Midwest and Great Plains Climate-Drought Outlook October 15, 2015

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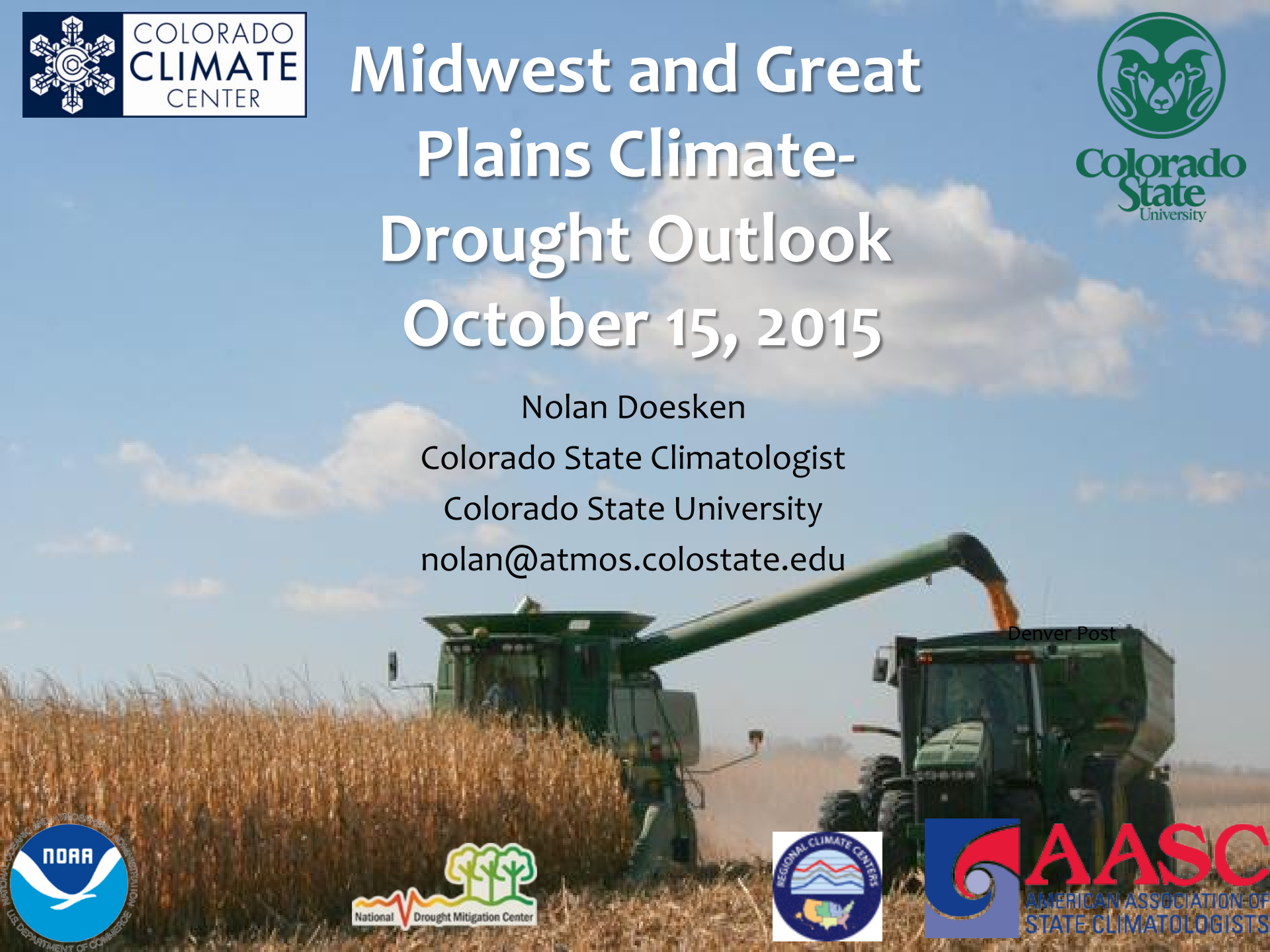


General Information

- **Providing climate services to the Central Region**
  - Collaboration Activity Between:
    - State Climatologists
    - Doug Kluck & John Eise (NOAA)
    - American Association of State Climatologists
    - Midwest and High Plains Regional Climate Centers
    - National Drought Mitigation Center/USDA

- **Next Regular Climate/Drought Outlook Webinar**
  - November 19 , 2015 (1 PM CDT)
- **Access to Future Climate Webinars and Information**
- http://www.drought.gov/drought/content/regional-programs/regional-drought-webinars

- *http://mrcc.isws.illinois.edu/webinars.htm*
- *http://www.hprcc.unl.edu/webinars.php*
- **Open for questions at the end**

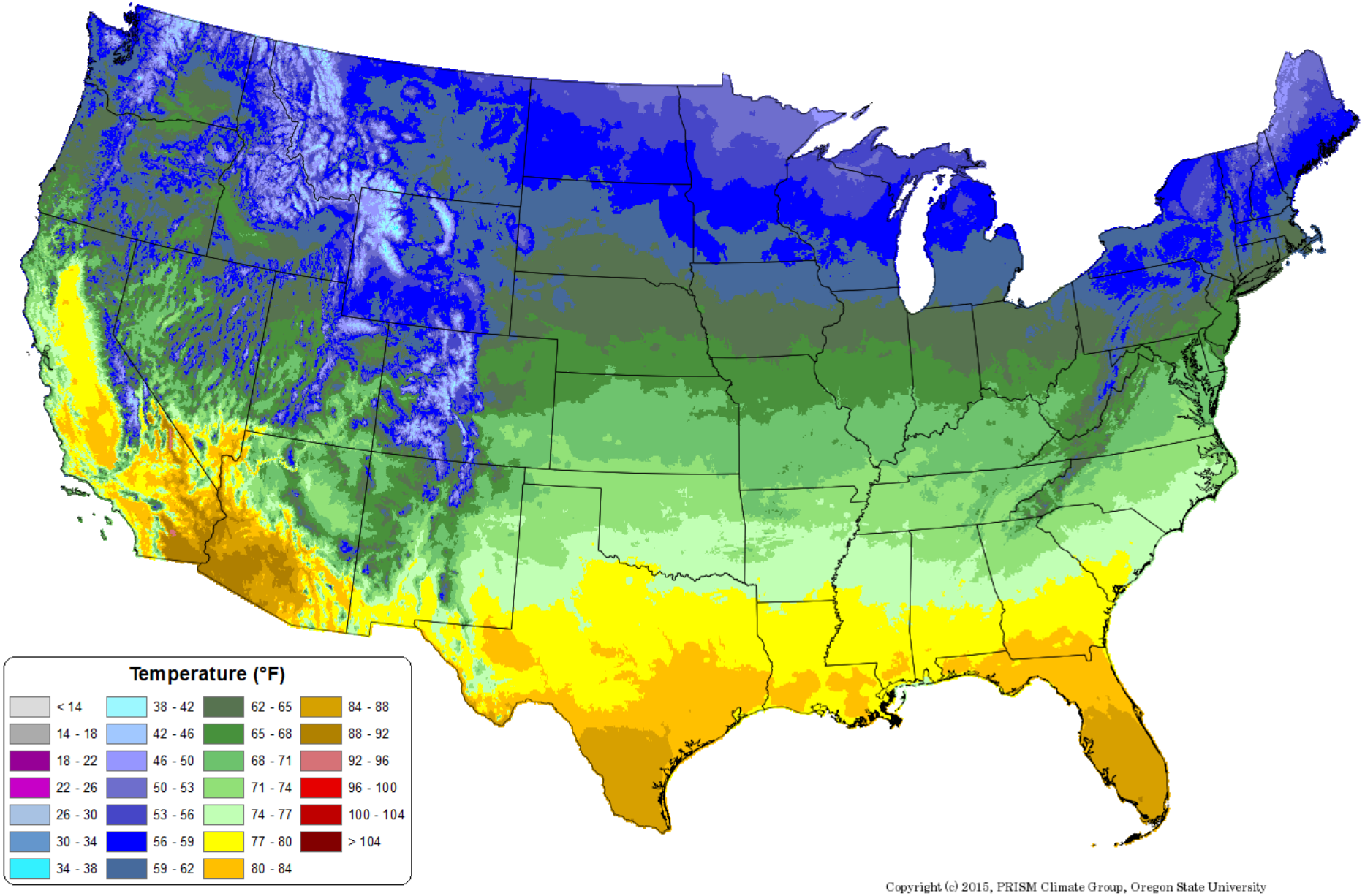
Agenda

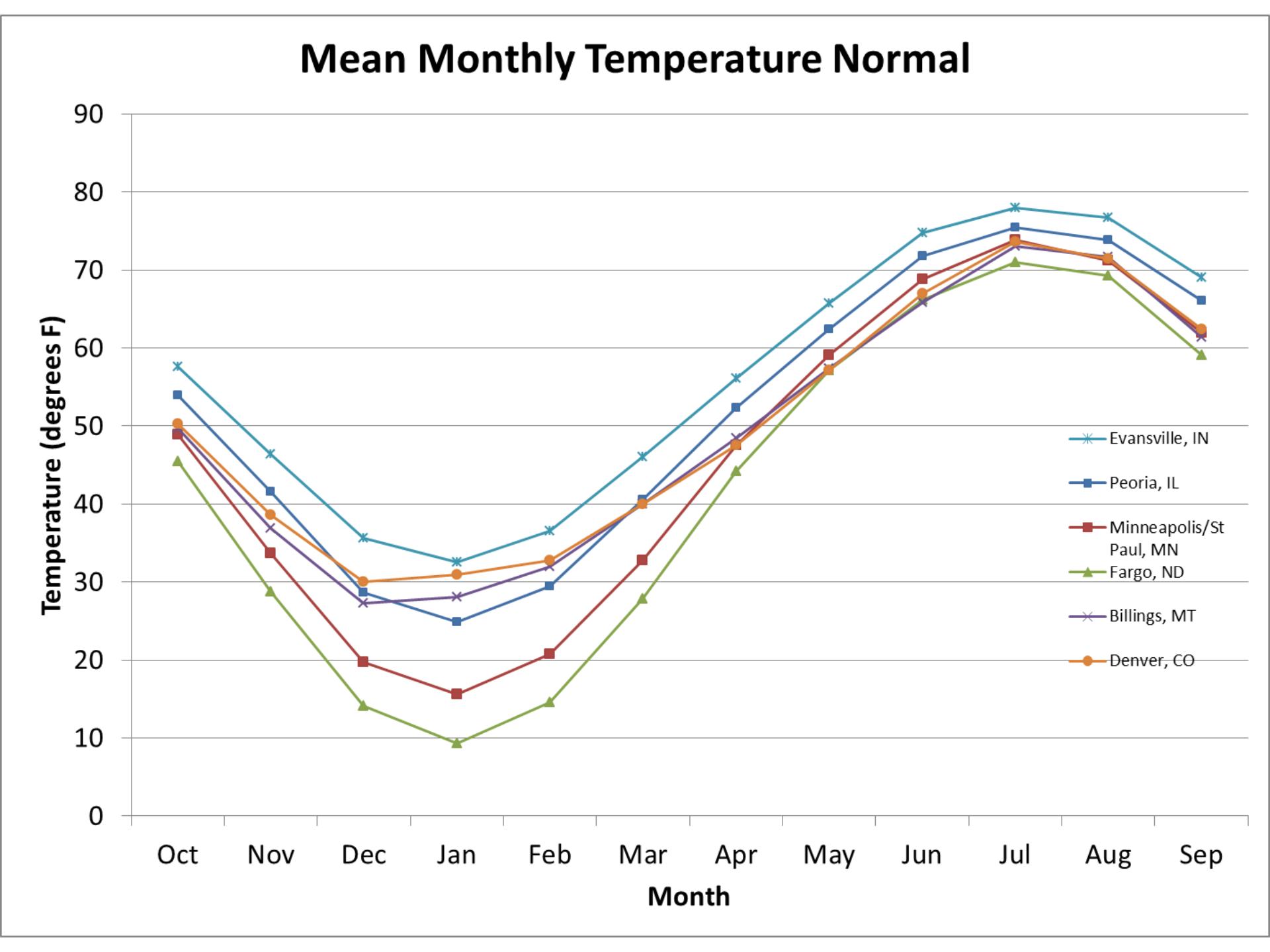
- Background Climate
- Current Conditions
- Impacts
  - Missouri River
  - Great Lakes
  - General Fall Ag
- Outlooks
  - El Niño
  - Anything Else?

Our Climate Background

30-yr Normal Maximum Temperature: October

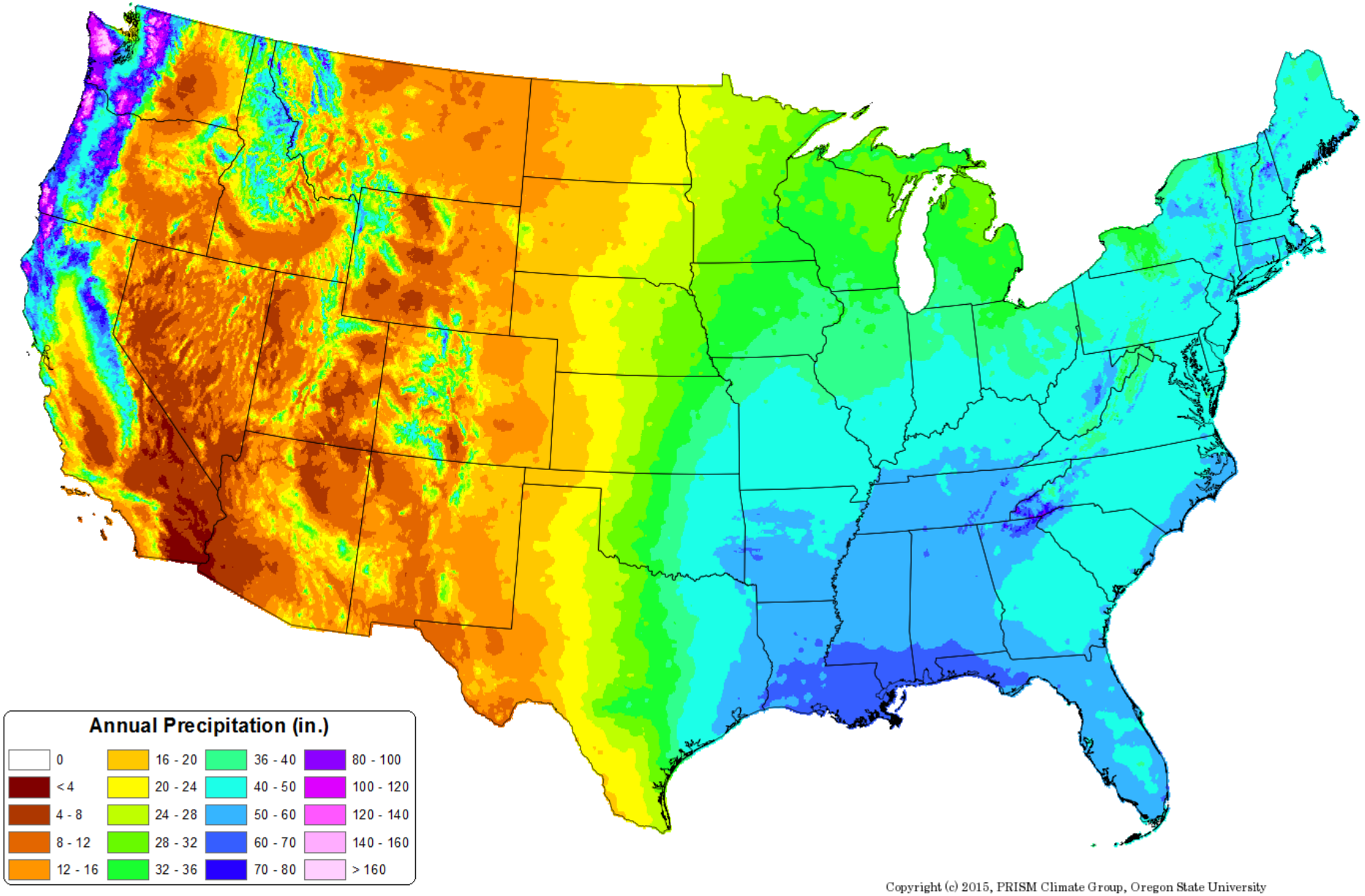
Period: 1981-2010

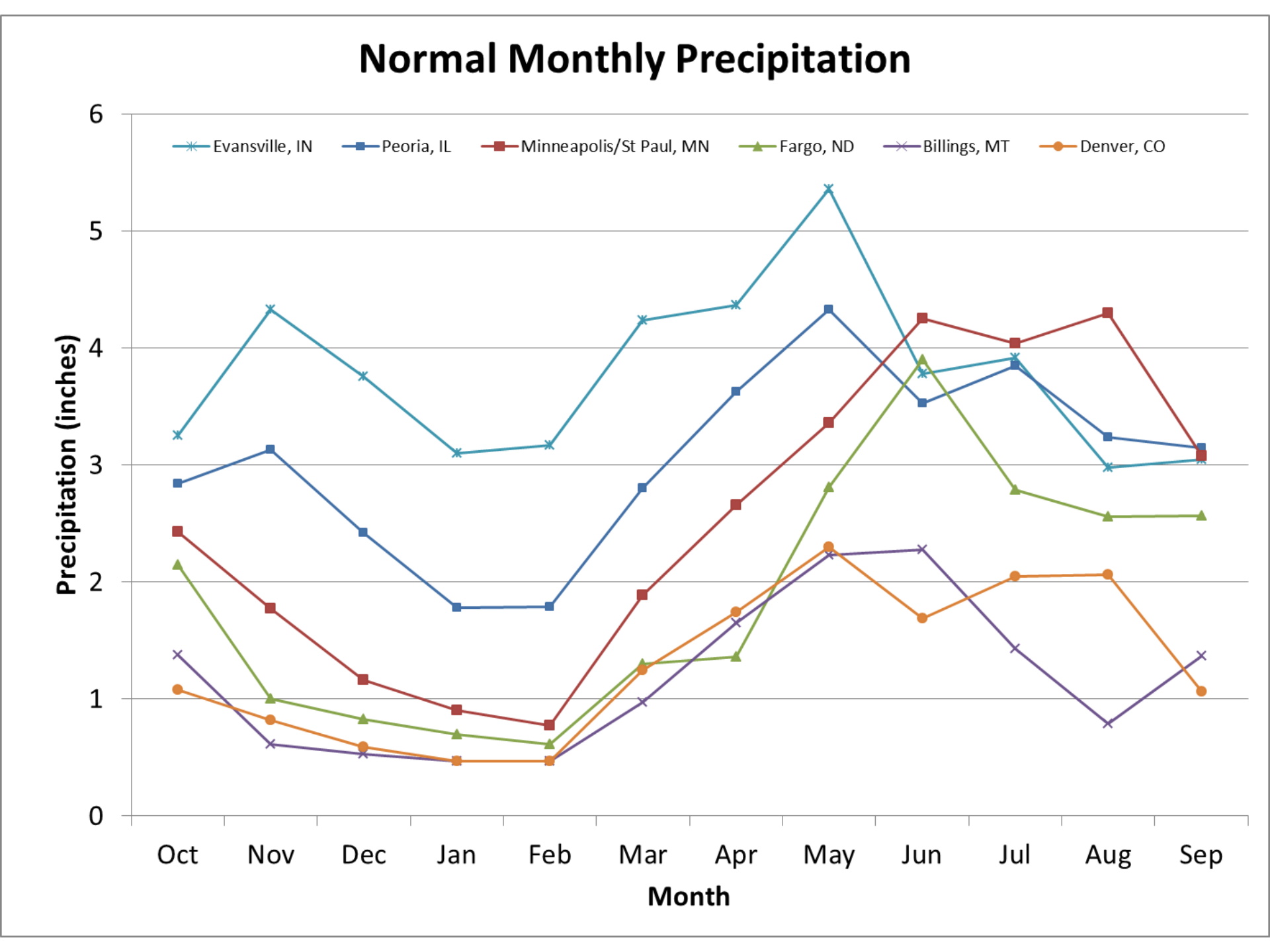



Mean Monthly Temperature Normal
Temperature (degrees F)
90
80
70
60
50
40
30
20
10
0
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Month
Evansville, IN
Peoria, IL
Minneapolis/St Paul, MN
Fargo, ND
Billings, MT
Denver, CO

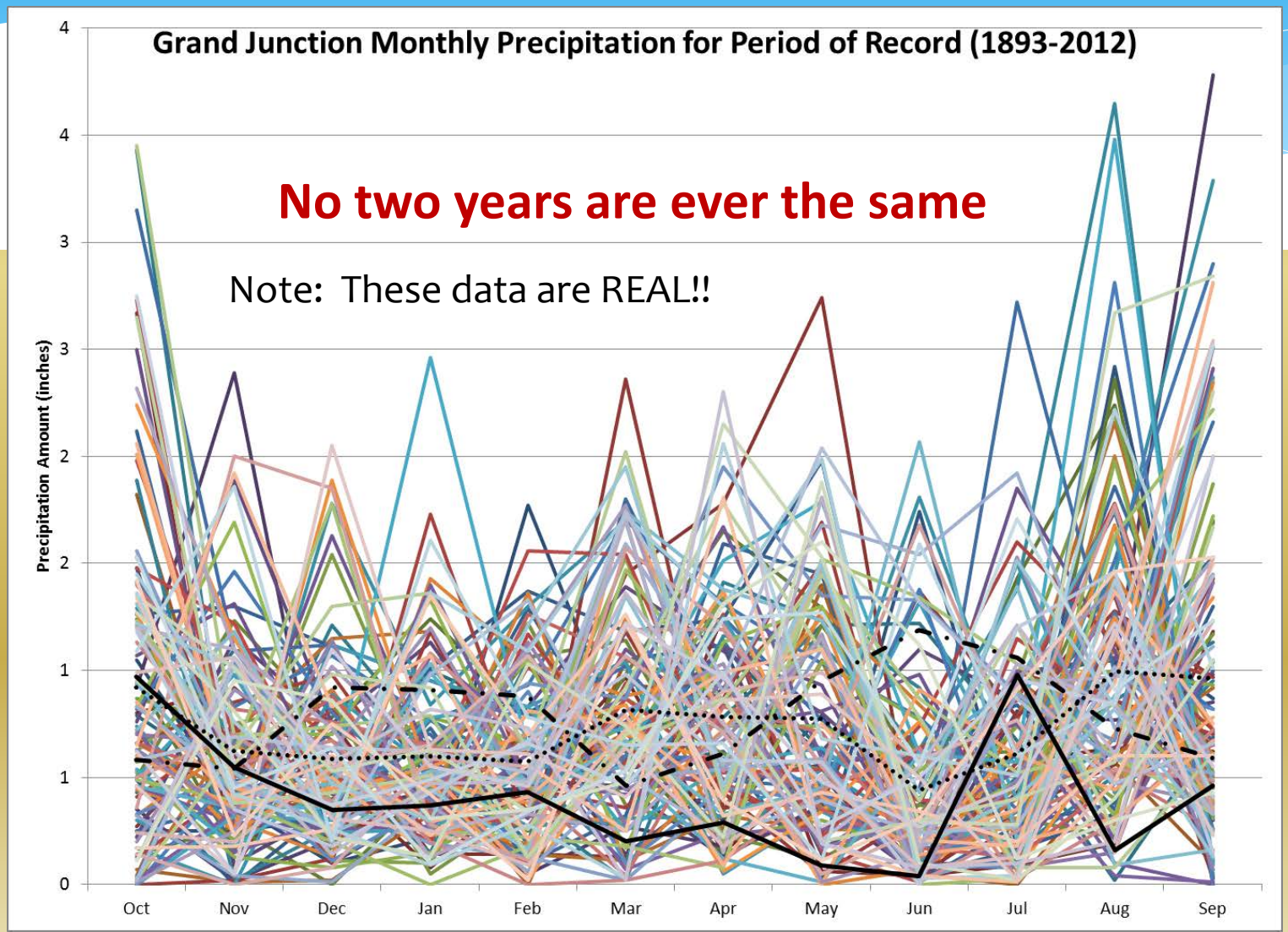
30-yr Normal Precipitation: Annual

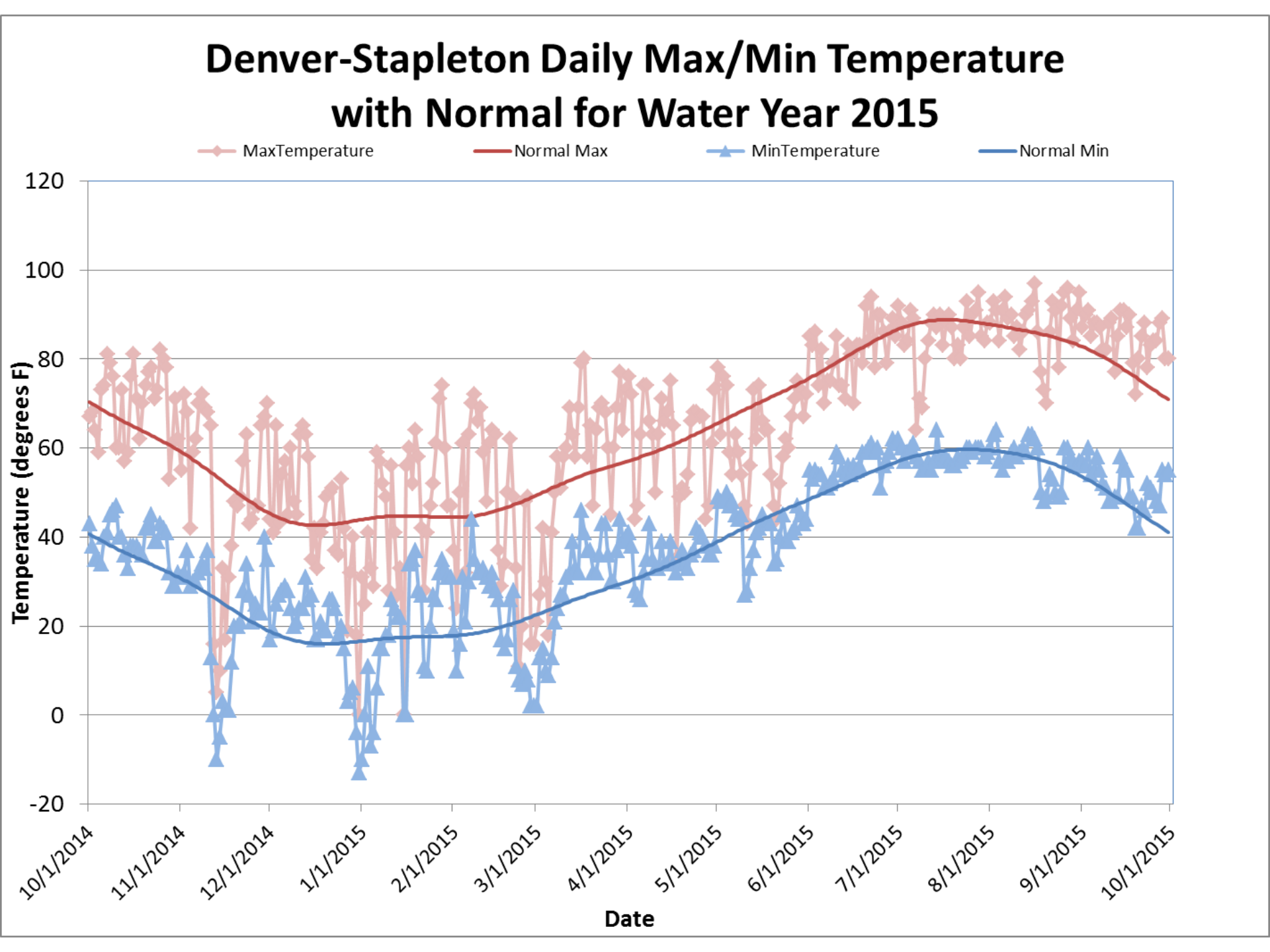
Period: 1981-2010

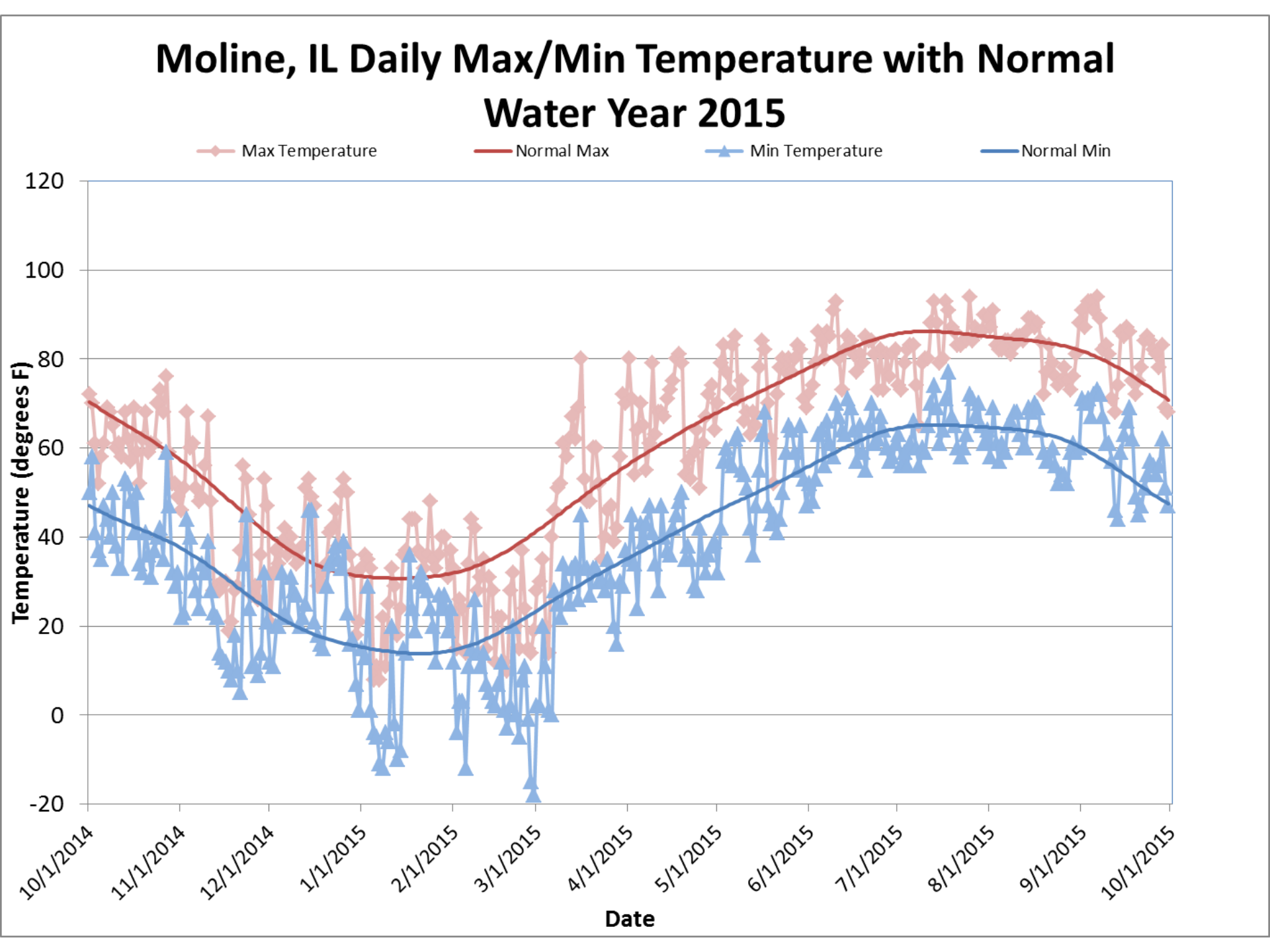



Normal Monthly Precipitation
Evansville, IN
Peoria, IL
Minneapolis/St Paul, MN
Fargo, ND
Billings, MT
Denver, CO
Precipitation (inches)
0
1
2
3
4
5
6
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Month

