Central Region Climate & Drought Outlook

16 January 2020

Thanksgiving Week Blizzard
16.5” of snow in Fort Collins!

Peter Goble

Service Climatologist

COLORADO CLIMATE CENTER

ATMOSPHERIC SCIENCE
COLORADO STATE UNIVERSITY

AASC AMERICAN ASSOCIATION OF STATE CLIMATOLOGISTS

National Drought Mitigation Center

USDA 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**
  - Thursday, Feb 20th at 1:00 CST – Speaker: Trent Ford (IL State Climatologist)
- **Access to Future Climate Webinars and Information**
  - http://www.drought.gov/drought/content/regional-programs/regional-drought-webinars

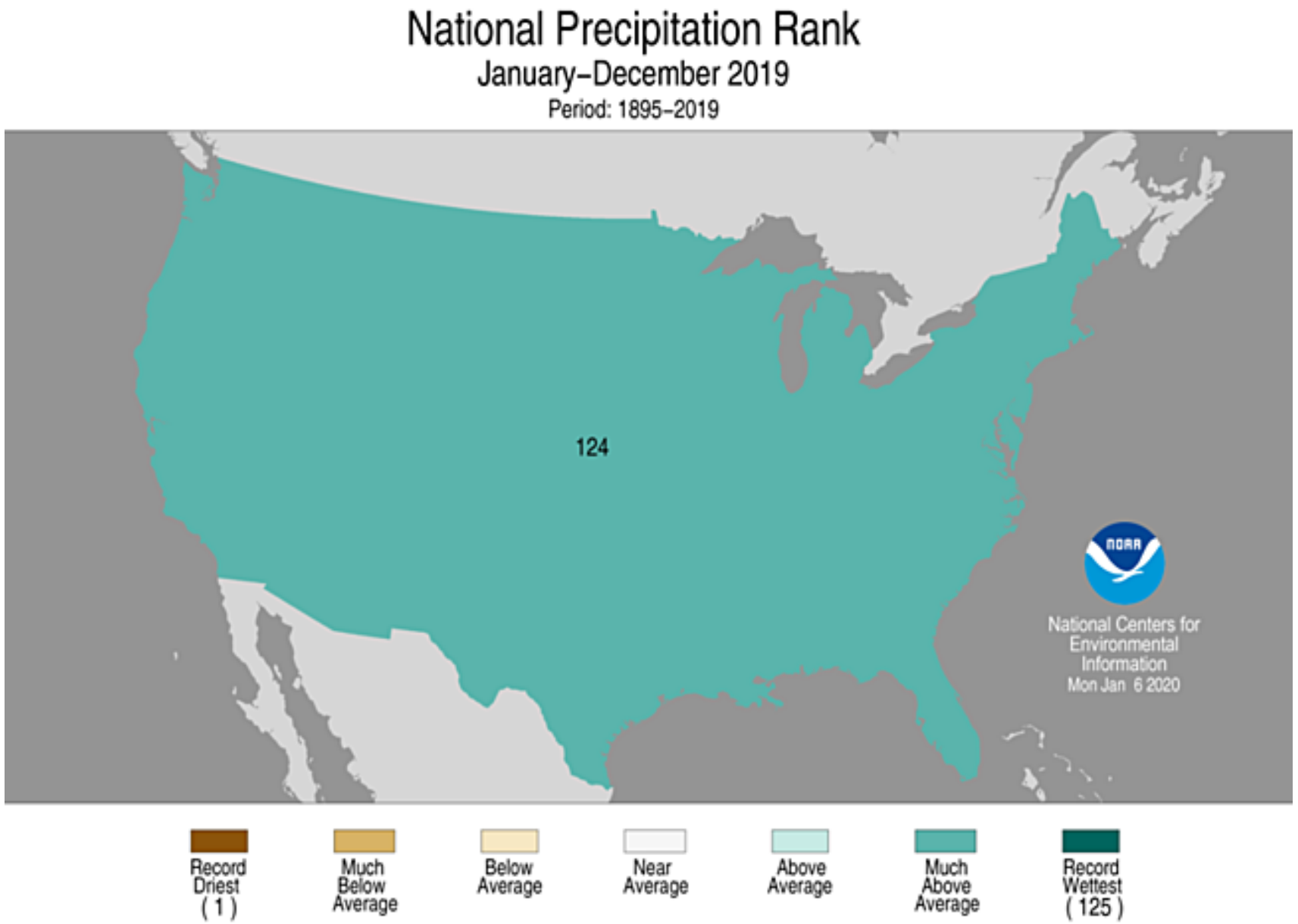
- **Recordings of Past Webinars**
  - https://mrcc.illinois.edu/multimedia/webinars.jsp
  - https://hprcc.unl.edu/webinars.php

- **Open for questions at the end**

Today's Agenda

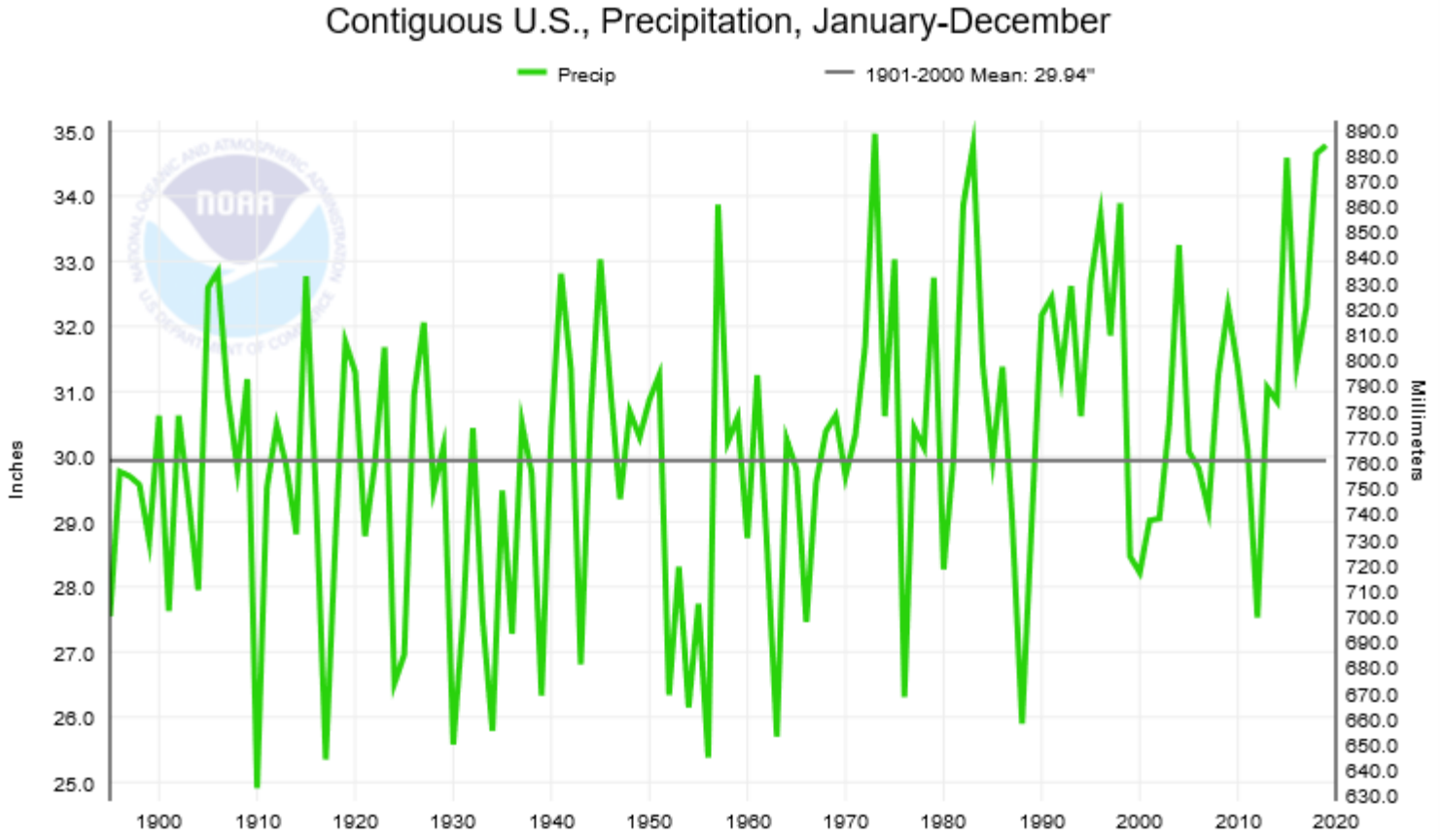
- **2019 Overview**
  - **Wettest year on record for Upper Midwest**
  - **Statewide precipitation records for MI, MN, ND, SD, WI**
  - **Some notable summer heat records in places**
- **Recent Conditions**
  - **Last 30,90 days**
  - **Snowpack, soils, streams**
- **Impacts**
  - **2019 impacts were mostly from flooding**
  - **Mix of concerns about wet and dry for this winter**
  - **High river volumes an ongoing concern**
- **Outlooks**
  - **ENSO neutral likely**
  - **Potential for Cold Outbreaks in February**
  - **Spring Outlook (more wet weather?)**

2019 Overview



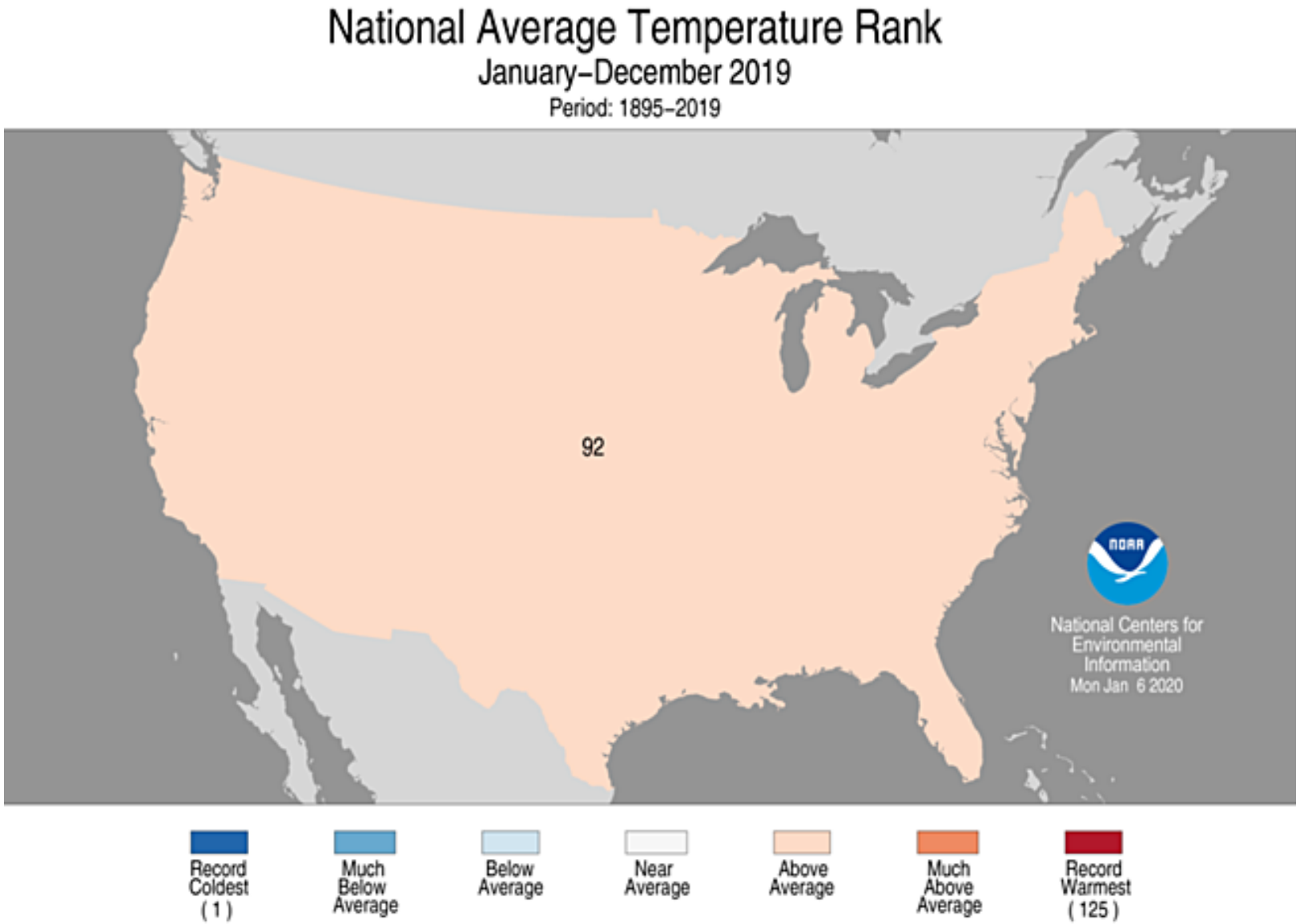
- The Continental US had its second wettest year on record (going back to 1895)
- “Bested” only by 1973

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



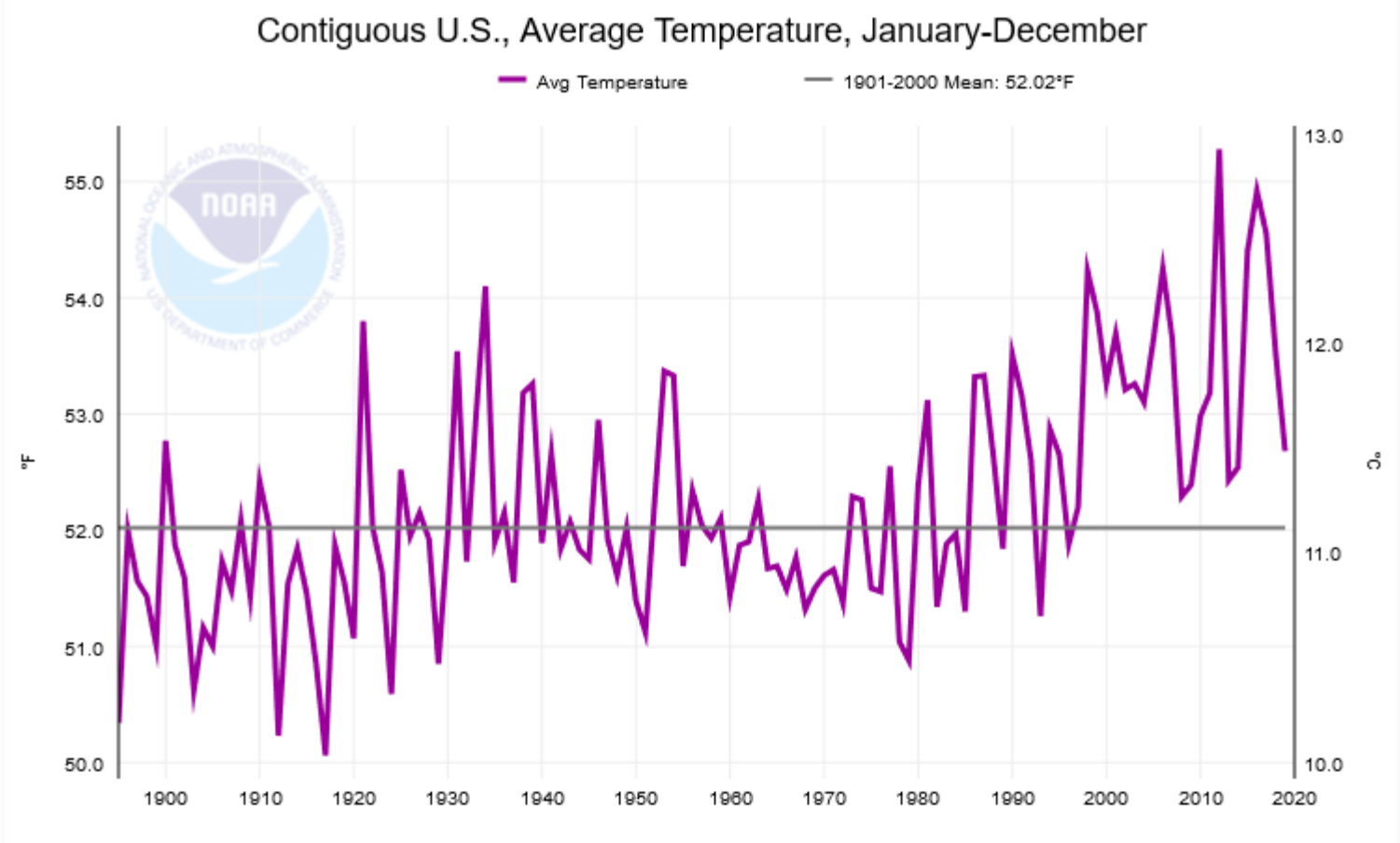
- Recent years have been marked by an uptick in precipitation
- This is even more notable across the central US
- Year-to-year variability is considerable

https://www.ncdc.noaa.gov/cag/national/time-series/



- The Continental US was warmer than average in 2019
- Conditions were slightly cooler than average with respect to the last decade
- Does this rank make sense for your area? Probably not. The Midwest was cooler than average, however the SE US had one of its warmest years on record

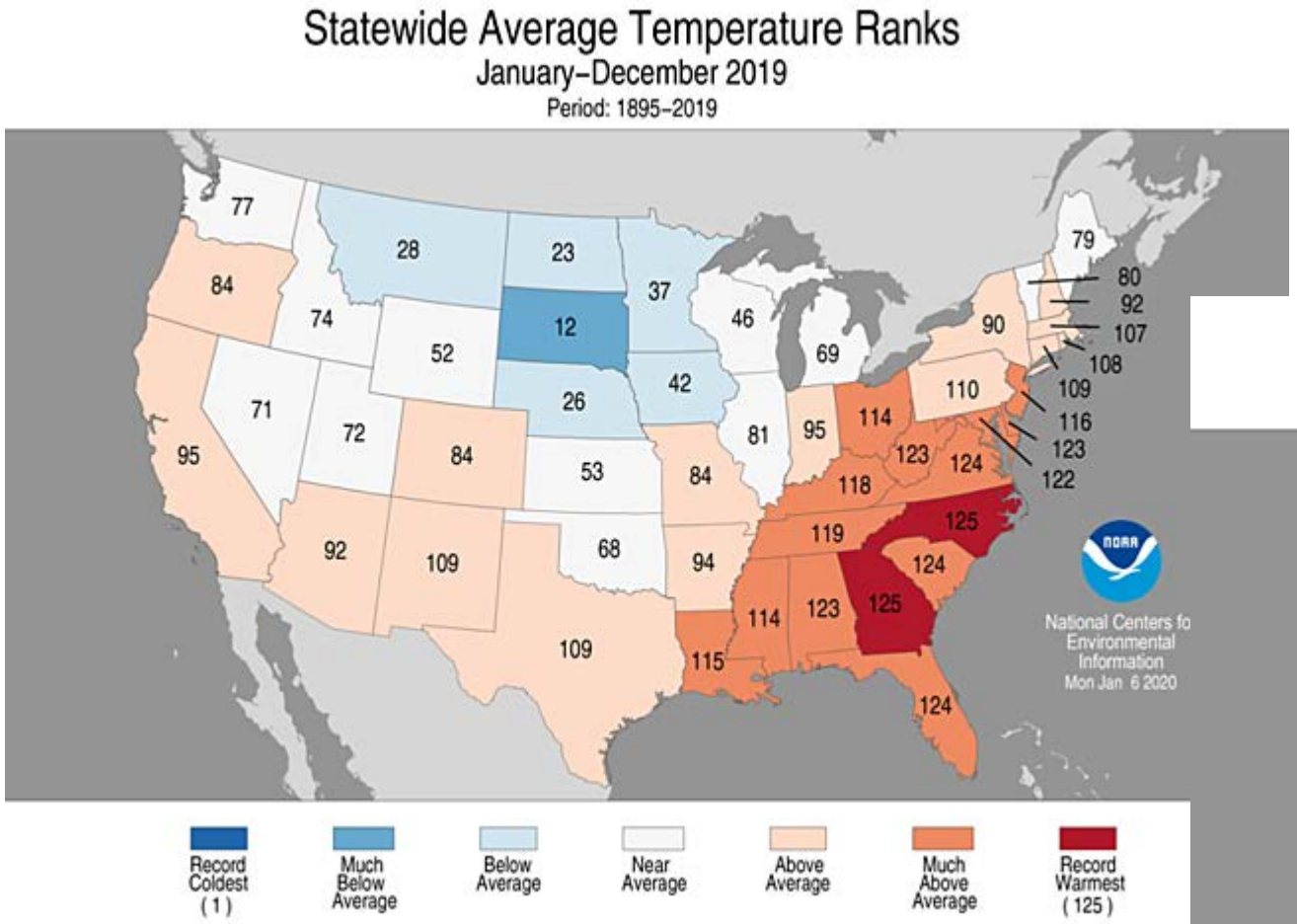
http://www.ncdc.noaa.gov/temp-and-precip/us-maps/

