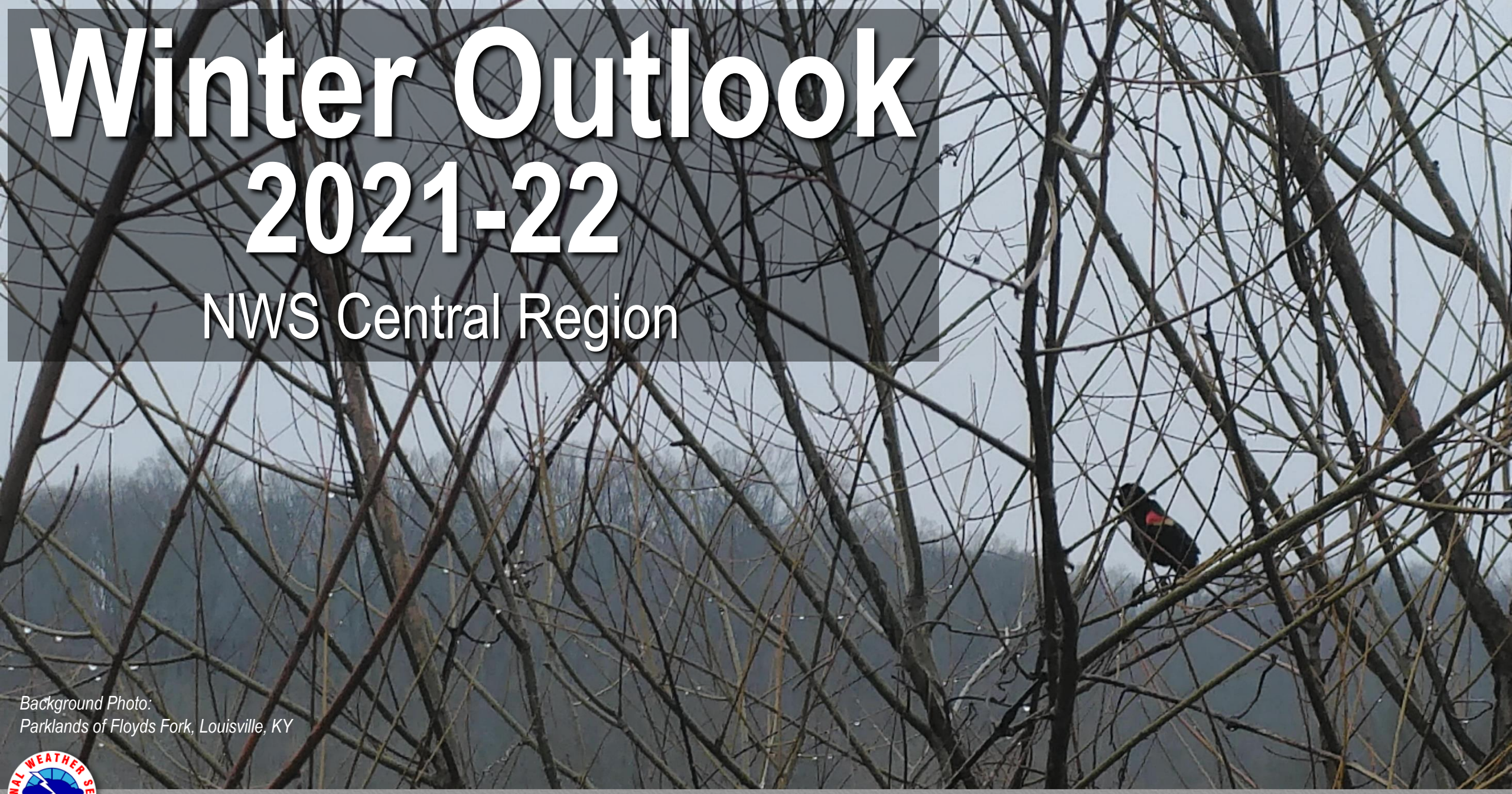
Winter Outlook 2021-22

NWS Central Region



Background Photo:
Parklands of Floyds Fork, Louisville, KY

NATIONAL WEATHER SERVICE, LOUISVILLE

weather.gov/louisville

WINTER OUTLOOK 2021-22

Upfront - The Takeaways

What's Currently Expected This Winter

CPC Temperature Outlook:

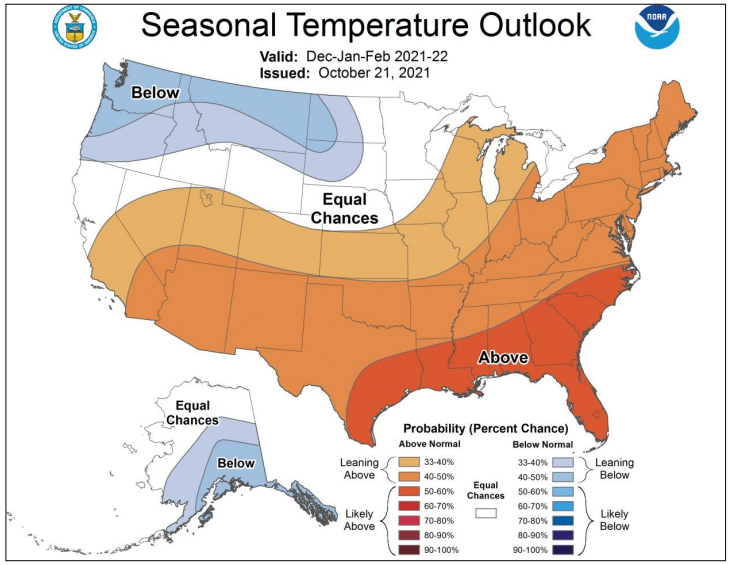
- Enhanced chances for **above-normal** temperatures across southern & eastern United States.
- Enhanced chances for **below-normal temperatures** in the Northern Plains.

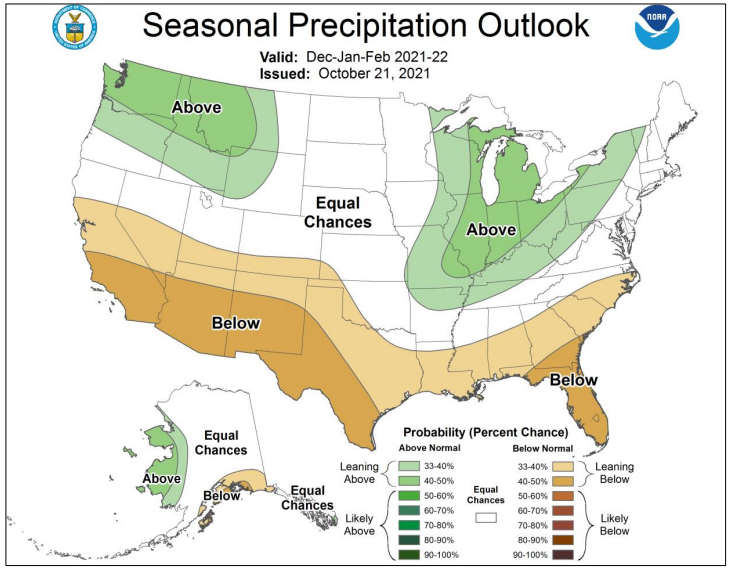
CPC Precipitation Outlook:

- Enhanced chances for **wetter-than-normal** conditions in northwest Wyoming, & from Kentucky & Missouri north into the Great Lakes.
- Enhanced chances for **drier-than-normal** in southern Colorado & southeast Kansas.
- Equal chances of **above-**, **near-**, and **below-normal** precipitation from eastern Wyoming & northern Colorado east into Kansas, western Iowa, & Minnesota.

