



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

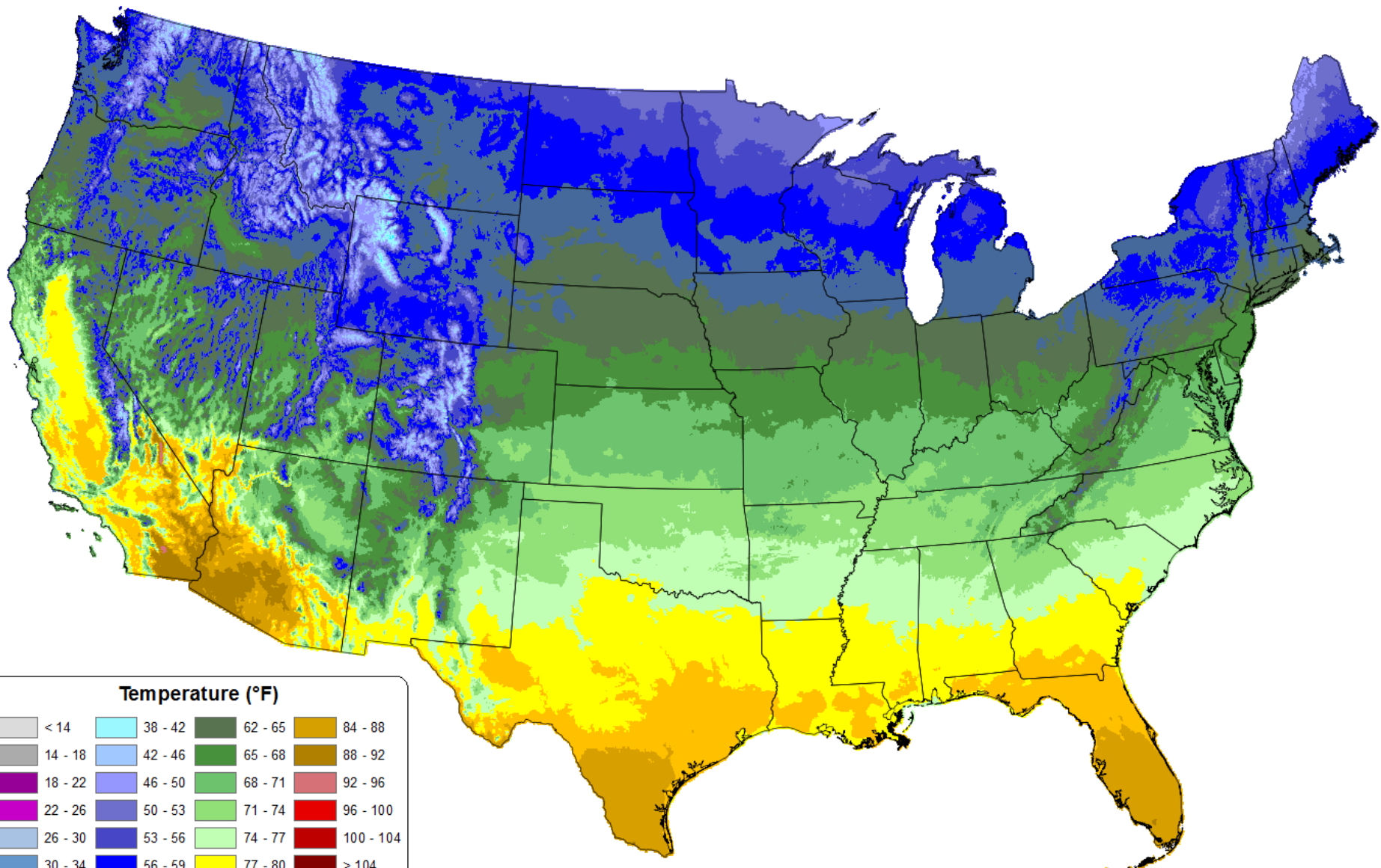
- * Background Climate
- * Current Conditions
- * Impacts
 - * Missouri River
 - * Great Lakes
 - * General Fall Ag
- * Outlooks
 - * El Niño
 - * Anything Else?

Our Climate Background

The bottom of the slide features a decorative graphic consisting of several overlapping, wavy lines in various shades of blue and white, creating a sense of movement and depth.

30-yr Normal Maximum Temperature: October

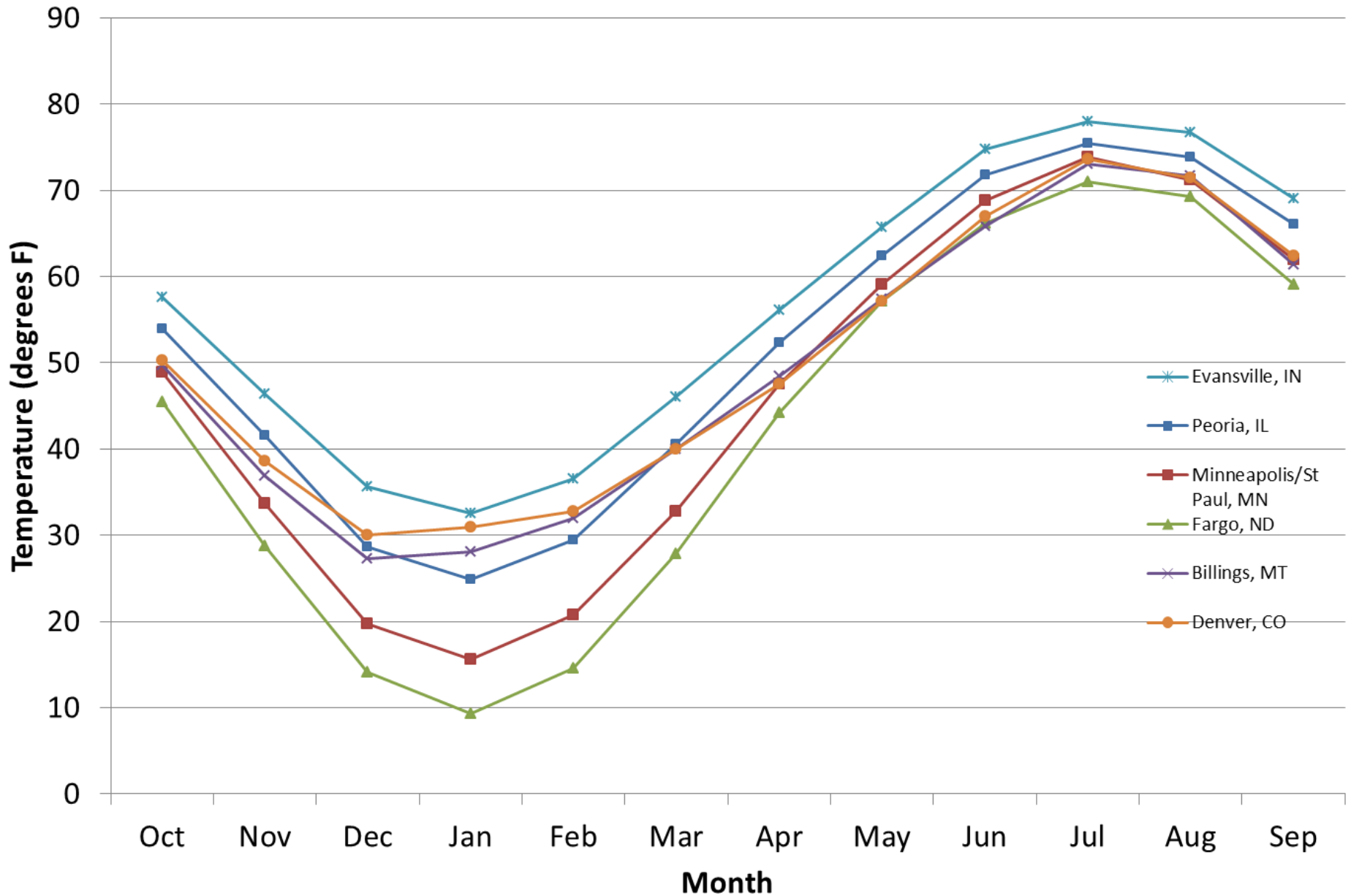
Period: 1981-2010



Temperature (°F)

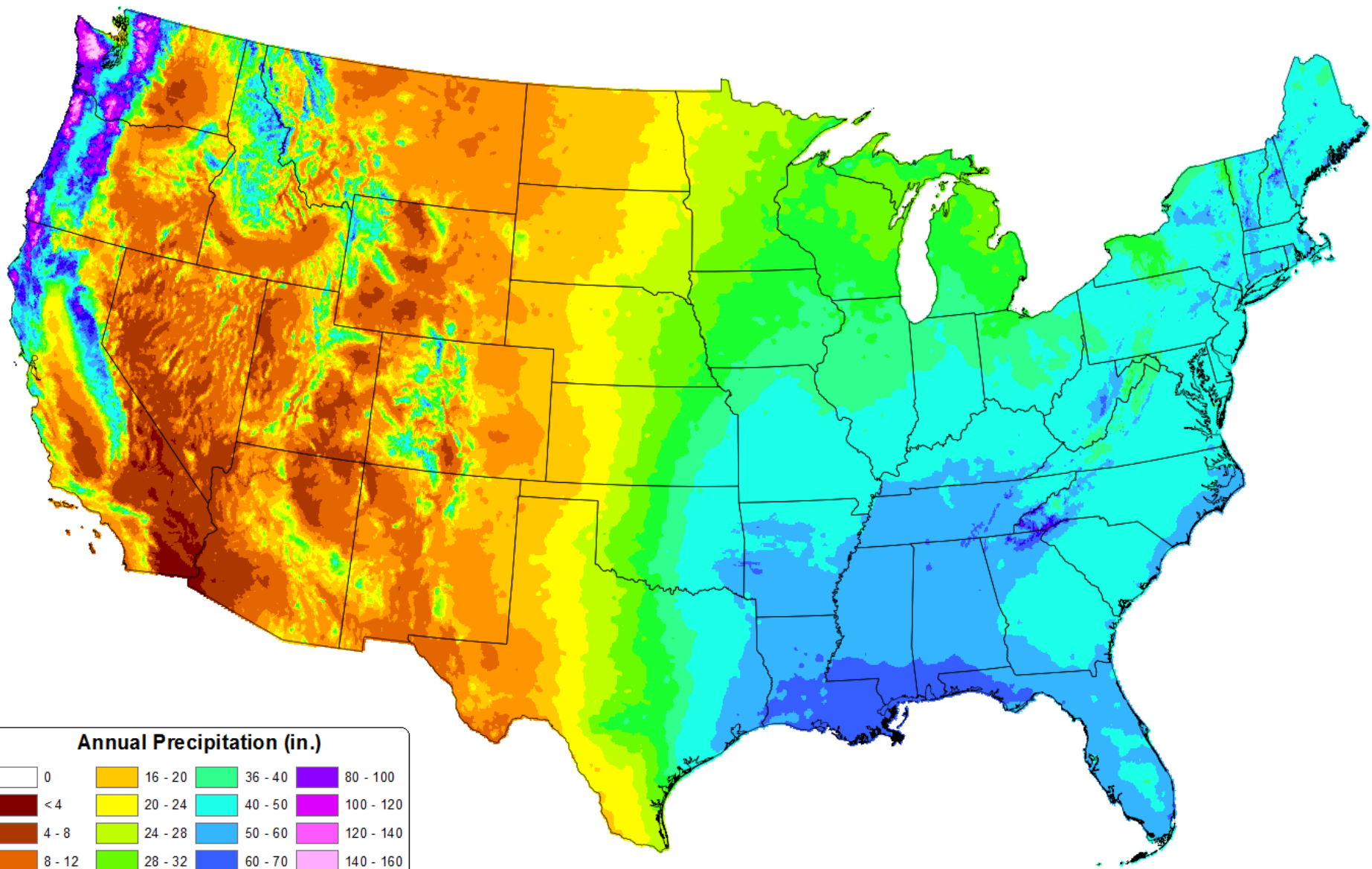
< 14	38 - 42	62 - 65	84 - 88
14 - 18	42 - 46	65 - 68	88 - 92
18 - 22	46 - 50	68 - 71	92 - 96
22 - 26	50 - 53	71 - 74	96 - 100
26 - 30	53 - 56	74 - 77	100 - 104
30 - 34	56 - 59	77 - 80	> 104
34 - 38	59 - 62	80 - 84	

Mean Monthly Temperature Normal



30-yr Normal Precipitation: Annual

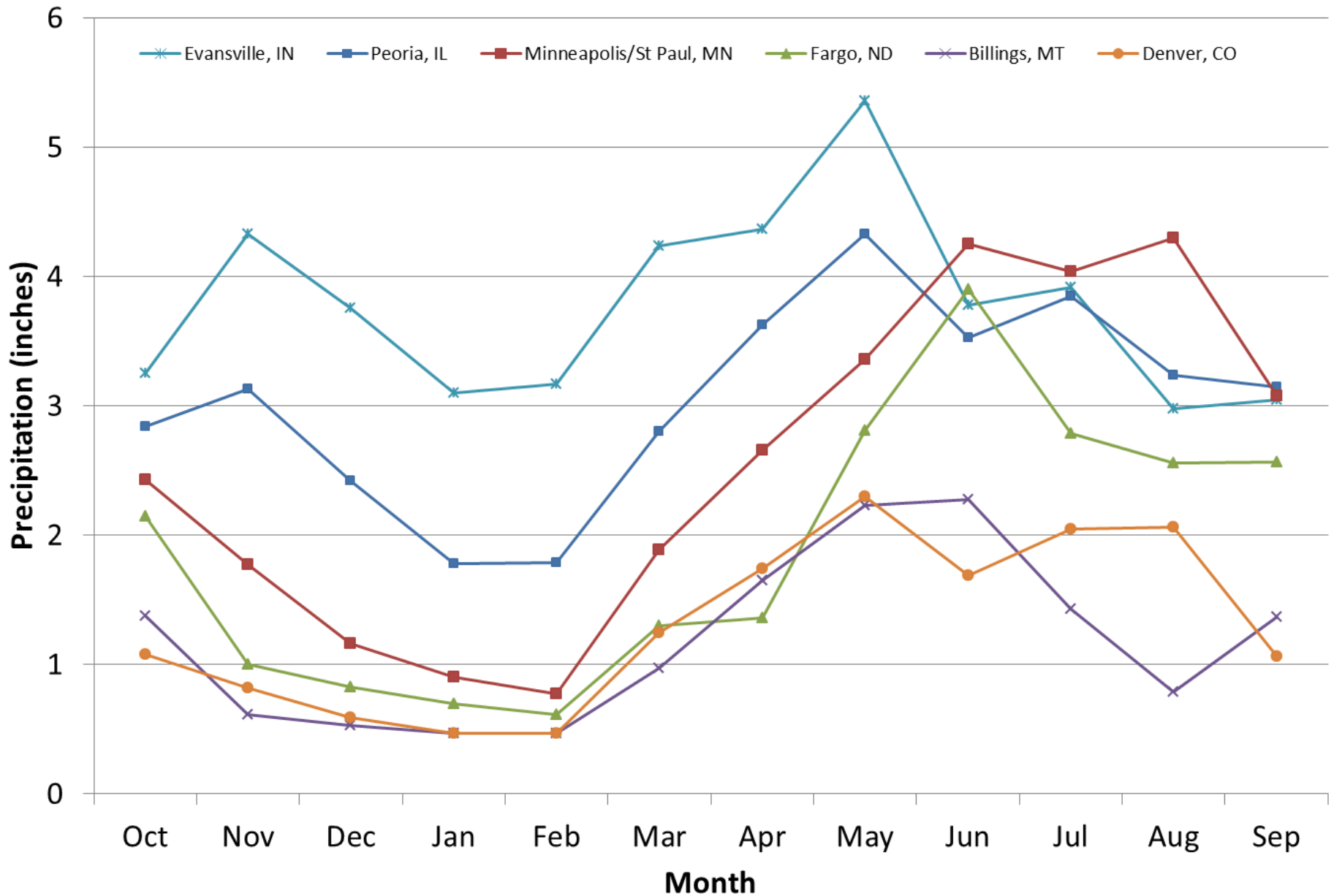
Period: 1981-2010



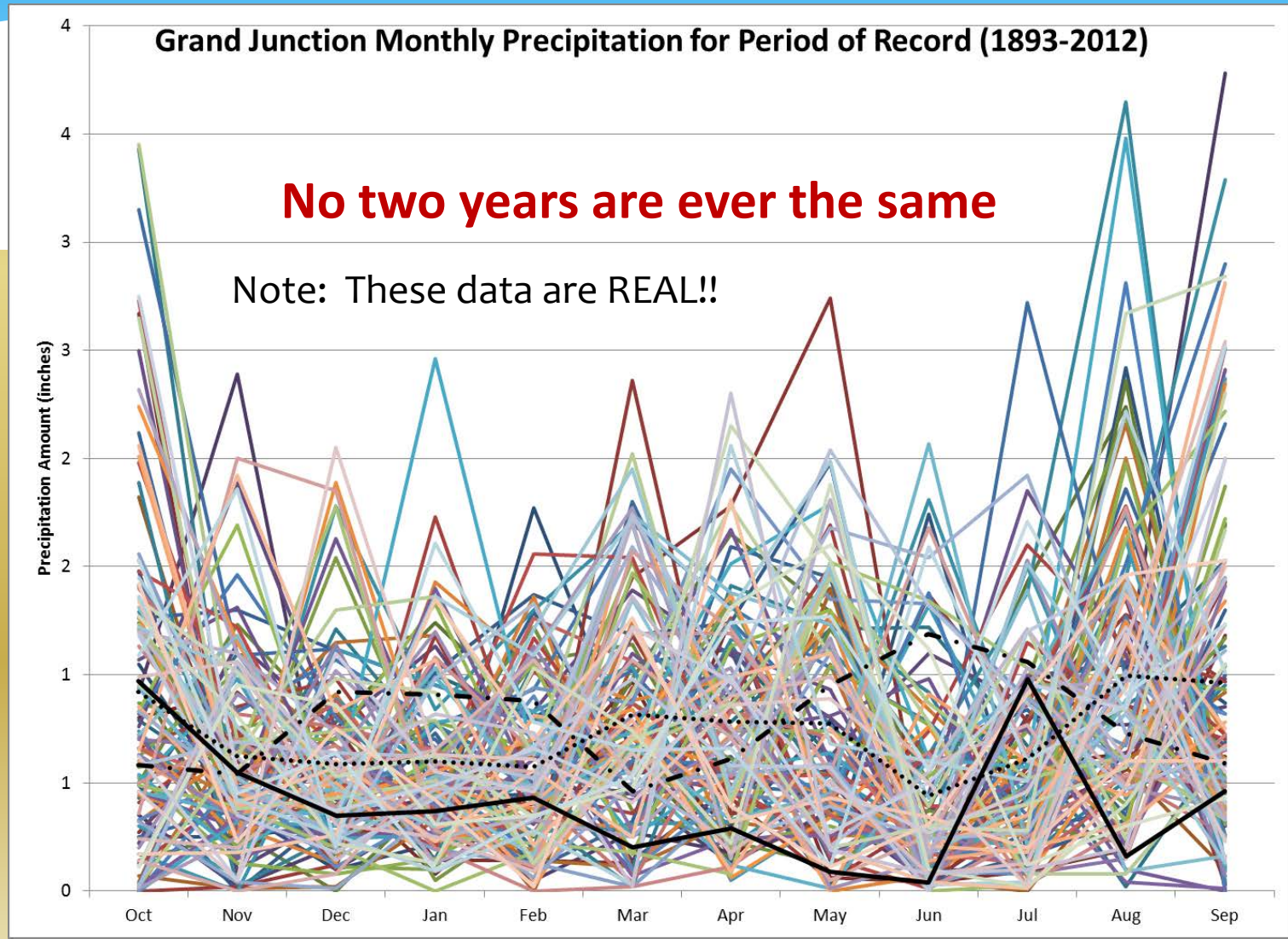
Annual Precipitation (in.)

0	16 - 20	36 - 40	80 - 100
<4	20 - 24	40 - 50	100 - 120
4 - 8	24 - 28	50 - 60	120 - 140
8 - 12	28 - 32	60 - 70	140 - 160
12 - 16	32 - 36	70 - 80	> 160

Normal Monthly Precipitation

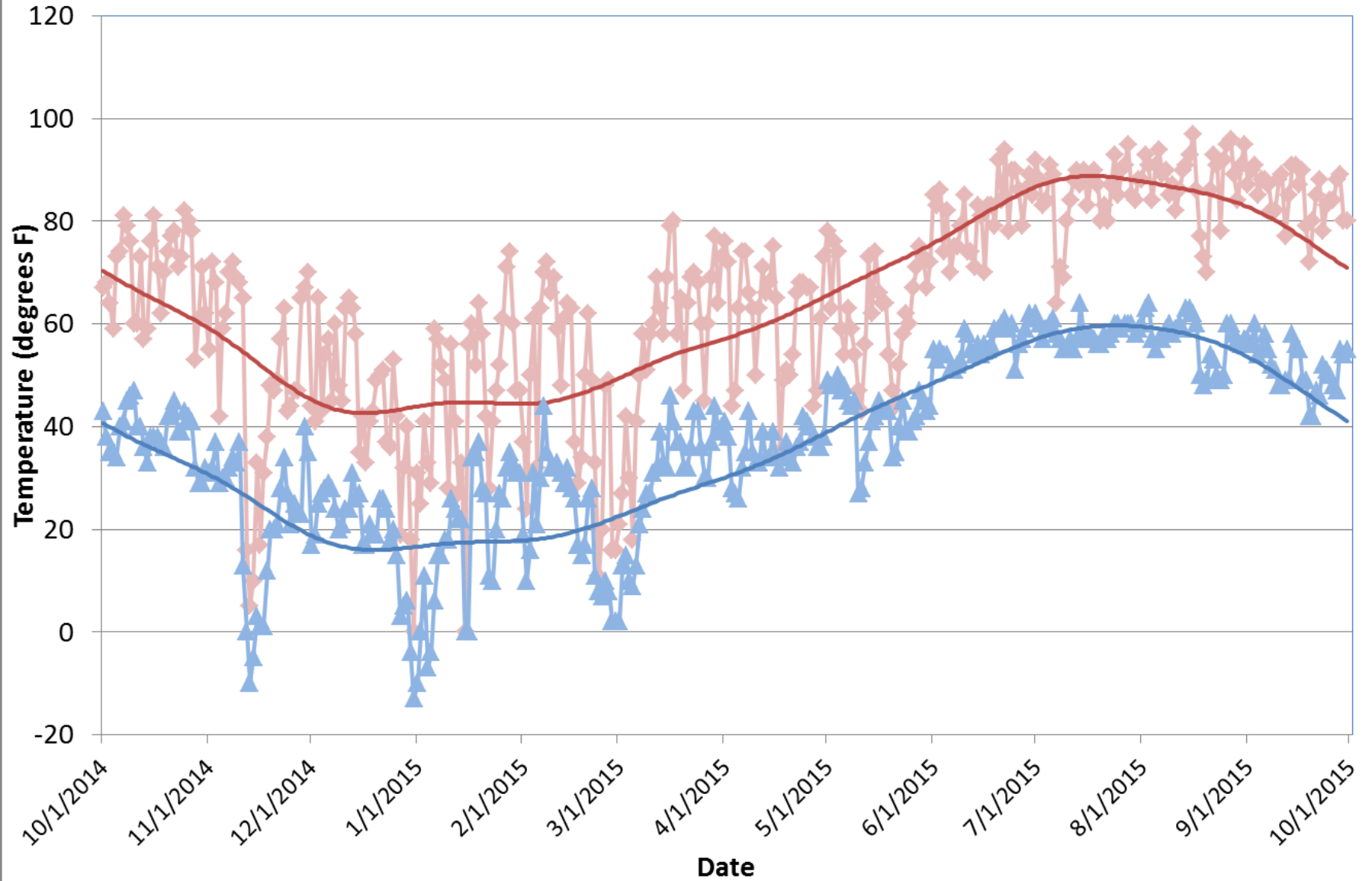


But don't expect our "weather" to follow those nice, smooth seasonal averages

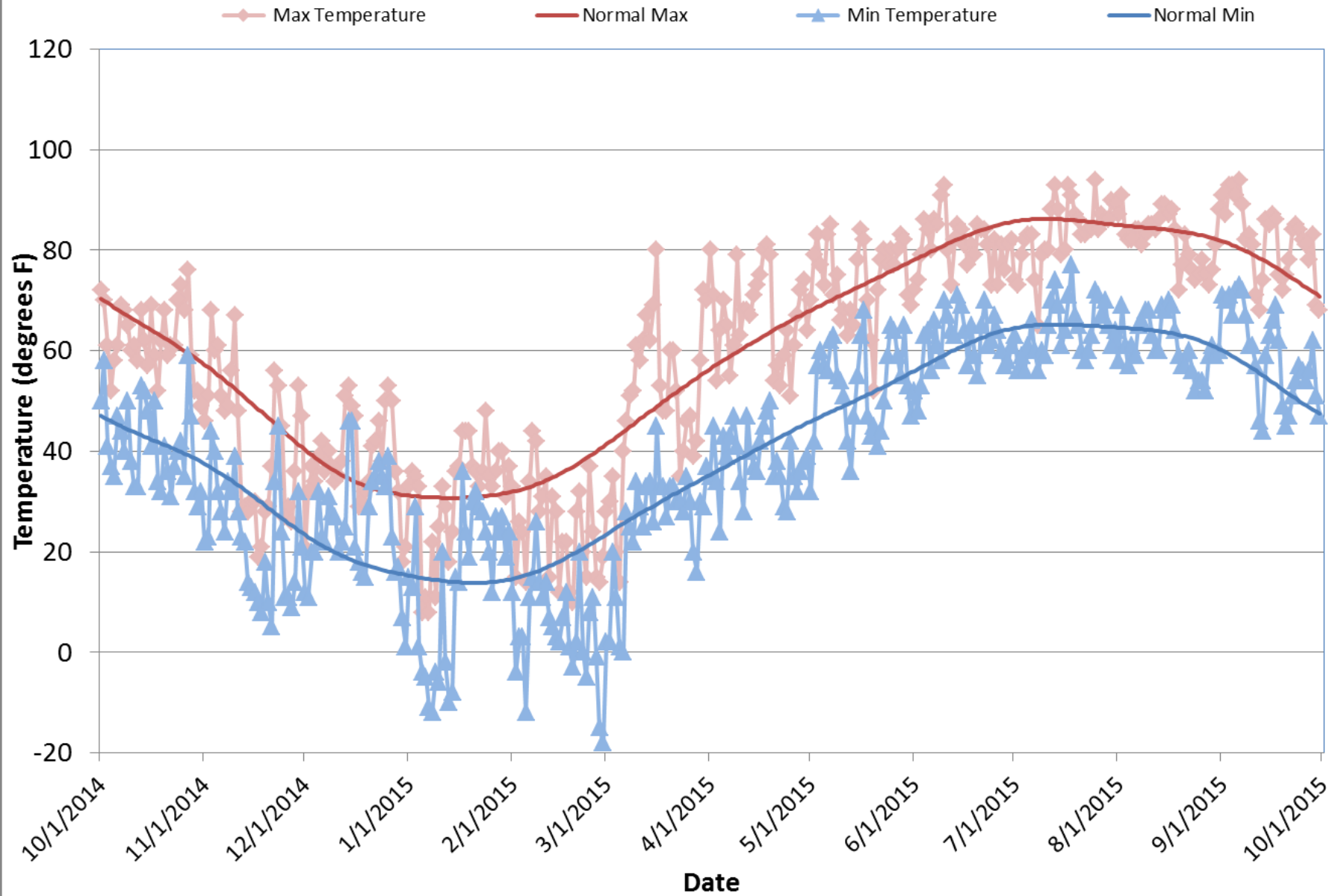


Denver-Stapleton Daily Max/Min Temperature with Normal for Water Year 2015

MaxTemperature Normal Max MinTemperature Normal Min



Moline, IL Daily Max/Min Temperature with Normal Water Year 2015

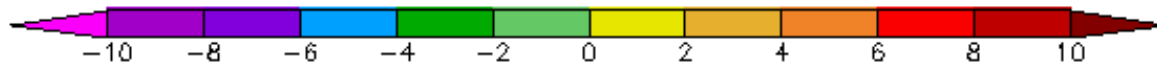
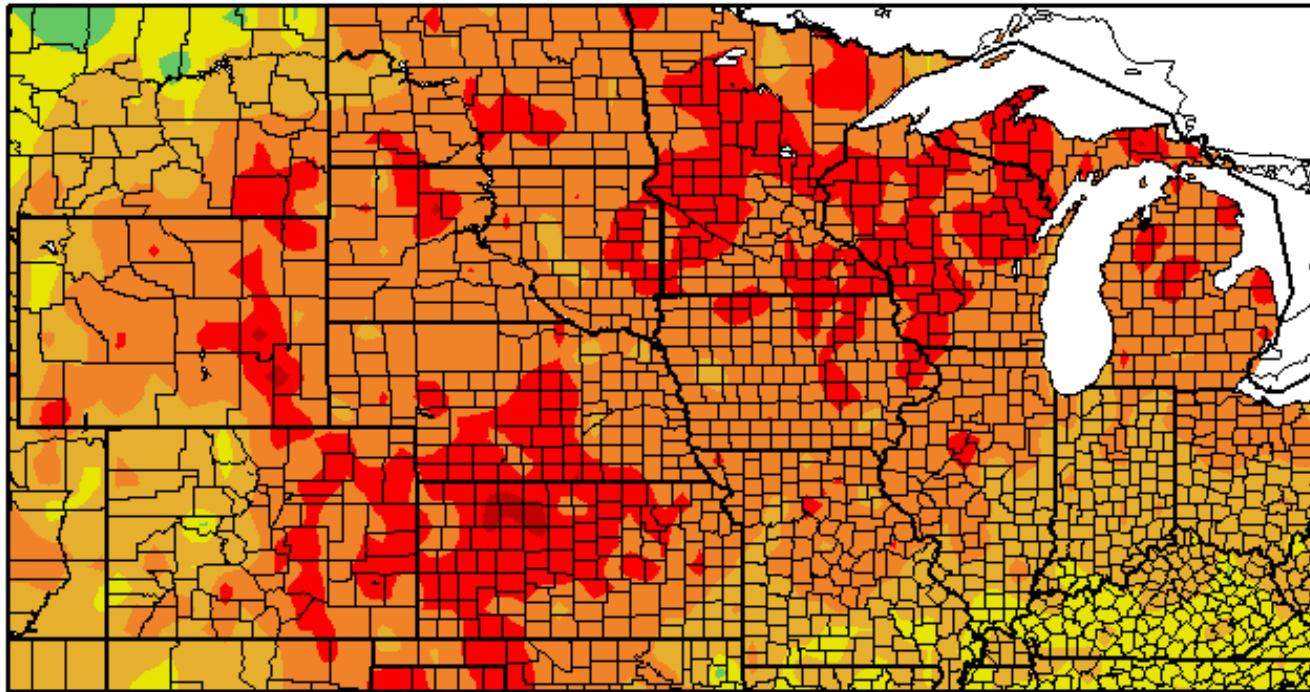


Review/Current Conditions

The slide features a solid blue background. At the bottom, there are several overlapping, wavy white and light blue shapes that create a sense of movement and depth, resembling stylized waves or a horizon line.