But don't expect our "weather" to follow those nice, smooth seasonal averages

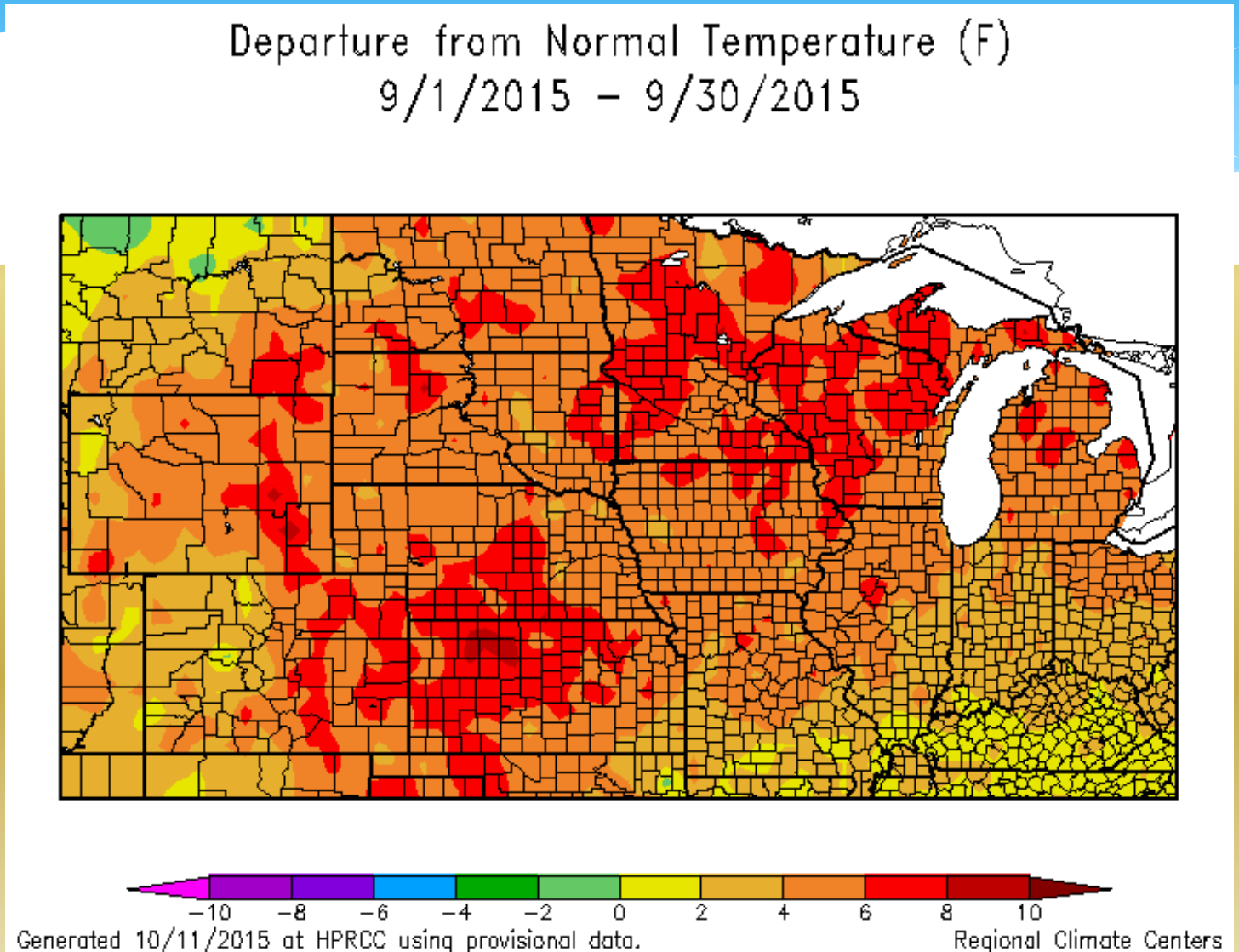



Denver-Stapleton Daily Max/Min Temperature with Normal for Water Year 2015
MaxTemperature
Normal Max
MinTemperature
Normal Min
120
100
80
60
40
20
0
-20
Temperature (degrees F)
10/1/2014
11/1/2014
12/1/2014
1/1/2015
2/1/2015
3/1/2015
4/1/2015
5/1/2015
6/1/2015
7/1/2015
8/1/2015
9/1/2015
10/1/2015
Date


Moline, IL Daily Max/Min Temperature with Normal
Water Year 2015
Max Temperature
Normal Max
Min Temperature
Normal Min
120
100
80
60
40
20
0
-20
Temperature (degrees F)
10/1/2014
11/1/2014
12/1/2014
1/1/2015
2/1/2015
3/1/2015
4/1/2015
5/1/2015
6/1/2015
7/1/2015
8/1/2015
9/1/2015
10/1/2015
Date

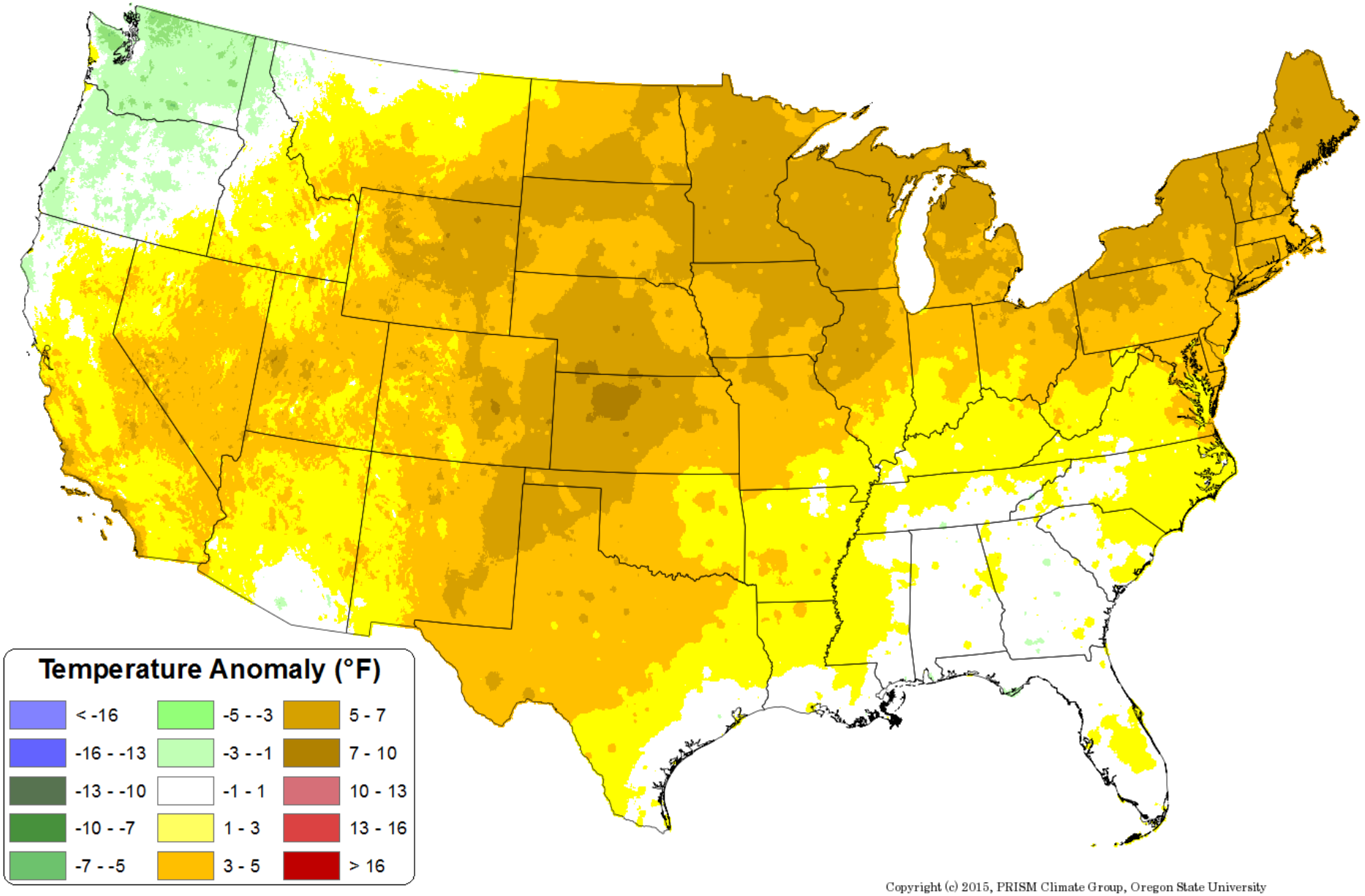
Review/Current Conditions

September Temperature Departure from Normal

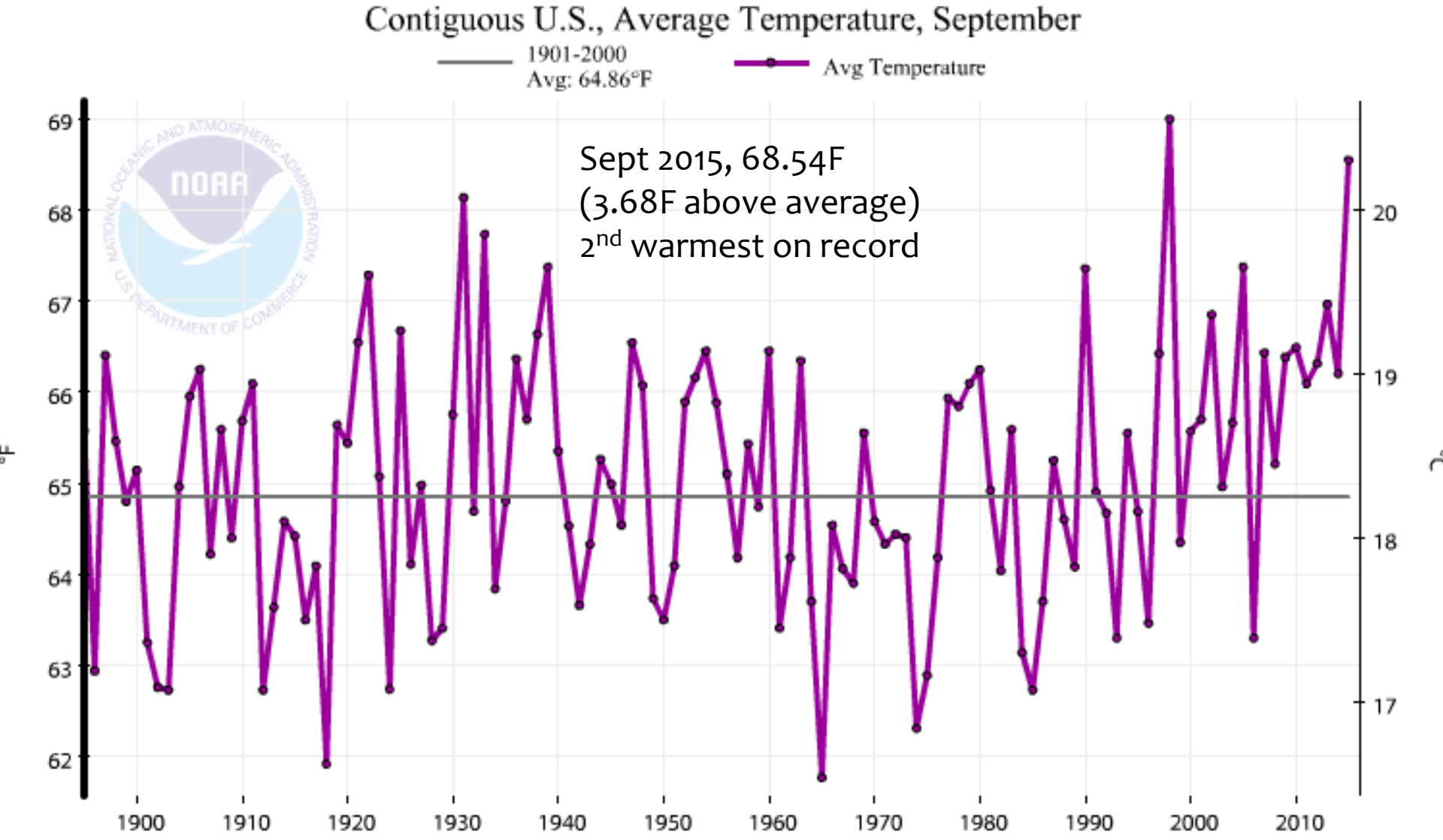


Daily Mean Temperature Anomaly: September 2015

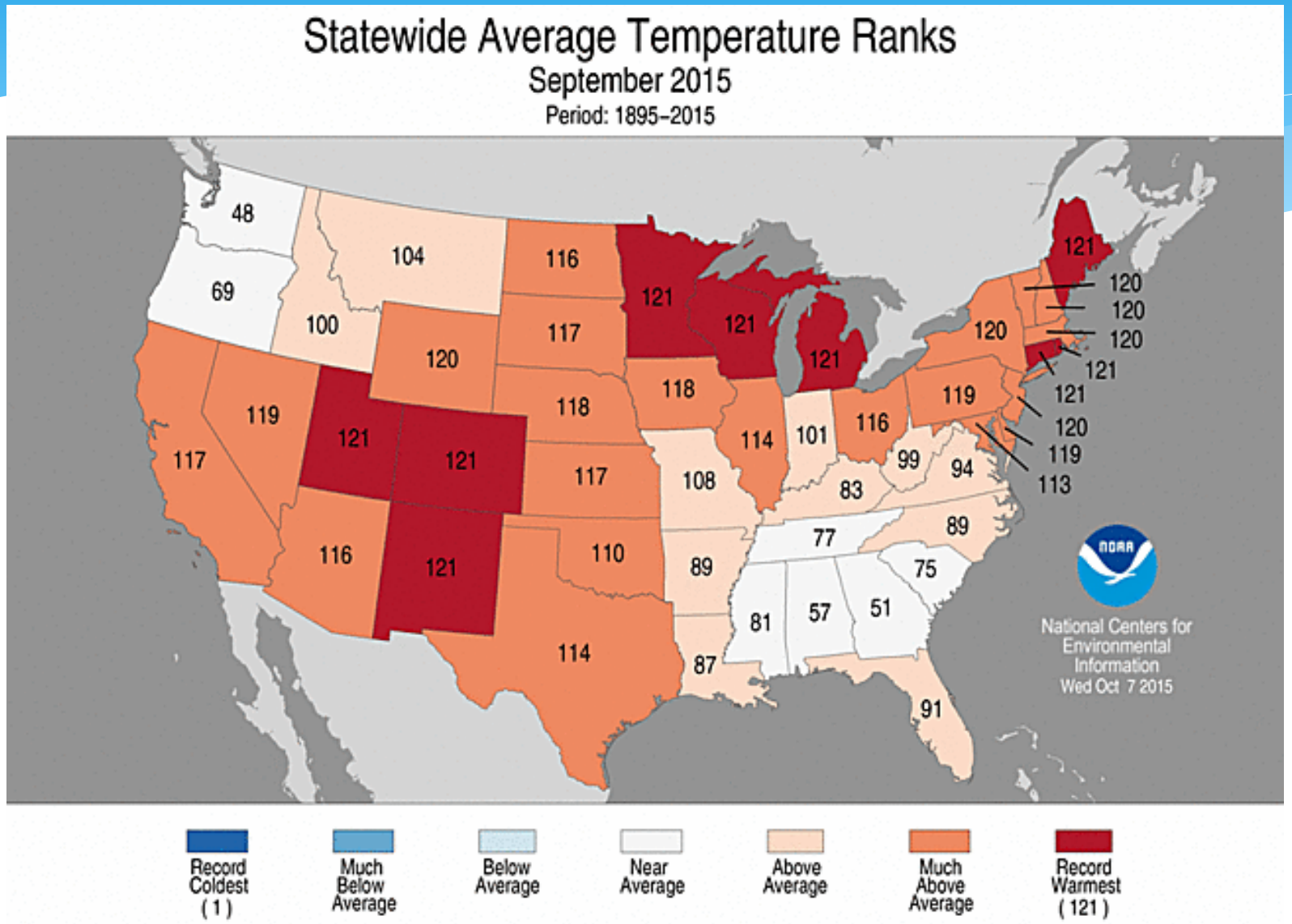
Period ending 7 AM EST 30 Sep 2015
Base period: 1981-2010
(Map created 02 Oct 2015)



September U.S. Average Temp

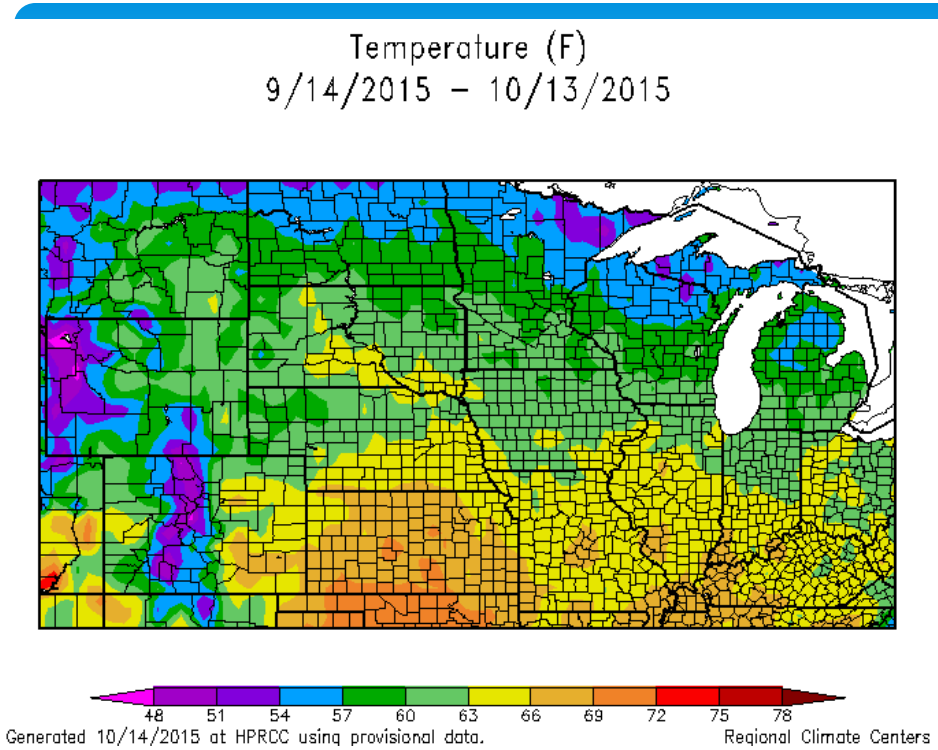


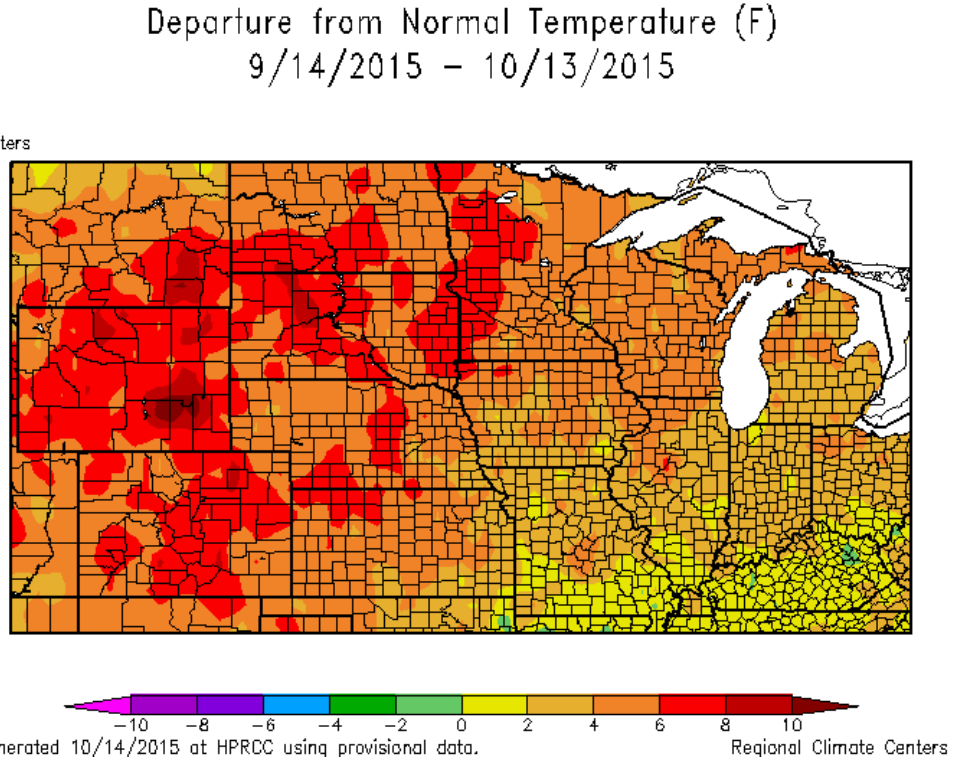
September Temperature Recap



http://www.ncdc.noaa.gov/temp-and-precip/us-maps/

Most recent 30-day temperatures

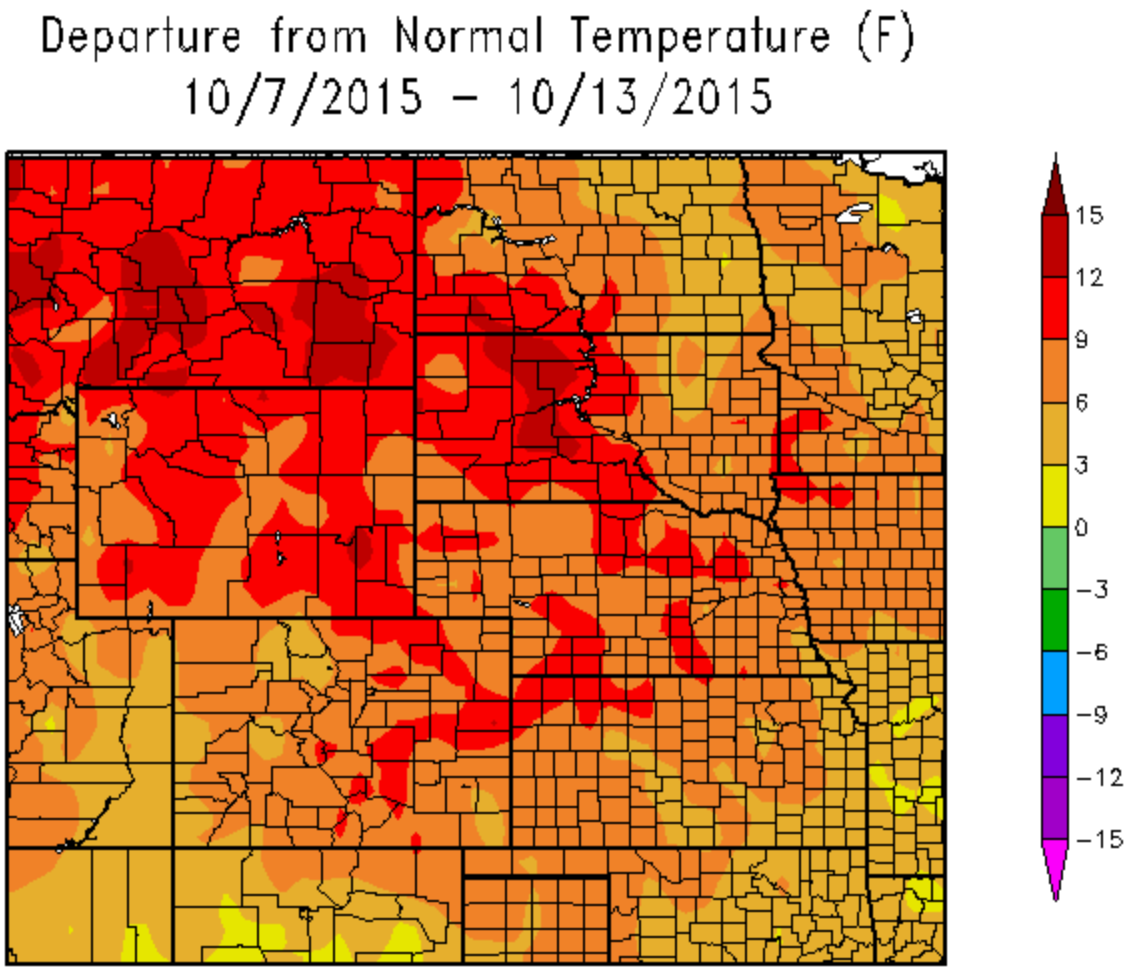




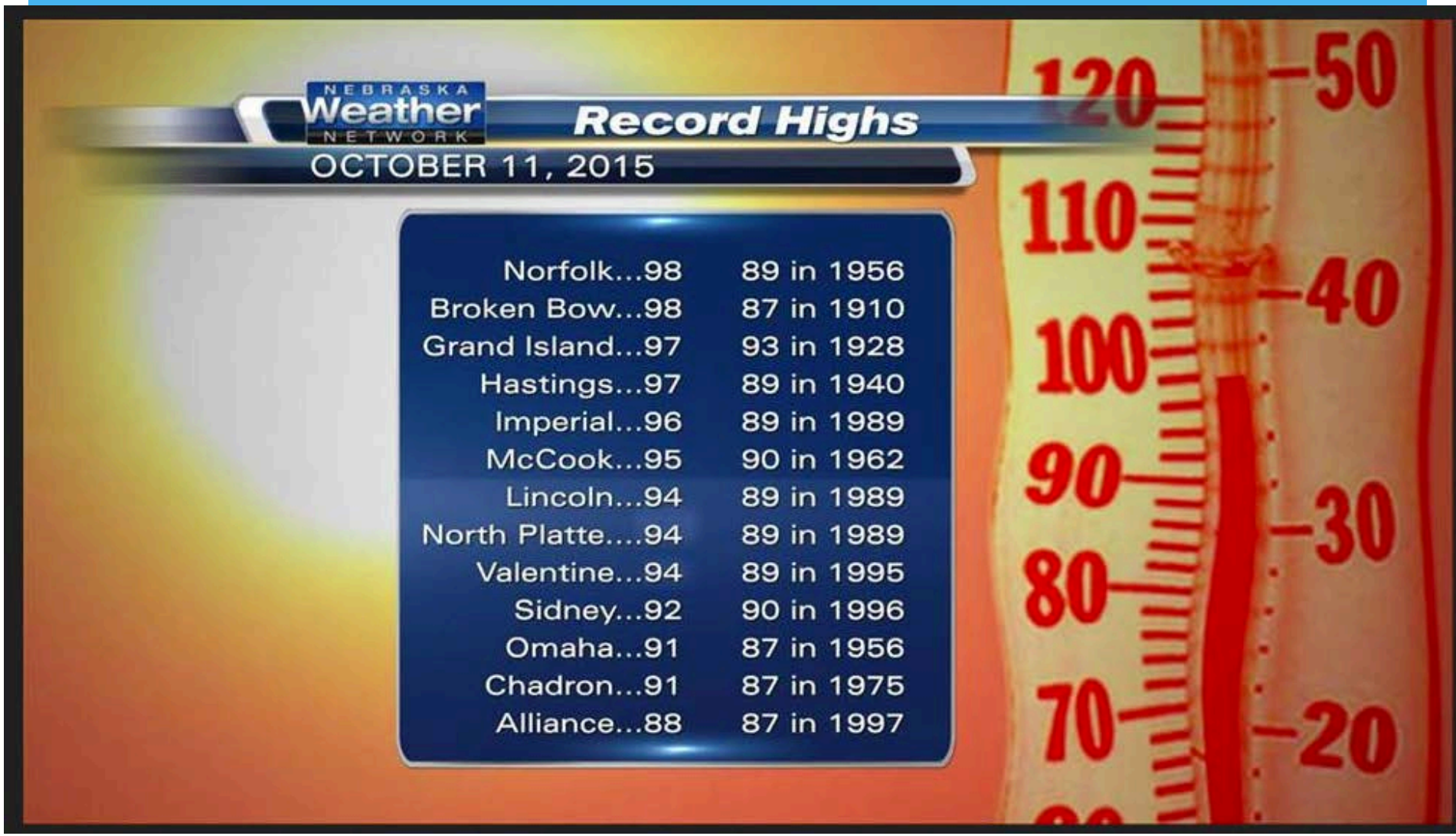
http://www.hprcc.unl.edu/maps/current/

HPRCC – Regional Climate Centers

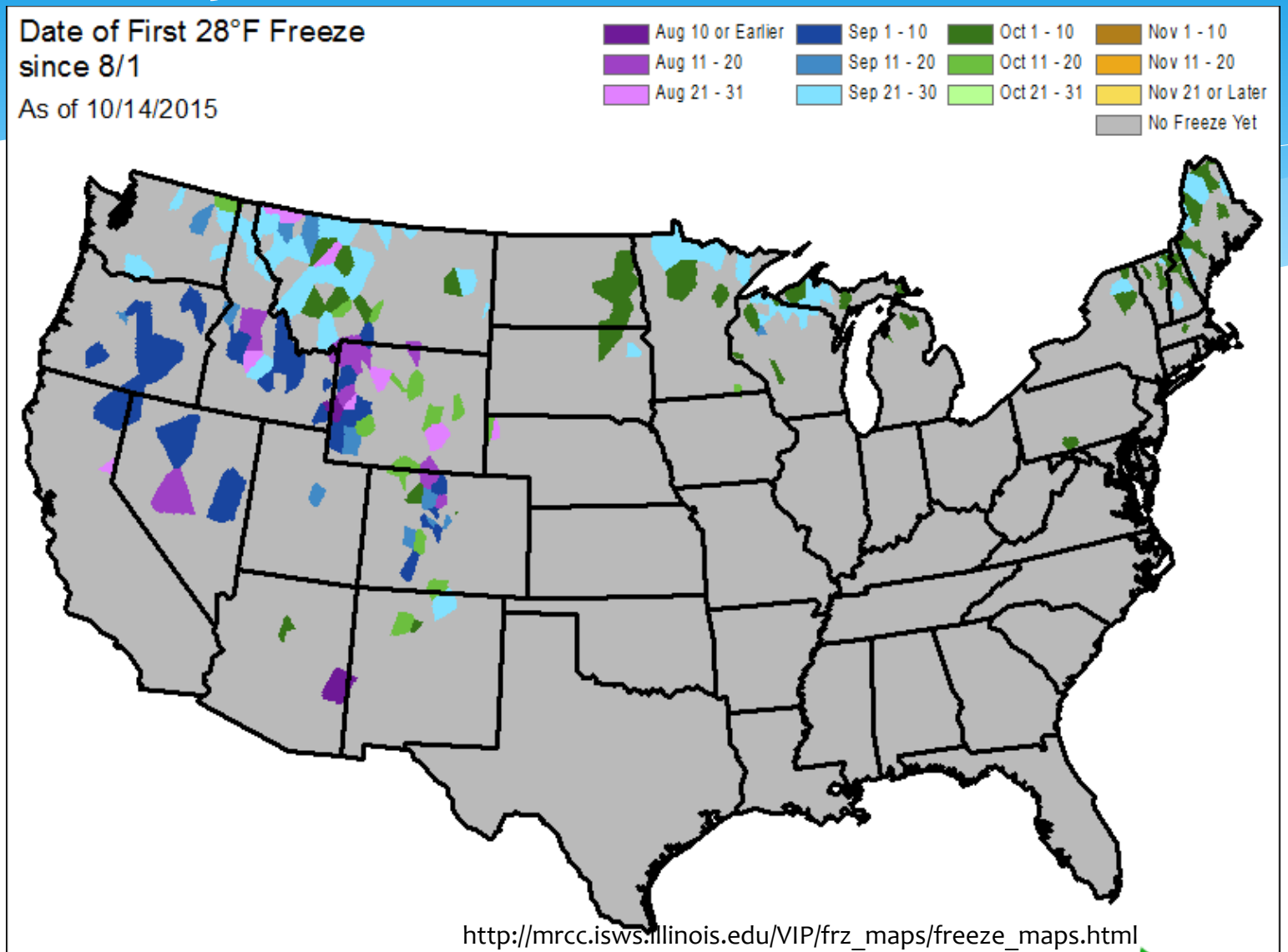
Past 7 days departure from normal Temperatures

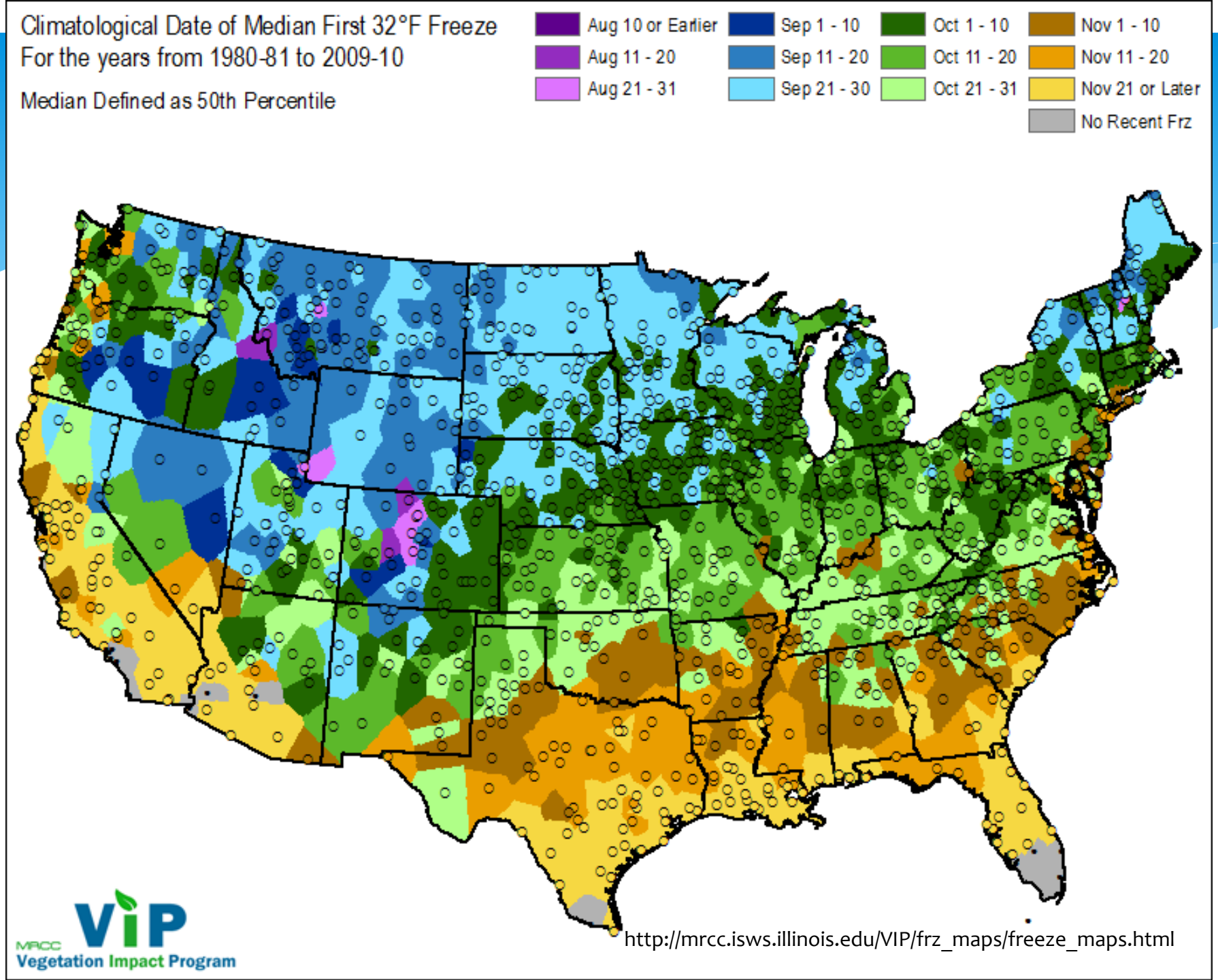


And then there was Sunday!