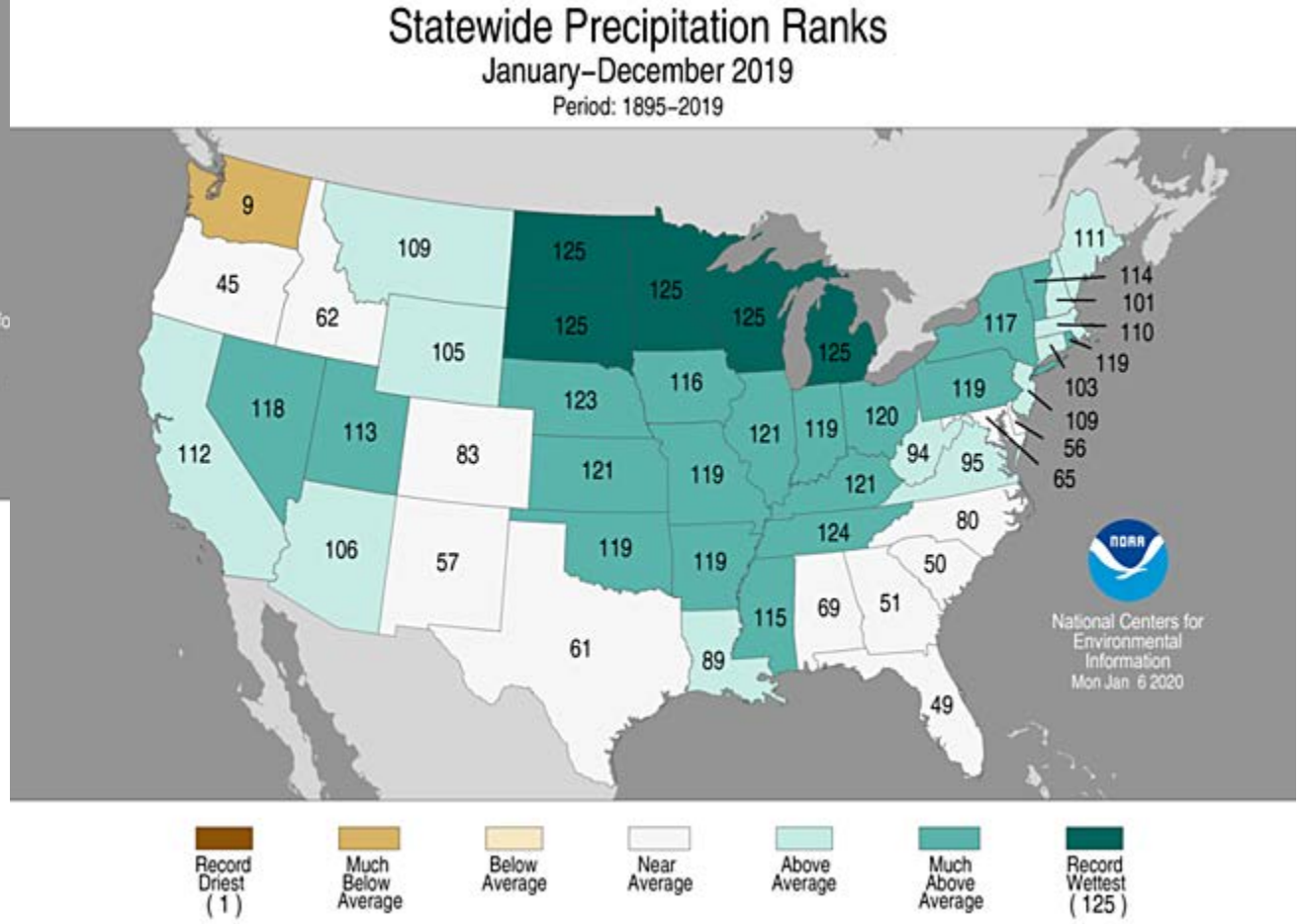


- 2019 was warmer than our 20th century average over CONUS, but cool with respect to some recent years

https://www.ncdc.noaa.gov/cag/national/time-series/

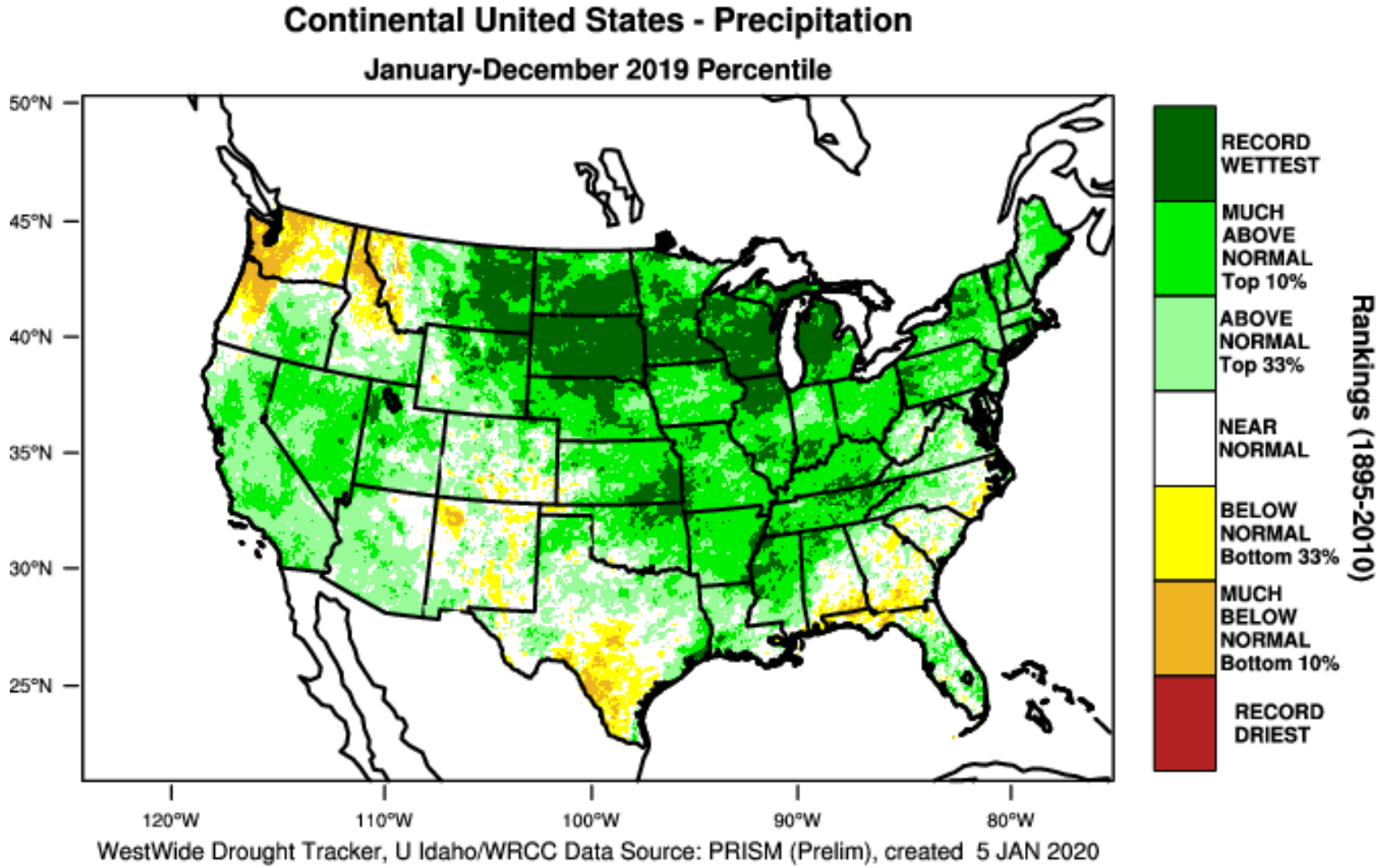
The Wettest Year on Record In the Upper Midwest!





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

Some areas of the Central Region had their record wettest year in 2019!

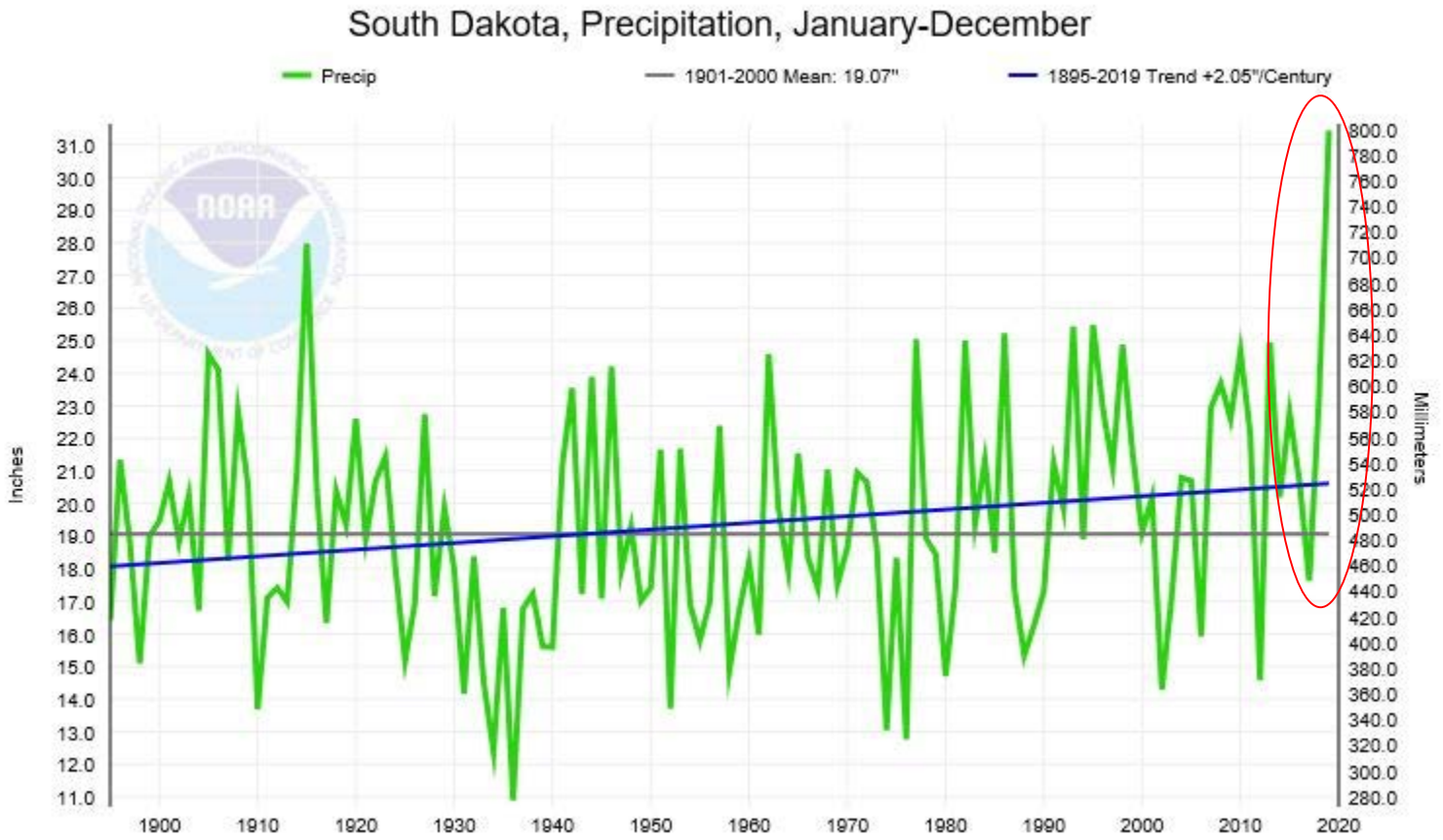


- It was a year for the books in the Upper Midwest and High Plains
- Nearly all of South Dakota experienced record wet conditions

https://wrcc.dri.edu/wwdt/index.php

Did we mention South Dakota was wet?

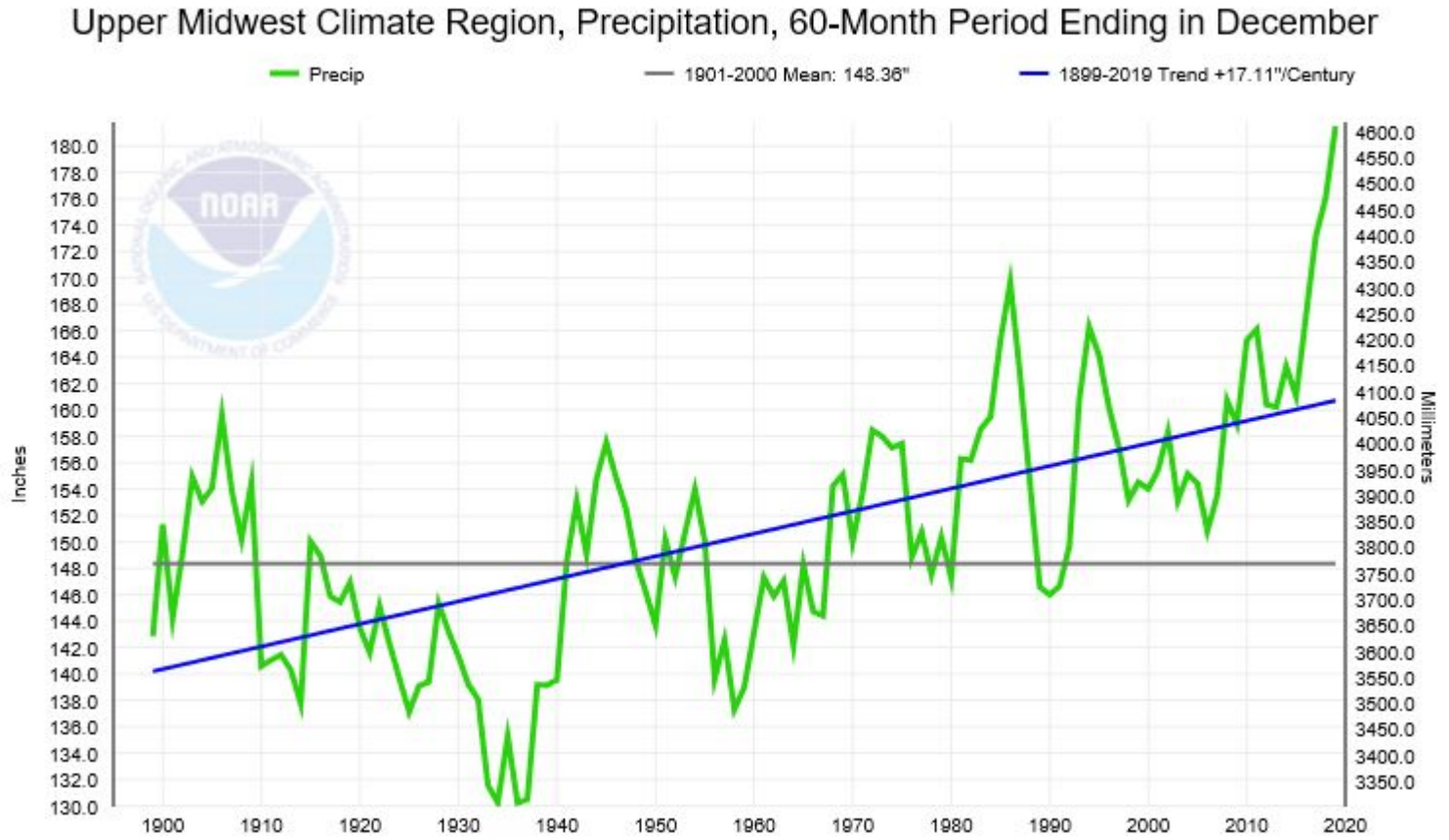
- South Dakota has been trending wetter… but not like this
- New state record average annual rainfall of 31.44” eclipses old mark by 3.47”
- MI, MN, ND, and WI also were record wet. These records were 41.55”, 35.51”, 24.41”, and 44.34” respectively



https://www.ncdc.noaa.gov/cag/national/time-series

The Upper Midwest is Seeing a Trend Wettest 5-year period on record

- The Upper Midwest has trended wetter since the 1930s
- Five-year precipitation averages are at an all-time high, leading to similar highs in lake and river levels



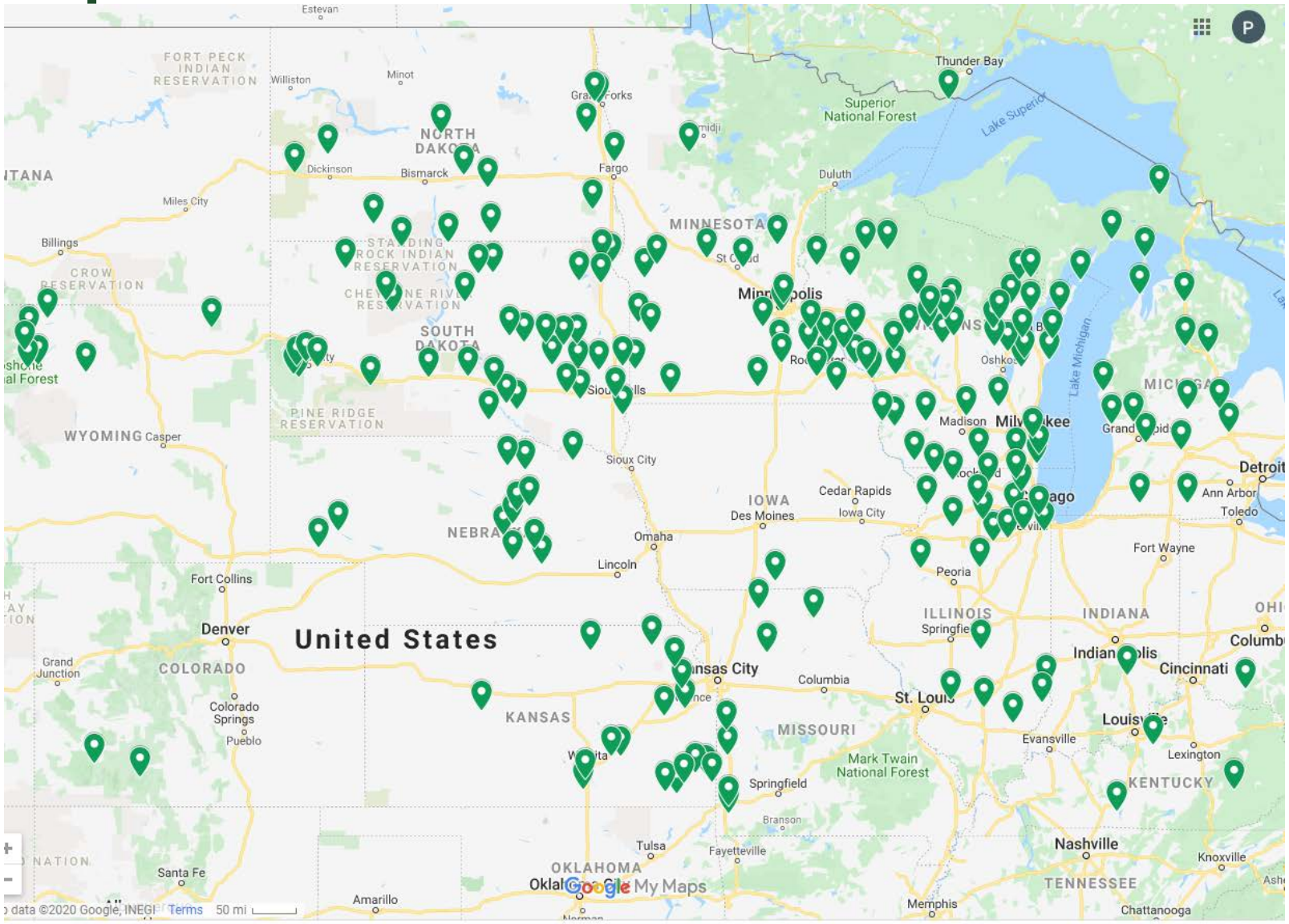
https://www.ncdc.noaa.gov/cag/national/time-series

Annual Precipitation Records Set in 2019

Numerous records across the region. Here are a couple notable ones:

Wolf Creek Summit – 61.1”
Chicago Midway – 53.9”
Grand Rapids – 51.37”
Mitchell Intl. – 46.04”
University of MN – 42.95”
Grand Portage – 39.96”
Sioux Falls – 39.54”
Rapid City – 28.43”
Great Forks – 28.11”

https://www.google.com/maps/d/u/0/viewer?mid=1oLIUqYalVTBaI90f7T7lWFYVIZfe6j2J&ll=42.66532977888264%2C-96.328055&z=6



