

Central Region Climate and Drought Outlook

March 18, 2021

From KY Mesonet webcam in Butler, Co., KY
pic provided by Stuart Foster, May 8, 2020



From KY Mesonet webcam in Butler, Co., KY
pic provided by Stuart Foster, March 3, 2021
Flood waters are from the Green River, a
tributary of the OH River.



Flooding near Carbondale, IL, March 12, 2021
pic credit: City of Carbondale



KENTUCKY
MESONET
AT WKU

Hardin County
February 12, 2021



Sandhill Cranes, pic provided by Stu Foster and
from KY Mesonet webcam in Hardin, Co., KY

Snow Geese, pic taken by Doug Kluck in
NW MO/SW IA, March 17, 2021



March 14, 2021 Snowstorm



CoCoRaHS Snow Depth Measurement
Pic taken by Becky Bollinger in Loveland, CO.
(She's in knee-deep!)

March 14, 2021 Snowstorm

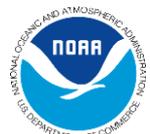


CSU weather station in Fort Collins, CO
Pic taken by Alistair Vierod

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University of Missouri

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UNIVERSITY OF MISSOURI
Extension



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**
 - April 15, 2021 (1 PM CDT), Dennis Todey, USDA Midwest Climate Hub
- **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

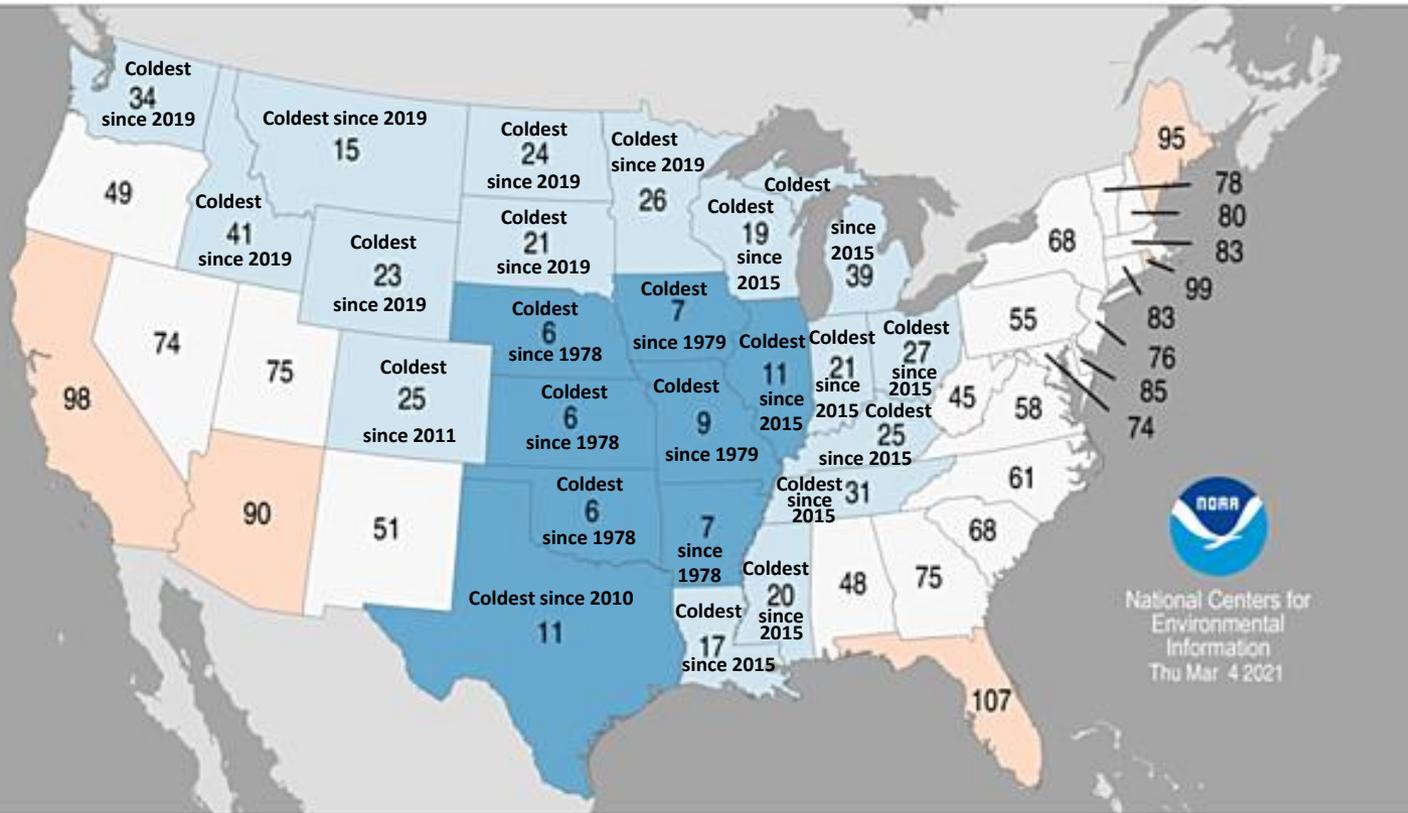
- **February and Winter Recap**
- **Recent Conditions (last 30 days)**
- **Snow, Water, Flood, Drought, Soil**
- **State Impacts**
- **Climate Outlooks**
- **Questions/Comments**

February and Winter Recap (Dec-Jan-Feb)

February Temperature Ranks

Statewide Average Temperature Ranks

February 2021
Period: 1895–2021



- Contiguous U.S. Avg. Temp: 30.6°F or 3.2°F below average.

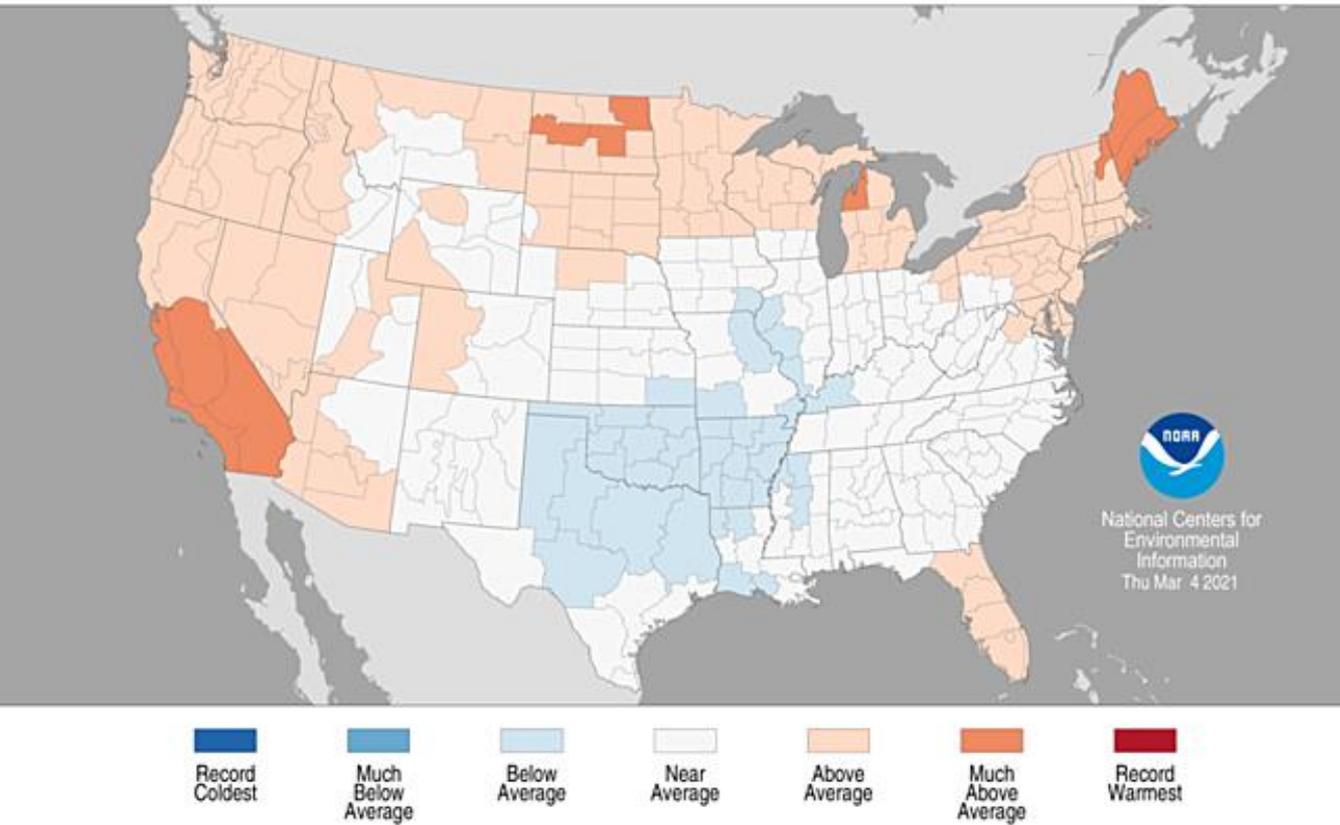
- Coldest February for the contiguous U.S. since 1989

- 19th coldest February in 127 years

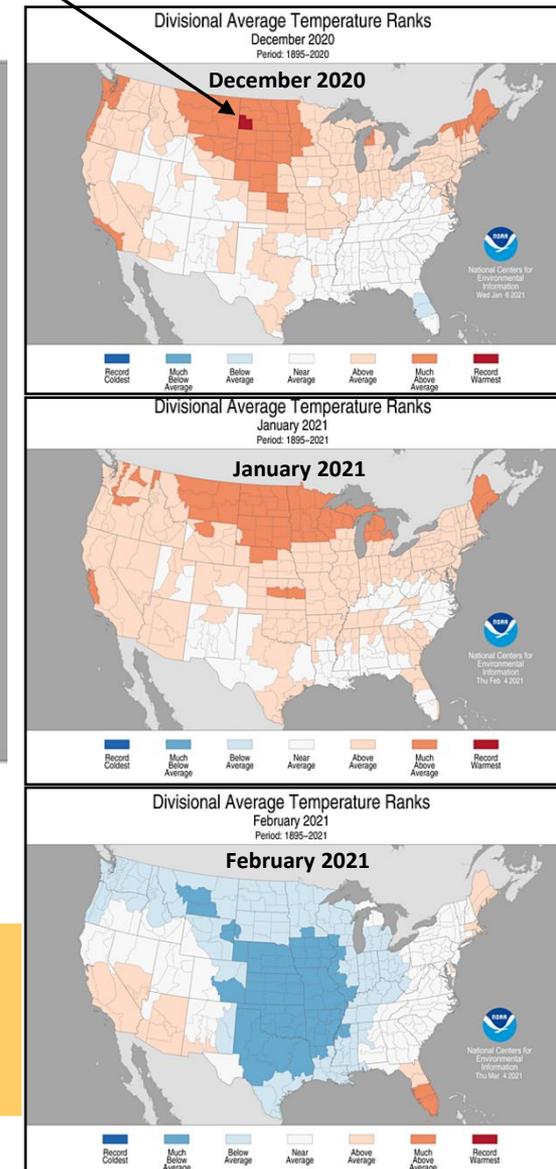


Winter Divisional Temperature Ranks (Dec 2020-Feb 2021)

Divisional Average Temperature Ranks
December 2020–February 2021
Period: 1895–2021



Record warmest



- Dec and Jan were unusually mild across much of Montana, the northern Plains and upper Midwest, but an intense 2-week Feb cold wave mitigated these conditions for meteorological winter.