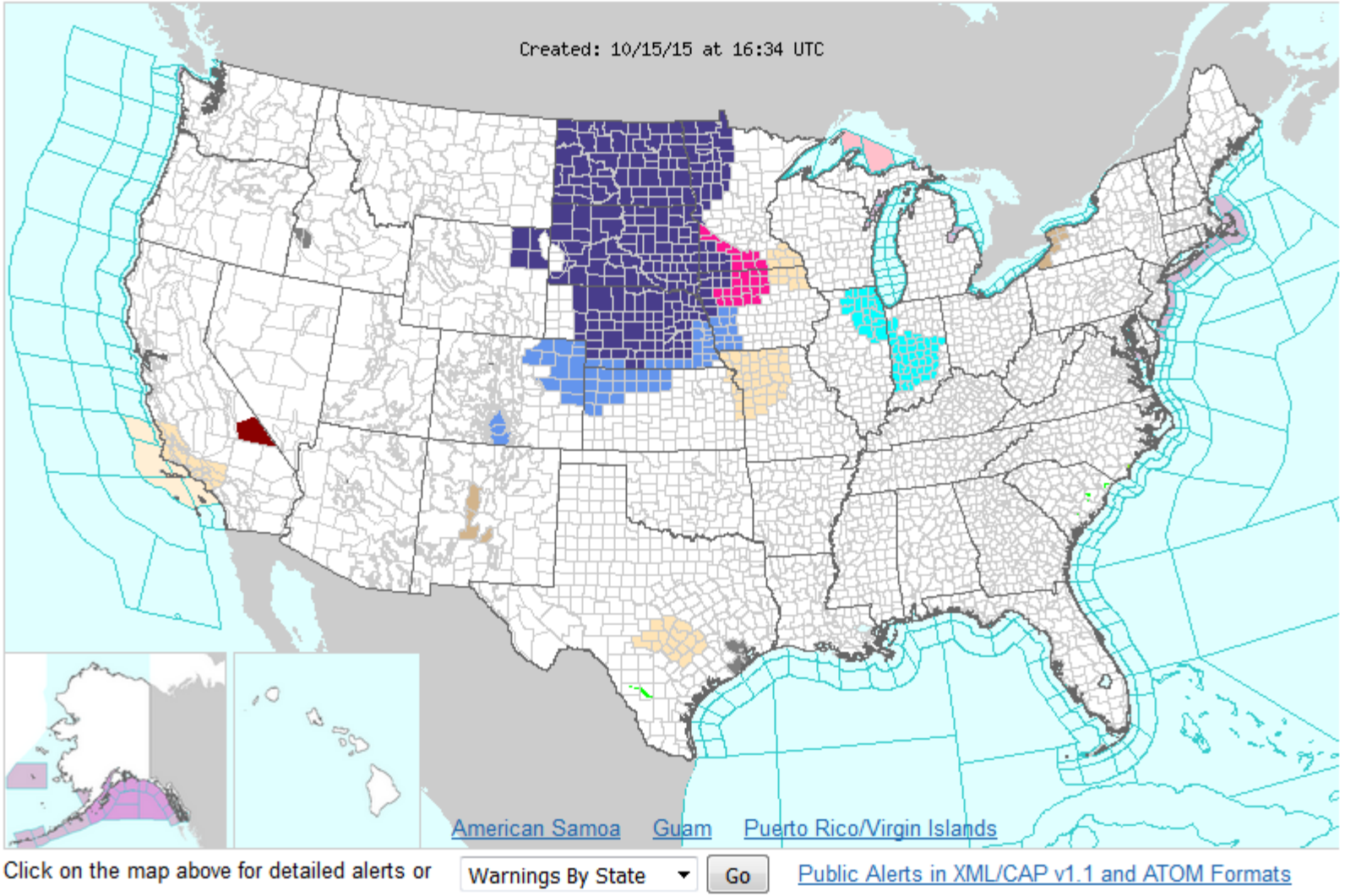


Very late first freeze this fall




Climatological Date of Median First 32°F Freeze
For the years from 1980-81 to 2009-10
Median Defined as 50th Percentile
Aug 10 or Earlier
Aug 11 - 20
Aug 21 - 31
Sep 1 - 10
Sep 11 - 20
Sep 21 - 30
Oct 1 - 10
Oct 11 - 20
Oct 21 - 31
Nov 1 - 10
Nov 11 - 20
Nov 21 or Later
No Recent Frz
MRCC
VIP
Vegetation Impact Program
http://mrcc.isws.illinois.edu/VIP/frz_maps/freeze_maps.html

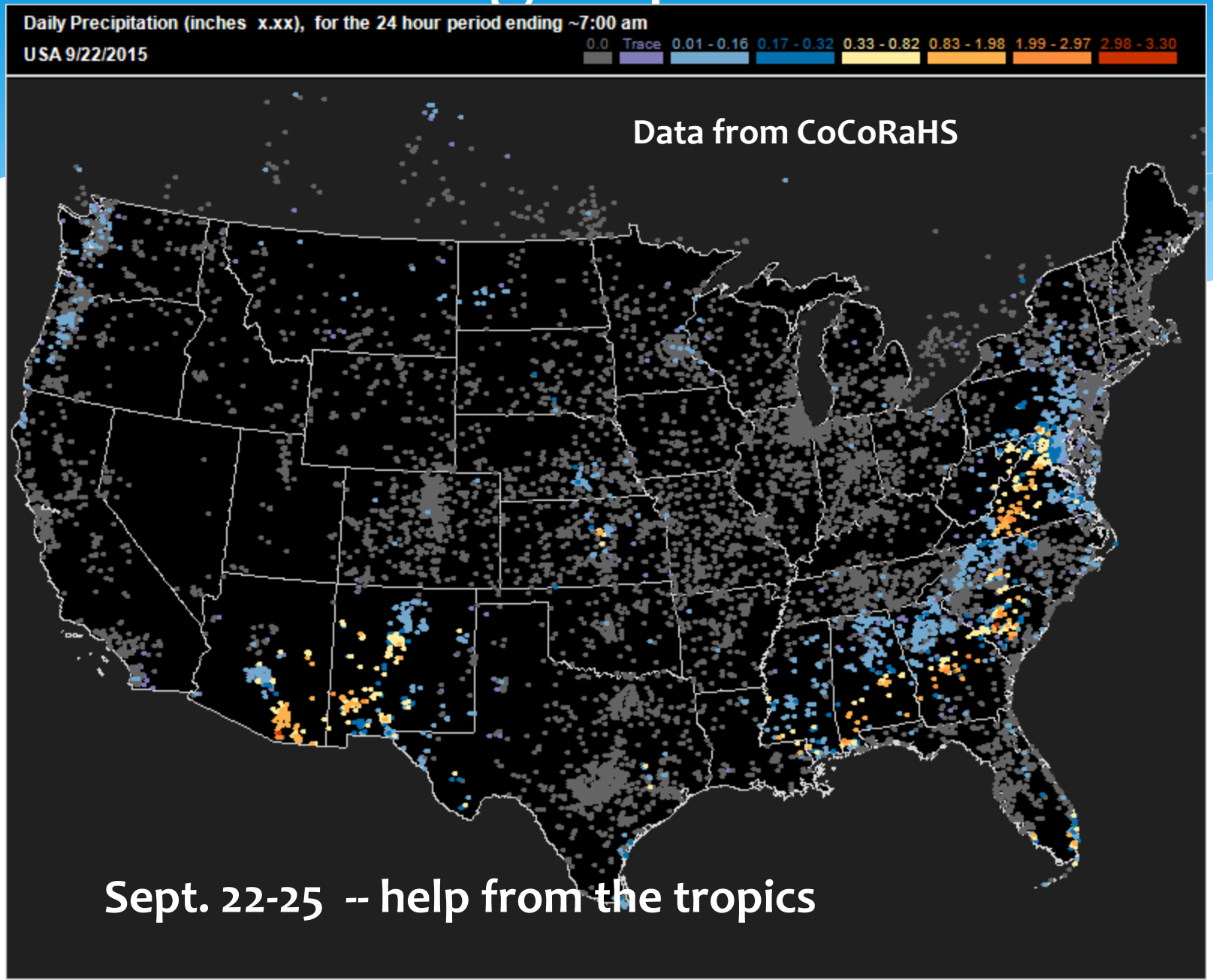
But the Freeze is Coming!!

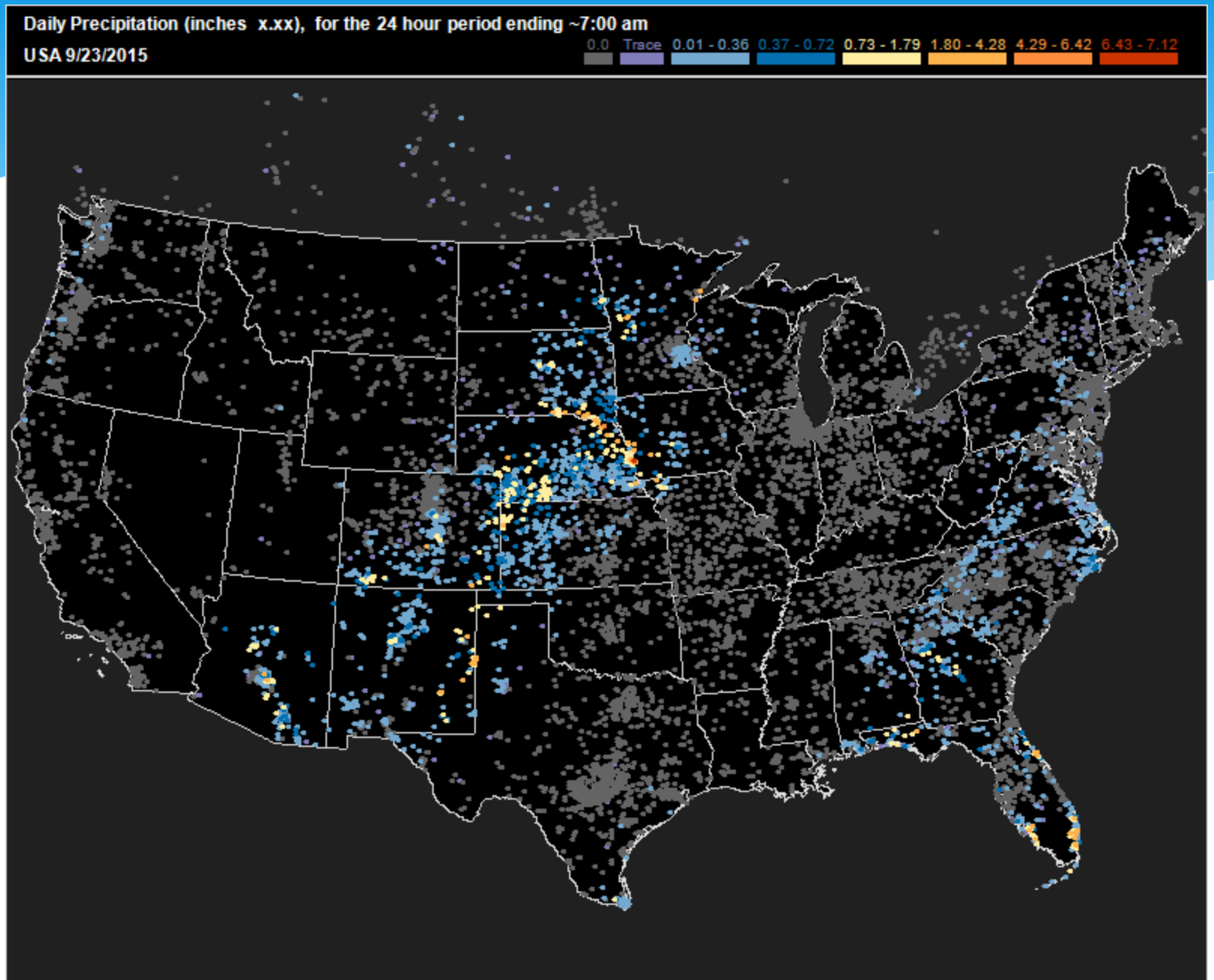


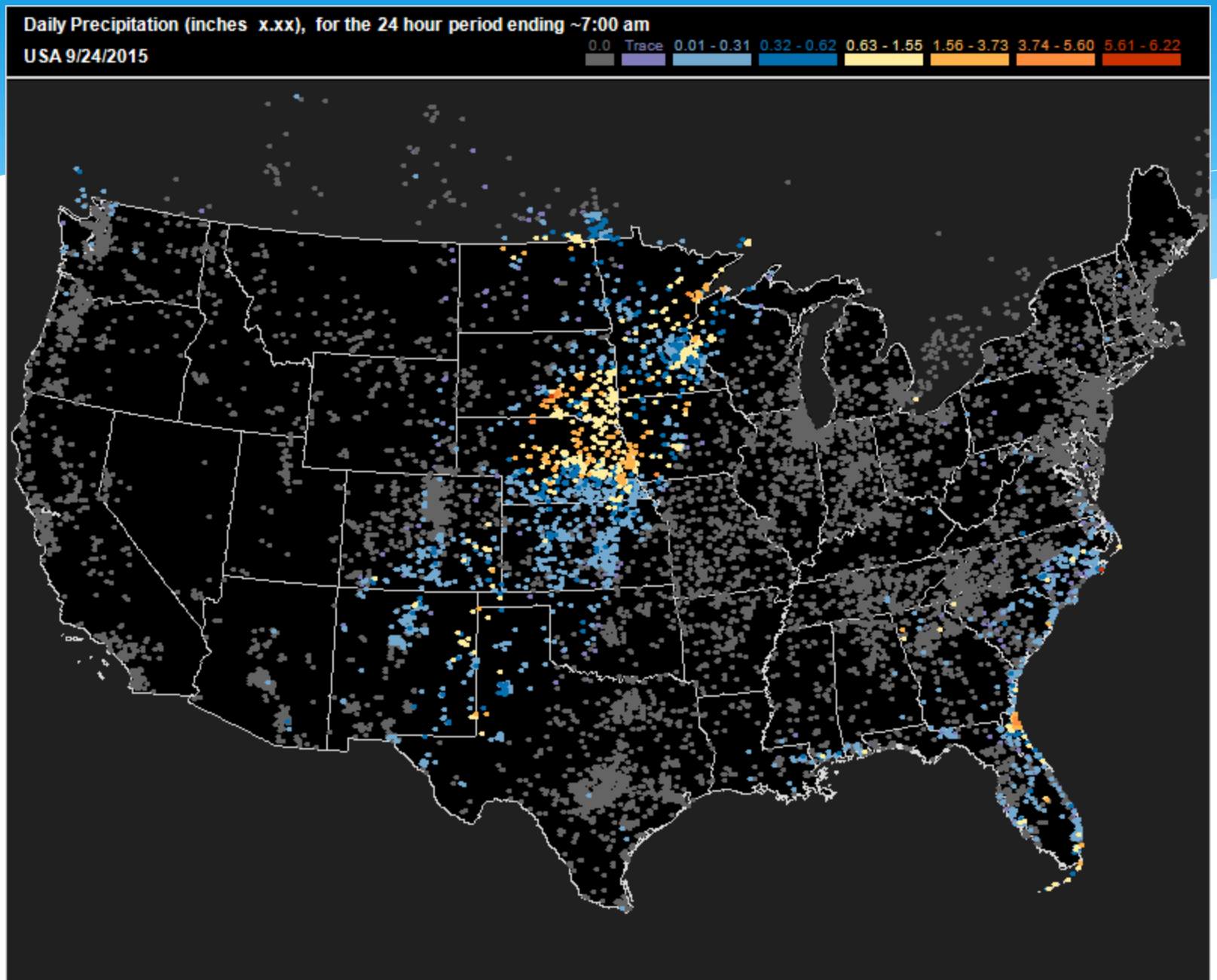
Now let's talk about precipitation

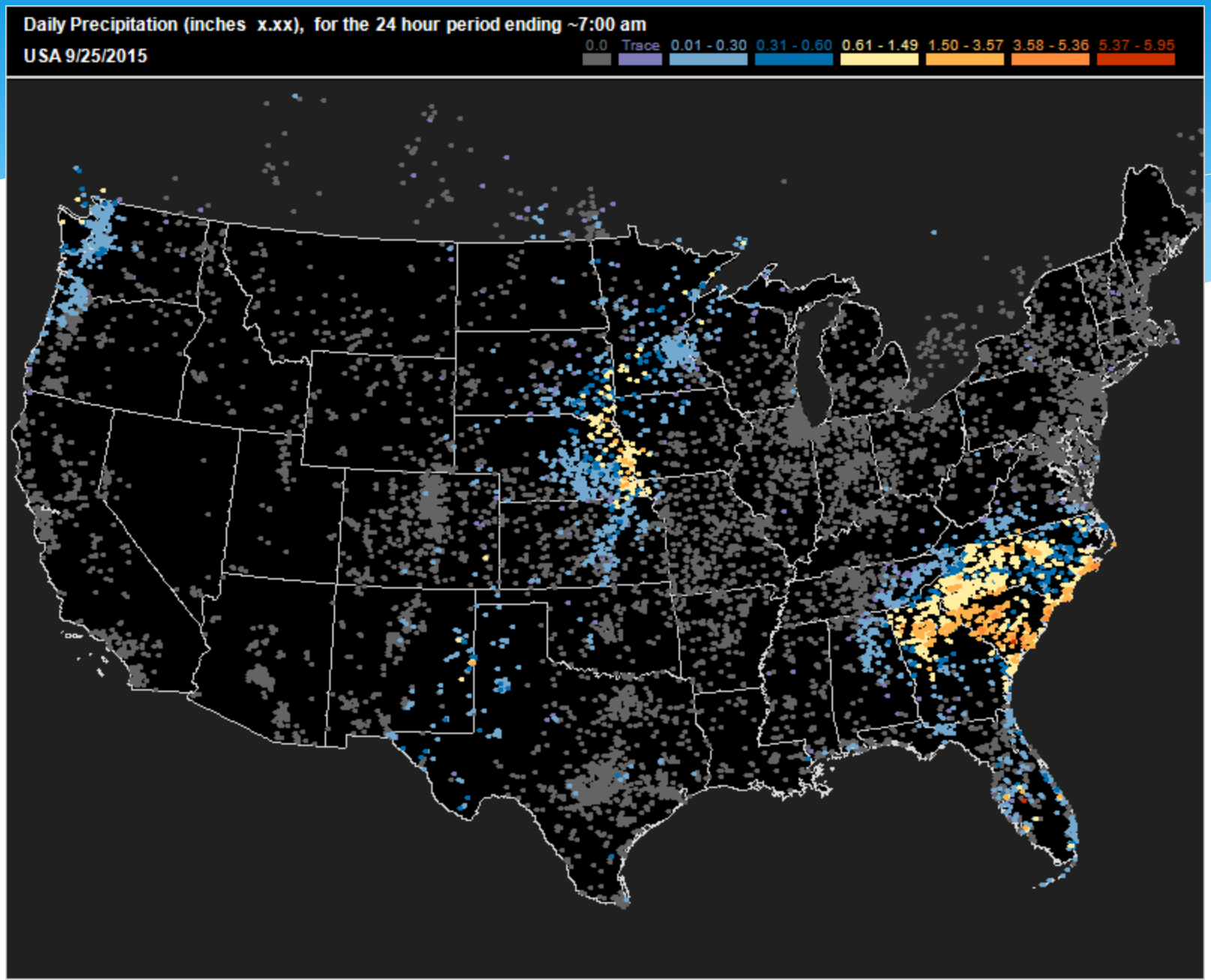
Credit: Henry Reges

An interesting September event



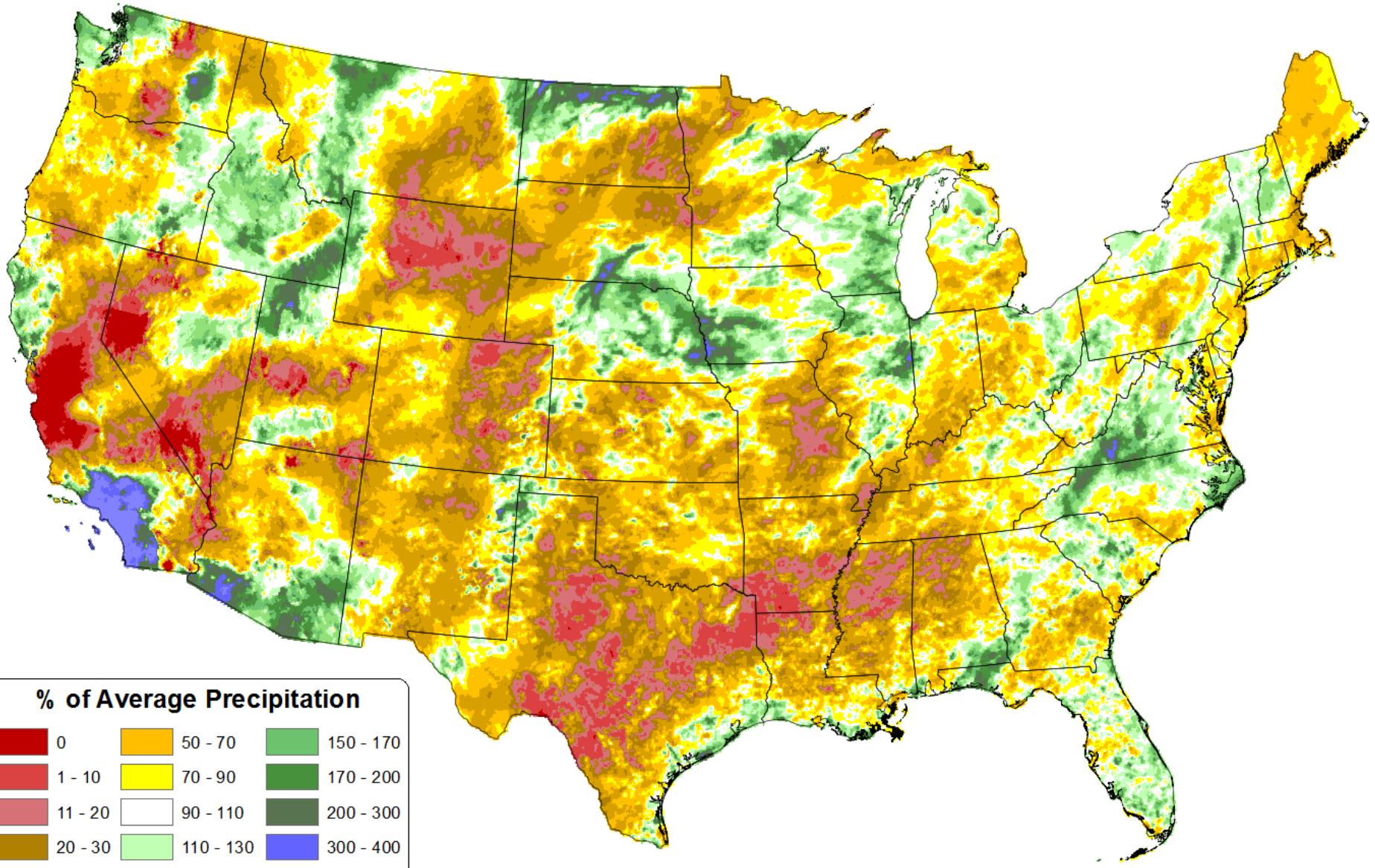

Daily Precipitation (inches x.xx), for the 24 hour period ending ~7:00 am
USA 9/23/2015
0.0
Trace
0.01 - 0.36
0.37 - 0.72
0.73 - 1.79
1.80 - 4.28
4.29 - 6.42
6.43 - 7.12


Daily Precipitation (inches x.xx), for the 24 hour period ending ~7:00 am
USA 9/24/2015
0.0
Trace
0.01 - 0.31
0.32 - 0.62
0.63 - 1.55
1.56 - 3.73
3.74 - 5.60
5.61 - 6.22

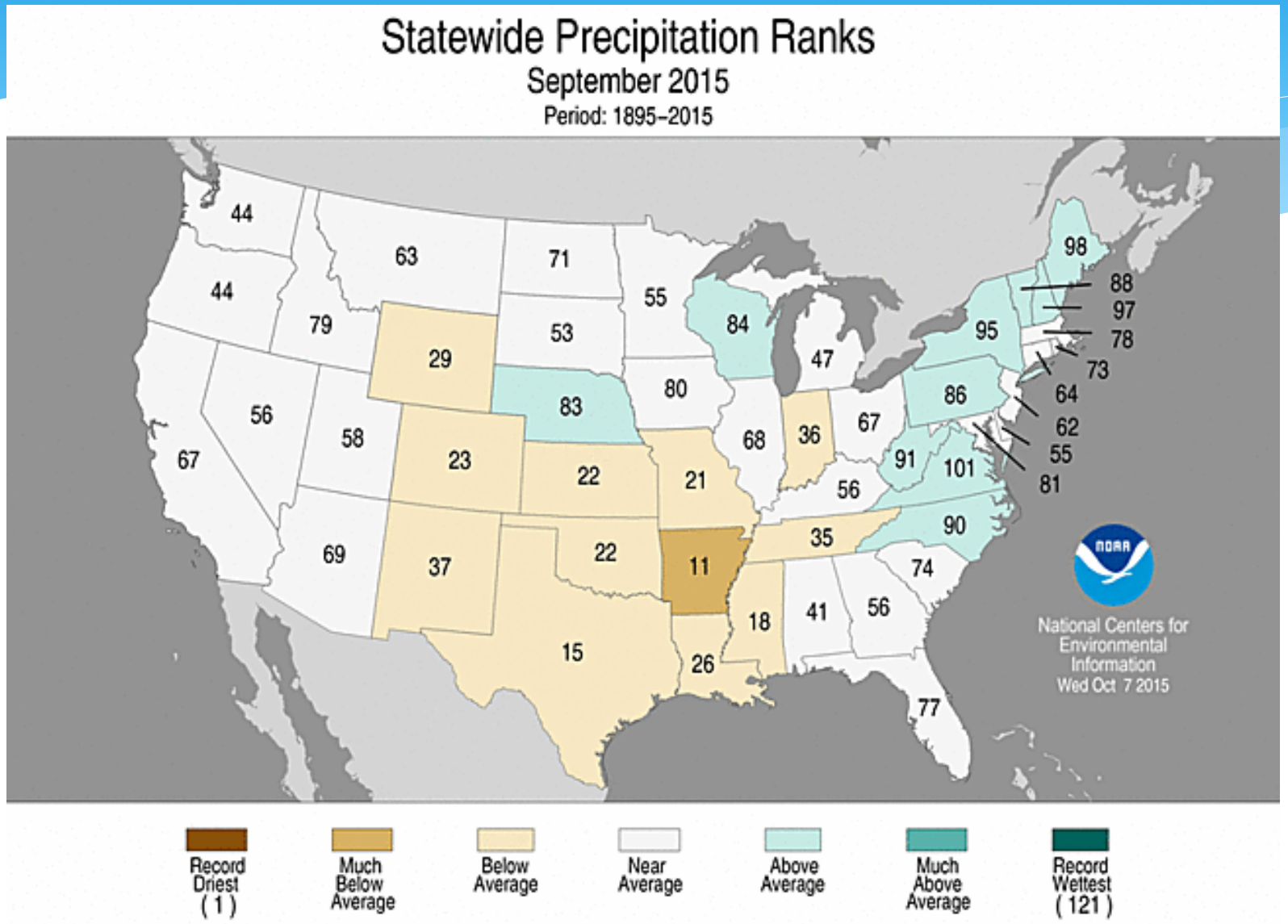

Daily Precipitation (inches x.xx), for the 24 hour period ending ~7:00 am
USA 9/25/2015
0.0
Trace
0.01 - 0.30
0.31 - 0.60
0.61 - 1.49
1.50 - 3.57
3.58 - 5.36
5.37 - 5.95

Total Precipitation Anomaly: September 2015

Period ending 30 Sep 2015
Base period: 1981-2010
(Map created 02 Oct 2015)

