Great Plains and Midwest Climate Outlook February 16, 2017

Brian Fuchs
Climatologist

National Drought Mitigation Center
NOAA's Drought Risk Management Research Center
University of Nebraska-Lincoln
bfuchs2@unl.edu
402-472-6775

Budding magnolia tree in Kansas.

Photo courtesy of Mary Knapp

General Information

- **Providing climate services to the Central Region**
  - Collaboration Activity Between:

  Dennis Todey (USDA), Doug Kluck (NOAA), American Association of State Climatologists, Midwest Regional Climate Center, High Plains Regional Climate Center, NOAAs Climate Prediction Center, Brian Fuchs and Mark Svoboda (National Drought Mitigation Center)

- **Next Climate/Drought Outlook Webinar**
  - March 16, 2017 with Martha Shulski, Nebraska State Climatologist
- **Access to Future Climate Webinars and Information**
- http://www.drought.gov/drought/content/regional-programs/regional-drought-webinars

- **Past recorded presentations and slides can be found here:**
- *http://mrcc.isws.illinois.edu/webinars.htm*
- *http://www.hprcc.unl.edu/webinars.php*

- **There will be time for questions at the end**

NIDIS

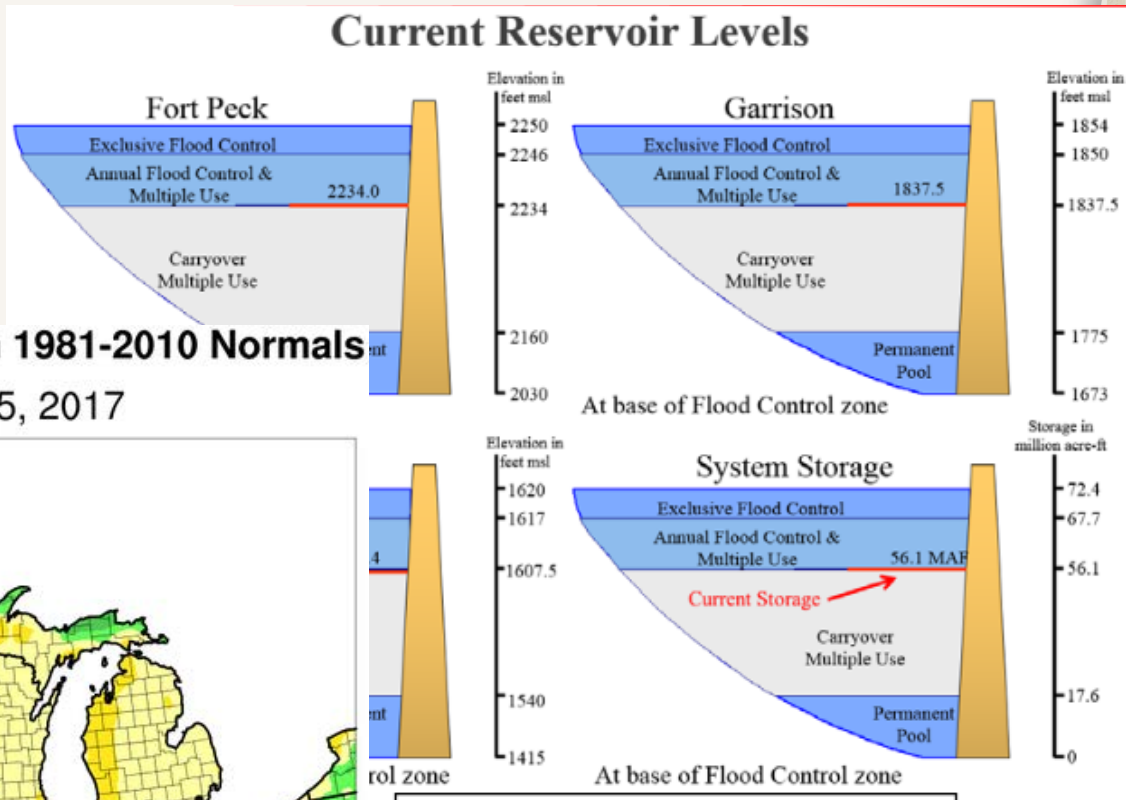
University of Nebraska Lincoln

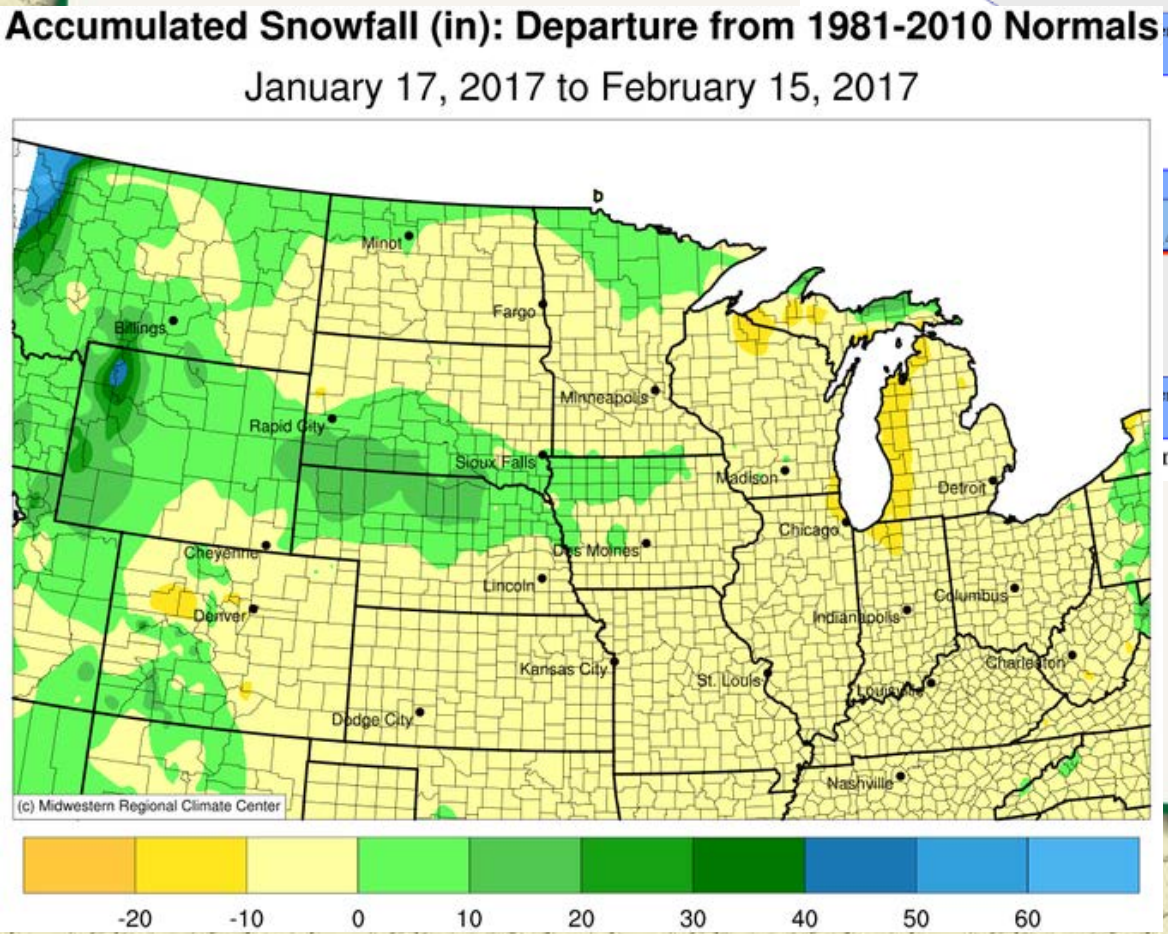
National Drought Mitigation Center

Agenda

- Current Conditions
- Regional Climate Updates
- Outlooks

Current Conditions



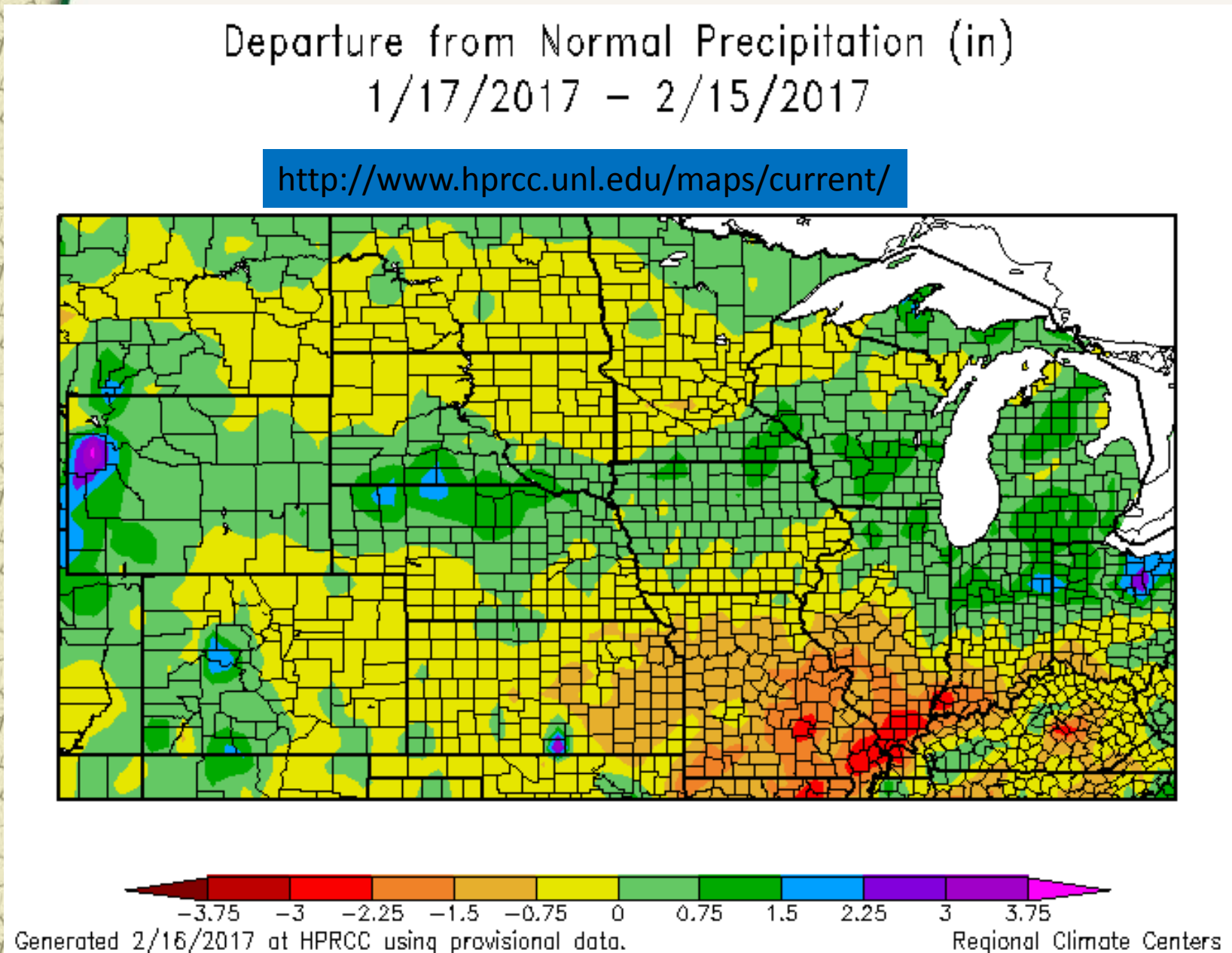


NIDIS

University of Nebraska Lincoln

National Drought Mitigation Center

30-Day Temperature Departure



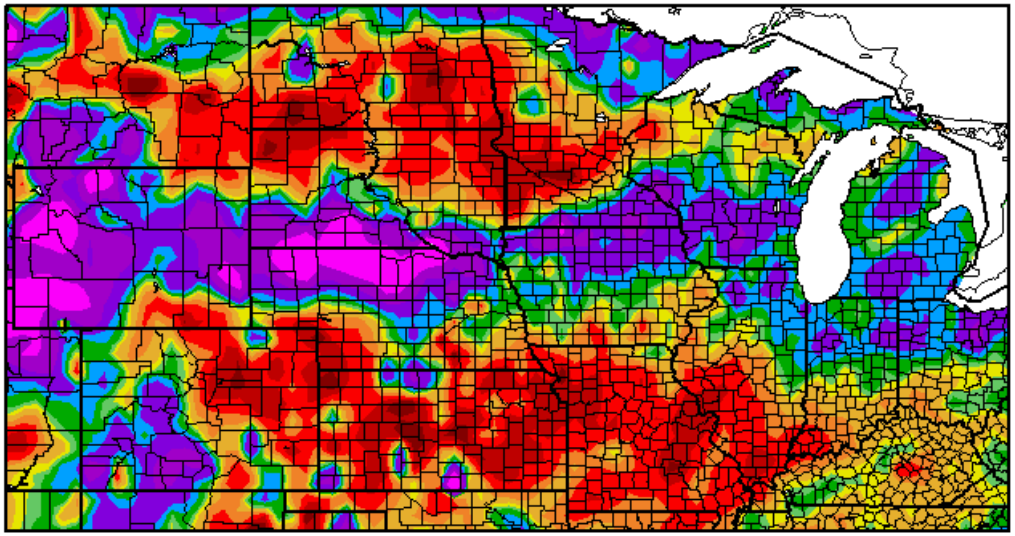
NIDIS

University of Nebraska Lincoln

National Drought Mitigation Center

30-Day Precipitation

Percent of Normal Precipitation (%)
1/17/2017 – 2/15/2017

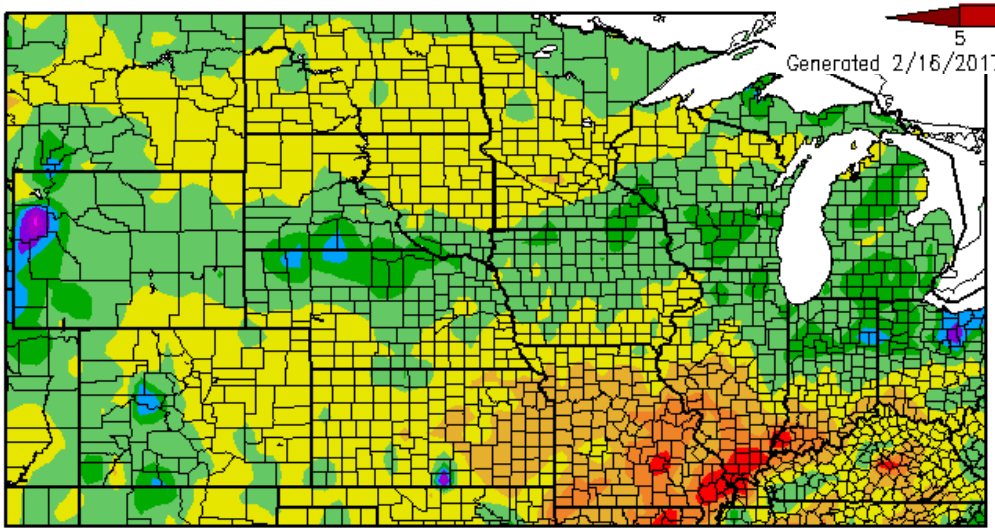


5 25 50 70 90 100 110 130 150 200 300

Generated 2/16/2017 at HPRCC using provisional data.

Regional Climate Centers

Departure from Normal Precipitation
1/17/2017 – 2/15/2017



−3.75 −3 −2.25 −1.5 −0.75 0 0.75 1.5 2.25 3 3.75

Generated 2/16/2017 at HPRCC using provisional data.

