



# North Central U.S. Climate Summary and Outlook Webinar December 15, 2016

Stuart Foster

State Climatologist for Kentucky

Department of Geography and Geology

Western Kentucky University

[Stuart.foster@wku.edu](mailto:Stuart.foster@wku.edu)

270.745.5983



# General Information

- Regional climate services for the North Central U.S., including the Great Plains and Midwest, are provided through collaboration among federal, regional, and state partners:
  - National Oceanic and Atmospheric Administration
  - U.S. Department of Agriculture
  - National Drought Mitigation Center
  - High Plains Regional Climate Center
  - Midwestern Regional Climate Center
  - American Association of State Climatologists
  
- Next webinar
  - January 19, 2017, Montana Climate Office
  
- Archive of past webinars
  - <http://mrcc.isws.illinois.edu/multimedia/webinars.jsp>
  - <http://www.hprcc.unl.edu/webinars.php>

# Agenda

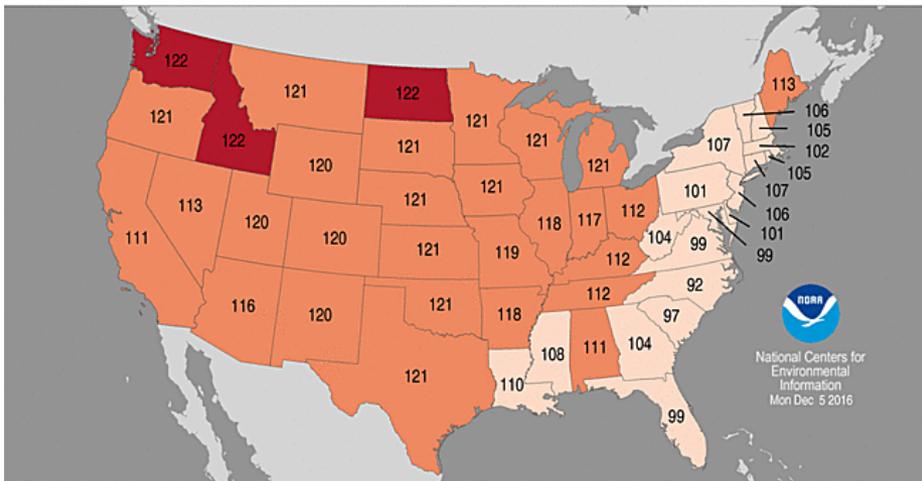
- Current climate conditions in historical context
- Current and prospective climate impacts
- Climate outlooks
- Questions and answers

# November

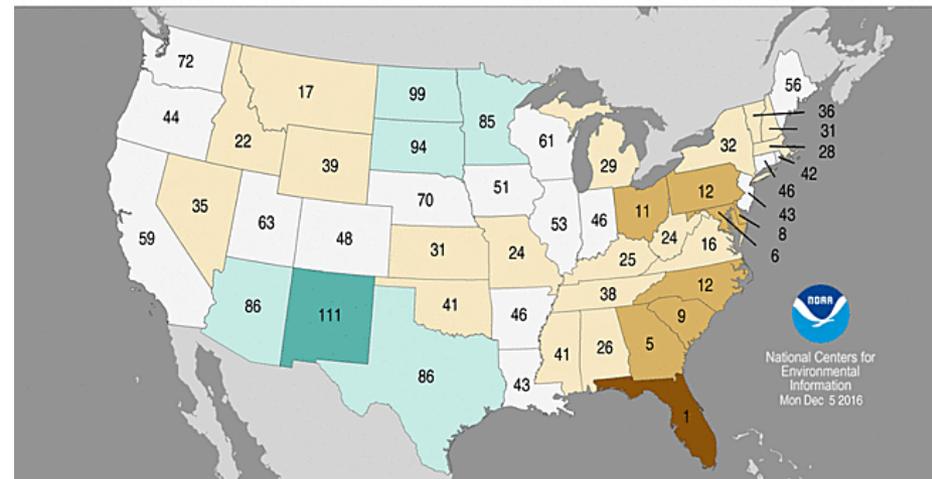
It's been warm throughout the region...

... and wet, dry, or about normal, depending on where you are

Statewide Average Temperature Ranks  
November 2016  
Period: 1895-2016



Statewide Precipitation Ranks  
November 2016  
Period: 1895-2016

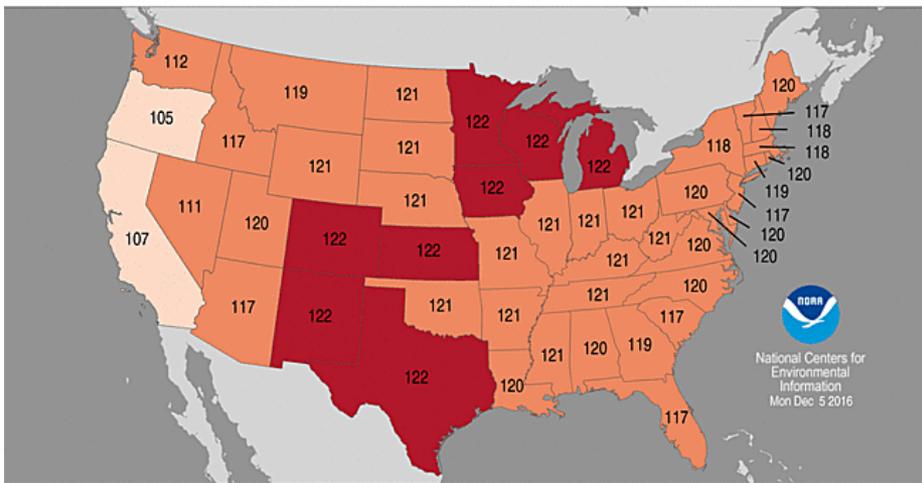


# Sep-Oct-Nov

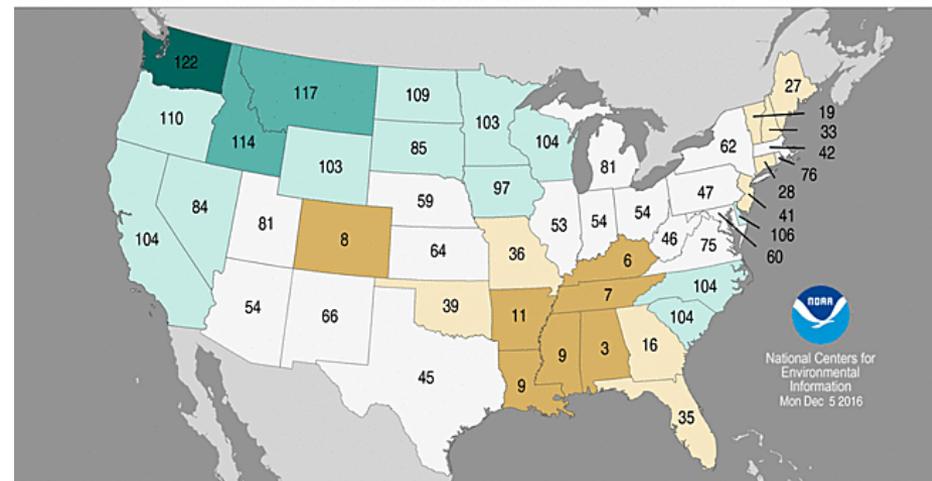
It's been warm throughout the region...

... and wet, dry, or about normal, depending on where you are

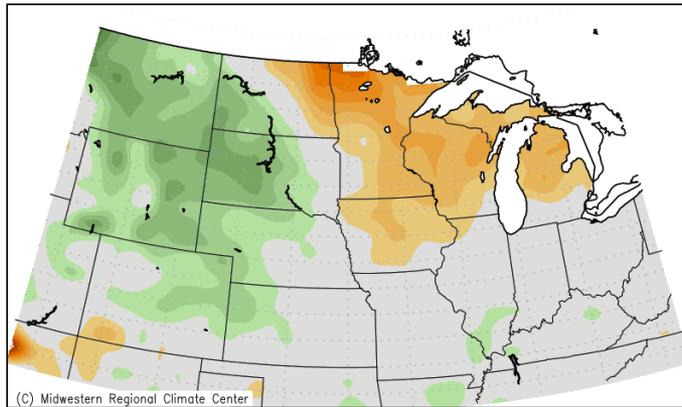
Statewide Average Temperature Ranks  
September–November 2016  
Period: 1895–2016



Statewide Precipitation Ranks  
September–November 2016  
Period: 1895–2016

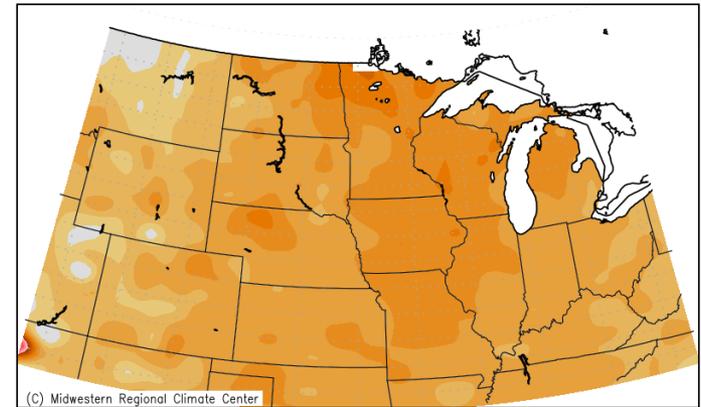


Average Temperature (°F): Departure from Mean  
November 16, 2016 to December 13, 2016



Midwestern Regional Climate Center  
Illinois State Water Survey, Prairie Research Institute  
University of Illinois at Urbana-Champaign

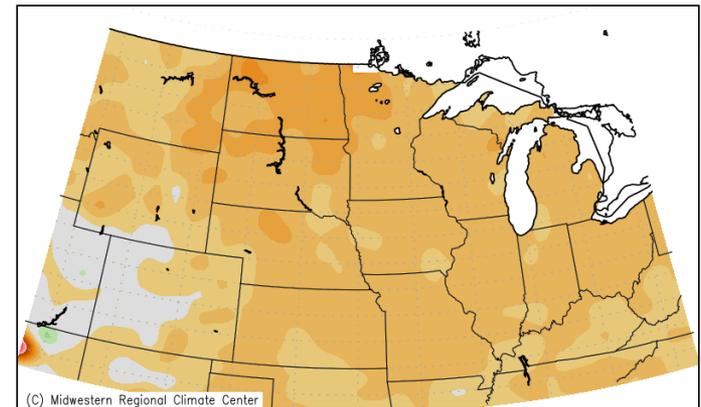
Average Temperature (°F): Departure from Mean  
September 17, 2016 to December 13, 2016



