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 2022**
TO:	NATIONAL WEATHER SERVICE (W/OS31) HYDROMETEOROLOGICAL INFO CENTER 1325 EAST-WEST HIGHWAY, RM 13468 SILVER SPRING, MD 20910	DATE: January 15, 2022
		SIGNATURE: Bruce Smith, 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

The first half of December 2022 featured fairly typical temperatures, but drier than normal conditions. Snow - primarily lake-effect snow - started falling around the middle of the month, and by Christmas a decent winter snowpack was taking shape across much of the area. Consecutive days of bitter cold temperatures led to rapid ice formation on most of the rivers. That all changed in the final week of the month, as temperatures in the 50s melted out virtually all snow on the ground, and by the start of the new year all 3 of the major river basins in the area were void of any snow, and the fledgling river ice had melted without issue. This sent a slug of meltwater through the river systems, but since no heavy rain accompanied the snowmelt, there was no flooding.

While virtually all of the Lower Peninsula end the month with below-average precipitation, once again the most dramatic dry conditions remained over southeast Lower Michigan (Figure 2). D2 drought conditions creeped further westward, and by the end of the month had expanded to the Lansing and Jackson areas (headwaters of the Grand and Kalamazoo River systems, see Figure 5). Because drought impacts in Lower Michigan are primarily agricultural, this posed only a limited problem, but if this trend holds the spring flooding risk in these areas may start to be reduced as the winter moves along.

Flood Conditions

The Grand and Kalamazoo River systems spent most of the month lower (less water) than normal, as the headwaters areas continue to see drought conditions limiting the

amount of water finding it's way to the river. Meanwhile, the Muskegon spent most of the month near long-term normal levels. The significant melt event at the end of the month brought the Grand and Kalamazoo up to normal levels for this time of year, while the Muskegon came up to about 90th percentile values for late December. Obviously this all came at the cost of a complete loss of the snowpack, so we're essentially bleeding out the spring snowmelt potential so far. There's still a lot of winter left, but as of now our spring flood risk is starting to trend significantly lower than normal. Stay tuned.

Flood Stage Report

No forecast points exceeded flood stage during the month. 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	146
Whitehall	White	215
Evart	Muskegon	174
Mt. Pleasant	Chippewa	114
Lansing	Grand	79
Grand Rapids	Grand	106
East Lansing	Red Cedar	93
Hastings	Thornapple	107
Battle Creek	Battle Creek	95
Battle Creek	Kalamazoo	95

General Hydrologic Information

December precipitation amounts for Grand Rapids, Lansing, and Muskegon, Michigan, were 2.75, 1.25, and 1.45 inches, respectively (Figure 1). Monthly departures were +0.27, -0.65, and -0.97 inches, respectively. Yearly departures were -1.67, -1.53 and -2.50 inches for Grand Rapids, Lansing and Muskegon, respectively. Percent of mean precipitation for December 2022 is shown in Figure 2.

Temperatures for the month of December at Grand Rapids, Lansing and Muskegon were near average. The monthly average temperature departures for these sites were -0.3, +1.5, and +0.8 degrees Fahrenheit, respectively.

