North Central U.S. Climate and Drought Outlook

June 2021

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ARTP Applied Research & Technology Program

KENTUCKY CLIMATE CENTER

WKU

GENERAL INFORMATION

- 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

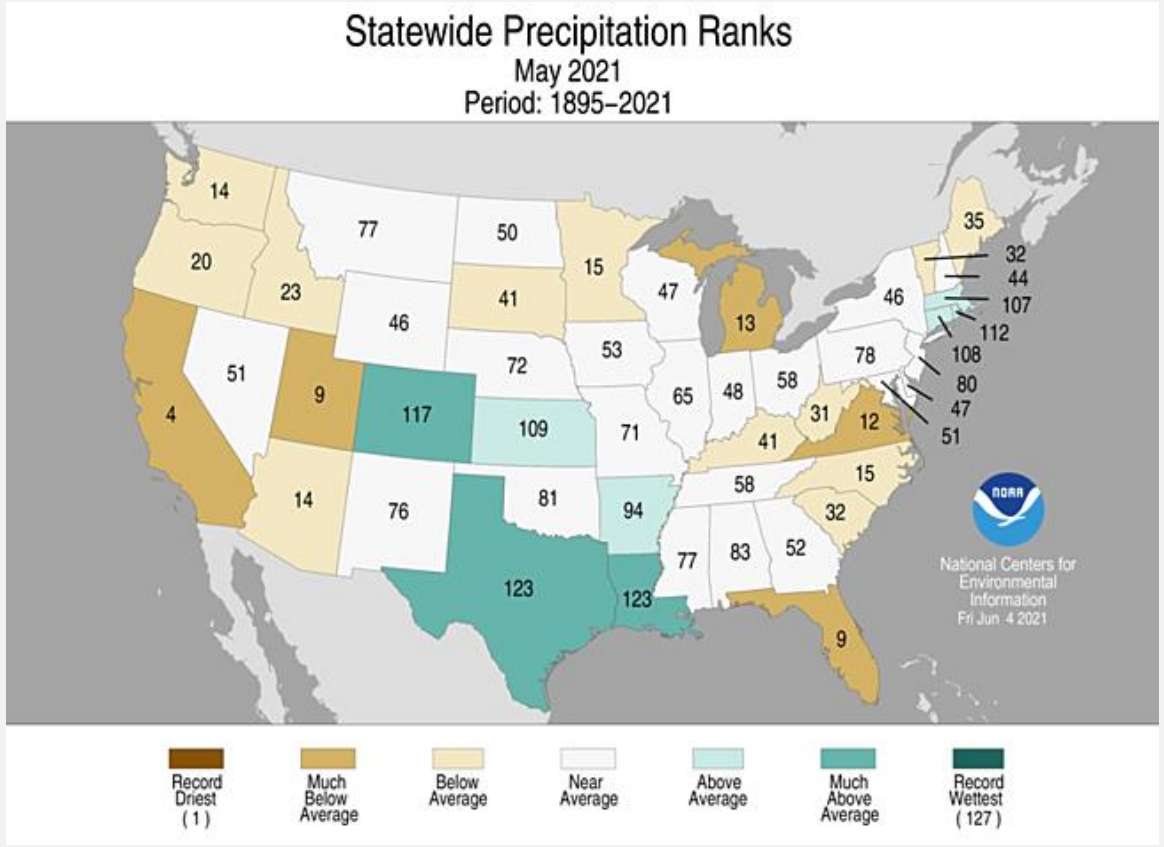
- Open for questions at the end

Agenda

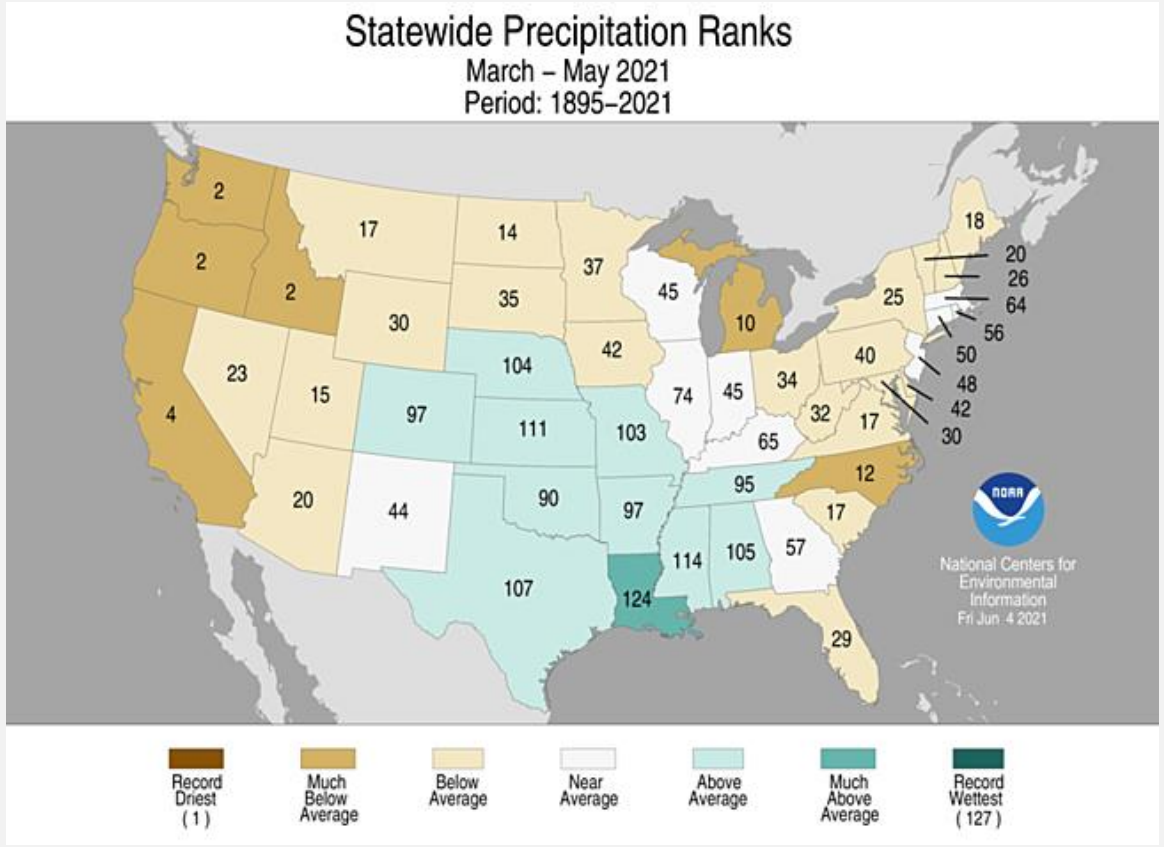
- Current Climatic Conditions
- Current and Prospective Impacts
- Outlooks

Dry water hazard at Lee Park Municipal Golf Course in Aberdeen, SD exposes golf balls. Date: 6/13/2021. Credit: Laura Edwards.

PRECIPITATION RANKS



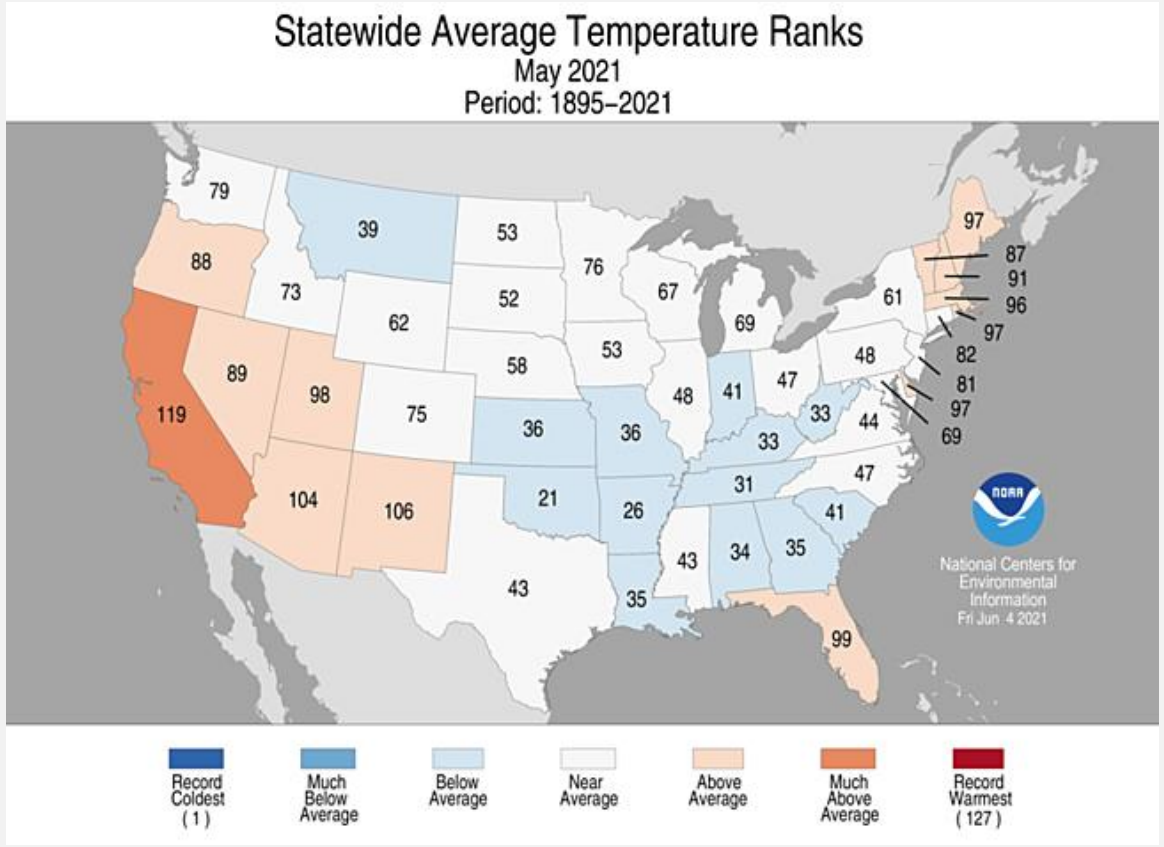
- Above average precipitation limited to eastern Colorado and Kansas during May



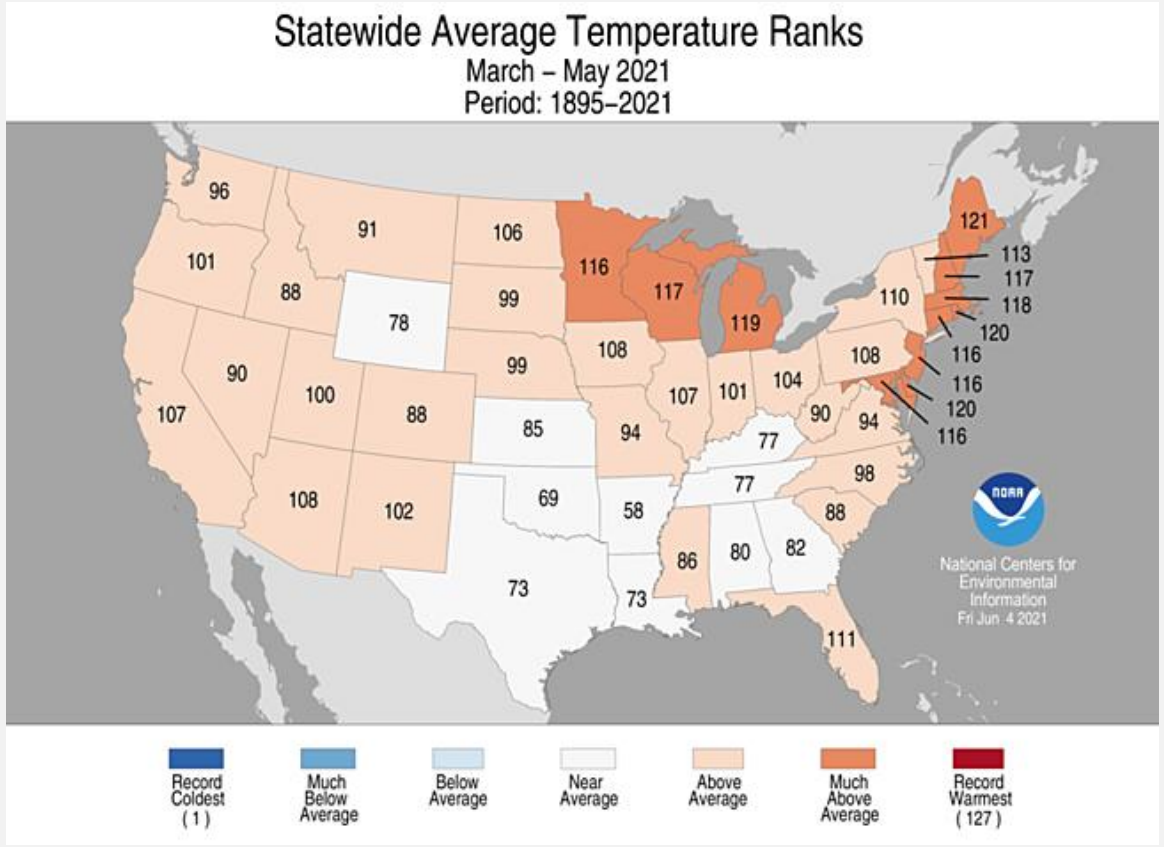
- Below average precipitation across the northern states, and much below average for Michigan

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

AVERAGE TEMPERATURE RANKS



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

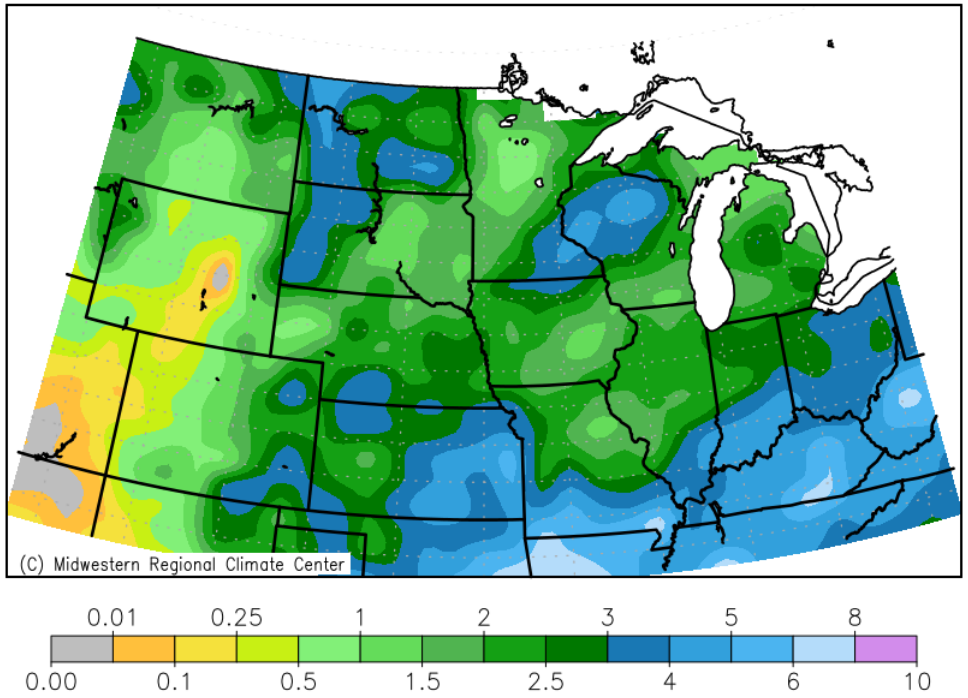


- Above to much above average temperatures for the season across most of the region, including top 10 warmest in upper Midwest

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

30-DAY PRECIPITATION

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



Midwestern Regional Climate Center
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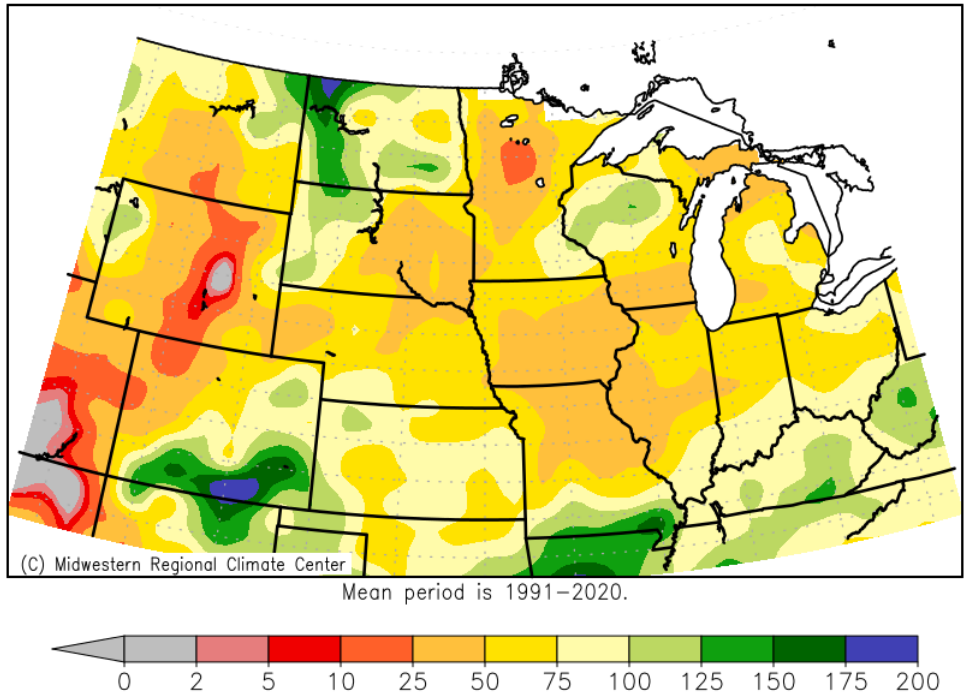
Accumulated Precipitation: Percent of Mean
May 19, 2021 to June 17, 2021



Mean period is 1991–2020.

Midwestern Regional Climate Center
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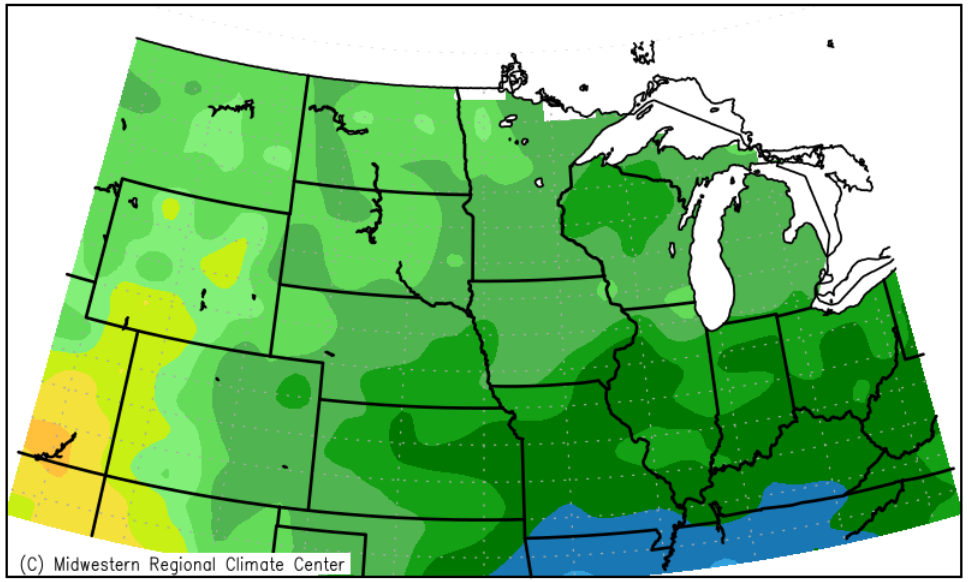
90-DAY PRECIPITATION

Accumulated Precipitation (in)
March 20, 2021 to June 17, 2021



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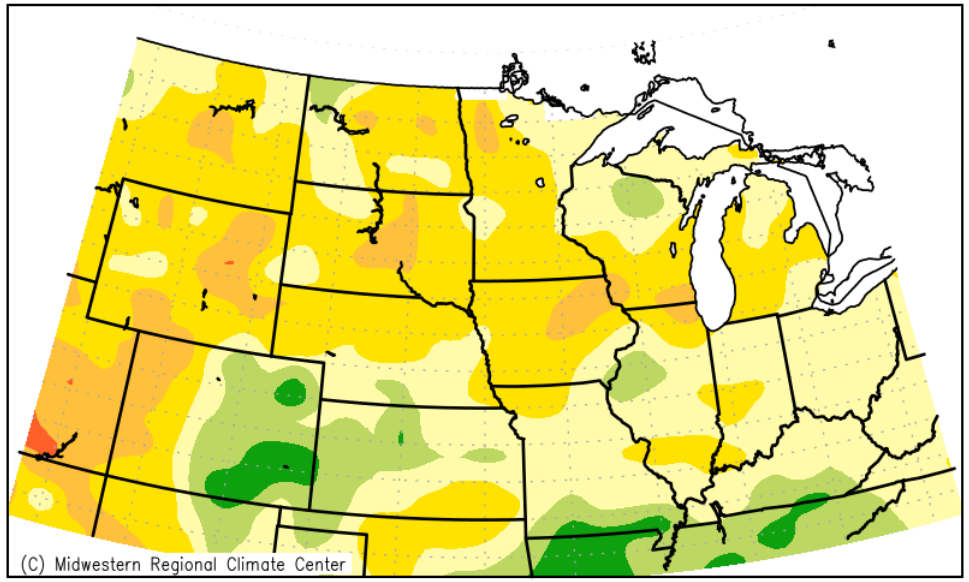
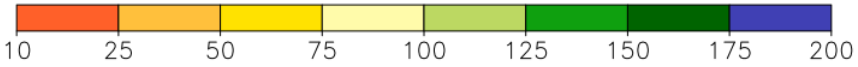
Accumulated Precipitation: Percent of Mean
March 20, 2021 to June 17, 2021



Mean period is 1991–2020.



