

NWS FORM E-5	U.S. DEPARTMENT OF COMMERCE NOAA, NATIONAL WEATHER SERVICE	HSA OFFICE: Marquette, MI		
MONTHLY REPORT O	F RIVER AND FLOOD CONDITIONS	REPORT FOR (MONTH / YEAR): November 2023		
TO: NATIONAL WEATHER SERVICE (W/OH12x1) HYDROMETEOROLOGICAL INFO CENTER 1325 EAST-WEST HIGHWAY, RM 7116 SILVER SPRING, MD 20910		DATE: December 16th, 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).

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

Summary

November was another warm and dry month with abnormally dry to drought conditions expanding across Upper Michigan. Each observation site recorded below normal precipitation and Iron Mountain was particularly dry with just over half an inch of rainfall for the entire month. Except for the final week of November, snowfall was uncharacteristically rare with most precipitation falling as rain. Considering the warm and dry fall season (Tables 2 and 3), this rainfall likely kept streamflow values (Figure 1) closer to normal than they would have been if snowfall occurred instead. After a wet spring, persistently warm and dry conditions for much of the summer and fall resulted in expanding drought conditions with the entire Upper Peninsula now classified as abnormally dry with small portions experiencing drought (Figure 4). Soil moisture values also ended November substantially below normal (Figures 7-9). For the year-to-date (Tables 4 and 5), precipitation was near-normal (92% to 126%) and temperatures ranged from $+0.4^{\circ}F$ to $+2.2^{\circ}F$ above-normal across Upper Michigan.

Location	Precipitation	% of Normal	Snowfall
WFO Marquette	1.78"	61%	7.8"
Marquette City	1.55"	64%	0.8"
Quincy Hill	2.46"	М	6.9"
Ironwood	1.57"	55%	5.5"
Iron Mountain	0.54"	28%	1.0"
Manistique	2.06"	79%	4.0"
Munising	2.91"	84%	12.6"
Stambaugh	0.95"	54%	3.6"

<u>NOTE</u>: Precipitation after 8 AM EST November 30th was counted in December stats for all but the WFO Marquette site due to the reporting structure of our cooperative observers.



Fall (September-November) Precipitation Summary

Location	Precipitation	% of Normal	Rank	Last Year
WFO Marquette (Records: 1962-2023)	7.17"	66%	7 th driest	11.49"
Marquette City (Records: 1875-2023)	6.05"	66%	17 th driest	7.71"
Ironwood (Records: 1901-2023)	9.20"	92%	60 th driest	13.09"
Iron Mountain (Records: 1902-2023)	5.74"	72%	29 th driest	6.01"
Manistique (Records: 1938-2023)	8.50"	94%	39 th driest	8.71"
Munising (Records: 1912-2023)	9.19"	81%	25 th driest	13.73"
Stambaugh (Records: 1900-2023)	5.48"	67%	21 st driest	6.39"

Table 2. Total observed precipitation at long-term climate sites across Upper Michigan for September, October, and November 2023.

Fall (September-November) Temperature Summary

Location	Avg Temp	Departure	Rank	Last Year
WFO Marquette (Records: 1962-2023)	46.2°F	+3.0°F	9 th warmest	46.0°F
Marquette City (Records: 1875-2023)	48.9°F	+2.0°F	23 rd warmest	49.0°F
Ironwood (Records: 1901-2023)	45.6°F	+1.7°F	38 th warmest	44.5°F
Iron Mountain (Records: 1902-2023)	47.3°F	+2.0°F	19 th warmest	47.2°F
Manistique (Records: 1938-2023)	46.6°F	+0.5°F	31 st warmest	46.0°F
Munising (Records: 1912-2023)	47.5°F	+1.7°F	22 nd warmest	46.3°F
Stambaugh (Records: 1900-2023)	44.3°F	+1.5°F	35 th warmest	43.3°F

Table 3. Average temperature observed at long-term climate sites across Upper Michigan for September, October, and November 2023.



Year-to-Date Precipitation Summary

Location	Precipitation	% of Normal	Rank	Last Year
WFO Marquette (Records: 1962-2023)	42.71"	126%	6 th wettest	40.13"
Marquette City (Records: 1875-2023)	31.62"	110%	44 th wettest	26.73"
Ironwood (Records: 1901-2023)	36.41"	108%	25 th wettest	38.64"
Iron Mountain (Records: 1902-2023)	27.64"	98%	46 th driest	30.31"
Manistique (Records: 1938-2023)	28.18"	98%	28 th driest	30.61"
Munising (Records: 1912-2023)	38.28"	115%	19 th wettest	39.99"
Stambaugh (Records: 1900-2023)	26.50"	92%	31 st driest	30.18"

Table 4. Total observed precipitation at long-term climate sites across Upper Michigan for January throughNovember 2023.

