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 2019** DATE: **May 4, 2018** SIGNATURE: **Robin J. Turner, MIC** **Keith White, Hydrology Program Manager**
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.

April Precipitation

The beginning of April was relatively benign, with only light rain or snow showers the 1st through the 5th. The pattern then became more active, with rain showers on the 6th producing 0.25"+ of rain over the western UP as well as southern Menominee County, with a few isolated locations near Ironwood seeing as much as 0.75". More rain on the 7th brought more than 0.5" to the NW and far E UP with a few spots approaching 1", and then for a third straight day much of northcentral and eastern Upper Michigan received ~0.5" of rain on the 8th. Some of this rain soaked directly into the snowpack, but there was some runoff, particularly in the Sturgeon Basin.

After a couple dry days, a heavy, wet snow event on the 11th brought another 0.5-1+" of liquid equivalent to the region, with the highest totals over the Garden Peninsula, Iron, and western Gogebic and Ontonagon Counties. Conditions then quieted down until the 17th, when a heavy rainfall event led to another 0.75+" over all but the far northwest. Portions of Delta and Menominee Counties received over 1.25" from this event.

As temperatures warmed through the second half of the month, a stationary front served as the focus for additional rainfall beginning late on the 21st, primarily over the northern UP. By the morning of the 23rd, another 1-2" of rain fell over the northwest and far east UP, with lower amounts across the central and especially south-central. As rivers receded, a lighter rain/snow event to close out the month brought up to 0.25" over the west on the 29th.

In terms of the monthly totals, a swath of 4.5 to nearly 6 inches of rain, or about 2-3 times the April average, stretches across NW Marquette, Baraga, southern Houghton, and eastern Ontonagon Counties, with other maxima near Ironwood and in Luce and southern Schoolcraft Counties. The lowest monthly totals were across the central at about 3-3.5 inches, which is still 50% above normal. Below is a chart of some of the larger cities in the Upper Peninsula, with monthly precipitation in inches and the percent of normal for the month. Any notable monthly ranks are also included. See figures 1 and 2 below for a smoothed out aerial view of these data.

Location	Precipitation	% of normal	Rank	Snowfall	Above/Below
WFO Marquette	5.02"	167	7/57	8.6"	-5.9"
Marquette City	4.17"	170	12/153	6.9 "	-0.6"
Quincy Hill	4.40"	239		8.0"	+0.2"
Ironwood	5.99"	227	4/118	2.6"	-8.8"
Iron Mountain	3.34"	142		6.0"	+1.4"
Manistique	4.74"	198	5/87	1.0"	-2.1"
Munising	3.25"	148		5.3"	-2.3"
Newberry	3.39"	153		T	-7.1"
Stambaugh	3.59"	160		8.1"	+2.3"

April Flooding

Although March 2019 was relatively dry, the anomalously wet snowpack combined with well above average April precipitation led to inevitable flooding issues. The past month featured arguably the most significant widespread river flooding in the Upper Peninsula since 2002. Thankfully, overall impacts this year remained subdued in comparison to that spring, and in many cases river levels did not rise to their 2002 highs. In total, 13 flood warnings were issued at 10 gage sites. Advisories were issued at 7 other sites for river levels above bankfull, however one of these (East Branch of the Escanaba near Gwinn) never reached bankfull stage. Note that for many of these, especially the eastern UP rivers of the Sturgeon in Delta County, the Manistique, and the Tahquamenon, there are no known impacts of the high water levels seen this year, as the area is quite rural and generally swamps soak up much of the water.

Areawide, rivers are running well above the 90th percentile (see river levels image from the USGS below). Multiple rivers reached Moderate Flood stage, namely the Sturgeon River near Alston and the Michigamme River near Witch Lake and Republic. These locations saw historically high crests in their top 5 all time, with records dating back more than 50 years at these sites. ALSM4 reached its second highest level on record at 12.1 feet (record: 13.75 feet set in 1960). Please see the April E3 report for full details on crests and length of time in flood.

