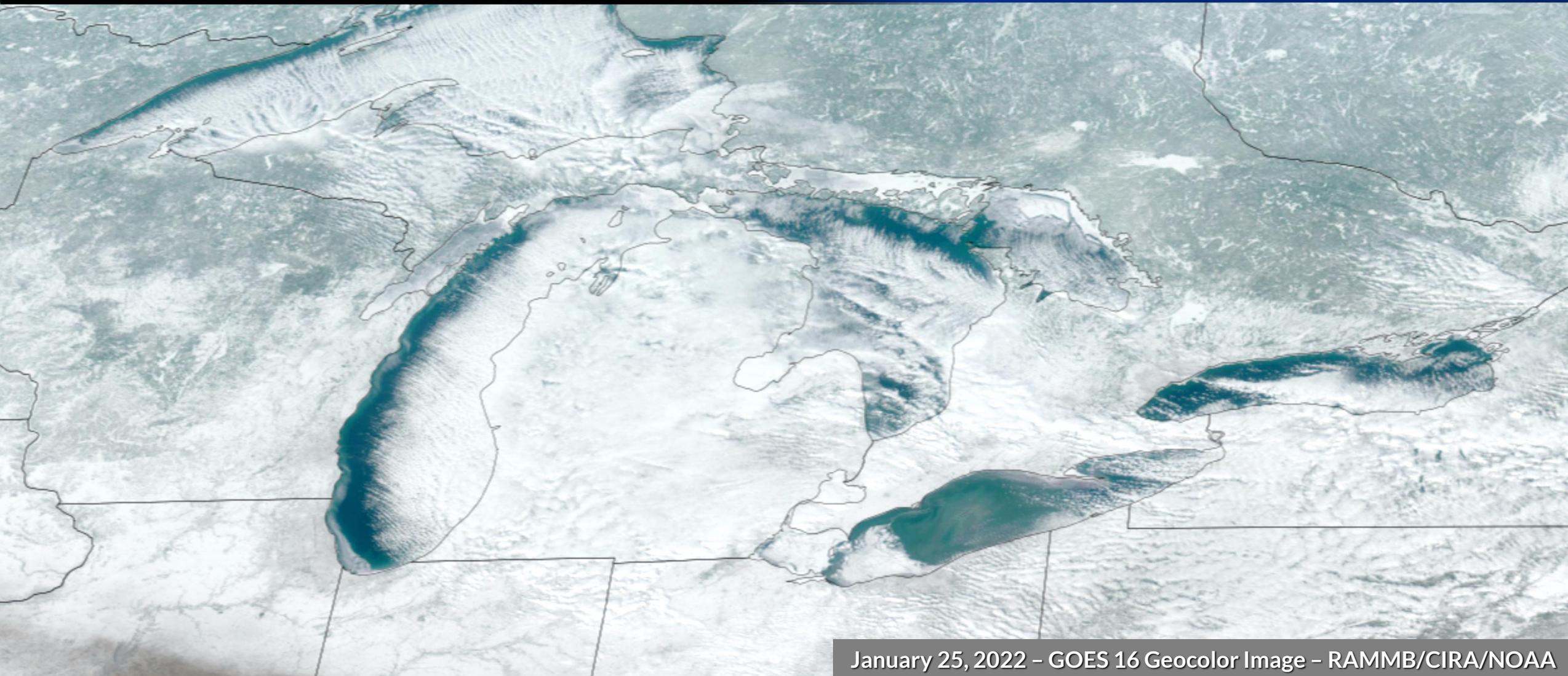


2022-2023 Winter Outlook for Southeast Michigan

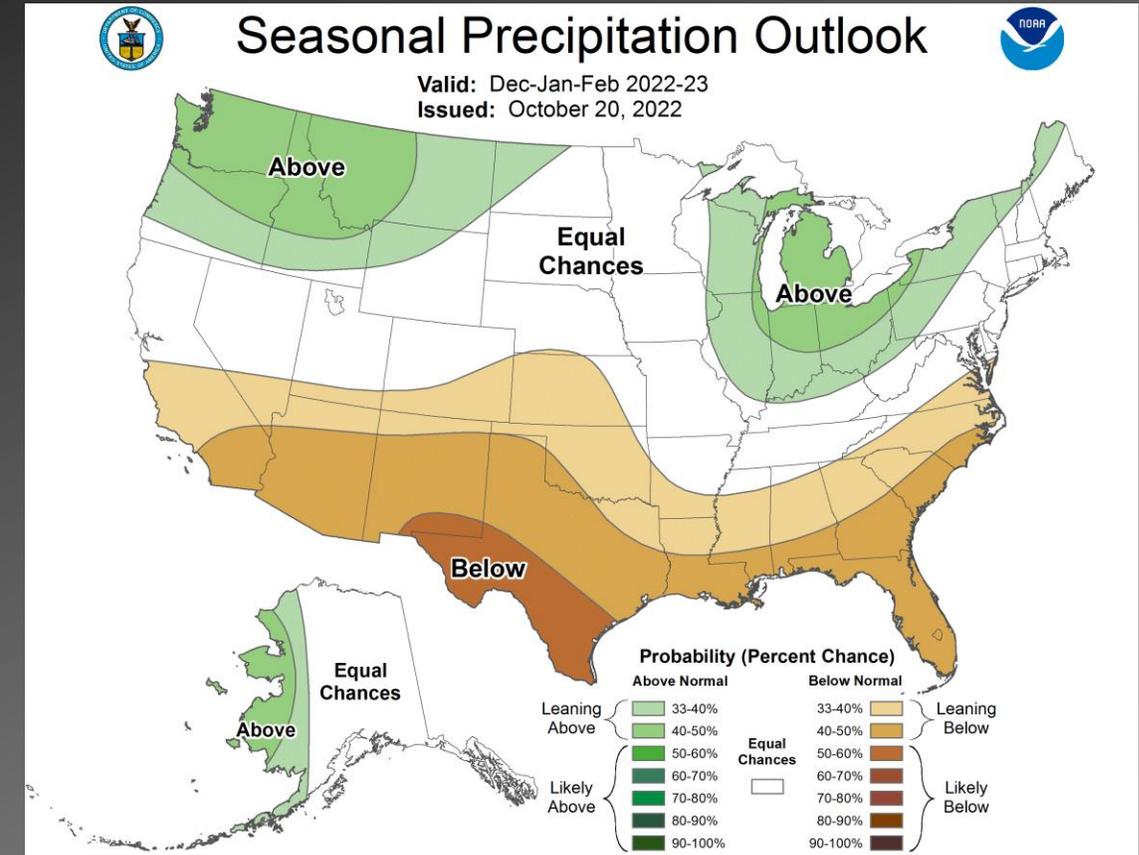
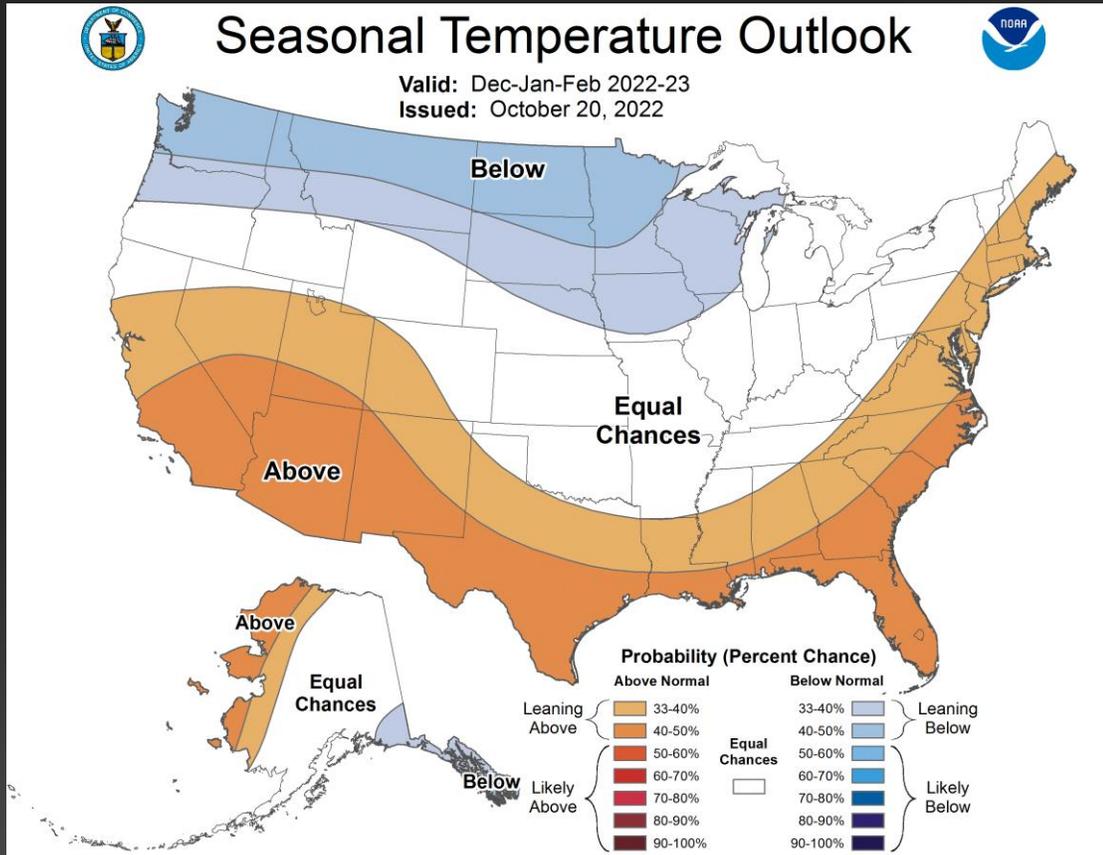
Weather Forecast Office
Detroit, MI