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

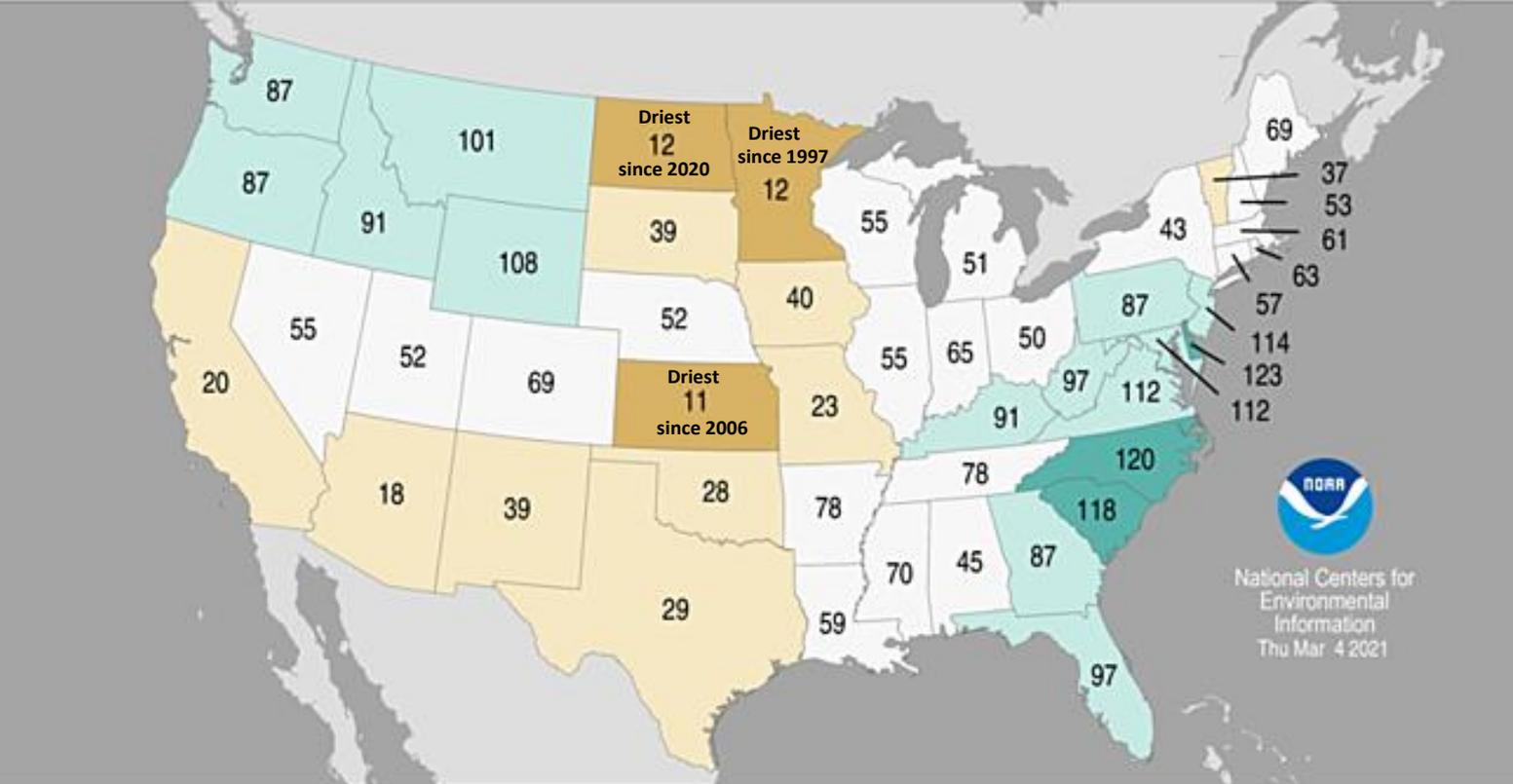
February Precipitation Ranks

Statewide Precipitation Ranks

February 2021
Period: 1895–2021

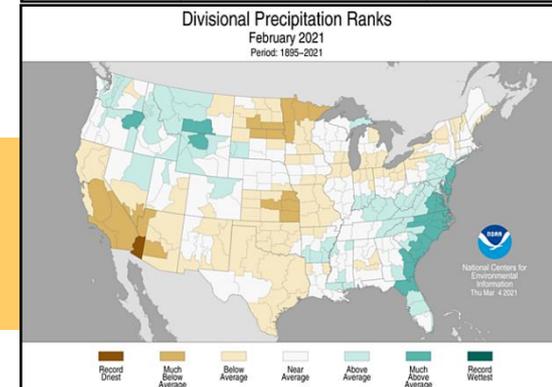
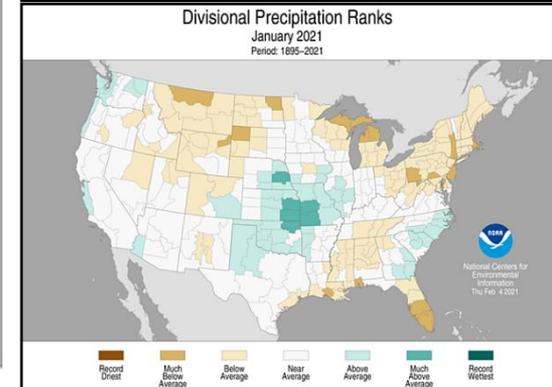
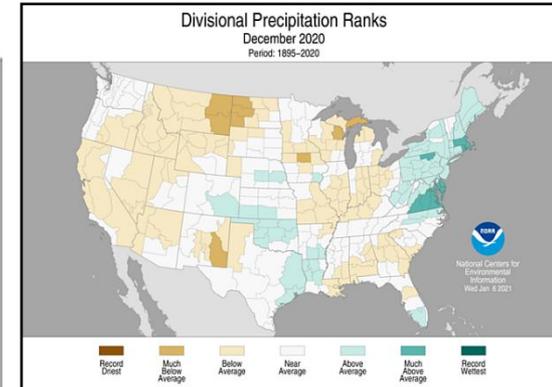
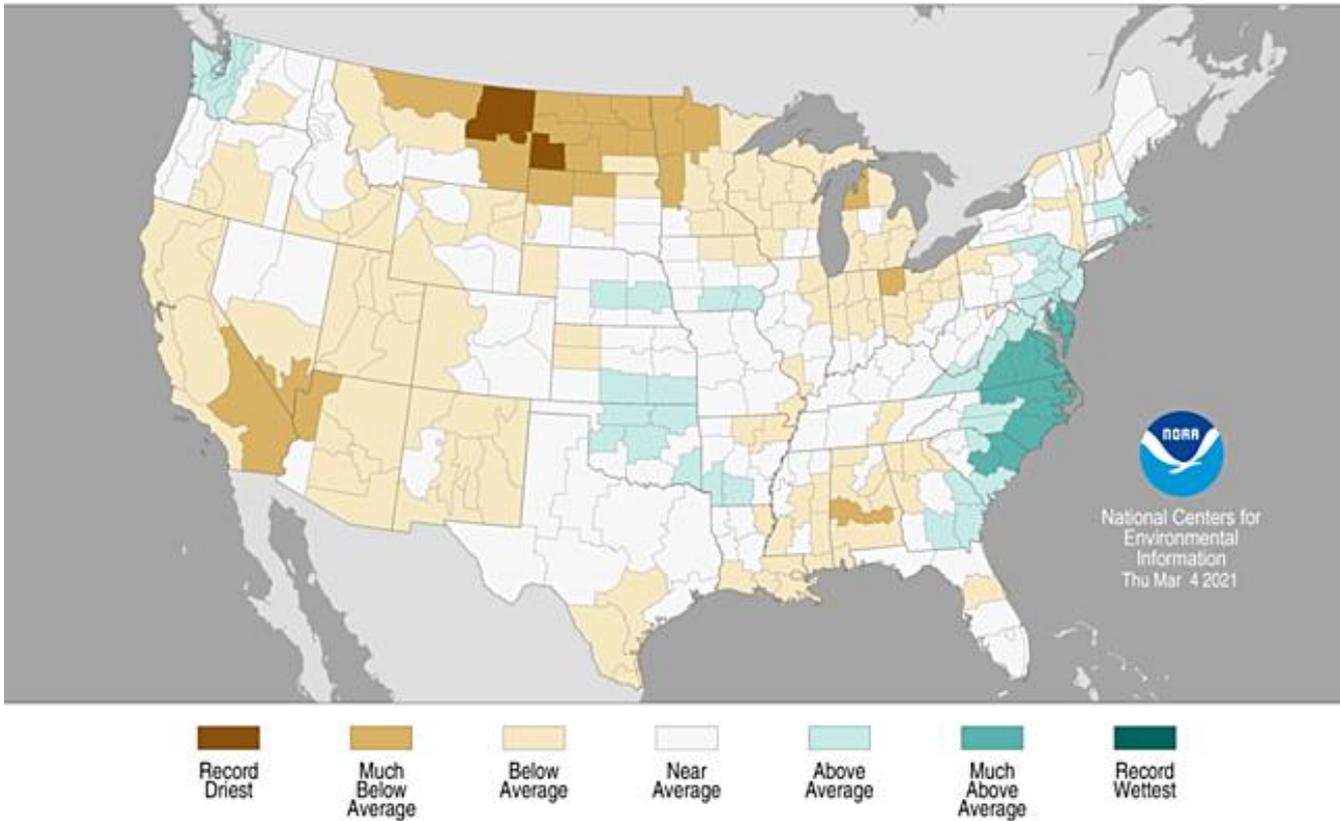
- Contiguous U.S. Avg. Total: 1.99" or 0.14" below average.

- KS ranked 11th driest while ND and MN reported 12 driest Feb.



Winter Divisional Precipitation Ranks (Dec 2020-Feb 2021)

Divisional Precipitation Ranks December 2020–February 2021 Period: 1895–2021



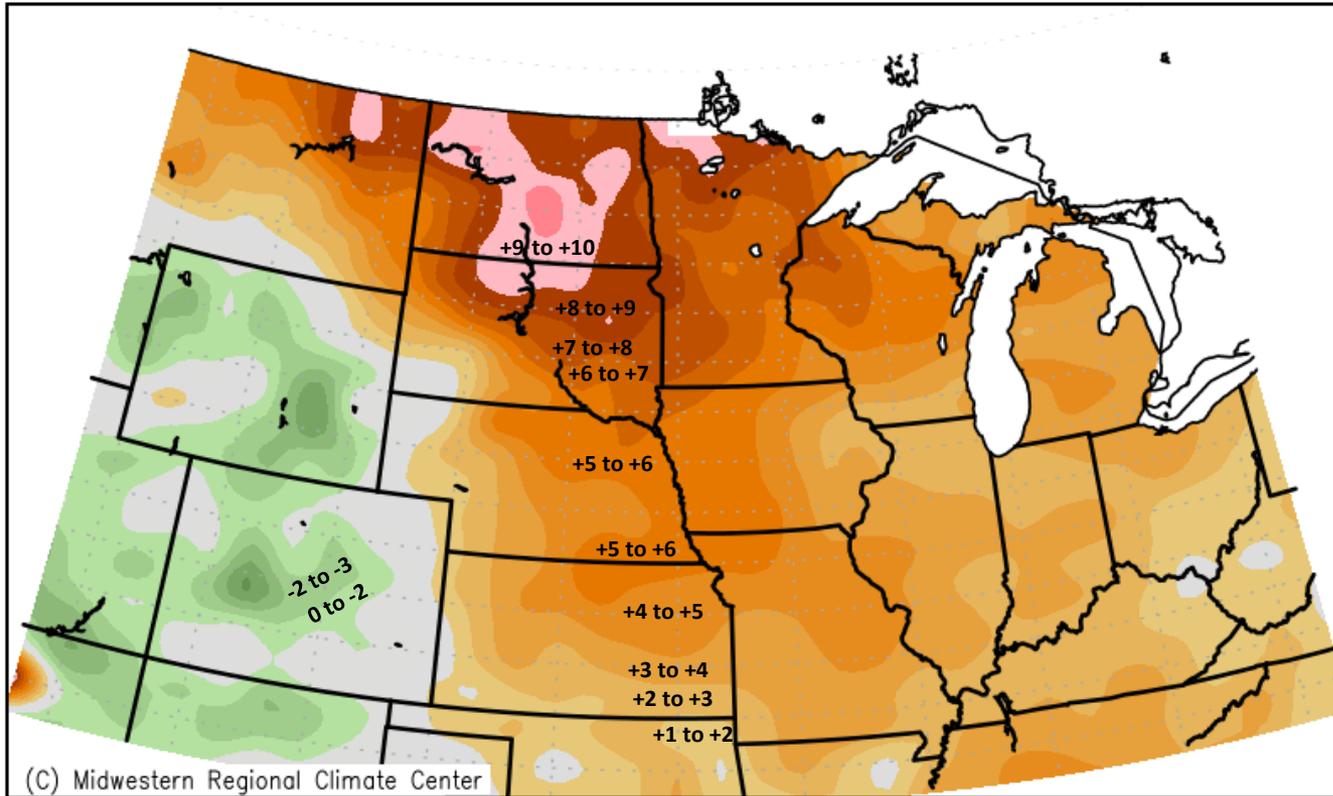
- Dry winter for western CO, parts of WY, eastern MT thru the northern Plains and upper Midwest. N. Dakota experienced their 3rd driest winter.

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

Recent Conditions (last 30 days)

Temperature Departure for the Last 30-days

Average Temperature (°F): Departure from Mean
February 19, 2021 to March 17, 2021



Mean period is 1981–2010.

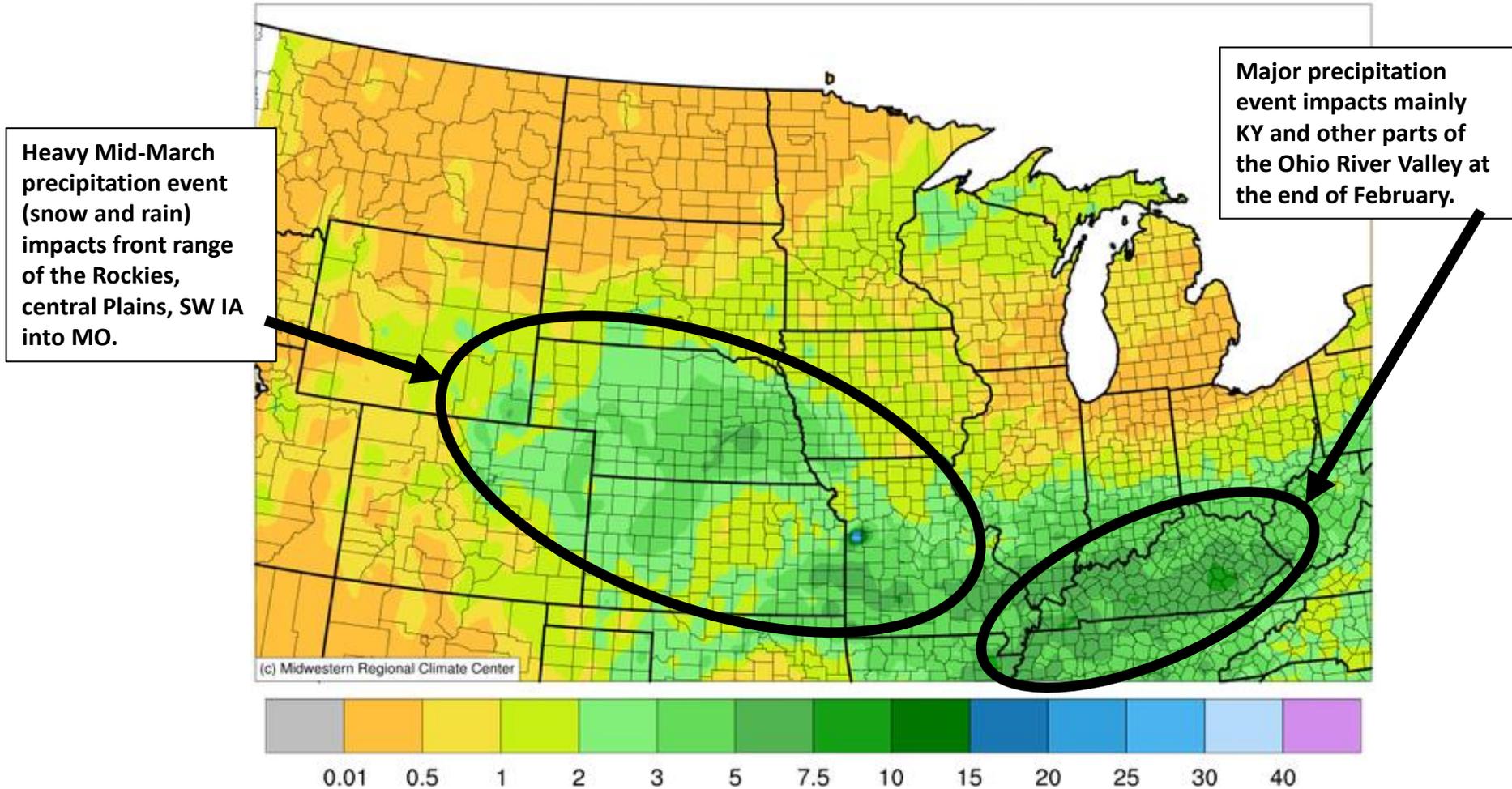


The two-week cold wave retreated by the last week of February and above normal temperatures returned to most of the region, much like the overall trend from November to January.

<https://mrcc.illinois.edu/CLIMATE/>

Precipitation for the Last 30-days

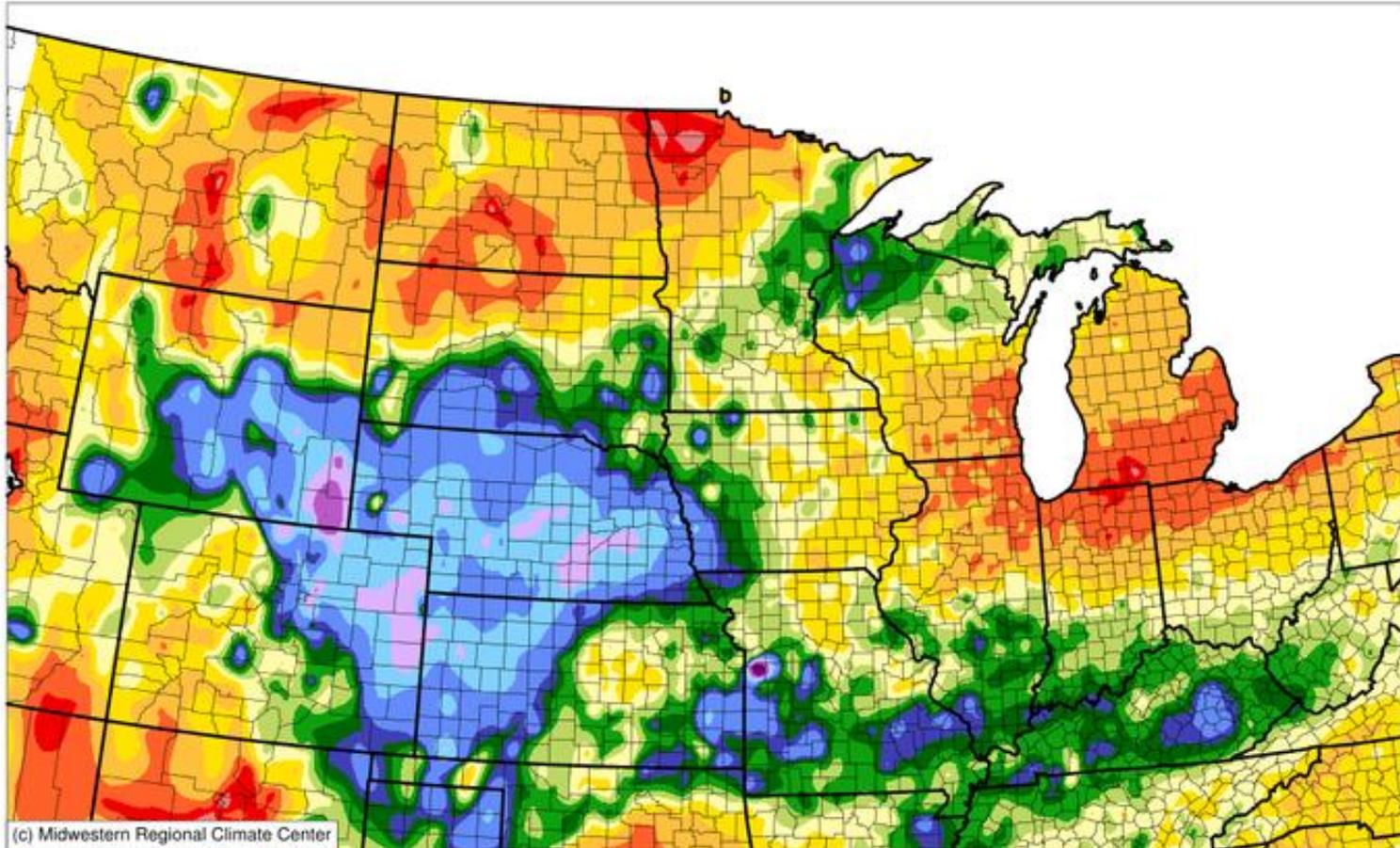
Accumulated Precipitation (in)
February 19, 2021 to March 18, 2021



