Monthly Report of River and Flood Conditions

Report for April 2023

NWS FORM E-5 U.S. DEPARTMENT OF COMMERCE NOAA, NATIONAL WEATHER SERVICE **MONTHLY REPORT OF RIVER AND FLOOD CONDITIONS** TO: NATIONAL WEATHER SERVICE (W/OH12x1) HYDROMETEOROLOGICAL INFO CENTER 1325 EAST-WEST HIGHWAY, RM 7116 SILVER SPRING, MD 20910	HSA OFFICE: **Marquette, MI** REPORT FOR (MONTH / YEAR): **April 2023** DATE: **May 10th, 2023** SIGNATURE: **Evan Kutta, Hydro Program Manager** **Robin J. Turner, MIC**
When no flooding occurs, include miscellaneous river conditions, such as significant rises, record low stages, ice conditions, snow cover, droughts, and hydrologic products issued (WSOM E-41).	

☐ An X inside this box indicates no flooding occurred within this Hydrologic Service Area.

Summary

Widespread precipitation amounts of 4 to 7 inches (>150% of normal) occurred during April across Upper Michigan resulting in the sixth consecutive month of above-normal precipitation. This is the wettest start to a year since records began at WFO Marquette in 1961. The last five months of above normal precipitation primarily fell as accumulating snow that rapidly melted during the second week of April as temperatures warmed to around 80°F across Upper Michigan. The combination of rapid snowmelt and above-normal precipitation resulted in extensive flooding across most of west-central Upper Michigan. Eight counties were included in a state of emergency declaration to better address flood damage estimated in the millions of dollars. NWS meteorologists issued 193 flood-related products including hydrologic outlooks that raised awareness of forecast imminent and rapid snowmelt.

Location	Precipitation	% of Normal	Snowfall
WFO Marquette	6.63”	198%	22.0”
Marquette City	4.10”	150%	6.7”
Quincy Hill	**5.18”	M	**9.2”
Ironwood	6.85”	218%	27.8”
Iron Mountain	4.55”	163%	16.5”
Manistique	4.45”	157%	5.0”
Munising	4.89”	166%	22.8”
Stambaugh	4.88”	191%	23.9”

NOTE: Precipitation after 8 AM EST April 30th was counted in May stats for all but the WFO Marquette site due to the reporting structure of our cooperative observers. ** = 10 days of data missing.

Monthly Report of River and Flood Conditions

Report for April 2023

Flooding Conditions

Hydrologic outlooks were issued in the days leading up to summer-like warmth during the second week of April, which resulted in rapid snowmelt of much above-normal snowpack and extensive flooding impacts across mainly western and central Upper Michigan. A flash flood impacted the Lake Linden, MI area on April 12th after a culvert under railroad tracks failed releasing a wave of flood waters resulting in an estimated $150,000 in damages and a state of emergency declaration for Houghton County. This culvert was recently installed as part of repairs following the Father's Day flooding in 2018. By April 13th, numerous roads were underwater and closed across the UP with the worst impacts across Gogebic County and the Ottawa National Forest. Governor Gretchen Whitmer declared a state of emergency for Gogebic and Houghton Counties on April 14th due to 'severe and widespread flooding'. Also on the 14th, Bluff Street in Ishpeming was closed due a sinkhole associated with an abandoned mine shaft. A major washout was observed along a popular biking and hiking trail in Humboldt on the 15th. Additional culvert and road washout occurred from snowmelt across Ontonagon, Baraga, and Marquette counties between the 10th and 15th of April. Widespread rainfall - especially on the 16th - prolonged and in some cases exacerbated flooding problems across Upper Michigan. Cooler temperatures and drier weather during the third week of April allowed flood waters to recede across most of Upper Michigan. However, extensive flooding impacts caused Governor Gretchen Whitmer to expand the state of emergency declaration to a total of eight Upper Michigan Counties on April 21st. Erosion around a historic bridge along M26 in Keweenaw County resulted in the road being closed until repairs can be made. Widespread rain and snow returned during the final couple days of April resulting in rising water levels once again. On April 24th, Marquette County officials described extensive and significant flooding damage to 25+ roads and 7+ crossings with damage estimates exceeding $4 million. U.P.-wide damages, primarily to roadway infrastructure, may be in excess of $15 million with damage assessment still ongoing.

Media Links

TV6, UP Matters, ABC10, and Mining Gazette stories about the Lake Linden flash flood.
Road closures by Gogebic County Road Commission, Ottawa National Forest, Delta County EM, and M-28 in Ewen on April 13th.
State of Emergency declaration for Gogebic and Houghton Counties on April 14th with a sinkhole opening up in Ishpeming on the same day.
Major washout along the Iron Ore Heritage trail in Humboldt.
On April 21st, Governor Whitmer expanded the state of emergency declaration to include Alger, Baraga, Dickinson, Iron, and Marquette, and Ontonagon Counties.
Bridge failure closed M-26 between Eagle Harbor and Copper Harbor in Keweenaw County
As of April 24th, flood damage estimates exceeded $4 million in Marquette County including 25+ roads and 7+ crossings damaged.

Monthly Report of River and Flood Conditions

Report for April 2023

River Conditions

Streamflow was much above normal across most of west-central Upper Michigan during April 2023. Record high streamflow occurred within the Ford and Escanaba River basins. Far eastern Upper Michigan observed near-normal streamflow during April.