Regional Climate Centers

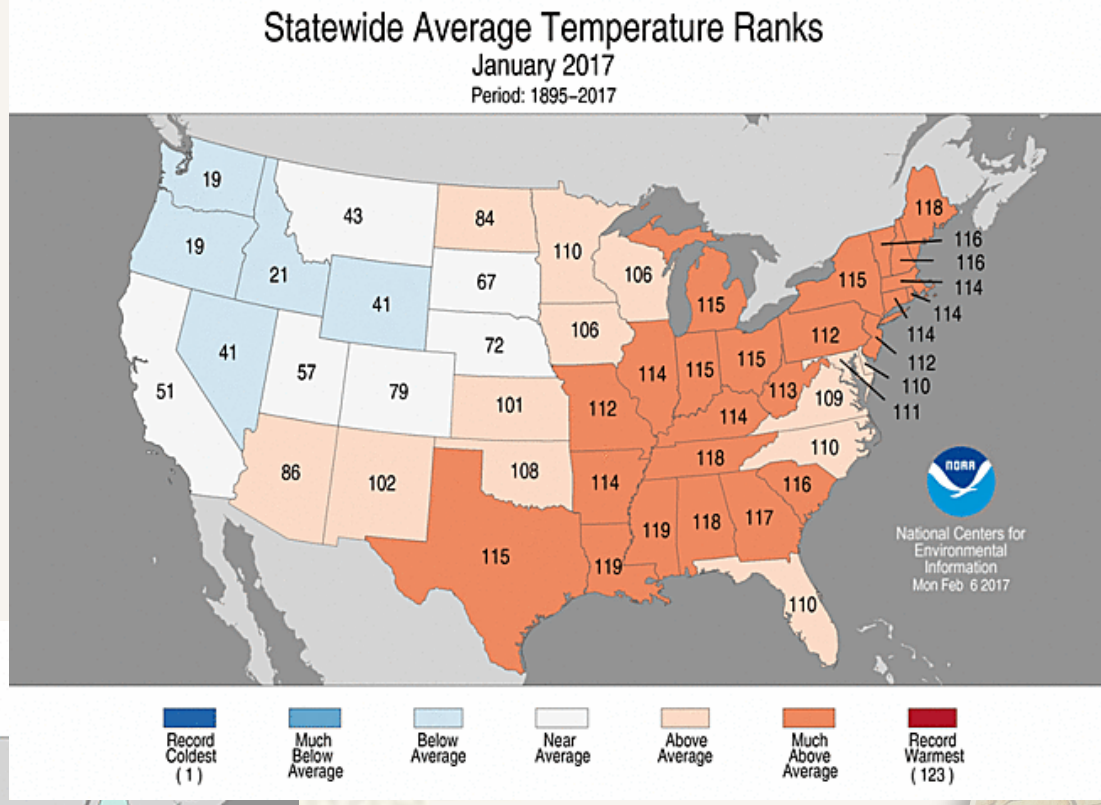
NIDIS

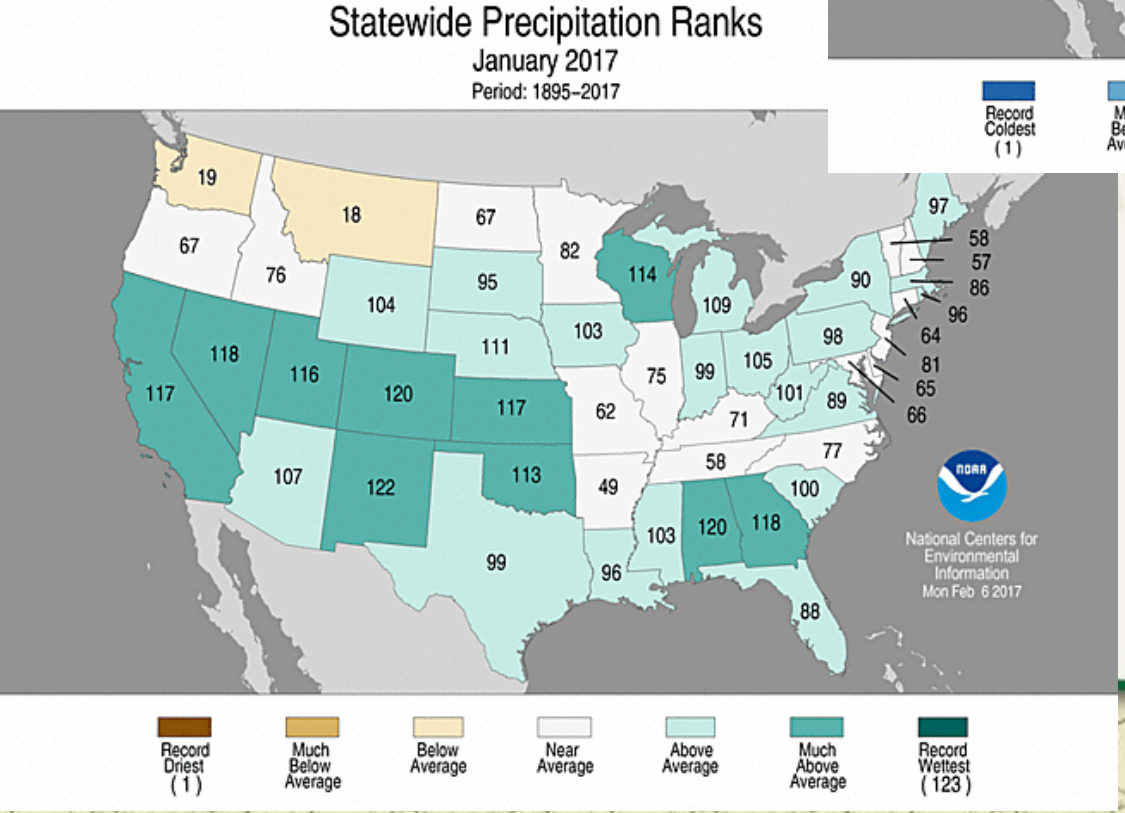
University of Nebraska Lincoln

National Drought Mitigation Center

January 2017 Climate

https://www.ncdc.noaa.gov/sotc/





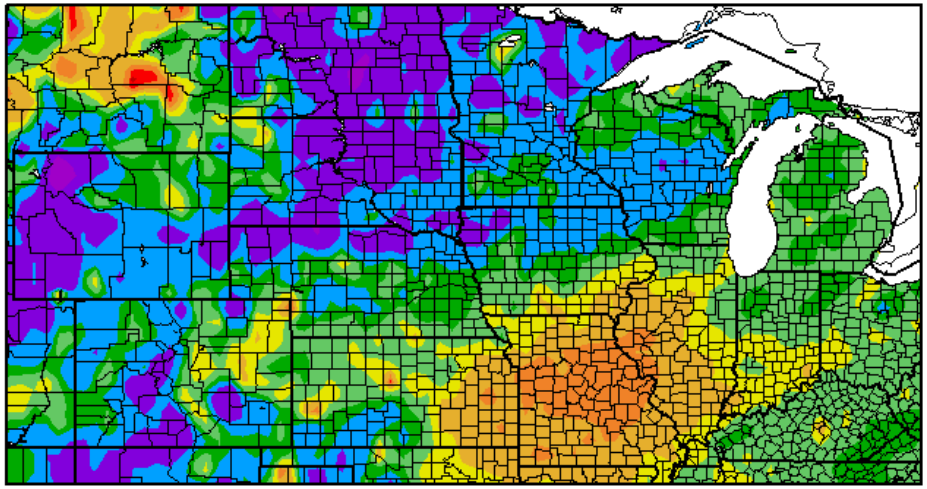
NIDIS

University of Nebraska Lincoln

National Drought Mitigation Center

90-Day Precipitation

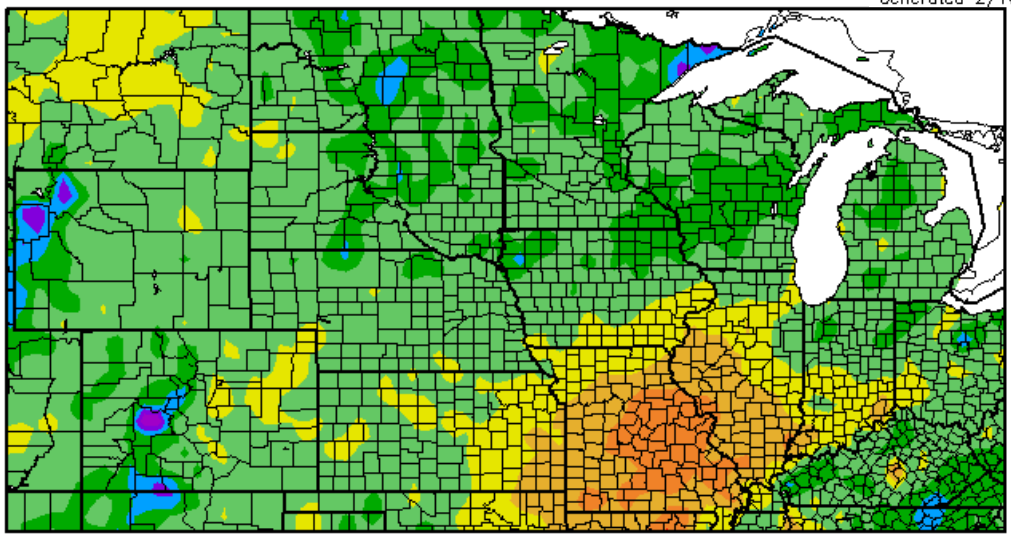
Percent of Normal Precipitation (%)
11/18/2016 – 2/15/2017



2 5 25 50 75 100 125 150 200 400 800

Generated 2/16/2017 at HPRCC using provisional data. Regional Climate Centers

Departure from Normal Precipitation (in)
11/18/2016 – 2/15/2017



−10 −8 −6 −4 −2 0 2 4 6 8 10

Generated 2/16/2017 at HPRCC using provisional data. Regional Climate Centers

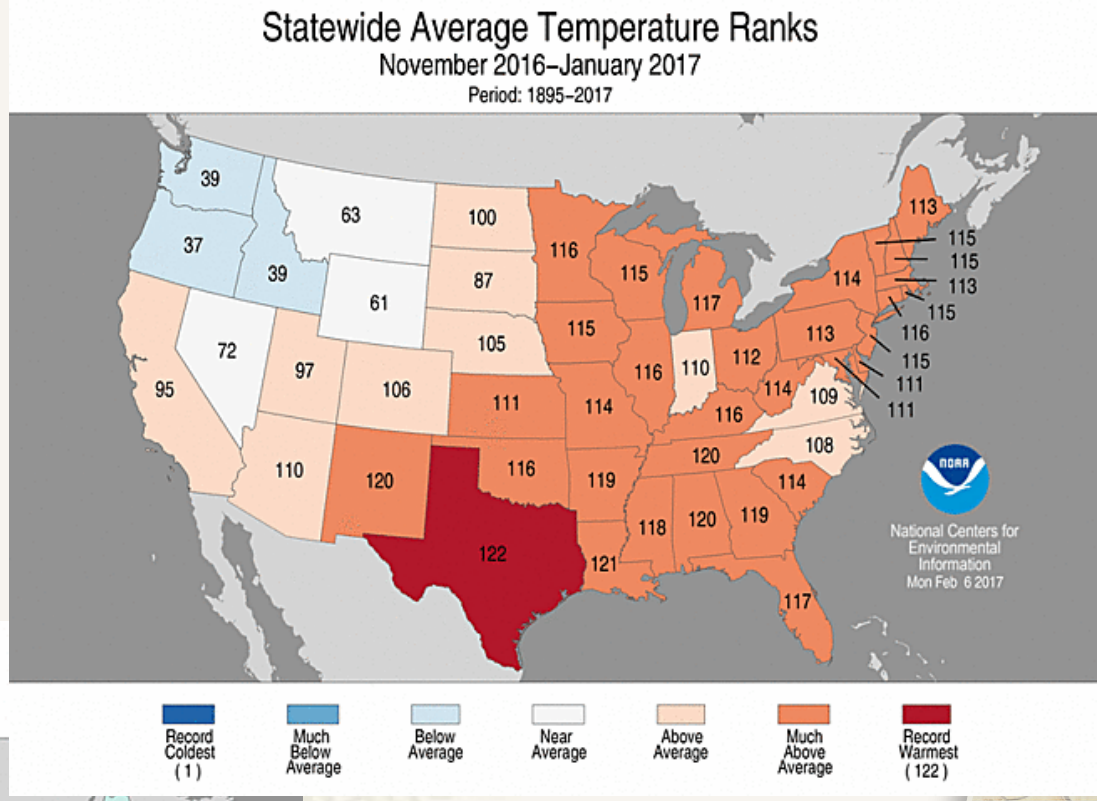
NIDIS

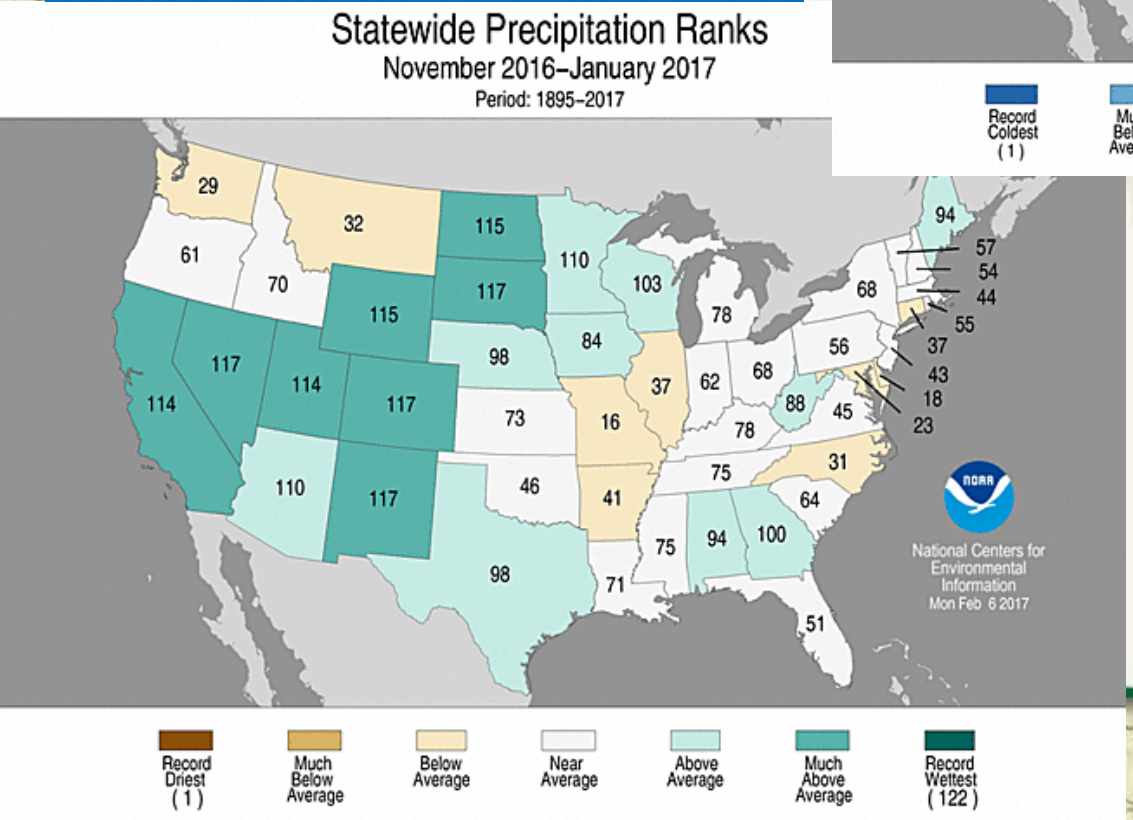
University of Nebraska Lincoln

National Drought Mitigation Center

November to January Climate

https://www.ncdc.noaa.gov/sotc/





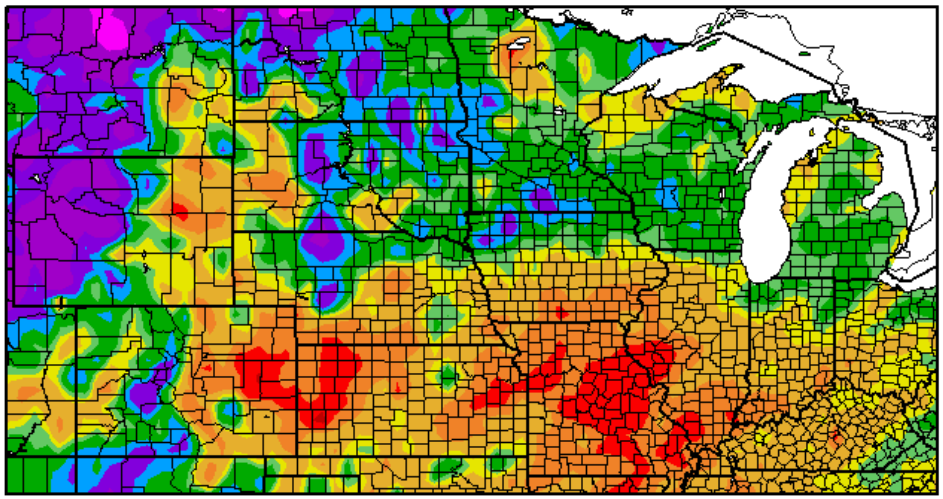
NIDIS

University of Nebraska Lincoln

National Drought Mitigation Center

Water Year to Date Precipitation

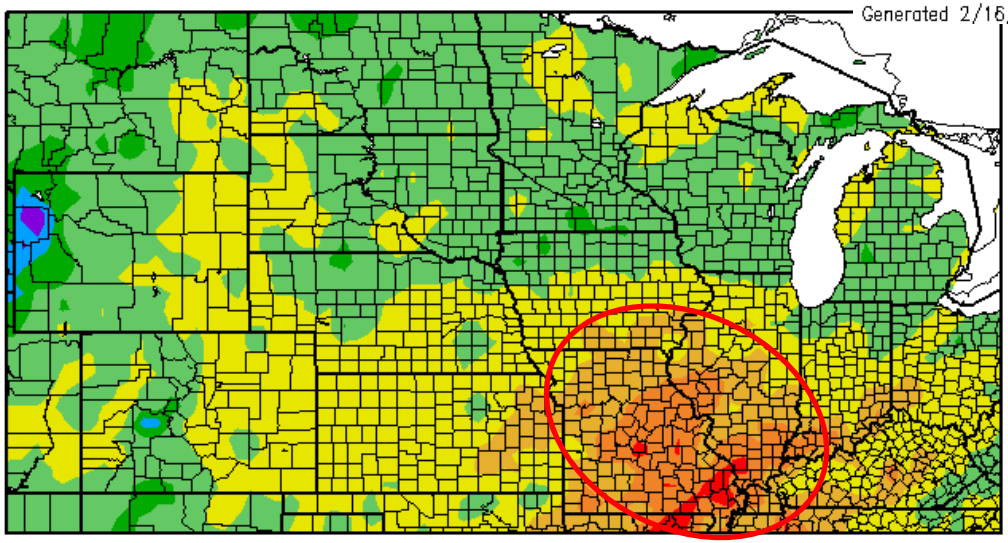
Percent of Normal Precipitation (%)
10/1/2016 – 2/15/2017



5 25 50 70 90 100 110 130 150 200 300

Generated 2/16/2017 at HPRCC using provisional data. Regional Climate Centers

Departure from Normal Precipitation (in)
10/1/2016 – 2/15/2017



−15 −12 −9 −6 −3 0 3 6 9 12 15

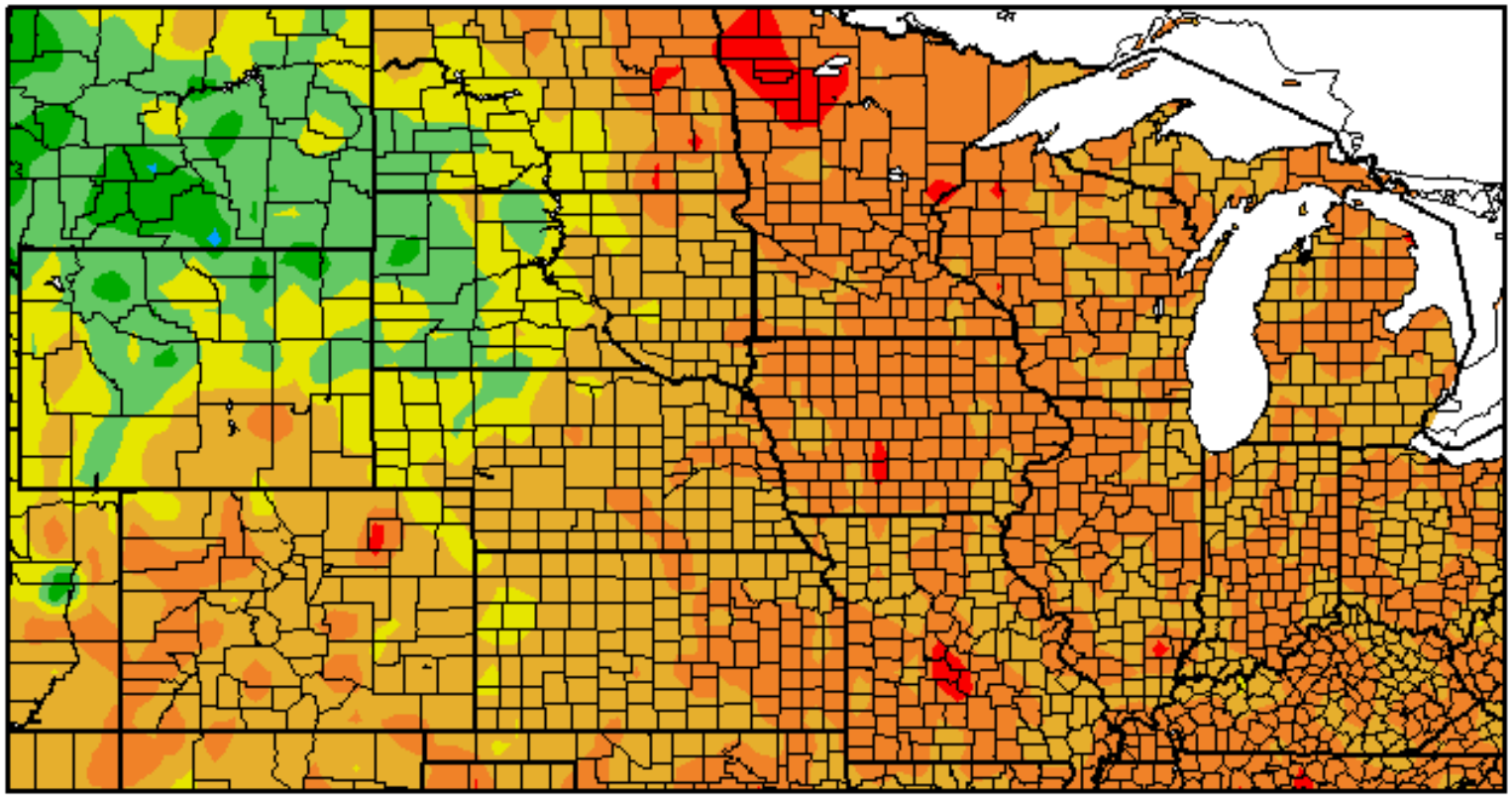
Generated 2/16/2017 at HPRCC using provisional data. Regional Climate Centers