Precipitation Percent of Mean for the Last 30-days

Accumulated Precipitation (in): Percent of 1981-2010 Normals

February 19, 2021 to March 18, 2021



2 5 10 25 50 75 100 125 150 175 200 300 400 500 750

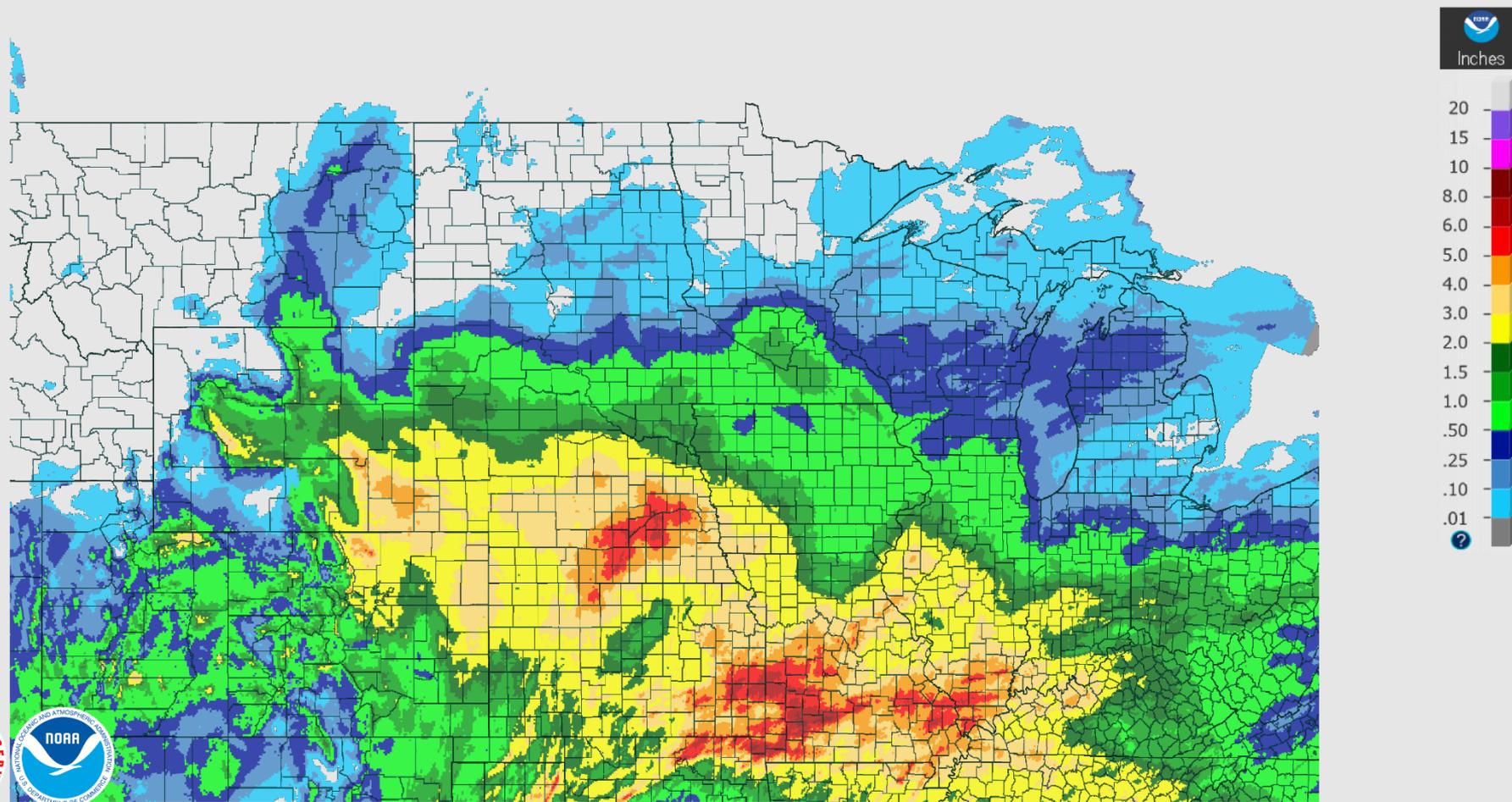
<https://mrcc.illinois.edu/CLIMATE/>

Radar-Estimated Precipitation over the past 7-days

March 18, 2021 7-Day Observed Precipitation

Created on: March 18, 2021 - 16:16 UTC

Valid on: March 18, 2021 12:00 UTC



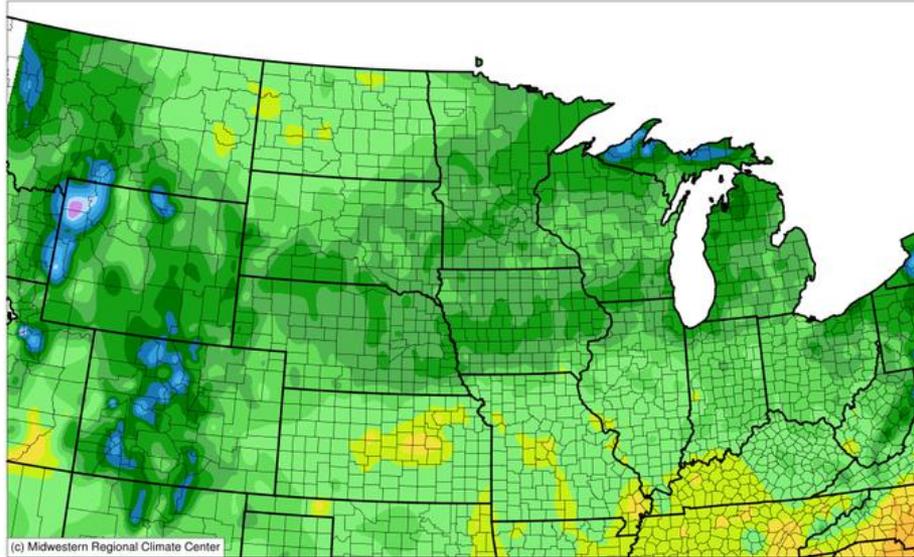
<https://water.weather.gov/precip/>

Snow/Water

Accumulated Snowfall and Departure

Accumulated Snowfall (in)

October 01, 2020 to March 18, 2021



(c) Midwestern Regional Climate Center

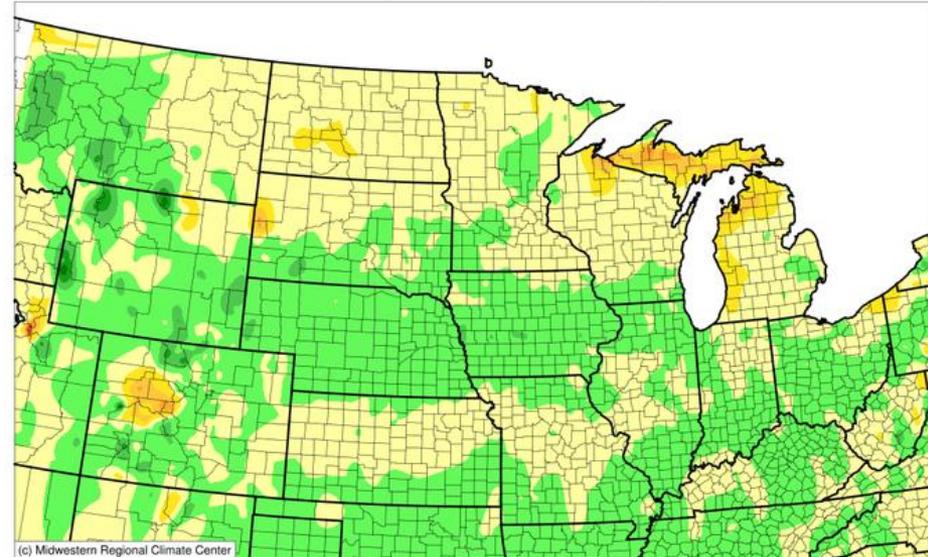
0.01 1 5 10 20 30 40 60 80 100 125 150 175

- Snowfall totals in parts of CO, WY, and NE increased notably with recent snowstorm.

<https://mrcc.illinois.edu/CLIMATE/>

Accumulated Snowfall (in): Departure from 1981-2010 Normals

October 01, 2020 to March 18, 2021



(c) Midwestern Regional Climate Center

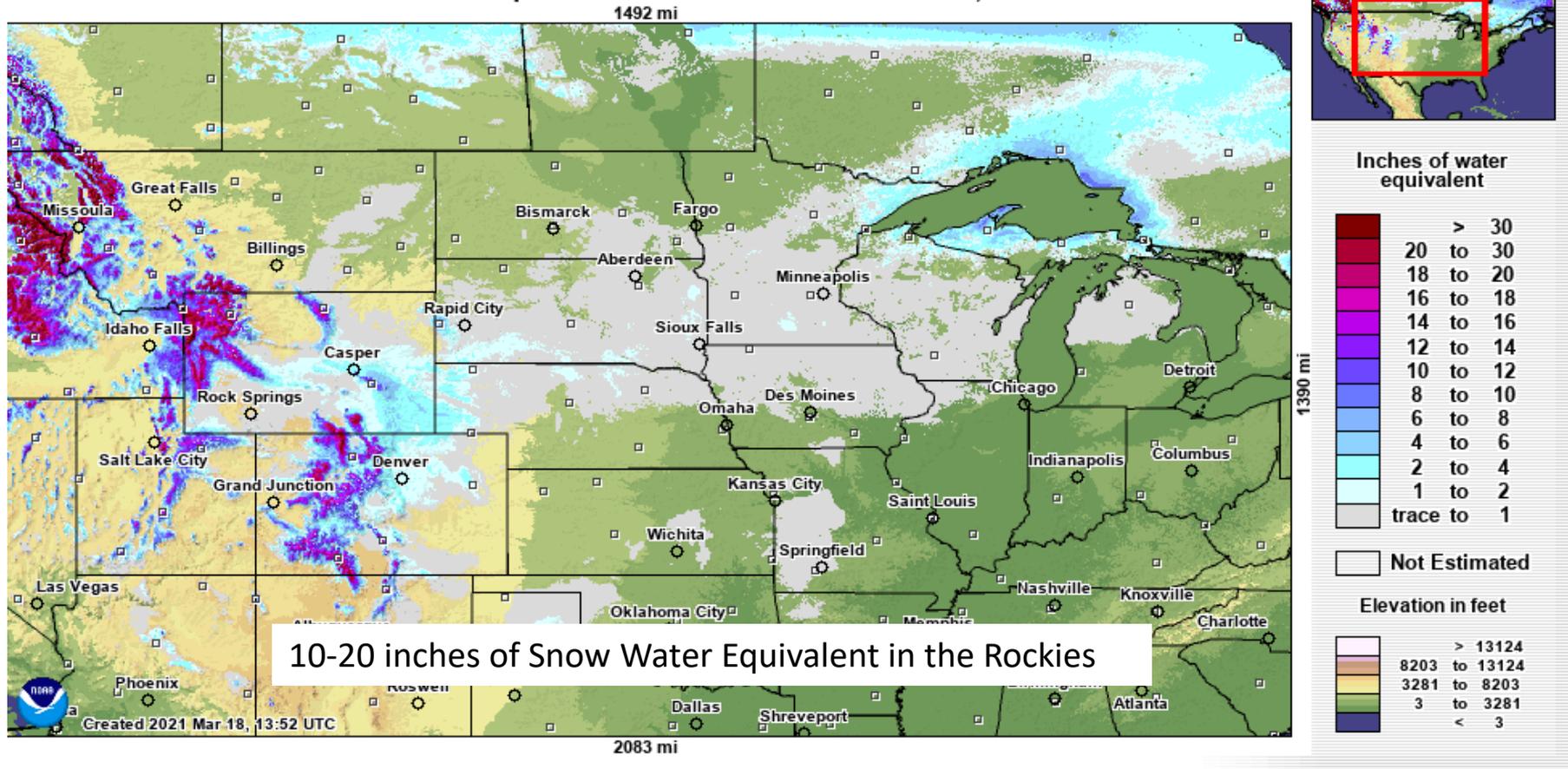
-175 -150 -125 -100 -75 -50 -25 0 25 50 75

- Green areas have received above normal snowfall for the cold season but eastern Corn Belt is still below with precipitation
- Much below normal snowfall in Lake Effect areas of Michigan.

<https://mrcc.illinois.edu/CLIMATE/>

Current Snow Water Equivalent March 18, 2021

Modeled Snow Water Equivalent forecasted for 2021 March 18, 14:00 UTC

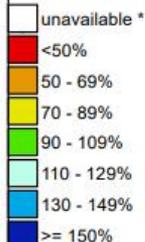


<https://www.nohrsc.noaa.gov/interactive/html/map.html>

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

Mar 18, 2021

Current Snow Water Equivalent (SWE) Basin-wide Percent of 1981-2010 Median



* Data unavailable at time of posting or measurement is not representative at this time of year

Provisional data subject to revision



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>

NRCS Snow Water Equivalent

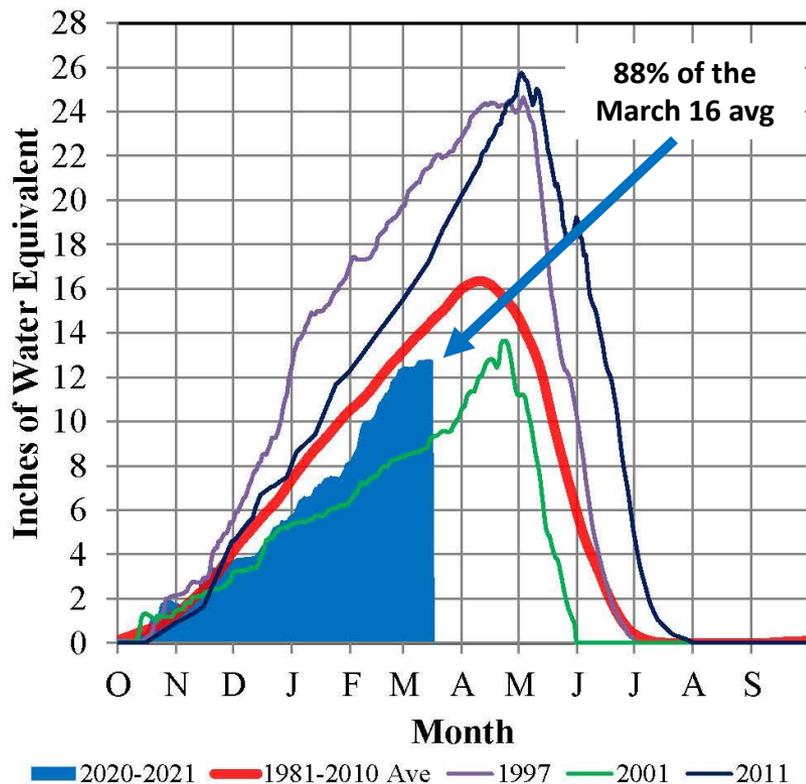
- Most snowpack in MT, WY and east of divide in CO are near normal.
- Highest SWE % of normal in WA and northeastern OR.
- Drier conditions around the Great Basin, southwestern and western CO, AZ and NM.