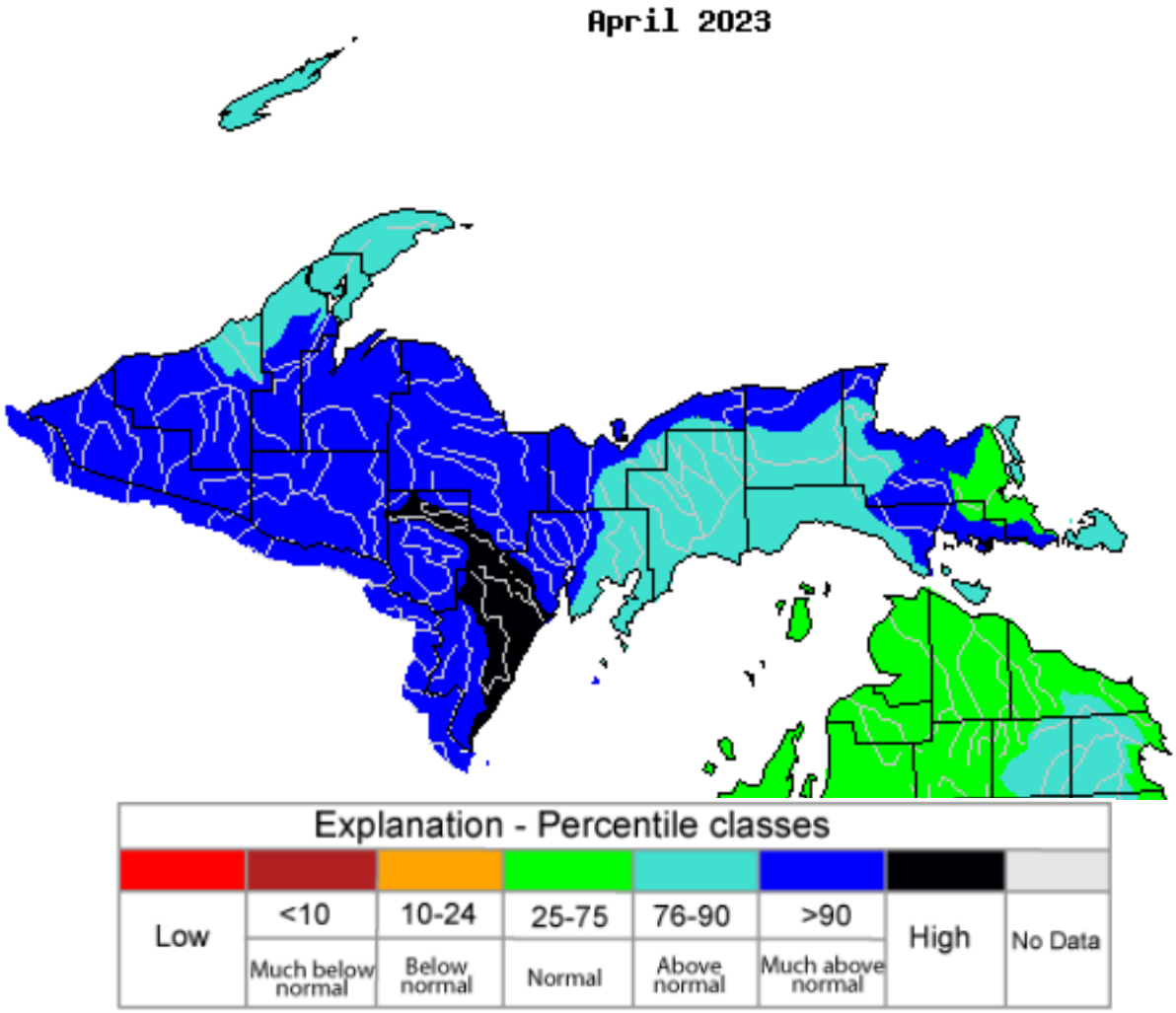


Figure 1: USGS monthly average streamflow in April 2023 across Upper Michigan

Snowpack SWE (Snow Water Equivalent) Conditions

Seasonal snowpack reached it's annual maximum during the first week of April when snow water equivalent values of 4 to 10 inches were common. Locally higher amounts greater than 12 inches were present across the most favored lake effect snow belts. The large majority of this SWE melted during the second week of the month as summer-like warmth spread across the area.