Midwestern Regional Climate Center
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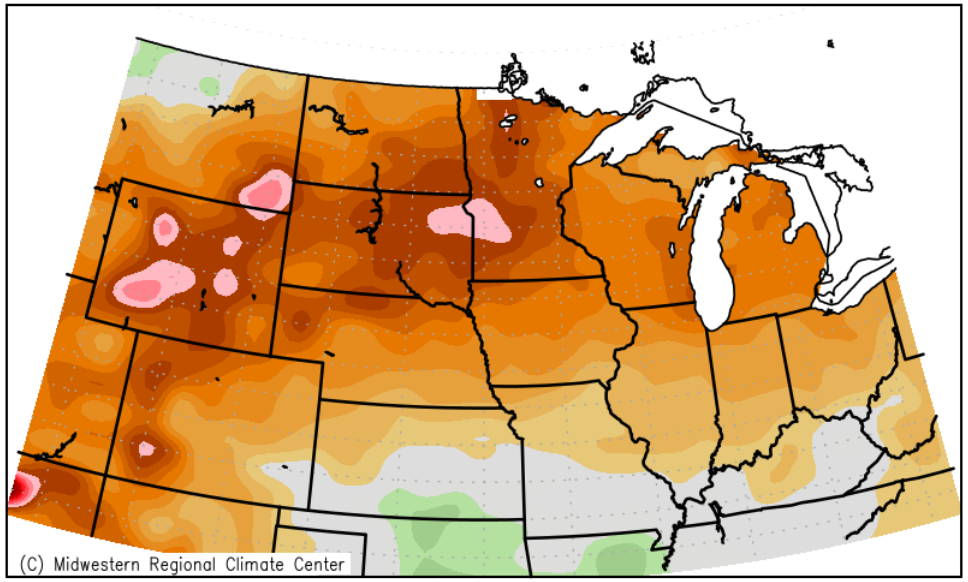
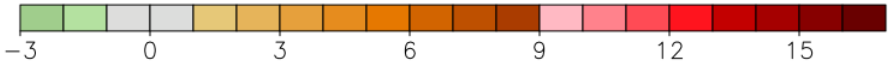
30-DAY MAX & MIN TEMPERATURE

Average Maximum Temp. (°F): Departure from Mean
May 19, 2021 to June 16, 2021



Mean period is 1991–2020.



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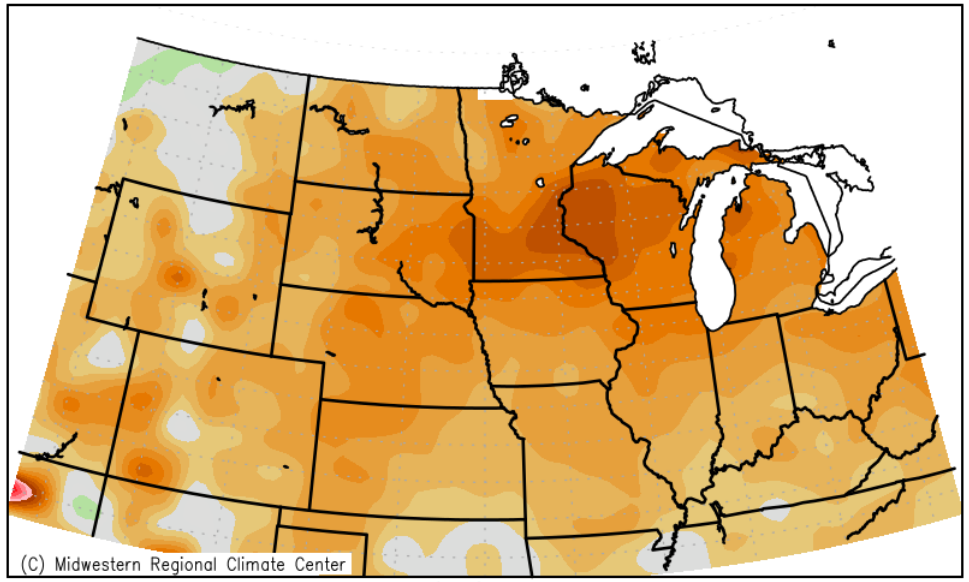
Average Minimum Temp. (°F): Departure from Mean
May 19, 2021 to June 17, 2021



Mean period is 1991–2020.

Midwestern Regional Climate Center
cli–MATE: MRCC Application Tools Environment
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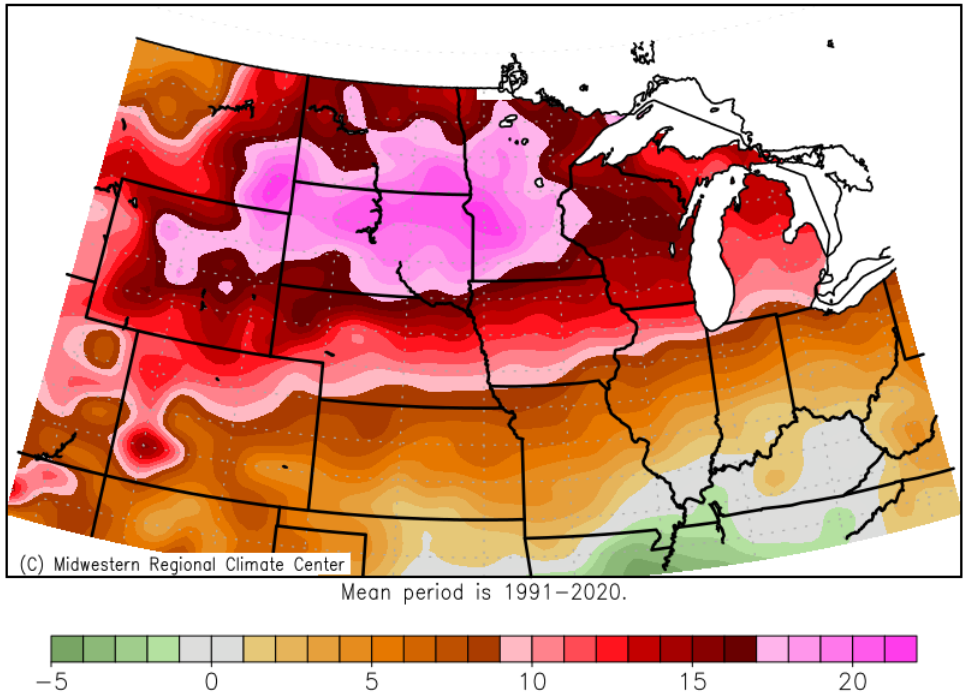
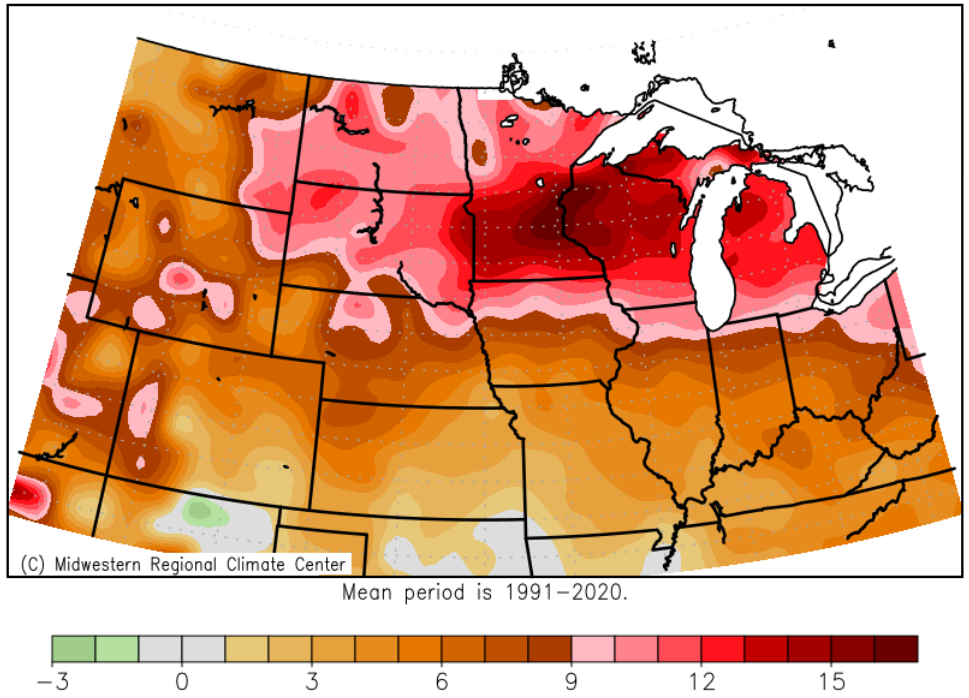
JUNE HEATWAVE