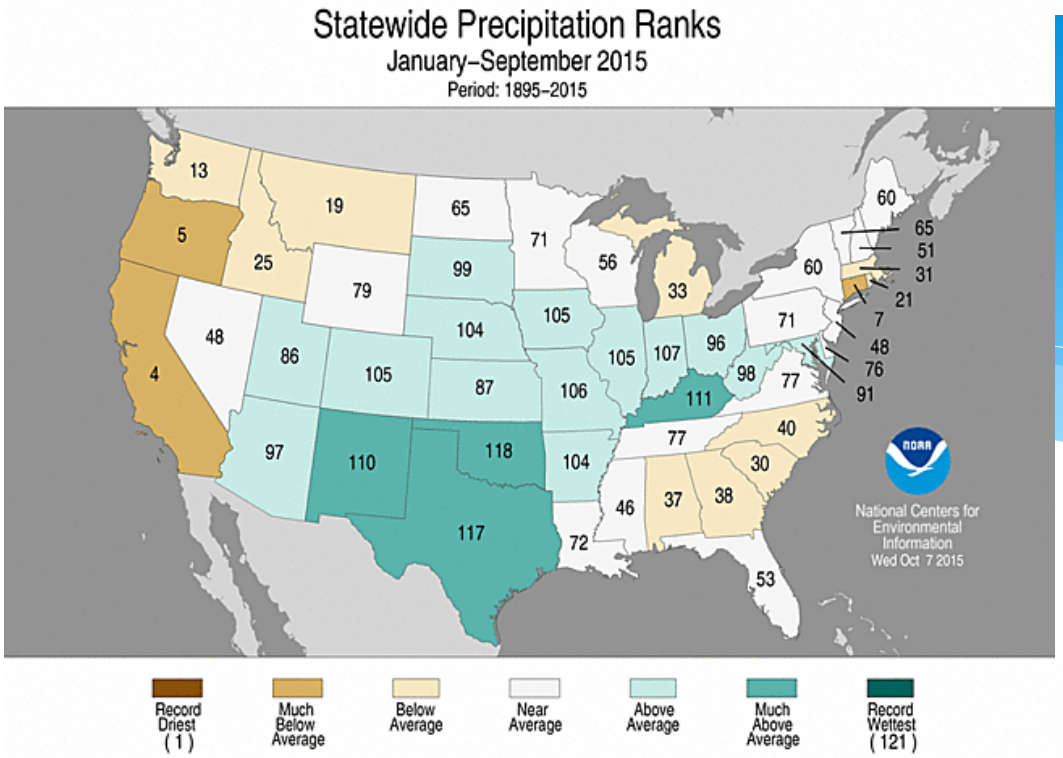


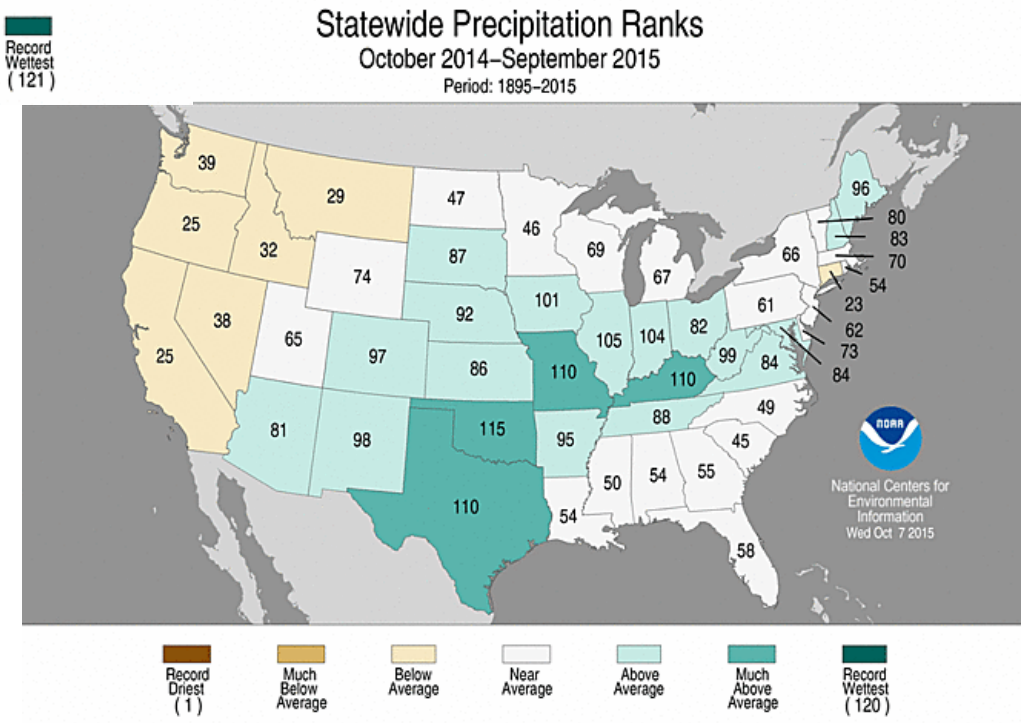
September Precipitation Recap



http://www.ncdc.noaa.gov/temp-and-precip/us-maps/

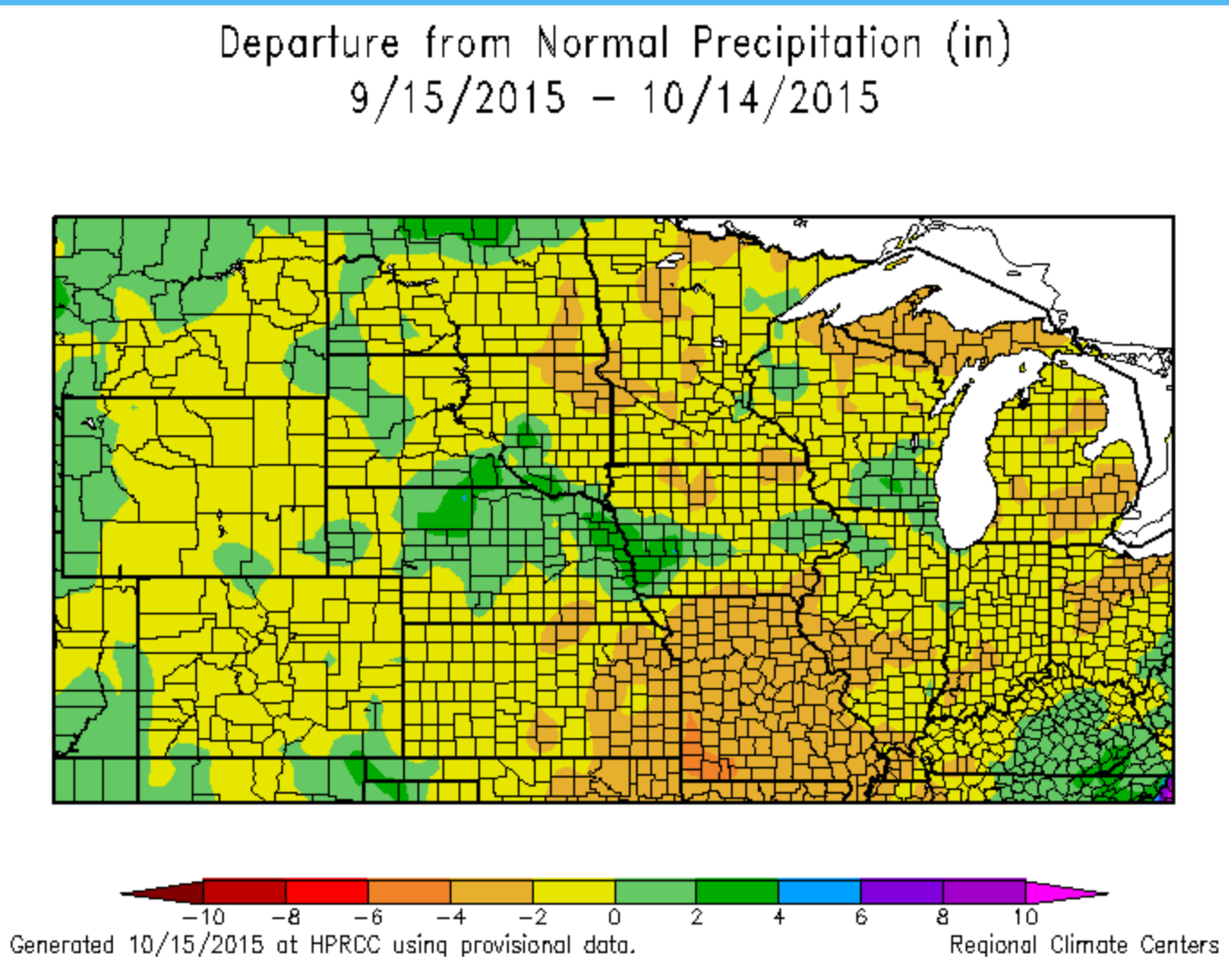
Year to Date and Water Year Precipitation



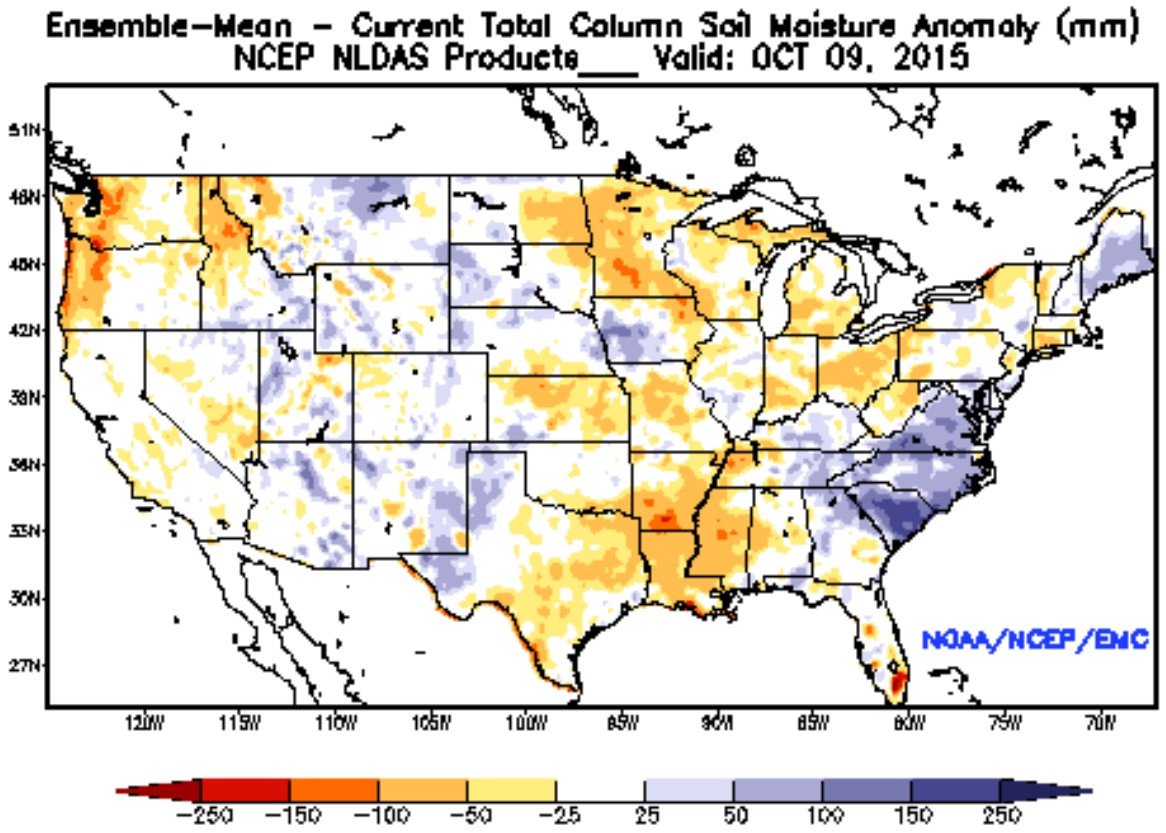


http://www.ncdc.noaa.gov/cag/mapping/us

30-Day Departure from normal precipitation



Soil Moisture



Soil Moisture Anomaly in millimeters

http://www.emc.ncep.noaa.gov/mmb/nldas/drought/

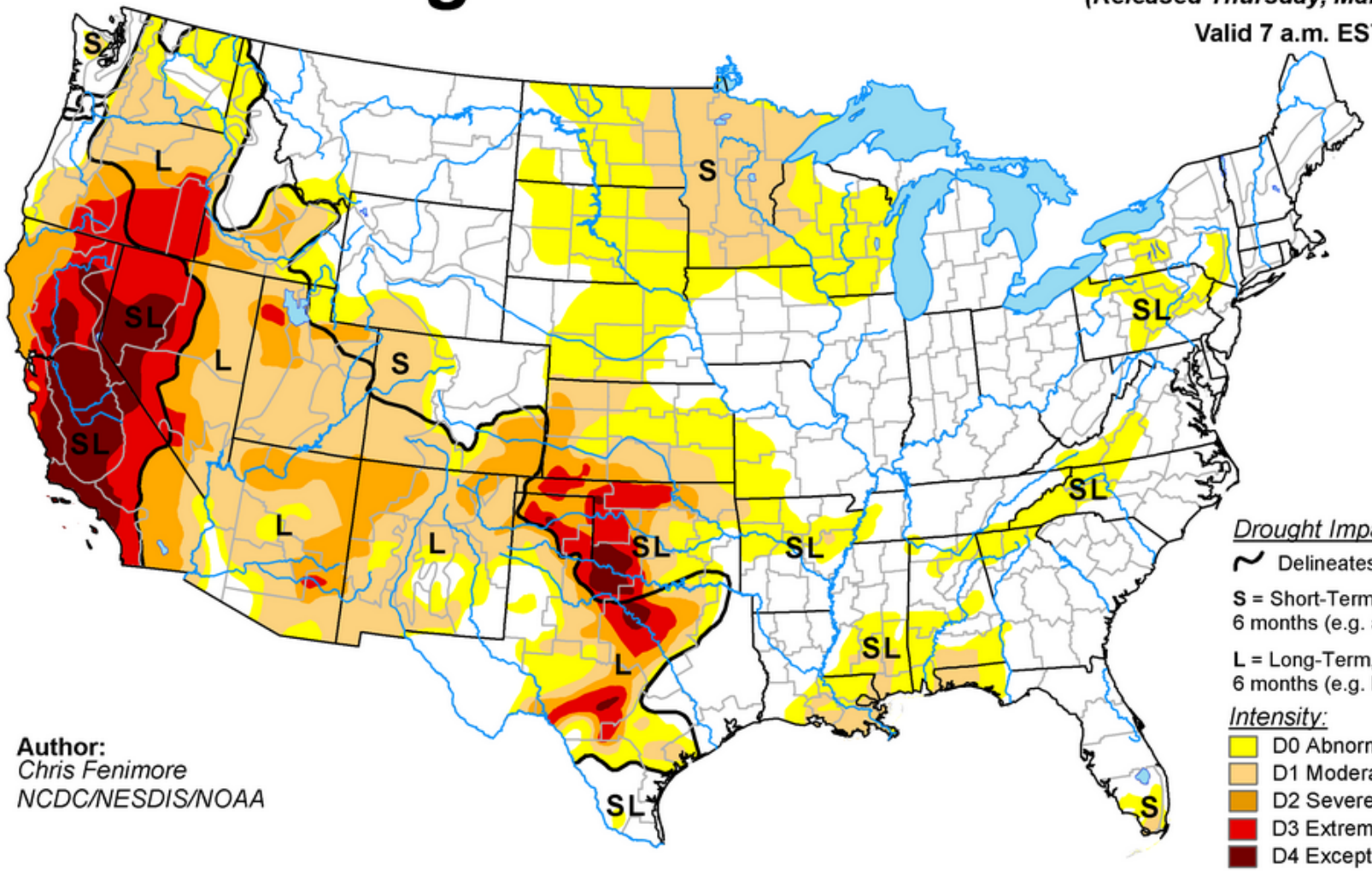
2015 drought evolution – or lack thereof

U.S. Drought Monitor

March 17, 2015

(Released Thursday, Mar. 19, 2015)

Valid 7 a.m. EST



Author:
Chris Fenimore
NCDC/NESDIS/NOAA

Drought Impact Types:

~ Delineates dominant impacts

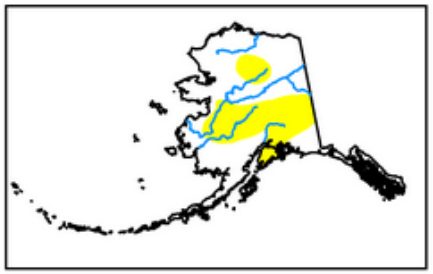
S = Short-Term, typically less than 6 months (e.g. agriculture, grasslands)

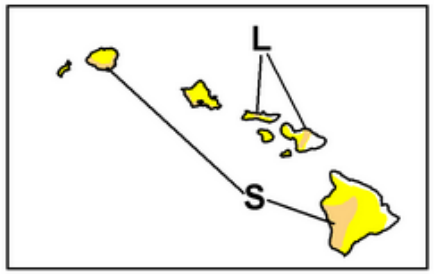
L = Long-Term, typically greater than 6 months (e.g. hydrology, ecology)

Intensity:

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

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





USDA National Drought Mitigation Center

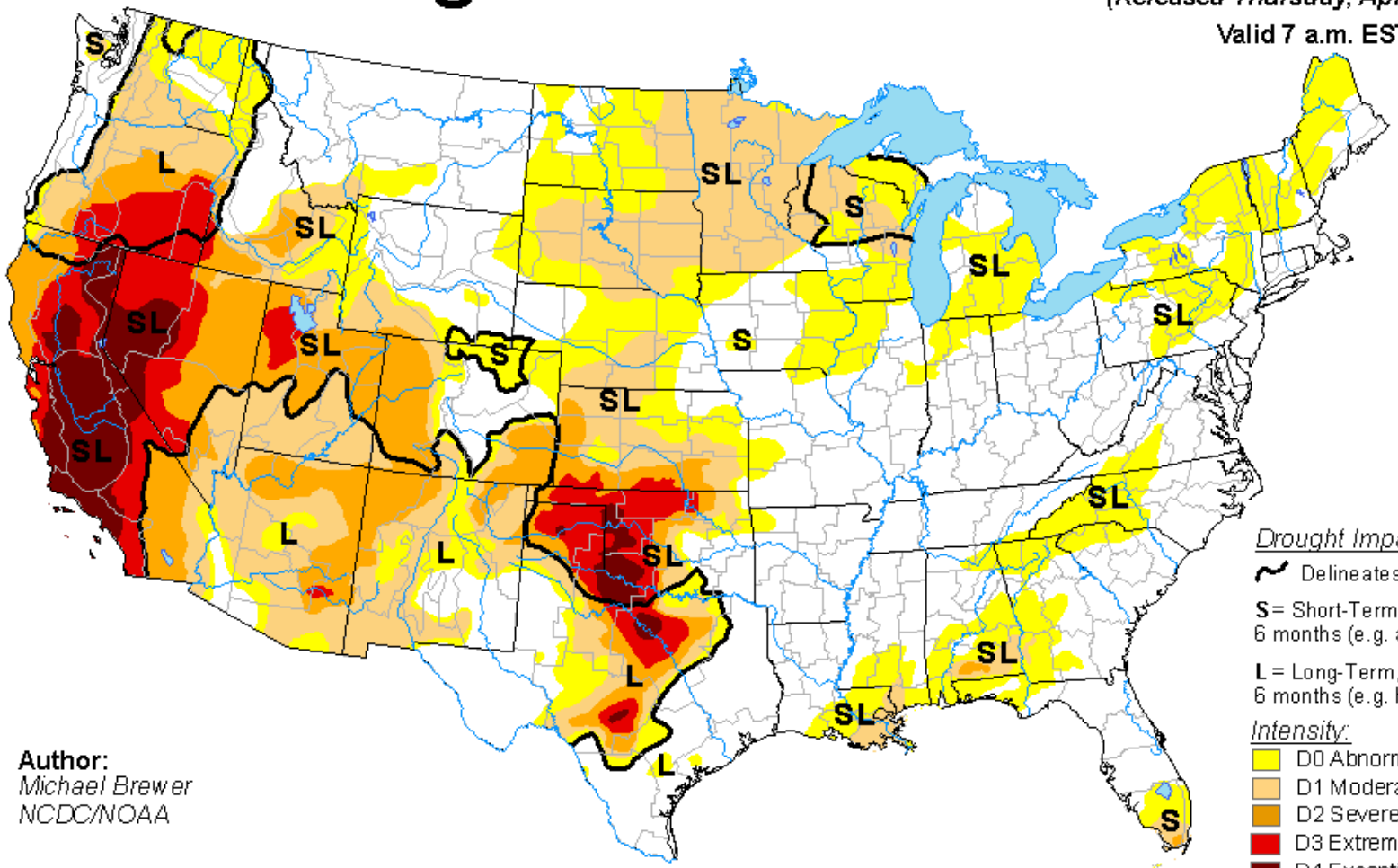
http://droughtmonitor.unl.edu/

U.S. Drought Monitor

April 14, 2015

(Released Thursday, Apr. 16, 2015)

Valid 7 a.m. EST



Author:
Michael Brewer
NCDC/NOAA

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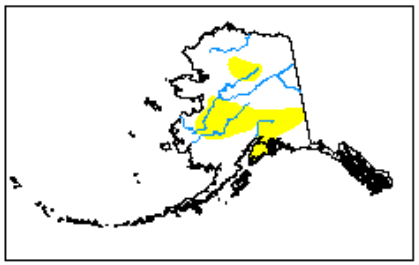
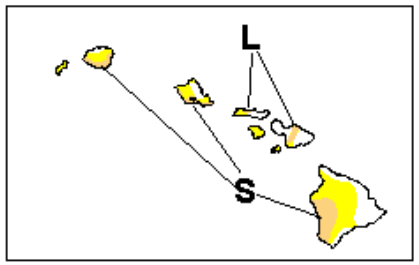
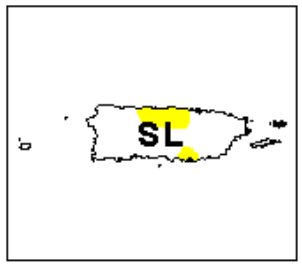






USDA National Drought Mitigation Center

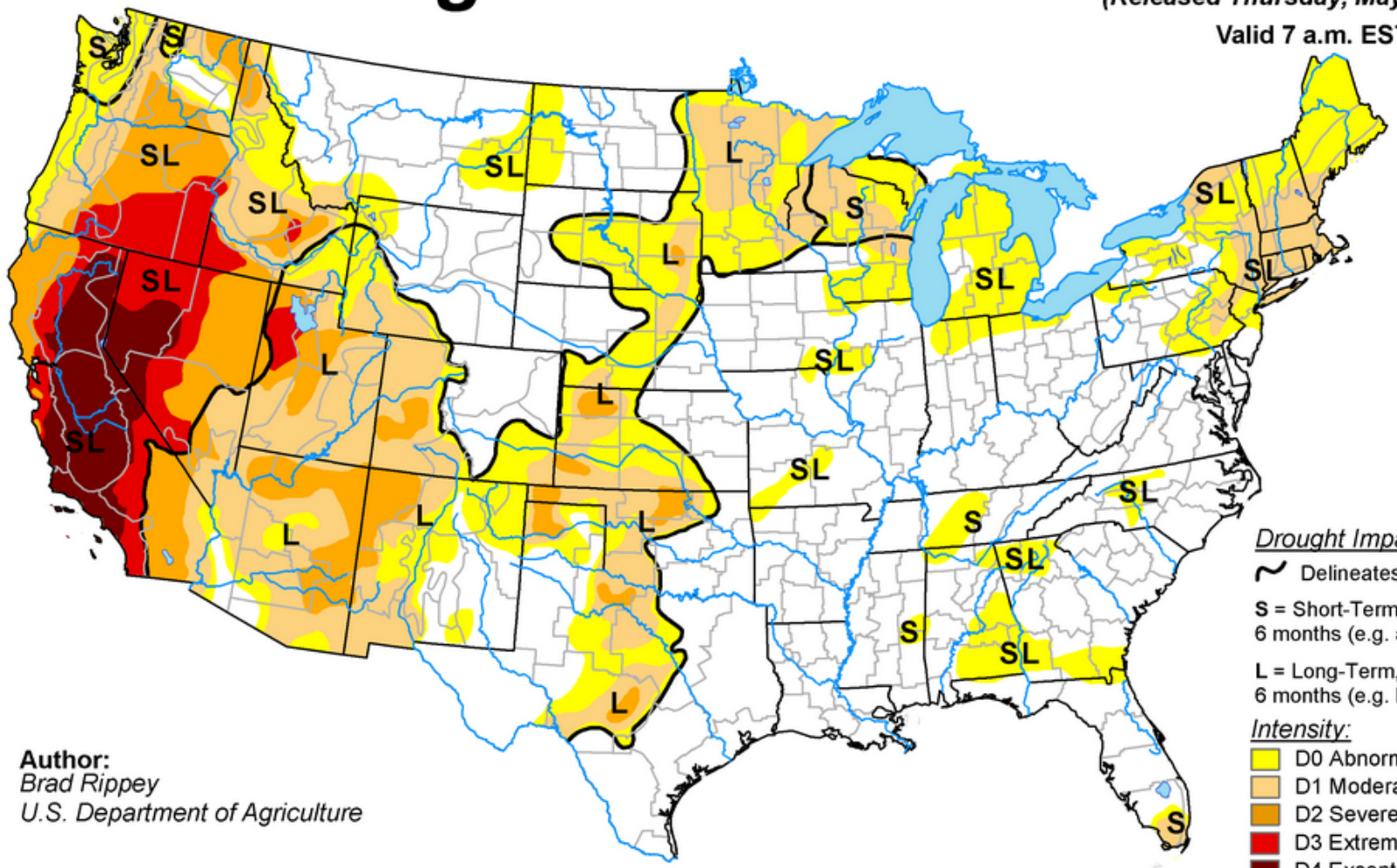
http://droughtmonitor.unl.edu/

U.S. Drought Monitor

May 19, 2015

(Released Thursday, May. 21, 2015)

Valid 7 a.m. EST



Author:
Brad Rippey
U.S. Department of Agriculture

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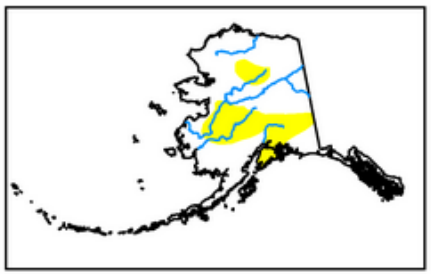
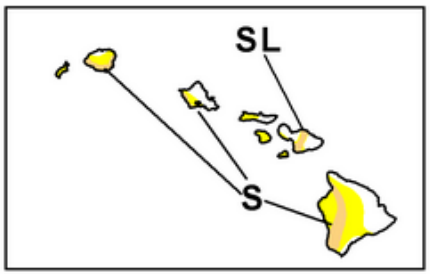
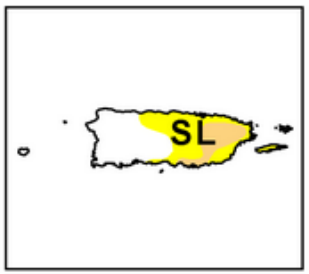






USDA National Drought Mitigation Center

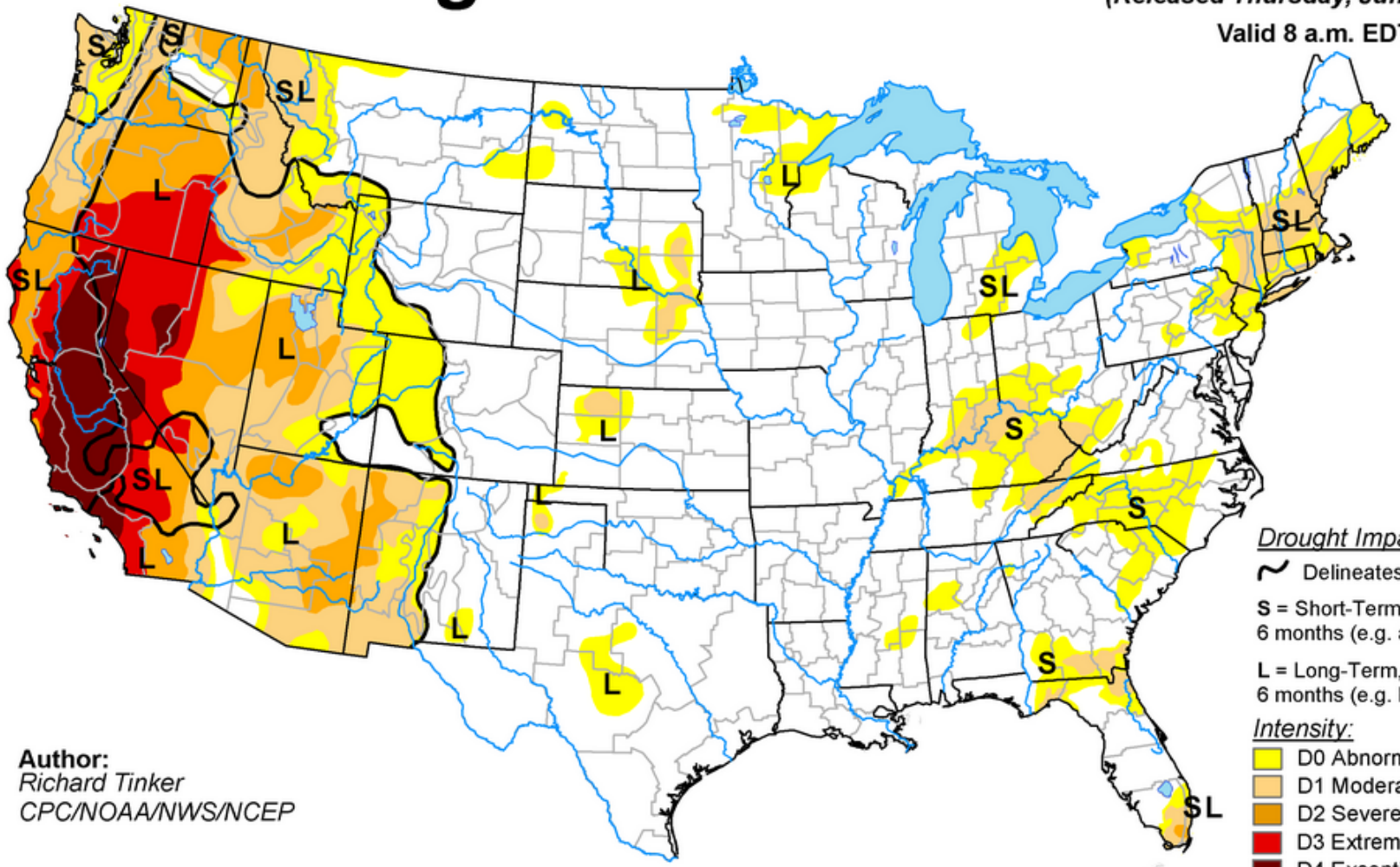
http://droughtmonitor.unl.edu/

U.S. Drought Monitor

June 16, 2015

(Released Thursday, Jun. 18, 2015)

Valid 8 a.m. EDT



Author:
Richard Tinker
CPC/NOAA/NWS/NCEP

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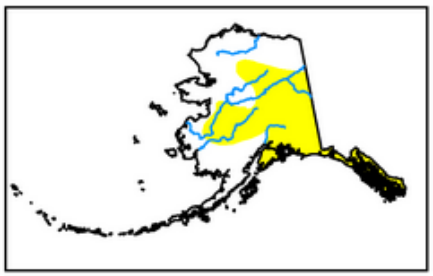
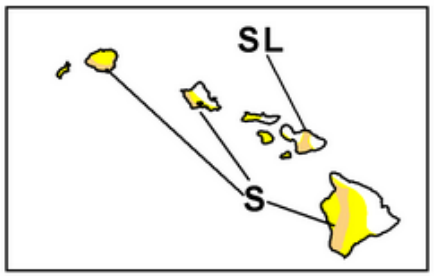
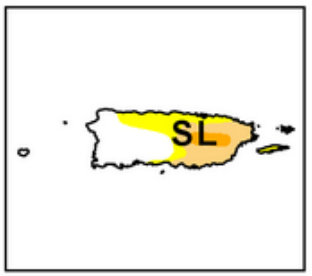