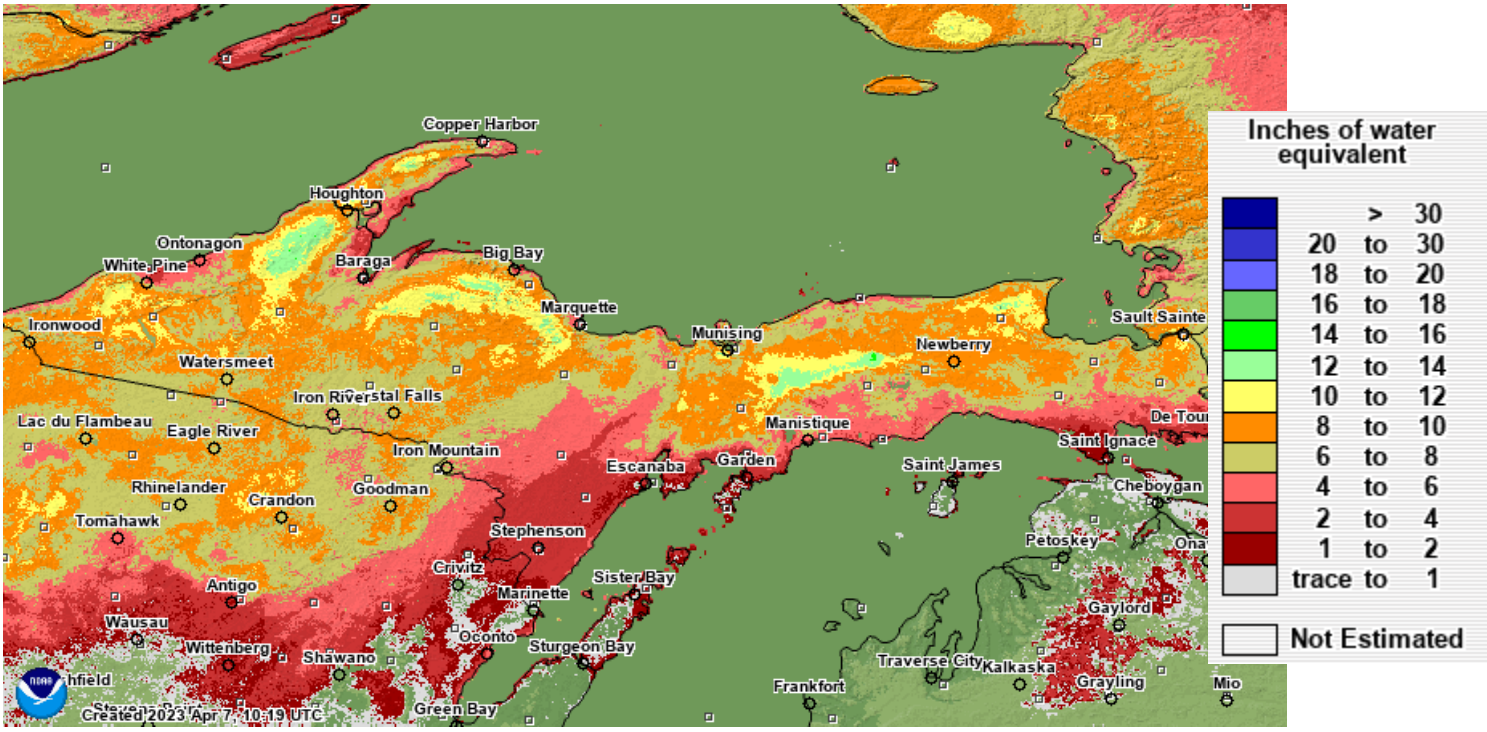


Figure 2: Modeled snowpack snow water equivalent on April 8th.

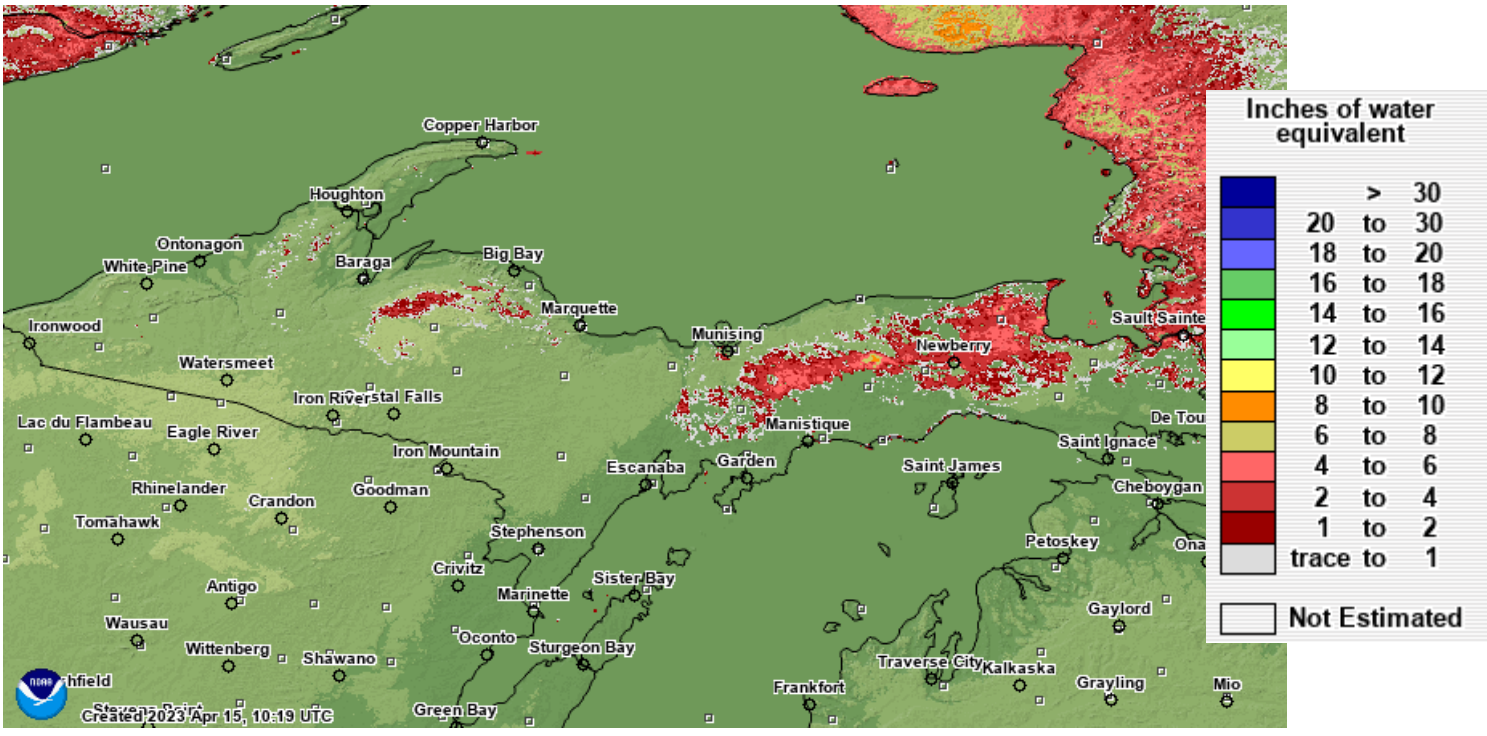


Figure 3: Modeled snowpack snow water equivalent on April 15th.

Snowpack SWE Conditions Continued

From a historical perspective, SWE values rapidly transitioned from near record high values during the first week of April to much below normal values by the end of the second week of April. While the SNODAS period of record is a relatively short 18 years, SWE values greater than 250% of normal were common across Upper Michigan on April 8th shrinking to below 25% of normal by April 15th.