90 Day Outlook Valid December 1, 2022 to February 28, 2023



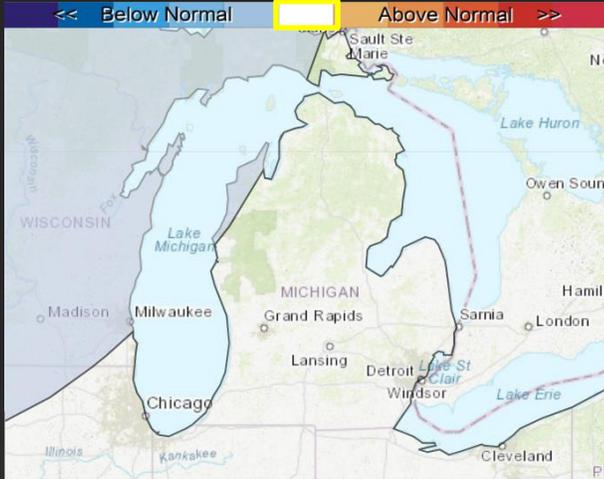
January 25, 2022 - GOES 16 Geocolor Image - RAMMB/CIRA/NOAA



In the official winter outlook from the Climate Prediction Center, probabilities lean toward above normal **precipitation** for Southeast Michigan. Predictability is low with regards to temperatures, so we are equally likely to see above, near, or below normal **temperatures**. This outlook accounts for many factors including ENSO, dynamical guidance such as the NMME, statistical tools, and trends in recent years. As a reminder, the new [1991-2020 climate normals](#) are now factored into the outlooks.

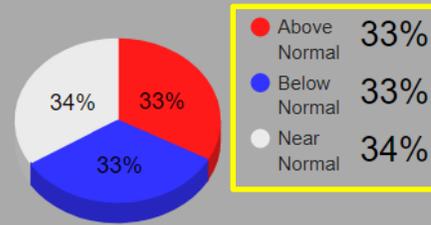


Temperature



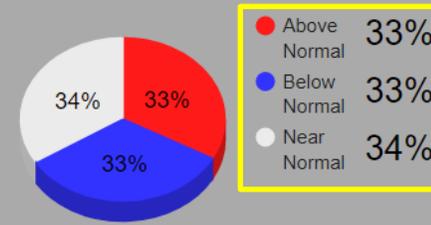
Detroit

Three Category Temperature Outlook
Normal Maximum Temperature: **35**
Normal Minimum Temperature: **22**



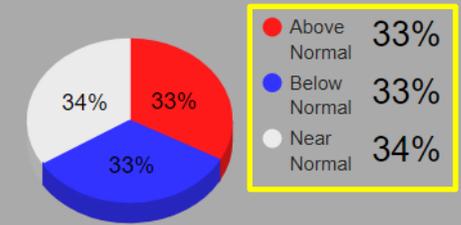
Flint

Three Category Temperature Outlook
Normal Maximum Temperature: **33**
Normal Minimum Temperature: **17**



Saginaw

Three Category Temperature Outlook
Normal Maximum Temperature: **33**
Normal Minimum Temperature: **18**



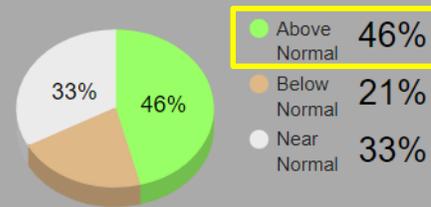
Equal Chances for Above, Below, or Near Normal Temperatures

