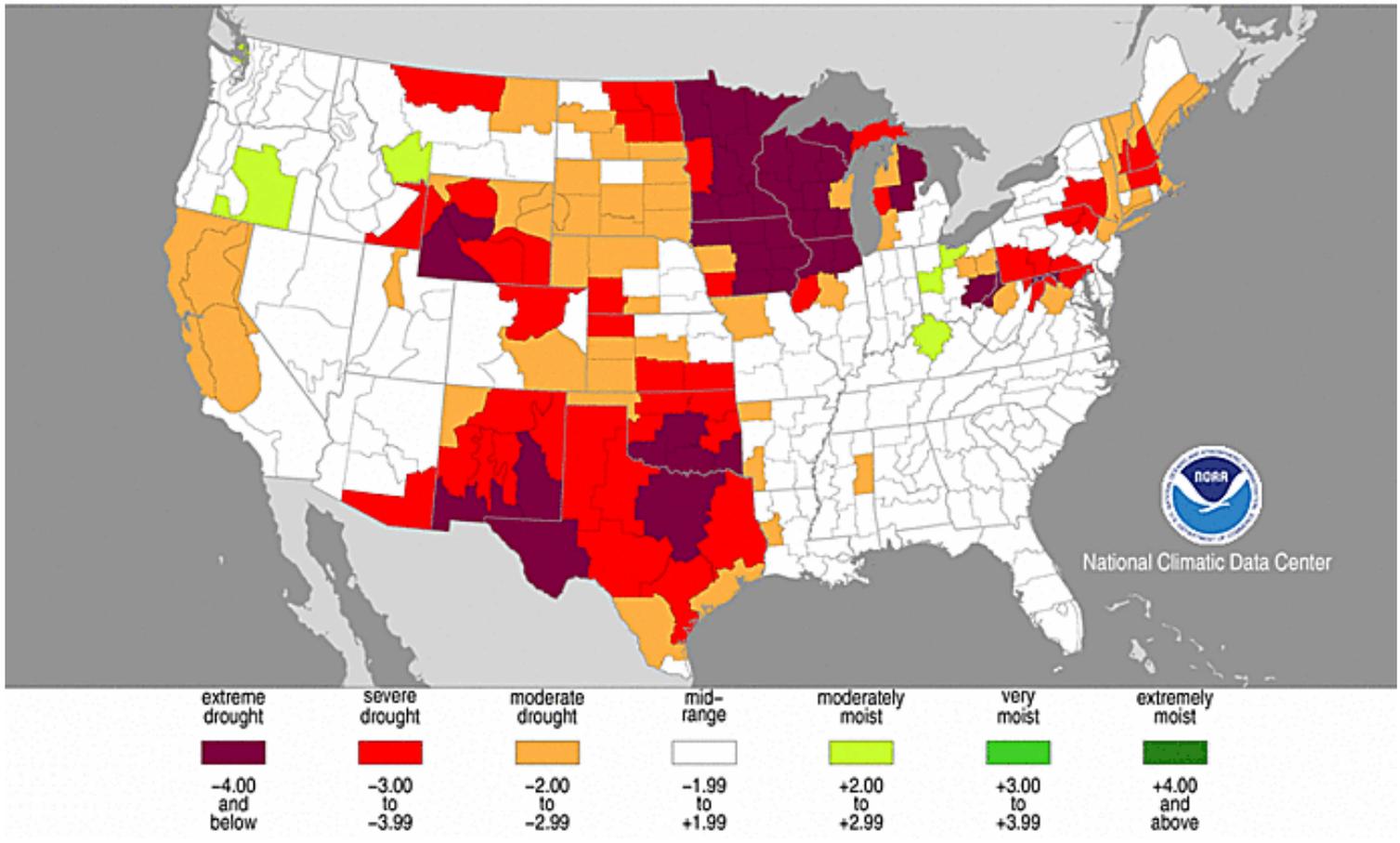
MINNEAPOLIS (AP) — The corn and hay are stunted, the earth powder dry. Minnesota farmers have already suffered \$600 million in crop losses this spring in the state's worst drought since 1910.

Courtesy: Polk County Leger (May 1976)



A One Hit Wonder: 1910 Drought

Palmer Drought Severity Index
December, 1910



National Climatic Data Center

Courtesy: NOAA



1987-1989 Drought

- Last time there was D4 (Exceptional Drought) in Minnesota (D3 in 2013)
- Twin Cities total sprinkling ban for 17 days
- Mississippi dropped to 842 cfs at Anoka
- Governor Perpich requested

Army Corps of Engineers to
to release water from Winnibigoshish

Courtesy: MHS





1987-1989 Drought

- Last time there was D4 (Exceptional Drought) in Minnesota (D3 in 2013)
- Twin Cities total sprinkling ban for 17 days
- Mississippi dropped to 842 cfs at Anoka
- Governor Perpich requested

Army Corps of Engineers to
to release water from Winnibigoshish

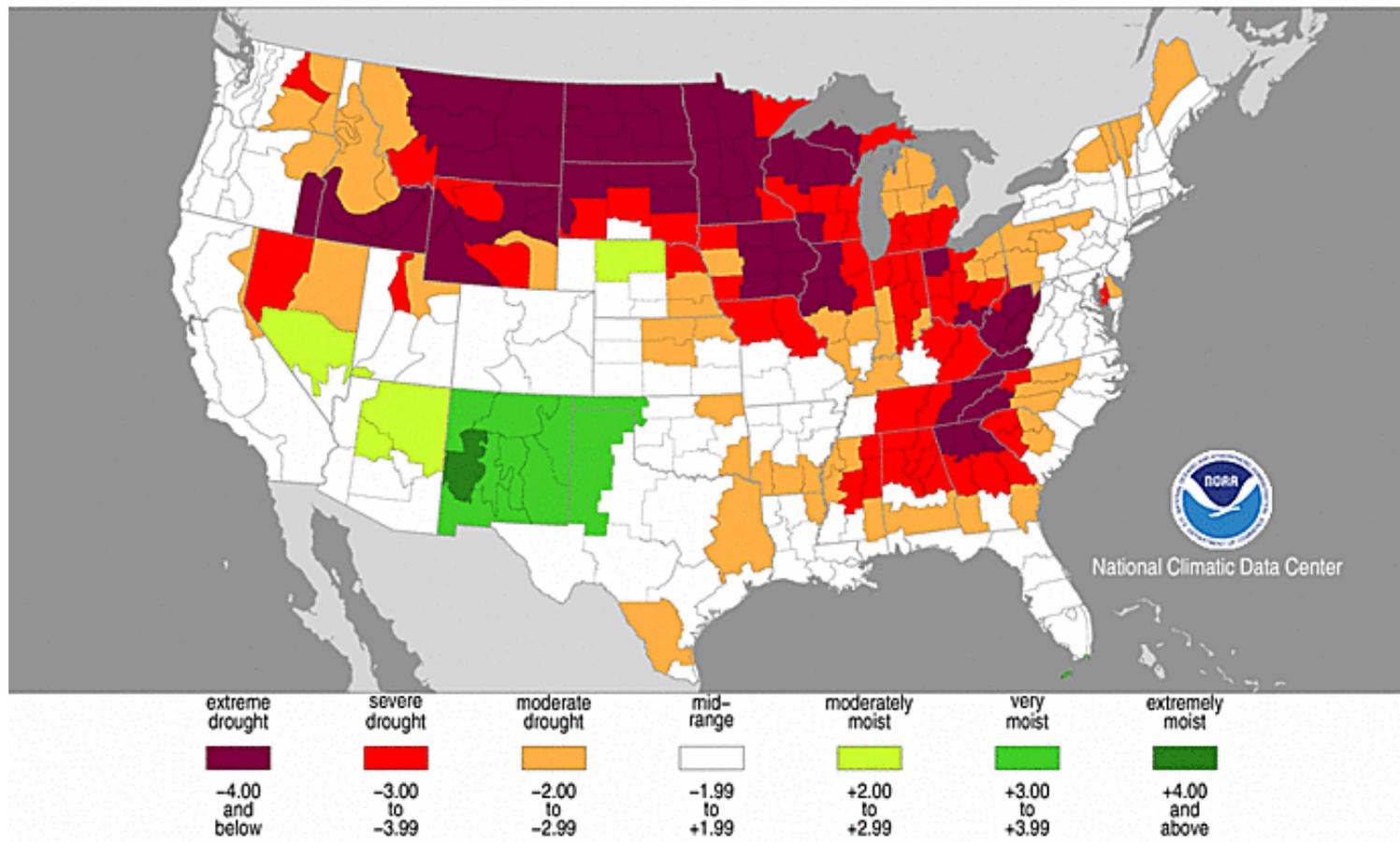
NO!