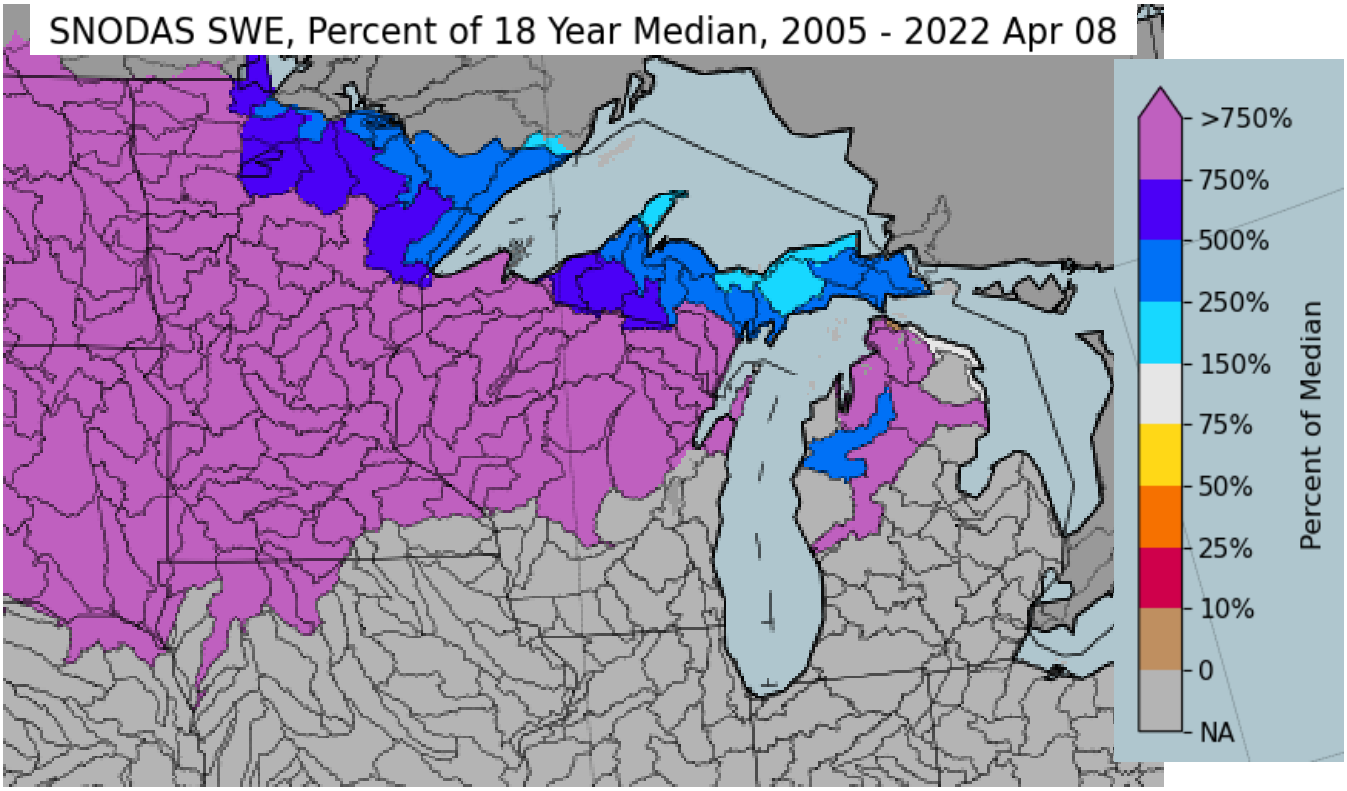


Figure 4: Modeled snow water equivalent for drainage basins on April 8, 2023 as a percent of 18-year median.