Precipitation



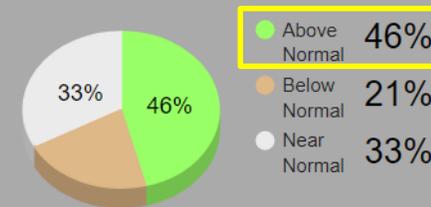
Detroit

Three Category Precipitation Outlook
Normal Precipitation: **6.92**



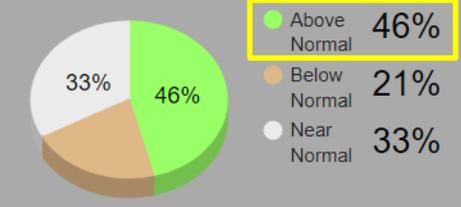
Flint

Three Category Precipitation Outlook
Normal Precipitation: **5.27**



Saginaw

Three Category Precipitation Outlook
Normal Precipitation: **5.28**



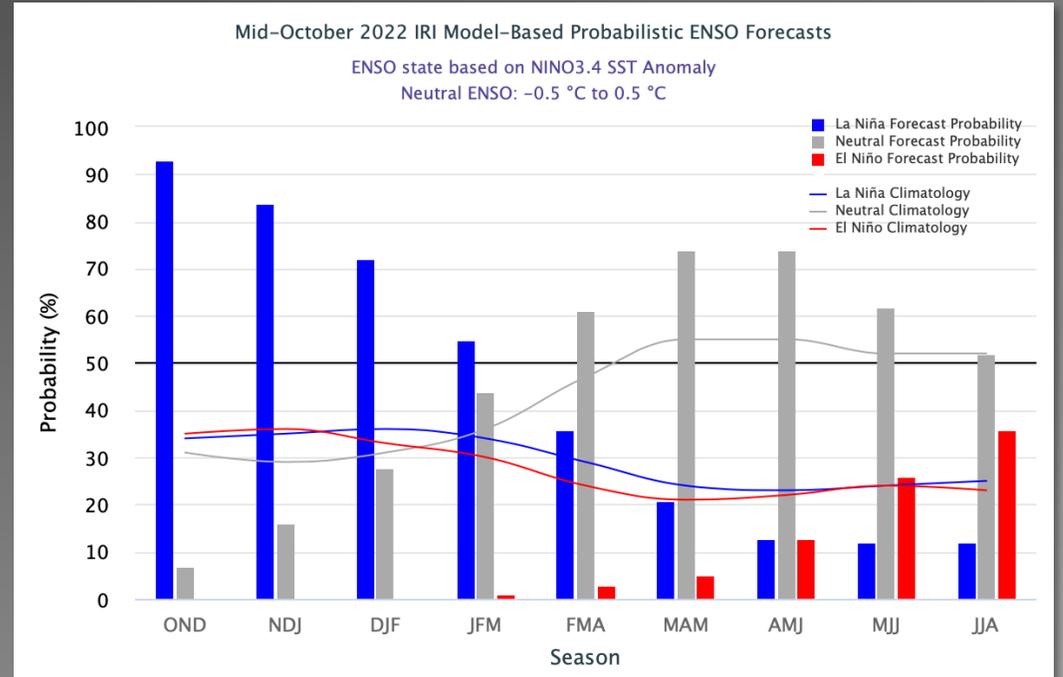
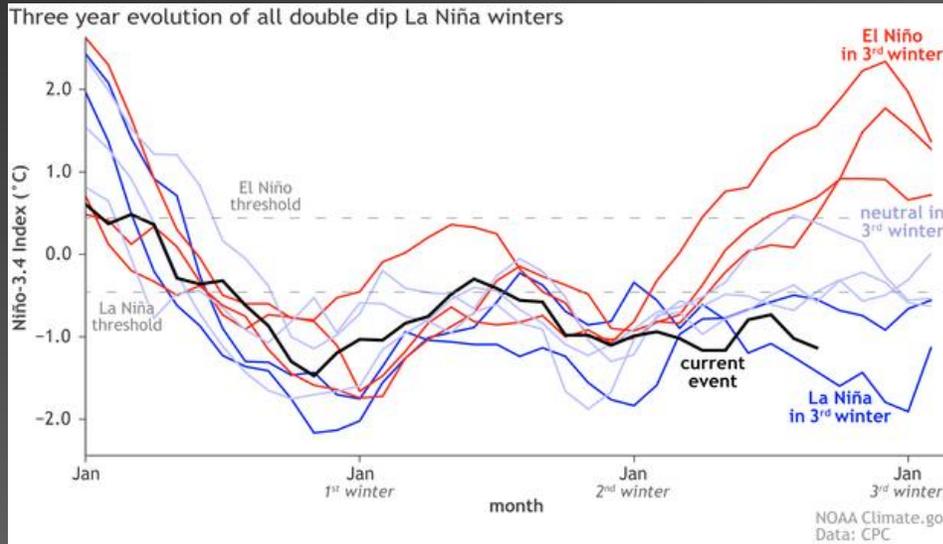
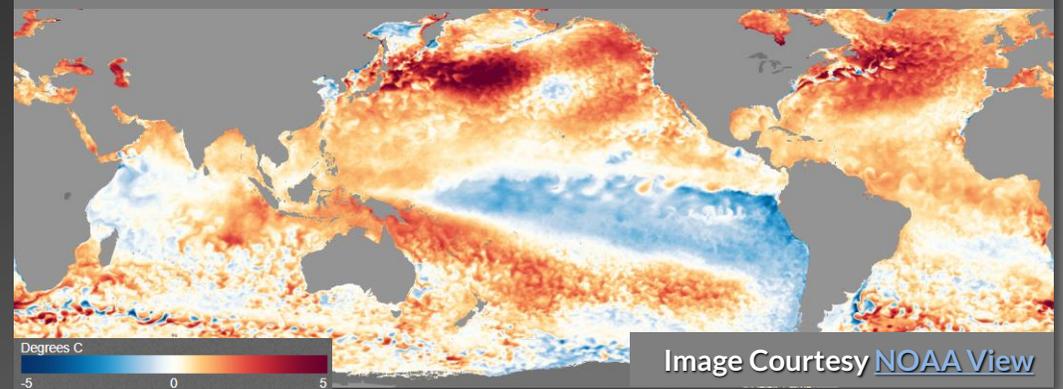
Leaning Toward Above Normal Precipitation



La Niña is here for a third winter in a row. Cool sea surface temperature anomalies are noted in the central and eastern equatorial Pacific (see image to the right). The typical coupled atmospheric processes have been observed as well.

La Niña is likely to continue through the winter before neutral conditions become favored by Feb-Mar-Apr 2023. Read more about the La Niña Advisory and the latest forecast from CPC [here](#) (updated weekly).

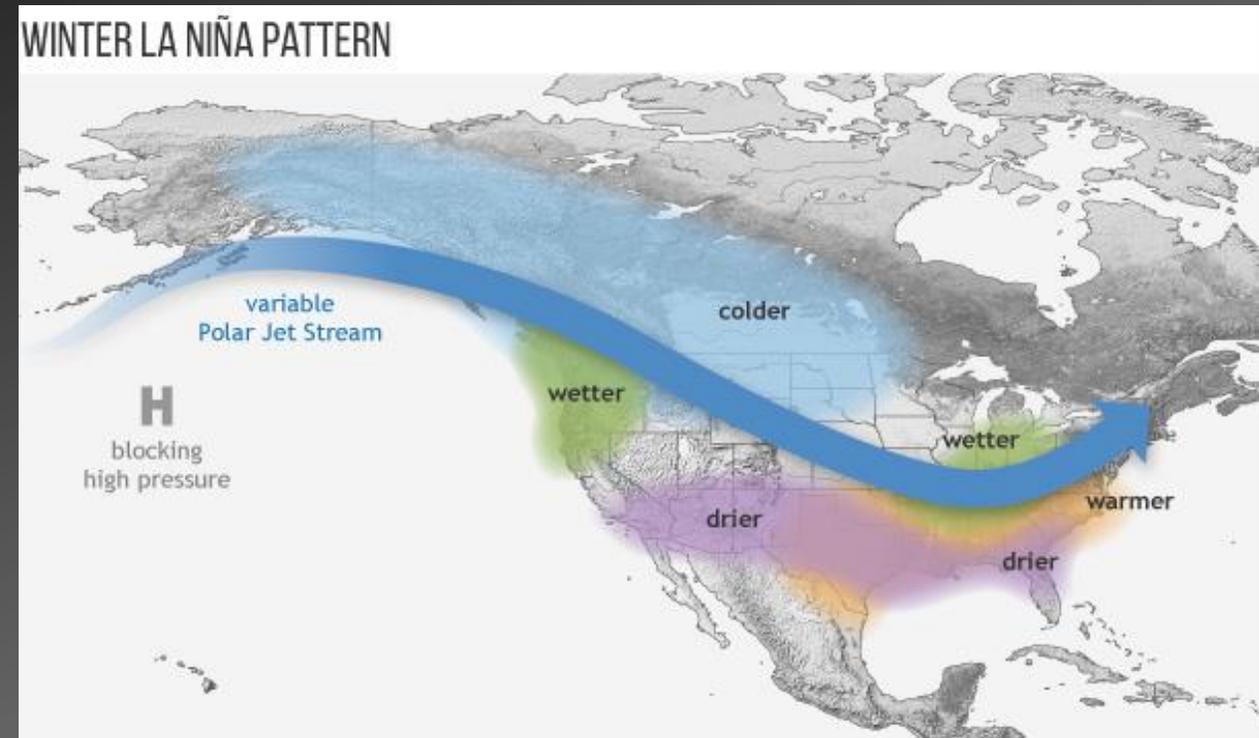
Sea Surface Temperature Anomaly – October 10-16, 2022