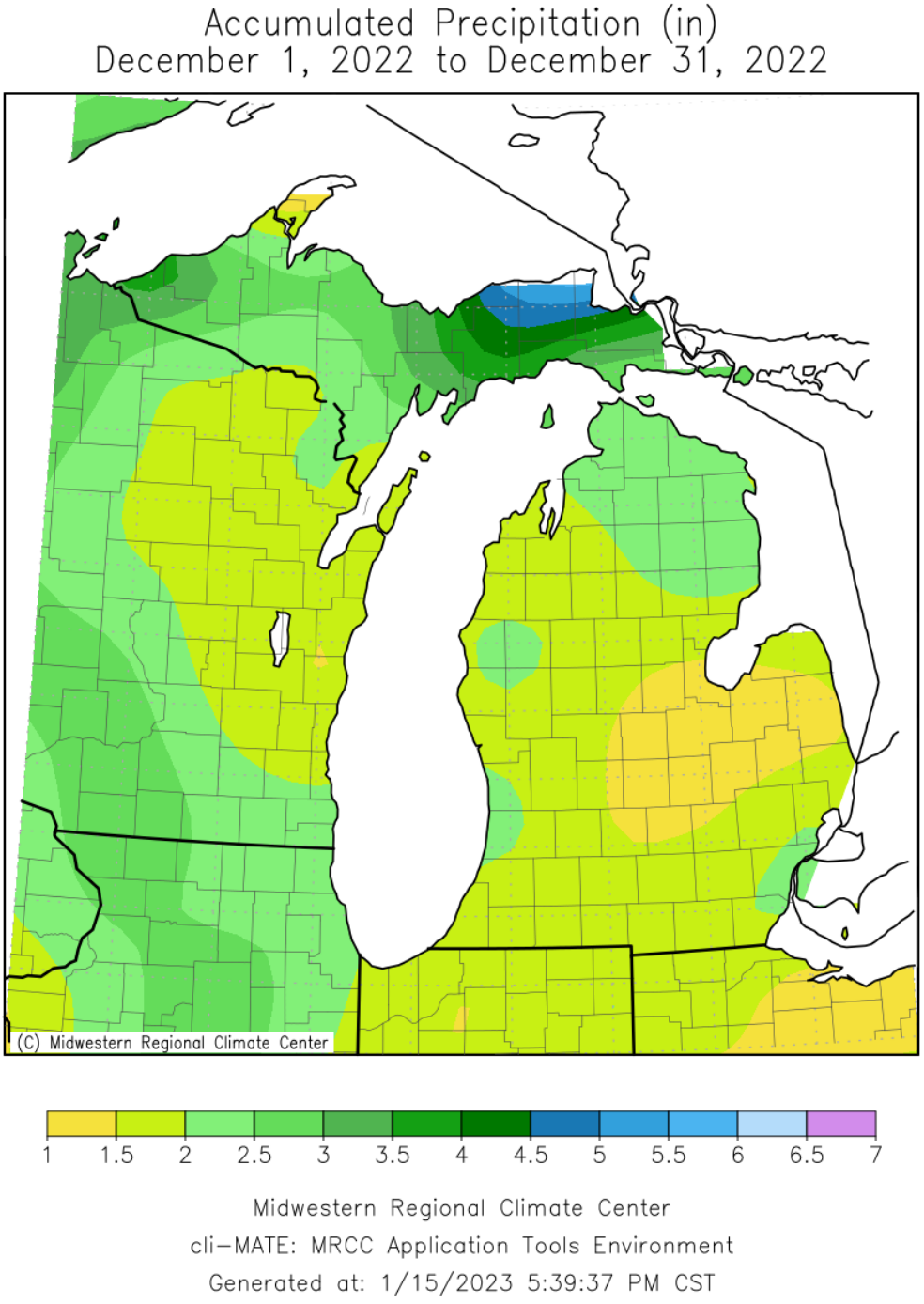

Figure 1. December 2022 Monthly Precipitation Totals.