Average Maximum Temp. (°F): Departure from Mean
June 3, 2021 to June 10, 2021

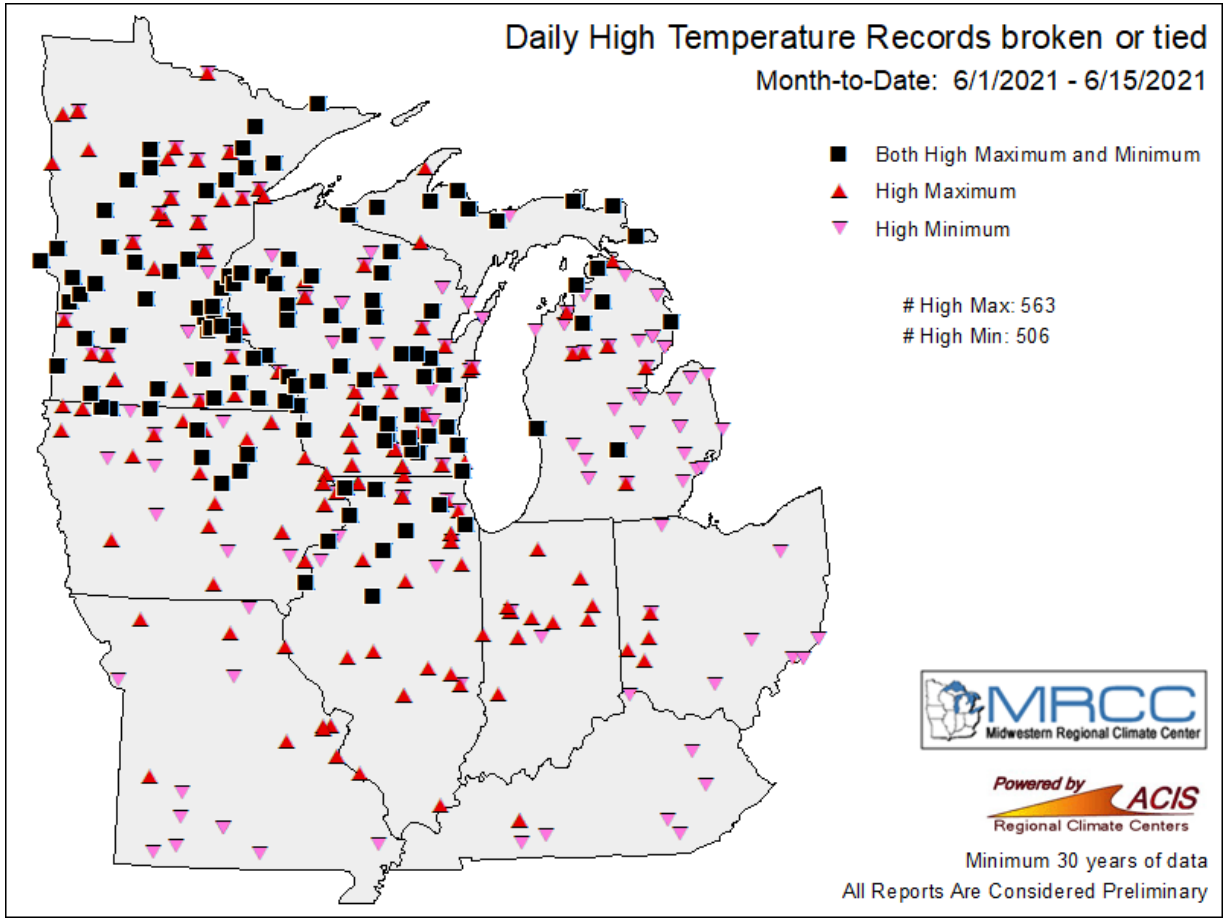


Average Minimum Temp. (°F): Departure from Mean
June 3, 2021 to June 10, 2021



- An historically significant heatwave has exacerbated drought development

Across the Midwest …



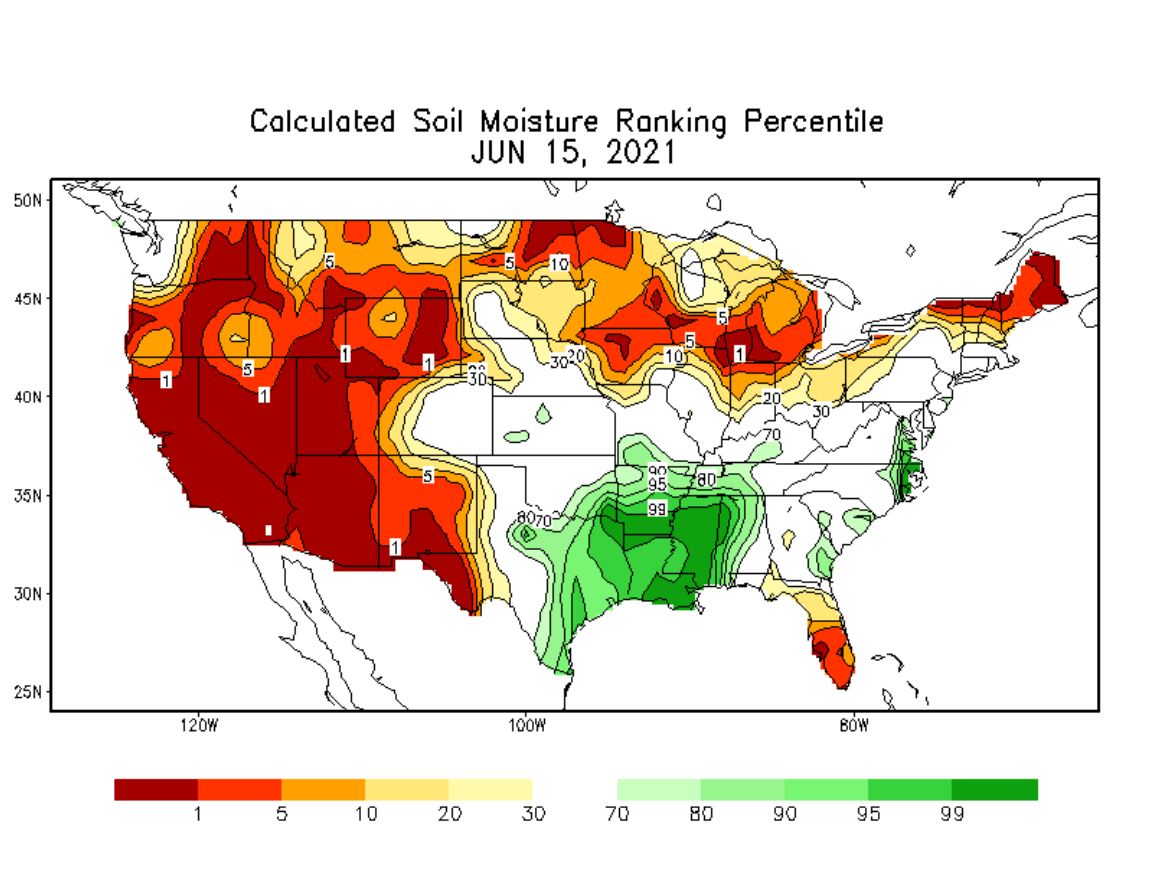
Credit: Mike Timlin

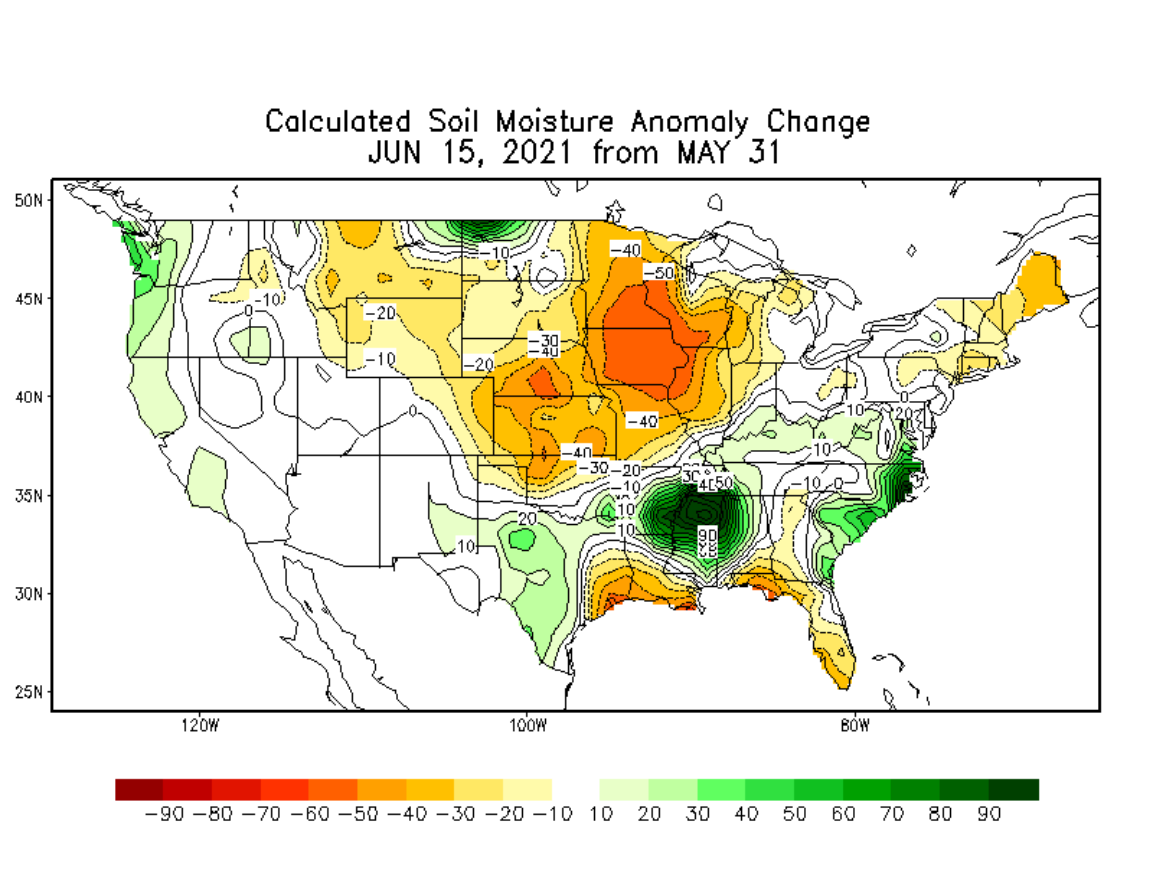
Across the Great Plains …

- **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

SOIL MOISTURE

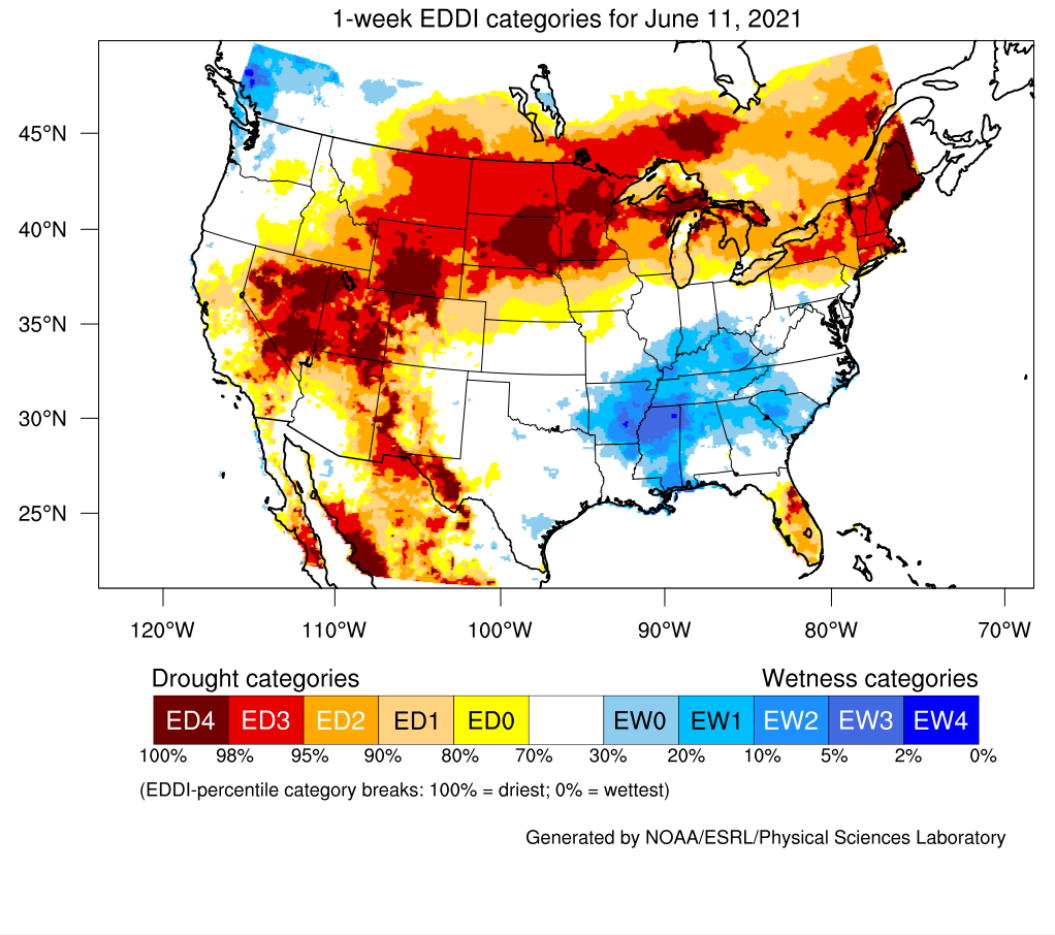


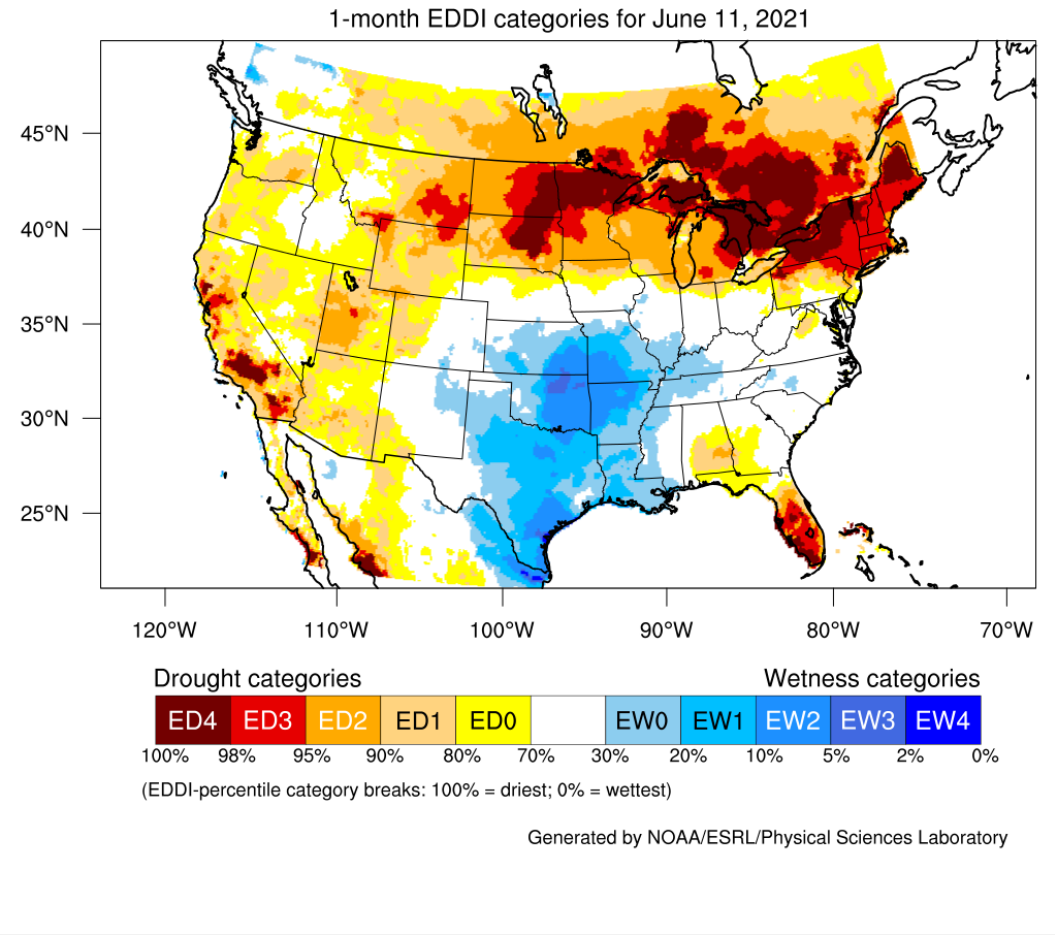


- Persistent dryness combined with above average temperatures have depleted soil moisture
- Recent heatwave and dry weather have led to rapid soil moisture depletion in upper Midwest

https://www.cpc.ncep.noaa.gov/products/Soilmst_Monitoring/US/Soilmst/Soilmst.shtml#

EVAPORATIVE DEMAND DROUGHT INDEX





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

https://downloads.psl.noaa.gov/Projects/EDDI/CONUS_archive/images/2021/

STREAM FLOWS – 7 & 28 DAY

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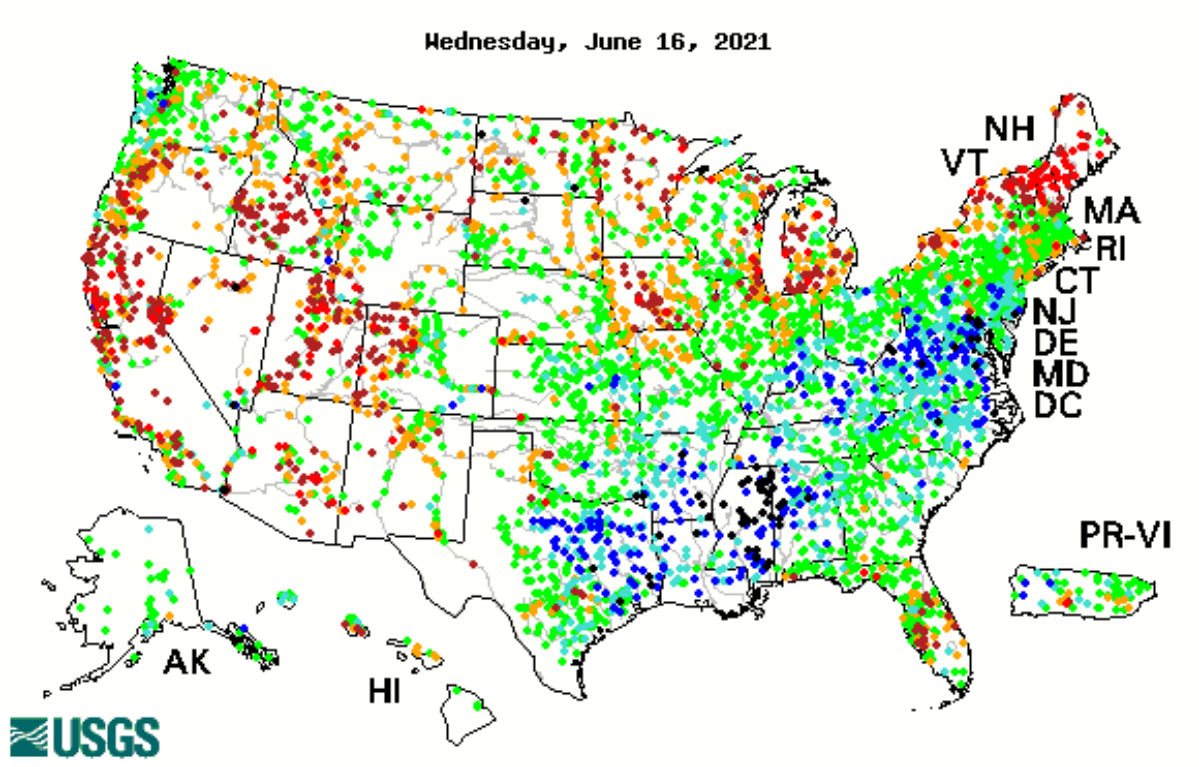
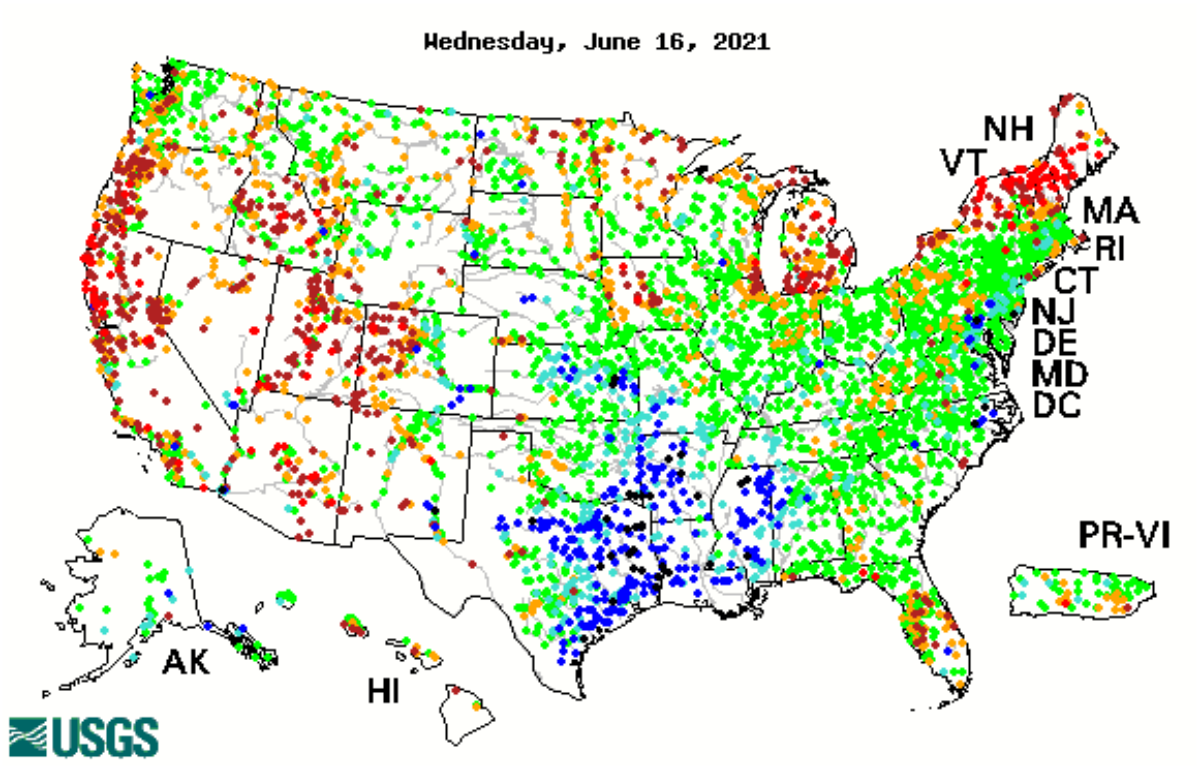
7-Day



28-Day



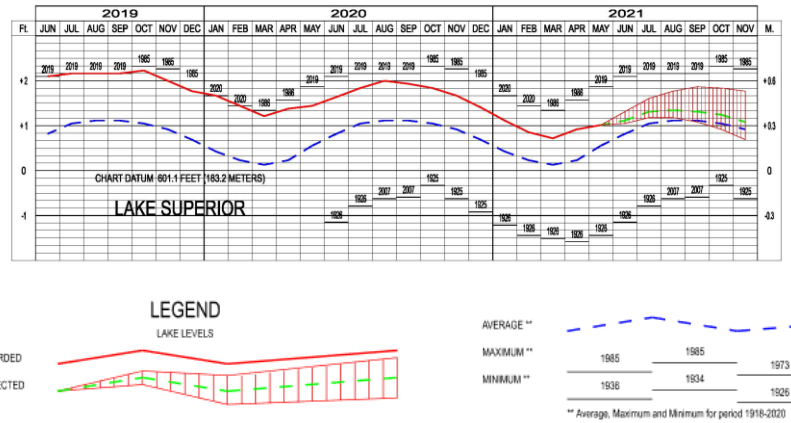
Explanation - Percentile classes							
Low	<10	10-24	25-75	76-90	>90	High	Not-ranked
	Much below normal	Below normal	Normal	Above normal	Much above normal		

http://waterwatch.usgs.gov/index.php?id=pa07d

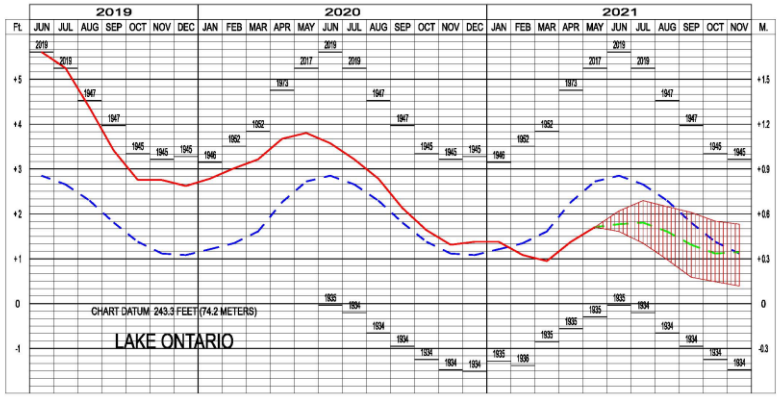
http://waterwatch.usgs.gov/index.php?id=pa28d

