NWS FORM E-5	**U.S. Department of Commerce** NOAA, NATIONAL WEATHER SERVICE	**HSA OFFICE:** **Grand Rapids, MI**
MONTHLY REPORT OF RIVER AND FLOOD CONDITIONS		REPORT FOR (MONTH & YEAR): **December 2021**
TO:	NATIONAL WEATHER SERVICE (W/OS31) HYDROMETEOROLOGICAL INFO CENTER 1325 EAST-WEST HIGHWAY, RM 13468 SILVER SPRING, MD 20910	DATE: January 14, 2022
		SIGNATURE: Richard Wagenmaker, MIC Andrew Dixon, Service Hydrologist

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).

X An **X** inside this box indicates that no flooding occurred within this hydrologic service area.

Summary

December 2021 finished the year on a warm note, with near-normal amounts of precipitation across Lower Michigan. From a hydrologic perspective, the most unusual aspect of the month was that it was warm enough that we made no progress building any winter snowpack. Quite the opposite, actually, as a warm spell in the middle of the month melted virtually all of the snow in the Lower Peninsula. While this sent a slug of water through the river systems, there were no flooding impacts, and by the end of the month most of the large river systems were once again back at normal levels for this time of year.

Warm temperatures also prevented the formation of any river ice, so no freeze-up ice jam issues developed.

Flood Conditions

While the Muskegon River system started the month very close to the long-term normal values for this time of year, the Grand and Kalamazoo river systems started a bit higher, closer to the 70th percentile. All river systems saw a bump up to 90th percentile flows during the mid-month warmup that melted the snowpack, but had returned to the 50th to 70th percentile values by the end of the month as colder temperatures and snow moved back into the state. Perhaps most notably, the river systems were back to normal levels by the end of the month AND there was pretty much no snow on the ground. If this trend continues, our spring flood potential will be significantly reduced if there isn't much snowpack to melt.

Flood Stage Report

No forecast points exceeded flood stage. Thus, the NWS Form E-3 “Flood Stage Report” was not issued.

River Conditions

The end of December percentage of normal flow for selected rivers is listed below:

Location	River	% of Normal
Scottville	Pere Marquette	107
Whitehall	White	87
Evart	Muskegon	95
Mt. Pleasant	Chippewa	121
Lansing	Grand	229
Grand Rapids	Grand	144
East Lansing	Red Cedar	266
Hastings	Thornapple	153
Battle Creek	Battle Creek	221
Battle Creek	Kalamazoo	166

General Hydrologic Information

December precipitation amounts for Grand Rapids, Lansing, and Muskegon, Michigan, were 2.23, 2.12, and 2.29 inches, respectively (Figure 1). Monthly departures were -0.25,+0.22, and -0.13 inches, respectively. Yearly departures were -1.36, +1.23 and -4.16 inches for Grand Rapids, Lansing and Muskegon respectively. Percent of mean precipitation for December 2021 is shown in Figure 2.

Temperatures for the month of December at Grand Rapids, Lansing and Muskegon were above normal. The monthly average temperature departures for these sites were +4.1, +6.5, and +4.6 degrees Fahrenheit, respectively.