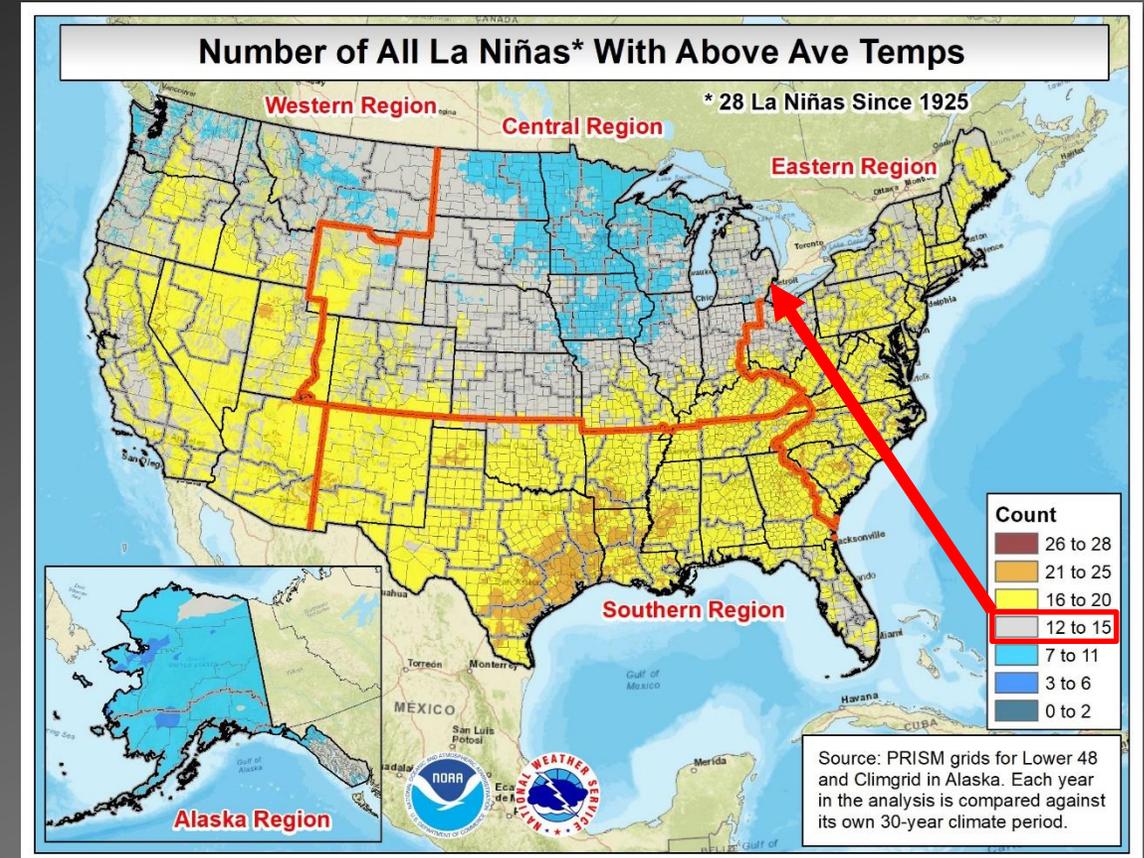
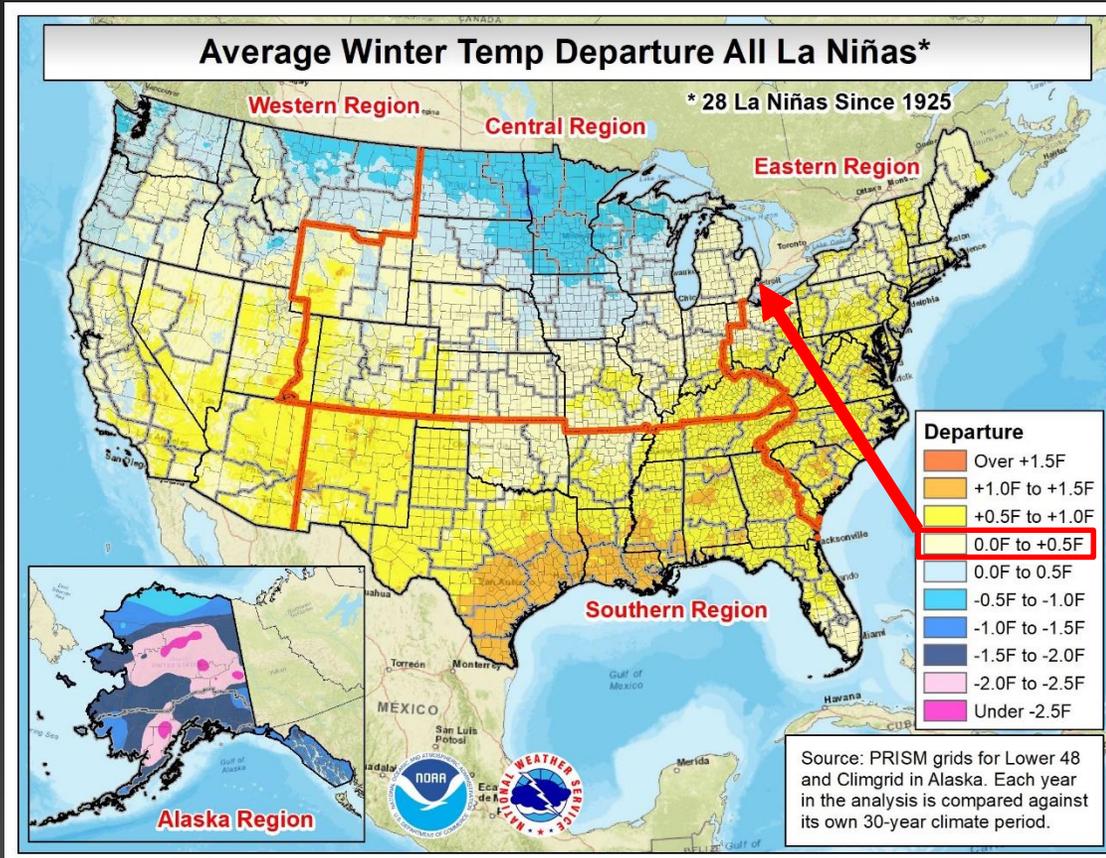
As a result, La Niña will again be the main driver for the atmospheric circulation pattern this winter, with implications on the local conditions for the Great Lakes. What this can mean:

- An active storm pattern across the northern tier of the US that brings numerous snow events. La Niña winters are generally wetter than normal across the Great Lakes.
- High subseasonal variability in temperatures. La Niña does not provide a strong signal with regards to a warmer or cooler winter for us. Rather, we will be subject to variations in the Arctic Oscillation, North Atlantic Oscillation, and stratospheric warming events that will likely have a stronger impact on weekly-to-monthly temperature trends. These influences are not predictable at the seasonal scale.