September Temperature Departure from Normal

Departure from Normal Temperature (F)
9/1/2015 - 9/30/2015



Generated 10/11/2015 at HPRCC using provisional data.

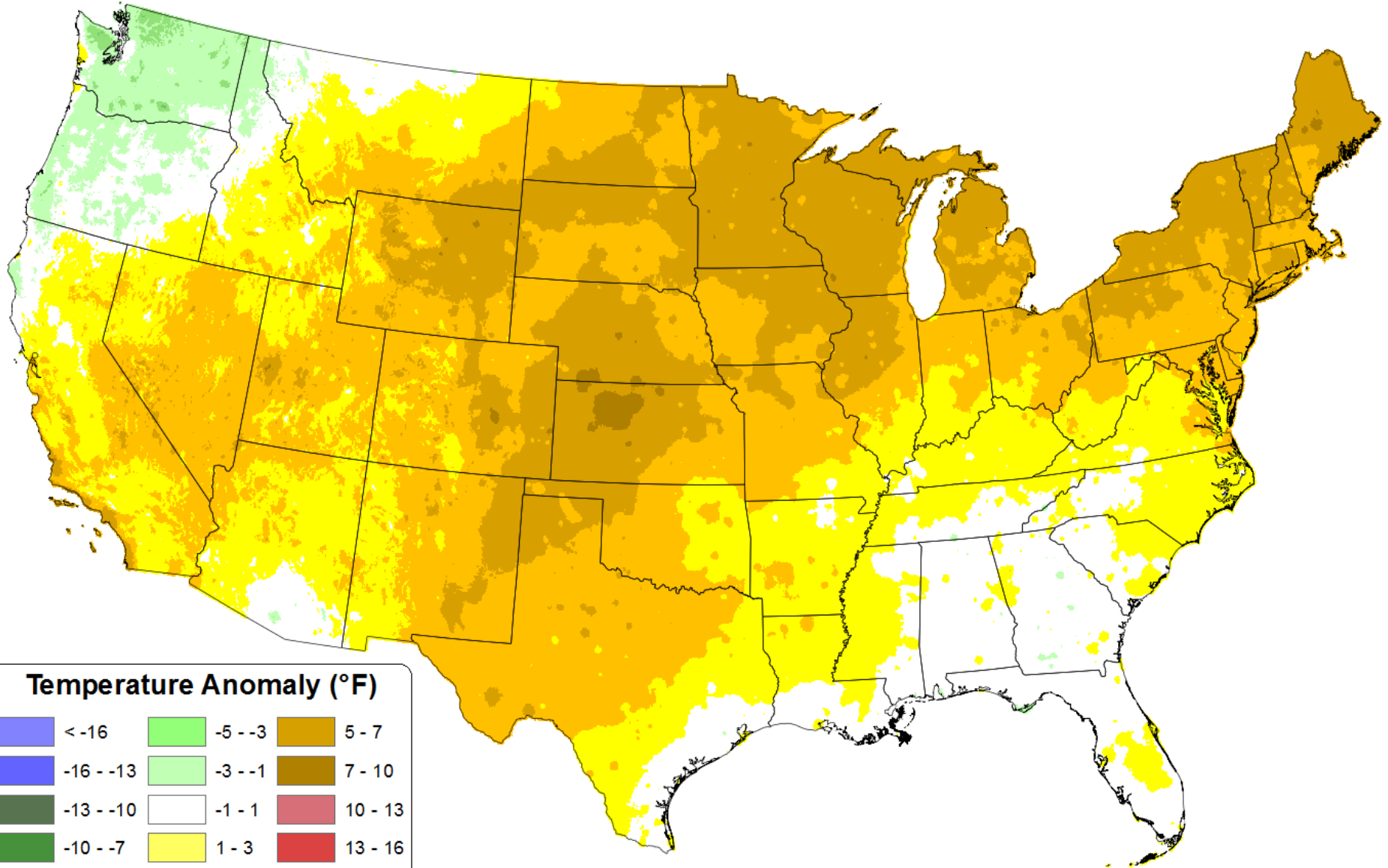
Regional Climate Centers

Daily Mean Temperature Anomaly: September 2015

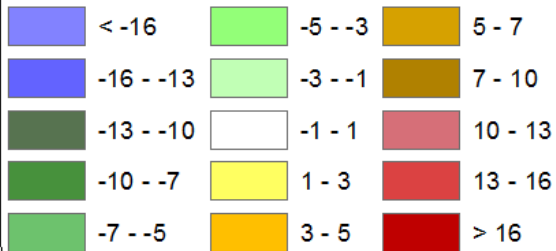
Period ending 7 AM EST 30 Sep 2015

Base period: 1981-2010

(Map created 02 Oct 2015)



Temperature Anomaly (°F)

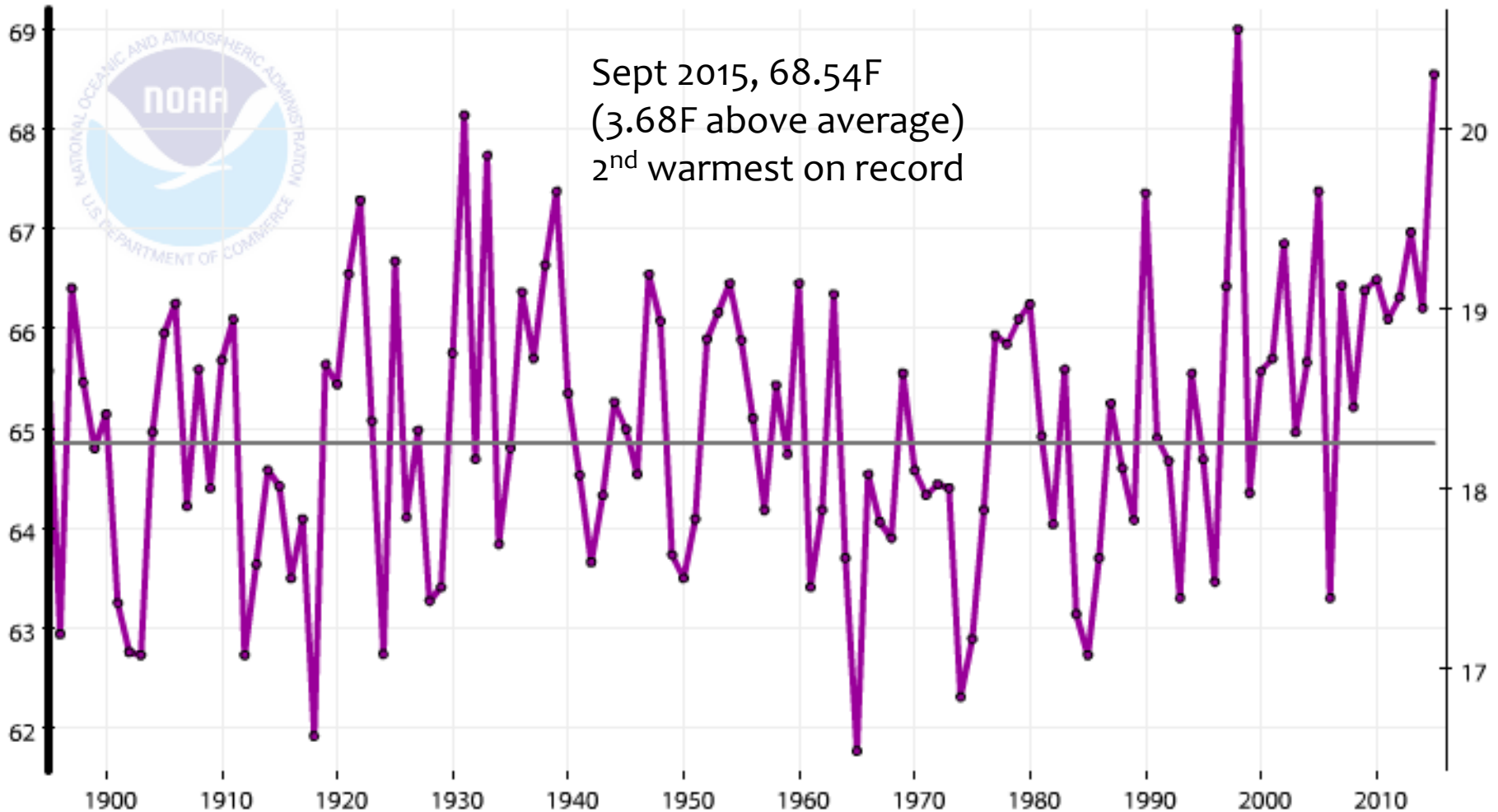


September U.S. Average Temp

Contiguous U.S., Average Temperature, September

— 1901-2000
Avg: 64.86°F

—●— Avg Temperature

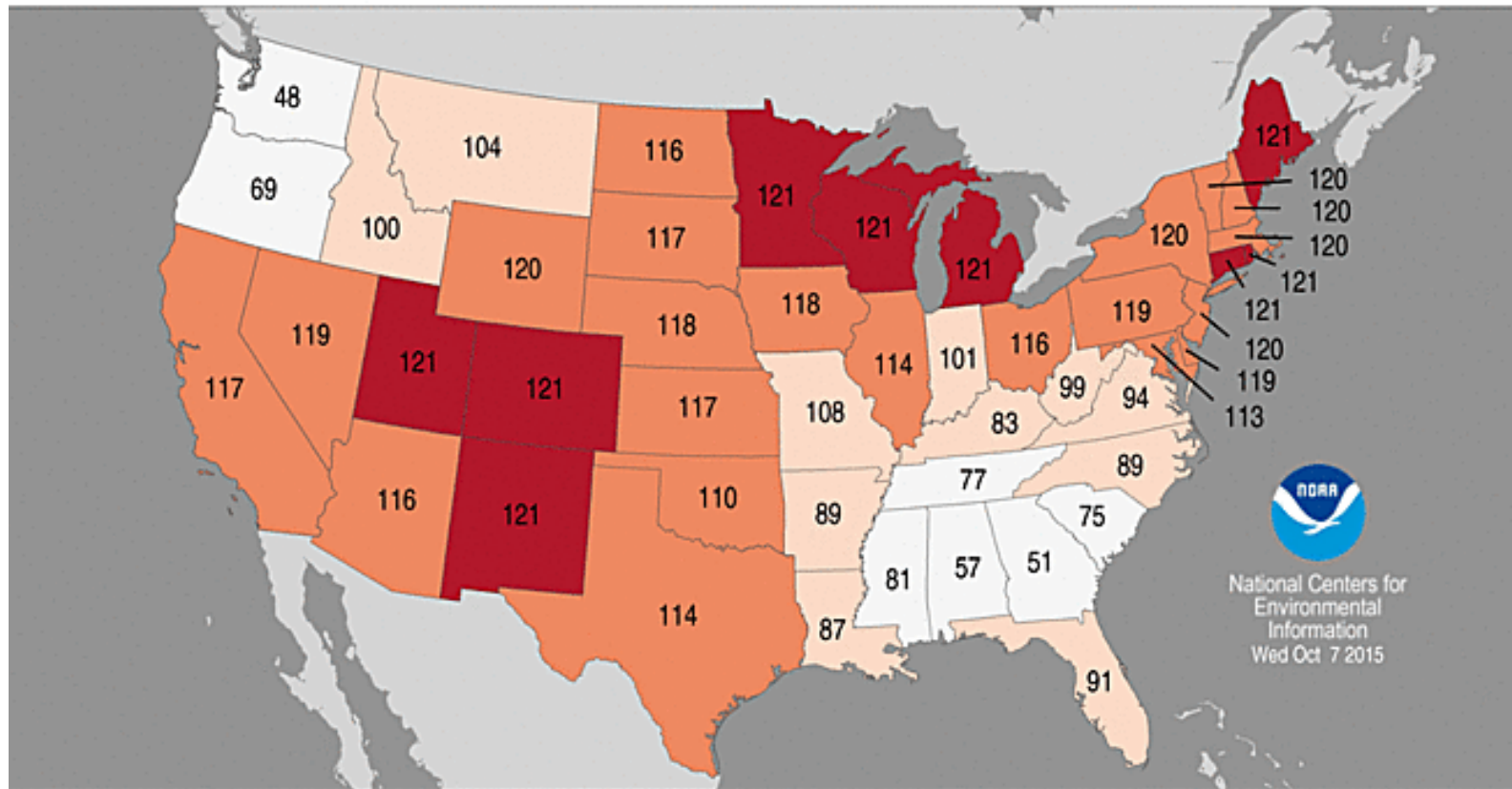


September Temperature Recap

Statewide Average Temperature Ranks

September 2015

Period: 1895-2015



National Centers for
Environmental
Information
Wed Oct 7 2015

Record
Coldest
(1)

Much
Below
Average

Below
Average

Near
Average

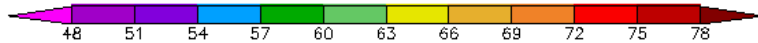
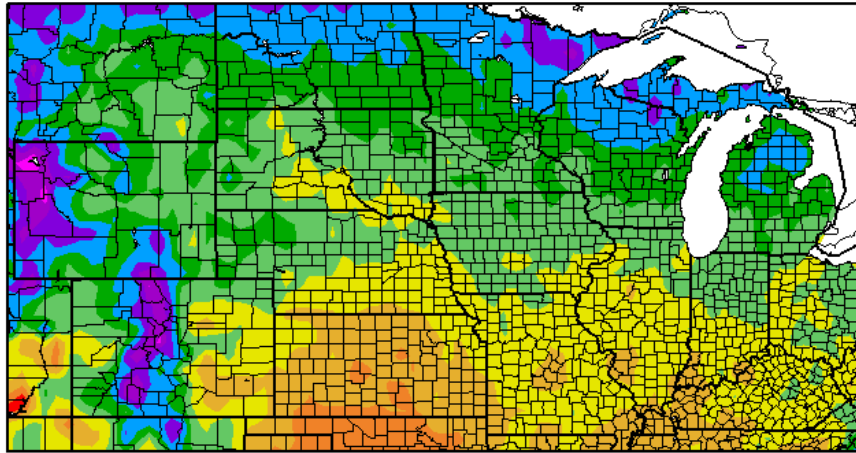
Above
Average

Much
Above
Average

Record
Warmest
(121)

Temperature (F)
9/14/2015 - 10/13/2015

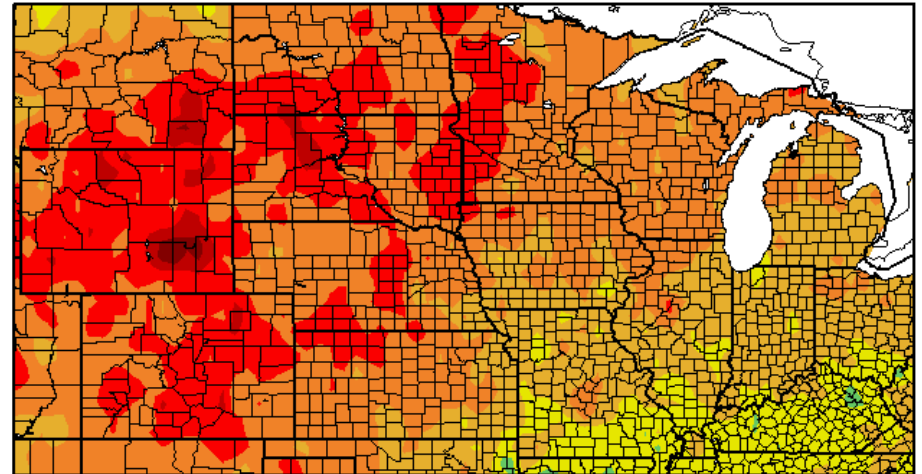
Most recent 30-day temperatures



Generated 10/14/2015 at HPRCC using provisional data.

Regional Climate Centers

Departure from Normal Temperature (F)
9/14/2015 - 10/13/2015



Generated 10/14/2015 at HPRCC using provisional data.

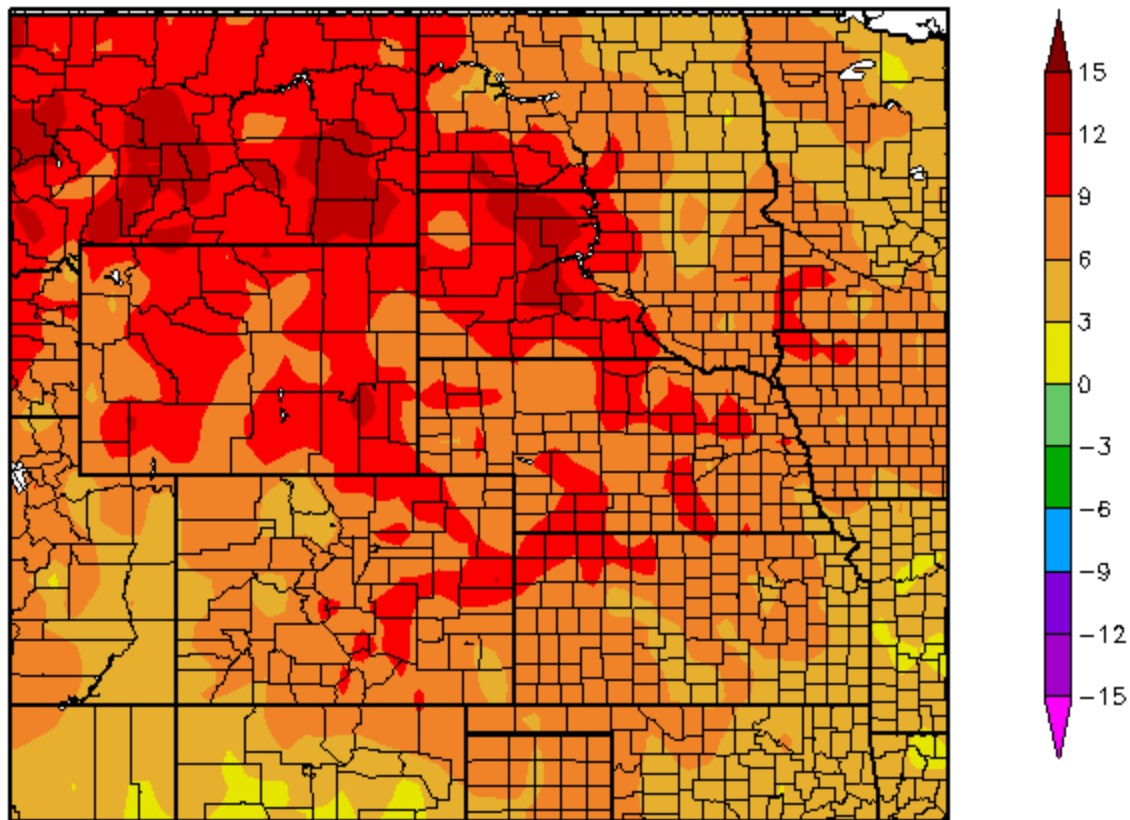
Regional Climate Centers

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

HPRCC - Regional Climate Centers

Past 7 days departure from normal Temperatures

Departure from Normal Temperature (F)
10/7/2015 - 10/13/2015



And then there was Sunday!

NEBRASKA
Weather
NETWORK

Record Highs

OCTOBER 11, 2015

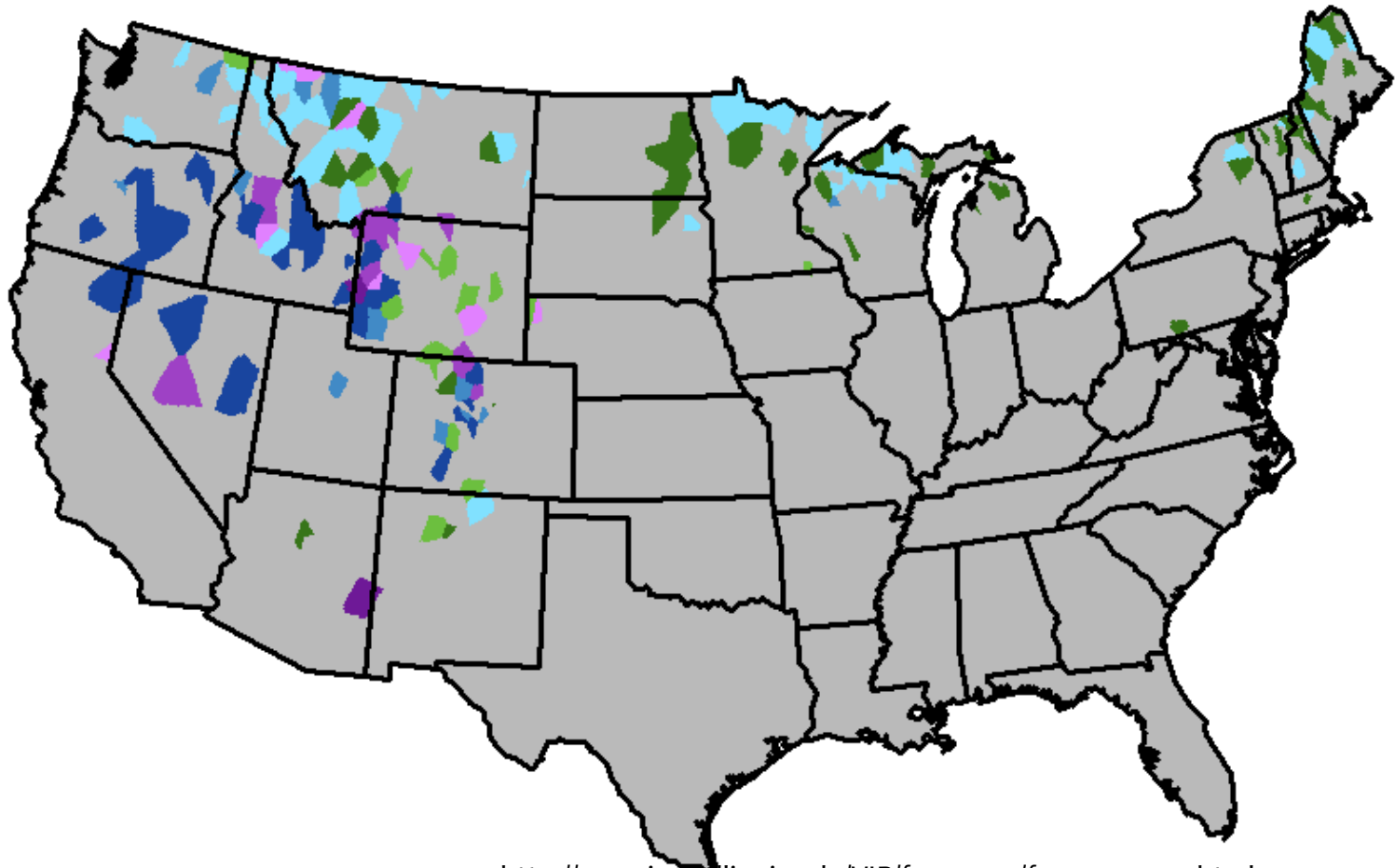
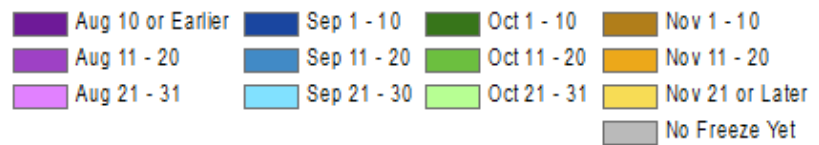
Norfolk...98	89 in 1956
Broken Bow...98	87 in 1910
Grand Island...97	93 in 1928
Hastings...97	89 in 1940
Imperial...96	89 in 1989
McCook...95	90 in 1962
Lincoln...94	89 in 1989
North Platte...94	89 in 1989
Valentine...94	89 in 1995
Sidney...92	90 in 1996
Omaha...91	87 in 1956
Chadron...91	87 in 1975
Alliance...88	87 in 1997



Very late first freeze this fall

Date of First 28°F Freeze
since 8/1

As of 10/14/2015



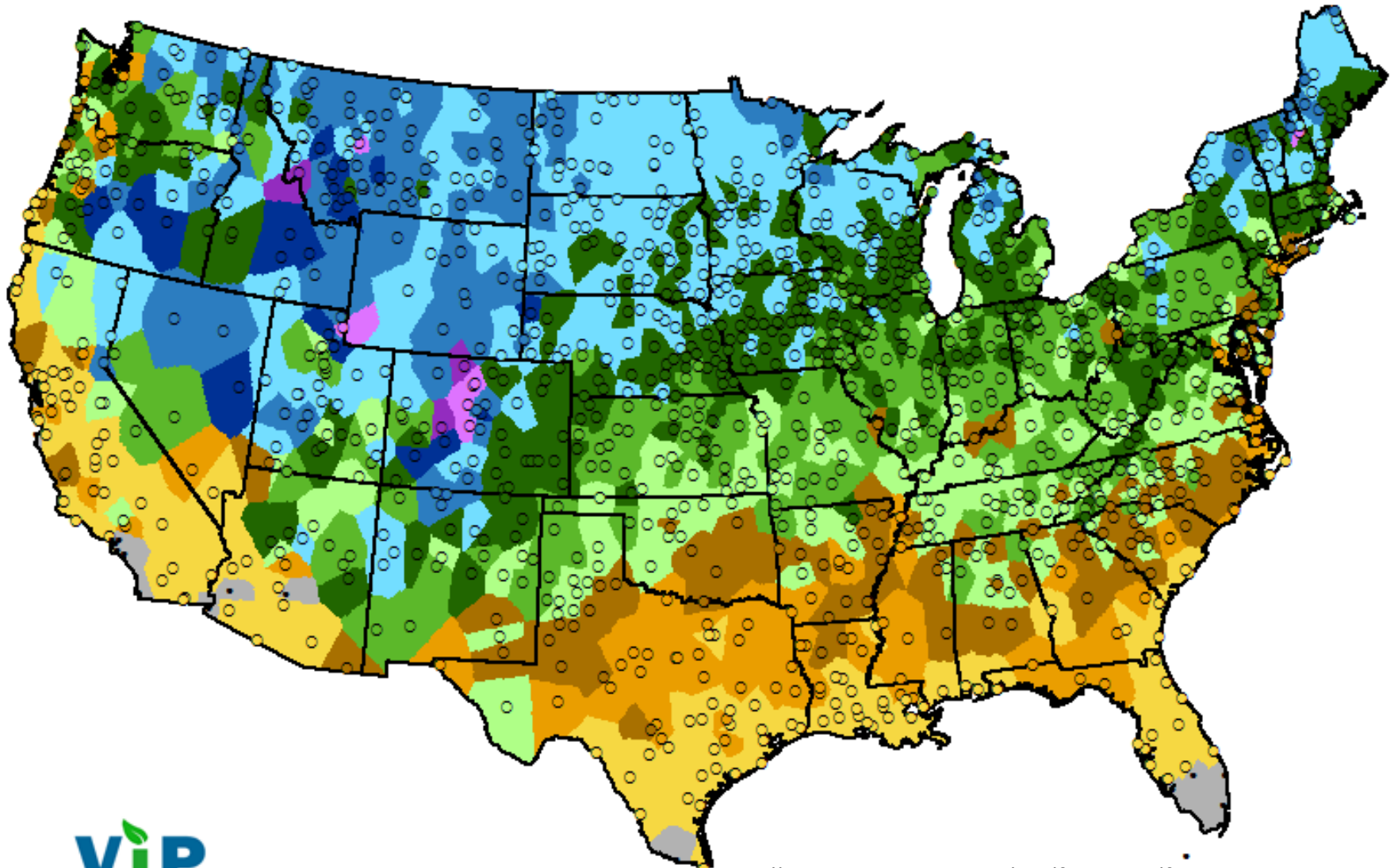
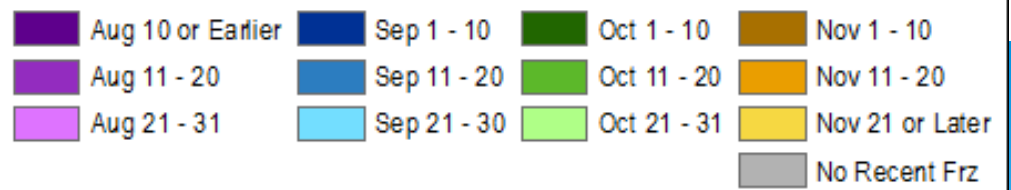
http://mrcc.isws.illinois.edu/VIP/frz_maps/freeze_maps.html

MRCC Experimental Freeze Guidance:

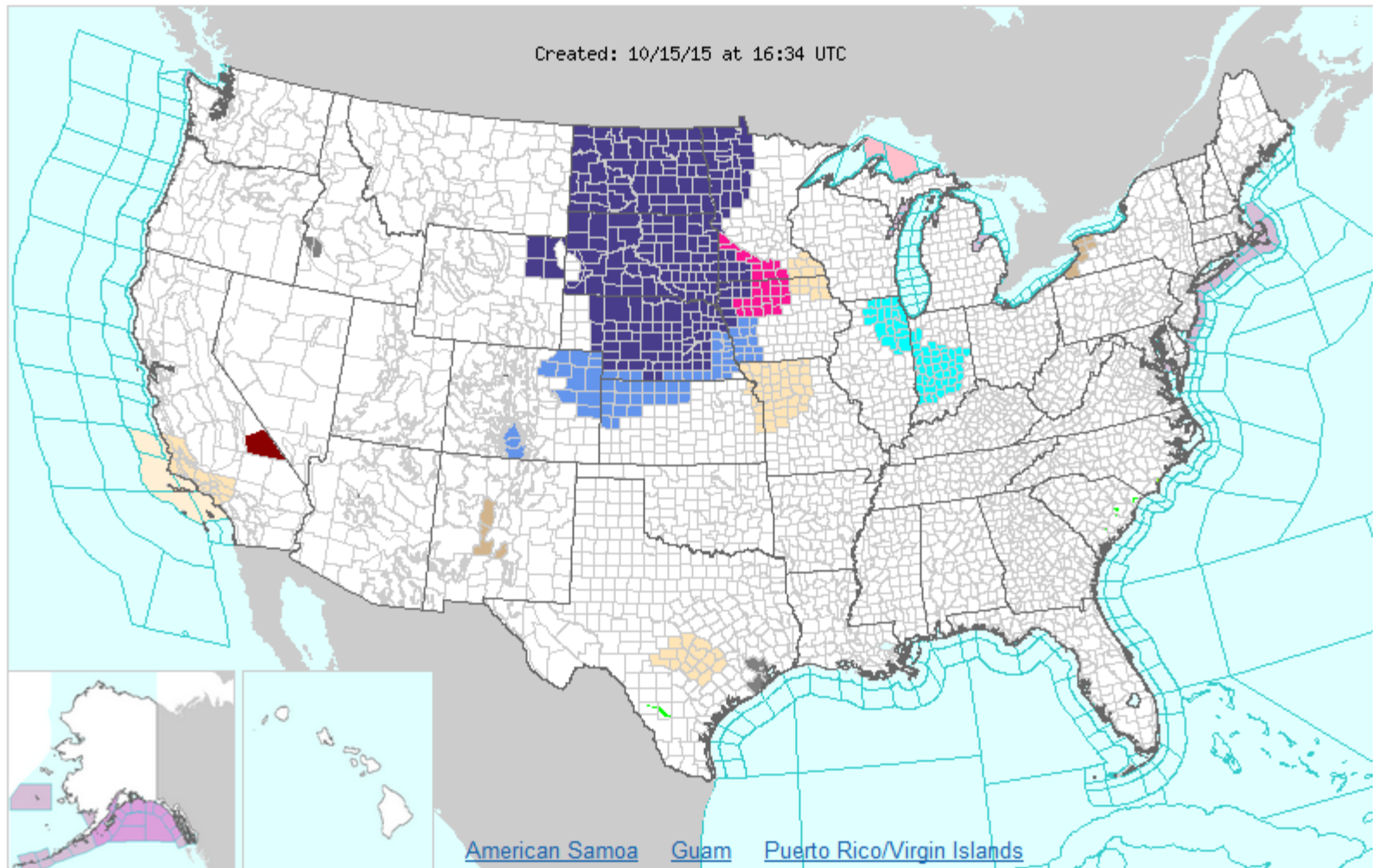
These experimental maps may be utilized as a guide to local and regional freeze conditions but should NOT be used by themselves for decision processes.