Colorado Statewide Records

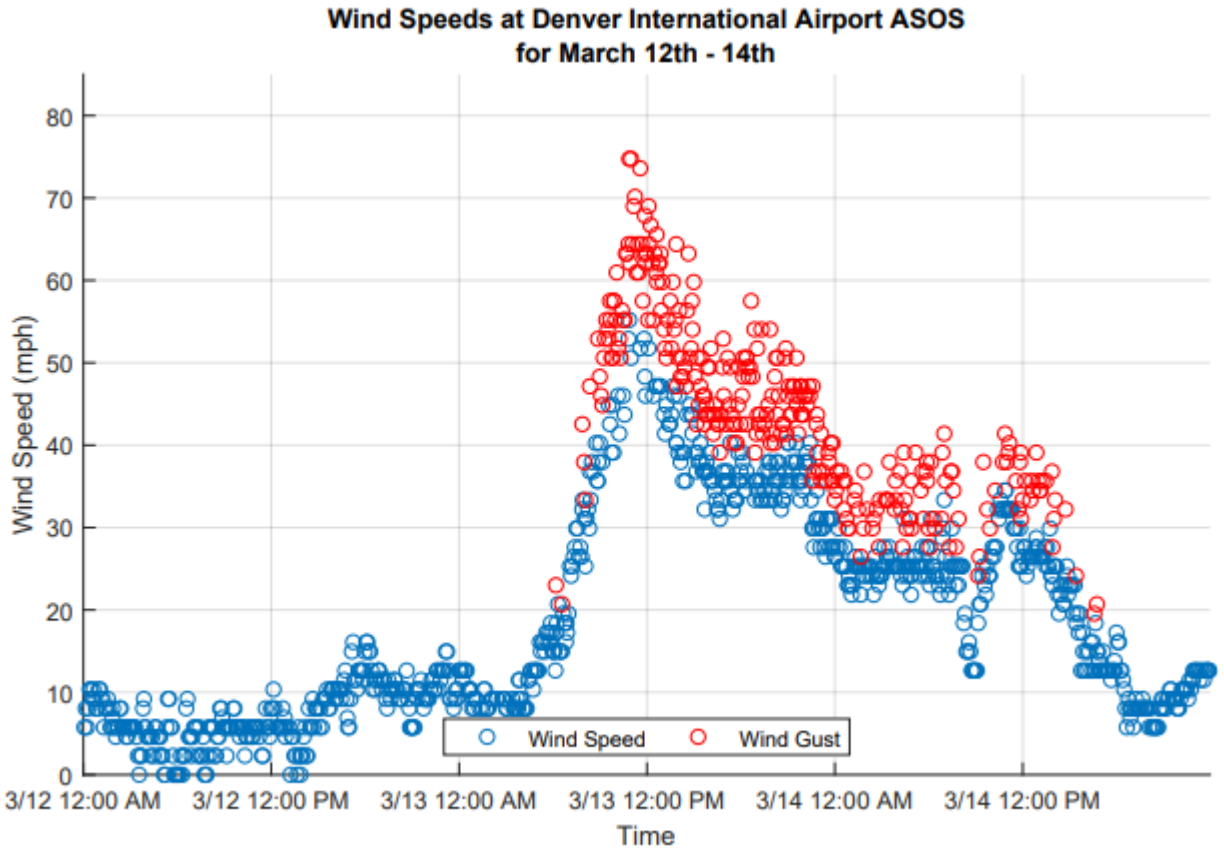
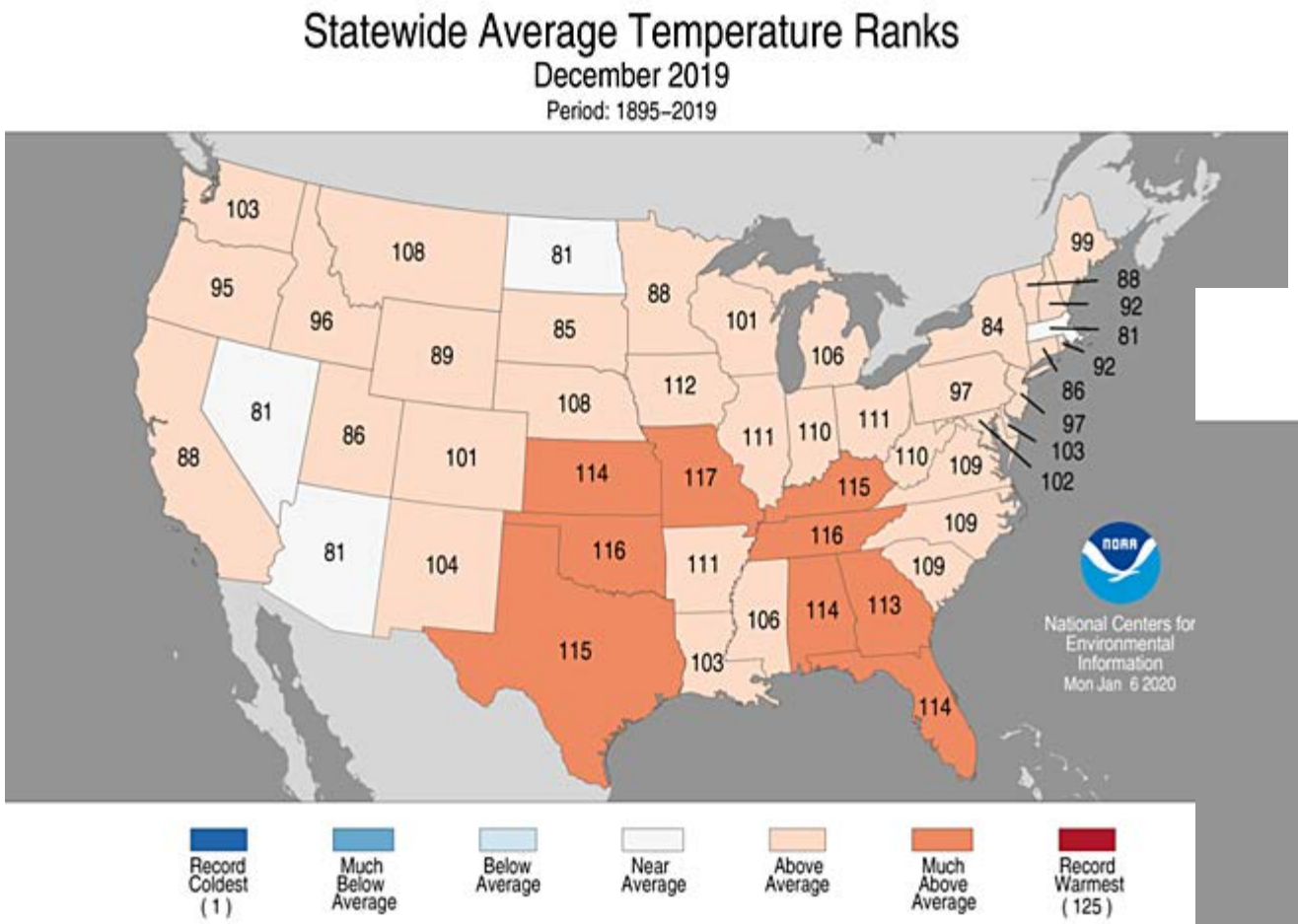
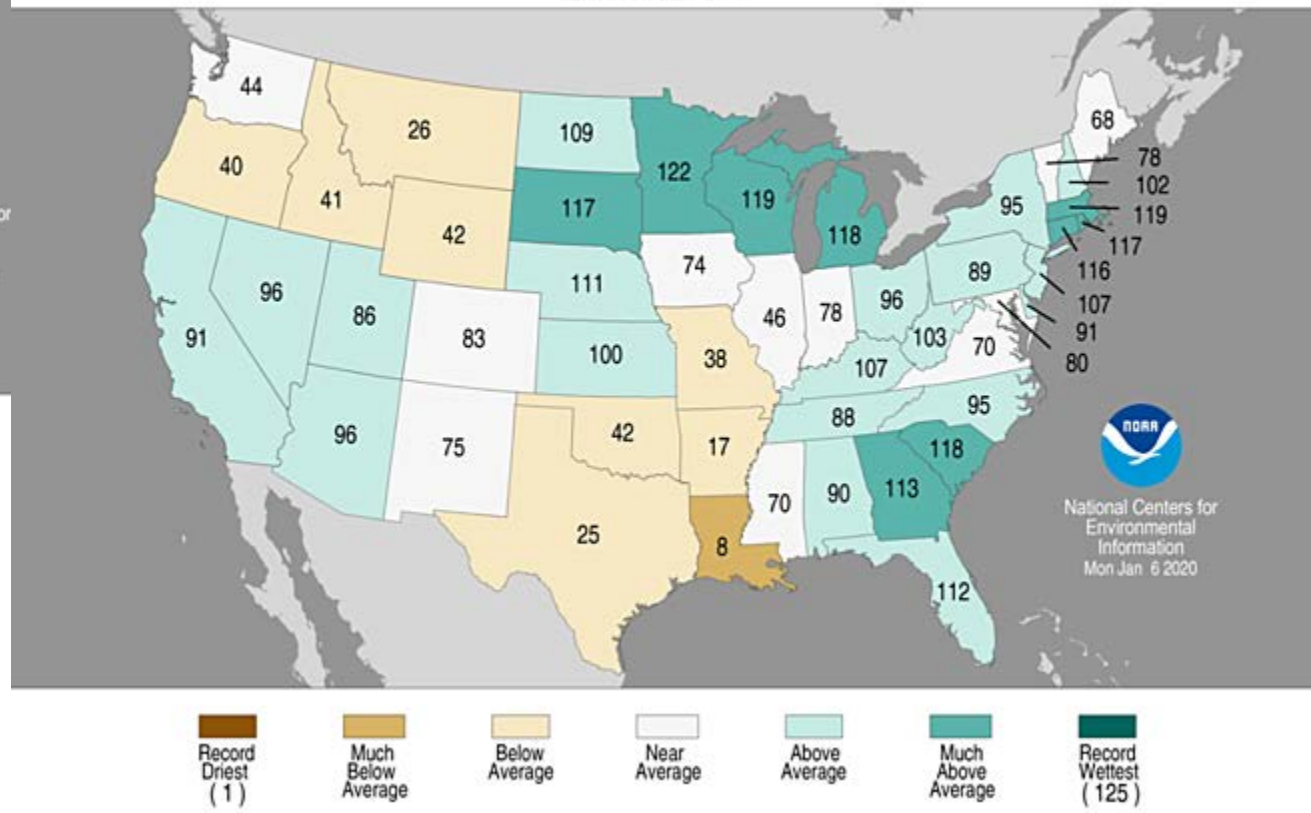


Photo of hailstone from Bethune, CO
Credit: Russ Schumacher & Becky Bolinger

- Lowest Sea Level-Adjusted Pressure March 13th (971.3 mb)
- Largest Hailstone (4.83” on August 13th)
- Hottest Temperature (115 degrees on July 20th)

Recent Conditions…



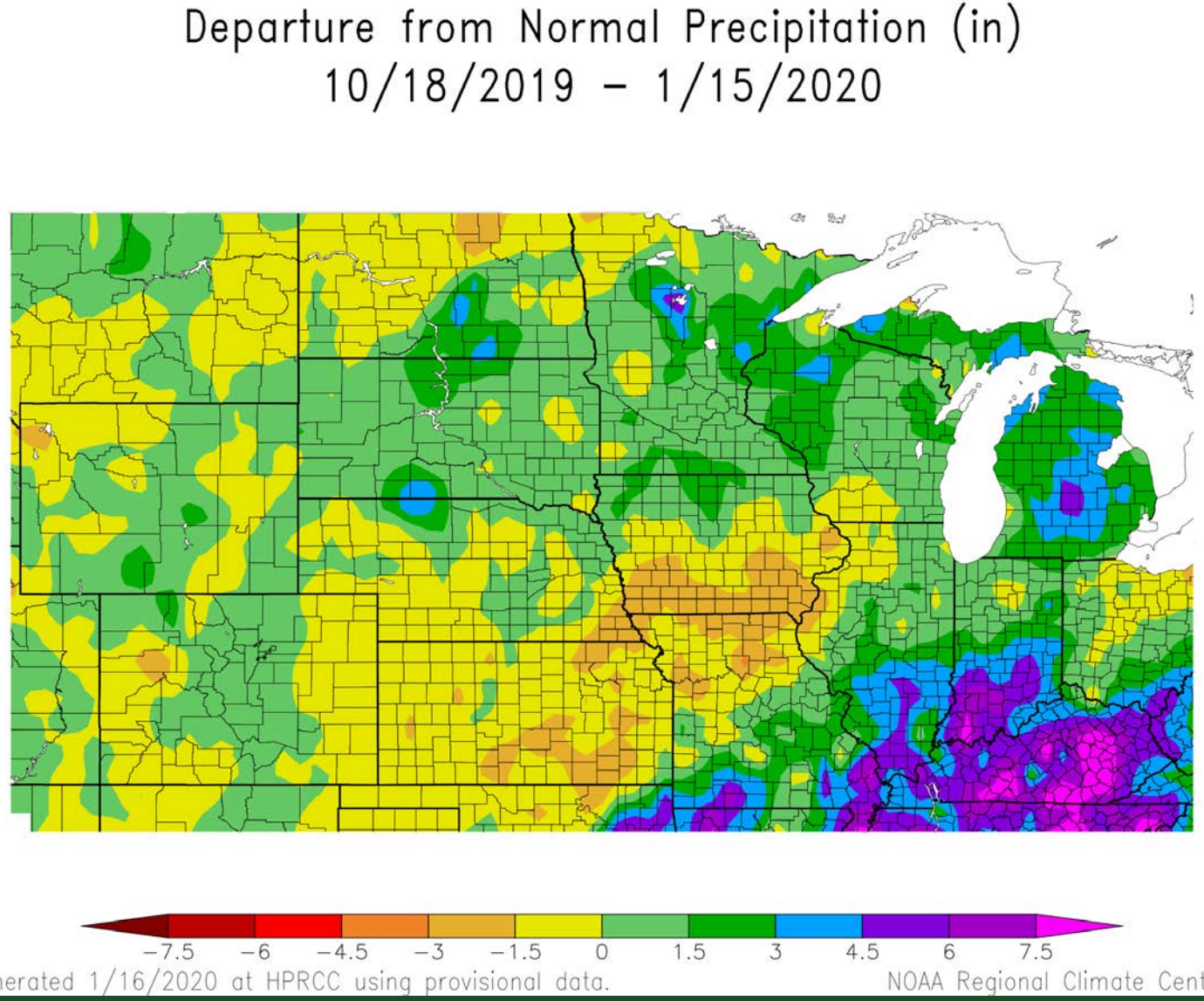


http://www.ncdc.noaa.gov/temp-and-precip/us-maps/

The last 90 days have given us a mix. The upper Midwest has remained cool and wet. Missouri is Drying out

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

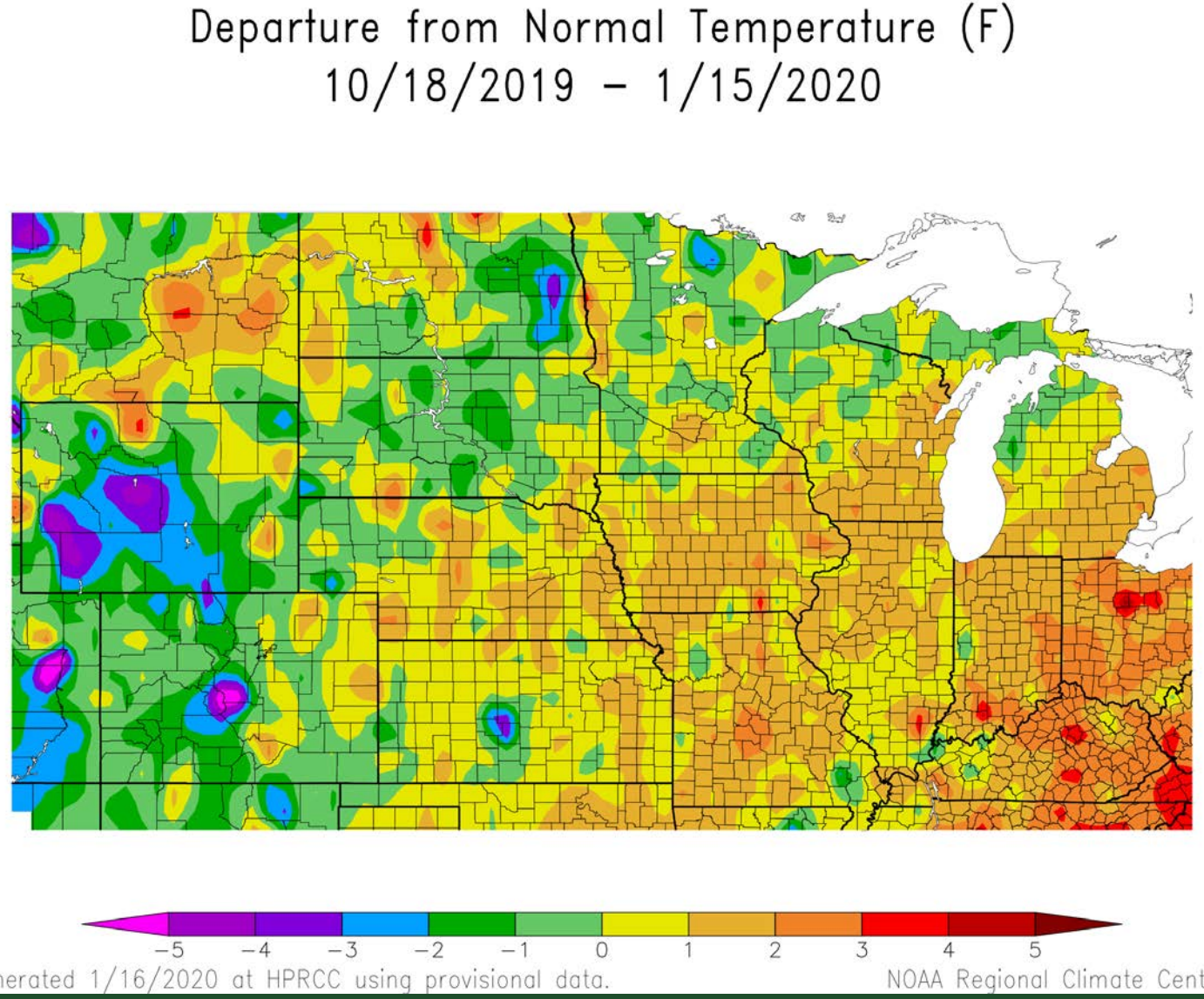
- Wet weather continues in the upper Midwest
- Some areas with a little less precip than normal, but still wet



Temperatures have been a mix of above and below normal. Colorado and Wyoming have been cooler than normal

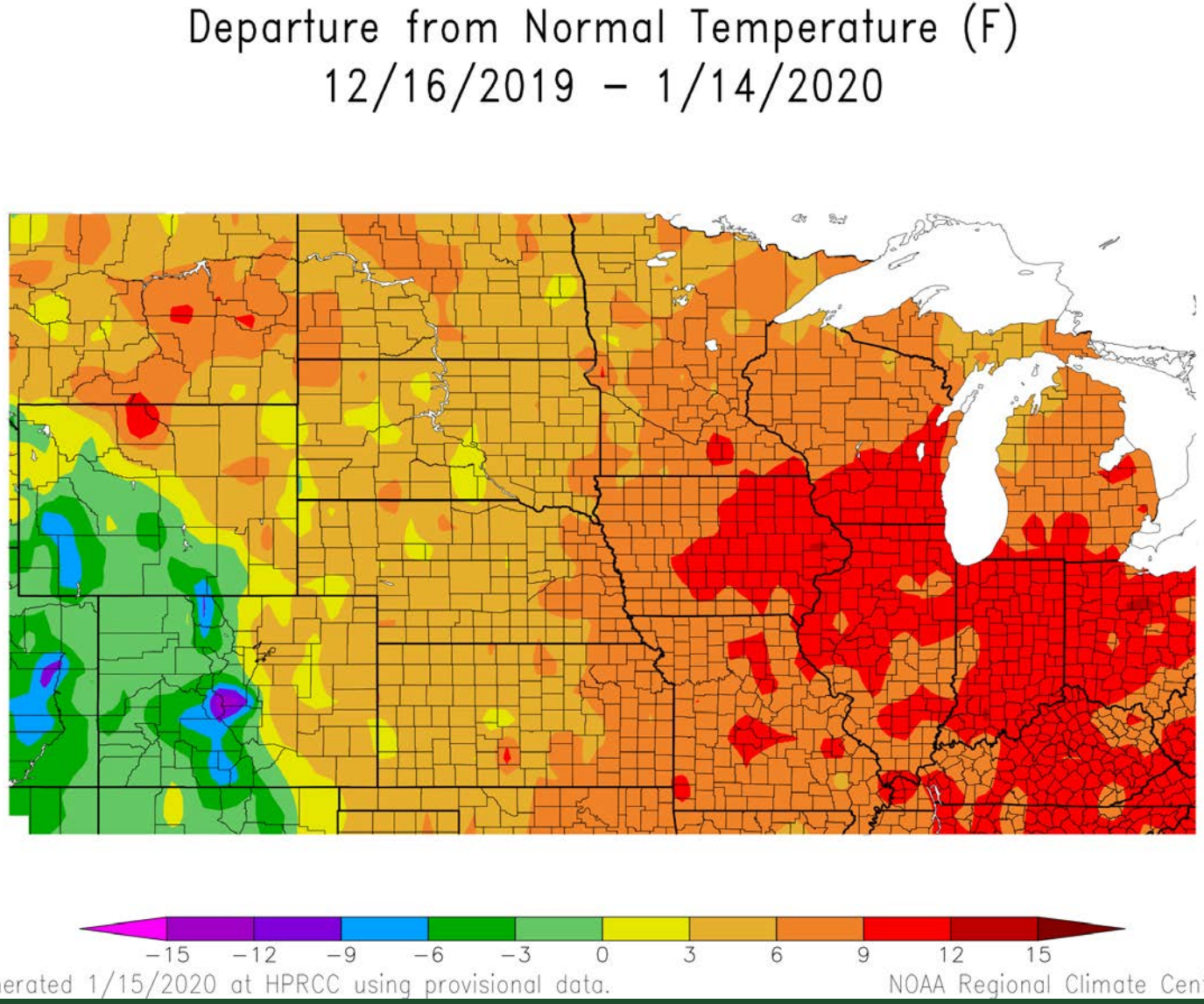
https://hprcc.unl.edu/maps.php?map=ACISClimateMaps

- A mix of cooler and warmer than normal over the last 90 days
- CO and WY experienced one of their coldest Octobers on record



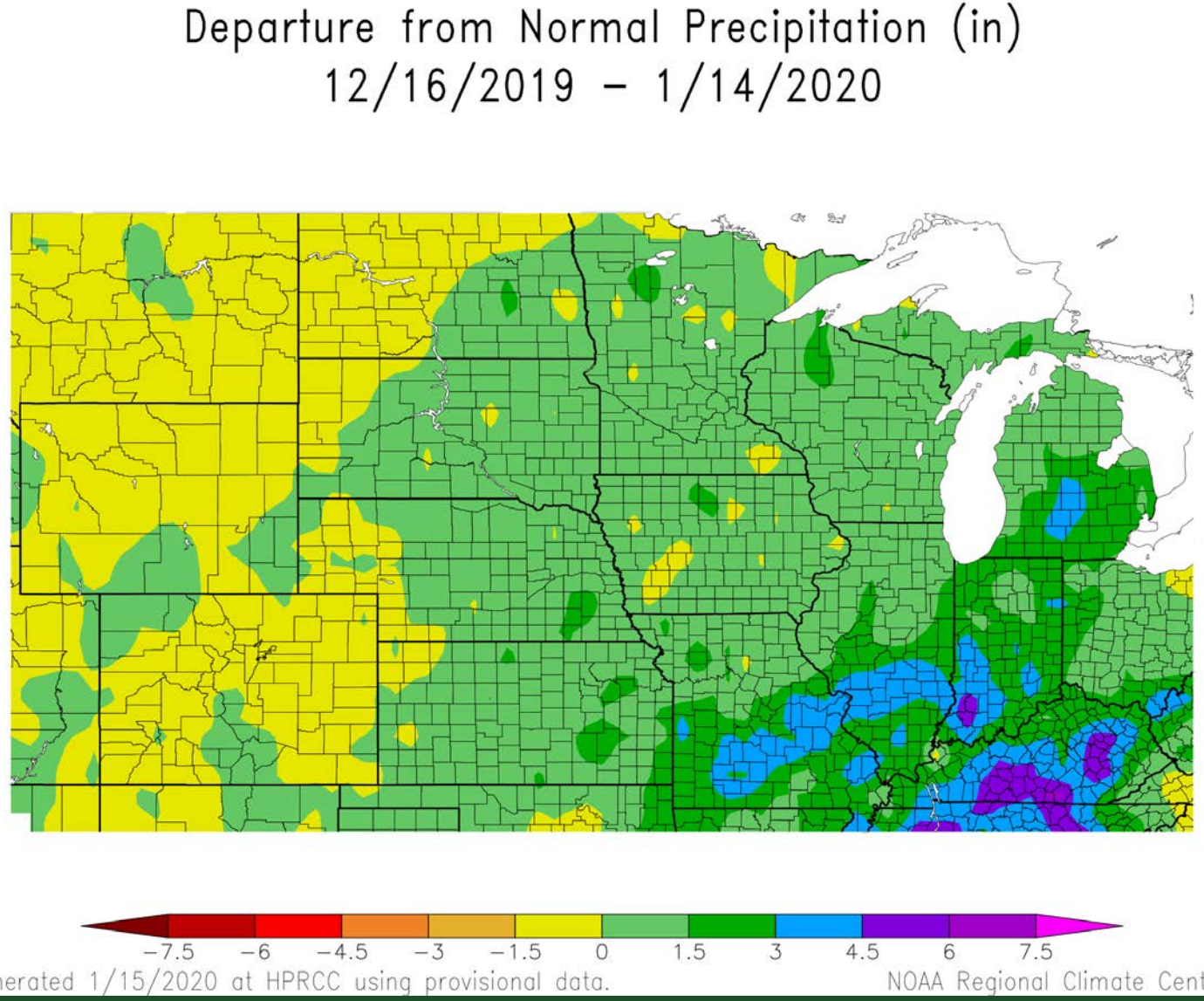
The holiday season was unusually warm

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



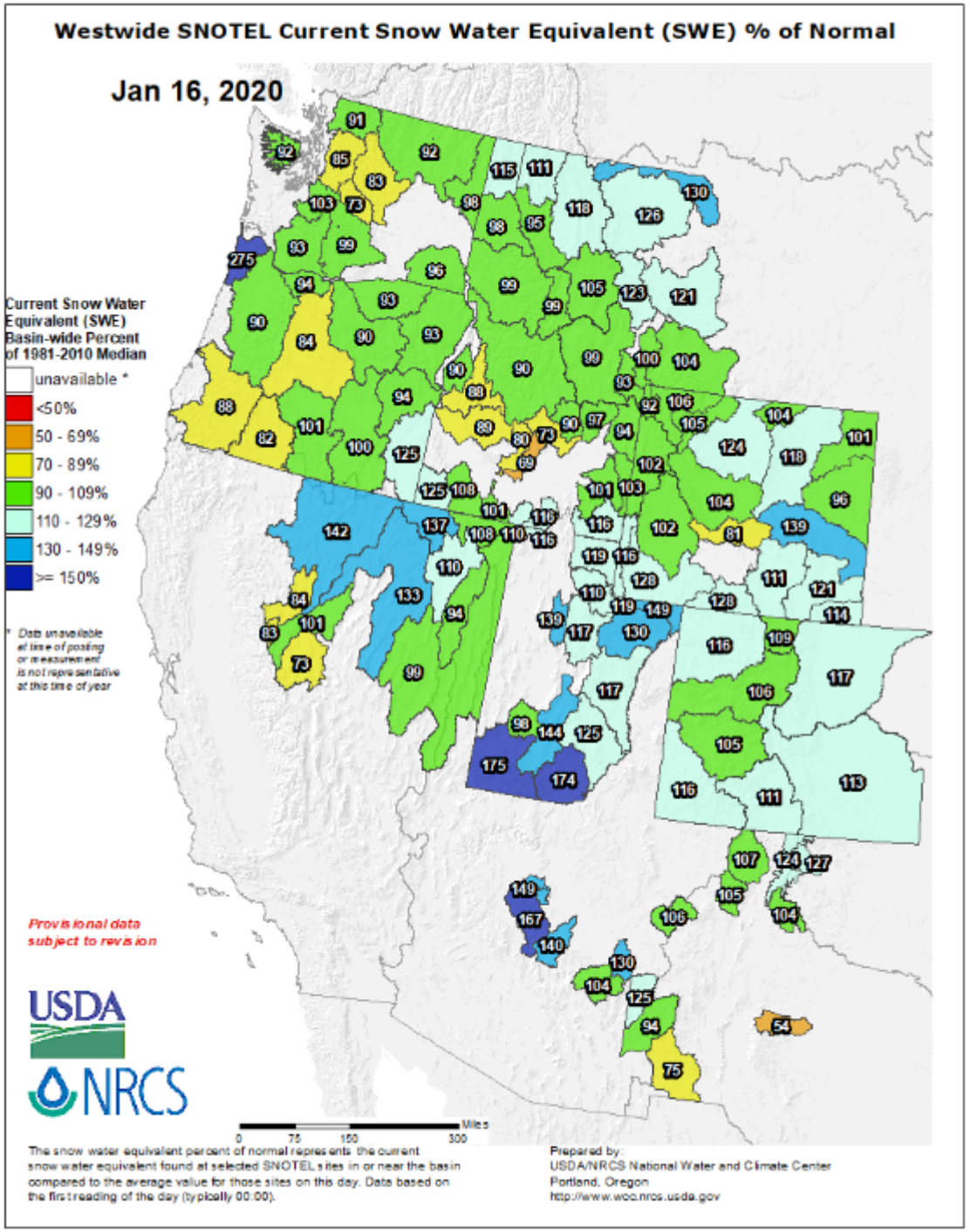
The holiday season was on the wet side, despite the warmth

