

North Central Drought Outlook

20 December 2018

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United States Department of Agriculture
Midwest Climate Hub

General Information

- **Providing climate services to the Central Region**
 - Collaboration Activity Between:
 - State Climatologists/American Association of State Climatologists
 - NOAA NCEI/NWS/OAR/NIDIS
 - USDA Climate Hubs
 - Midwest and High Plains Regional Climate Centers
 - National Drought Mitigation Center
- **Next Regular Climate/Drought Outlook Webinar**
 - January 17, 2018 (1 PM CST): Presenter: TBD
- **Access to Future Climate Webinars and Information**
- <http://www.drought.gov/drought/content/regional-programs/regional-drought-webinars>
- **Recordings of Past Webinars**
- <http://mrcc.isws.illinois.edu/webinars.htm>
- <http://www.hprcc.unl.edu/webinars.php>
- **Open for questions at the end**

Presentation Outline

- Recent Conditions
 - Temperature and precipitation ranks
 - 30-day temperature and precipitation
 - Modeled soil moisture
 - Stream flow
 - Drought
 - Snow
- Impacts
- Outlooks
 - El Niño
 - Short-term
 - Winter season

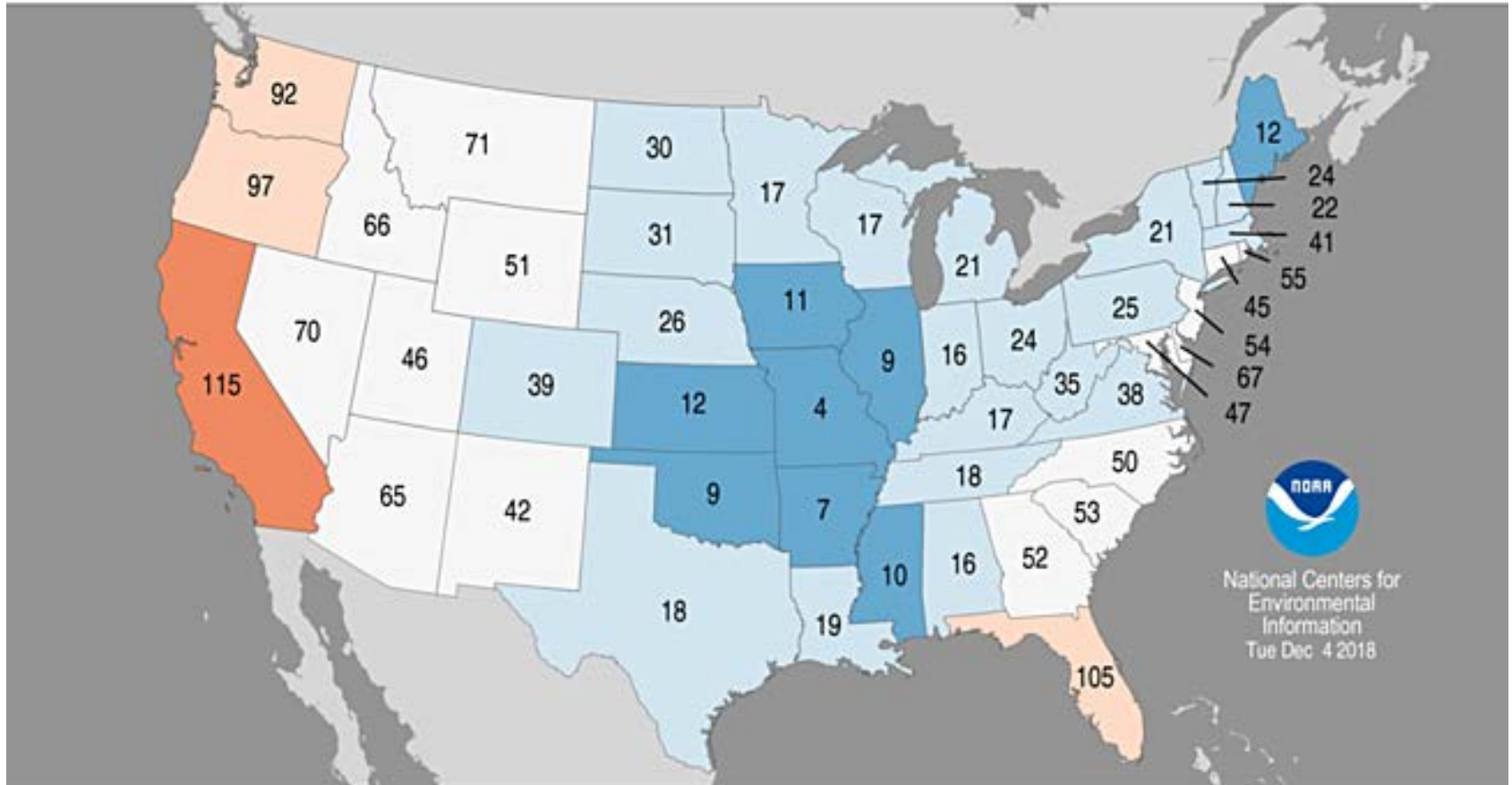
Recent Conditions

November Temperature Ranks

Statewide Average Temperature Ranks

November 2018

Period: 1895-2018



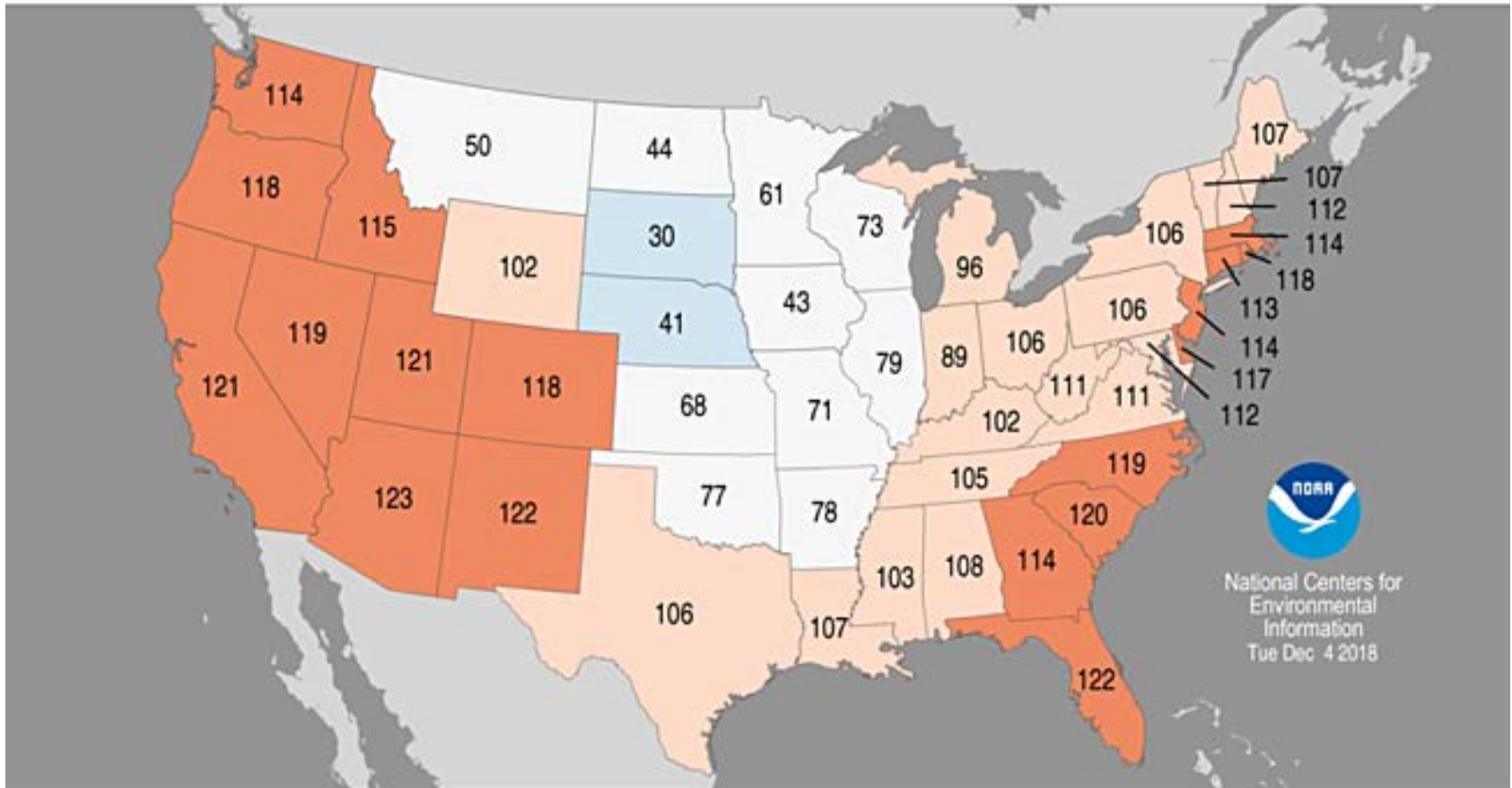
<http://www.ncdc.noaa.gov/temp-and-precip/us-maps/>

Year-To-Date Temperature Ranks

Statewide Average Temperature Ranks

January–November 2018

Period: 1895–2018



National Centers for
Environmental
Information
Tue Dec 4 2018



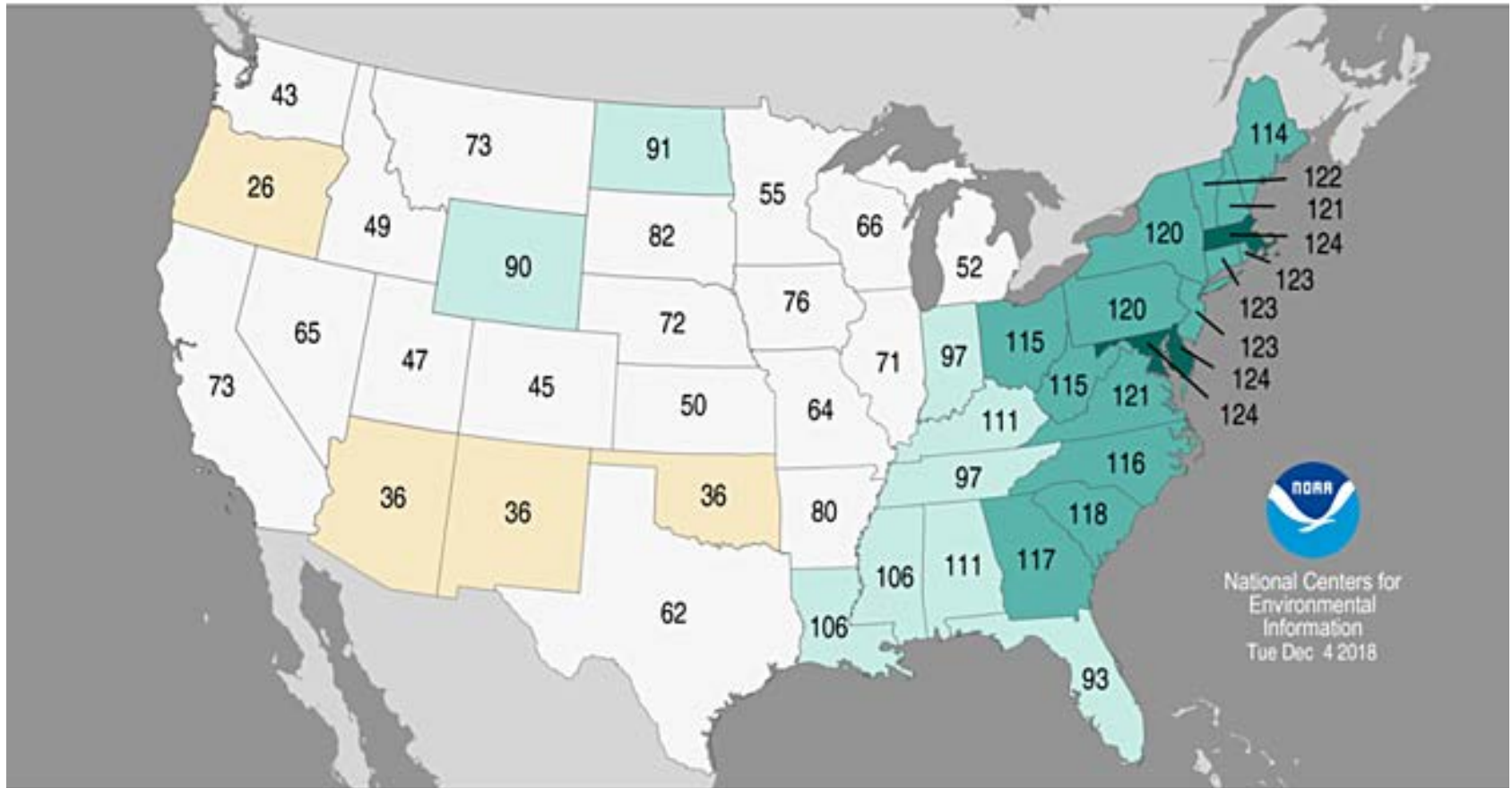
<http://www.ncdc.noaa.gov/temp-and-precip/us-maps/>

November Precipitation Ranks

Statewide Precipitation Ranks

November 2018

Period: 1895-2018



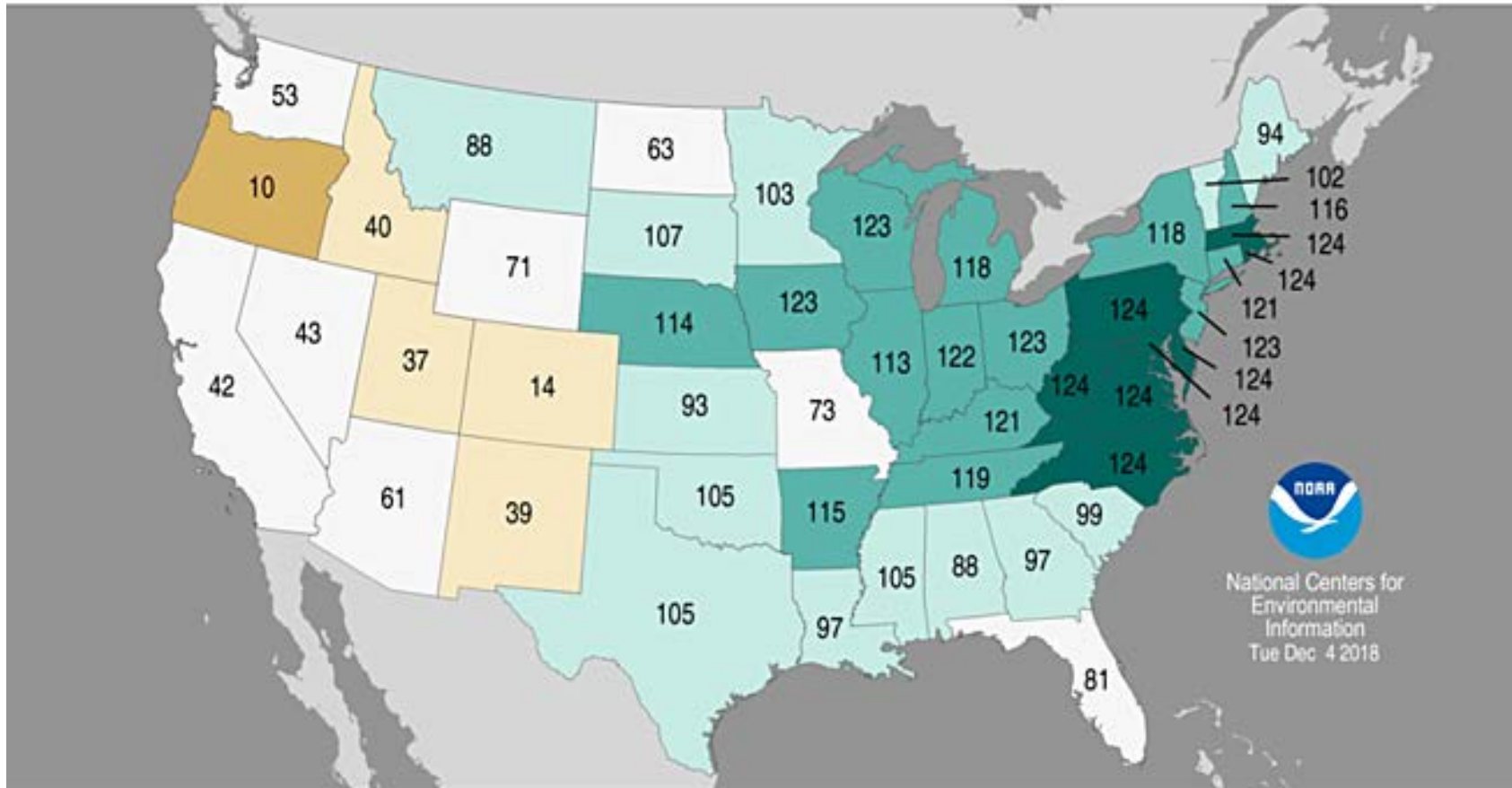
<http://www.ncdc.noaa.gov/temp-and-precip/us-maps/>