Midwestern Regional Climate Center  
Illinois State Water Survey, Prairie Research Institute  
University of Illinois at Urbana-Champaign

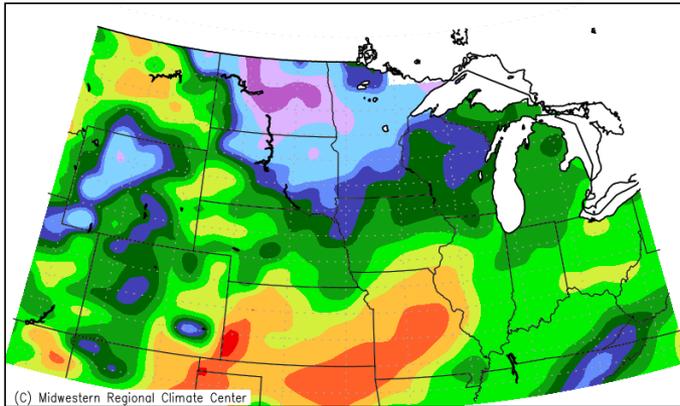
- Near normal with warm and cool pockets over past 30 days
- From 3 to 5 °F above normal for much of the region over past 90 days
- From 1 to 4 °F above normal for much of the region year-to-date

Average Temperature (°F): Departure from Mean  
January 1, 2016 to December 13, 2016



Midwestern Regional Climate Center  
Illinois State Water Survey, Prairie Research Institute  
University of Illinois at Urbana-Champaign

Accumulated Precipitation: Percent of Mean  
November 16, 2016 to December 14, 2016

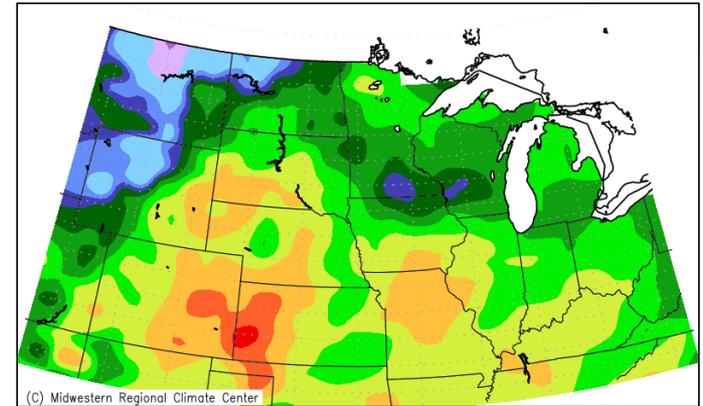


Mean period is 1981–2010.



Midwestern Regional Climate Center  
Illinois State Water Survey, Prairie Research Institute  
University of Illinois at Urbana–Champaign

Accumulated Precipitation: Percent of Mean  
September 17, 2016 to December 14, 2016



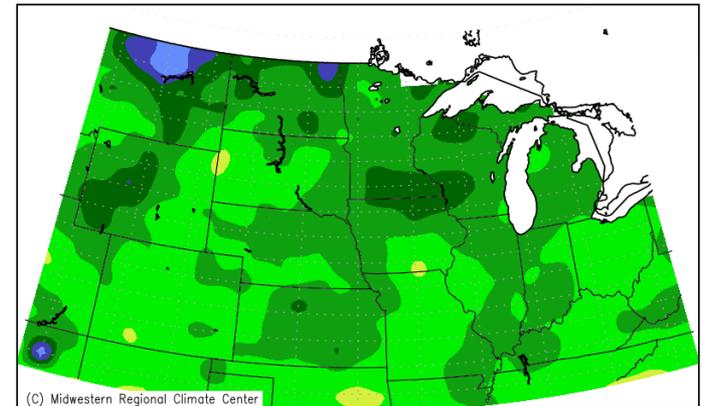
Mean period is 1981–2010.



Midwestern Regional Climate Center  
Illinois State Water Survey, Prairie Research Institute  
University of Illinois at Urbana–Champaign

- Above normal in upper Midwest and Plains and near to below normal in portions of the lower Midwest and Plains over past 30 days
- Above normal in upper Midwest and Plains and sharply below normal in portions of the lower Midwest over past 90 days
- Generally wetter than normal, including some areas of record wetness in portions of Iowa and Minnesota

Accumulated Precipitation: Percent of Mean  
January 1, 2016 to December 14, 2016



Mean period is 1981–2010.



Midwestern Regional Climate Center  
Illinois State Water Survey, Prairie Research Institute  
University of Illinois at Urbana–Champaign

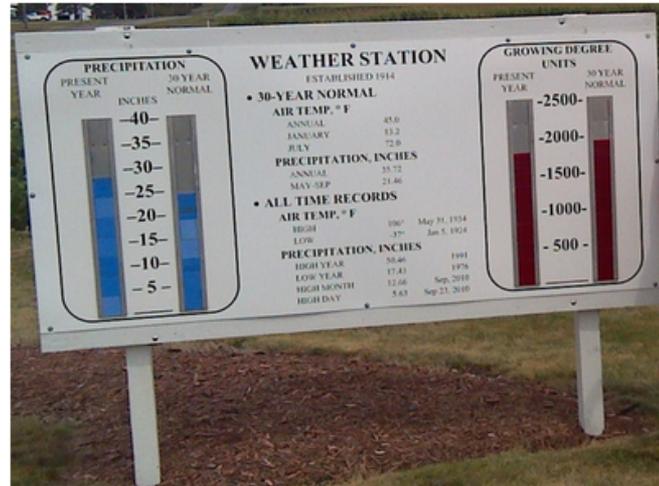
# Annual Precipitation Records Broken

## Minnesota Annual Precipitation Record Broken

Waseca, in south central Minnesota, has set the official state precipitation record, coming in with the highest annual precipitation total for a National Weather Service Cooperative Observation site.

As of December 12, 2016 Waseca had a total of 54.96 inches with more precipitation on the way.

The old statewide annual record was 53.52 inches of precipitation at St. Francis in Anoka County in 1991.



Sign Outside the Waseca Weather Station  
Courtesy: Minnesota State Climatology Office

[http://www.dnr.state.mn.us/climate/journal/16\\_waseca.html](http://www.dnr.state.mn.us/climate/journal/16_waseca.html)

## Iowa

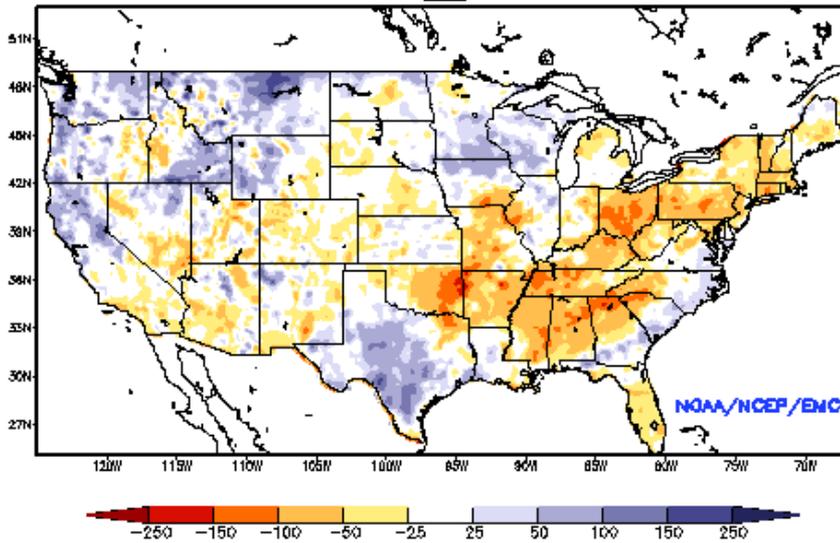
| Station      | 2016 Total   | Previous Annual Record | Period of Record |
|--------------|--------------|------------------------|------------------|
| Charles City | 57.31 inches | 51.35 in 1999          | 133 years        |
| Decorah      | 56.33 inches | 48.74 in 2007          | 128 years        |
| Cresco       | 56.00 inches | 47.87 in 1951          | 110 years        |
| New Hampton  | 55.42 inches | 51.88 in 2007          | 110 years        |
| Osage        | 50.91 inches | 45.72 in 1999          | 112 years        |

# Modeled Soil Moisture

## NLDAS

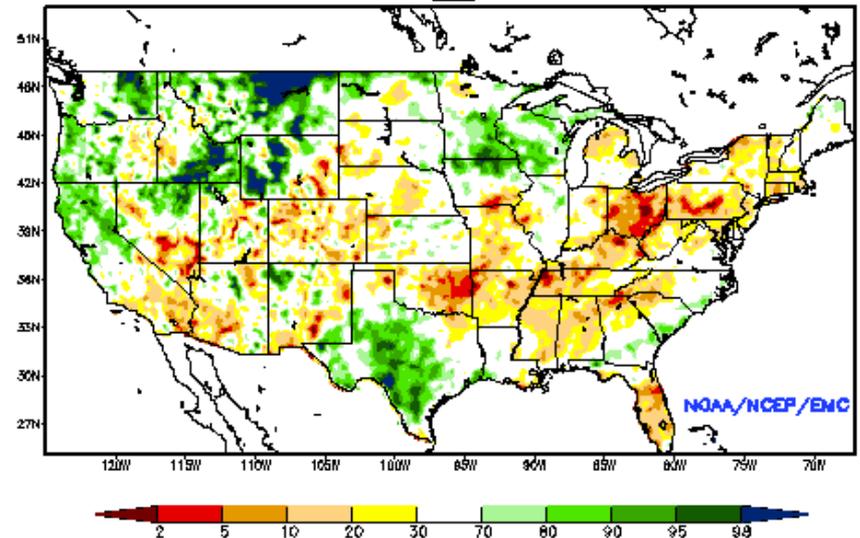
### Anomaly

Ensemble-Mean - Current Total Column Soil Moisture Anomaly (mm)  
NCEP NLDAS Products Valid: DEC 10, 2016