NIDIS

University of Nebraska Lincoln

National Drought Mitigation Center

October 1 to present Temperature Departure

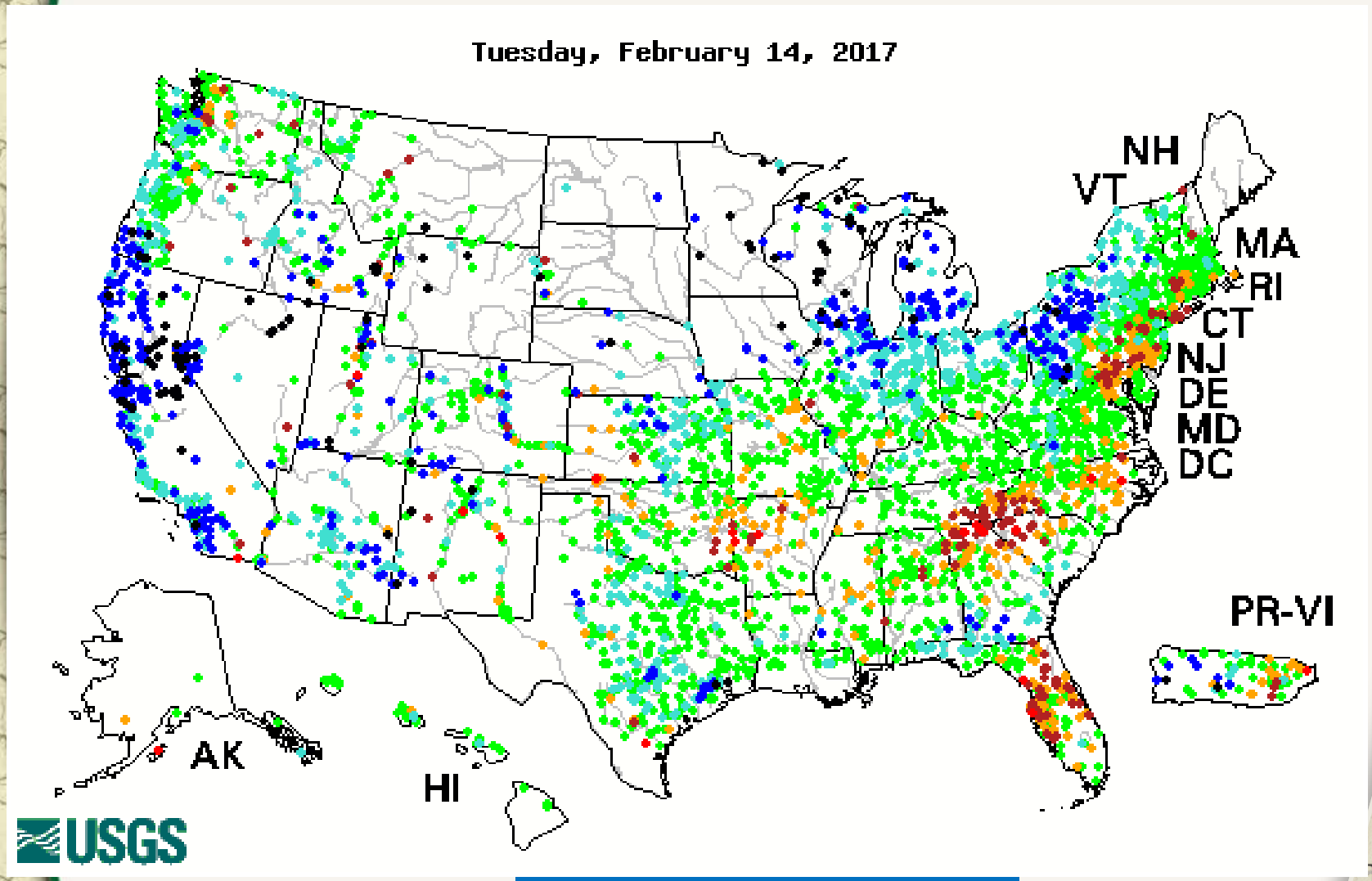


NIDIS

University of Nebraska Lincoln

National Drought Mitigation Center

28-Day Average Streamflow



http://waterwatch.usgs.gov/

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

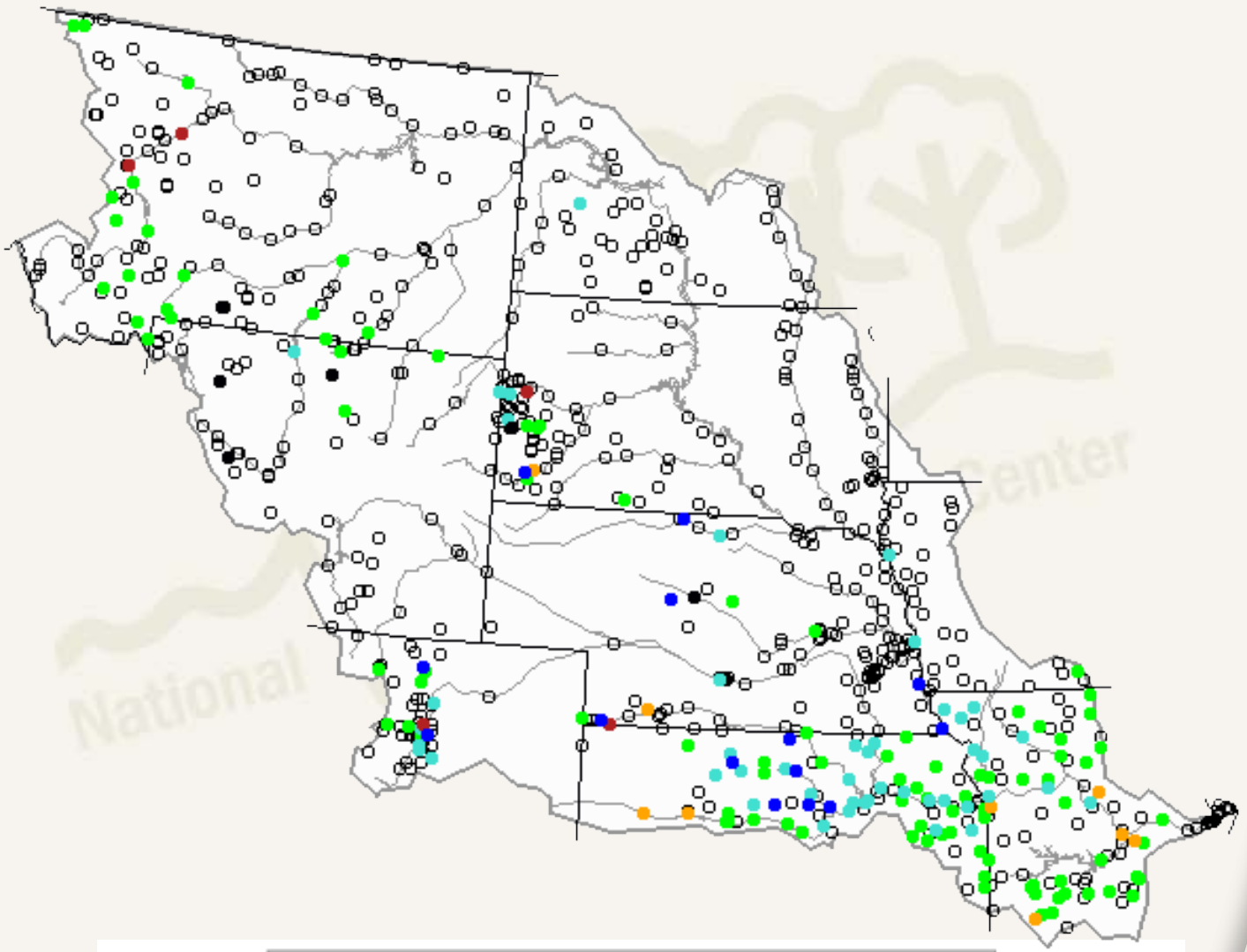
NIDIS

University of Nebraska Lincoln

National Drought Mitigation Center

28-Day Average Streamflow

Tuesday, February 14, 2017



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

USGS

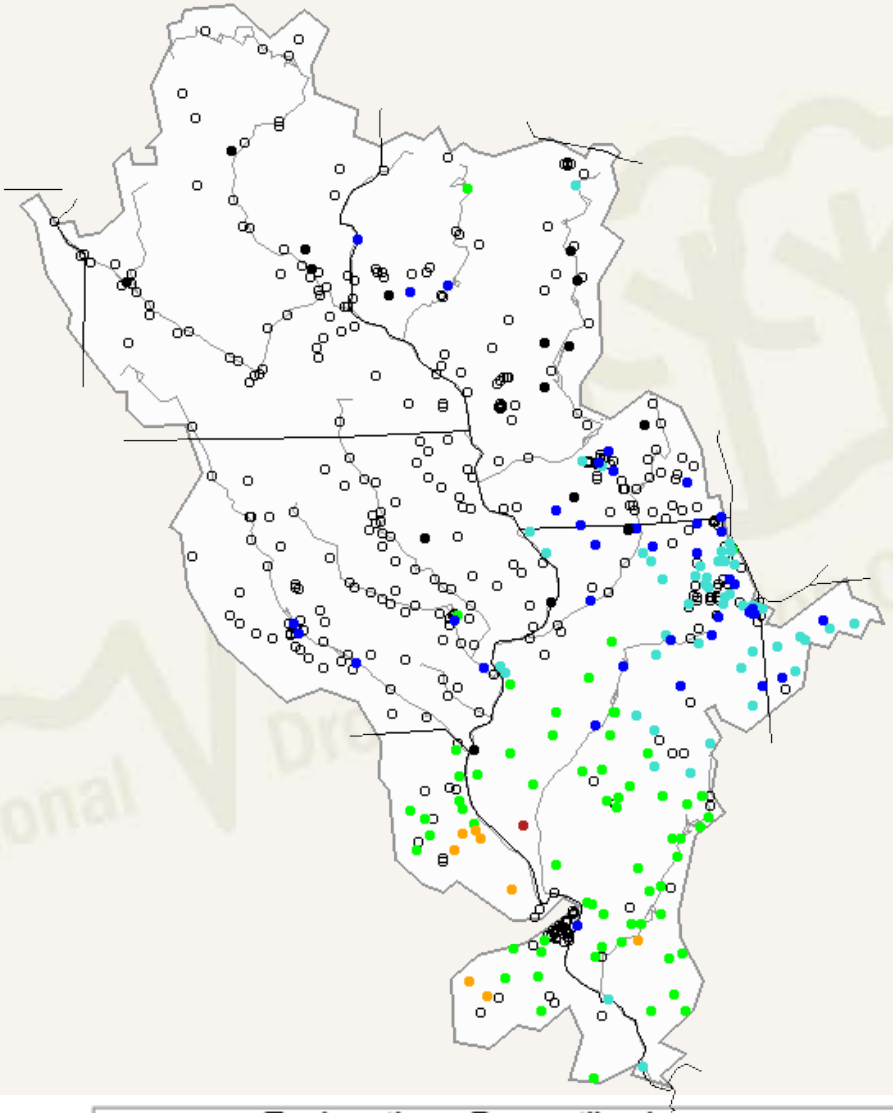
NIDIS

University of Nebraska Lincoln

National Drought Mitigation Center

28-Day Average Streamflow

Tuesday, February 14, 2017



USGS

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

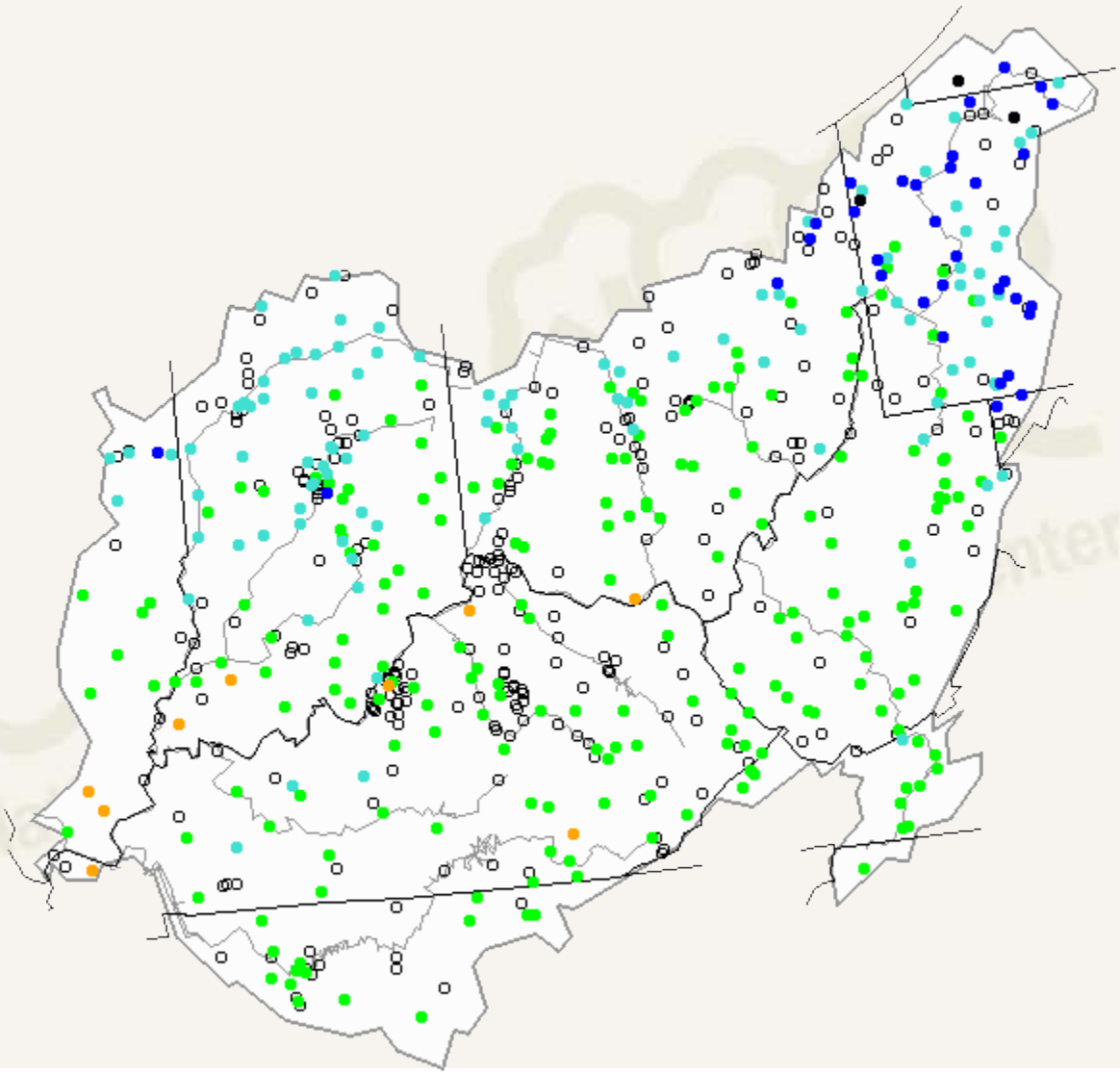
NIDIS

University of Nebraska Lincoln

National Drought Mitigation Center

28-Day Average Streamflow

Tuesday, February 14, 2017



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

USGS

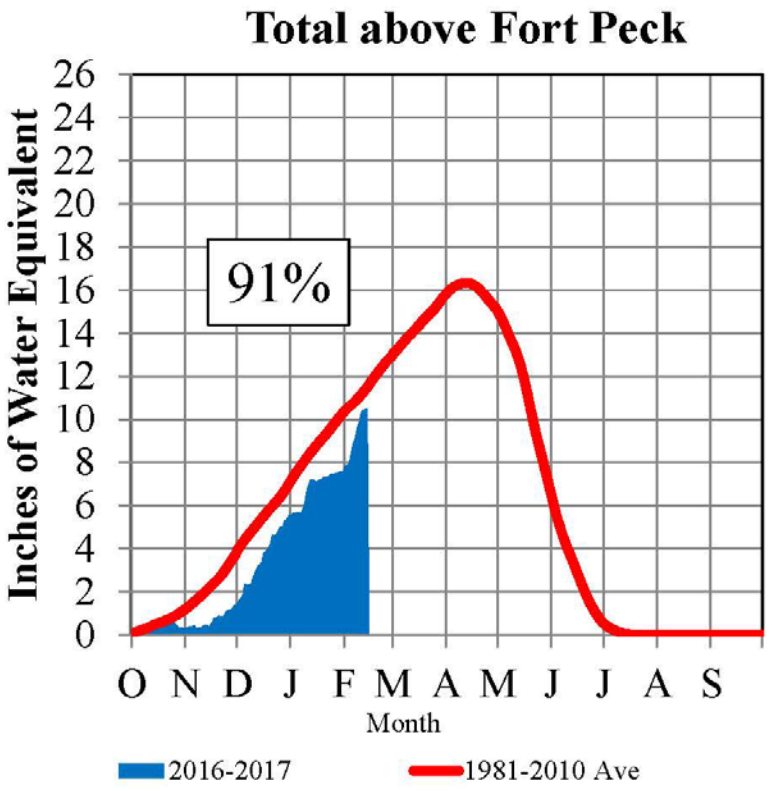
NIDIS

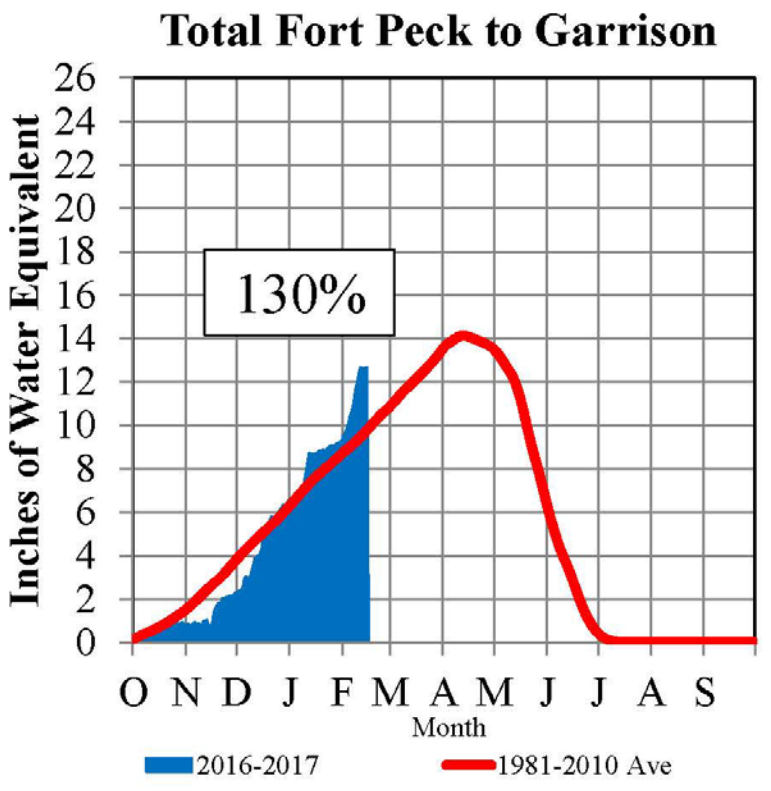
University of Nebraska Lincoln

National Drought Mitigation Center

Missouri River Basin – Mountain Snowpack Water Content

February 15, 2017



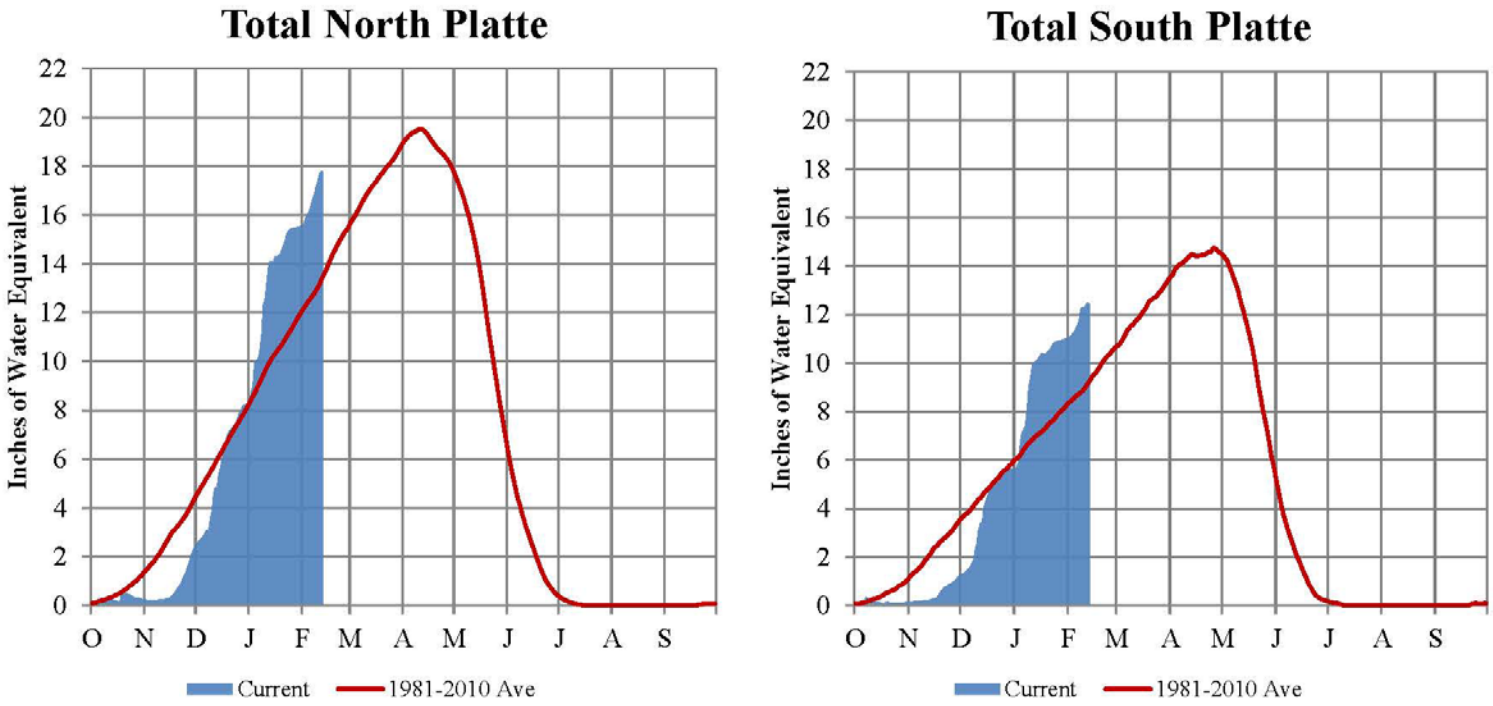


Normally by February 15 about 70% of the peak SWE has occurred in both reaches.

http://www.nwd-mr.usace.army.mil/rcc/reports/snow.pdf