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



https://www.wcc.nrcs.usda.gov

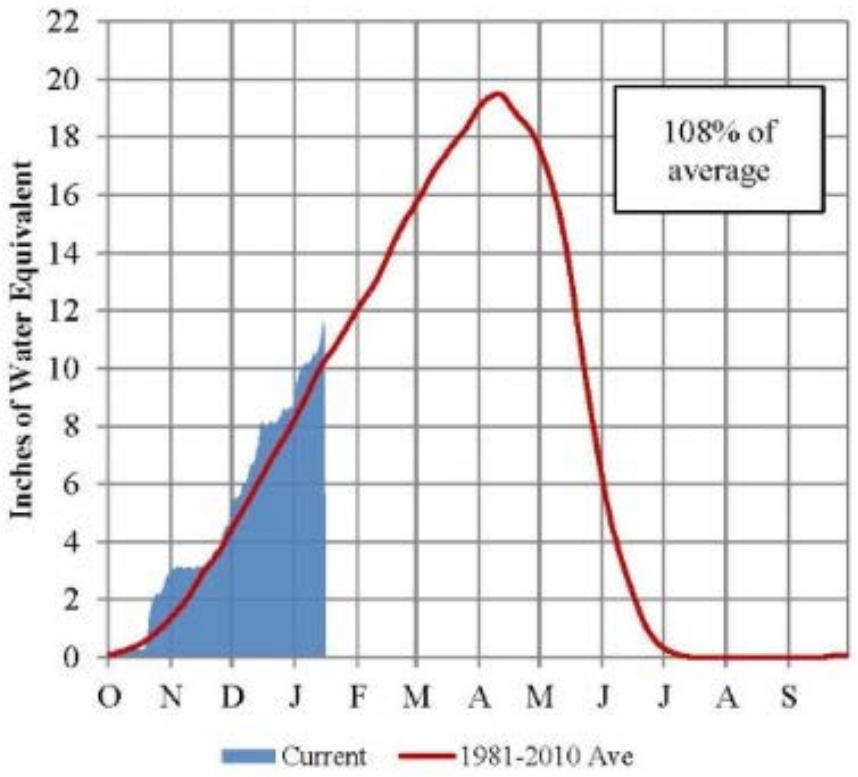
- Headwaters of Missouri Basin are currently reporting near-to-above normal snowpack
- Snowpack in the west relatively normal for mid-January
- The Cascades have made a large recovery, with snowpack improving from ~30-50% of normal as of January 1st



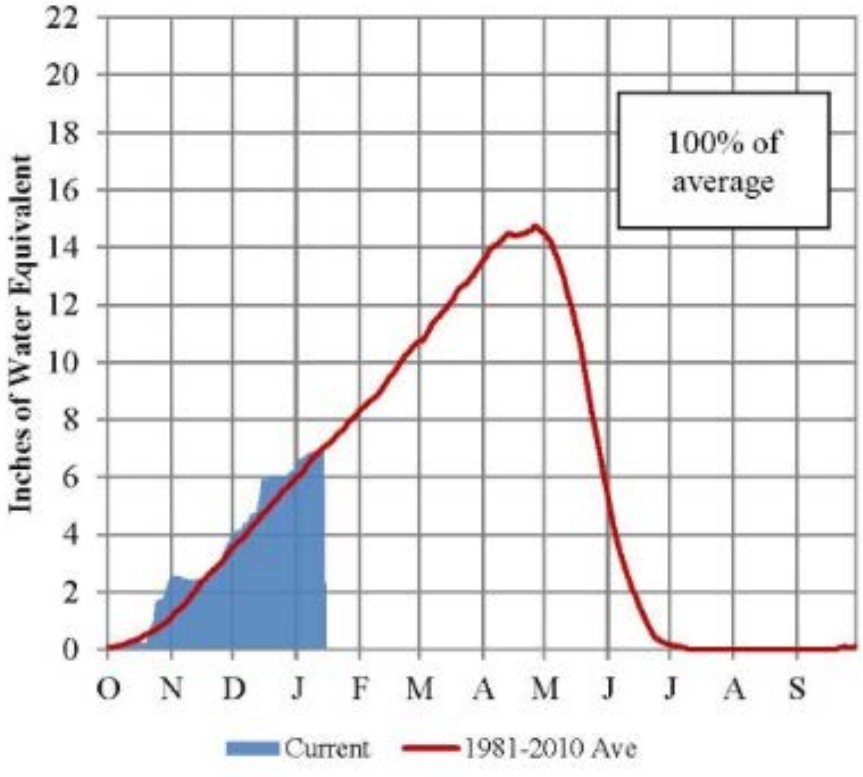
Platte River Basin - Mountain Snowpack Water Content
Water Year 2019-2020

January 14, 2020

Total North Platte



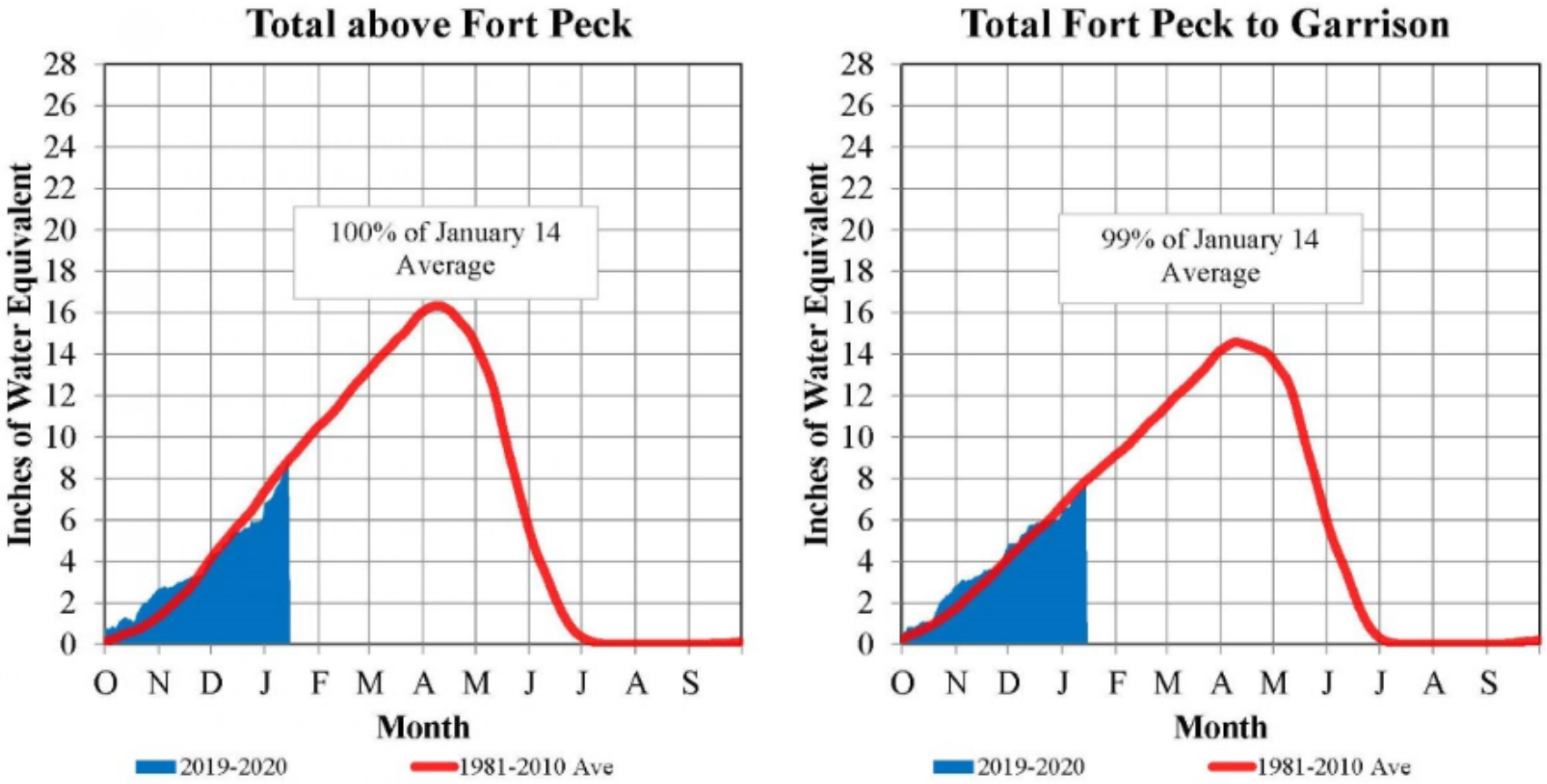
Total South Platte



The North and South Platte River Basin mountain snowpacks normally peak near April 15 and the end of April, respectively. As of January 13, 2020, the mountain snowpack SWE in the "Total North Platte" reach is currently 10.8", 108% of average. The mountain snowpack SWE in the "Total South Platte" reach is currently 7.0", 100% of average.

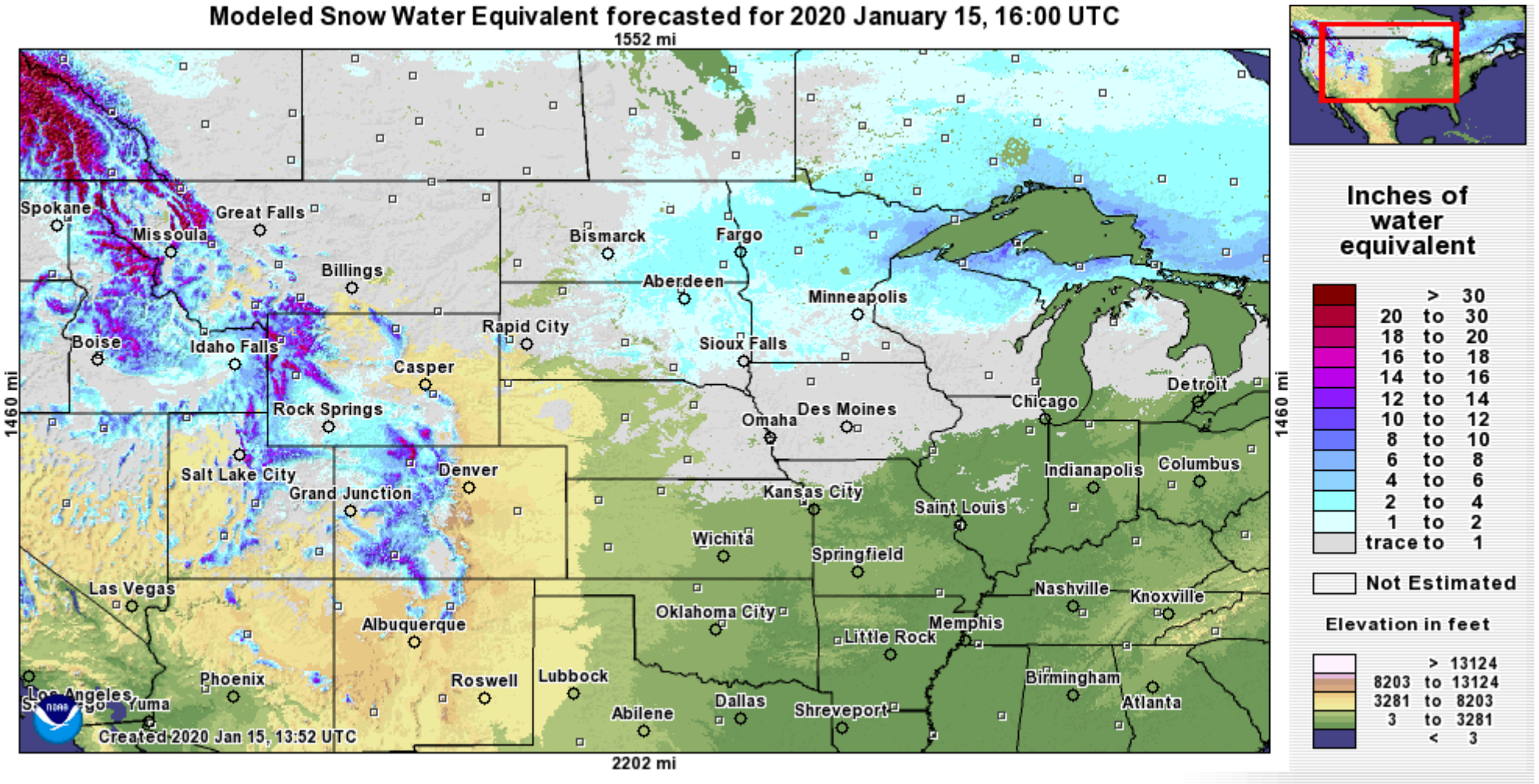
Missouri River Basin – Mountain Snowpack Water Content
2019-2020

14-Jan-2020



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

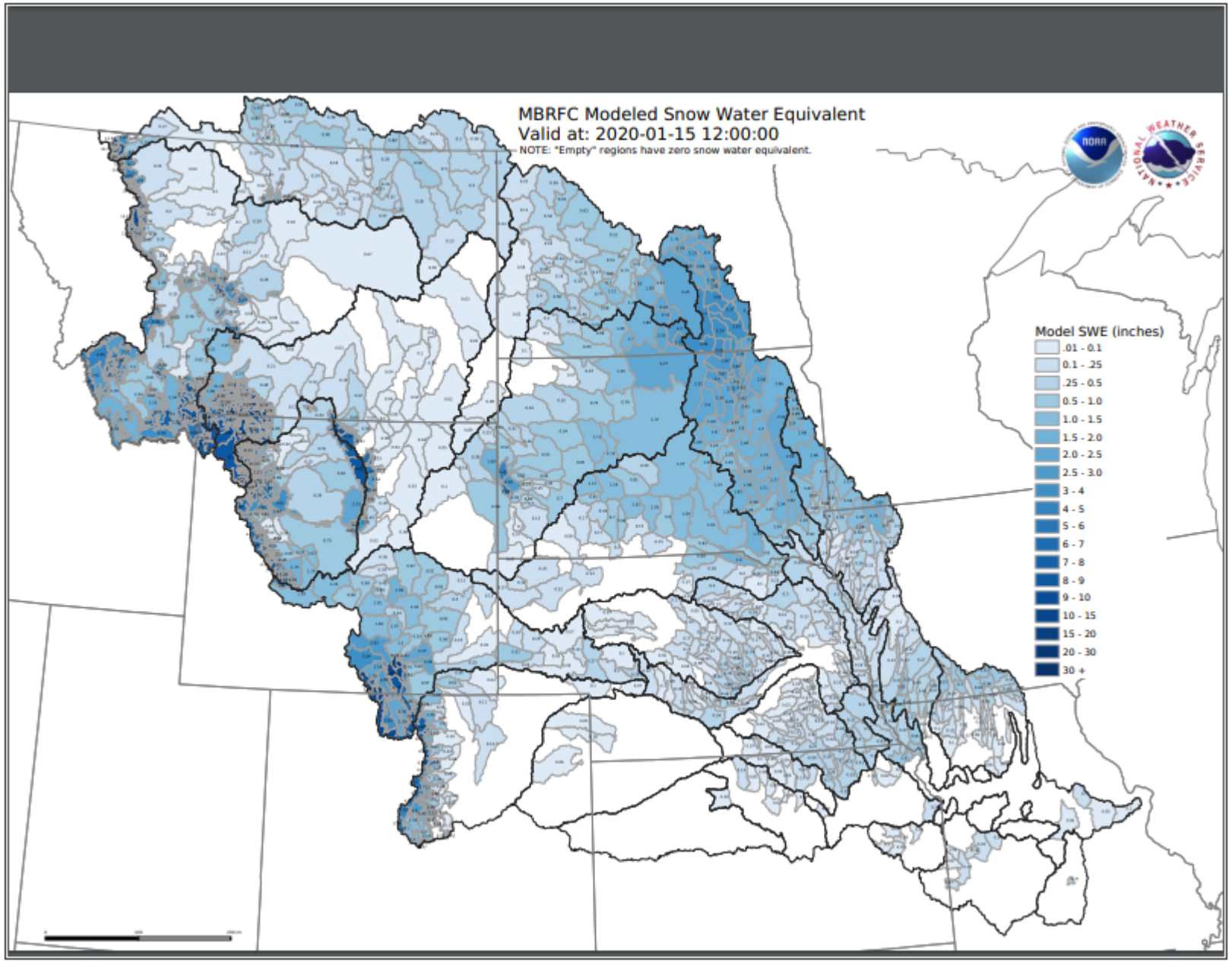
Snowpack is building over the high country, but sparse over the plains for mid-January

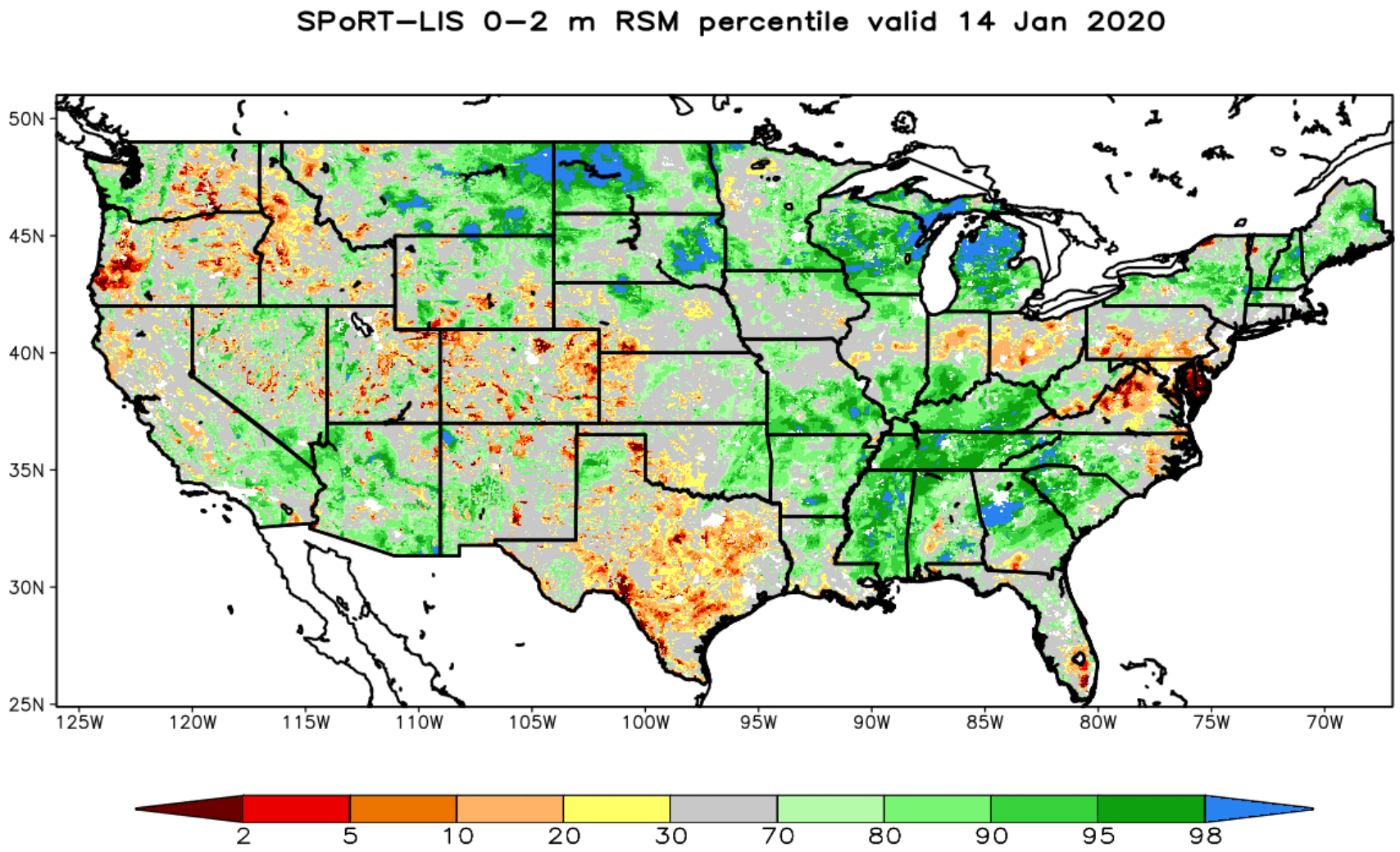


https://www.nohrsc.noaa.gov/interactive/html/map.html

- Lower elevations of Missouri Basin mostly < 1” of SWE on ground
- Eastern Dakotas and northern Minnesota with 2-4” SWE
- Snowpack at near-to-above normal rates in headwaters