Courtesy: Wikipedia



1987-1989 Drought

Palmer Drought Severity Index
July, 1988



Courtesy: NOAA

1920s-1930s Drought

- Longest drought for MN in past 200 years and was greatest in magnitude
- Low flow Mississippi record for Minneapolis (April 11, 1934) 3.34 ft
- July 1936 warmest month on record in Minnesota and US

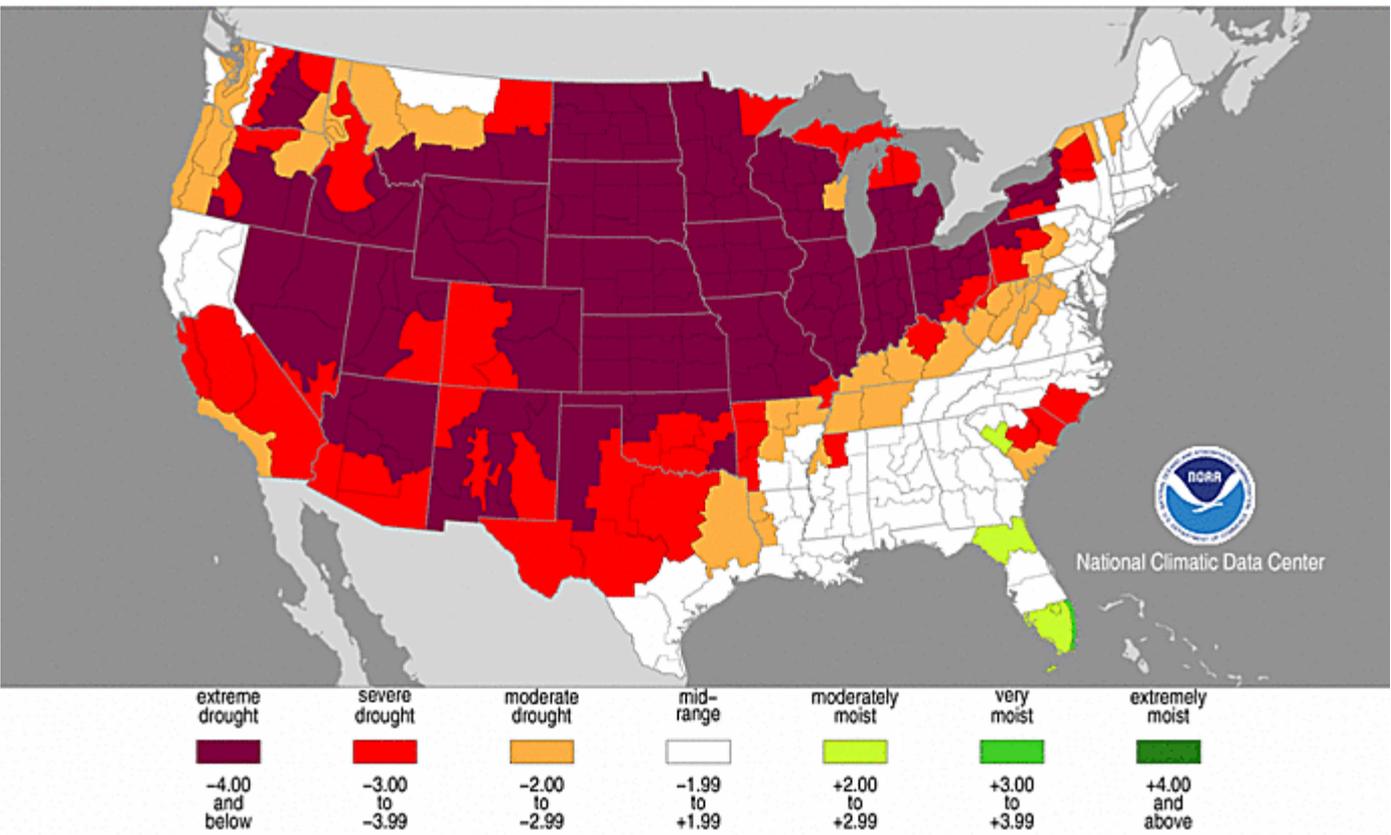
Praying for Rain near Beardsley, MN

Courtesy: Minnesota Historical Society



1920s-1930s Drought

Palmer Drought Severity Index
July, 1934



National Climatic Data Center

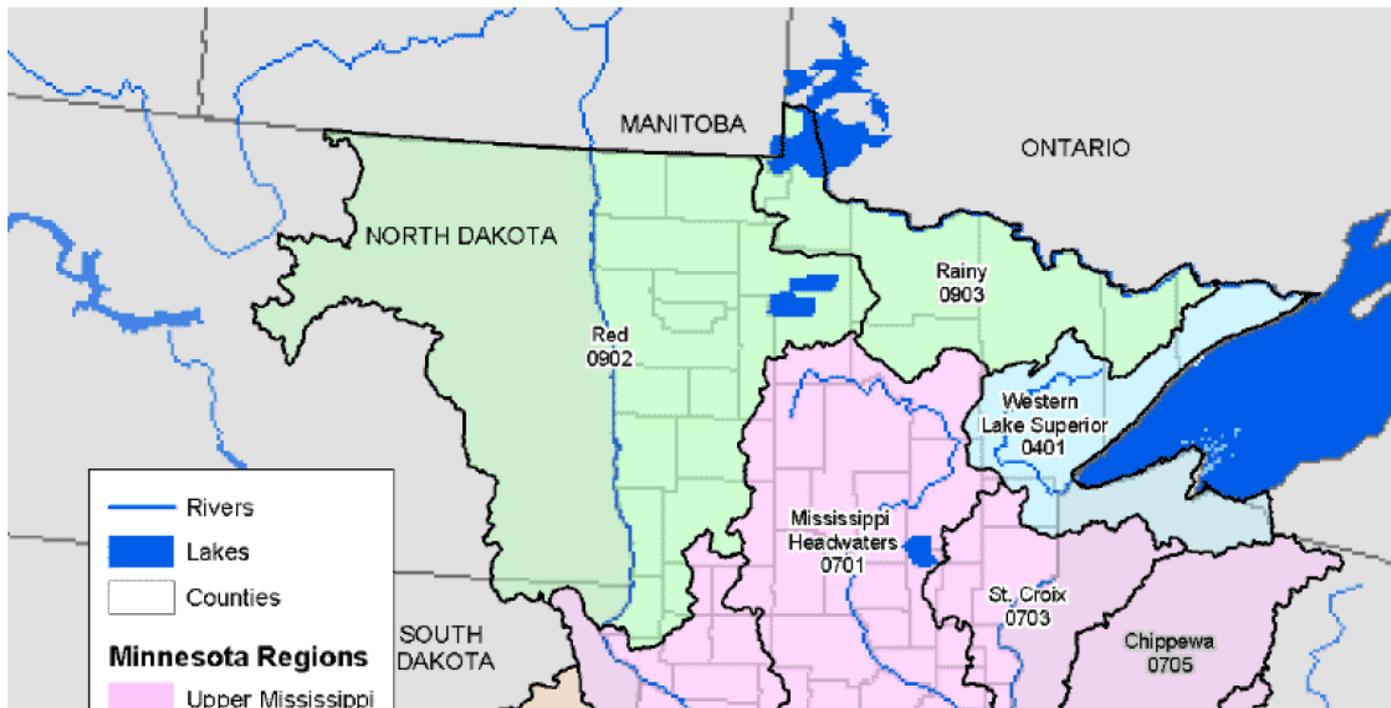
Courtesy: NOAA



MN Statewide Drought Plan

Minnesota Statewide Drought Plan

This plan provides a framework for preparing for and responding to droughts to minimize conflicts and negative impacts on Minnesota's natural resources and economy.





MN Statewide Drought Plan

EMERGENCY PHASE

A significant portion of the watershed ([see map](#)) is in an “**Exceptional Drought**”, or highest priority water supply needs are not being met, or there are threatened or actual electricity shortages due to cooling water supply shortages, or for public water suppliers in the Twin Cities, the average daily flow of the Mississippi River USGS gage near Anoka is at or below 1000 cfs for five consecutive days.