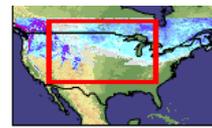
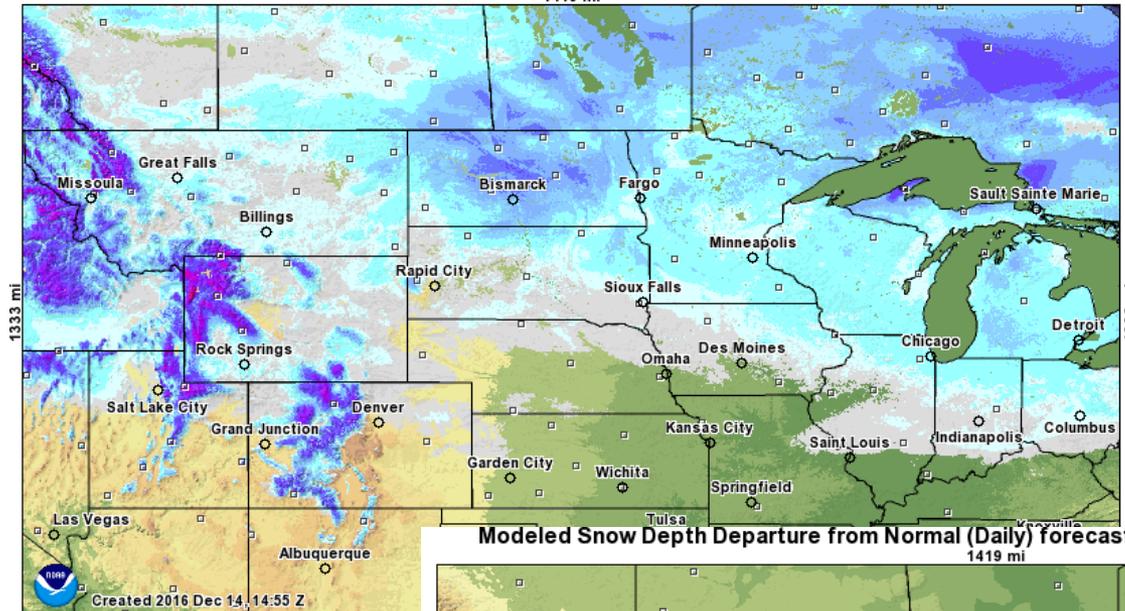
### Percentile

Ensemble-Mean - Current Total Column Soil Moisture Percentile  
NCEP NLDAS Products Valid: DEC 10, 2016

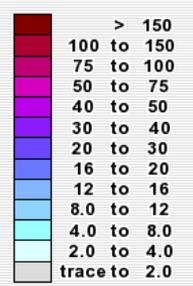




Modeled Snow Depth forecasted for 2016 December 15, 2:00 UTC  
1419 mi



Inches of depth

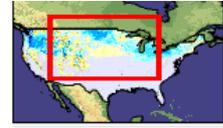
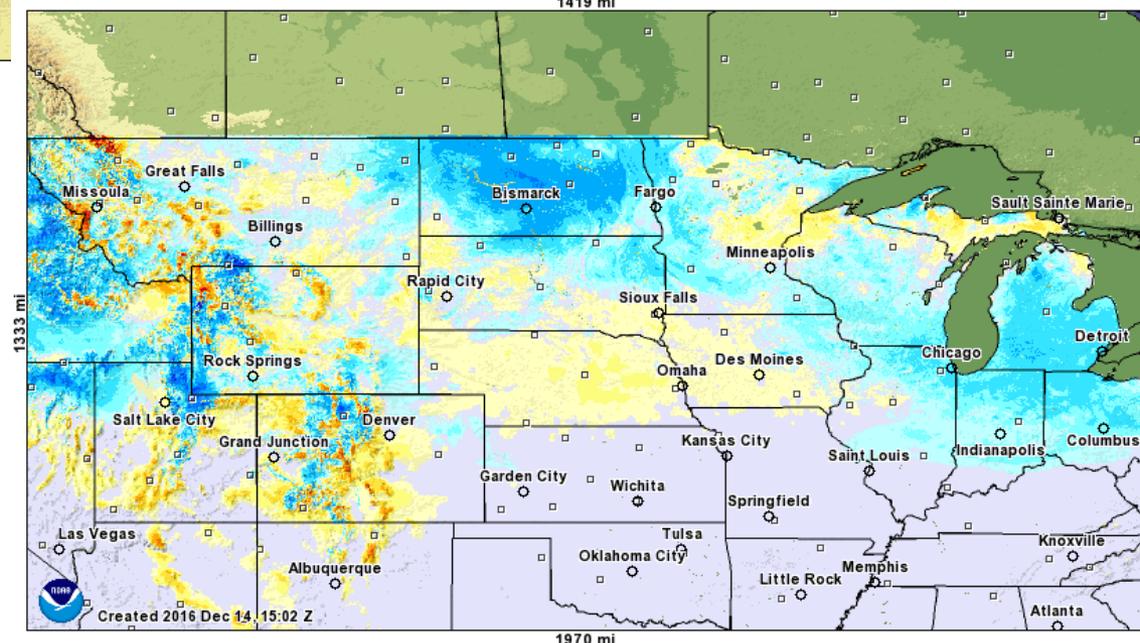


Elevation in feet

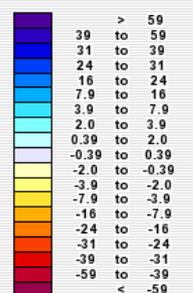


Snow Depth

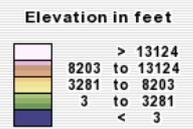
Modeled Snow Depth Departure from Normal (Daily) forecasted for 2016 December 15, 6:00 UTC  
1419 mi



Inches of depth



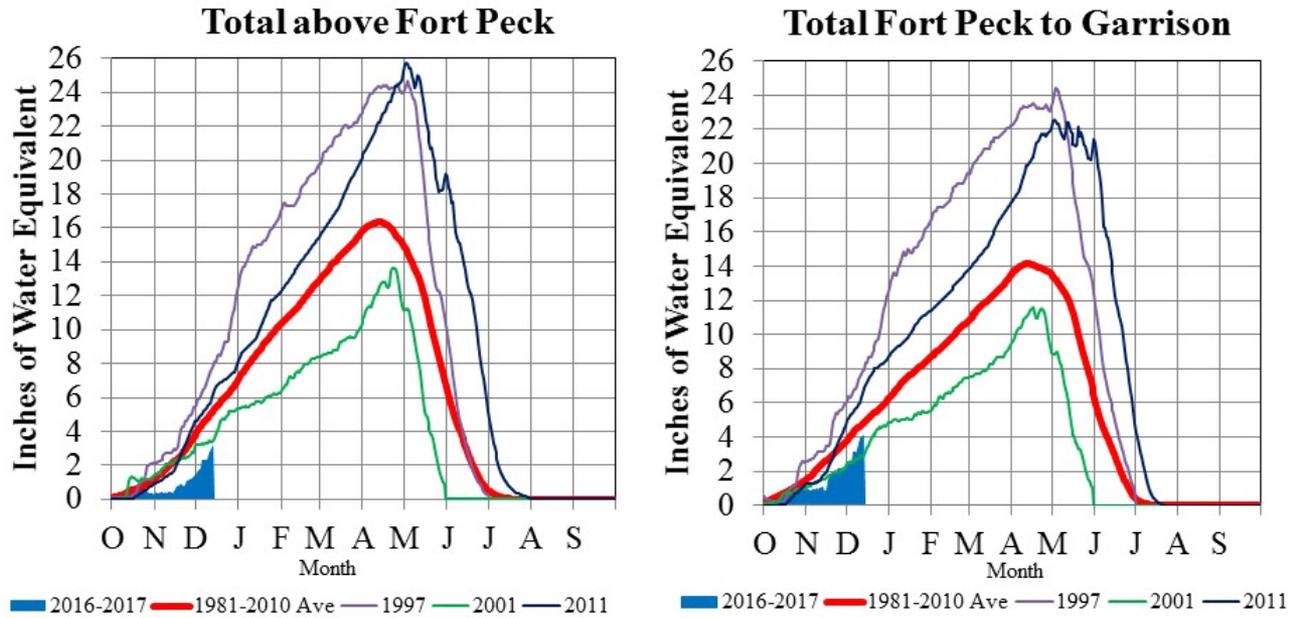
Elevation in feet



Departure from Normal

# Missouri River Basin – Mountain Snowpack Water Content 2016-2017 with comparison plots from 1997\*, 2001\*, and 2011

December 13, 2016



The Missouri River Basin mountain snowpack normally peaks near April 15. On December 13, 2016 the mountain Snow Water Equivalent (SWE) in the "Total above Fort Peck" reach was 3.2", 62% of average. The mountain SWE in the "Total Fort Peck to Garrison" reach was 4.1", 84% of average. Normally by December 15, about 34% of the peak mountain SWE has occurred in both reaches.

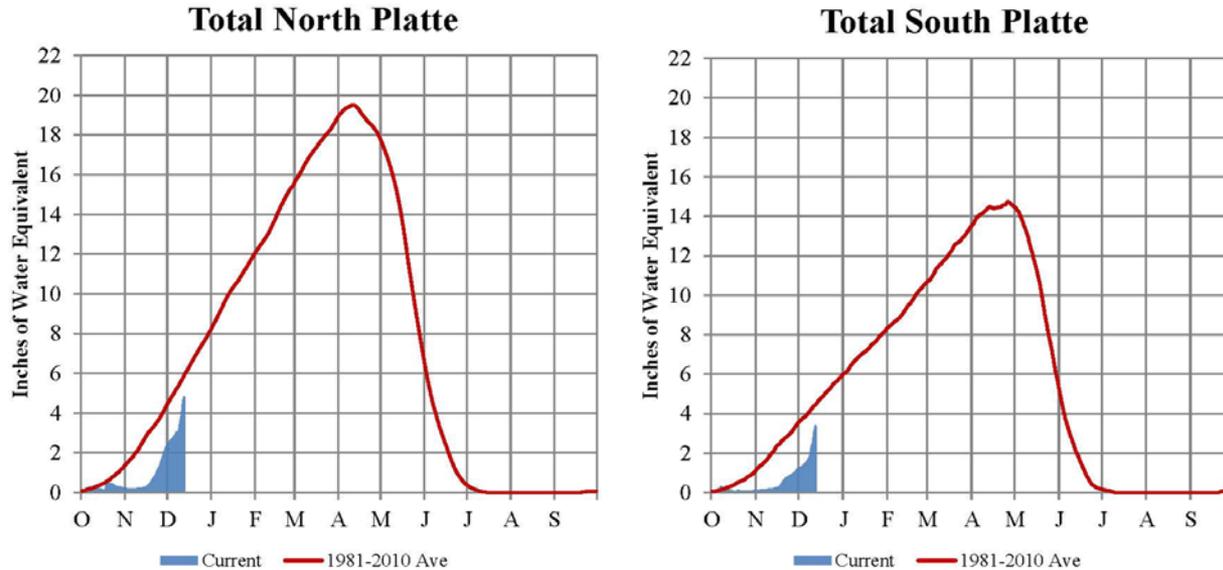
\*Generally considered the high and low year of the last 20-year period, respectively.