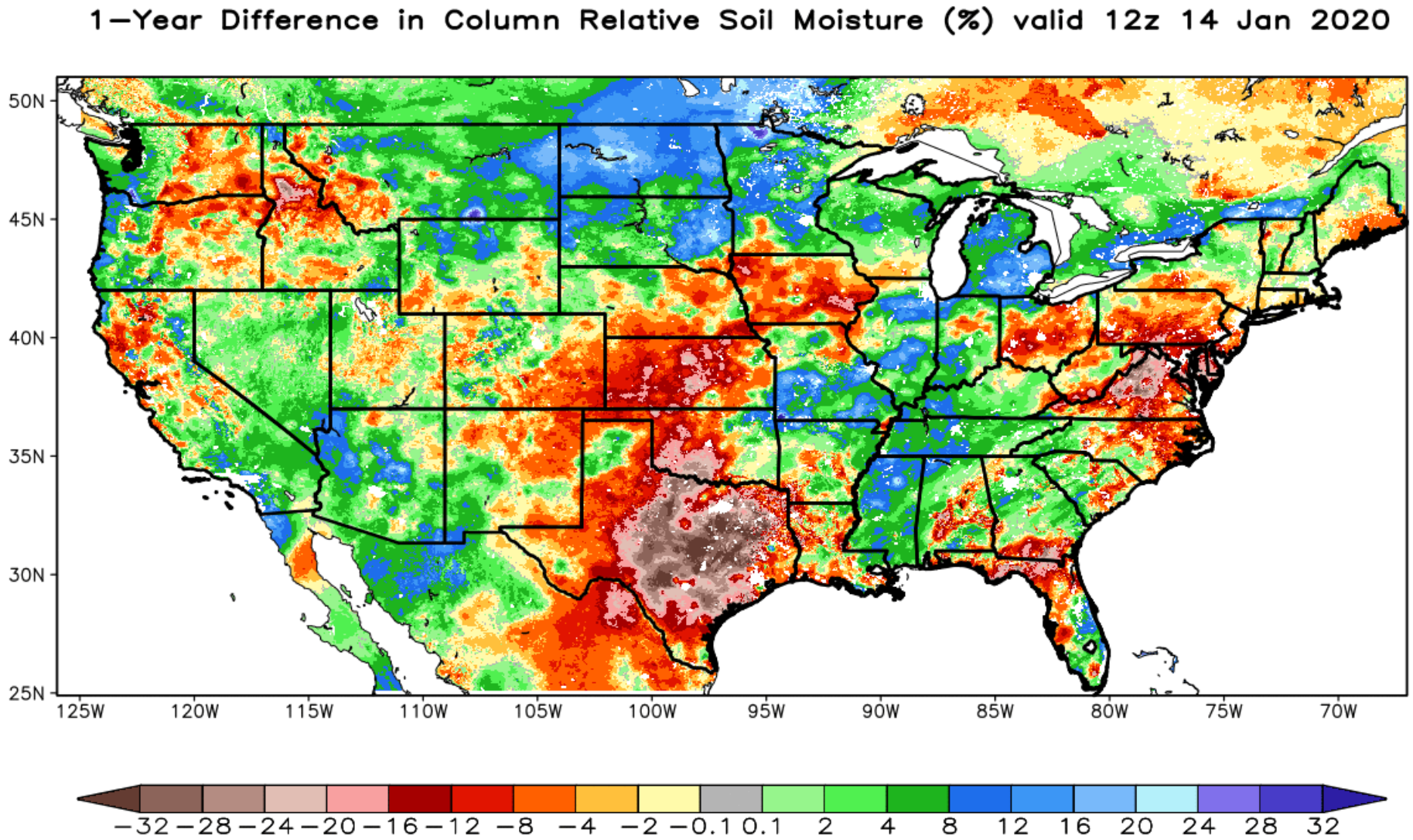
https://www.weather.gov/mbrfc/modelswe





- Modeled soil moisture above average over most of upper Midwest
- Some dry spots in IL and IN

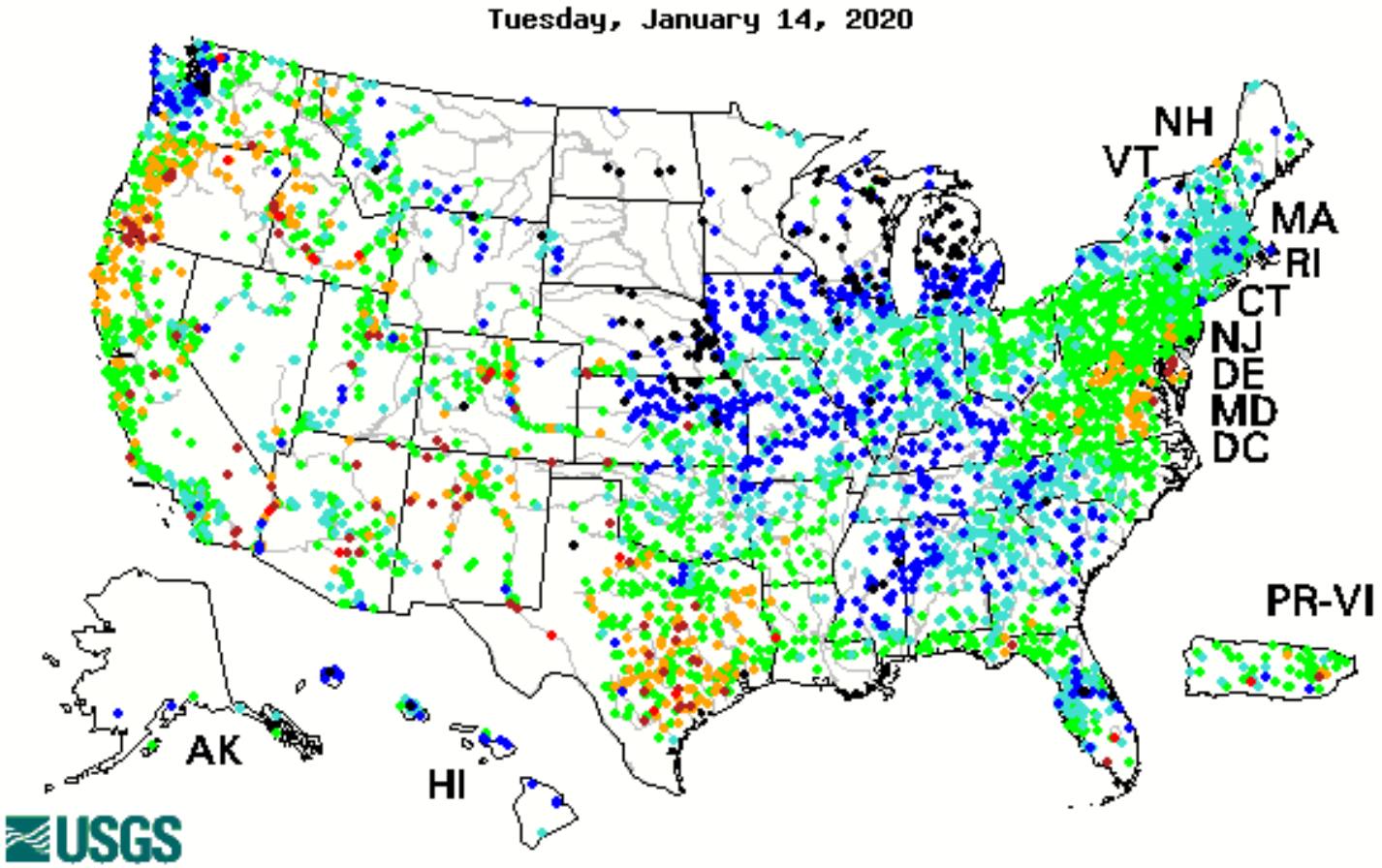
https://weather.msfc.nasa.gov/cgi-bin/basicLooper.pl?category=lis_CONUS&initialize=first&regex=rsm02percent_20200109/



Soils in the Dakotas and Minnesota are significantly wetter than one year ago Southern portion of region showing mix of higher and lower

https://weather.msfc.nasa.gov/cgi-bin/basicLooper.pl?category=lis_CONUS&initialize=first&regex=rsm02percent_20200109/

28-day averaged streamflow

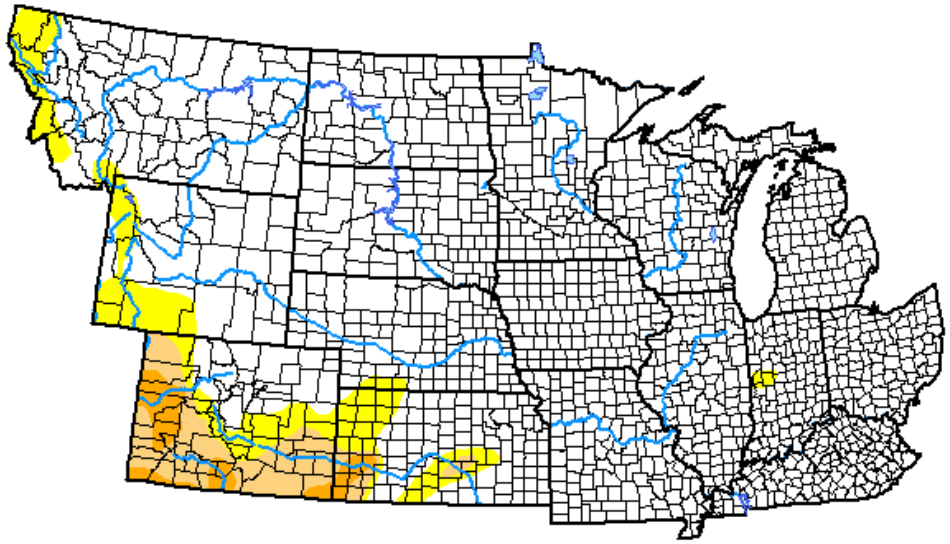


- Flows much above normal in the Upper Missouri Basin and Great Lakes states
- Closer to normal further south

https://waterwatch.usgs.gov

U.S. Drought Monitor

NWS Central Region



January 7, 2020

(Released Thursday, Jan. 9, 2020)

Valid 7 a.m. EST

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	87.88	12.12	5.33	1.55	0.00	0.00
Last Week *12-31-2019*	87.81	12.19	5.33	2.11	0.00	0.00
3 Months Ago *10-08-2019*	80.47	19.53	8.22	1.65	0.04	0.00
Start of Calendar Year *12-31-2019*	87.81	12.19	5.33	2.11	0.00	0.00
Start of Water Year *10-01-2019*	79.05	20.95	8.02	2.19	0.14	0.00
One Year Ago *01-08-2019*	85.40	14.60	7.78	5.23	2.32	0.95

Intensity:

- None
- 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. For more information on the Drought Monitor, go to https://droughtmonitor.unl.edu/About.aspx

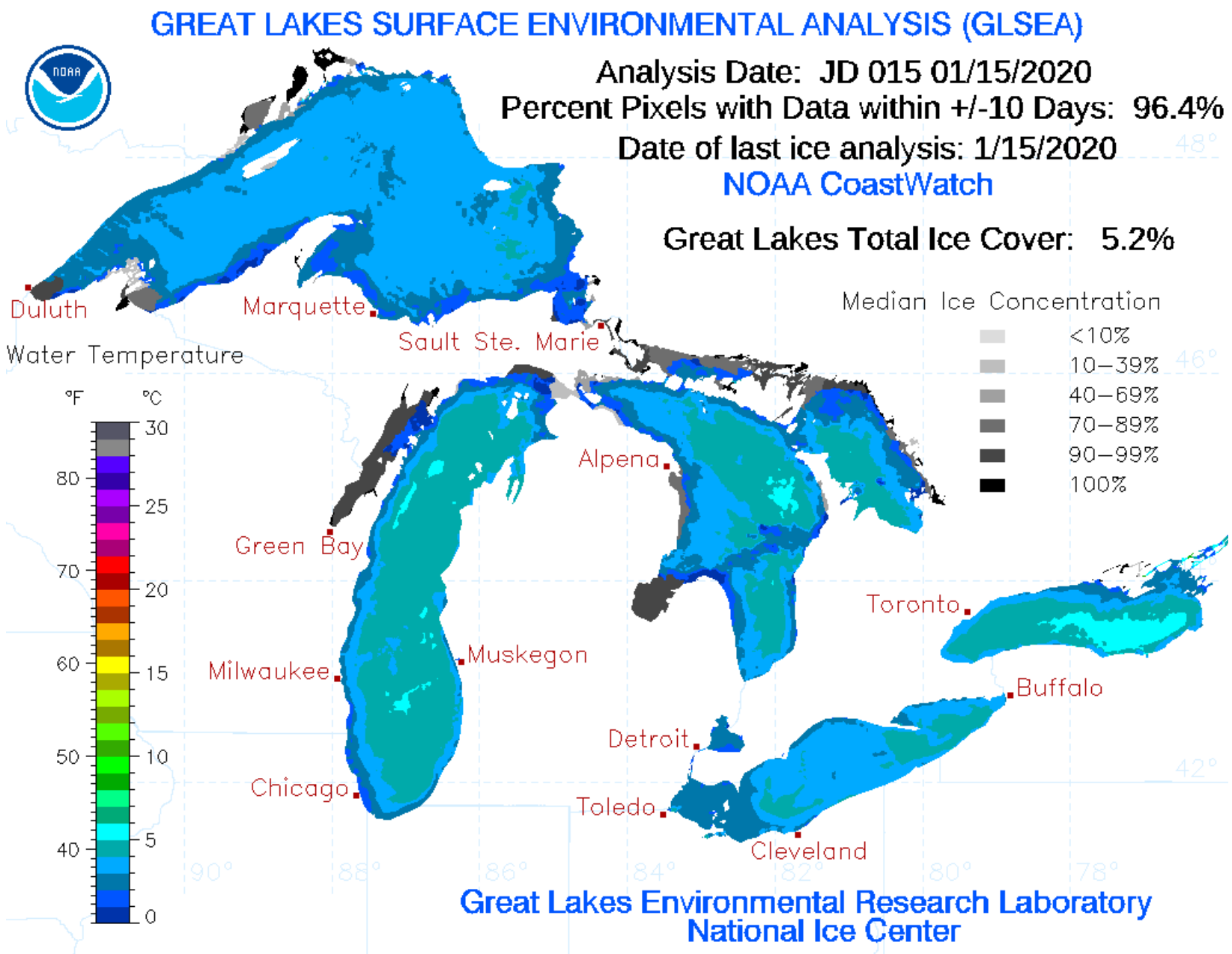
Author:

Curtis Riganti

National Drought Mitigation Center

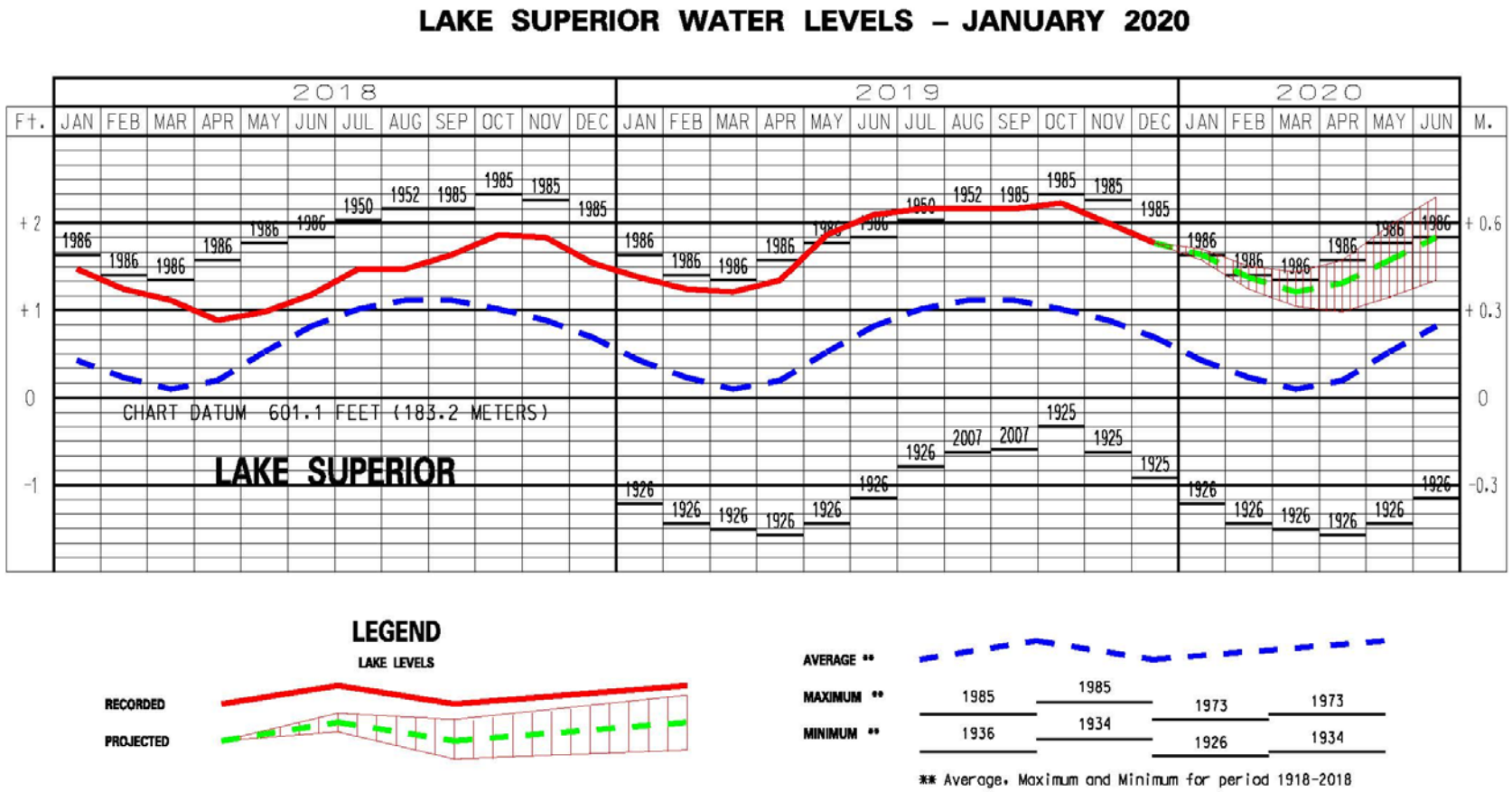
droughtmonitor.unl.edu

- Low current drought concern in the region (although things can change quickly)
- The High Plains Region was drought free (D1-D4) for the first time in the US Drought Monitor era in 2019
- Colorado was drought free (D0-D4) for the first time ever in the US Drought Monitor Era
- Four stations in Kansas recorded 70+” of moisture in 2019 (more than New Orleans’ annual average!)



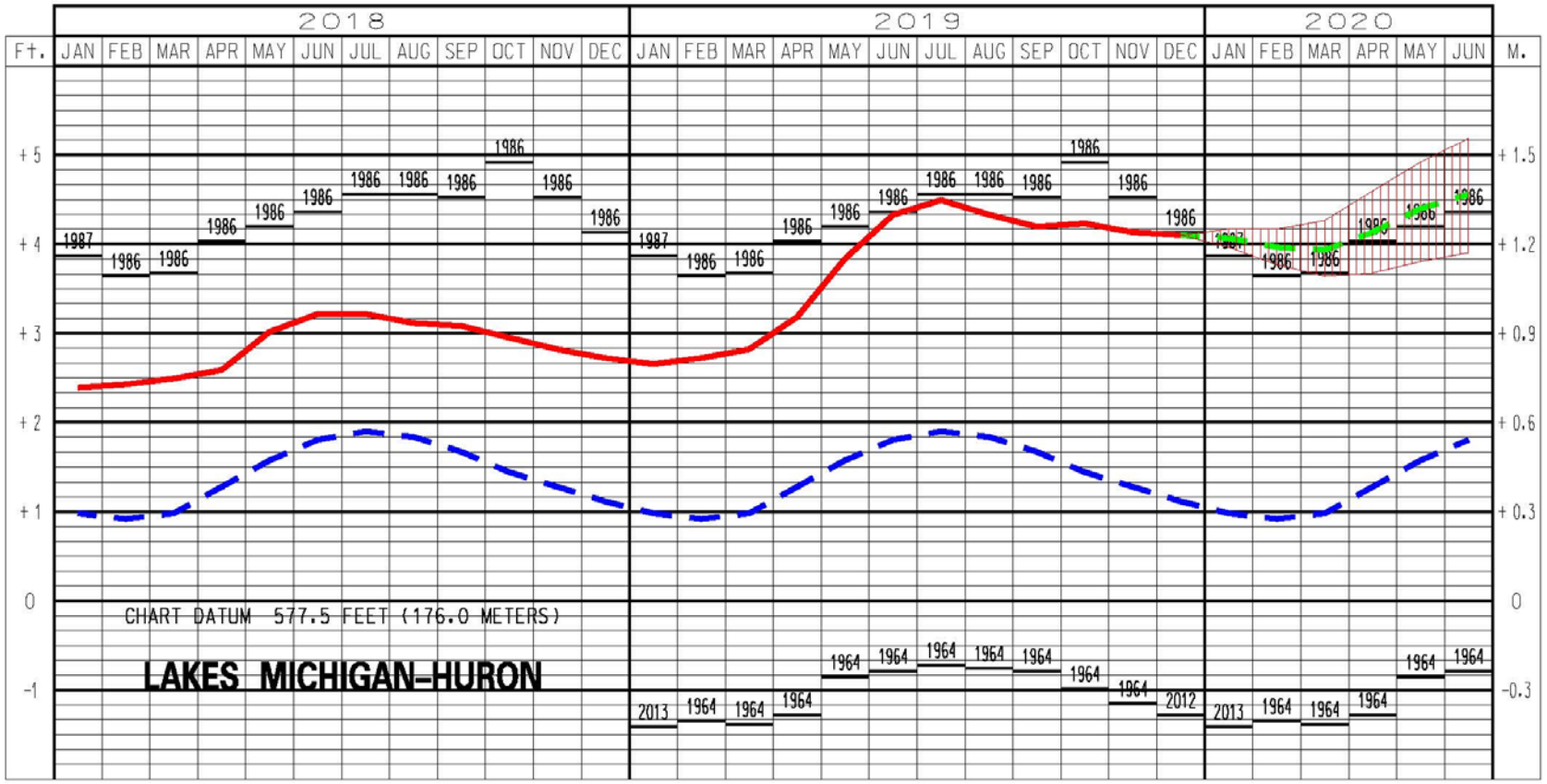
- Warm weather delaying ice onset over Great Lakes
- Lake Eerie still above 40 degrees across southern portion
- Chunks of Michigan and Superior are beginning to freeze

https://www.glerl.noaa.gov/data/ice/



https://www.lre.usace.army.mil/Missions/Great-Lakes-Information/Great-Lakes-Water-Levels/Water-Level-Forecast/Monthly-Bulletin-of-Great-Lakes-Water-Levels/