Climatological Date of Median First 32°F Freeze
For the years from 1980-81 to 2009-10

Median Defined as 50th Percentile



But the Freeze is Coming!!



Click on the map above for detailed alerts or

Warnings By State ▼

Go

[Public Alerts in XML/CAP v1.1 and ATOM Formats](#)

Now let's talk about precipitation



Credit: Henry Reges

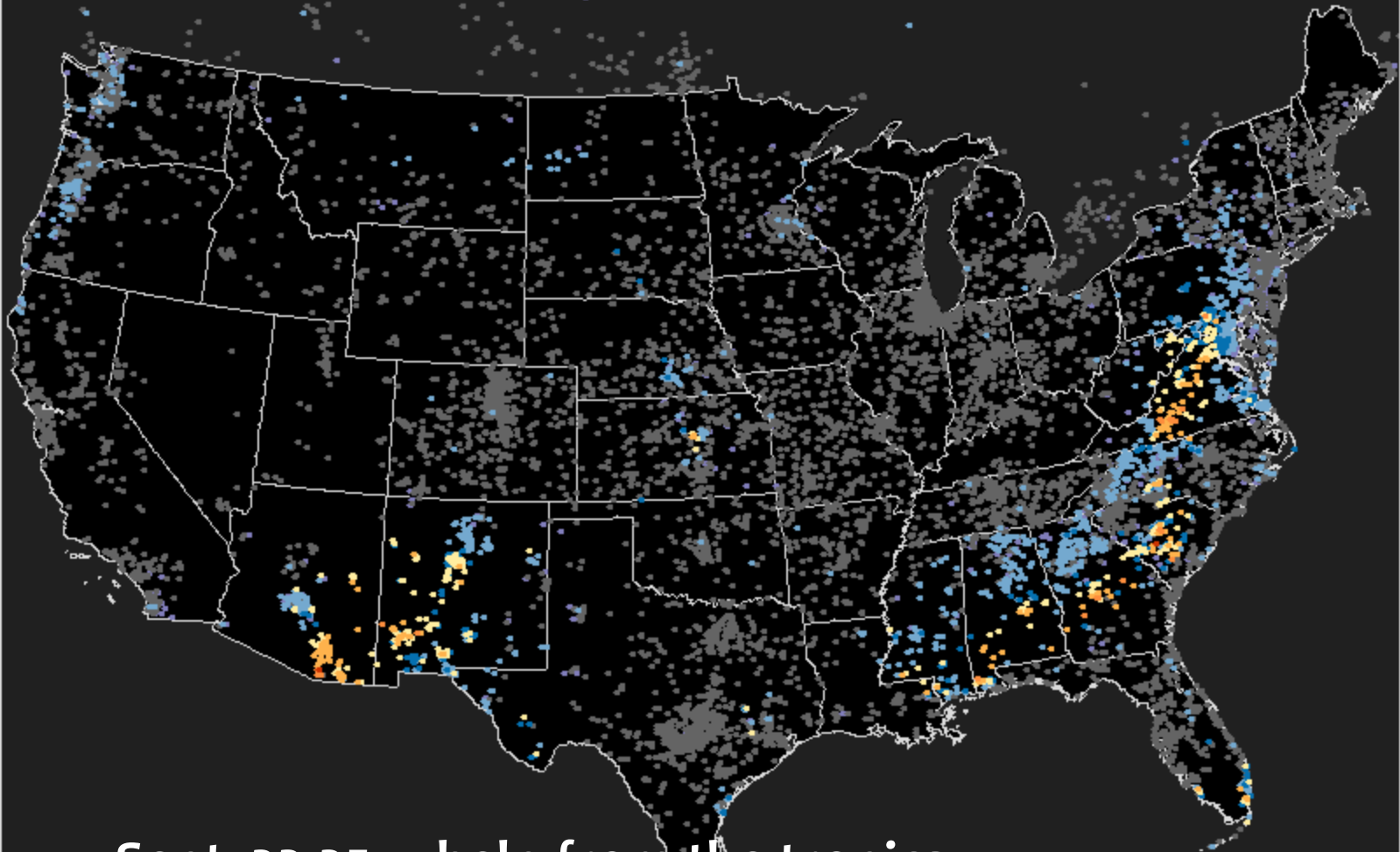
An interesting September event

Daily Precipitation (inches x.xx), for the 24 hour period ending ~7:00 am

USA 9/22/2015

0.0 Trace 0.01 - 0.16 0.17 - 0.32 0.33 - 0.82 0.83 - 1.98 1.99 - 2.97 2.98 - 3.30

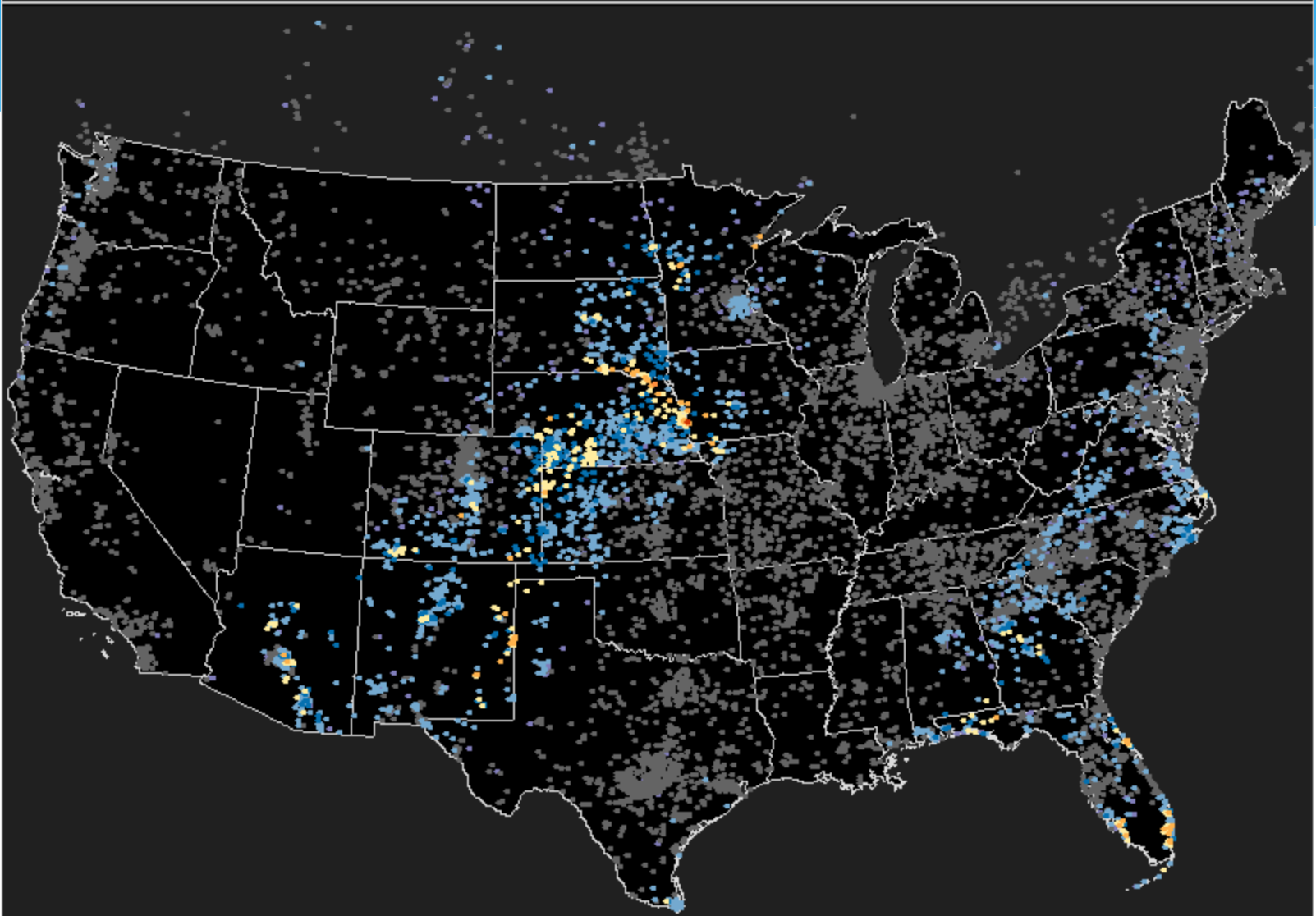
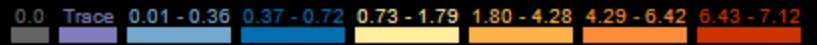
Data from CoCoRaHS



Sept. 22-25 -- help from the tropics

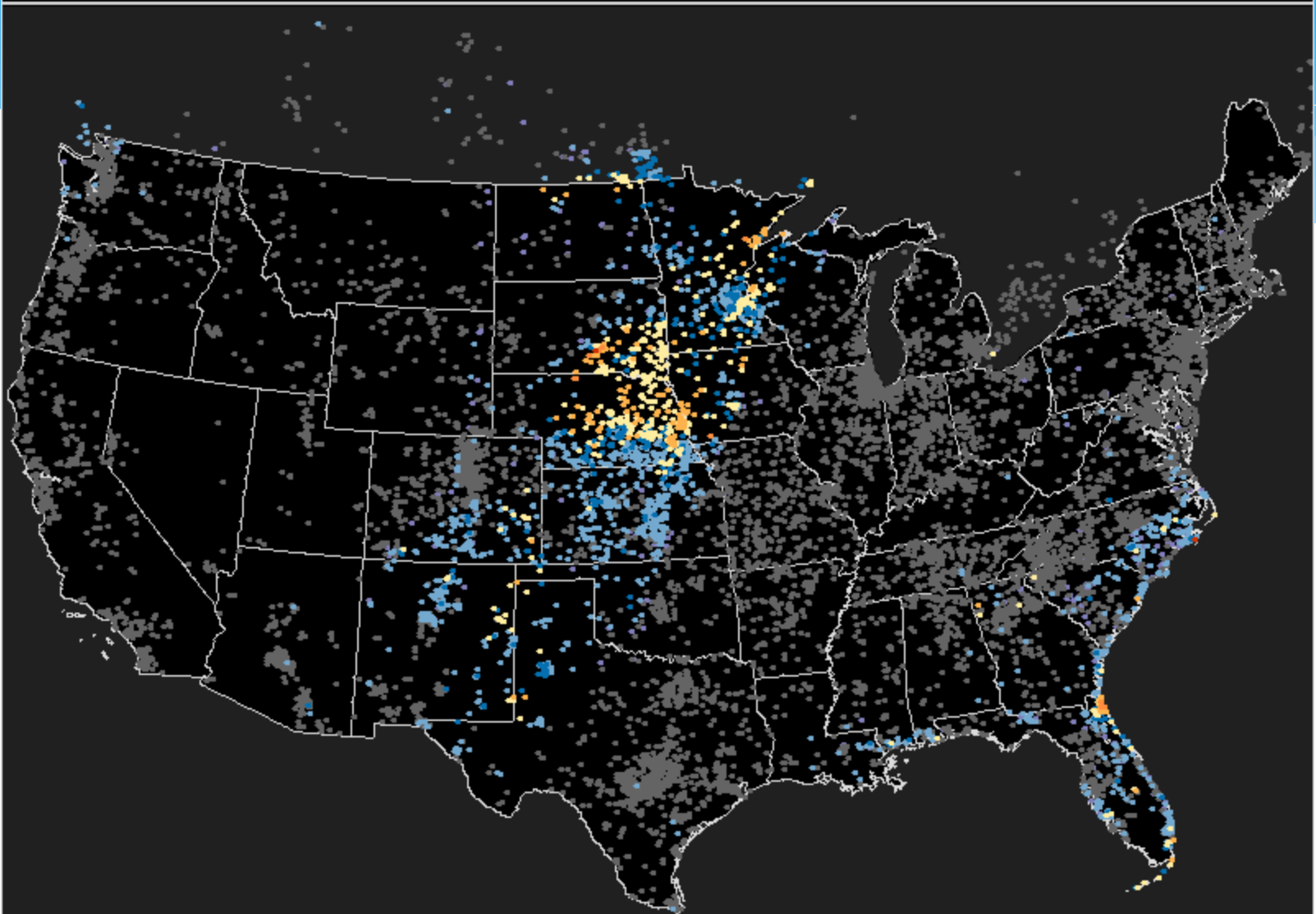
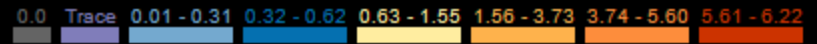
Daily Precipitation (inches x.xx), for the 24 hour period ending ~7:00 am

USA 9/23/2015



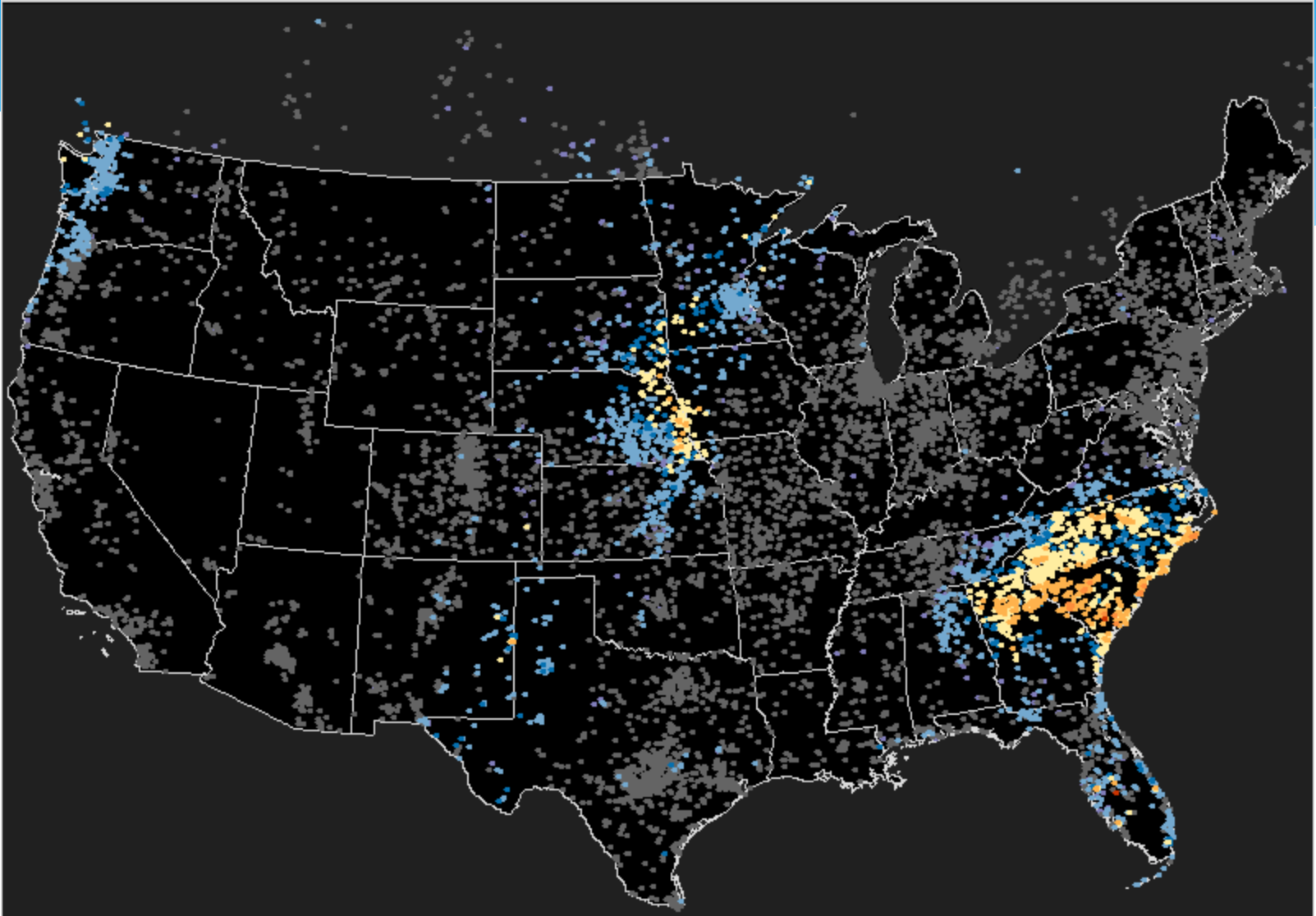
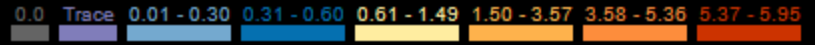
Daily Precipitation (inches x.xx), for the 24 hour period ending ~7:00 am

USA 9/24/2015



Daily Precipitation (inches x.xx), for the 24 hour period ending ~7:00 am

USA 9/25/2015

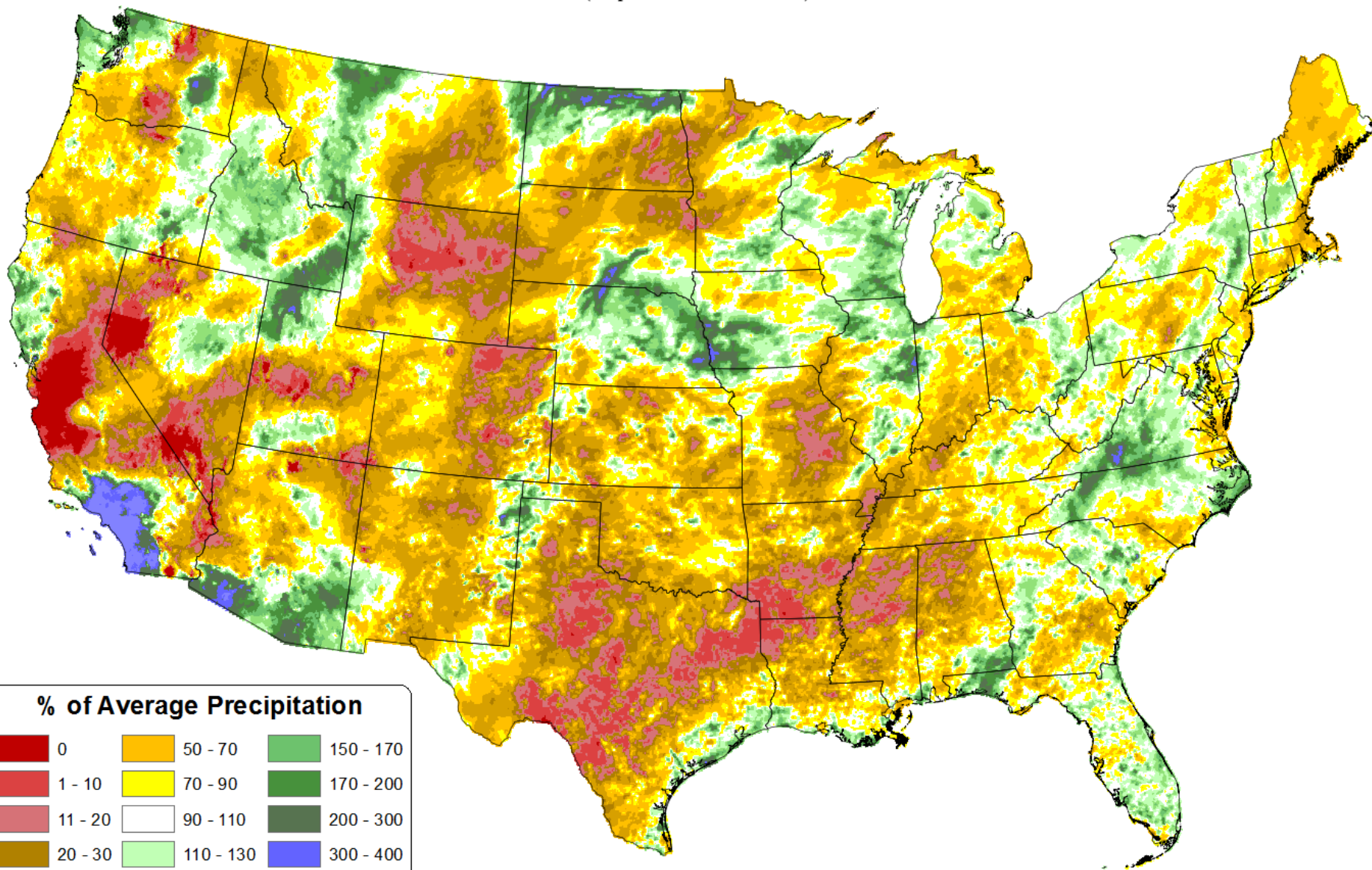


Total Precipitation Anomaly: September 2015

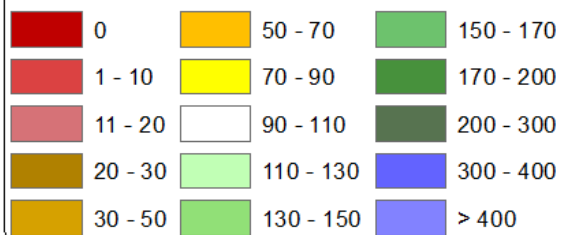
Period ending 30 Sep 2015

Base period: 1981-2010

(Map created 02 Oct 2015)



% of Average Precipitation

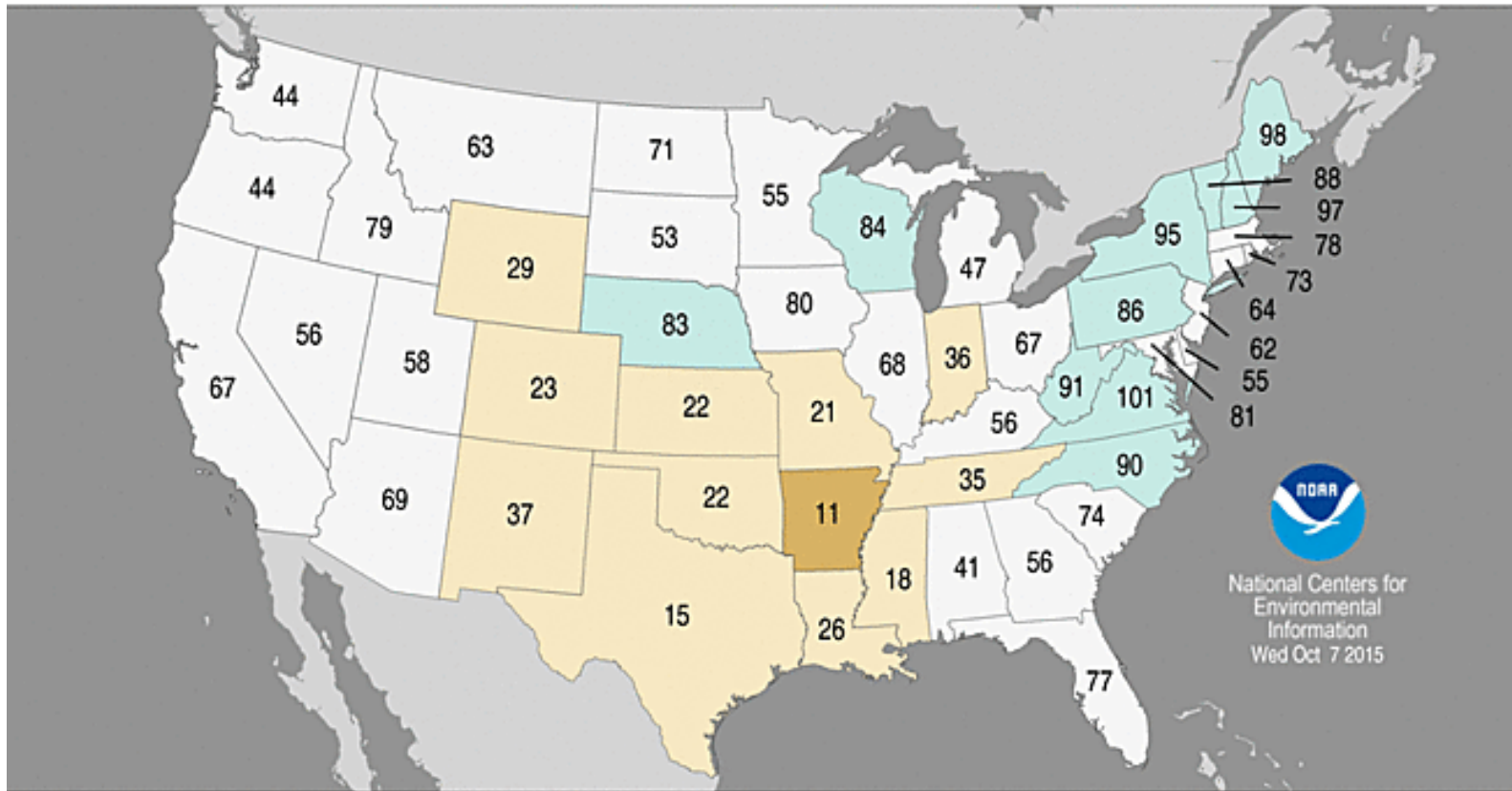


September Precipitation Recap

Statewide Precipitation Ranks

September 2015

Period: 1895-2015

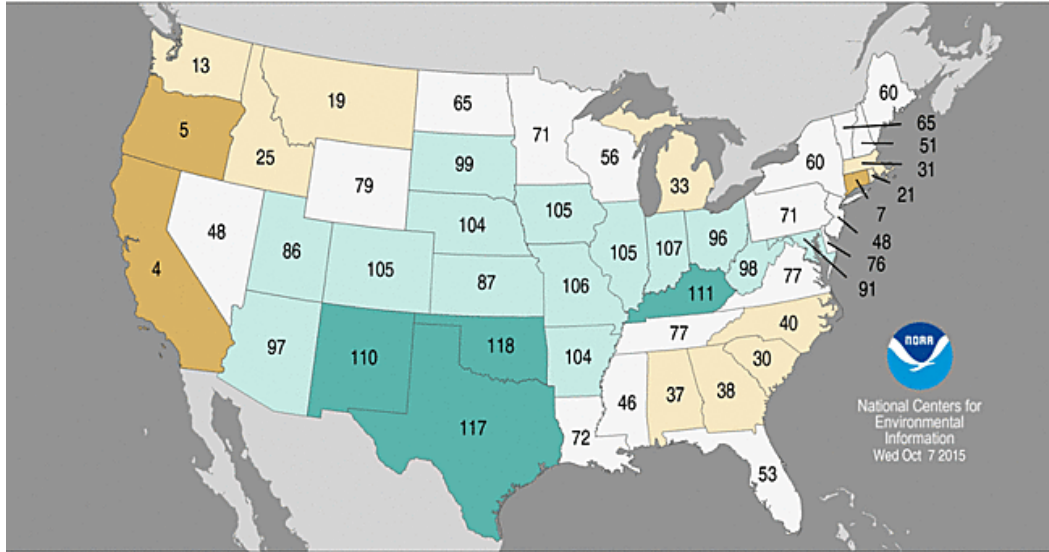


National Centers for
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Information
Wed Oct 7 2015