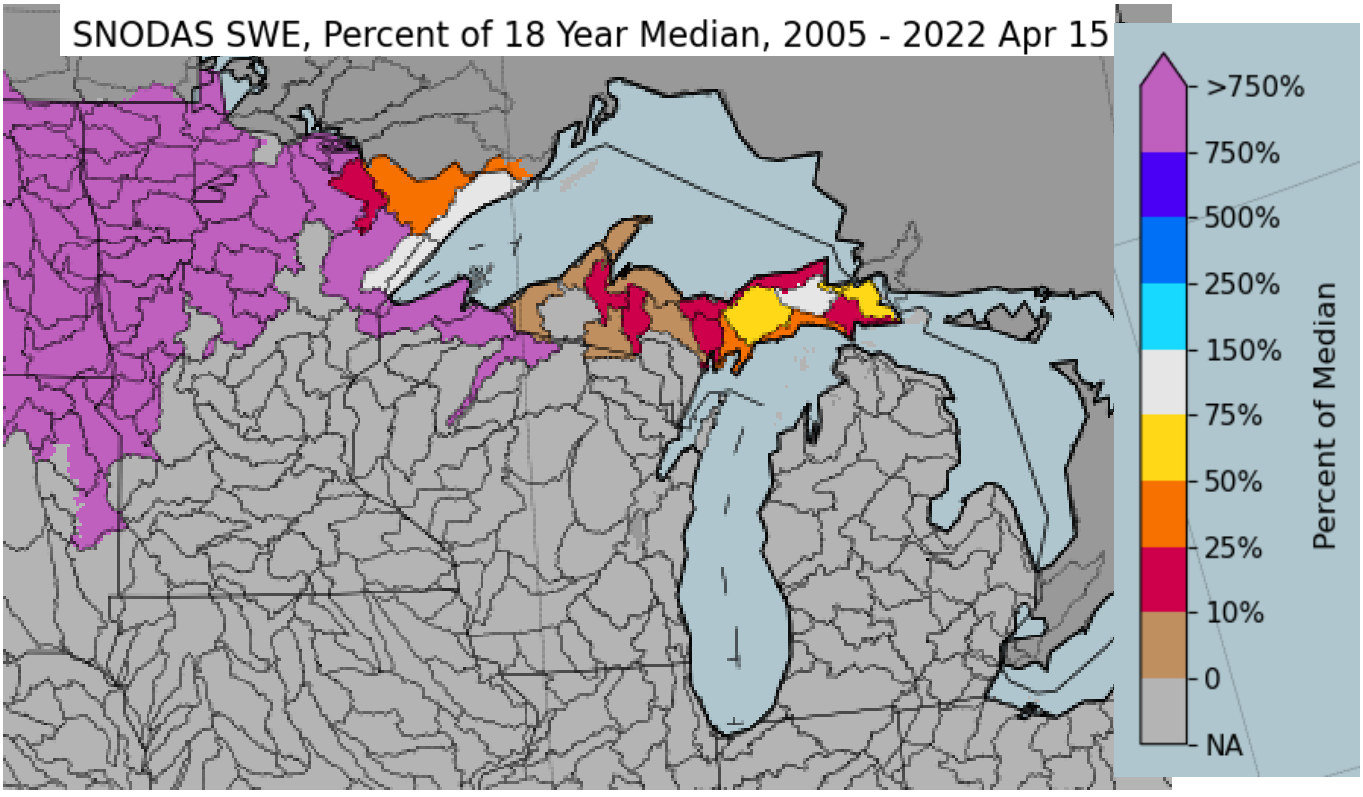


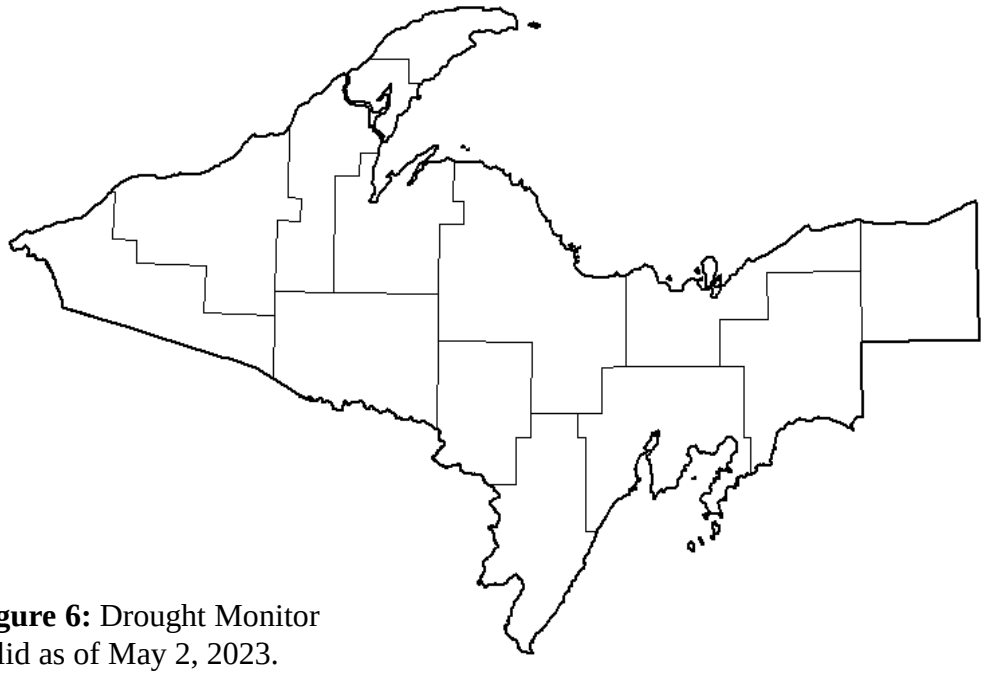
Figure 5: Modeled snow water equivalent for drainage basins on April 15, 2023 as a percent of 18-year median.

Monthly Report of River and Flood Conditions

Report for April 2023

Drought Discussion

No drought was present. For the latest drought status, please visit http://www.drought.gov.



May 2, 2023

(Released Thursday, May. 4, 2023)

Valid 8 a.m. EDT

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	100.00	0.00	0.00	0.00	0.00	0.00
Last Week 04-25-2023	100.00	0.00	0.00	0.00	0.00	0.00
3 Months Ago 01-31-2023	100.00	0.00	0.00	0.00	0.00	0.00
Start of Calendar Year 01-03-2023	93.80	6.20	0.00	0.00	0.00	0.00
Start of Water Year 09-27-2022	88.48	11.52	1.94	0.00	0.00	0.00
One Year Ago 05-03-2022	94.90	5.10	0.00	0.00	0.00	0.00

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:
Brad Pugh
CPC/NOAA

droughtmonitor.unl.edu

Figure 6: Drought Monitor valid as of May 2, 2023.

Hydro Products Issued

Product	Number
Hydrologic Outlook (ESF)	7
Flood Watch (FFA)	13
Flood Warning (FLW)	24
Flood Advisories and Statements (FLS)	148
Flash Flood Warning (FFW)	1
Flash Flood Statement (FFS)	0
Hydrologic Summary (RVA)	30
Daily River Forecasts (RVD)	23