Platte River Basin - Mountain Snowpack Water Content
Water Year 2016-2017

February 14, 2017

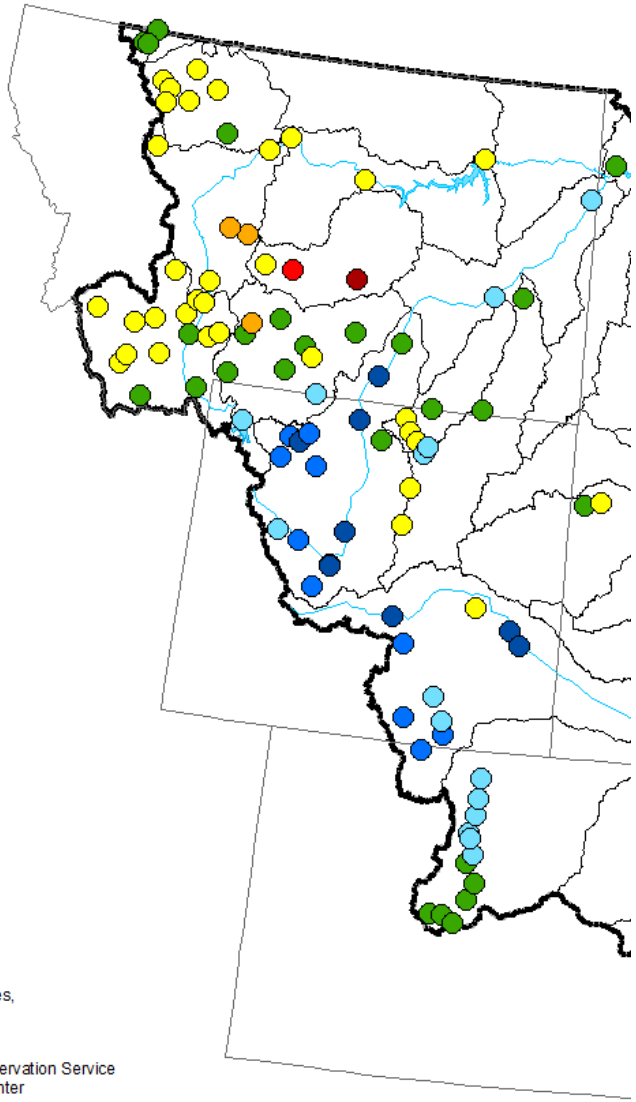


The North and South Platte River Basin mountain snowpacks normally peak near April 15 and the end of April, respectively. As of February 13, 2017, the mountain snowpack SWE in the "Total North Platte" reach is currently 17.7", 131% of average. The mountain snowpack SWE in the "Total South Platte" reach is currently 12.4", 134% of average.

Source: USDA, Natural Resource Conservation Service

Provisional Data. Subject to Revision

Missouri River Basin
Spring and Summer Streamflow Forecasts
as of February 1, 2017



Percent of
1981-2010 Average

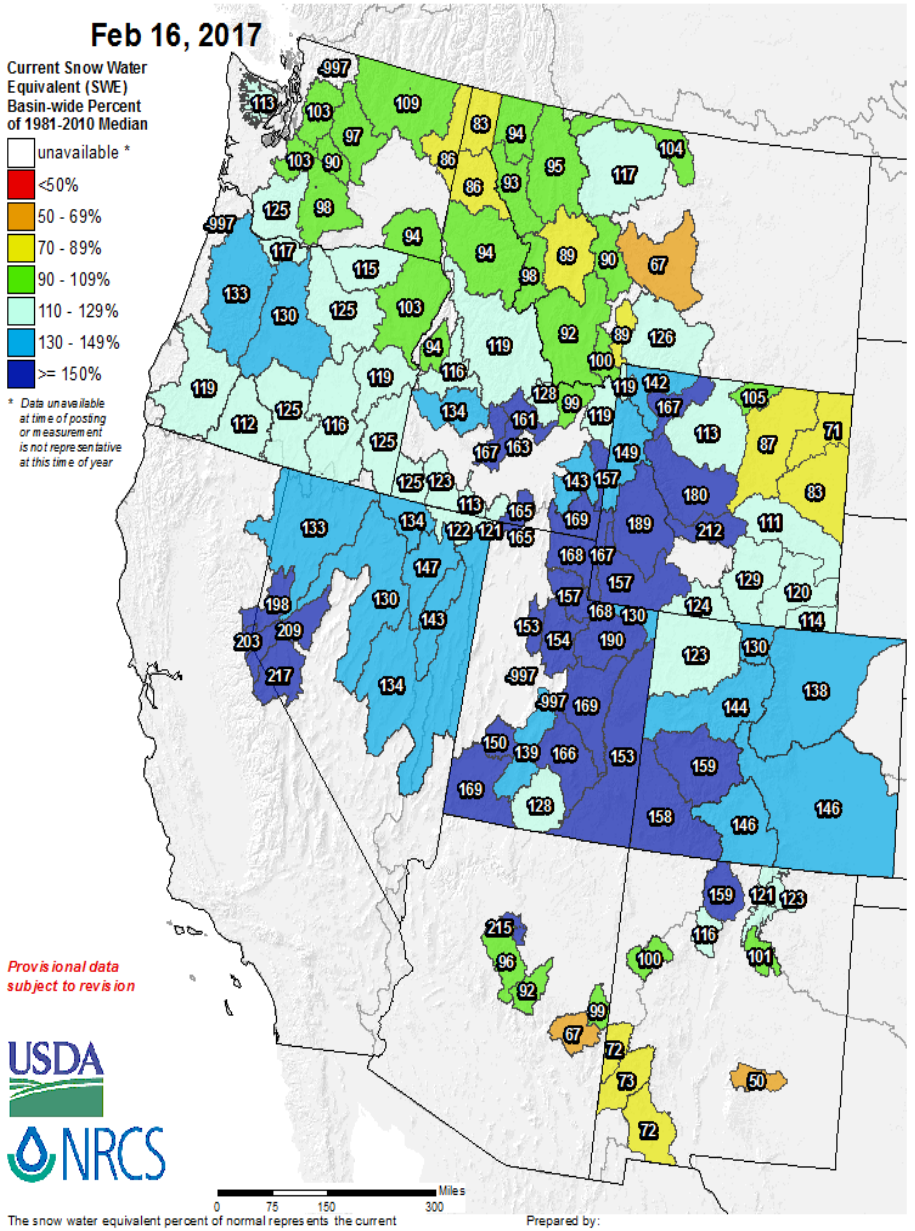
- > 180
- 150 - 180
- 130 - 149
- 110 - 129
- 90 - 109
- 70 - 89
- 50 - 69
- 25 - 49
- < 25

50% exceedance probability forecasts shown. For forecasts at other exceedance probabilities, see individual state reports.

Prepared by:
USDA Natural Resources Conservation Service
National Water and Climate Center
Portland, Oregon
http://www.wcc.nrcs.usda.gov
Created: 7 Feb 2017 13:12

Westwide SNOTEL Current Snow Water Equivalent (SWE) % of Normal

Feb 16, 2017



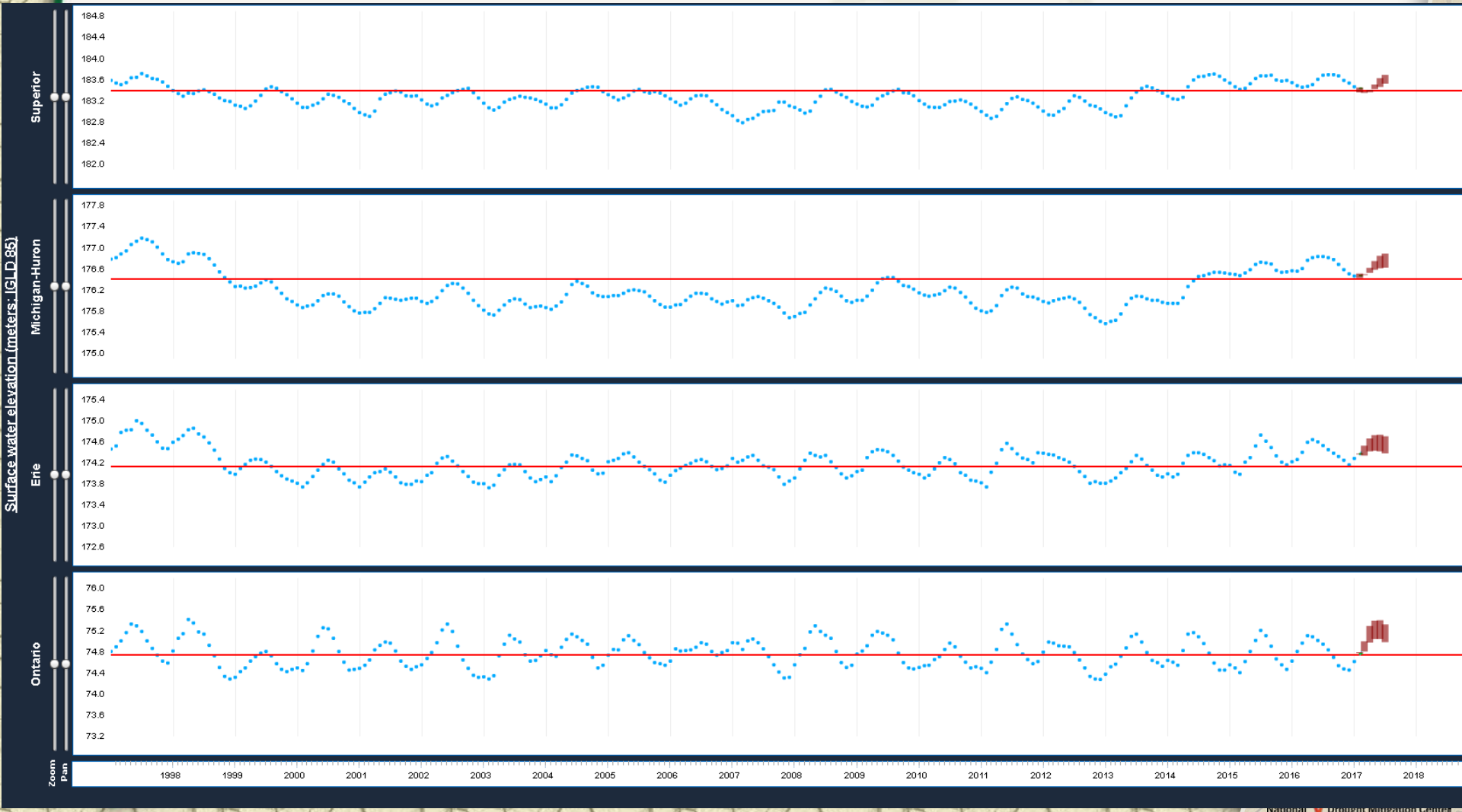
The snow water equivalent percent of normal represents the current snow water equivalent found at selected SNOTEL sites in or near the basin compared to the average value for those sites on this day. Data based on the first reading of the day (typically 00:00).