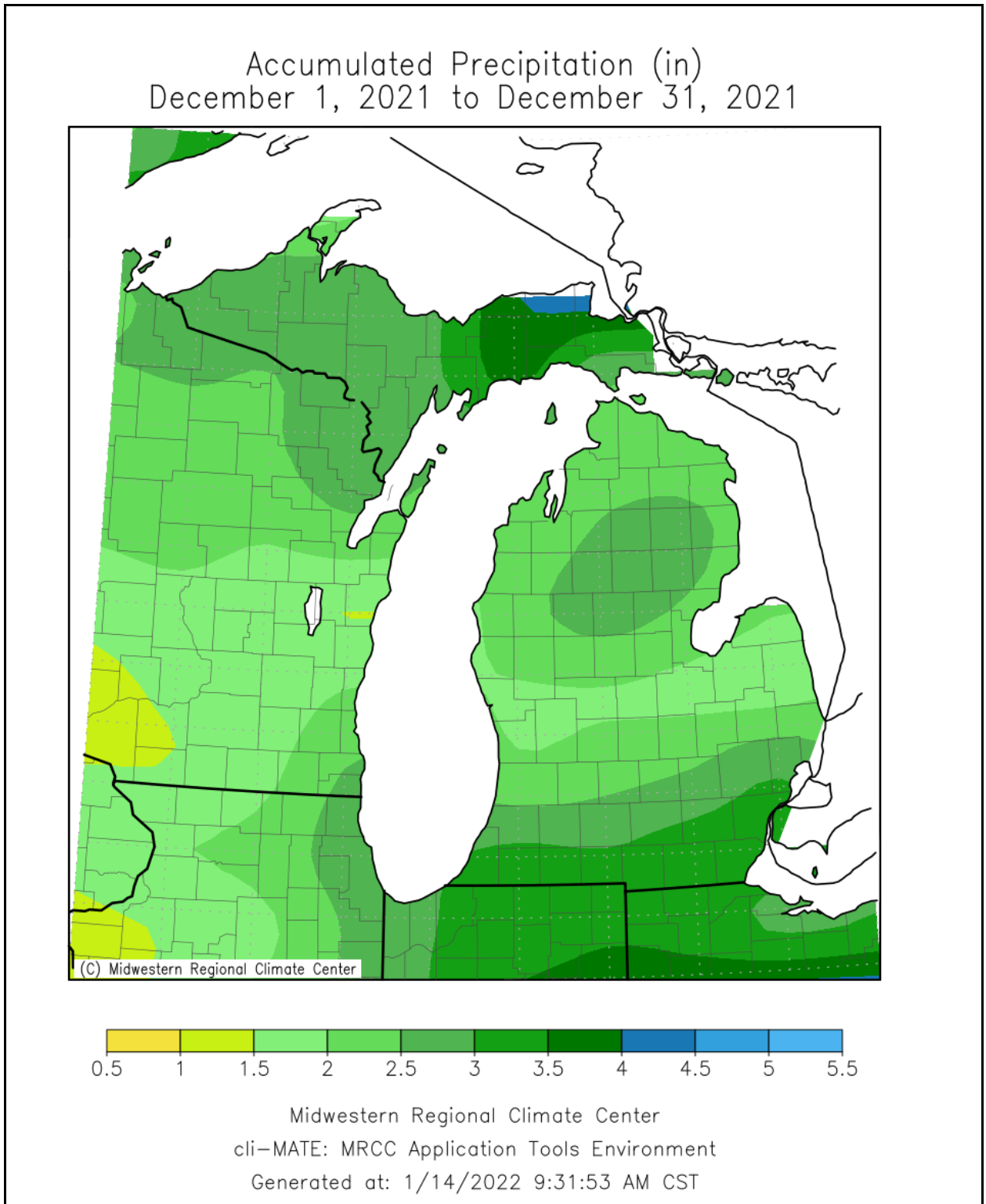

Figure 1. December 2021 Monthly Precipitation Totals.