Precipitation Summary

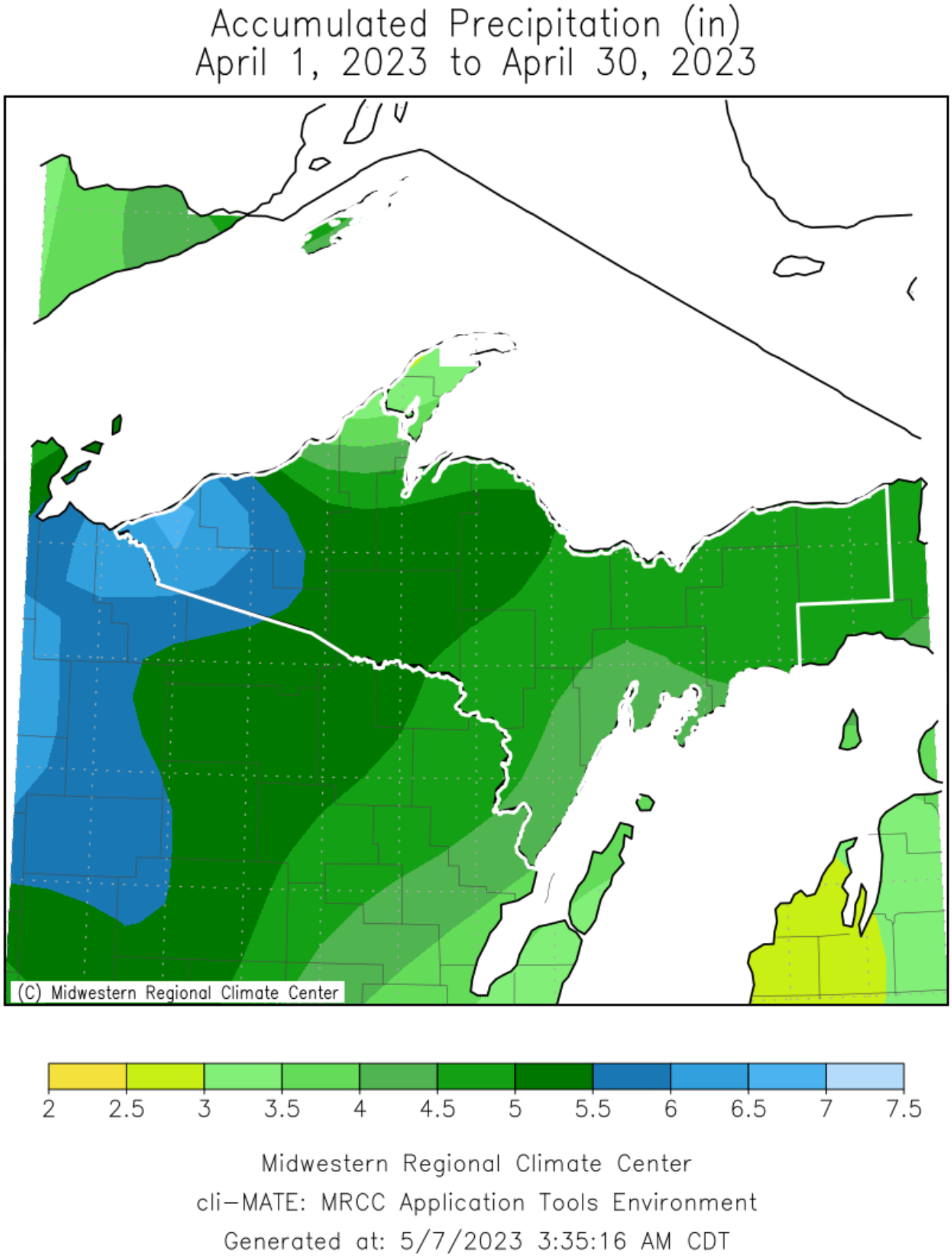


Figure 7: April 2023 Monthly Precipitation Totals.

Precipitation Summary Continued

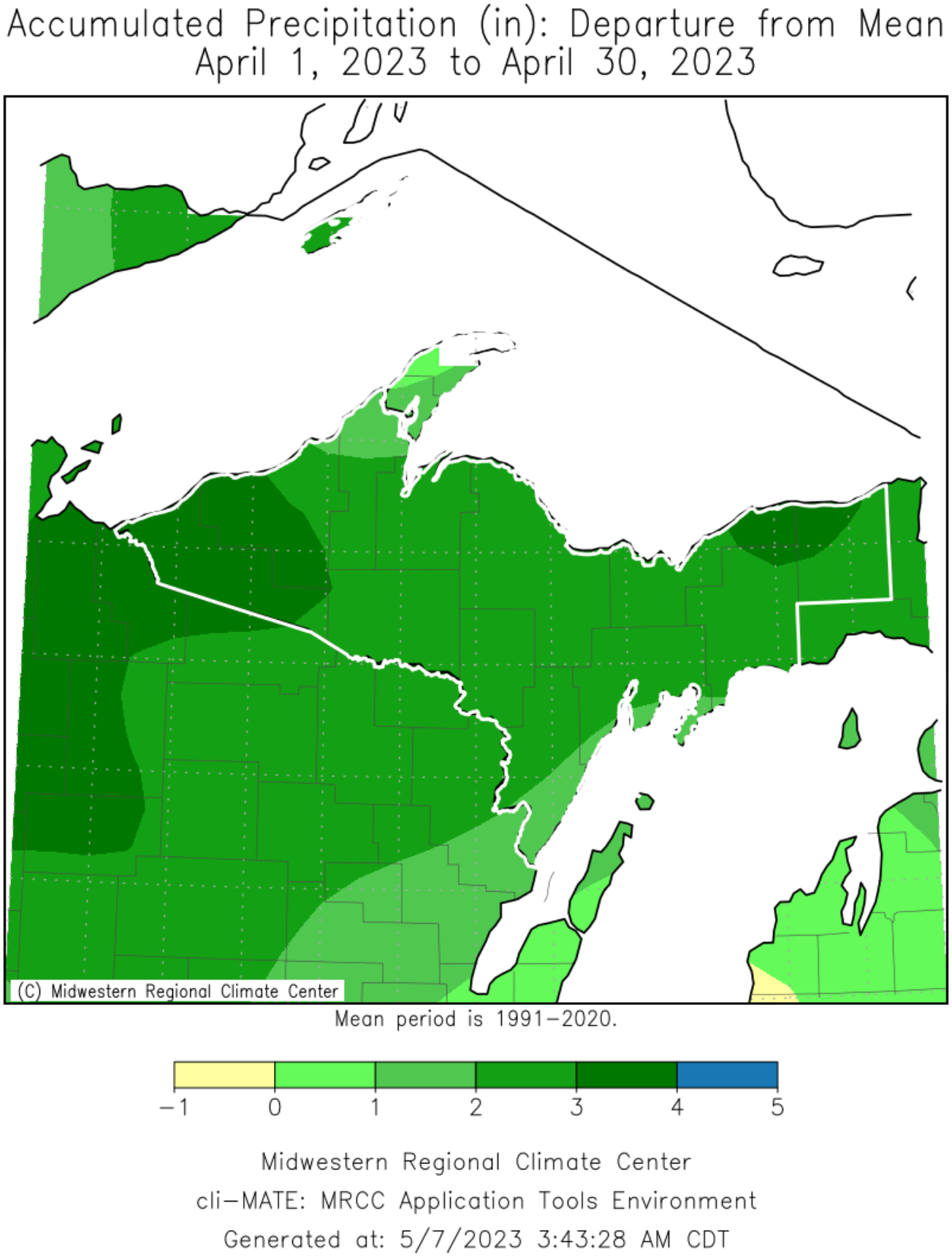


Figure 8: April 2023 Percent of Normal of Accumulated Precipitation.