Statewide Precipitation Ranks

January–September 2015

Period: 1895–2015



Year to Date and Water Year Precipitation



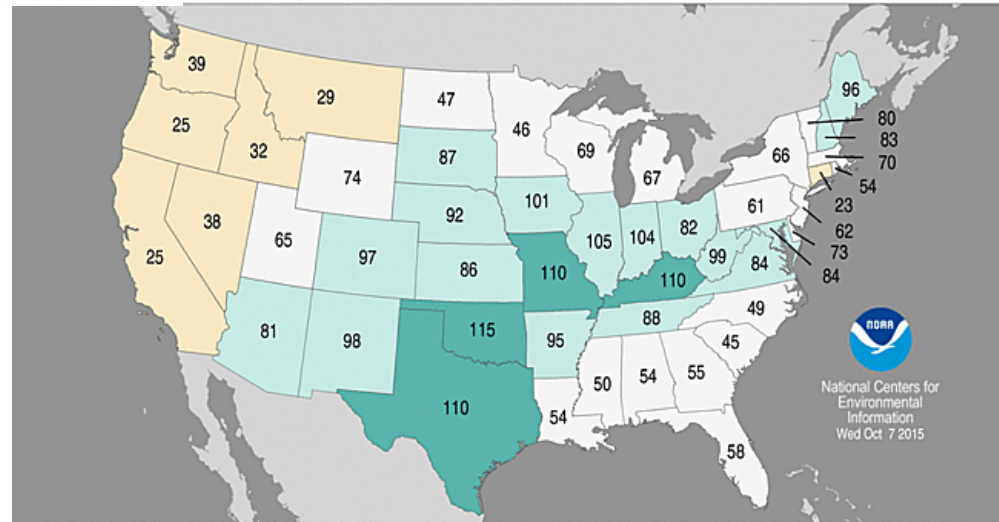
National Centers for Environmental Information
Wed Oct 7 2015



Statewide Precipitation Ranks

October 2014–September 2015

Period: 1895–2015

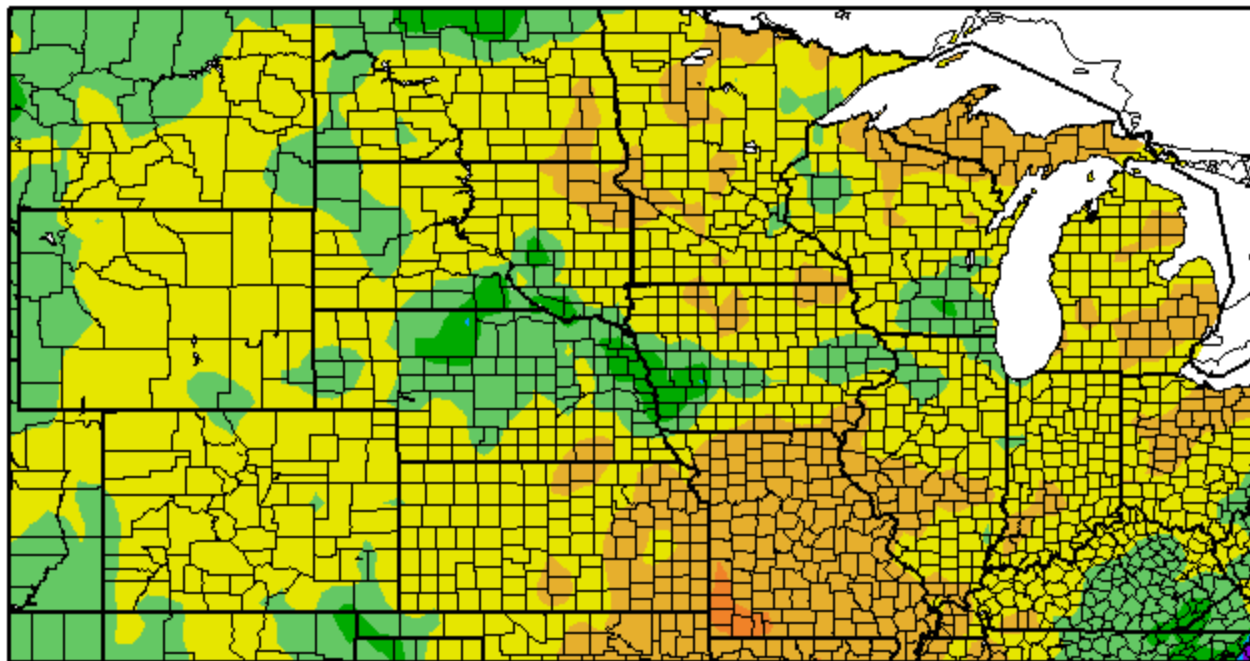


National Centers for Environmental Information
Wed Oct 7 2015



30-Day Departure from normal precipitation

Departure from Normal Precipitation (in)
9/15/2015 - 10/14/2015

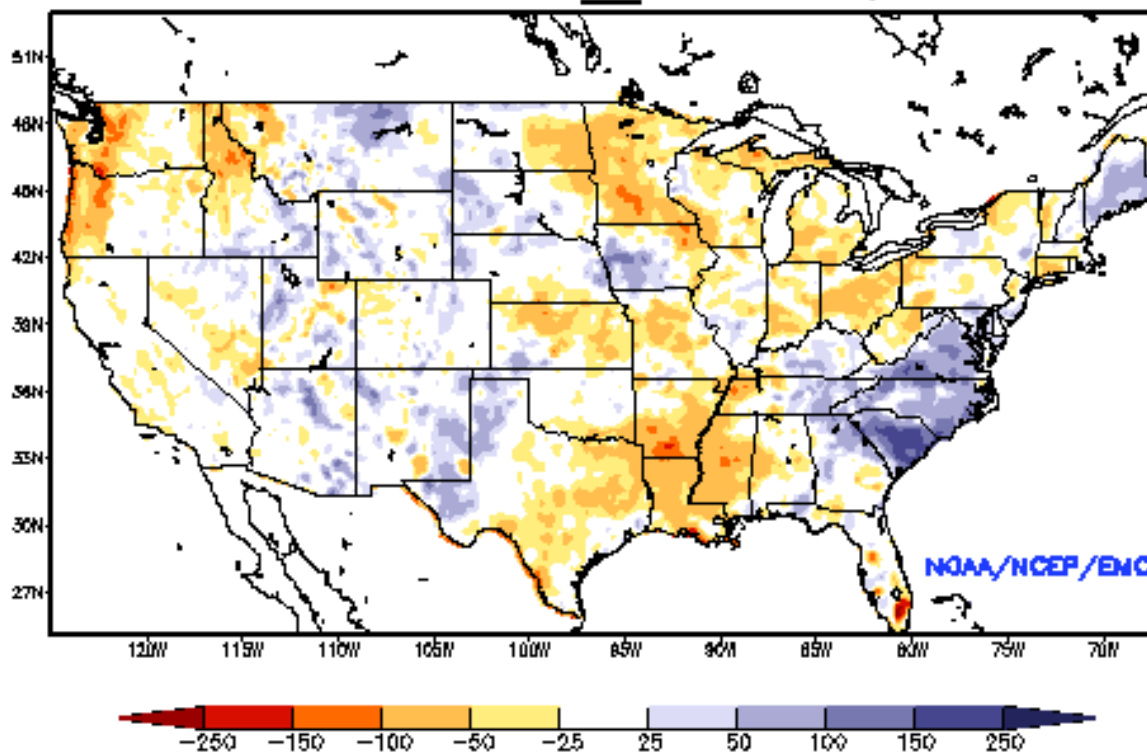


Generated 10/15/2015 at HPRCC using provisional data.

Regional Climate Centers

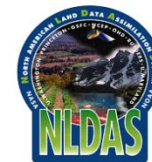
Soil Moisture

Ensemble-Mean - Current Total Column Soil Moisture Anomaly (mm)
NCEP NLDAS Products Valid: OCT 09, 2015



Soil Moisture Anomaly in millimeters

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

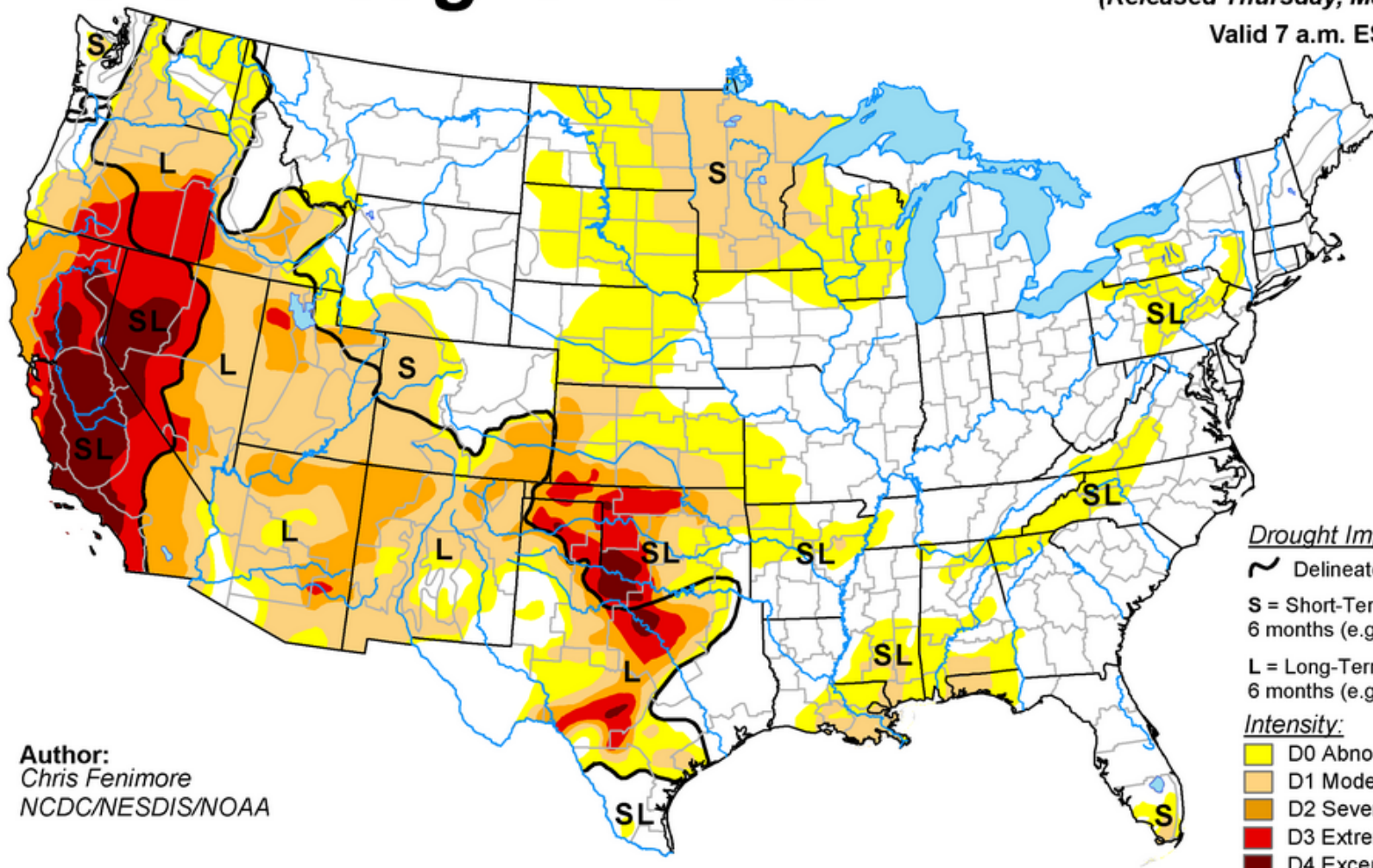


2015 drought evolution – or lack thereof

U.S. Drought Monitor

March 17, 2015
(Released Thursday, Mar. 19, 2015)

Valid 7 a.m. EST



Author:
Chris Fenimore
NCDC/NESDIS/NOAA

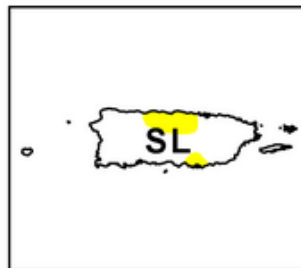
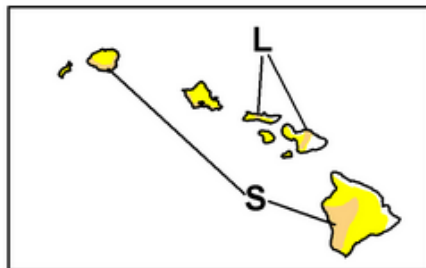
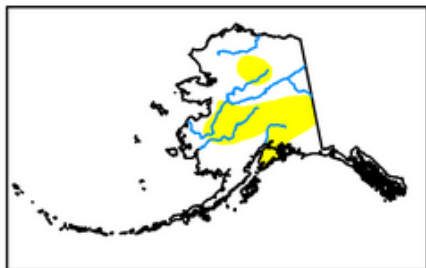
Drought Impact Types:

- ~ 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:

- 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.



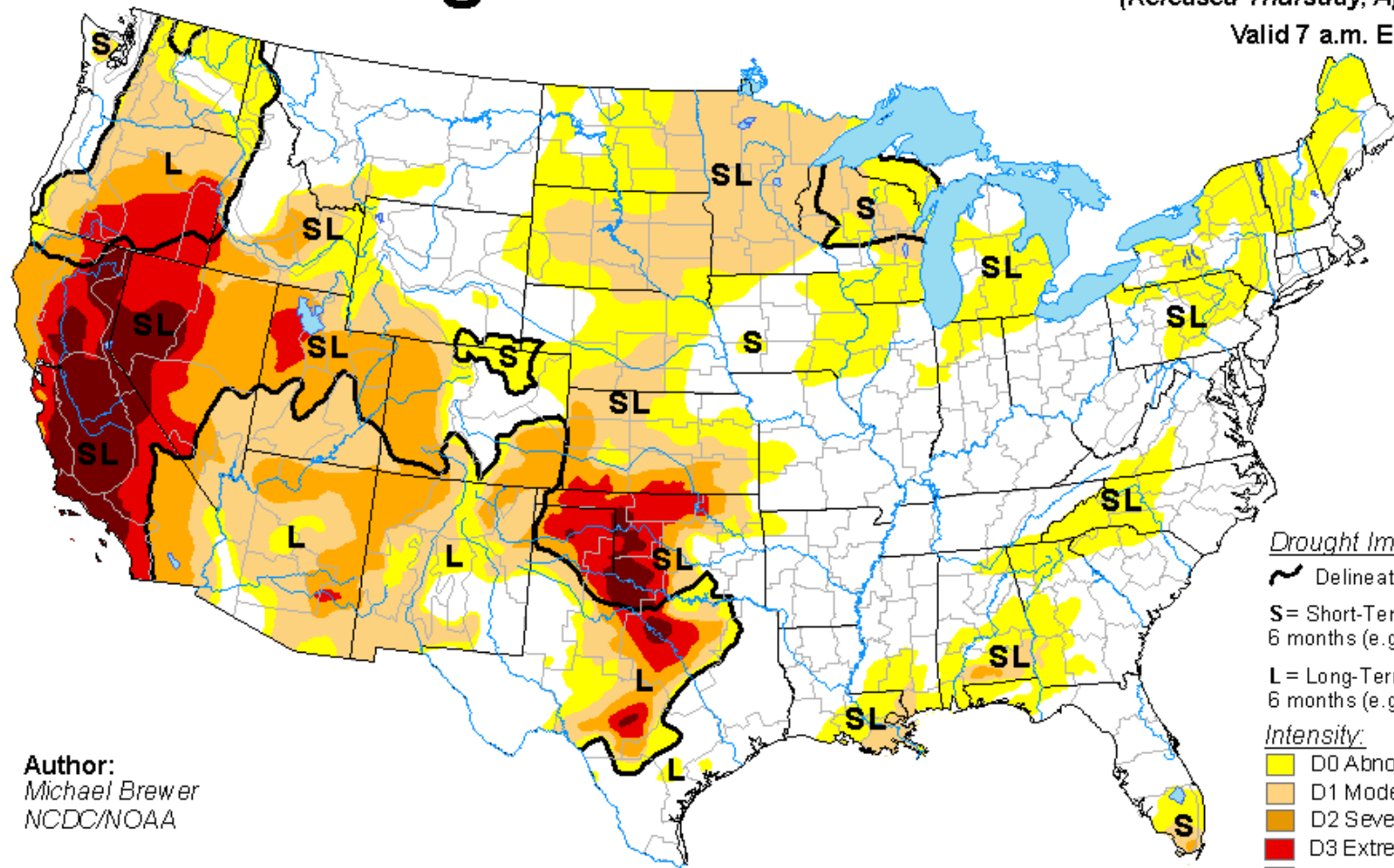
<http://droughtmonitor.unl.edu/>

U.S. Drought Monitor

April 14, 2015

(Released Thursday, Apr. 16, 2015)

Valid 7 a.m. EST



Author:
Michael Brewer
NCDC/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

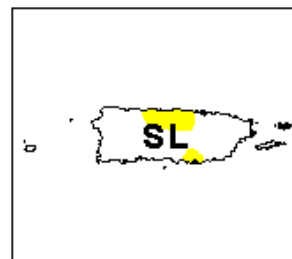
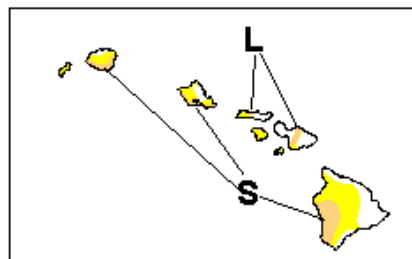
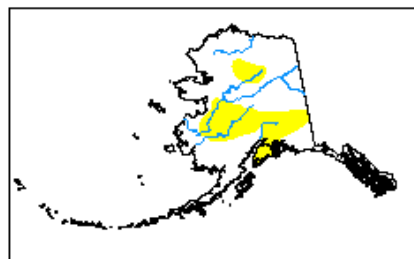
D1 Moderate Drought

D2 Severe Drought

D3 Extreme Drought

D4 Exceptional Drought

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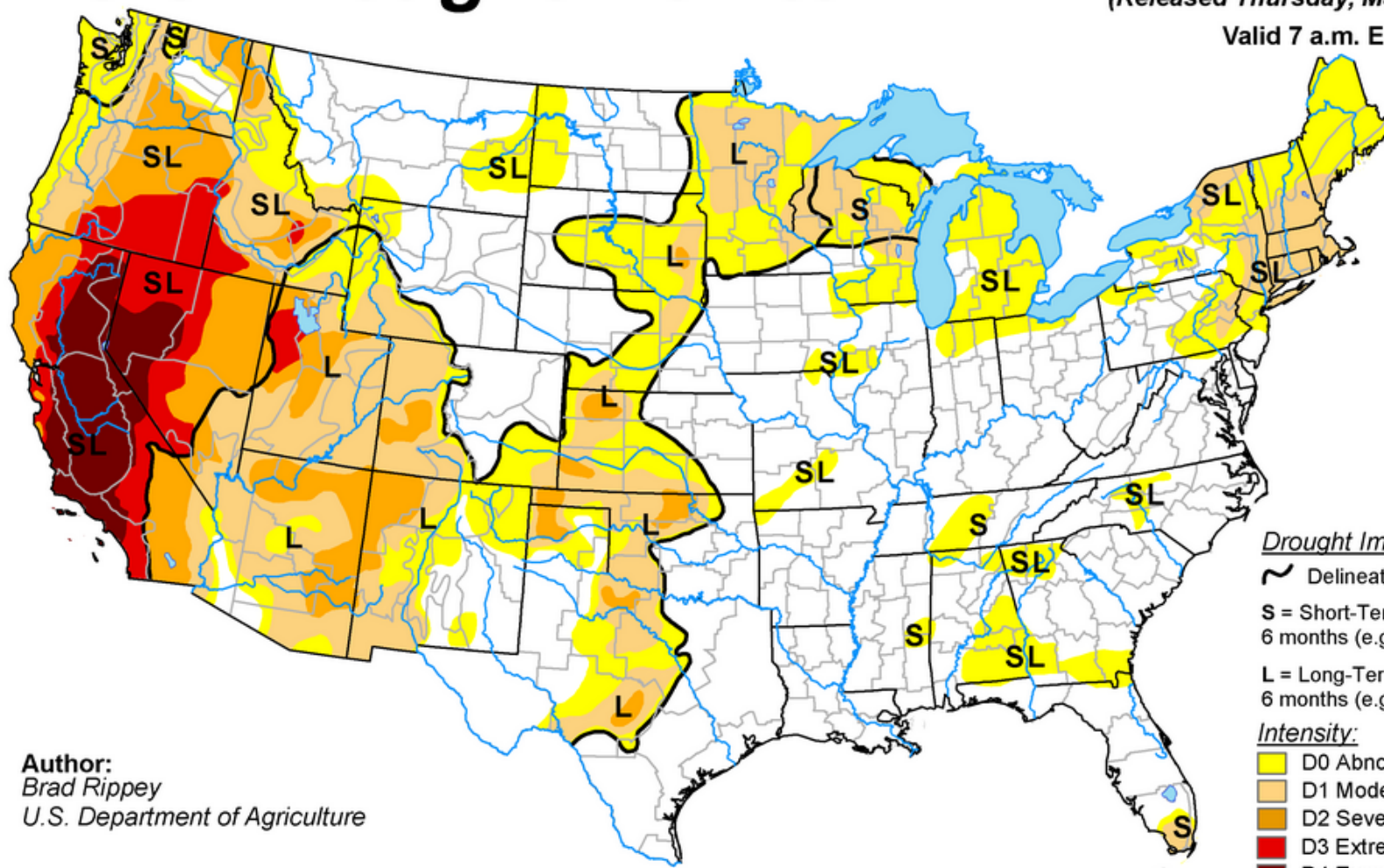
<http://droughtmonitor.unl.edu/>

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

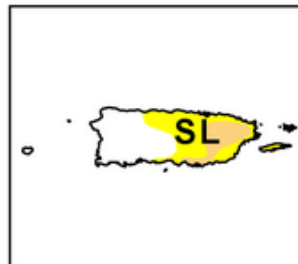
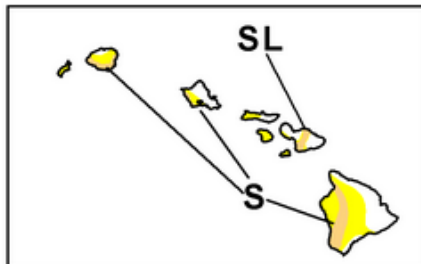
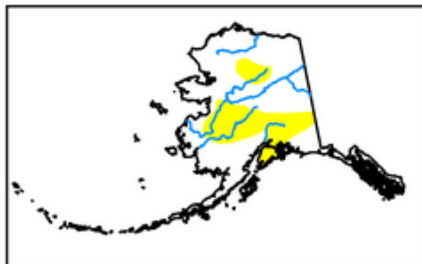
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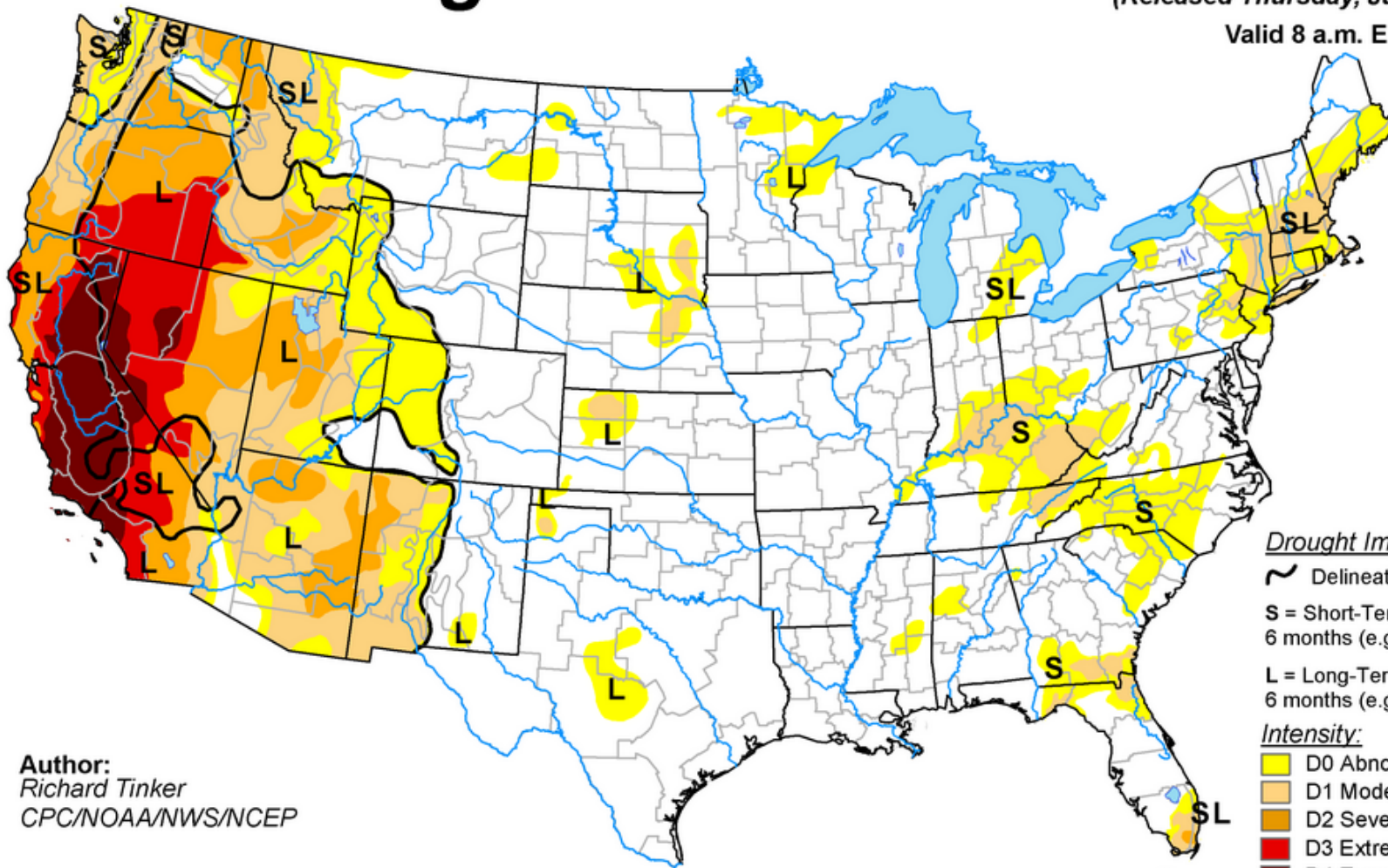
<http://droughtmonitor.unl.edu/>

U.S. Drought Monitor

June 16, 2015


(Released Thursday, Jun. 18, 2015)

Valid 8 a.m. EDT








Author:
Richard Tinker
CPC/NOAA/NWS/NCEP

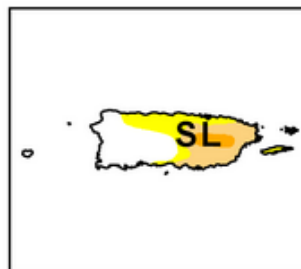
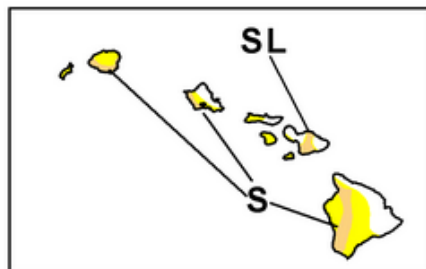
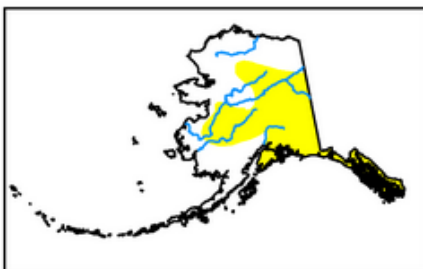
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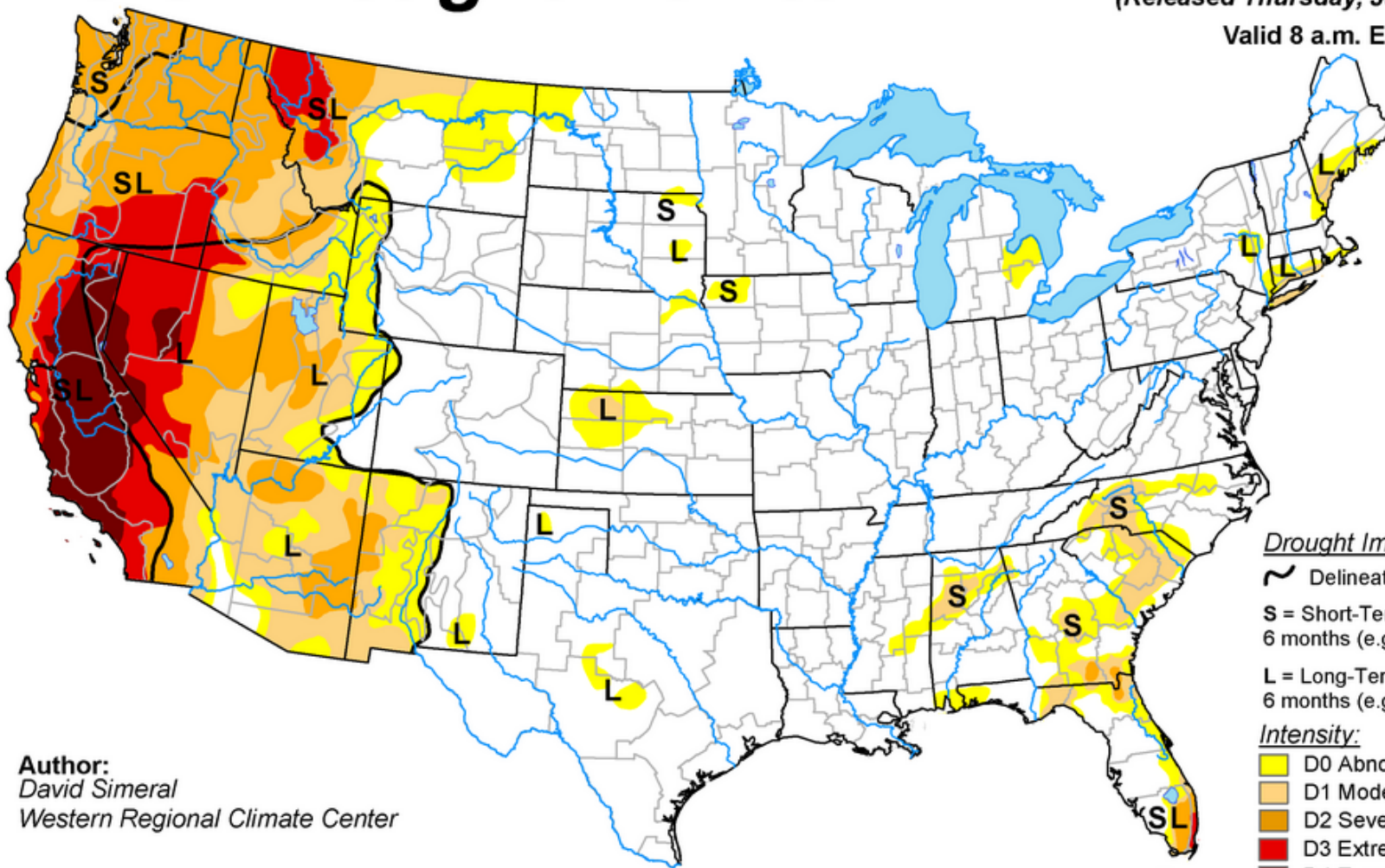
<http://droughtmonitor.unl.edu/>

