

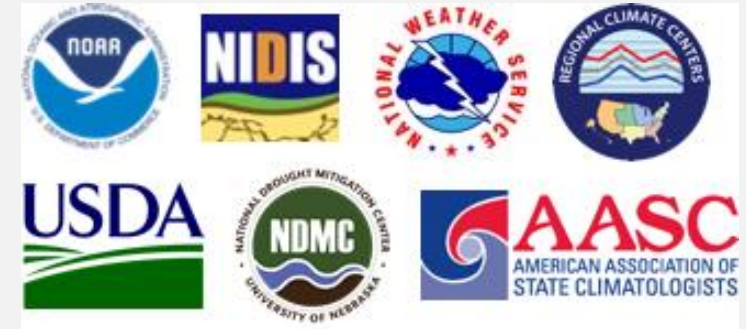
North Central U.S. Climate and Drought Outlook

June 2021

Stuart A. Foster
State Climatologist for Kentucky

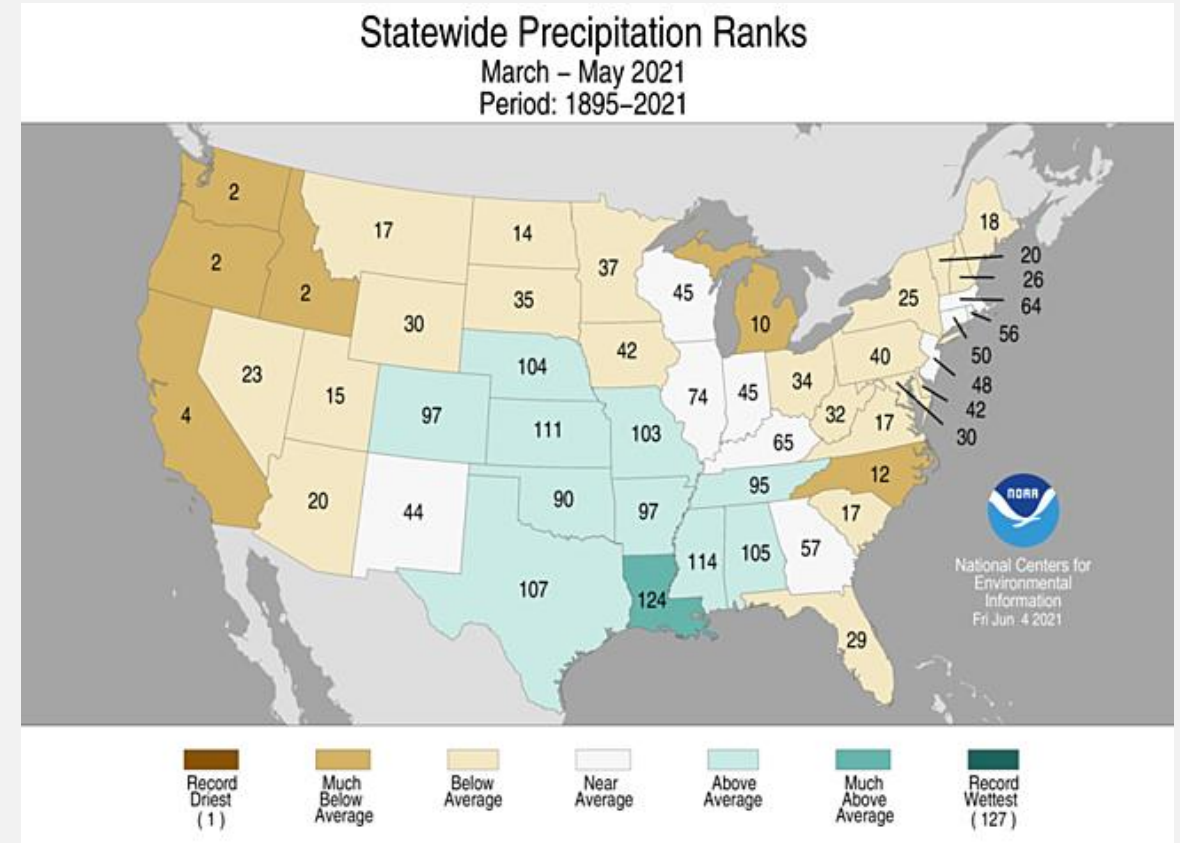
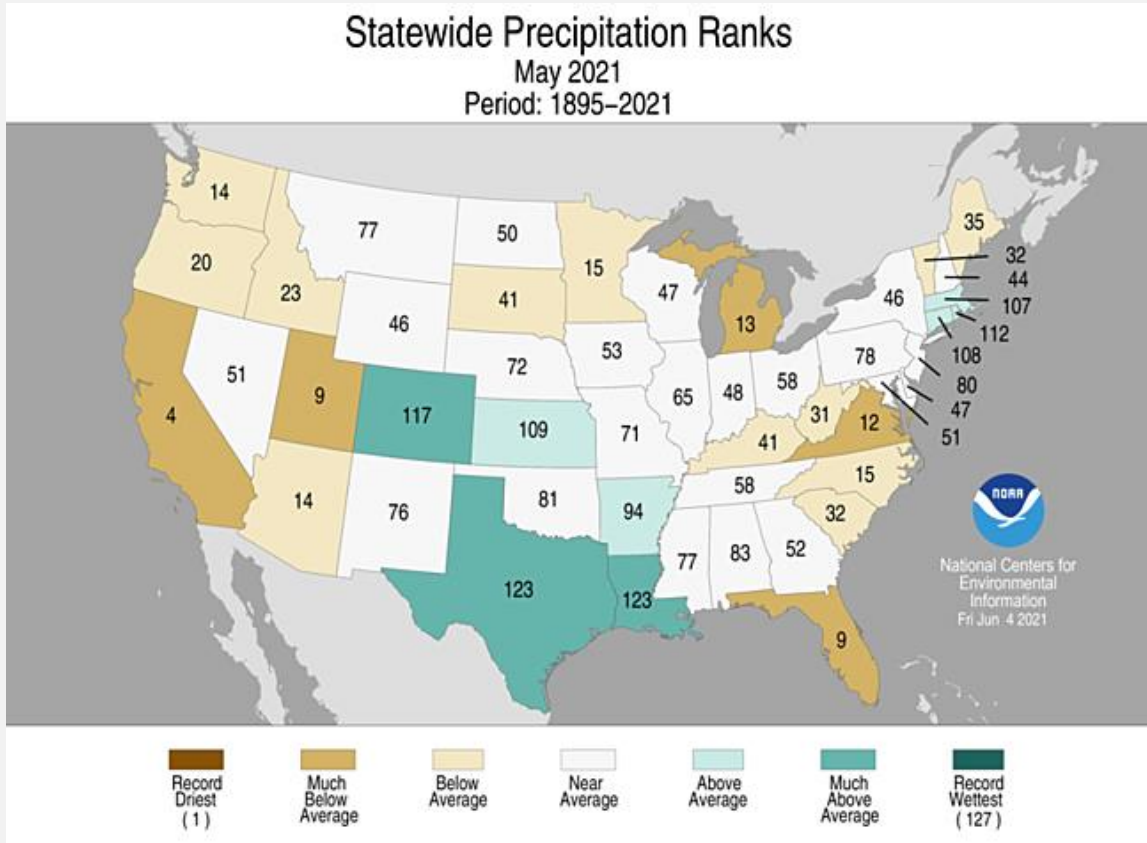


- Providing climate services to the North Central US through collaboration
 - NOAA NCEI/NWS/OAR/NIDIS
 - USDA Climate Hubs
 - American Association of State Climatologists
 - Midwest and High Plains Regional Climate Centers
 - National Drought Mitigation Center
- Next regularly scheduled webinar
 - July 15 (1 PM CDT) | Pete Boulay, Minnesota State Climatology Office
- Access to regional drought updates and a schedule of upcoming events
 - <https://www.drought.gov/latest>
- Access to Archived Climate Webinars
 - <https://mrcc.illinois.edu/multimedia/webinars.jsp>
 - <http://www.hprcc.unl.edu/webinars.php>
- Open for questions at the end



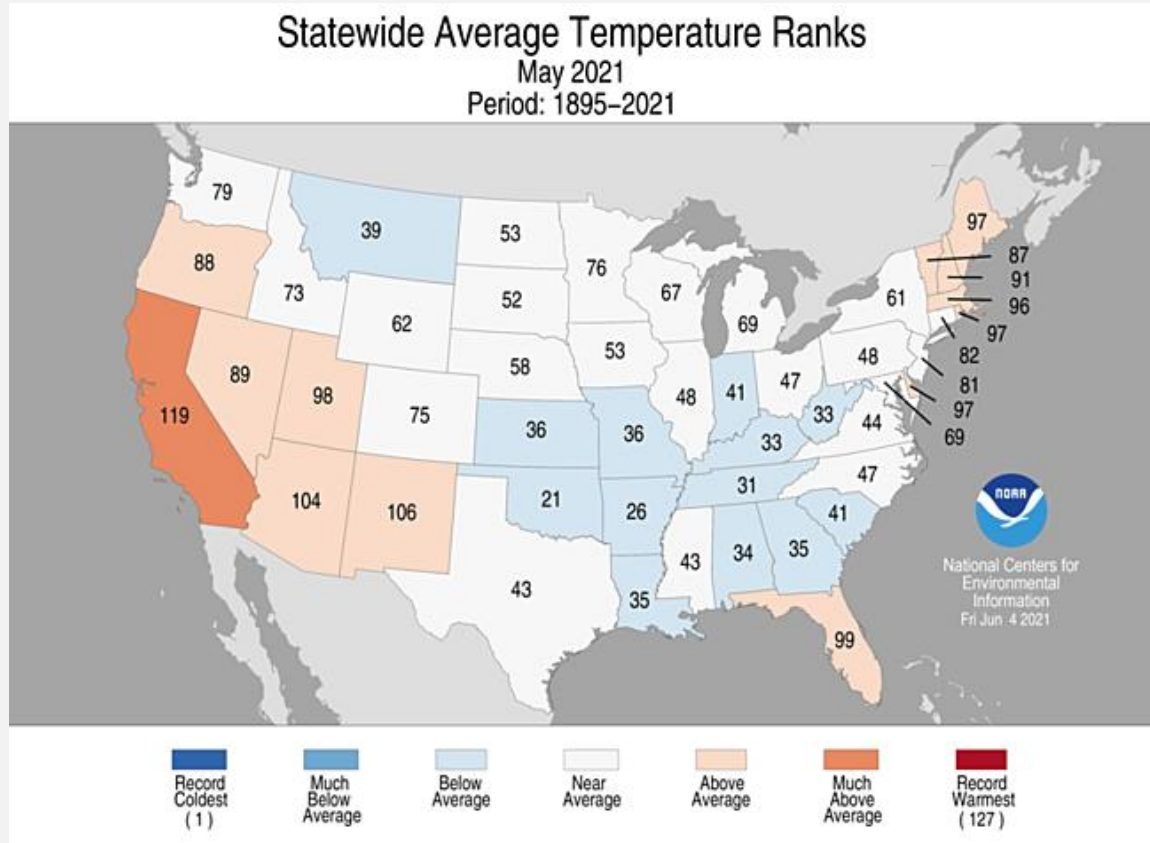
Agenda

- Current Climatic Conditions
- Current and Prospective Impacts
- Outlooks

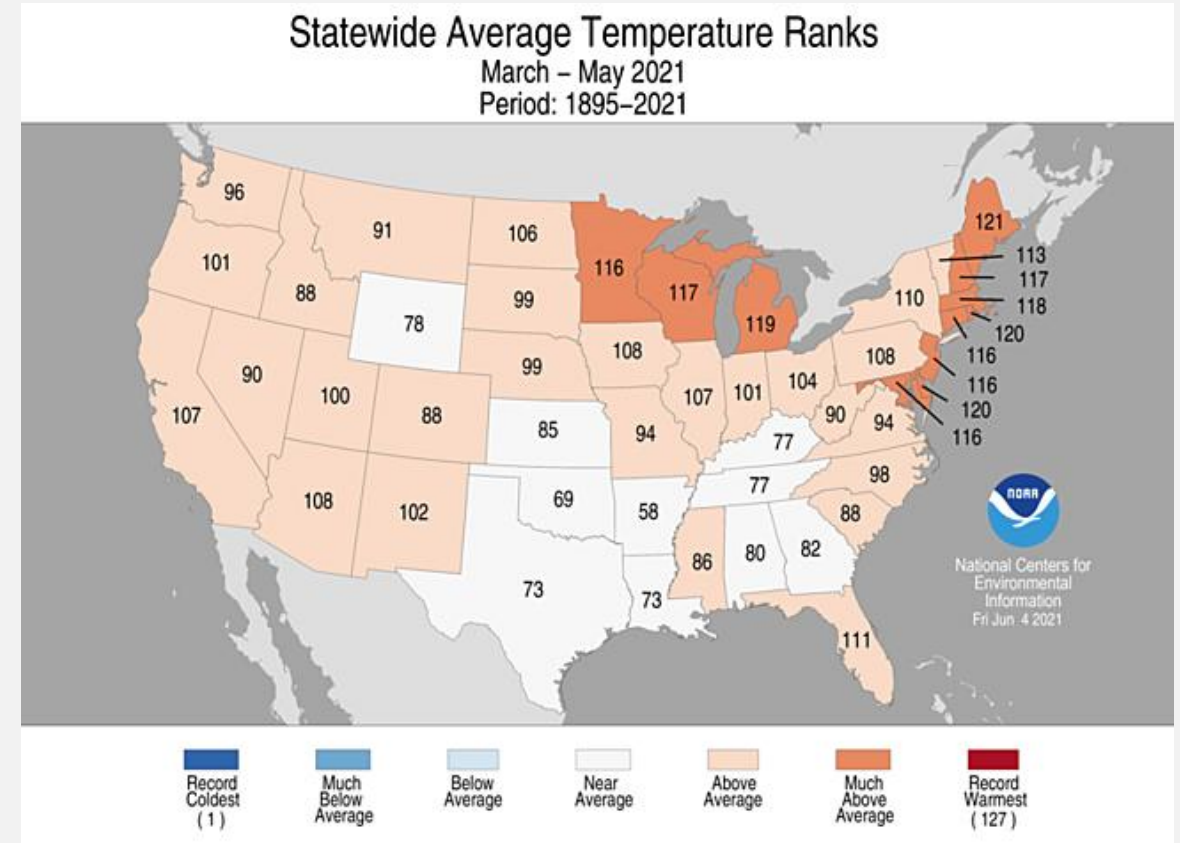


- Above average precipitation limited to eastern Colorado and Kansas during May

- Below average precipitation across the northern states, and much below average for Michigan

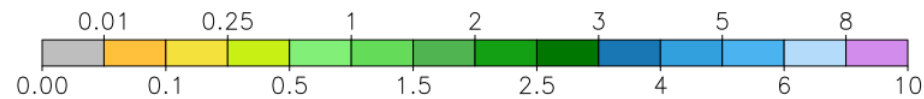
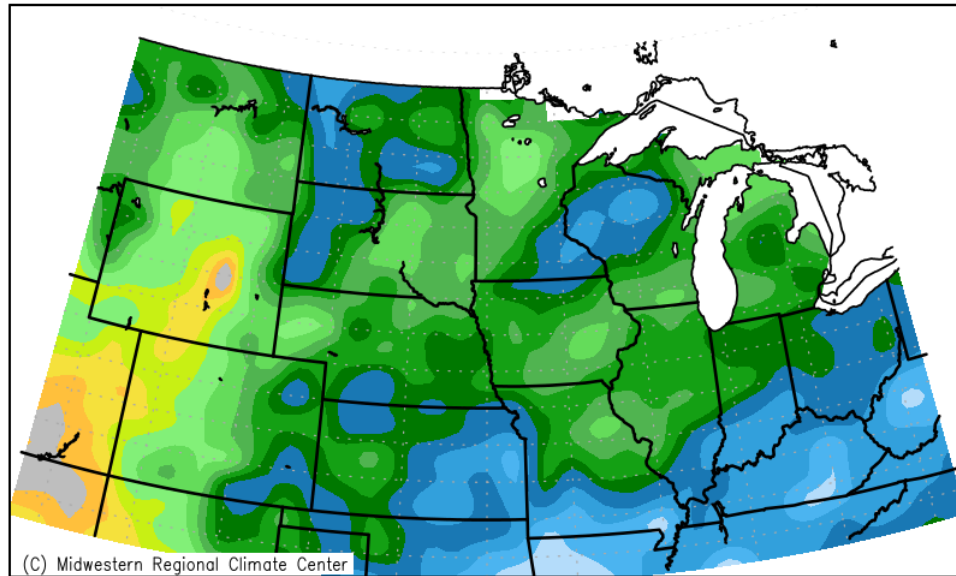


- Near average temperature, except below average in some states during May



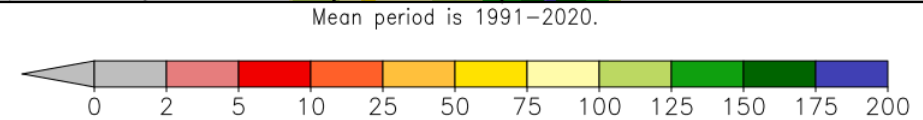
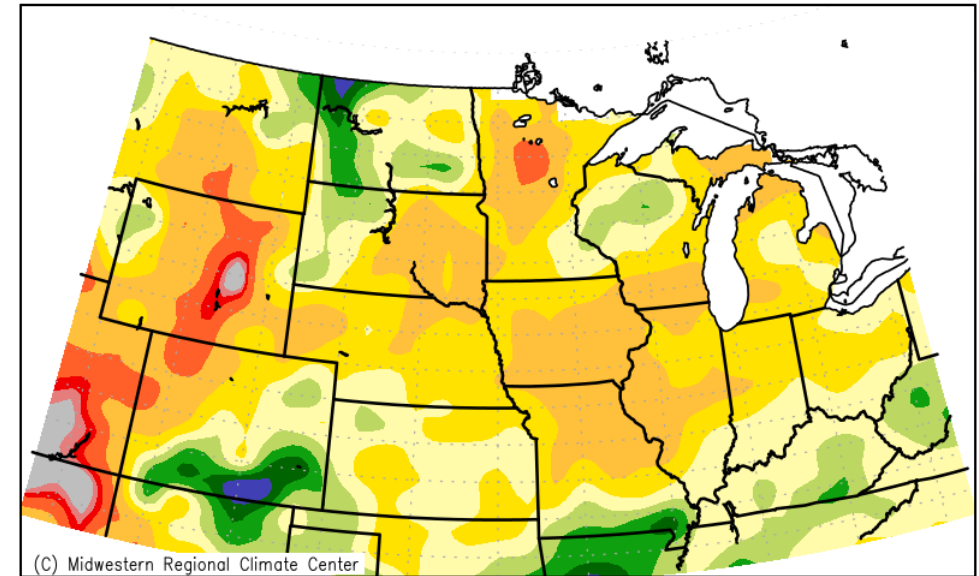
- Above to much above average temperatures for the season across most of the region, including top 10 warmest in upper Midwest

Accumulated Precipitation (in)
May 19, 2021 to June 17, 2021



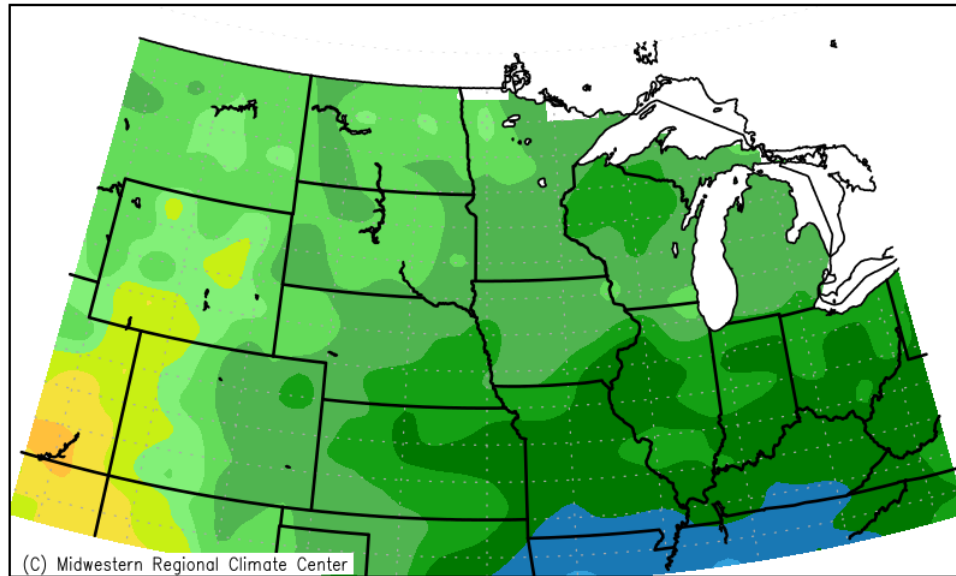
Midwestern Regional Climate Center
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Generated at: 6/17/2021 9:32:39 AM CDT