GREAT LAKES WATER LEVELS

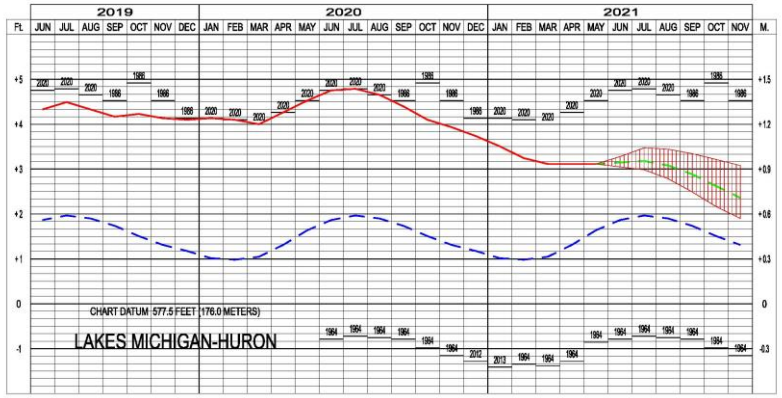
LAKE SUPERIOR WATER LEVELS - JUNE 2021



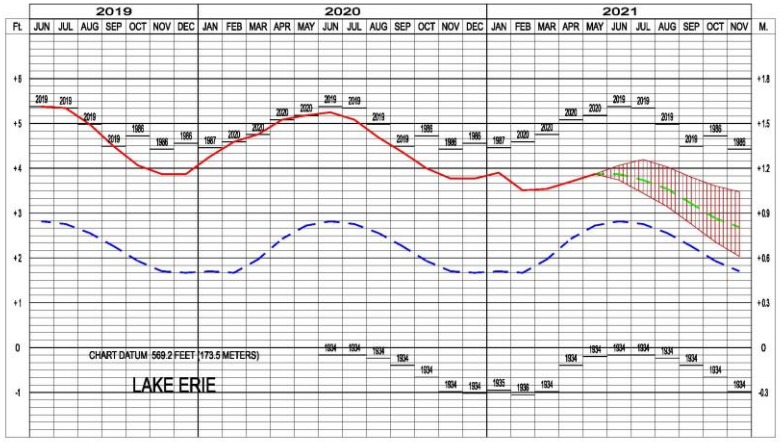
LAKE ONTARIO WATER LEVELS - JUNE 2021



LAKES MICHIGAN-HURON WATER LEVELS - JUNE 2021



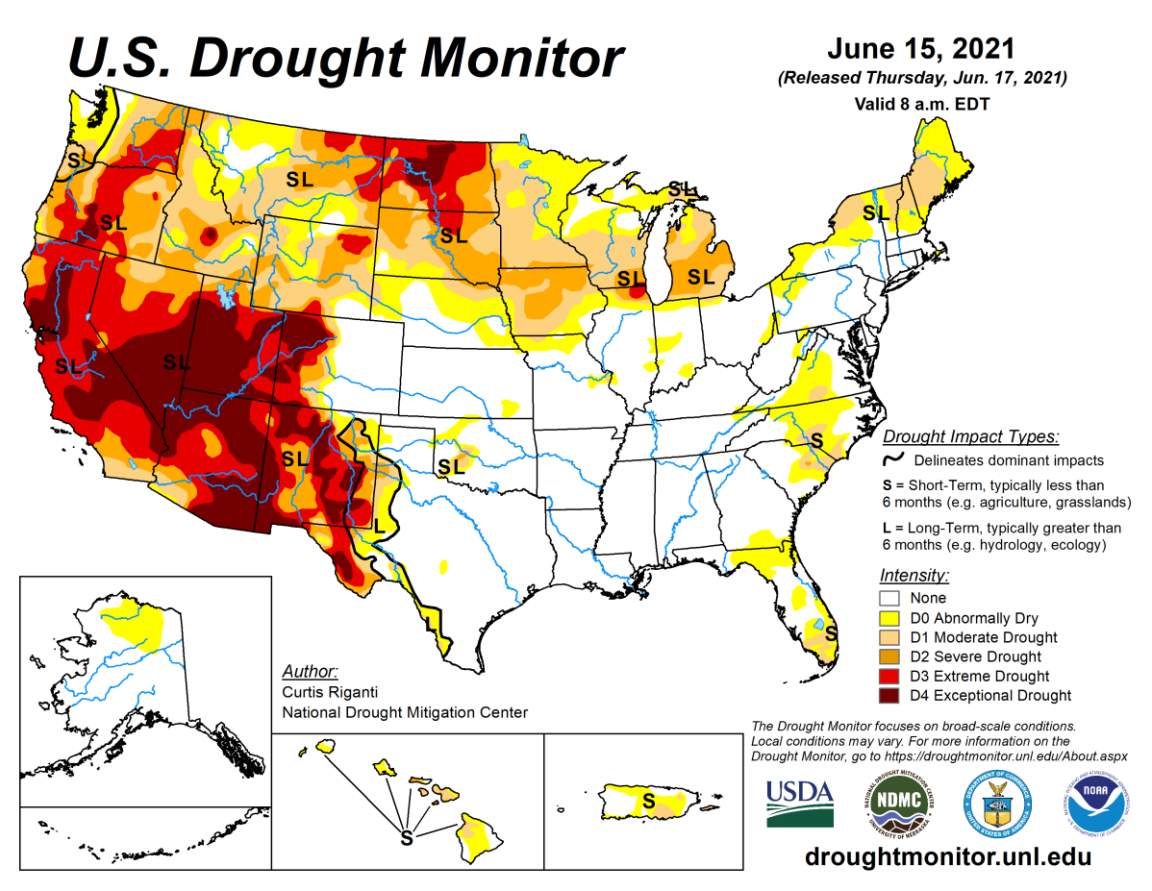
LAKE ERIE WATER LEVELS - JUNE 2021

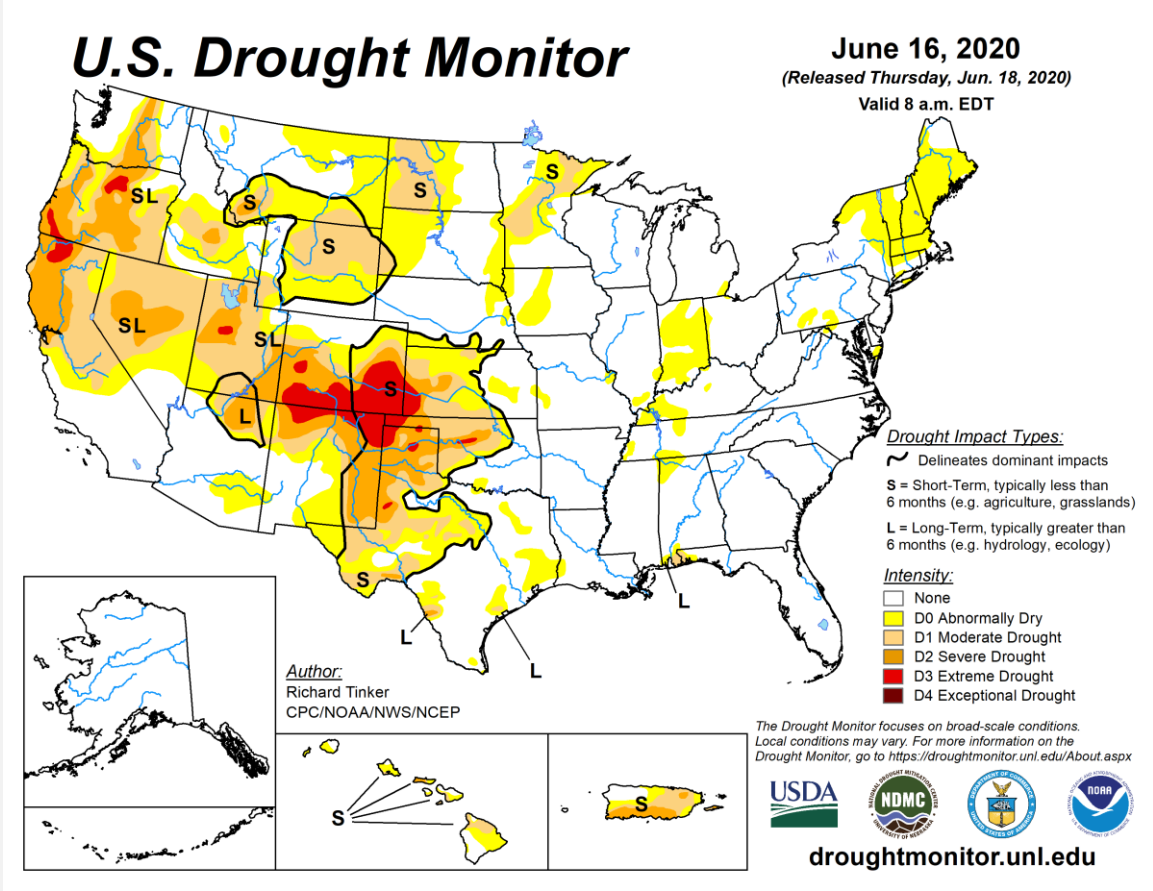


- Lake water levels are declining, though most remain above average

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

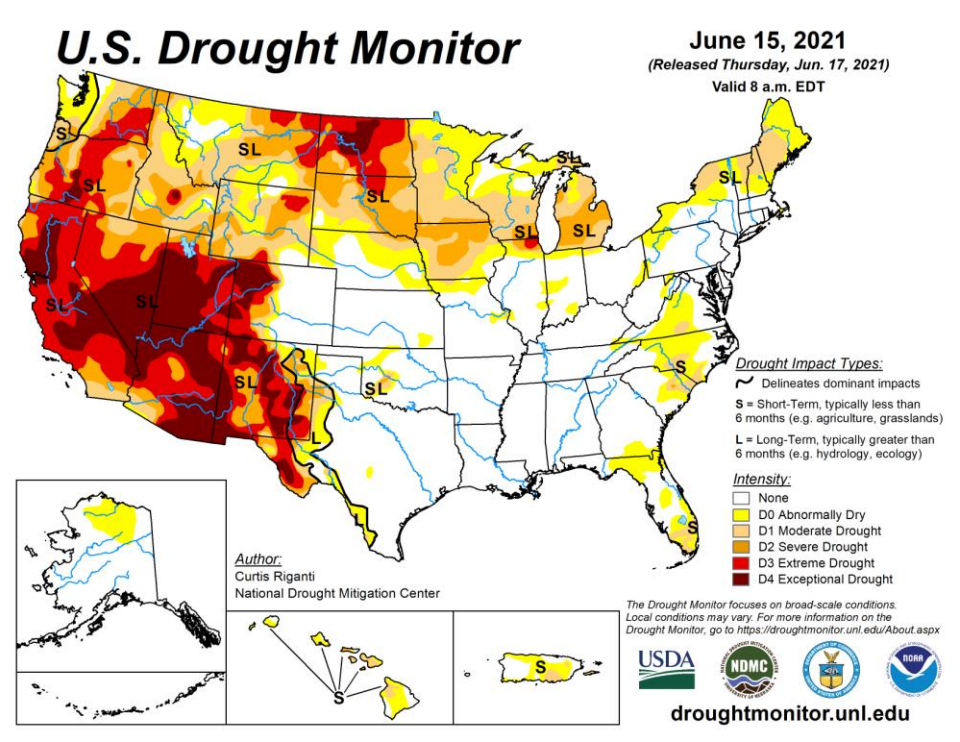
DROUGHT YEAR-OVER-YEAR



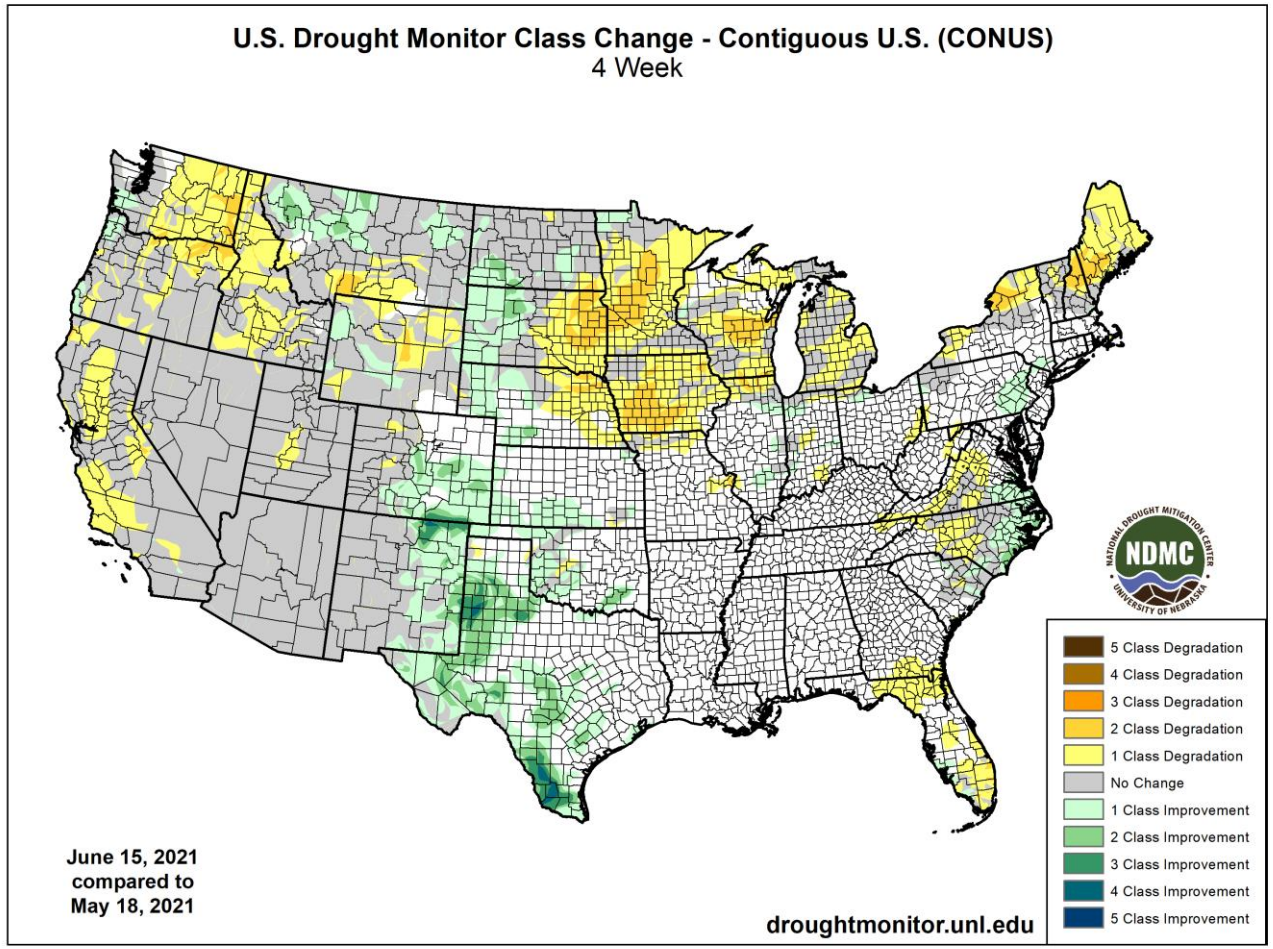


- Exceptional drought in upper Great Plains is an evolution from dry conditions in 2020
- Sharp boundary of drought in Colorado west to east
- Greatest USDM drought coverage since the spring of 2013
- First D3 in Wisconsin since 2013

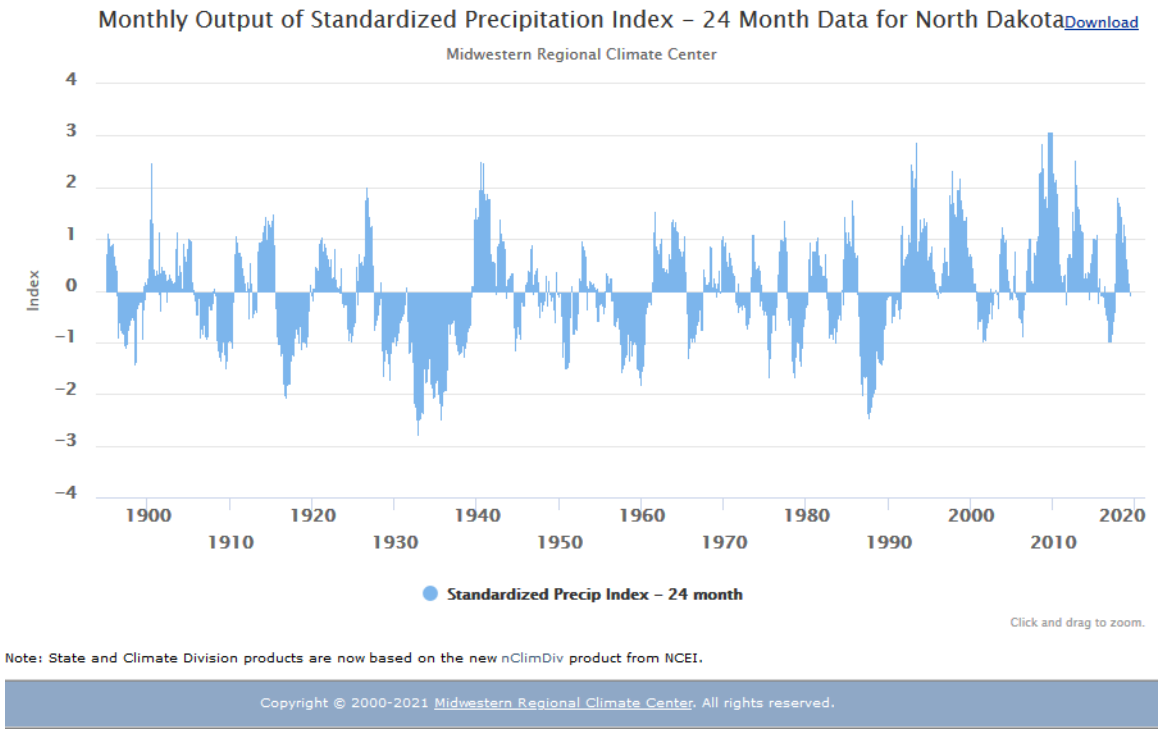
DROUGHT STATUS CHANGE

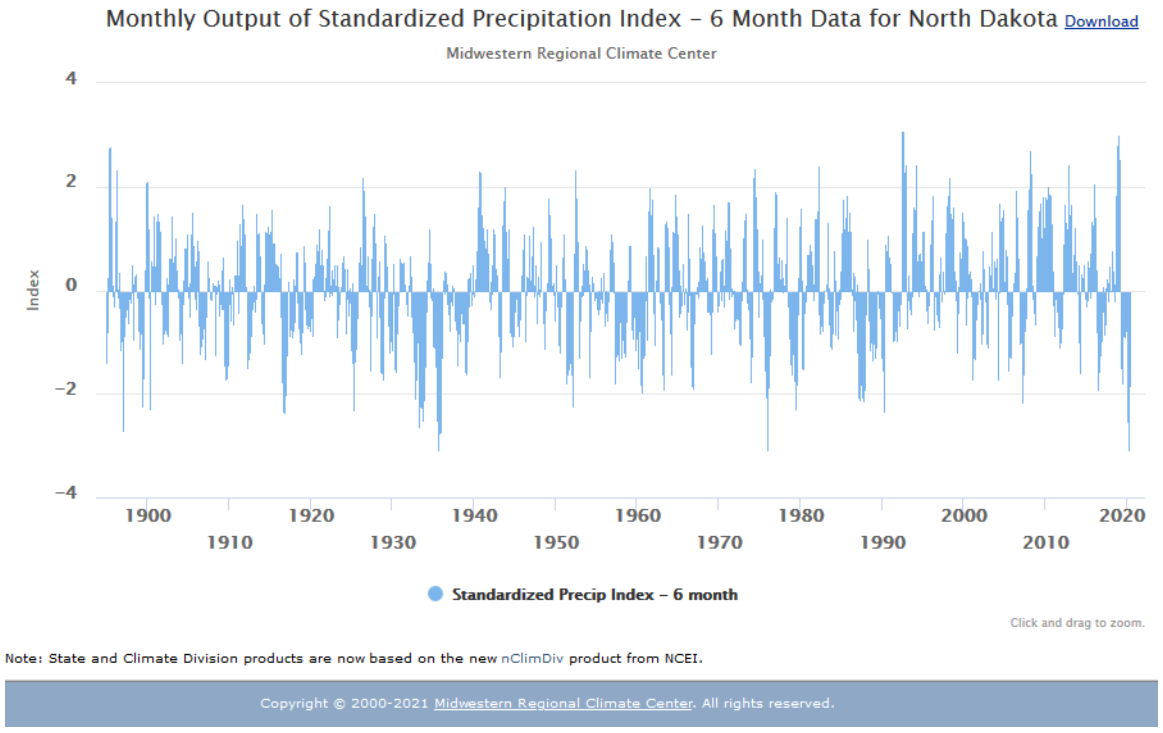


- Drought development in the Midwest has occurred early in the growing season



RECENT DRYNESS IN PERSPECTIVE – NORTH DAKOTA

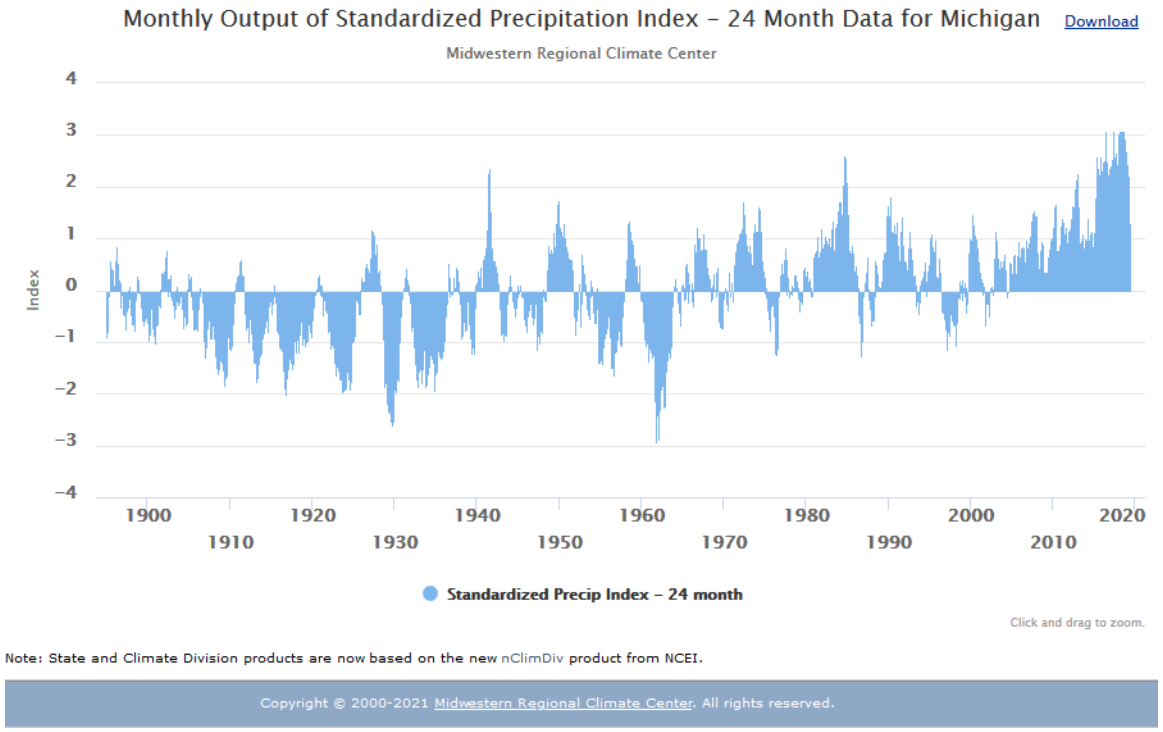


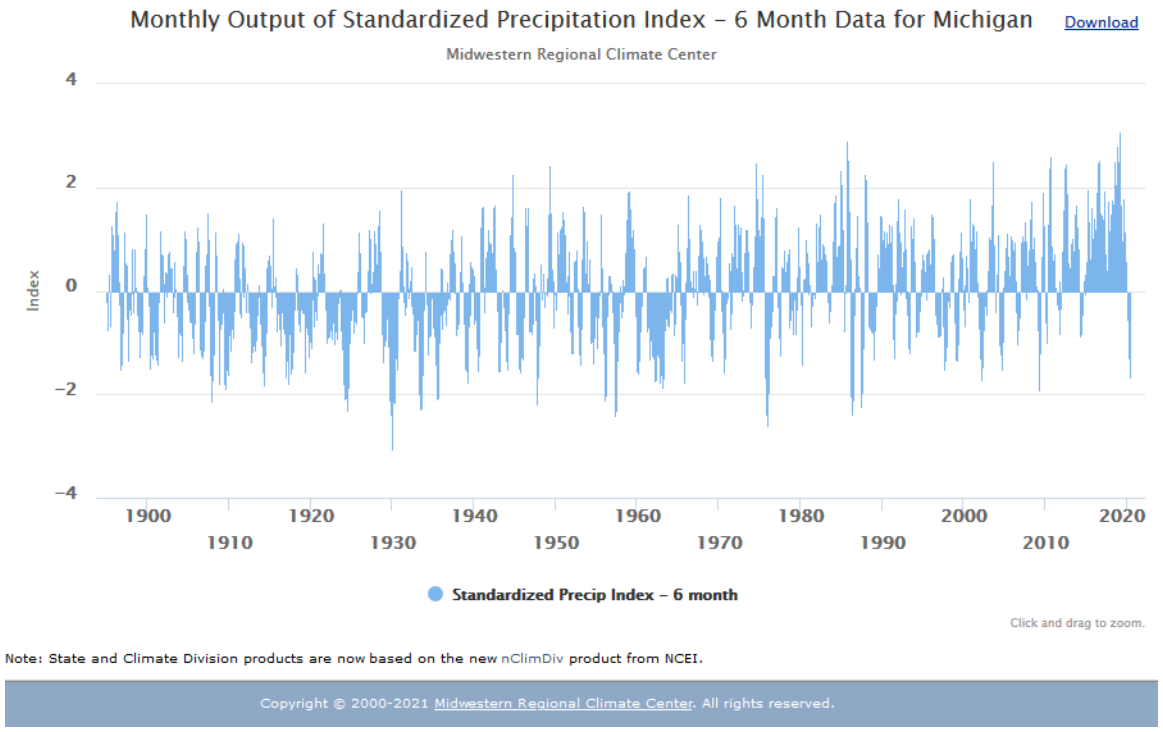


- 24-month SPI indicates that wetter that average conditions have been prevalent over recent decades

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

RECENT DRYNESS IN PERSPECTIVE - MICHIGAN

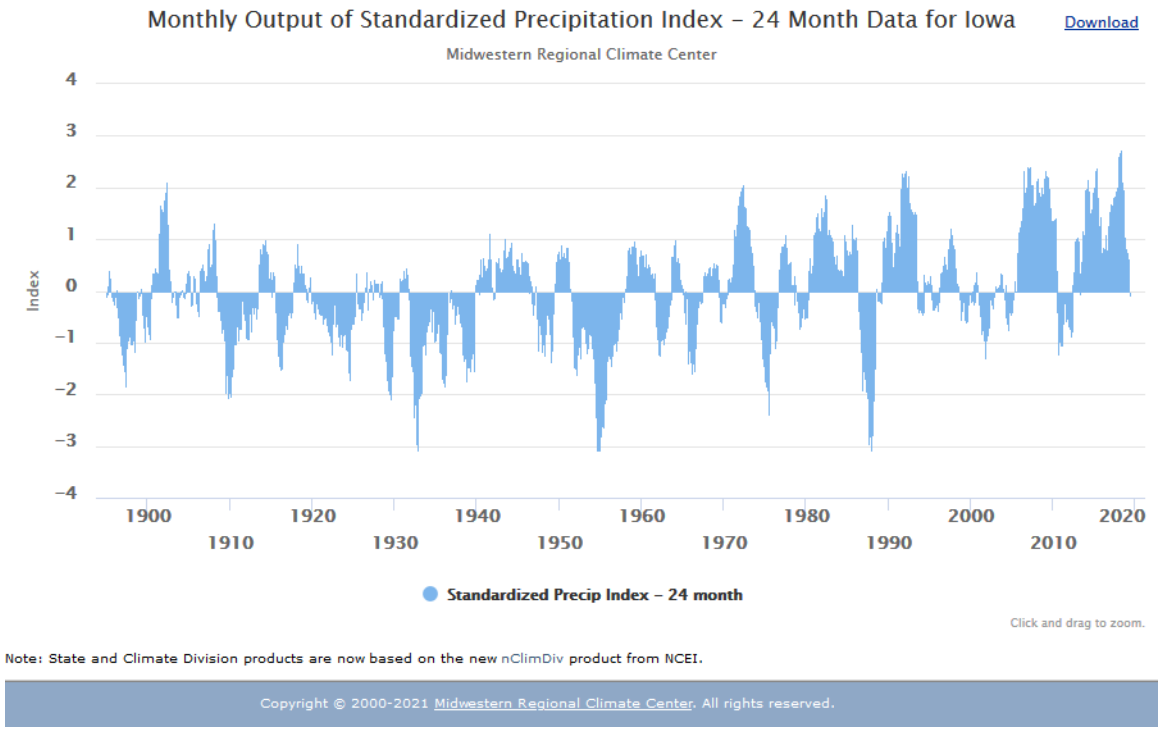


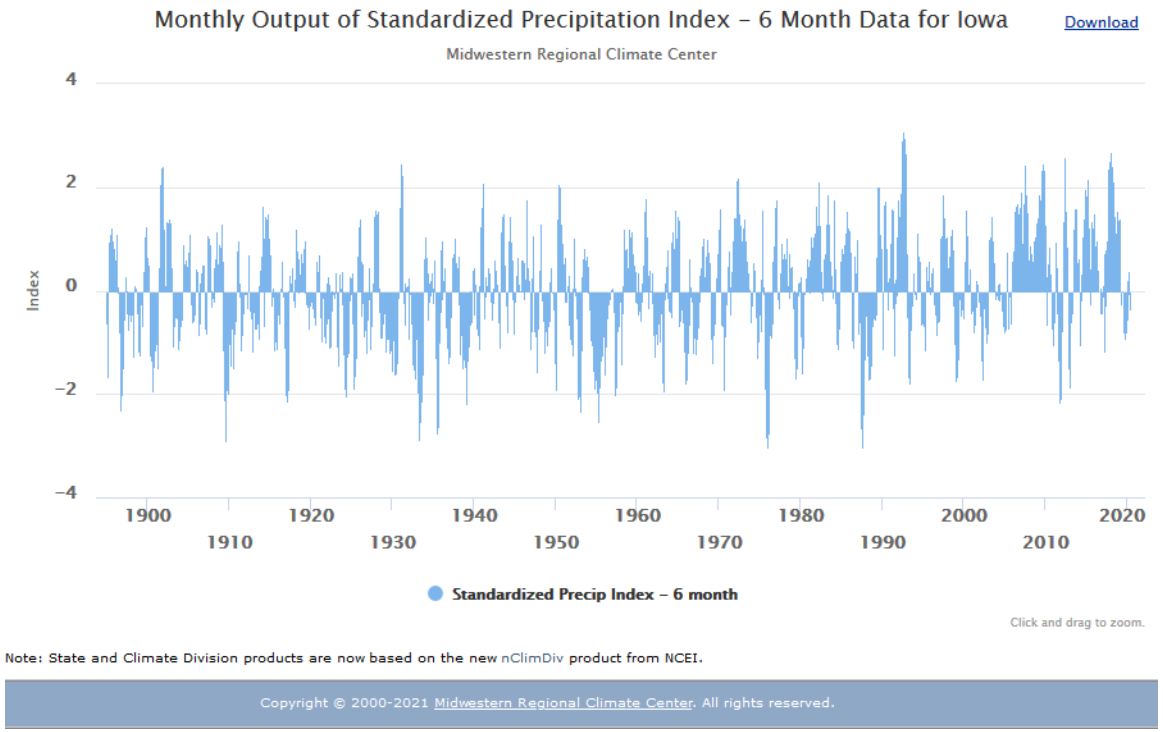


- 24-month SPI highlights an unprecedented period of wet conditions

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

RECENT DRYNESS IN PERSPECTIVE - IOWA





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

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WILDFIRE

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.

