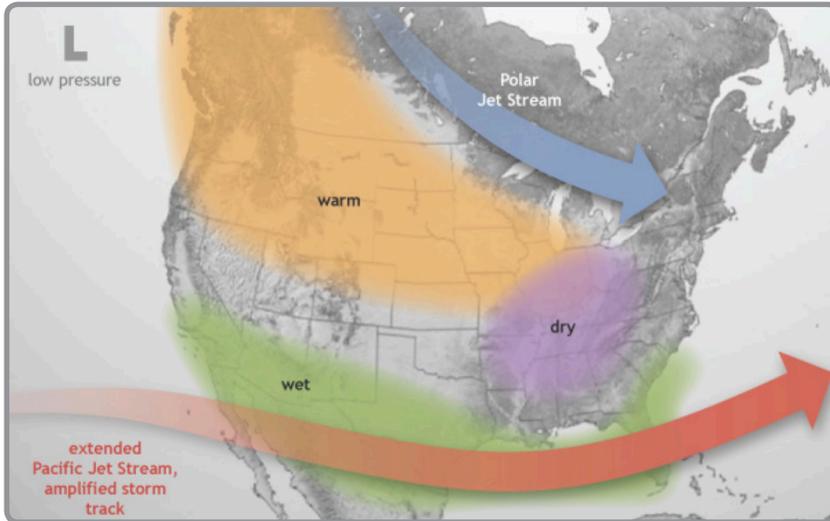




Typical El Niño Winter Pattern



During El Niño winters, the polar jet stream tends to stay to the north of the Great Lakes region, while the Pacific jet stream remains across the southern U.S. With the Great Lakes positioned between the storm tracks, warmer and possibly drier conditions can develop during El Niño events.

Image courtesy of the National Oceanic and Atmospheric Administration

Highlights for the Great Lakes Basin

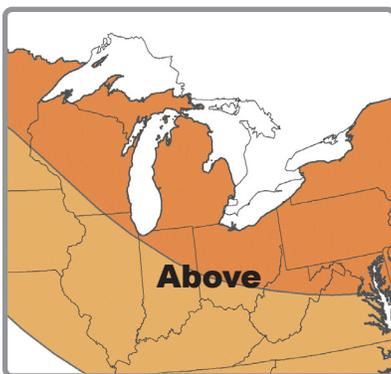
An El Niño develops when sea surface temperatures are warmer than average in the eastern equatorial Pacific Ocean for an extended time. El Niño conditions can affect North American weather patterns, especially in the winter and early spring.

While each El Niño is different, some general patterns are predictable. For instance, the polar jet stream is typically farther north than usual, while the Pacific jet stream tends to remain across the southern U.S.

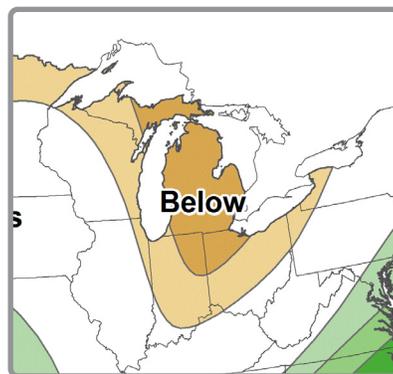
This pattern brings increased chances of above-normal temperatures to the Great Lakes region. Cold weather will still occur, but cold air outbreaks tend to be less frequent. El Niño also increases the chances of dry conditions, especially in the southern portion of the Great Lakes basin.

Winter Outlook -- December 2023 - February 2024

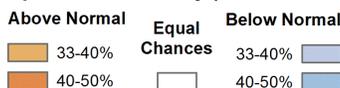
Temperature



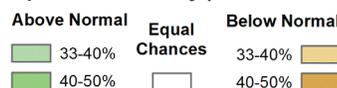
Precipitation



Temperature Probability (Percent Chance)



Precipitation Probability (Percent Chance)



NOAA's winter temperature outlook (issued in October 2023) indicates the Great Lakes basin has an increased chance of above-normal temperatures.

The winter precipitation outlook also shows a slightly increased chance of below-normal precipitation across the Great Lakes, with the greatest chance of below-normal precipitation in the central portion of the Great Lakes basin (in Michigan). There are equal chances of above-, below-, and near-normal precipitation east of Lake Erie.

An El Niño Advisory is currently in effect, which means El Niño conditions have developed and are expected to continue.