Accumulated Precipitation: Percent of Mean
May 19, 2021 to June 17, 2021



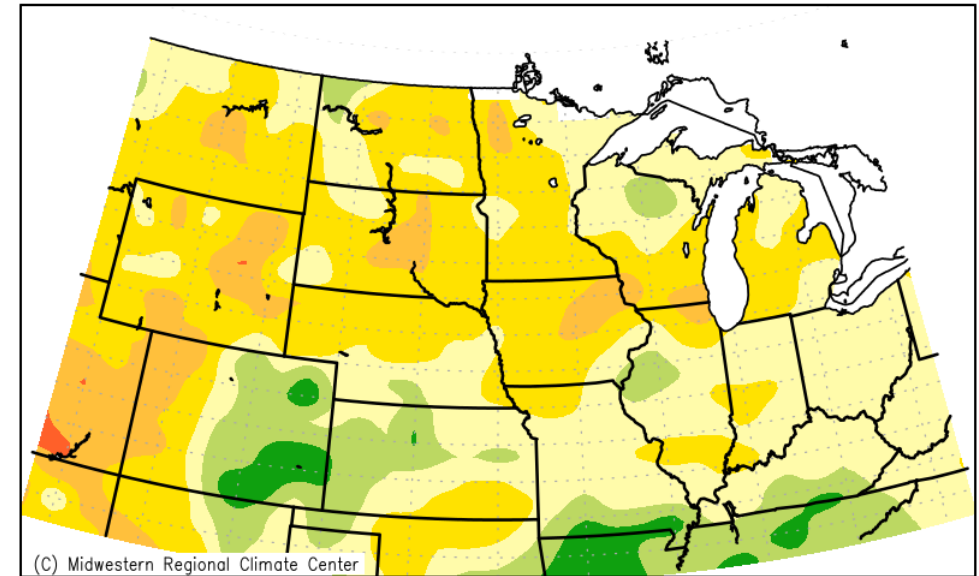
Midwestern Regional Climate Center
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Accumulated Precipitation (in)
March 20, 2021 to June 17, 2021

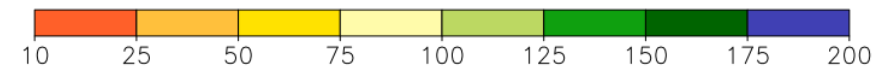


Midwestern Regional Climate Center
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Accumulated Precipitation: Percent of Mean
March 20, 2021 to June 17, 2021

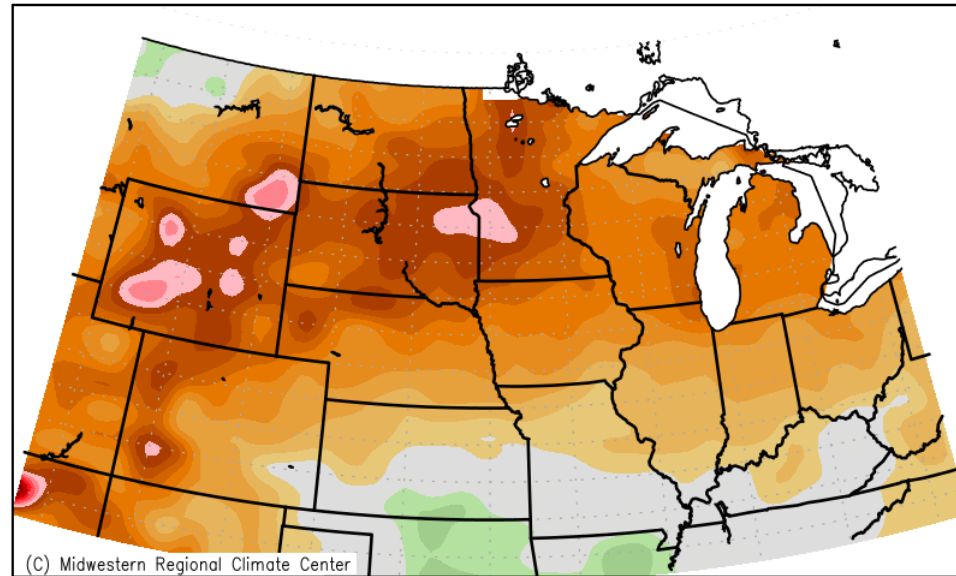


Mean period is 1991-2020.



Midwestern Regional Climate Center
cli-MATE: MRCC Application Tools Environment
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Average Maximum Temp. (°F): Departure from Mean
May 19, 2021 to June 16, 2021



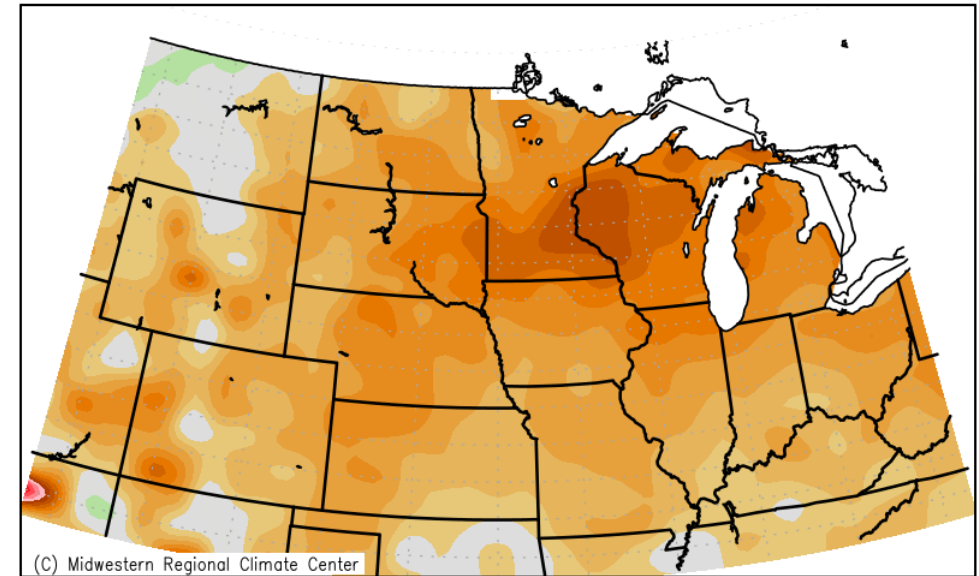
(C) Midwestern Regional Climate Center

Mean period is 1991–2020.



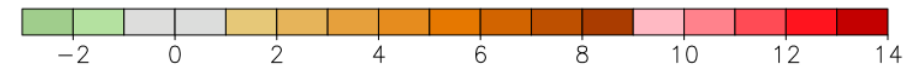
Midwestern Regional Climate Center
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Average Minimum Temp. (°F): Departure from Mean
May 19, 2021 to June 17, 2021



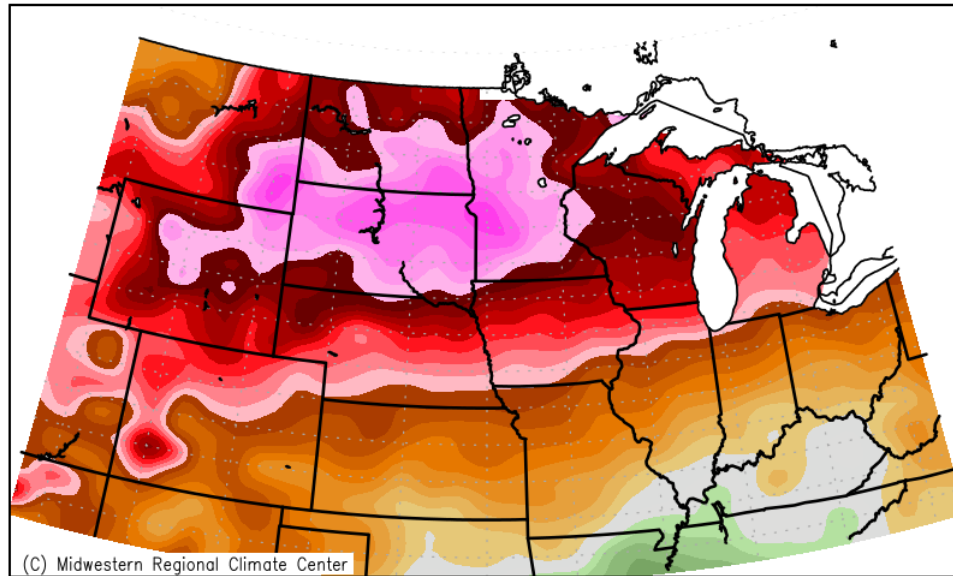
(C) Midwestern Regional Climate Center

Mean period is 1991–2020.



Midwestern Regional Climate Center
cli-MATE: MRCC Application Tools Environment
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Average Maximum Temp. (°F): Departure from Mean
June 3, 2021 to June 10, 2021



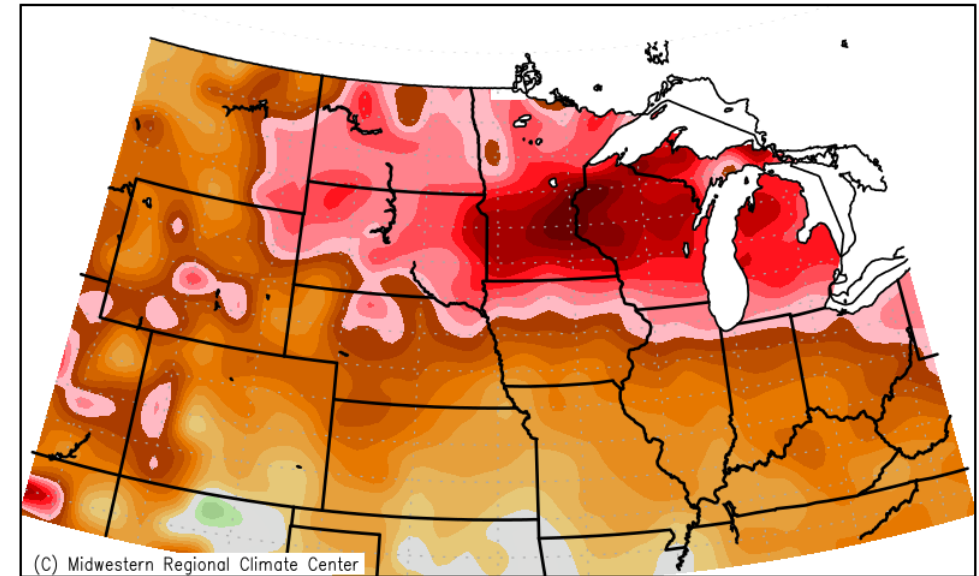
(C) Midwestern Regional Climate Center

Mean period is 1991–2020.



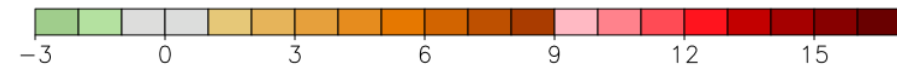
Midwestern Regional Climate Center
cli-MATE: MRCC Application Tools Environment
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Average Minimum Temp. (°F): Departure from Mean
June 3, 2021 to June 10, 2021



(C) Midwestern Regional Climate Center

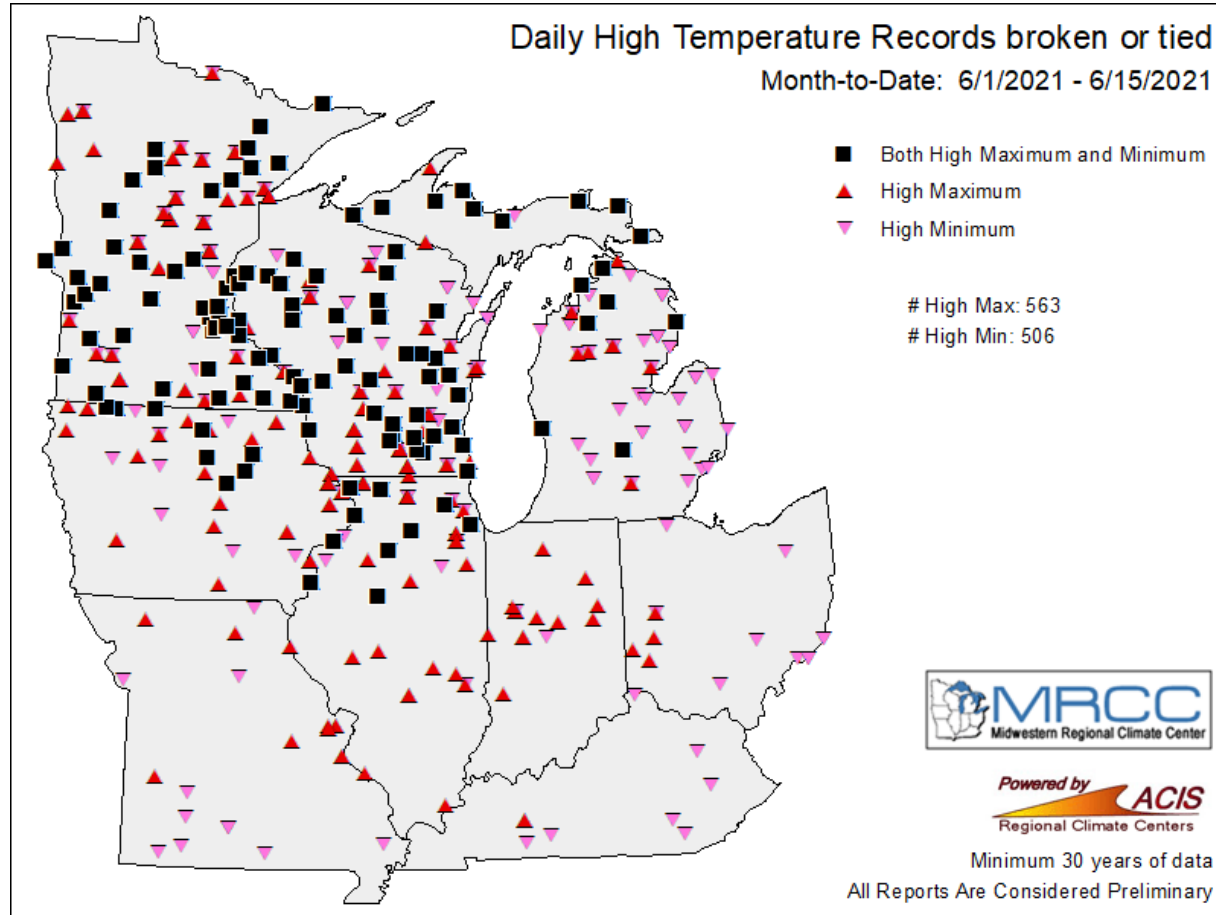
Mean period is 1991–2020.



Midwestern Regional Climate Center
cli-MATE: MRCC Application Tools Environment
Generated at: 6/16/2021 11:36:29 PM CDT

- An historically significant heatwave has exacerbated drought development

Across the Midwest ...



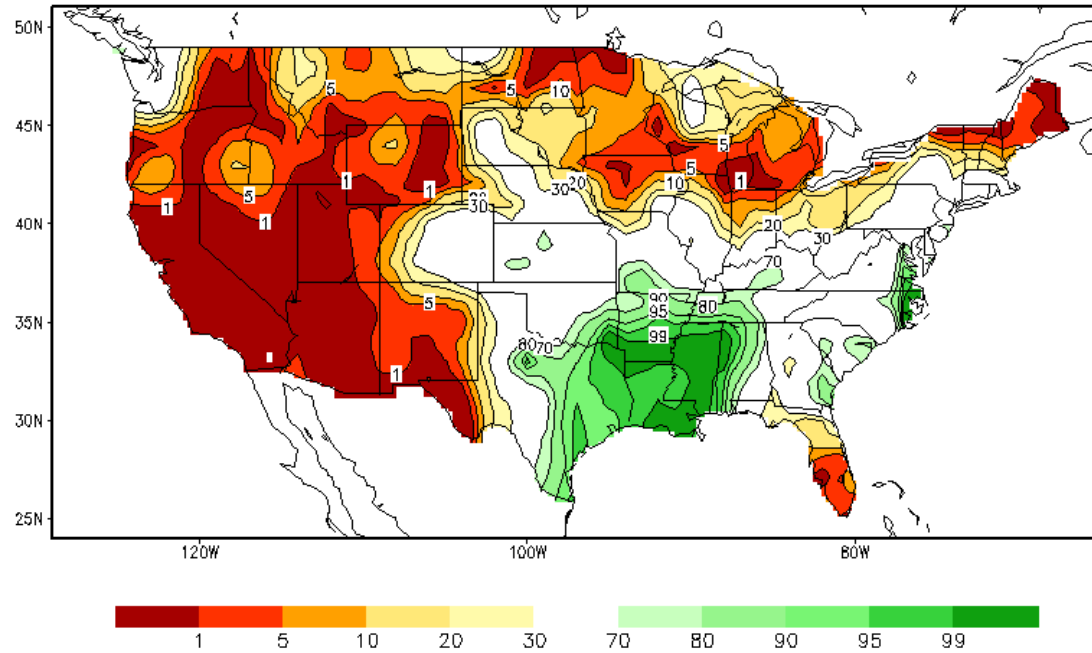
Credit: Mike Timlin

Across the Great Plains ...

- **Brainerd, Minnesota:** 100°F on June 4 – tied June record originally set on 6/19/1988. First triple-digit heat since 7/28/2006.
- **Bismarck, North Dakota:** 106°F on June 4 – highest June reading since 6/29/2002 (111°F). Highest temperature since 7/23/2007 (also 106°F).
- **Minot, North Dakota:** 105°F on June 4 – highest June temperature on record (was 102°F on 6/20/1988). Highest reading since 8/12/2018.
- **Mobridge, South Dakota:** 103°F on June 5 – highest June temperature since 6/09/2017 (also 103°F).
- **Aberdeen, South Dakota:** 104°F on June 5 – highest June temperature since 6/29/2002. Highest temperature since 7/17/2017 (also 104°F).
- **Sisseton, South Dakota:** 101°F on June 5 – highest June temperature since 6/24/1988. Highest temperature since 7/17/2017 (also 101°F).
- **Huron, South Dakota:** 101°F on June 5 – highest June temperature since 6/29/2002. Highest reading since 7/17/2017 (also 101°F).
- **Sioux Falls, South Dakota:** 101°F on June 5 – highest June temperature since 6/29/2002. Highest reading since 8/30/2012 (104°F).
- **Glasgow, Montana:** 100°F on June 3 – highest June temperature since 6/26/2012.

