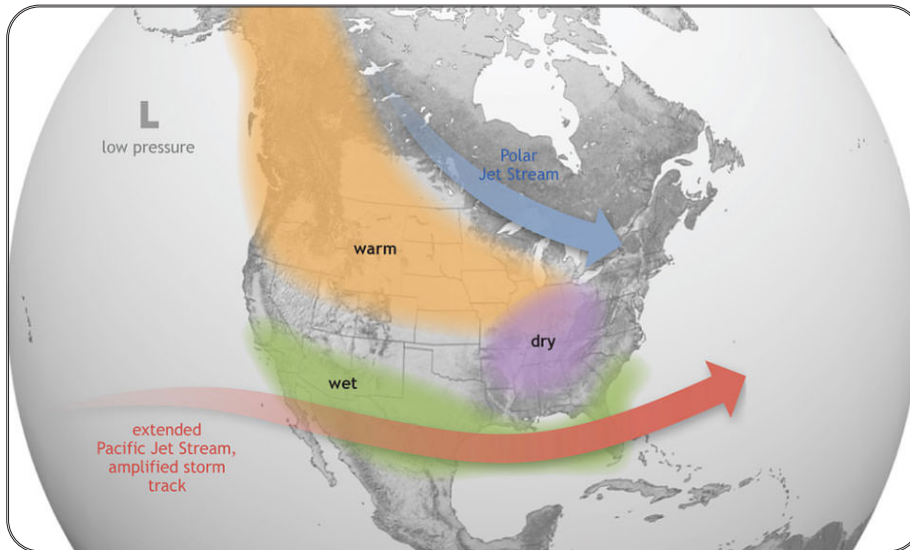


Typical El Niño Winter Pattern



Highlights for the Basin

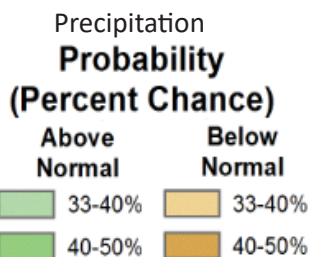
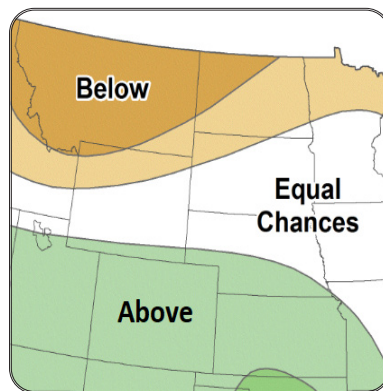
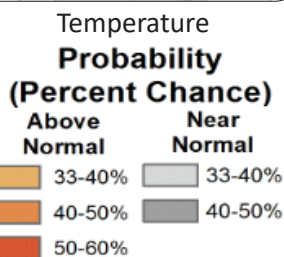
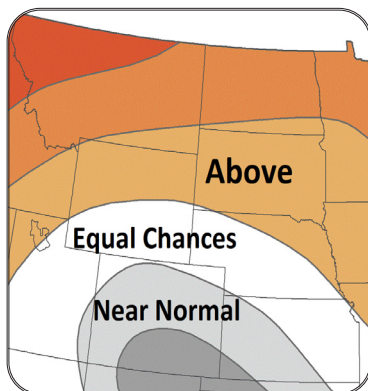
An El Niño develops when sea surface temperatures are warmer than average in the eastern equatorial Pacific Ocean for an extended time. This is important to North America because El Niño can impact our weather patterns, especially in the winter and early spring.

Although each El Niño is different, there are some general patterns that are predictable. For instance, the polar jet stream is typically farther north than usual, while the Pacific jet stream remains across the southern U.S.

This pattern often brings above-normal temperatures to much of the Missouri River Basin region, particularly across the north. But, this does not mean cold weather will not happen this winter. Cold air outbreaks tend to be less frequent, however.

The image (source: NOAA) above shows the typical pattern in the winter during El Niño events. The polar jet stream tends to stay to the north of the Missouri Basin region, while the Pacific jet stream remains across the southern U.S. With the Missouri Basin isolated between the storm tracks, warmer and possibly drier conditions can develop during El Niño events.

Winter Outlook -- December 2023 - February 2024



The winter outlook indicates increased chances for above-normal temperatures in the northern part of the basin, while near-normal temperatures are favored in Colorado and western Kansas. The rest of the basin has equal chances of above-, below-, and near-normal temperatures.