- Advise Governor on need for emergency declaration.
- Minnesota Division of Homeland Security and Emergency Management implements MN Emergency Operations Plan (MEOP).
- Consider request to the USACE for the release of water from the Mississippi River Headwaters Reservoirs.

MN Statewide Drought Plan

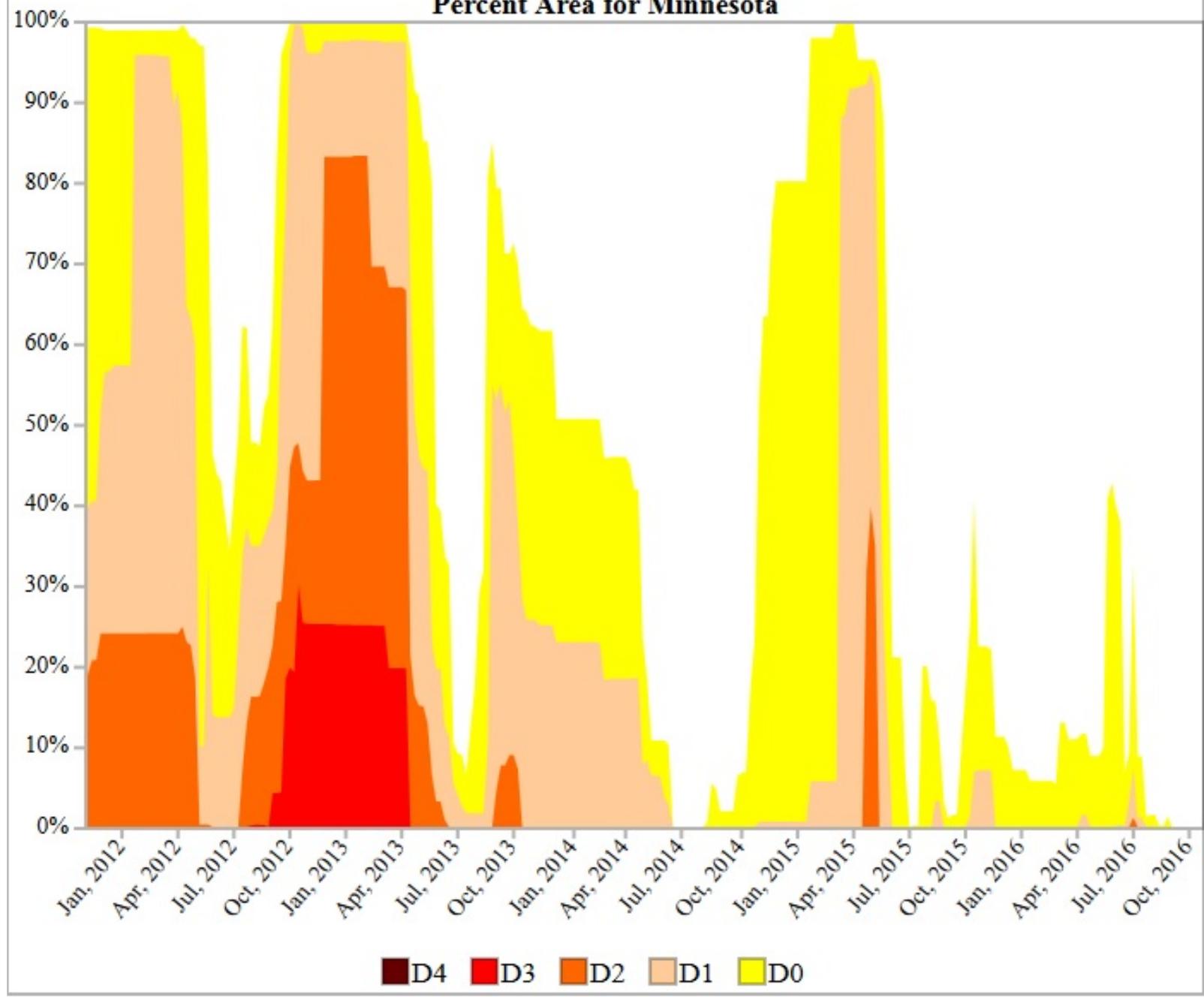
EMERGENCY PHASE

A significant portion of the watershed ([see map](#)) is in an “**Exceptional Drought**”, or highest priority water supply needs are not being met, or there are threatened or actual electricity shortages due to cooling water supply shortages, or for public water suppliers in the Twin Cities, the average daily flow of the Mississippi River USGS gage near Anoka is at or below 1000 cfs for five consecutive days.

- Advise Governor on need for emergency declaration.
- Minnesota Division of Homeland Security and Emergency Management implements MN Emergency Operations Plan (MEOP).
- Consider request to the USACE for the release of water from the Mississippi River Headwaters Reservoirs.