What's Uncertain

- La Niña will **not** be the only player this winter. Temperatures could be highly variable throughout the winter. Snow storms will likely occur at times this winter. However, the frequency, number, and intensity of these events cannot be predicted on a seasonal timescale.





The **CPC winter forecasts above show only the most likely outcome** where there is greater confidence, but this is **not** the only possible outcome.

Rationale for the CPC Winter Outlook Issued on October 21, 2021

- ✓ La Niña conditions have developed and are expected to continue with an **87% chance of La Niña during December 2021- February 2022 (meteorological winter).**

- ✓ La Niña is anticipated to affect temperature and precipitation across the United States during the upcoming months, so the **CPC temperature and precipitation outlooks reflect La Niña impacts**.

- ✓ **Greatest La Niña impacts typically occur in February & March.**

- ✓ Last winter was also a La Niña winter. Since 1949-50, 50% (9 out of 18) of La Niña winters have been followed up by another one.

- ✓ **Sea surface temperatures are currently not as cold as last year at this time, but the atmospheric response is stronger which means this La Niña could be potentially stronger than last year's.** Stronger La Niñas can shift the storm track further northwest. This may impact the Upper Mississippi River Valley and northern Great Lakes, so enhanced chances for wetter-than-normal conditions were expanded further north and west than what is typical in La Niña composites.

- ✓ **Recent temperature & precipitation trends were also considered.** La Niñas have been highly variable with winter temperatures in the Ohio Valley, leading to forecast uncertainty. The precipitation signal is slightly more consistent, favoring wetter than normal winters.

La Niña– What is it?

La Niña is anomalously cool water in the central and eastern tropical Pacific Ocean combined with a corresponding atmospheric response. During these events…

1) The normal easterly winds (trade winds) along the equator become even stronger, so they push more warm water toward Asia.

2) Meanwhile, off the west coast of the Americas, an increase in upwelling sends cold water toward the surface.

3) Cold waters cause the Pacific jet stream to meander north more frequently than normal, guiding winter storms into the northern tier of the U.S.