Year-To-Date Precipitation Ranks

Statewide Precipitation Ranks

January–November 2018

Period: 1895–2018

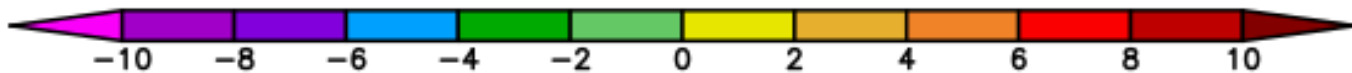
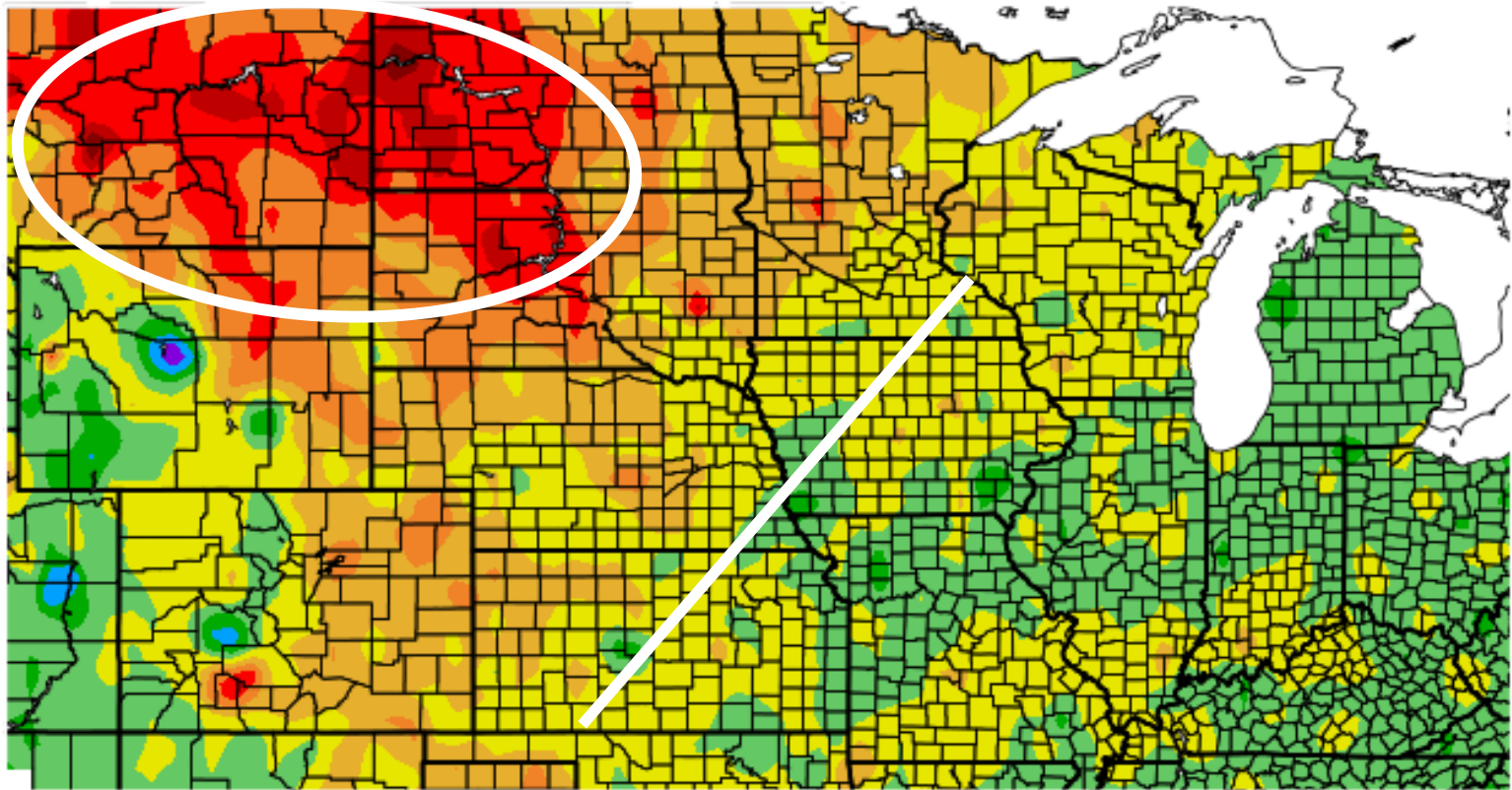


National Centers for
Environmental
Information
Tue Dec 4 2018



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

Departure from Normal Temperature (F) 11/20/2018 - 12/19/2018



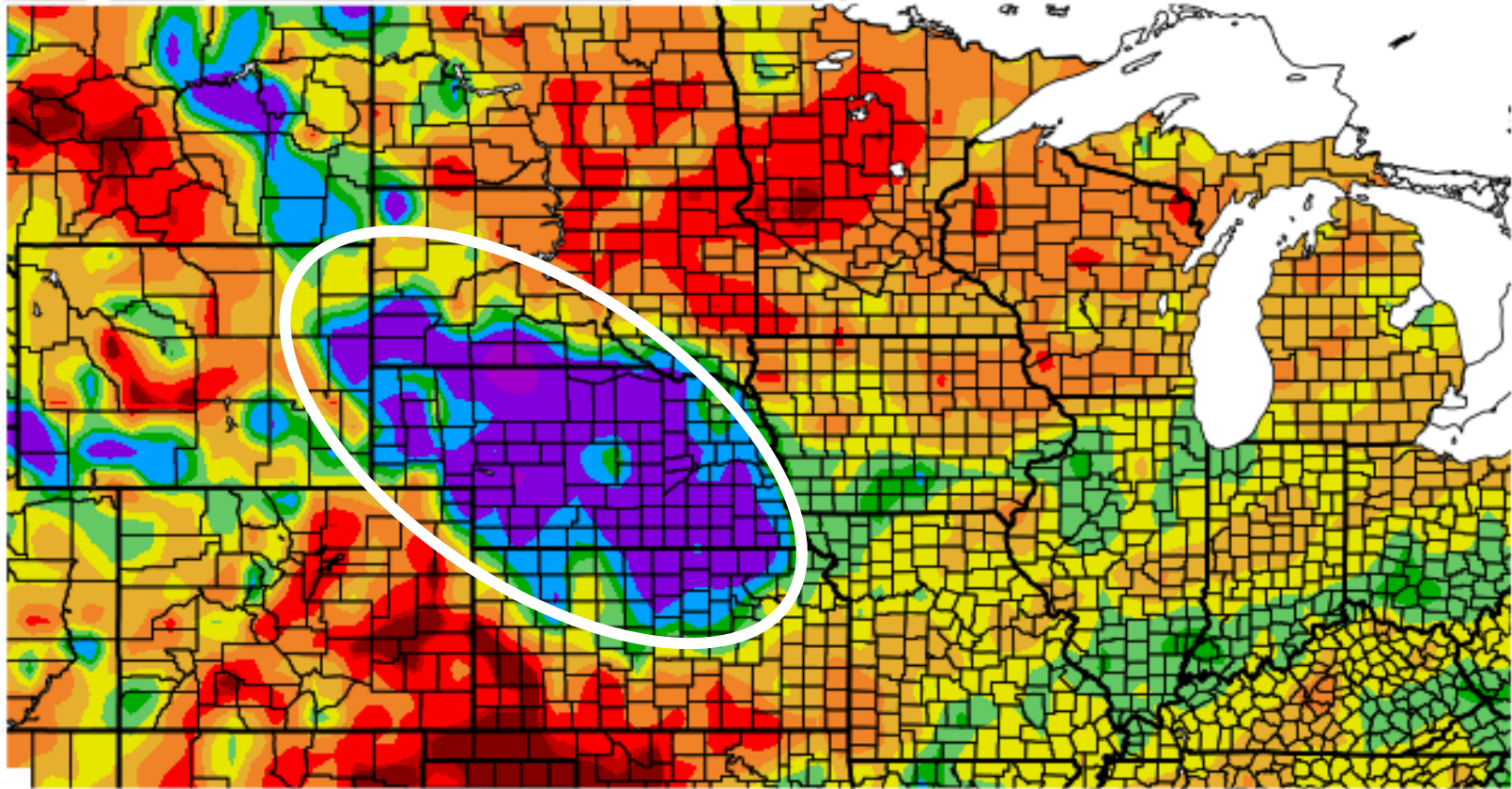
Generated 12/20/2018 at HPRCC using provisional data.

NOAA Regional Climate Centers

<https://hprcc.unl.edu/maps.php?map=ACISClimateMaps>

Percent of Normal Precipitation (%)

11/20/2018 – 12/19/2018

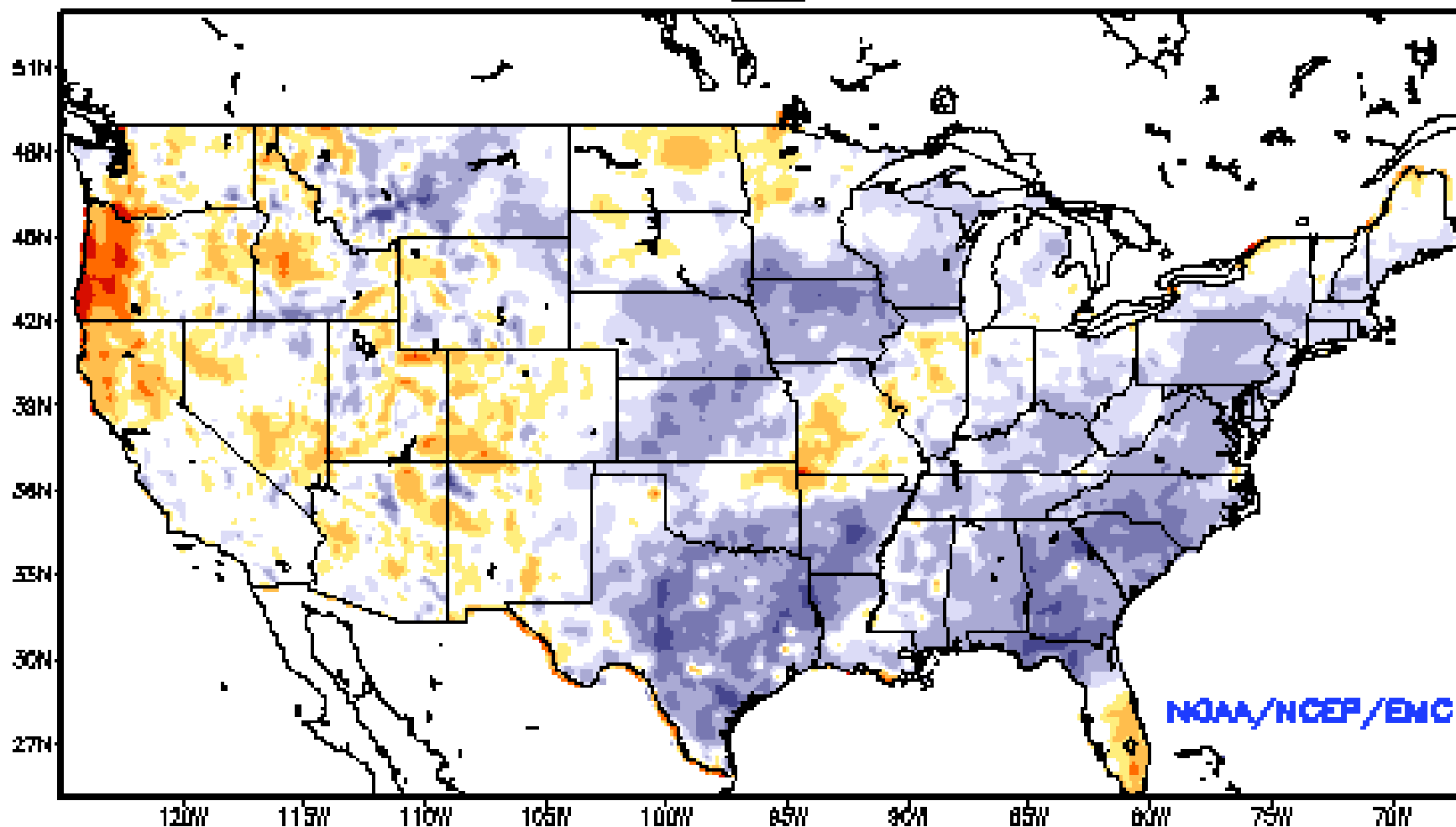


Generated 12/20/2018 at HPRCC using provisional data.