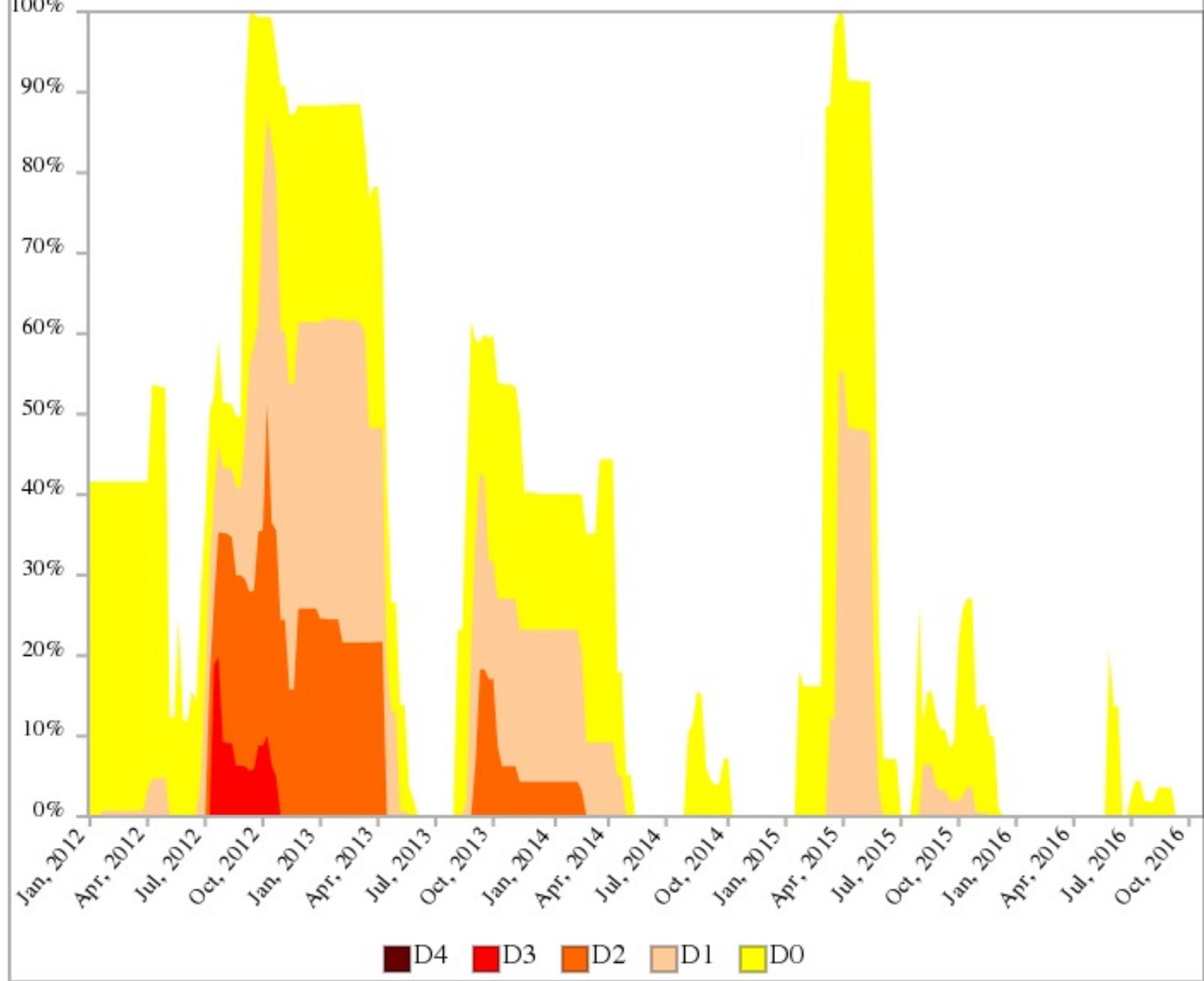


Percent Area for Minnesota





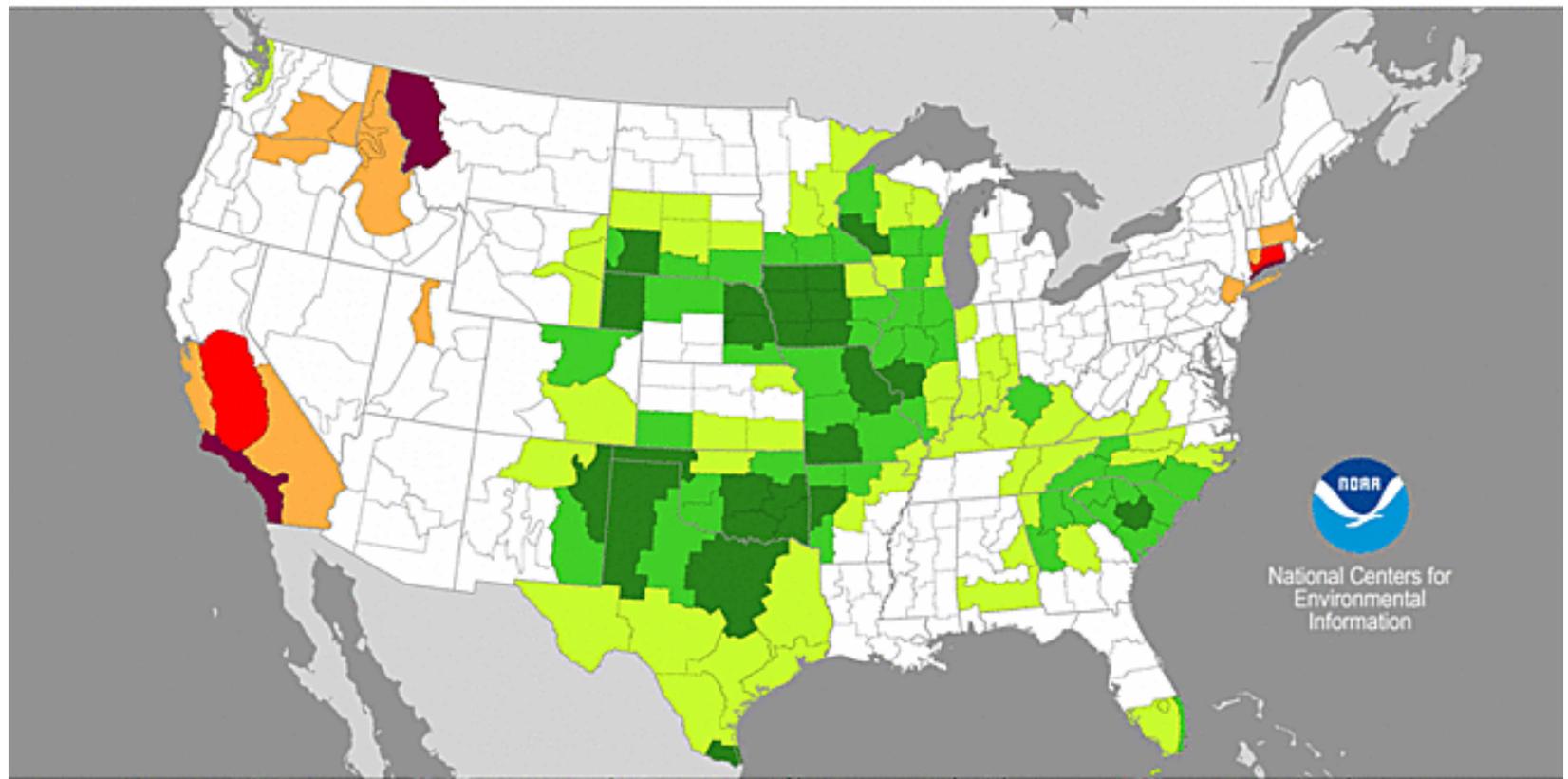
Percent Area for Wisconsin





Recent Conditions

Palmer Drought Severity Index
January, 2016



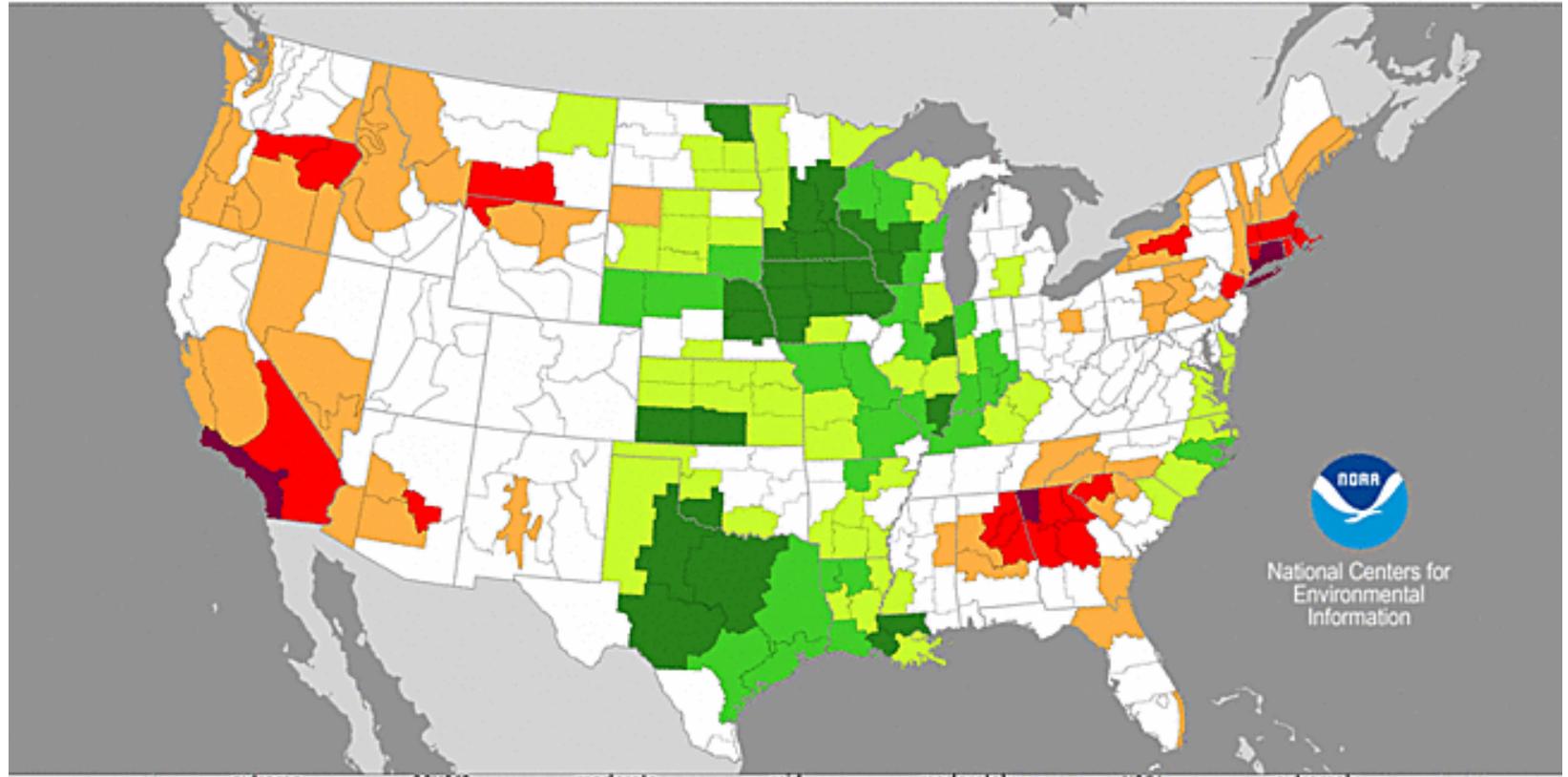
National Centers for Environmental Information

extreme drought	severe drought	moderate drought	mid-range	moderately moist	very moist	extremely moist
						
-4.00 and below	-3.00 to -3.99	-2.00 to -2.99	-1.99 to +1.99	+2.00 to +2.99	+3.00 to +3.99	+4.00 and above