LAKES MICHIGAN–HURON WATER LEVELS – JANUARY 2020



LEGEND

LAKE LEVELS

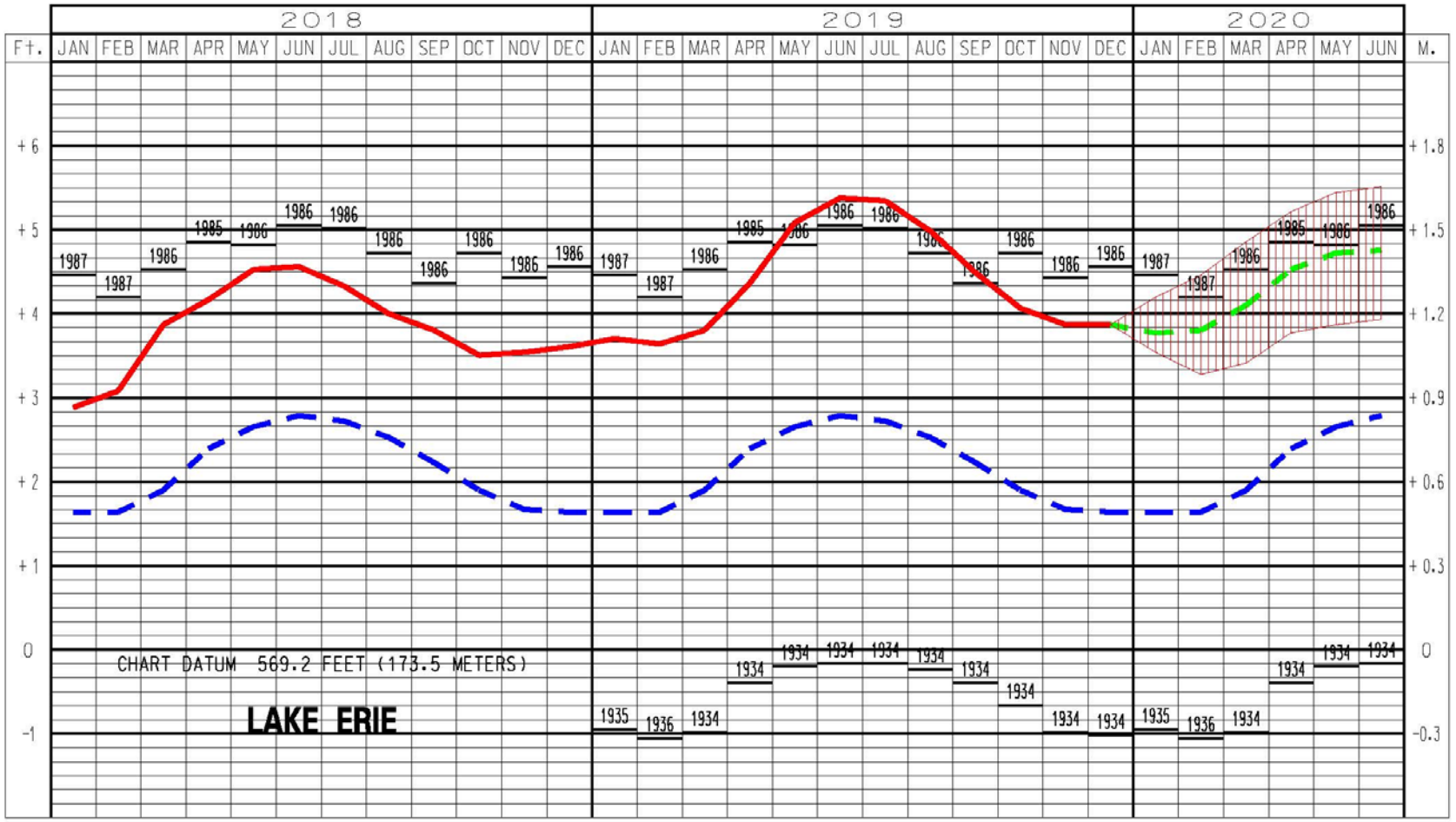
RECORDED

PROJECTED

AVERAGE **				
MAXIMUM **	1985	1985	1973	1973
MINIMUM **	1936	1934	1926	1934

** Average, Maximum and Minimum for period 1918-2018

LAKE ERIE WATER LEVELS – JANUARY 2020



LEGEND

LAKE LEVELS

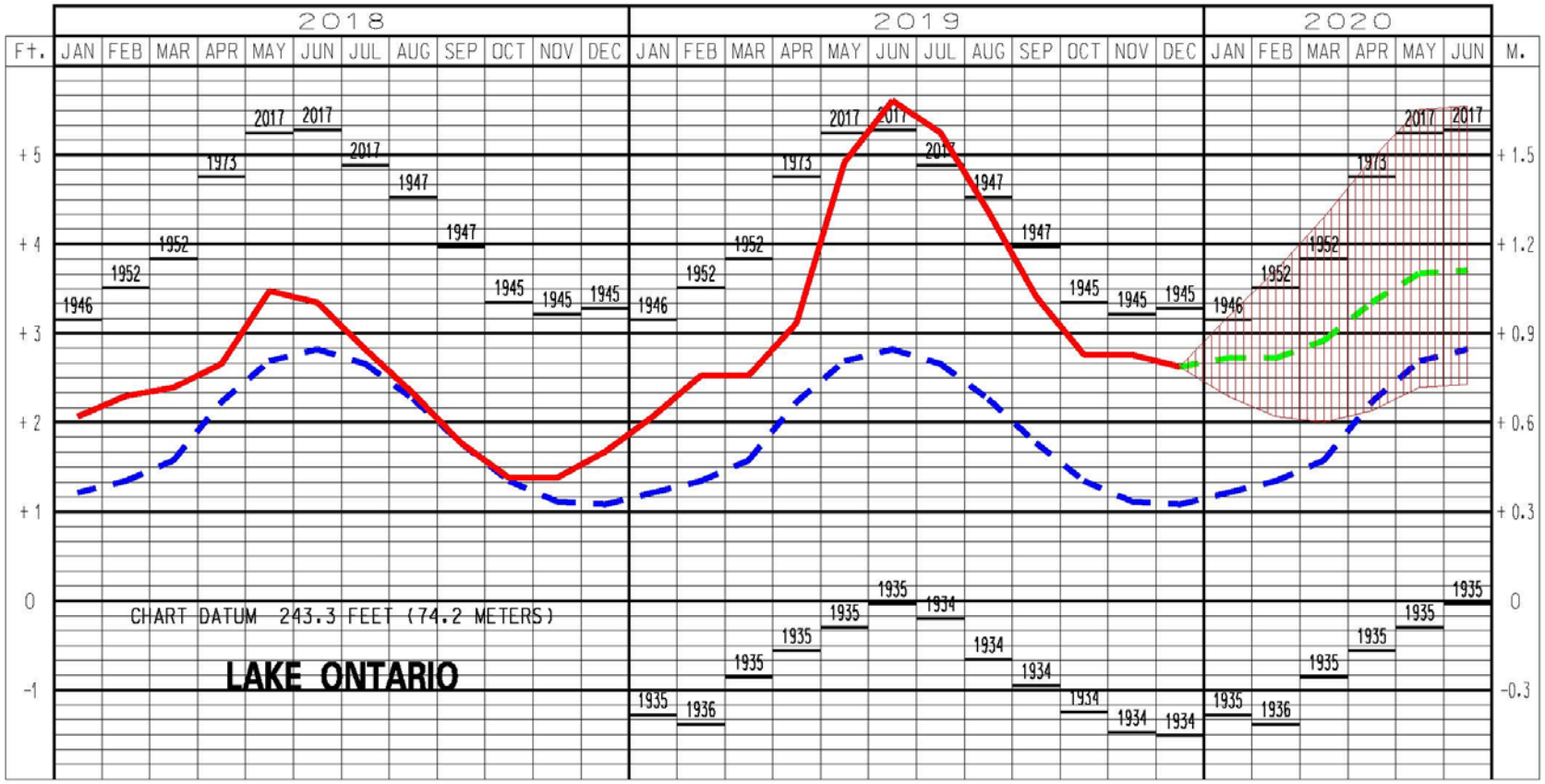
RECORDED

PROJECTED

AVERAGE **				
MAXIMUM **	1985	1985	1973	1973
MINIMUM **	1936	1934	1926	1934

** Average. Maximum and Minimum for period 1918-2018

LAKE ONTARIO WATER LEVELS – JANUARY 2020



LEGEND

LAKE LEVELS

RECORDED

PROJECTED

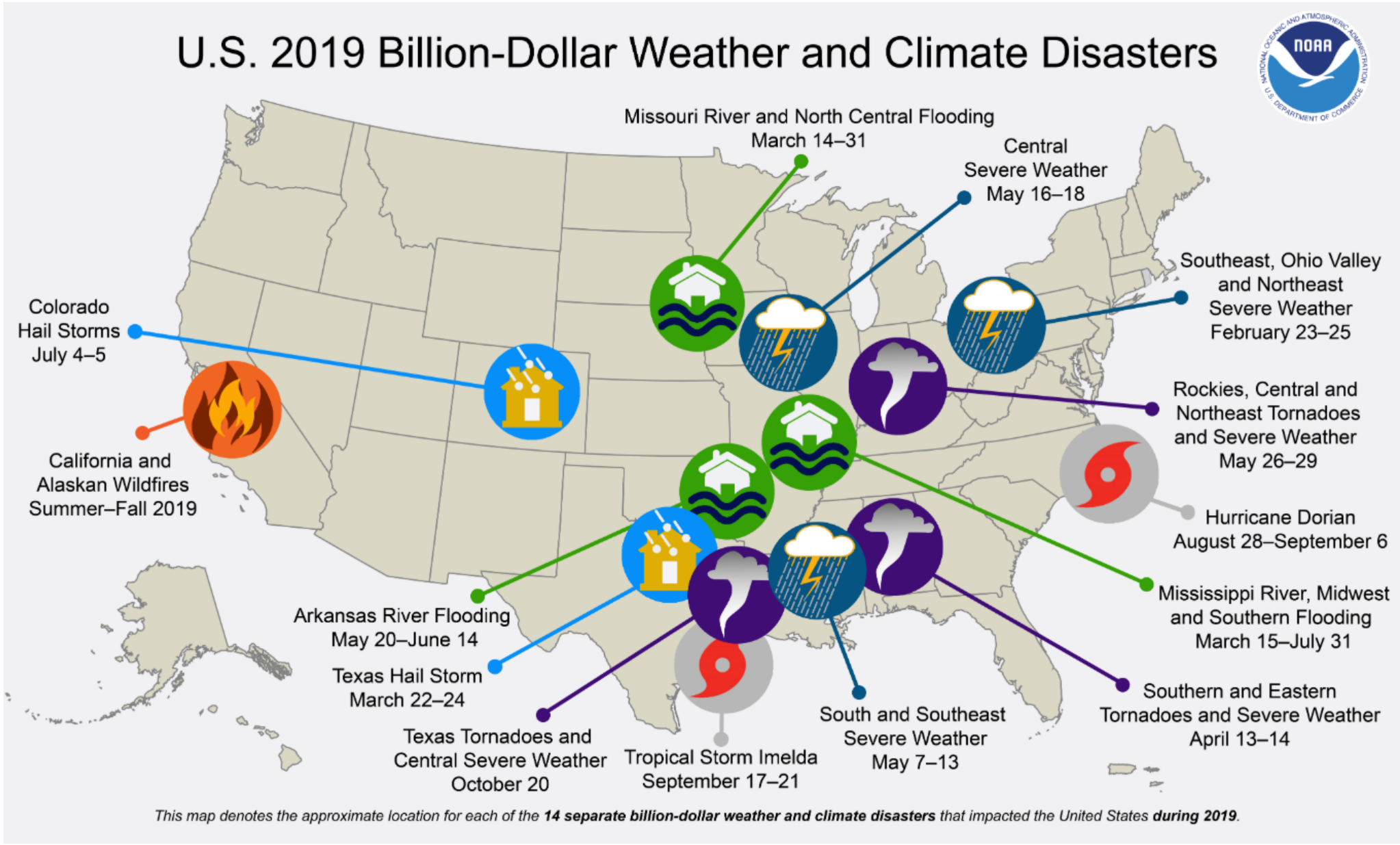
AVERAGE **

MAXIMUM ** 1985 1985 1973 1973

MINIMUM ** 1936 1934 1926 1934

** Average, Maximum and Minimum for period 1918-2018

Impacts



- 2019 billion dollar disasters included Colorado hail, and major flooding on the Missouri and Mississippi rivers
- It was the most active severe weather season for the high plains since 2011 (4,000 tornado, large hail, or high wind reports)

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

Agricultural Impacts

- Winter Wheat
  - SE CO and SW KS crops had dry soils during planting season
  - Poor stands in SE CO prior to dormancy
  - Moisture is needed before spring green-up for crop success
- Corn
  - Late planting from excessive rains lead to late harvests
  - Some producers still harvesting corn in December
- Cattle
  - Persistent wet conditions increasing cattle diseases
- Poor harvesting conditions in the Dakotas with cold, wet weather and muddy fields
- Millions of acres were never planted because of flooding (particularly in SD). Producers still harvesting
- End of December rains in KS were a positive. Rains fell on unfrozen ground, minimizing runoff issues
- Some of the rains fell on drought-stricken areas, yielding improvements
- Early winter wheat green up in parts of Ohio
- Warm, dry December helped with harvest and field work conditions in IA

Transportation Impacts

- Record January 3-day precipitation totals in Illinois lead to flooding and closures
- The Kaskaskia River breached, and crossed highway 51
- Ice storms in early December caused 500 accidents in Minnesota as well as two fatalities
- November Colorado blizzard conditions lead to treacherous road conditions across the CO urban corridor
- Kansas City area with potential for ice storm this weekend

Hydrologic Impacts

- “In the Missouri Basin, 2019 was a VERY wet year. During 2019, runoff in the upper Missouri River basin (above Sioux City, IA) was 60.9 MAF (average is 25.3 MAF). This total was only 0.1 MAF less than the record 61.0 MAF observed in 2011 in 122 years of record-keeping (1898-2019). Iowa, flooding is worst in the southwest corner of the state due to less than ideal melting of snowpack (rain on snow events).” - USACE
- Missouri River Basin runoff forecast to be 2x average through April
- Numerous stations along the Missouri River Basin were above flood stage for over 270 straight days. Several are still not below flood stage (Mitchell SD, Huron SD, Stratford SD, Columbia SD)
- “Setup is grim, worst I have seen in my 30 year career. But the wild card is the precip (and temps). If we get below average spring and early summer precipitation, we'll be ok.” - MBRFC
- Minor Flooding on and off in Ohio and Kentucky the last month

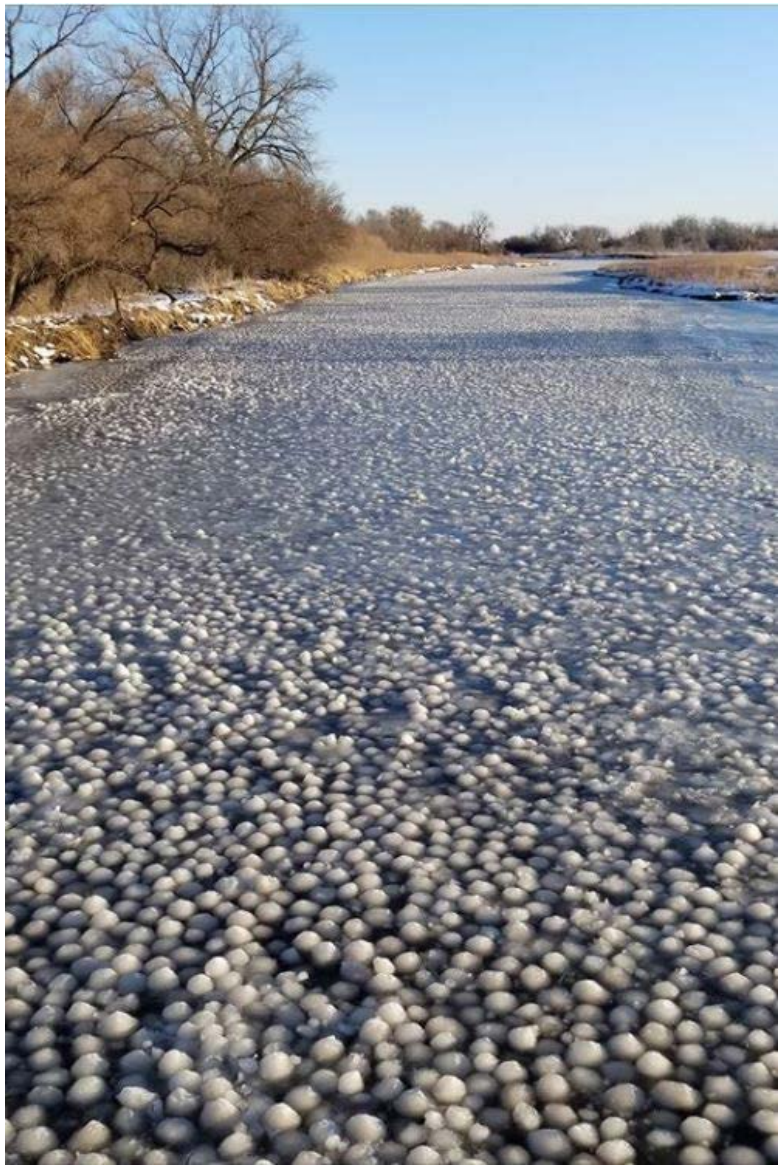
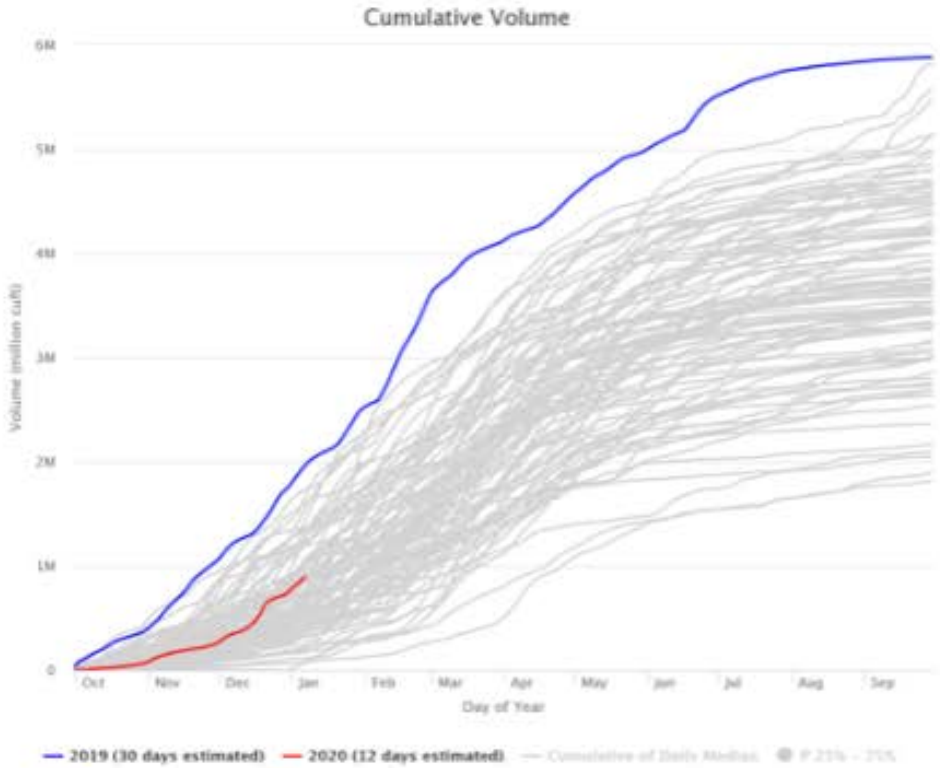


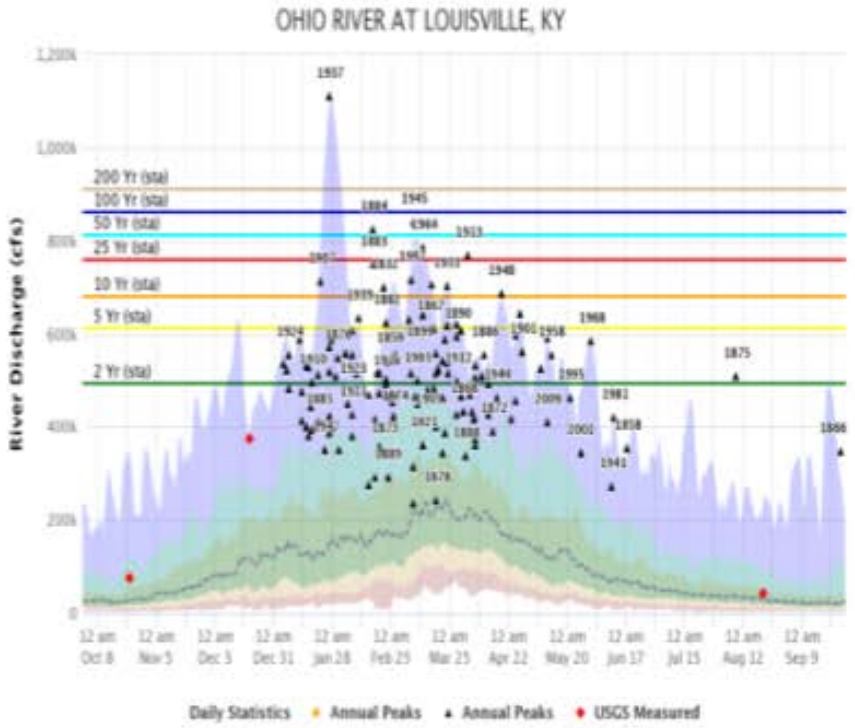
Photo Credit: Jeni Kellum

- Army Corps of Engineers releasing over twice the volumes from Gavins Point Dam is last year
- Crop plans to eliminate excess water by the end of February
- Releasing too much water in winter can lead to ice jams
- Spring flooding a concern. The next Spring Flood Outlook will be issued March 2020

Omaha Herald: https://www.omaha.com/news/local/corps-again-increases-dam-releases-as-another-year-of-high/article_f702ad35-1b56-55c1-bb83-51ce33824fab.html

Ohio River Basin Cumulative Volume





Cumulative Volume Ohio River At Louisville since 1928

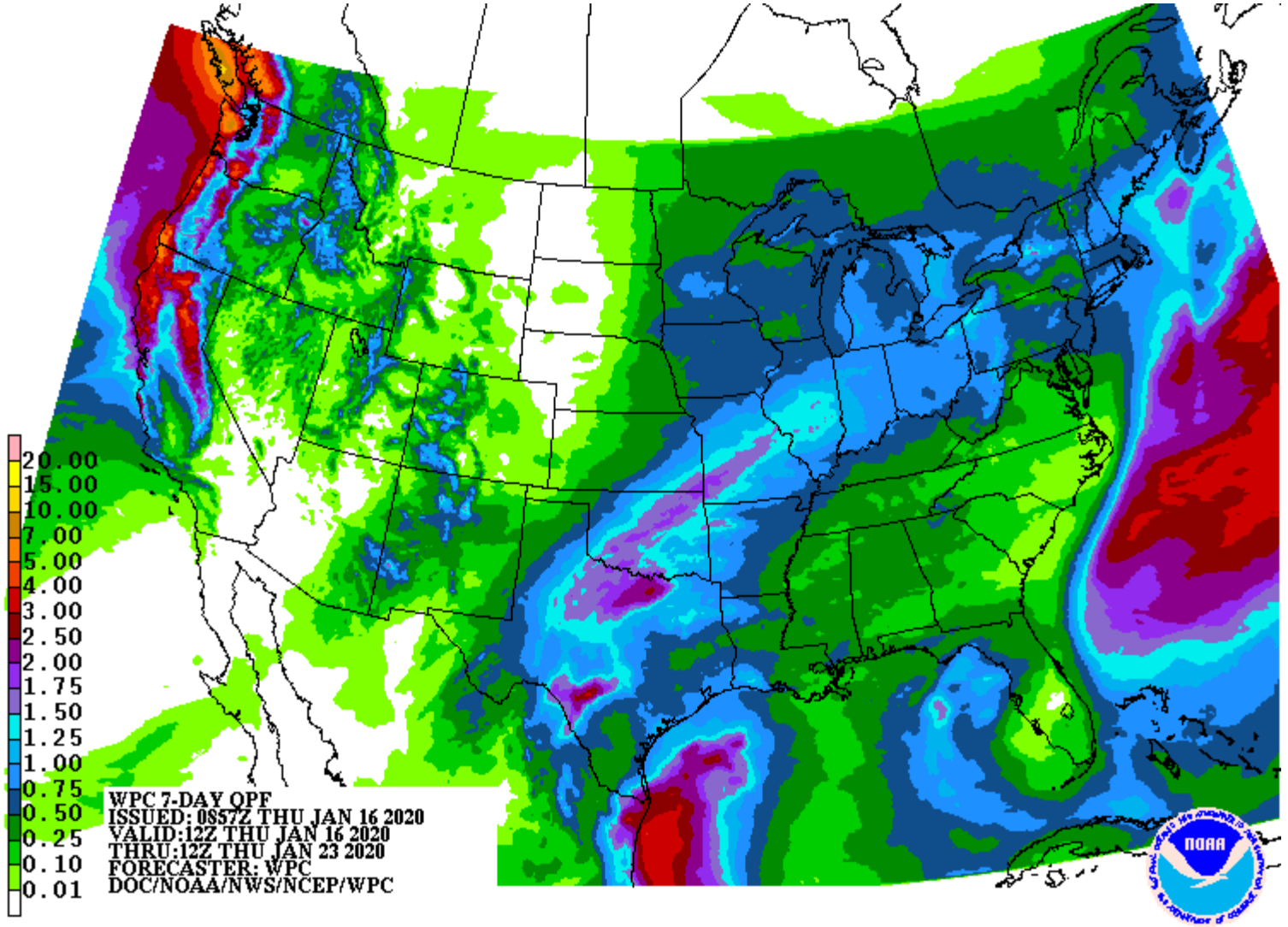
1937 remains peaks of record. Flow above normal until summer 2019

New cumulative volume peak for 2019 water year. 1937 record peak stage adjusted for reservoirs about 15 feet higher than 2019.