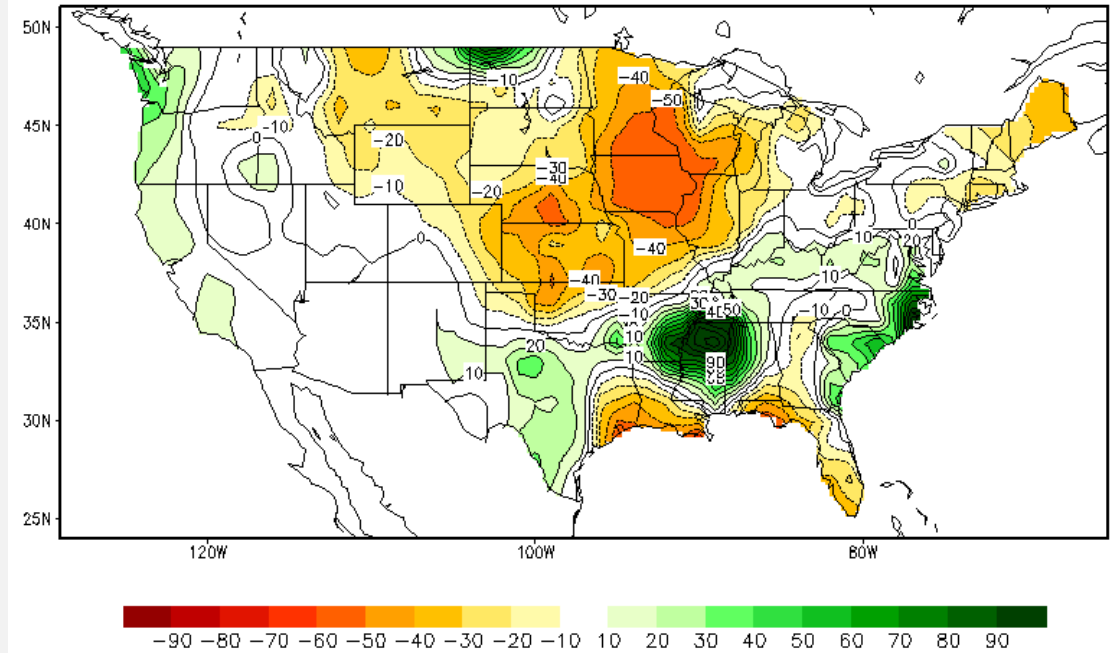
Credit: Brad Rippey and Crystal Stiles

Calculated Soil Moisture Ranking Percentile
JUN 15, 2021



- Persistent dryness combined with above average temperatures have depleted soil moisture

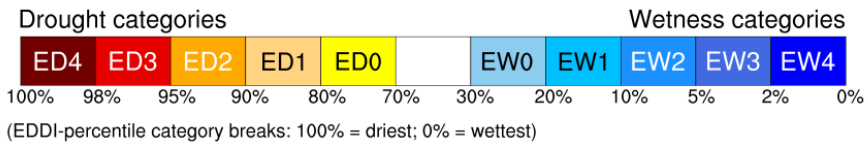
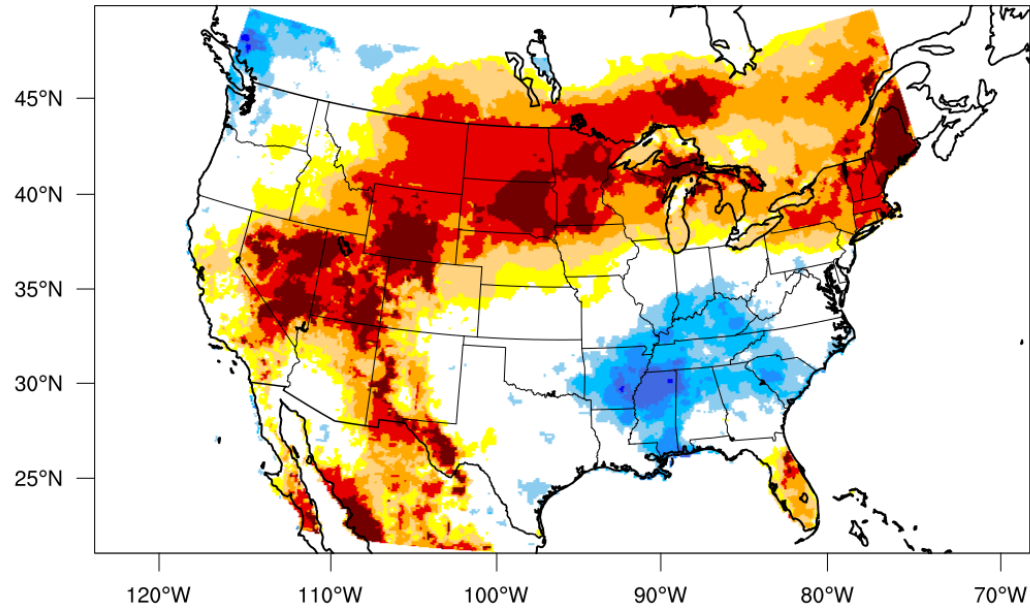
Calculated Soil Moisture Anomaly Change
JUN 15, 2021 from MAY 31



- Recent heatwave and dry weather have led to rapid soil moisture depletion in upper Midwest

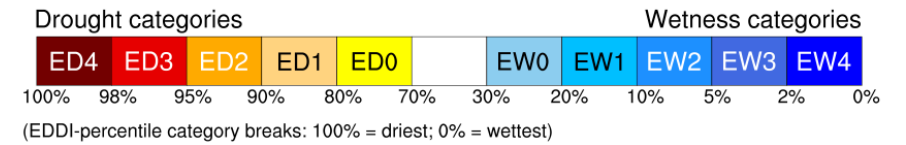
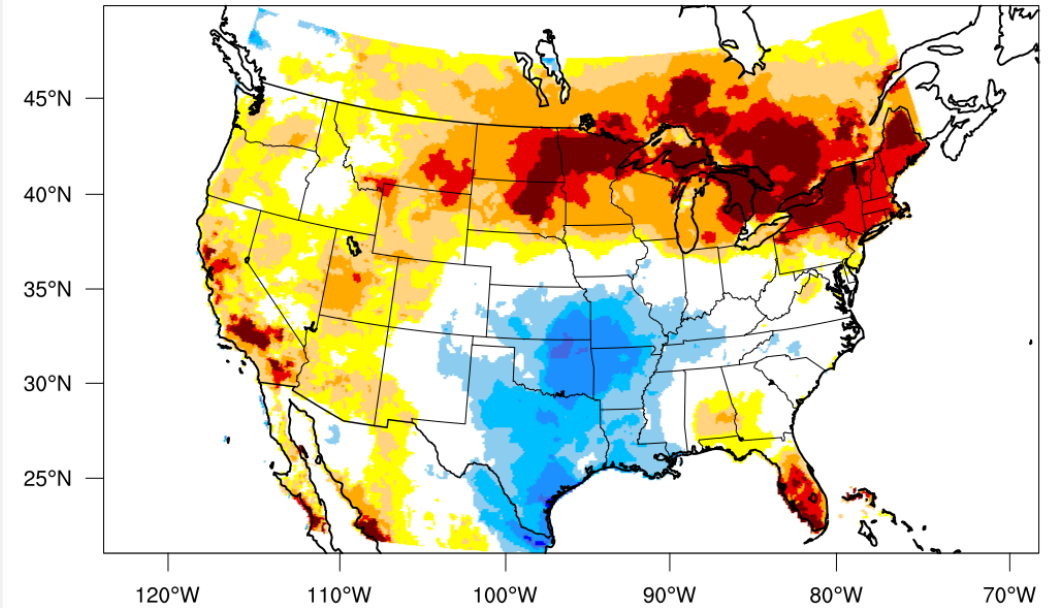
EVAPORATIVE DEMAND DROUGHT INDEX

1-week EDDI categories for June 11, 2021



Generated by NOAA/ESRL/Physical Sciences Laboratory

1-month EDDI categories for June 11, 2021



Generated by NOAA/ESRL/Physical Sciences Laboratory

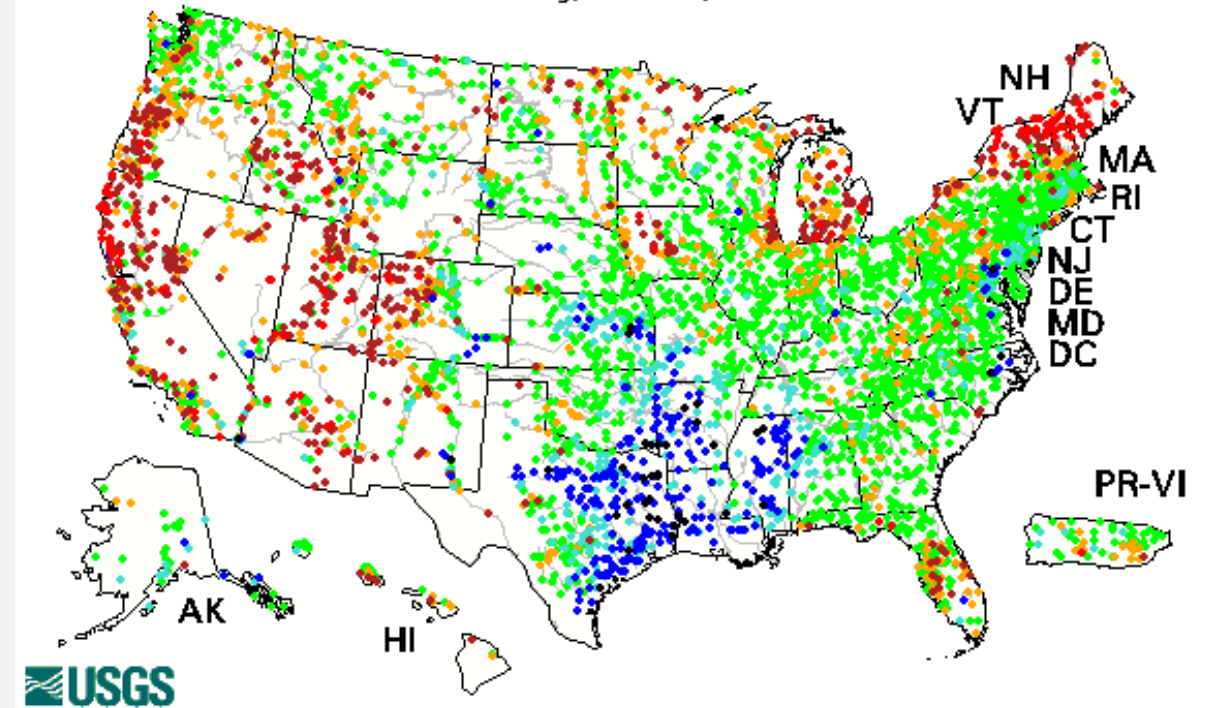
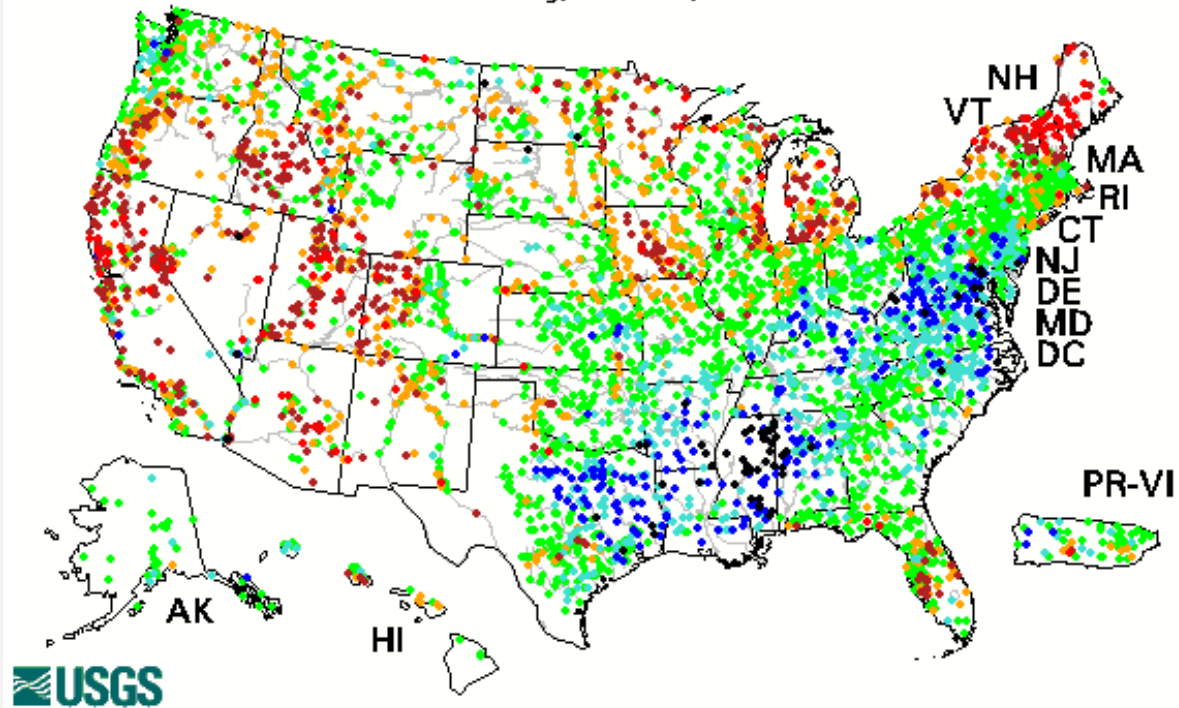
- The atmospheric thirst for water has remained extremely high, contributing to depletion of soil moisture

7-Day

28-Day

Wednesday, June 16, 2021

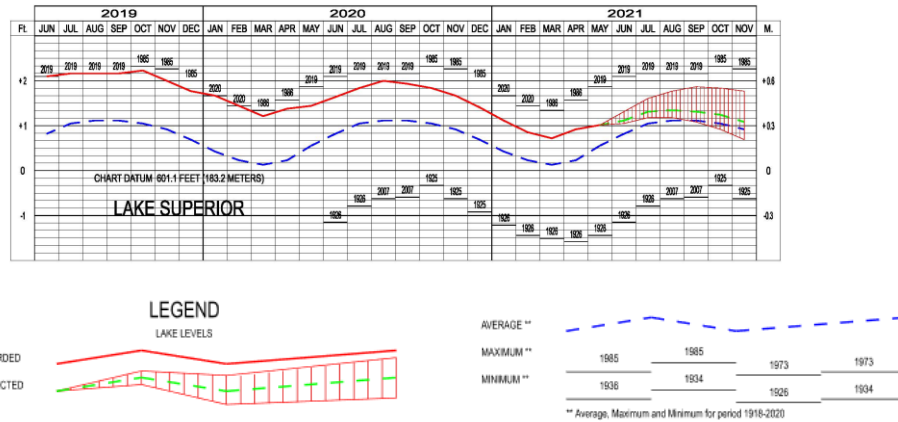
Wednesday, June 16, 2021



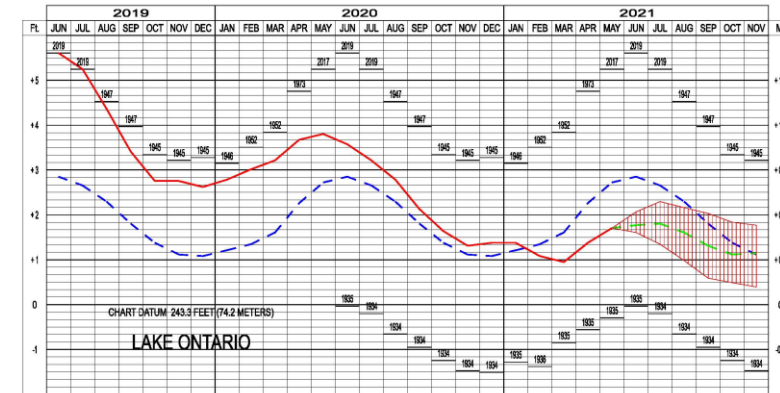
Explanation - Percentile classes							
●	●	●	●	●	●	●	○
Low	<10	10-24	25-75	76-90	>90	High	Not-ranked
	Much below normal	Below normal	Normal	Above normal	Much above normal		

GREAT LAKES WATER LEVELS

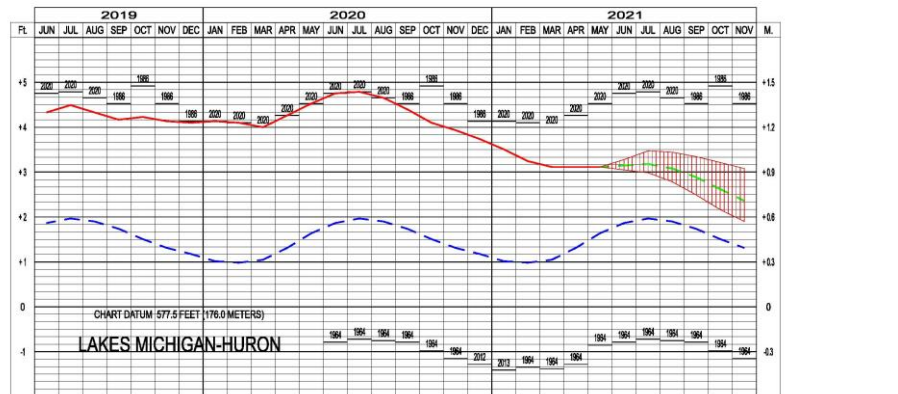
LAKE SUPERIOR WATER LEVELS - JUNE 2021



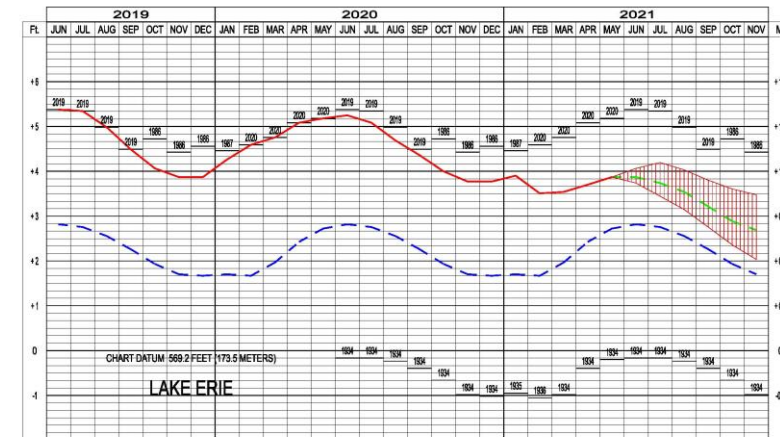
LAKE ONTARIO WATER LEVELS - JUNE 2021



LAKES MICHIGAN-HURON WATER LEVELS - JUNE 2021



LAKE ERIE WATER LEVELS - JUNE 2021



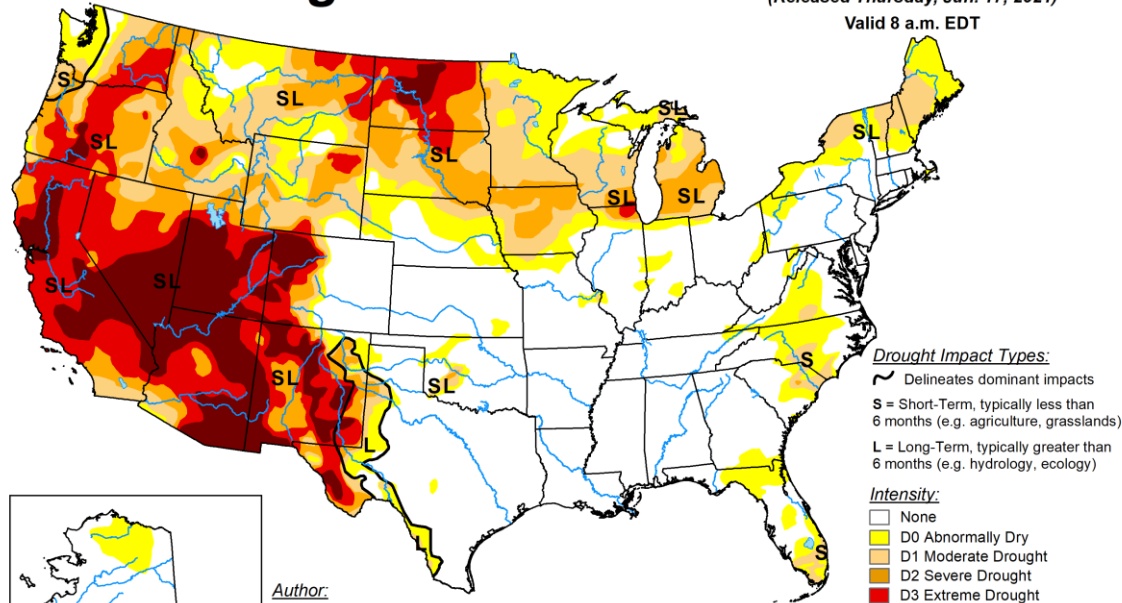
- Lake water levels are declining, though most remain above average

U.S. Drought Monitor

June 15, 2021

(Released Thursday, Jun. 17, 2021)

Valid 8 a.m. EDT



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

Author:
Curtis Riganti
National Drought Mitigation Center

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>



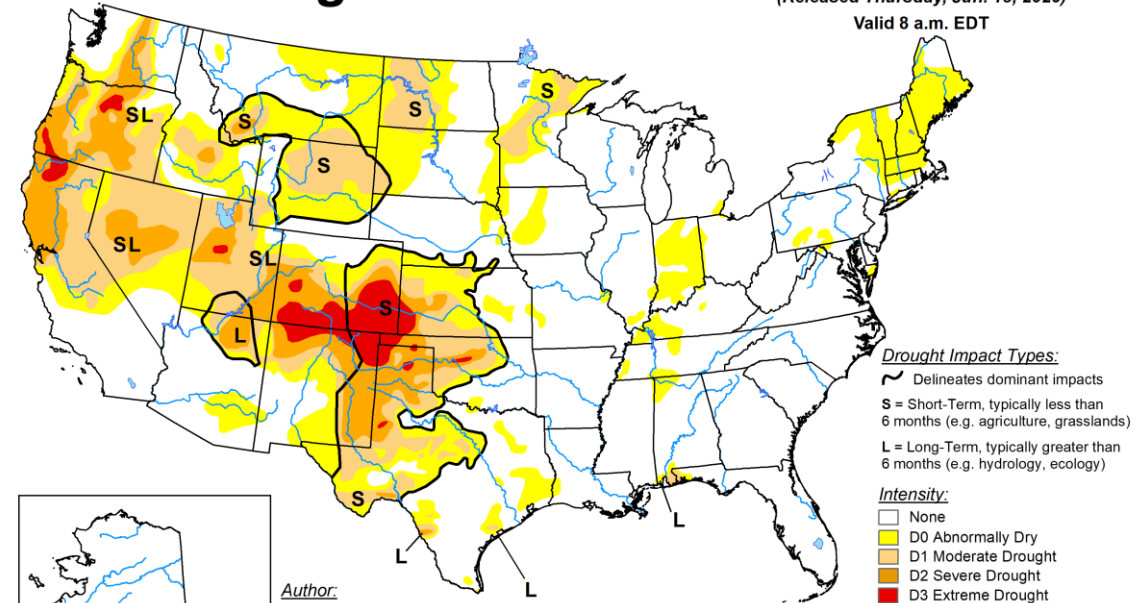
droughtmonitor.unl.edu

U.S. Drought Monitor

June 16, 2020

(Released Thursday, Jun. 18, 2020)