NOAA Regional Climate Centers

<https://hprcc.unl.edu/maps.php?map=ACISClimateMaps>

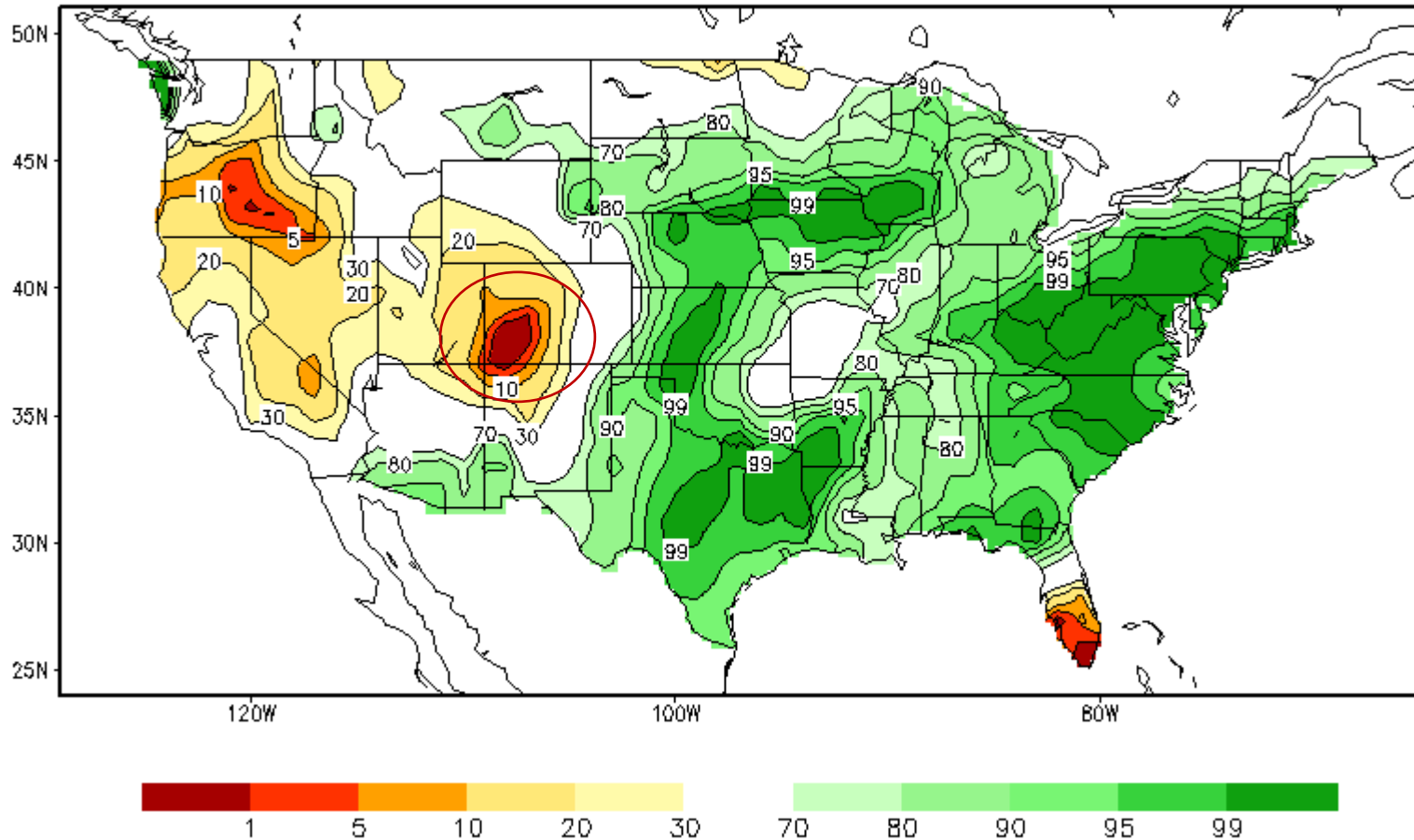
Ensemble-Mean - Current Total Column Soil Moisture Anomaly (mm) NCEP NLDAS Products Valid: DEC 15, 2018



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

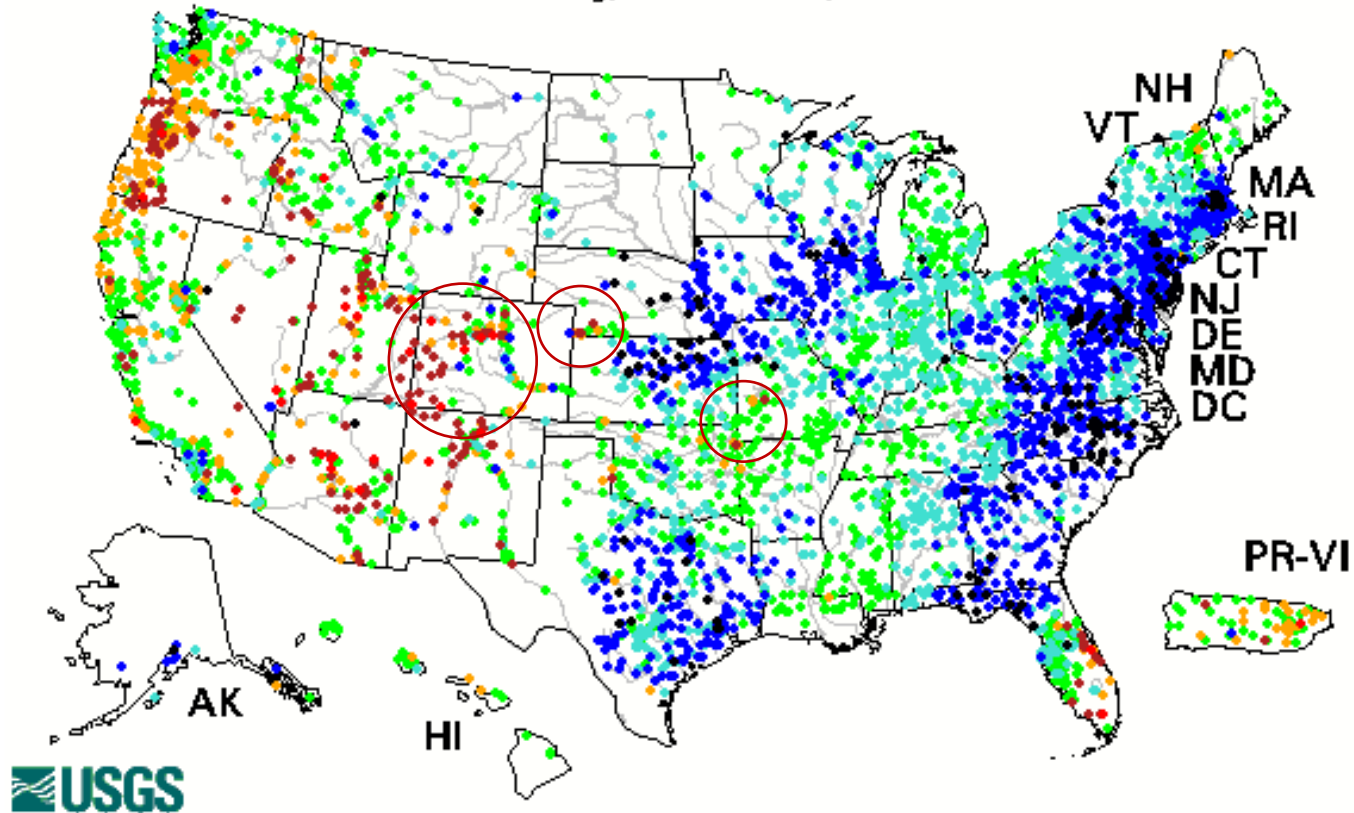
Calculated Soil Moisture Percentiles (valid 19 December)

Calculated Soil Moisture Ranking Percentile
DEC 19, 2018



28-Day Average Streamflow

Wednesday, December 19, 2018

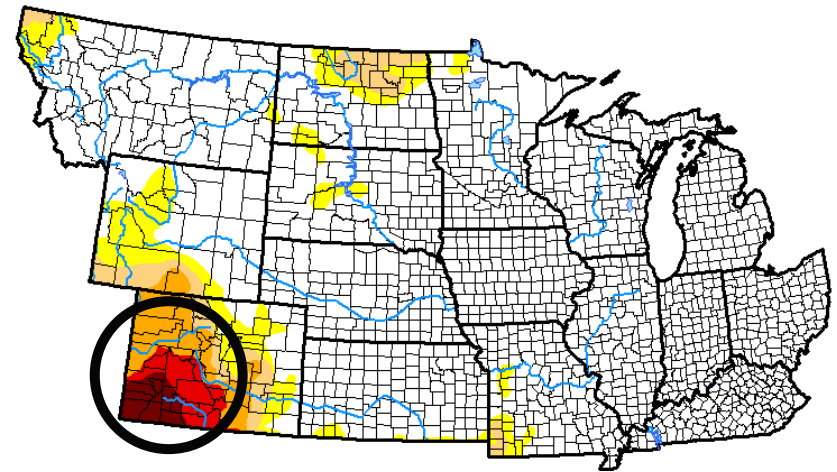
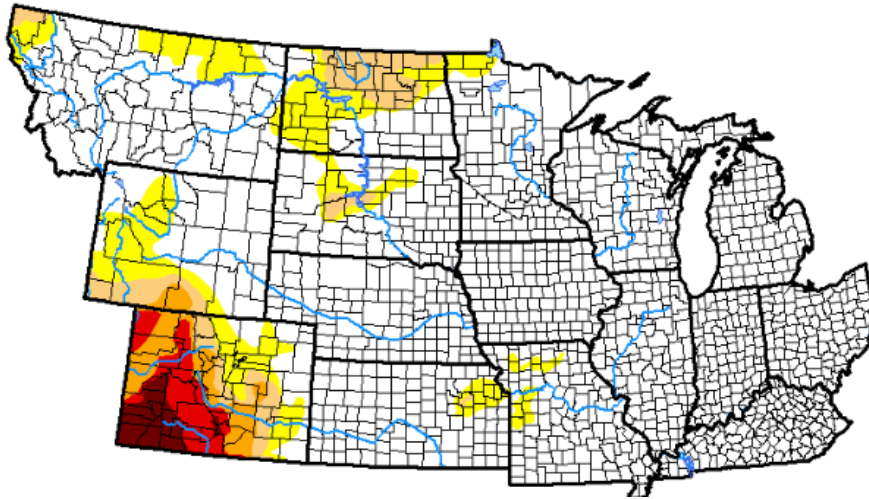


Explanation - Percentile classes						
Low	<10	10-24	25-75	76-90	>90	High
	Much below normal	Below normal	Normal	Above normal	Much above normal	

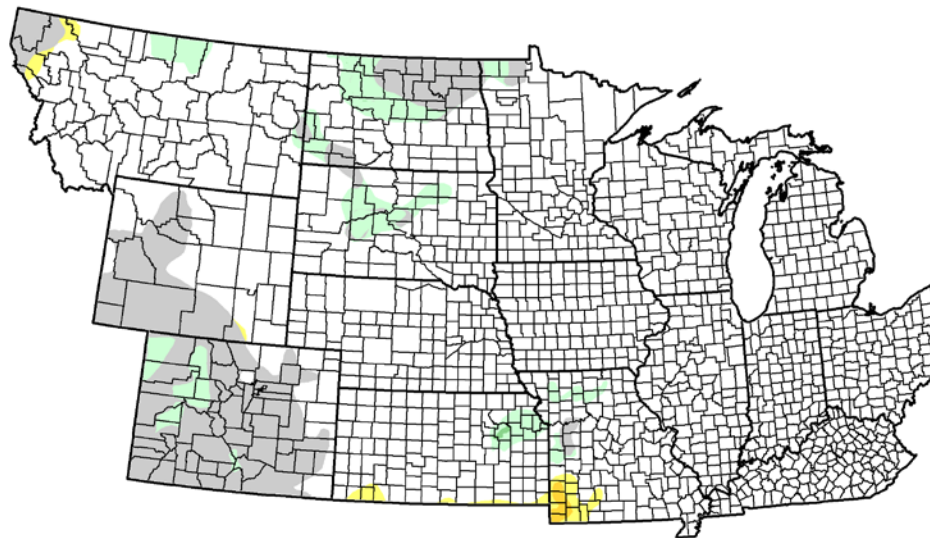
<https://waterwatch.usgs.gov/index.php?r=us&m=pa28d&w=map>

Valid: 13 November 2018

Valid: 18 December 2018



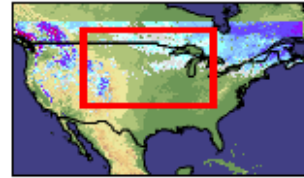
None D0 (Abnormally Dry) D1 (Moderate Drought) D2 (Severe Drought) D3 (Extreme Drought) D4 (Exceptional Drought)



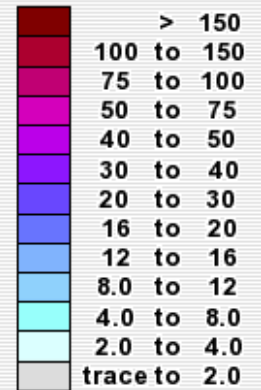
5 Class Degradation
4 Class Degradation
3 Class Degradation
2 Class Degradation
1 Class Degradation
No Change
1 Class Improvement
2 Class Improvement
3 Class Improvement
4 Class Improvement
5 Class Improvement

Modeled Snow Depth for 2018 December 19, 0:00 UTC

1256 mi

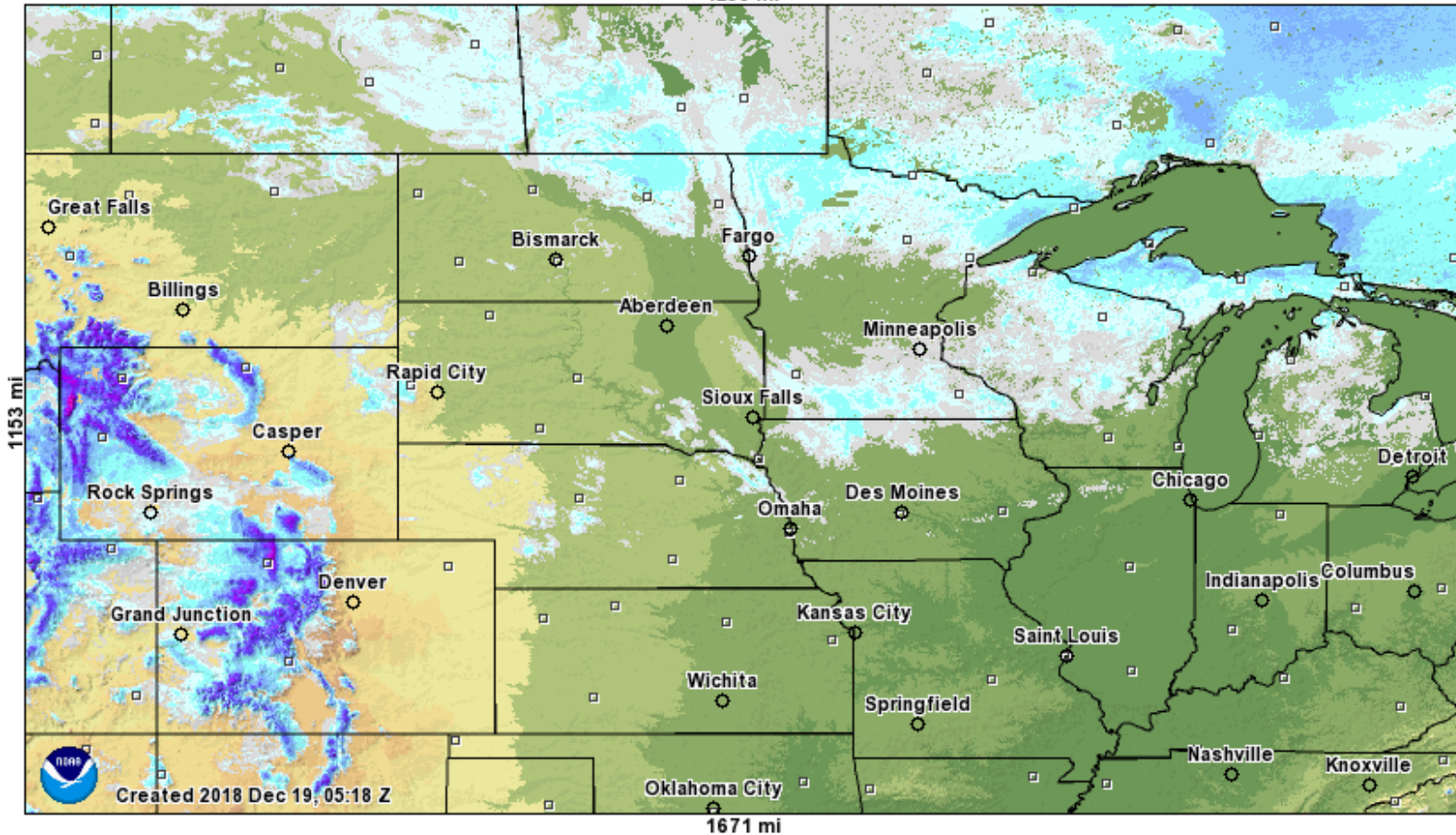
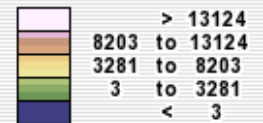