Recent Conditions

Palmer Drought Severity Index
September, 2016



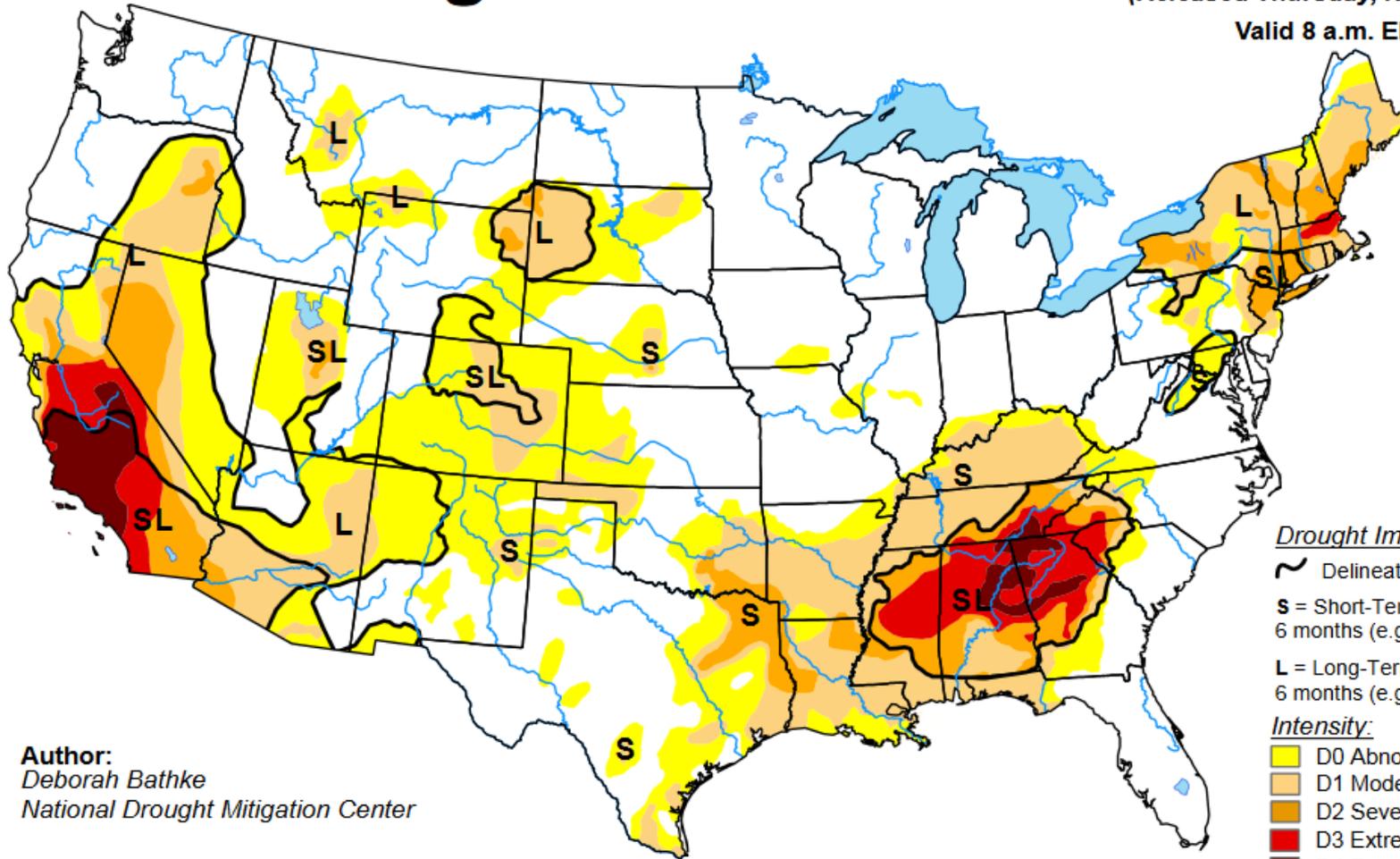
National Centers for Environmental Information

extreme drought	severe drought	moderate drought	mid-range	moderately moist	very moist	extremely moist
						
-4.00 and below	-3.00 to -3.99	-2.00 to -2.99	-1.99 to +1.99	+2.00 to +2.99	+3.00 to +3.99	+4.00 and above

U.S. Drought Monitor

November 1, 2016
(Released Thursday, Nov. 3, 2016)