Valid 8 a.m. EDT



Drought Impact Types:
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 S = Short-Term, typically less than 6 months (e.g. agriculture, grasslands)
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 D4 Exceptional Drought

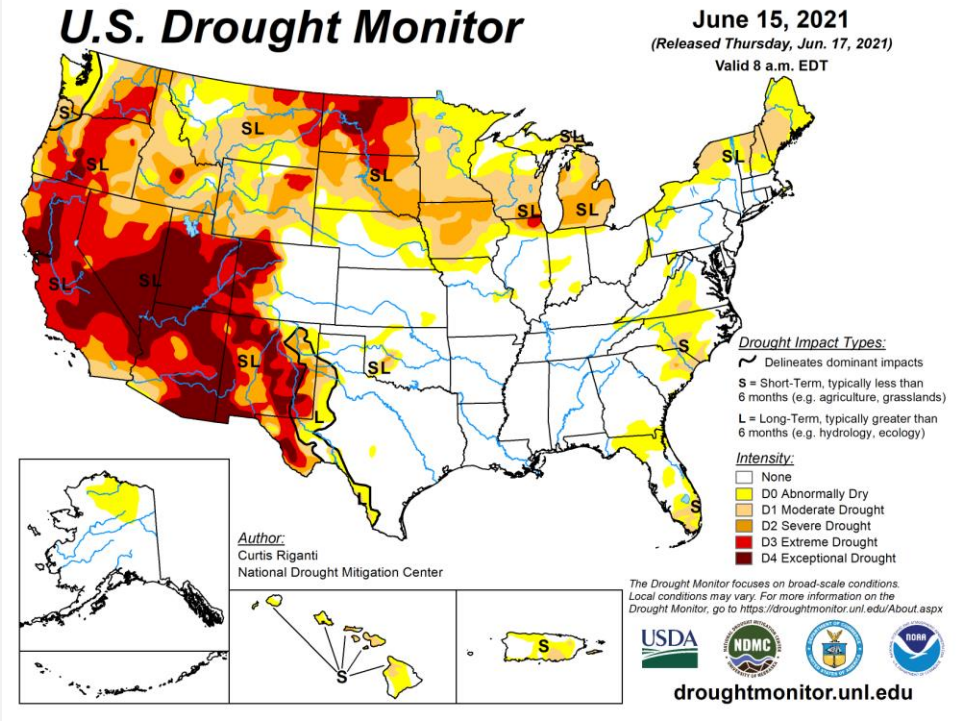
Author:
Richard Tinker
CPC/NOAA/NWS/NCEP

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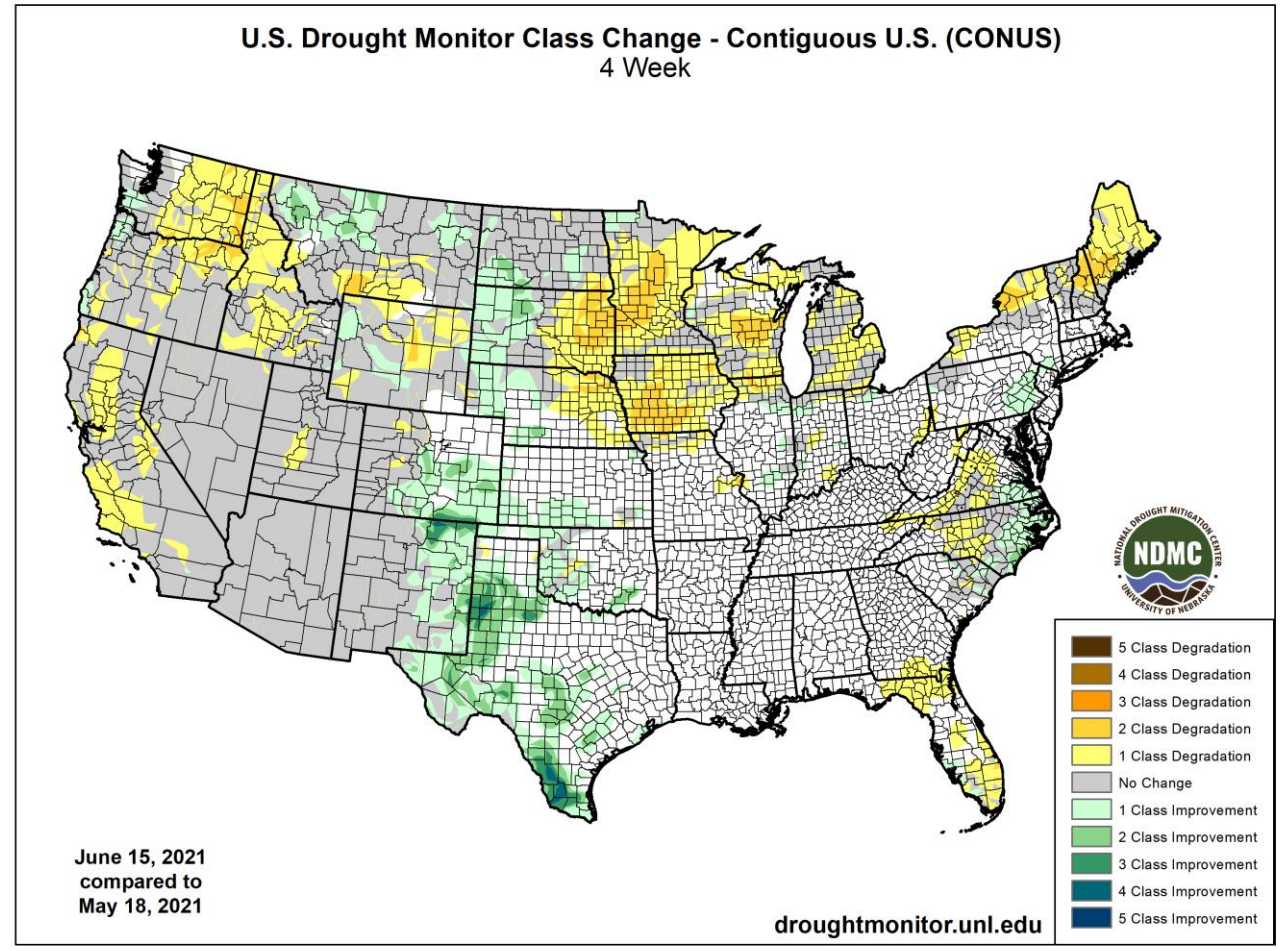


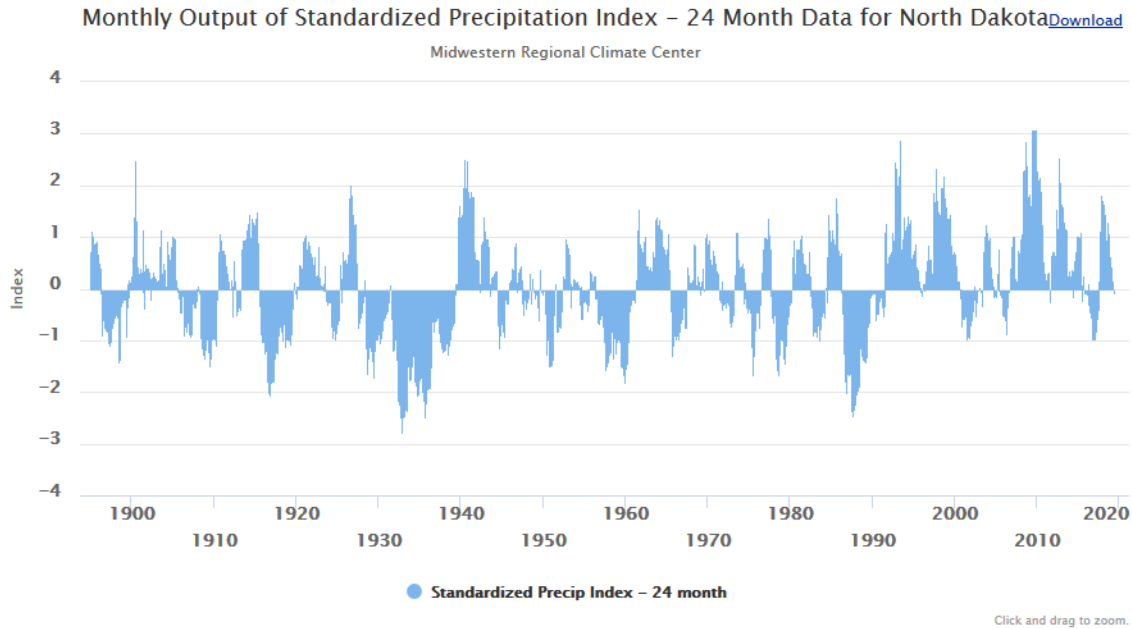
droughtmonitor.unl.edu

- Exceptional drought in upper Great Plains is an evolution from dry conditions in 2020
- Sharp boundary of drought in Colorado west to east
- Greatest USDM drought coverage since the spring of 2013
- First D3 in Wisconsin since 2013



- Drought development in the Midwest has occurred early in the growing season

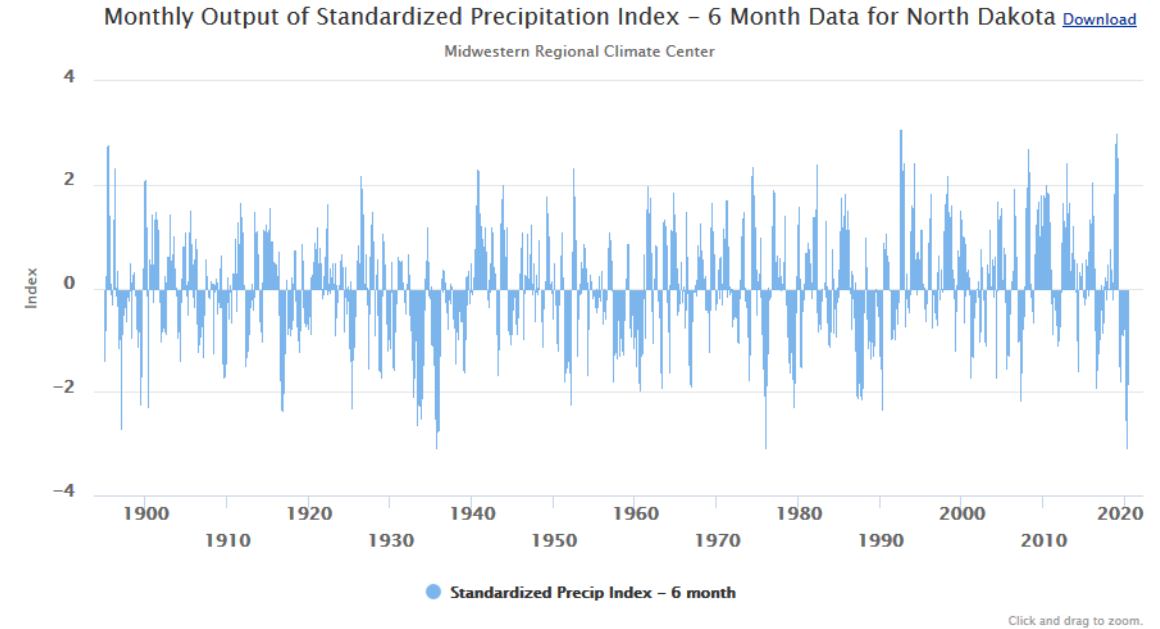




Note: State and Climate Division products are now based on the new nClimDiv product from NCEI.

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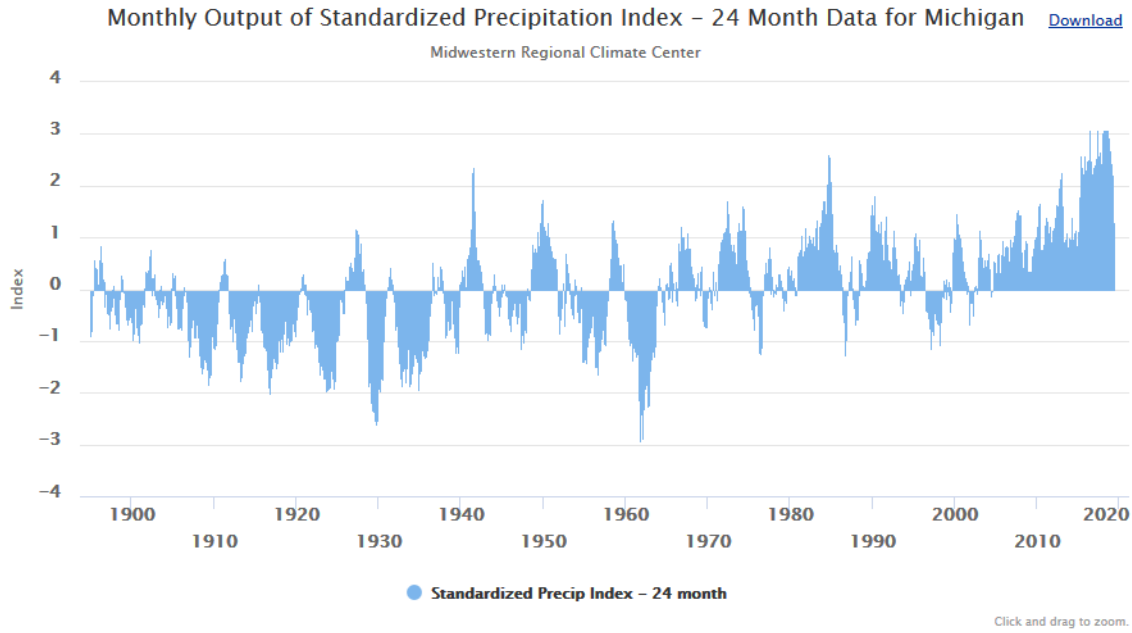
- 24-month SPI indicates that wetter than average conditions have been prevalent over recent decades



Note: State and Climate Division products are now based on the new nClimDiv product from NCEI.

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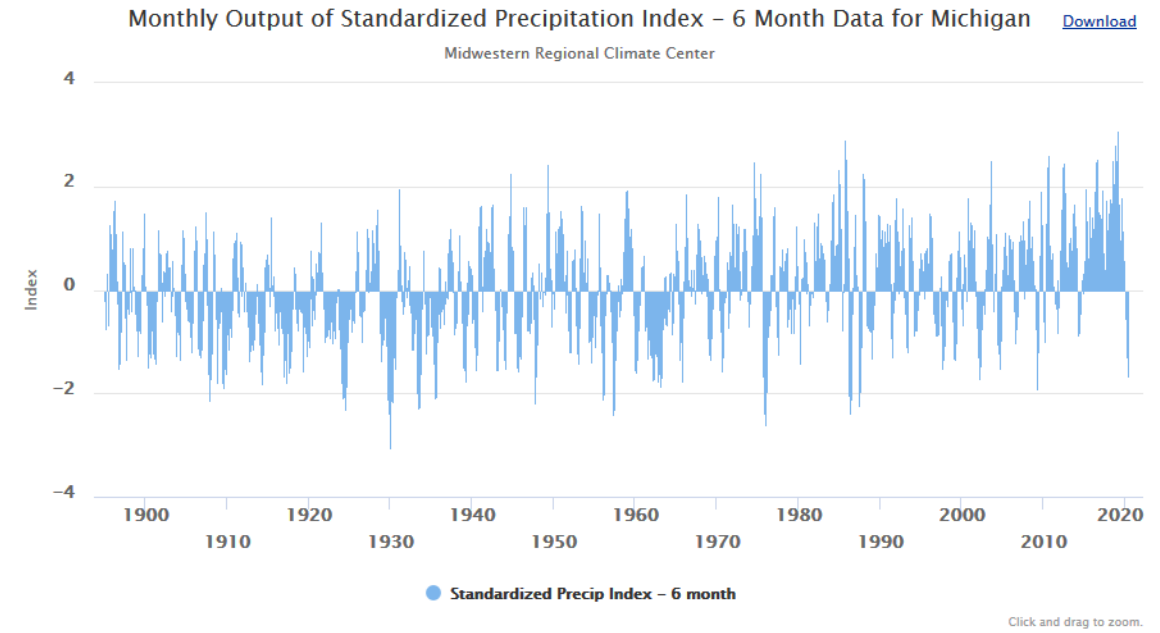
- 6-month SPI indicates extreme dryness in historical perspective that reflects a dramatic reversal of hydrologic conditions



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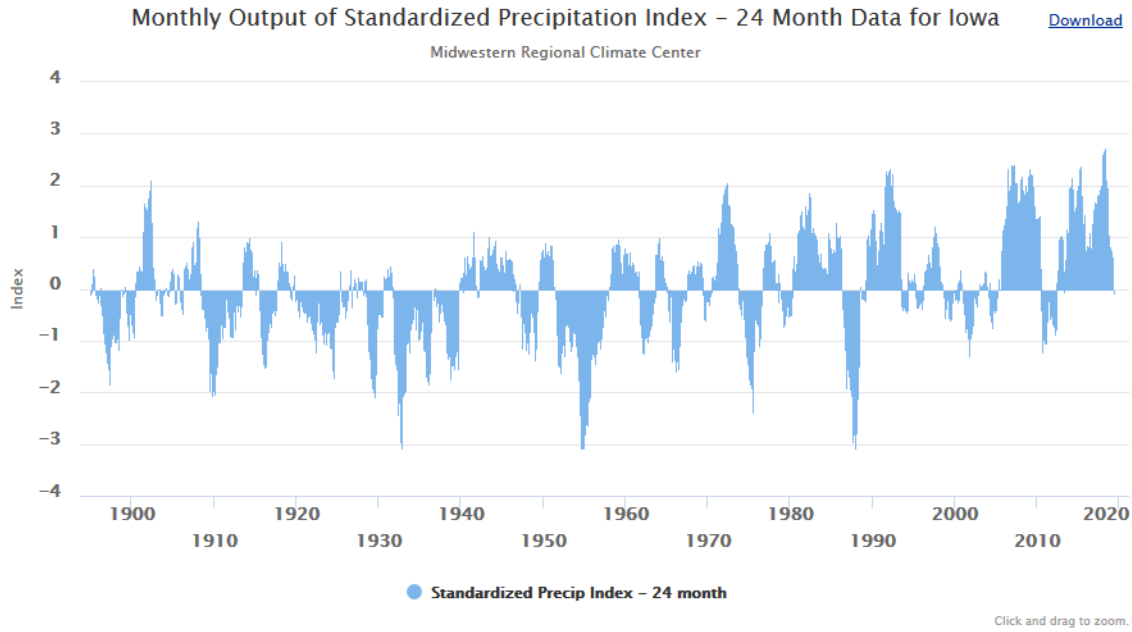
- 24-month SPI highlights an unprecedented period of wet conditions



Note: State and Climate Division products are now based on the new nClimDiv product from NCEI.