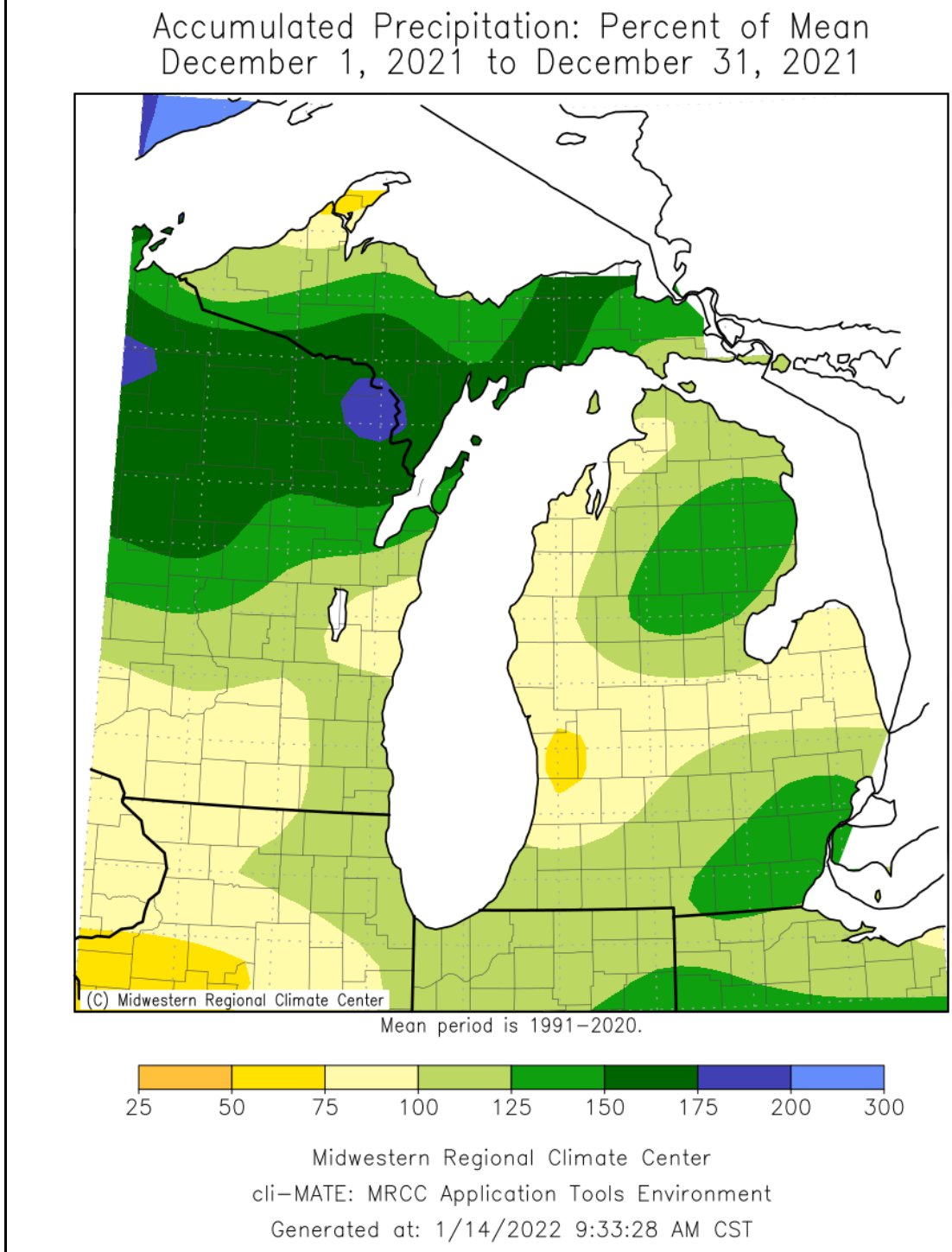

Figure 2. December 2021 Percent of Mean of Accumulated Precipitation.