Provisional data. Subject to revision.

# Platte River Basin - Mountain Snowpack Water Content

## Water Year 2016-2017

December 15, 2016



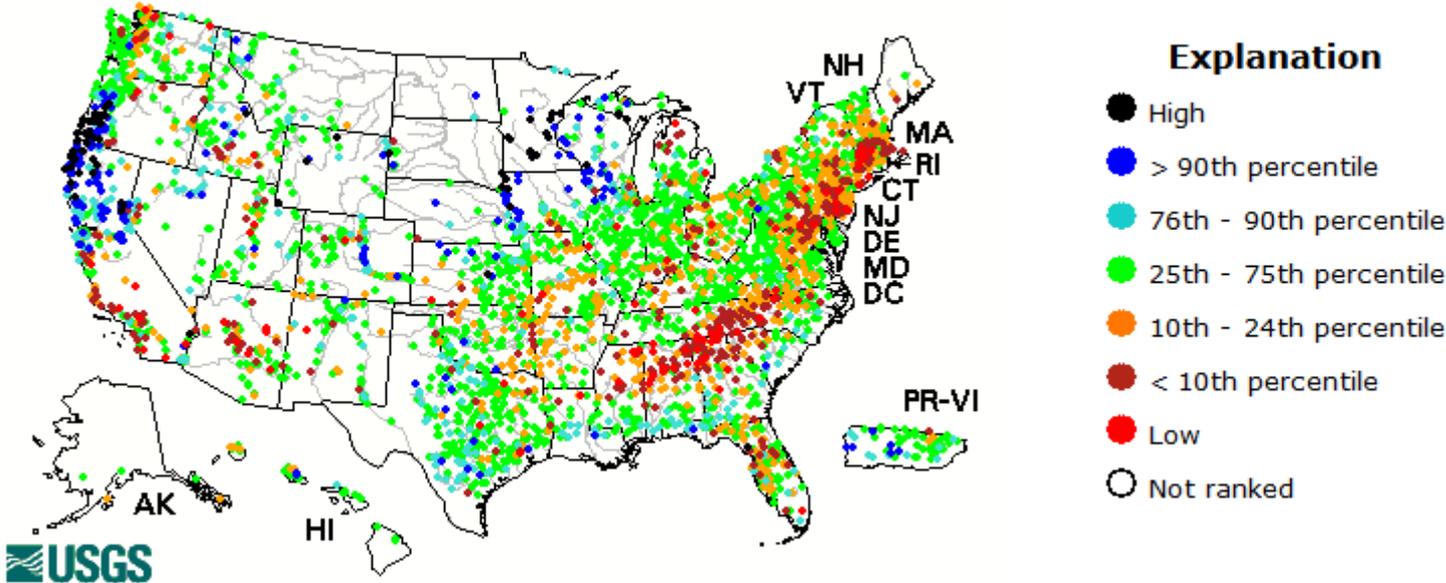
The North and South Platte River Basin mountain snowpacks normally peak near April 15 and the end of April, respectively. As of December 13, 2016, the mountain snowpack SWE in the "Total North Platte" reach is currently 4.8", 81% of average. The mountain snowpack SWE in the "Total South Platte" reach is currently 3.4", 74% of average.

Source: USDA, Natural Resource Conservation Service

Provisional Data. Subject to Revision

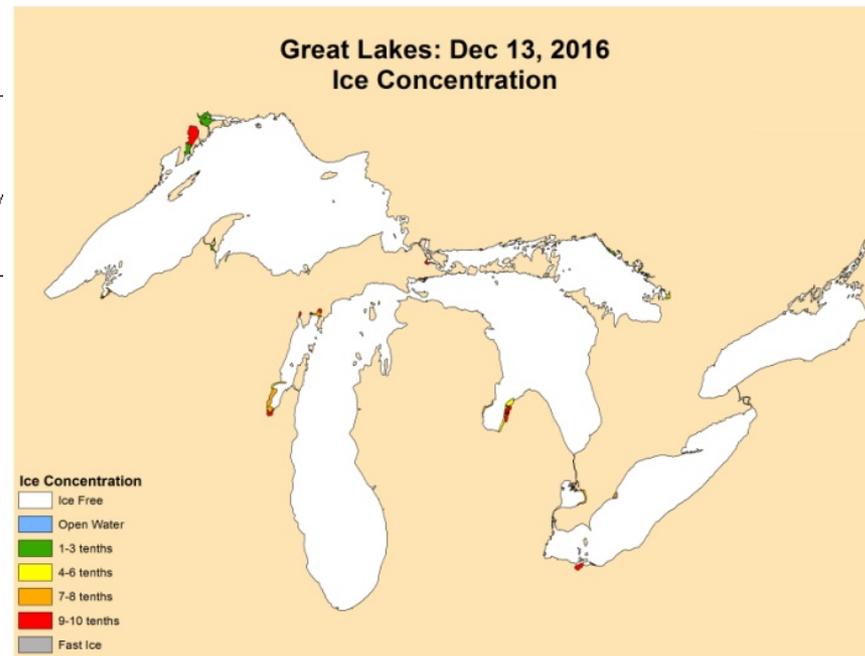
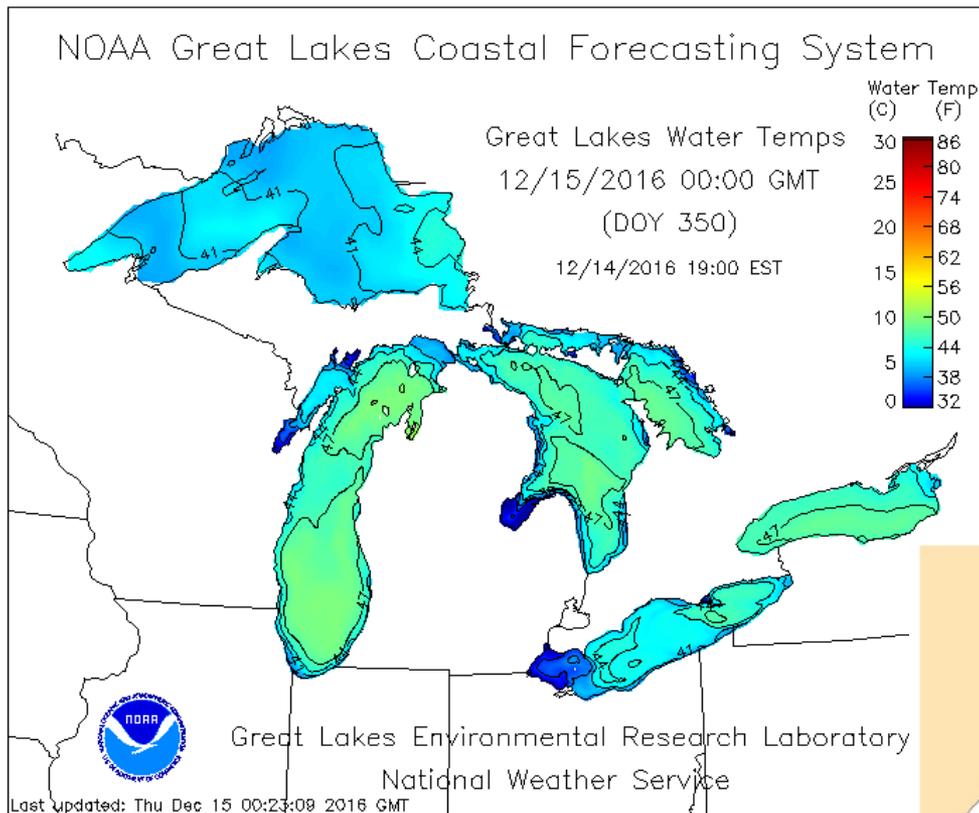
# Streamflow Conditions