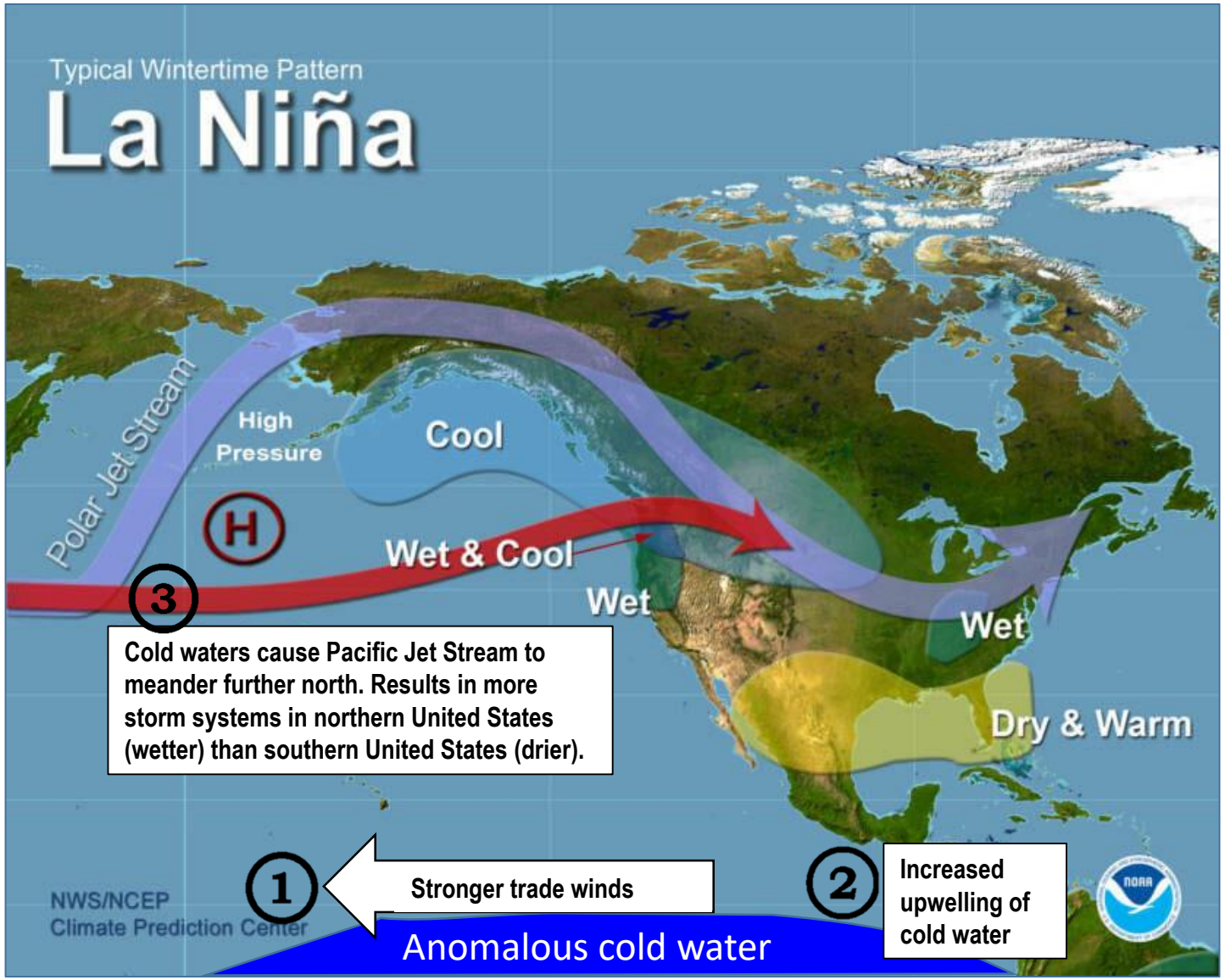


Image courtesy of NWS/NCEP Climate Prediction Center

La Niña – What's Expected This Winter

WINTER OUTLOOK 2021-22

Strength: **Moderate**

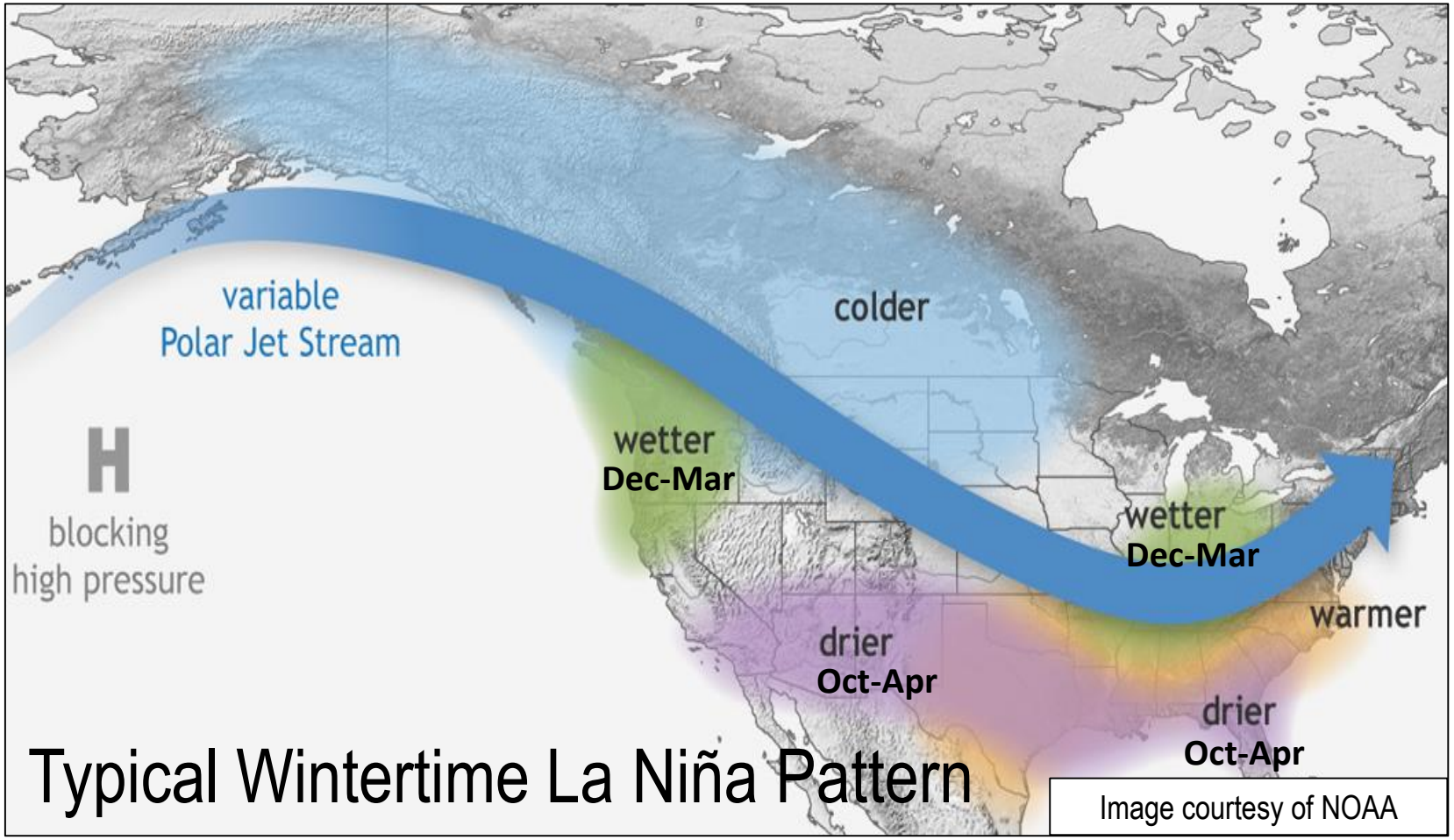
Typical Impacts

Temperatures:

- ✓ There tends to be colder-than-normal conditions from southeast Alaska into the Northern Plains.
- ✓ There is a tendency for warmer-than-normal conditions across the southern and eastern United States.

Precipitation:

- ✓ There is a tendency for wetter-than-normal conditions from the Tennessee/Ohio river valleys into the southern Great Lakes as well as the Pacific Northwest
- ✓ There is a tendency for drier-than-normal conditions across the southern United States.



Typical Wintertime La Niña Pattern

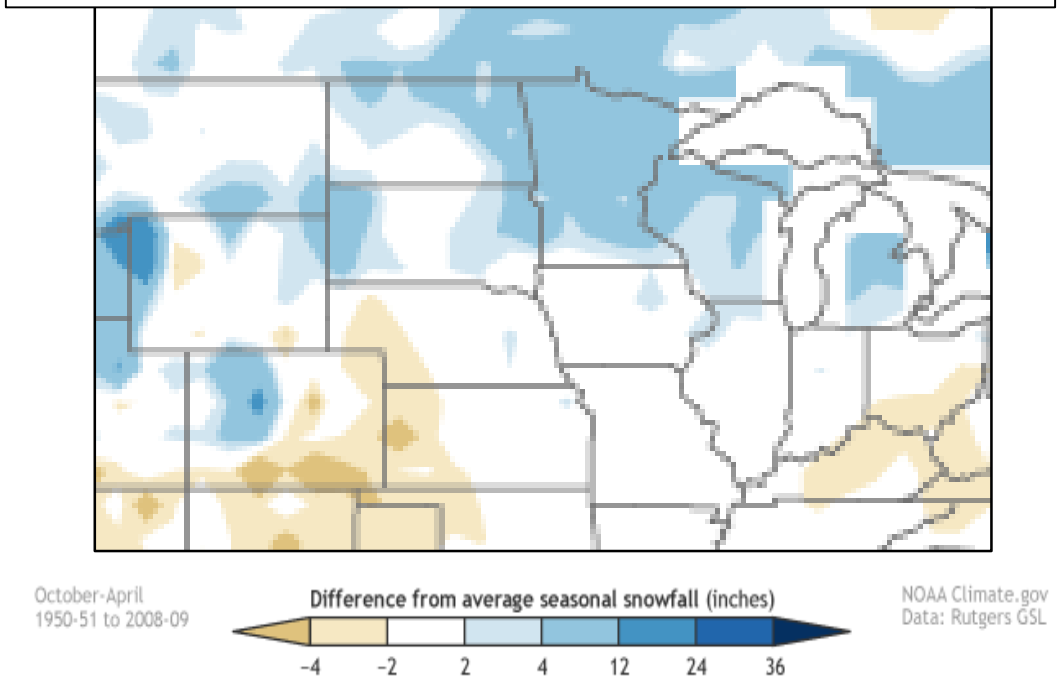
Image courtesy of NOAA

Moderate La Niña Winters: 1955-56, 1970-71, 1984-85, 2010-11, & 2020-21.