Soil Moisture Anomaly

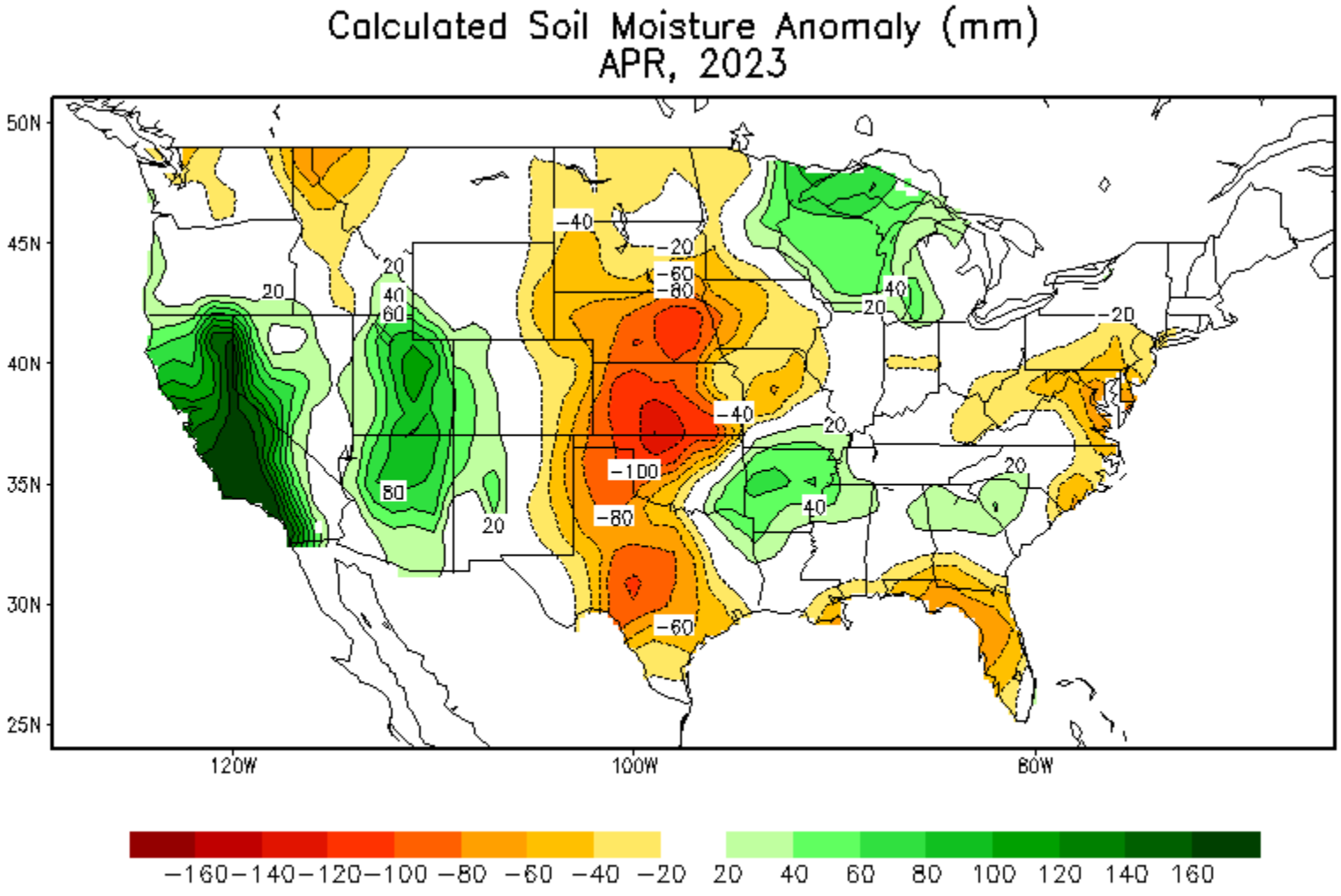


Figure 9: Climate Prediction Center's monthly average soil moisture anomaly for April 2023.