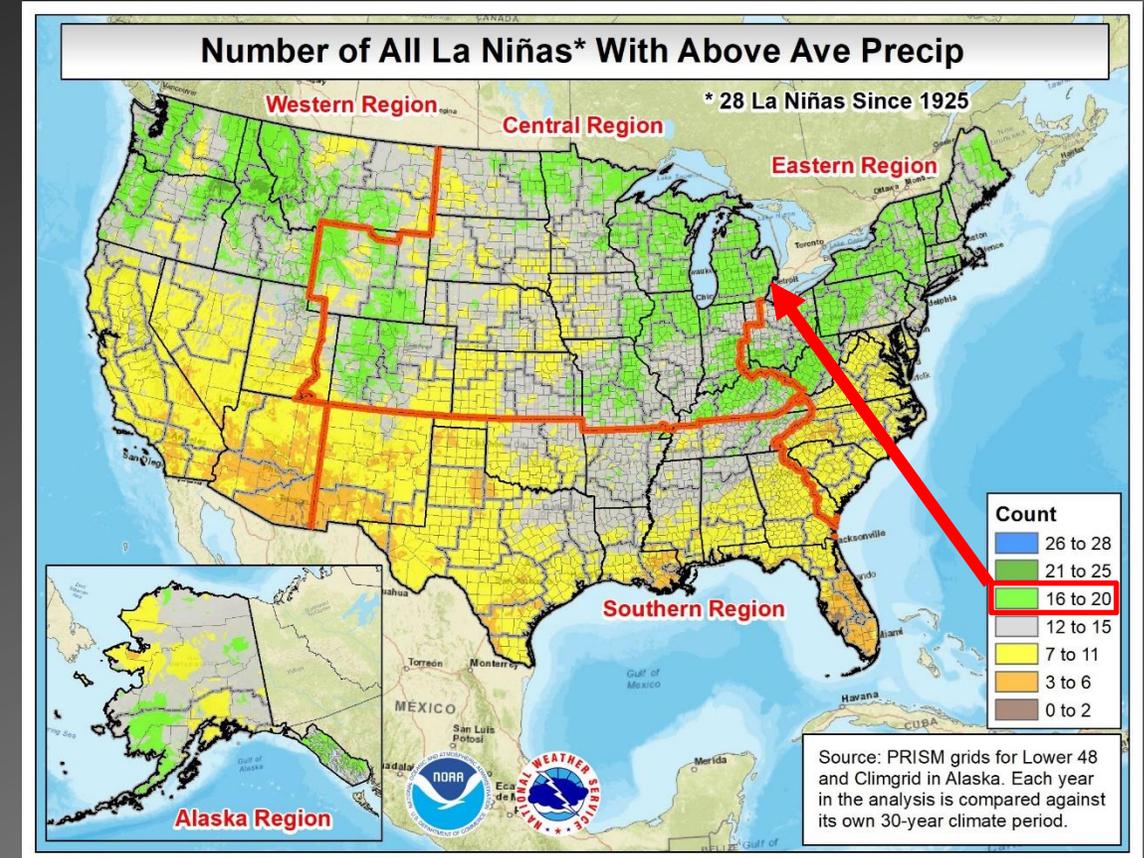
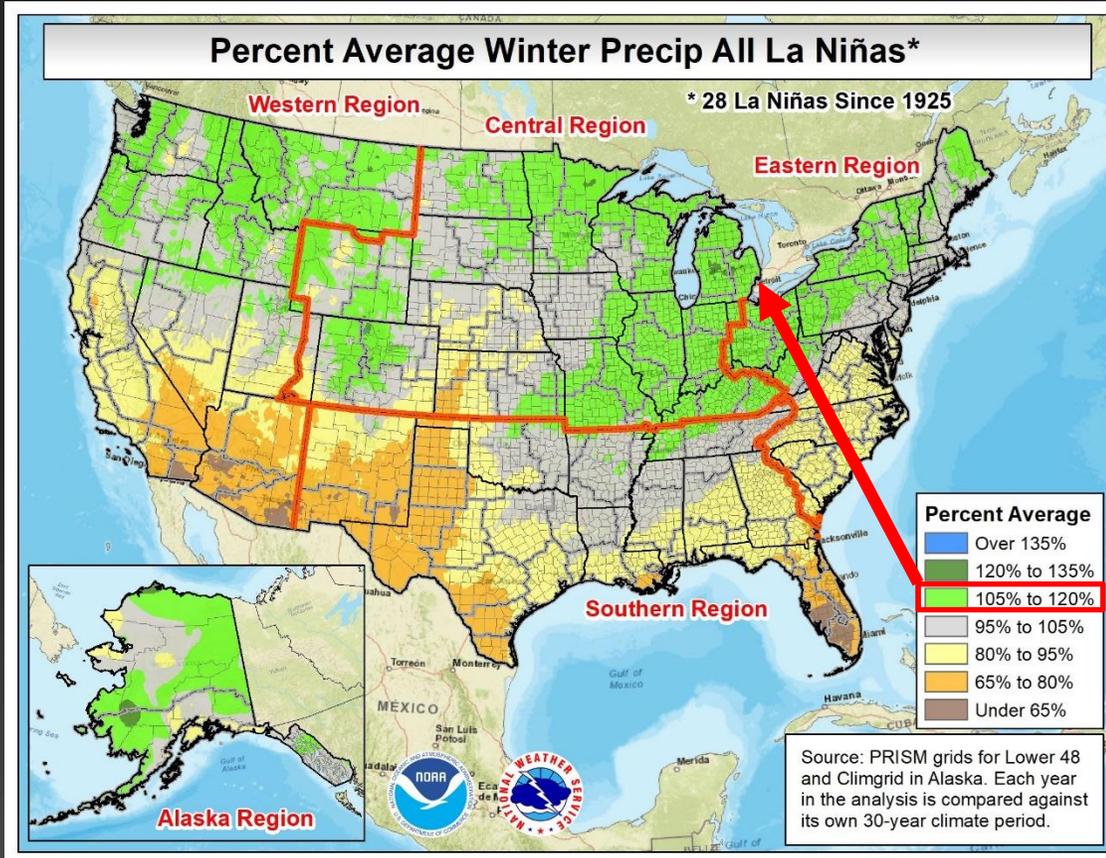
Historical La Niña Impacts – Temperature



There is no strong signal for temperatures above or below normal for our area when taking the average of winter temperature departures over all 28 La Niñas since 1925.