Valid 8 a.m. EDT



Author:
Deborah Bathke
National Drought Mitigation Center

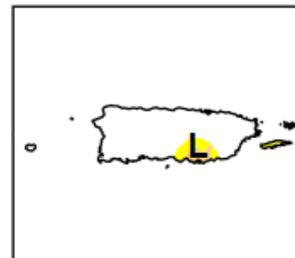
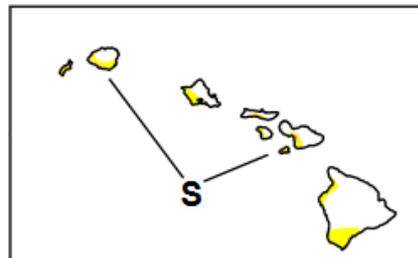
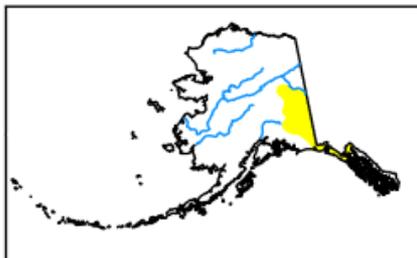
Drought Impact Types:

- ~ Delineates dominant impacts
- S** = Short-Term, typically less than 6 months (e.g. agriculture, grasslands)
- L** = Long-Term, typically greater than 6 months (e.g. hydrology, ecology)

Intensity:

- Yellow: D0 Abnormally Dry
- Light Orange: D1 Moderate Drought
- Orange: D2 Severe Drought
- Red: D3 Extreme Drought
- Dark Red: D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.



<http://droughtmonitor.unl.edu/>



Outlook



What to look at?

Outlook



There's El Nino and La Nina...

Outlook



What about other factors?



Outlook

El Nino vs La Nina...

A [LA NINA](#) WATCH HAS BEEN REISSUED, AND THE LATEST CPC/IRI CONSENSUS [ENSO](#) FORECAST INDICATES PROBABILITIES FOR [LA NINA](#) NEAR 70% DURING AUTUMN 2016, CONTINUING INTO THE WINTER OF 2016-2017, ALBEIT AT A LOWER PROBABILITY AT THE CURRENT TIME. [LA NINA](#) REMAINS A CONSIDERATION IN THE OUTLOOKS THROUGH THE WINTER

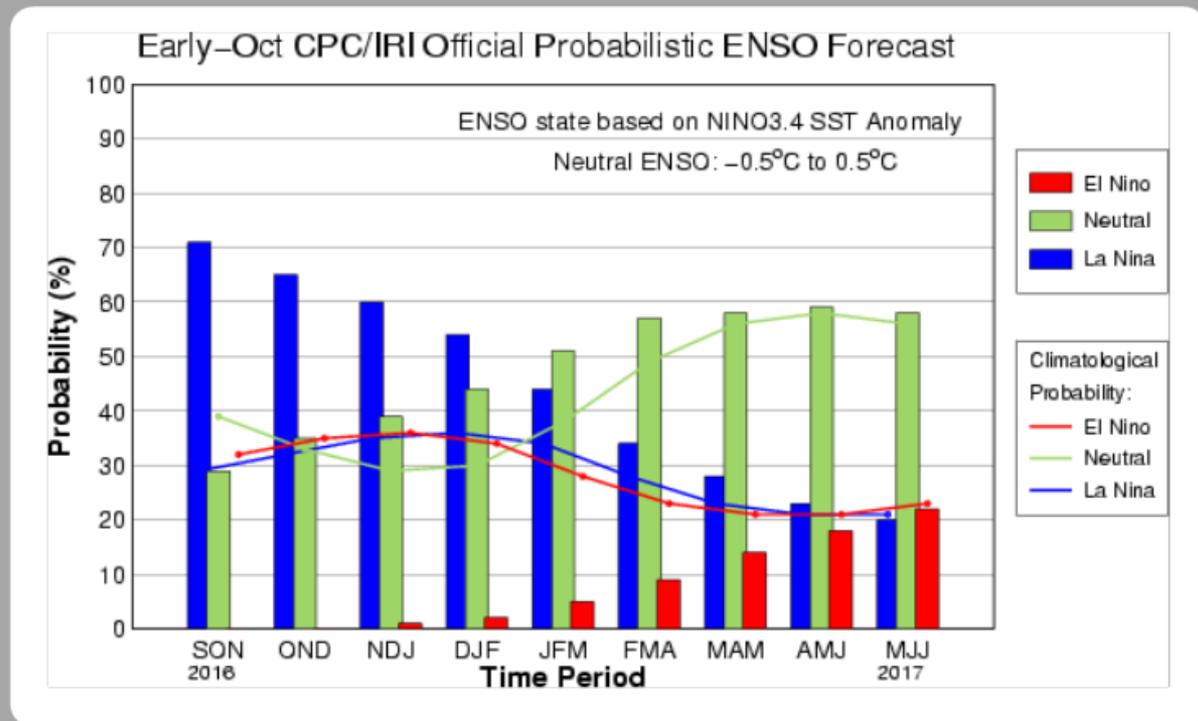


Outlook

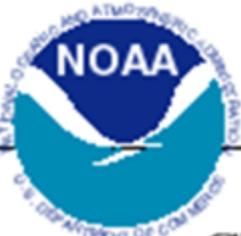
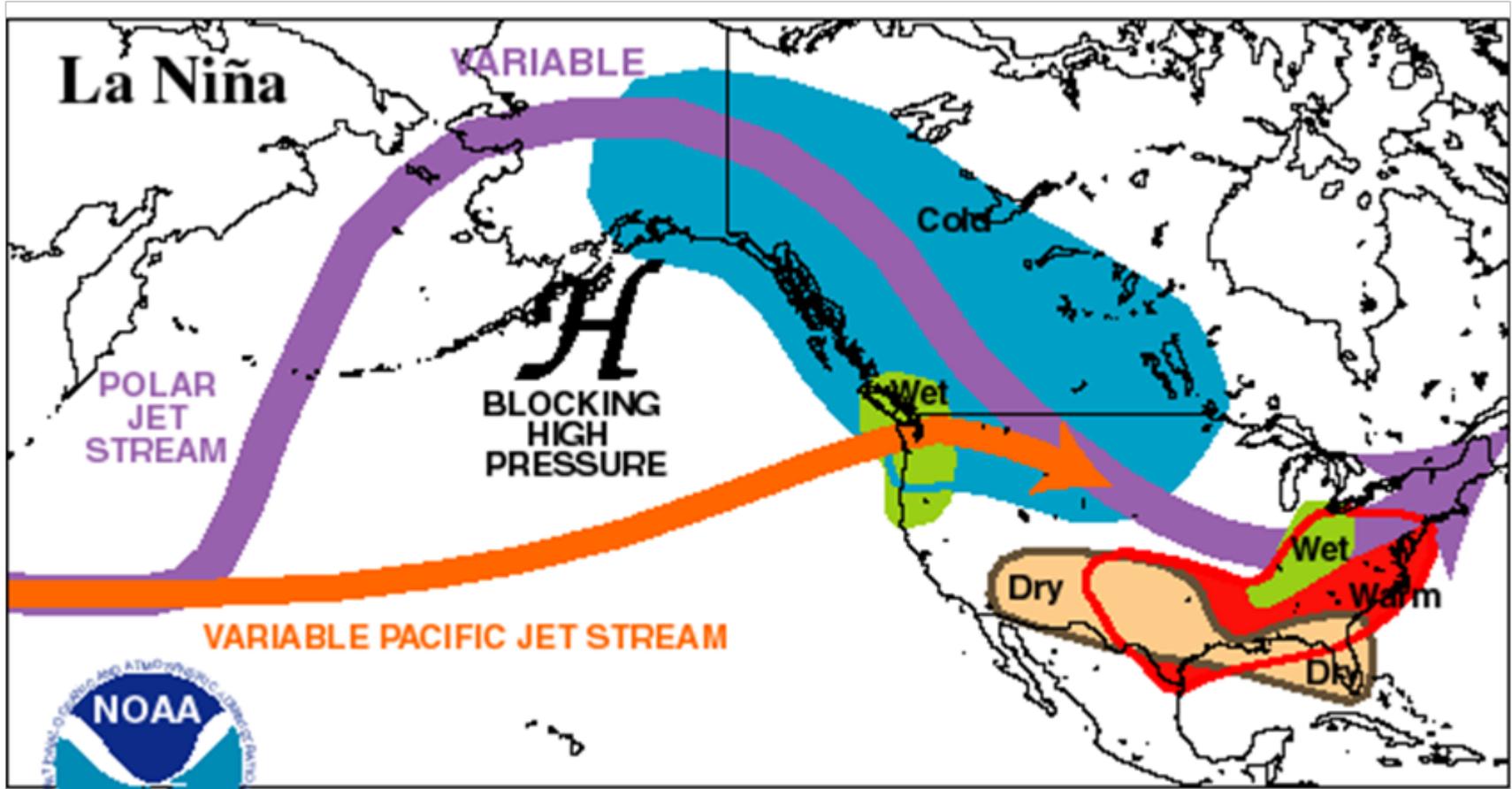
CPC/IRI Probabilistic ENSO Outlook