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

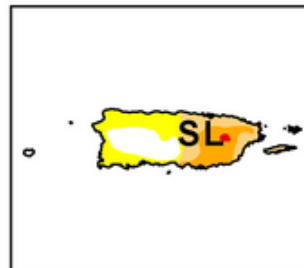
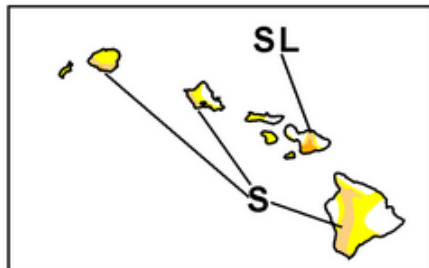
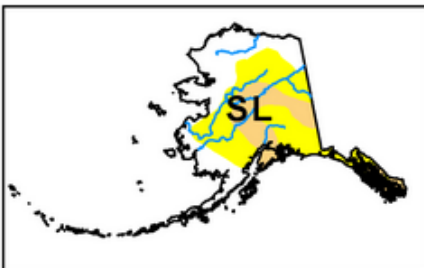
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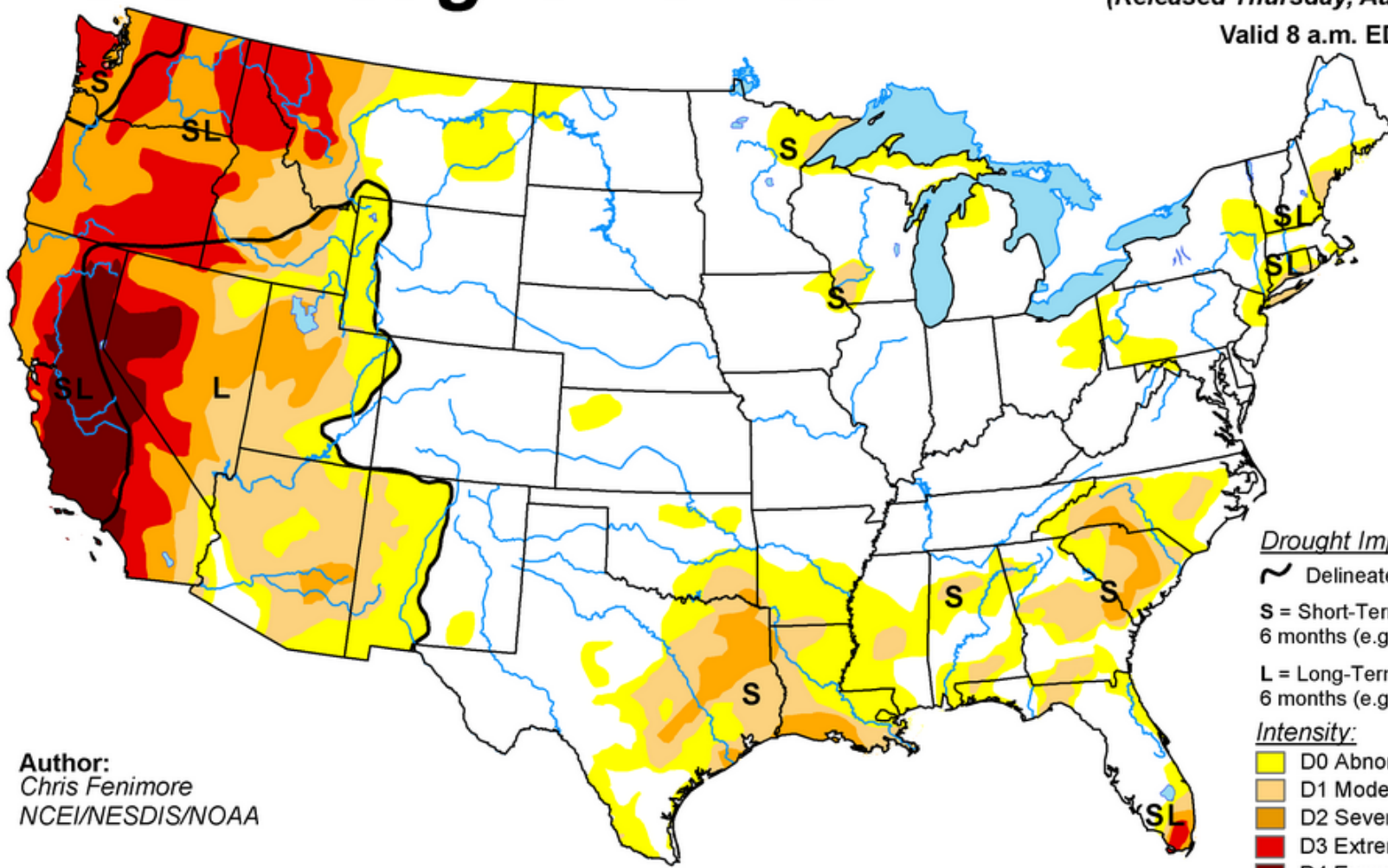


<http://droughtmonitor.unl.edu/>

U.S. Drought Monitor


August 18, 2015
(Released Thursday, Aug. 20, 2015)

Valid 8 a.m. EDT








Author:
Chris Fenimore
NCEI/NESDIS/NOAA

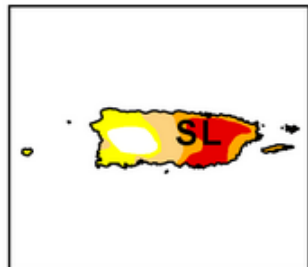
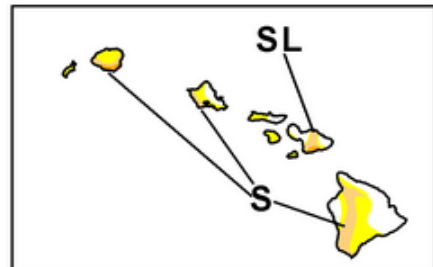
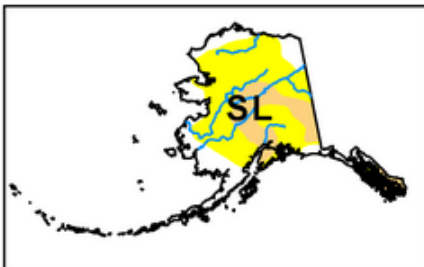
Drought Impact Types:

-  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.

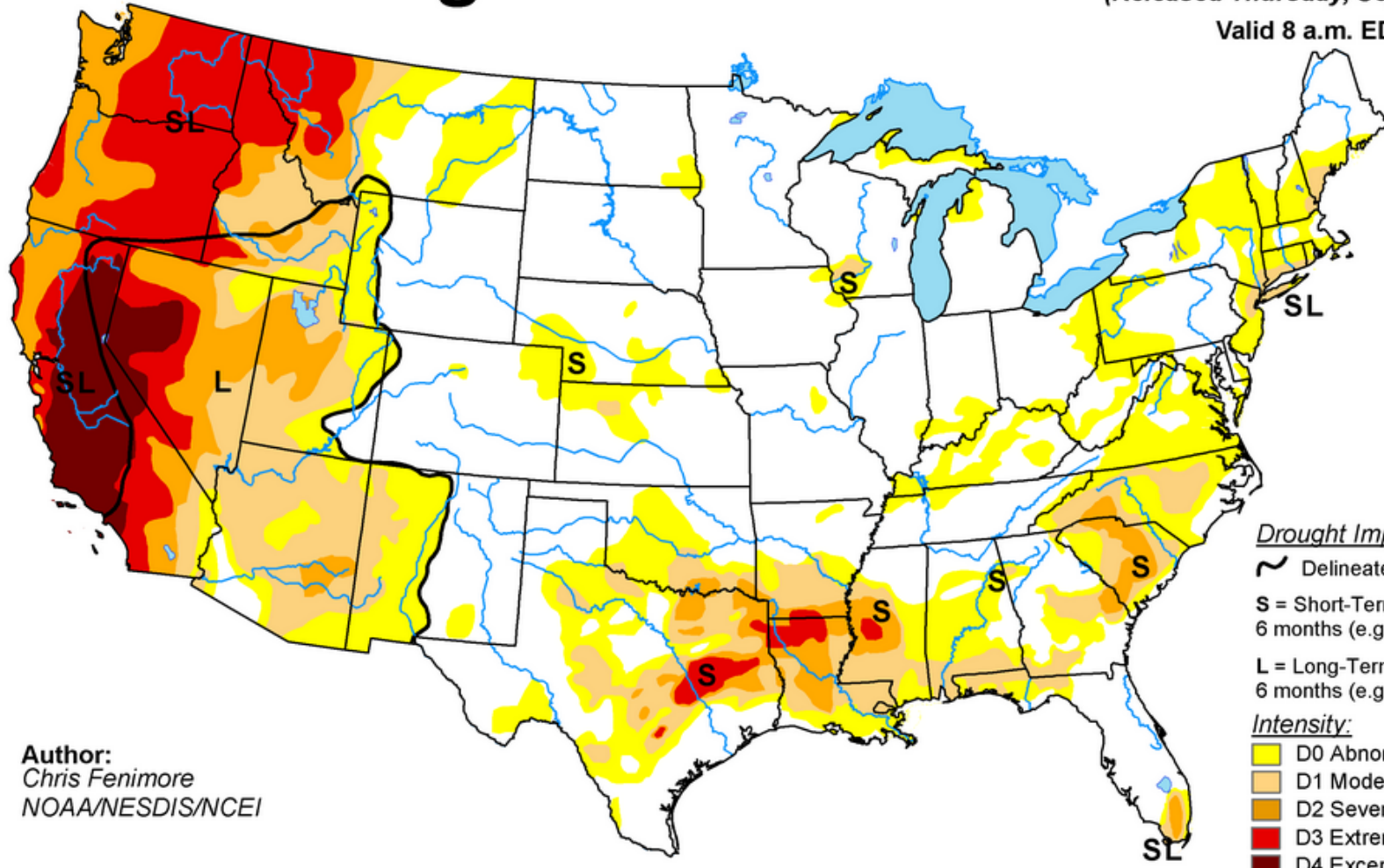


<http://droughtmonitor.unl.edu/>

U.S. Drought Monitor

September 15, 2015
(Released Thursday, Sep. 17, 2015)

Valid 8 a.m. EDT



Author:
Chris Fenimore
NOAA/NESDIS/NCEI

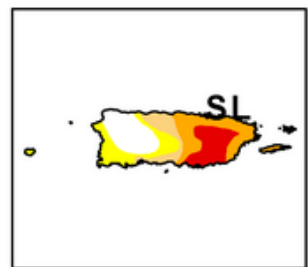
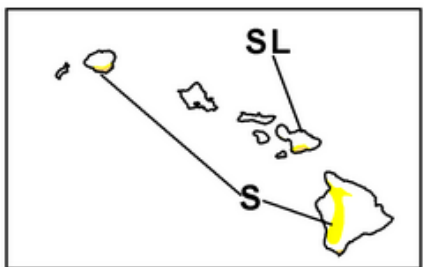
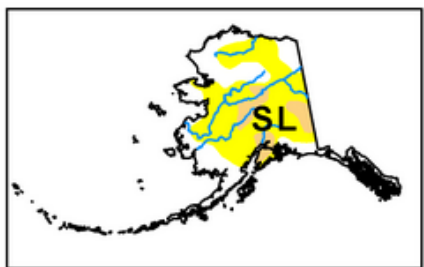
Drought Impact Types:

- ~ 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.

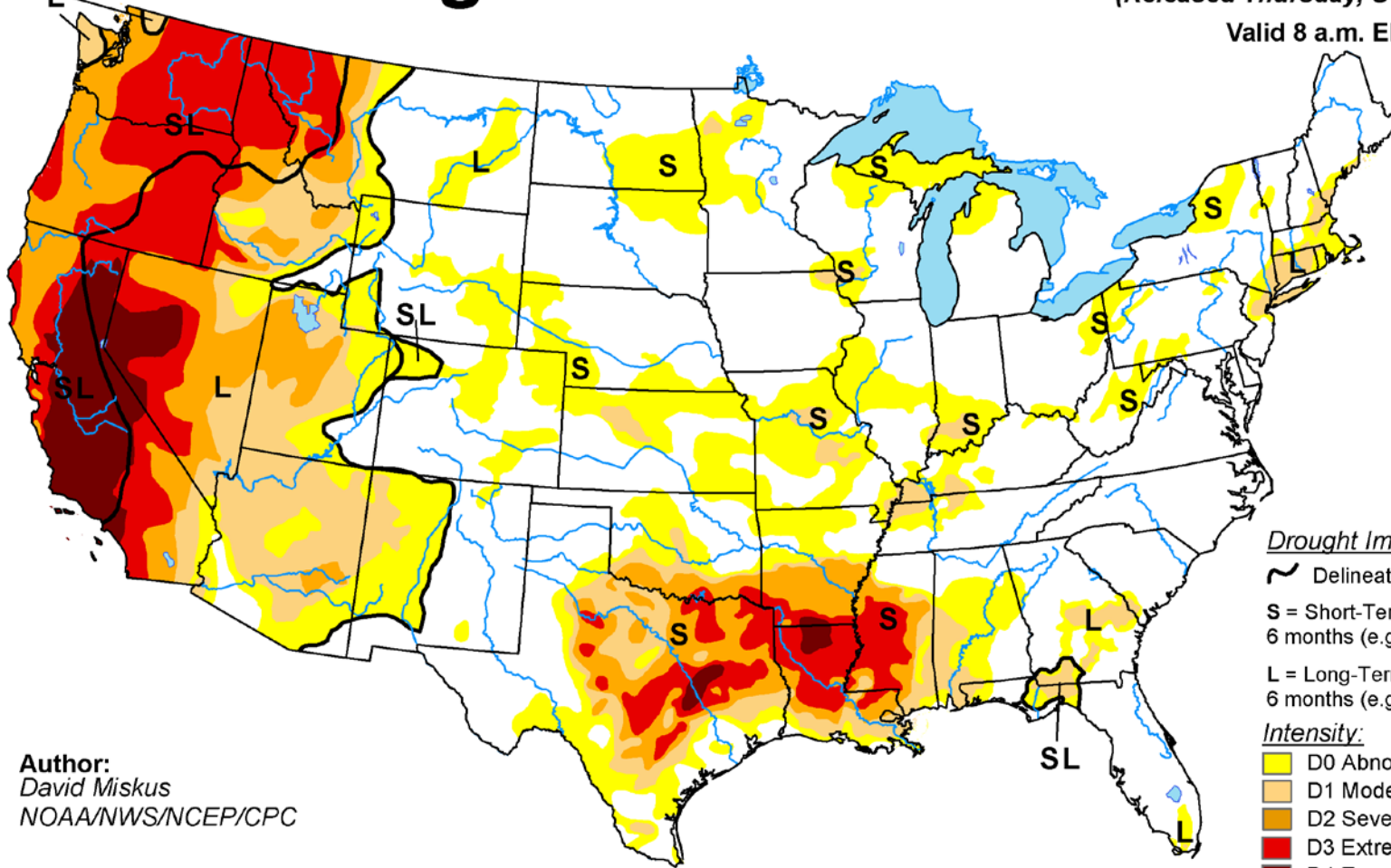


<http://droughtmonitor.unl.edu/>

U.S. Drought Monitor

October 13, 2015
(Released Thursday, Oct. 15, 2015)

Valid 8 a.m. EDT



Author:
David Miskus
NOAA/NWS/NCEP/CPC

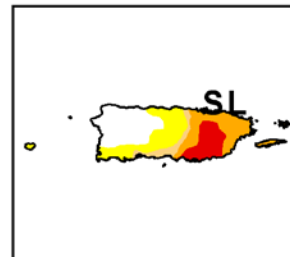
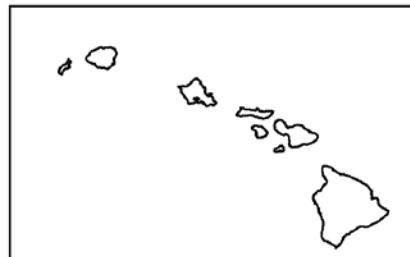
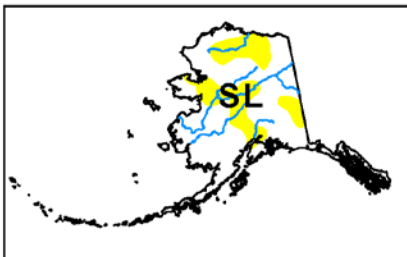
Drought Impact Types:

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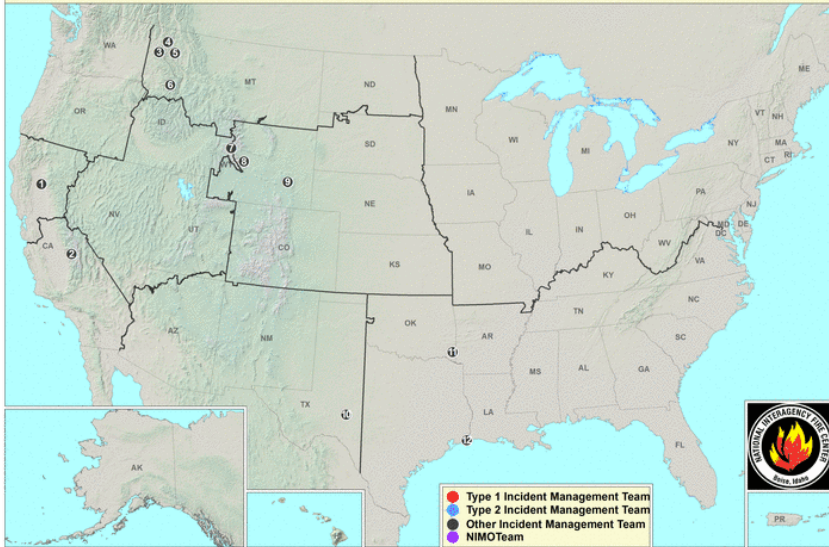
<http://droughtmonitor.unl.edu/>

Impacts

The image features a solid blue background with a white wavy line at the bottom. The word "Impacts" is centered in white text.

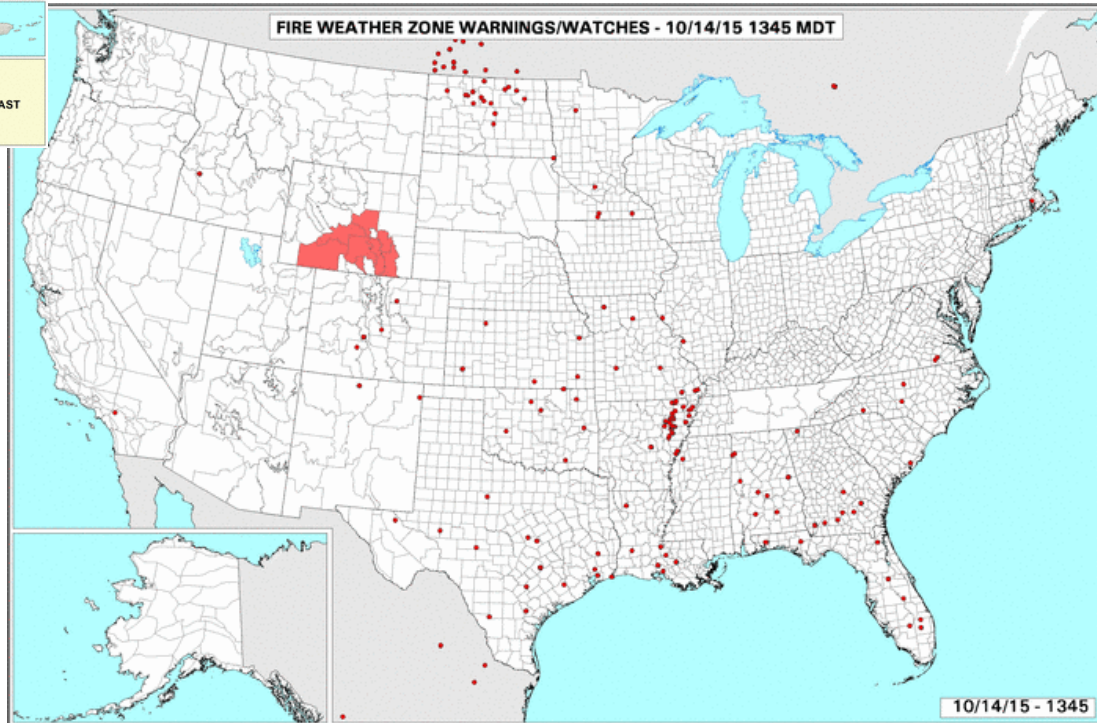
Current Large Incidents

October 09, 2015



- ① MERIDIAN
- ② ROUGH
- ③ GRIZZLY COMPLEX
- ④ GOAT ROCK COMPLEX
- ⑤ SMEARL
- ⑥ WILDERNESS COMPLEX
- ⑦ CROOKED CREEK
- ⑧ SOUTH FORK 1
- ⑨ SMITH MOUNTAIN
- ⑩ MERTZ
- ⑪ ROCK PILE MTN.
- ⑫ TEXAS POINT NORTHEAST

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

The image features a solid blue background with a white wavy line at the bottom. The text "Autumn Foliage" is centered in the upper half of the image.

Colorado foliage this past weekend

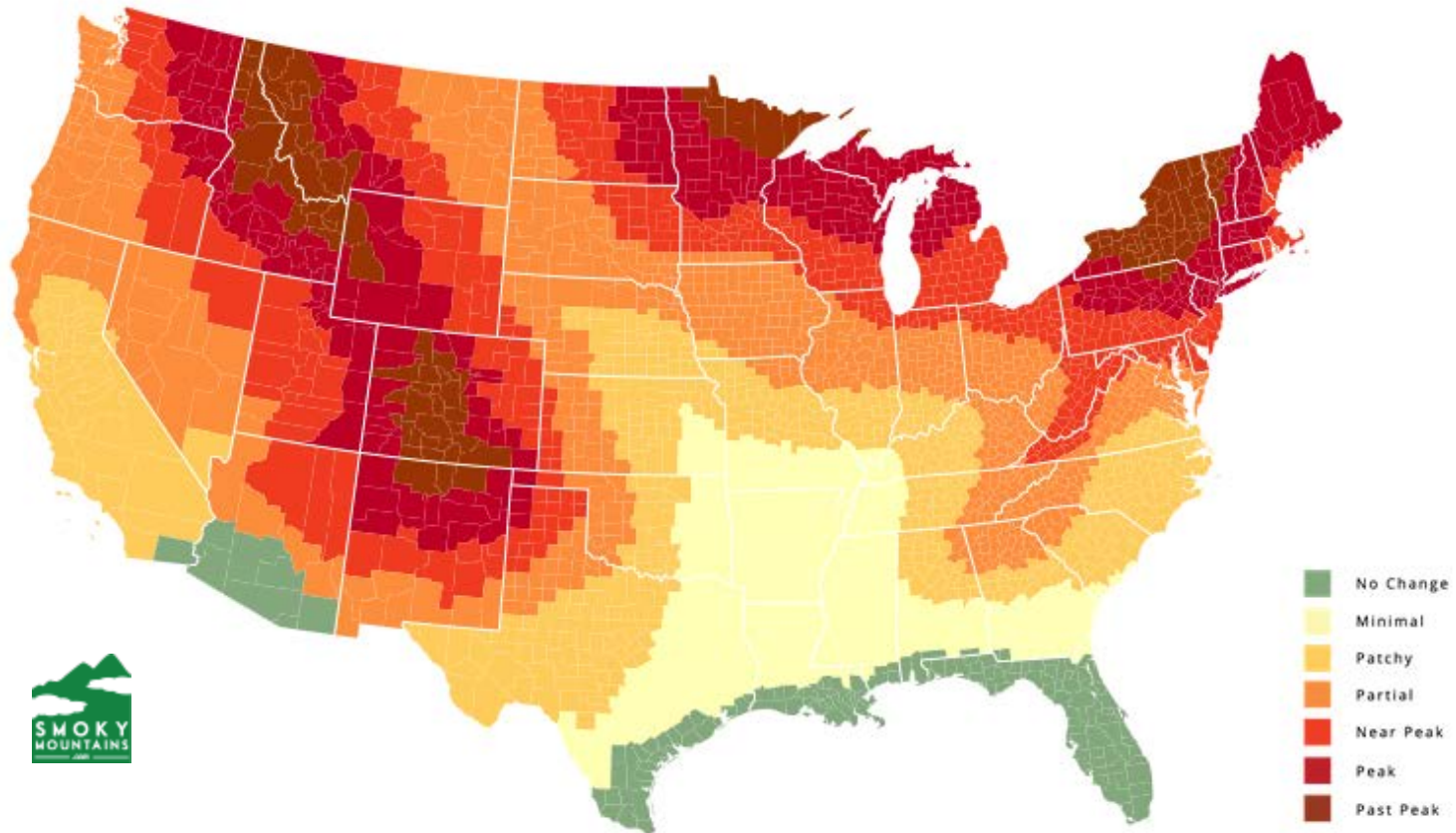


Current Fall Foliage Map

THE Fall Foliage Prediction Map

2015 EDITION

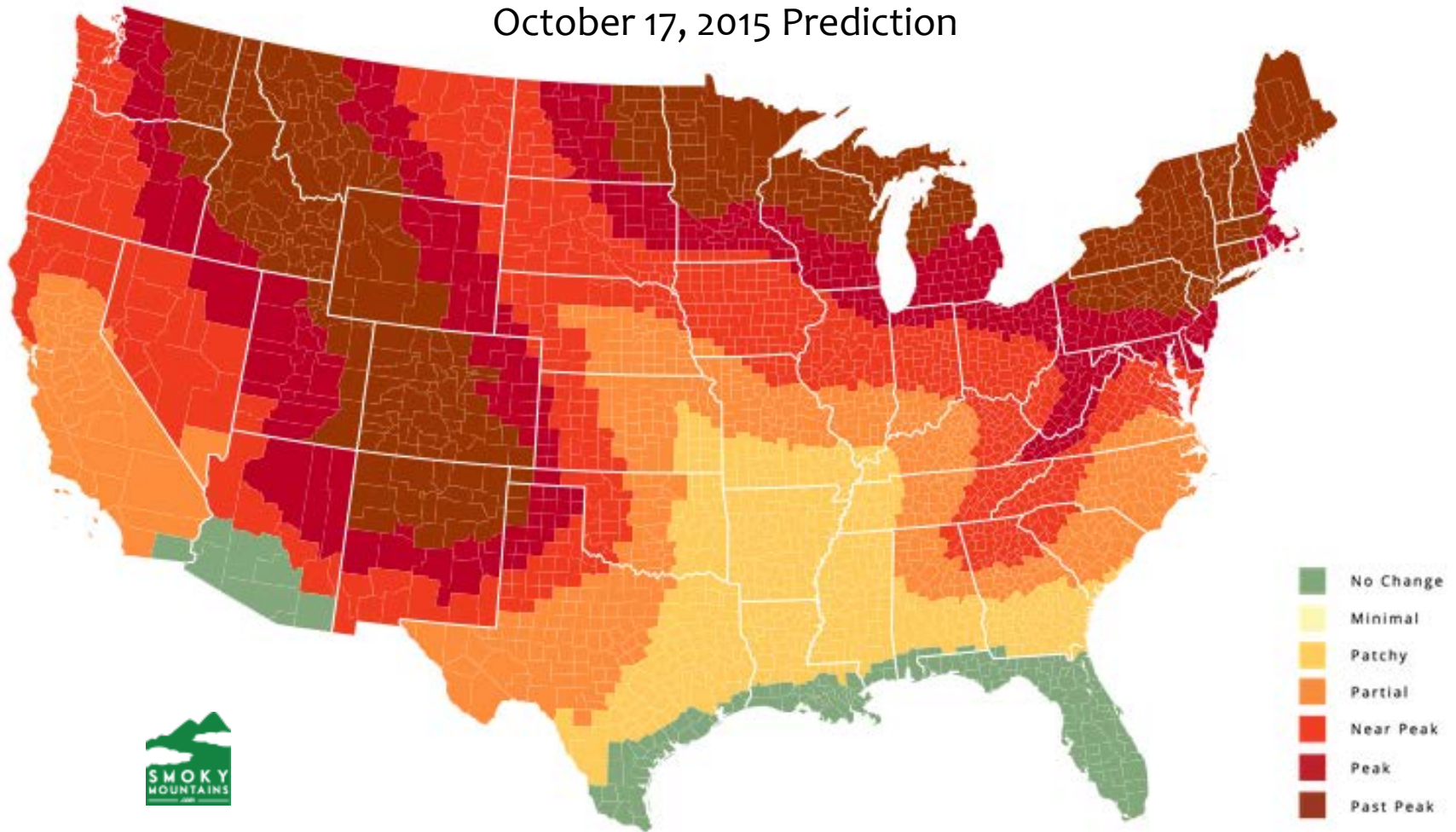
October 10, 2015



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

Current Fall Foliage Map

October 17, 2015 Prediction



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

Impacts

Great Lakes

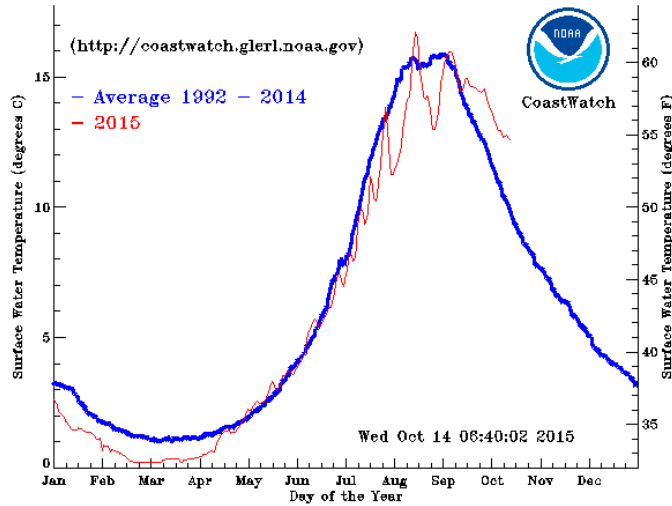
Great Lakes

- 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



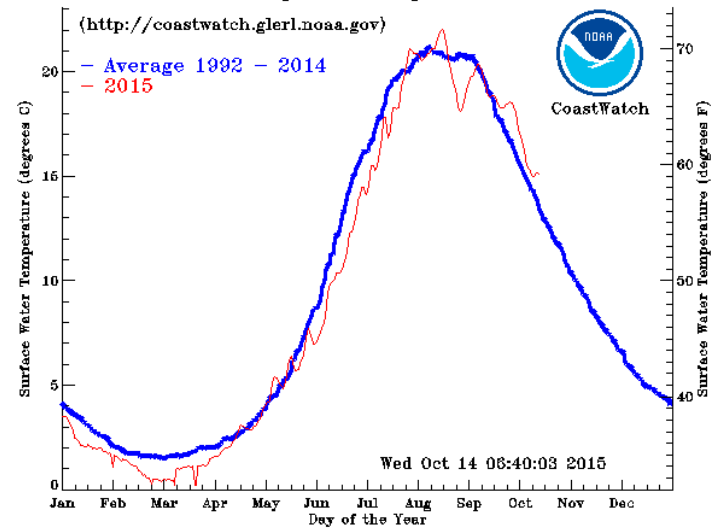
Lake Superior

Lake Superior Average Great Lakes Surface Environmental Analysis (GLSEA) Surface Water Temperature Compared to Current Year