Although the majority of the flooding came during the second half of the month as rainfall exacerbated snowmelt, particularly over the central and western UP, minor flooding began as early as the 7th on the Sturgeon River. River levels across the area modulated through the middle of the month with cooler than average temperatures preventing additional snowmelt. But a couple moderate to heavy rainfall events the 17th through the 22nd, combined with temperatures rising into the 60s on several days during this period, drastically increased runoff into already saturated soils, leading to minor to moderate flooding concerns across the majority of the Upper Peninsula. As the signal for heavy precip increased, a Flood Watch was issued early in the morning Sunday, April 21st, and NWS Marquette issued our first Hydrology Partner Sitrep on the morning of Monday, April 22nd ahead of the heaviest rainfall and flood potential.

The most widespread impacts this spring seemed to be basement flooding, which was reported in multiple counties. Here are some of the other reports of impacts from both gaged and ungaged rivers received by NWS Marquette or the media this month. Note that this list is not complete:

- Gages Creek overflowed its banks onto private property east of the Peavy Pond April 19th.
- On April 20th, the Big Cedar River near Powers was inundating yards up near a few porches, and some minor roads in Menominee County were reportedly under some water.
- Willow Creek in Escanaba was spilling over onto Willow Creek Road on the 20th.
- M26 near Tamarack City was closed briefly on the night of the 22nd. The water was reportedly not coming from Dover creek, rather from the 6th st. area. Clogged culverts in the area led to additional water on the rd.
- Water over Black River Rd near McDonalds Dam on April 22.
- Norrie Park Rd in Ironwood between Lime st. and Riverside rd. was closed due to the failure of a small, old dam in the Montreal River, also April 22nd.
- Multiple sections of Halonen Rd. near Pelkie and adjacent fields were reported to be under water the morning of 04/23 as the Sturgeon River crested.
- An aerial survey on April 23rd on the Sturgeon River near Chassell showed that several houses and barns had water approaching, but not inundating them. At the time, Sturgeon River Rd. was under 6-8” of water and Rajala Rd. was under 8-10” of water, per Houghton County EM.

- On April 24th, numerous road closures were reported in the City of Wakefield in Gogebic County as the Little Black River and Sunday Lake rose outside their banks. The city enlisted students to fill and place sandbags. More information is included in the media links below.

Media Links
Wakefield, via TV6
Matt Zika interview with TV6, April 22
Jaclyn Ritzman WJMN 3 interview (partial river focus)

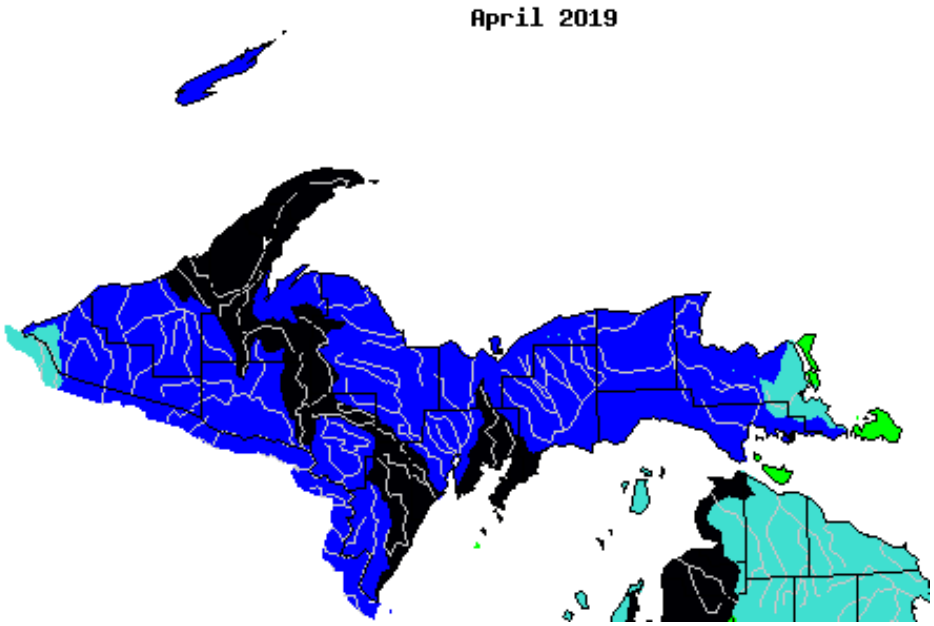
Snowpack Discussion

At this time, the only remaining snowpack in the Upper Peninsula is in the wooded higher terrain areas of the Keweenaw Peninsula and Michigamme Highlands, and in the northeastern snowbelts mainly north of M28 and east of Munising. See Figure 3 for the May 3, 2019 NOHRSC analysis.