In roughly half of La Niña winters since 1925, our area has had above normal temperatures.

These graphics account for trends in winter temperatures over the years.



There is a lean toward wetter than normal conditions across the Great Lakes and Ohio Valley when taking the average of winter precipitation departures over all 28 La Niñas since 1925.

Our area has had above normal precipitation in more than half of the La Niña winters since 1925.

These graphics account for trends in winter precipitation over the years.



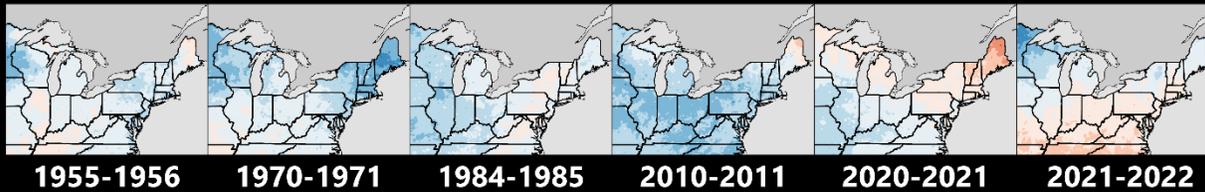
No Two La Niñas are the Same

LA NIÑA EVENTS: TEMPERATURE

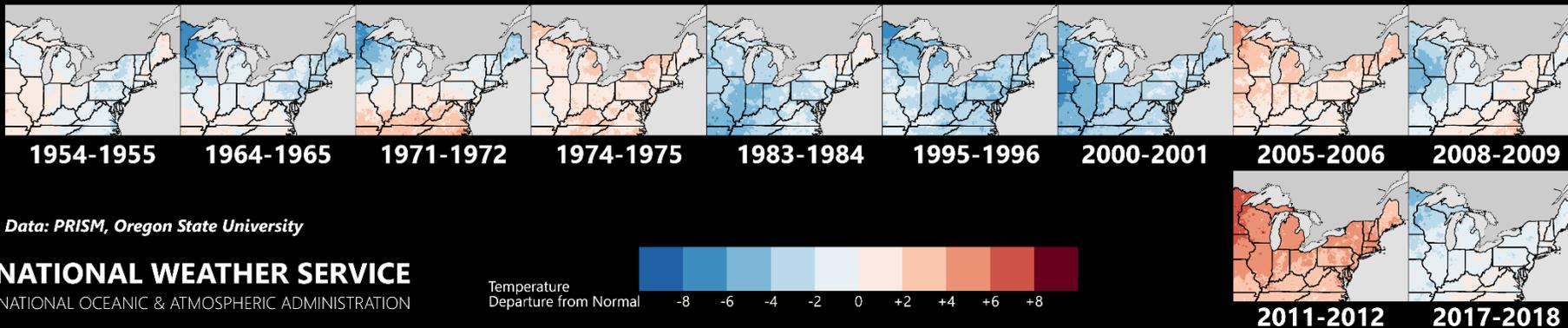
STRONG



MODERATE



WEAK



La Niña's effect on winter temperatures across the Great Lakes generally offers little forecast skill as there is often higher sub-seasonal variability. These maps show how each La Niña winter played out across the region.

A weak to moderate La Niña is forecast this year.

Data: PRISM, Oregon State University



NATIONAL WEATHER SERVICE
NATIONAL OCEANIC & ATMOSPHERIC ADMINISTRATION

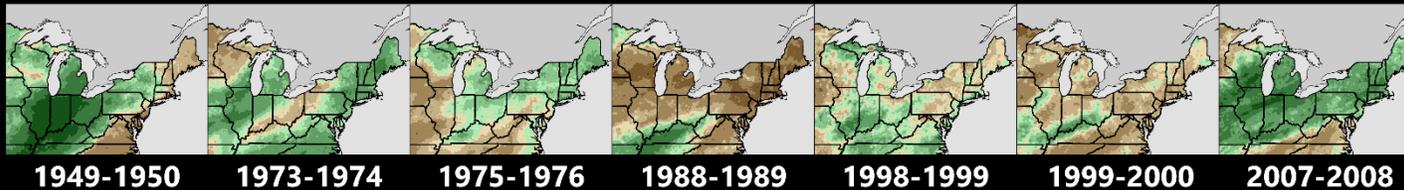
Temperature Departure from Normal -8 -6 -4 -2 0 +2 +4 +6 +8



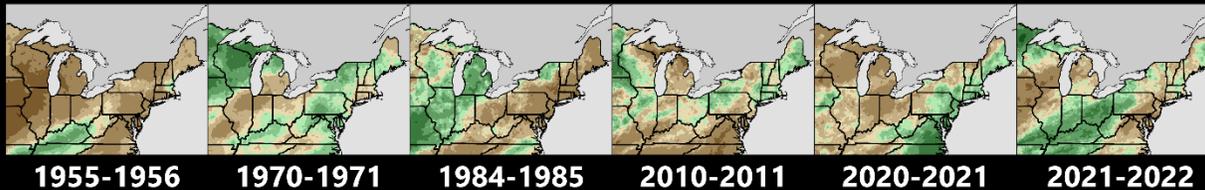
No Two La Niñas are the Same

LA NIÑA EVENTS: PRECIPITATION

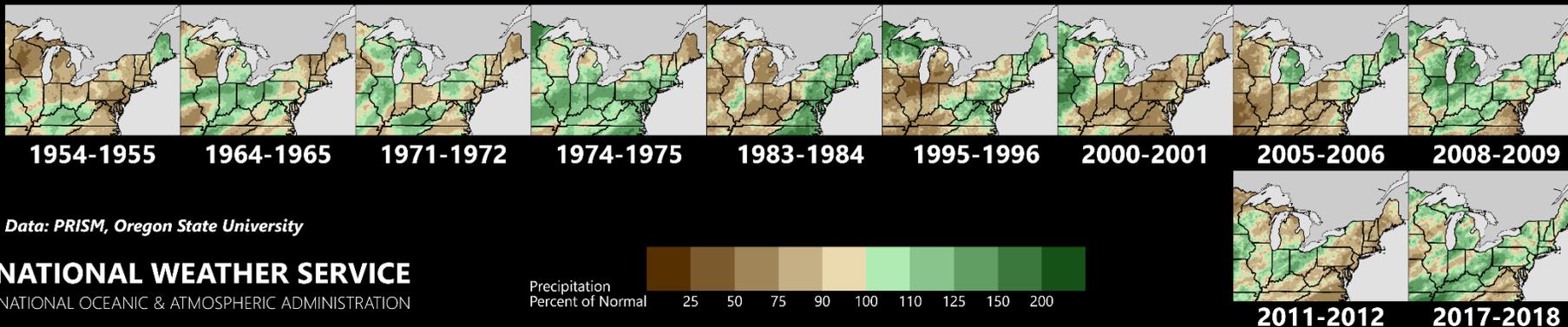
STRONG



MODERATE



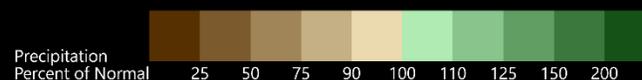
WEAK



La Niña's effect on winter precipitation has some predictability in the Great Lakes, but no two La Niñas are the same. These maps show how each La Niña winter played out across the region.