Missouri River Basin – Mountain Snowpack Water Content

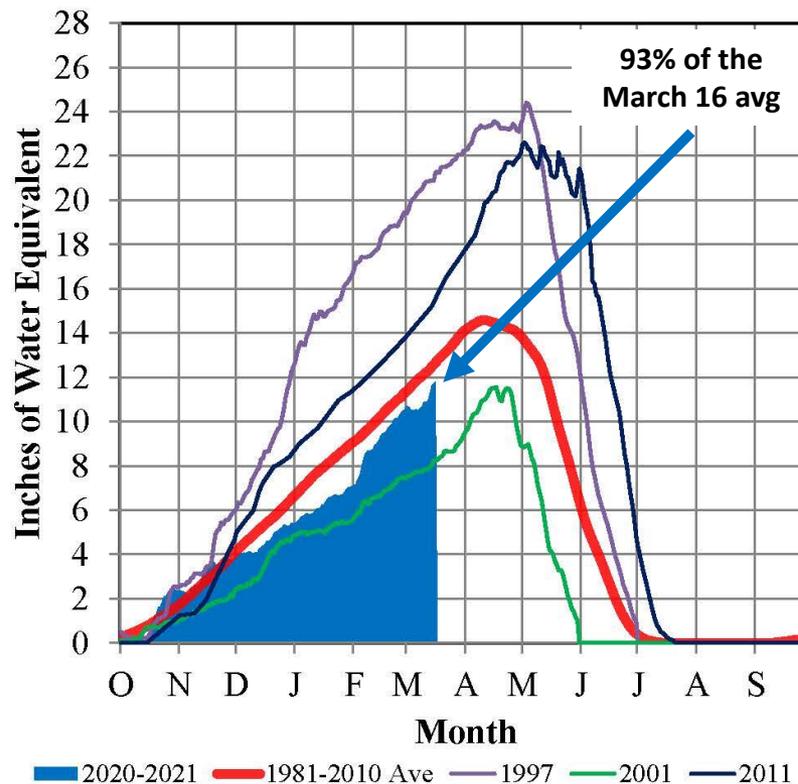
Missouri River Basin – Mountain Snowpack Water Content 2020-2021 with comparison plots from 1997*, 2001*, and 2011

16-Mar-2021

Total above Fort Peck



Total Fort Peck to Garrison



On March 16, 2021 the mountain Snow Water Equivalent (SWE) in the “Total above Fort Peck” reach was 12.8”, 88% of the March 16 average. On March 16, 2021 the mountain SWE in the “Fort Peck to Garrison” reach was 11.8”, 93% of the March 16 average. The normal peak for both reaches is near April 15.

Provisional data. Subject to revision.

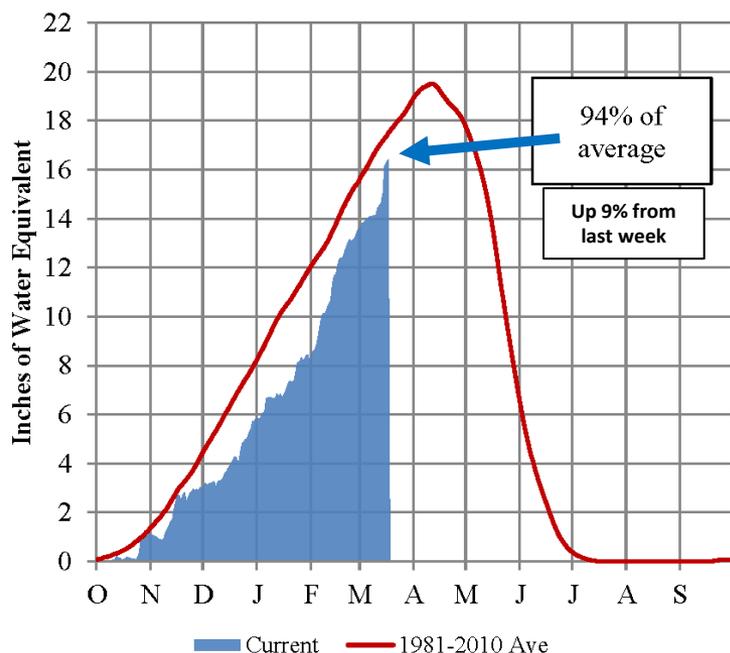
<https://www.nwd-mr.usace.army.mil/rcc/reports/snow.jpg>

Platte River Basin – Mountain Snowpack Water Content

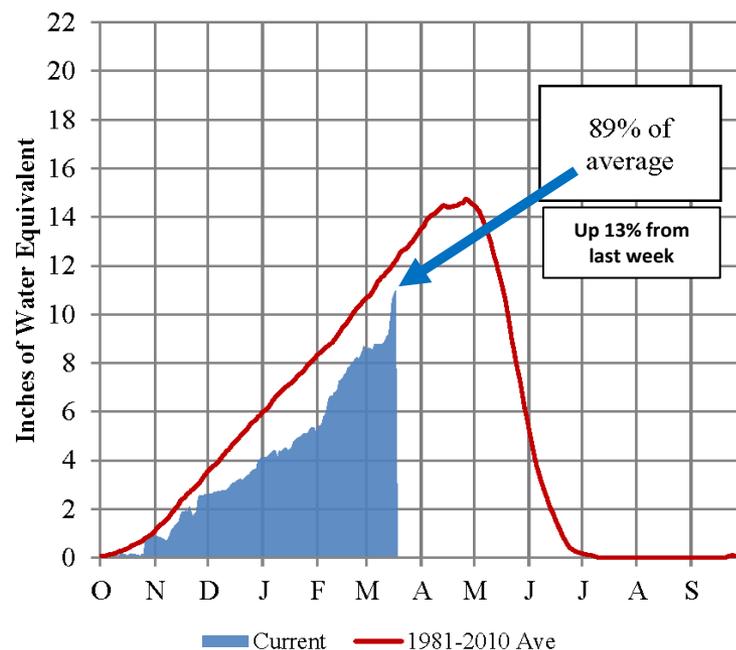
Platte River Basin - Mountain Snowpack Water Content Water Year 2020-2021

March 17, 2021

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 March 16, 2021, the mountain snowpack SWE in the "Total North Platte" reach is currently 16.3", 94% of average. The mountain snowpack SWE in the "Total South Platte" reach is currently 10.8", 89% of average.

Front range snowstorm last weekend increased water supply in both North and South Platte mountain system.

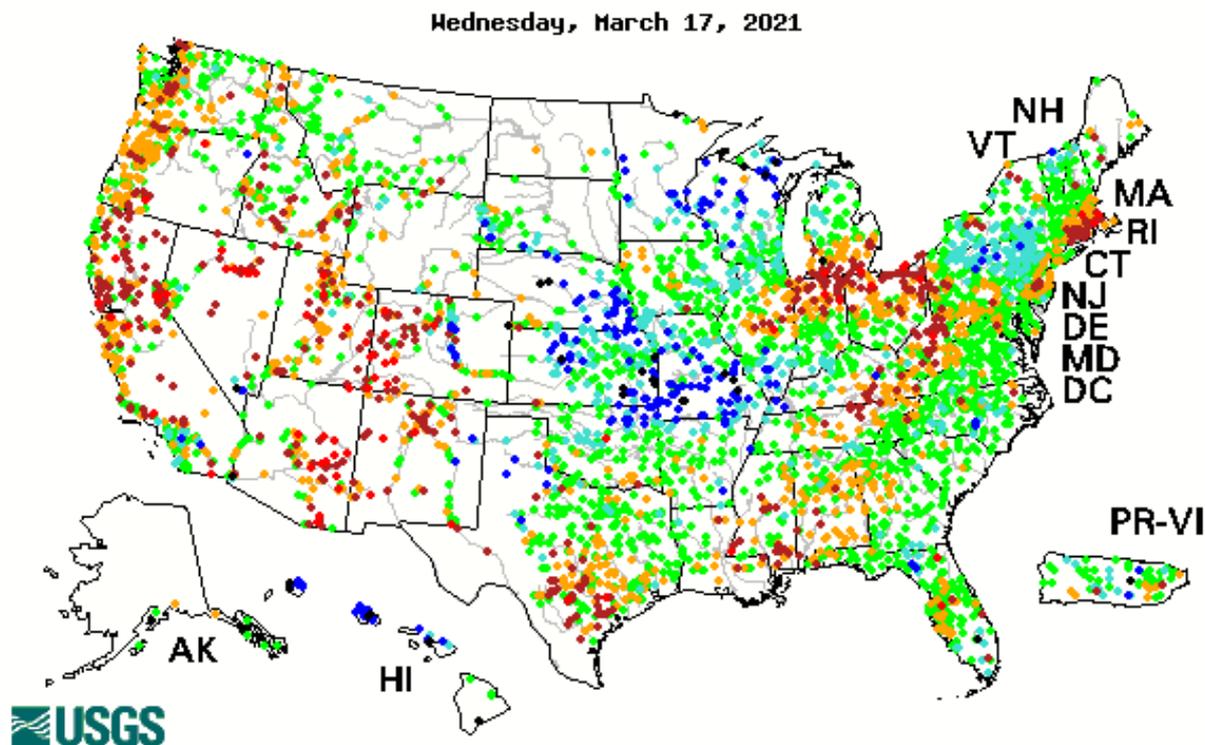
7-Day Average Streamflow

Map of 7-day average streamflow compared to historical streamflow for the day of the year (United States)

State or Water-Resources Regions All Days

Wednesday, March 17, 2021

- Generally above to much above average streamflows across the lower Missouri Basin, from central NE to southern MO, and parts of the Upper Mississippi River Basin, from central WI to northern IL
- Below to much below average streamflows from central IL into northern IN, southern MI and northern OH. Also in SW KY.
- Some record streamflows for this time of year in SE KS and southern MO.



<https://waterwatch.usgs.gov/?id=pa07d>

Minor to Major flooding occurring or forecasted

NWS- Missouri Basin River Forecast Center

Missouri Basin, Pleasant Hill
River Forecast Center

Weather.gov > Missouri Basin, Pleasant Hill

[River Observations and Forecasts](#) [Weather Observations and Forecasts](#) [Water Supply](#) [Climate and History](#) [Seasonal Interest](#) [Local Information](#)

Auto Refresh: OFF



Print this map

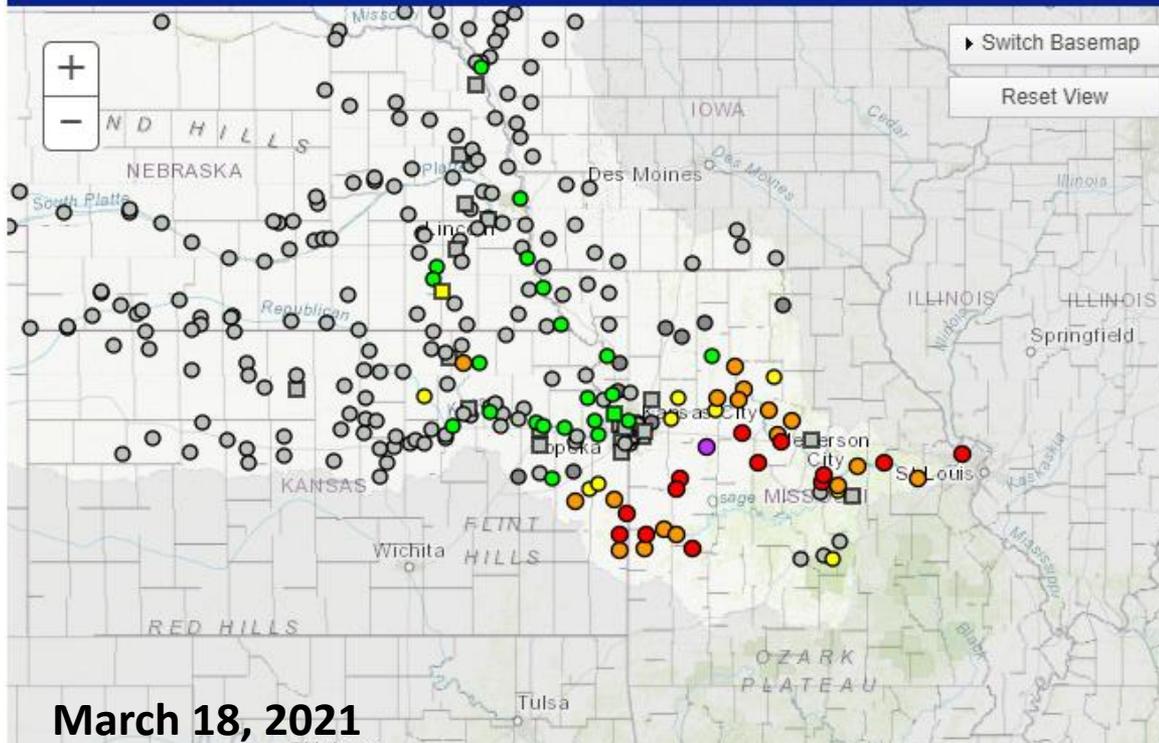
Maximum Forecast Flood Category Through: 03/27/2021 16:44:30 UTC



Entire Period

All Locations

River Observations River Forecasts



Click on the map or select one of the data views below:

- United States
- NWS Weather Forecast Offices
- Missouri Basin River Forecast Center
- Water Resources Regions

- Probability and forecasts available
- Forecasts available

472 total gauges
[Show all locations in flood \(31\)](#)

- 1 Gauges: Major Flooding
- 13 Gauges: Moderate Flooding
- 17 Gauges: Minor Flooding
- 10 Gauges: Near Flood Stage
- 22 Gauges: No Flooding
- 1 Flood Category Not Defined
- 0 At or Below Low Water Threshold
- 394 Gauges: Forecasts Are Not Current
- 9 Gauges: No forecast within selected timeframe
- 5 Gauges: Out of Service

[Show all locations](#)

Last map update:

March 18, 2021

<https://www.weather.gov/mbrfc/>

Minor to moderate flooding occurring or forecasted

NWS North Central River Forecast Center

[Weather.gov](https://www.weather.gov/ncrfc) > North Central River Forecast Center

North Central River Forecast Center

River Forecast Center

[River Observations and Forecasts](#) [Weather Observations and Forecasts](#) [Water Supply](#) [Climate and History](#) [Seasonal Interest](#) [Local Information](#)

Auto Refresh: OFF



Print this map

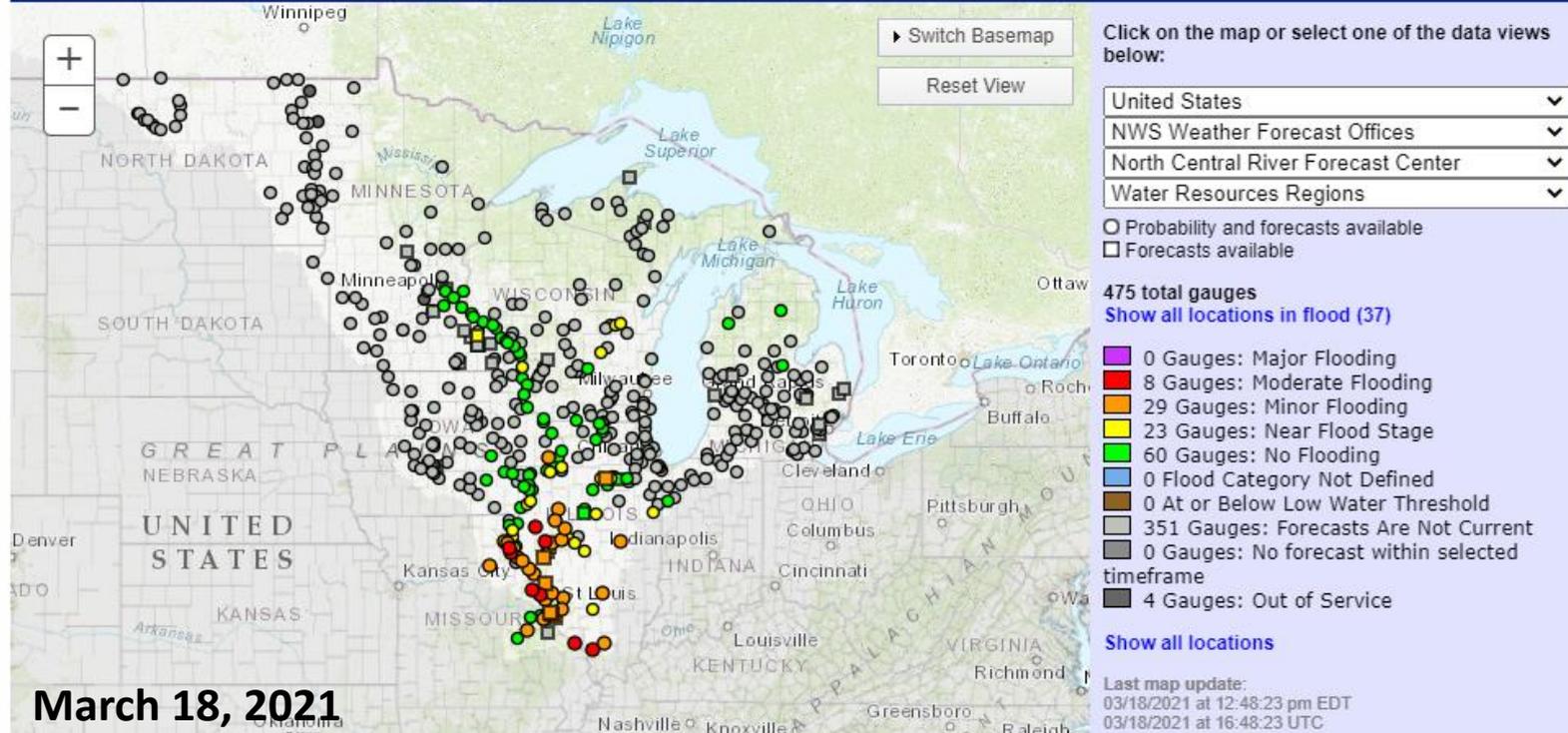
Maximum Forecast Flood Category Through: 03/27/2021 16:48:50 UTC