Drought Discussion

The May 2nd update of the US Drought Monitor continues to indicate no drought conditions across the MWS MQT Hydrologic Service Area (HSA). For the latest drought status, please go to http://www.drought.gov.

April River Levels



Explanation - Percentile classes							
Low	<10	10-24	25-75	76-90	>90	High	No Data
	Much below normal	Below normal	Normal	Above normal	Much above normal		

April Products Issued

10 – Hydrologic Outlook (ESF; 15th updated 3 times, 20th updated 4 times; one monthly 90 day outlook)
8 – Flood Watch (FFA; One areal watch, one river flood watch, and updates/cancellation statements)
17 – Flood Warning (FLW; 13 warnings plus updated stage category statements and one misplaced cancellation statement)
184 – Flood Advisories and Statements (FLS; includes some corrected products)
0 – Flash Flood Warning (FFW)
0 – Flash Flood Statement (FFS)
30 – Hydrologic Summary (RVA)
30 – Daily River Forecasts (RVD)

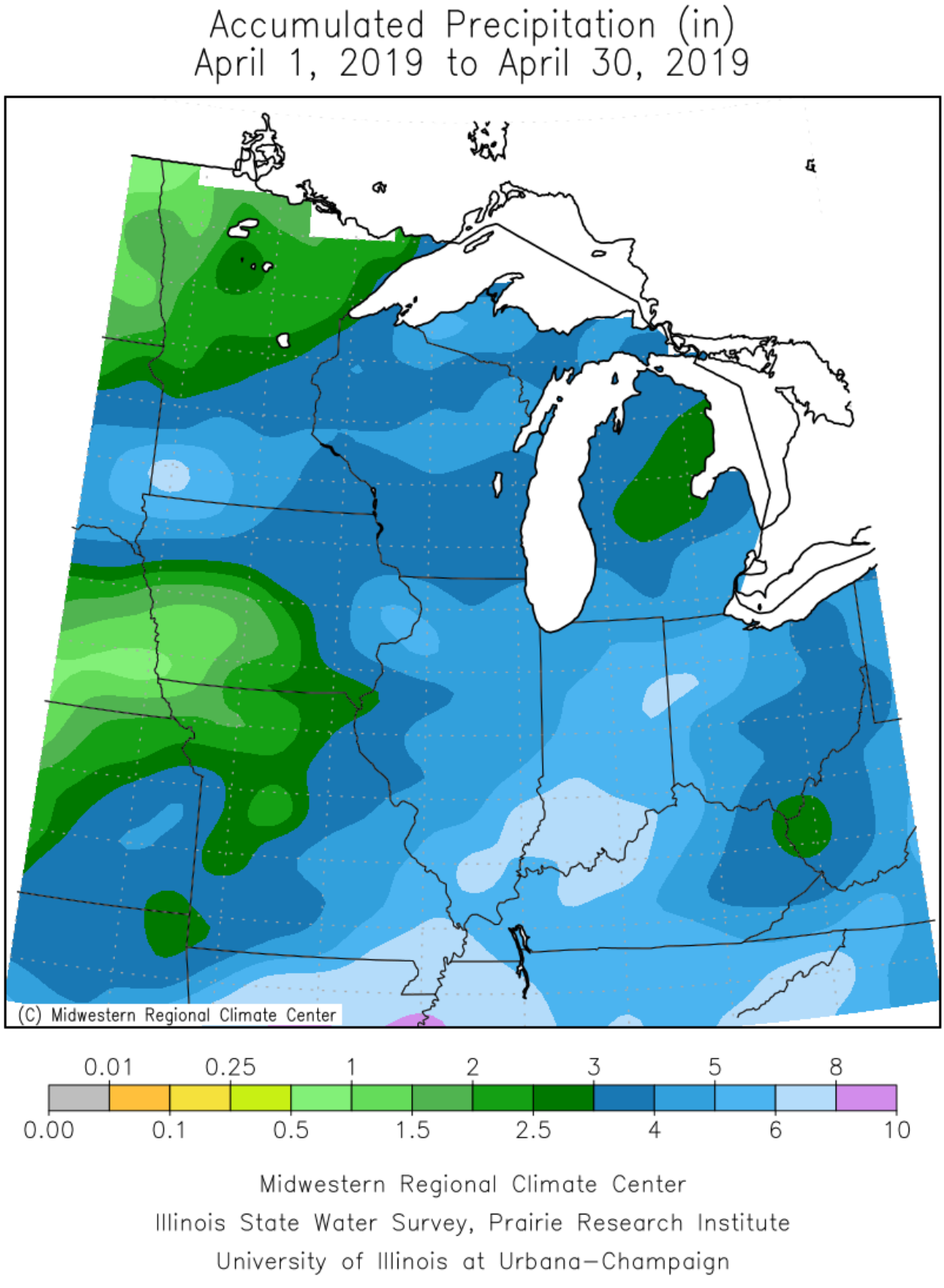


Figure 1. April 2018 Monthly Precipitation Totals.