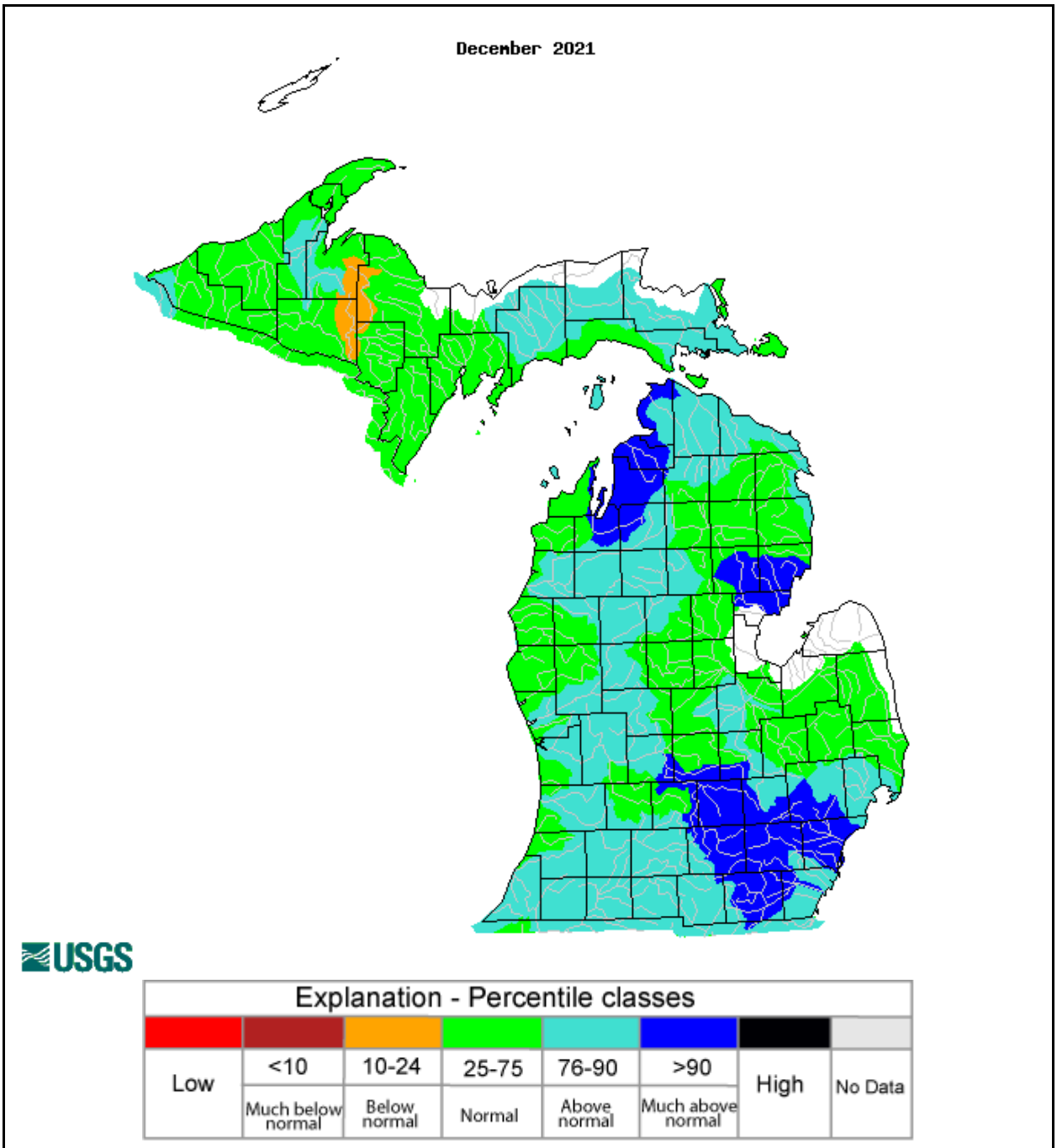

Figure 3. USGS monthly average streamflow for December, grouped by significant hydrologic units. Note streamflows across Lower Michigan generally near average for this time of year.

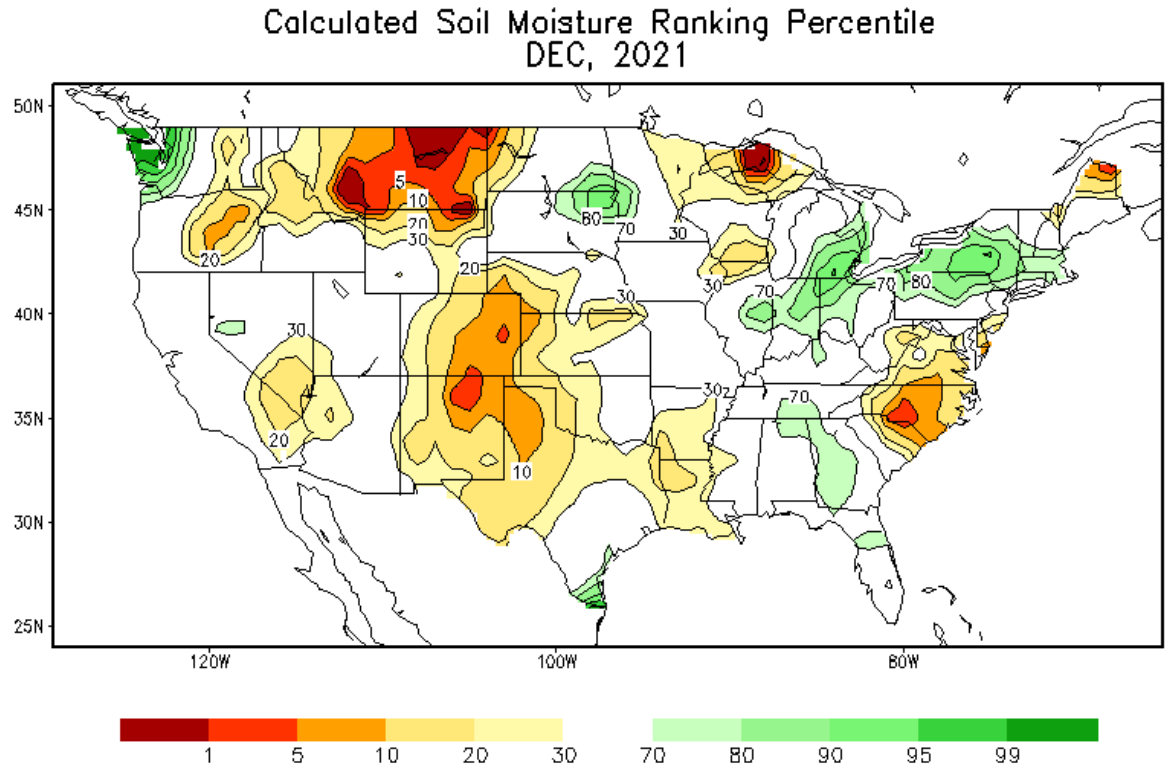

Figure 4. Chart of monthly values of soil moisture, by percentile ranking.

Hydrologic Products issued this month

31 Hydrologic Summaries (ARBRVAGRR)
1 Probabilistic Hydrologic Outlook (ARBESFGRR)
0 Event-driven Hydrologic Outlook (ARBESFGRR)
31 Daily River Forecasts (ARBRVDGRR)
0 Areal Flood Advisory Statements (ARBFLSGRR)
0 Flood Warning Statements (ARBFLWGRR)
0 Flood Watch Statements (ARBFFAGRR)
0 River Statements (ARBRVSGRR)

News Articles and Related Documentation

None