Inches of depth



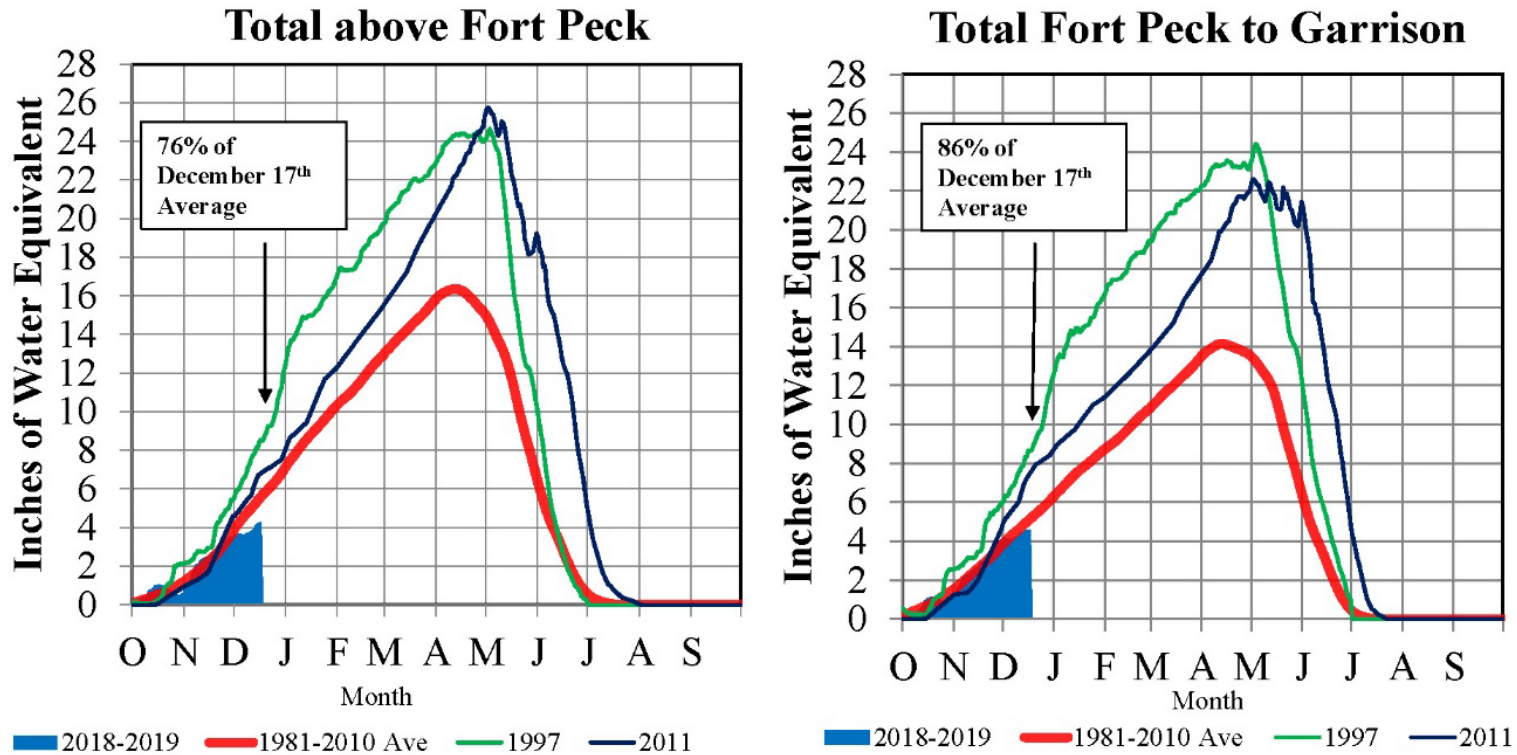
Not Estimated

Elevation in feet



Missouri River Basin Mountain Snowpack Water Content

December 17, 2018

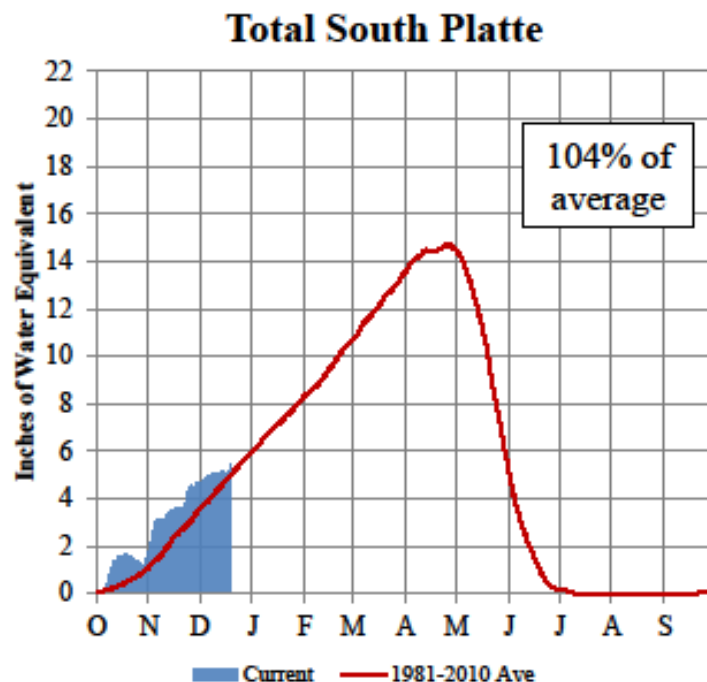
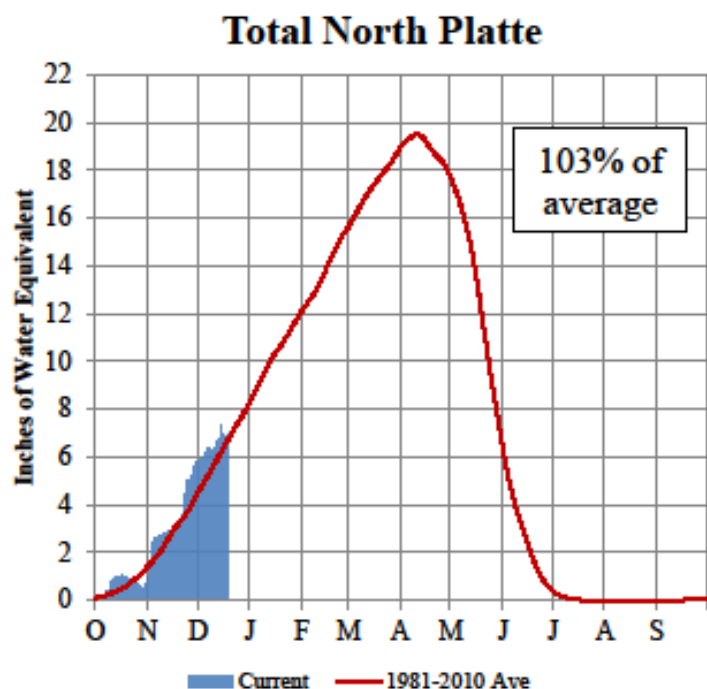


The Missouri River Basin mountain snowpack normally peaks near April 15.

- Snowpack water content running below average for this time of year
- Still time to catch up, as we're only a third of the way into the accumulation period

Platte River Basin - Mountain Snowpack Water Content Water Year 2018-2019

December 19, 2018

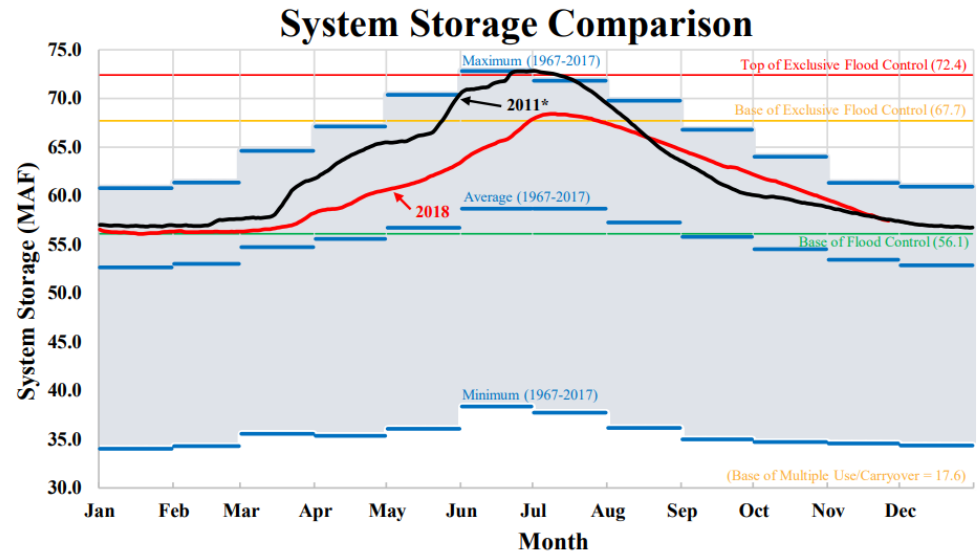


The North and South Platte River Basin mountain snowpacks normally peak near April 15 and the end of April, respectively. As of December 19, 2018, the mountain snowpack SWE in the "Total North Platte" reach is currently 6.8", 103% of average. The mountain snowpack SWE in the "Total South Platte" reach is currently 5.1", 104% of average.

Missouri River

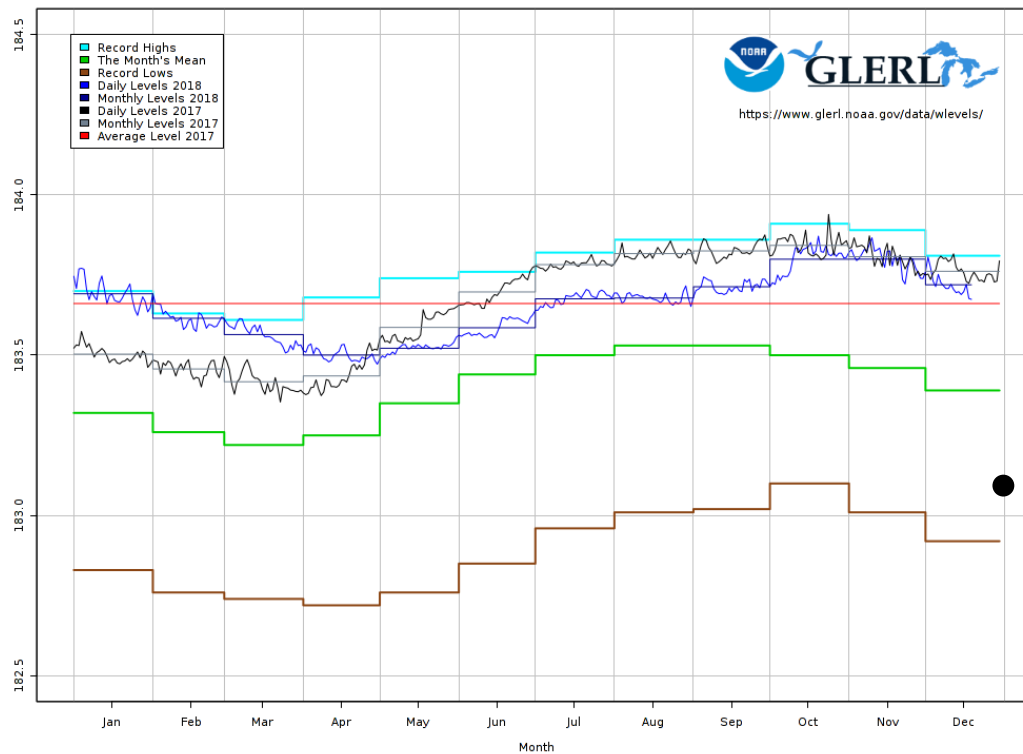
Missouri Mainstem Reservoir Status (as of 12/17/18):

- 2018 will be 3rd highest runoff year for the Upper Missouri River basin, behind 1997 and 2011.
- Project releases will be above average through November to evacuate the bulk of the stored flood waters before reducing to winter releases.



*In January 2011, the Base of Flood Control was 56.8 MAF, and the Top of Exclusive Flood Control was 73.1 MAF.

Lake Superior Water Levels from Marquette C.G., MI - 9099018 2017 - 2018
As of End of Day 12/19/2018 (Refresh your browser to ensure plot is up to date)



- All Great Lakes running above their long-term averages
 - Superior, Michigan-Huron, and Erie near last year's levels
 - Ontario lower than same time in 2017
- Forecasted levels over the next six months should remain above the 1918-2018 long term average

GREAT LAKES SURFACE ENVIRONMENTAL ANALYSIS (GLSEA)



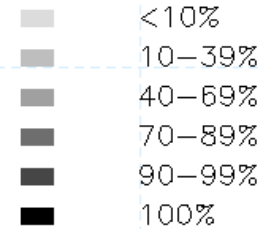
Analysis Date: JD 352 12/18/2018
Percent Pixels with Data within +/-10 Days: 99.0%

Date of last ice analysis: 12/18/2018 48°

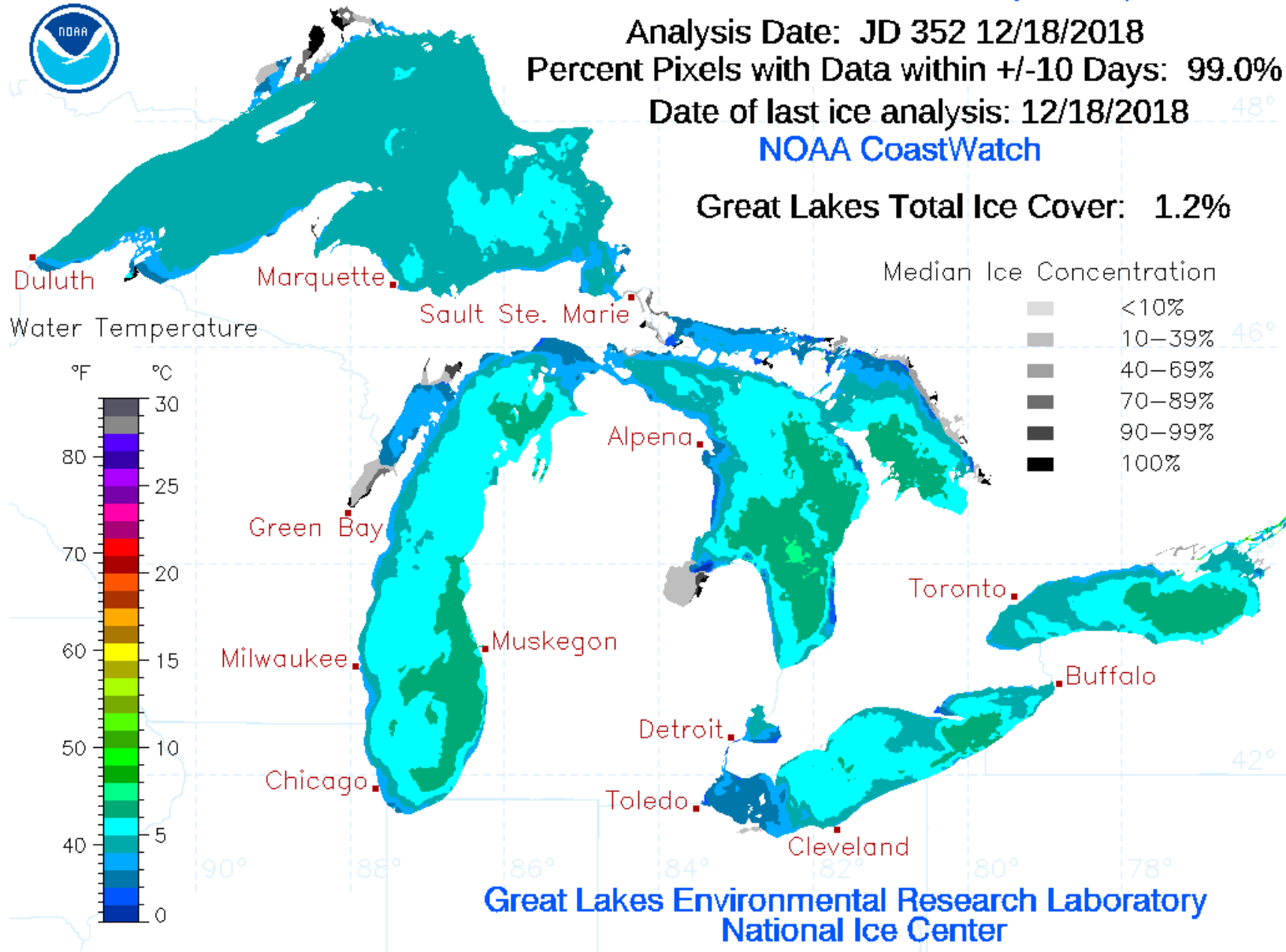
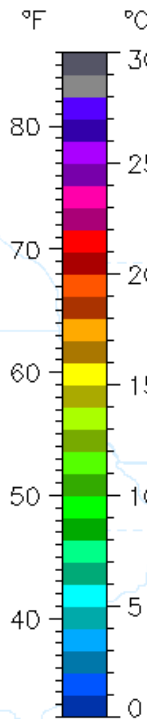
NOAA CoastWatch