Thursday, December 15, 2016 09:30ET



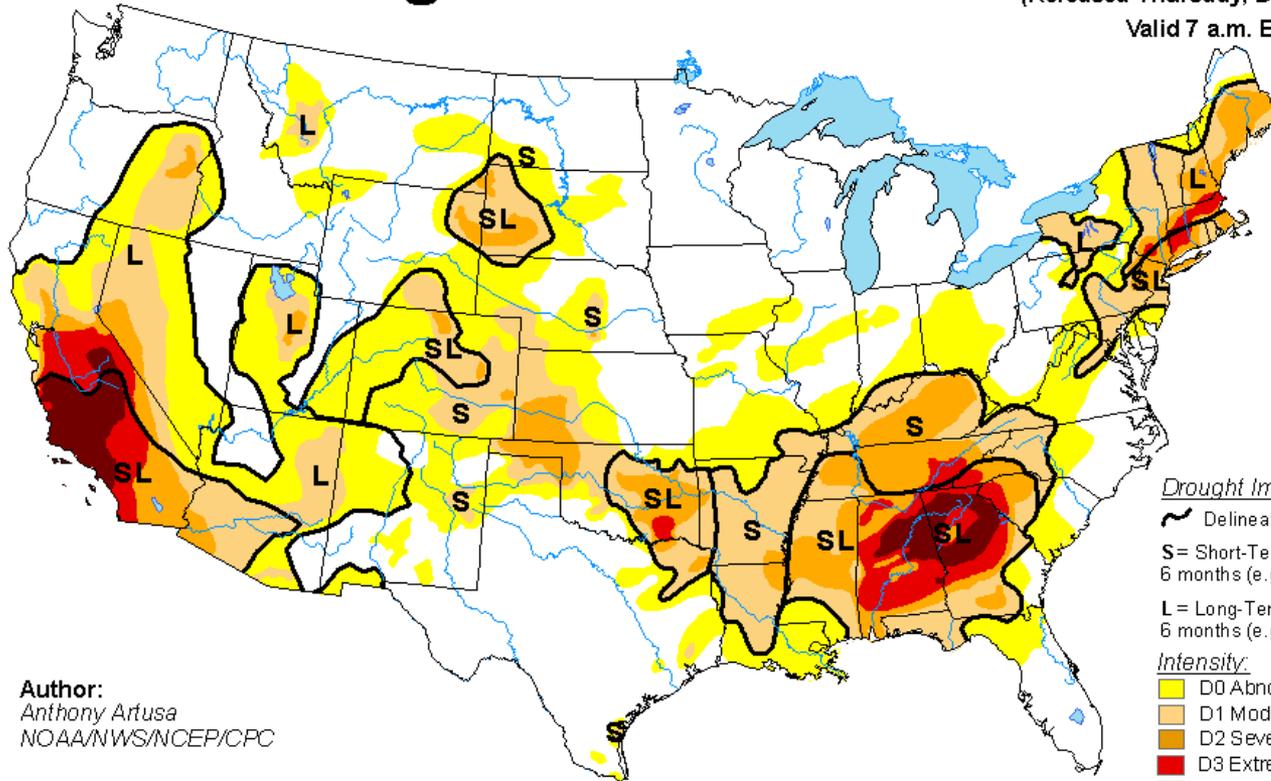
# Great Lakes

## Water Temperatures & Ice Concentration



# U.S. Drought Monitor

December 13, 2016  
 (Released Thursday, Dec. 15, 2016)  
 Valid 7 a.m. EST



Author:  
 Anthony Artusa  
 NOAA/NWS/NCEP/CPC

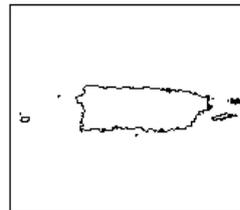
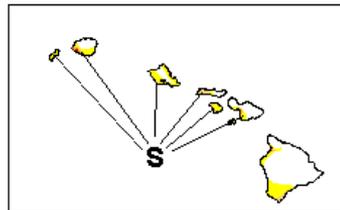
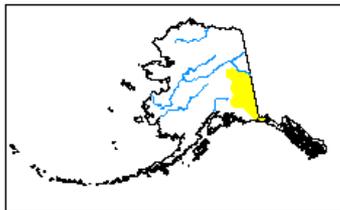
Drought Impact Types:

- ~ 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:

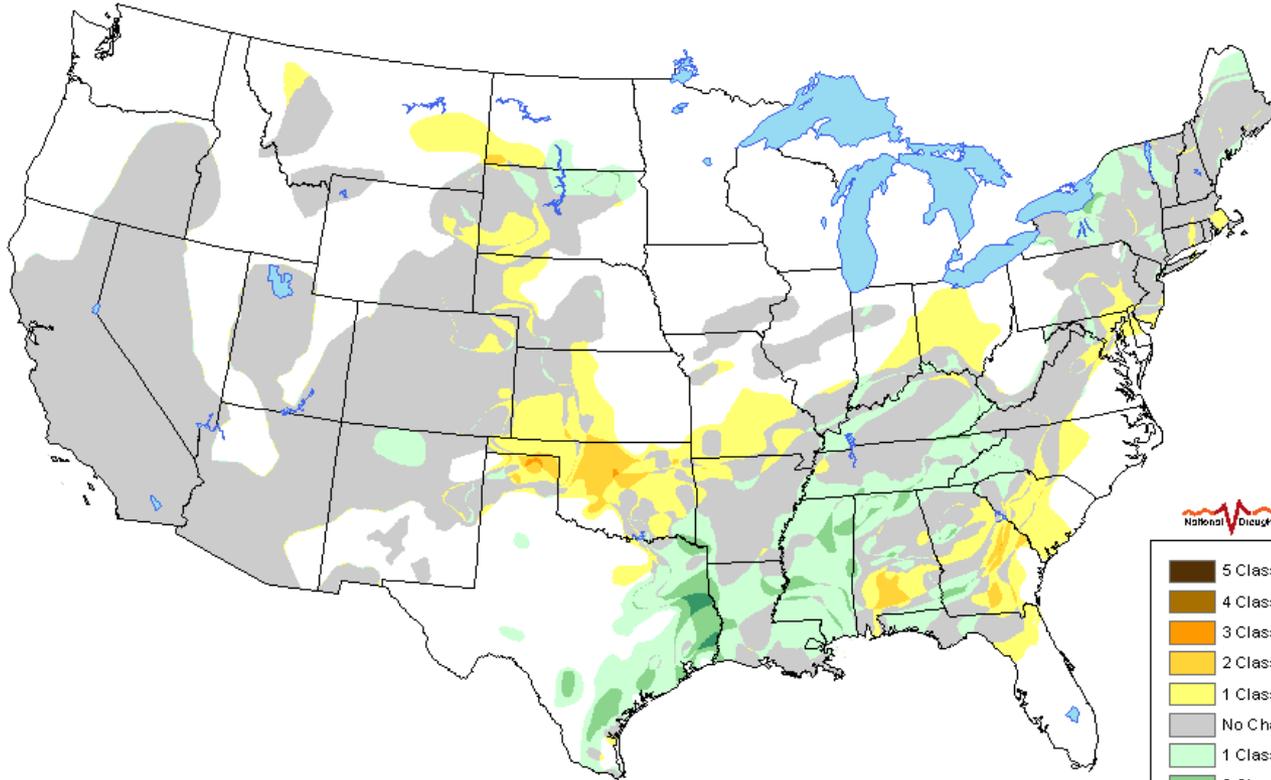
- Yellow: D0 Abnormally Dry
- Light Orange: D1 Moderate Drought
- Orange: D2 Severe Drought
- Red: D3 Extreme Drought
- Dark Red: D4 Exceptional Drought