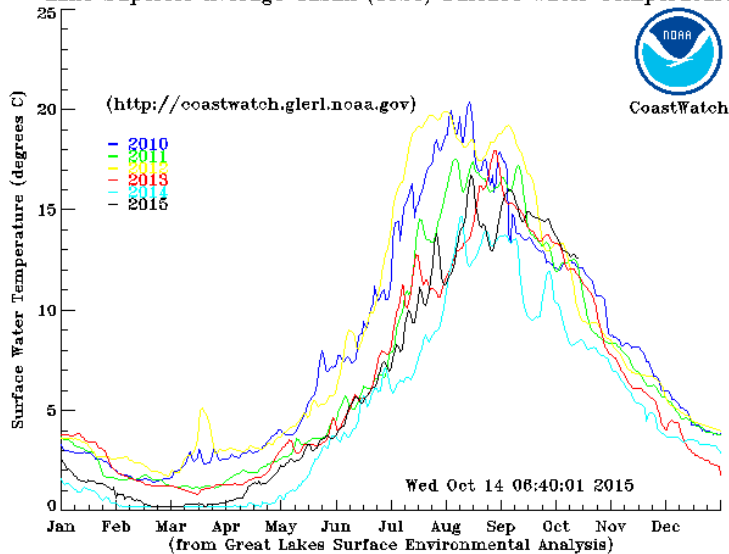


Lake Michigan

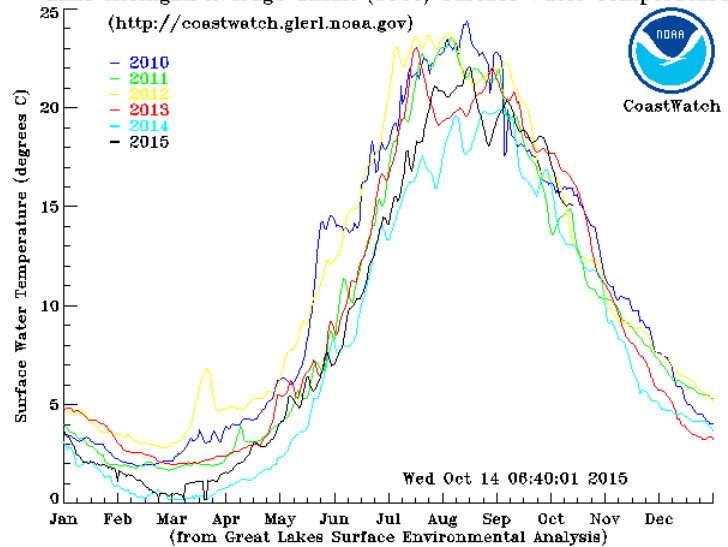
Lake Michigan Average Great Lakes Surface Environmental Analysis (GLSEA) Surface Water Temperature Compared to Current Year



Lake Superior Average GLSEA (1024) Surface Water Temperature

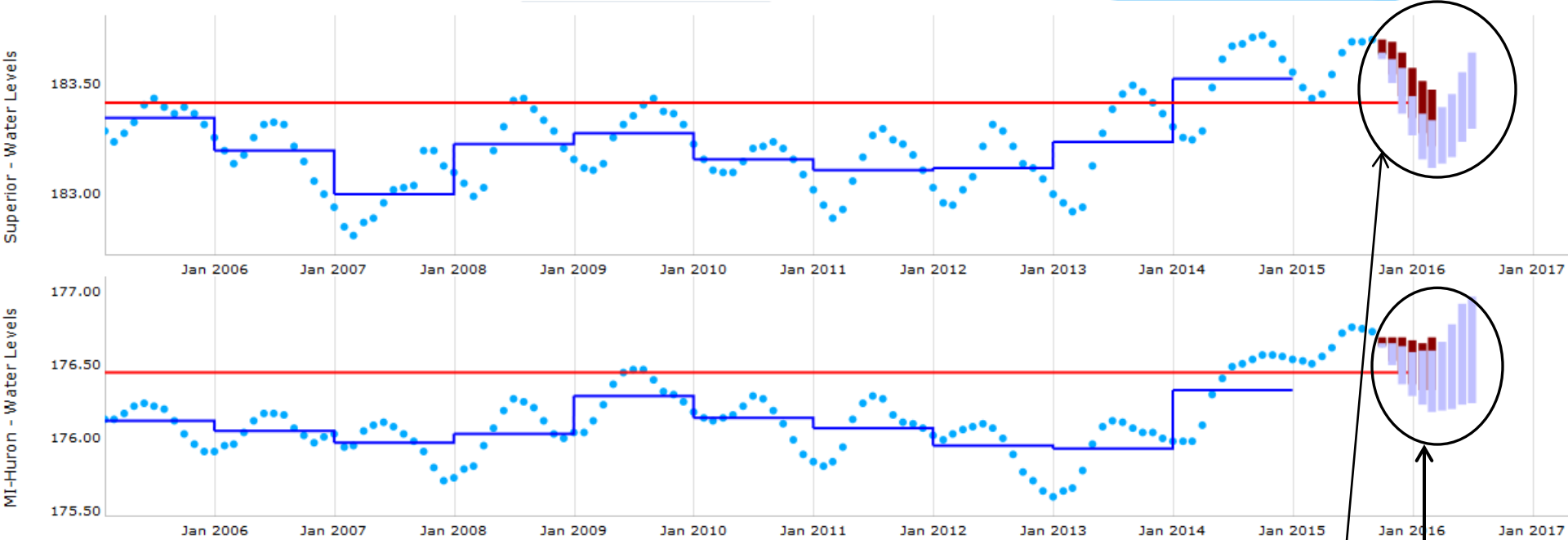


Lake Michigan Average GLSEA (1024) Surface Water Temperature



Great Lakes Levels

Lake Superior



Lake Michigan-Huron

Predicted levels

Edmund Fitzgerald – 40 years ago

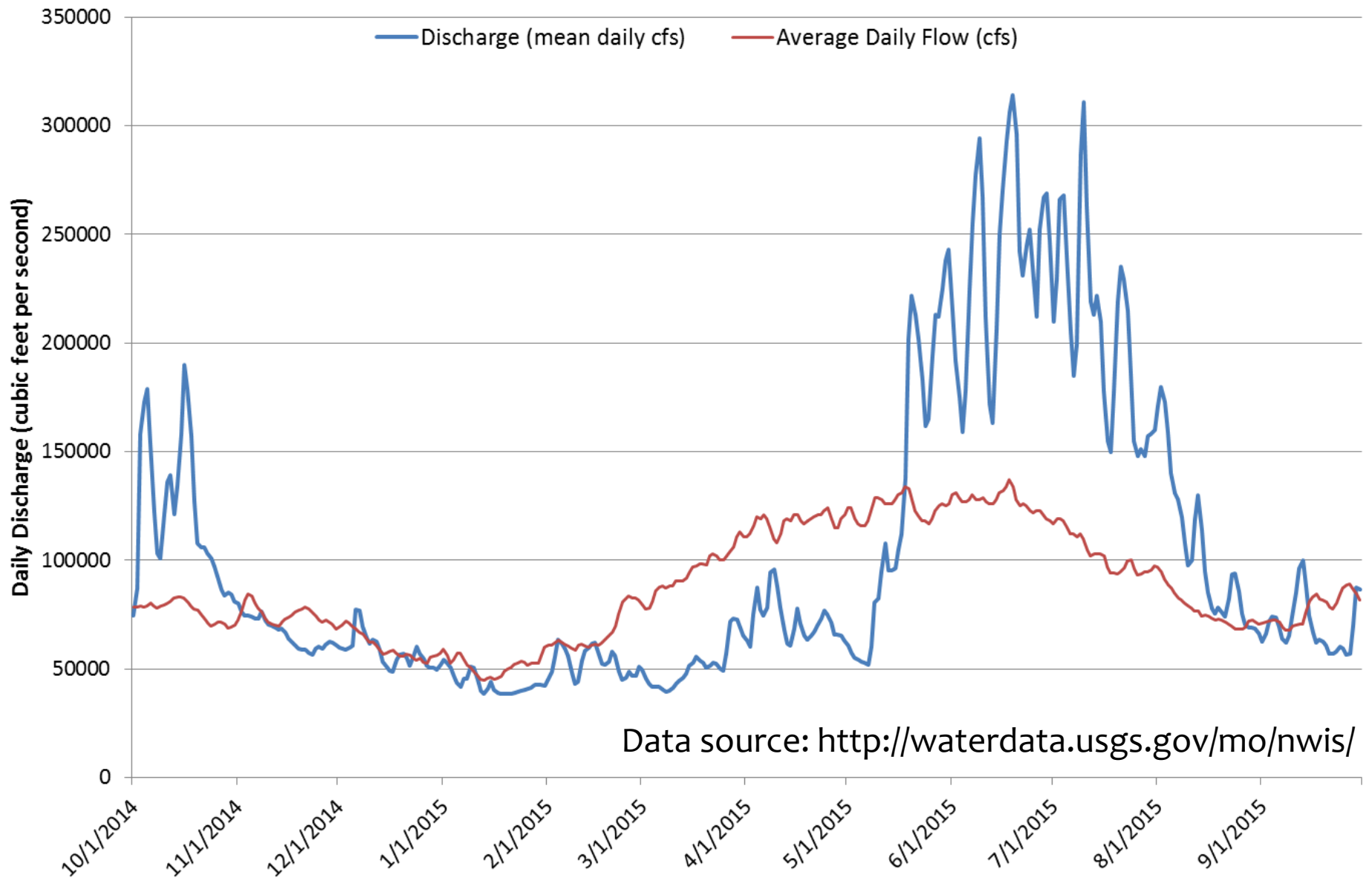


Will the gales of November come early this year?

Impacts

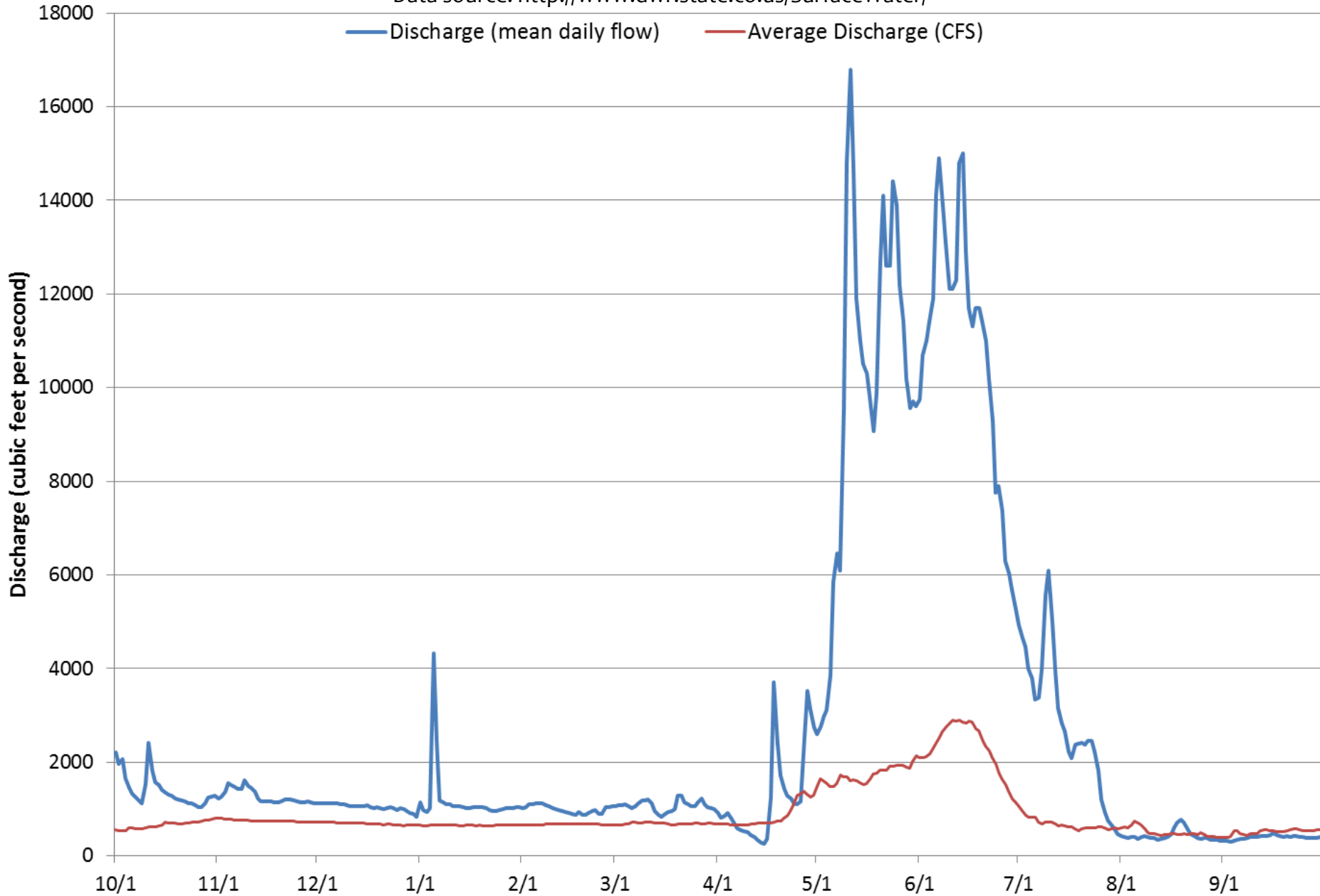
Missouri River/Streams

Missouri River at Hermann, MO Daily Streamflow Water Year 2015



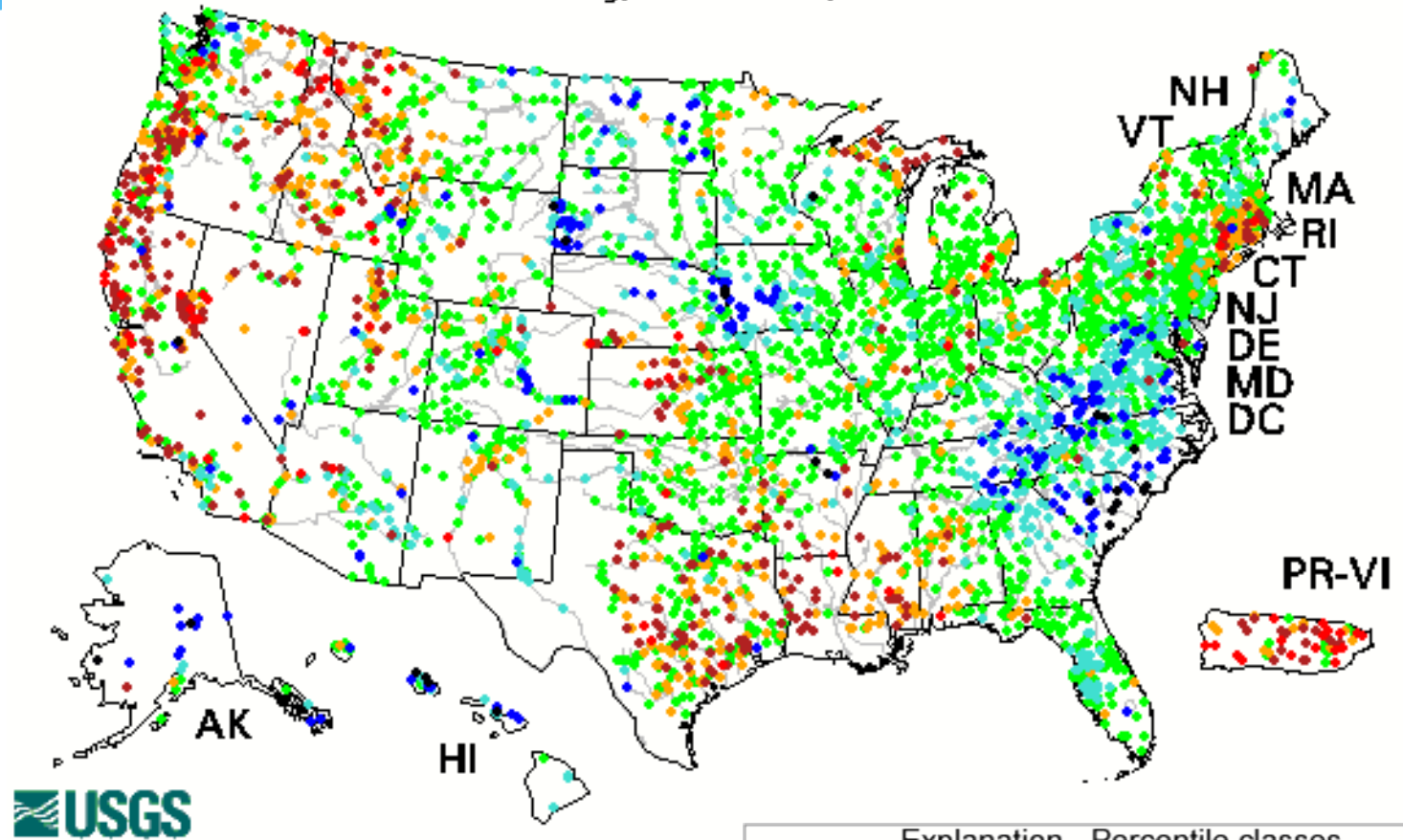
South Platte River at Kersey, CO Daily Streamflow

Data source: <http://www.dwr.state.co.us/SurfaceWater/>



7-Day Average Streamflow

Tuesday, October 13, 2015



Wednesday, 15 Apr. 2015

Explanation - Percentile classes						
Low	<10	10-24	25-75	76-90	>90	High
	Much below normal	Below normal	Normal	Above normal	Much above normal	