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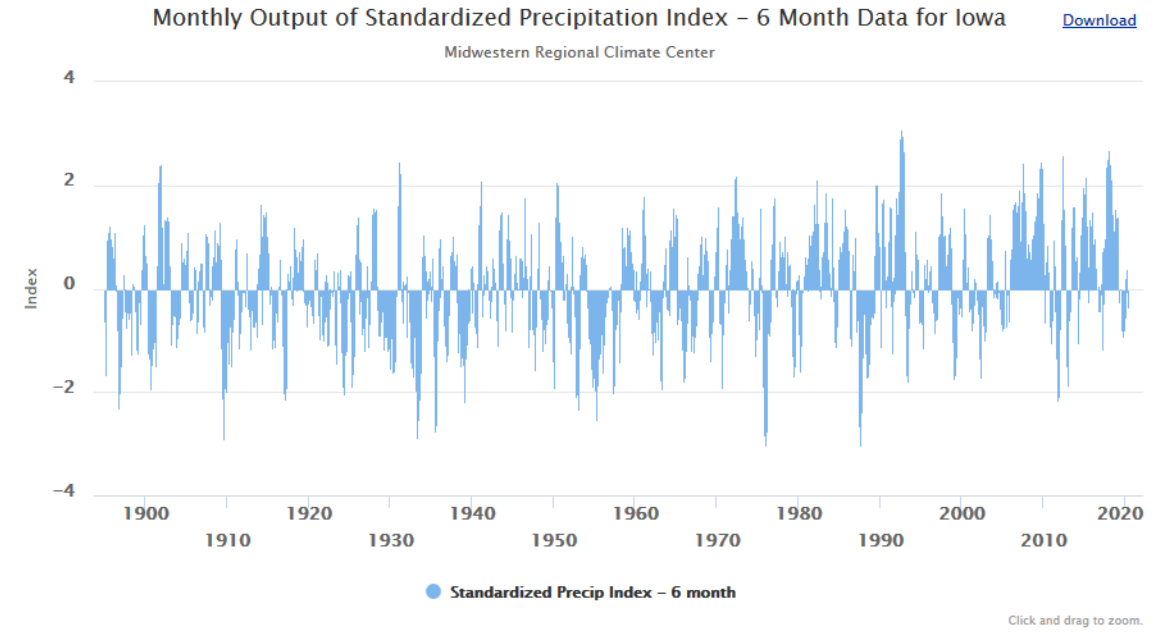
- 6-month SPI indicates that recent dryness, while creating adverse impacts, is not historically prominent



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Wildfire near Yellowstone National Park in Montana.
Credit: InciWeb, NWS, June 16, 2021.



A wildfire in McHenry County, ND. Credit: Rachel Wald.

- Persistent high pressure coupled with long-term drought has elevated the risk of wildfires in much of the West.
- Wildfire risk in the Northern Great Plains is elevated where fires can be triggered by farm operations, other human activity, and dry lightning in areas suffering from drought and extreme heat.
- Mountainous areas scarred by wildfires in 2020 are at elevated risk for flash flooding due to increased runoff rates from rain events.



Below Fort Peck Dam in the Upper Missouri Basin.
Credit: Tanja Fransen, NWS, June 13, 2021.

- Mountain snowpack is nearly gone.
- Upper Missouri Basin runoff was 64% of average in May.
- Upper Missouri Basin runoff for 2021 is projected at 69% of average.
- Water conservation measures impacting navigation flow support are likely to be initiated, conditional upon actual July 1 System storage.



Damaged corn (left) and terminated soybean (right) from May 28, 2021 freeze. Source: Carrington Research Extension Center, ND

- Crops have faced a range of extremes. A freeze in late May preceded the extreme heat of early June.

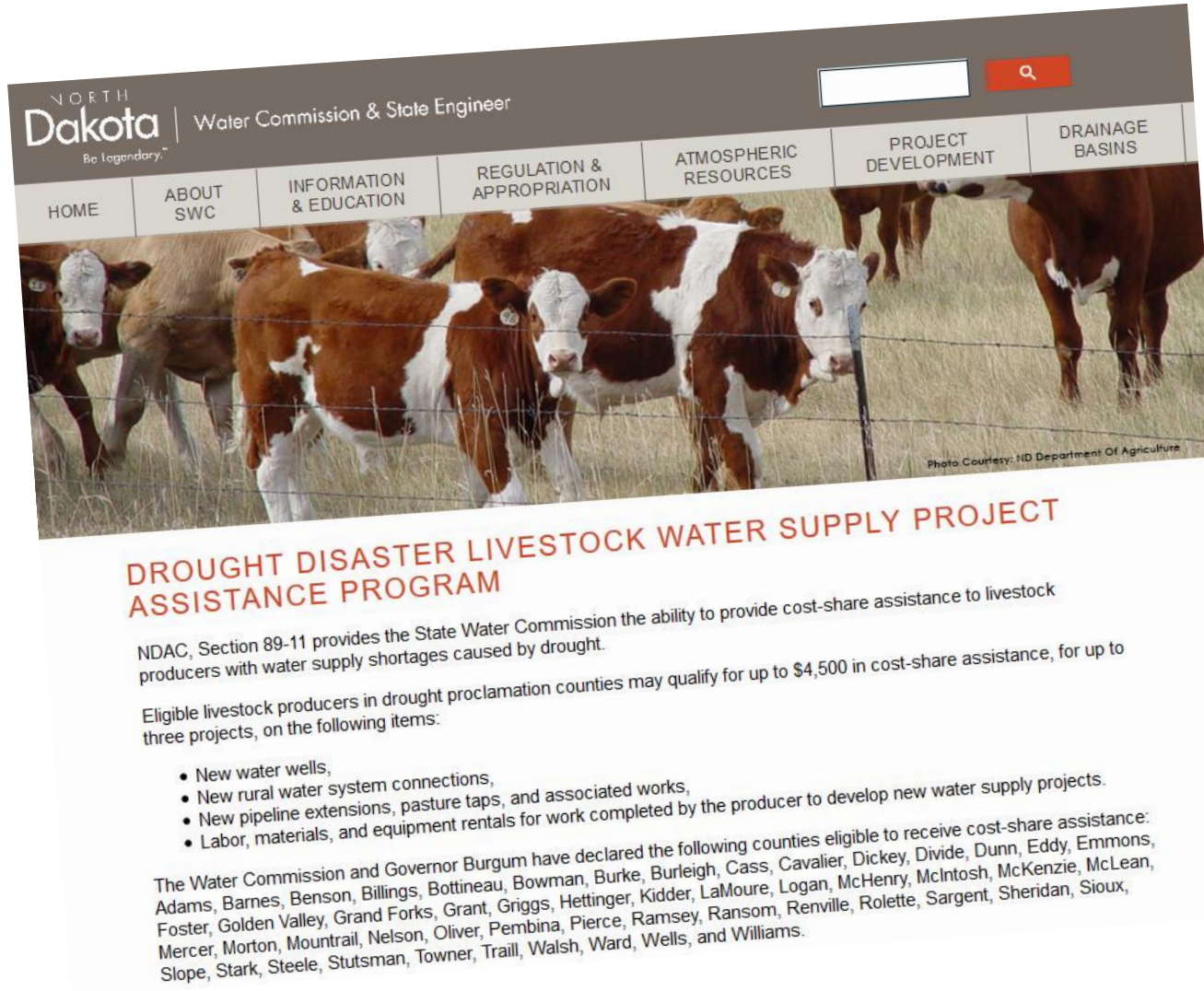


Dry landscape as far as the eye can see in Glasgow, MT.
Credit: Tanja Fransen, NWS.



Runoff from localized storm in northern Dawson County, MT.
Credit: Tanja Fransen, NWS.

- Hot and dry conditions have been prevalent in Montana and neighboring states, though recent storms have provided intense localized rainfall in some areas of Montana and the Dakotas.



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DROUGHT DISASTER LIVESTOCK WATER SUPPLY PROJECT ASSISTANCE PROGRAM

NDAC, Section 89-11 provides the State Water Commission the ability to provide cost-share assistance to livestock producers with water supply shortages caused by drought.

Eligible livestock producers in drought proclamation counties may qualify for up to \$4,500 in cost-share assistance, for up to three projects, on the following items:

- New water wells,
- New rural water system connections,
- New pipeline extensions, pasture taps, and associated works,
- Labor, materials, and equipment rentals for work completed by the producer to develop new water supply projects.

The Water Commission and Governor Burgum have declared the following counties eligible to receive cost-share assistance: Adams, Barnes, Benson, Billings, Bottineau, Bowman, Burke, Burleigh, Cass, Cavalier, Dickey, Divide, Dunn, Eddy, Emmons, Foster, Golden Valley, Grand Forks, Grant, Griggs, Hettinger, Kidder, LaMoure, Logan, McHenry, McIntosh, McKenzie, McLean, Mercer, Morton, Mountrail, Nelson, Oliver, Pembina, Pierce, Ramsey, Ransom, Renville, Rolette, Sargent, Sheridan, Sioux, Slope, Stark, Steele, Stutsman, Towner, Traill, Walsh, Ward, Wells, and Williams.

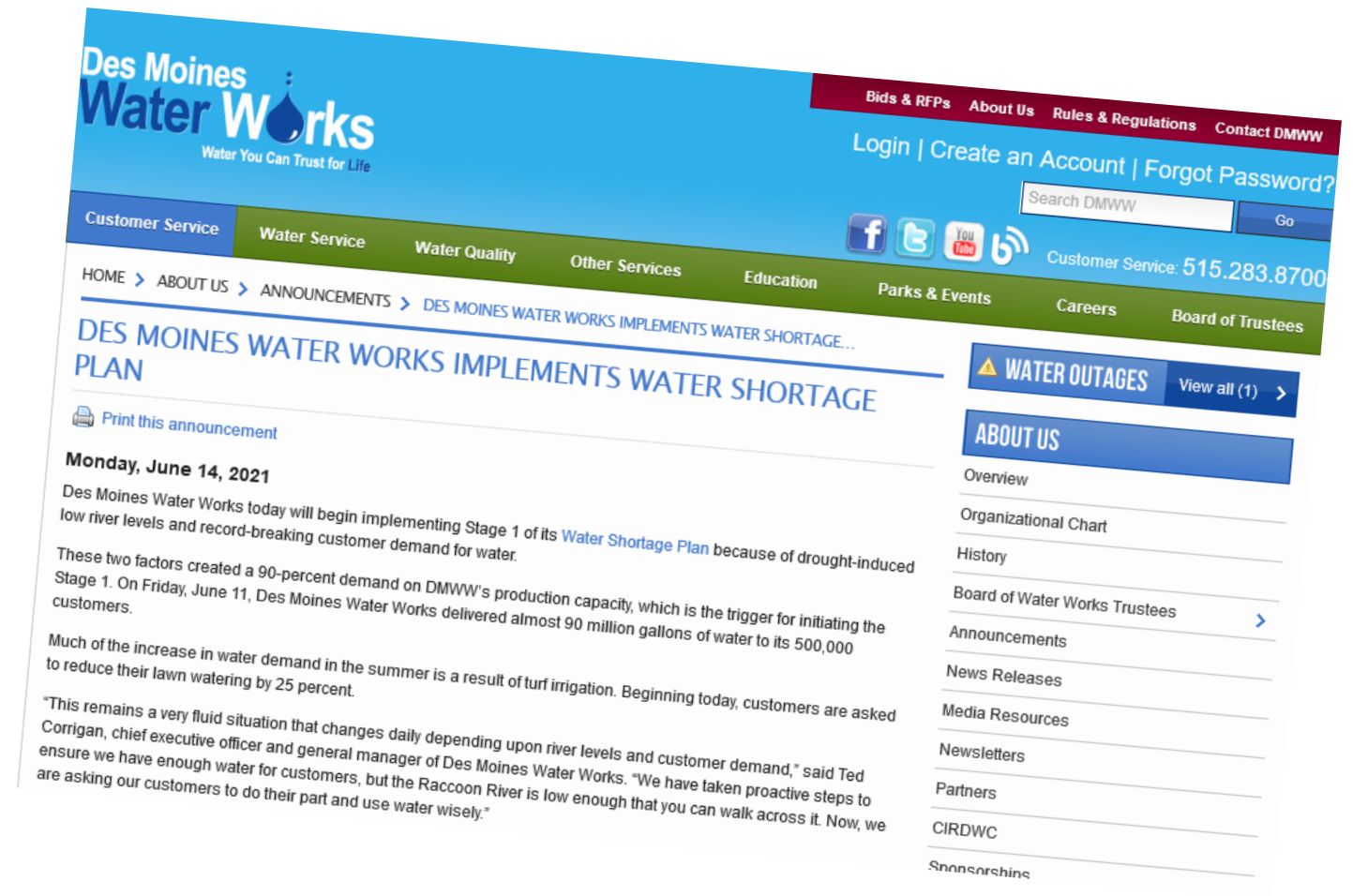
- Drought has led to poor pasture conditions in North Dakota and other impacted areas
- Hay was cut early in an effort to maximize quality, though yields were reduced
- Farm water supplies are low and poor water quality is an issue
- Producers are culling cattle herds in the northern Great Plains



Credit: Meaghan Anderson, Iowa Extension Field Agronomist, Monday, June 14, 2021

- Hot, dry weather has adversely impacted the early development of corn in Iowa and surrounding states, but a return to more normal precipitation would largely alleviate concerns.
- Corn in Nebraska has benefitted from available soil moisture following a relatively wet spring, but that moisture is being depleted.
- High temperatures have accelerated the grain-fill stage of winter wheat development, adversely affecting potential yields in the Great Plains.
- In Michigan, a series of freezes from April through late May adversely impacted fruit trees, reducing projected yields.

- Hot, dry conditions have contributed to decrease supply coupled with increased demand for water
- Water restrictions, such as those issued for Des Moines, IA, are likely to become more commonplace across region, especially for those communities that rely heavily on surface water and shallow groundwater



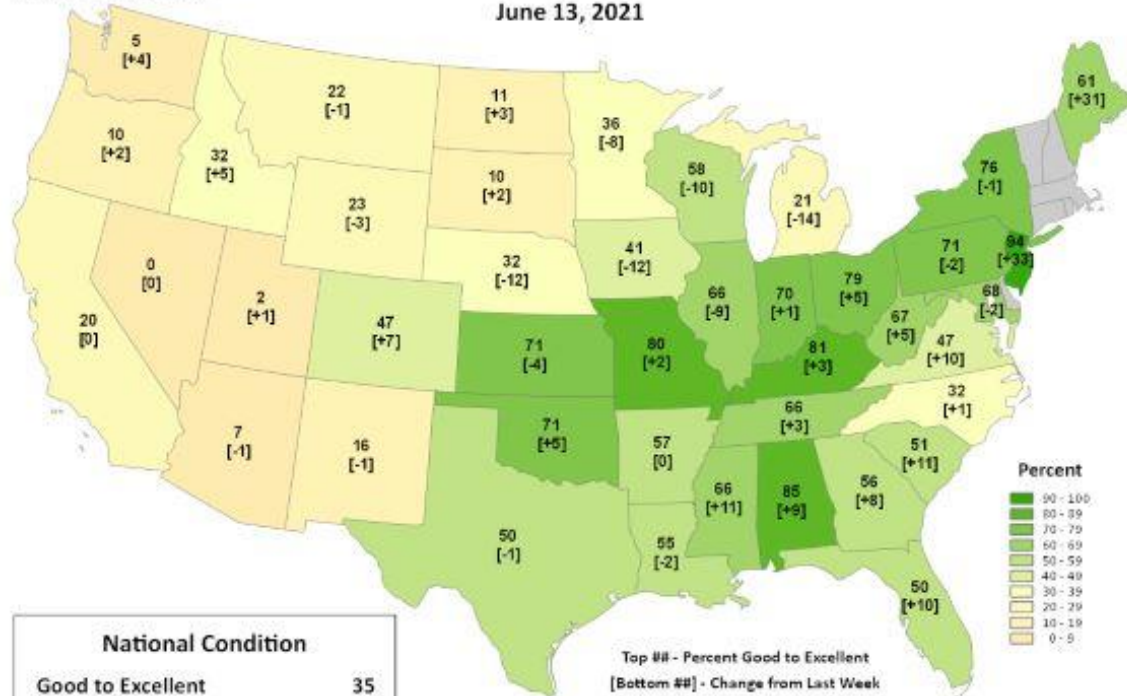


The analysis was prepared by the
USDA Office of the Chief Economist (OCE)
Weekly Agricultural Outlook Board (WAOB)

Pasture and Range Conditions

Percent Good to Excellent

June 13, 2021



National Condition	
Good to Excellent	35
Change from Last Week	0

Top ## - Percent Good to Excellent
[Bottom ##] - Change from Last Week

Data obtained from USDA National Agricultural Statistics Service weekly Crop Progress reports

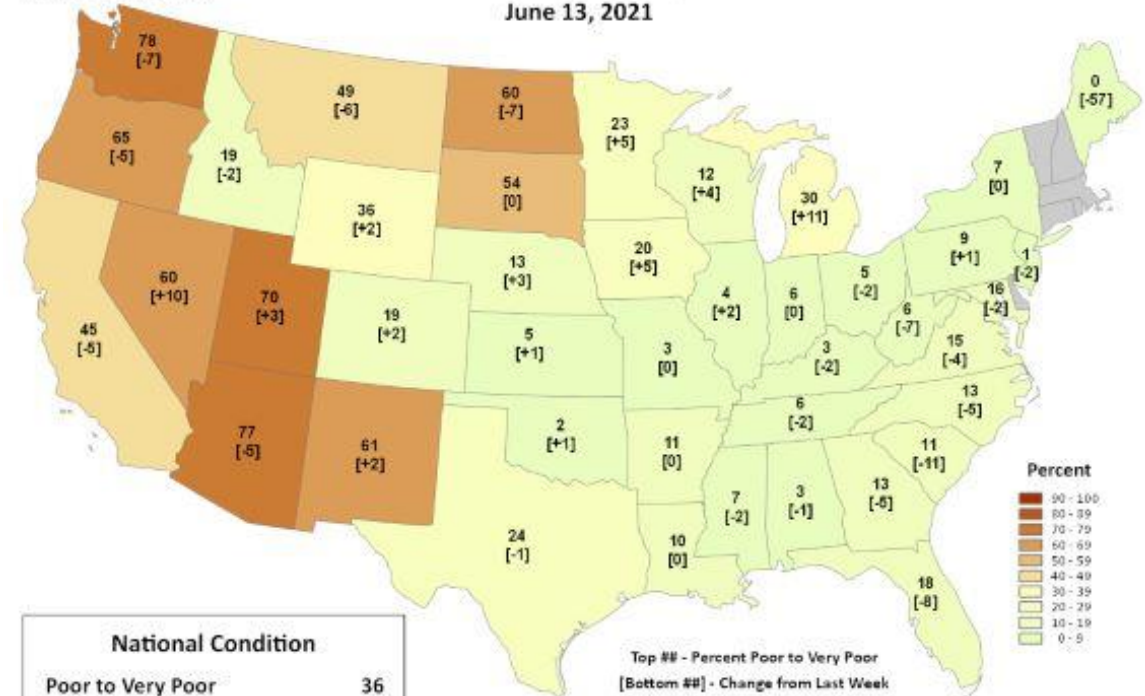


The analysis was prepared by the
USDA Office of the Chief Economist (OCE)
Weekly Agricultural Outlook Board (WAOB)

Pasture and Range Conditions

Percent Poor to Very Poor

June 13, 2021



National Condition	
Poor to Very Poor	36
Change from Last Week	-1

Top ## - Percent Poor to Very Poor
[Bottom ##] - Change from Last Week

Data obtained from USDA National Agricultural Statistics Service weekly Crop Progress reports

USDA United States
Department of
Agriculture
The analysis was prepared by the
USDA Office of the Chief Economist (OCE)
Weekly Agricultural Outlook Board (WAOB)

Spring Wheat Conditions Percent Good to Excellent

June 13, 2021



National Condition	
Good to Excellent	37
Change from Last Week	-1

Top ## - Percent Good to Excellent
[Bottom ##] - Change from Last Week

Date obtained from USDA National Agricultural Statistics Service weekly Crop Progress reports

USDA United States
Department of
Agriculture
The analysis was prepared by the
USDA Office of the Chief Economist (OCE)
Weekly Agricultural Outlook Board (WAOB)

Spring Wheat Conditions Percent Poor to Very Poor

June 13, 2021



National Condition	
Poor to Very Poor	27
Change from Last Week	+2

Top ## - Percent Poor to Very Poor
[Bottom ##] - Change from Last Week

Date obtained from USDA National Agricultural Statistics Service weekly Crop Progress reports

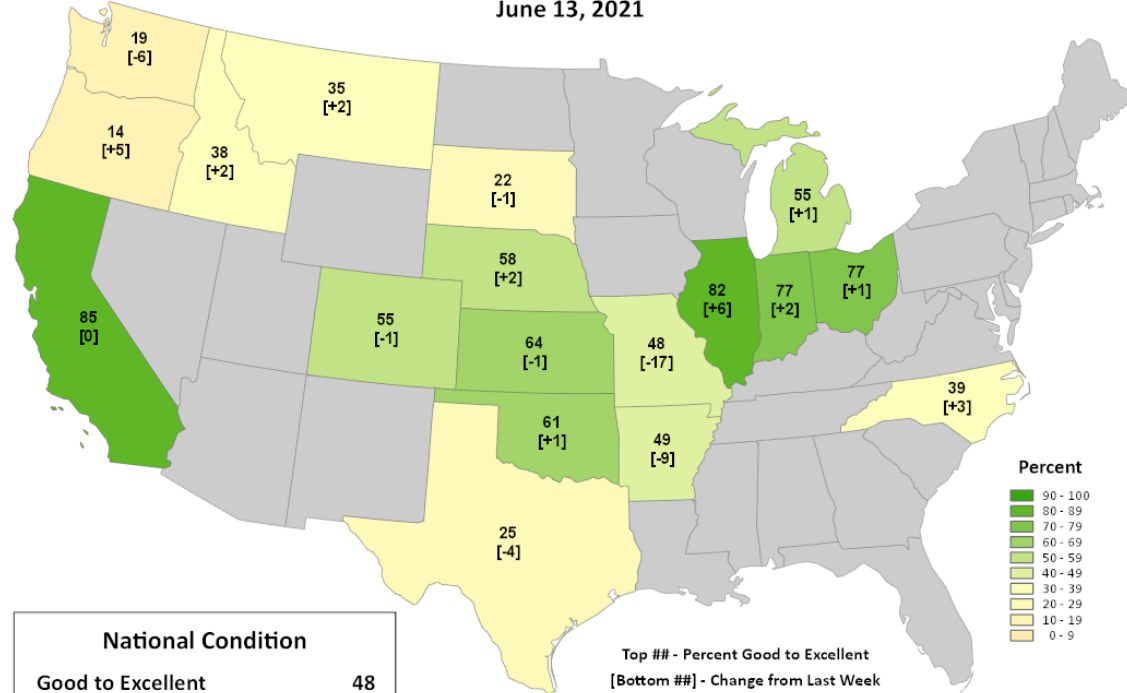


This product was prepared by the
USDA Office of the Chief Economist (OCE)
World Agricultural Outlook Board (WAOB)

Winter Wheat Conditions

Percent Good to Excellent

June 13, 2021



National Condition	
Good to Excellent	48
Change from Last Week	-2

Top ### - Percent Good to Excellent
[Bottom ##] - Change from Last Week

Data obtained from USDA National Agricultural Statistics Service weekly Crop Progress reports.