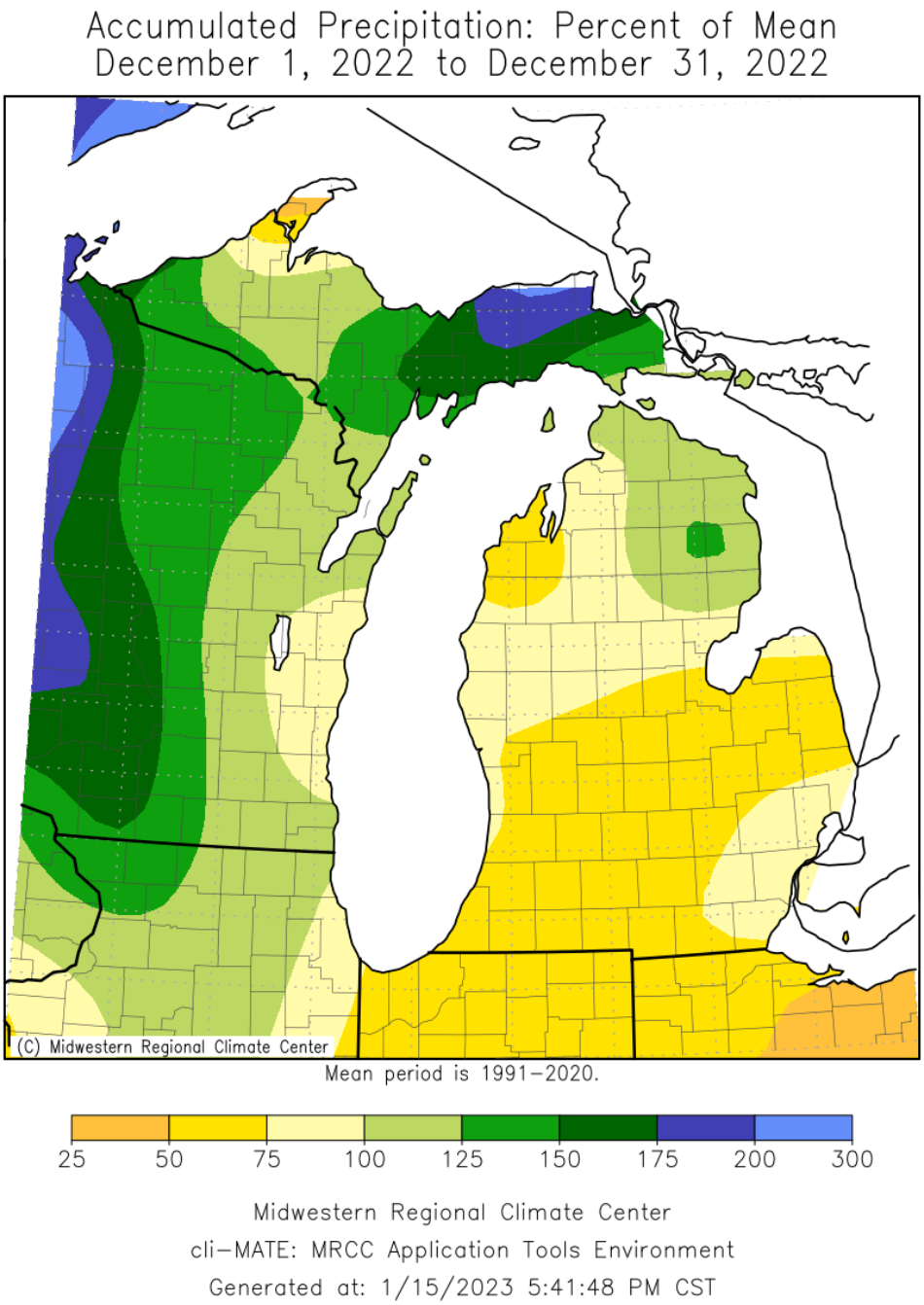

Figure 2. December 2022 Percent of Mean of Accumulated Precipitation.