UPPER MISSOURI RIVER BASIN

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.

LATE MAY FREEZE

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.

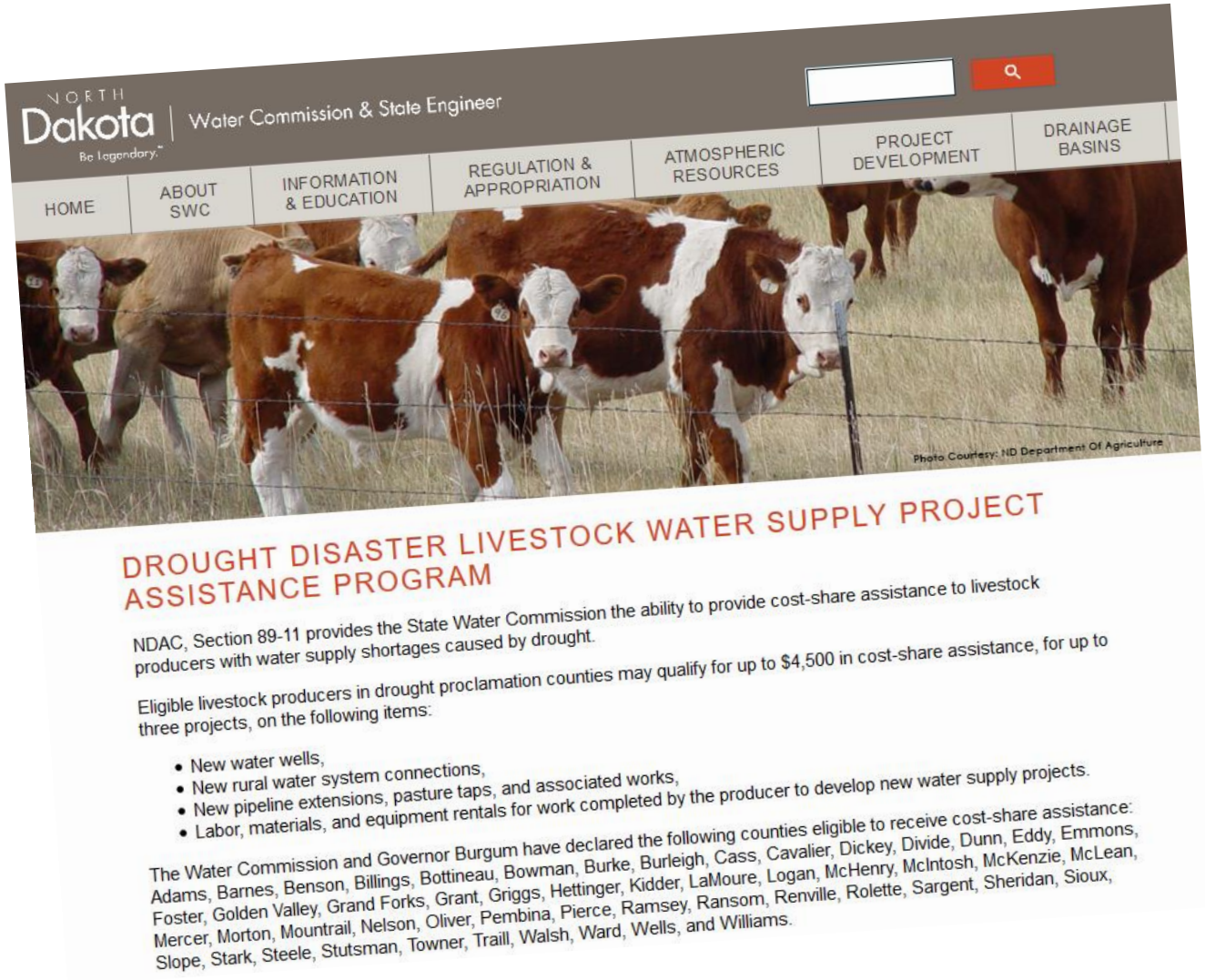
PASTURES AND CROPS

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.

PASTURES AND LIVESTOCK



https://www.swc.nd.gov/project_development/drought_disaster_livestock.html

- 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

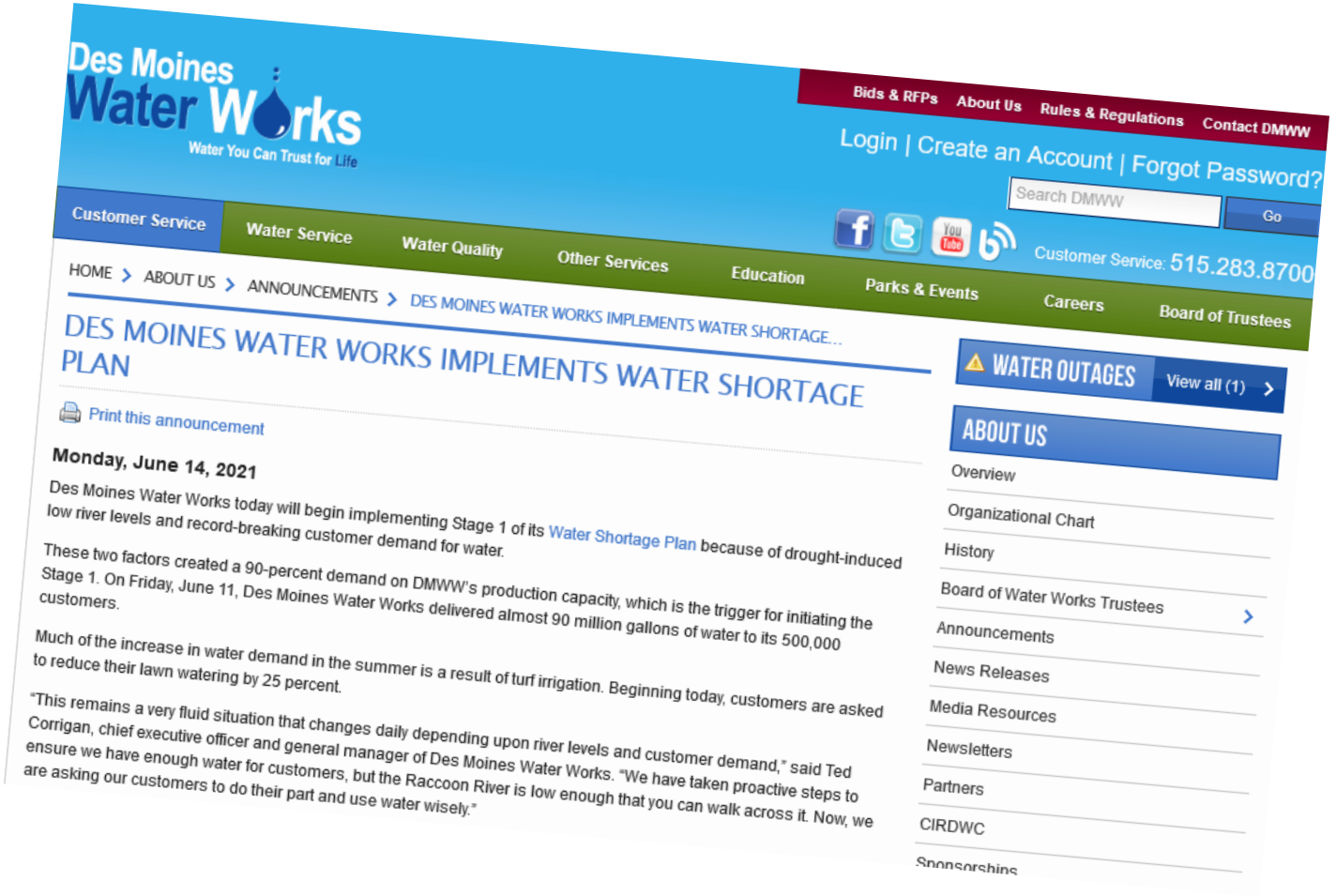
MIDWEST CROPS

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.

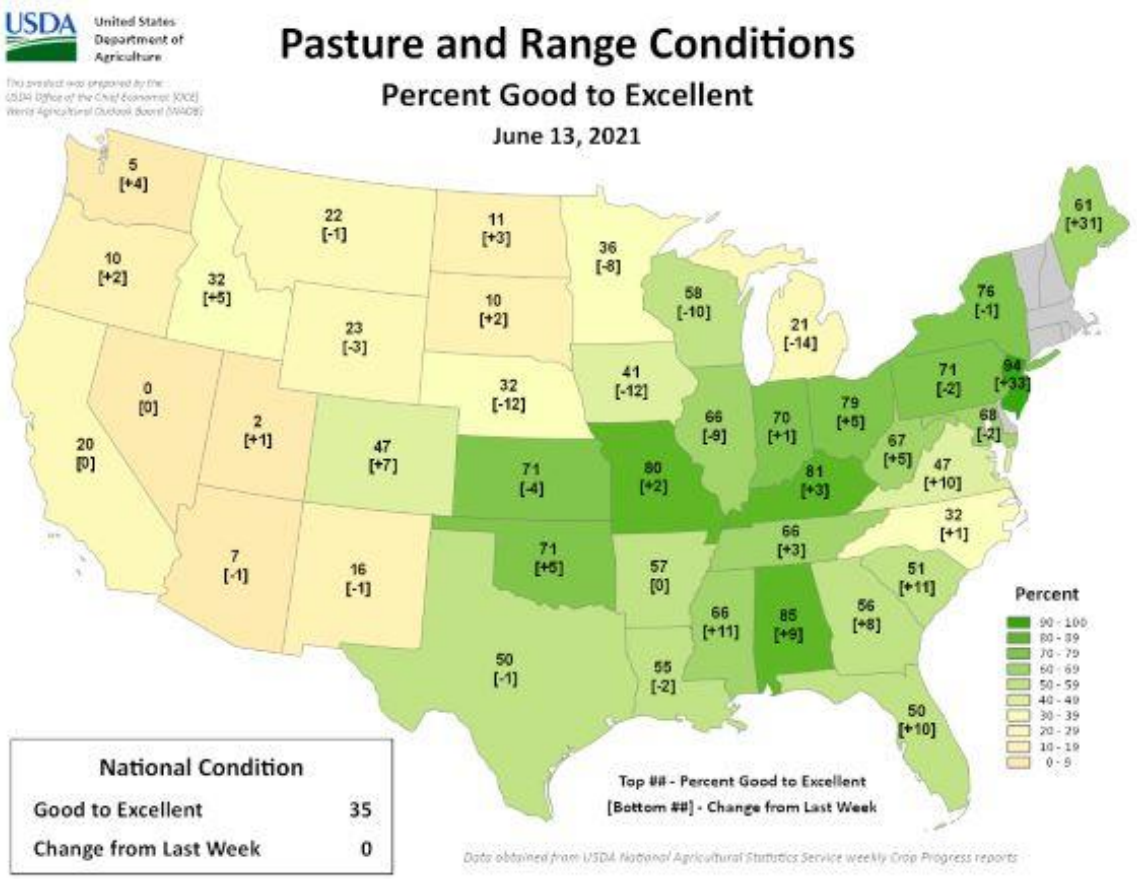
MUNICIPAL WATER SUPPLIES

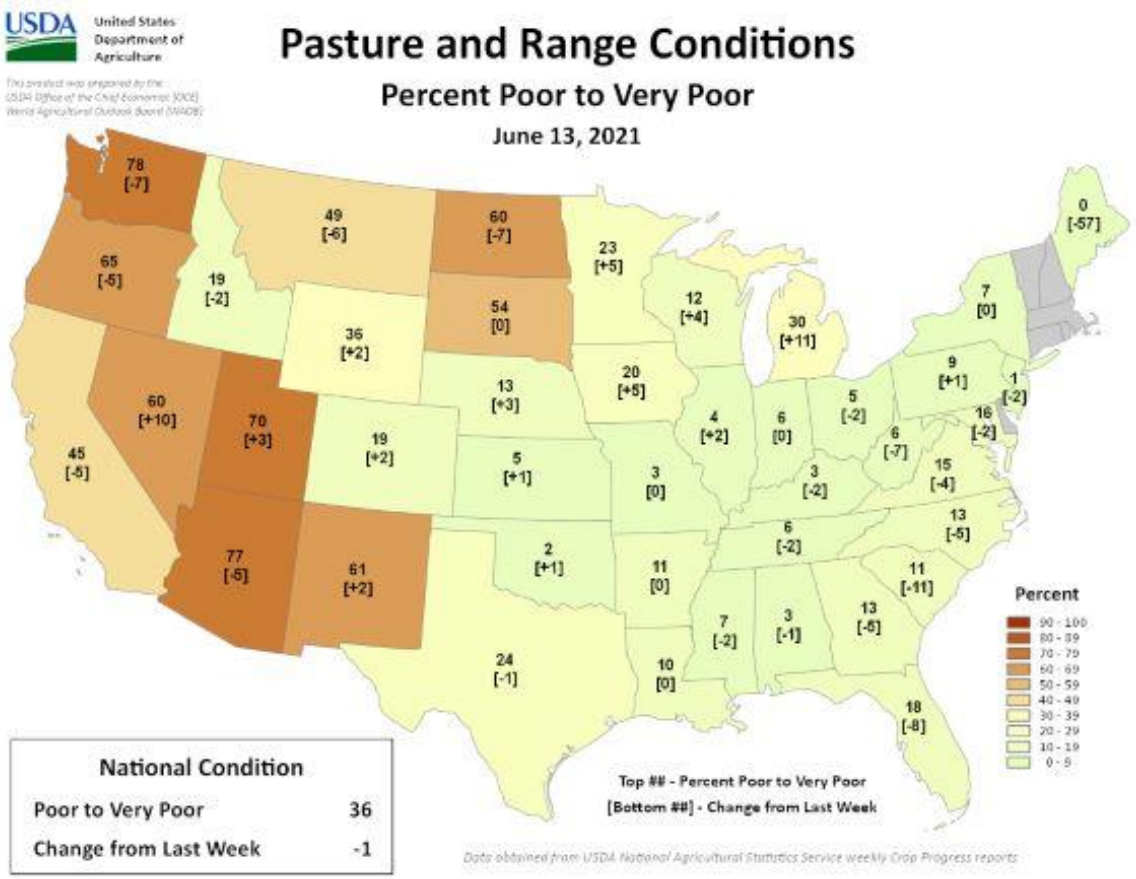
- Hot, dry conditions have contributed to decrease supply coupled with increased demand for water
- Water restrictions, such as those issued for Des Moines, IA, are likely to become more commonplace across region, especially for those communities that rely heavily on surface water and shallow groundwater



http://www.dmww.com/about-us/announcements/des-moines-water-works-implements-water-shortage-plan.aspx