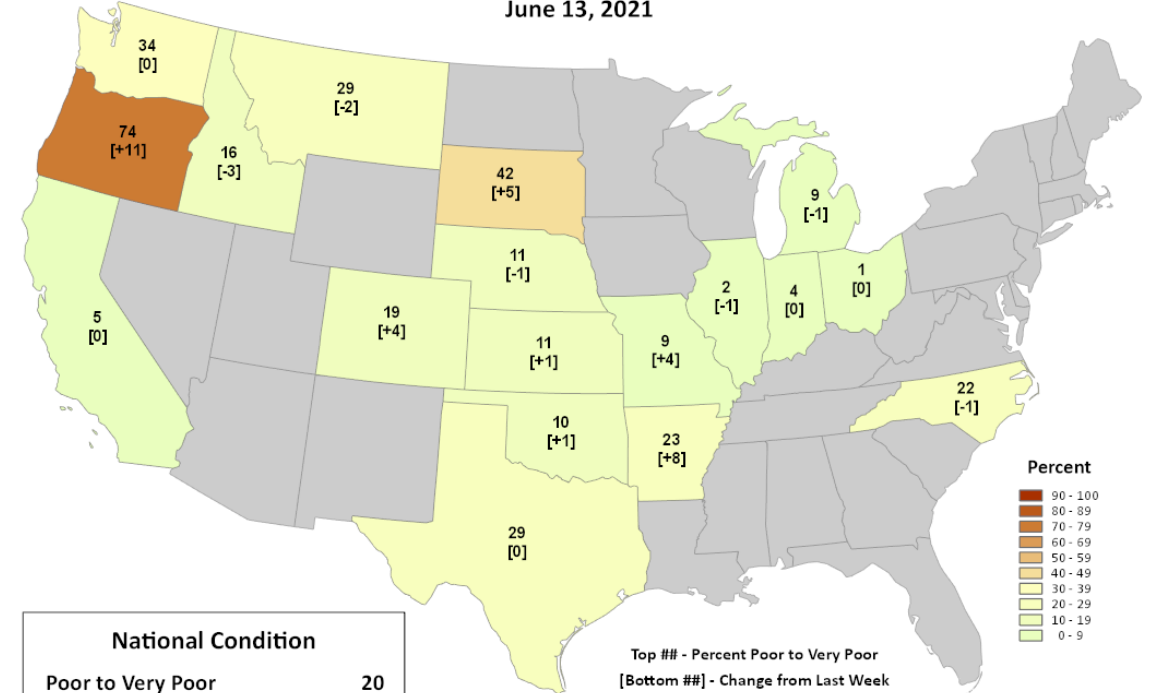


This product was prepared by the
USDA Office of the Chief Economist (OCE)
World Agricultural Outlook Board (WAOB)

Winter Wheat Conditions

Percent Poor to Very Poor

June 13, 2021



National Condition	
Poor to Very Poor	20
Change from Last Week	+2

Top ### - Percent Poor to Very Poor
[Bottom ##] - Change from Last Week

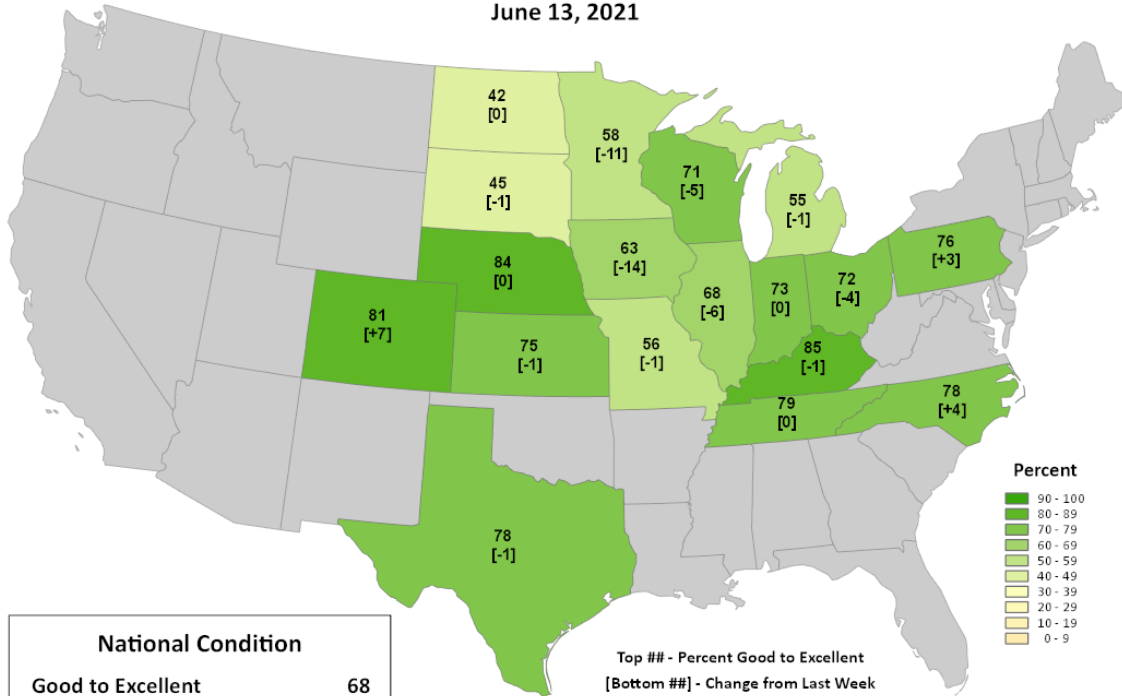
Data obtained from USDA National Agricultural Statistics Service weekly Crop Progress reports.



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World Agricultural Outlook Board (WAOB)

Corn Conditions Percent Good to Excellent

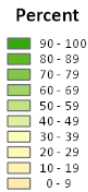
June 13, 2021



National Condition	
Good to Excellent	68
Change from Last Week	-4

Top ## - Percent Good to Excellent
[Bottom ##] - Change from Last Week

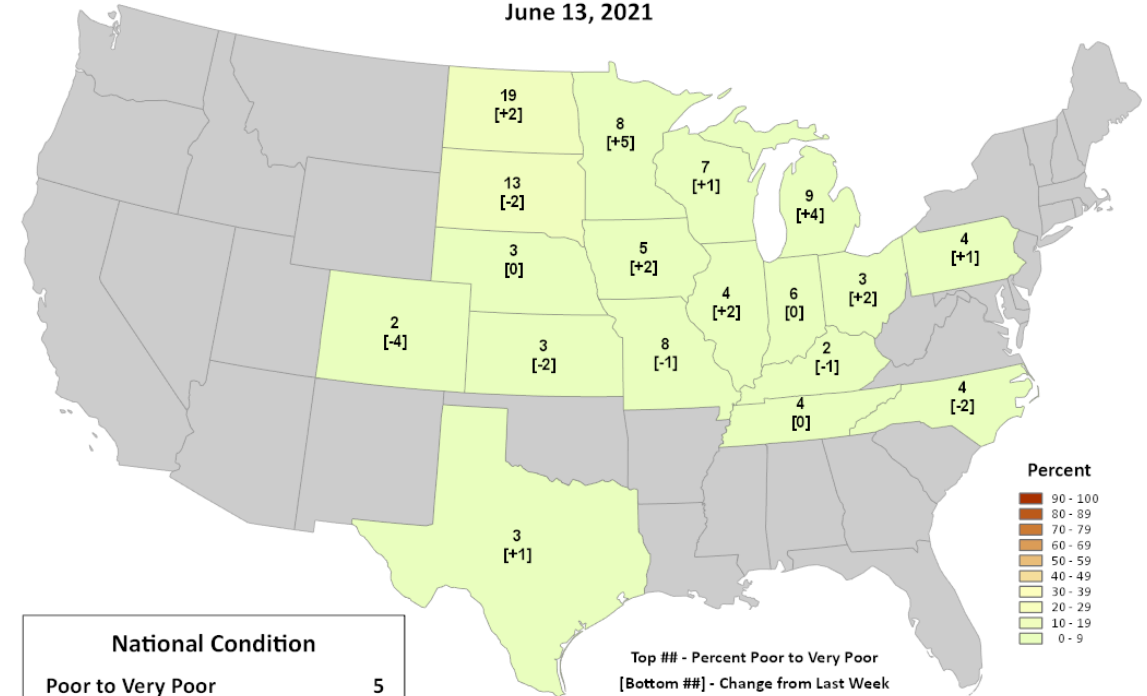
Data obtained from USDA National Agricultural Statistics Service weekly Crop Progress reports.



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World Agricultural Outlook Board (WAOB)

Corn Conditions Percent Poor to Very Poor

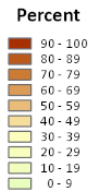
June 13, 2021



National Condition	
Poor to Very Poor	5
Change from Last Week	0

Top ## - Percent Poor to Very Poor
[Bottom ##] - Change from Last Week

Data obtained from USDA National Agricultural Statistics Service weekly Crop Progress reports.

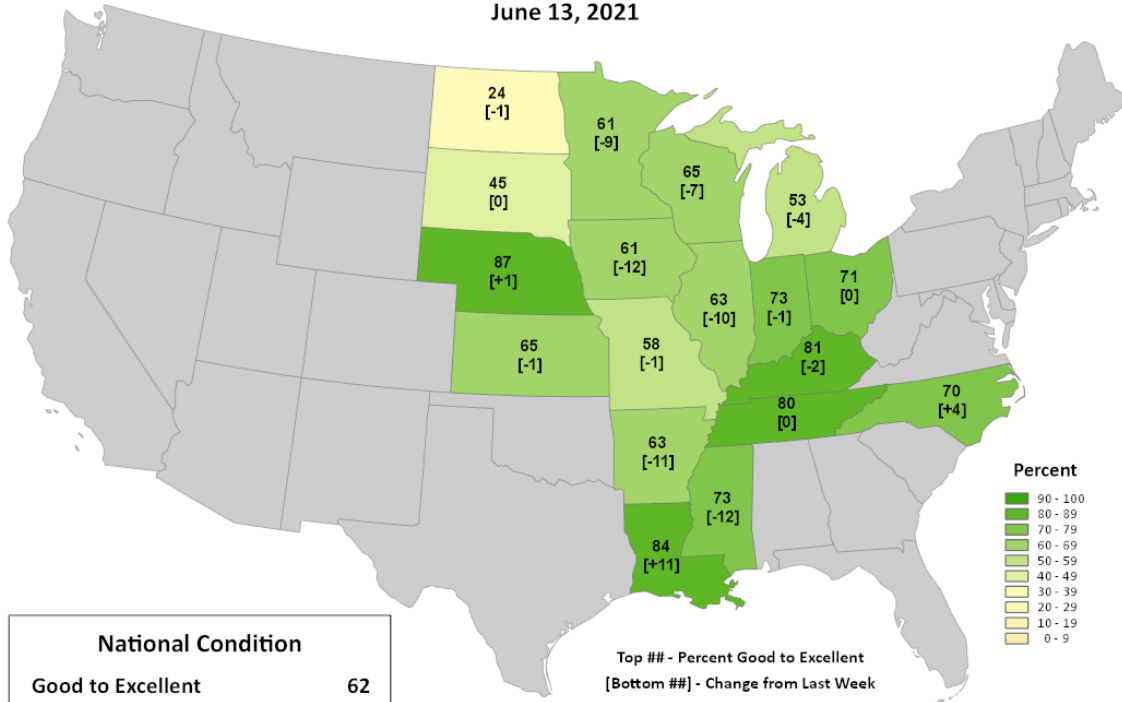




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Soybean Conditions Percent Good to Excellent

June 13, 2021



National Condition	
Good to Excellent	62
Change from Last Week	-5

Top ### - Percent Good to Excellent
[Bottom ##] - Change from Last Week

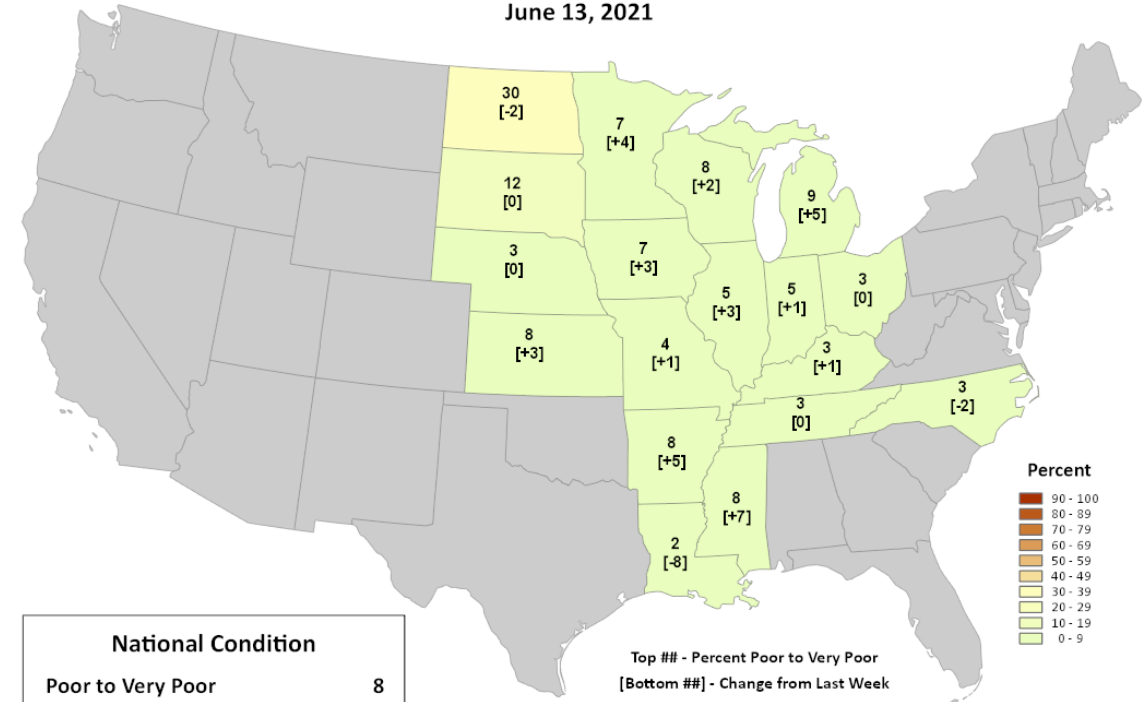
Data obtained from USDA National Agricultural Statistics Service weekly Crop Progress reports.



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Soybean Conditions Percent Poor to Very Poor