Outlook

7-day Precip Forecast

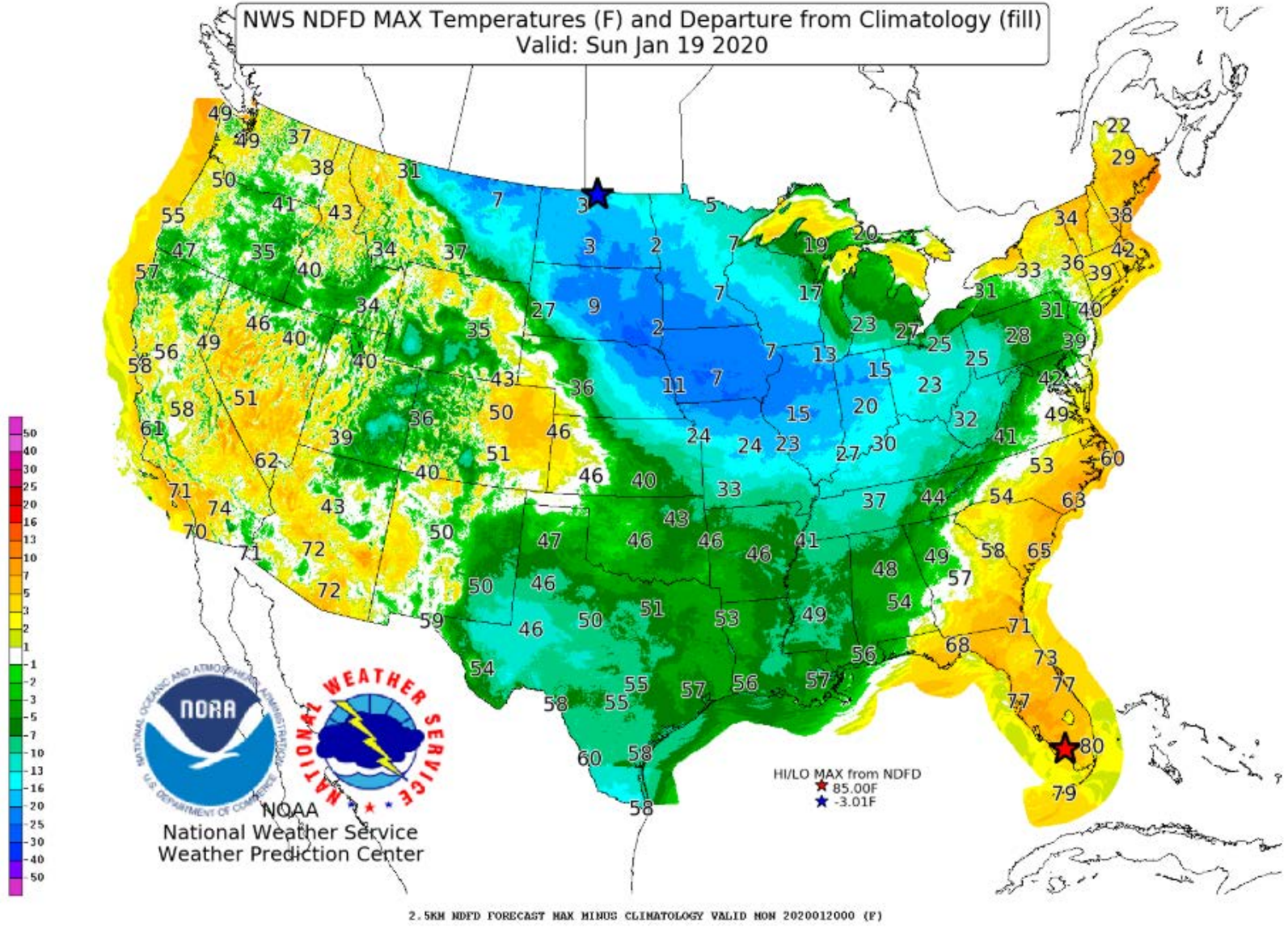
- Precipitation across the region heading into this weekend. Snow over much of the Upper Midwest
- Ice possible further south
- Could be another disturbance mid-week next week



https://www.wpc.ncep.noaa.gov

Temperatures this Week

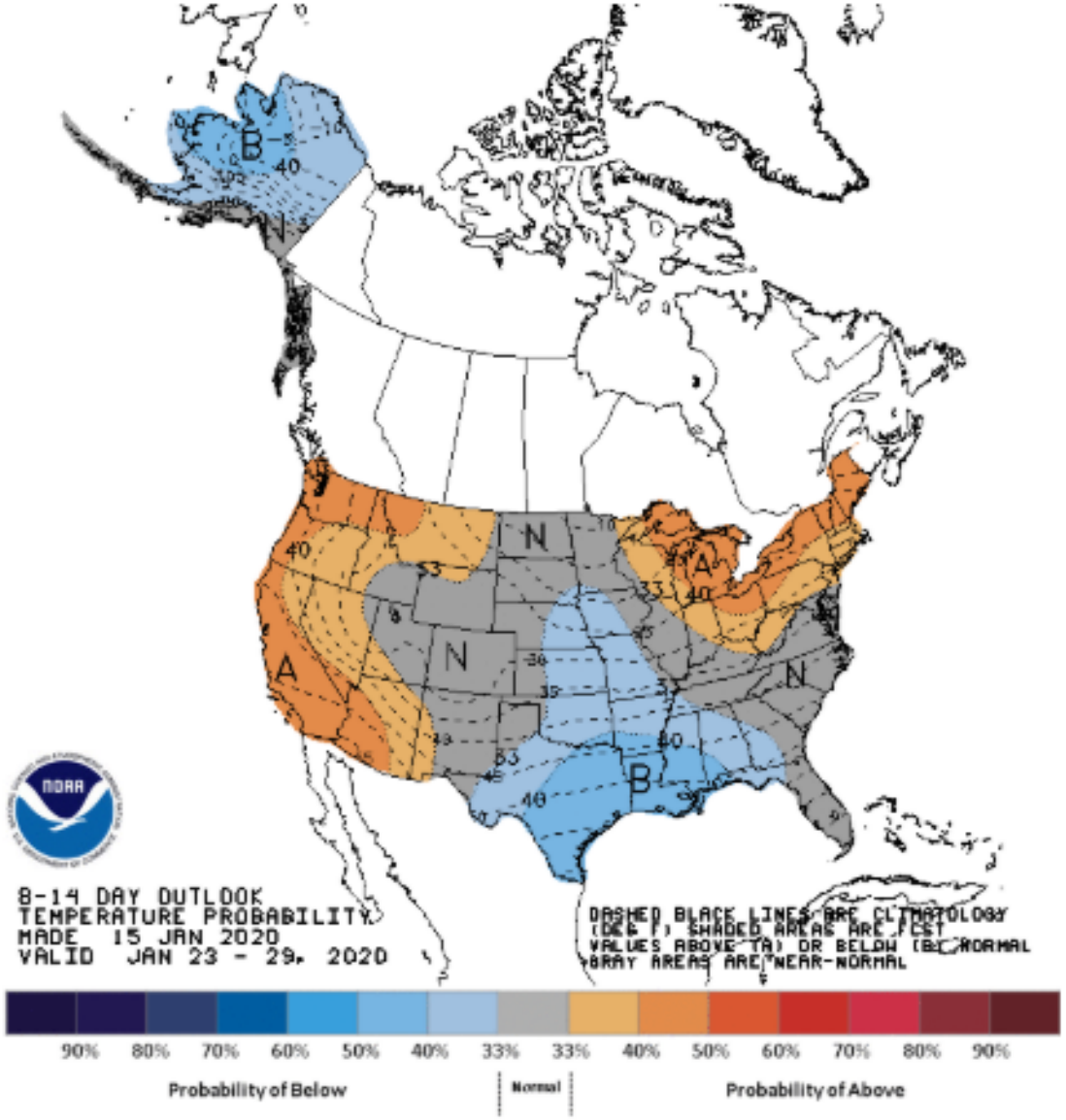
- Region has finally cooled down
- Cooler air moving in behind this weekend's storm