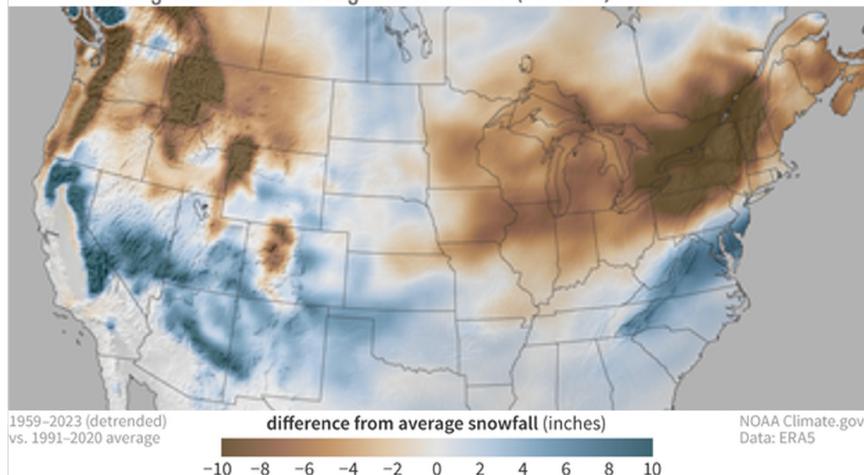
According to the NOAA Climate Prediction Center, there is an 80 percent chance that El Niño conditions will last through Northern Hemisphere spring. There is a 75 to 85 percent chance that the current El Niño will become a "strong" event.

Images courtesy of the National Oceanic and Atmospheric Administration (NOAA)



Potential Winter and Spring Impacts

Snowfall during moderate-to-strong El Niño winters (Jan-Mar)



The image above shows areas that tend to receive more (blue) or less (brown) than average snowfall from January to March during moderate-to-strong El Niño events from 1959 to 2023. The Great Lakes tend to have below-average snowfall. Sources: [NOAA ENSO Blog](#)

Water Levels and Ice

Runoff is typically a significant contributor to increasing lake levels, but runoff may be limited this winter and spring due to warmer temperatures and reduced snowpack. Warmer winter temperatures may also contribute to basinwide reduced ice cover on the Great Lakes.

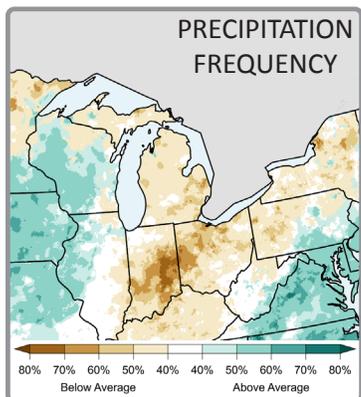
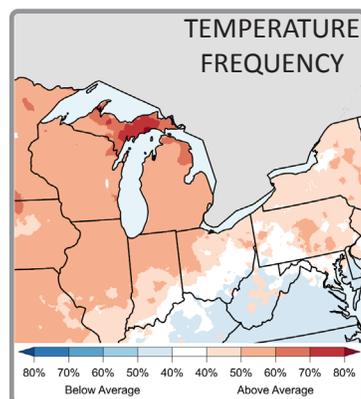
Agriculture

Much of the Great Lakes region is entering winter with below-normal soil moisture, so drier conditions due to El Niño may slow drought recovery. Additionally, reduced snowpack can expose crops to harsh winds and cold air outbreaks. Milder winter temperatures should benefit livestock producers by reducing operating costs and animal stress. Wheat, forage, cover crops, and fruit plants may also benefit from milder conditions.

Economy

Mild winters with lower snowfall can be beneficial to construction and home sales, along with reduced heating costs and increased retail sales. Less ice on the Great Lakes could lead to an extended navigation season for shipping. Economic losses from a mild winter include reduced salt sales, snow removal, and towing. Winter sports and businesses that depend on typical winter conditions may be negatively affected.

Comparisons and Limitations



Source: NOAA Physical Sciences Laboratory

Variability of Winter Conditions During Past El Niño Years

While El Niño winters (Dec-Jan-Feb) tend to be warmer and drier across the Great Lakes region, each event is unique and may not follow this pattern. The left top map shows how frequently winter temperatures were warmer (reds) or colder (blues) than normal in 12 past moderate-to-strong El Niño events from 1950-2022. The left bottom map shows how frequently winter precipitation was drier (tan) or wetter (green) than normal. Locations with darker colors are more frequently warmer/colder or drier/wetter during El Niño winters, whereas locations with light colors or white indicate variable conditions from event to event.

Past El Niño events can help inform weather forecasts, but there are there some limitations. For instance El Niño is *not* known to impact:

- first freeze in the fall (early or late)
- last freeze in the spring (early or late)
- potential for ice storms or blizzards
- track/intensity of any one weather system
- potential for spring drought or flooding.

Additionally, El Niño events are happening alongside other modes of climate variability and a warming trend in long-term global climate patterns, including warmer winters in the Great Lakes region. This creates added complexity for identifying El Niño signals.

Great Lakes Partners

- [Midwestern Regional Climate Center](#)
- [American Assoc. of State Climatologists](#)
- [National Integrated Drought Information System](#)
- [Great Lakes Integrated Sci. and Assess.](#)
- [USDA Midwest Climate Hub](#)
- [National Oceanic and Atmospheric Administration](#)
- [Great Lakes Enviro. Research Lab.](#)
- [Great Lakes Sea Grant Network](#)
- [NWS Climate Prediction Center](#)
- [NWS Central Region Headquarters](#)
- [North Central River Forecast Center](#)
- [National Centers for Environmental Information](#)
- [NWS Ohio River Forecast Center](#)