La Niña – Snowfall Trends

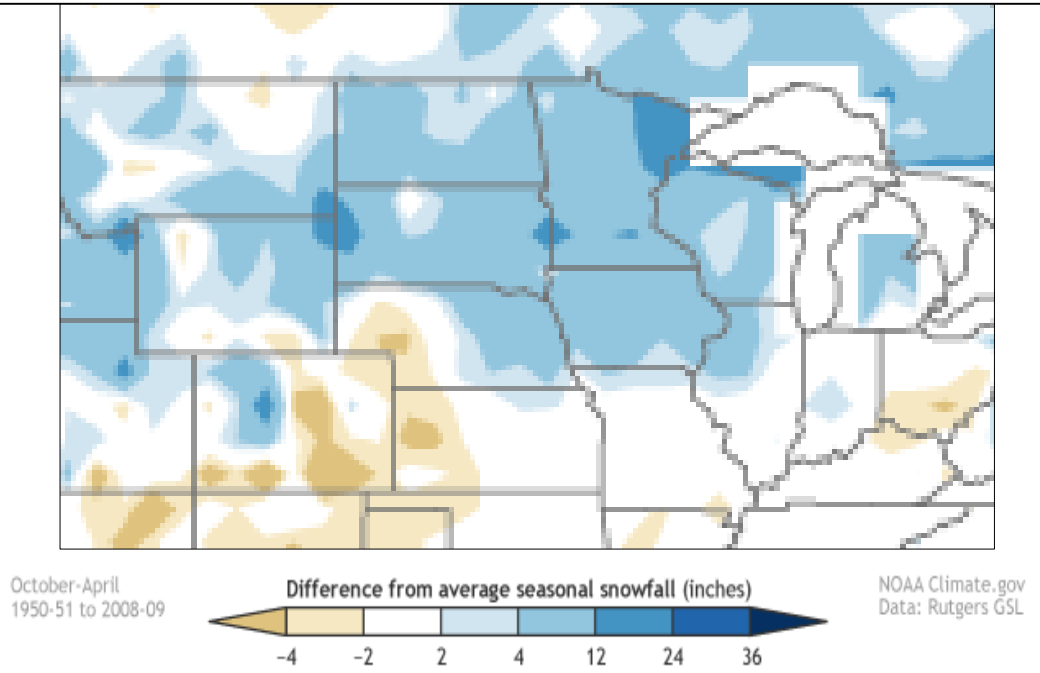
WINTER OUTLOOK 2021-22

Difference All La Niña Snow Seasons from Avg. Snowfall



La Niña favors increased snowfall from October to April over the Northwest and northern Rockies, as well as in the upper Midwest and Great Lakes region. Reduced snowfall is observed over parts of the Ohio Valley, central-southern Plains, Southwest, and mid-Atlantic.

Difference All Weak La Niña Snow Seasons from Avg. Snowfall

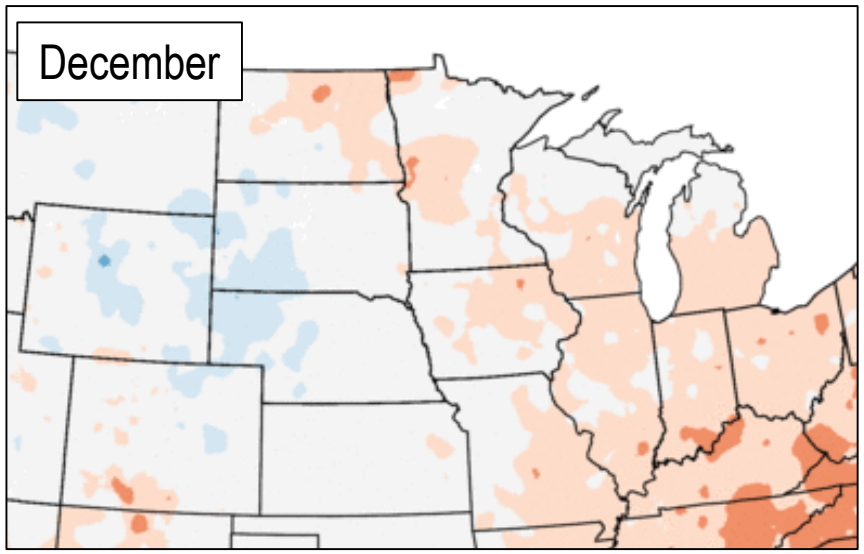


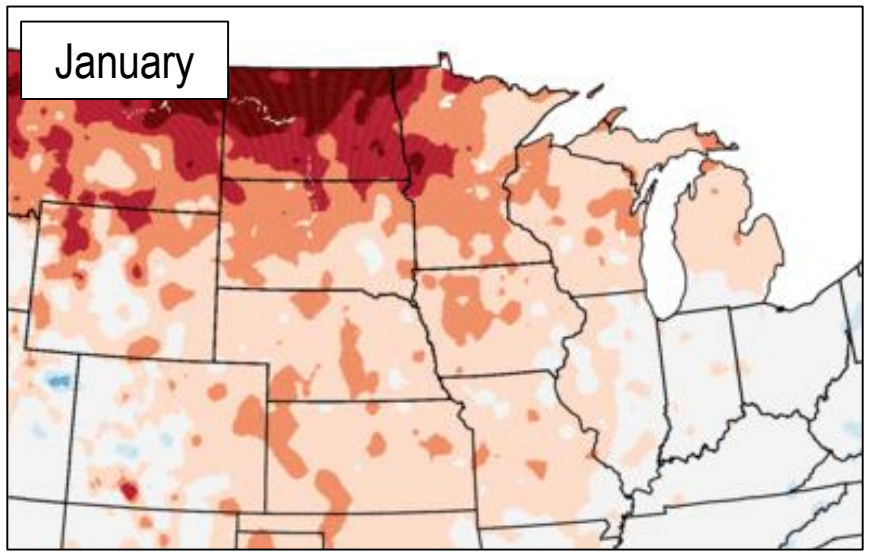
Weaker La Niña events tend to be snowier from October to April over the Northeast and Northern and Central Plains on average. The signal is weak in the Ohio Valley.