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 Class Change 1 Month



- 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

December 13, 2016  
compared to  
November 15, 2016

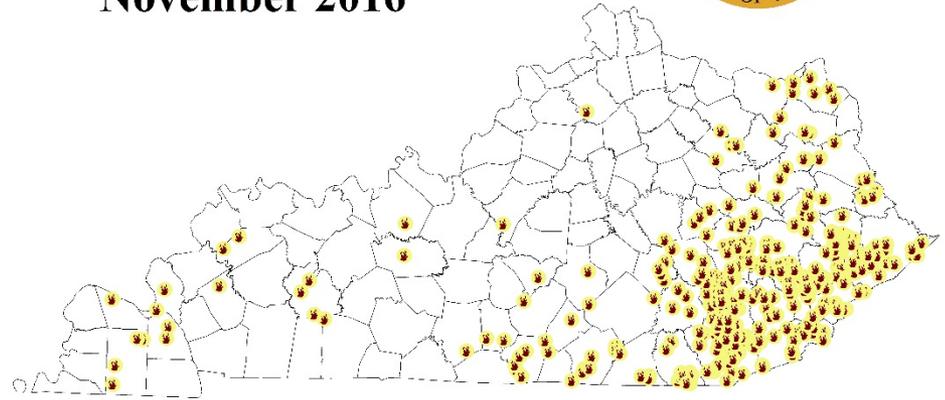
<http://droughtmonitor.unl.edu>

# Drought Impacts

## Kentucky



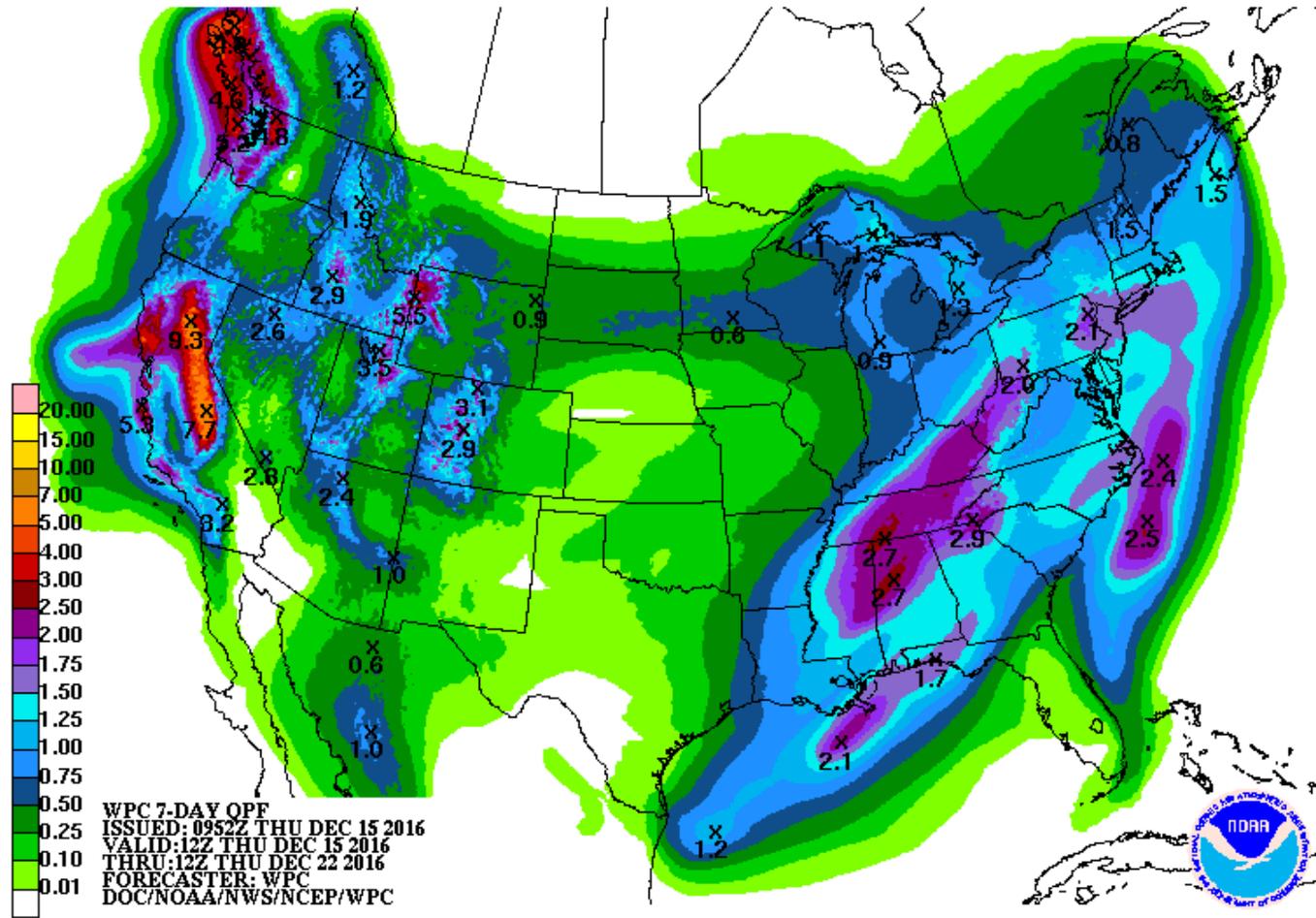
### Wildfire Occurrence November 2016



Images provided by Steve Kull, Kentucky Division of Forestry



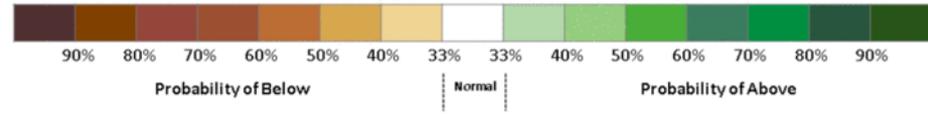
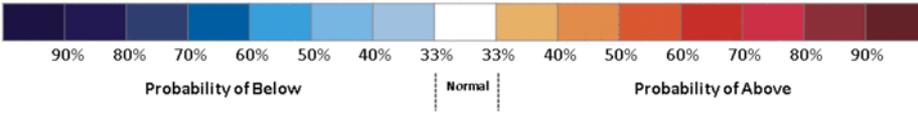
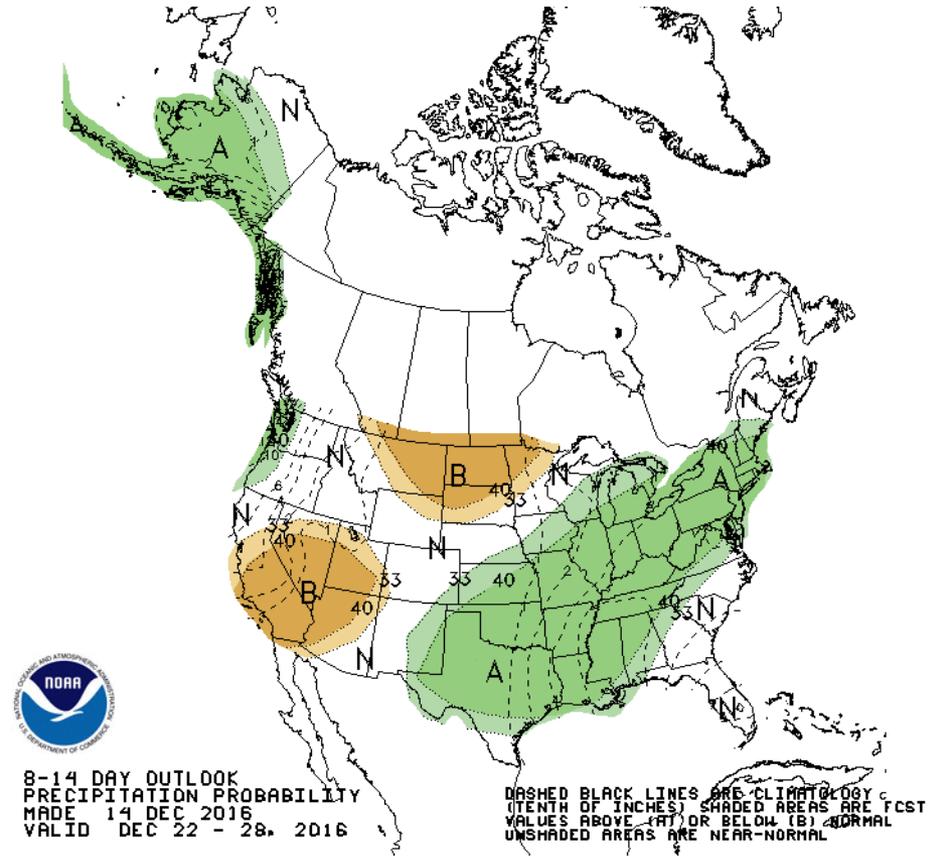
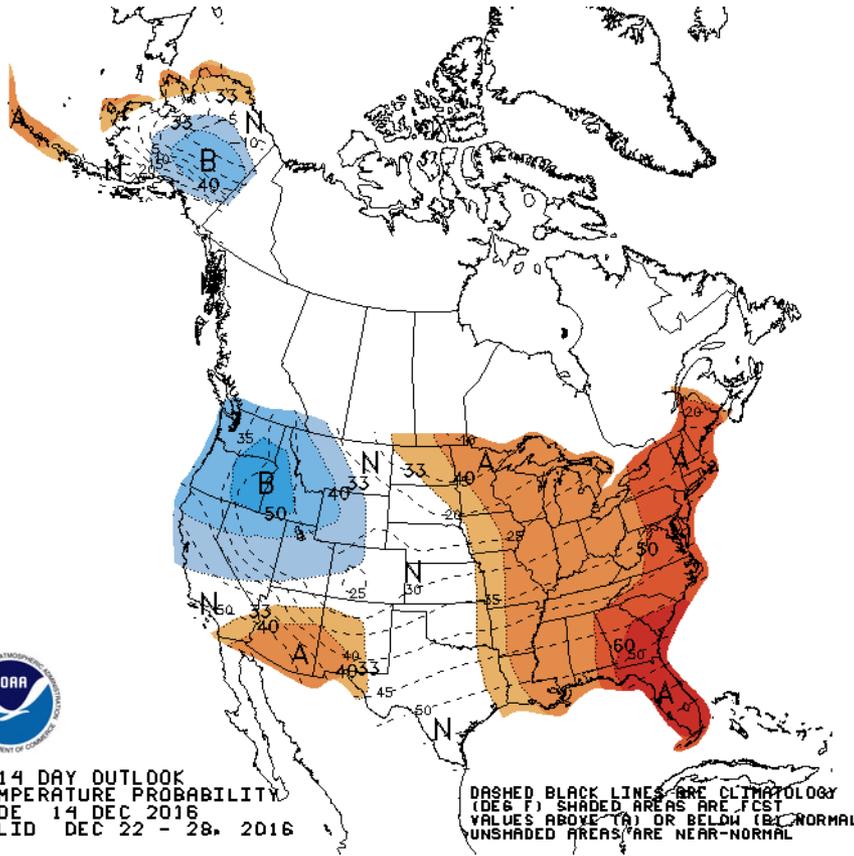
# 7-day Quantitative Precipitation Forecast



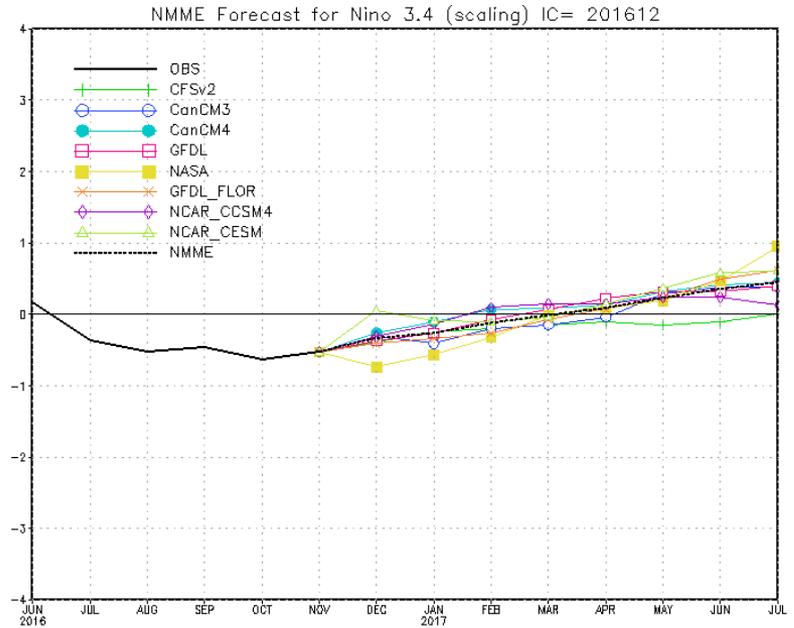
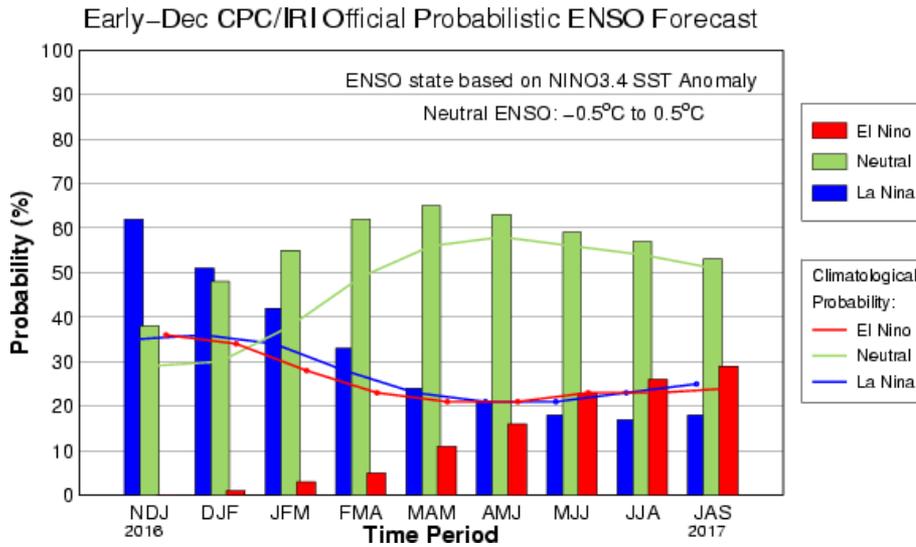
# 8-14 Day Outlook