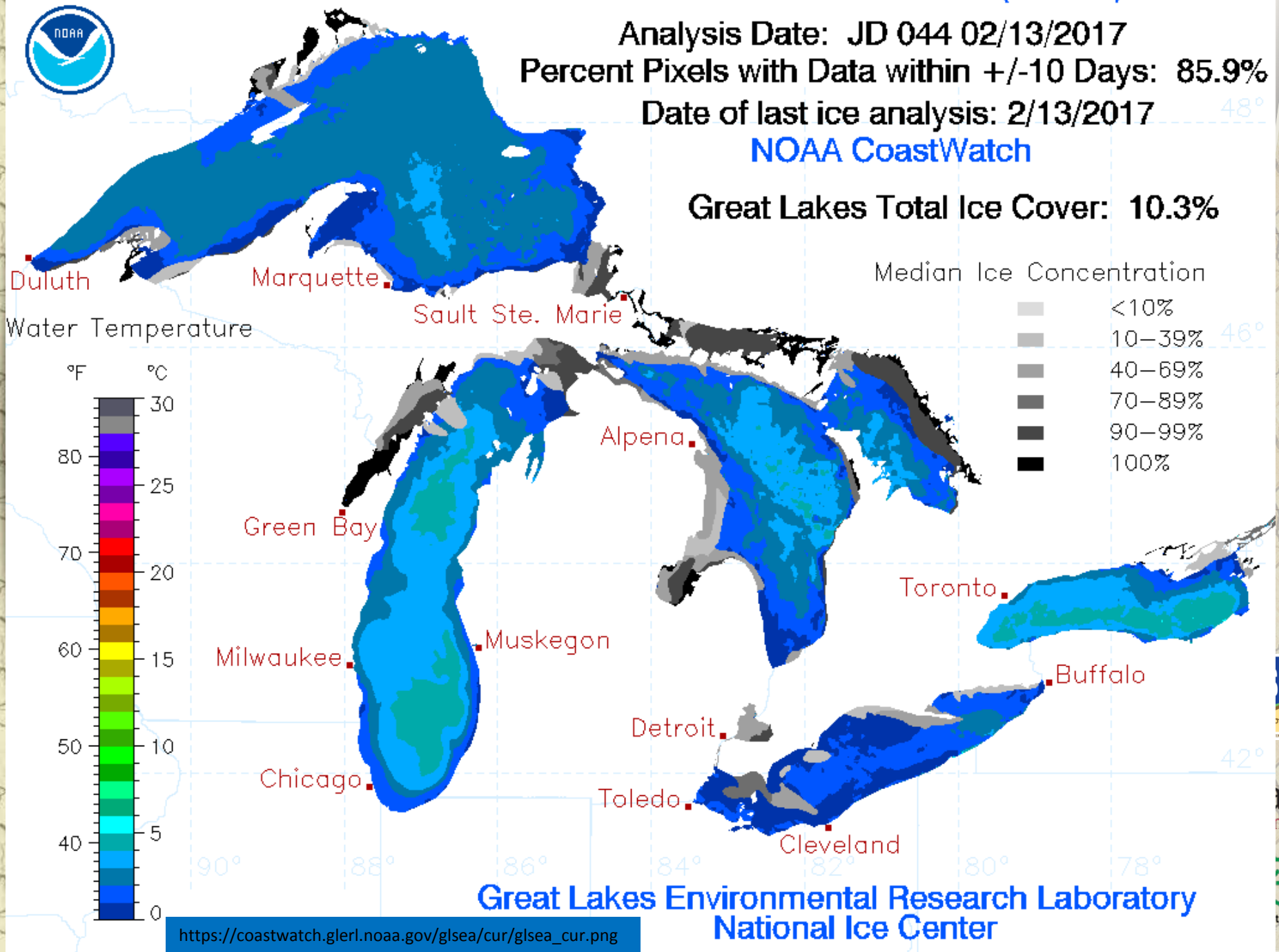
Prepared by:
USDA/NRCS National Water and Climate Center
Portland, Oregon
http://www.wcc.nrcs.usda.gov

https://www.wcc.nrcs.usda.gov/snow/snotel-wereports.html

Great Lakes Water Levels

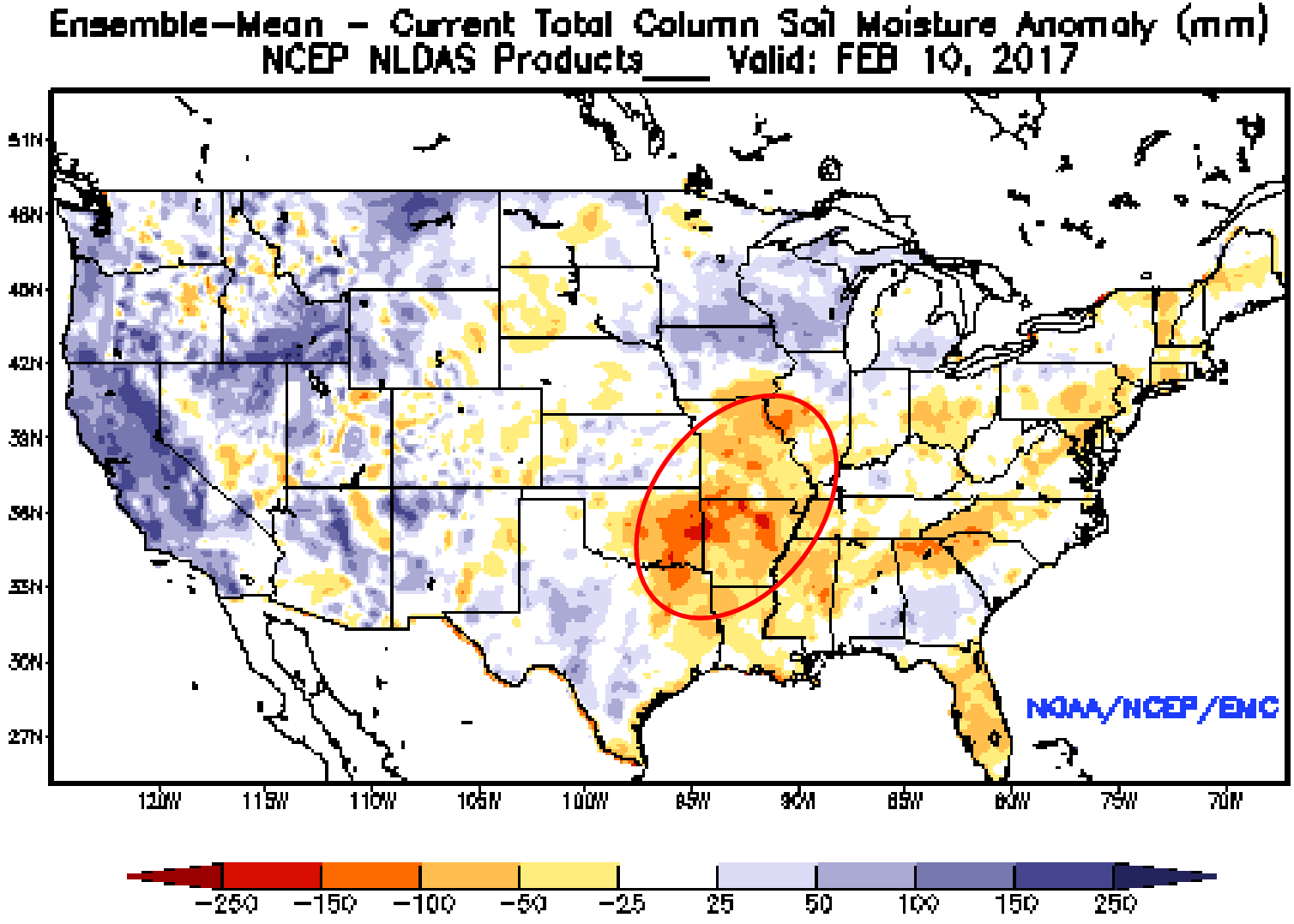
http://www.glerl.noaa.gov/




GREAT LAKES SURFACE ENVIRONMENTAL ANALYSIS (GLSEA)
NOAA
Analysis Date: JD 044 02/13/2017
Percent Pixels with Data within +/-10 Days: 85.9%
Date of last ice analysis: 2/13/2017
NOAA CoastWatch
Great Lakes Total Ice Cover: 10.3%
Median Ice Concentration
<10%
10–39%
40–69%
70–89%
90–99%
100%
Water Temperature
°F
°C
80
70
60
50
40
30
25
20
15
10
5
0
Duluth
Marquette
Sault Ste. Marie
Alpena
Green Bay
Milwaukee
Muskegon
Chicago
Toronto
Buffalo
Detroit
Toledo
Cleveland
48°
46°
42°
90°
88°
86°
84°
82°
80°
78°
Great Lakes Environmental Research Laboratory
National Ice Center
https://coastwatch.glerl.noaa.gov/glsea/cur/glsea_cur.png

Soil Moisture Anomaly

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

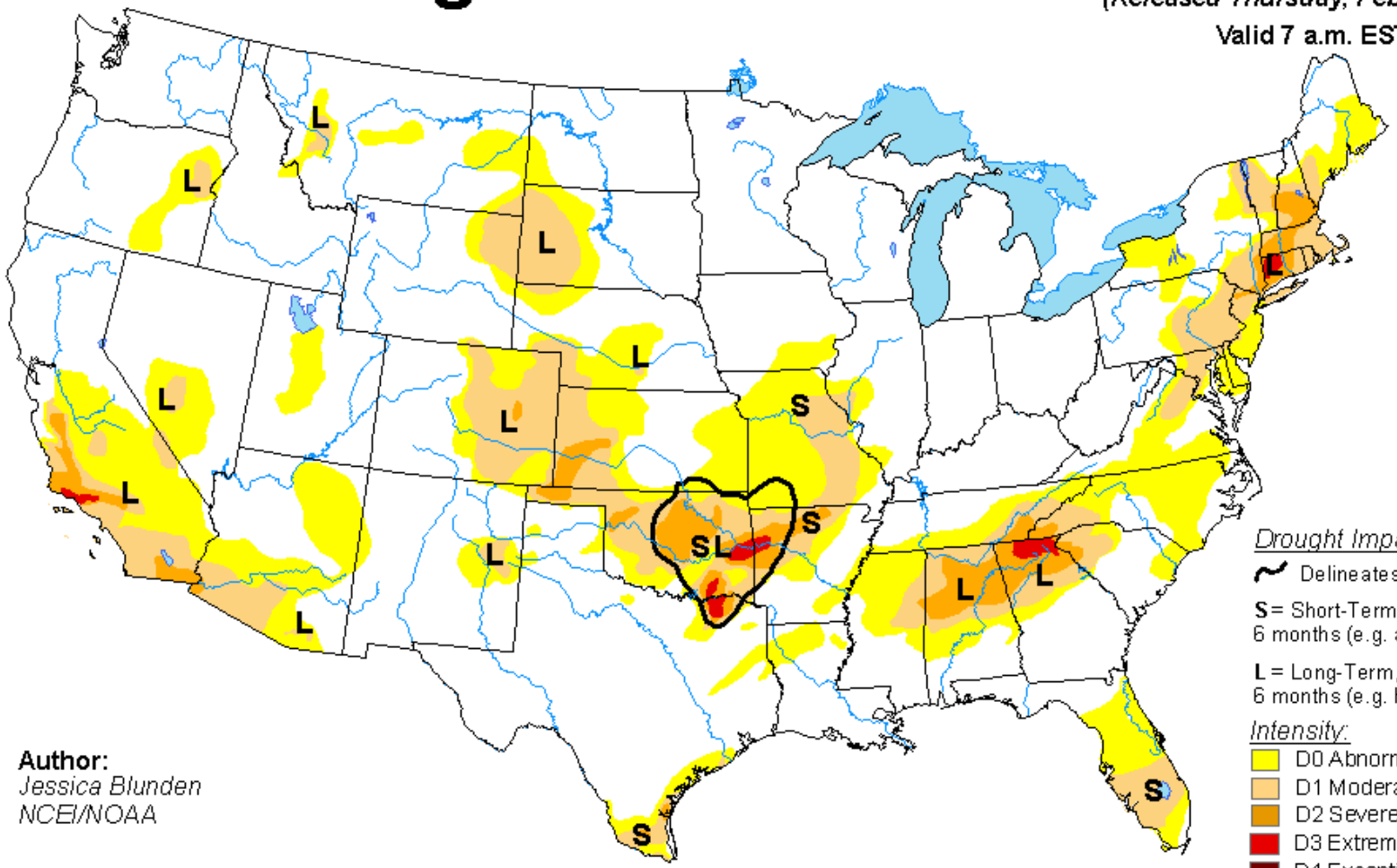


U.S. Drought Monitor

February 14, 2017

(Released Thursday, Feb. 16, 2017)

Valid 7 a.m. EST



Author:
Jessica Blunden
NCEI/NOAA

Drought Impact Types:

Delineates dominant impacts

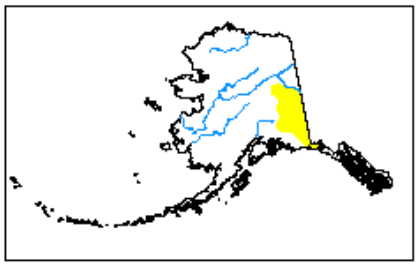
S = Short-Term, typically less than 6 months (e.g. agriculture, grasslands)

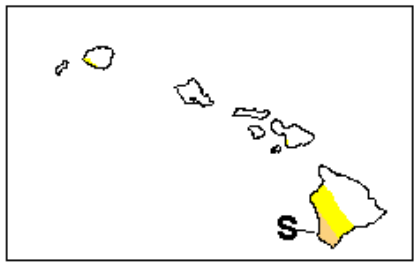
L = Long-Term, typically greater than 6 months (e.g. hydrology, ecology)

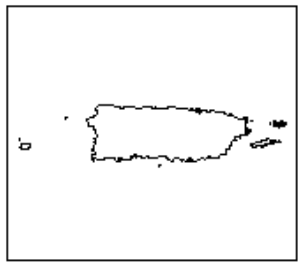
Intensity:

- 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 | NOAA

http://droughtmonitor.unl.edu/

Drought Condition (Percent Area): United States

Statistics type: (•) Traditional (D0-D4, D1-D4, etc.) ( ) Categorical (D0, D1, etc.)

Conditions for the U.S., including Alaska, Hawaii and Puerto Rico

Week	Date	Nothing	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	2017-02-14	71.99	28.01	11.33	2.65	0.29	0.00
Last Week	2017-02-07	72.55	27.45	11.92	2.84	0.29	0.00
3 Months Ago	2016-11-15	55.05	44.95	25.18	12.07	5.35	1.97
Start of Calendar Year	2016-12-27	56.09	43.91	20.09	8.43	3.78	1.51
Start of Water Year	2016-09-27	61.21	38.79	15.85	6.77	2.67	0.97
One Year Ago	2016-02-16	71.17	28.83	12.70	6.47	3.41	1.83

Conditions for the Contiguous U.S.

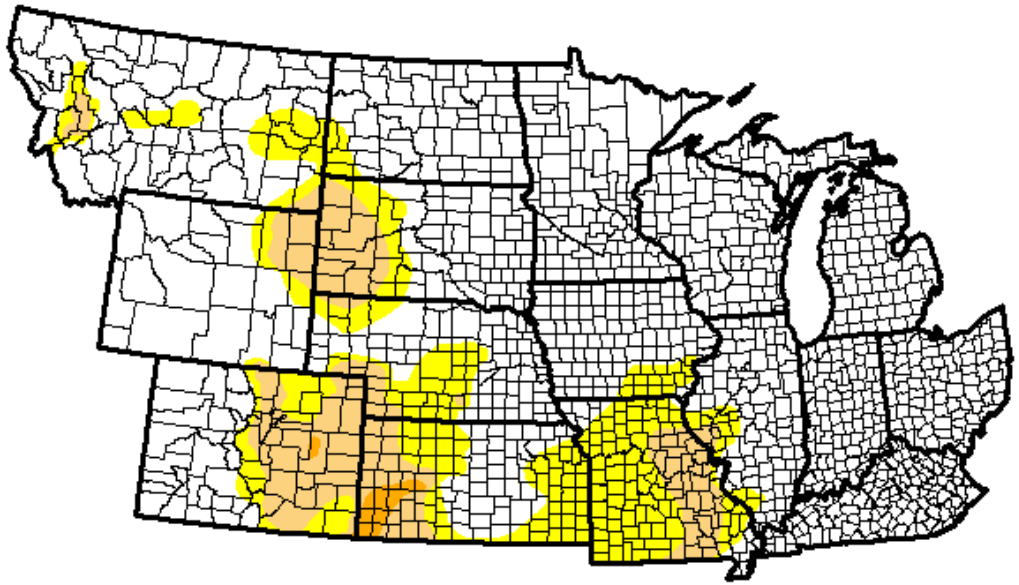
Week	Date	Nothing	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	2017-02-14	68.26	31.74	13.54	3.17	0.35	0.00
Last Week	2017-02-07	68.99	31.01	14.27	3.40	0.34	0.00
3 Months Ago	2016-11-15	48.01	51.99	30.13	14.44	6.40	2.36
Start of Calendar Year	2016-12-27	49.19	50.81	24.04	10.09	4.53	1.81
Start of Water Year	2016-09-27	53.60	46.40	18.96	8.10	3.20	1.16
One Year Ago	2016-02-16	67.75	32.25	15.05	7.73	4.08	2.19

As of 2/14/17 just over **90,000,000** people are being impacted by drought in the CONUS.

National Drought Mitigation Center

U.S. Drought Monitor

NWS Central Region



February 14, 2017

(Released Thursday, Feb. 16, 2017)

Valid 7 a.m. EST

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	74.89	25.11	10.46	0.54	0.00	0.00
Last Week *2/7/2017*	75.33	24.67	9.14	0.54	0.00	0.00
3 Months Ago *11/15/2016*	64.78	35.22	14.35	3.43	0.01	0.00
Start of Calendar Year *1/3/2017*	65.79	34.21	12.04	1.70	0.00	0.00
Start of Water Year *9/27/2016*	76.71	23.29	7.36	1.93	0.12	0.00
One Year Ago *2/16/2016*	81.23	18.77	5.09	1.31	0.00	0.00

Intensity:

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

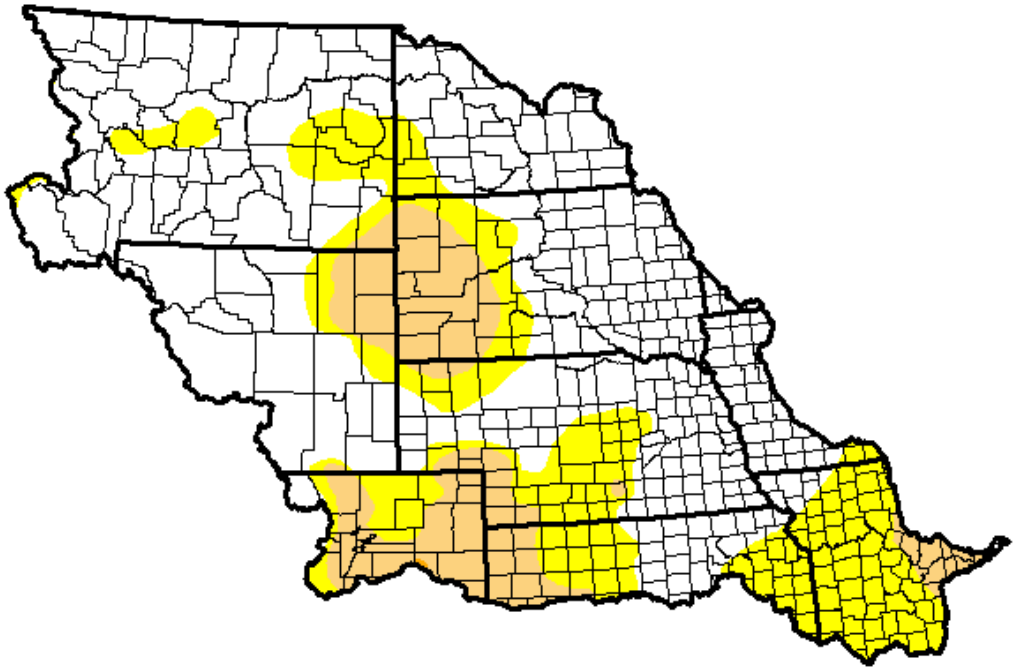
The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

Author:
Jessica Blunden
NCEI/NOAA

http://droughtmonitor.unl.edu/

U.S. Drought Monitor

Missouri Watershed



February 14, 2017

(Released Thursday, Feb. 16, 2017)

Valid 7 a.m. EST

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	63.50	36.50	13.59	0.03	0.00	0.00
Last Week *2/7/2017*	64.49	35.51	12.44	0.03	0.00	0.00
3 Months Ago *11/15/2016*	60.78	39.22	14.62	0.99	0.00	0.00
Start of Calendar Year *1/3/2017*	55.38	44.62	15.99	1.41	0.00	0.00
Start of Water Year *9/27/2016*	68.21	31.79	12.24	3.65	0.26	0.00
One Year Ago *2/16/2016*	72.87	27.13	6.63	0.08	0.00	0.00

Intensity:

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

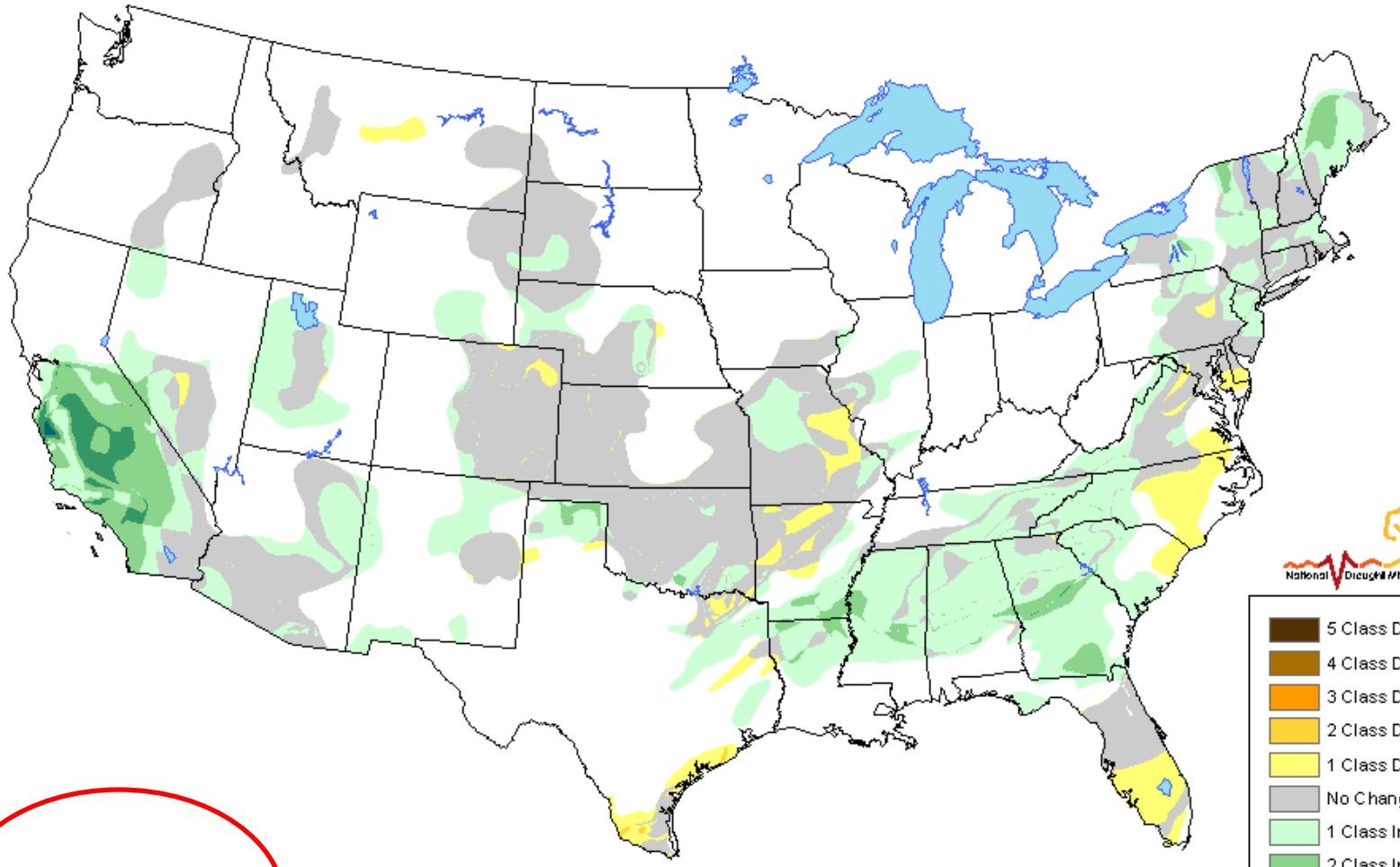
The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

Author:
Jessica Blunden
NCEI/NOAA

http://droughtmonitor.unl.edu/

U.S. Drought Monitor Class Change

1 Month



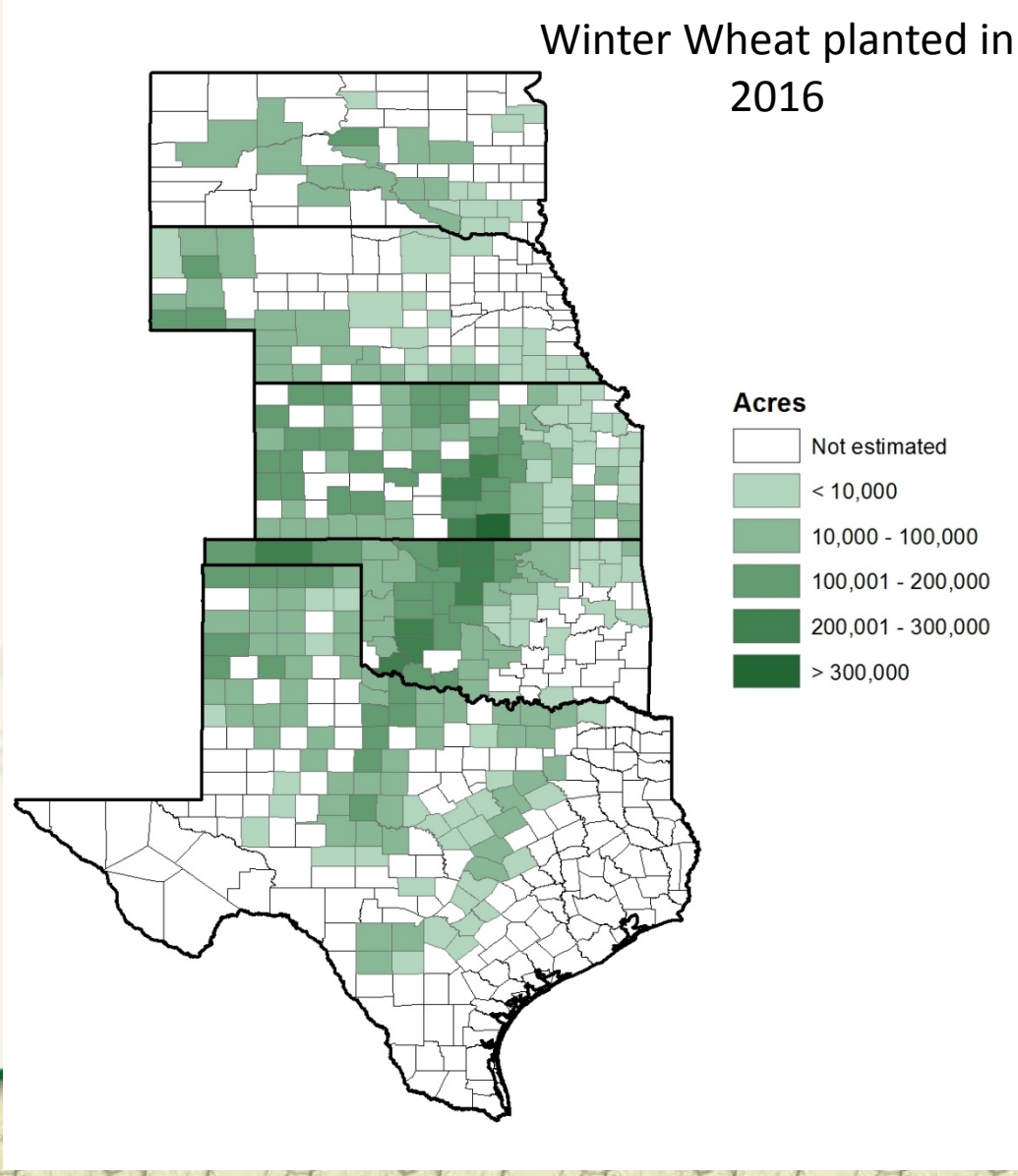
National Drought Mitigation Center

- 5 Class Degradation
- 4 Class Degradation
- 3 Class Degradation
- 2 Class Degradation
- 1 Class Degradation
- No Change
- 1 Class Improvement
- 2 Class Improvement
- 3 Class Improvement
- 4 Class Improvement
- 5 Class Improvement

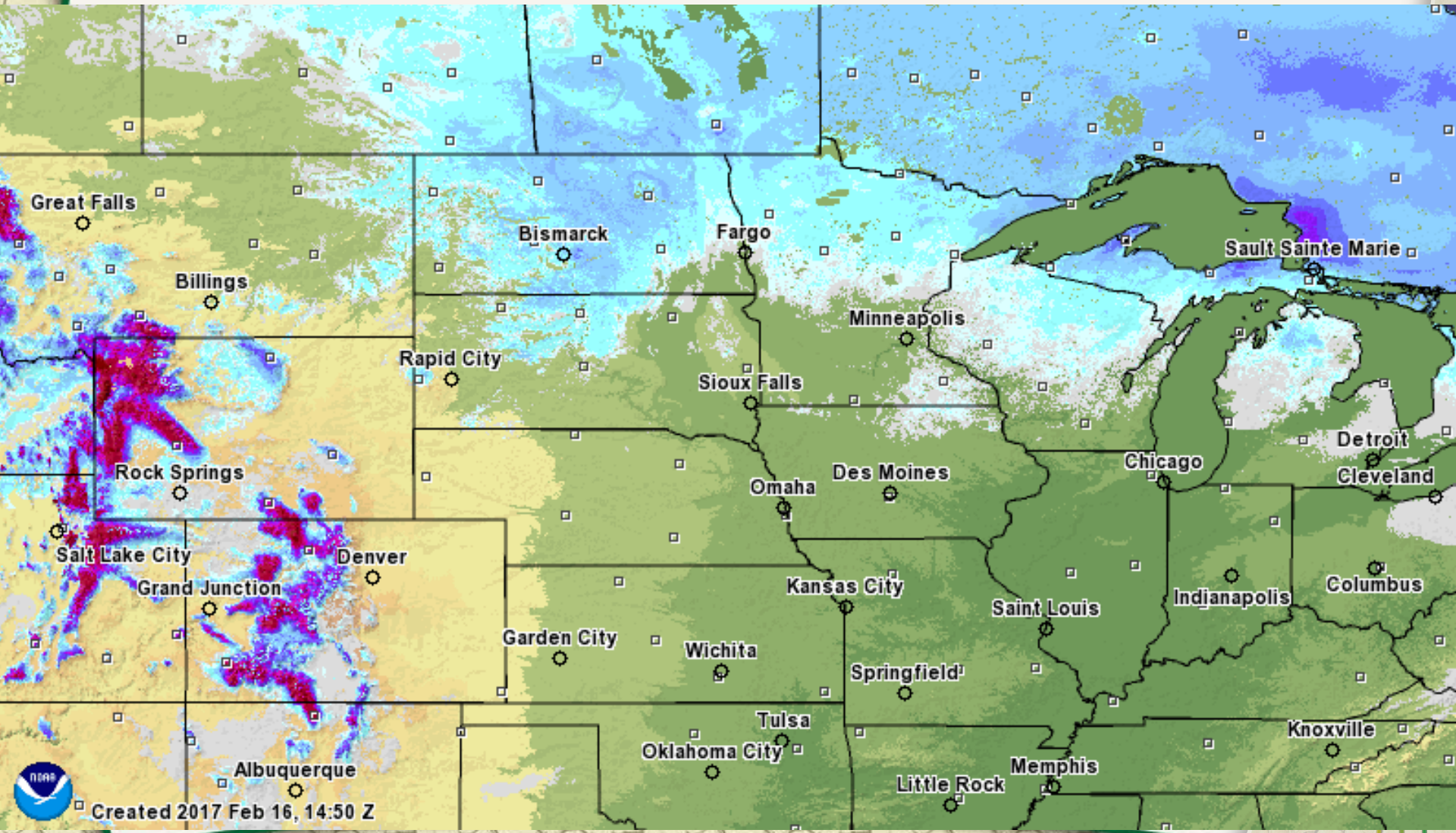
February 14, 2017
compared to
January 17, 2017

http://droughtmonitor.unl.edu

Regional Impacts

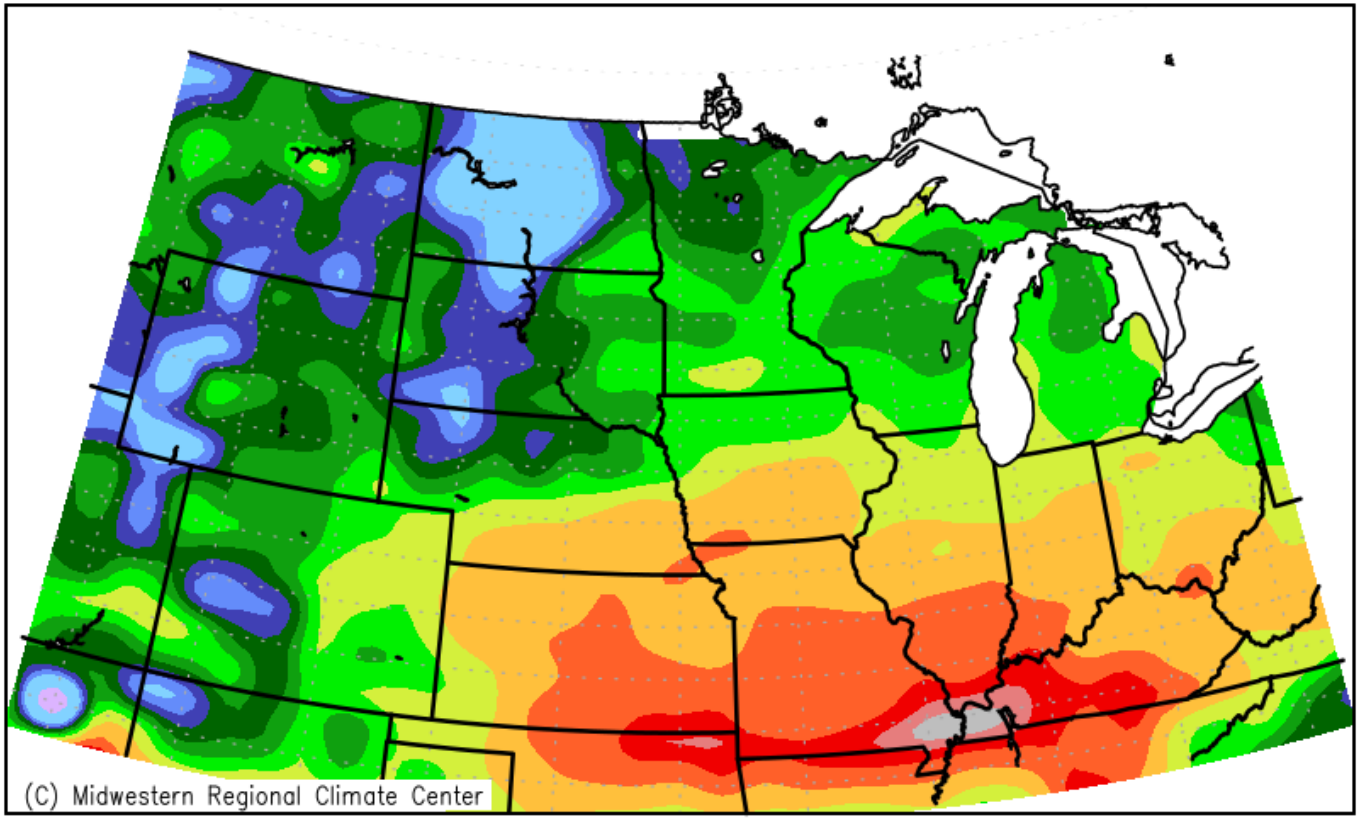


Snow Drought of 2016-17

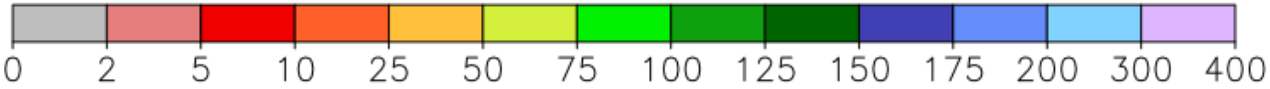


National Drought Mitigation Center

Accumulated Snowfall: Percent of Mean
July 1, 2016 to February 15, 2017



Mean period is 1981–2010.



Midwestern Regional Climate Center

cli–MATE: MRCC Application Tools Environment

Generated at: 2/15/2017 1:23:44 PM CST

Agricultural Impacts

- Exposed winter wheat in areas of Kansas and Nebraska allowed for some winterkill
- Adequate soil moisture recharge in most locations with several standing water reports throughout the region (NE, OH, IL)
- Frost quickly exiting the ground throughout much of the region where there is no snow pack
- Concerns are rapidly developing over an early break to dormancy for fruit trees and what the impact of a hard freeze (MO)
- Muddy feedlots are becoming an issue for livestock producers (NE)
- Calving season is starting 2-3 weeks early with some of this attributed to the warm climate (SD)
- Exposed soils are softening up as Spring rapidly approaches making mud fairly common over the entire region

NIDIS
University of Nebraska Lincoln
National Drought Mitigation Center

Regional Issues

- Missouri:
  - Very mild February (Columbia)
- Wyoming:
  - Heavy snow and wind toppled steel power poles
  - Ice Jams due to warm weather in the Bighorn Basin
  - High Winds (70-90 mph) causing travel issues

Regional Issues

- South Dakota:
  - Rapidly declining snow cover
  - More instances of icing conditions over the last 6 weeks compared to a normal winter
- Minnesota:
  - 18 consecutive months of above normal temperatures in the Twin Cities
  - Maximum frost depths reached, generally 18-20 inches
  - Bad lake ice conditions in the central to southern portions of the state impacting ice fishing
  - Freezing rain throughout the winter, especially in the southern portions of the state and into Iowa

NIDIS

University of Nebraska Lincoln

National Drought Mitigation Center

Regional Issues

- Iowa:
  - Spring flood potential is high in the northern portions of the state where saturated soils and snow will combine to cause issues
  - 9-18 inches of frost left in the soil in the northern half of the state (below normal)
  - Portions of southern IA have been frost-free this winter for much of the season
  - Very dry in south central IA, little winter impacts to drought
- Illinois:
  - Will continue to monitor areas of precipitation deficits going into spring for drought development
- North Dakota:
  - Red River has a high probability (75-90% chance) of flooding by the first week in April