Updated: 13 October 2016

La Niña is favored to develop (~70% chance) during the Northern Hemisphere fall 2016 and slightly favored to persist (~55% chance) during winter 2016-17.

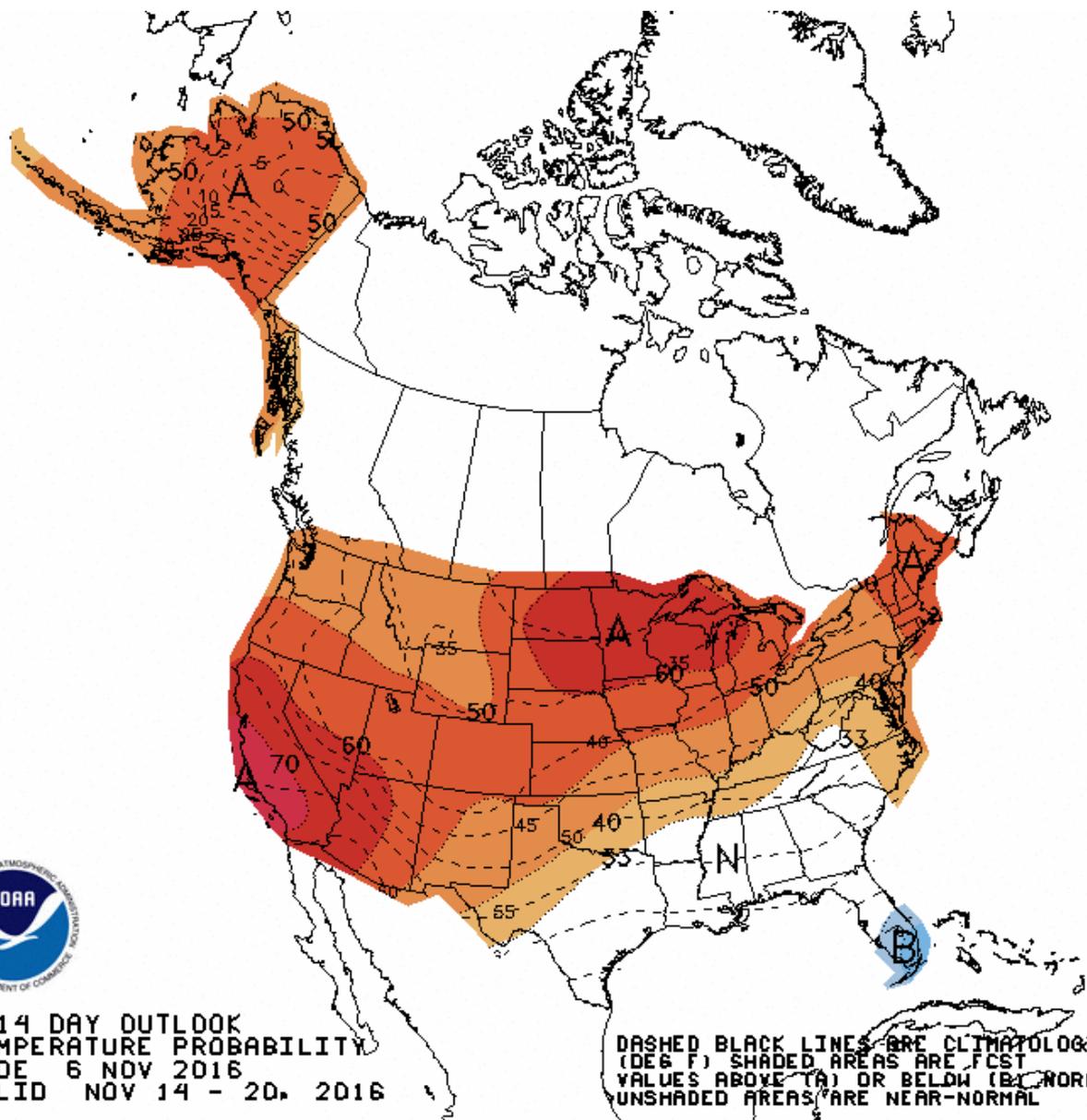


Outlook



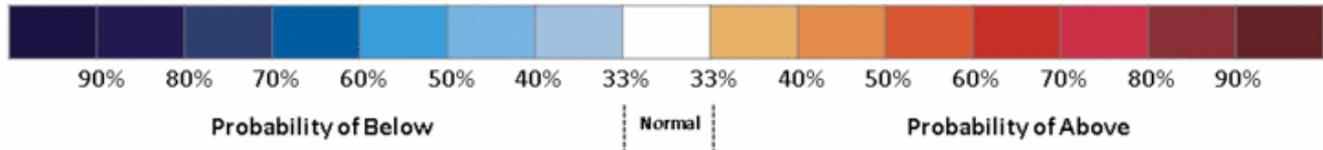
Climate Prediction Center/NCEP/NWS

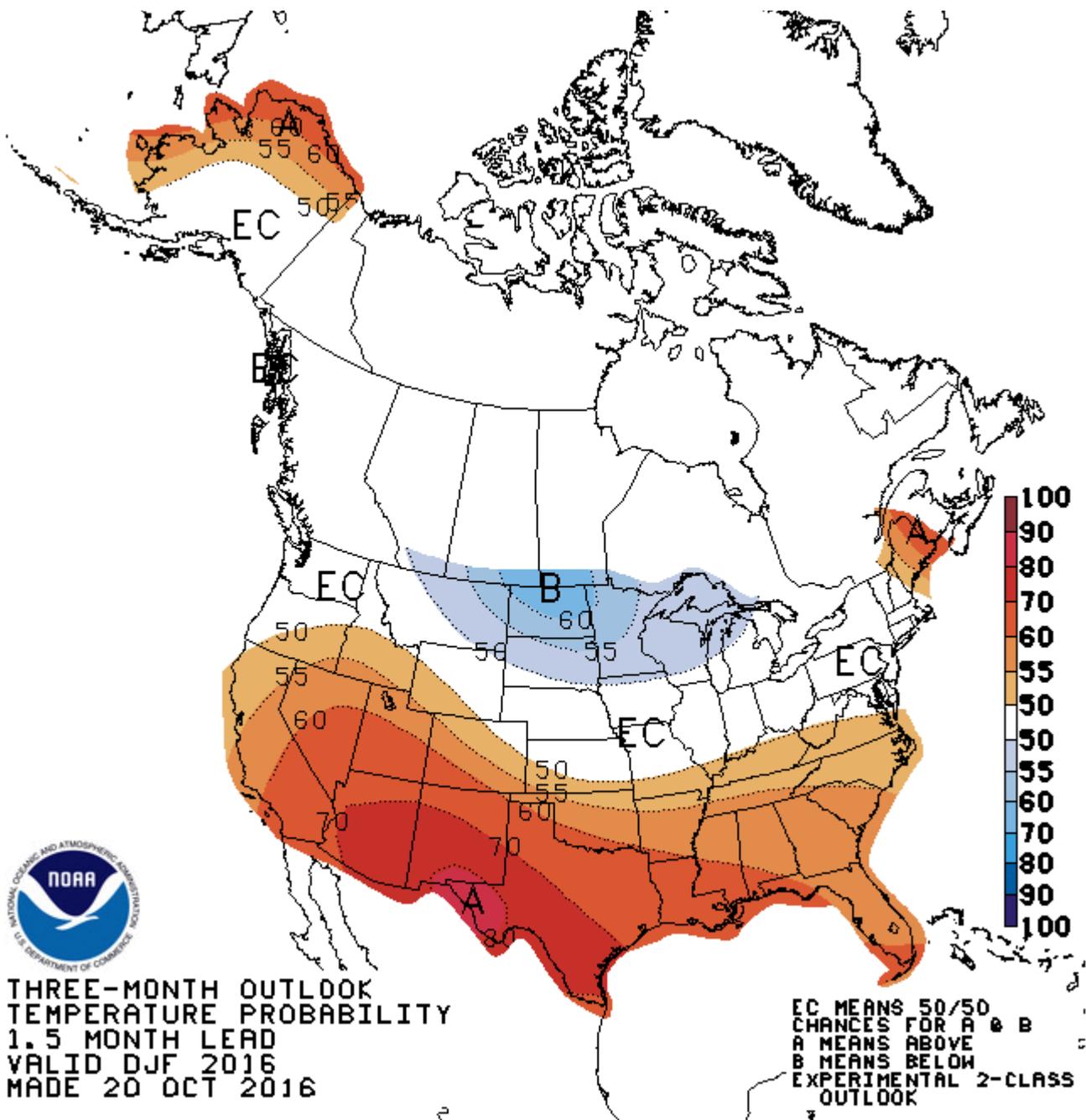
Typical Winter La Nina Pattern



8-14 DAY OUTLOOK
 TEMPERATURE PROBABILITY
 MADE 6 NOV 2016
 VALID NOV 14 - 20, 2016

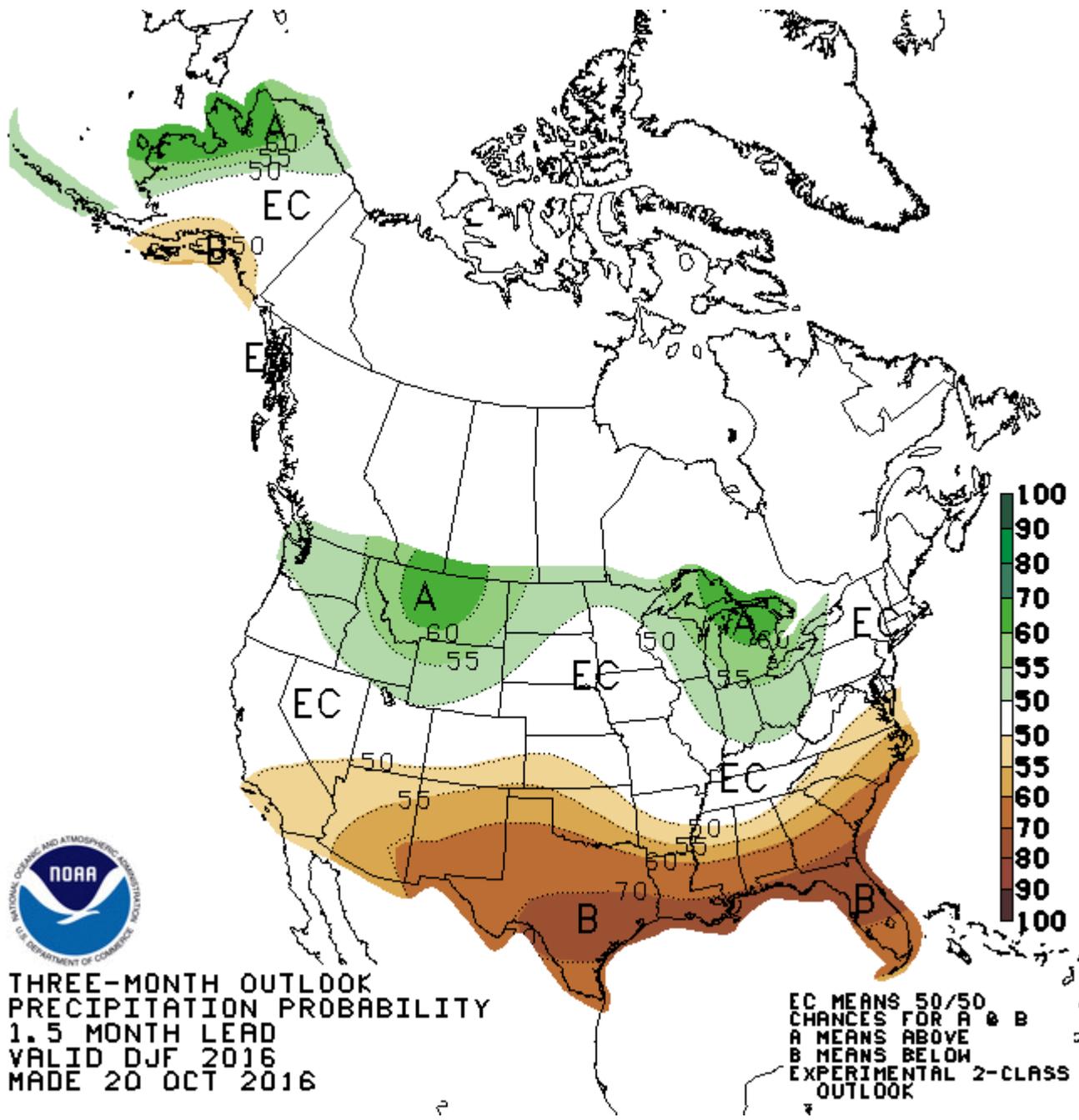
DASHED BLACK LINES ARE CLIMATOLOGY (DEG F) SHADED AREAS ARE FCST VALUES ABOVE (A) OR BELOW (B) NORMAL UNSHADED AREAS ARE NEAR-NORMAL





THREE-MONTH OUTLOOK
 TEMPERATURE PROBABILITY
 1.5 MONTH LEAD
 VALID DJF 2016
 MADE 20 OCT 2016

EC MEANS 50/50
 CHANCES FOR A & B
 A MEANS ABOVE
 B MEANS BELOW
 EXPERIMENTAL 2-CLASS
 OUTLOOK



THREE-MONTH OUTLOOK
 PRECIPITATION PROBABILITY
 1.5 MONTH LEAD
 VALID DJF 2016
 MADE 20 OCT 2016

EC MEANS 50/50
 CHANCES FOR A & B
 A MEANS ABOVE
 B MEANS BELOW
 EXPERIMENTAL 2-CLASS
 OUTLOOK



Thank you!

Contact:

- Peter.Boulay@state.mn.us
- 651-296-4214

Lake Traverse, MN Nov 1934