USDA National Drought Mitigation Center

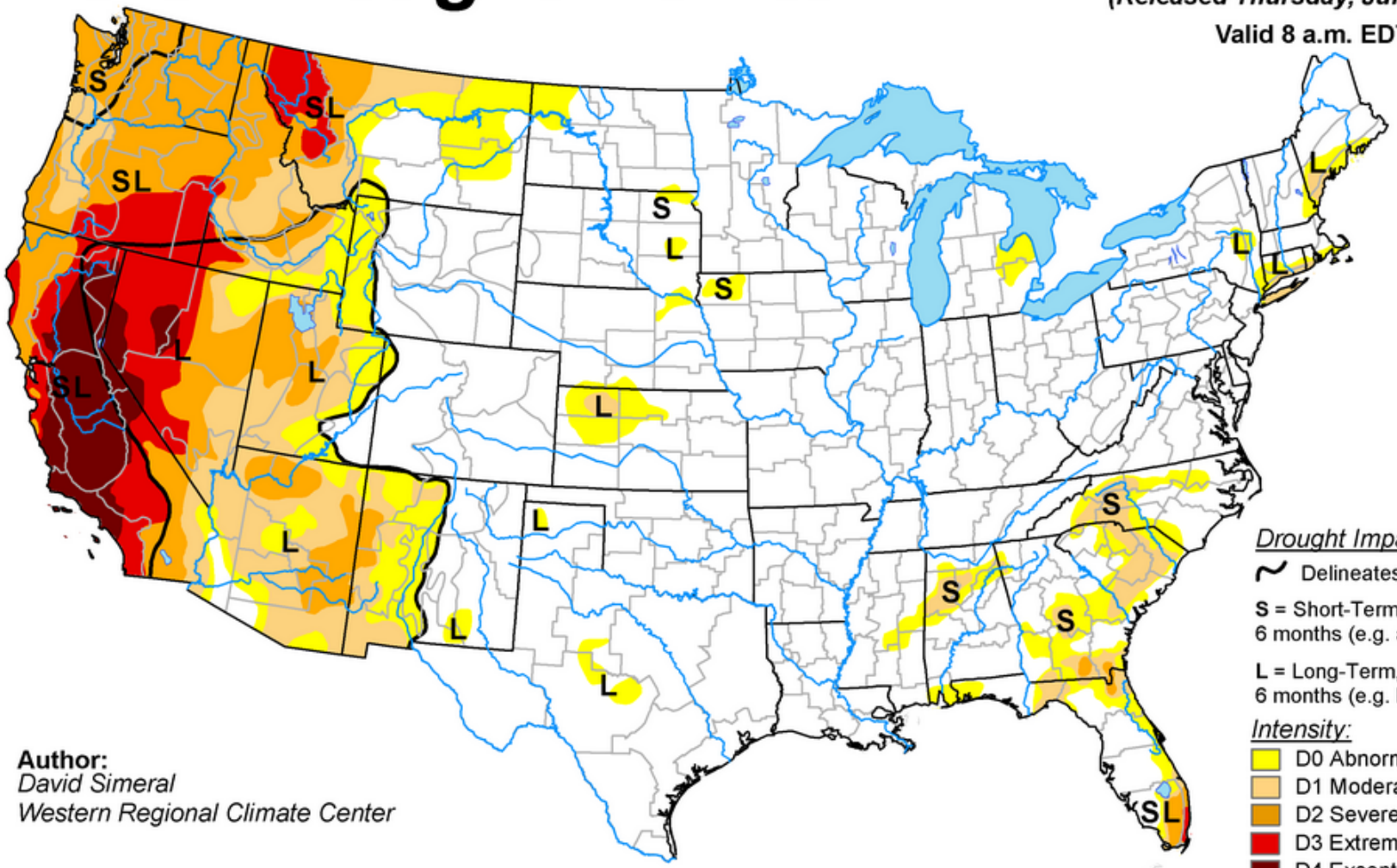
http://droughtmonitor.unl.edu/

U.S. Drought Monitor

July 14, 2015

(Released Thursday, Jul. 16, 2015)

Valid 8 a.m. EDT



Author:
David Simeral
Western Regional Climate Center

Drought Impact Types:

~ Delineates dominant impacts

S = Short-Term, typically less than 6 months (e.g. agriculture, grasslands)

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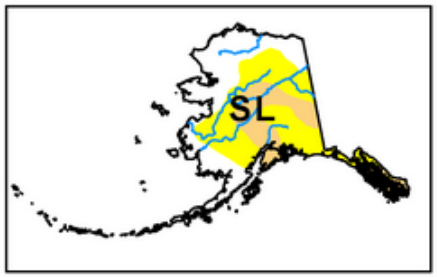
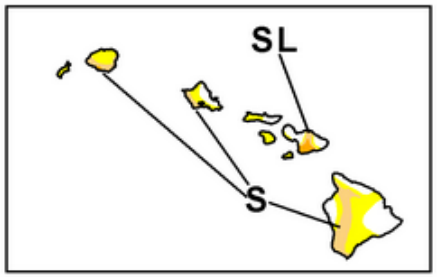
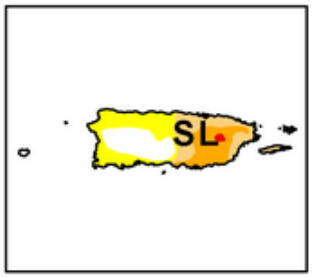






USDA National Drought Mitigation Center

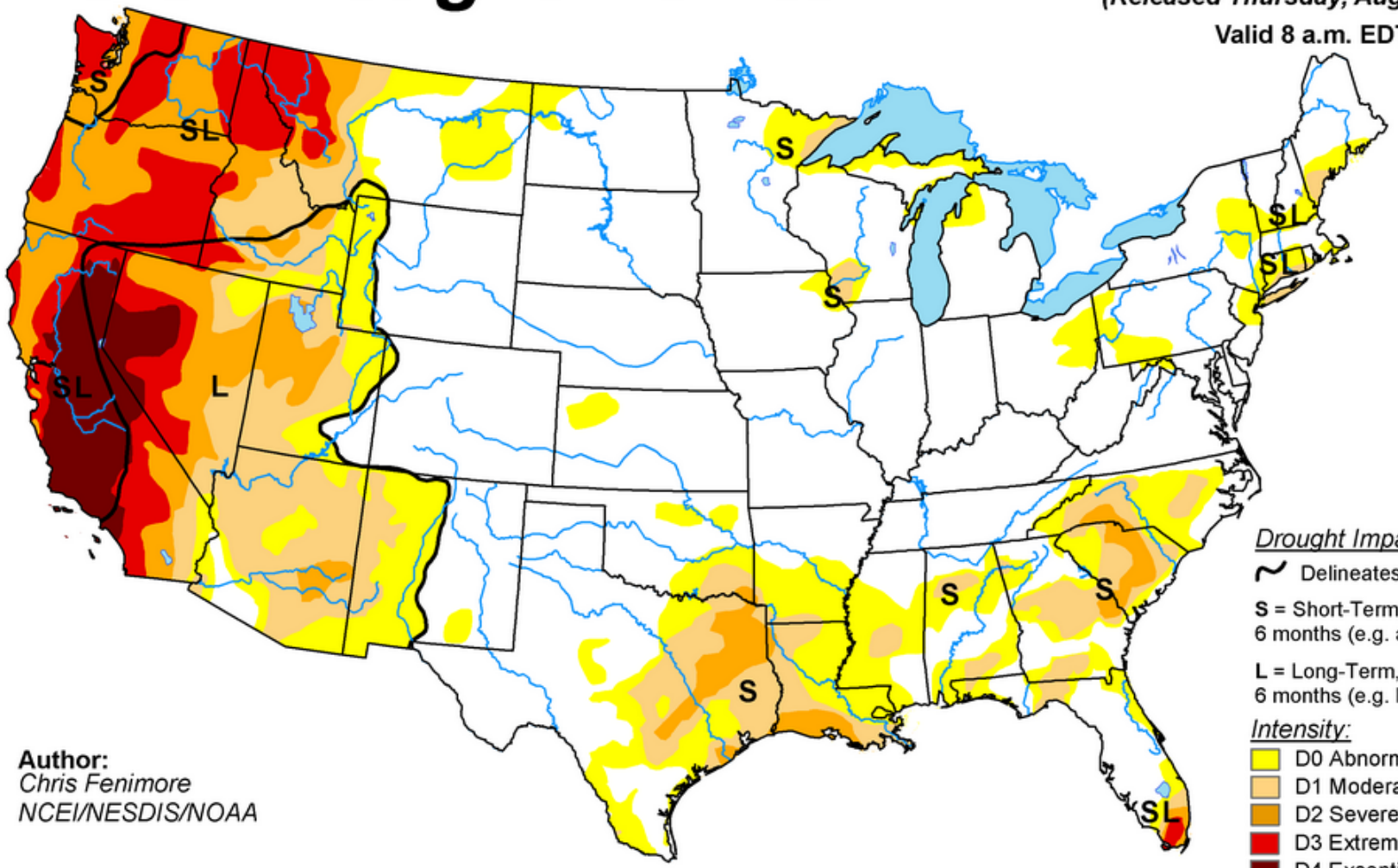
http://droughtmonitor.unl.edu/

U.S. Drought Monitor

August 18, 2015

(Released Thursday, Aug. 20, 2015)

Valid 8 a.m. EDT



Author:
Chris Fenimore
NCEI/NESDIS/NOAA

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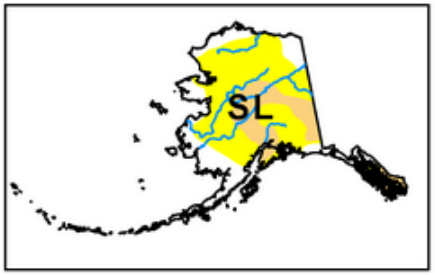
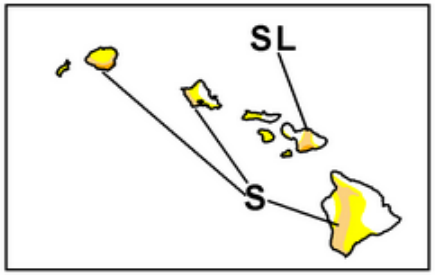
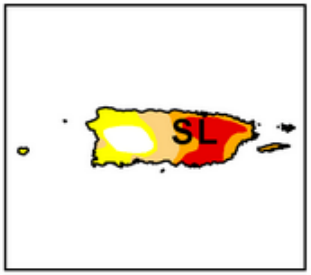






USDA National Drought Mitigation Center

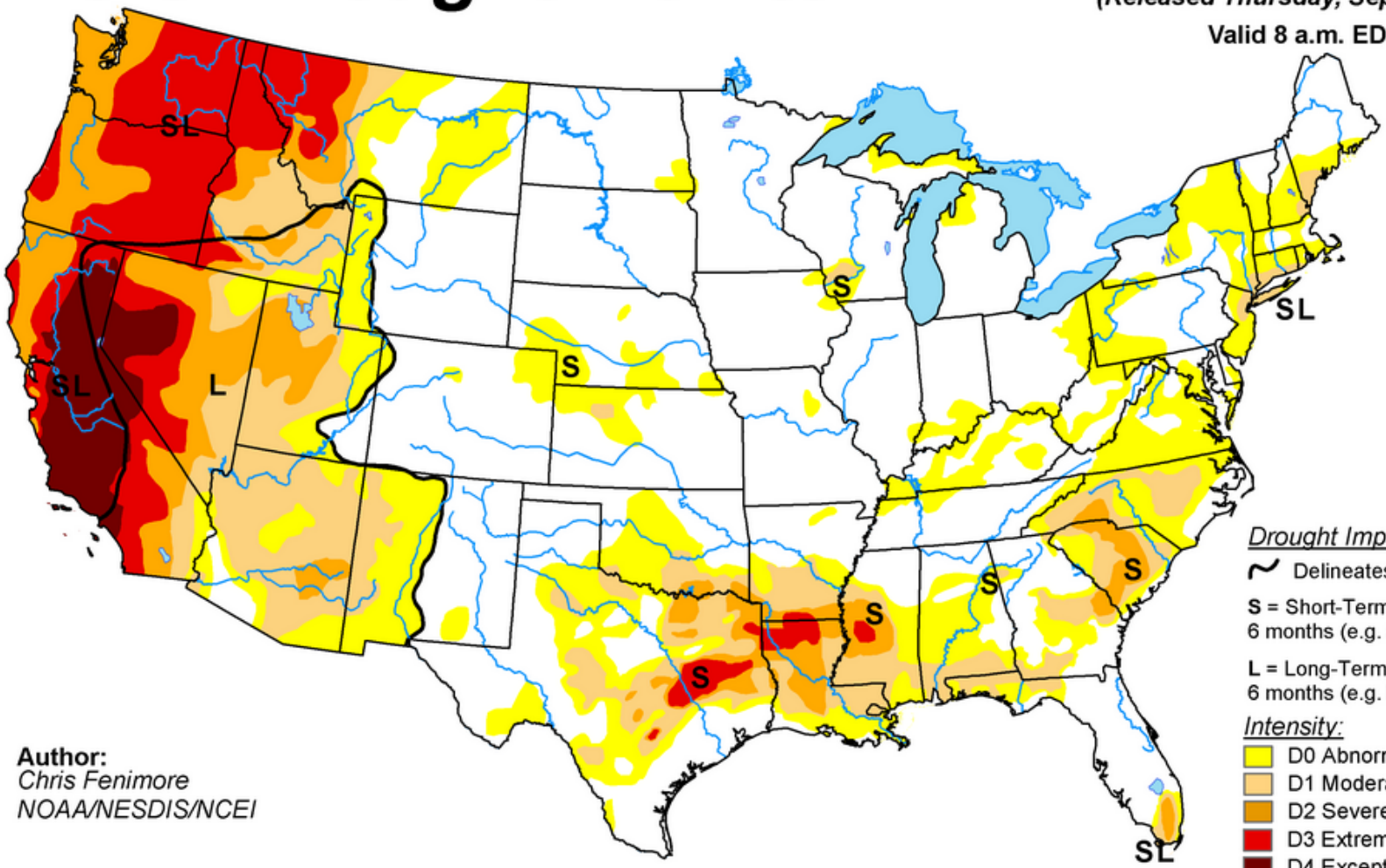
http://droughtmonitor.unl.edu/

U.S. Drought Monitor

September 15, 2015

(Released Thursday, Sep. 17, 2015)

Valid 8 a.m. EDT



Author:
Chris Fenimore
NOAA/NESDIS/NCEI

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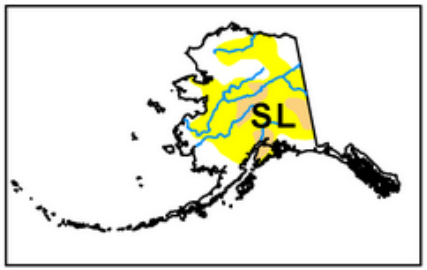
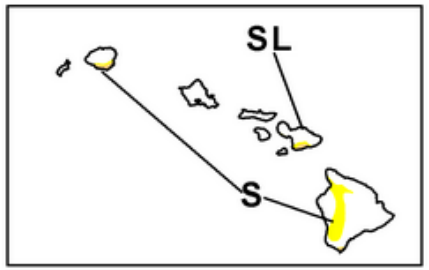
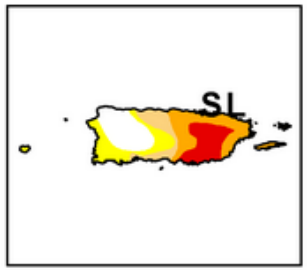






USDA National Drought Mitigation Center

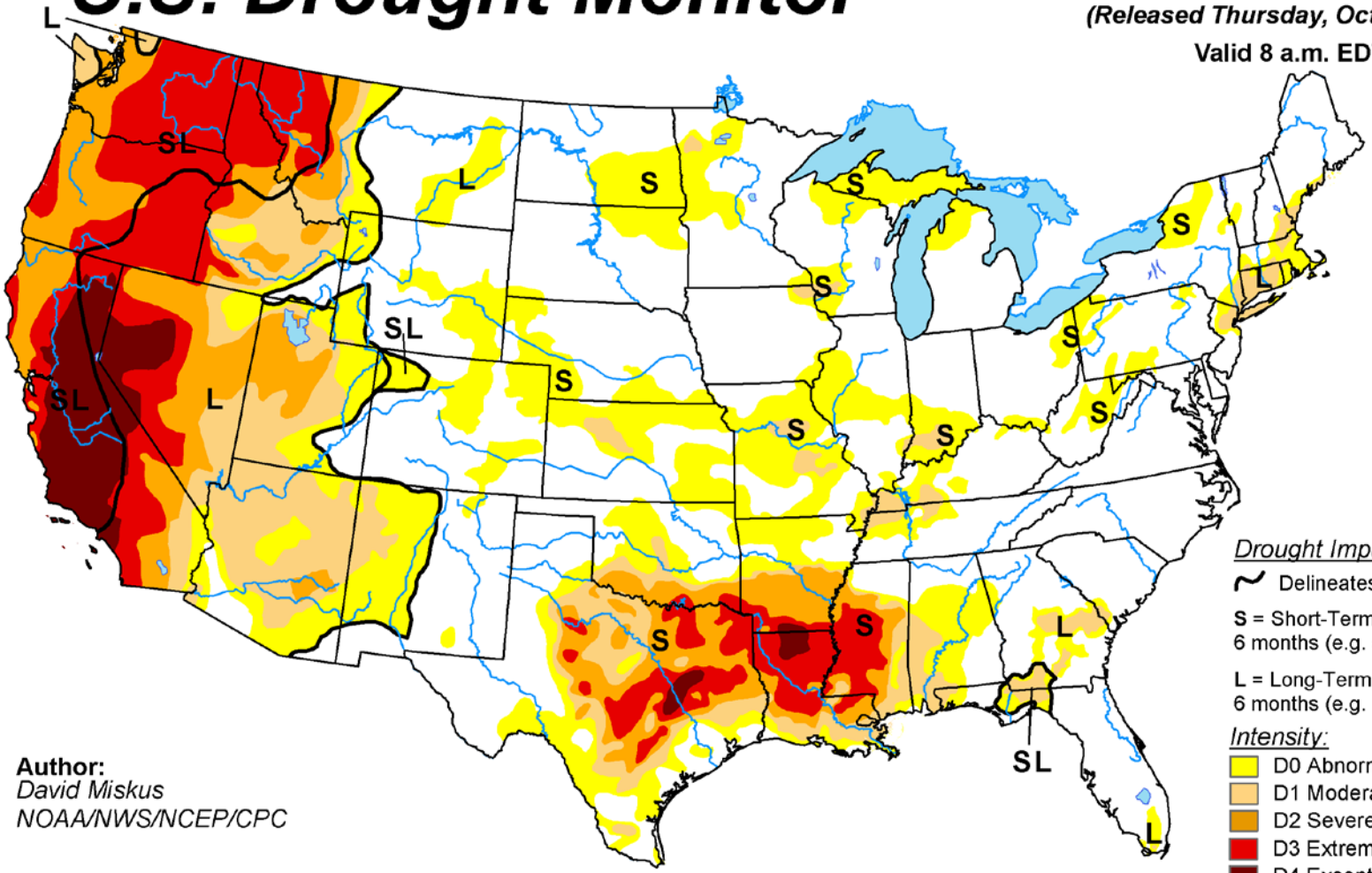
http://droughtmonitor.unl.edu/

U.S. Drought Monitor

October 13, 2015

(Released Thursday, Oct. 15, 2015)

Valid 8 a.m. EDT



Author:
David Miskus
NOAA/NWS/NCEP/CPC

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~ Delineates dominant impacts

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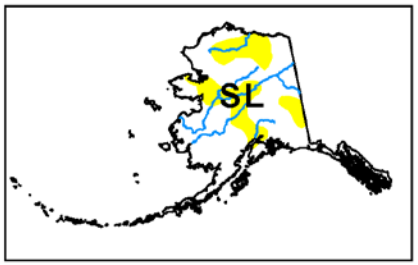
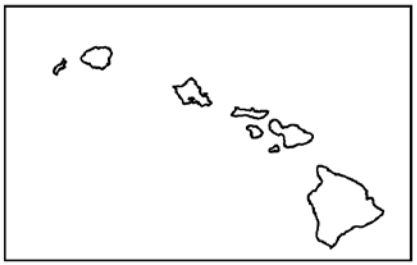
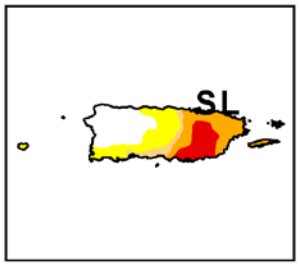




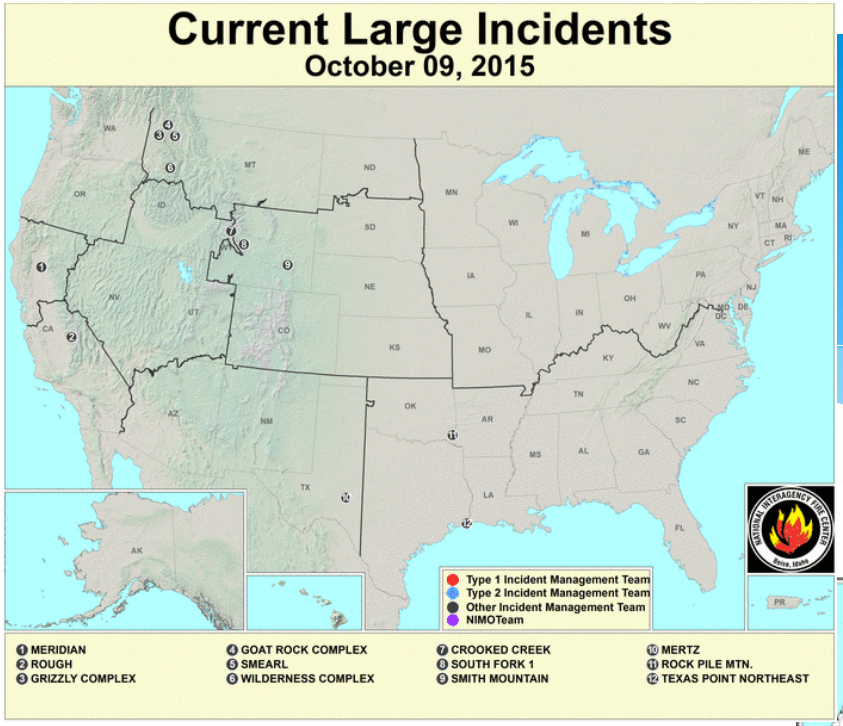


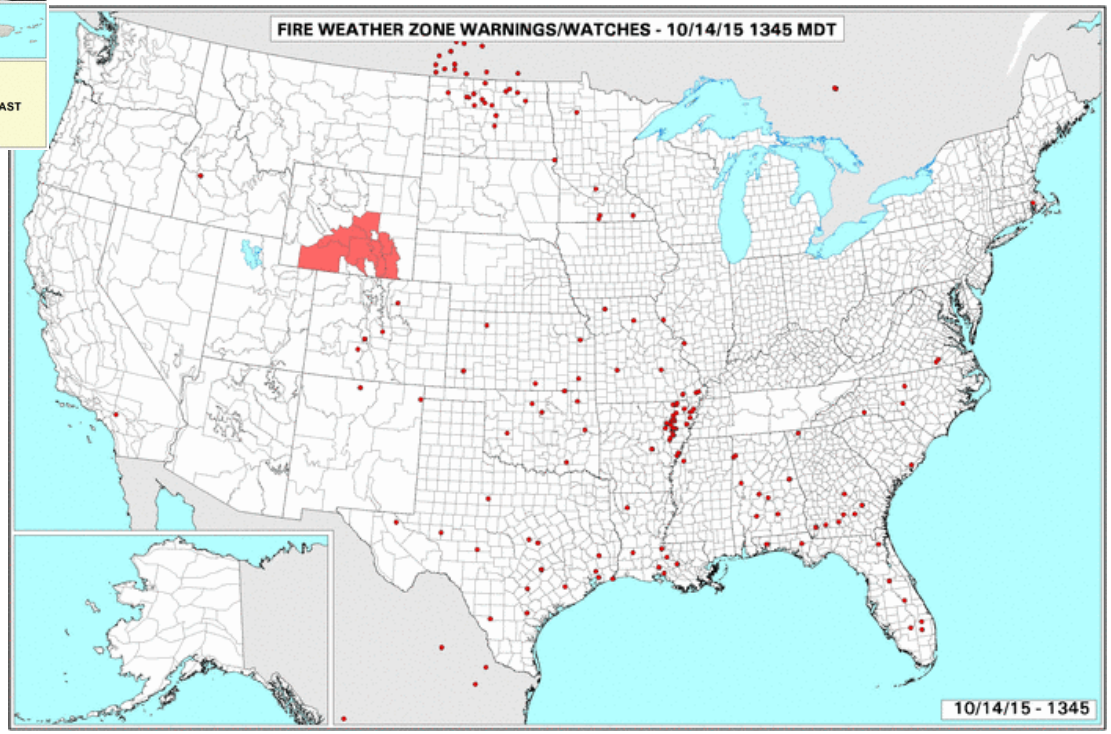
USDA National Drought Mitigation Center

http://droughtmonitor.unl.edu/

Impacts

Fire Activity





USDA Forest Service
http://activefiremaps.fs.fed.us/current.php

Fire Issues

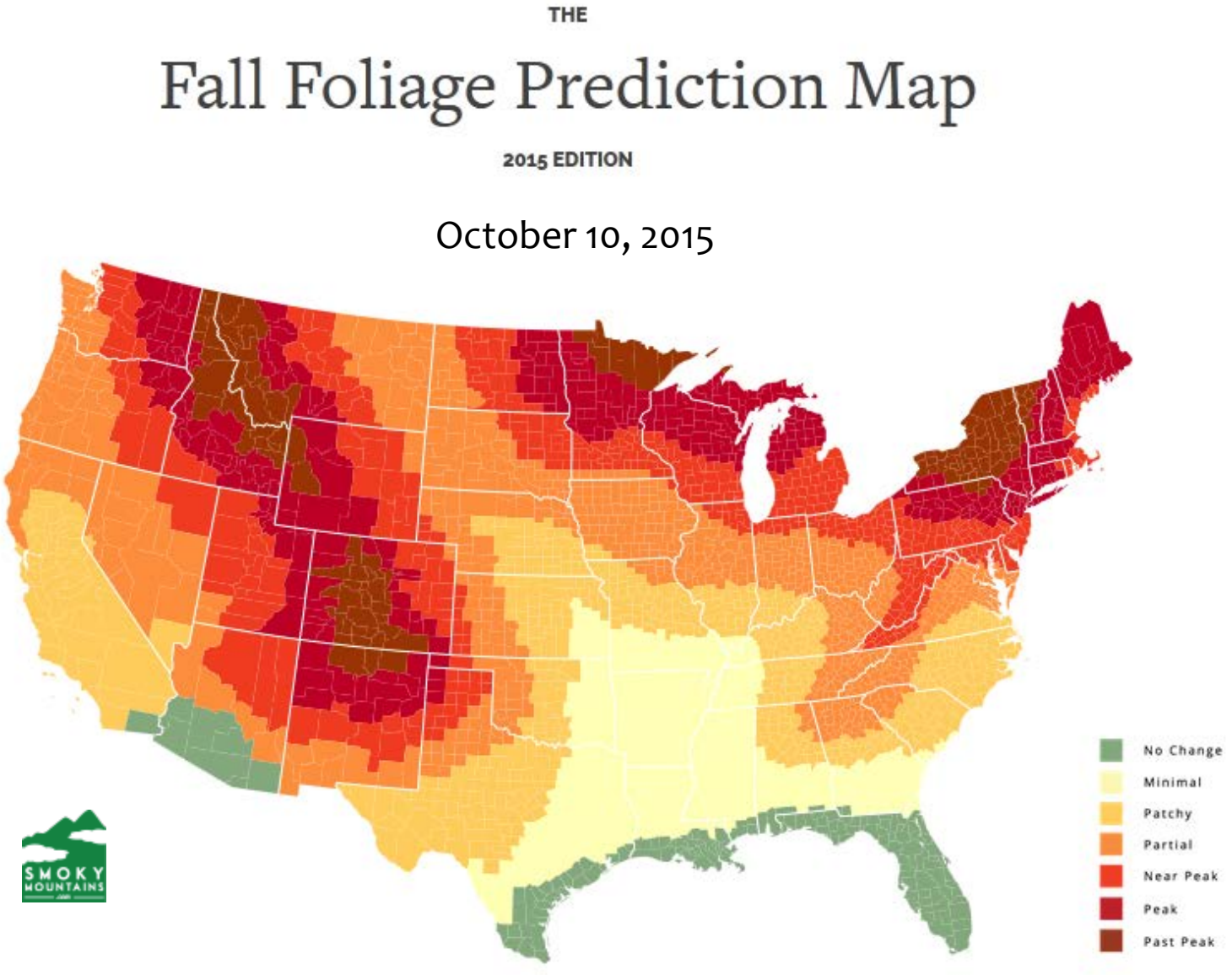
* Until late summer, not much going on – but very touchy recently
  * Fires are not uncommon in fall
  * Plenty of dry grass
  * Rapid late-season drying
  * Recent extreme warmth and high winds
* Numerous high wind and red flag warnings recently N. Plains
* Several fires, some damage

In this Oct. 12, 2015 photo, five horses huddle in a charred pasture after a fire with gusts up to 60 mph blew a fire into Cannon Ball, N.D. About 875 residents had to evacuate from the blaze that scorched 2.5 square miles. (Tom Stromme/The Bismarck Tribune via AP) (Tom Stromme/AP)