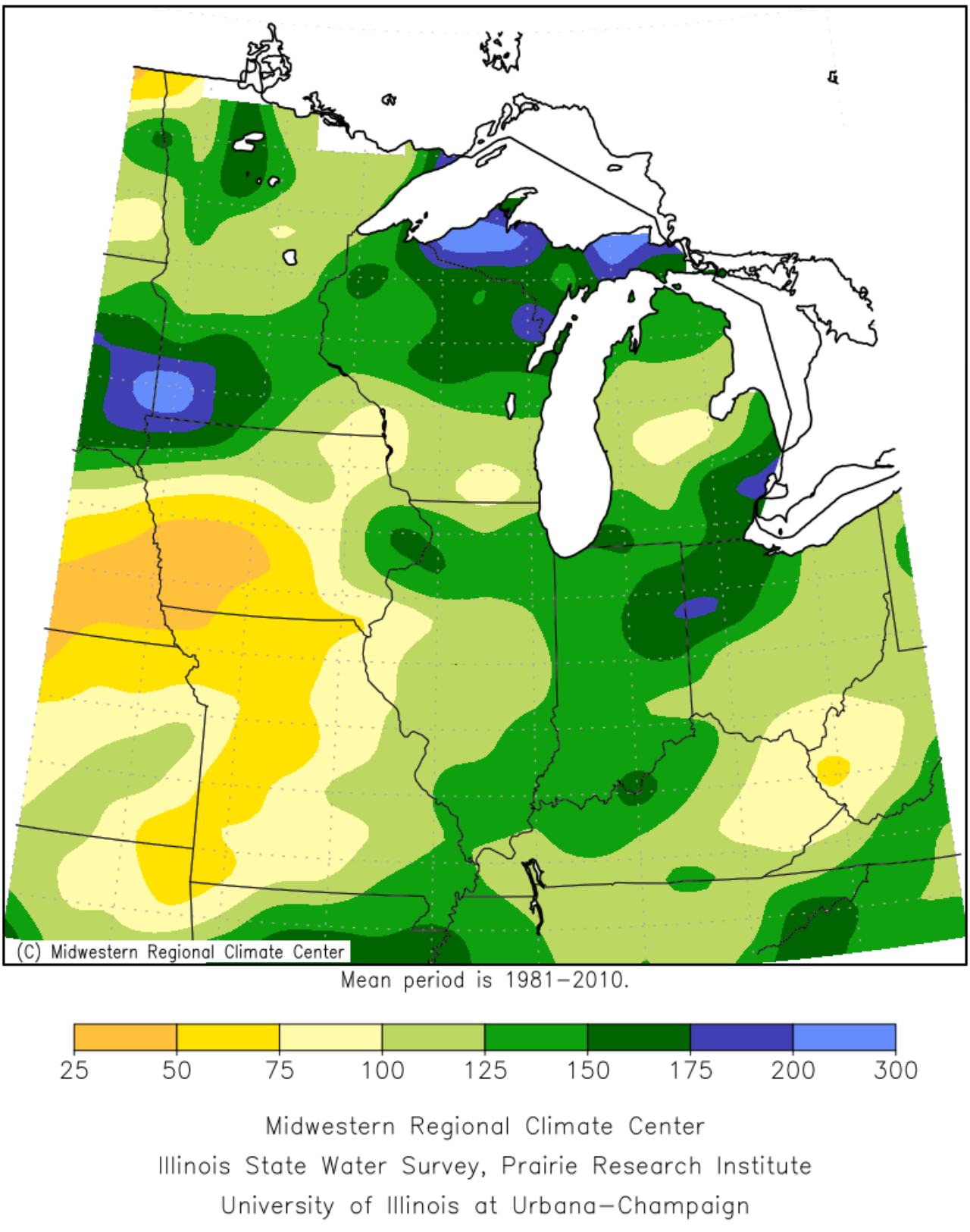


Figure 2. April 2018 Percent of Mean of Accumulated Precipitation