Day 1 2 3 4 5 6 7 8 9

Entire Period

All Locations

River Observations River Forecasts



March 18, 2021

<https://www.weather.gov/ncrfc/>

Minor Flooding Occurring or Forecast

Auto Refresh: OFF

Print this map

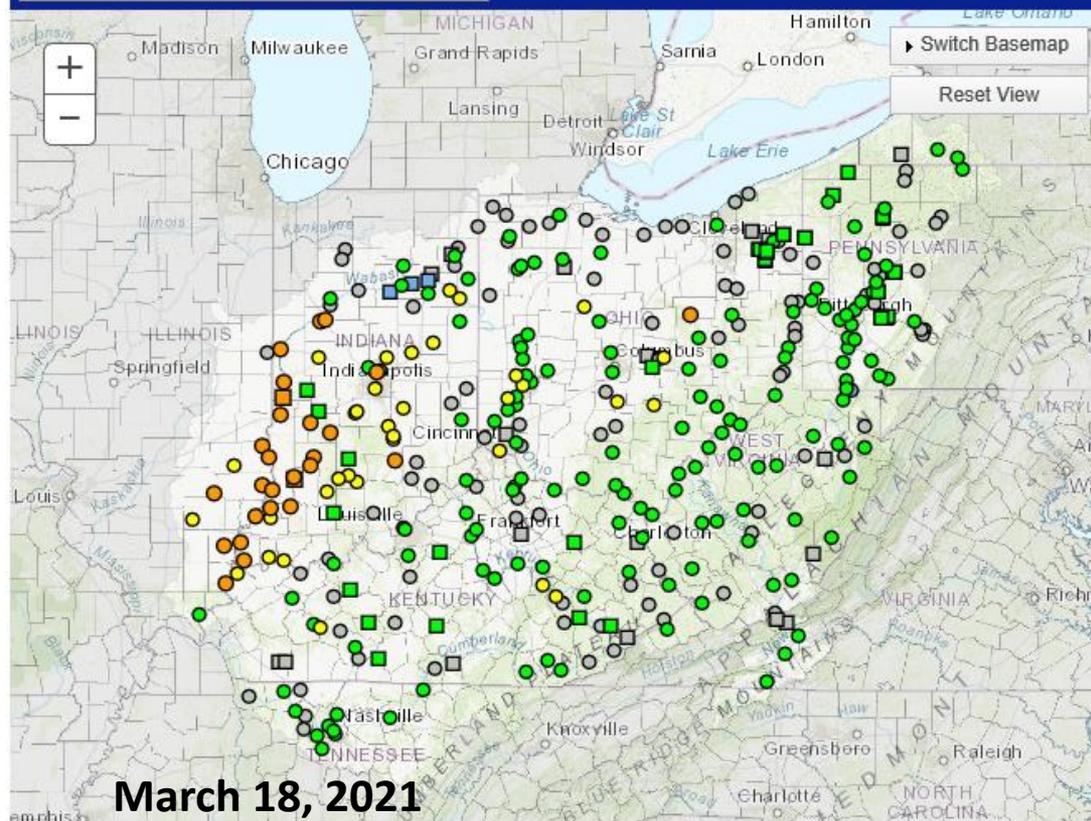
Maximum Forecast Flood Category Through: 03/27/2021 16:54:25 UTC



Entire Period

All Locations

River Observations River Forecasts



Click on the map or select one of the data views below:

- United States
- NWS Weather Forecast Offices
- Ohio River Forecast Center
- Water Resources Regions

- Probability and forecasts available
- Forecasts available

362 total gauges
[Show all locations in flood \(27\)](#)

- 0 Gauges: Major Flooding
- 0 Gauges: Moderate Flooding
- 27 Gauges: Minor Flooding
- 35 Gauges: Near Flood Stage
- 180 Gauges: No Flooding
- 4 Flood Category Not Defined
- 0 At or Below Low Water Threshold
- 116 Gauges: Forecasts Are Not Current
- 0 Gauges: No forecast within selected timeframe
- 0 Gauges: Out of Service

[Show all locations](#)

Last map update:
03/18/2021 at 12:52:56 pm EDT
03/18/2021 at 16:52:56 UTC

[What is UTC time?](#)

[Map Help](#)

March 18, 2021

Great Lakes Ice Cover

March 17, 2021

GREAT LAKES SURFACE ENVIRONMENTAL ANALYSIS (GLSEA)



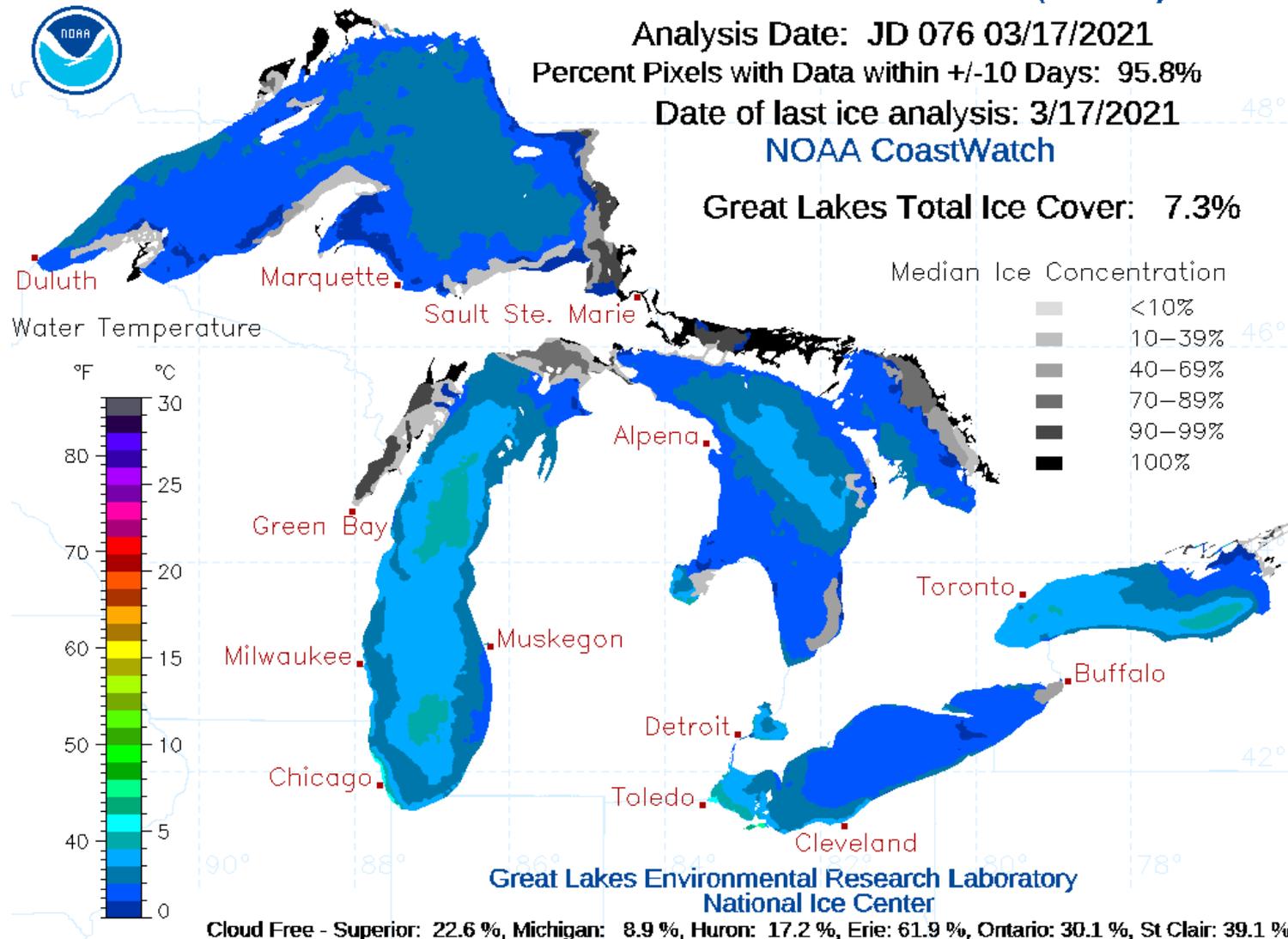
Analysis Date: JD 076 03/17/2021

Percent Pixels with Data within +/-10 Days: 95.8%

Date of last ice analysis: 3/17/2021

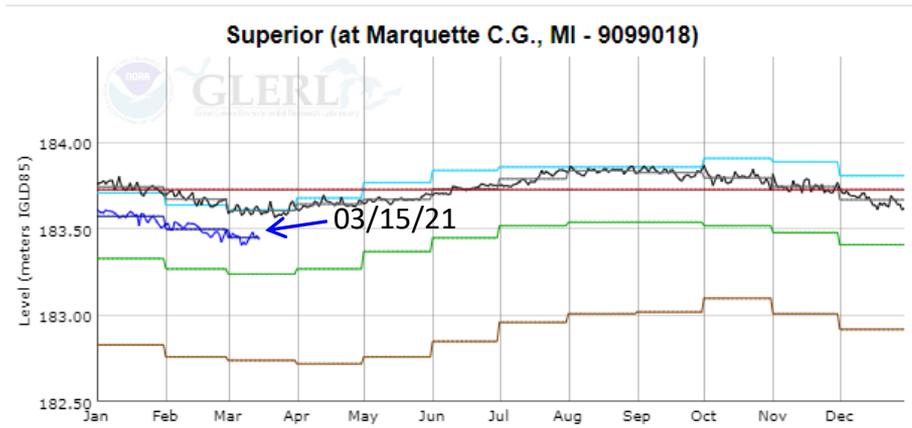
NOAA CoastWatch

Great Lakes Total Ice Cover: 7.3%

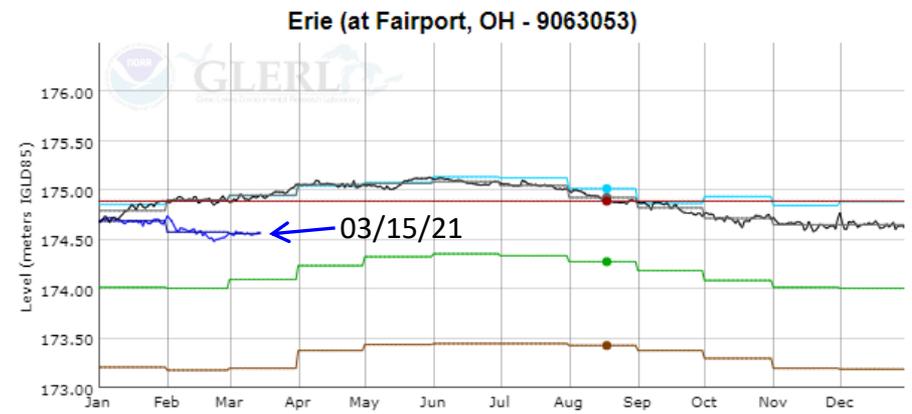
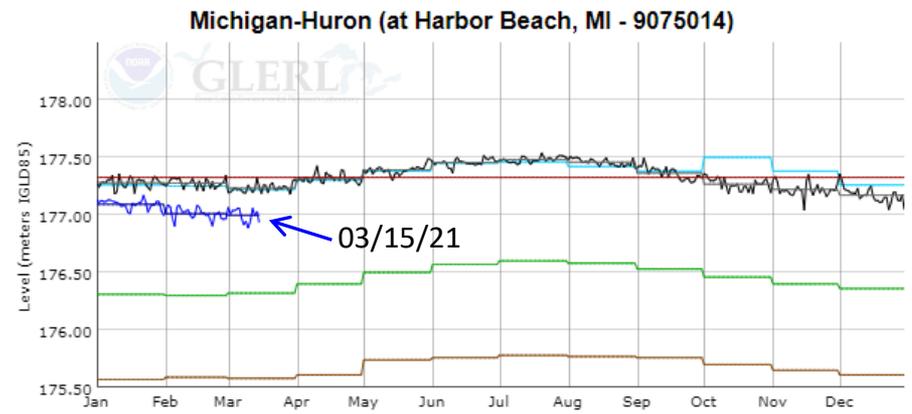


<https://www.glerl.noaa.gov/data/ice/>

Great Lakes Water Level



- Record hi daily lake levels —
- 2020 daily lake levels —
- 2020 annual avg lake levels —
- 2021 daily lake levels —
- Average daily lake levels —
- Record low daily lake levels —



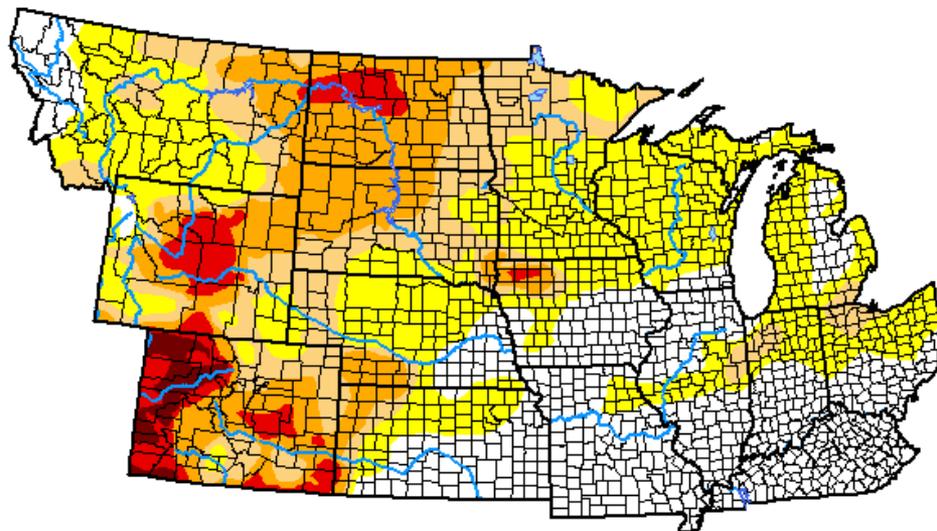
U.S. Drought Monitor

U.S. Drought Monitor NWS Central Region

March 16, 2021
(Released Thursday, Mar. 18, 2021)
Valid 8 a.m. EDT

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	28.16	71.84	38.50	21.47	6.34	1.36
Last Week <i>03-09-2021</i>	24.38	75.62	46.78	26.52	8.40	1.43
3 Months Ago <i>12-15-2020</i>	32.43	67.57	45.27	24.23	12.18	2.52
Start of Calendar Year <i>12-29-2020</i>	30.52	69.48	46.07	24.23	12.18	2.52
Start of Water Year <i>09-29-2020</i>	29.60	70.40	37.34	17.96	7.13	0.24
One Year Ago <i>03-17-2020</i>	90.91	9.09	4.66	0.44	0.00	0.00



Intensity:

None	D2 Severe Drought
D0 Abnormally Dry	D3 Extreme Drought
D1 Moderate 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:

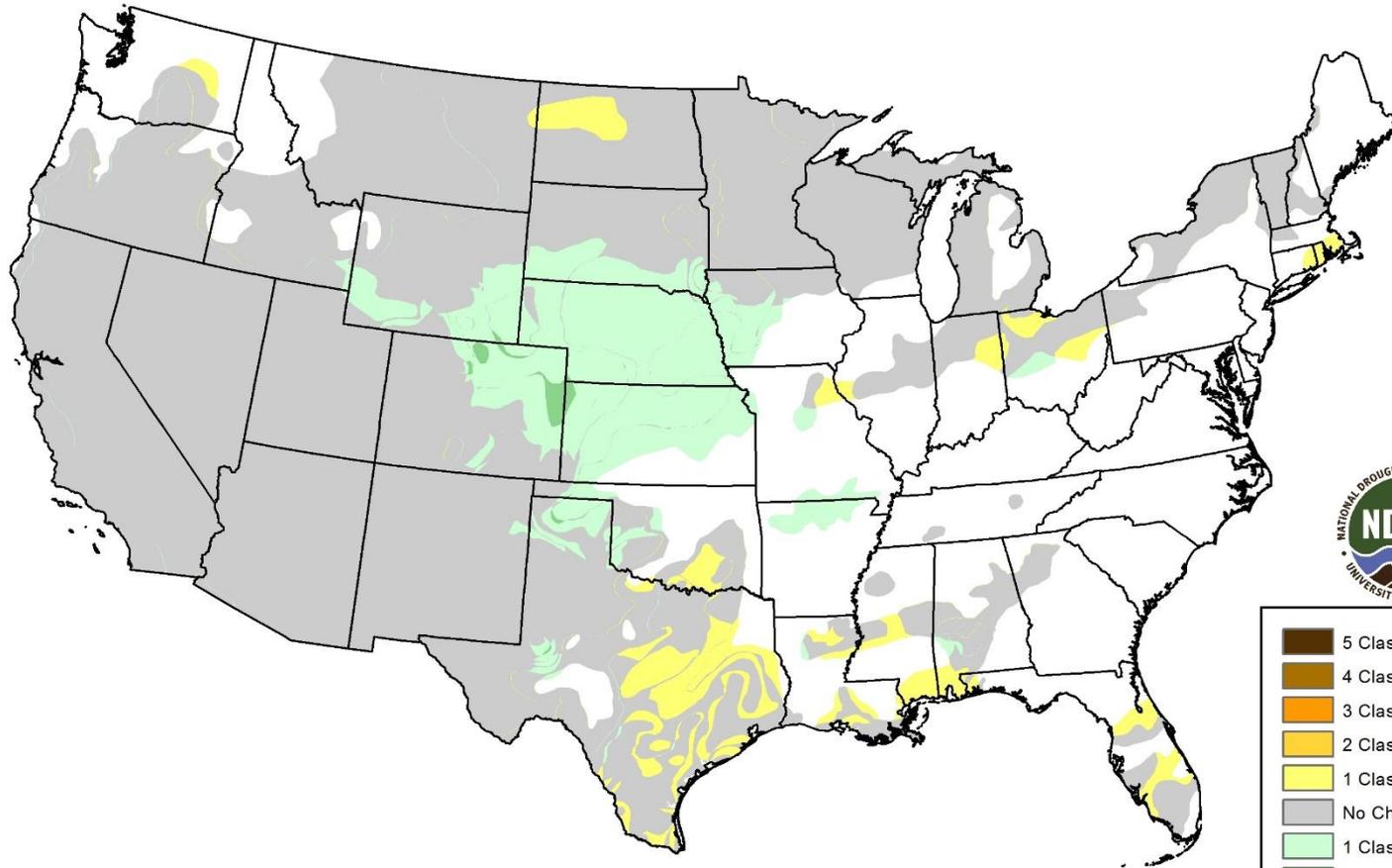
Brad Pugh
CPC/NOAA



droughtmonitor.unl.edu

1-Week U.S. Drought Monitor Class Change

U.S. Drought Monitor Class Change - CONUS
1 Week



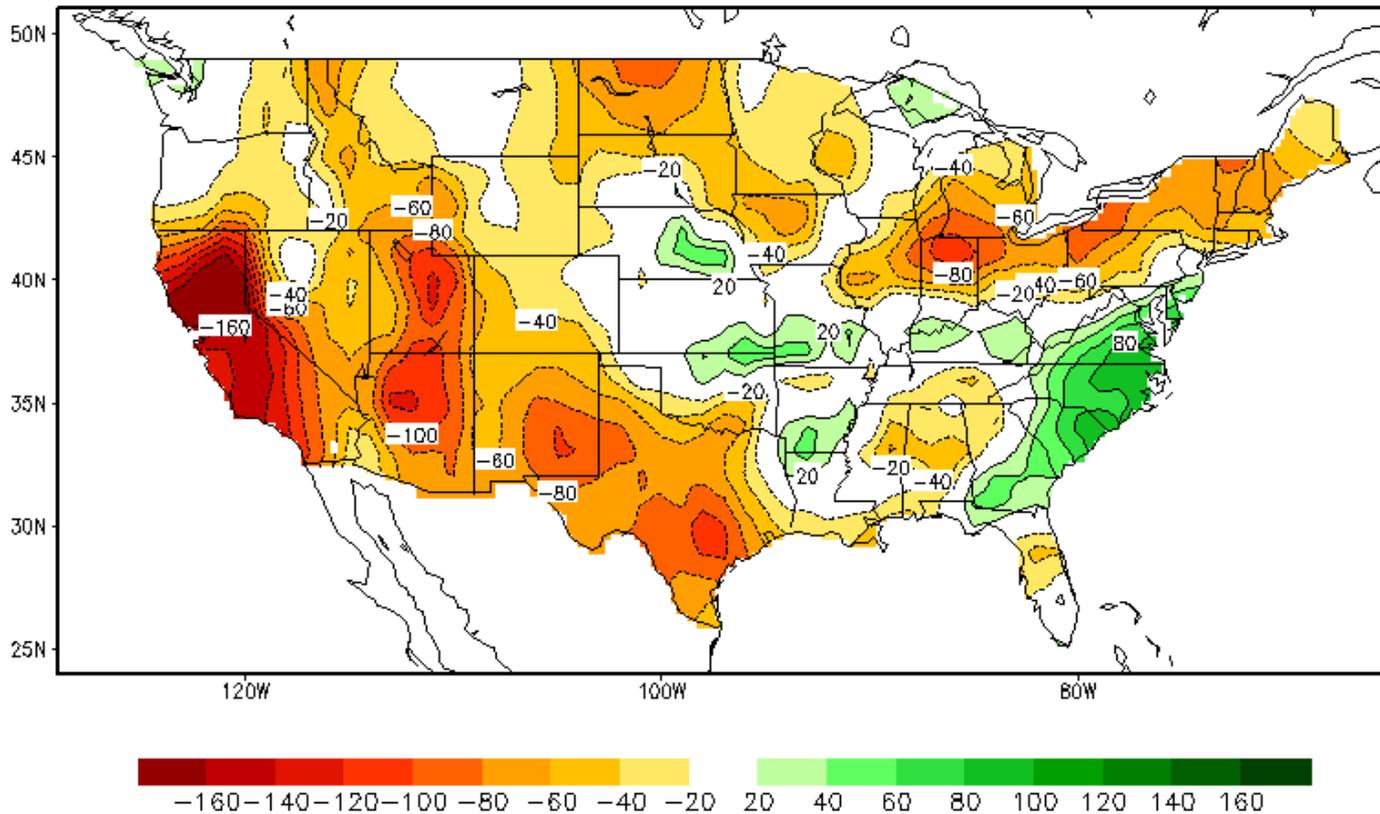
March 16, 2021
compared to
March 9, 2021

droughtmonitor.unl.edu

- 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

Soil Moisture

Calculated Soil Moisture Anomaly (mm)
MAR 17, 2021



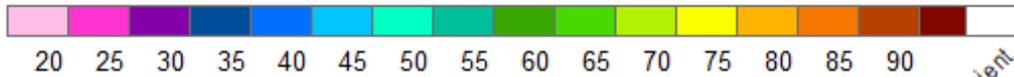
Notes:

- Full Field:** unit is mm and the maximum is set to be 760 mm in the model. With a porosity of 0.47 this corresponds to a model depth of about 1.6 meters
- Wetness:** ratio of calculated soil moisture (mm) to the maximum (760 mm)
- Anomaly:** departure from 1971-2000 Climatology (unit: mm)
- Ranking Percentile:** from 1932-2000 period

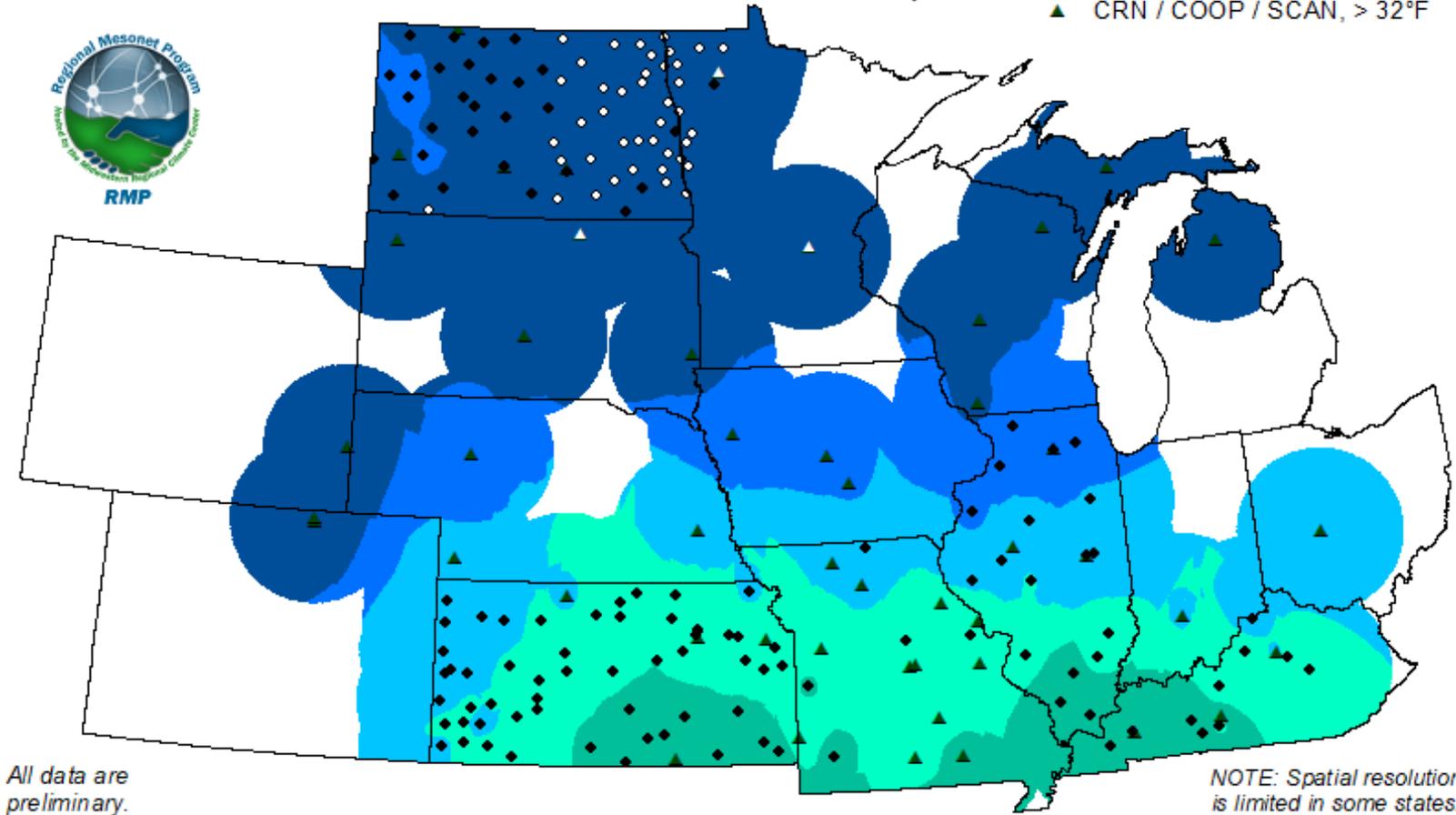
4-in Soil Temperatures Under Sod

4" Soil Temperature (°F) (Sod)

24-Hour Period Through 3/16/2021



- ◇ Mesonets, $\leq 32^\circ\text{F}$
- ◆ Mesonets, $> 32^\circ\text{F}$
- △ CRN / COOP / SCAN, $\leq 32^\circ\text{F}$
- ▲ CRN / COOP / SCAN, $> 32^\circ\text{F}$

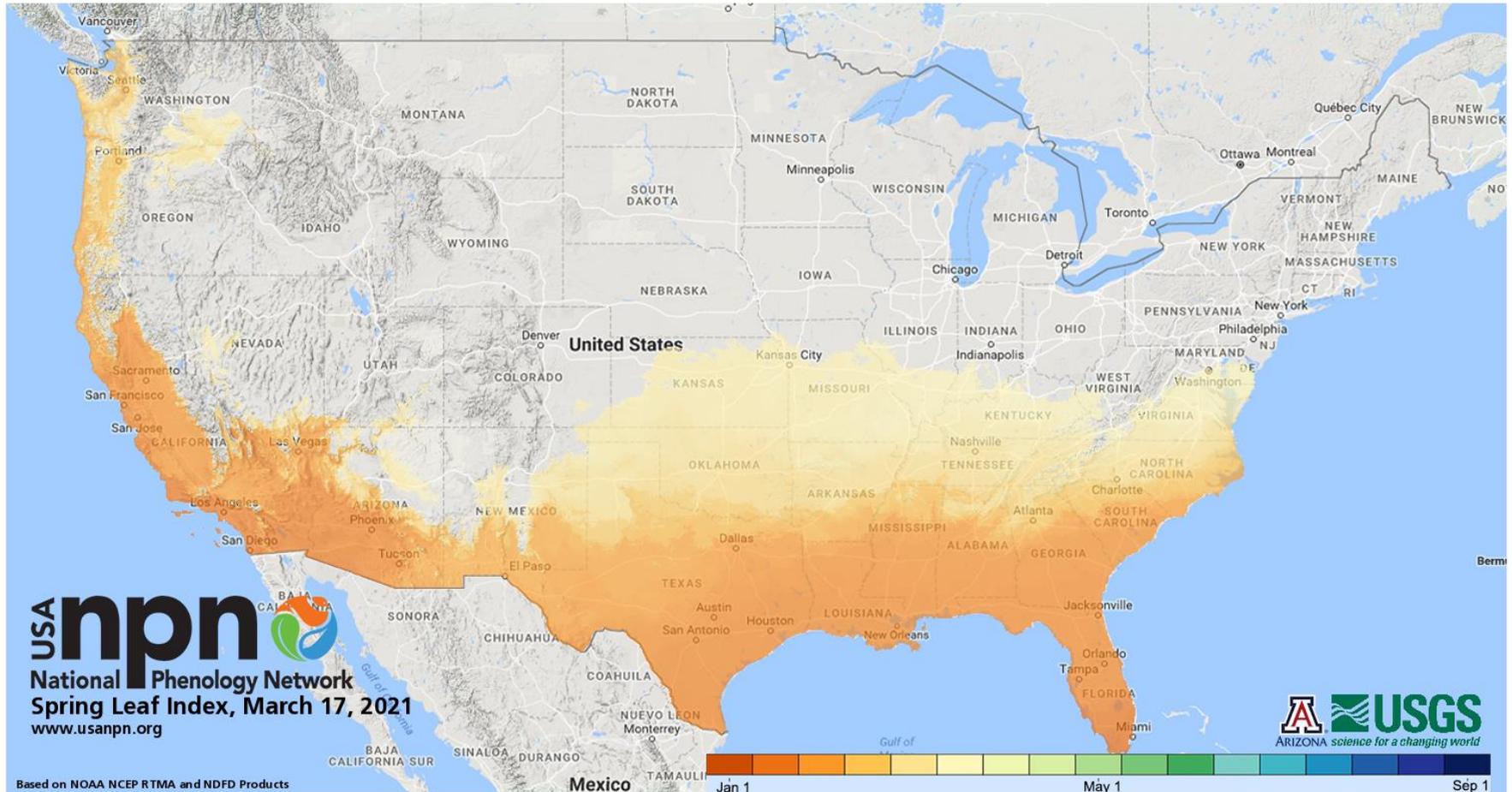


All data are preliminary.