Dec 22- Dec 28

NWS Climate Prediction Center



# ENSO Probabilistic Forecast



North American Multi-model Ensemble Plumes

# TYPICAL LA NIÑA WINTERS

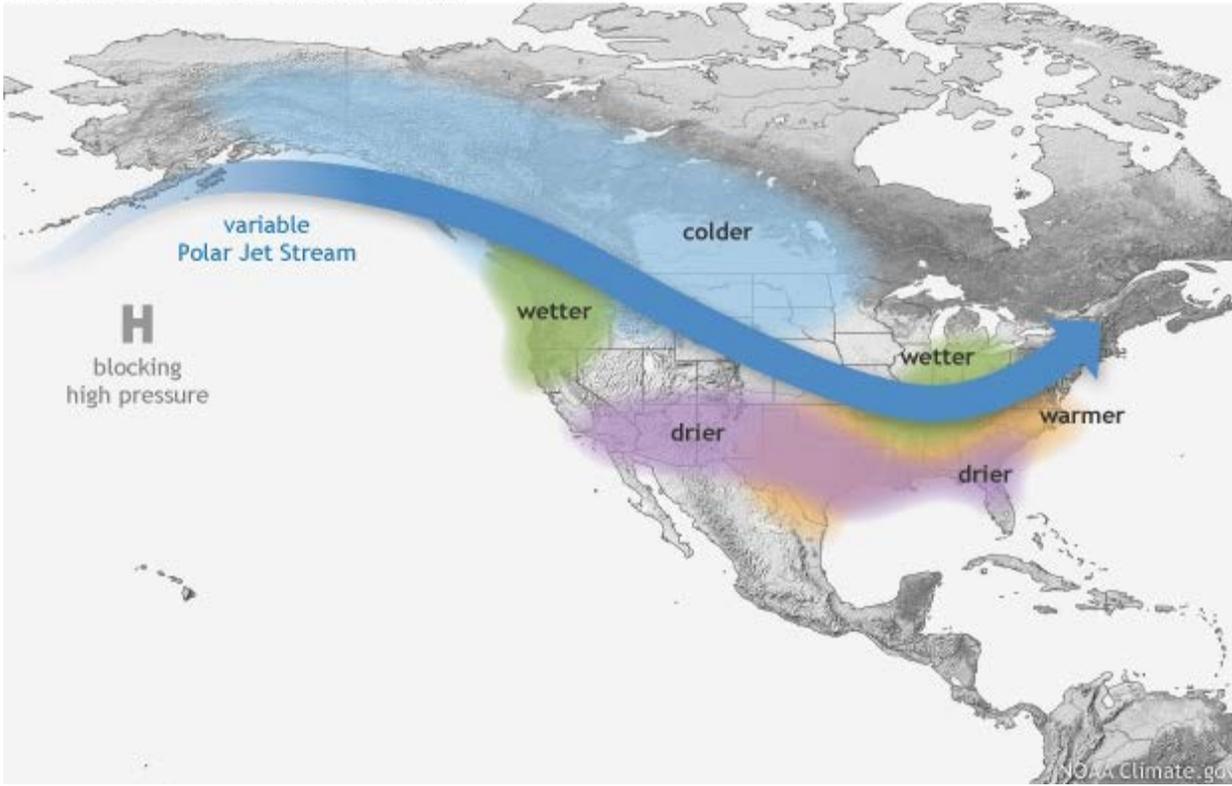
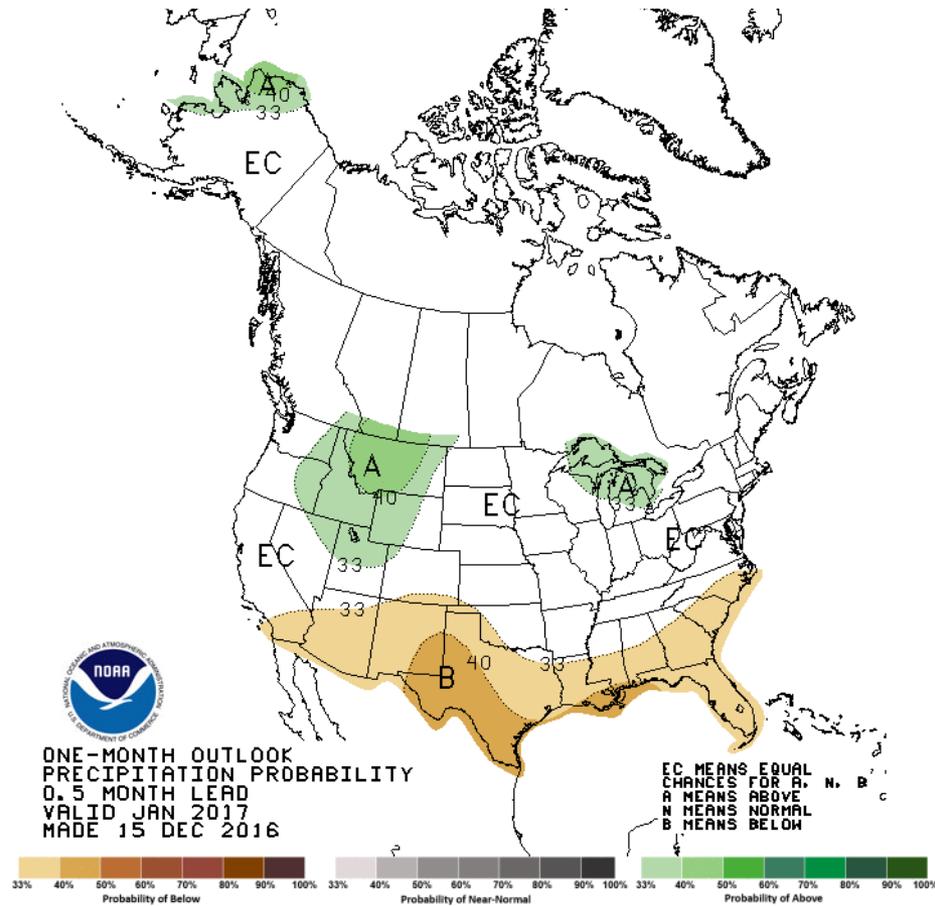
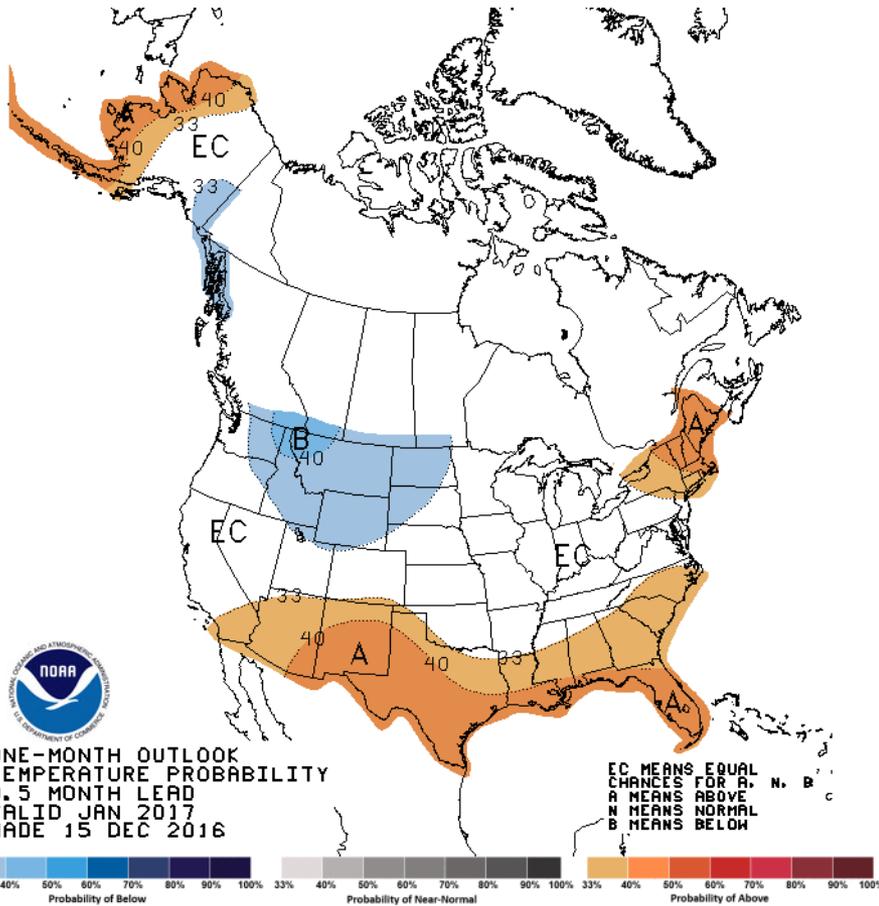


Image Credit: Fiona Martin, NOAA Climate.gov

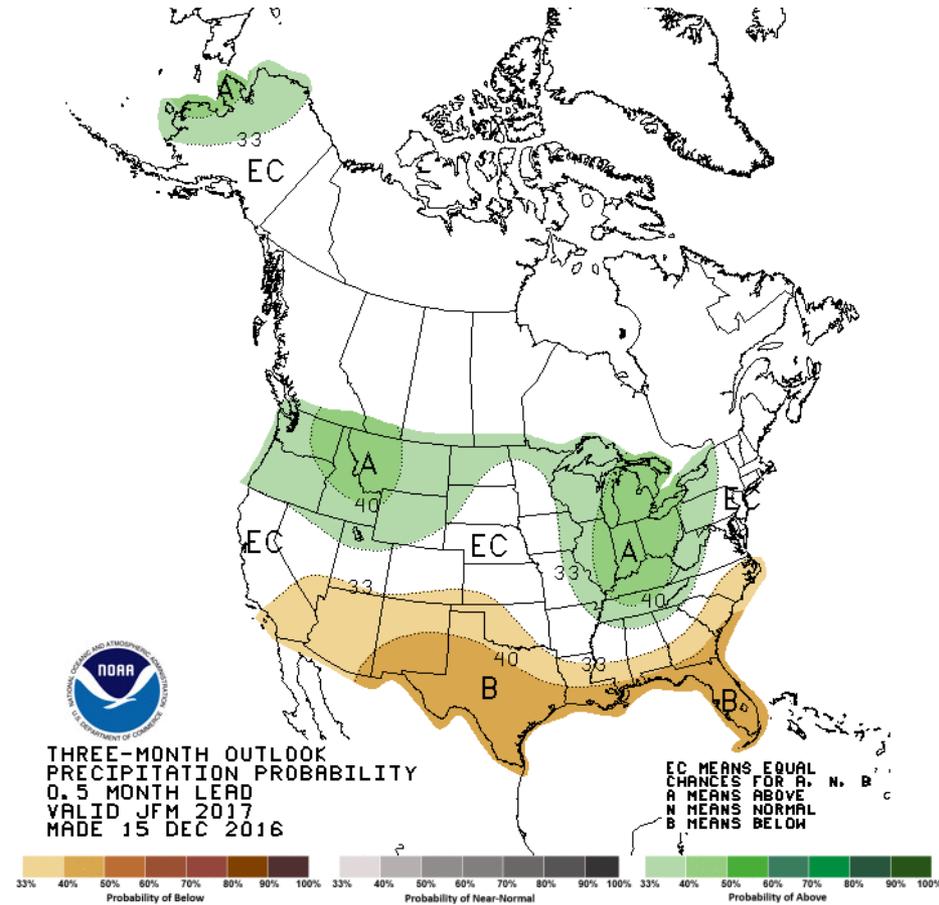
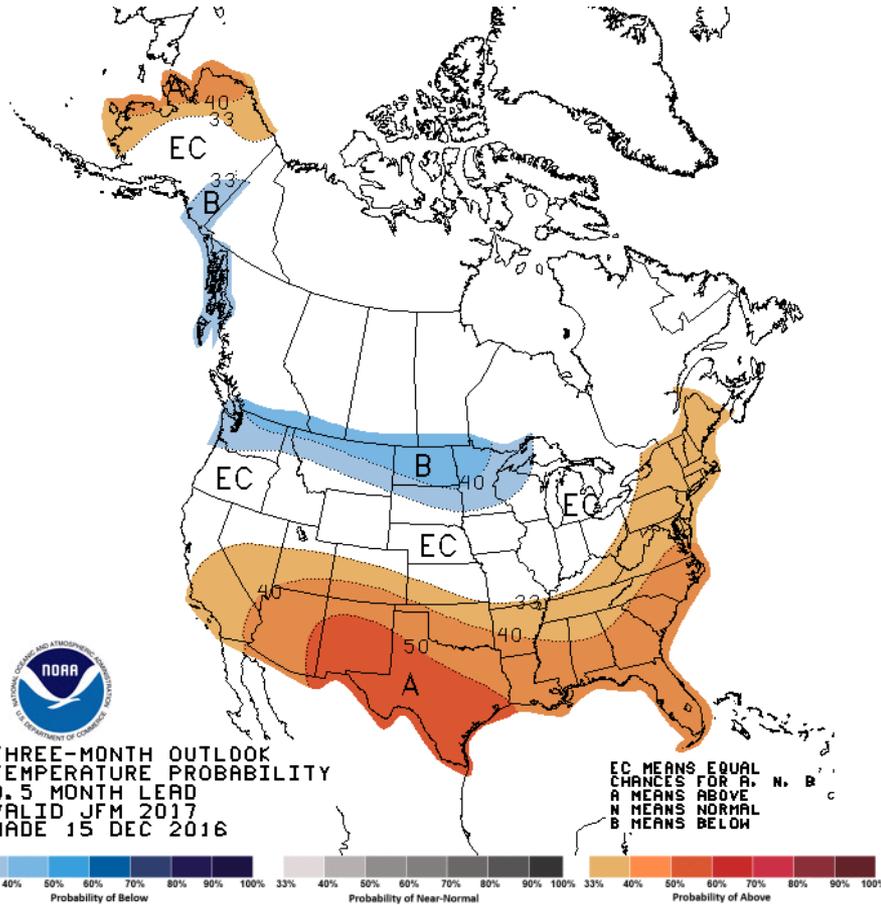
# Monthly Outlook for January