<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

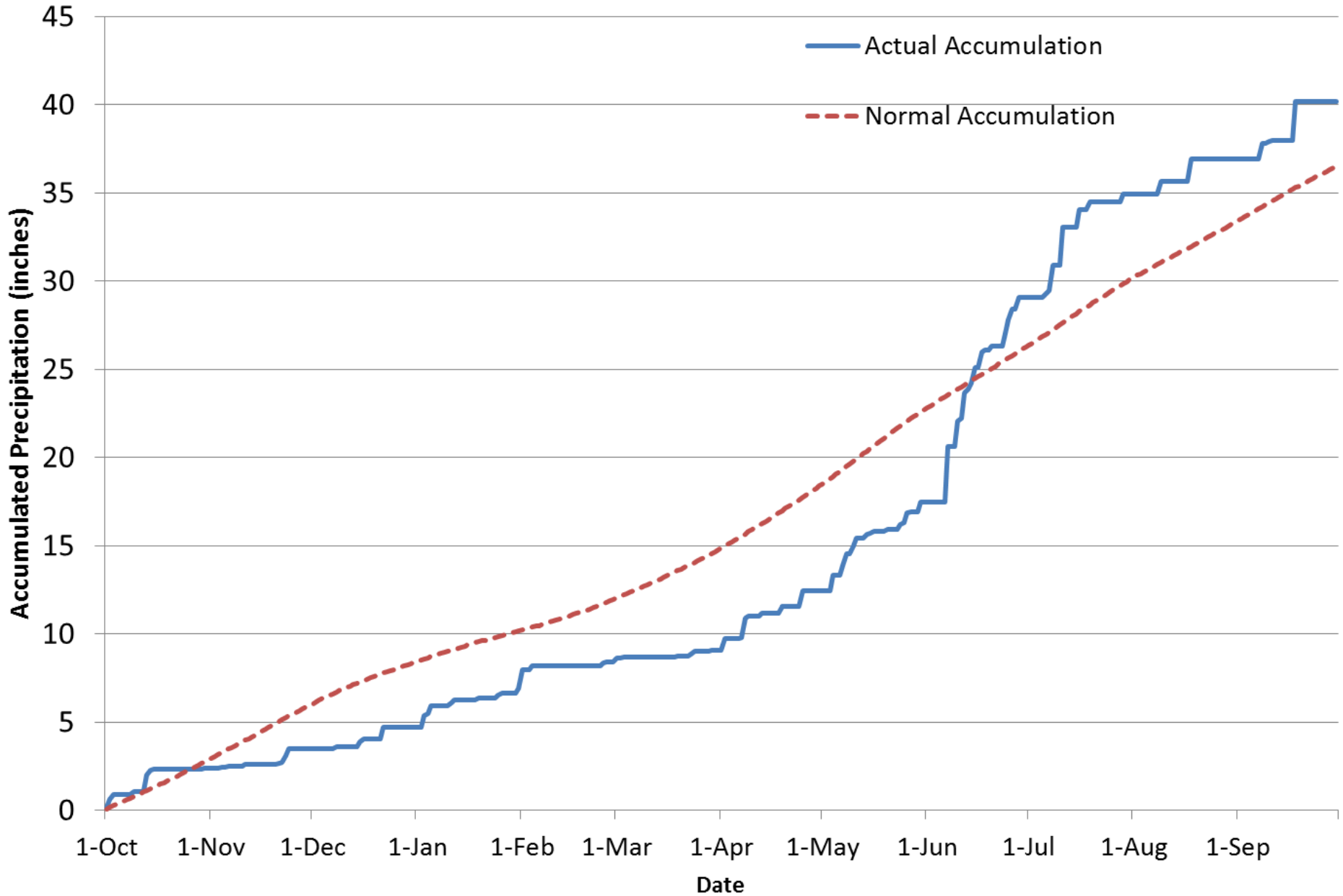
Fall Ag Activity



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



Impacts

Wheat Belt

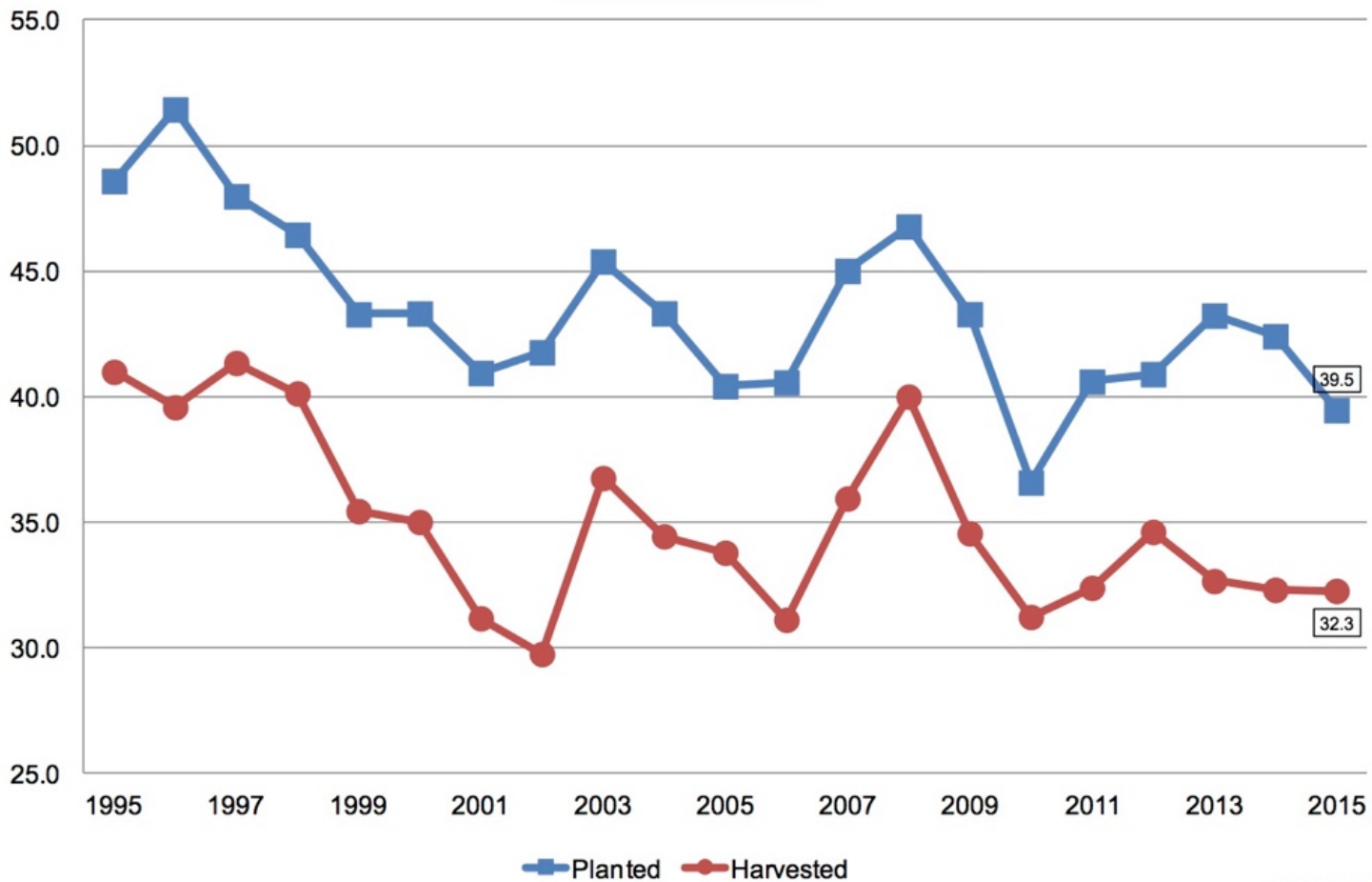
Winter wheat

- * 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

Million Acres

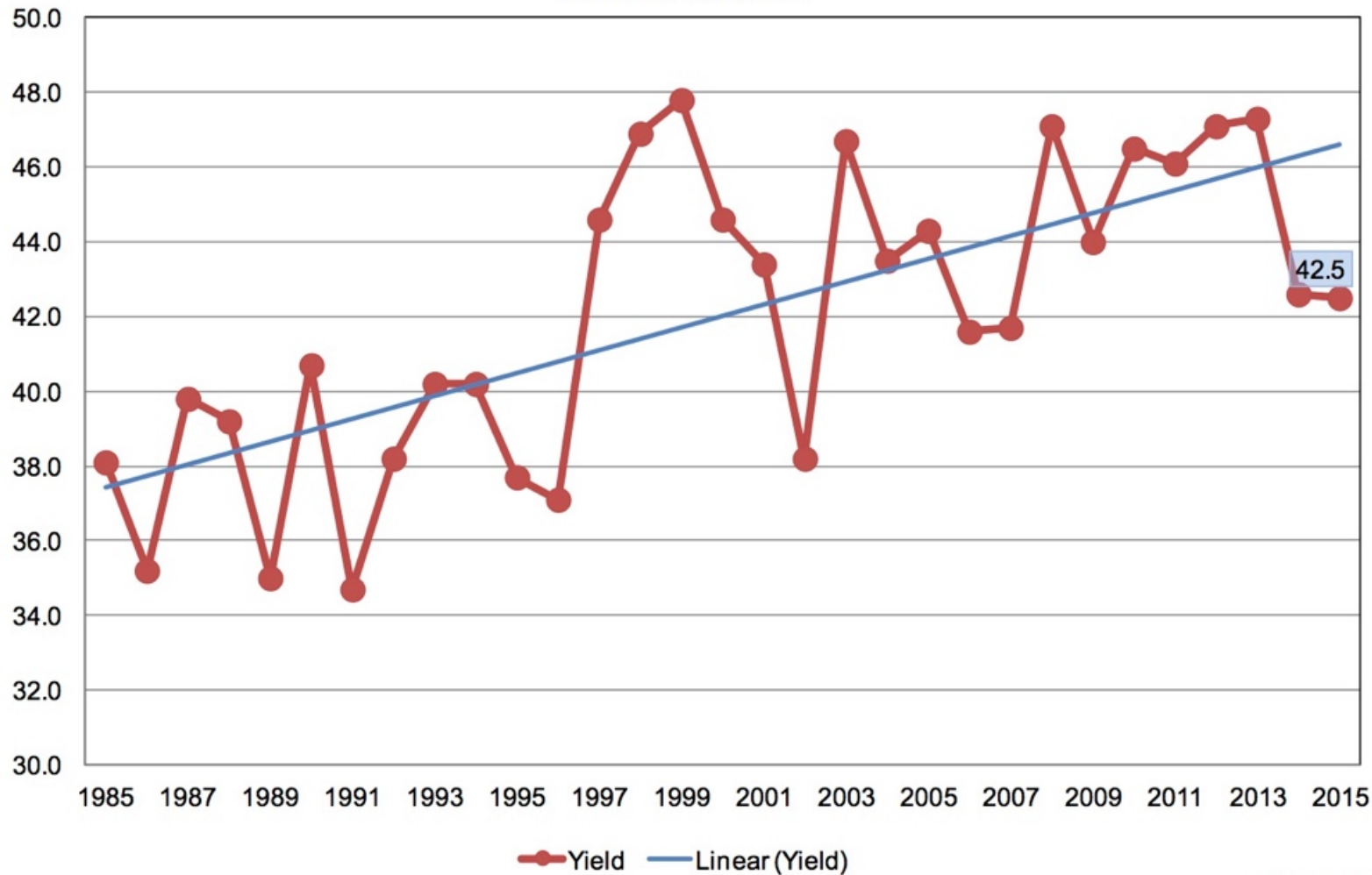


USDA-NASS
9-30-15



Winter Wheat Yield United States

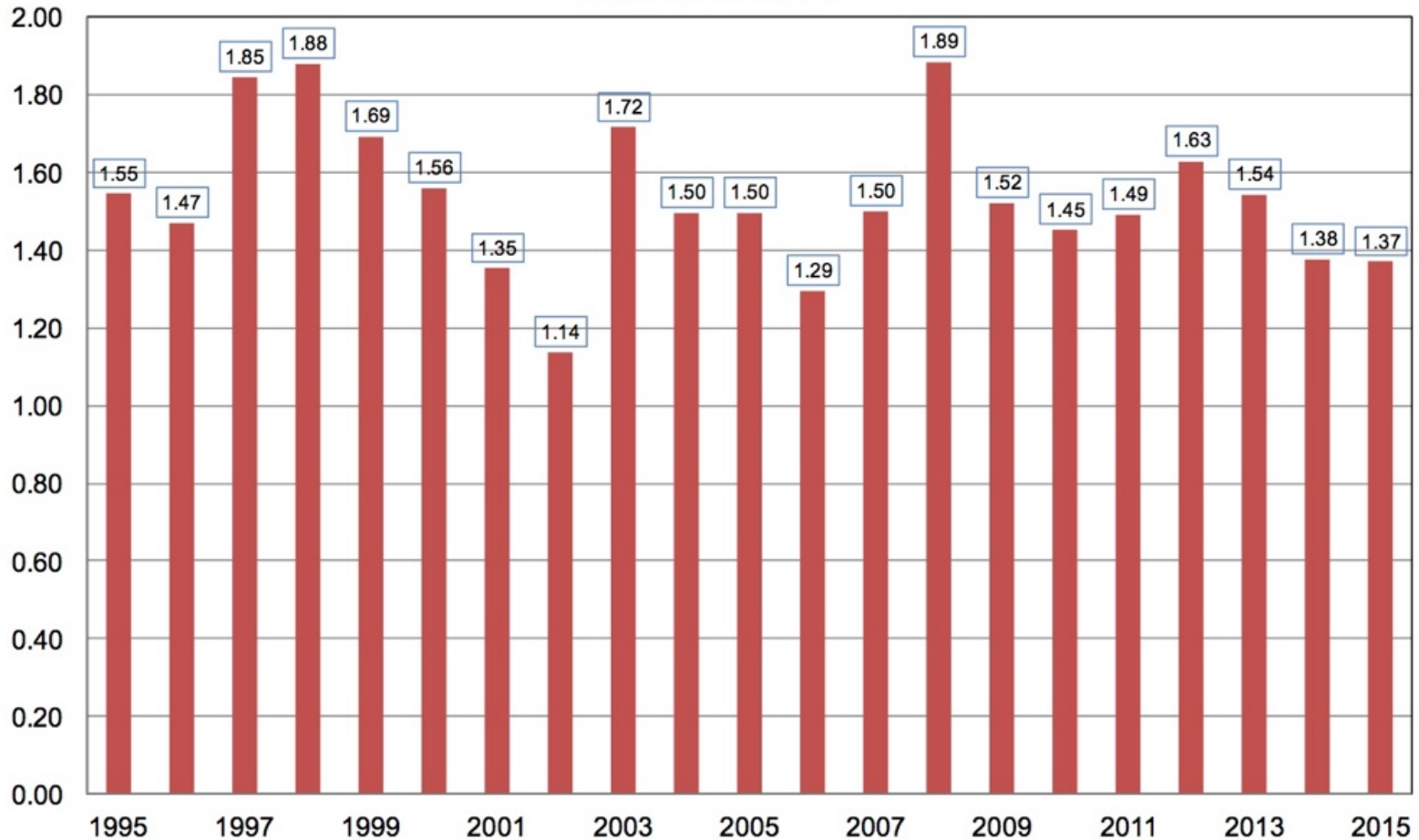
Bushels per Acre





Winter Wheat Production United States

Billion Bushels



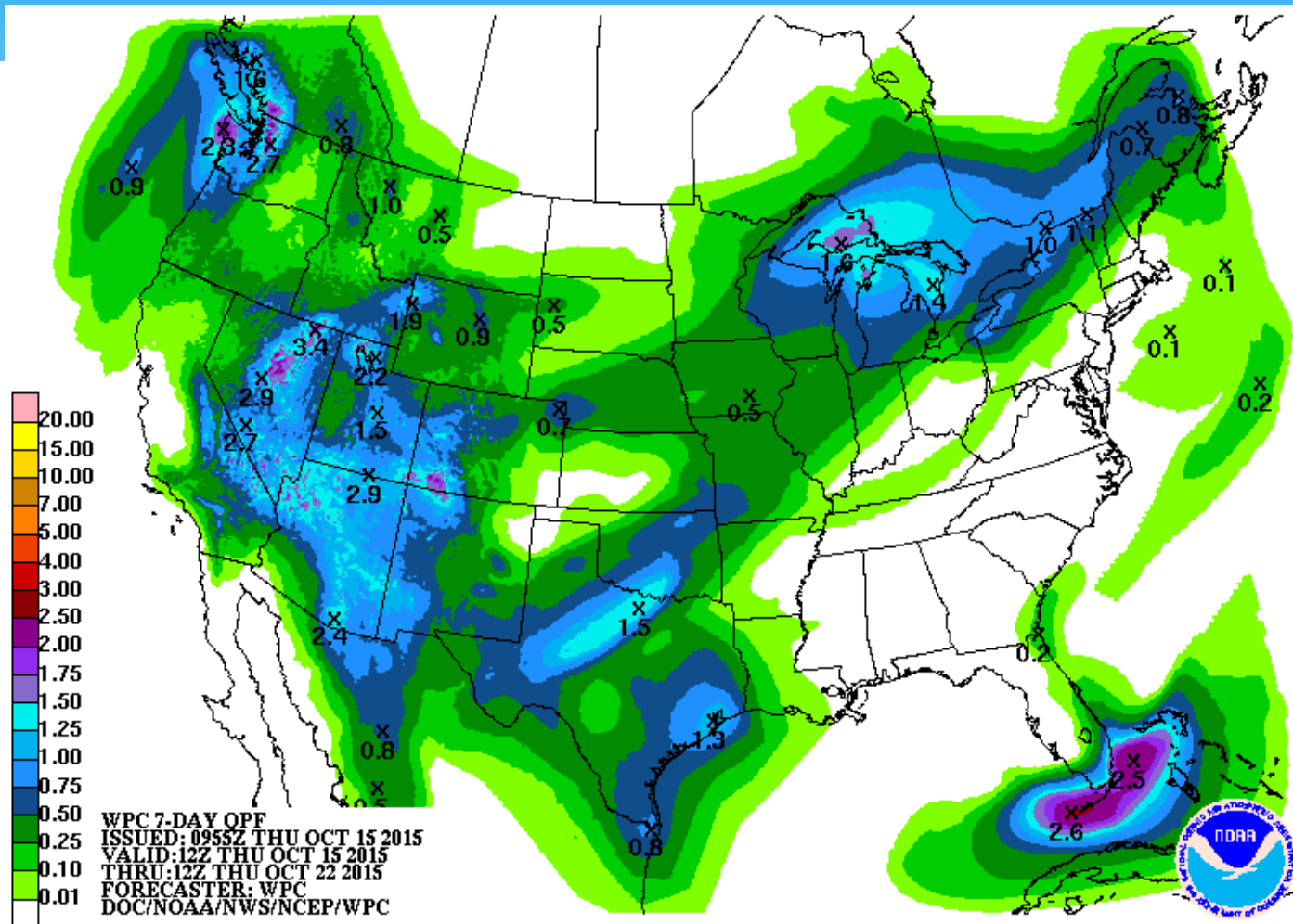
Outlooks

Climate Outlooks

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

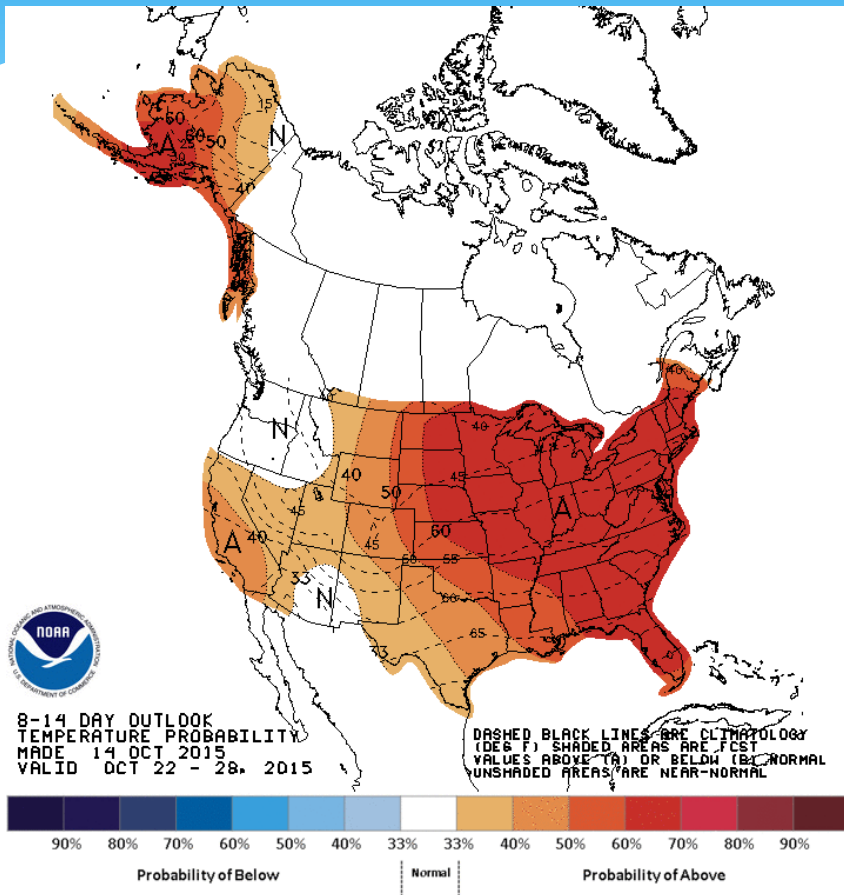
7-day Quantitative Precipitation Forecast

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

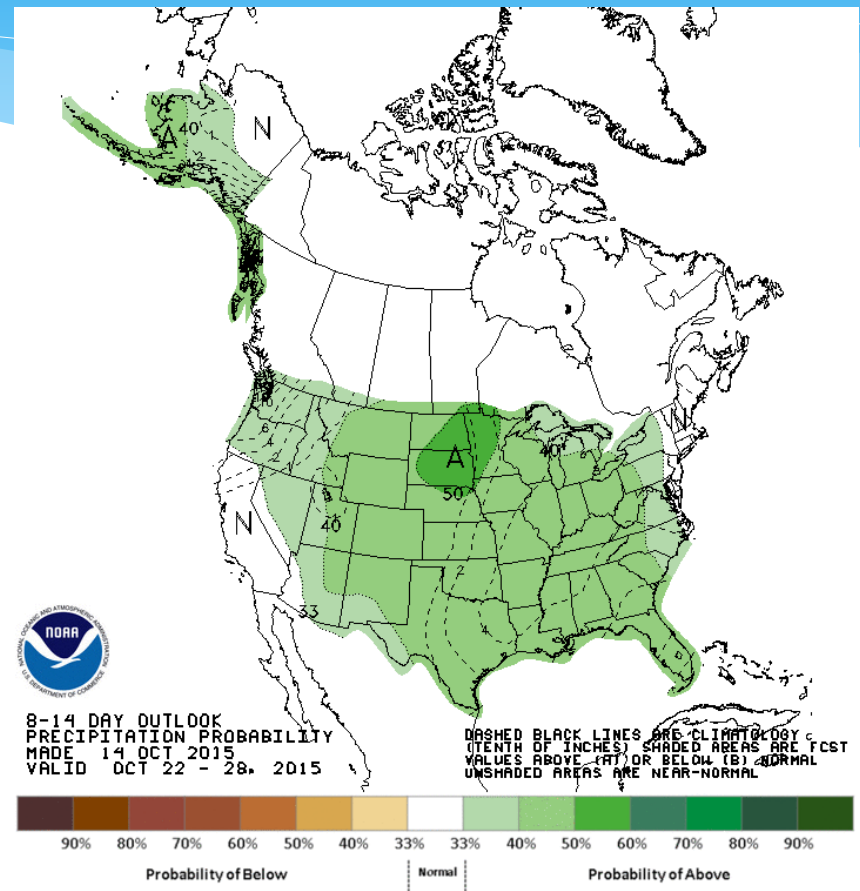


<http://www.wpc.ncep.noaa.gov/qpf/day1-7.shtml>

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

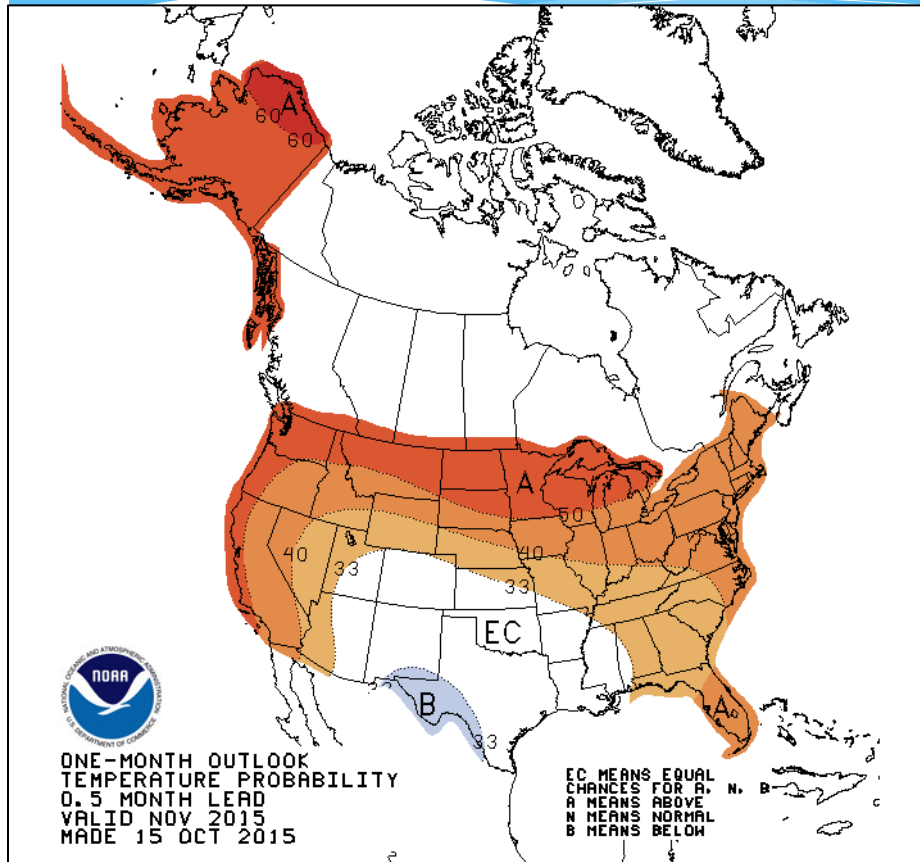


Temperature

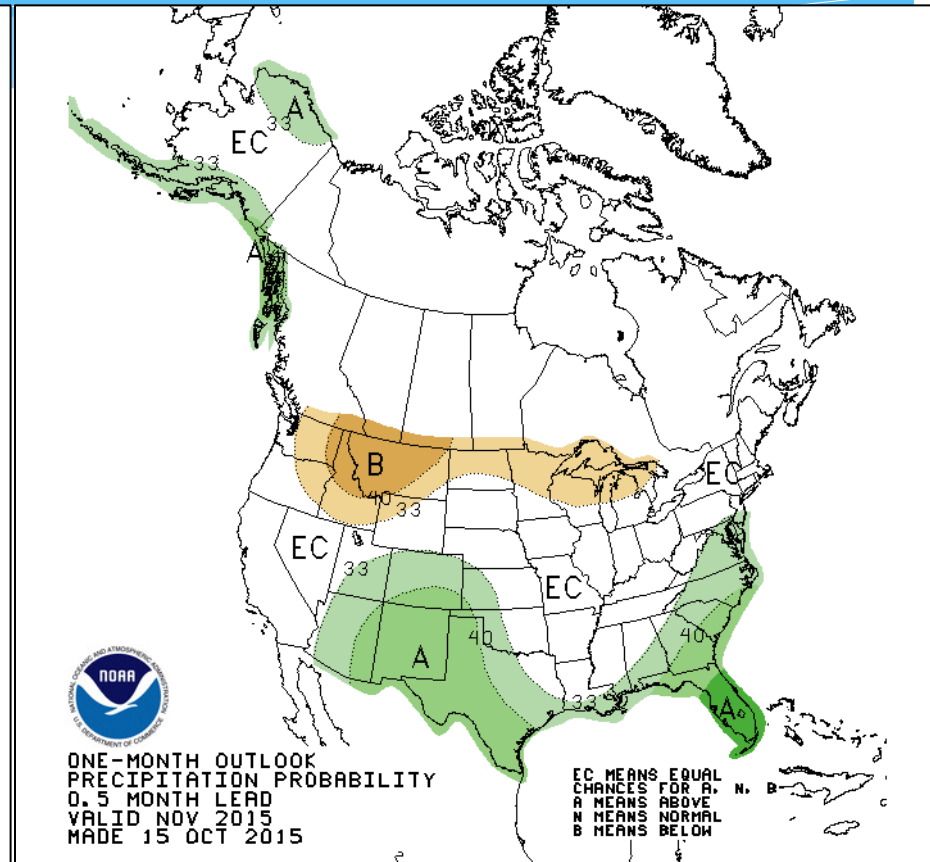


Precipitation

November Temperature and Precipitation Probabilities



Temperature

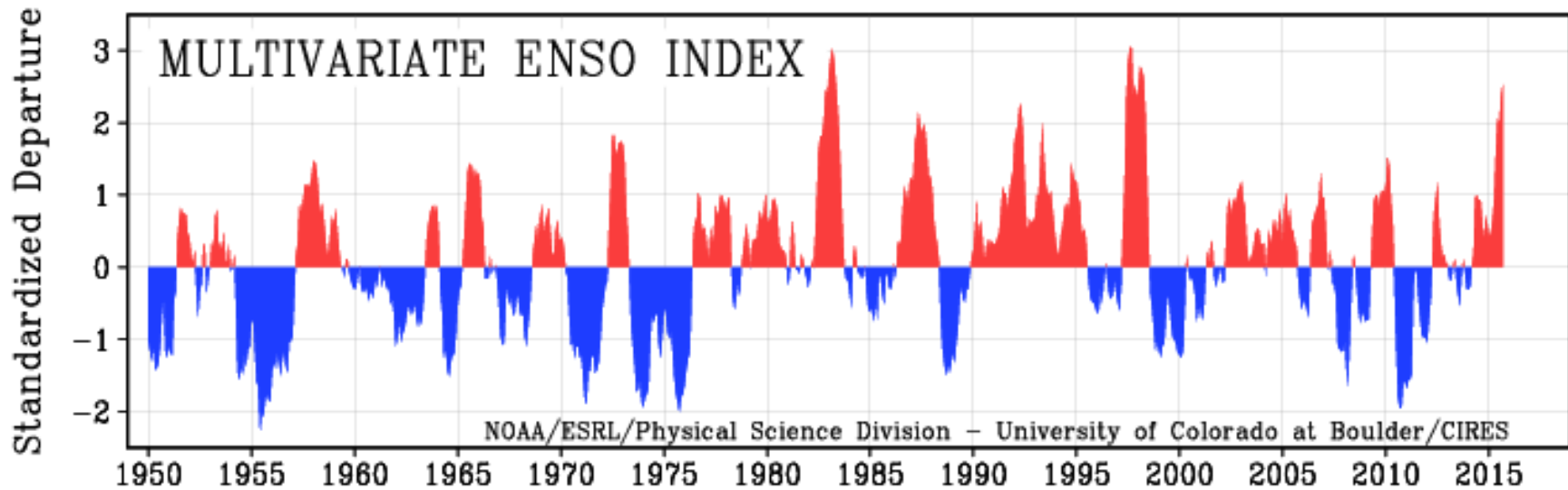


Precipitation

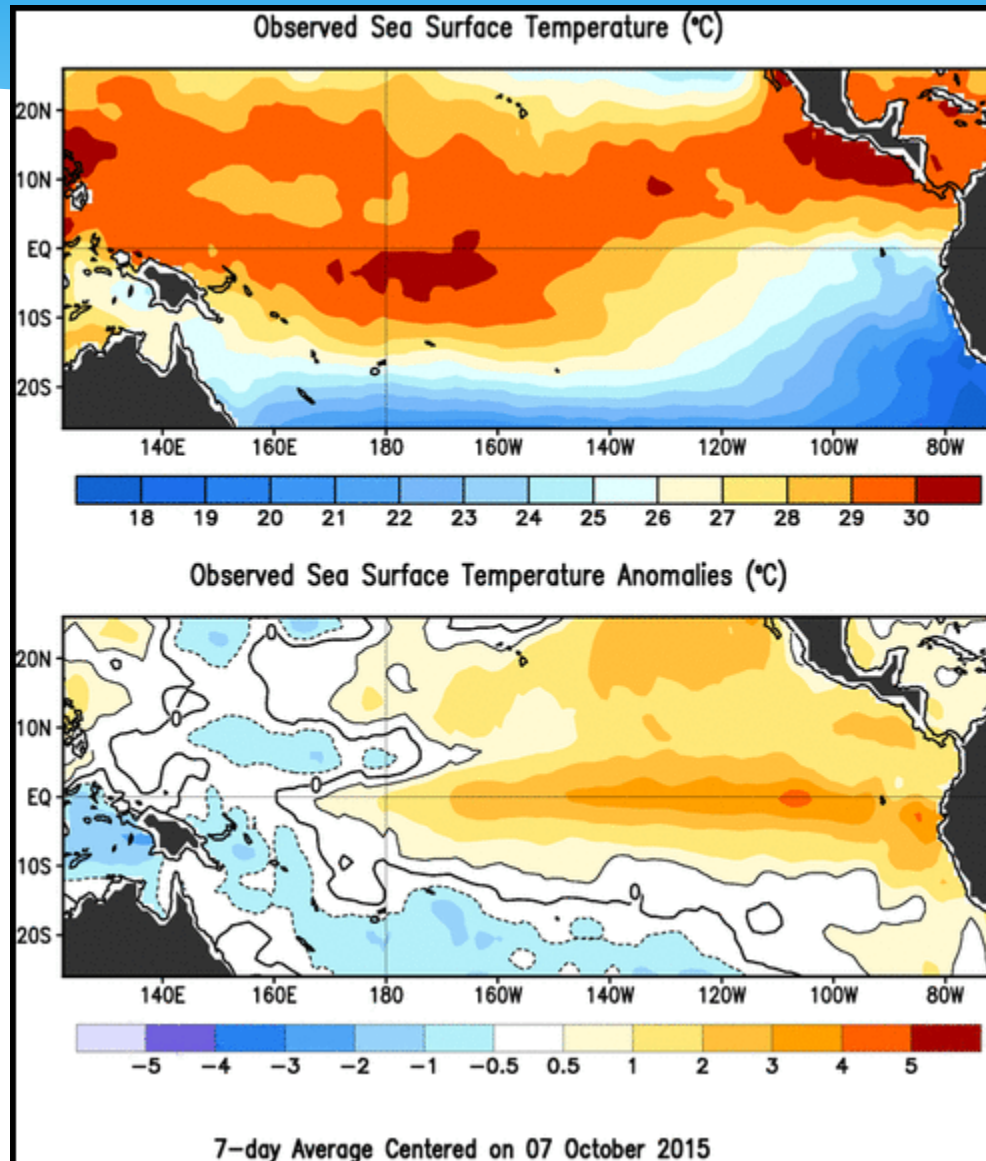
<http://www.cpc.ncep.noaa.gov/products/predictions/30day/>

El Niño

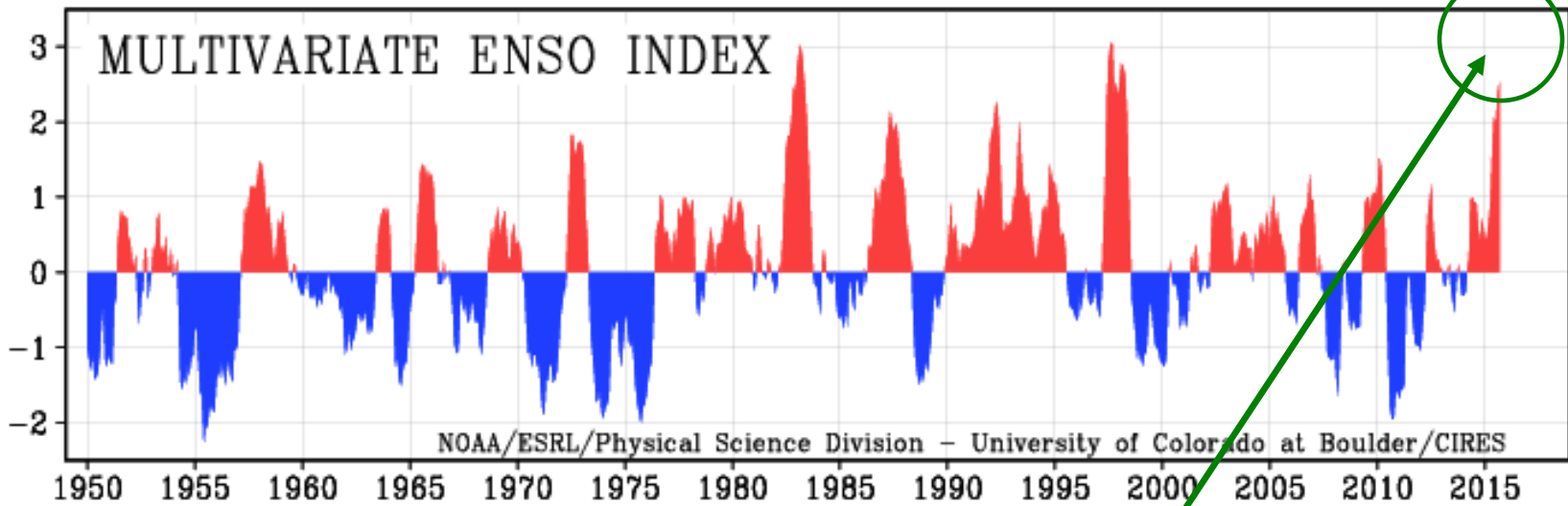
***Alive and Well**



Weekly Sea Surface Temperature Anomalies

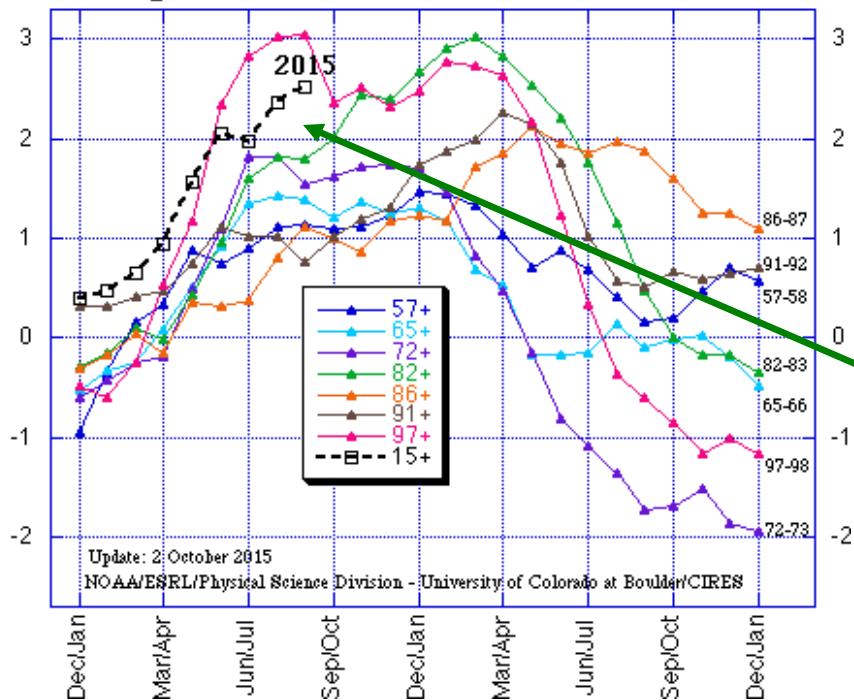


Standardized Departure



Multivariate ENSO Index (MEI) for the seven strongest El Niño events since 1950 vs. 2015