The frost line is retreating northward with mild March conditions. Soils will have precipitation recharge opportunities where thawed.

<https://mrcc.illinois.edu/RMP/currentMaps.html#banner>

First Leaf Index as of March 17, 2021



The First Leaf Index shows locations that have reached the requirements for the Spring Leaf Index model so far this year.

<https://www.usanpn.org/news/spring>

State Impacts

Very dry conditions in Eastern Montana where moderate to severe drought exists. Culled livestock are a possibility if precip doesn't arrive soon to recharge soils and provide moisture for pasture growth. Increase of releases from Gavins Point has been delayed for navigation season until the high stages and flows from the lower MO River basin decline.

Driest winter on record & driest Sep-Feb on record. Producers are reporting no spring runoff, pastures with little to no soil moisture, concern for grass growth, sloughs dried up last fall & stock ponds low. Wild fires have burned more than 20,000 acres. Significant precip in Mar-Apr will be critical for crops and livestock

Moderate drought impacting Northern 1/3 of MN. The Red River is currently sending a crest downstream below bankfull. Snow depth is trace at International Falls. Very warm March, so far. Early snowpack has melted and runoff for the Mississippi Basin. Tributary streams are past crest, with most below flood stage. The mainstem Mississippi is cresting in NE Iowa, below bankfull. Dry conditions continue, especially across southern half of state, soils thawed

Good runoff from the UP and northern WI. Lake Superior, Lake Michigan, Lake Huron, & Lake Erie remain well above long-term average but below 2020's record levels. Lower levels are due to below avg Nov-Mar precip.

Dry in northern IN, soils need moisture. Wetter in southern half of state, where flood risk remains into early April

Dry across northern half of OH, especially NW OH out to 6-months. Wetter conditions over southern OH where flood risk remains into early Apr.

Significant flood in early March, major to record flooding on KY River. Water rescues, evacuations, flooding of buildings, and navigation hindered due to debris. Flood risk remains into April.

Mid-March snowstorm brought big improvements to southeastern WY with some areas receiving 1-3"+ of SWE and 1-2-category DM improvement in 1-week! Report from CO Extension offices mention livestock impacts from the storm, particularly calves that would get covered in the snow and then consequently trampled by cattle, however nothing widespread or any big numbers of losses. Also, moisture will help winter wheat areas.

Mid-March winter storm clipped southern half of SD with beneficial precip, from 0.5" SWE in central sections to ~2" SWE along NE border. Most state south of I-90 is thawed out, so moisture will infiltrate. NW corner of state is driest and soil moisture statewide still running 20-50% shorter in profile compared to last year at this time. Minimal damage reported to winter wheat and alfalfa from February cold.

Ice out anticipated in 10 days in central and south MN. Soils have thawed across south and winter barley already greening up around St. Paul.

Mid-March storm brought 4-9" of snow to northern 1/3 of IA, while southwest corner of state received 3-5" of rain. Soil profile was thawed out at the time so moisture will be good for recharge in drought affected areas of western IA. Wetter conditions exist in southern & eastern IA. No drought statewide.

Feb 19-Mar 14 very dry across northern 1/2 of IL. Despite hefty Feb snowpack, flooding issues were sparse in northern & central IL. Recent rain event helped, but need more.

Wet in southern IL where flood risk remains, with delayed fieldwork & planting concerns.

Widespread minor to moderate flooding due to heavy mid-March rain events. Flash flooding, road closures & water rescues reported in SW MO with reports of 6-8" between Mar 12-15. Fieldwork delays inevitable. Bootheel also received heavy rain at the end of February.

Mid-March snowstorm brought big improvements mainly east of the Continental Divide with some areas receiving 2"+ of SWE and 1-2-category DM improvement in 1-week! Precip was a healthy boost for South Platte Basin and Arkansas Basin. The heavy snow closed major highways & increased avalanche risk. Western CO lagging behind with only minor increases in percent snowpack & extreme to exceptional drought continuing, avg snowpack is unlikely to occur & agricultural & recreational losses mounting

Highly unusual heavy and widespread mid-March precip event. Most of the state received 2"+ of liquid equivalent. Up to 18" snow in the panhandle, and rainfall totals of 4-6" reported along the mid-to-lower Platte River, from Kearney to Omaha. The Platte River is running strong but soils were so dry and thawed, no flooding was reported!! Great recharge in top layer but still dry from 1.5-3 ft.

Wheat was beginning to break dormancy and showing slight stress prior to Mid-March precip event, 2-3" totals were common in central KS with event. Fire danger was high prior to rain event, 50 mph winds on March 10 resulted in numerous grass fires in the Flint Hills. One fire was fought for 5 days in Shawnee Co. Rain event so significant, that Webster & Kerwin Reservoirs went into flood operation status.