NWS Climate Prediction Center



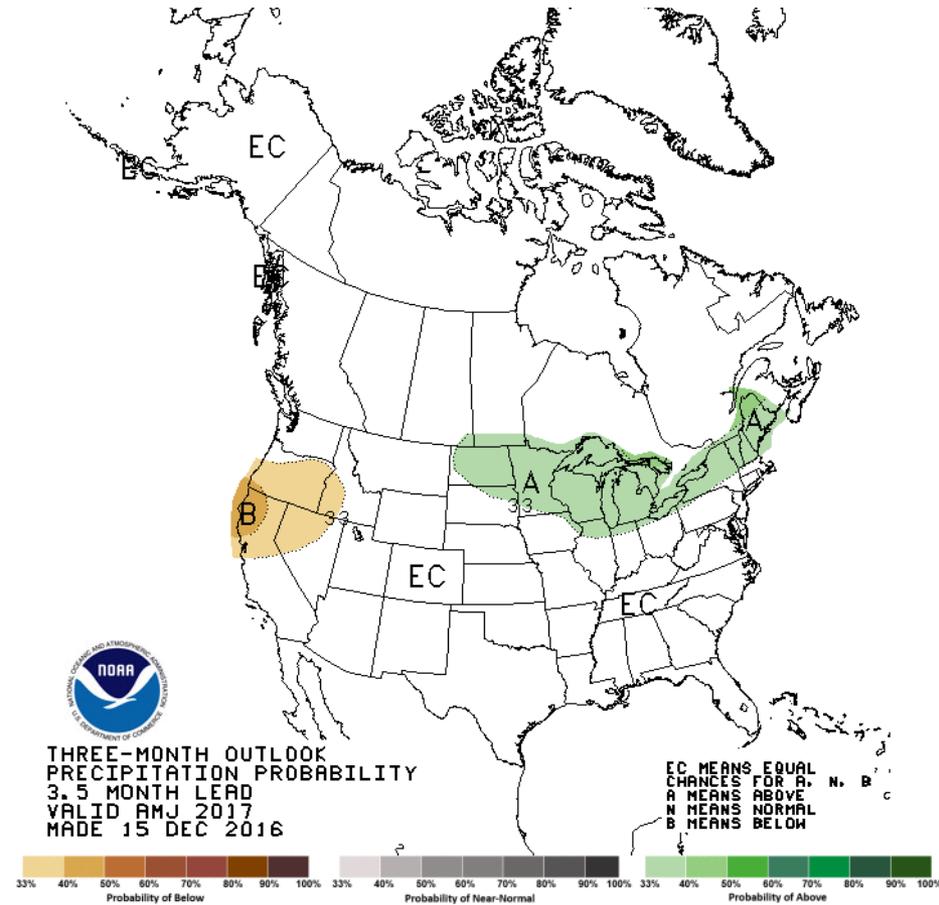
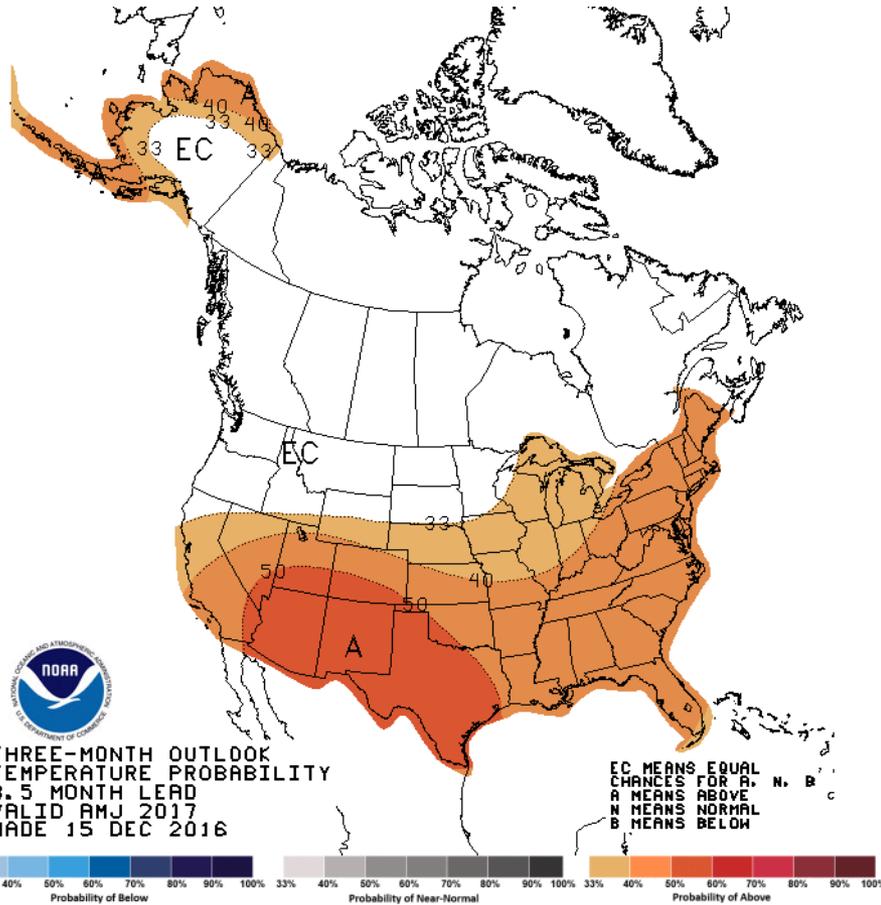
# Seasonal Outlook for Jan-Feb-Mar

NWS Climate Prediction Center



# Seasonal Outlook for Apr-May-Jun

NWS Climate Prediction Center



# Summary

- Both temperature and precipitation have averaged near normal region-wide, with pockets of above and below normal in some areas.
- Snow pack is approaching normal conditions following a slow start of the season.
- Drought conditions in Kentucky are easing.
- La Niña conditions are likely to diminish into winter, though climatic conditions may still reflect La Niña influence.

# Additional Information

- Today's and Past Recorded Presentations and  
<http://mrcc.isws.illinois.edu/multimedia/webinars.jsp>  
<http://www.hprcc.unl.edu/webinars.php>
- NOAA's National Centers for Environmental Information:  
<https://www.ncei.noaa.gov/>
- Monthly climate reports (U.S. & Global): [www.ncdc.noaa.gov/sotc/](http://www.ncdc.noaa.gov/sotc/)
- NOAA's Climate Prediction Center: [www.cpc.ncep.noaa.gov](http://www.cpc.ncep.noaa.gov)
- Climate Portal: [www.climate.gov](http://www.climate.gov)
- U.S. Drought Portal: [www.drought.gov](http://www.drought.gov)
- National Drought Mitigation Center: <http://drought.unl.edu/>
- American Association of State Climatologists  
<http://www.stateclimate.org>
- Regional Climate Centers serving the Central Region
  - Midwestern RCC <http://mrcc.isws.illinois.edu>
  - High Plains RCC <http://www.hprcc.unl.edu>

# Questions?

## **Climate**

- Stuart Foster: [stuart.foster@wku.edu](mailto:stuart.foster@wku.edu), 270-745-5983
- Brian Fuchs: [bfuchs2@unl.edu](mailto:bfuchs2@unl.edu), 402-472-6775
- Jim Angel: [jimangel@Illinois.edu](mailto:jimangel@Illinois.edu), 217-333-0729
- Dennis Todey: [dennis.todey@ars.usda.gov](mailto:dennis.todey@ars.usda.gov), 515-294-2013
- Doug Kluck: [doug.kluck@noaa.gov](mailto:doug.kluck@noaa.gov), 816-994-3008
- Barb Mayes: [barbara.mayes@noaa.gov](mailto:barbara.mayes@noaa.gov), 402-359-2394
- Mike Timlin: [mtimlin@illinois.edu](mailto:mtimlin@illinois.edu), 217-333-8506
- Natalie Umphlett: [numphlett2@unl.edu](mailto:numphlett2@unl.edu), 402 472-6764

## **Weather**

- [crhroc@noaa.gov](mailto:crhroc@noaa.gov)

Thank you for your participation!