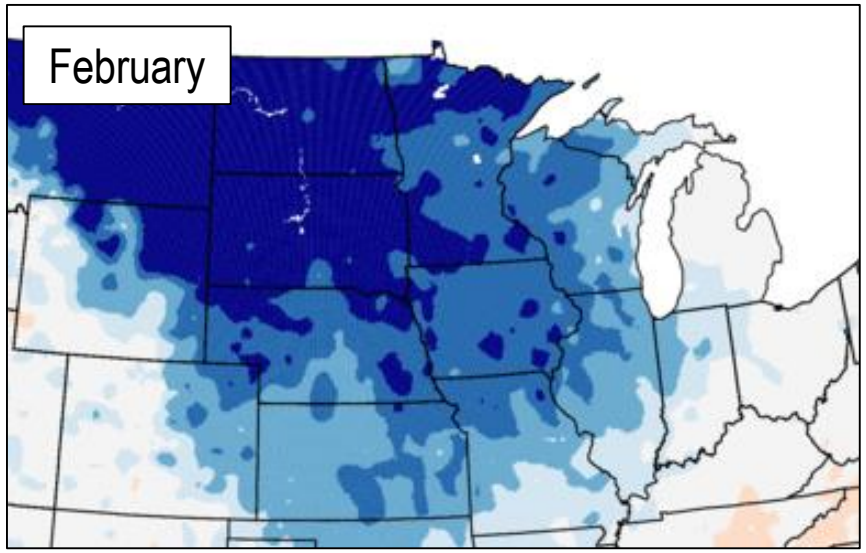
Source: https://www.climate.gov/news-features/blogs/enso/what-about-snow-during-la-ni%C3%B1a-winters

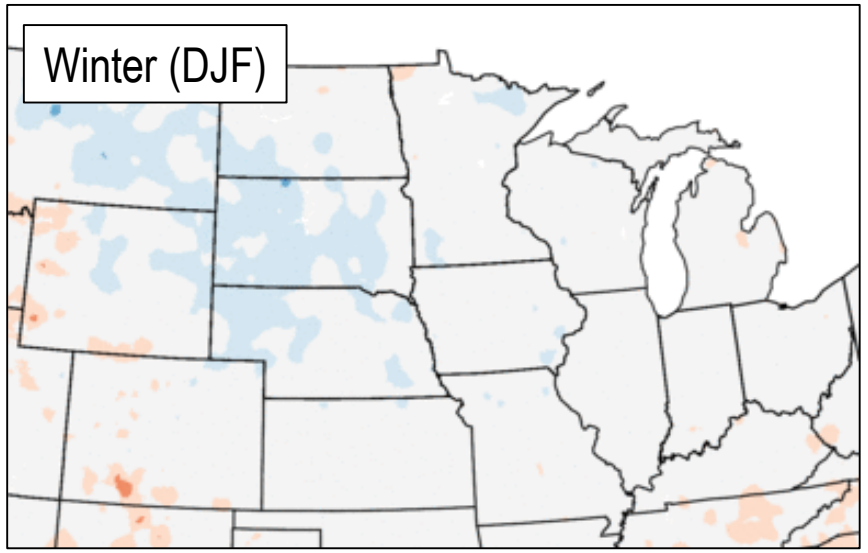
Average Temperature Trends during the Last 30 Years (1991-2020)

WINTER OUTLOOK 2021-22









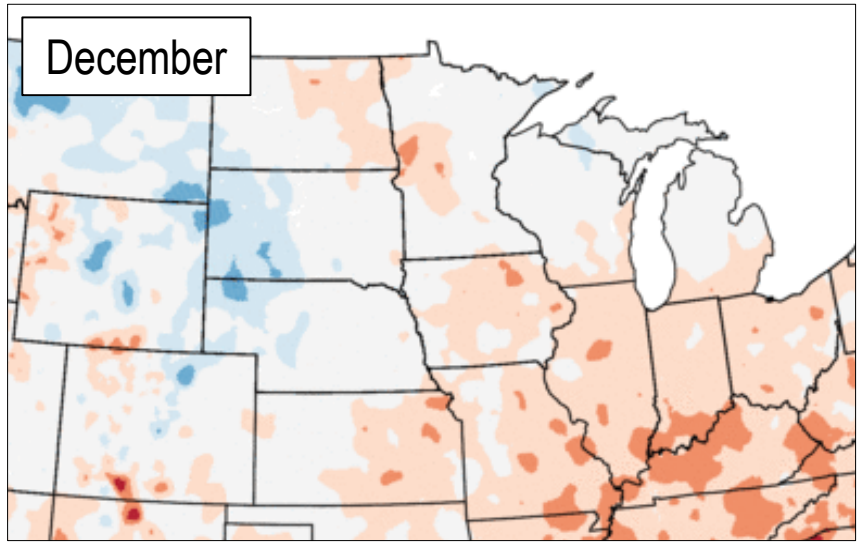
Key Points

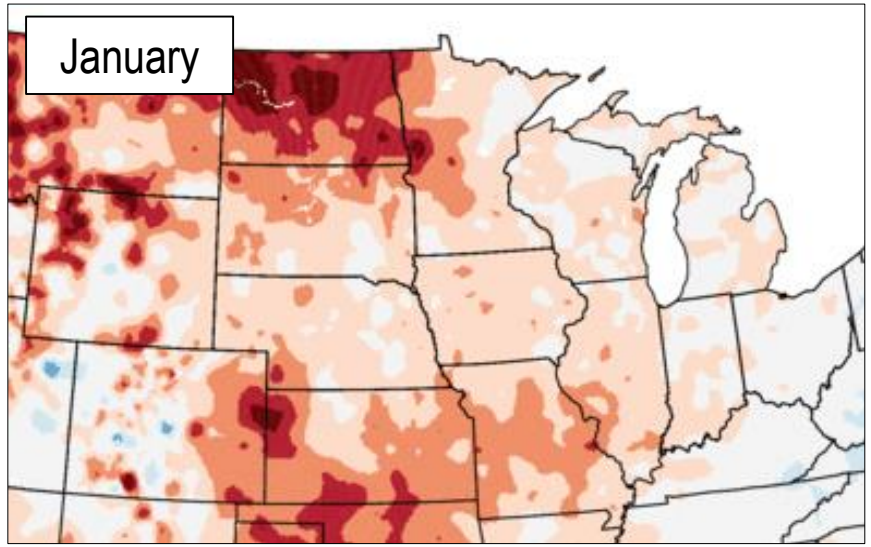
- **December** has been trending slightly warmer east of the Mississippi River & slightly colder from Wyoming into western Nebraska & western South Dakota.
- **January** is warmer across much of Central Region. Strongest warming in the Northern Plains.
- **February** swings the other way, showing appreciable cooling, especially in the Northern Plains.
- There has been a slight cooling during **meteorological winter** (DJF) in the Northern & Central Plains. Elsewhere little change.