Autumn Foliage

Colorado foliage this past weekend

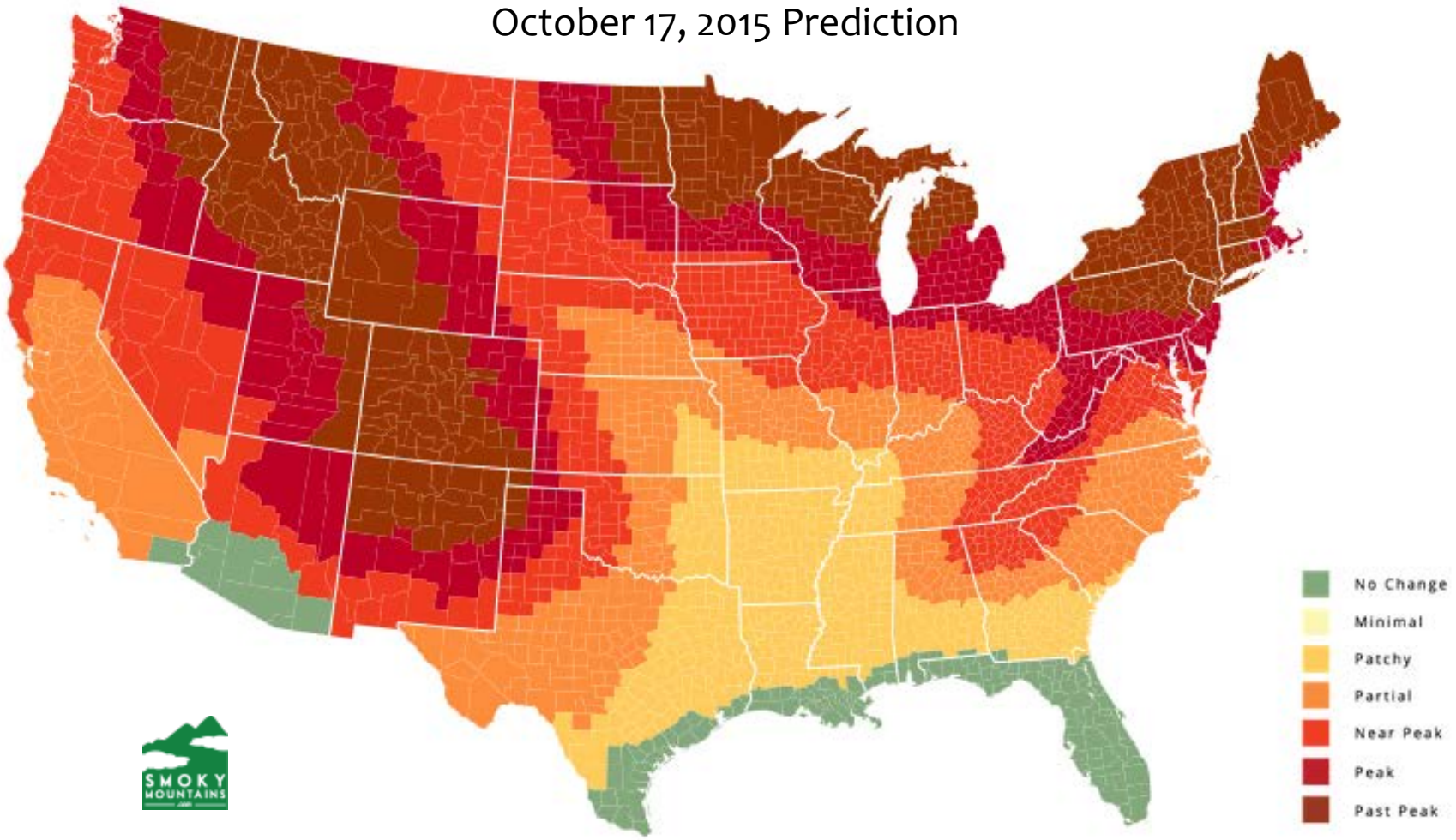
Current Fall Foliage Map



http://smokymountains.com/fall-foliage-map/

Current Fall Foliage Map

October 17, 2015 Prediction



http://smokymountains.com/fall-foliage-map/

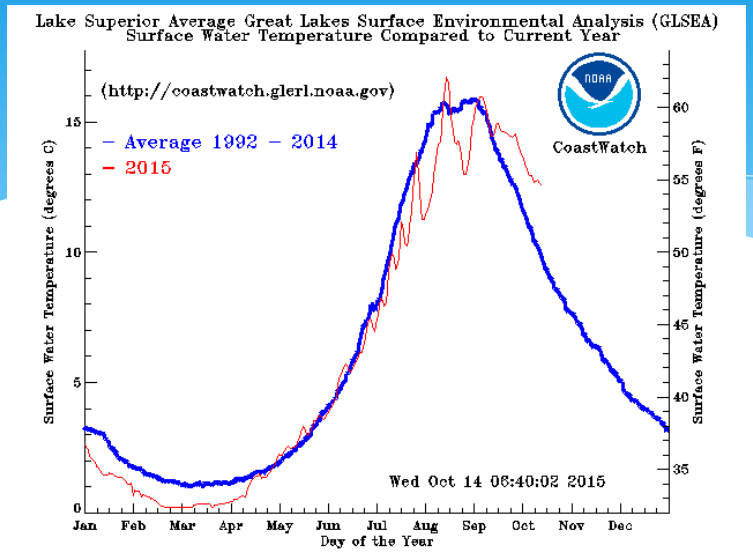
Impacts

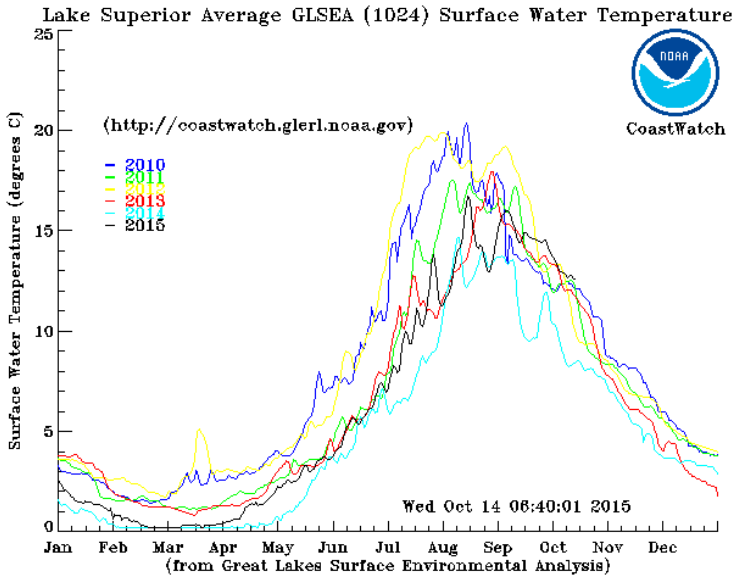
Great Lakes

Great Lakes

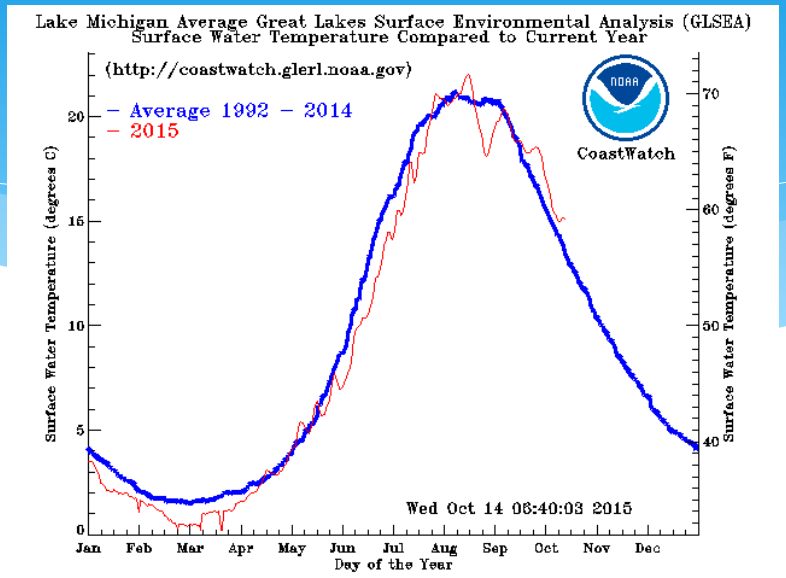
- Surface temperatures have returned to near average after an exceptionally cool 2014 and early 2015 -- now a bit warm but still cooler than 2010-2012
- Lake levels dropping now as expected, but still high, and dramatically above 2011 - 2013

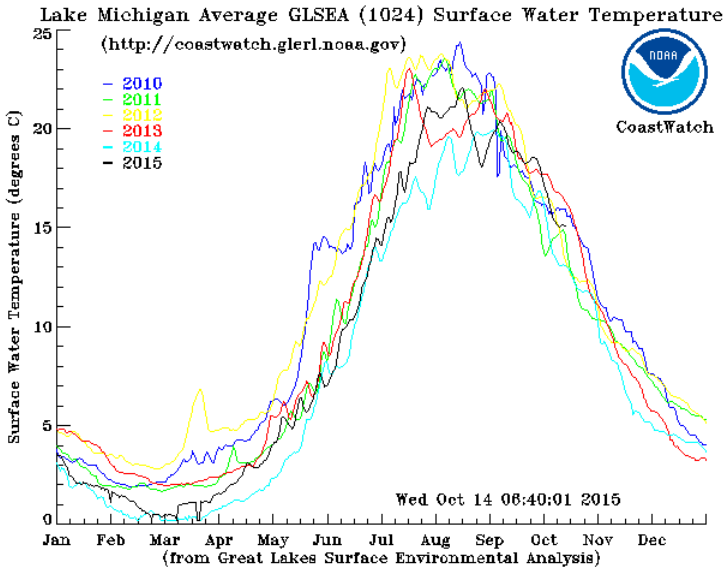
Lake Superior





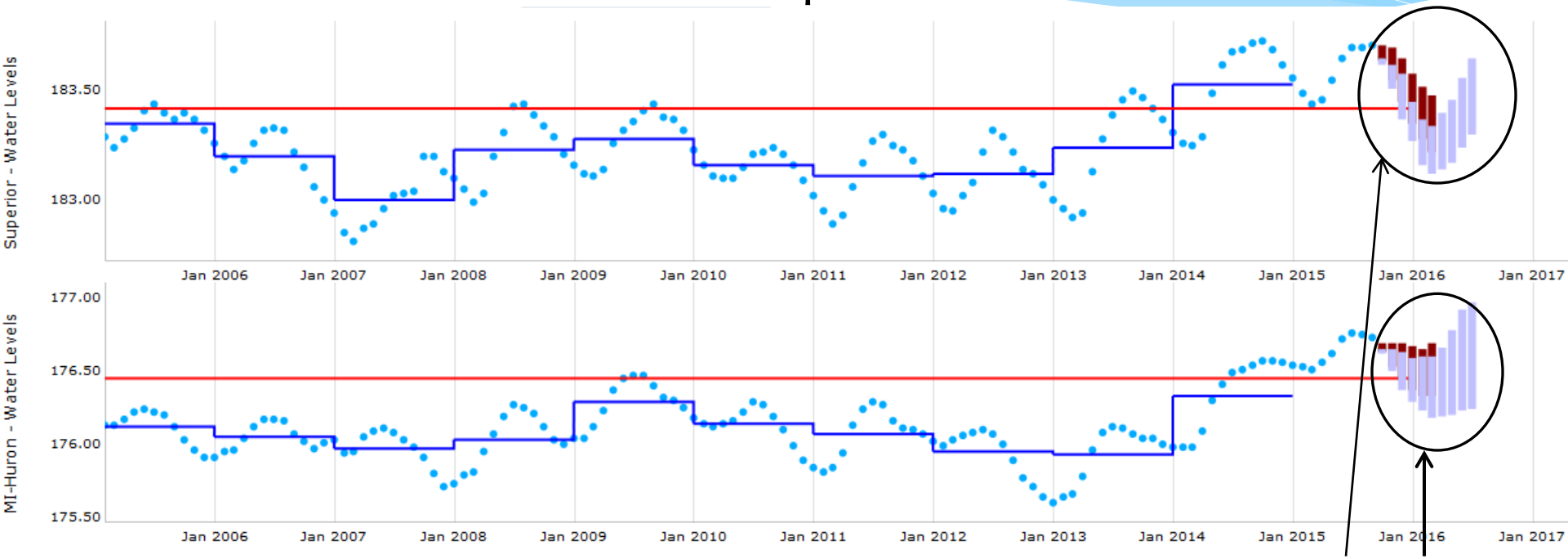
Lake Michigan





Great Lakes Levels

Lake Superior



Lake Michigan-Huron

Predicted levels

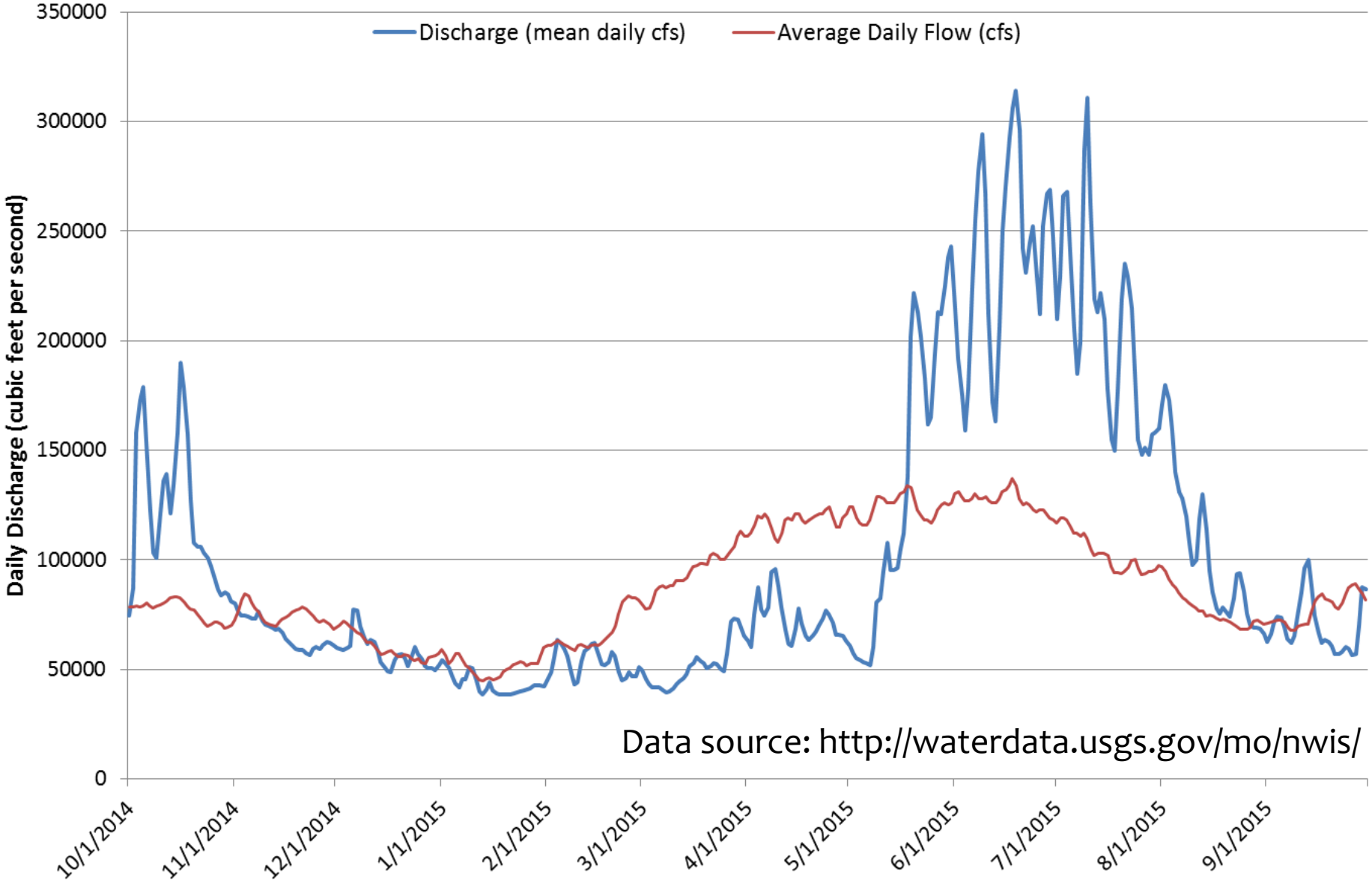
Edmund Fitzgerald – 40 years ago

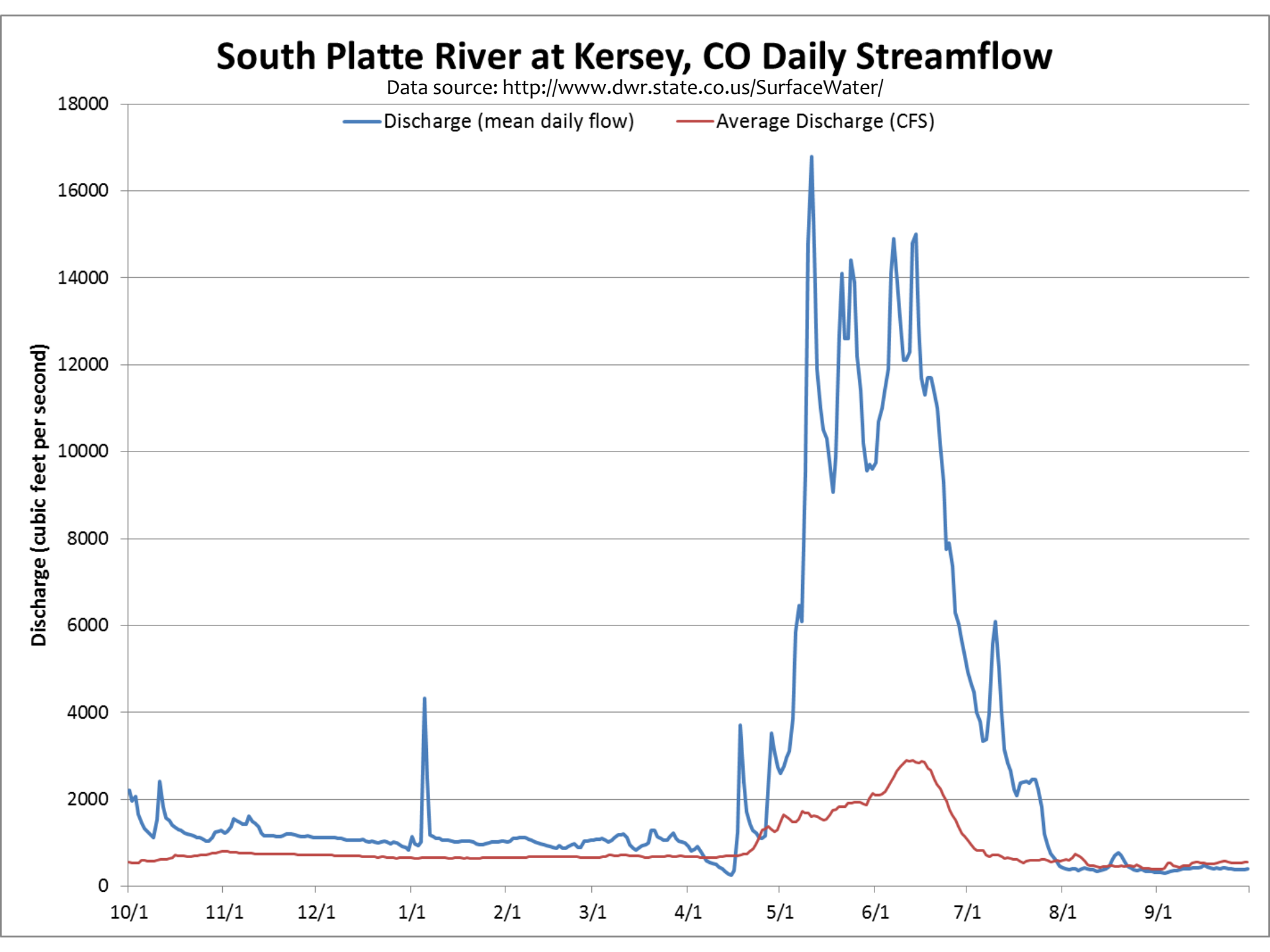
Will the gales of November come early this year?

Impacts

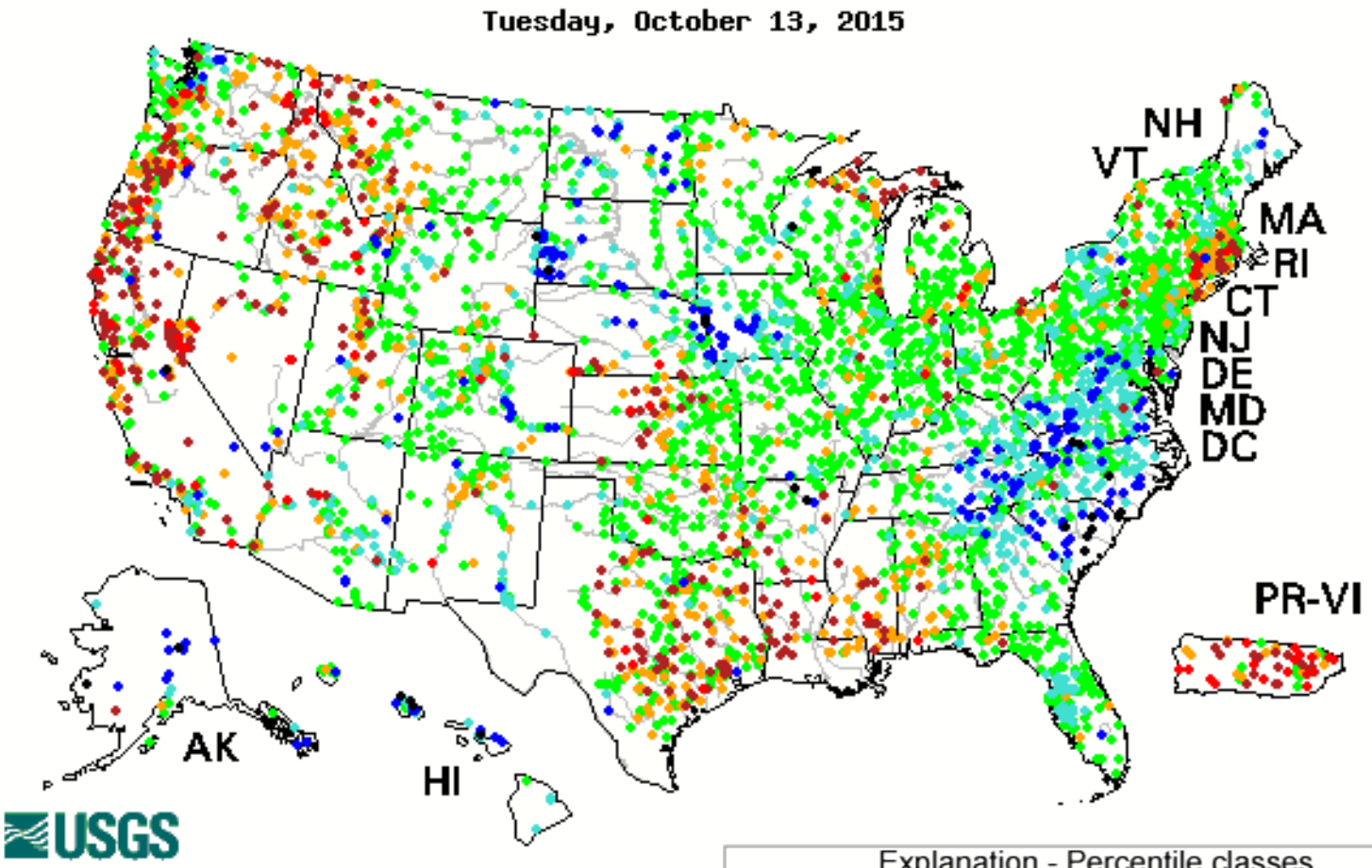
Missouri River/Streams

Missouri River at Hermann, MO Daily Streamflow
Water Year 2015




South Platte River at Kersey, CO Daily Streamflow
Data source: http://www.dwr.state.co.us/SurfaceWater/
Discharge (mean daily flow)
Average Discharge (CFS)
Discharge (cubic feet per second)
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
10/1
11/1
12/1
1/1
2/1
3/1
4/1
5/1
6/1
7/1
8/1
9/1

7-Day Average Streamflow



Wednesday, 15 Apr. 2015

http://waterwatch.usgs.gov

Overall, streamflows and surface water supplies have held up well

Drying out with low flows in parts of Kansas and the Michigan U.P.

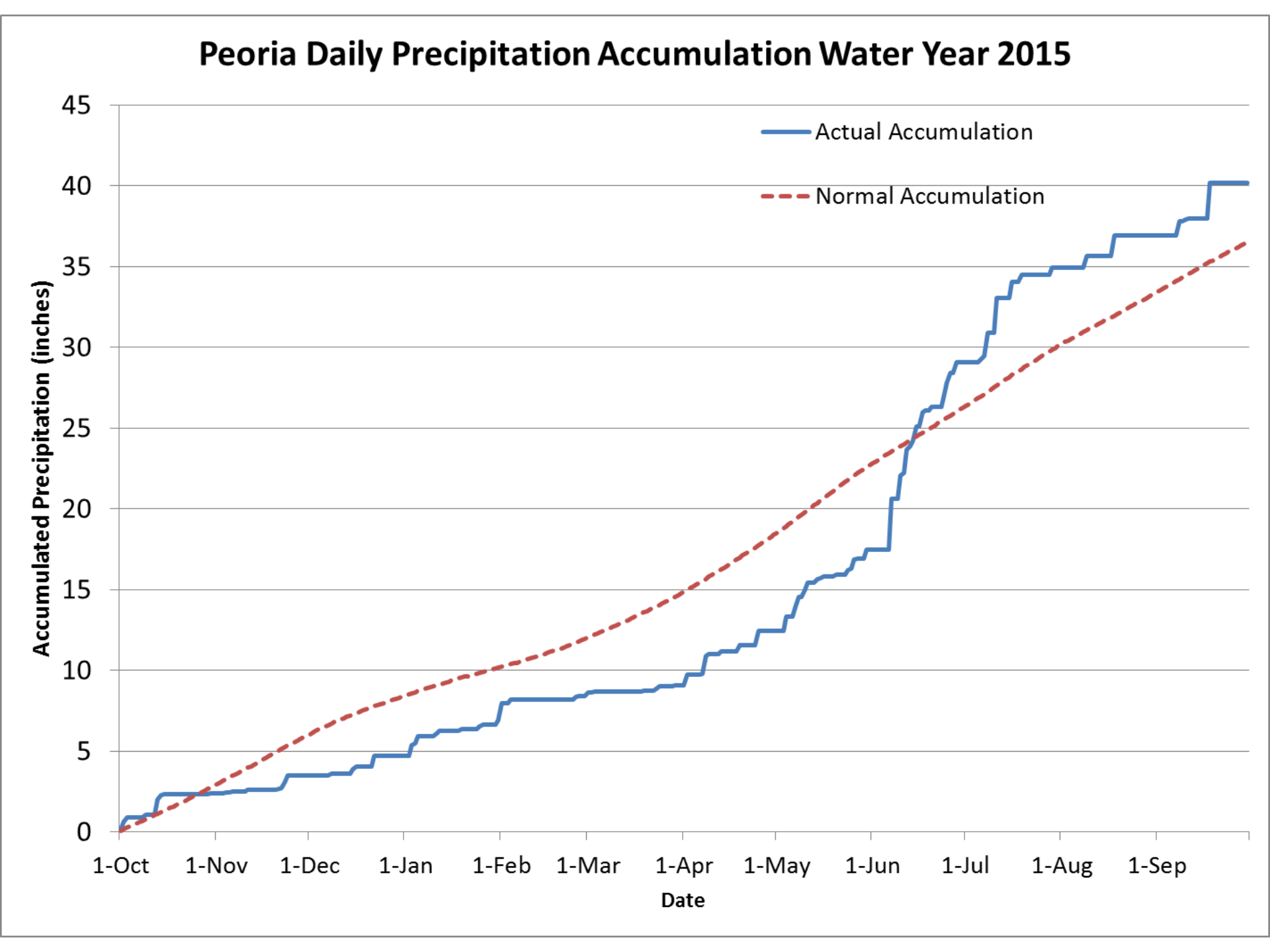
No significant impacts reported

Impacts

Fall Ag Activity

Midwestern Ag Issues

* Dry / warm fall has had more advantages than disadvantages for most.
* Crops have matured nicely, even those that got off to late starts
* Harvest is underway – and ahead of schedule in many areas
* No early freezes this year –
* Fantastic year in MN and northern IA
* Sorry about IL pie pumkins ☹
* 2016 winter wheat – shaky start so far –poor surface moisture especially for no-till


Peoria Daily Precipitation Accumulation Water Year 2015
Actual Accumulation
Normal Accumulation
Accumulated Precipitation (inches)
0
5
10
15
20
25
30
35
40
45
1-Oct
1-Nov
1-Dec
1-Jan
1-Feb
1-Mar
1-Apr
1-May
1-Jun
1-Jul
1-Aug
1-Sep
Date

Impacts

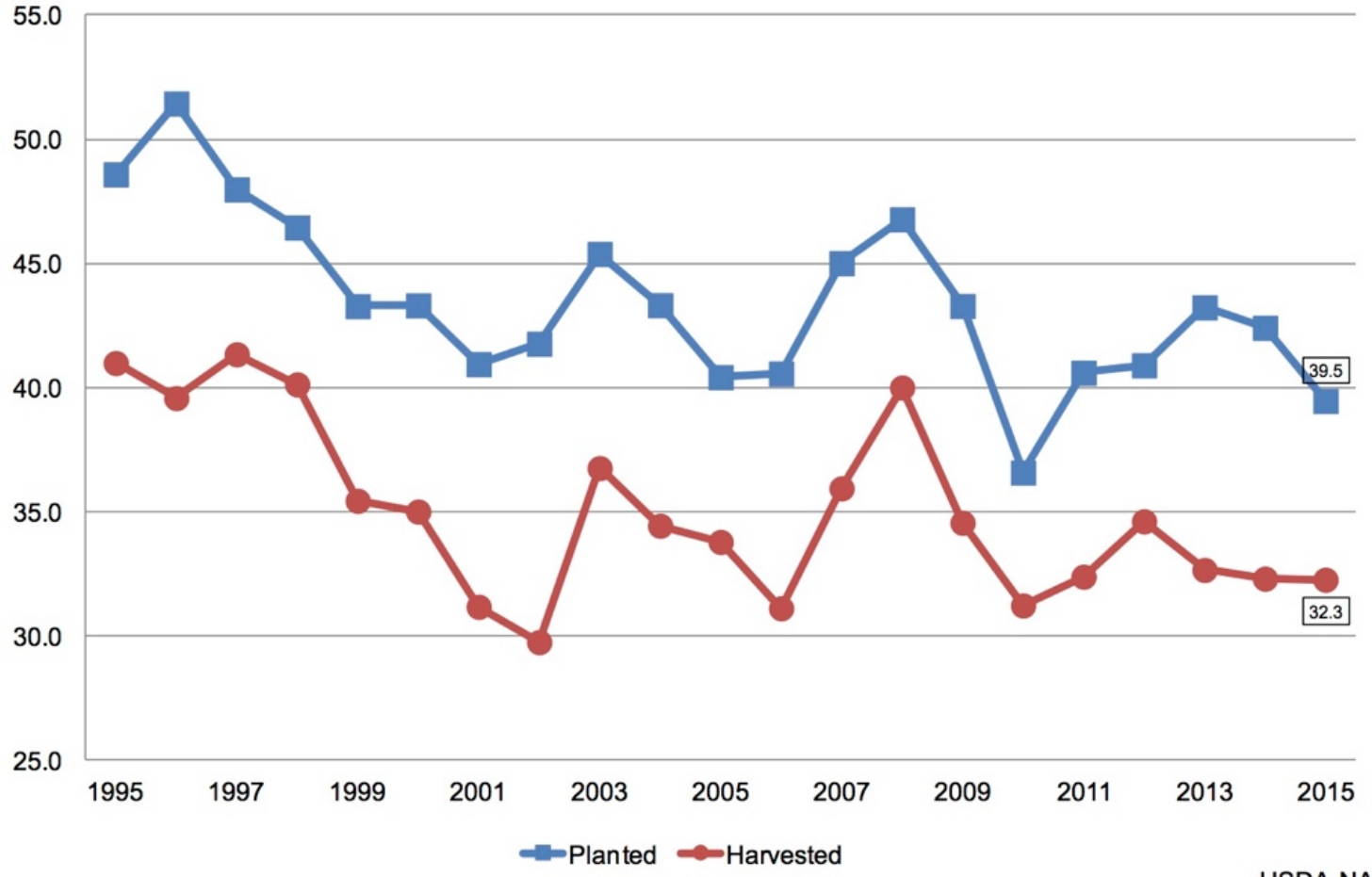
Wheat Belt

Winter wheat

* 2015 crop – OK
* Soil moisture coming in short at time of planting this fall (2015)
* Late/spotty emergence W. Kansas and Colorado
* Temperature pushing growth and water demand emerging crop
* “Iffy” now, but wheat is a resilient crop