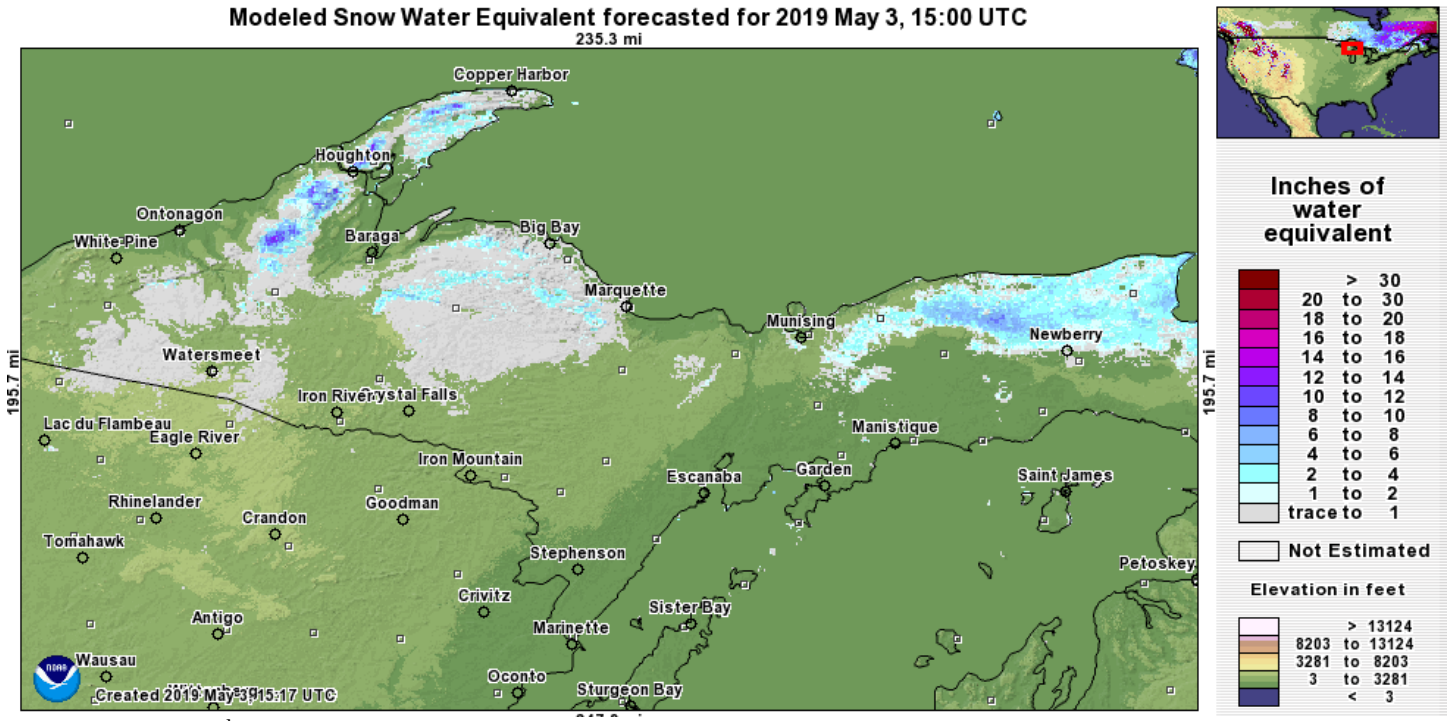


Figure 3: May 3rd snow water equivalent from NOHRSC.