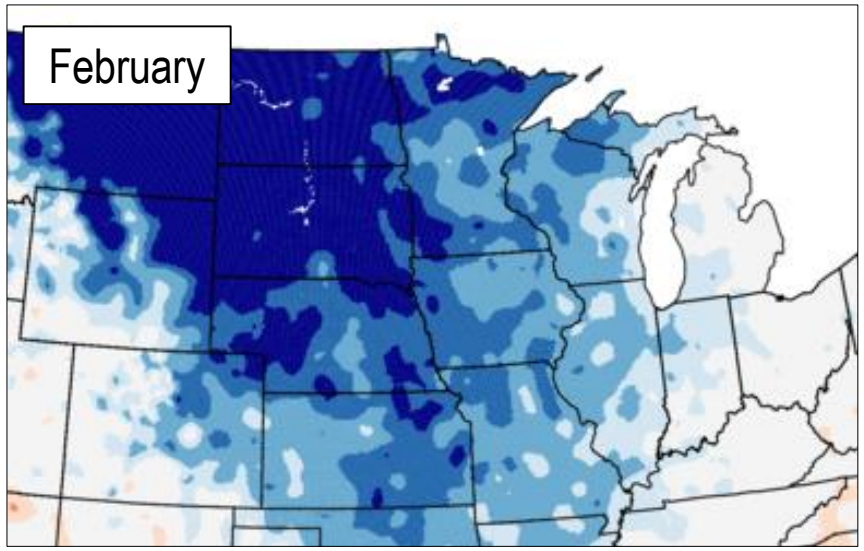
Data Source: 5km Gridded Dataset (nClimGrid) National Centers for Environmental Information

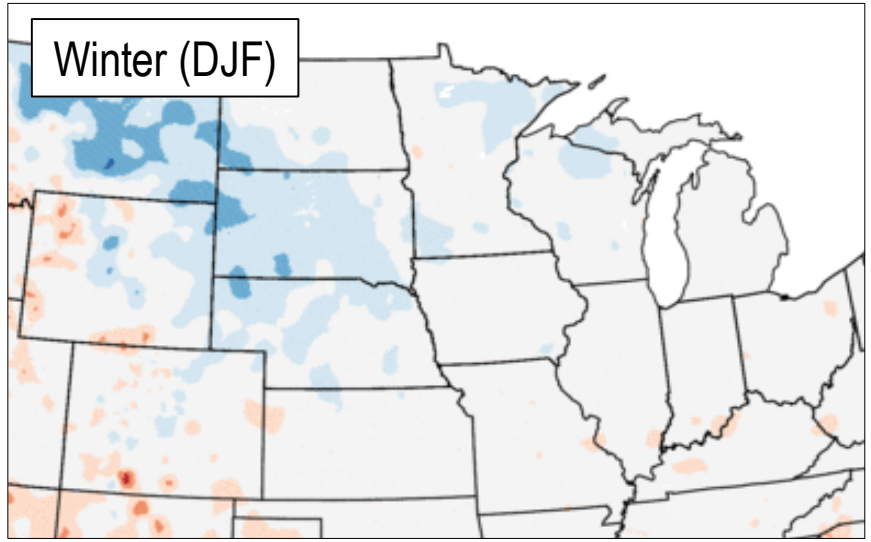
Maximum Temperature Trends during the Last 30 Years (1991-2020)

WINTER OUTLOOK 2021-22









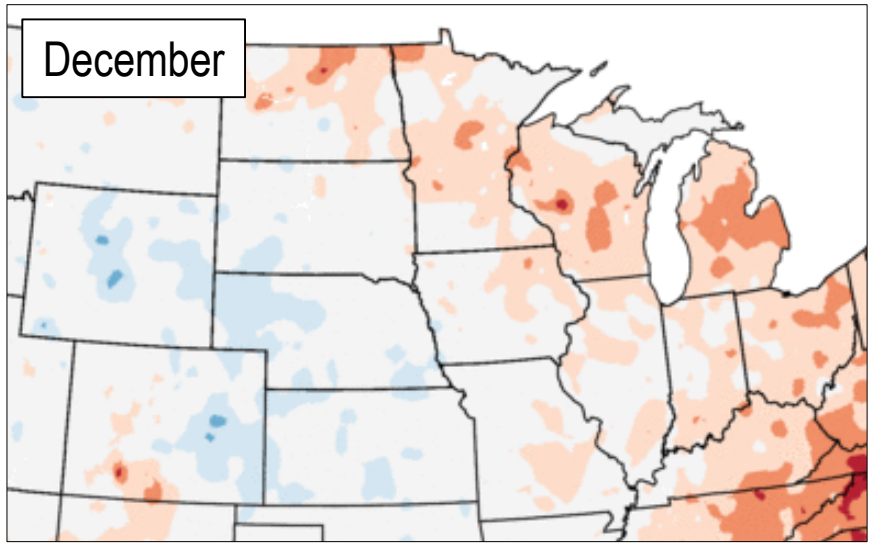
Key Points

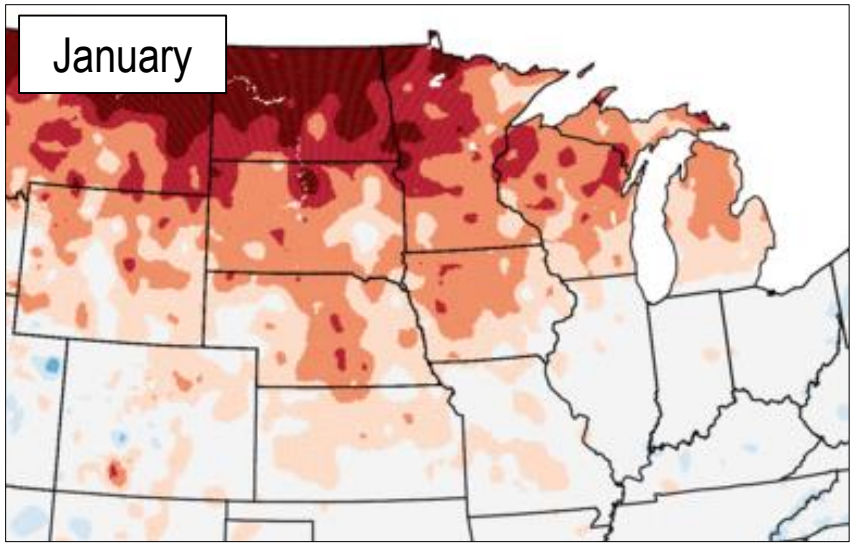
- **December** has been trending slightly warmer east of the Mississippi River & slightly colder from Wyoming into western Nebraska & western South Dakota.
- **January** is warmer across much of Central Region. Strongest warming in the Northern Plains.
- **February** swings the other way, showing colder conditions across Central Region. Strongest cooling in the Northern Plains.
- There has been a slight cooling during **meteorological winter** (DJF) from Wyoming into Upper Michigan.