Shallow and Deep Soil Moisture Percentiles

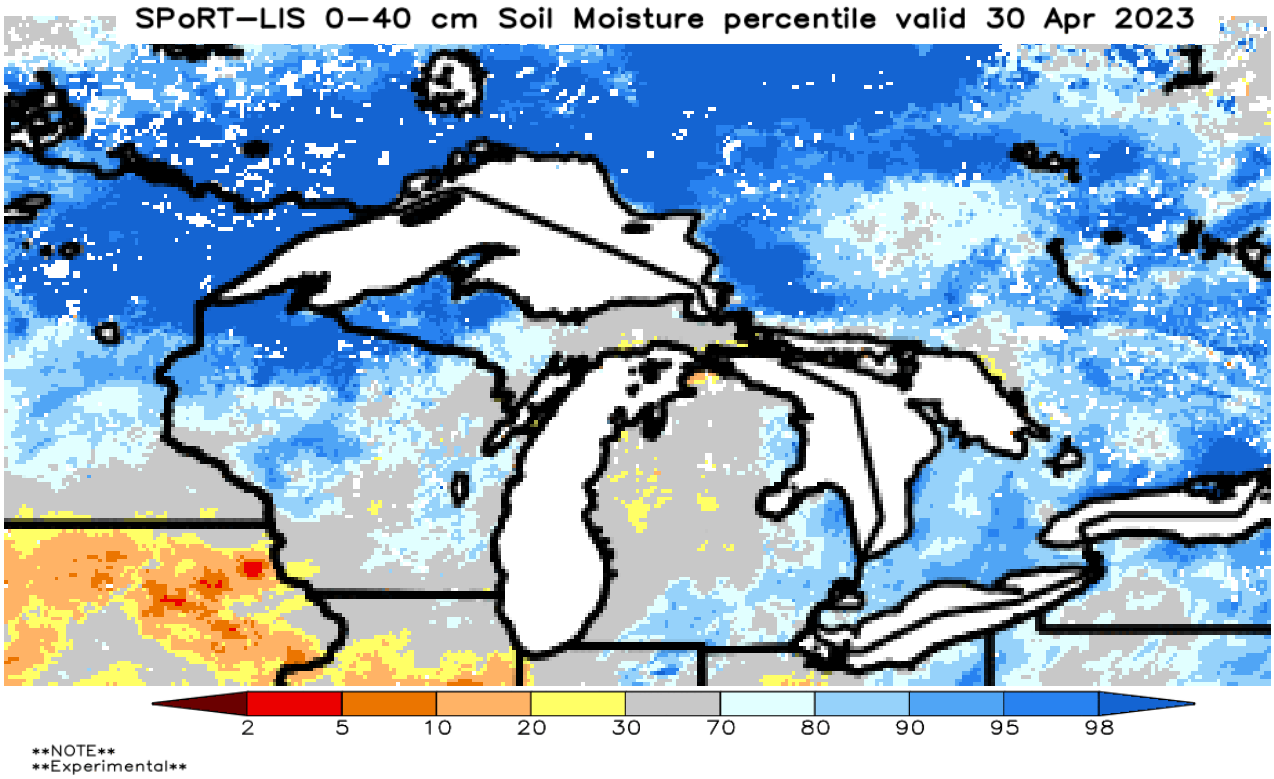


Figure 10: NASA's Short-term Prediction Research and Transition (SPoRT) Center's shallow (0-40 cm) soil moisture percentile valid April 30, 2023.

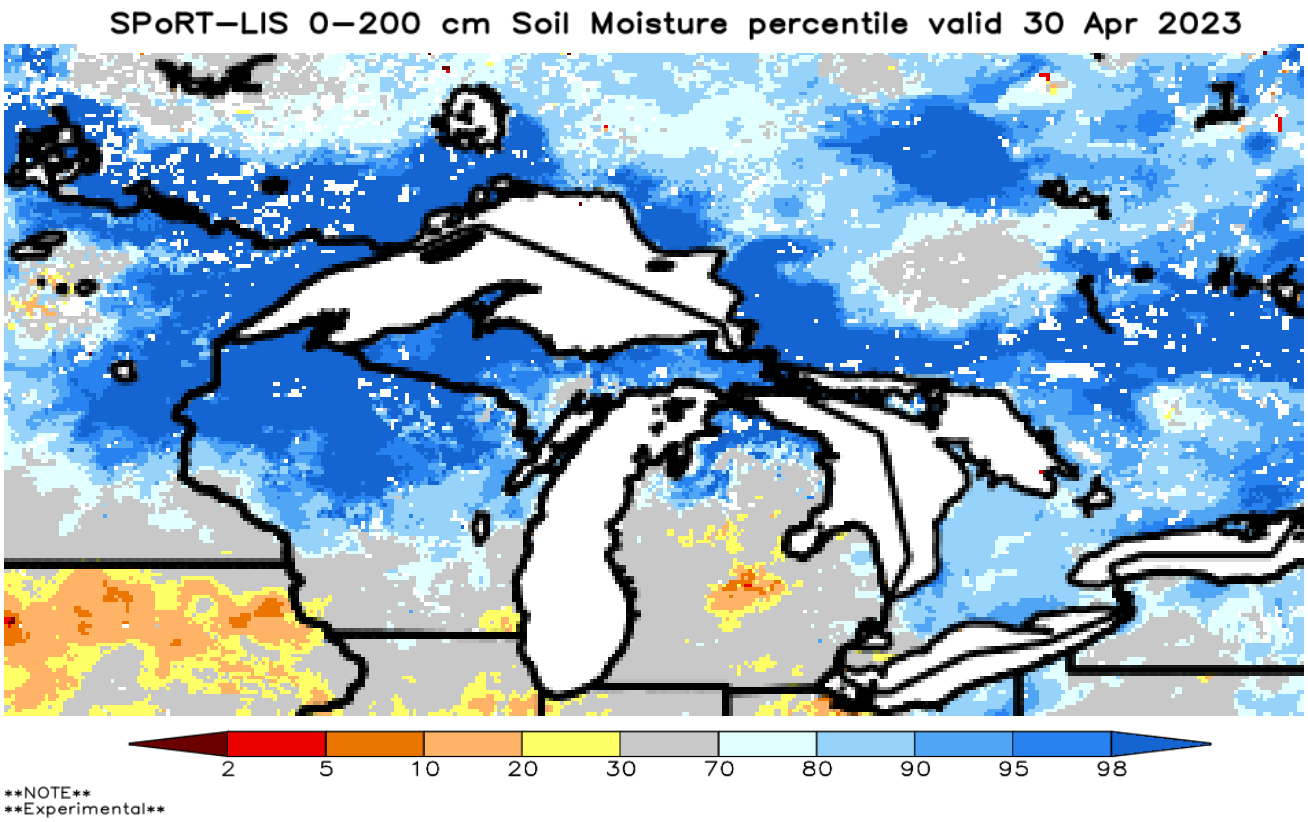


Figure 11: NASA's Short-term Prediction Research and Transition (SPoRT) Center's deep (0-200 cm) soil moisture percentile valid April 30, 2023.