Great Lakes Total Ice Cover: 1.2%

Median Ice Concentration

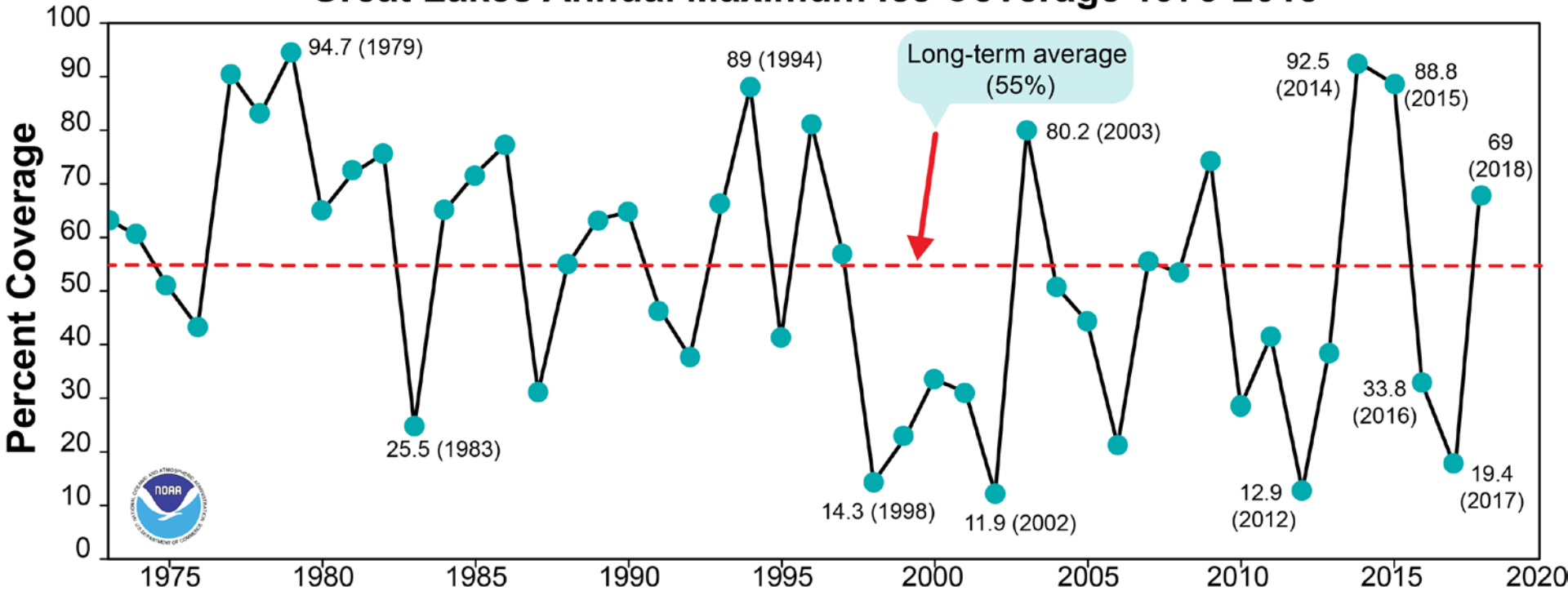


Water Temperature



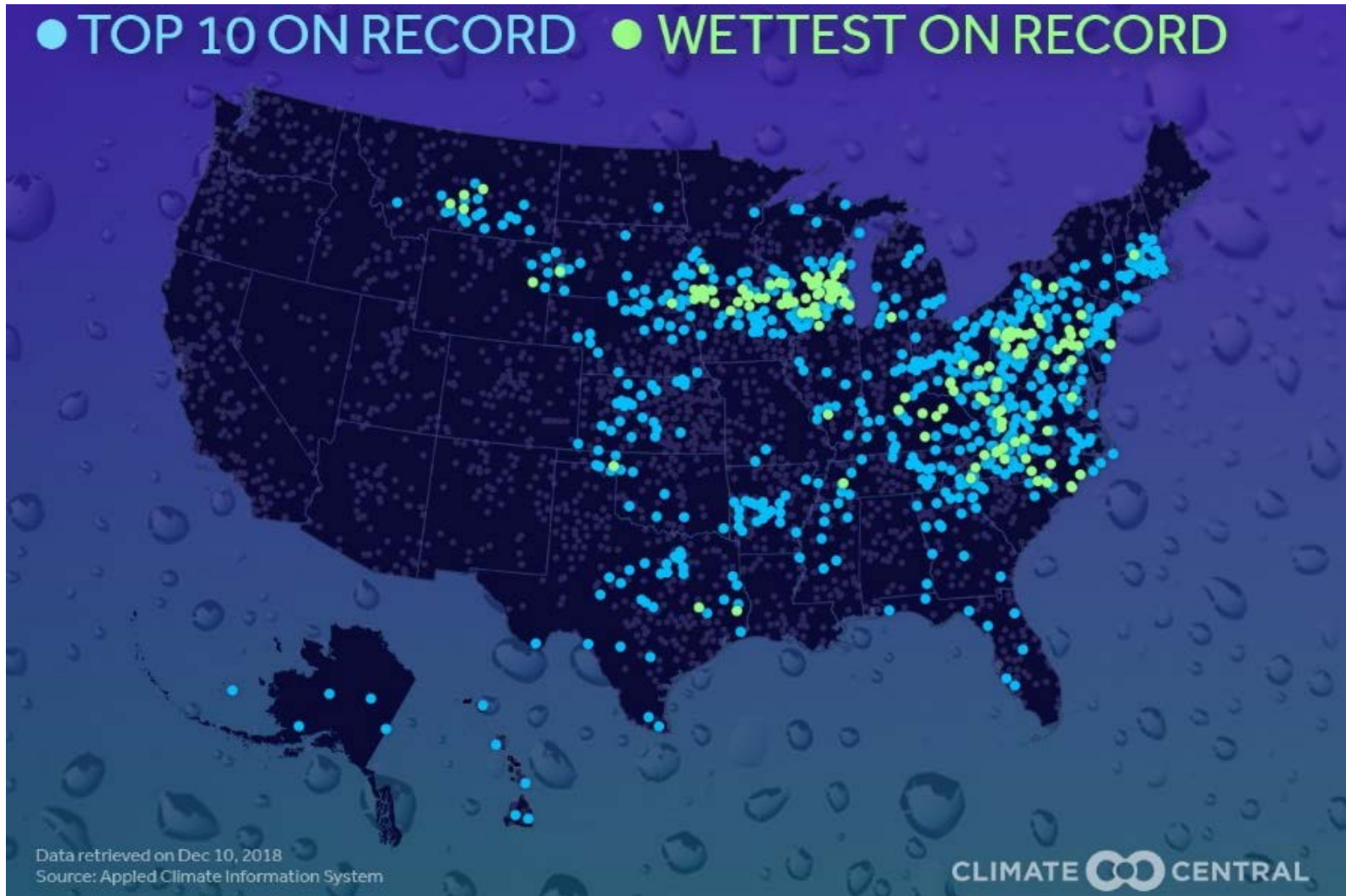
Great Lakes Environmental Research Laboratory
National Ice Center

Great Lakes Annual Maximum Ice Coverage 1973-2018



- Slightly behind last year at this time, though there's plenty of time in the season for freeze up

Record and Near-Record Wetness



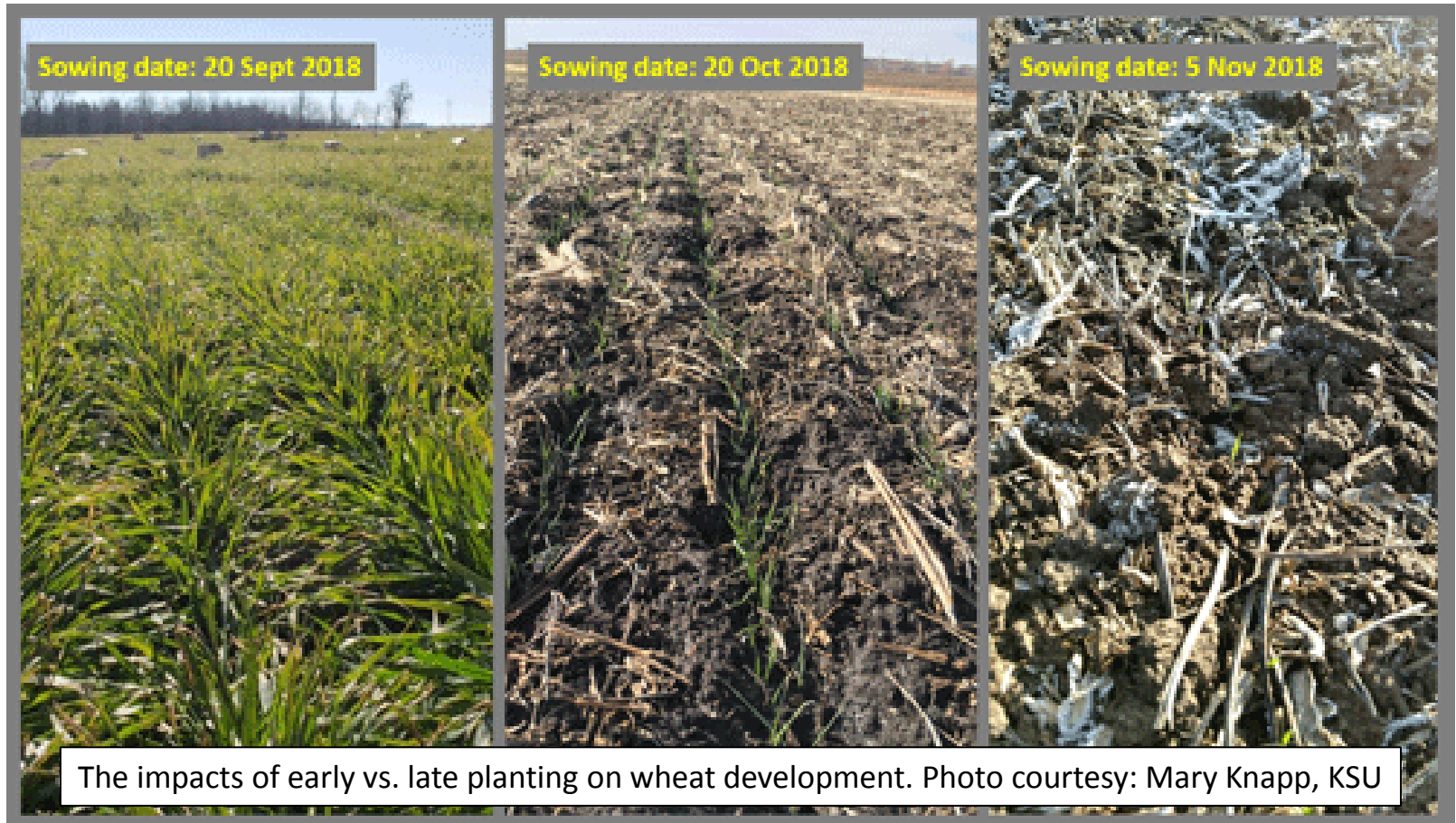
State Impacts

- Unseasonably high snowfall totals for November (IA, KS, NE, MI, MO)
 - Many locations across SE and SC NE have already received over 50% of their average seasonal snowfall by the end of November.
 - Stations along the Kansas border have already exceeded last season's snow totals
 - Concordia, KS (2nd snowiest)
 - Topeka, KS (4th snowiest)
 - Lincoln, NE (7th snowiest)
 - Grand Island, NE (10th snowiest)

Soybean Harvest

- 2018 is now the slowest soybean harvest over the 1995 – 2018 period
- U.S. Soybeans Harvested by Nov. 25
 1. 2018 94.0% (reached 94% on Nov. 25)
 2. 1996 94.3% (reached 94% on Nov. 24)
 3. 2009 94.9% (reached 94% on Nov. 22)
- Some fields across the region remain unharvested (IA, IN, MI, NE, OH)
- A lot of soybeans have been binned due to low commodity prices, moisture dockage and quality issues (IN, NE, OH).

Kansas Wheat Crop



- Extremely wet fall conditions (+ 3.86 inches; 7th wettest)
- ~65% of the wheat crop planted late
- Reports from the field indicate more acres will not be planted with wheat

Ohio/Kentucky Ice Storm

- 14 - 15 November 2018
- SW Ohio – northern Kentucky
- Between 0.25 and 0.40' of ice accretion;
1 – 2 inches of snow
 - Unusual November weather
 - Down trees and power lines
 - Wide-spread power outages
 - 19 outages in Lexington
- Murray State University canceled classes at six campuses
- Boone County Arboretum (southwest of Cincinnati) sustained significant ice damage
 - Half of over 3600 trees and shrubs experienced damage
 - 10 – 15% severe damage

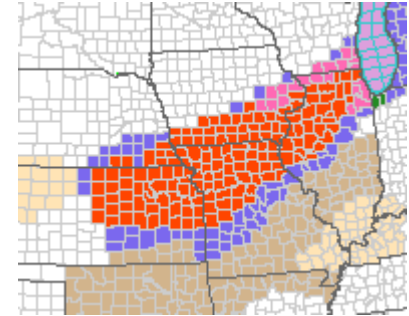


Photo Courtesy: Kat Bledsoe



Photo Courtesy: Elizabeth Hawkins

Thanksgiving Blizzard



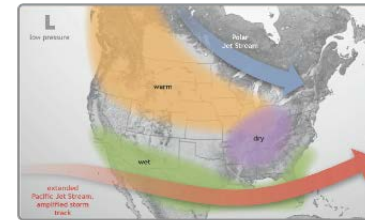
- The Thanksgiving Weekend storm was particularly impactful.
 - In our region, portions of Interstates 35 (KS), 70 (CO & KS), and 80 (WY & NE) were closed down due to blizzard conditions.
 - The governor of Kansas declared a state of emergency and the KU and UMKC canceled classes the Monday after Thanksgiving.

Wetness Issues

- Cattle feedlots have been battling mud, impacting feeding operations. (NE, KS, IA, IL, I
 - Any addition moisture will not soak into already saturated soil
 - Wet pastures and mud are keeping cattle in barns where they have to be fed
- Many farmers may need extension of 10 Dec. crop insurance reporting deadline as a result of bad weather and slow harvest (NE, IA, KS)

El Niño 2018 – 2019

Typical El Niño Winter Pattern



The image above shows the typical pattern in the winter during El Niño events. In El Niño winters the polar jet stream tends to stay further to the north, while the Pacific jet stream remains across the southern U.S. With the Midwest region falling between the storm tracks, warmer and possibly drier conditions can develop during El Niño events.

Image courtesy of the National Oceanic and Atmospheric Administration.

Highlights for the Midwest

An El Niño develops when sea surface temperatures are warmer than average in the equatorial Pacific for an extended time. This is important to North America because El Niño can impact our weather patterns, especially in the winter.

Although each El Niño is different, there are some general patterns that are predictable. For instance, the polar jet stream is typically farther north than usual, while the Pacific jet stream remains across the southern U.S.