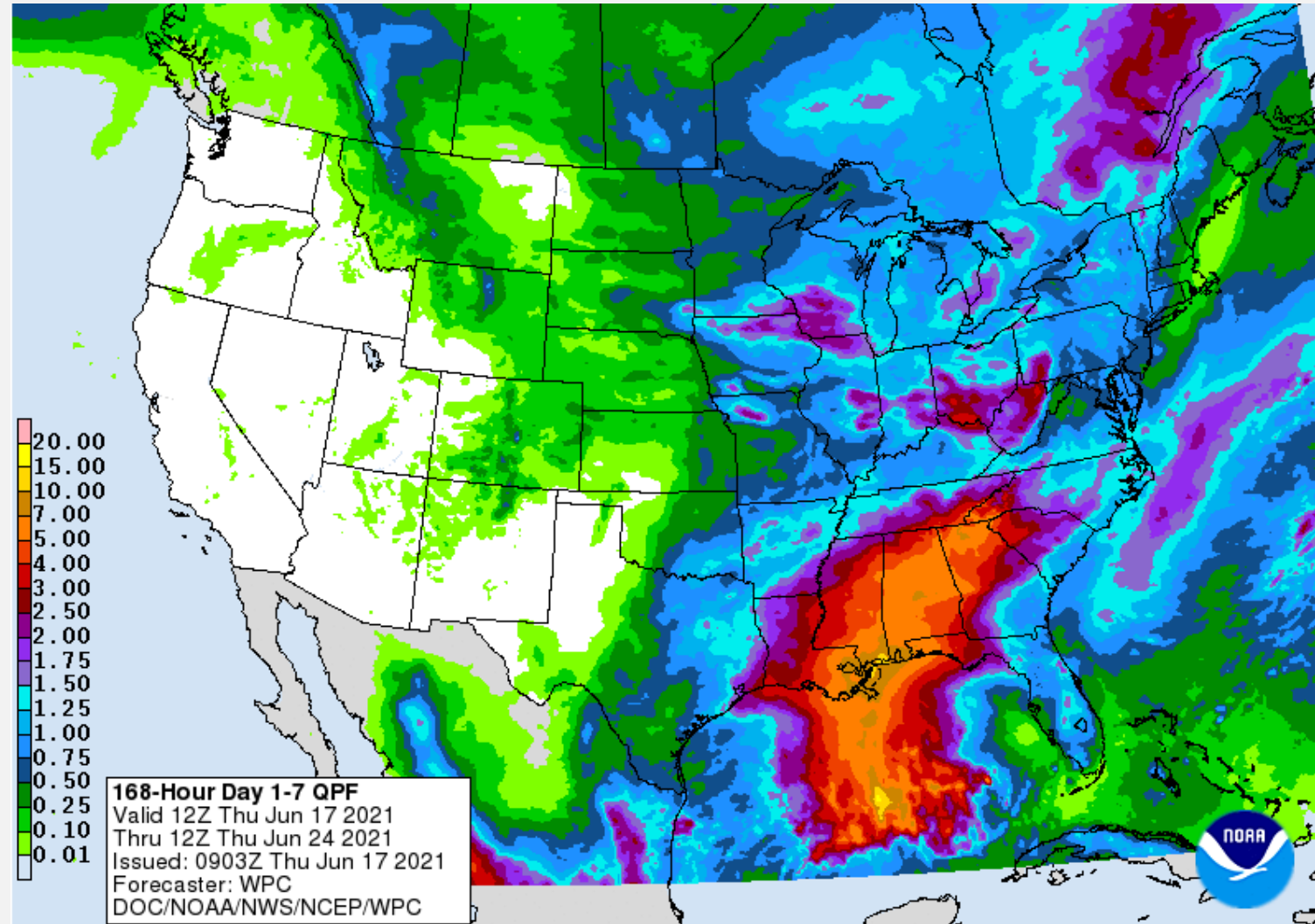
June 13, 2021

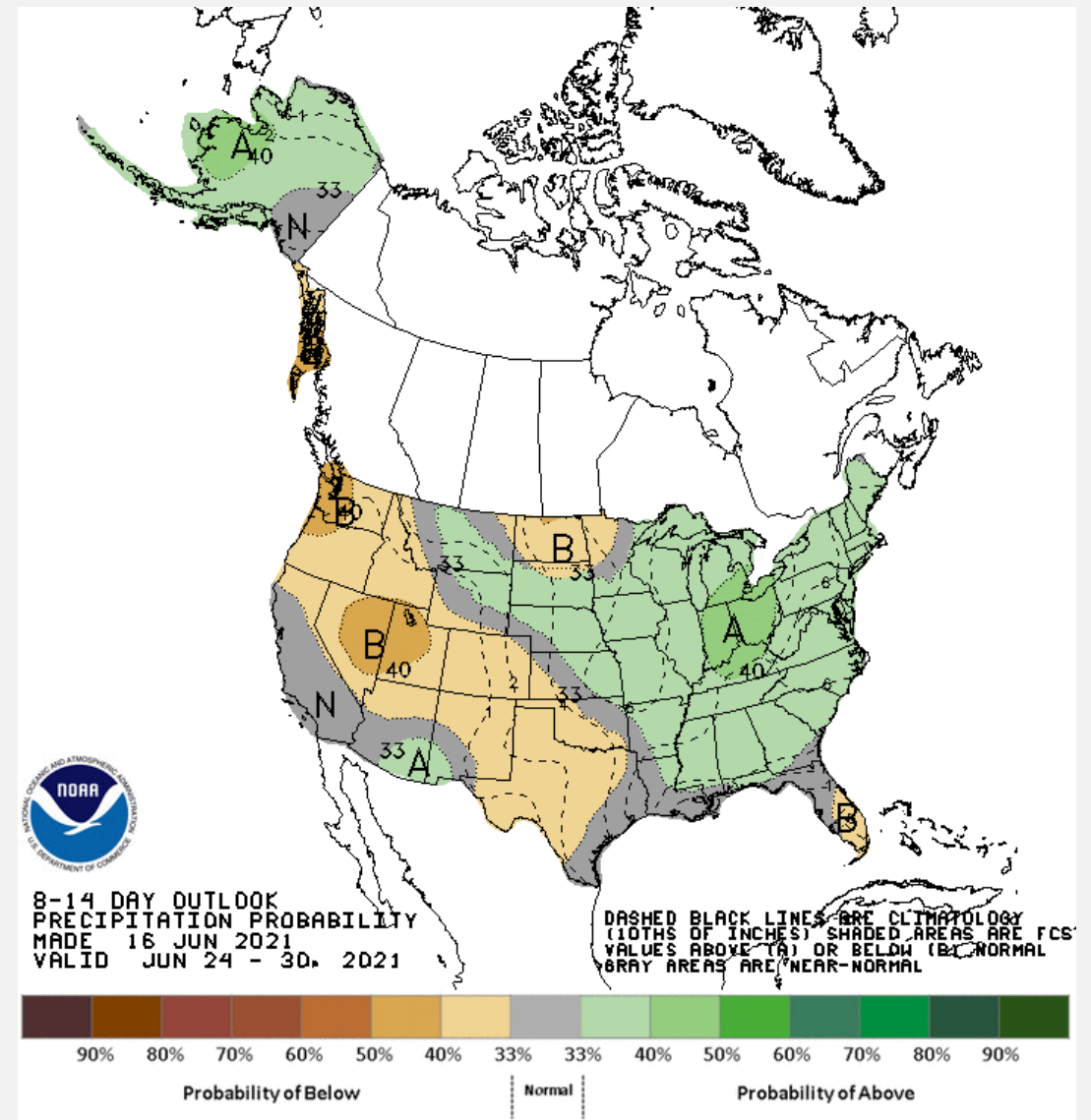
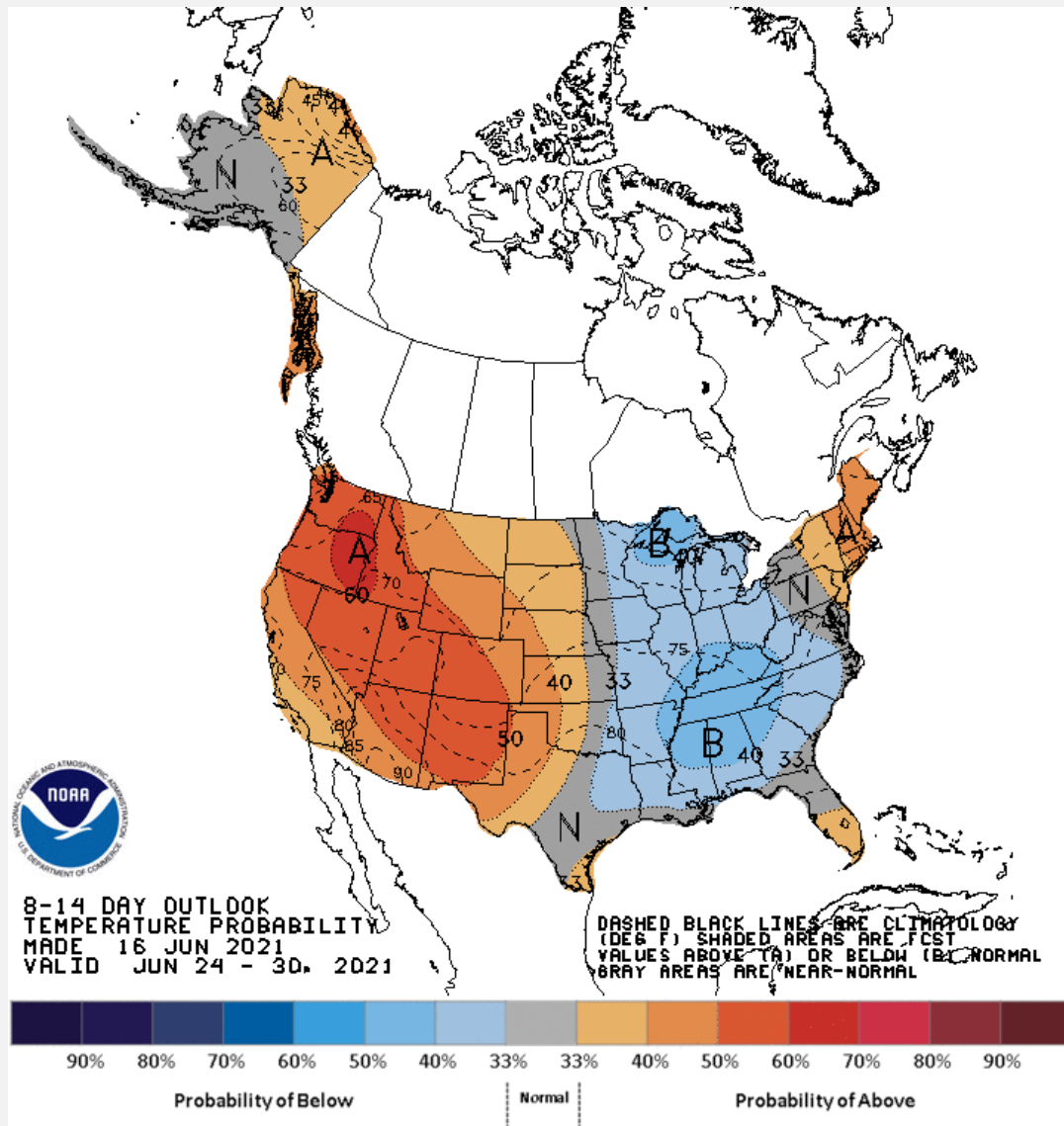


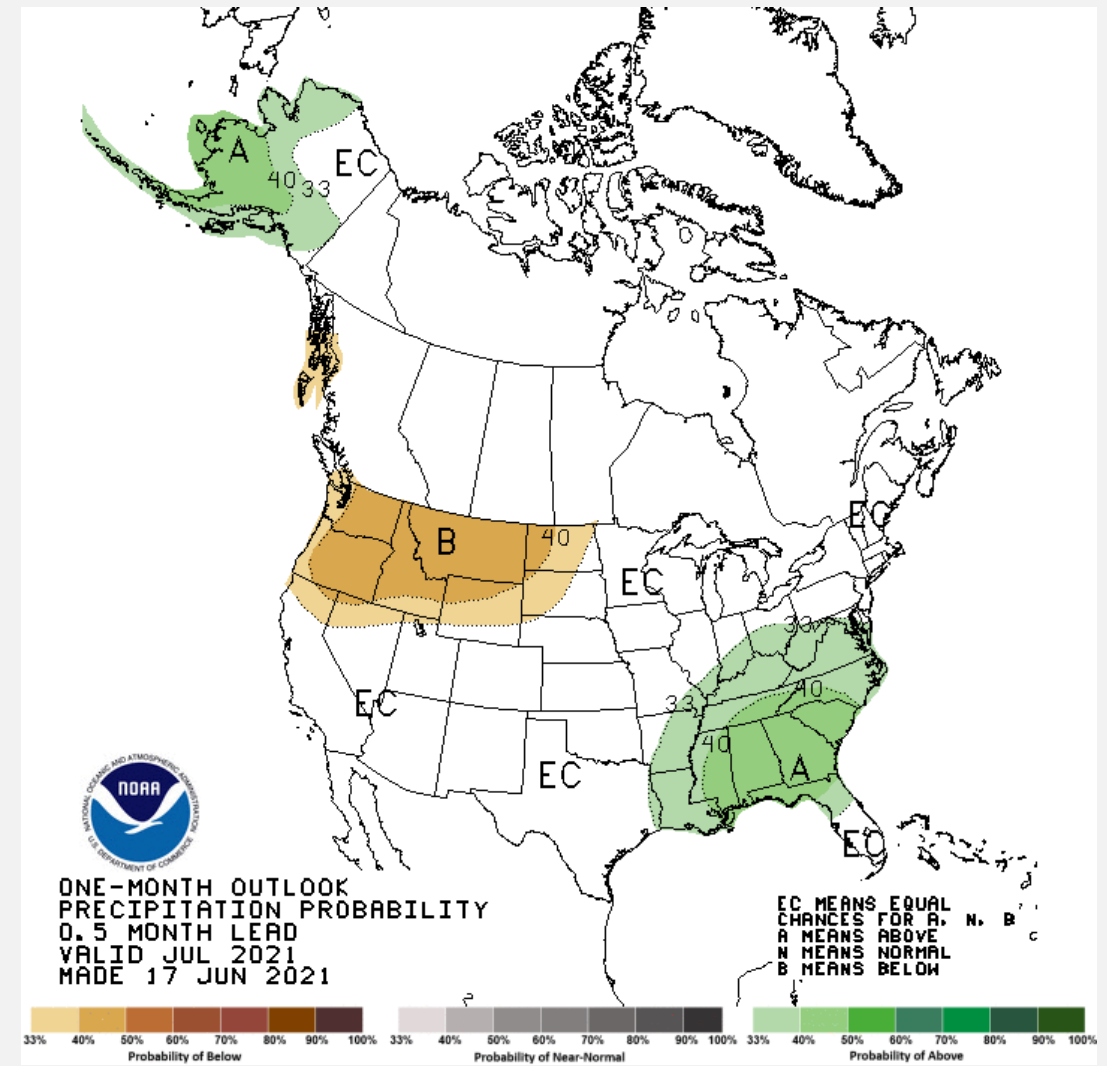
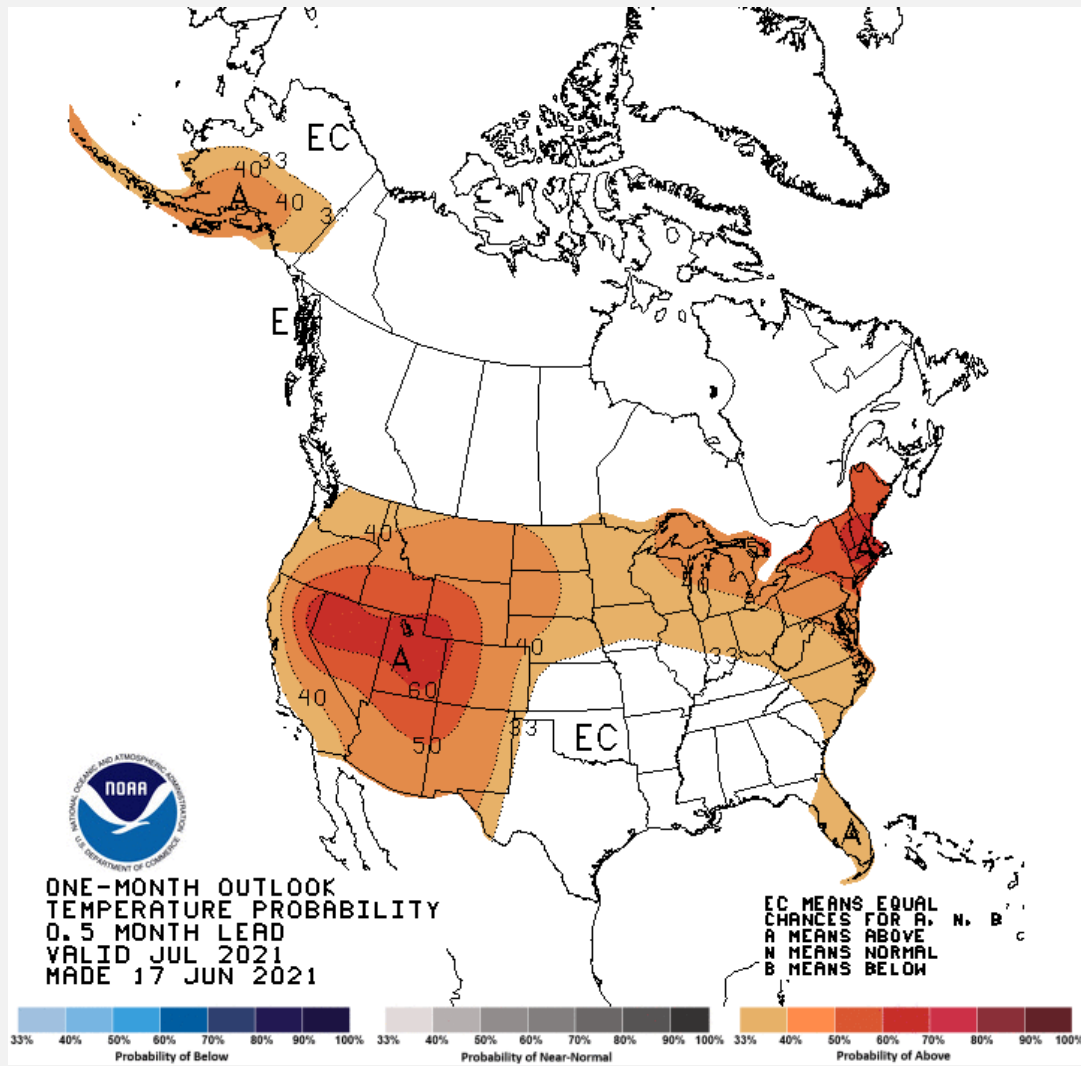
National Condition	
Poor to Very Poor	8
Change from Last Week	+2

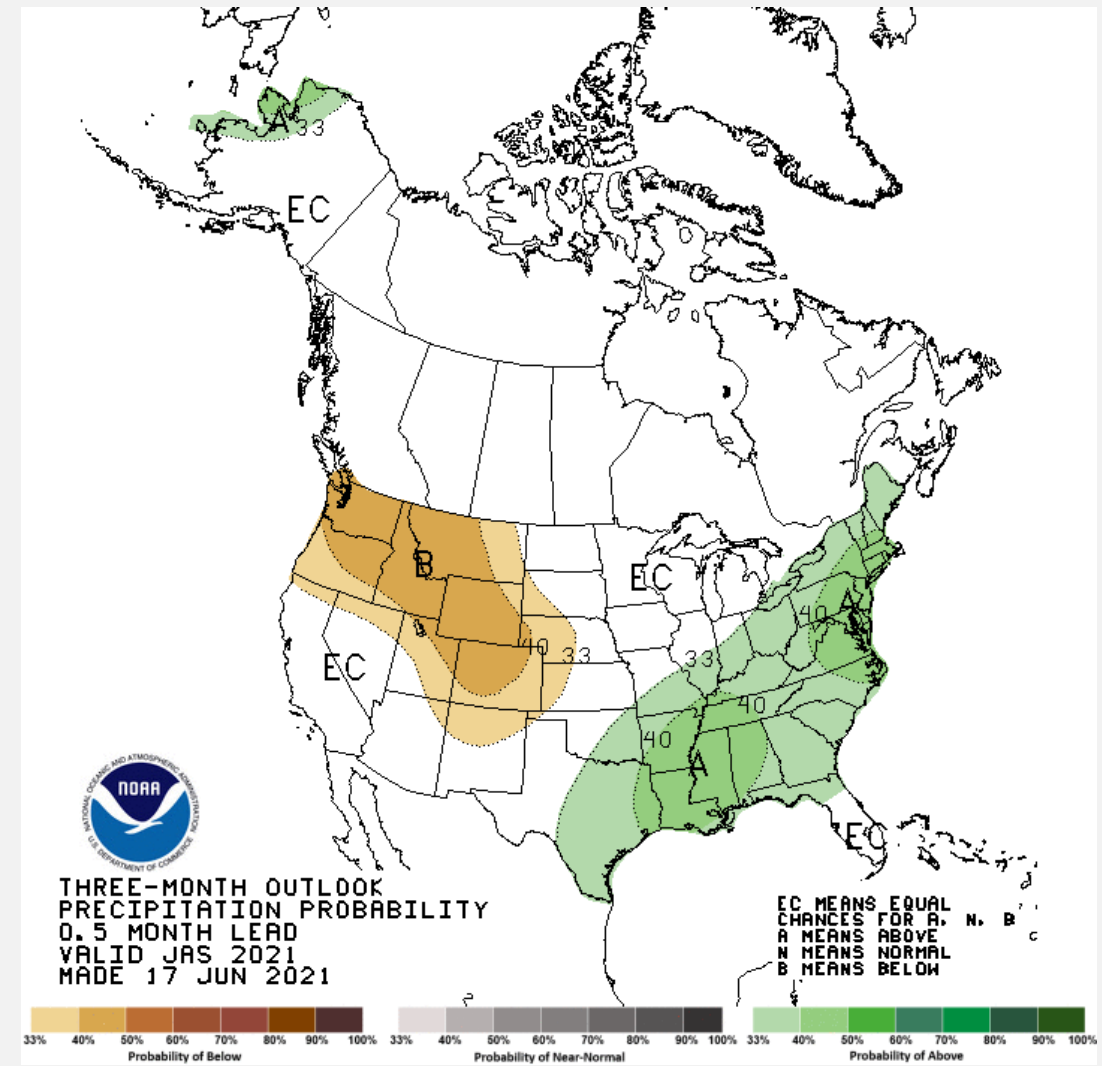
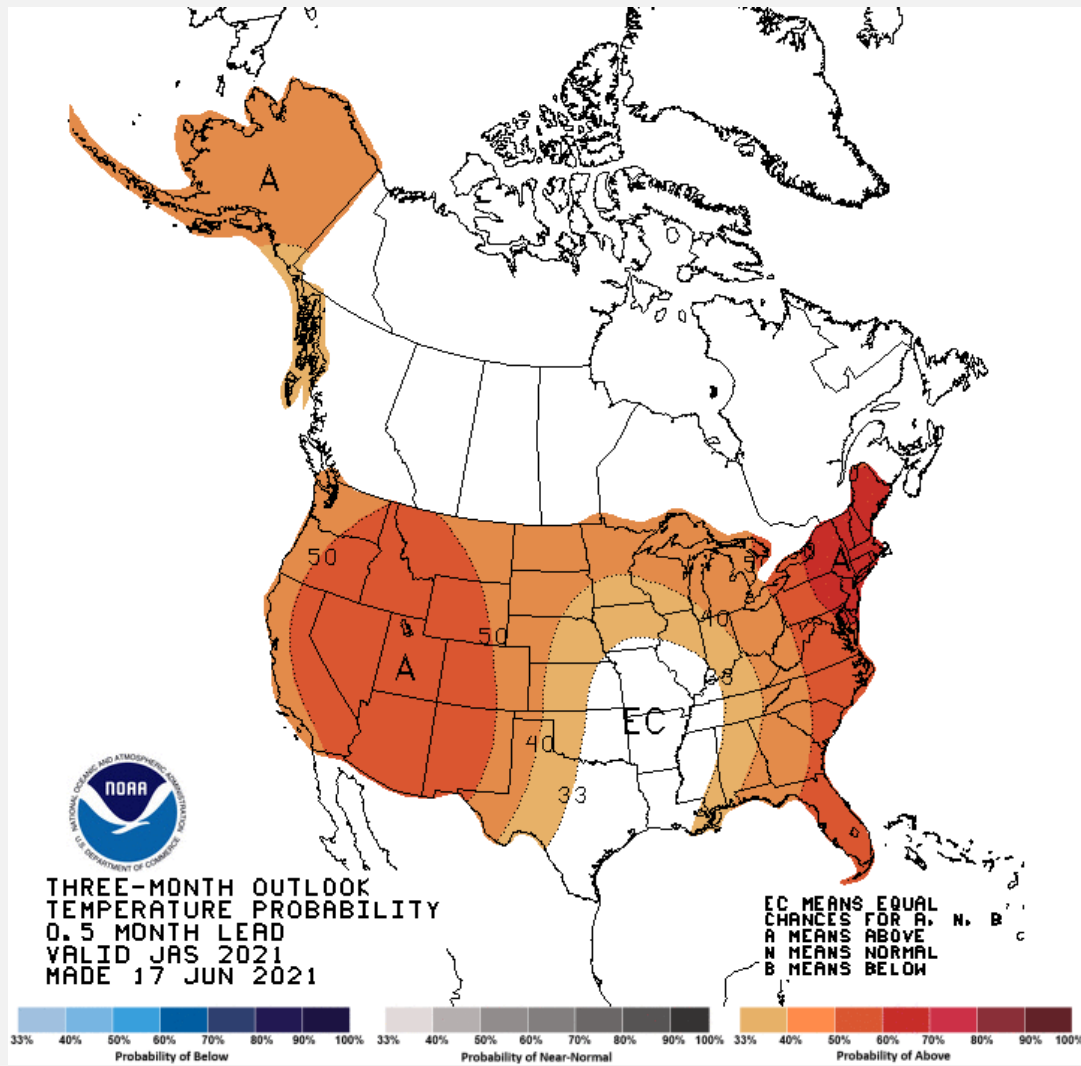
Top ### - Percent Poor to Very Poor
[Bottom ##] - Change from Last Week