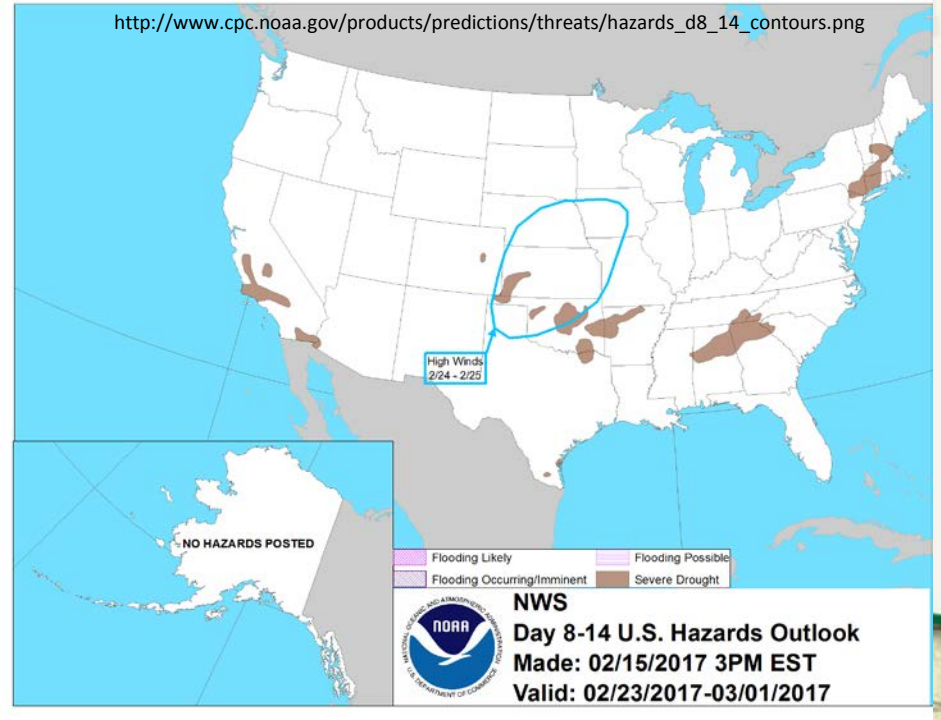
NIDIS

University of Nebraska Lincoln

National Drought Mitigation Center

Regional Issues

- Many states reporting an increase in fire danger due to dry and exposed fuels and dryness prior to green up
- Dangers of an early green up and late freeze starting to be discussed



Climate Outlooks

- Regional Flood Potential/Outlook
- 7-day precipitation forecast
- 8-14 day outlook
- ENSO Outlook
- Monthly Outlook
- Spring Outlook (Mar-May)
- Summer Outlook (Jun-Aug)
- Autumn Outlook (Sep-Nov)
- Seasonal Drought Outlook

NIDIS

University of Nebraska Lincoln

National Drought Mitigation Center

Regional Flood Outlook and Potential

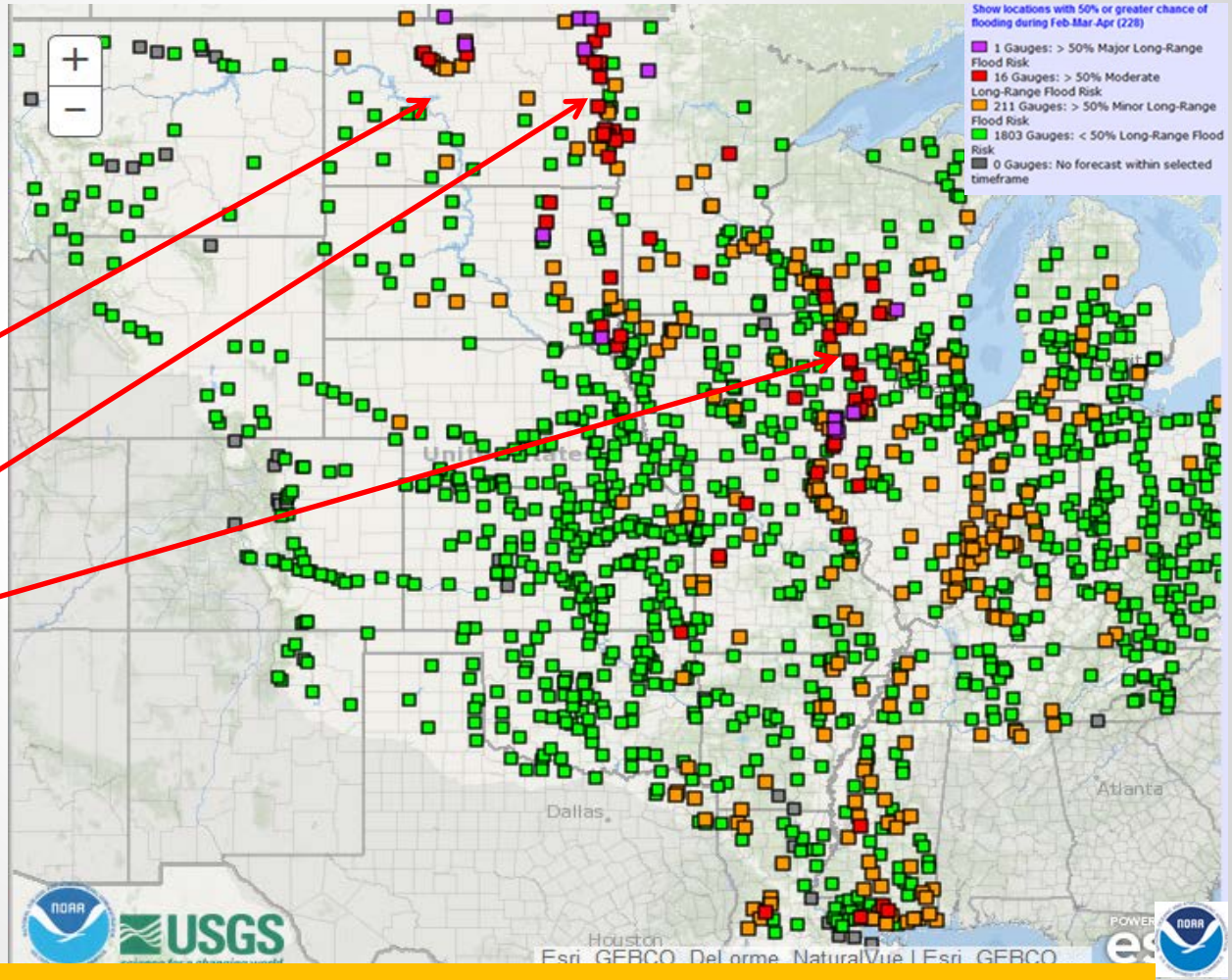
- Slides and Data provided courtesy of:

- **Jim Noel – OHRFC**
- **Brian Connelly – NCRFC**
- **Kevin Low – MBRFC**
- **James Paul – ABRFC**
- **Jeff Graschel - LMRFC**

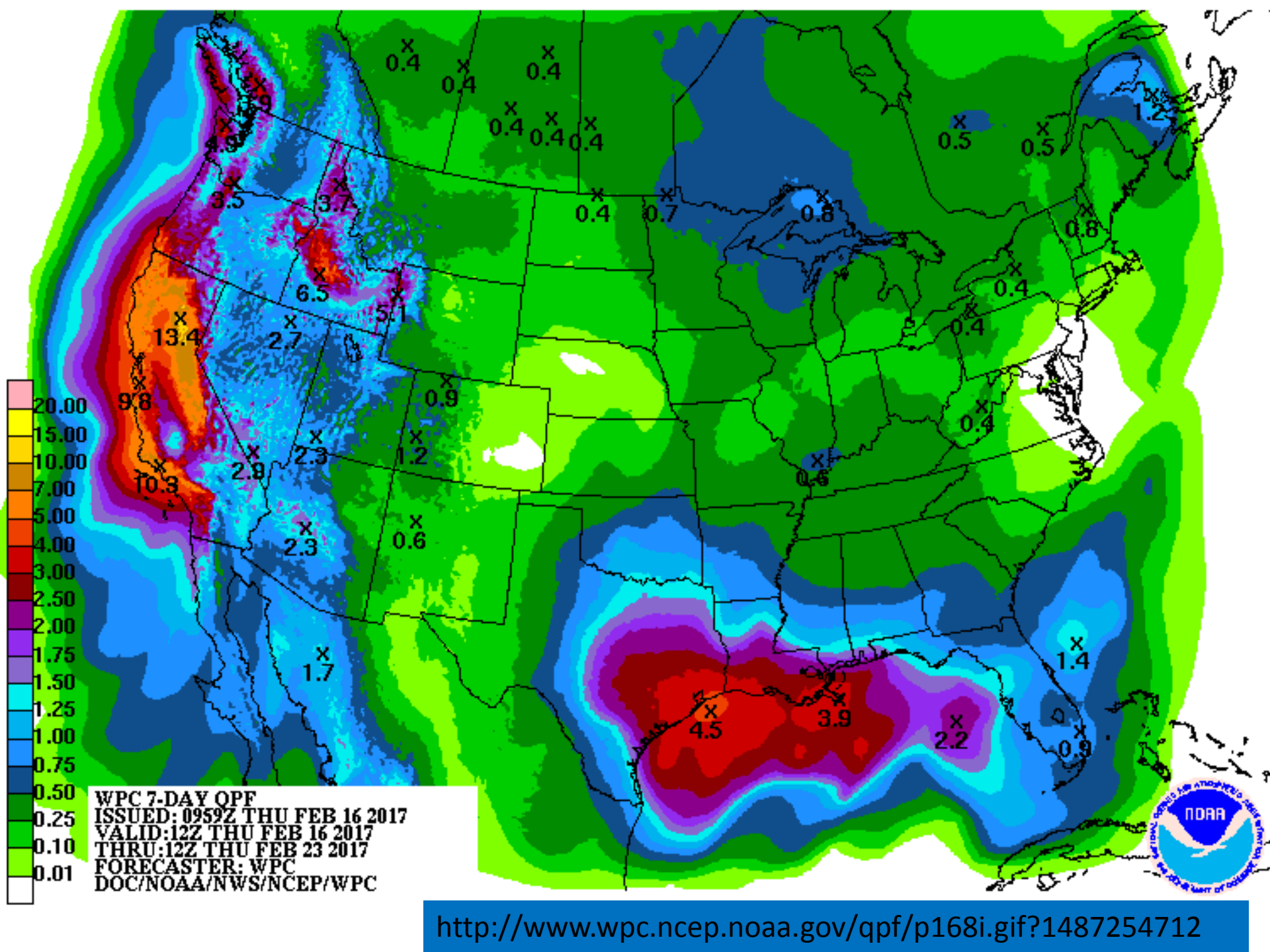
Flood Outlook
Through April 2017

50% or Greater Chance of Flooding

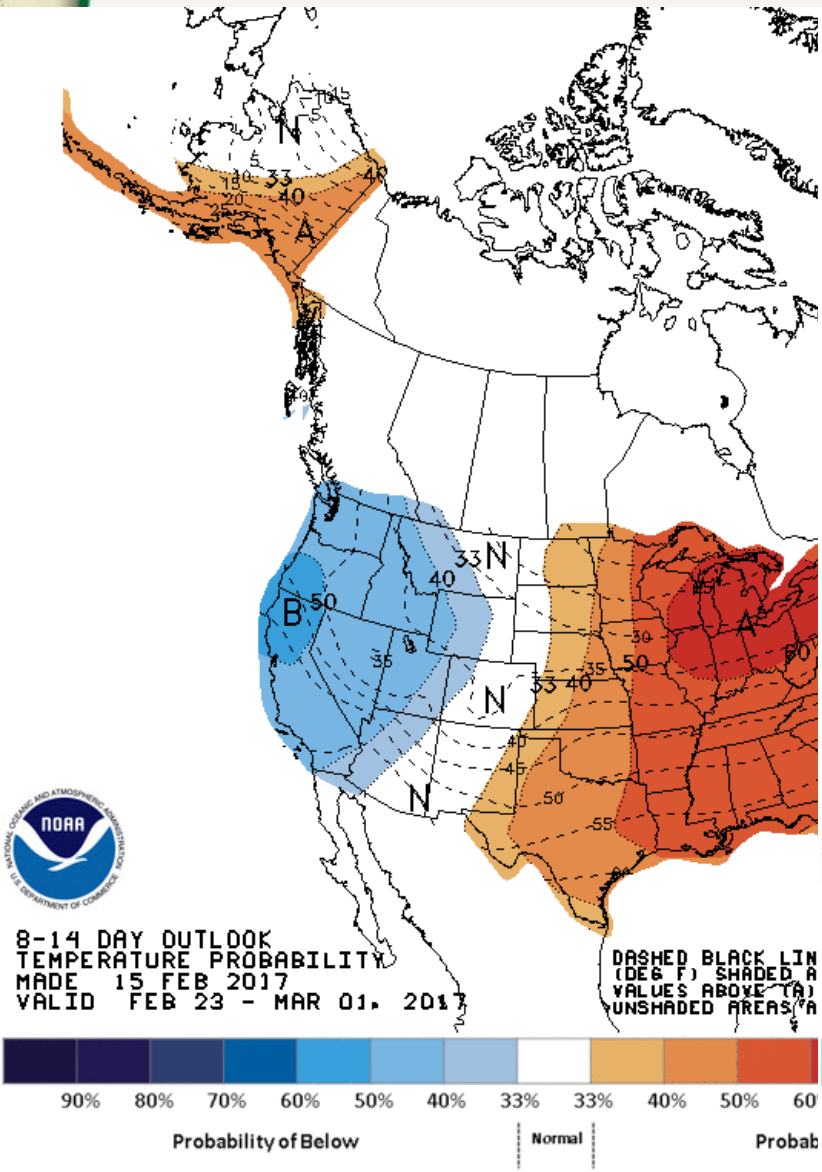
- Main threat areas for the more significant flood risk appear to be focused in the upper Mississippi drainage system into the Souris and Red River of the North basins at this time.

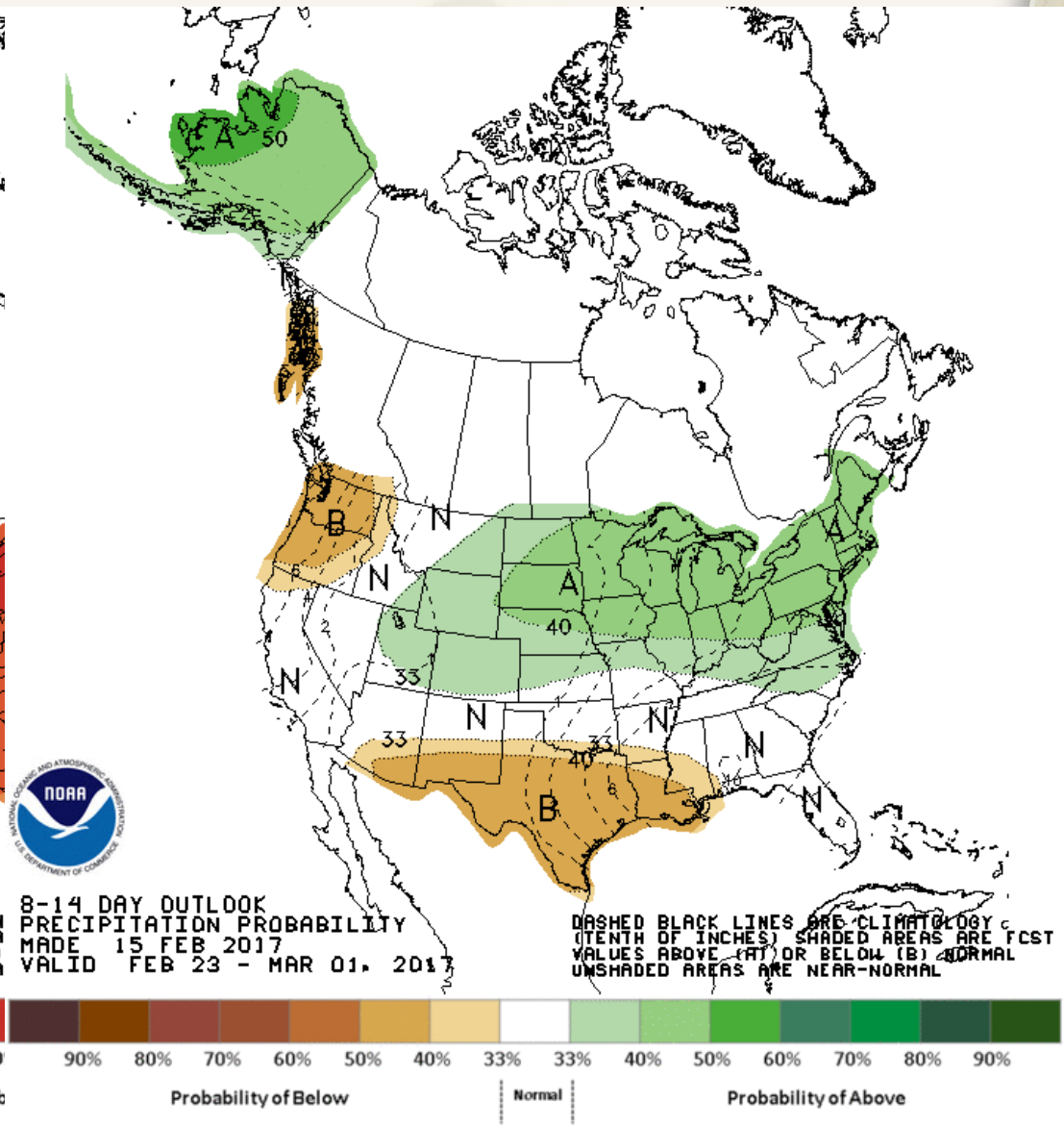


http://water.weather.gov/ahps/region_long_range.php?rfc=mvrfc&percent=50

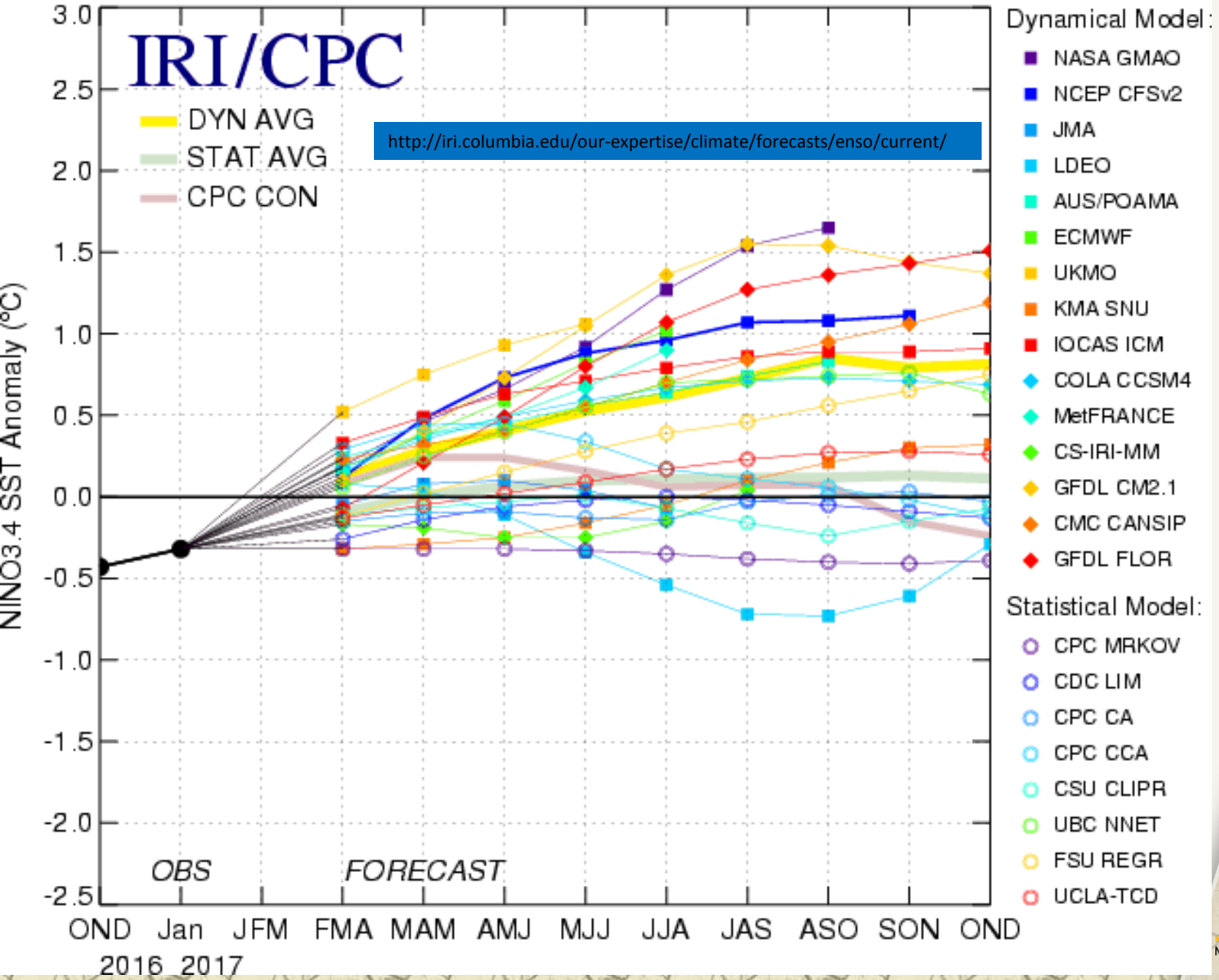

20.00
15.00
10.00
7.00
5.00
4.00
3.00
2.50
2.00
1.75
1.50
1.25
1.00
0.75
0.50
0.25
0.10
0.01
WPC 7-DAY QPF
ISSUED: 0959Z THU FEB 16 2017
VALID:12Z THU FEB 16 2017
THRU:12Z THU FEB 23 2017
FORECASTER: WPC
DOC/NOAA/NWS/NCEP/WPC
NOAA
http://www.wpc.ncep.noaa.gov/qpf/p168i.gif?1487254712