This pattern brings enhanced chances of above-normal temperatures to the upper Midwest. Cold weather will still occur, but extreme cold weather may be milder or less frequent. Enhanced chance of dry weather in the Ohio Valley is also associated with El Niño winters.

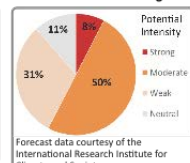
Winter Outlook

Valid for December 2018 - February 2019



A. Above normal
B. Below normal
EC. Equal chances of above, near, or below normal

Winter El Niño Strength



Forecast data courtesy of the International Research Institute for Climate and Society.

Potential Winter Impacts

Agriculture



Cape in Michigan. Image: Matt W. Lavigne (CC BY-NC-SA)



Image: USFWS (CC BY-NC-SA)



Image: USFWS (CC BY-NC-SA)

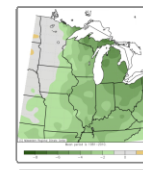
Winter El Niño impacts in the Midwest are often beneficial. Milder weather can benefit us in storage, and cover crops as well as fruit plants. However, El Niño winters can have reduced snowpack, exposing the crops to harsh winds and cold air outbreaks. Milder temperatures should be beneficial for livestock producers by reducing heating costs, reducing stress to animals, and better production. Commodity prices may increase due to negative impacts internationally.

Mild and damp winters with decreased snowfall can have a significant positive impact on the Midwest economy. The largest positive impacts are reductions in heating costs and increased retail sales. Construction and home sales also benefit in milder winter conditions. Economic losses from a mild winter include salt sales, towing, snow removal, winter sports, and other businesses that are dependent on typical winter temperatures and snowfall.

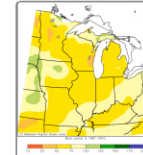
Due to the Climate Prediction Center, outlooks favor a weak to moderate El Niño event developing in the next few months, which could continue through the winter (70-75% chance). An El Niño Watch is in effect. The chart above shows the potential for this winter's El Niño, using data from the International Research Institute for Climate and Society.

Comparisons and Limitations

Winter Conditions During Past El Niños



The maps to the left illustrate the conditions during the most recent weak to moderate strength El Niño from the winter of 2014-15. Much of the Midwest was cooler than average (top map). Percentage of normal precipitation (lower image) showed that most of the region fell short of normal for the winter. Please note that each El Niño is different and other factors also impact the winter conditions, such as a recent cold front that trumped the El Niño during the winter of 2009-10.



While past El Niño events can help inform forecasters about certain conditions, there are limitations. For one, this El Niño event may not develop as forecast. Additionally in the Midwest, El Niño is not known to impact: 1) potential for ice storms or blizzards, 2) the track or intensity of any single weather system, 3) early and late freeze events in the fall and spring, or 4) potential for drought to develop in the spring.

Midwest Region Partners

- Midwestern Regional Climate Center
www.mrccclimate.org
- State Climatologists
www.stateclimate.org
- National Oceanic and Atmospheric Administration
www.noaa.gov
- NWS Climate Prediction Center
www.cpc.ncep.noaa.gov
- National Centers for Environmental Information
www.ncei.noaa.gov
- National Weather Service Central Region
www.weather.gov/central
- North Central River Forecast Center
www.weather.gov/ncr
- Ohio River Forecast Center
www.weather.gov/orfc
- National Drought Mitigation Center
www.ndmc.edu
- National Integrated Drought Information System
www.drought.gov
- USDA Midwest Climate Hub
www.forestlandscapesecore.gov/midwest



El Niño briefings:

Midwest:

<https://www.drought.gov/drought/documents/el-nino-impacts-and-outlook-midwest-region-october-2018>

Great Lakes:

<https://www.drought.gov/drought/documents/el-nino-impacts-and-outlook-great-lakes-region-october-2018>

Missouri River Basin:

<https://www.drought.gov/drought/documents/el-nino-impacts-and-outlook-missouri-river-basin-october-2018>

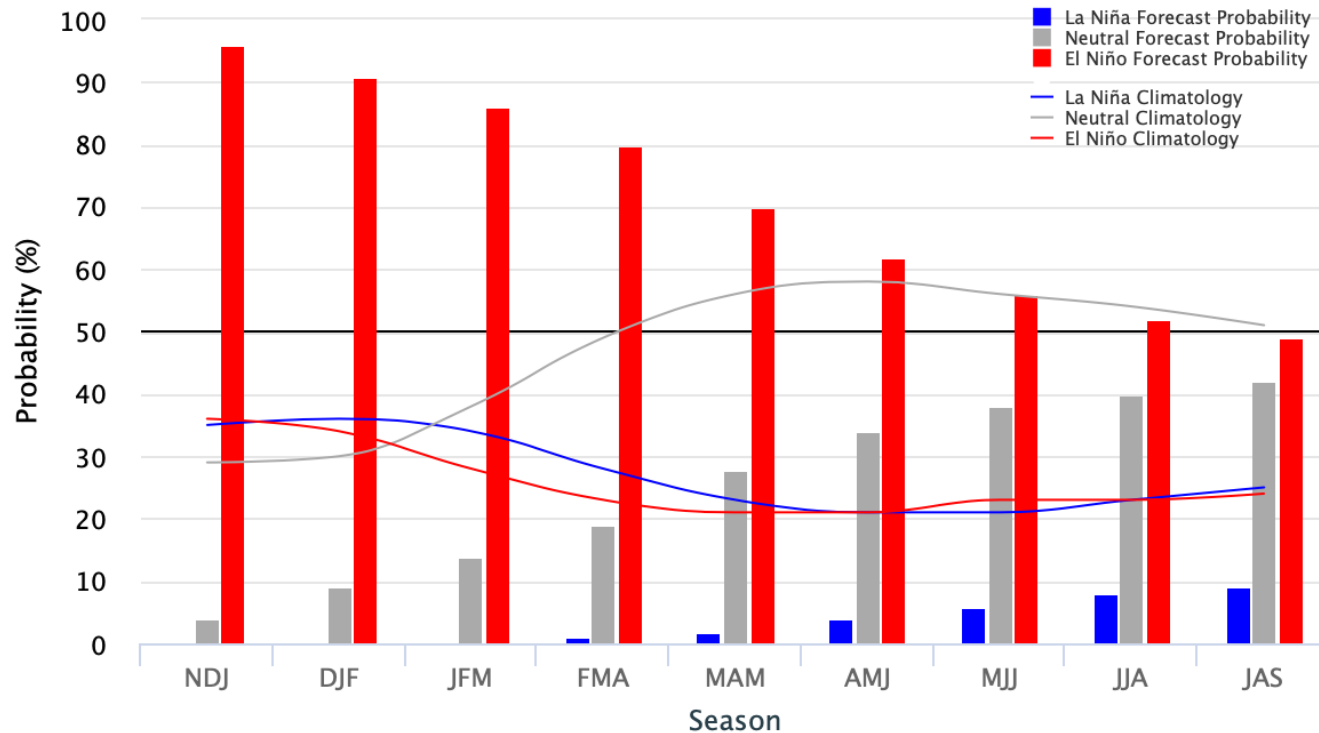
El Niño Watch

- 90% chance of formation though the Northern Hemisphere winter and 60% chance of continuation through spring
- ENSO-neutral continued during November, despite the continuation of above-average SSTs
- Atmospheric anomalies largely reflected intra-seasonal variability related to the MJO, and have not yet shown a clear coupling to the above-average ocean temperatures

ENSO Probabilities

Early-December 2018 CPC/IRI Official Probabilistic ENSO Forecasts

ENSO state based on NINO3.4 SST Anomaly
Neutral ENSO: $-0.5\text{ }^{\circ}\text{C}$ to $0.5\text{ }^{\circ}\text{C}$

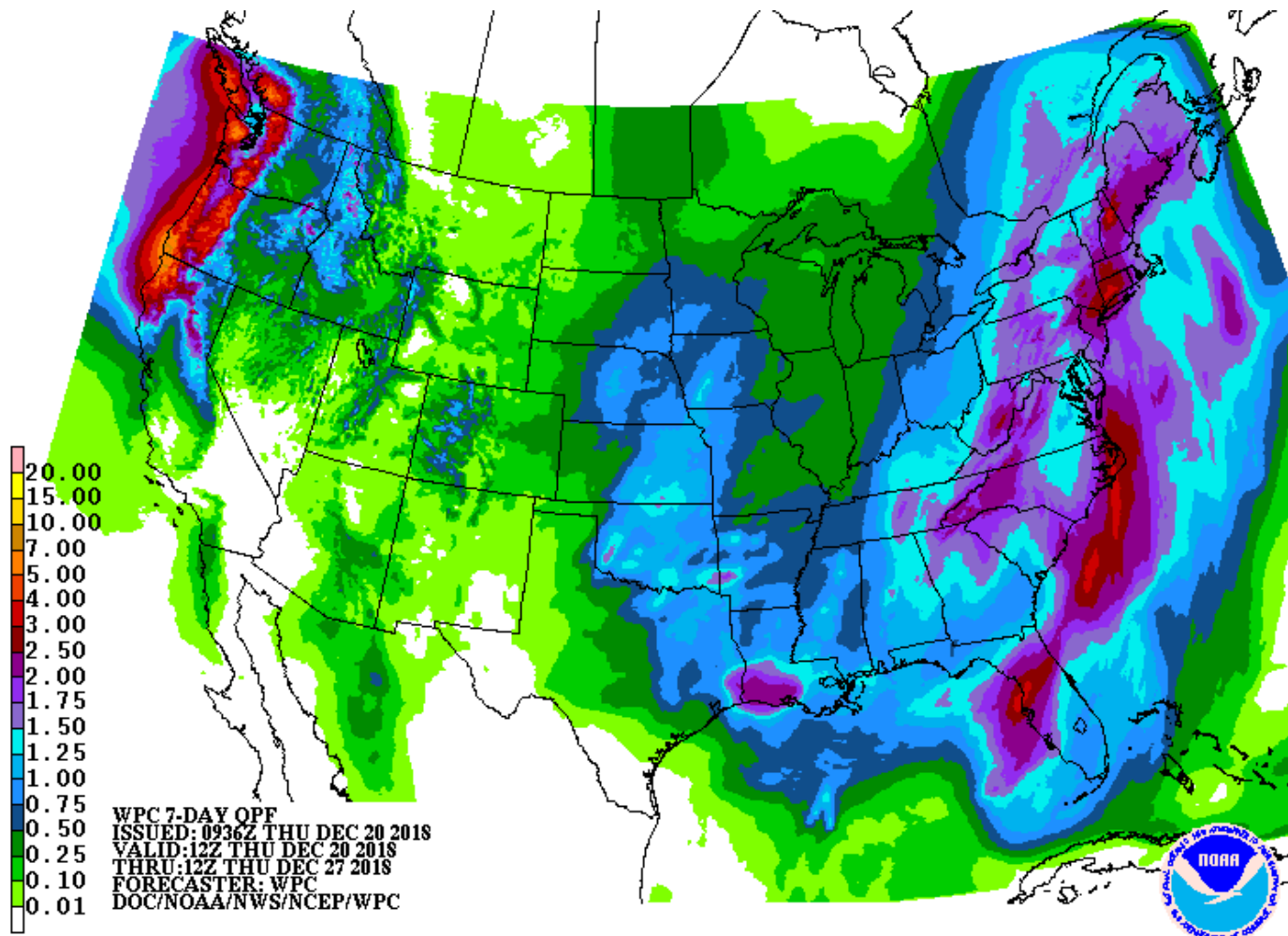


Climate Outlooks

- 7-day QPF
- U.S. Hazard Outlooks
- 6 – 10; 8 – 14 day outlooks
- Holiday Storm System
- January temperature and precipitation
- JFM temperature and precipitation
- AMJ temperature and precipitation

7-day Quantitative Precipitation Forecast

Valid: 20 Dec. – 27 Dec.