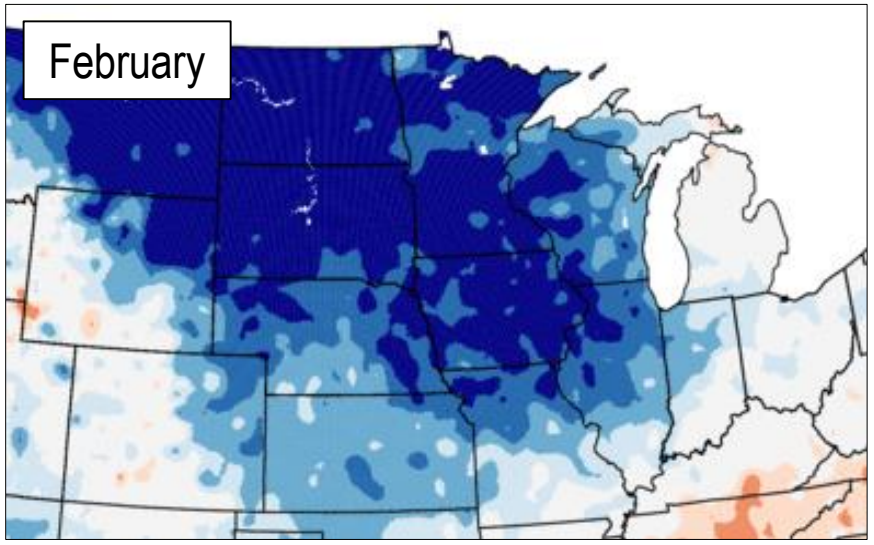
Data Source: 5km Gridded Dataset (nClimGrid)
National Centers for Environmental Information

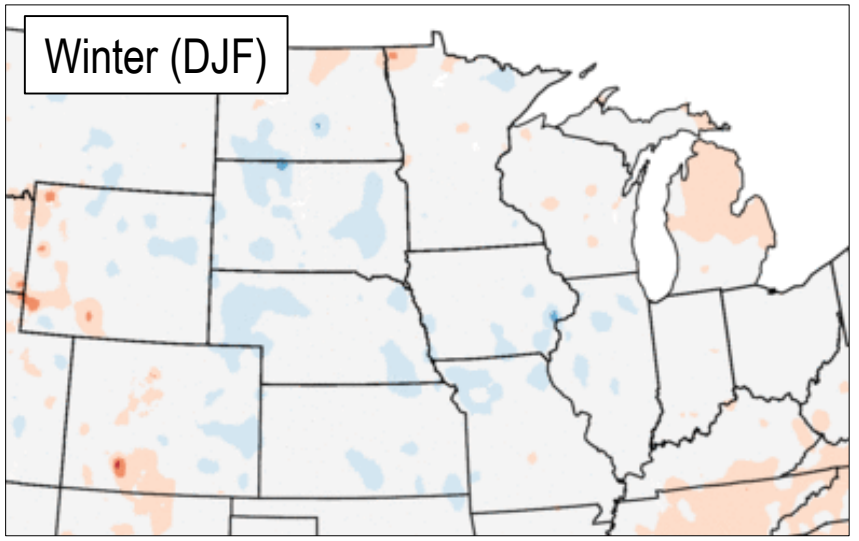
Minimum Temperature Trends during the Last 30 Years (1991-2020)

WINTER OUTLOOK 2021-22









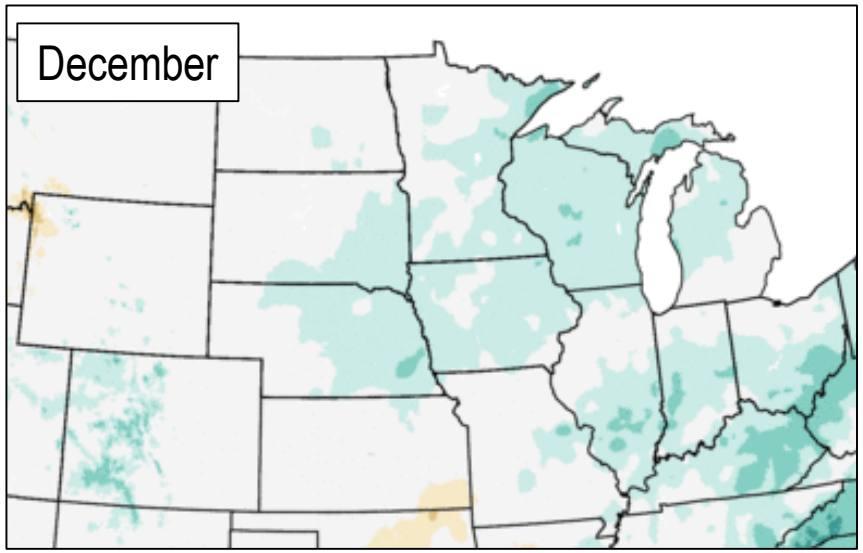
Key Points

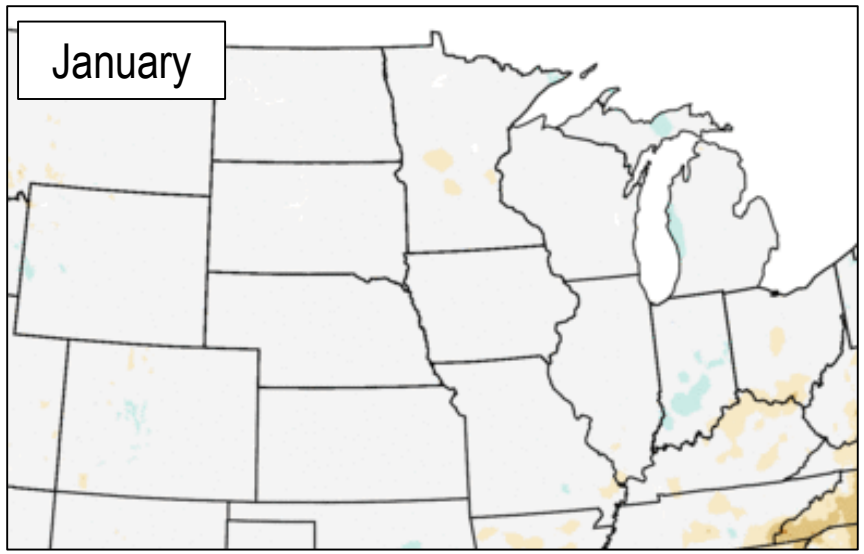
- **December** has been trending slightly warmer from the Northern Plains southeast into Kentucky. Slight cooling from Wyoming into Kansas.
- **January** is warmer across much of Central Region. Strongest warming in the Northern Plains.
- **February** swings the other way, showing colder conditions across Central Region. Strongest cooling in the Northern Plains.
- **Meteorological winter** (DJF): there has been generally little change.