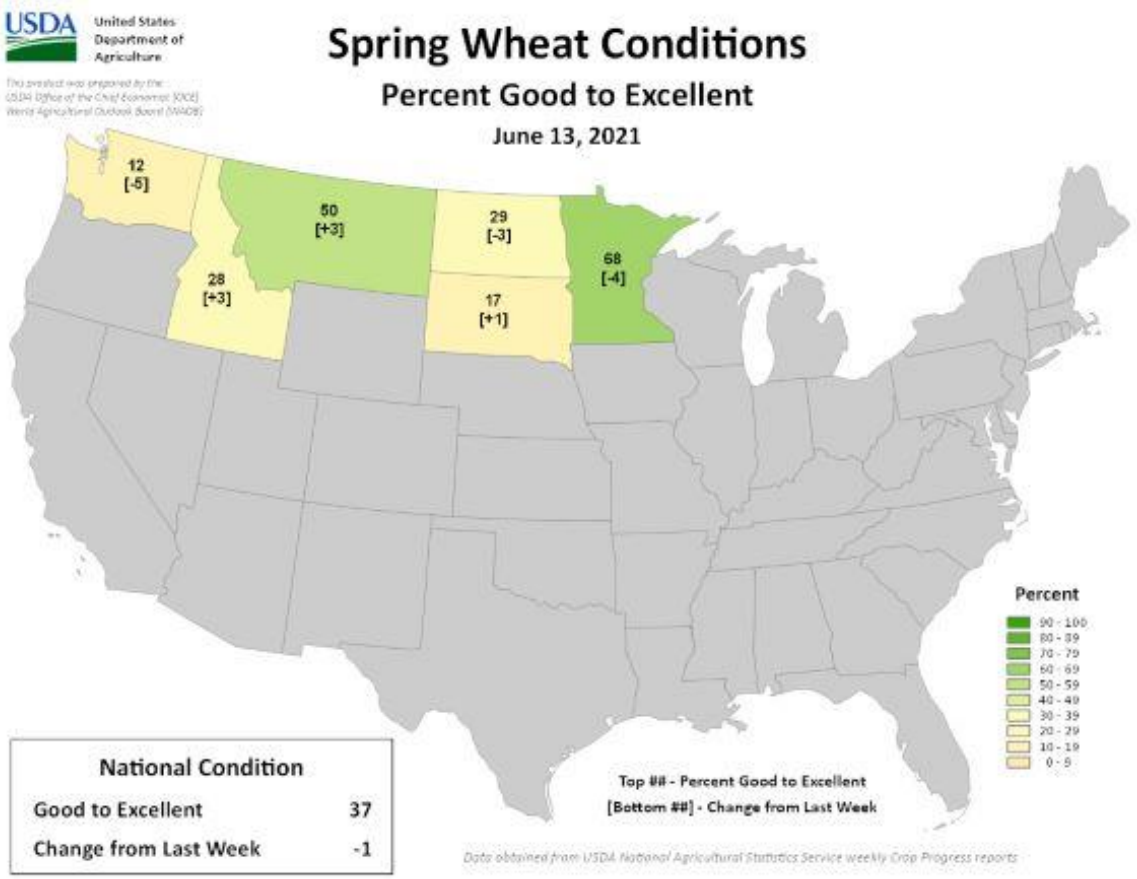
CROP CONDITIONS – PASTURE & RANGE

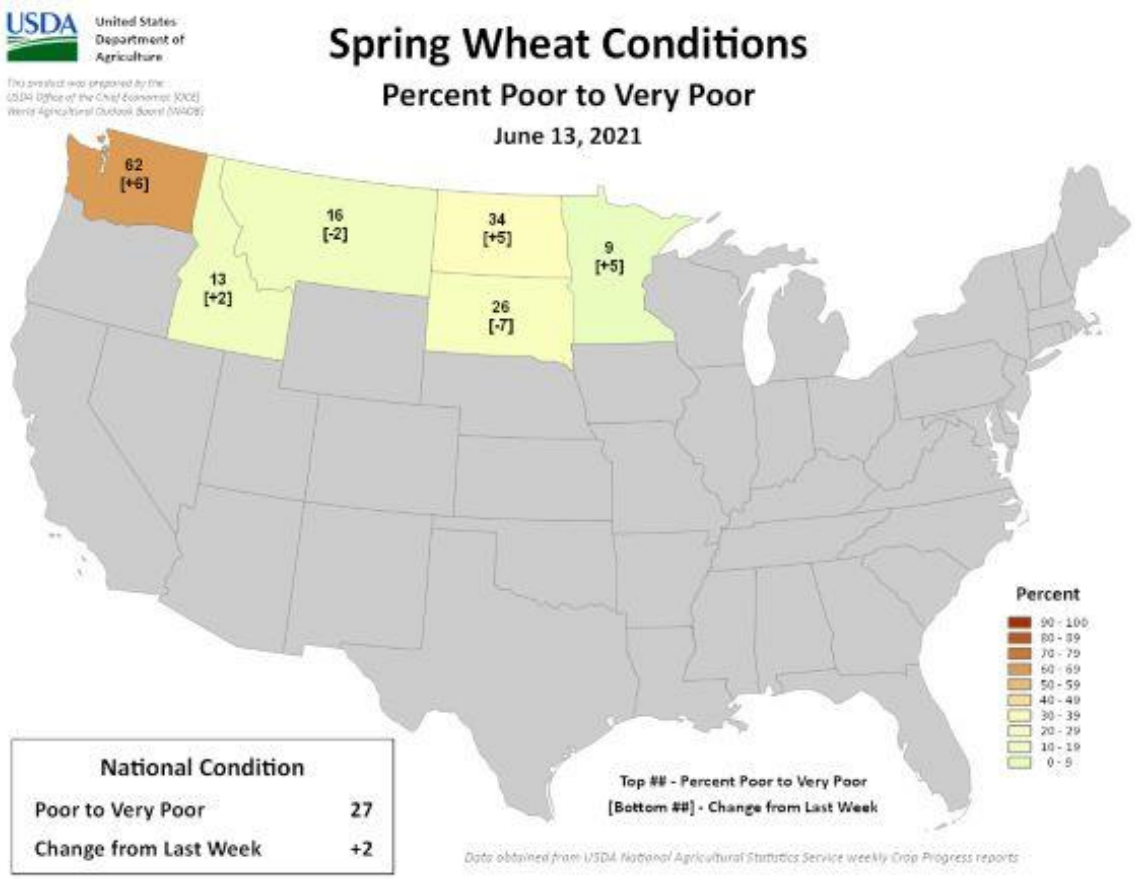




Credit: Brad Rippey, USDA

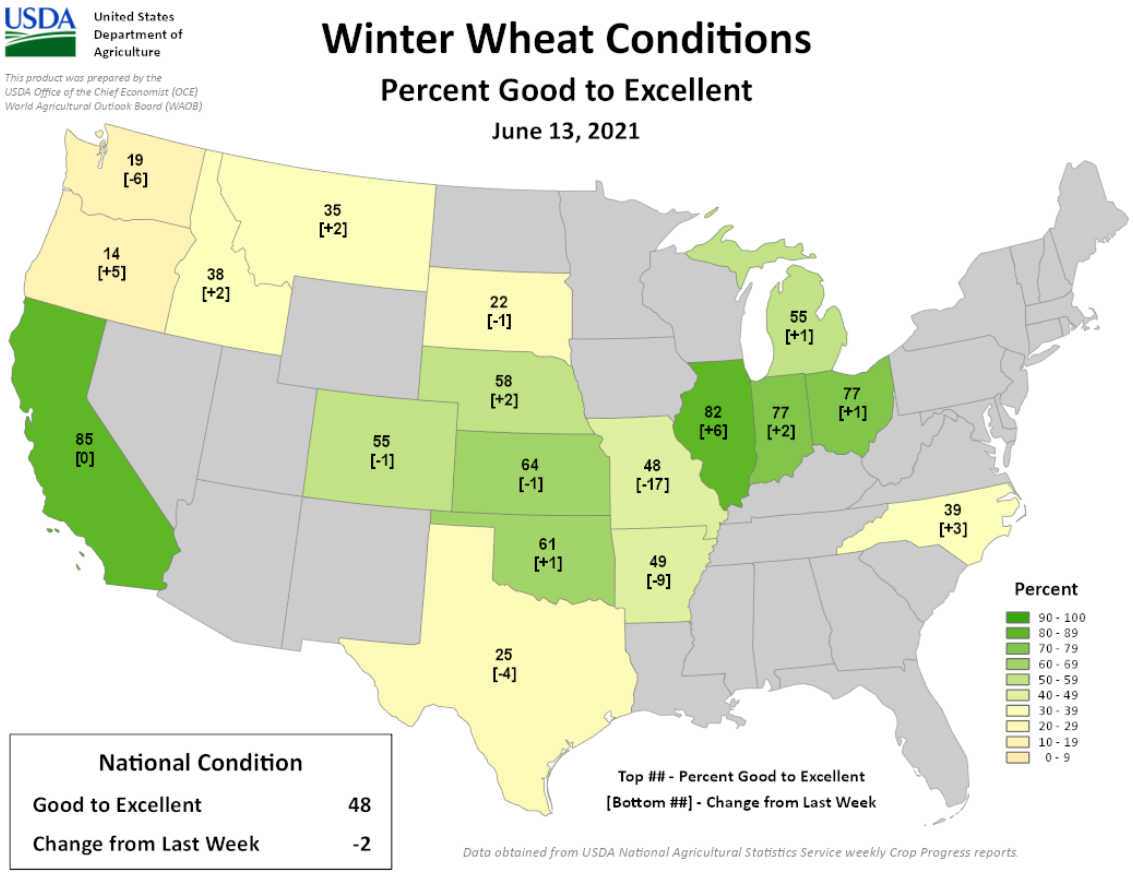
CROP CONDITIONS – SPRING WHEAT

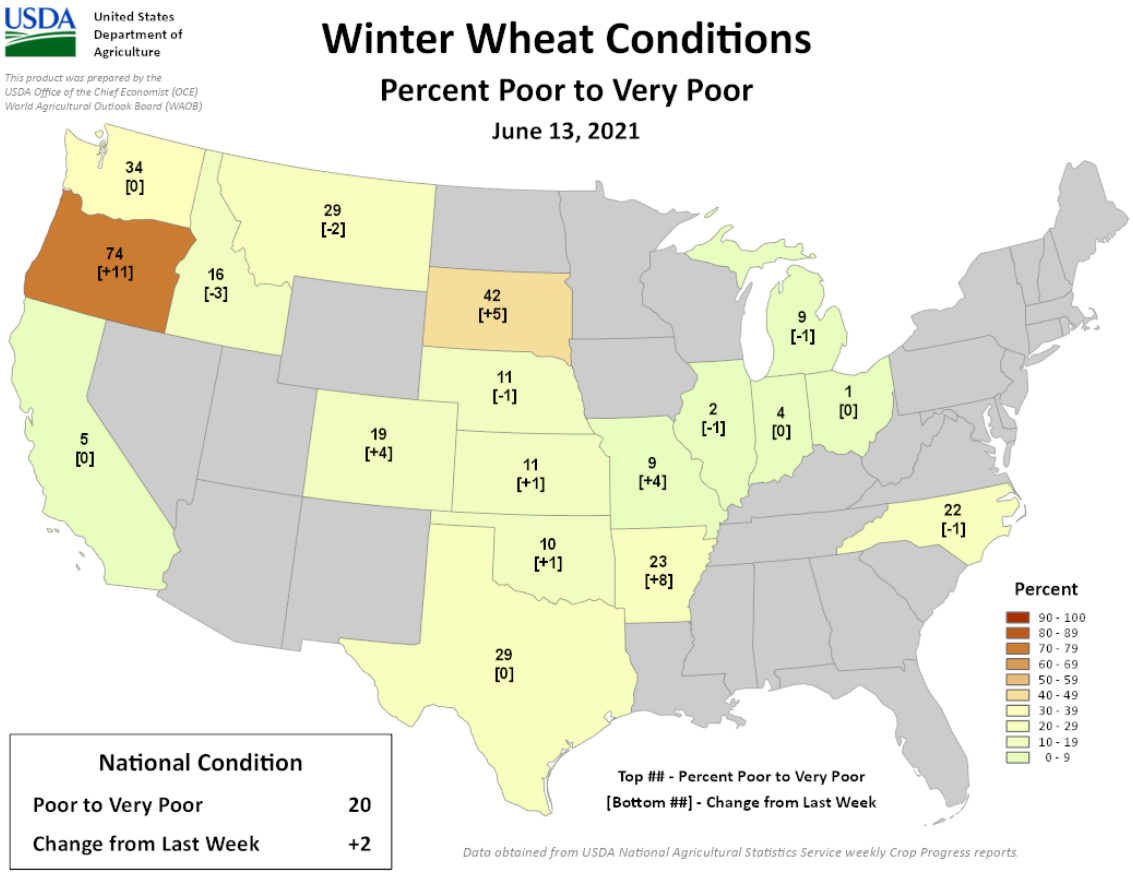




Credit: Brad Rippey, USDA

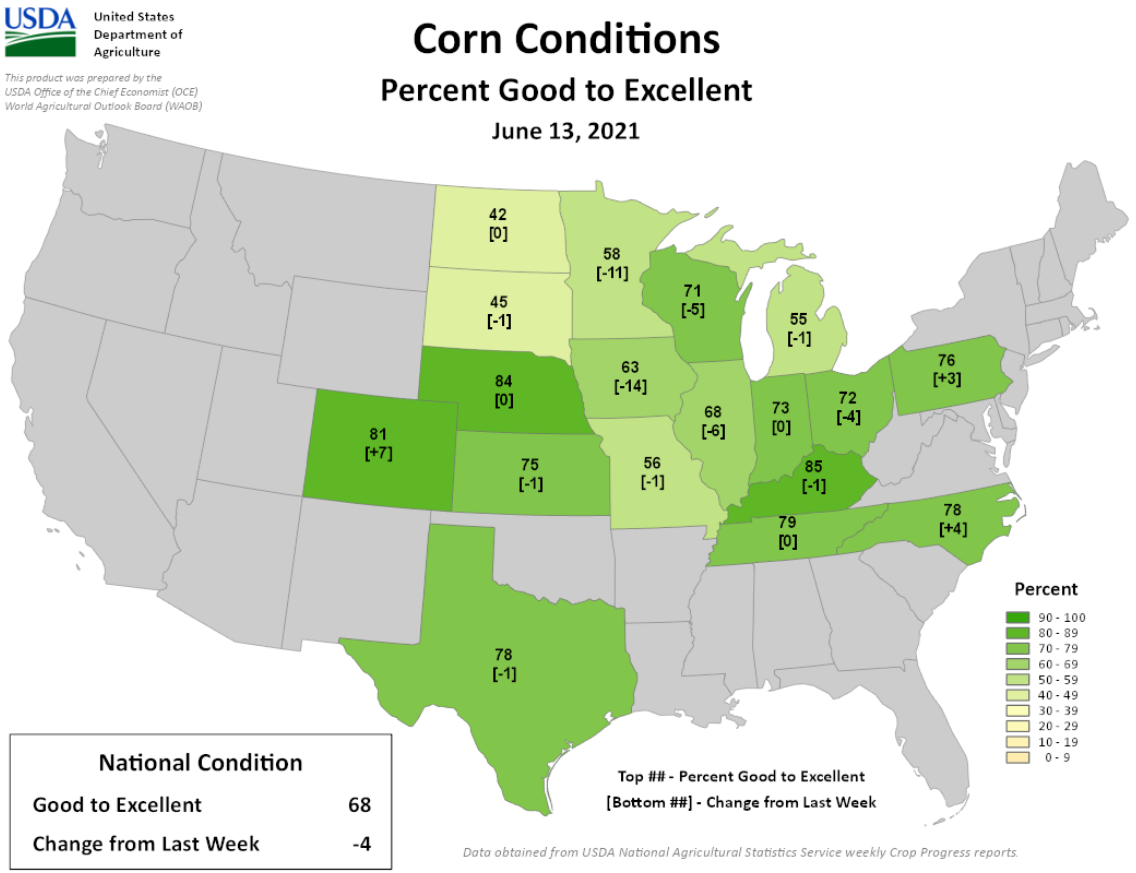
CROP CONDITIONS – WINTER WHEAT

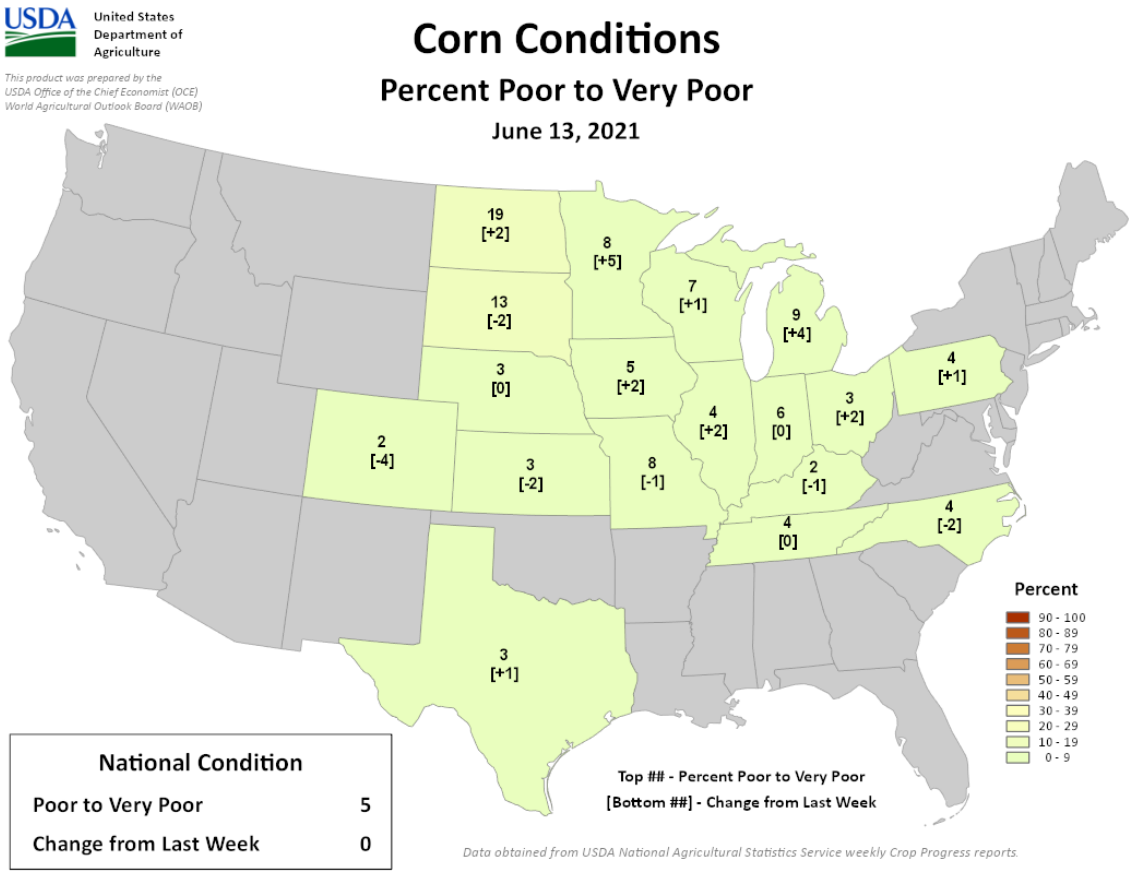




Credit: Brad Rippey, USDA

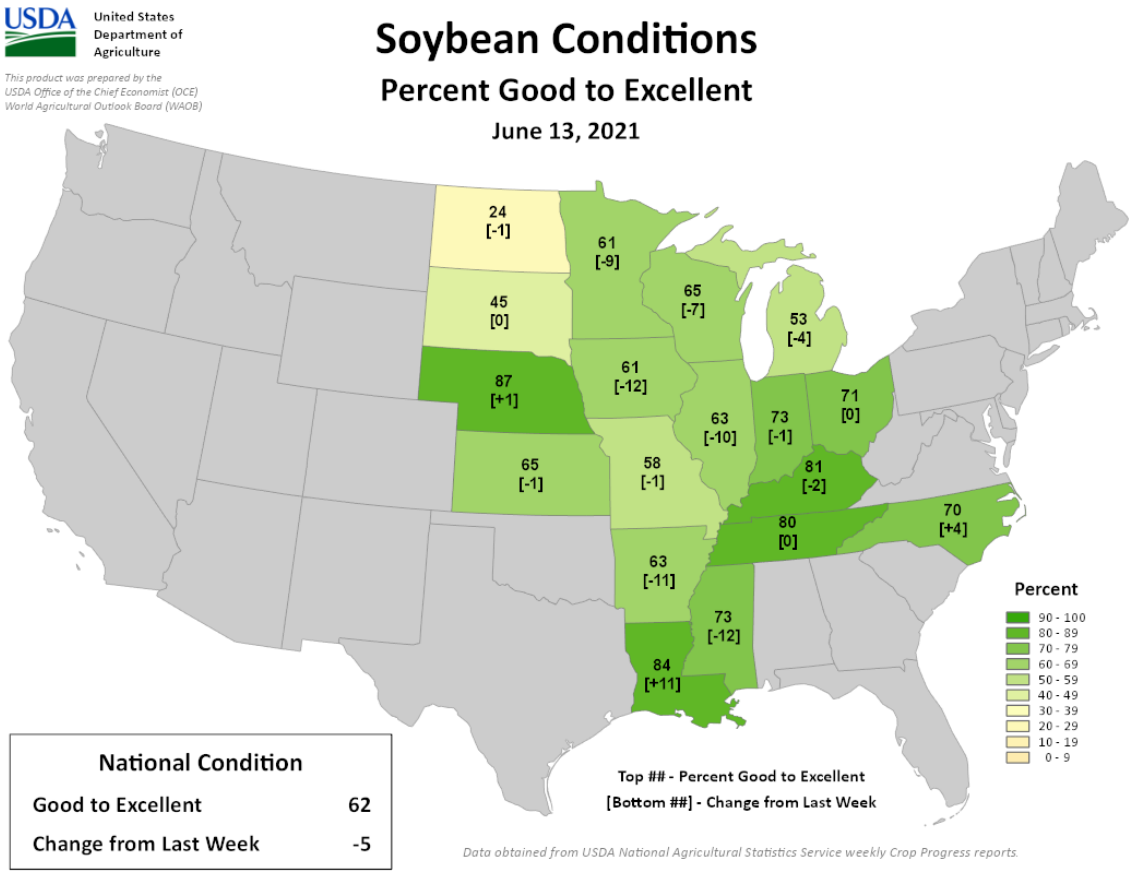
CROP CONDITIONS – CORN

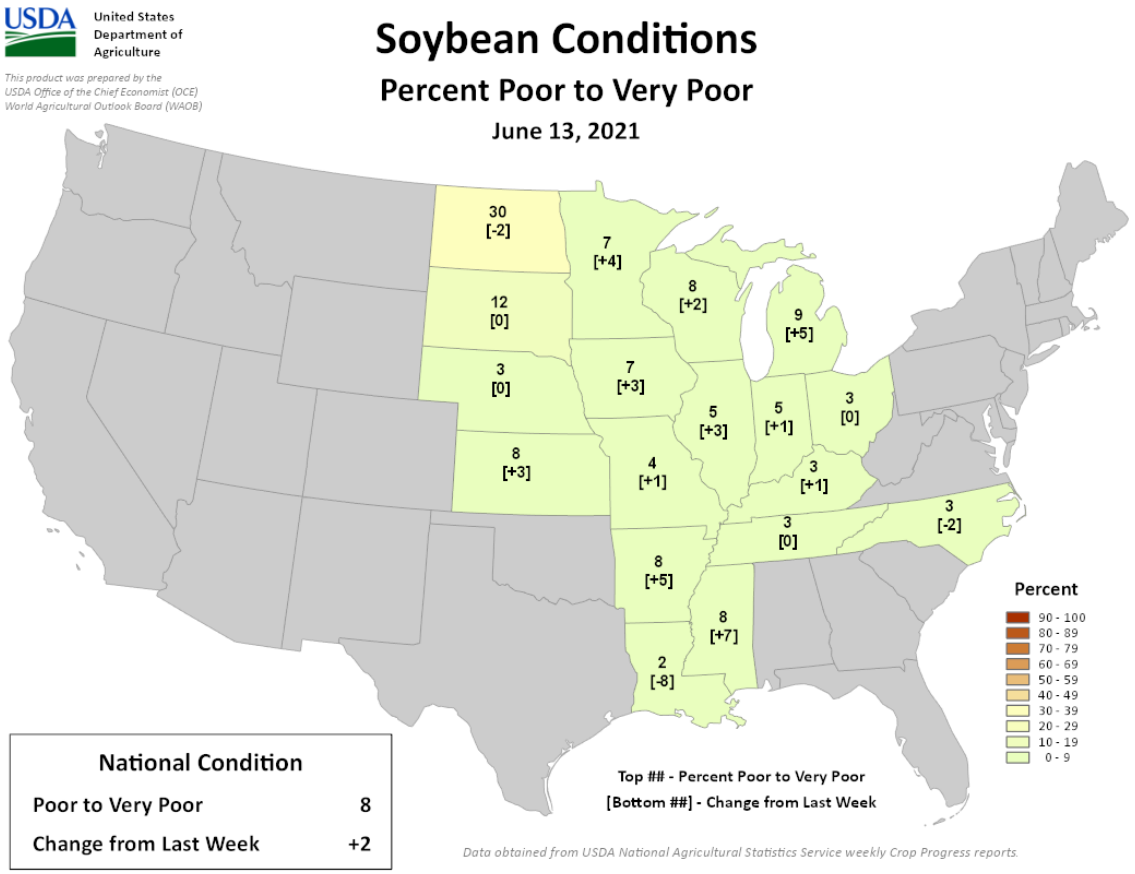




Credit: Brad Rippey, USDA

CROP CONDITIONS – SOYBEANS