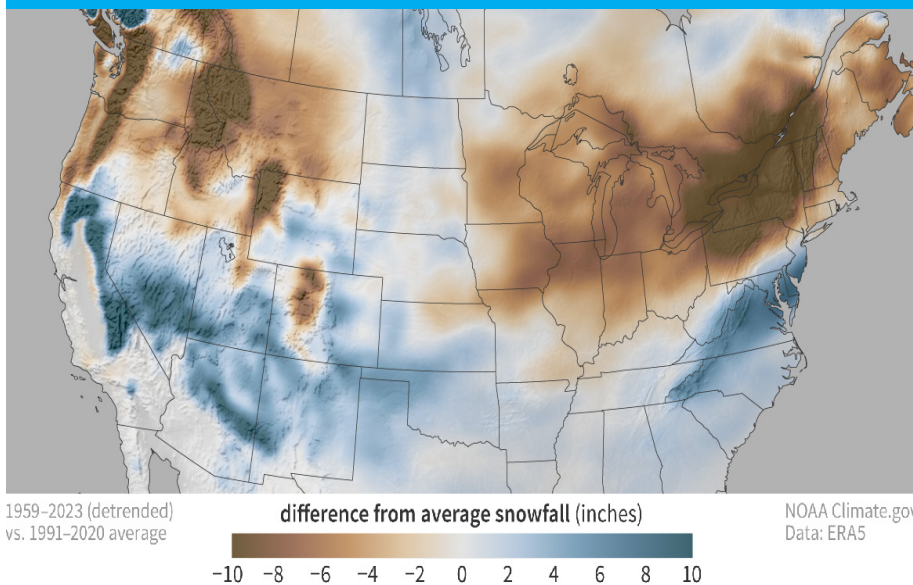
The precipitation outlook has increased chances of below-normal precipitation in the northwestern portions of the basin, which combined with above-normal temperatures, could negatively impact mountain snowfall. Above-normal precipitation is slightly favored in the southern part of the basin.

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 above 80 percent chance that El Niño conditions will last through the Northern Hemisphere spring. The outlooks indicate a 75 to 85 percent chance of a moderate to strong El Niño event.

Image courtesy of the National Oceanic and Atmospheric Administration.

Potential Winter and Spring Impacts



1959-2023 (detrended)
vs. 1991-2020 average

NOAA Climate.gov
Data: ERA5

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

Economy

The increased chances of below-normal precipitation in the northwestern part of the basin could lead to reduced chances for snow recreation activities snowmobiling and skiing. Warmer temperatures in the northern parts of the Basin could lead to reduced heat costs this winter.

Missouri River and Streams

Persistent and intense drought continues to affect some rivers and streams in the lower basin. Despite this, the U.S. Army Corps of Engineers expects runoff to be slightly above normal through the winter. Less snowpack in the mountainous areas could reduce spring time runoff.

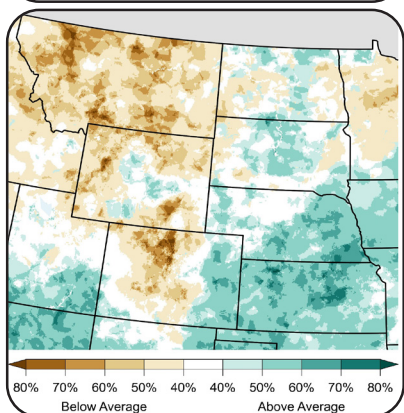
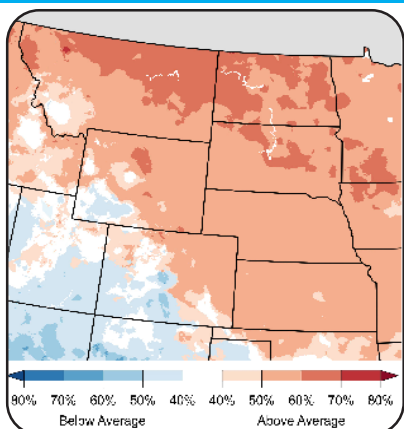
Agriculture

Much of the lower basin is heading into winter in drought, which could lead to challenges with fall plantings (cover crops, winter wheat, etc.). Areas that do not receive typical snowcover are at risk from cold air outbreaks leading to deeper frozen soils, which in turn, can lead to increased chances for flooding. In addition, areas in drought and snow free have a higher likelihood of wildfire. The potential for milder conditions in the northern basin could lead to reduced stress for livestock producers.

Comparisons and Limitations

Variability of Winter Conditions During Past El Niño Years

While there are tendencies for El Niño winters (Dec-Jan-Feb) to be warmer and drier across the northern Missouri River Basin, each event is unique and may not follow this pattern. The top left map shows how frequently winter temperature was warmer (reds) or colder (blues) than normal in 12 past moderate to strong El Niño events from 1950-2022. The bottom left map shows how frequently winter precipitation was drier (tan) or wetter (green) than normal. Locations with darker colors more frequently have warmer/colder or drier/wetter conditions during El Niño winters, whereas locations with light colors or white indicate variable conditions from 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 long-term changes in global climate patterns, including warming winters. This creates added complexity for identifying El Niño signals.

MO River Basin Partners

- [High Plains Regional Climate Center](#)
- [National Drought Mitigation Center](#)
- [National Integrated Drought Information System](#)
- [NOAA NCEI](#)
- [NOAA NWS- Central Region](#)
- [NOAA NWS Climate Prediction Center](#)
- [NOAA NWS Missouri Basin River Forecast Center](#)
- [American Association of State Climatologists](#)
- [U.S. Army Corps of Engineers](#)
- [U.S. Bureau of Reclamation](#)
- [USDA Northern Plains Climate Hub](#)

Source: NOAA Physical Sciences Laboratory

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<https://www.drought.gov/drought/resources/reports>