Climate Outlooks

7-day precipitation forecast

6-10 day outlook

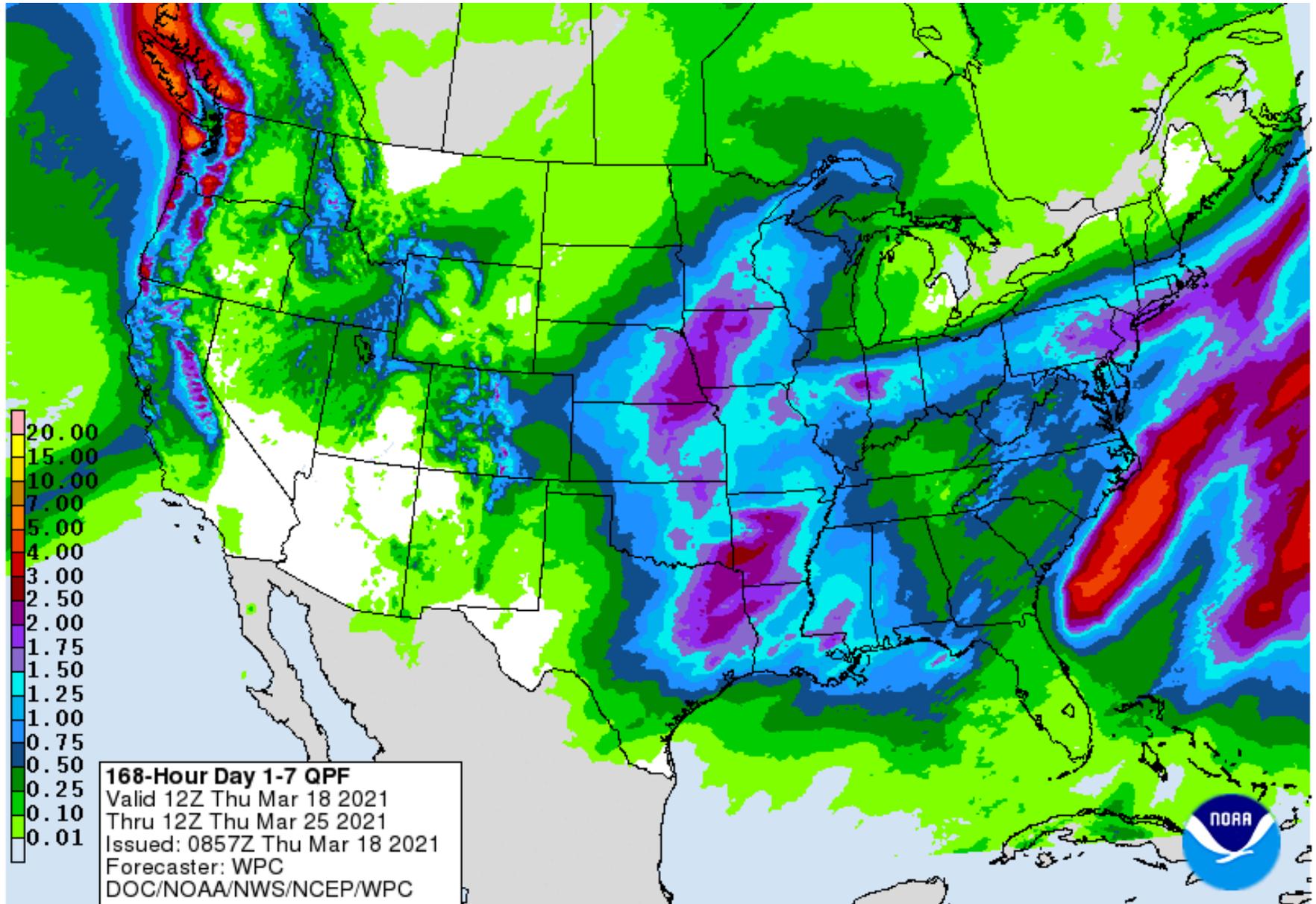
ENSO Predictions

April

Apr-May-Jun

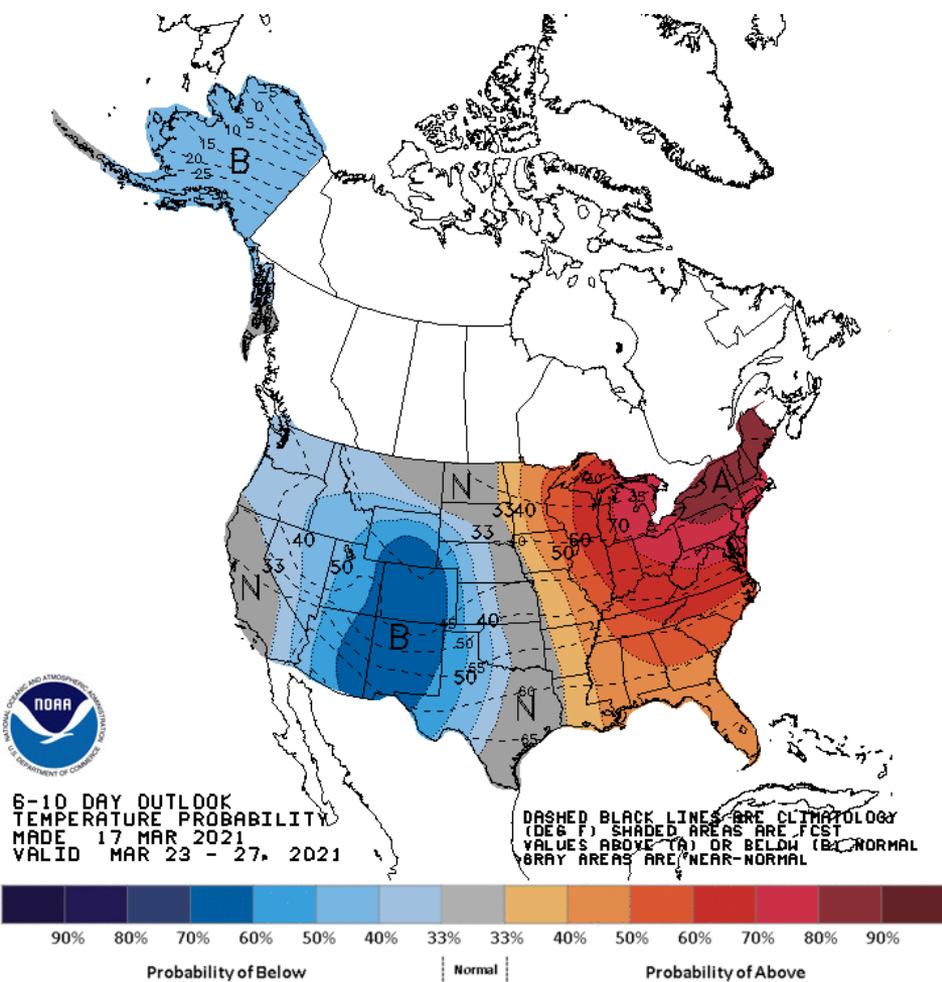
Jun-Jul-Aug

7-Day Precipitation Forecast

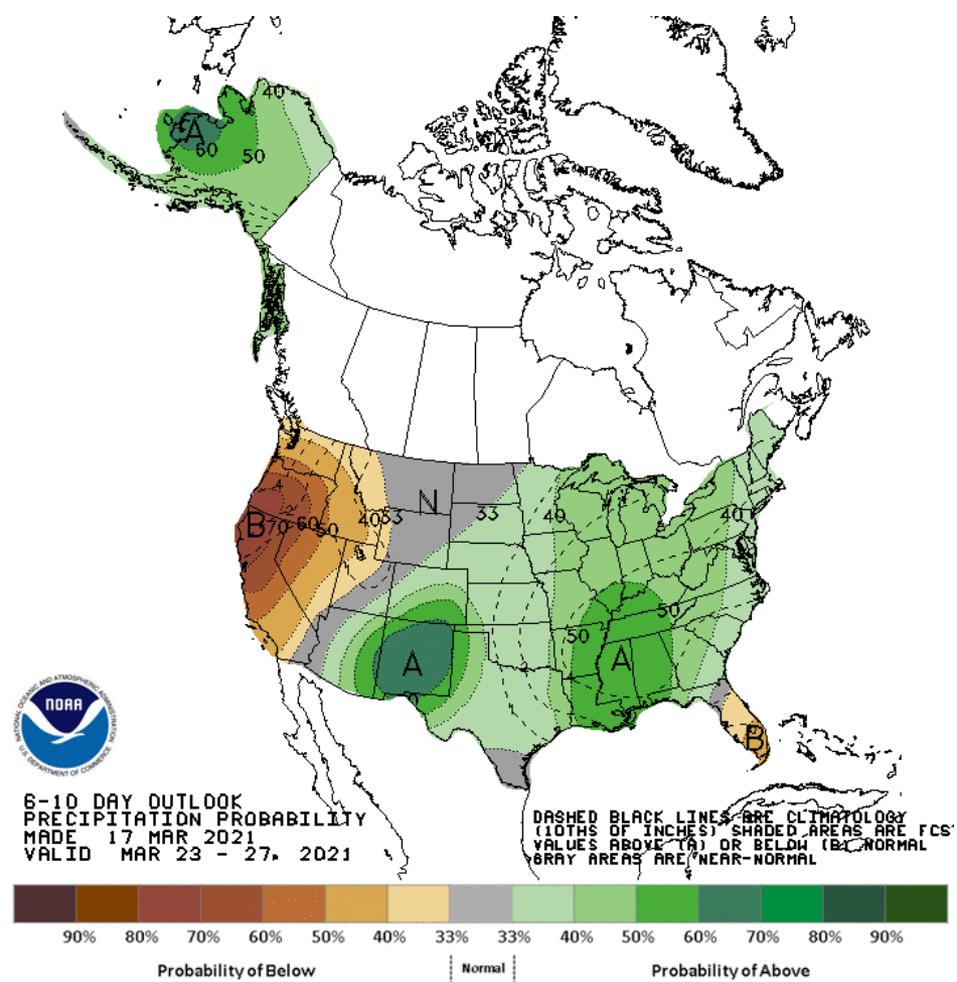


<http://www.wpc.ncep.noaa.gov/qpf/day1-7.shtml>

6-10 Day Temperature and Precipitation Outlook for Mar 23-27, 2021



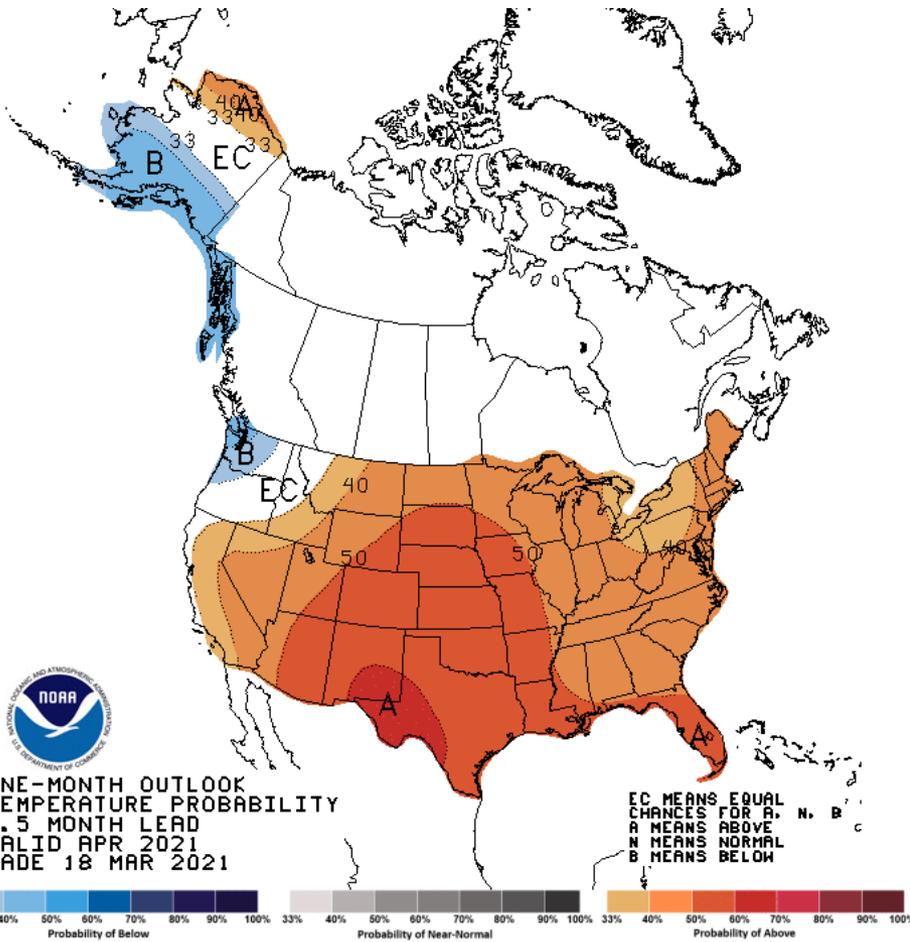
Temperature



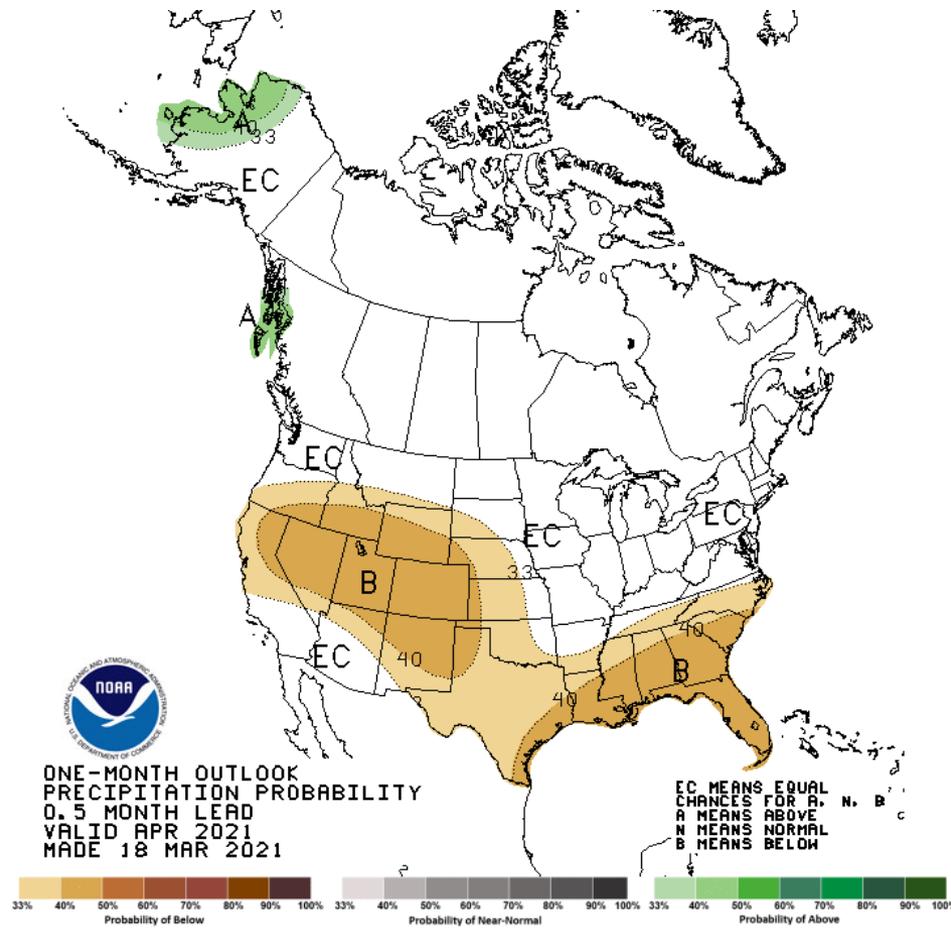
Precipitation

<http://www.cpc.ncep.noaa.gov/products/predictions/610day>

April Temperature and Precipitation Outlooks

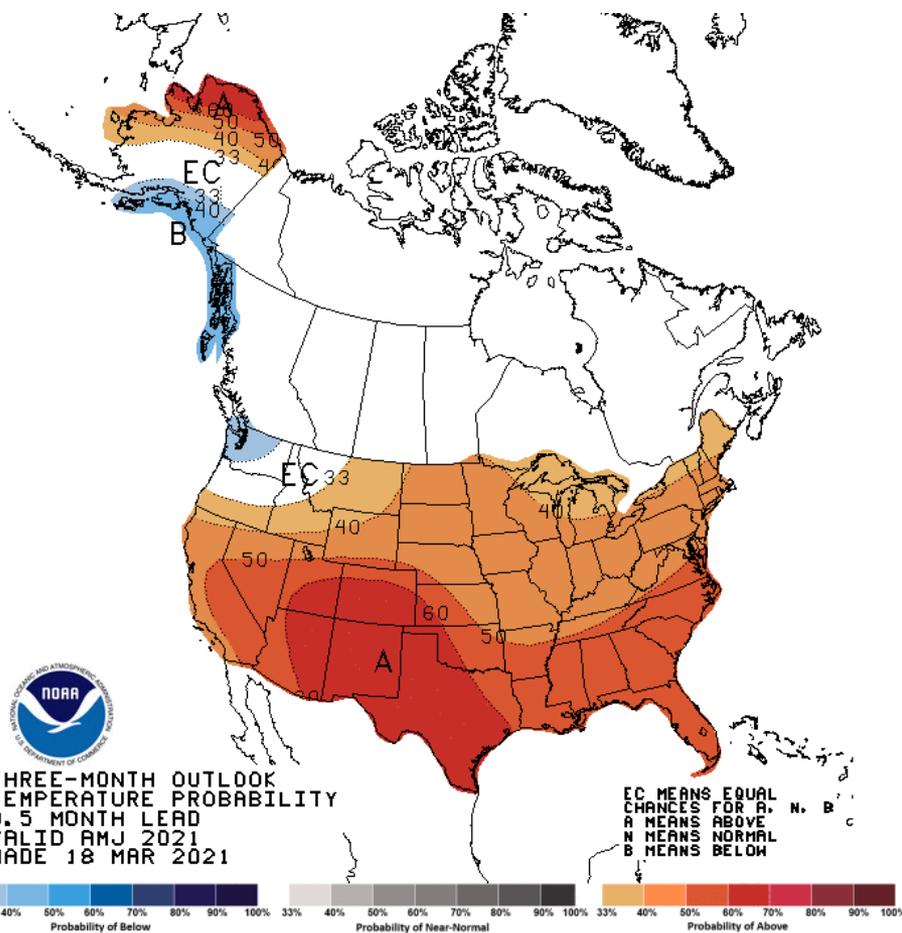


Temperature

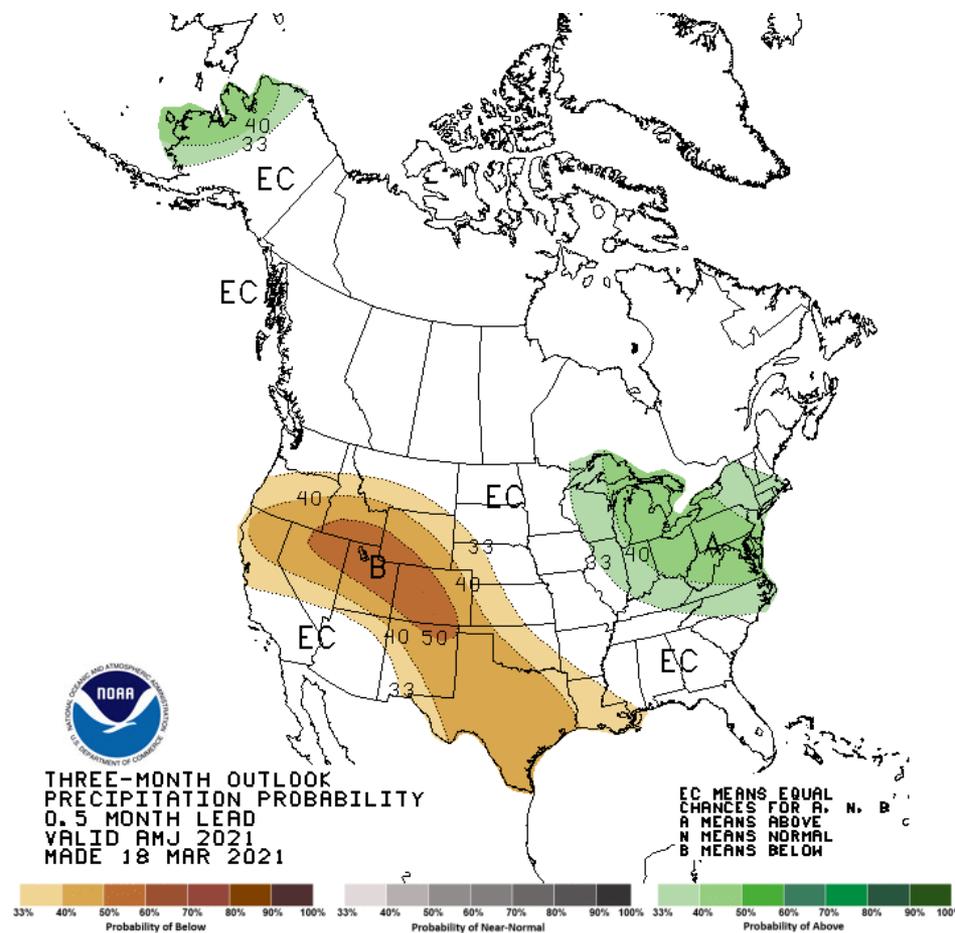


Precipitation

April-May-June Temperature and Precipitation Outlooks

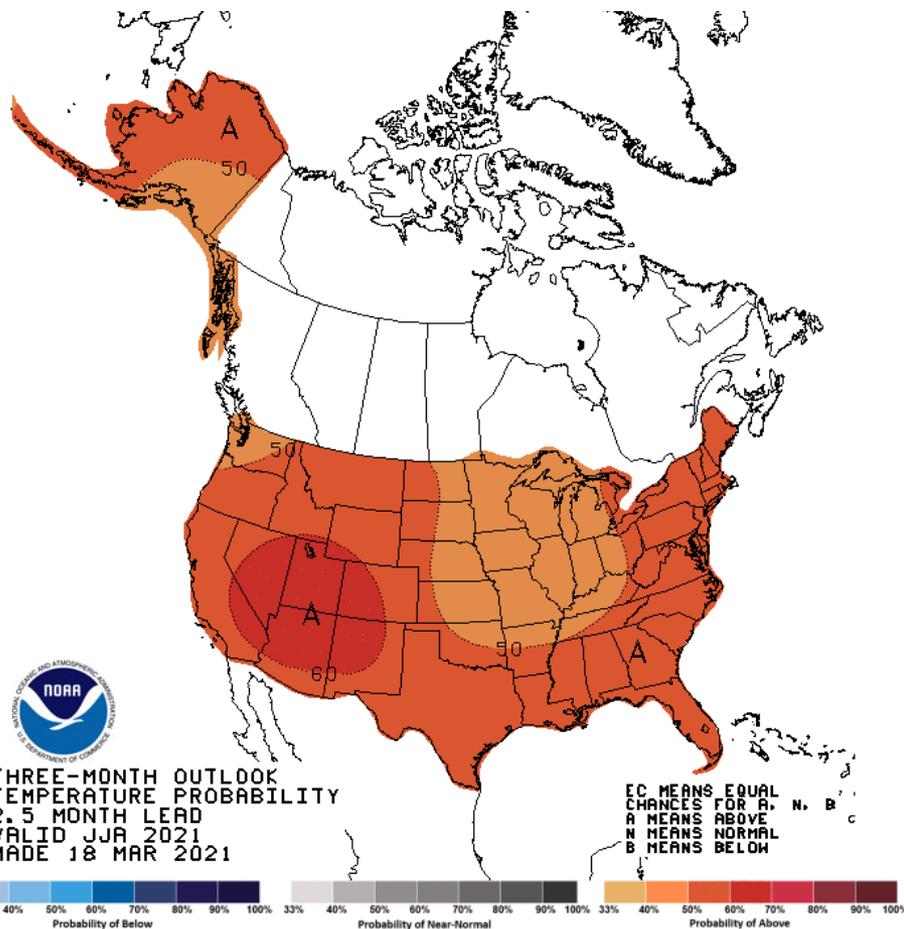


Temperature

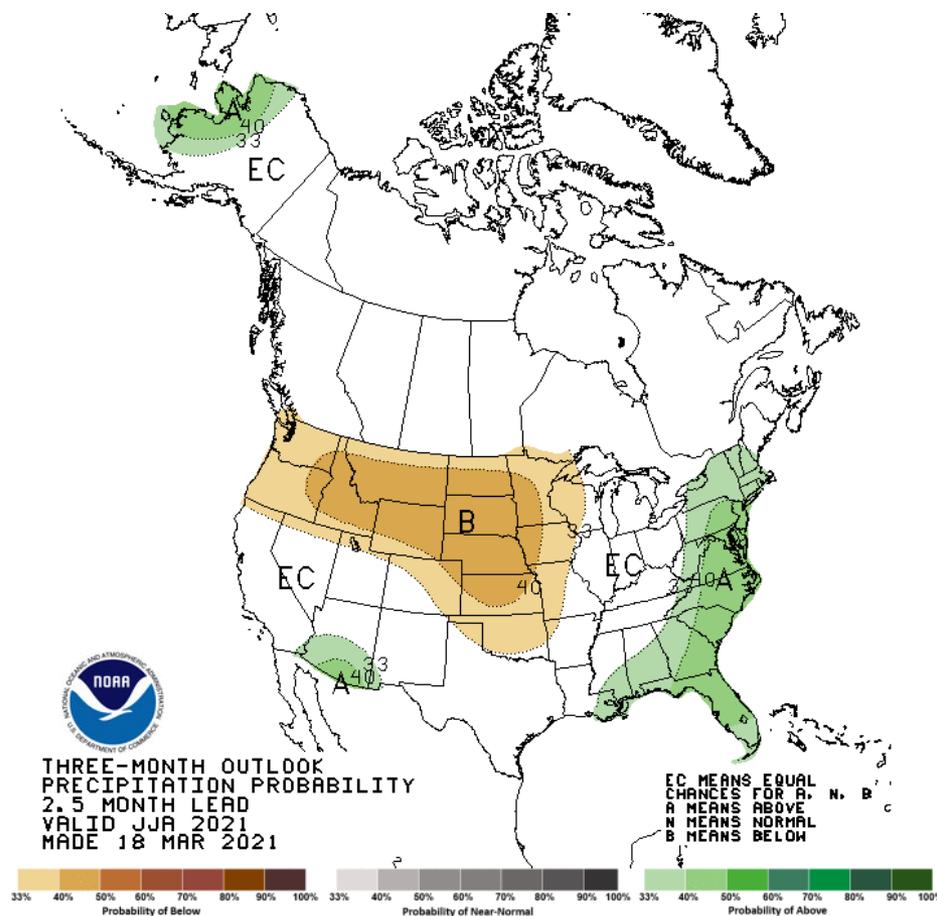


Precipitation

Jun-Jul-Aug Temperature and Precipitation Outlooks



Temperature



Precipitation

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: <http://drought.unl.edu>
- State climatologists <http://www.stateclimate.org>
- Regional climate centers
 - <http://mrcc.isws.illinois.edu>
 - <http://www.hprcc.unl.edu>

Thank You and Questions?

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