A weak to moderate La Niña is forecast this year.

Data: PRISM, Oregon State University



2022-2023 Winter Outlook for Southeast Michigan

Weather Forecast Office
Detroit, MI



How did previous moderate La Niña winters play out in SE Michigan?

	Normal Winter Avg Temp	Observed Winter Avg Temp During Moderate La Niñas (°F)					
		1955-1956	1970-1971	1984-1985	2010-2011	2020-2021	2021-2022
Detroit	28.4	27.3	25.7	25.9	24.1	28.5	28.0
Flint	25.5	23.3	24.2	25.2	22.3	27.3	25.5
Saginaw	25.5	23.3	23.8	22.8	22.4	26.4	25.1

	Normal Winter Precipitation	Observed Winter Precipitation During Moderate La Niñas (inches)					
		1955-1956	1970-1971	1984-1985	2010-2011	2020-2021	2021-2022
Detroit	6.56	4.79	5.32	9.36	6.41	3.86	6.60
Flint	5.56	3.89	4.02	8.83	5.08	4.47	4.79
Saginaw	5.54	4.07	4.85	7.39	4.15	3.79	4.17

	Normal Winter Snowfall	Observed Winter Snowfall During Moderate La Niñas (inches)					
		1955-1956	1970-1971	1984-1985	2010-2011	2020-2021	2021-2022
Detroit	35.4	26.4	24.4	44.0	58.9	37.8	32.5
Flint	39.5	27.2	35.7	40.7	61.1	47.1	46.0
Saginaw	37.1	27.9	27.5	47.2	59.1	30.5	29.5



Trends in Recent Winters

Beyond ENSO, a skillful predictor at the seasonal time scale is to look at how trends have evolved over the past 10-15 years. Our [new climate normals](#) illustrate these trends well: winters in Southeast Michigan have generally trended warmer, wetter, and snowier over the past 10 years.

Winter Average Temperature (DJF)	1981-2010 Normal	1991-2020 Normal	Change
Detroit	27.9 °F	28.4 °F	+0.5 °F
Flint	24.9 °F	25.5 °F	+0.6 °F
Saginaw	24.7 °F	25.5 °F	+0.8 °F

Winter Average Precipitation (DJF)	1981-2010 Normal	1991-2020 Normal	Change
Detroit	6.44"	6.56"	+0.12"
Flint	5.03"	5.56"	+0.53"
Saginaw	5.18"	5.54"	+0.36"

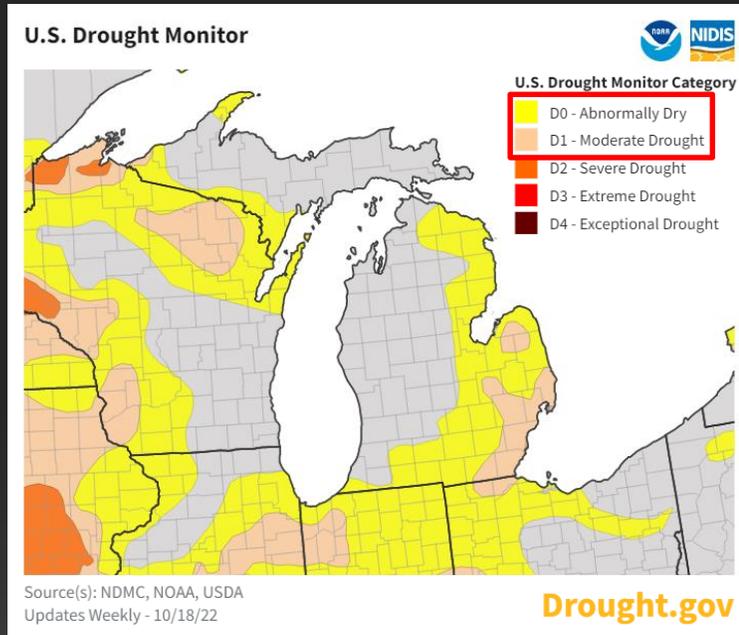
Winter Average Snowfall (DJF)	1981-2010 Normal	1991-2020 Normal	Change
Detroit	32.3"	35.4"	+3.1"
Flint	35.7"	39.5"	+3.8"
Saginaw	29.5"	37.1"	+7.6"

2022-2023 Winter Outlook for Southeast Michigan

Weather Forecast Office
Detroit, MI

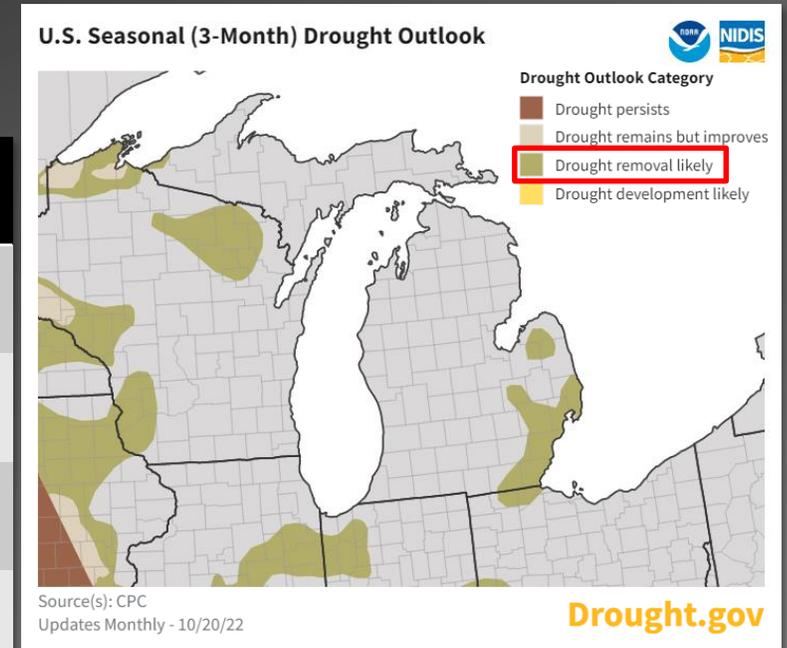


Current Drought Status and Seasonal Drought Outlook



All of Southeast Michigan is experiencing either Abnormally Dry (D0) or Moderate Drought (D1) conditions this fall. Rainfall amounts have been below normal over the past year, particularly at Detroit and Flint.