8-14 day Outlook





Mid-Feb 2017 Plume of Model ENSO Predictions

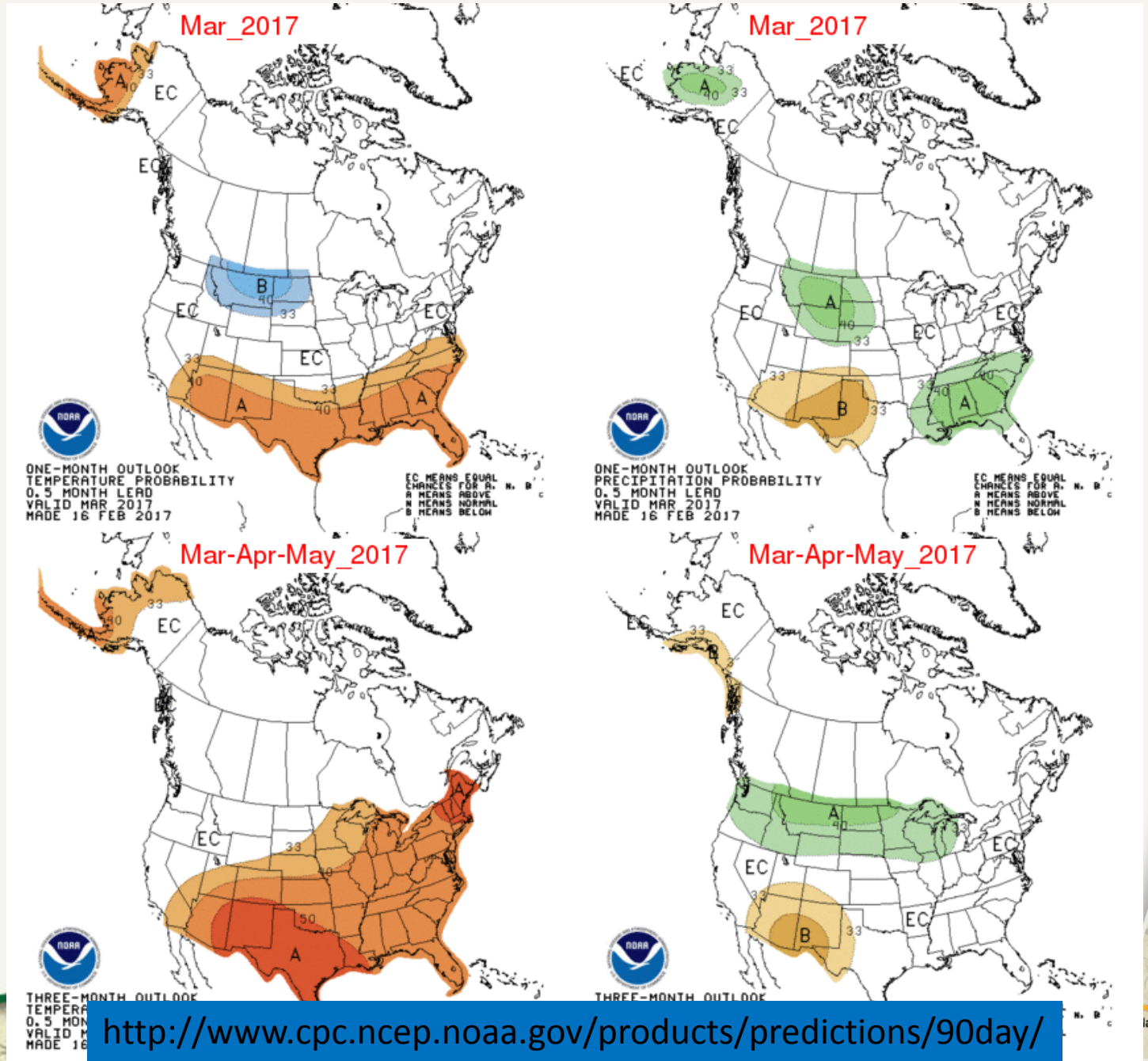


NIDIS

University of Nebraska Lincoln

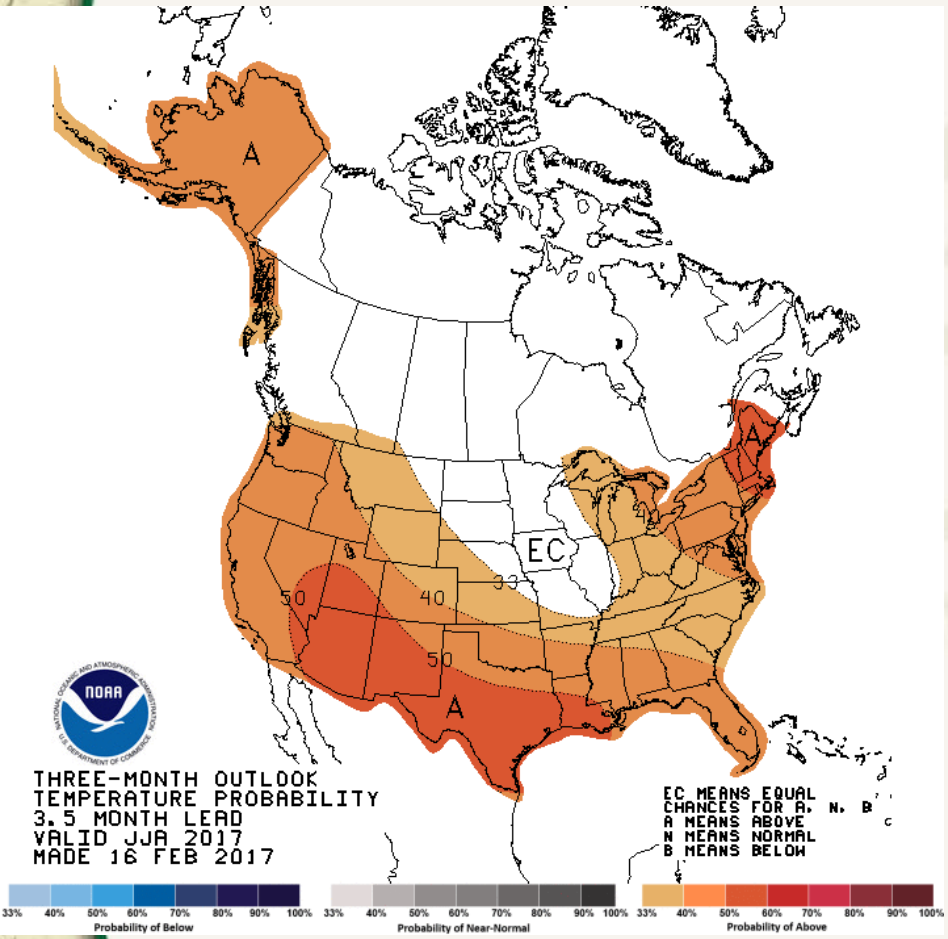
National Drought Mitigation Center

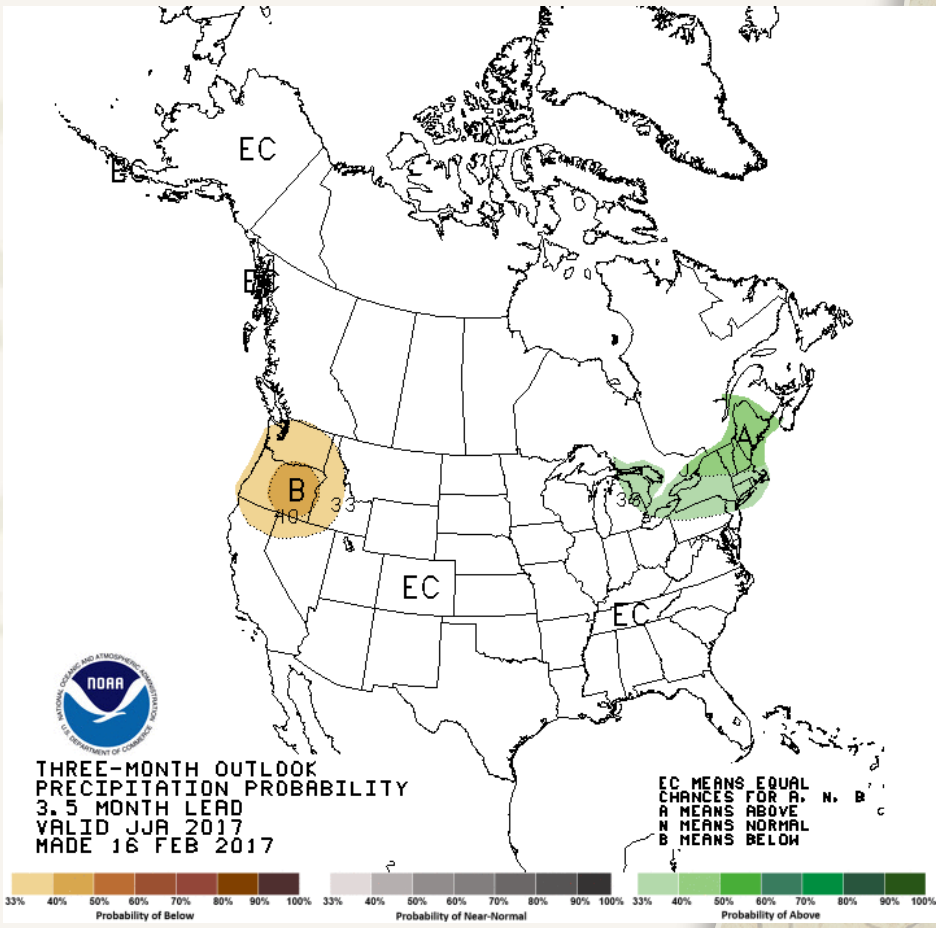
Monthly and Seasonal Outlook



http://www.cpc.ncep.noaa.gov/products/predictions/90day/

Summer Outlook JJA





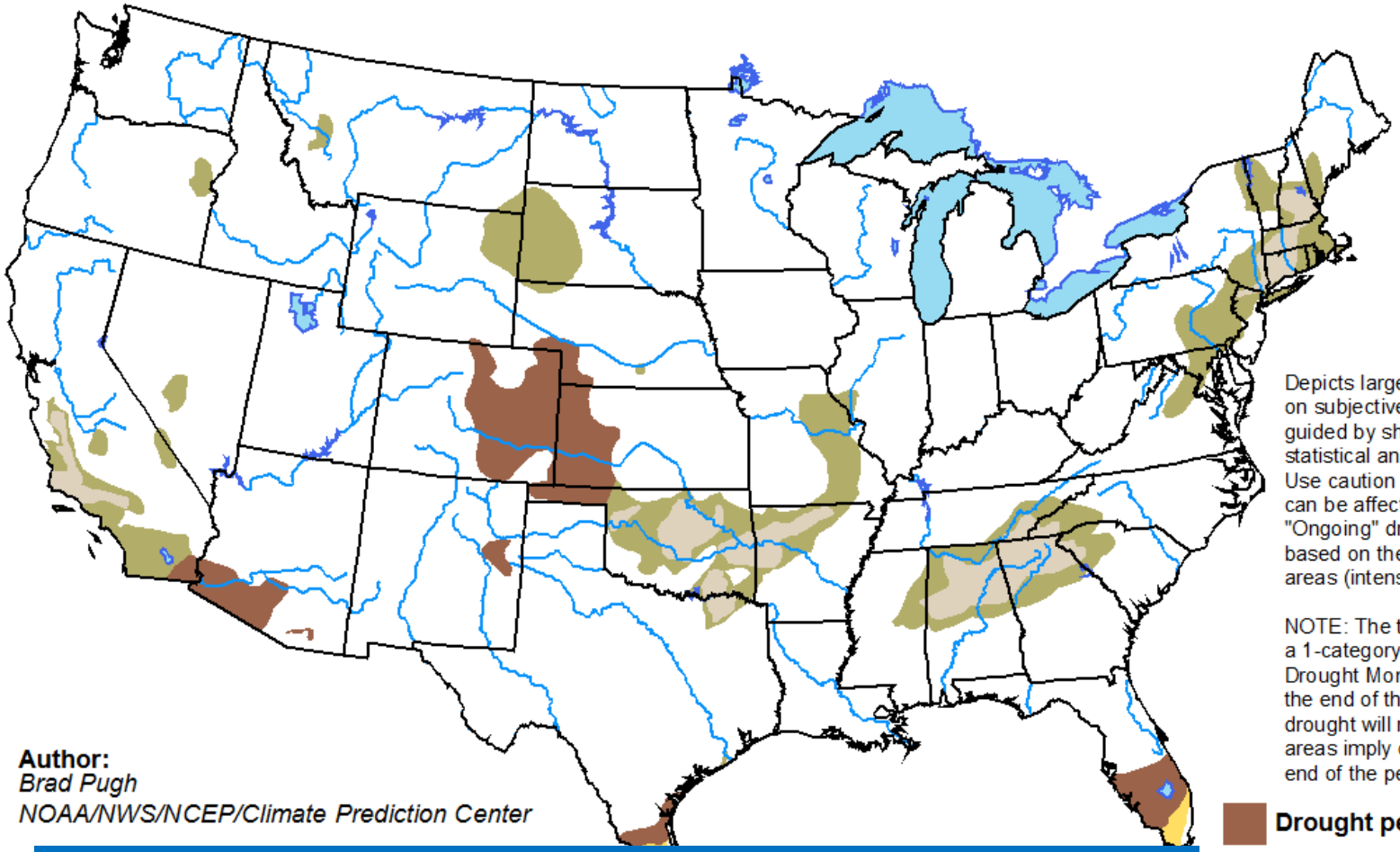
University of Nebraska Lincoln

National Drought Mitigation Center

U.S. Seasonal Drought Outlook

Drought Tendency During the Valid Period

Valid for February 16 - May 31, 2017
Released February 16, 2017



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).

Drought persists

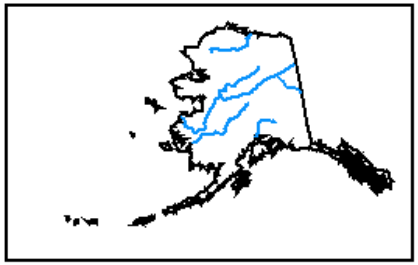
Drought remains but improves

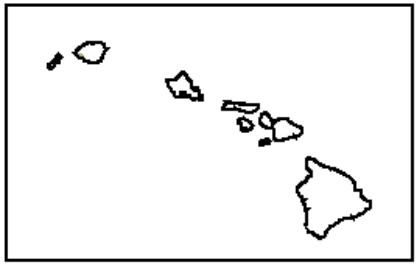
Drought removal likely

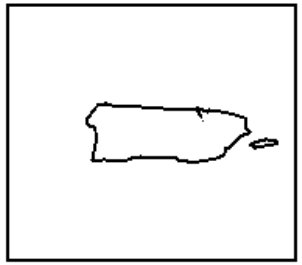
Drought development likely

Author:
Brad Pugh
NOAA/NWS/NCEP/Climate Prediction Center

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







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

Summary

- A continuing trend of warmer than normal conditions continues for most of the region
- Outside of the northern reaches, most of the region recorded fairly low snow totals to date
- Pockets of drought remain and areas of Missouri and Illinois are being monitored as dryness accumulates and it is starting to impact surface water flows
- La Nina has subsided and neutral conditions are projected through the summer
- With no oceanic forcing, skill associated with the extended outlooks decreases
- Flood concerns throughout the region are developing as fully recharged soils and winter snows coupled with good mountain snowpacks will potentially impact the region

NIDIS

University of Nebraska Lincoln

National Drought Mitigation Center

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

NIDIS

University of Nebraska Lincoln

National Drought Mitigation Center

Thank You and Questions?

- Questions:

Climate:

- Brian Fuchs: bfuchs2@unl.edu, 402-472-6775
- Dennis Todey: Dennis.Todey@ARS.USDA.GOV, 515-294-2013
- Doug Kluck: doug.kluck@noaa.gov, 816-994-3008
- Mike Timlin: mtimlin@illinois.edu, 217-333-8506
- Natalie Umphlett: numphlett2@unl.edu, 402 472-6764

Weather:

- crhroc@noaa.gov

NIDIS

University of Nebraska Lincoln

National Drought Mitigation Center

Contact Information:

Brian Fuchs

bfuchs2@unl.edu
402-472-6775

National Drought Mitigation Center
NOAA's Drought Risk Management Research Center

School of Natural Resources
University of Nebraska-Lincoln