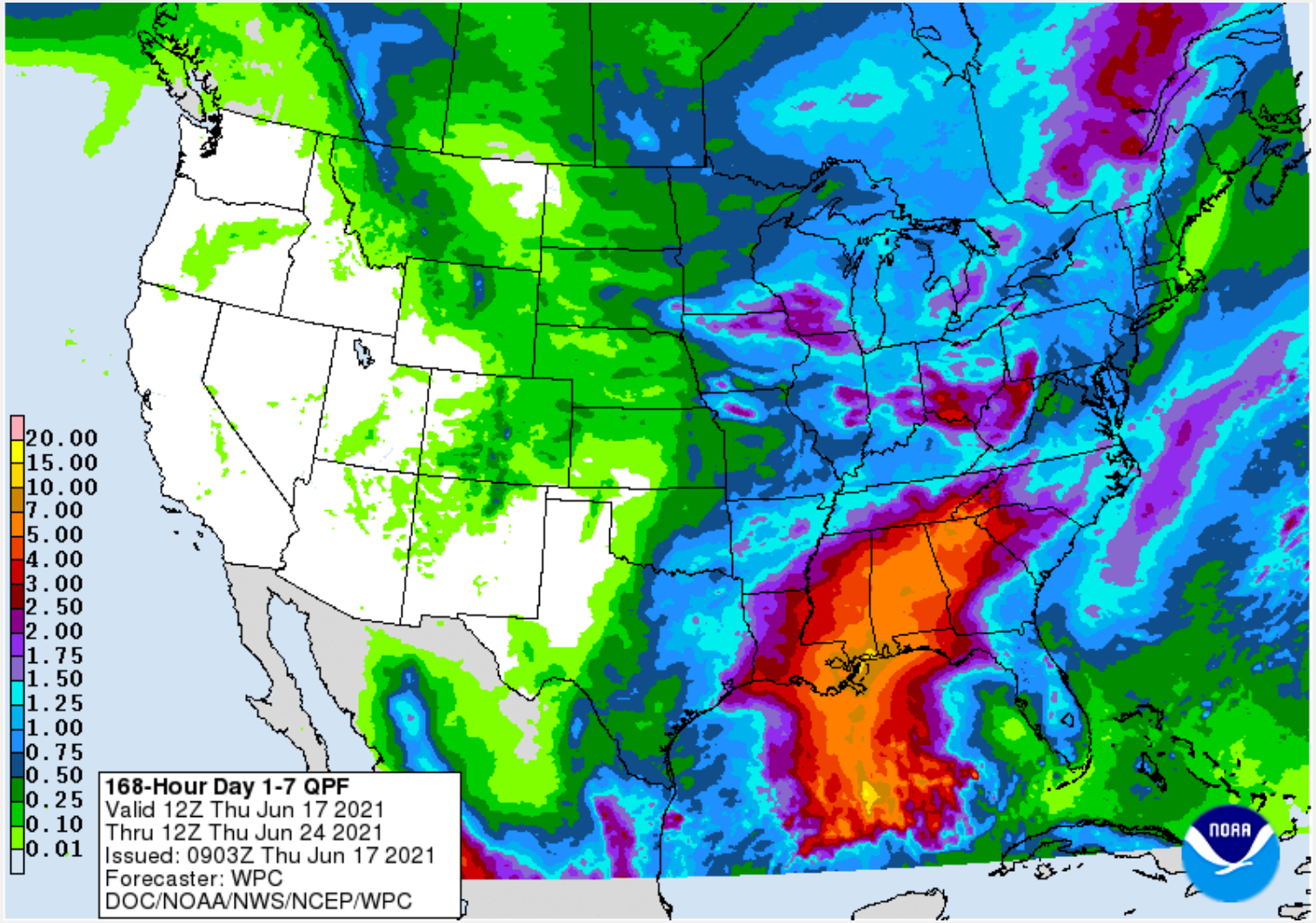




Credit: Brad Rippey, USDA

OUTLOOK

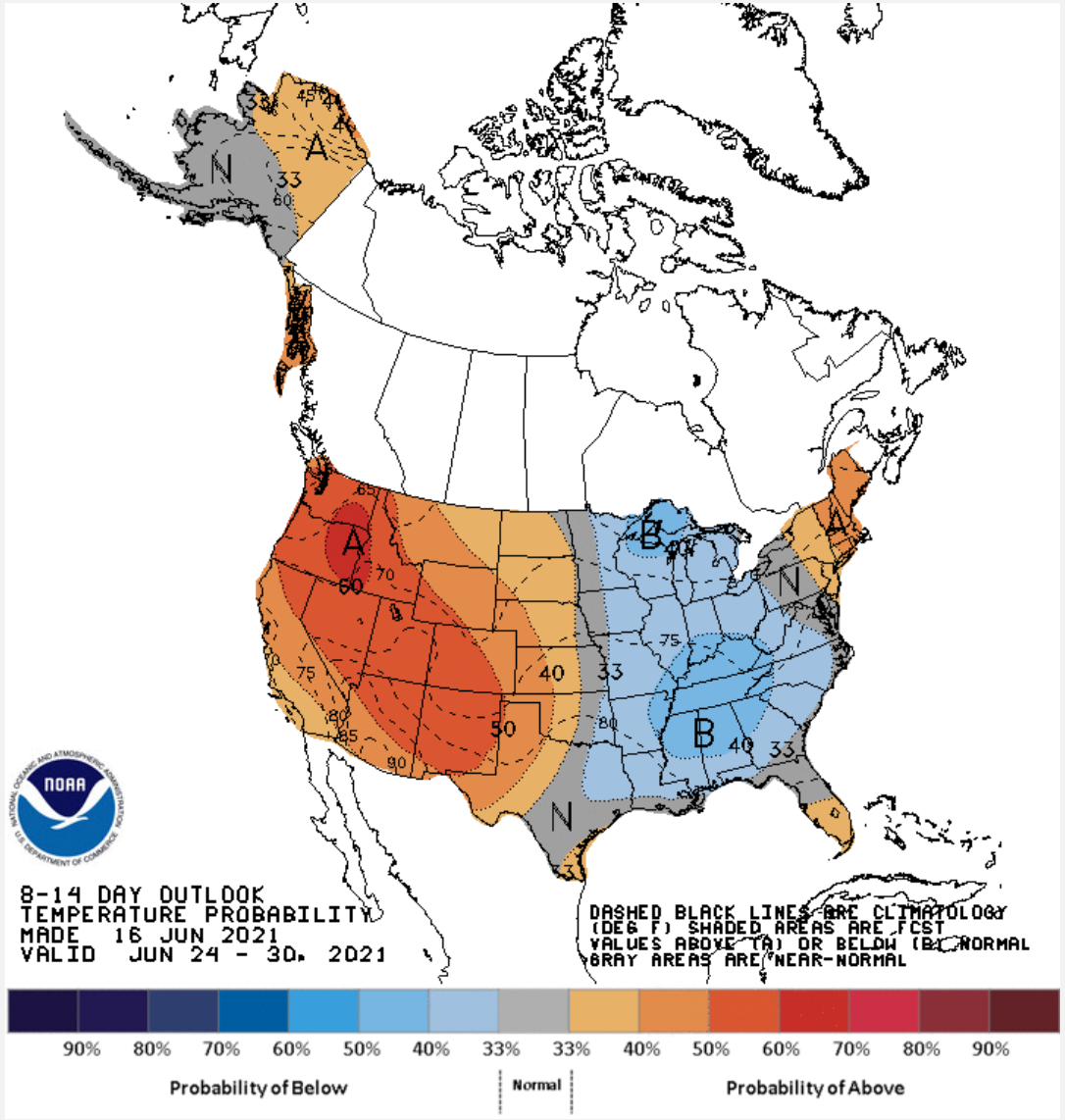
7-DAY QPF

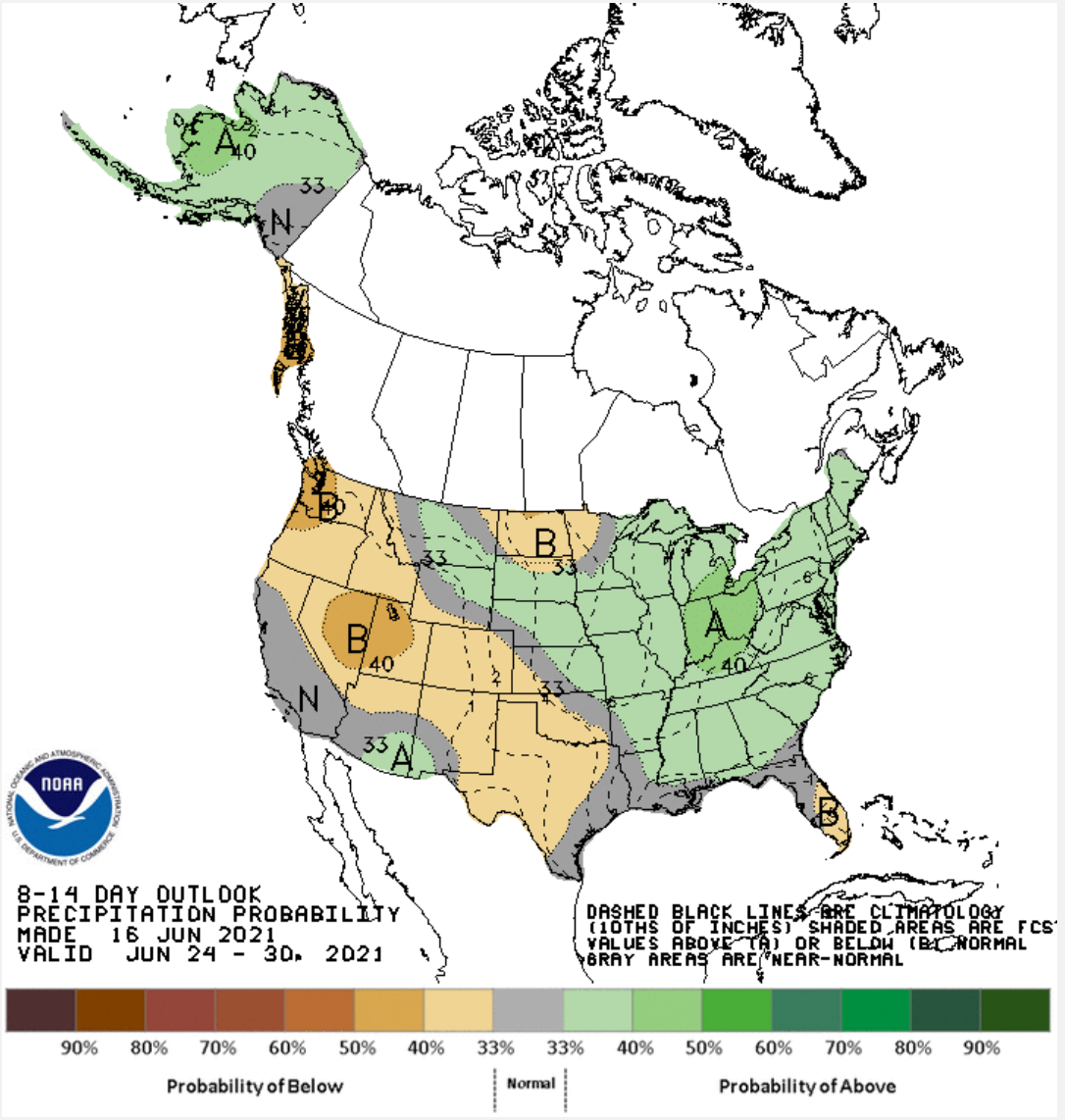


https://www.wpc.ncep.noaa.gov/qpf/p168i.gif?1623940318

OUTLOOK

8 TO 14 DAYS

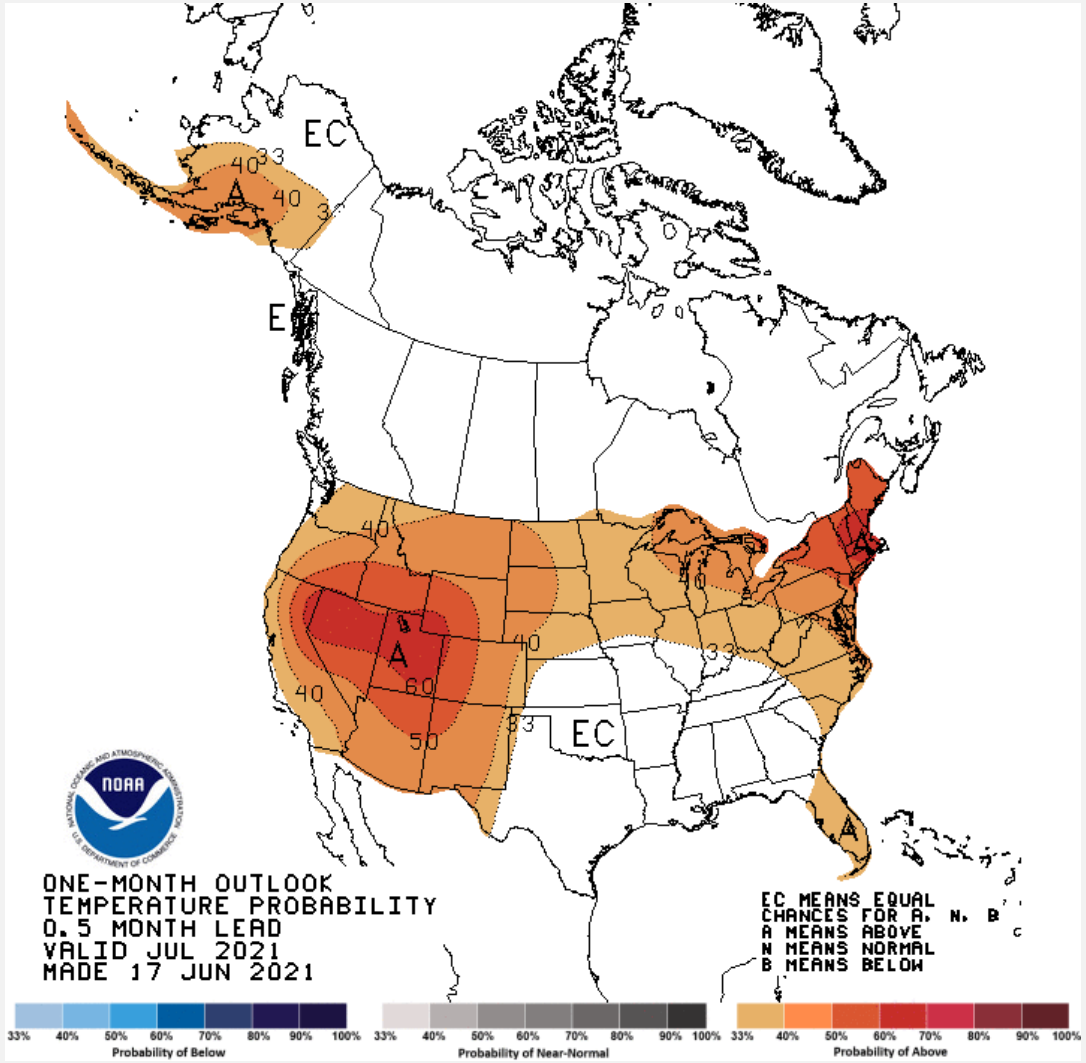


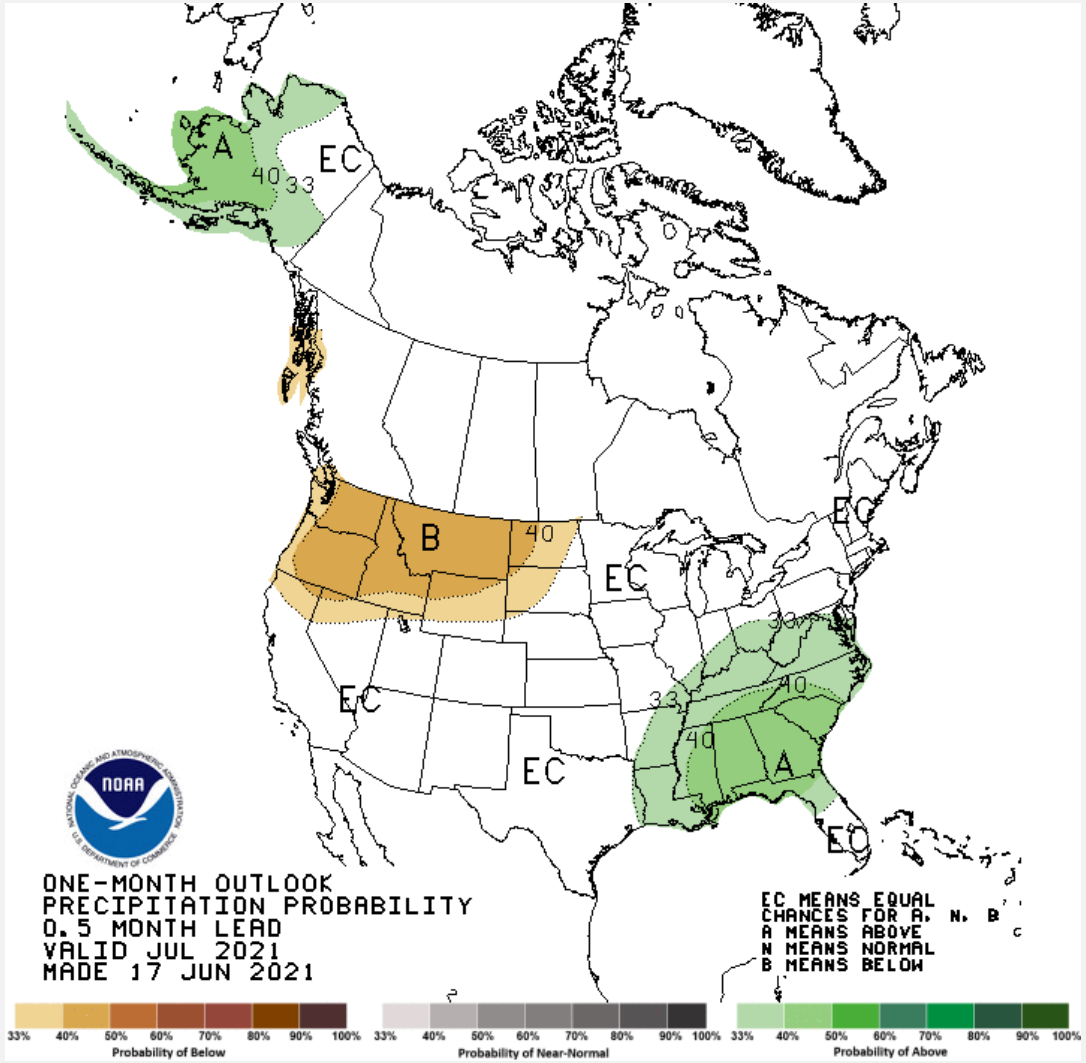


https://www.cpc.ncep.noaa.gov/

OUTLOOK

JULY

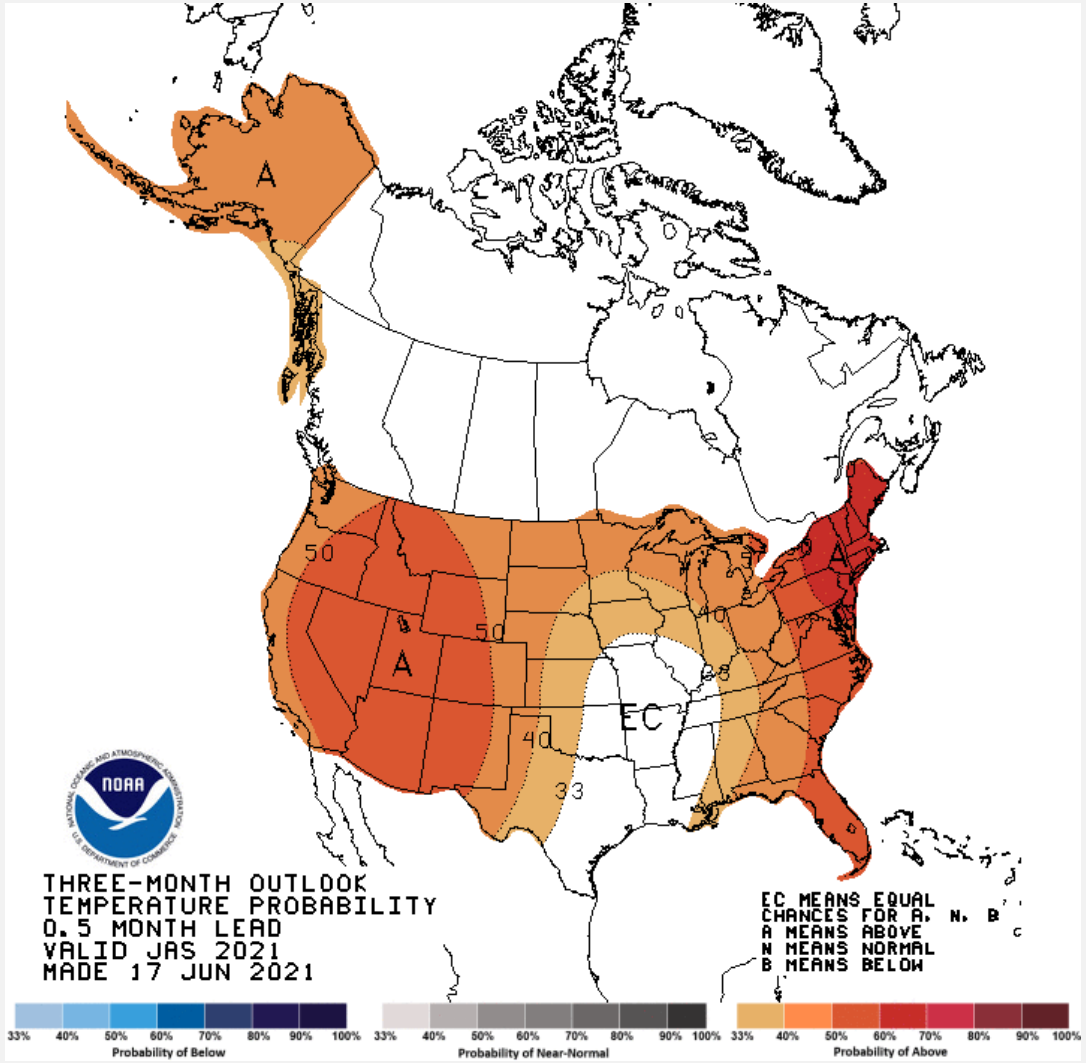


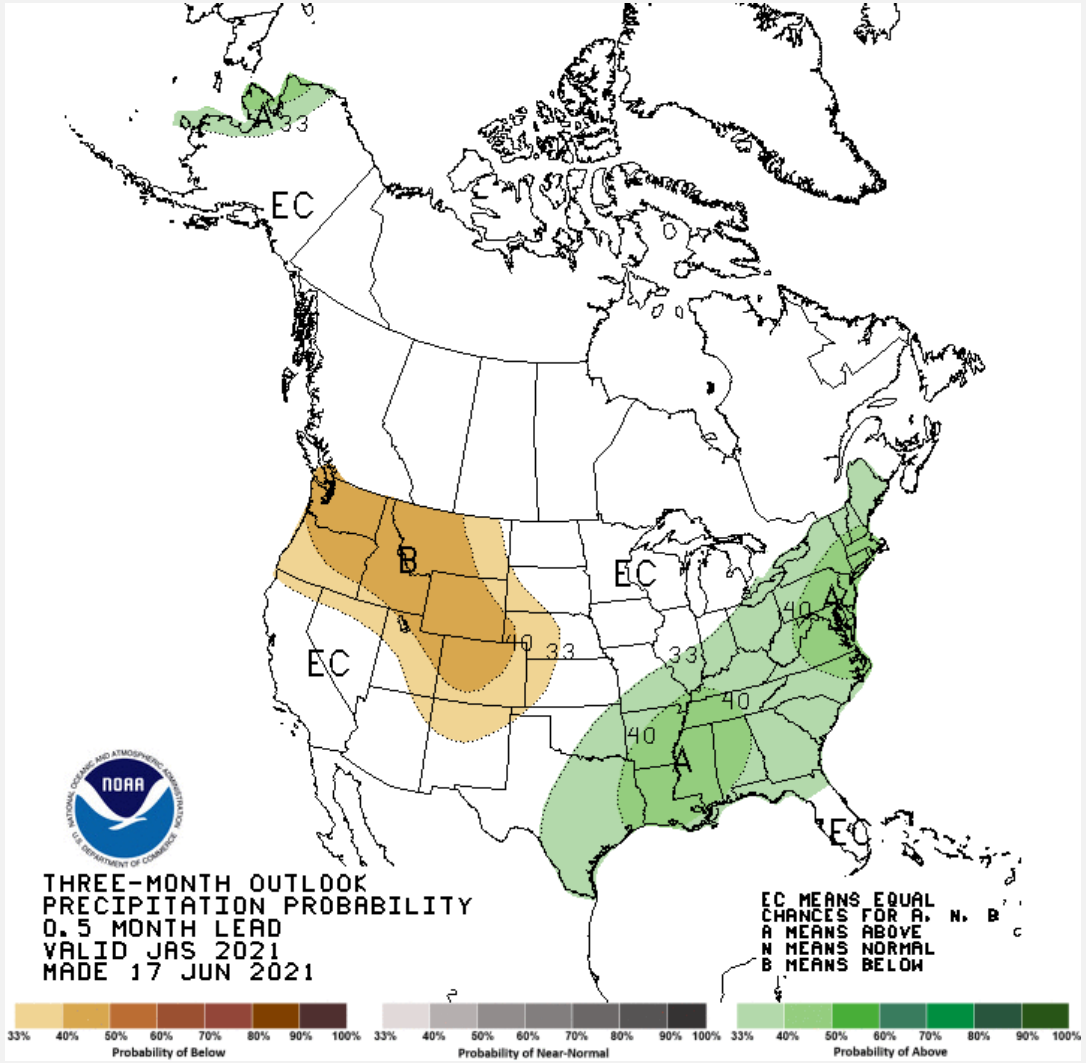


https://www.cpc.ncep.noaa.gov/

OUTLOOK

SEASONAL: JUL-AUG-SEP

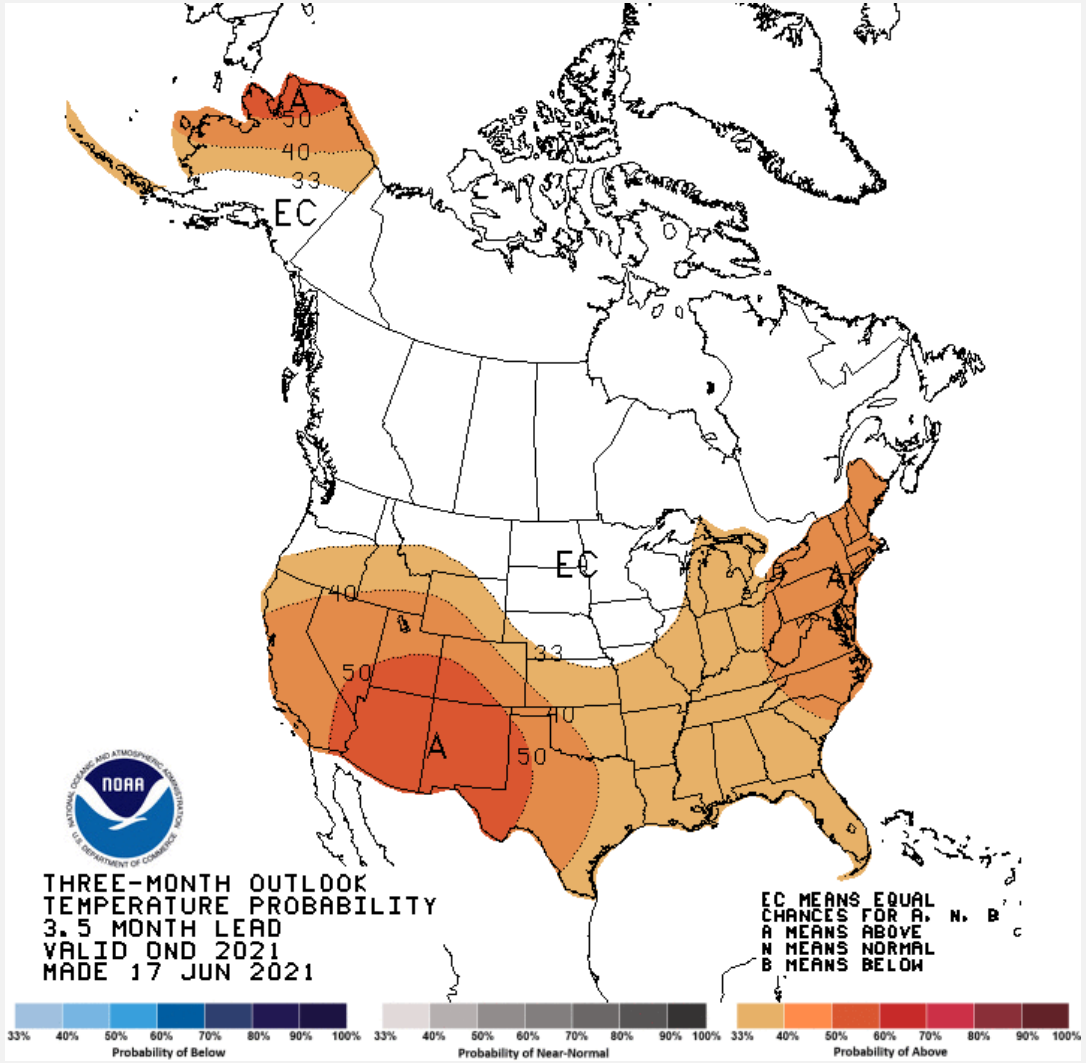