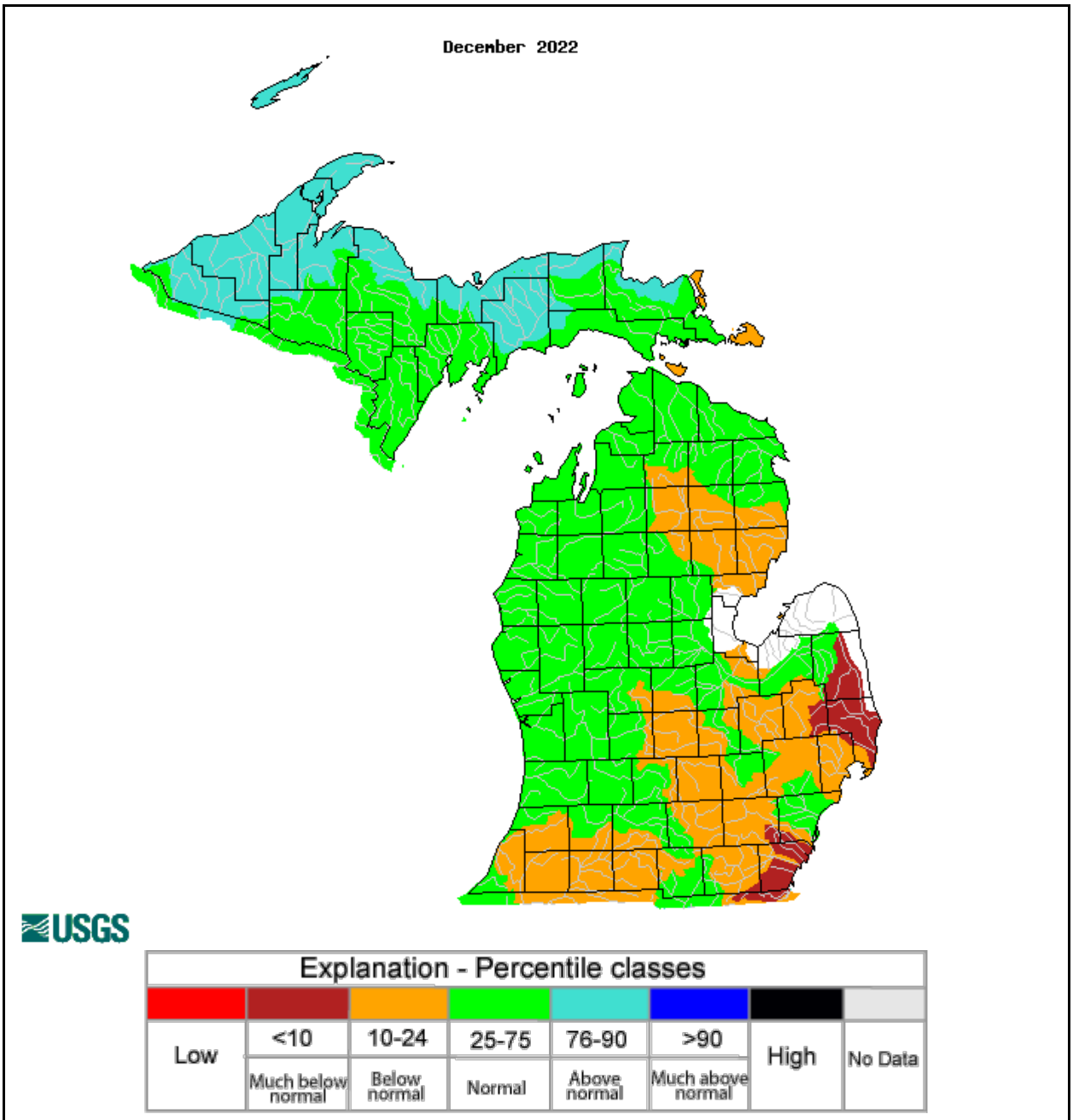

Figure 3. USGS monthly streamflow for December, grouped by significant hydrologic units. Note streamflows somewhat below normal over western Lower Michigan, but much below normal in eastern Lower Michigan for this time of year.

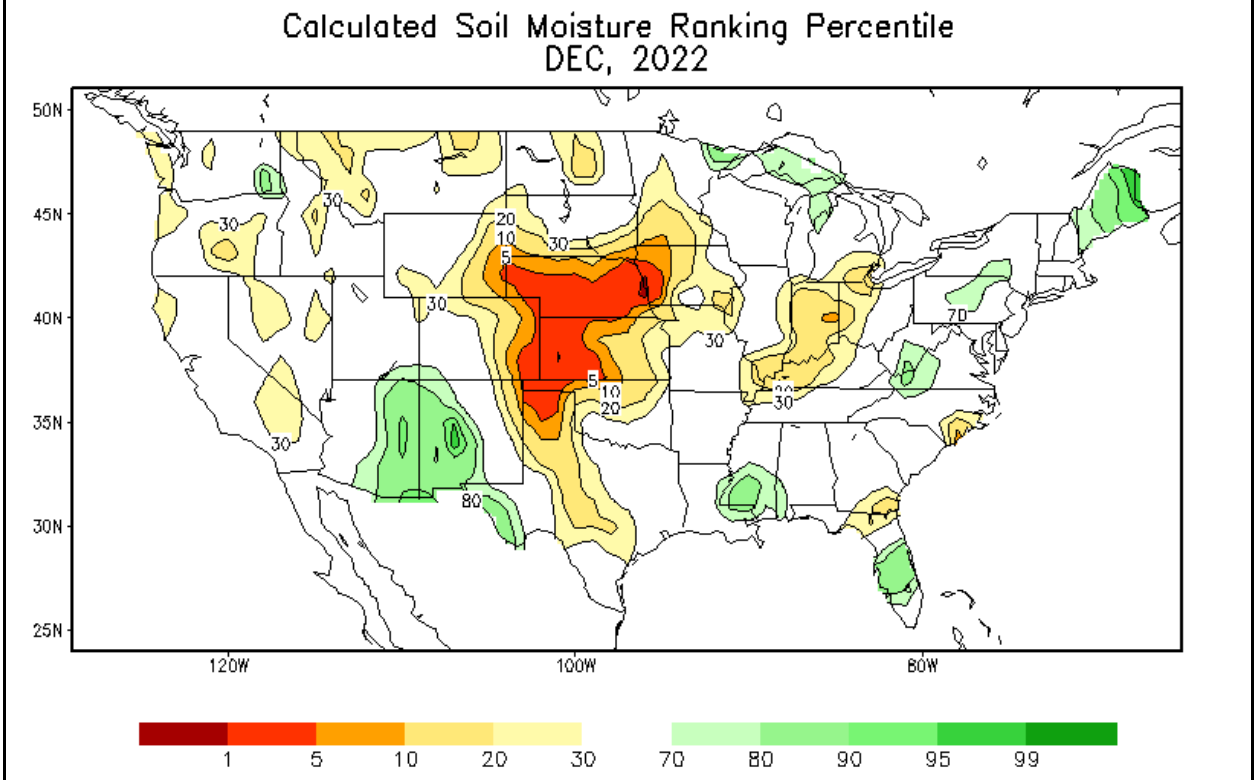

Figure 4. Chart of monthly values of soil moisture, by percentile ranking. This supports the idea that soil moisture levels are near-normal for this time of year.