Year-to-Date Temperature Summary

Location	Avg Temp	Departure	Rank	Last Year
WFO Marquette (Records: 1962-2023)	44.1°F	+2.2°F	8 th warmest	42.5°F
Marquette City (Records: 1875-2023)	45.6°F	+1.0°F	27 th warmest	43.9°F
Ironwood (Records: 1901-2023)	43.7°F	+0.9°F	35 th warmest	40.9°F
Iron Mountain (Records: 1902-2023)	46.3°F	+1.9°F	9 th warmest	44.2°F
Manistique (Records: 1938-2023)	44.0°F	+0.4°F	27 th warmest	41.9°F
Munising (Records: 1912-2023)	44.5°F	+1.2°F	19 th warmest	42.3°F
Stambaugh (Records: 1900-2023)	42.4°F	+0.6°F	44 th warmest	39.8°F

Table 5. Total observed precipitation at long-term climate sites across Upper Michigan for January through November 2023.



Flooding Conditions

There were no flooding concerns during the month of November 2023.

Media Links

None.

River Conditions

Streamflow was near to below normal across Upper Michigan during November 2023. Streamflow for the Manistique, Carp, and Pine River basins across eastern Upper Michigan was below normal.



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



Snowpack SWE (Snow Water Equivalent) Conditions

There was less than an inch of snow water equivalent in the northwest wind lake effect snow belts to start December.



Figure 2: Current modeled snowpack snow water equivalent on December 1st.



Figure 3: Modeled snow water equivalent for drainage basins on December 1st as a percent of 18-year median.



Monthly Hydrometeorological Report Report for November 2023

Drought Discussion

Abnormally dry weather spread across the remainder of Upper Michigan during November with small portions of the area in moderate to severe drought. For the latest drought status, please visit <u>http://www.drought.gov</u>.



Hydro Products Issued

Product	Number
Hydrologic Outlook (ESF)	0
Flood Watch (FFA)	0
Flood Warning (FLW)	0
Flood Advisories and Statements (FLS)	0
Flash Flood Warning (FFW)	0
Flash Flood Statement (FFS)	0
Hydrologic Summary (RVA)	30

December 12, 2023 (Released Thursday, Dec. 14, 2023) Valid 7 a.m. EST

	Drought Conditions (Percent Area)					
	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	0.01	99.99	15.20	4.96	0.00	0.00
Last Week 12-05-2023	52.00	48.00	15.20	4.96	0.00	0.00
3 Month s Ago 09-12-2023	55.88	44.12	13.42	5.43	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 09-26-2023	55.88	44.12	13.42	5.42	0.00	0.00
One Year Ago 12-13-2022	93.94	6.06	0.00	0.00	0.00	0.00

Intensity:	
None	D2 Severe Drought
D0 Abnormally Dry	D3 Extreme Drought
D1 Moderate Drought	D4 Exceptional Drough

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

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Precipitation Summary

Accumulated Precipitation (in)

November 01, 2023 to November 30, 2023



Figure 5: Total monthly precipitation for November 2023.



Precipitation Summary Continued

Accumulated Precipitation (in): Percent of 1991-2020 Normals

November 01, 2023 to November 30, 2023



Figure 6: Percent of normal total precipitation for November 2023.



Soil Moisture Anomaly



Figure 7: Climate Prediction Center's monthly average soil moisture anomaly for November 2023.



Monthly Hydrometeorological Report

Report for November 2023

Shallow and Deep Soil Moisture Percentiles

SPoRT-LIS 0-40 cm Soil Moisture percentile valid 01 Dec 2023



NOTE **Experimental**

Figure 8: NASA's Short-term Prediction Research and Transition (SPoRT) Center's shallow (0-40 cm) soil moisture percentile valid December 1st, 2023.



SPoRT-LIS 0-200 cm Soil Moisture percentile valid 01 Dec 2023

NOTE **Experimental**

Figure 9: NASA's Short-term Prediction Research and Transition (SPoRT) Center's deep (0-200 cm) soil moisture percentile valid December 1st, 2023.