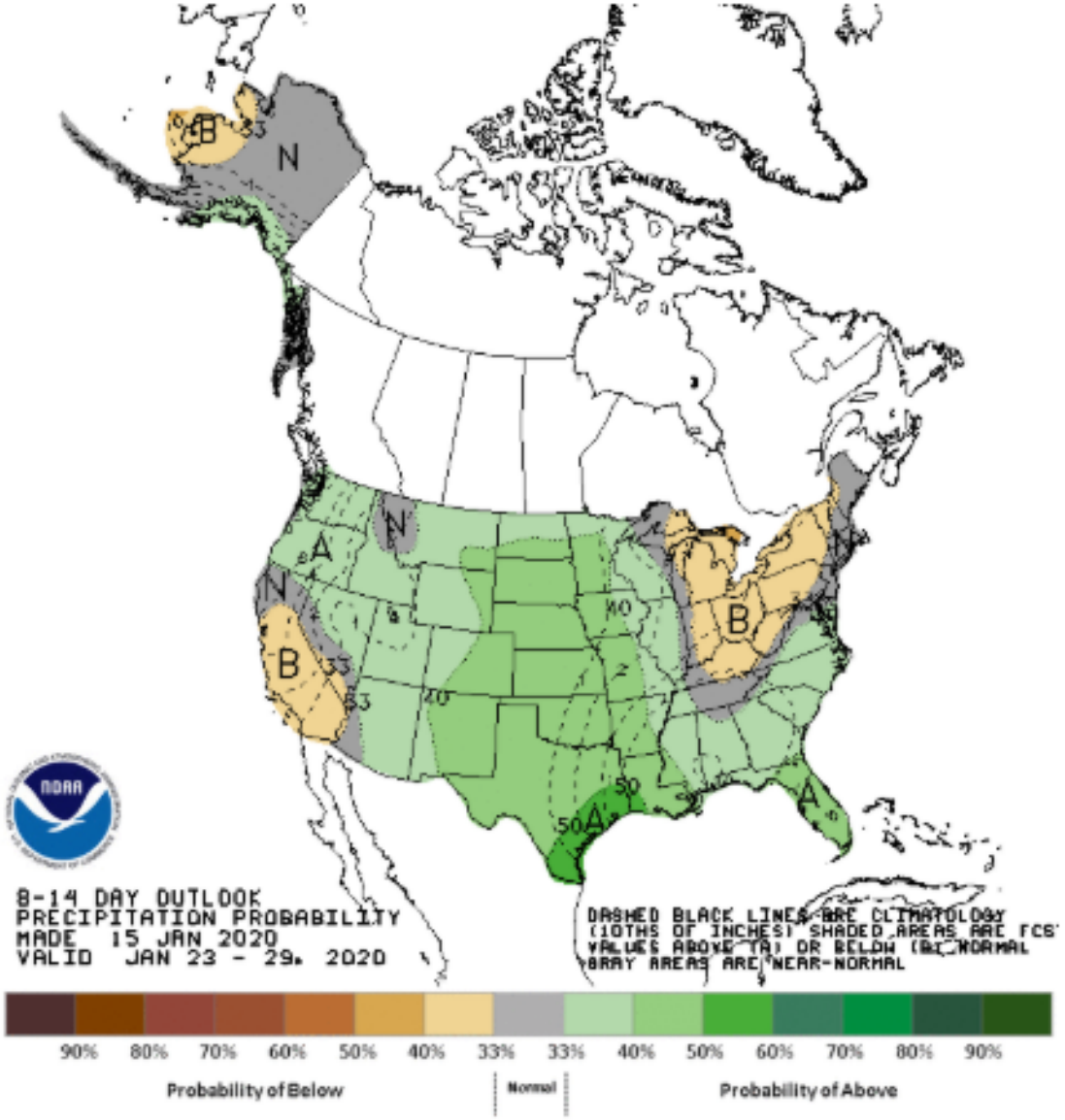


https://www.wpc.ncep.noaa.gov/exper/ndfdmxmn/map.html

8-14 Day Outlook

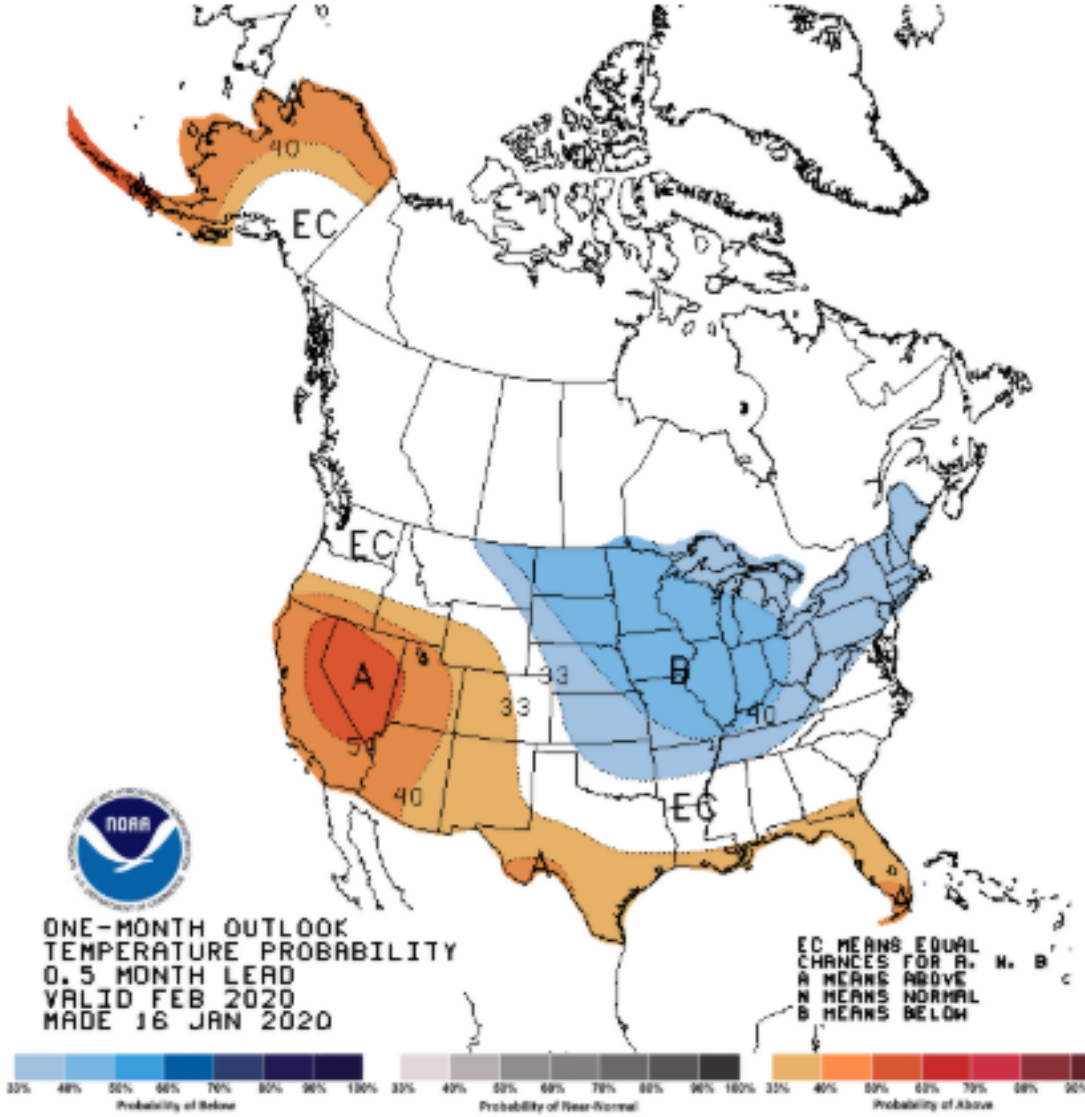
https://www.cpc.ncep.noaa.gov

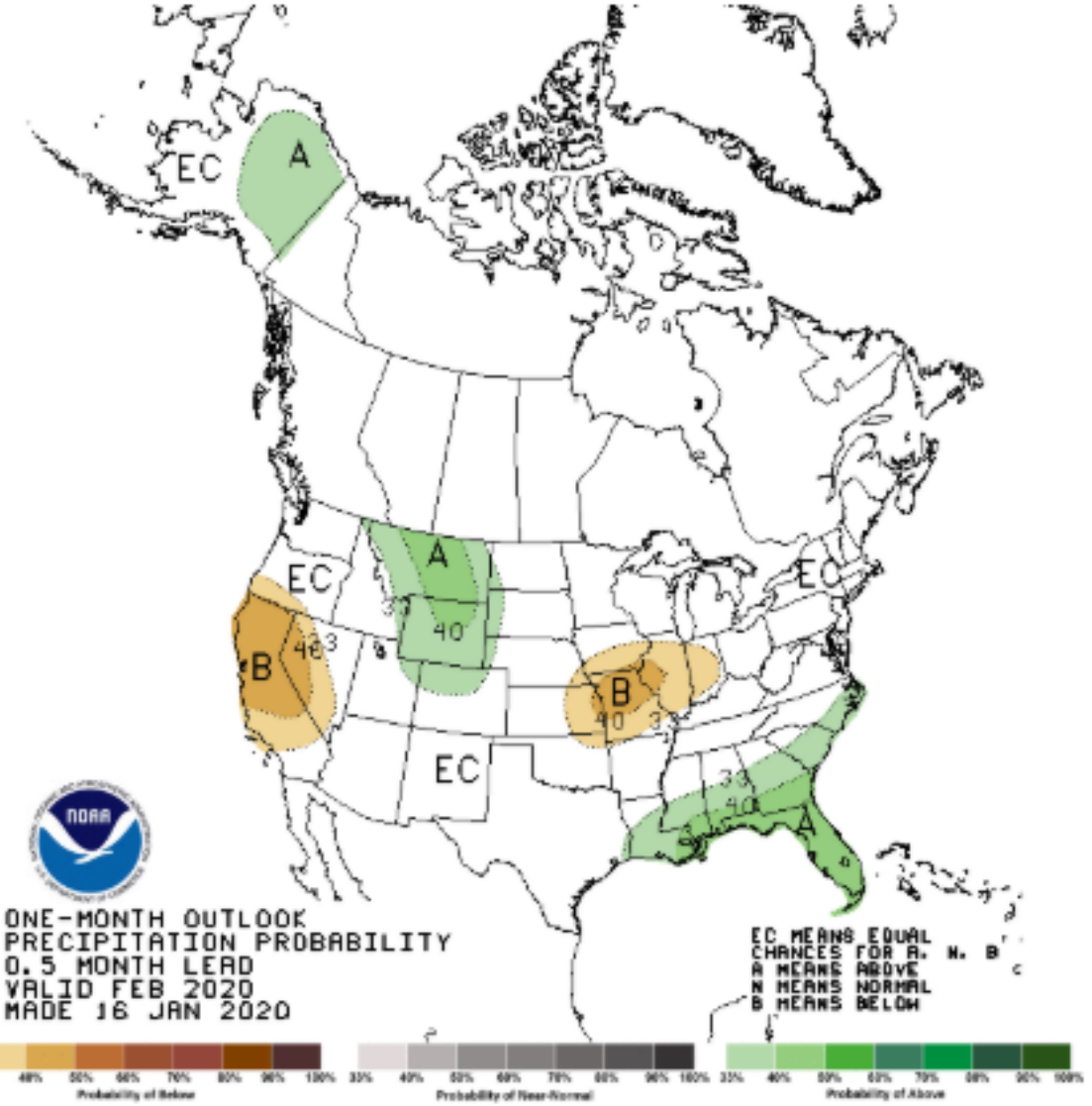




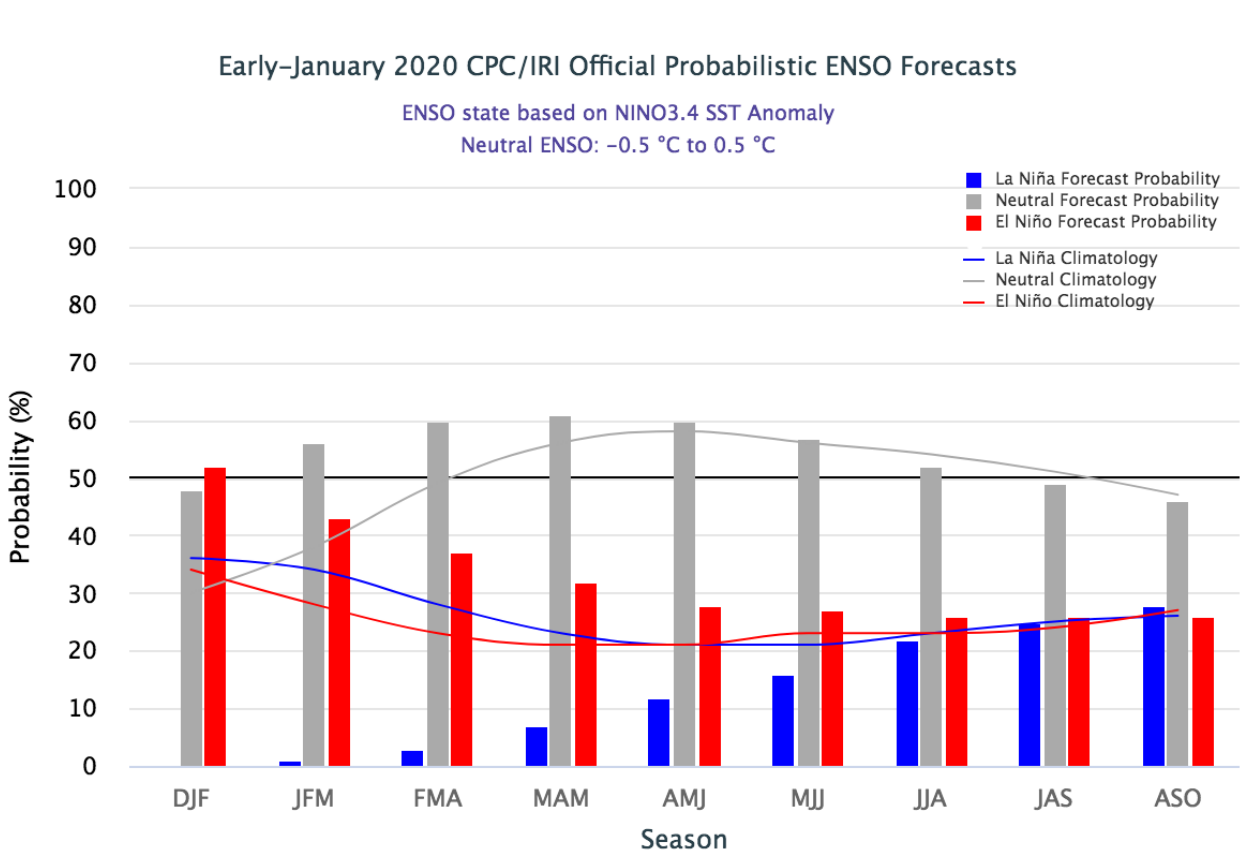
February Outlook

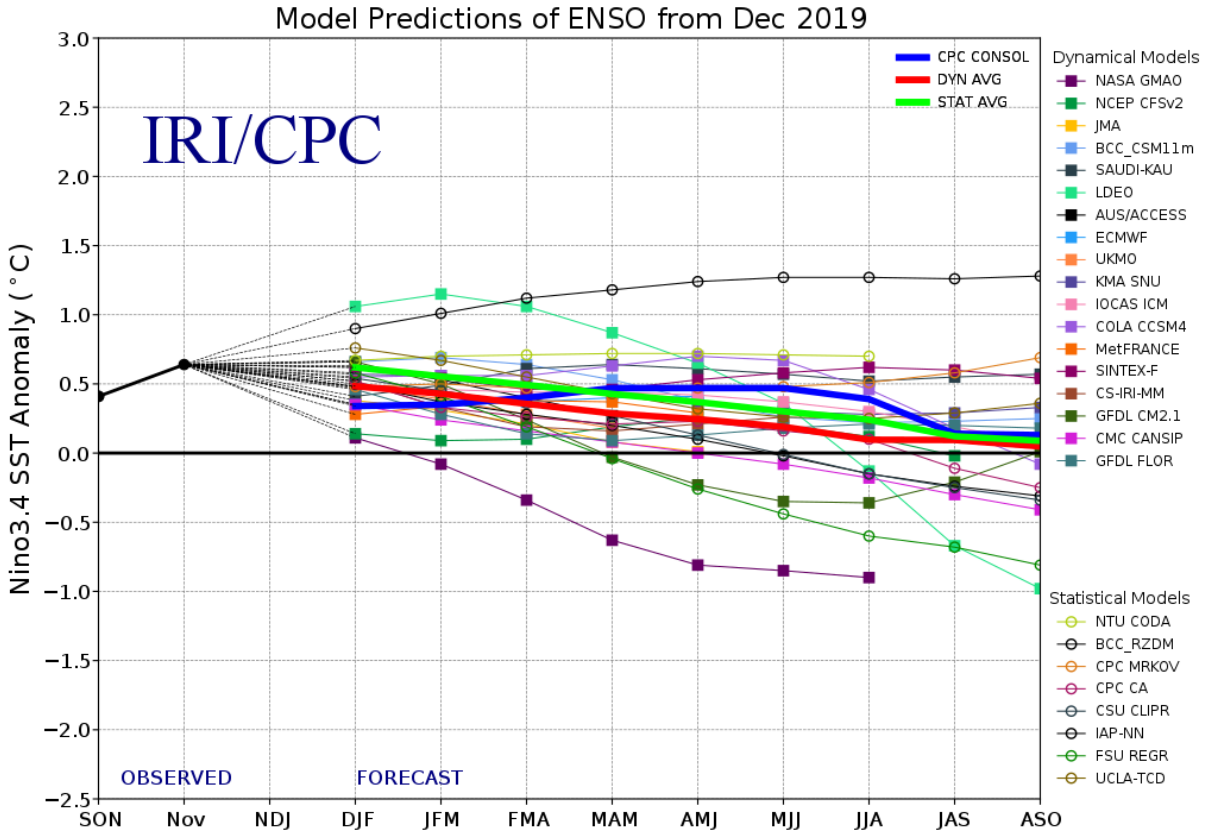
https://www.cpc.ncep.noaa.gov





Neutral Conditions Persist

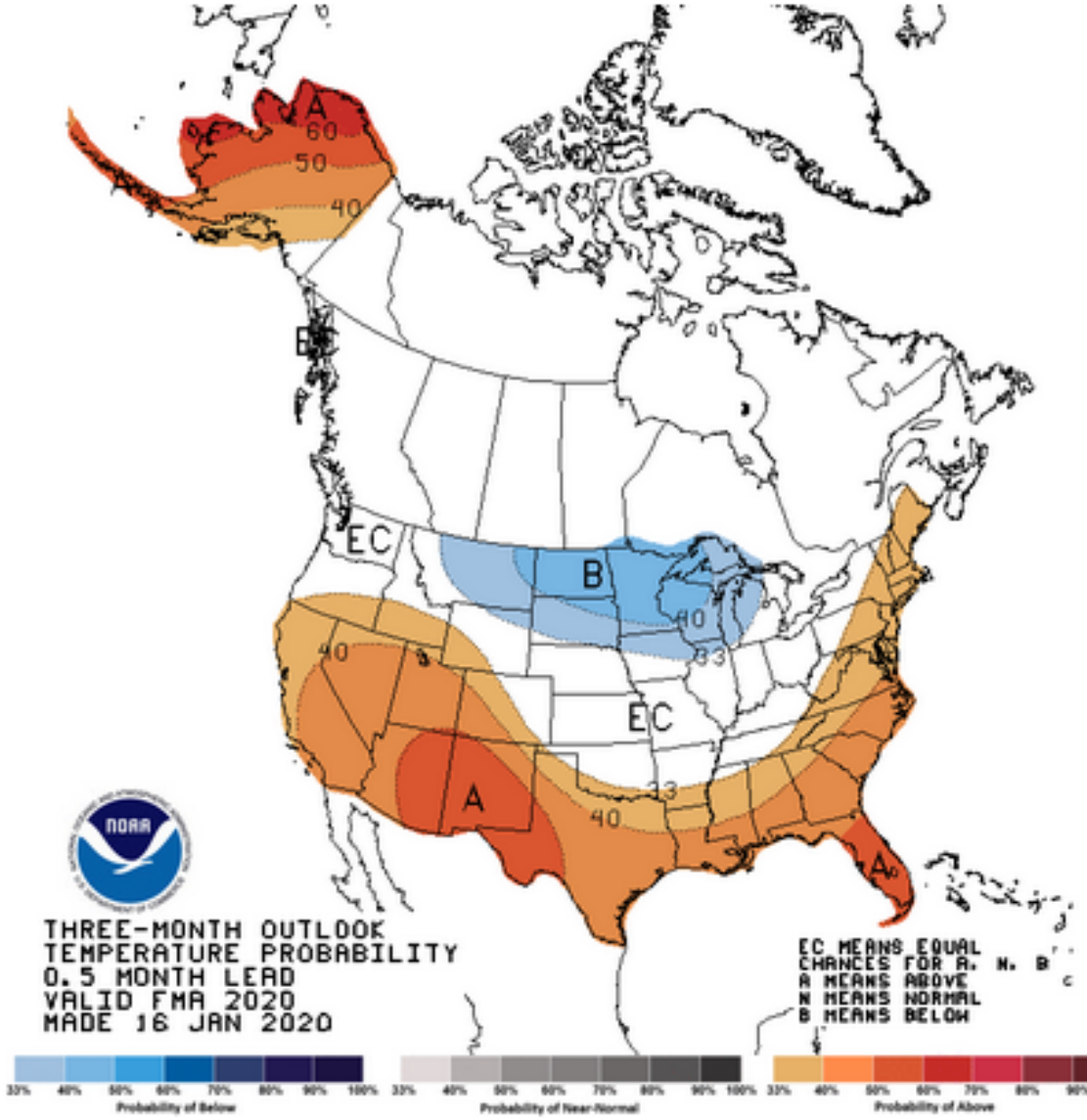


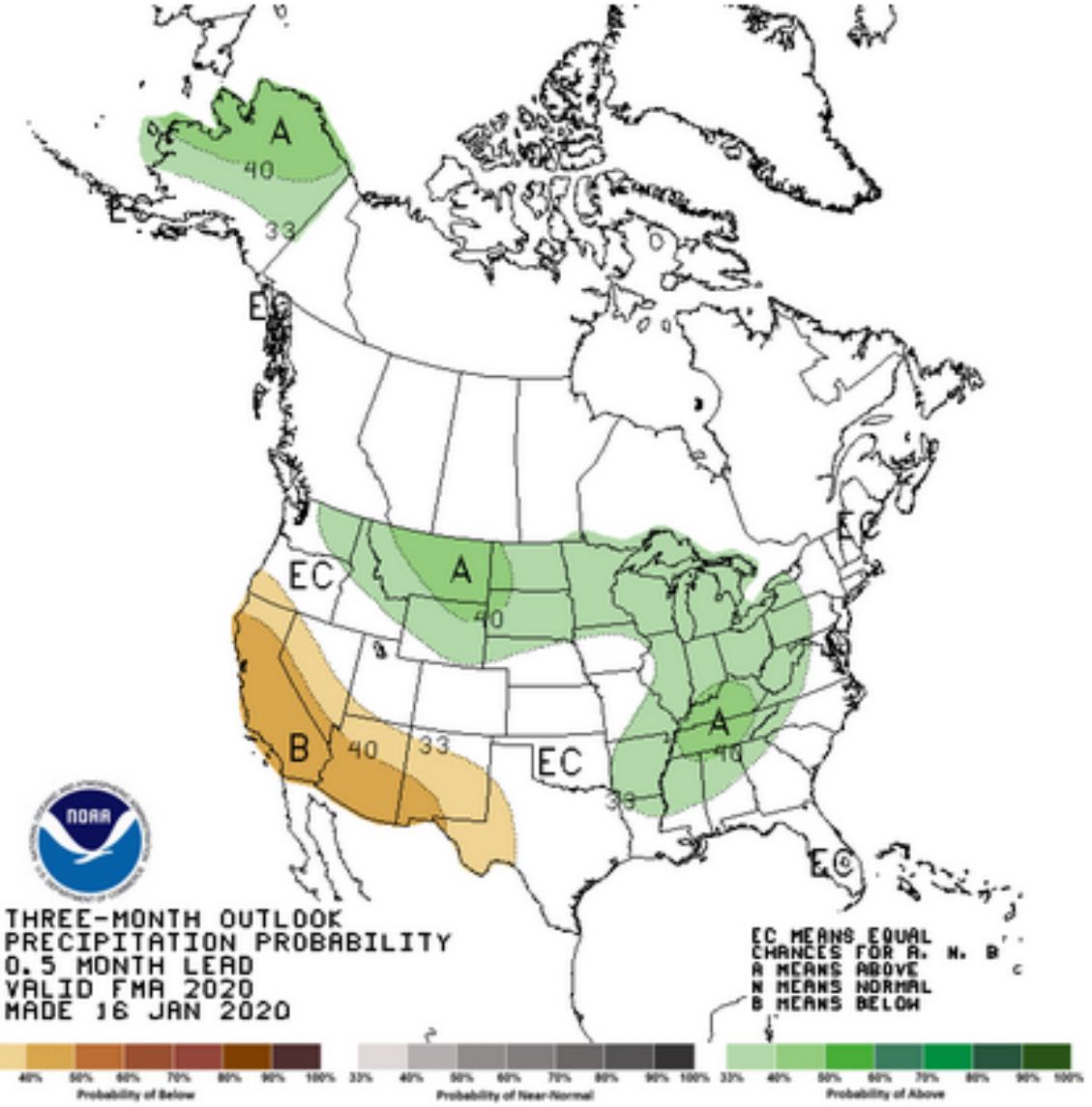


IRI/CPC ENSO Forecasts:
https://iri.columbia.edu/our-expertise/climate/forecasts/enso/current/

Seasonal Outlook – FMA

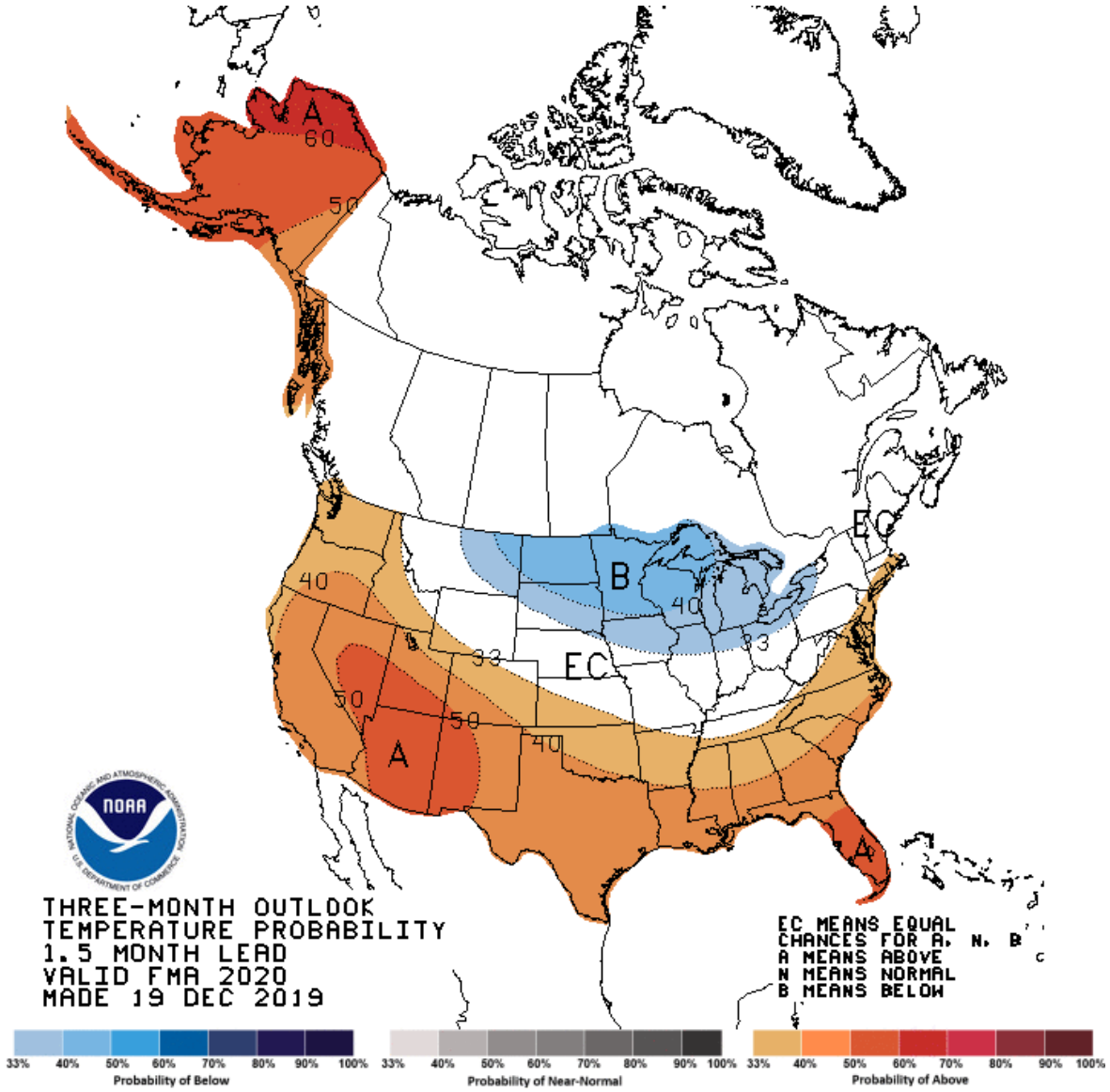
https://www.cpc.ncep.noaa.gov

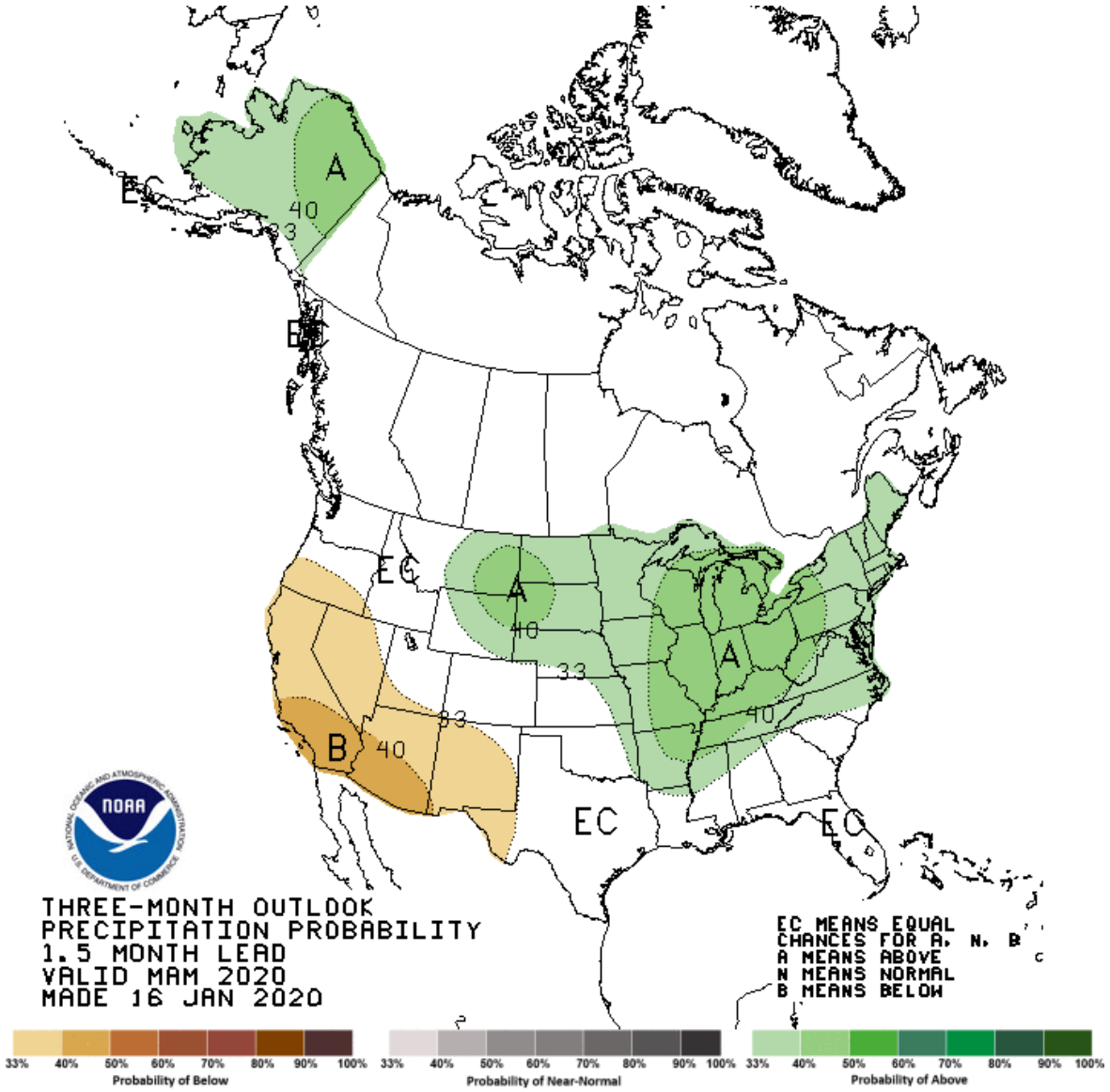




Seasonal Outlook – MAM

https://www.cpc.ncep.noaa.gov





In Summation

- We are in the midst of an historically wet period for the Central Region
- The excess water has lead to numerous impacts, delayed or missed planting, delayed harvest, high flows and dam breaches
- The time of year climatologically we tend to see increases in surface moisture (as the days get longer the storms get stronger)
- The CPC outlook is leaning towards wetter than normal for much of the region. Given our current conditions, even normal precipitation is to much for many of us

Further Information - Partners

- **Today's and Past Recorded Presentations:**
  - https://mrcc.illinois.edu/multimedia/webinars.jsp
  - https://hprcc.unl.edu/webinars.php
- 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: https://drought.unl.edu/
- State climatologists: https://www.stateclimate.org
- Regional climate centers
  - https://mrcc.illinois.edu
  - https://hprcc.unl.edu

Thank you

- **Climate**
  - Peter Goble: peter.goble@colostate.edu, 970-491-8312
  - Becky Bolinger: becky.bolinger@colostate.edu, 970-491-8506
  - 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
  - Brian Fuchs: bfuchs2@unl.edu, 402-472-6775 (drought)
- **Weather**
  - chroc@noaa.gov

COLORADO CLIMATE CENTER

ATMOSPHERIC SCIENCE
COLORADO STATE UNIVERSITY