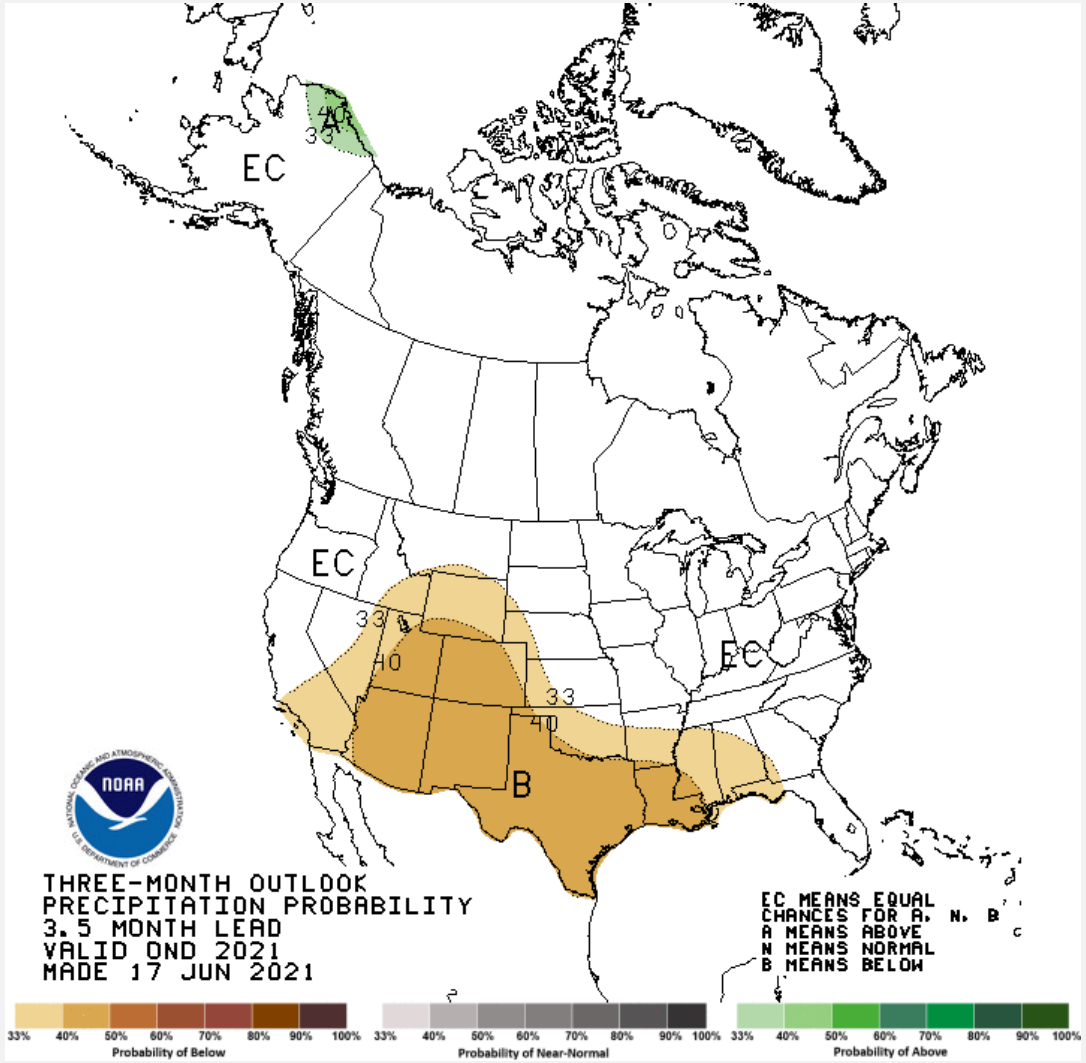


https://www.cpc.ncep.noaa.gov/

OUTLOOK

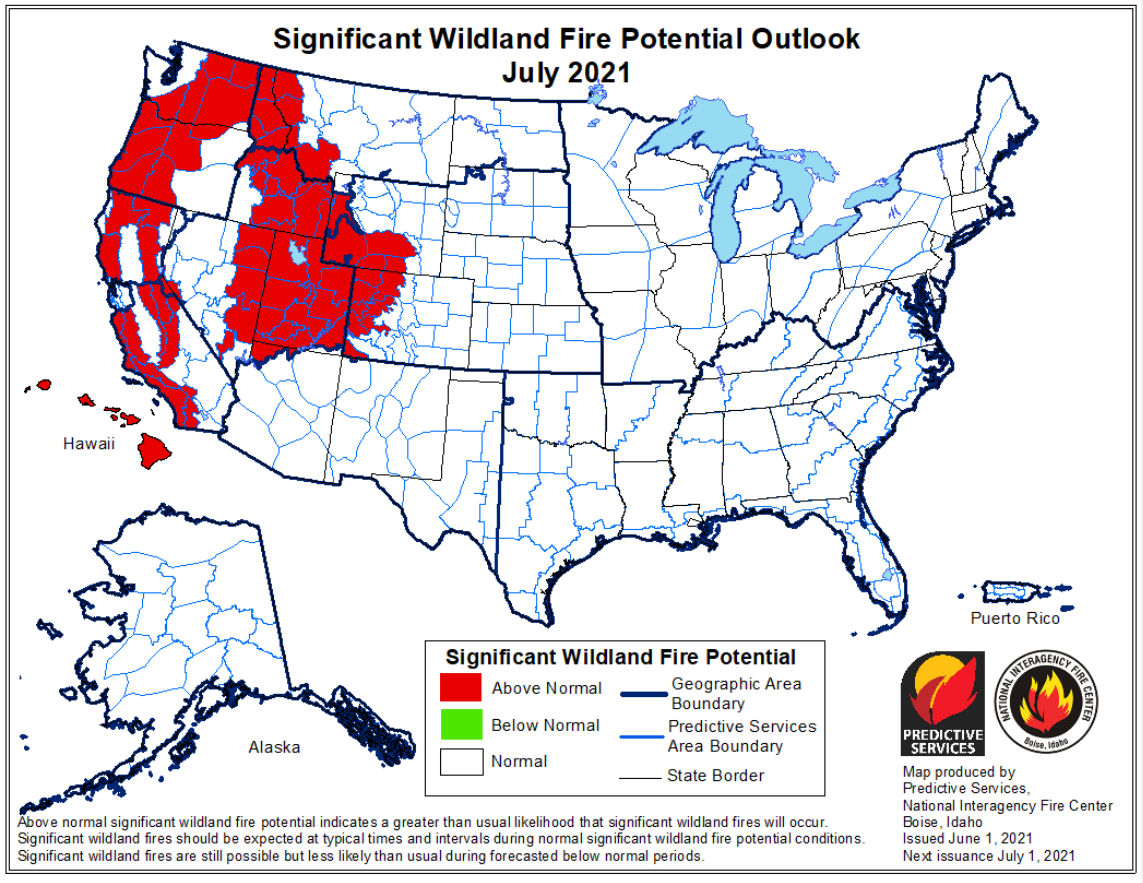
SEASONAL: OCT-NOV-DEC

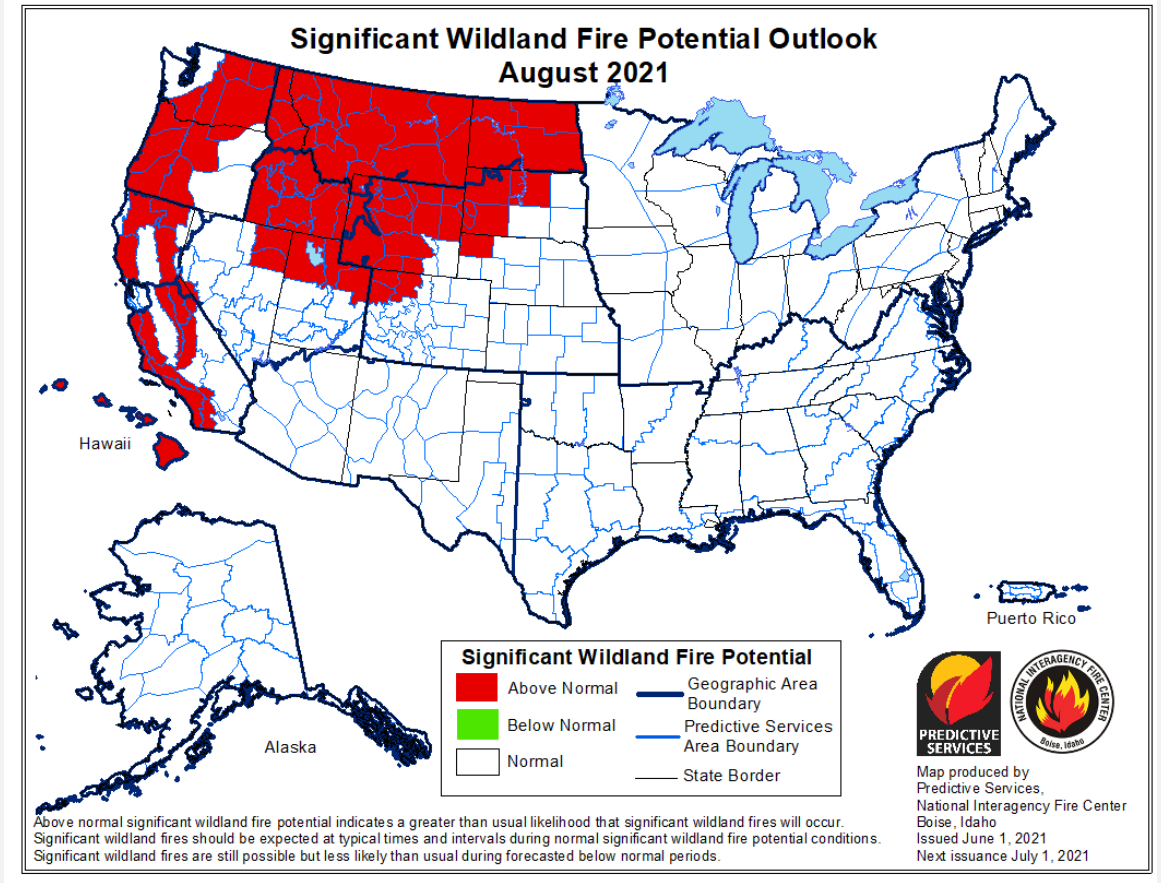




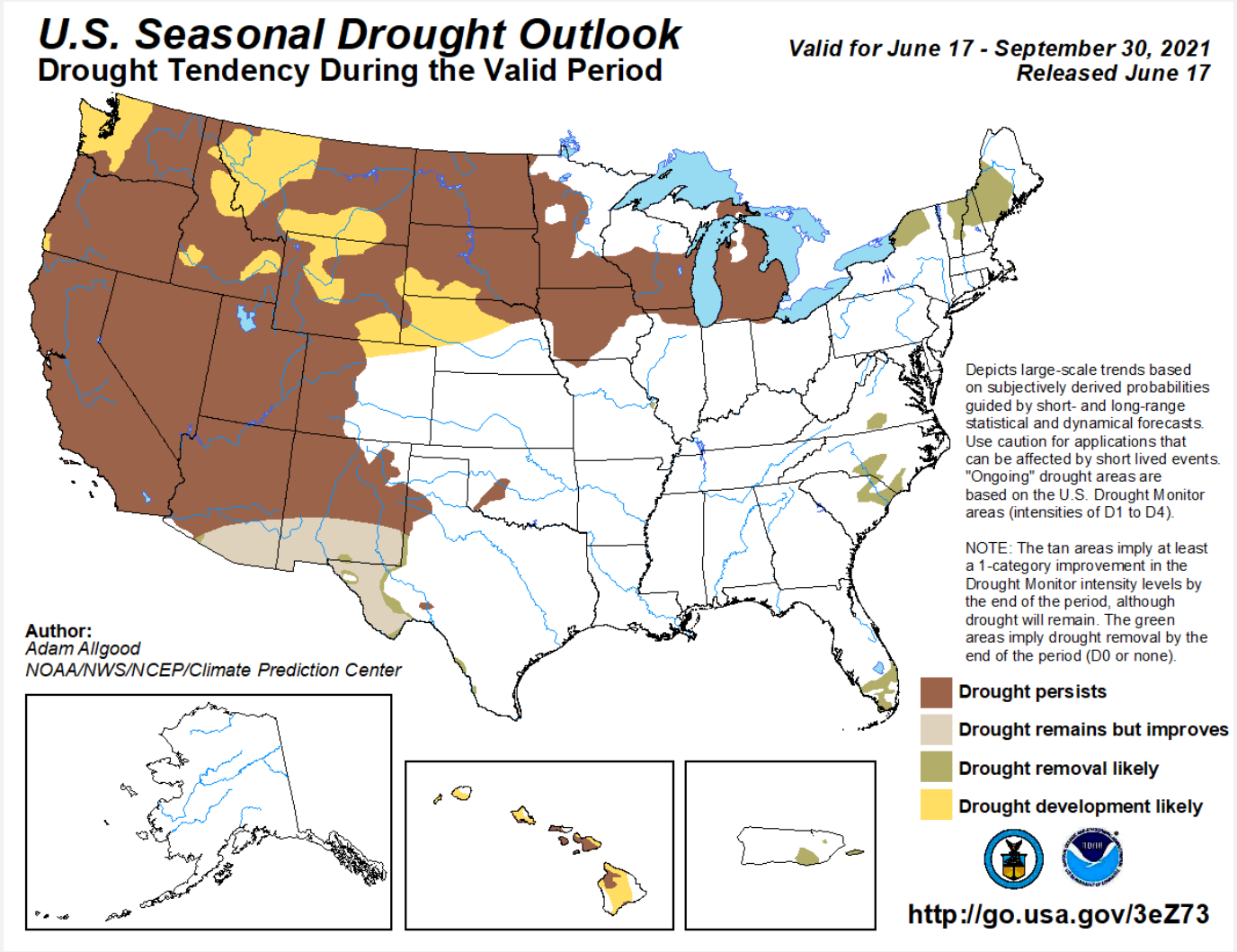
https://www.cpc.ncep.noaa.gov/

WILDLAND FIRE POTENTIAL





https://www.predictiveservices.nifc.gov/outlooks/outlooks.htm



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

OUTLOOK

SUMMARY

- 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

FOR ADDITIONAL INFORMATION

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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