Winter Wheat Acres

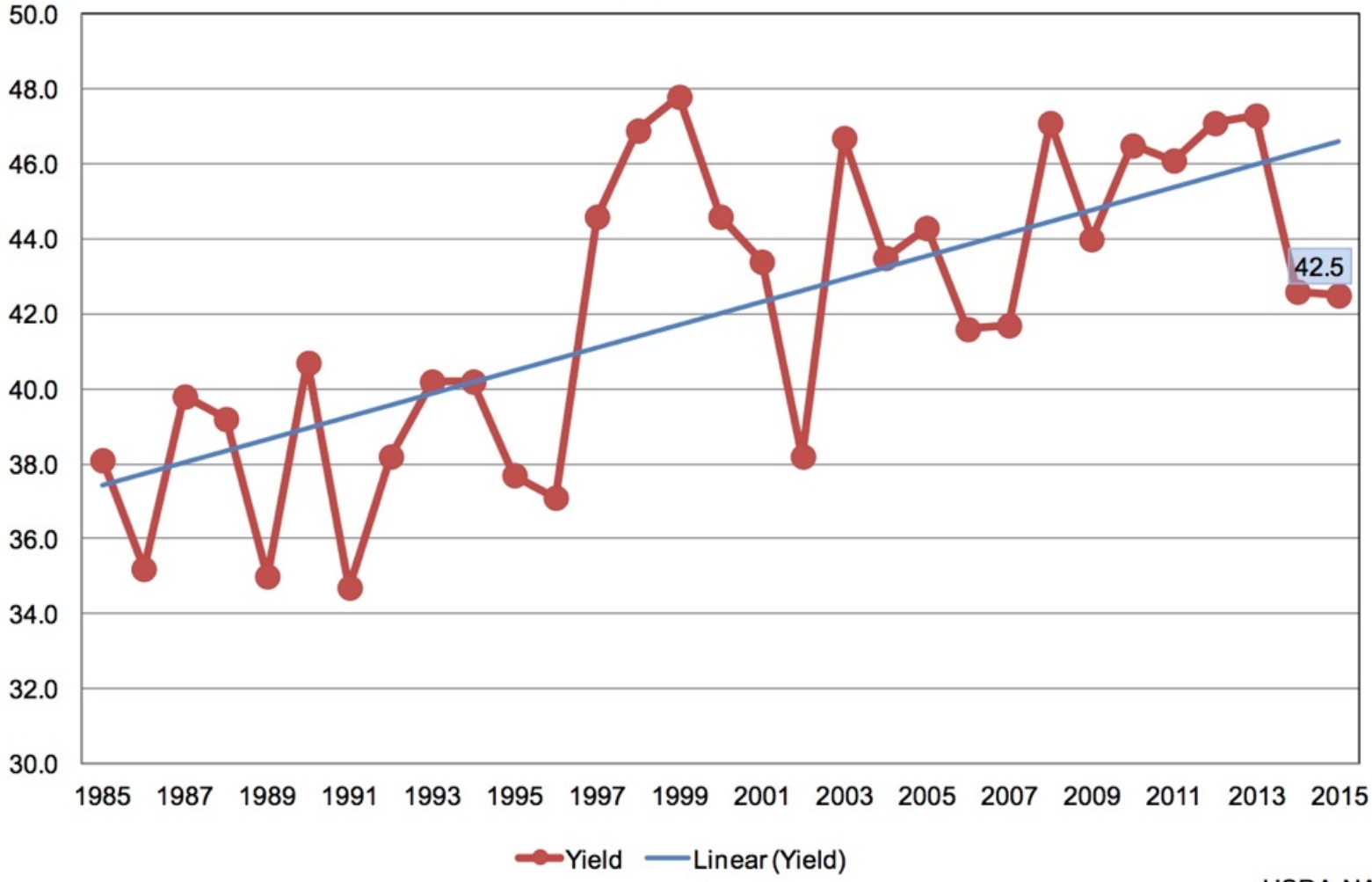
United States



USDA-NASS
9-30-15

Winter Wheat Yield

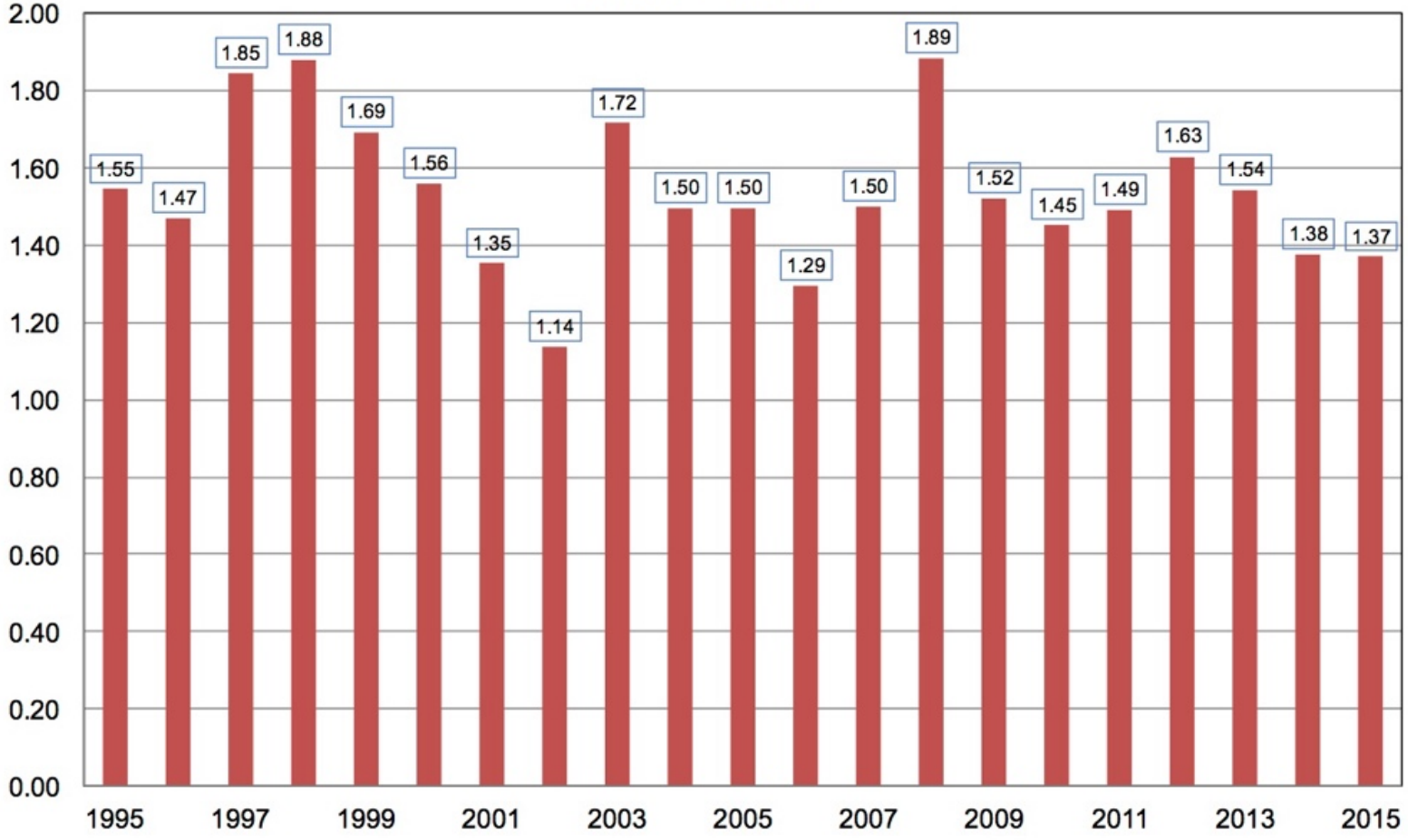
United States



USDA-NASS
9-30-15

Winter Wheat Production

United States



USDA-NASS
9-30-15

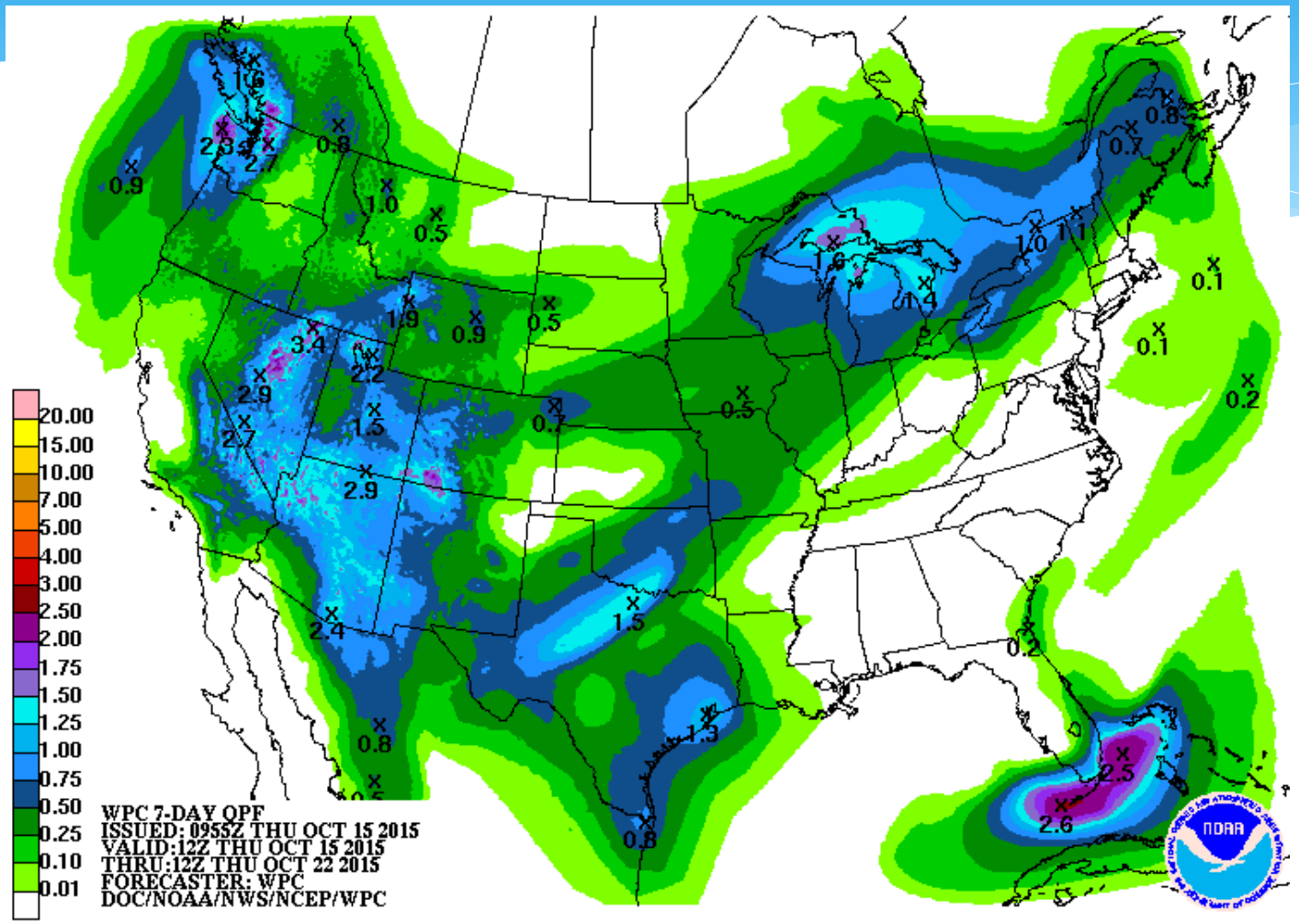
Outlooks

Climate Outlooks

* 7-day precipitation forecast
* 8-14 day outlook
* November
* El Nino
* 3 Month outlooks
* Seasonal Drought Outlooks

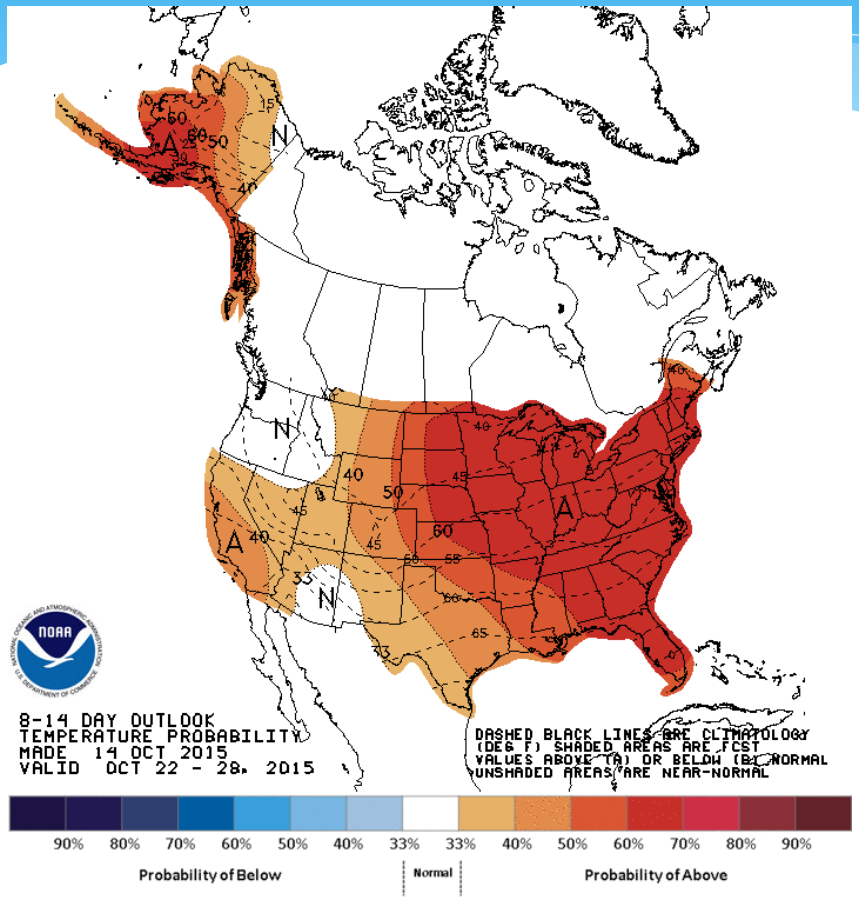
7-day Quantitative Precipitation Forecast

Valid: 7 AM Thu 15 Oct– 7 AM Thu 22 Oct

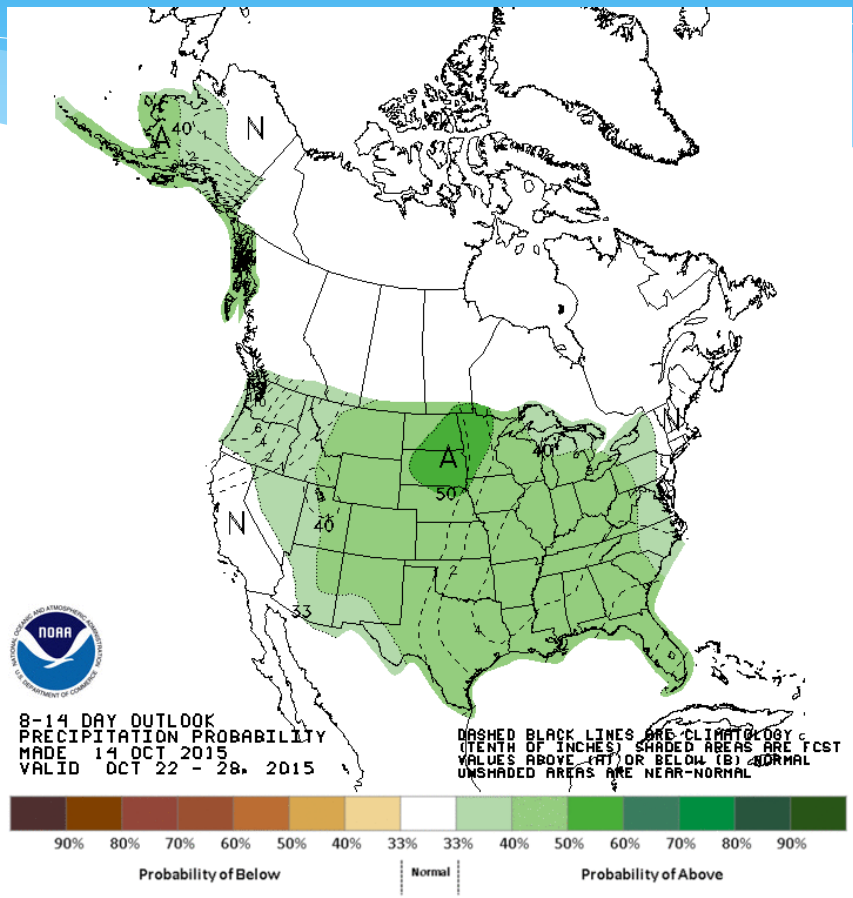


http://www.wpc.ncep.noaa.gov/qpf/day1-7.shtml

Temperature and Precipitation Probabilities for 22 Oct. – 28 Oct. 2015



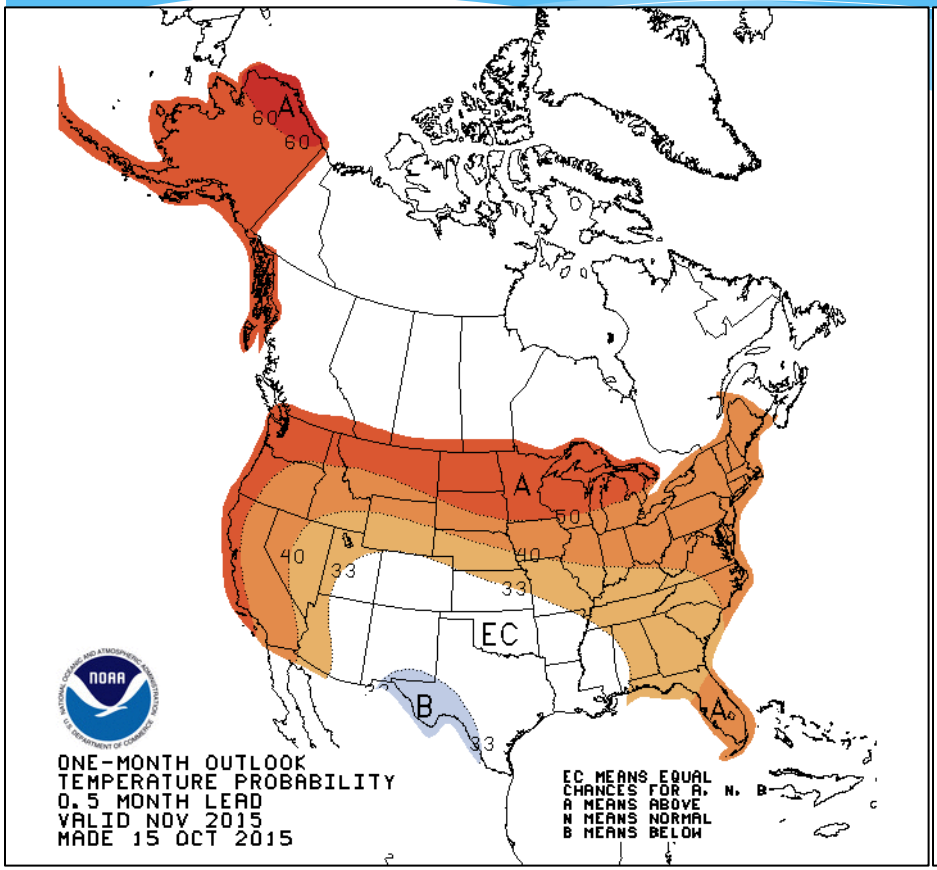
Temperature



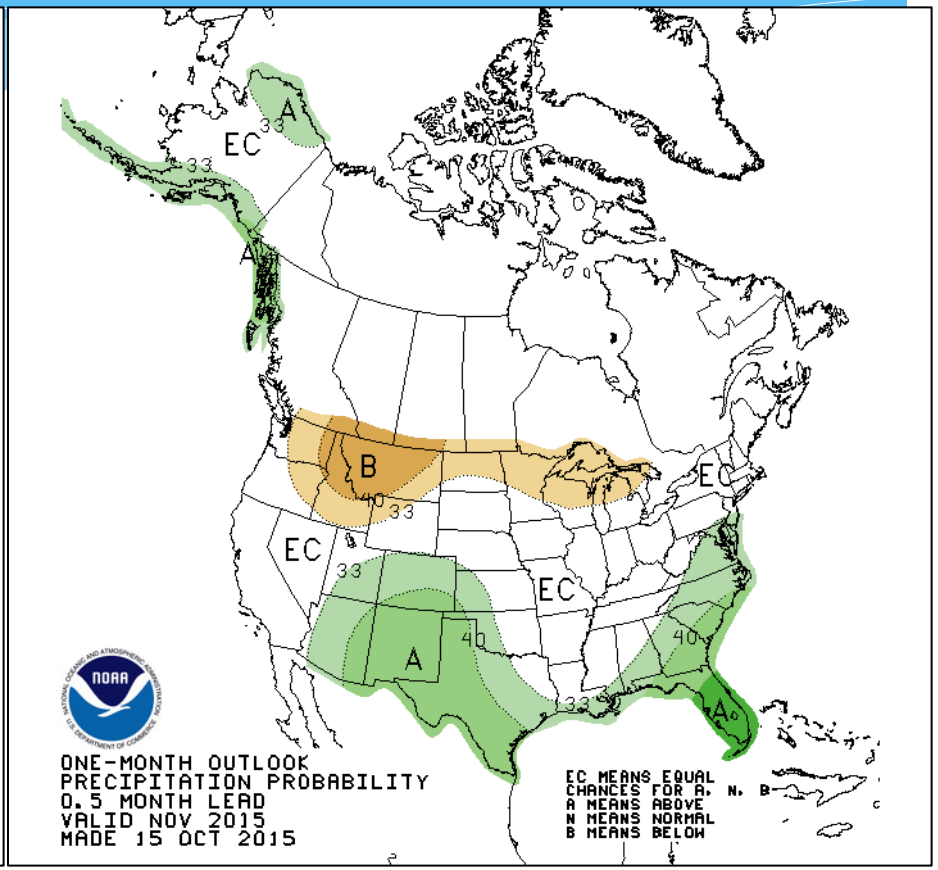
Precipitation

http://www.cpc.ncep.noaa.gov/products/predictions/814day/index.php

November Temperature and Precipitation Probabilities



Temperature

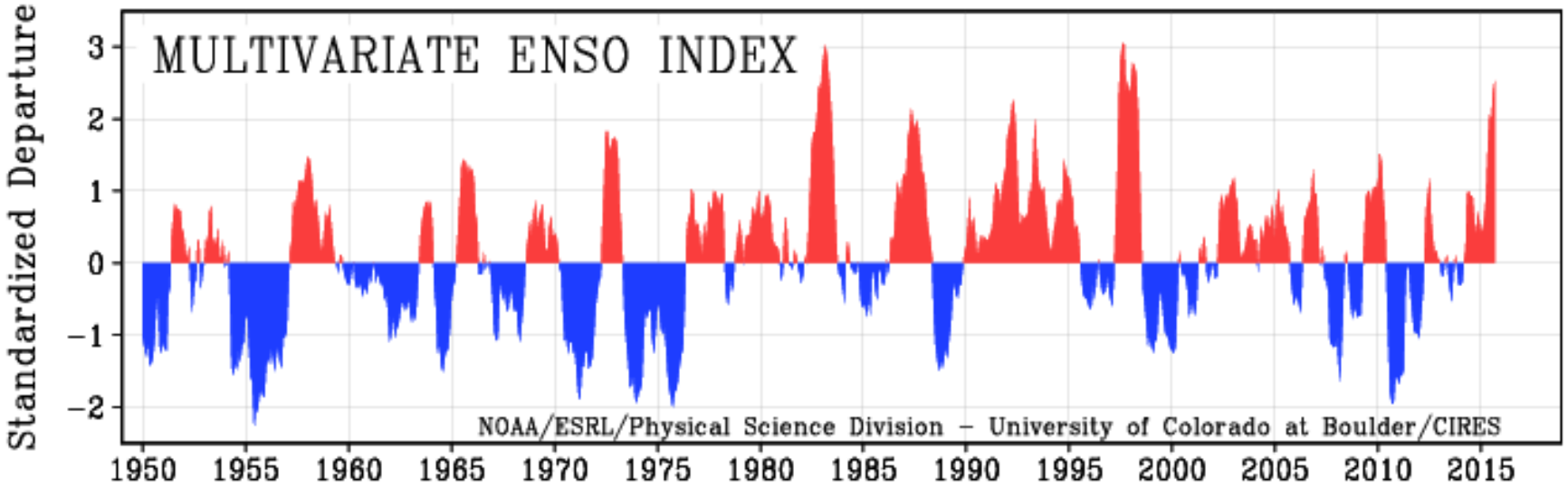


Precipitation

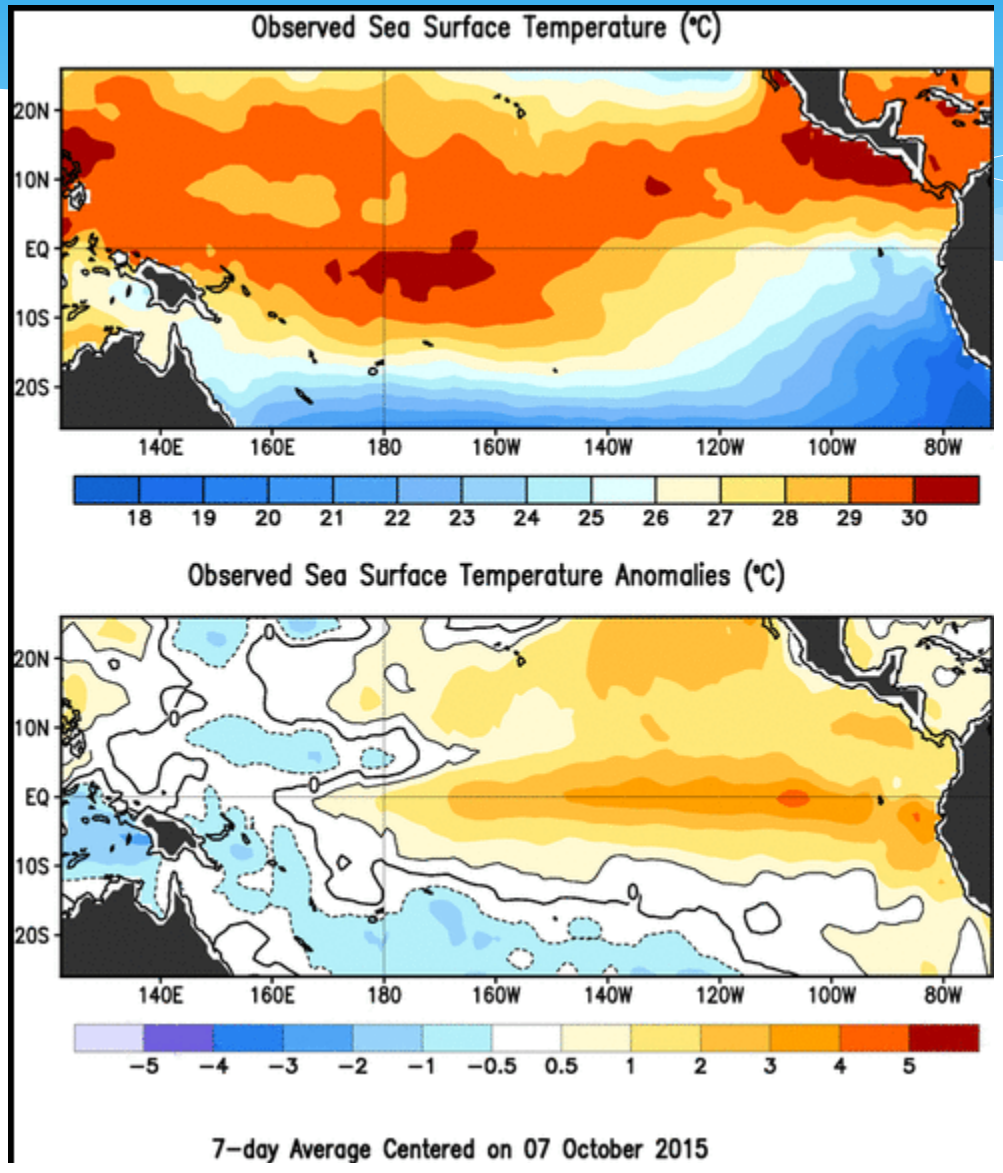
http://www.cpc.ncep.noaa.gov/products/predictions/30day/