Rainfall (Departure)	Detroit	Flint	Saginaw
1 Month <i>Sep 20 to Oct 20</i>	1.09" (-1.66")	2.71" (-0.23")	2.21" (-0.74")
3 Months <i>Jul 20 to Oct 20</i>	4.30" (-5.25")	7.14" (-2.19")	9.60" (-0.09")
6 Months <i>Apr 20 to Oct 20</i>	12.95" (-6.95")	14.10" (-5.24")	16.89" (-2.40")
9 Months <i>Jan 20 to Oct 20</i>	19.44" (-7.74")	20.88" (-4.72")	23.99" (-1.74")
1 Year <i>Oct 20, 2021 to Oct 20, 2022</i>	28.60" (-5.80")	26.61" (-5.45")	28.94" (-3.27")

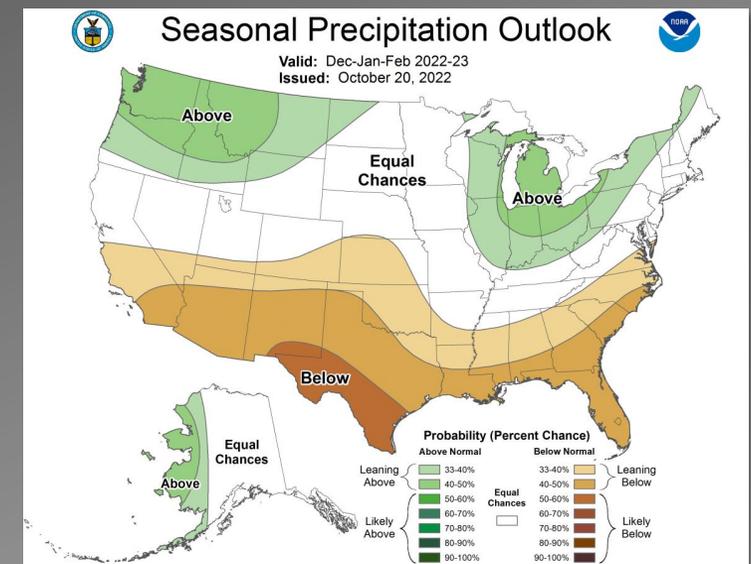
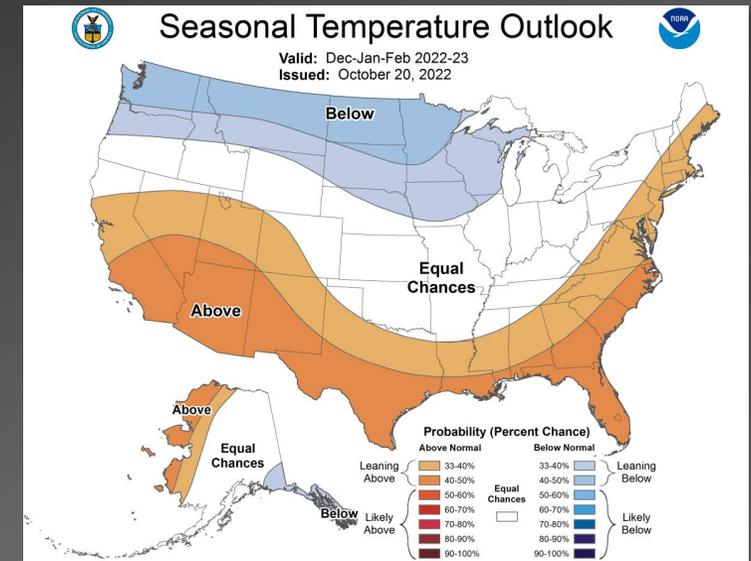


With higher probabilities for a wetter than normal winter, conditions are favored to improve and drought removal is likely for our area by the end of January.



Outlook Summary

- La Niña is expected to be a primary driver of the upper air pattern this winter and the outlook is based heavily upon typical impacts.
- Past La Niñas have generally not had a strong lean toward above or below normal temperatures for our region. The outlook shows equal chances for above, below, and near normal temperatures as there is no strong signal in any direction.
- La Niña often (but not always) brings a wetter than normal pattern during the winter. Probabilities lean toward a wetter winter this year. Snowier than normal conditions will be possible if wet and cold periods coincide.
- Other shorter-scale climate features like the Arctic Oscillation, North Atlantic Oscillation, and stratospheric warming events will have potential to impact the region this winter and bring temporary warm and cold spells. These influences may become more likely during the latter half of the winter, but are not predictable at this lead time.
- Trends over recent years have shown Southeast Michigan winters generally becoming warmer, wetter, and snowier.
- Drought conditions are expected to improve this winter.



2022-2023 Winter Outlook for Southeast Michigan

Weather Forecast Office
Detroit, MI



Winter Records and Trivia – Temperature

Normal High Temp	December	January	February	Winter (DJF)
Detroit	37.2	32.3	35.2	34.9
Flint	34.9	29.9	32.8	32.6
Saginaw	34.7	29.5	31.8	32.0

Normal Low Temp	December	January	February	Winter (DJF)
Detroit	25.3	19.2	20.8	21.8
Flint	22.5	16.0	16.7	18.4
Saginaw	23.1	16.4	17.3	18.9

Warmest...	Temperature	Month	Winter (DJF)
Detroit	70 (2/24/2017 & 2/11/1999)	41.1 (Dec. 2015)	37.0 (1881 – 1882)
Flint	70 (12/5/2001)	41.0 (Dec. 2015)	33.6 (1931 – 1932)
Saginaw	67 (12/5/2001 & 2/22/1930)	39.1 (Dec. 2015)	33.2 (1931 – 1932)

Coolest...	Temperature	Month	Winter (DJF)
Detroit	-21 (1/21/1984)	12.2 (Feb. 1875)	18.7 (1903 – 1904)
Flint	-25 (2/20/2015 & 1/18/1976)	10.9 (Jan. 1977)	16.9 (1976 – 1977)
Saginaw	-23 (2/5/1918)	9.4 (Jan. 1912)	13.3 (1911 – 1912)

Normal number of days per winter with a min temp at or below 0 degrees: Detroit: 3.4; Flint: 8.7; Saginaw: 6.5

All temps in °F; normals reflect 1991-2020 period

2022-2023 Winter Outlook for Southeast Michigan

Weather Forecast Office
Detroit, MI



Winter Records and Trivia – Precipitation & Snowfall

Normal Precipitation	December	January	February	Winter (DJF)	Normal Snowfall	December	January	February	Winter (DJF)
Detroit	2.25"	2.23"	2.08"	6.56"	Detroit	8.9"	14.0"	12.5"	35.4"
Flint	1.89"	1.99"	1.68"	5.56"	Flint	11.4"	15.1"	13.0"	39.5"
Saginaw	1.85"	1.92"	1.77"	5.54"	Saginaw	11.8"	13.9"	11.4"	37.1"
Wettest...	Month		Winter (DJF)		Snowiest...	Month		Winter (DJF)	
Detroit	6.41" (Feb. 1881)		12.74" (1949 - 1950)		Detroit	39.1" (Jan. 2014)		78.0" (2013 - 2014)	
Flint	5.28" (Feb. 1954)		10.48" (1949 - 1950)		Flint	35.3" (Dec. 2000)		71.6" (2013 - 2014)	
Saginaw	6.10" (Feb. 1997)		11.95" (1996 - 1997)		Saginaw	40.2" (Dec. 2000)		75.7" (2007 - 2008)	
Driest...	Month		Winter (DJF)		Least Snowy...	Month		Winter (DJF)	
Detroit	0.04" (Feb. 1877)		2.24" (2002 - 2003)		Detroit	0.0" (Dec. 1889)		5.6" (1889 - 1890)	
Flint	0.07" (Jan. 1945)		1.51" (1962 - 1963)		Flint	T (Jan. 1934)		5.8" (1936 - 1937)	
Saginaw	0.21" (Feb. 1969)		1.86" (1941 - 1942)		Saginaw	T (Dec. 1943 & Feb. 1987)		5.6" (1941 - 1942)	