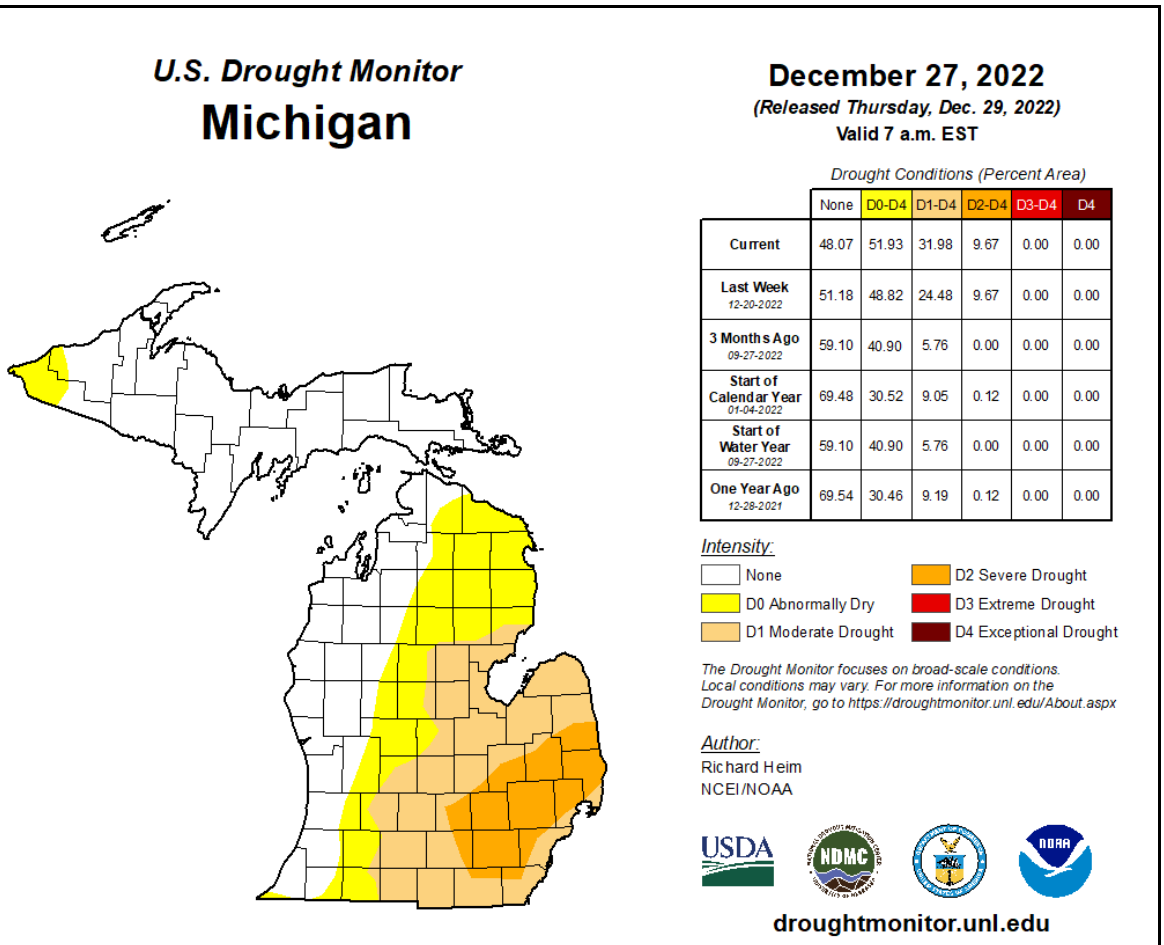

Figure 5. U.S. Drought Monitor showing drier than normal conditions over central Lower Michigan, but much drier than normal conditions over southeast Lower Michigan, including in the headwaters of the Grand and Kalamazoo River basins.

Hydrologic Products issued this month

31 Hydrologic Summaries (ARBRVAGRR)
1 Probabilistic Hydrologic Outlook (ARBESFGRR)
0 Event-driven Hydrologic Outlook (ARBESFGRR)
0 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