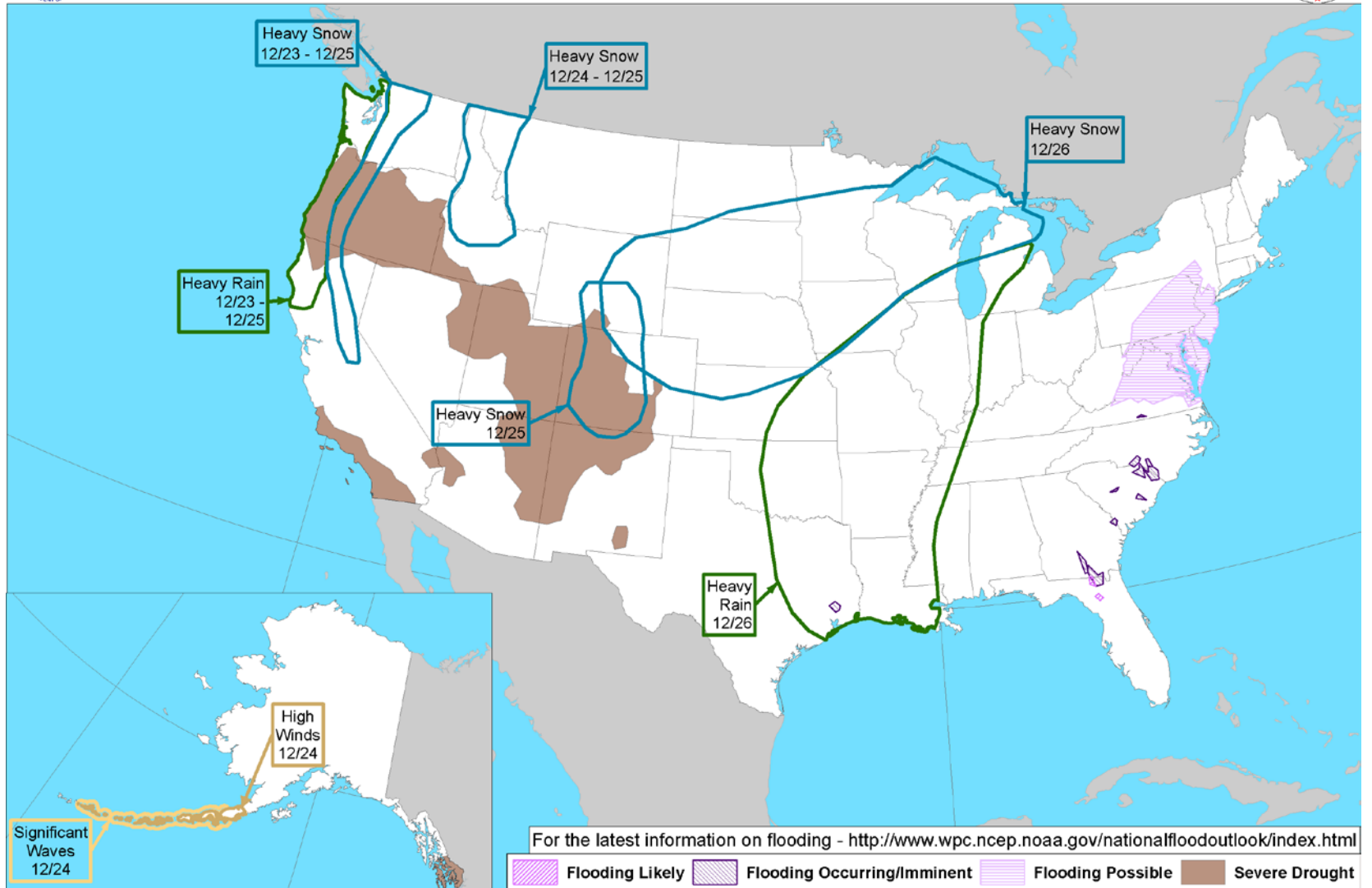


<https://www.wpc.ncep.noaa.gov/qpf/day1-7.shtml>



Day 3-7 U.S. Hazards Outlook

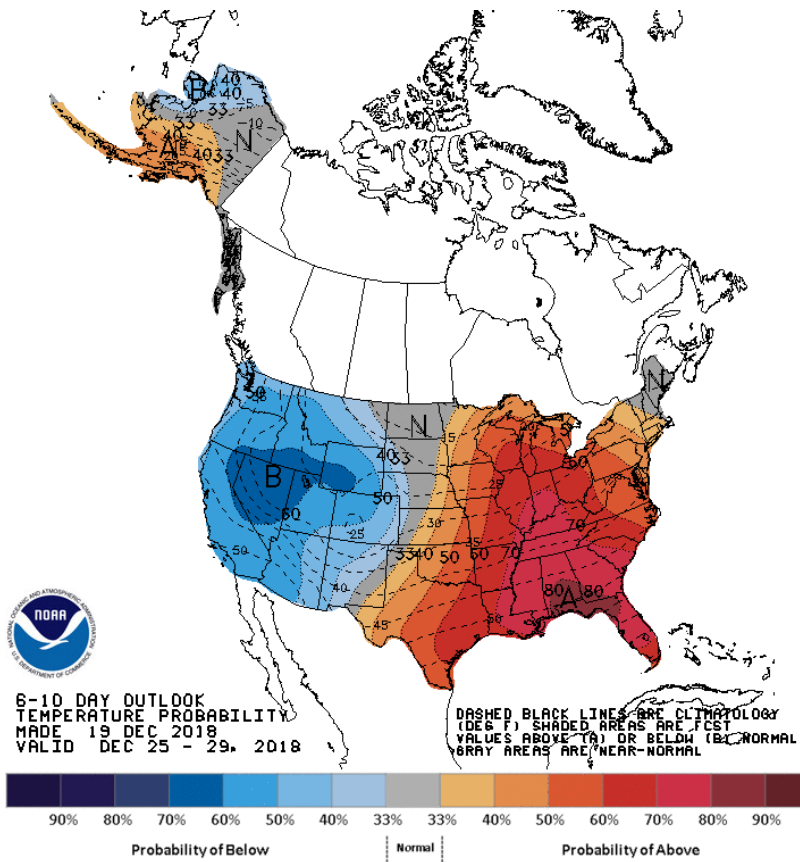
Valid: 12/22/2018-12/26/2018



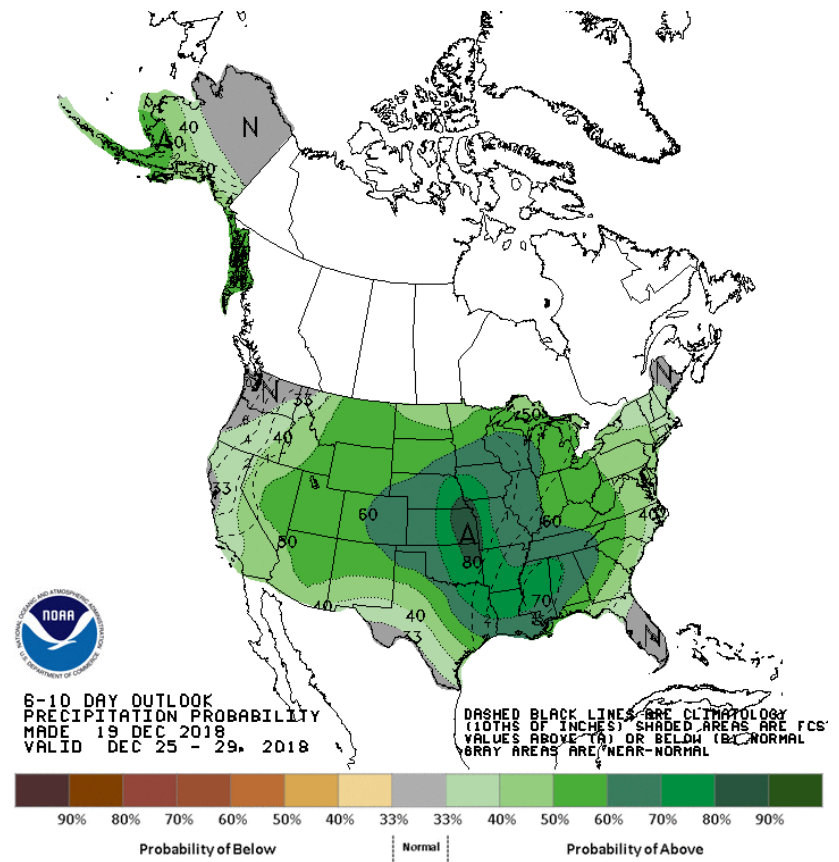
Climate Prediction Center
 Made: 12/19/2018 3PM EST

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6-10 Day Outlook

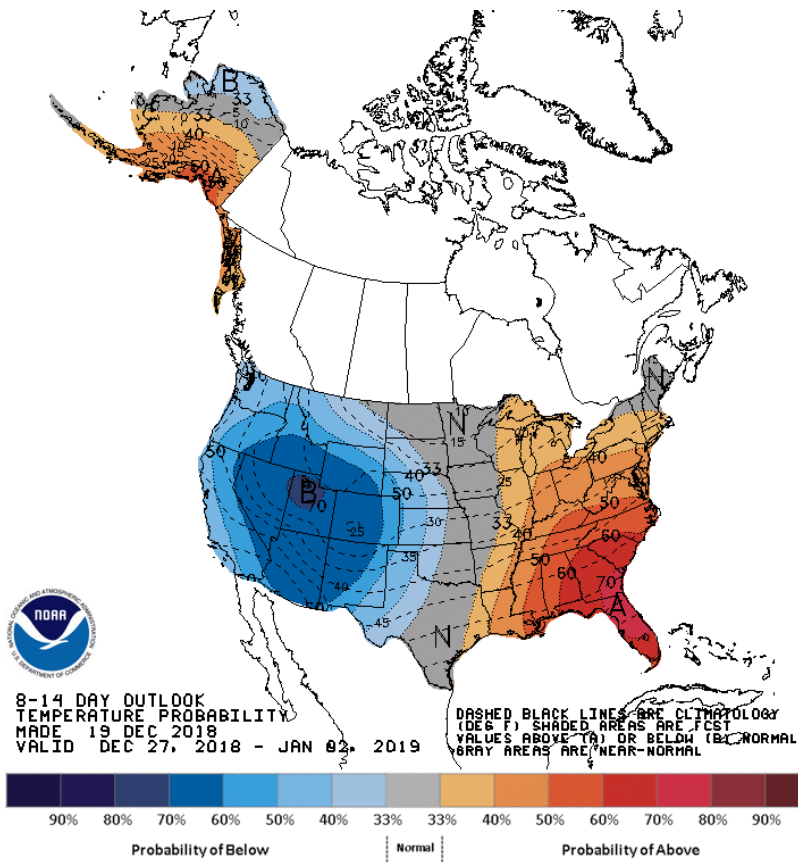


Temperature

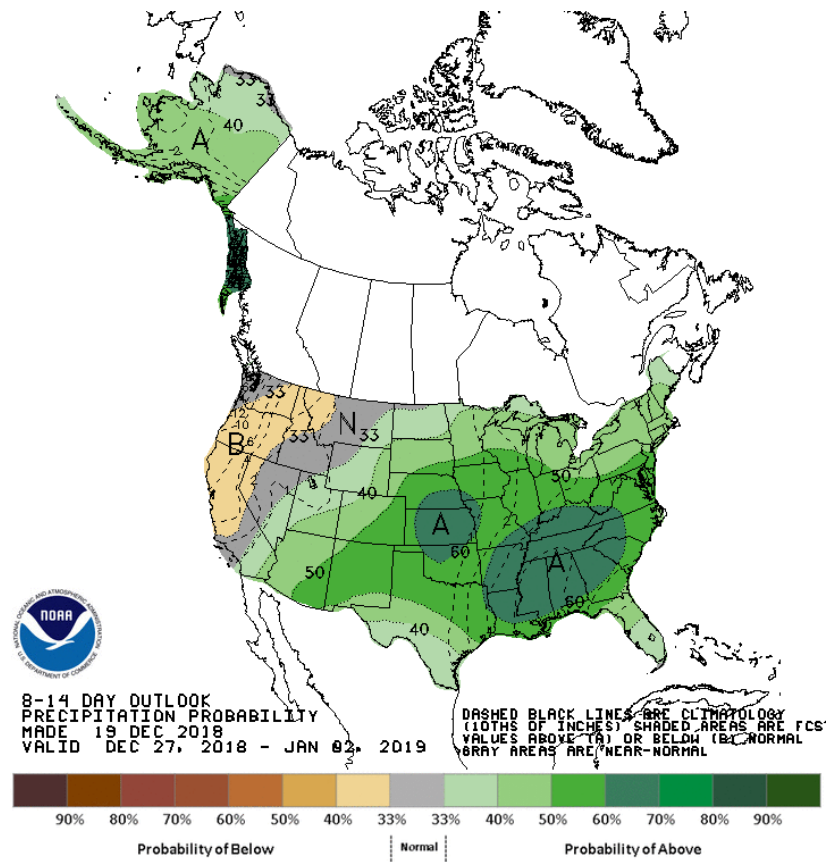


Precipitation

8-14 Day Outlook



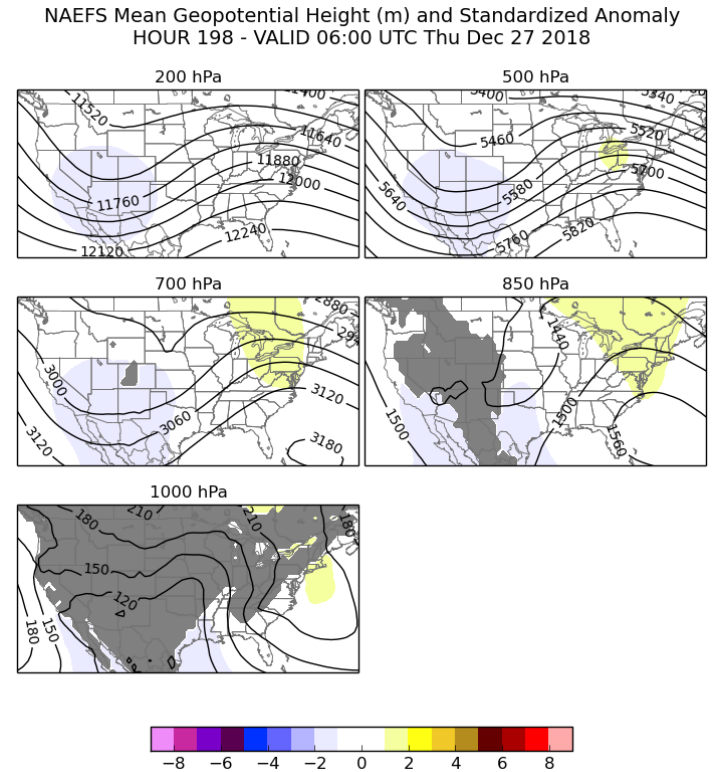
Temperature



Precipitation

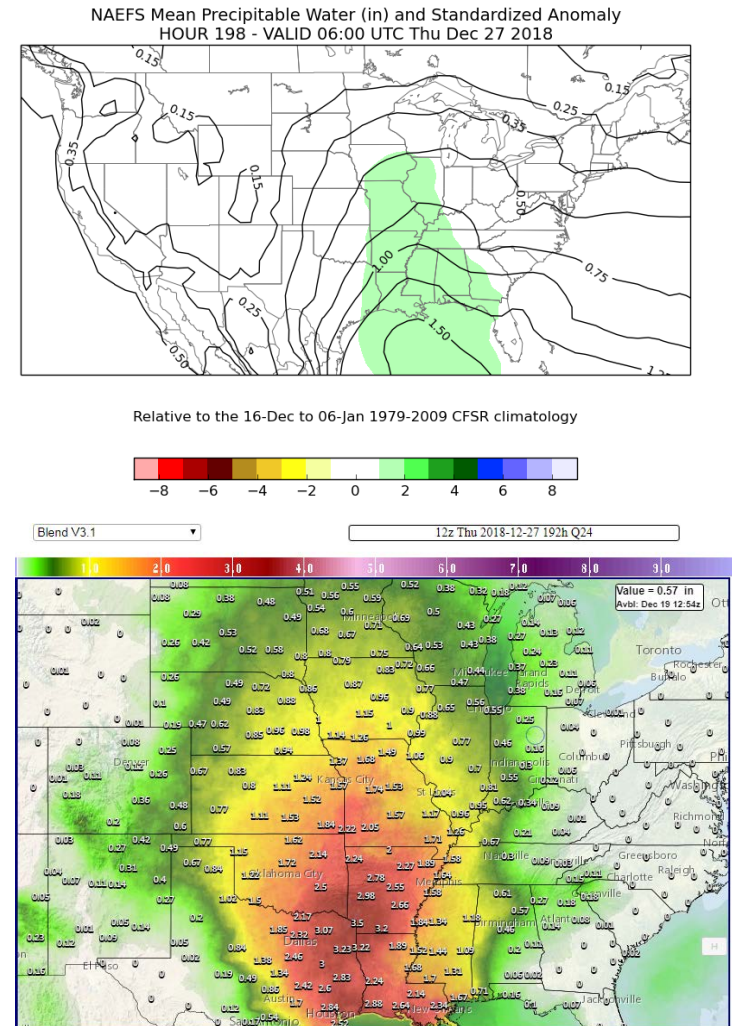
Plains Storm System just after Christmas

- Numerous ECMWF and GFS runs through Dec 19th pointing to a significant storm system in the Plains Dec 26-27
- NAEFS pattern and standardized anomaly (at right) reflect this too
- MJO entering phase 5 aligns with this pattern shift



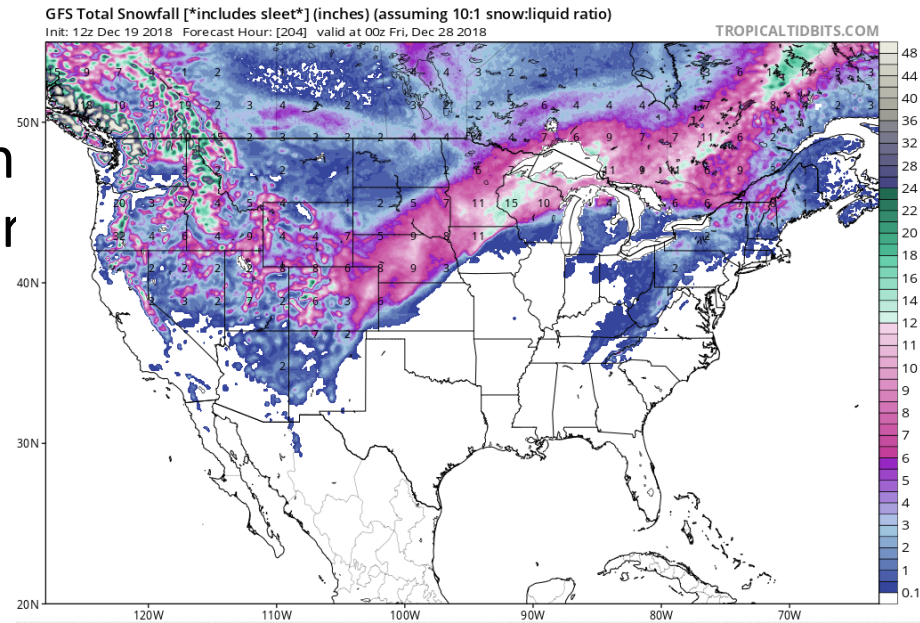
Concerns - Heavy Precipitation

- Precipitable water anomaly already near 2" - given how far out it is in the forecast it is worth monitoring
- 24 hr QPF forecast from Dec 19th 12Z NBM picking up on that anomalous moisture with up to 3" potential
 - Amounts will likely differ what is shown here, but gives that idea of heavy rainfall possible
 - East TX into Lower MS Valley currently seems to be area of most concern