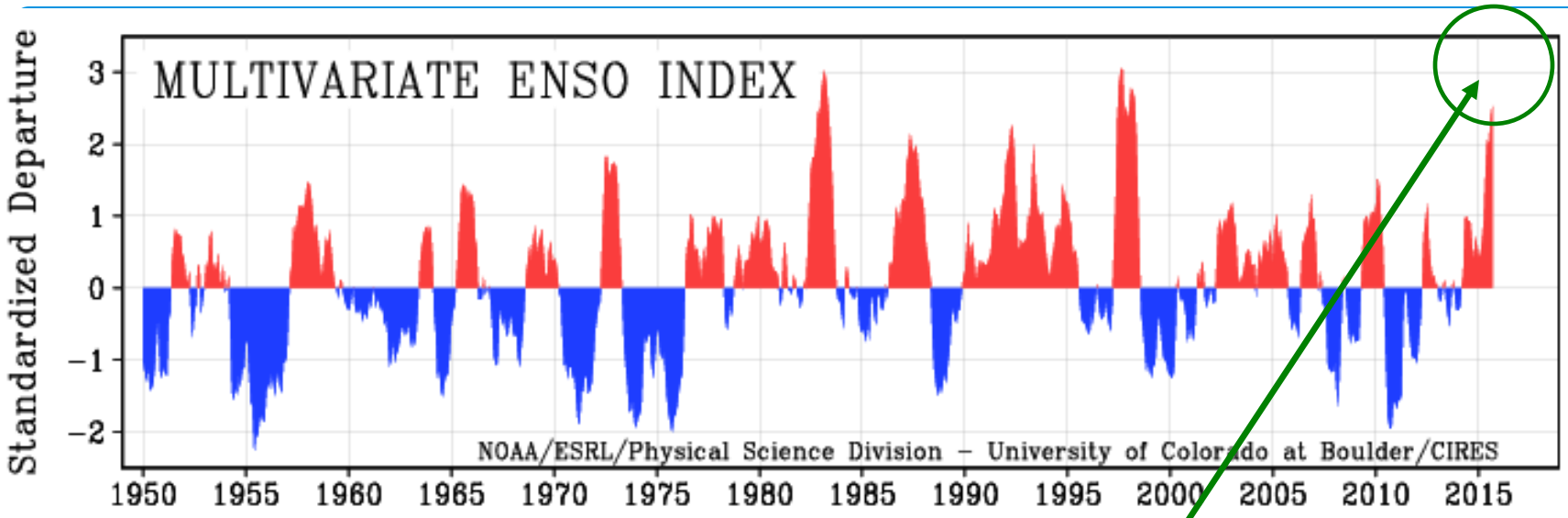
El Niño

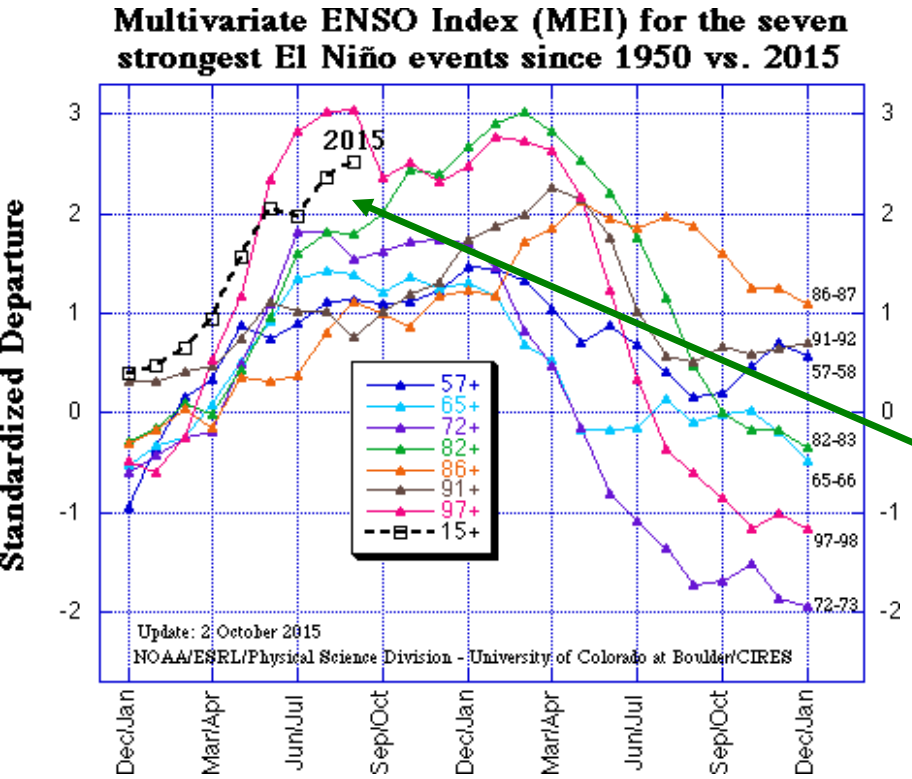
* **Alive and Well**



Weekly Sea Surface Temperature Anomalies

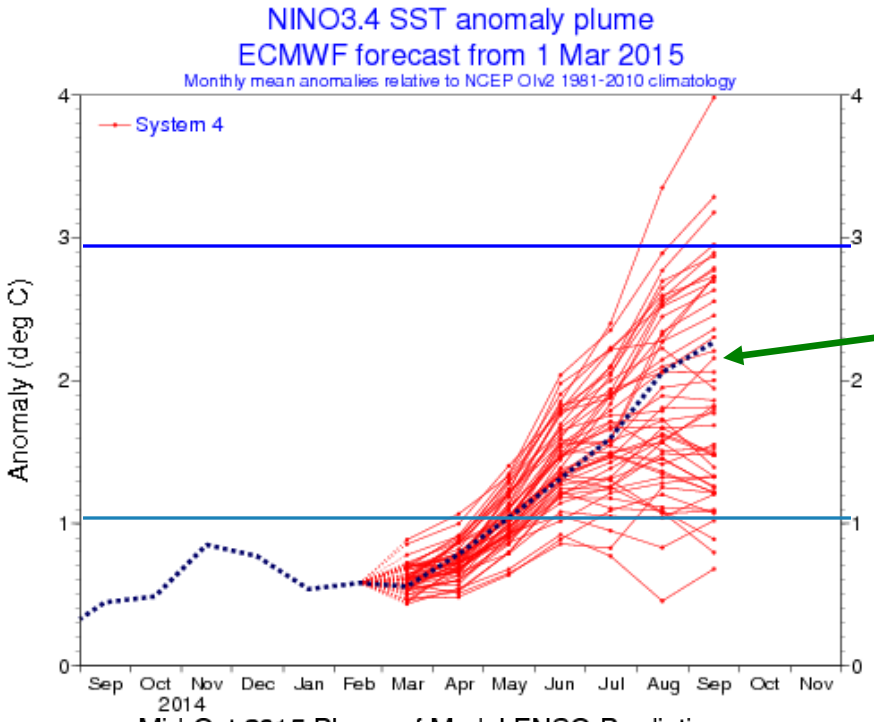






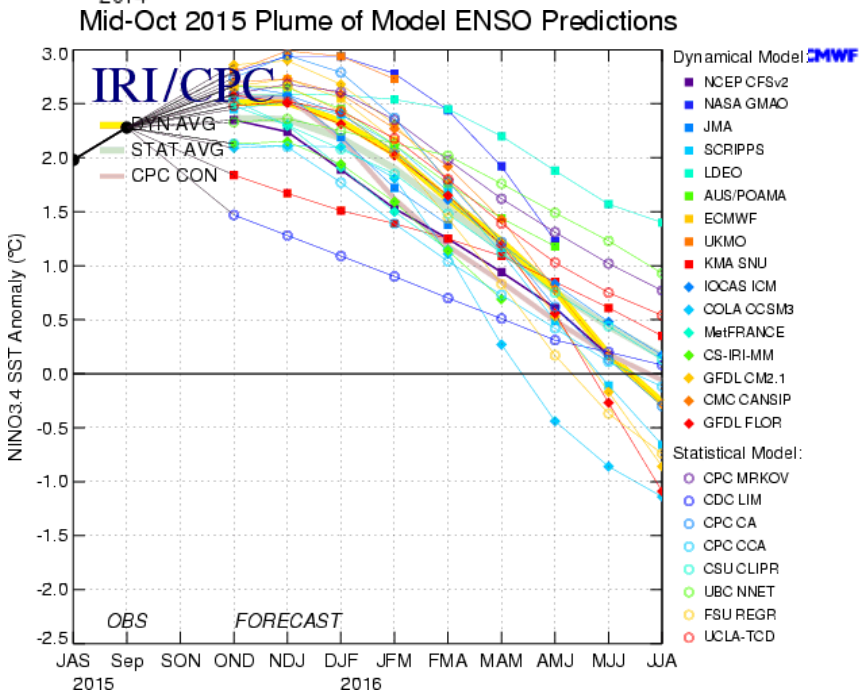
The **MEI** monitors ENSO based on all observed fields over the tropical Pacific (pressure, wind, temperatures, and cloudiness). El Niño events can reach up to +3 standard deviations, while La Niña events may dip down to -2 standard deviations. **The current El Niño has already reached +2.53, the largest MEI value since 1998.** Even if does not grow any further, I would call it a 'Big Boy' now!

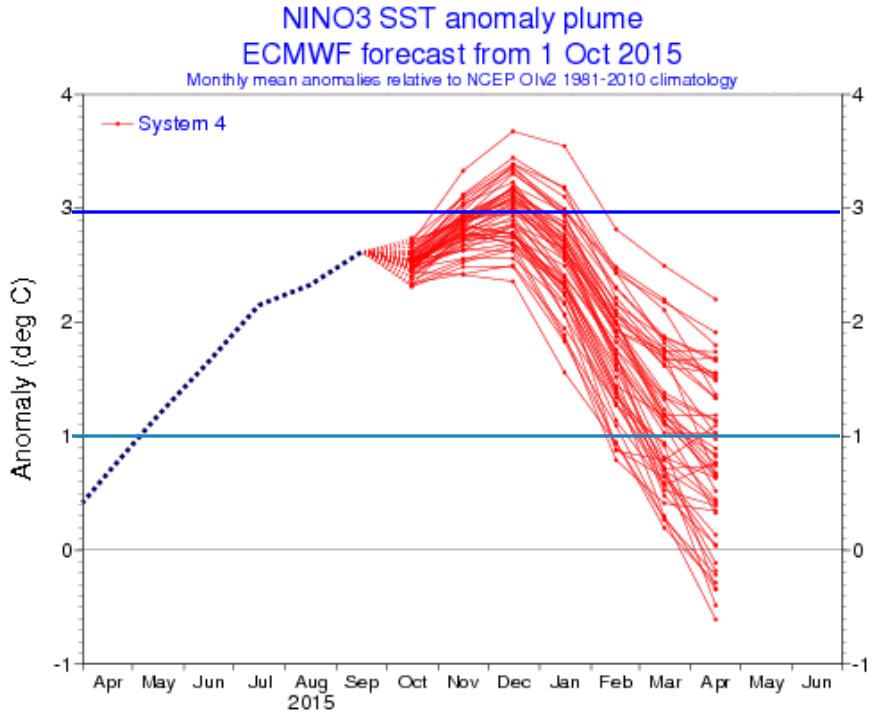
http://www.esrl.noaa.gov/psd/enso/mei



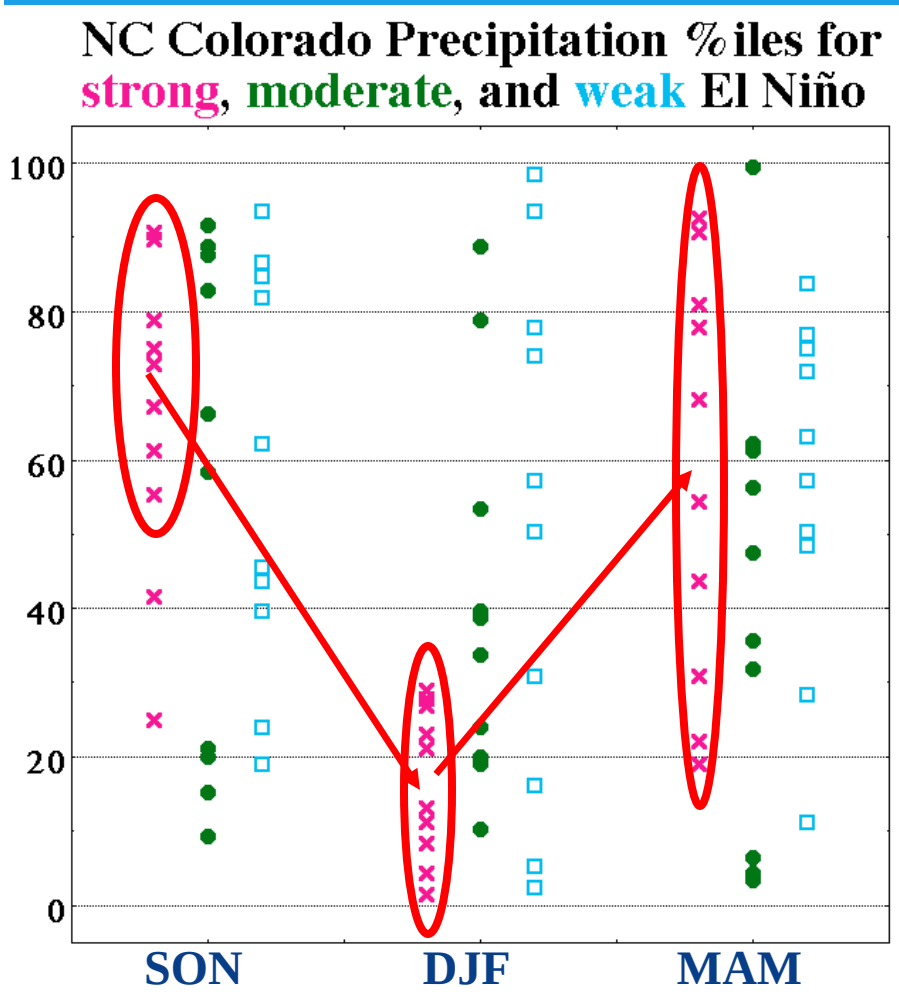
The ECMWF March 2015 forecast (left) was very bullish, with over 90% of the ensemble members exceeding +1.0° C by June! The median forecast was actually right on target thru July, while the last two months have tracked even higher than that!

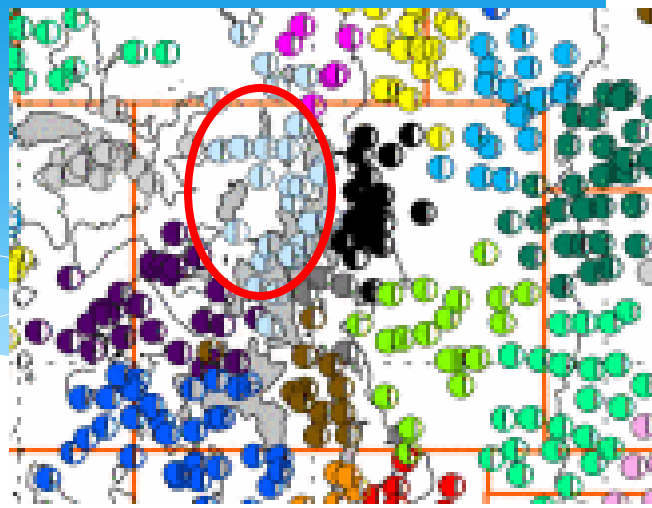
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/seasonal_range_forecast/





A closer look at Northwest Colorado (1910-2011)

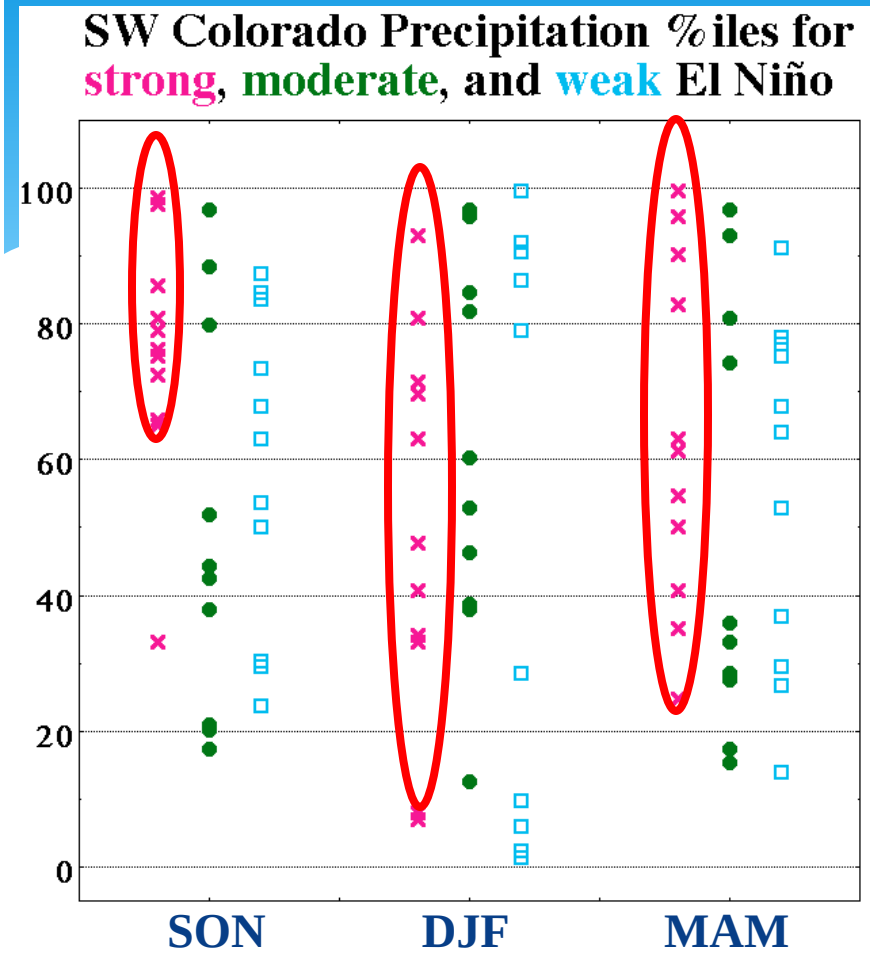


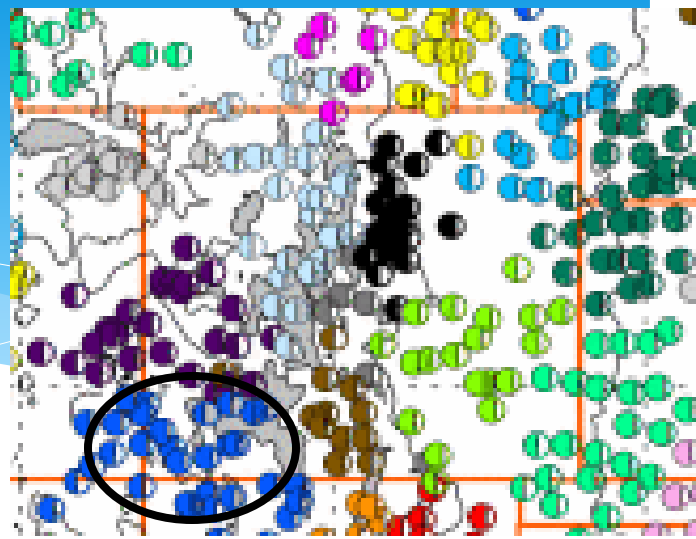


ENSO conditions during season in question!

Our northern mountains from the Elk to the Park Range are favored this fall under strong El Niño conditions (8 of 10 above median), NOT favored during winter (ALL 10 below 30%ile), and only slightly favored during spring (6 of 10 above median). The fall season is critical – only the 3rd driest fall (1994) managed to stage a huge comeback in spring, while the two driest falls ('57 and '87) ended up below the median for winter & spring as well.

A closer look at Southwest Colorado (1905-2011)



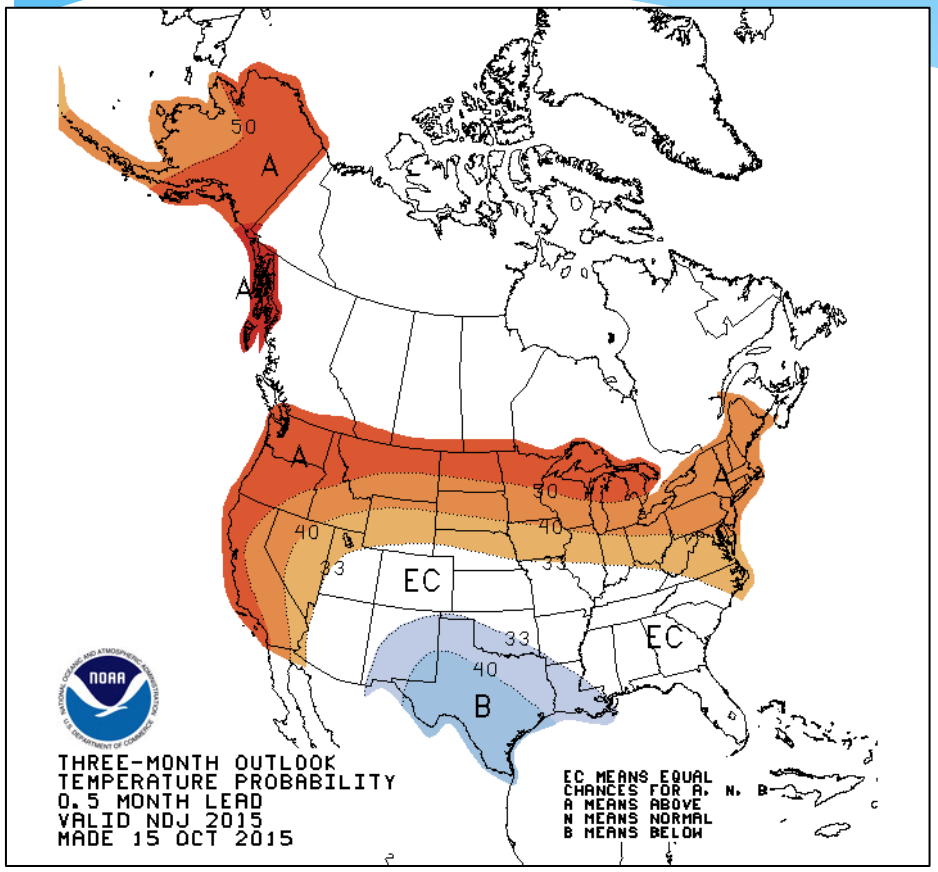


ENSO conditions during season in question!

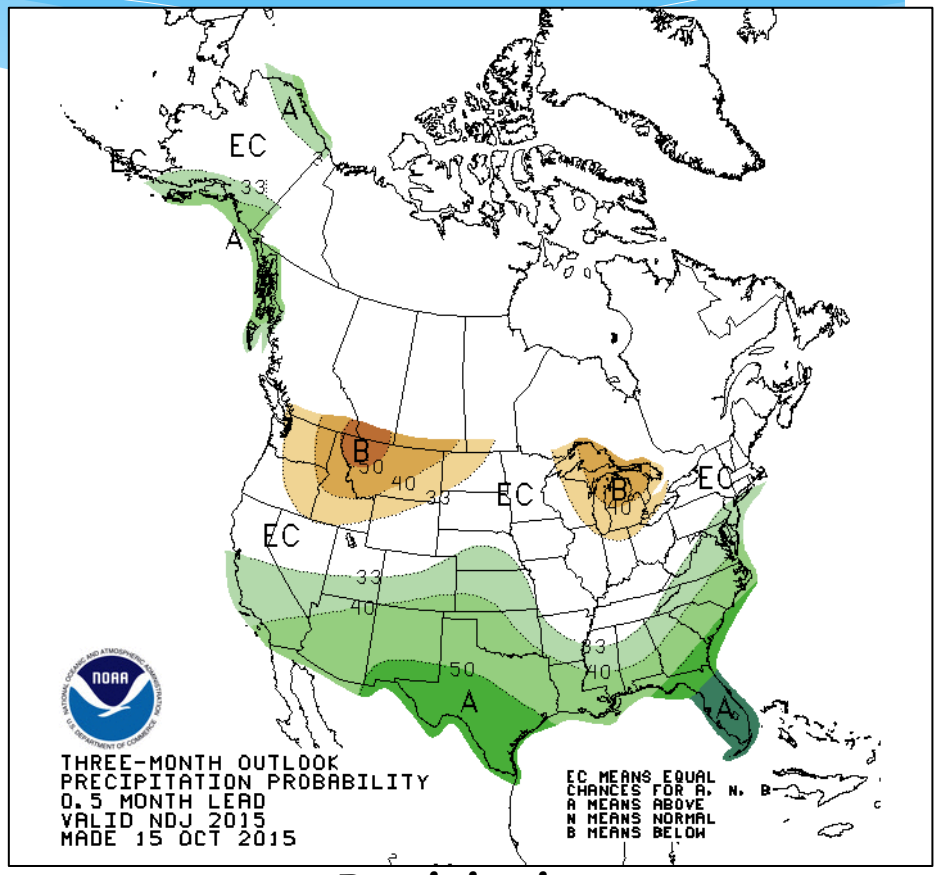
The San Juans and SW Colorado are more favored during strong El Niño than further north, especially lopsided in the fall (10 of 11 above 60%ile), about equal chances during winter, and slightly favored during spring (none below 20%ile). On average, a strong El Niño gives this region a wetter outcome than a weaker one, especially during fall and spring. *The lonely dry fall ('30) was followed by a dry winter and near-normal spring.*

3 Month Temperature and Precipitation Probabilities

(November - January)



Temperature

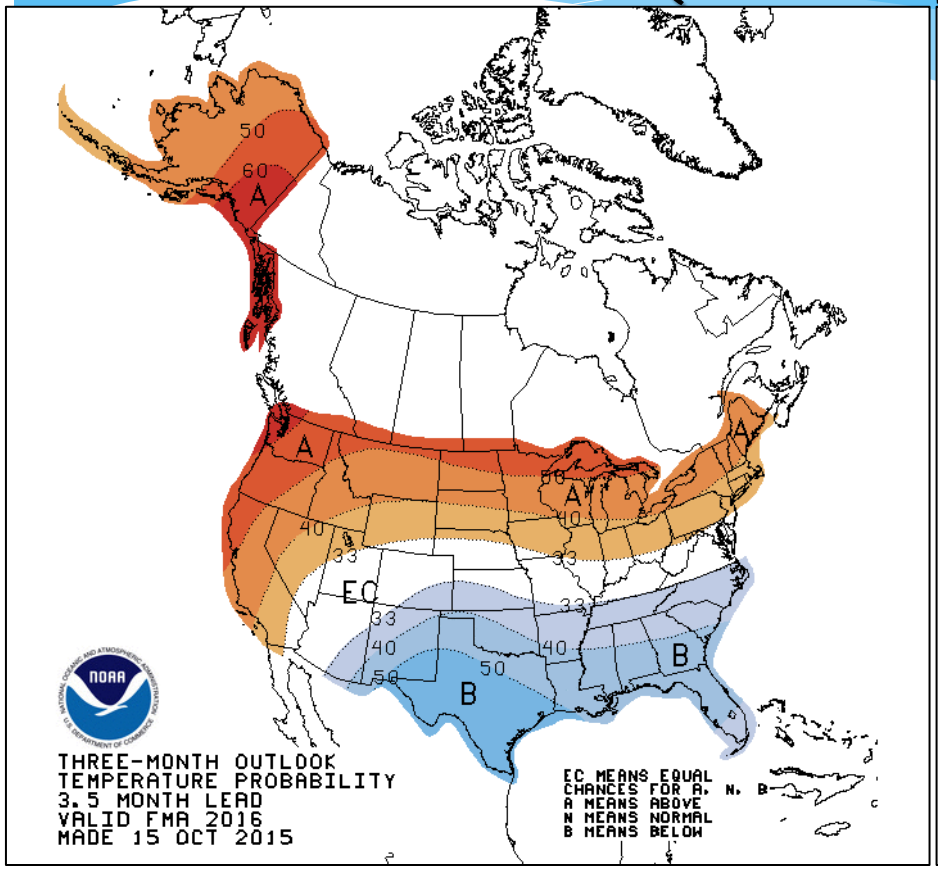


Precipitation

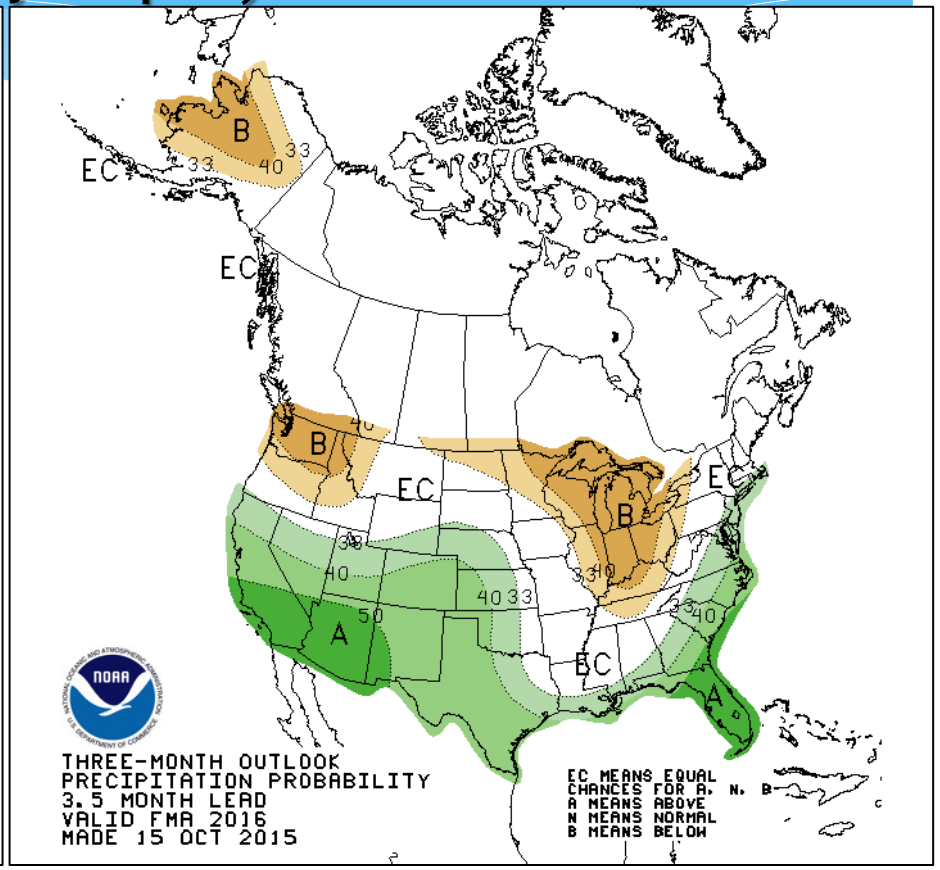
http://www.cpc.ncep.noaa.gov/products/predictions/long_range/seasonal.php?lead=1

3 Month Temperature and Precipitation Probabilities

(February - April)



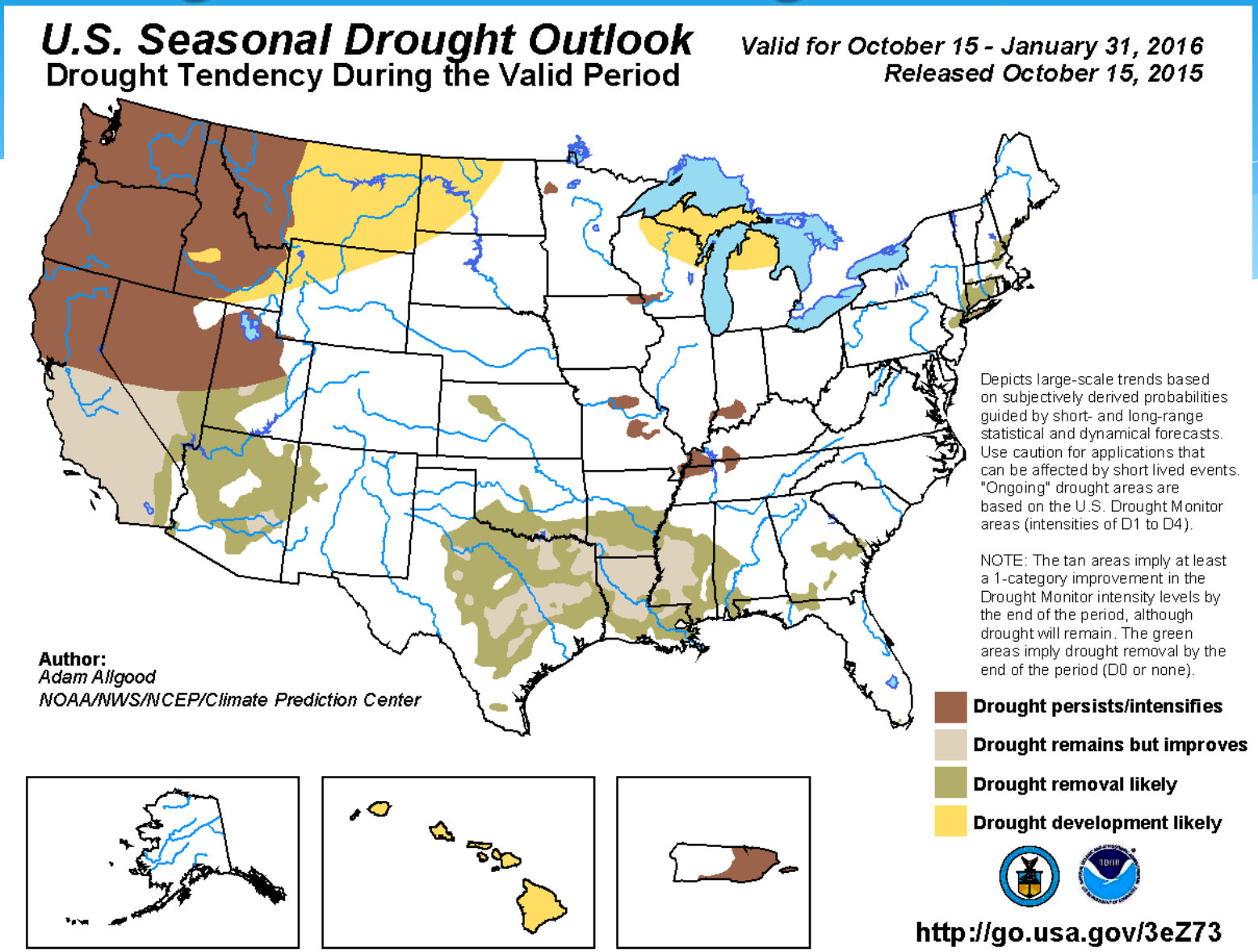
Temperature



Precipitation

http://www.cpc.ncep.noaa.gov/products/predictions/long_range/seasonal.php?lead=1

Drought Outlook through Jan 31, 2016



http://www.cpc.ncep.noaa.gov/products/expert_assessment/season_drought.png/

Summary - Conditions

* It's been really warm and fairly dry
* Dry recent weather great for harvest and all outdoor fall activities – very few complaints
* Cooler weather coming soon, but not cold

Summary - Outlooks

Evidence that El Nino Outlook is on track – several S. California precip events already

Further Information - Partners

- **Today's and Past Recorded Presentations and :**
- *http://mrcc.isws.illinois.edu/webinars.htm*
  http://www.hprcc.unl.edu
- NOAA's National Climatic Data Center: www.ncdc.noaa.gov
  - Monthly climate reports (U.S. & Global): www.ncdc.noaa.gov/sotc/
- NOAA's Climate Prediction Center: www.cpc.ncep.noaa.gov
- Climate Portal: www.climate.gov
- U.S. Drought Portal: www.drought.gov
- National Drought Mitigation Center: http://drought.unl.edu/
- State climatologists
  - http://www.stateclimate.org
- Regional climate centers
  - http://mrcc.isws.illinois.edu
  - http://www.hprcc.unl.edu

Thank You and Questions?

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  * Natalie Umphlett: numphlett2@unl.edu ; 402 472-6764
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