Standardized Departure

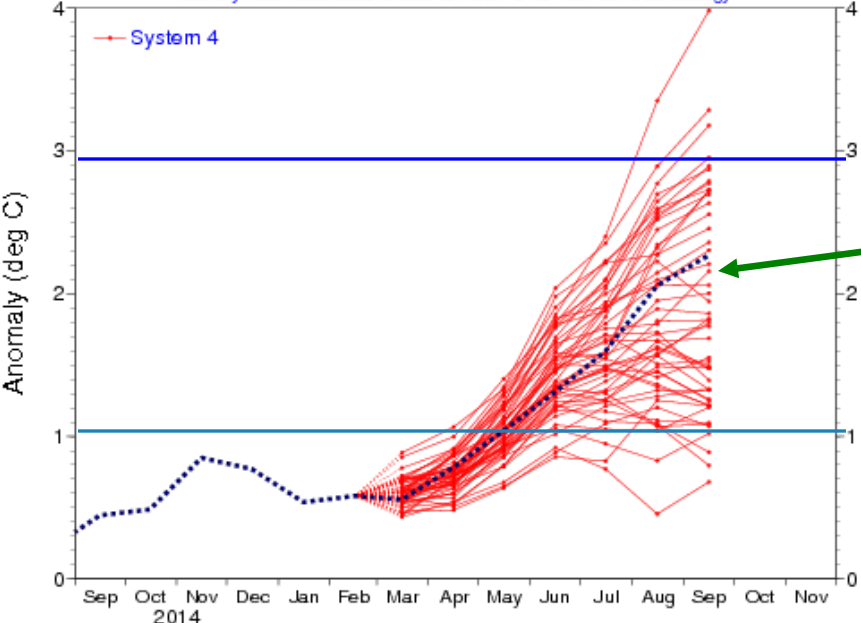


The **MEI** monitors ENSO based on all observed fields over the tropical Pacific (pressure, wind, temperatures, and cloudiness). El Niño events can reach up to +3 standard deviations, while La Niña events may dip down to -2 standard deviations. **The current El Niño has already reached +2.53, the largest 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>

NINO3.4 SST anomaly plume ECMWF forecast from 1 Mar 2015

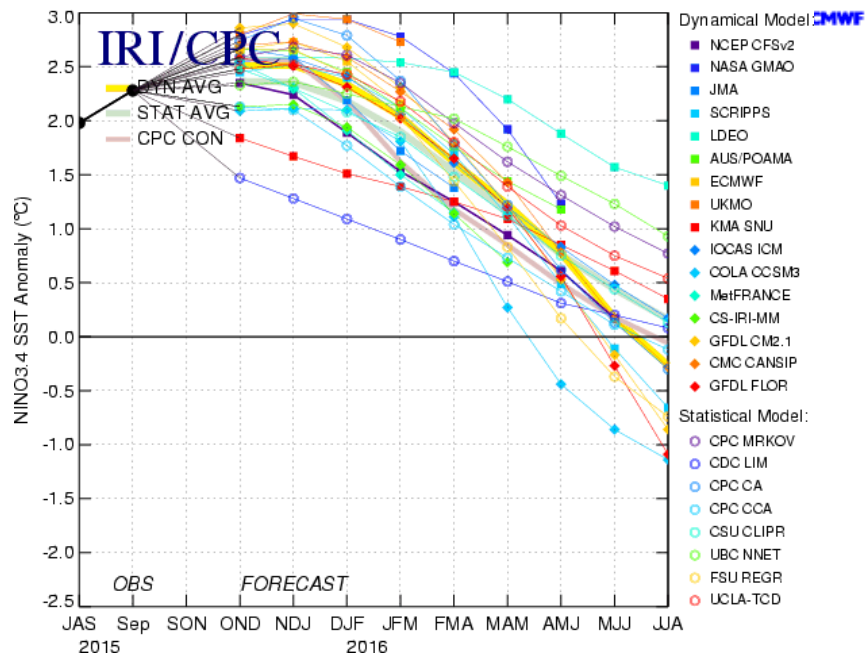
Monthly mean anomalies relative to NCEP OIv2 1981-2010 climatology



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

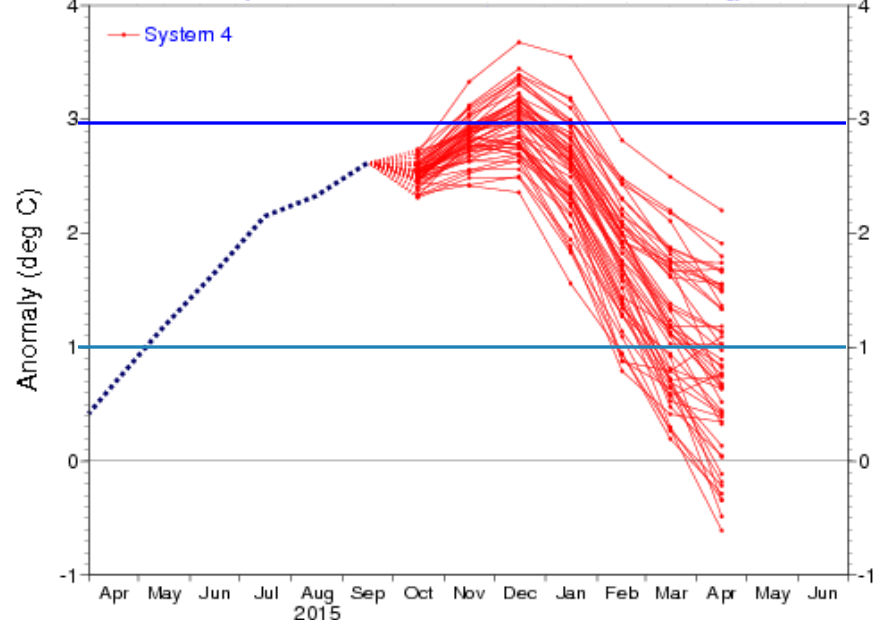
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/seasonal_range_forecast/

Mid-Oct 2015 Plume of Model ENSO Predictions



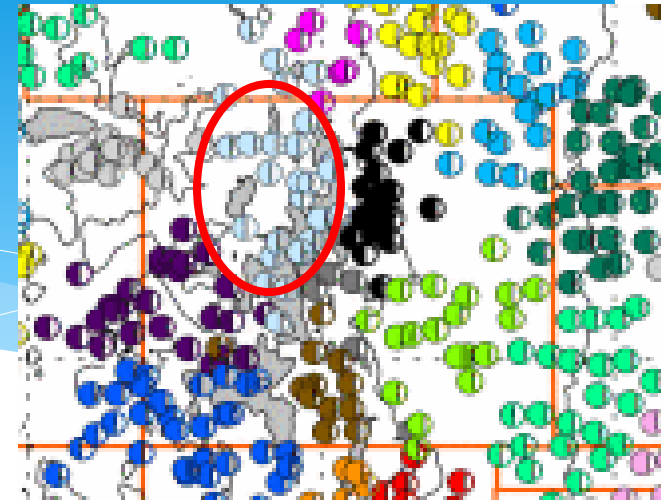
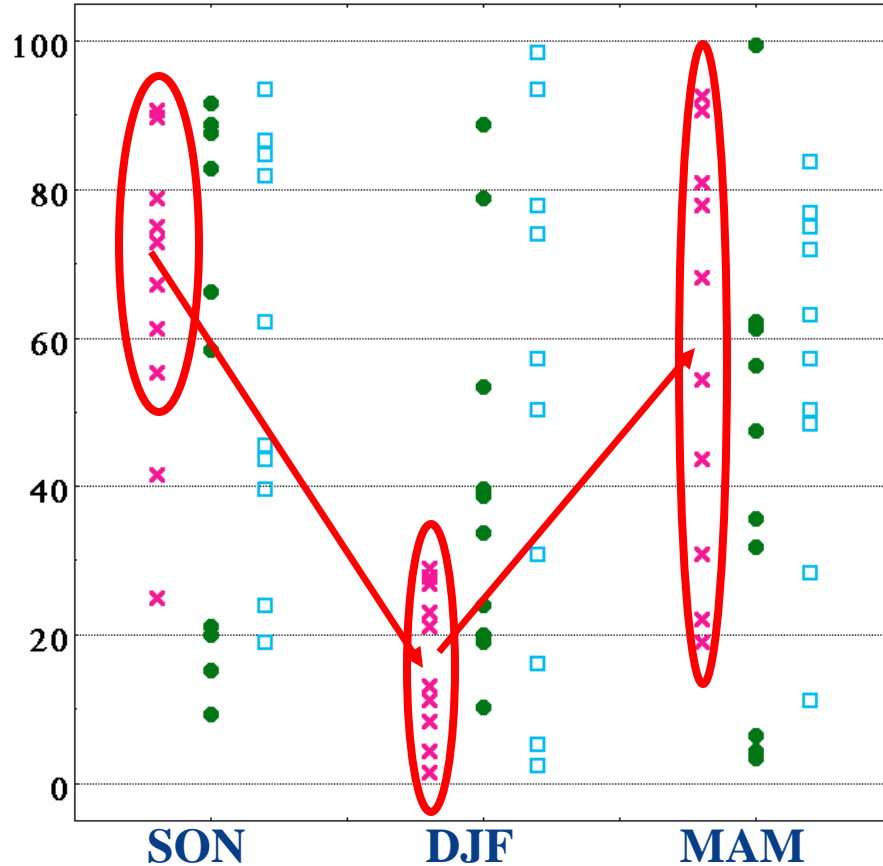
NINO3 SST anomaly plume ECMWF forecast from 1 Oct 2015

Monthly mean anomalies relative to NCEP OIv2 1981-2010 climatology



A closer look at Northwest Colorado (1910-2011)

NC Colorado Precipitation %iles for strong, moderate, and weak El Niño

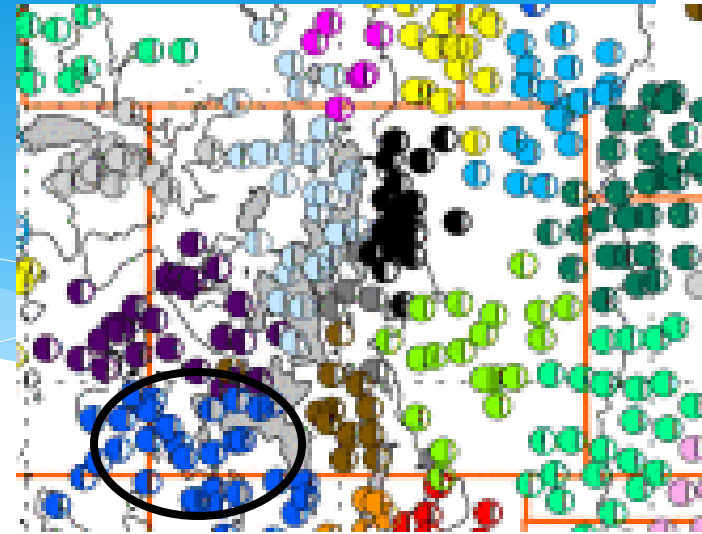
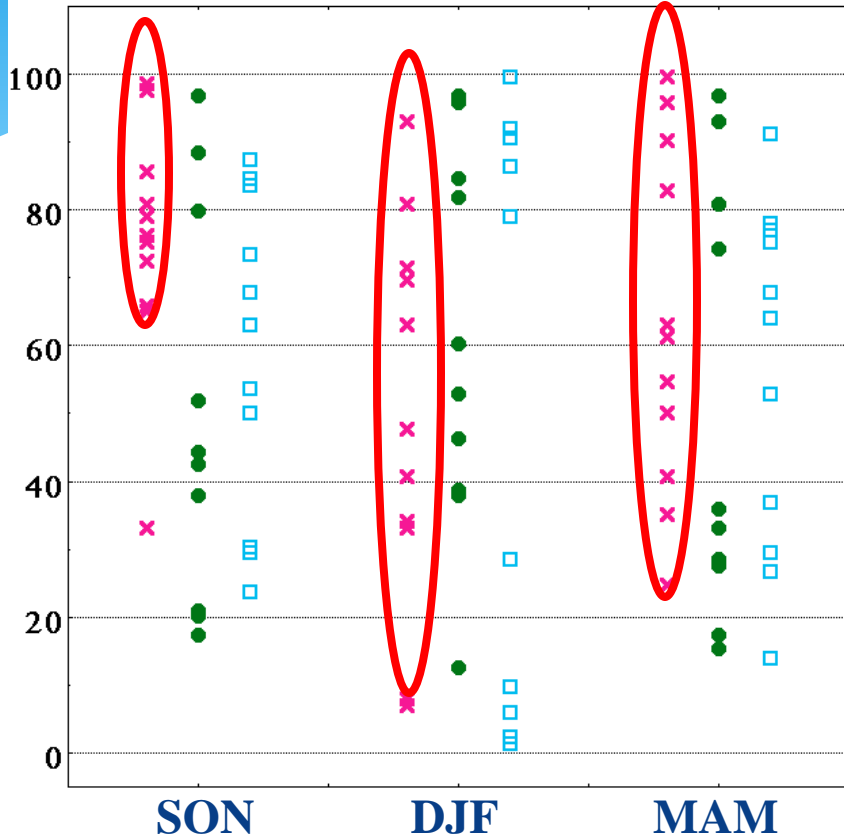


ENSO conditions during season in question!

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)

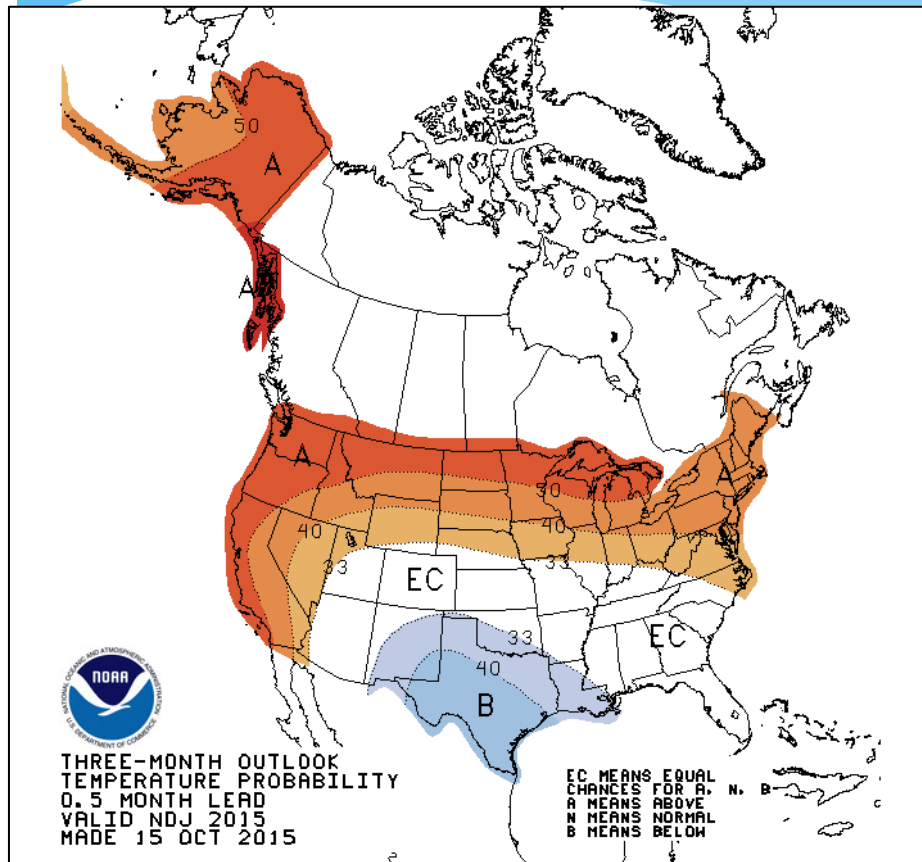
SW Colorado Precipitation %iles for strong, moderate, and weak El Niño



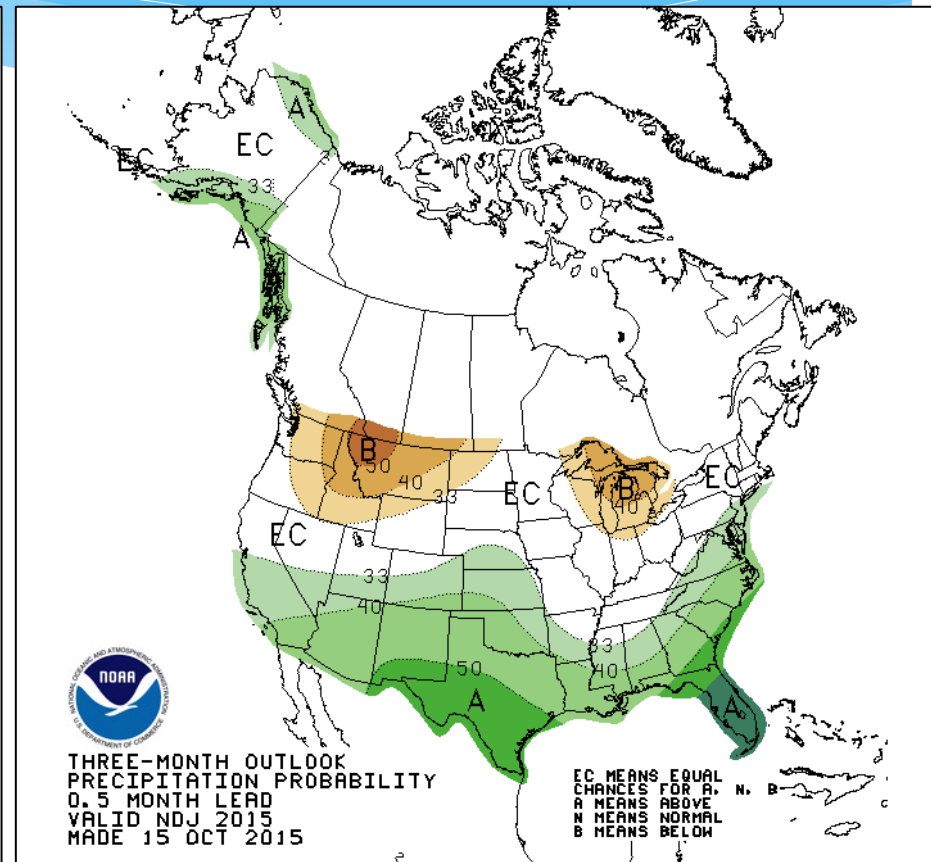
ENSO conditions during season in question!

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)

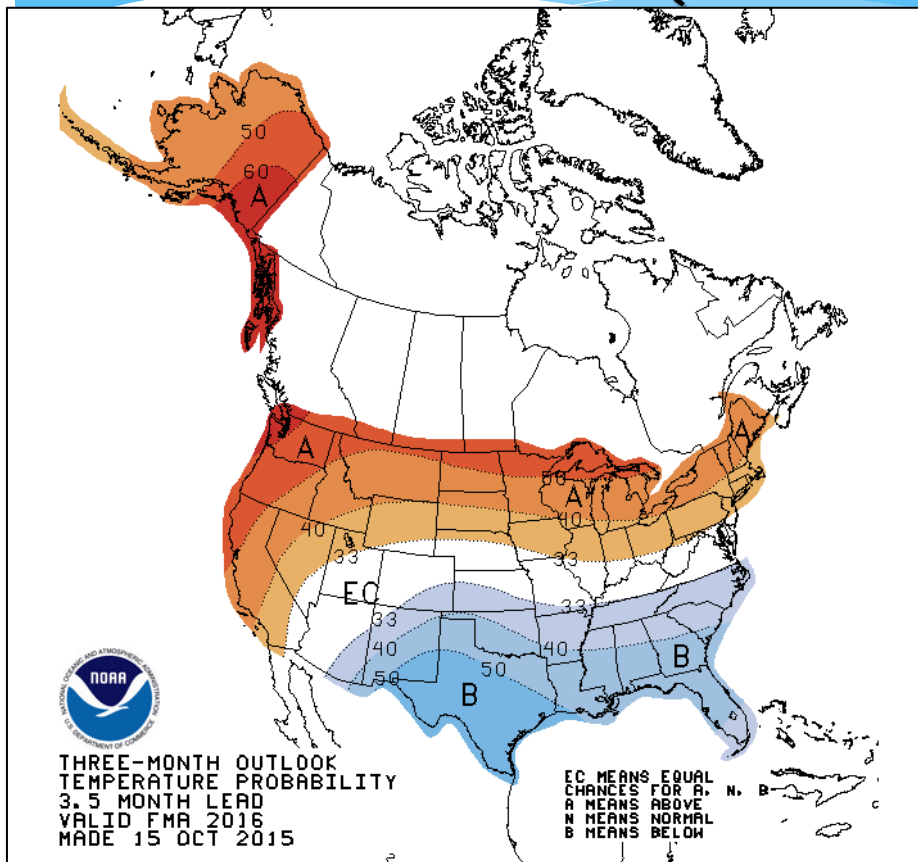


Temperature

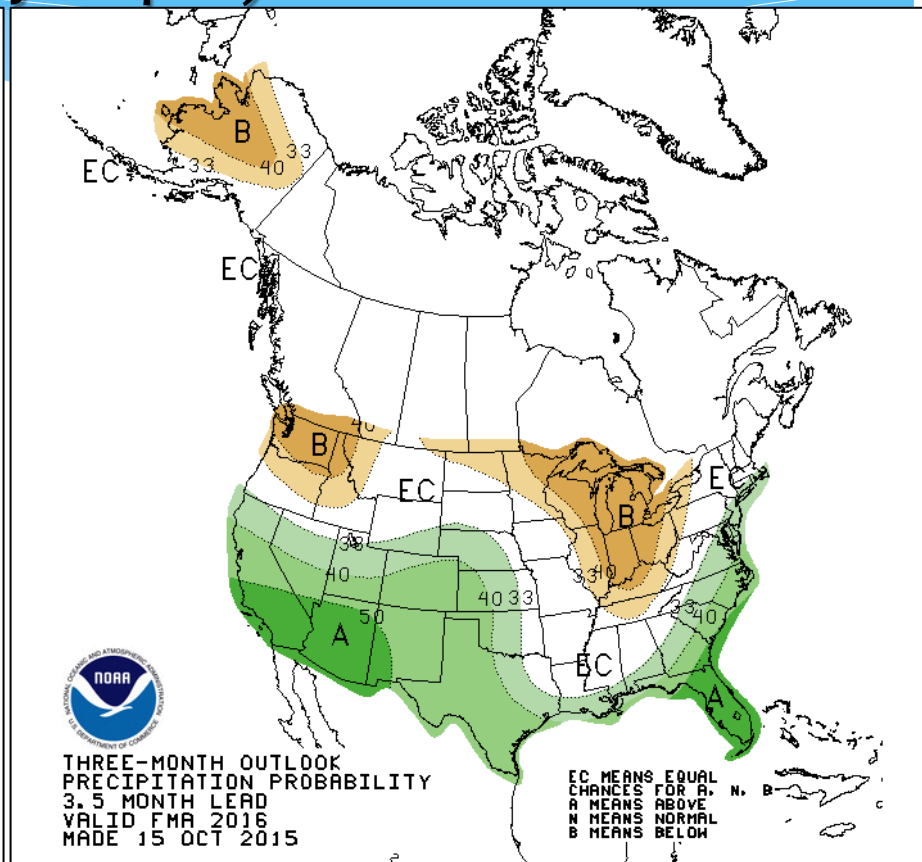


Precipitation

3 Month Temperature and Precipitation Probabilities (February - April)



Temperature

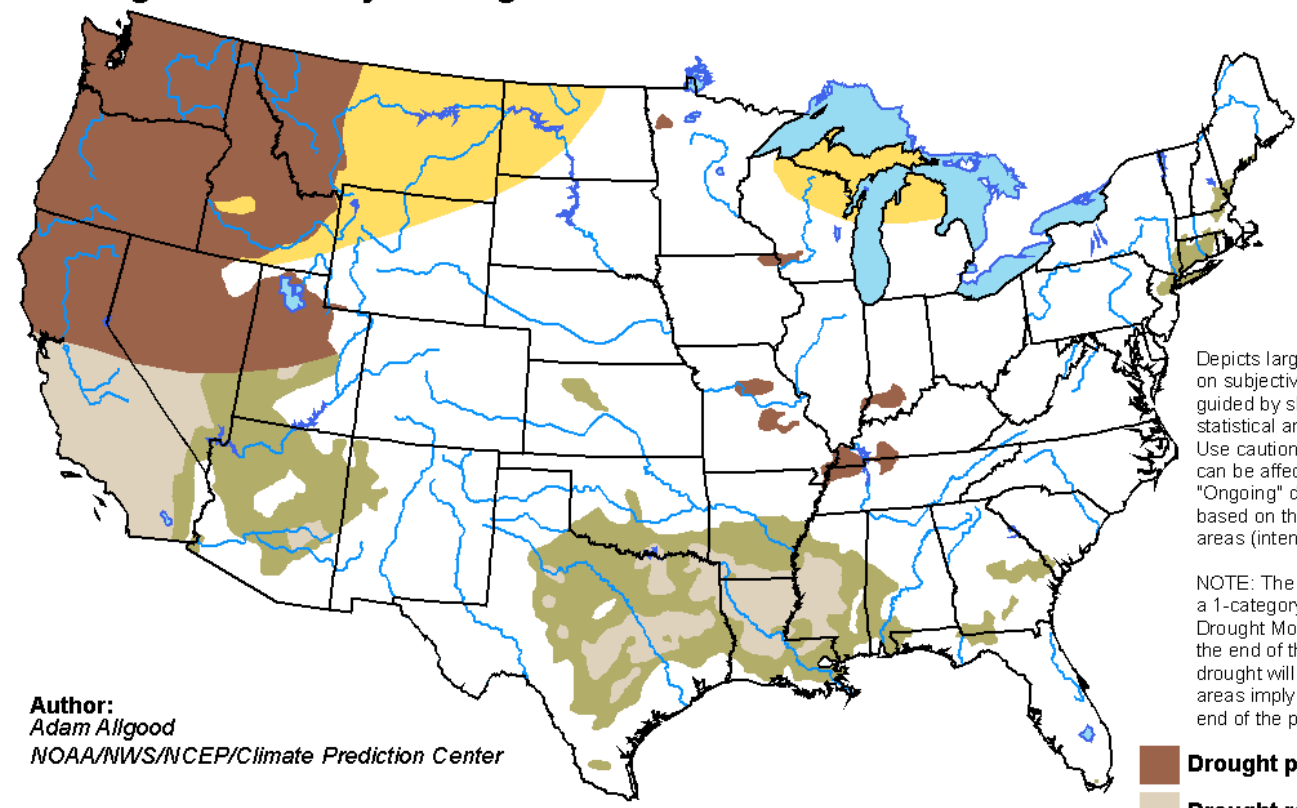


Precipitation

Drought Outlook through Jan 31, 2016

U.S. Seasonal Drought Outlook Drought Tendency During the Valid Period

Valid for October 15 - January 31, 2016
Released October 15, 2015

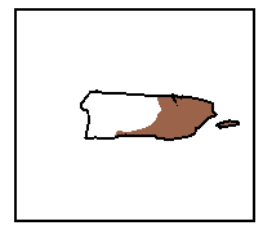
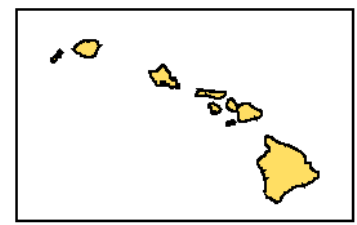
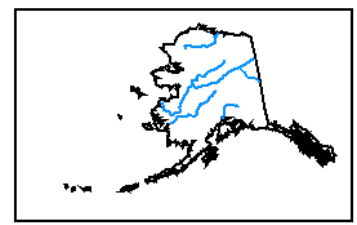


Depicts large-scale trends based on subjectively derived probabilities guided by short- and long-range statistical and dynamical forecasts. Use caution for applications that can be affected by short lived events. "Ongoing" drought areas are based on the U.S. Drought Monitor areas (intensities of D1 to D4).

NOTE: The tan areas imply at least a 1-category improvement in the Drought Monitor intensity levels by the end of the period, although drought will remain. The green areas imply drought removal by the end of the period (D0 or none).

Author:
Adam Allgood
NOAA/NWS/NCEP/Climate Prediction Center

- Drought persists/intensifies**
- Drought remains but improves**
- Drought removal likely**
- Drought development likely**



<http://go.usa.gov/3eZ73>





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?

- * Questions:

- * **Climate:**

- * Dennis Todey: dennis.todey@sdstate.edu , 605-688-5141

- * Doug Kluck: doug.kluck@noaa.gov, 816-994-3008

- * John Eise: john.eise@noaa.gov, 816-268-3144

- * Mike Timlin: mtimlin@illinois.edu; 217-333-8506

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

- * Brian Fuchs: bfuchs2@unl.edu 402 472-6775

- * **Weather:**

- * crhroc@noaa.gov