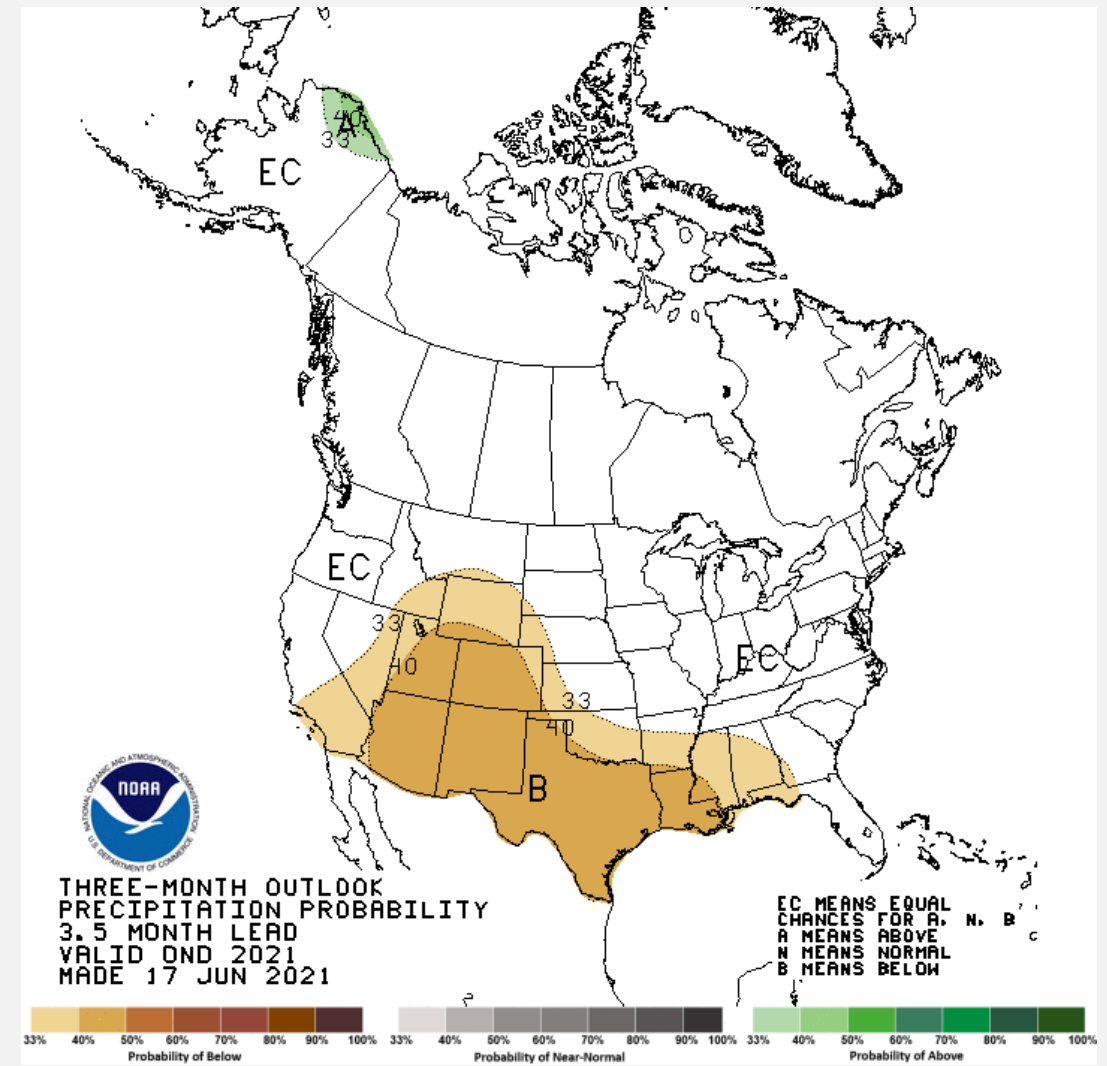
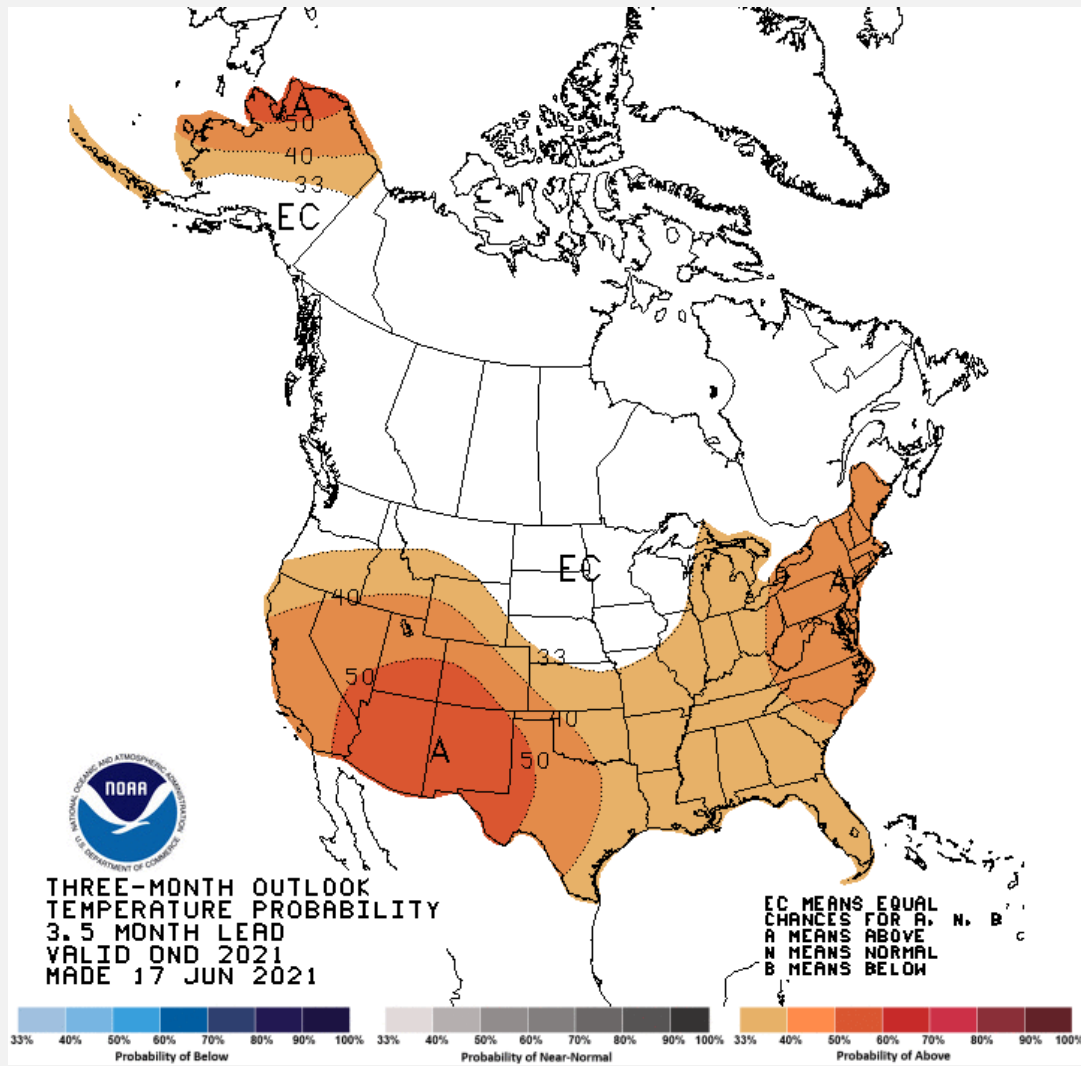
Data obtained from USDA National Agricultural Statistics Service weekly Crop Progress reports.

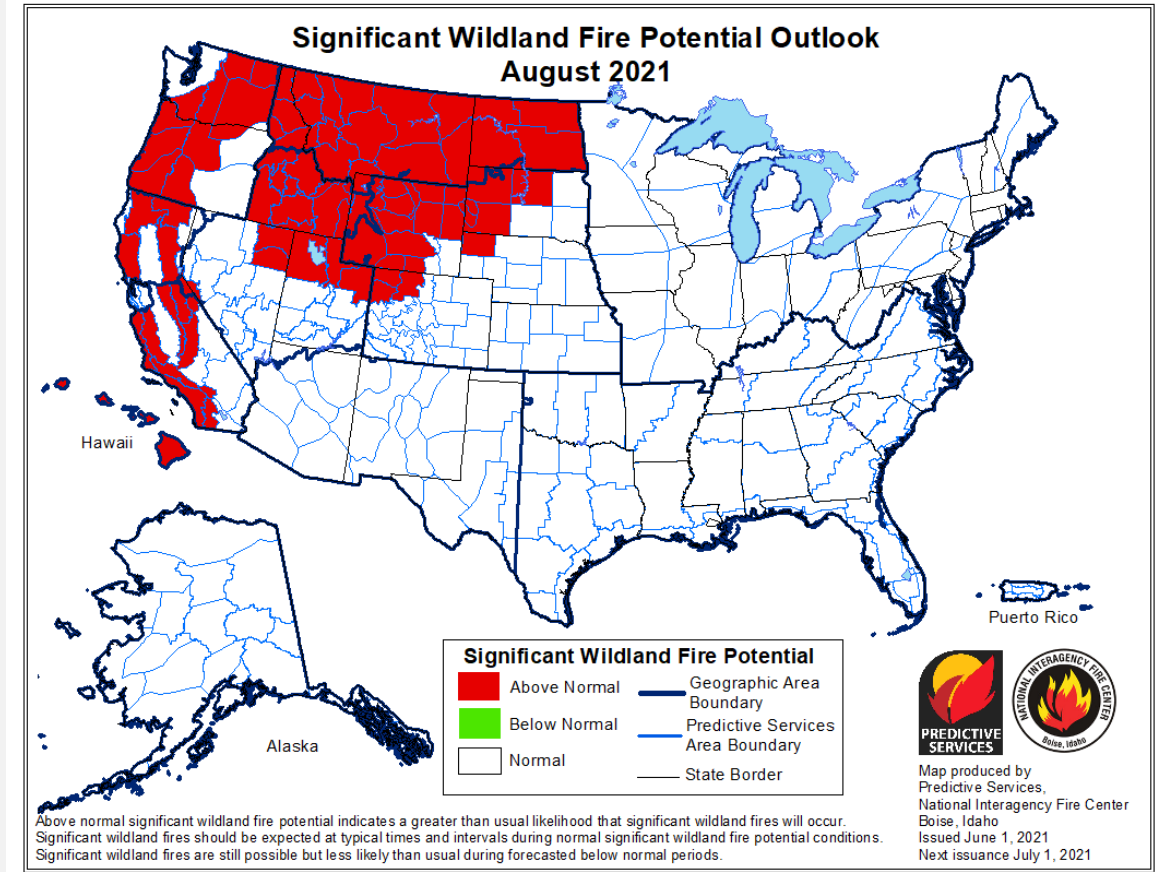
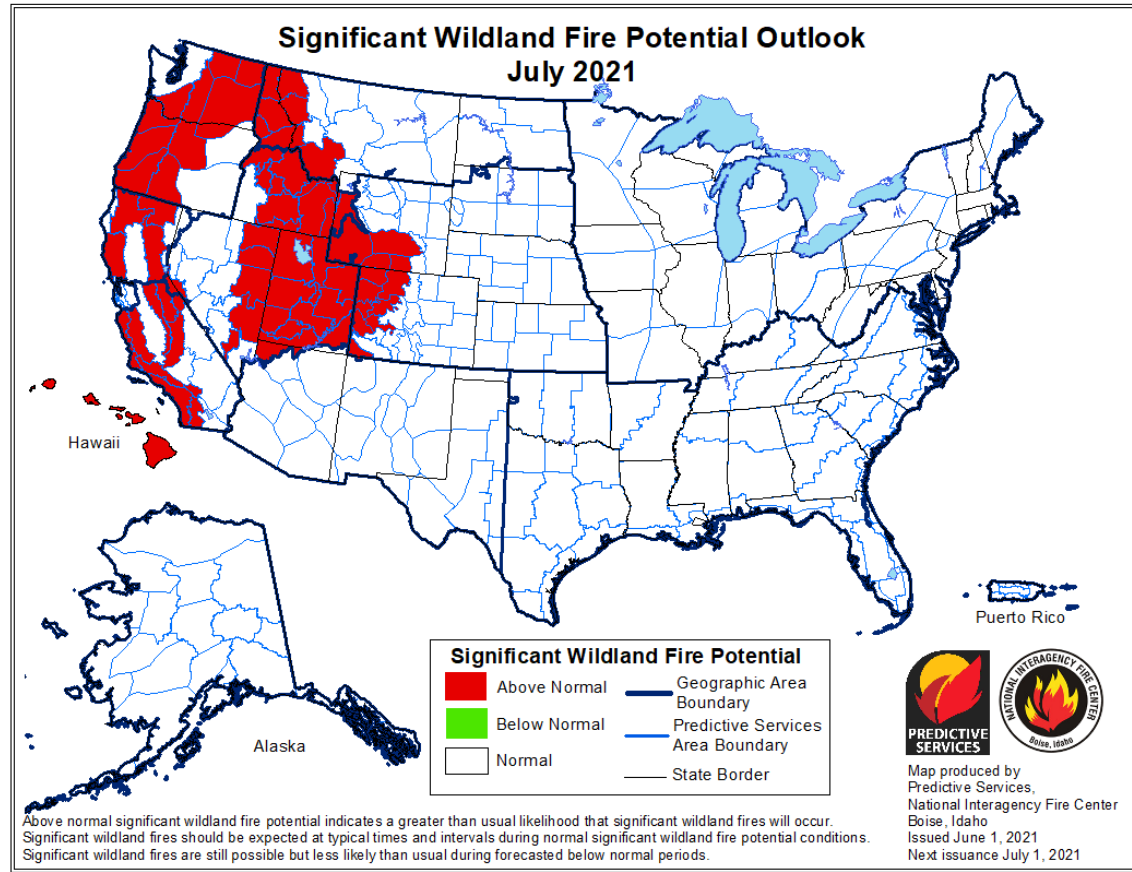






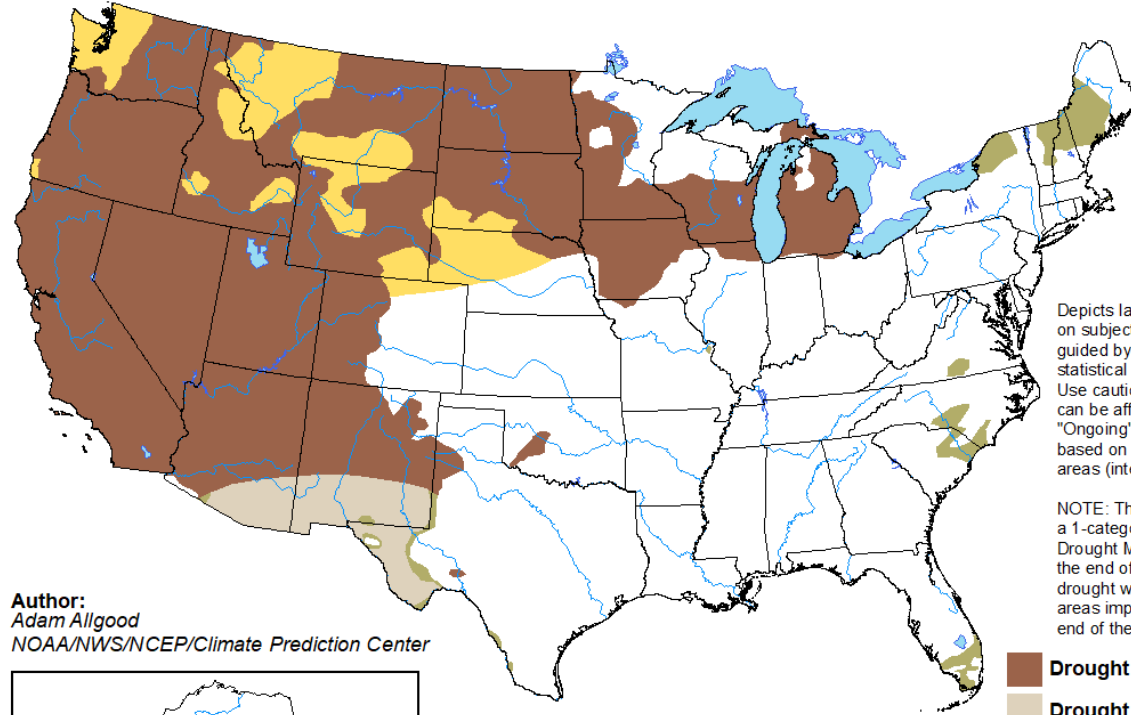






U.S. Seasonal Drought Outlook Drought Tendency During the Valid Period

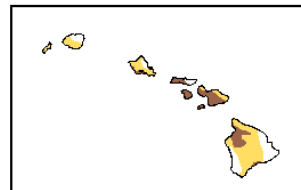
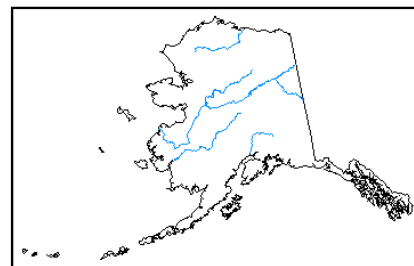
Valid for June 17 - September 30, 2021
Released June 17



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:
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NOAA/NWS/NCEP/Climate Prediction Center



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



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

- Drought conditions in the upper Great Plains have built from dry conditions in 2020
- Extreme heat in the upper Midwest and Great Plains has contributed to rapid development and intensification of drought in portions of the Midwest
- Impacts, initially limited to agriculture, are expanding to include municipal water supplies, and will likely impact navigation if conditions persist
- The outlook for cooler temperatures in the second half of June is expected to bring some temporary relief following the early-June heatwave
- The seasonal outlook indicates that drought is likely to persist, with no indication of a reversal to the pattern of dry weather in the upper Great Plains and Midwest

Presentations Archive

<http://www.hprcc.unl.edu>

<https://mrcc.illinois.edu/multimedia/webinars.jsp>

**NOAA's National Centers
for Environmental Information**

www.ncdc.noaa.gov

Monthly Climate Reports

www.ncdc.noaa.gov/sotc/

NOAA's Climate Prediction Center

www.cpc.ncep.noaa.gov

U.S. Drought Portal

www.drought.gov

National Drought Mitigation Center

drought.unl.edu

State Climatologists

www.stateclimate.org

Regional Climate Centers

www.hprcc.unl.edu mrcc.illinois.edu

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