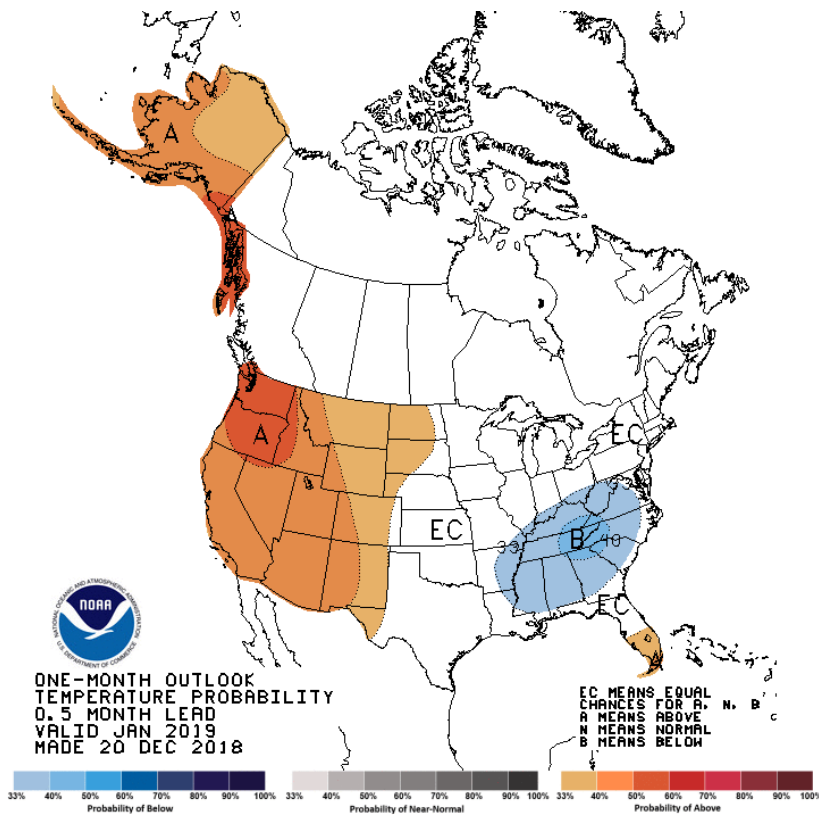
Concerns - Winter Weather

- Crude snowfall map from GFS using 10 to 1 ratio
- GFS and ECMWF consistently showing heavy snow band on northwest side of storm system
- Eventual amounts and location to be determined but signal for heavy snow there, especially given previously shown high PW anomaly
- May have to watch for a leading edge freezing rain/sleet on nose of warm conveyor belt

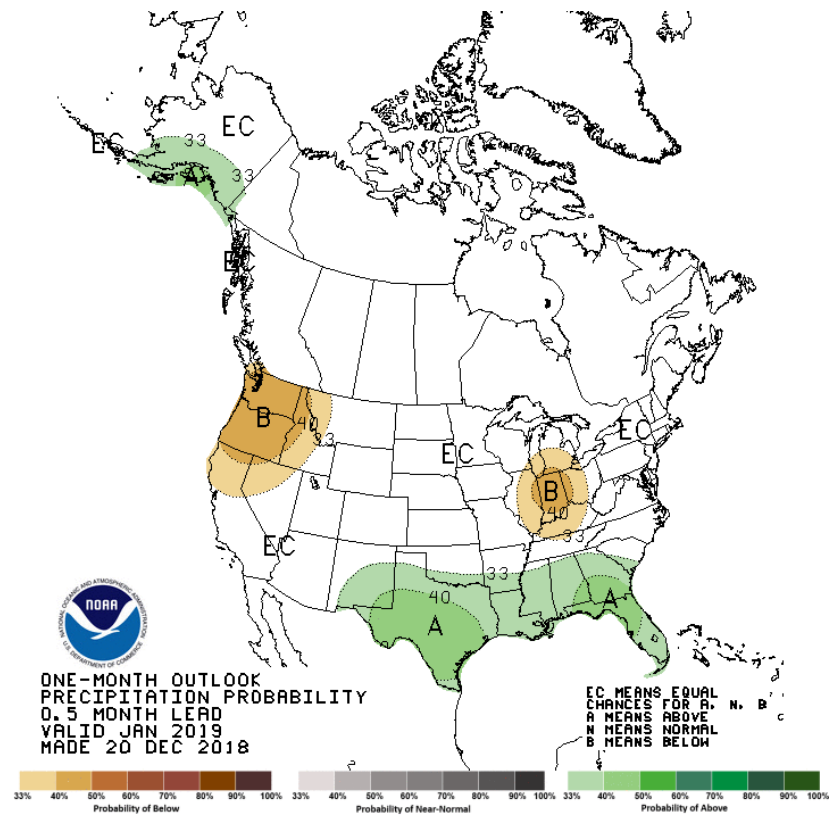


Dec 19 12Z GFS total snowfall. Eastern CO through Upper MI mainly 27-28th

January Outlook

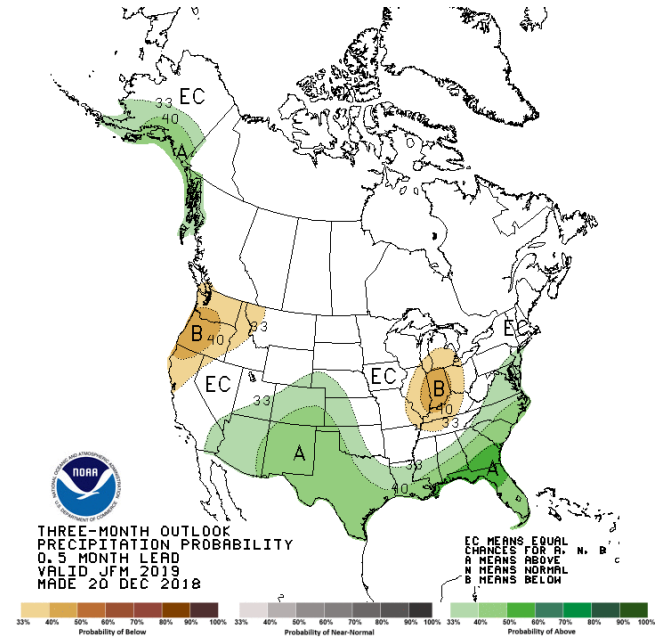
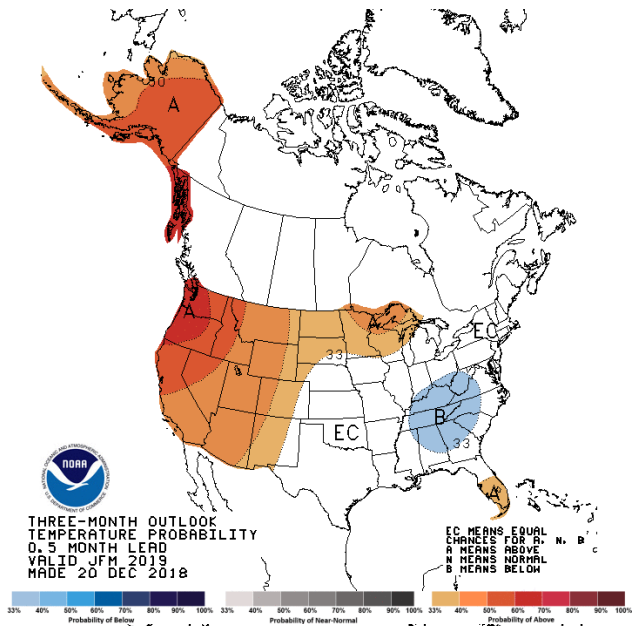


Temperature

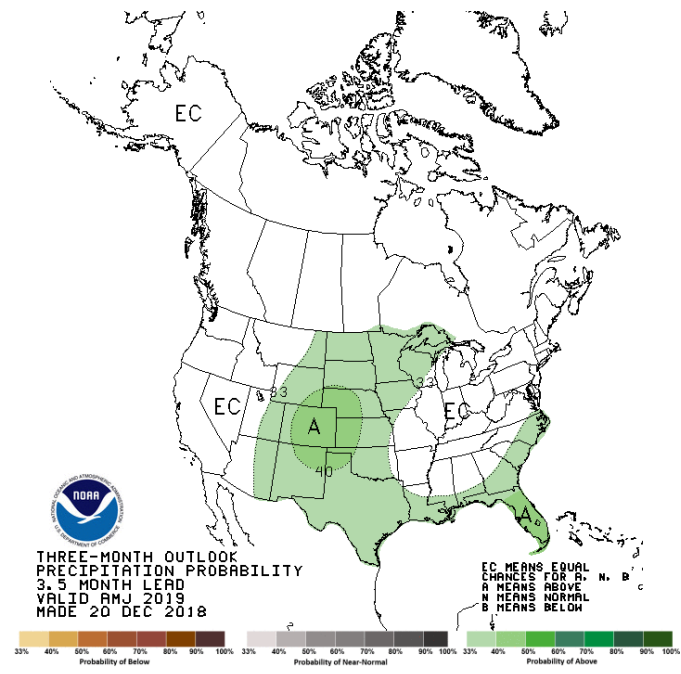
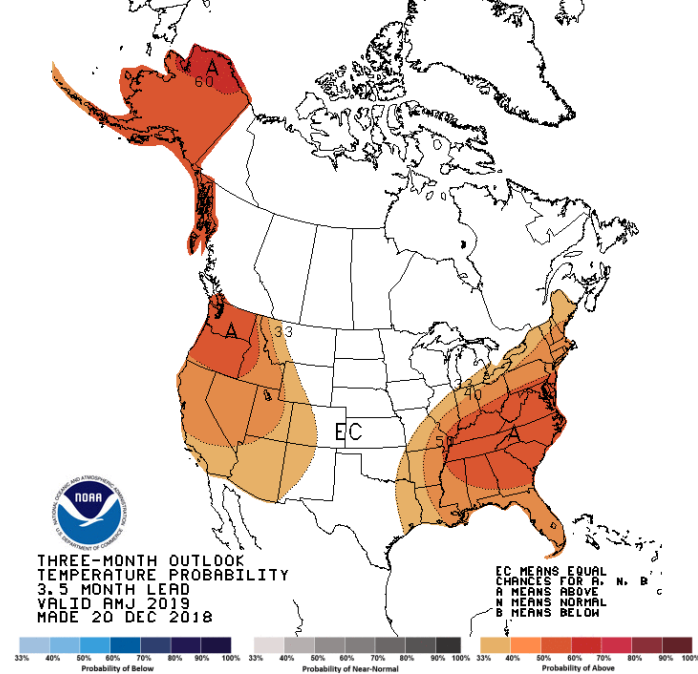


Precipitation

JFM



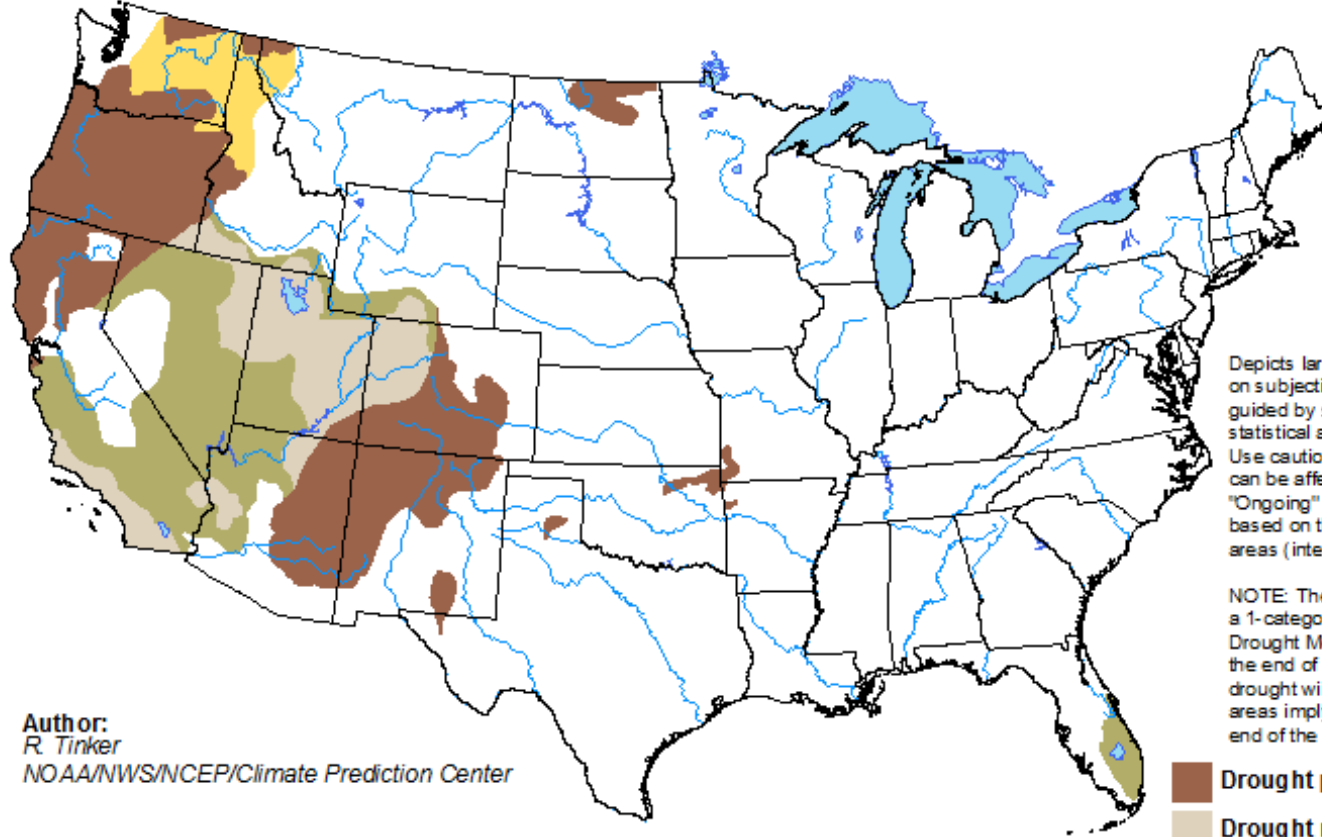
AMJ



Seasonal Drought Outlook

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





Valid for December 20, 2018 - March 31, 2019
Released December 20, 2018

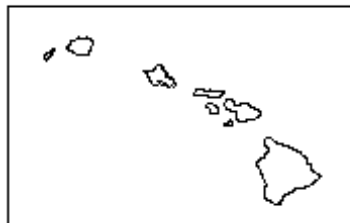
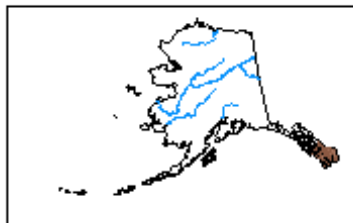


Depicts large-scale trends based on subjectively derived probabilities guided by short- and long-range statistical and dynamical forecasts. Use caution for applications that can be affected by short lived events. "Ongoing" drought areas are based on the U.S. Drought Monitor areas (intensities of D1 to 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:
R. Tinker
NOAA/NWS/NCEP/Climate Prediction Center

-  Drought persists
-  Drought remains but improves
-  Drought removal likely
-  Drought development likely



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

Outlook Summary

- 90% of a weak El Niño formation through NH DJF and 60% chance through spring

Further Information - Partners

- **Today's and Past Recorded Presentations:**
- <http://mrcc.isws.illinois.edu/webinars.htm>
<http://www.hprcc.unl.edu>
- NOAA's National Centers for Environmental Information: 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
 - <https://mrcc.illinois.edu>
 - <http://www.hprcc.unl.edu>

Thank You and Questions?

- Questions:
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