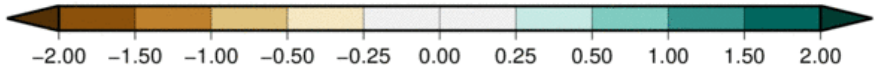
Data Source: 5km Gridded Dataset (nClimGrid)
National Centers for Environmental Information

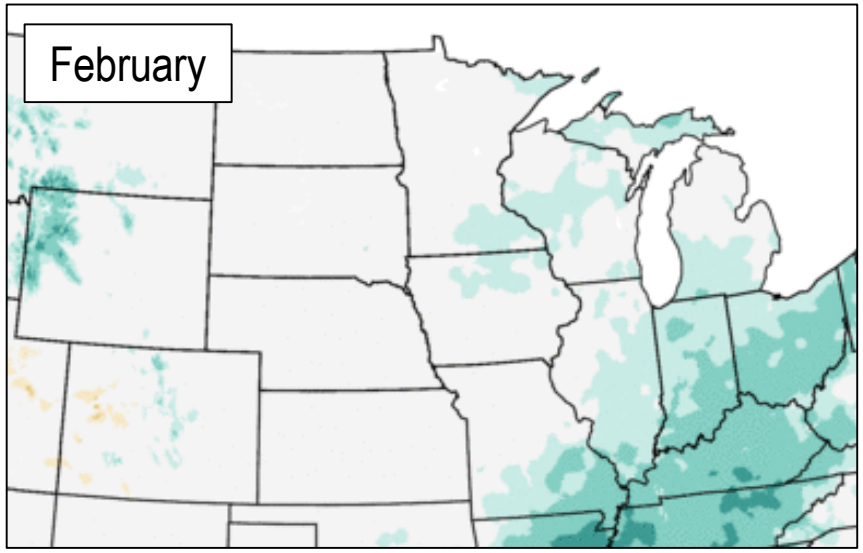
Precipitation Trends during the Past 30 Years (1991-2020)

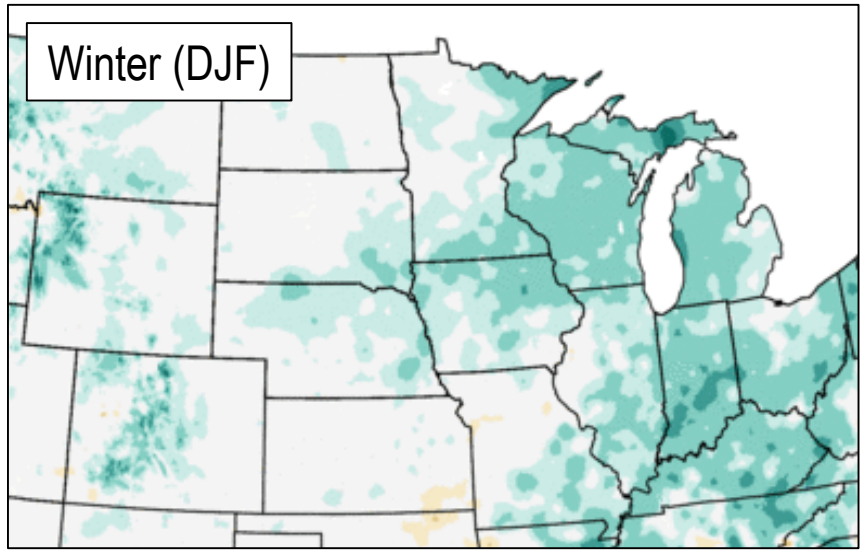
WINTER OUTLOOK 2021-22









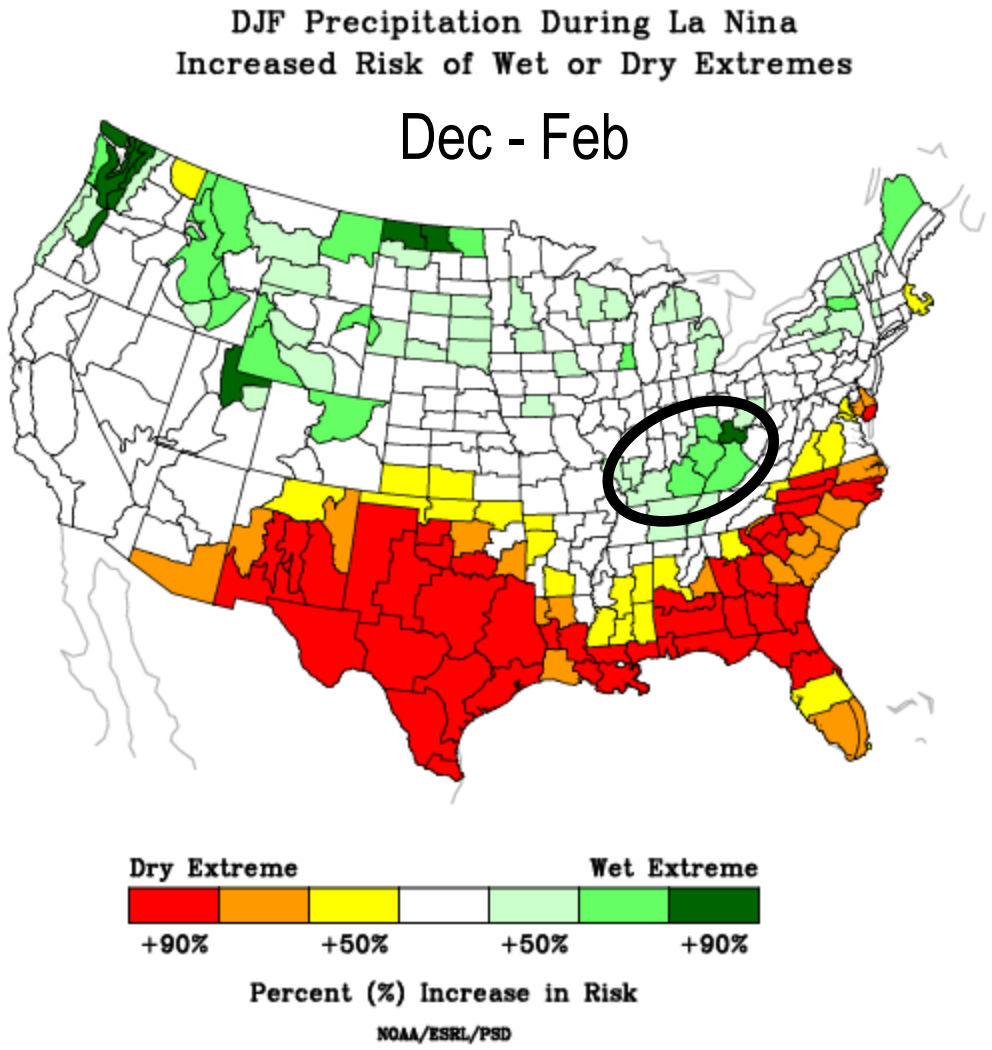


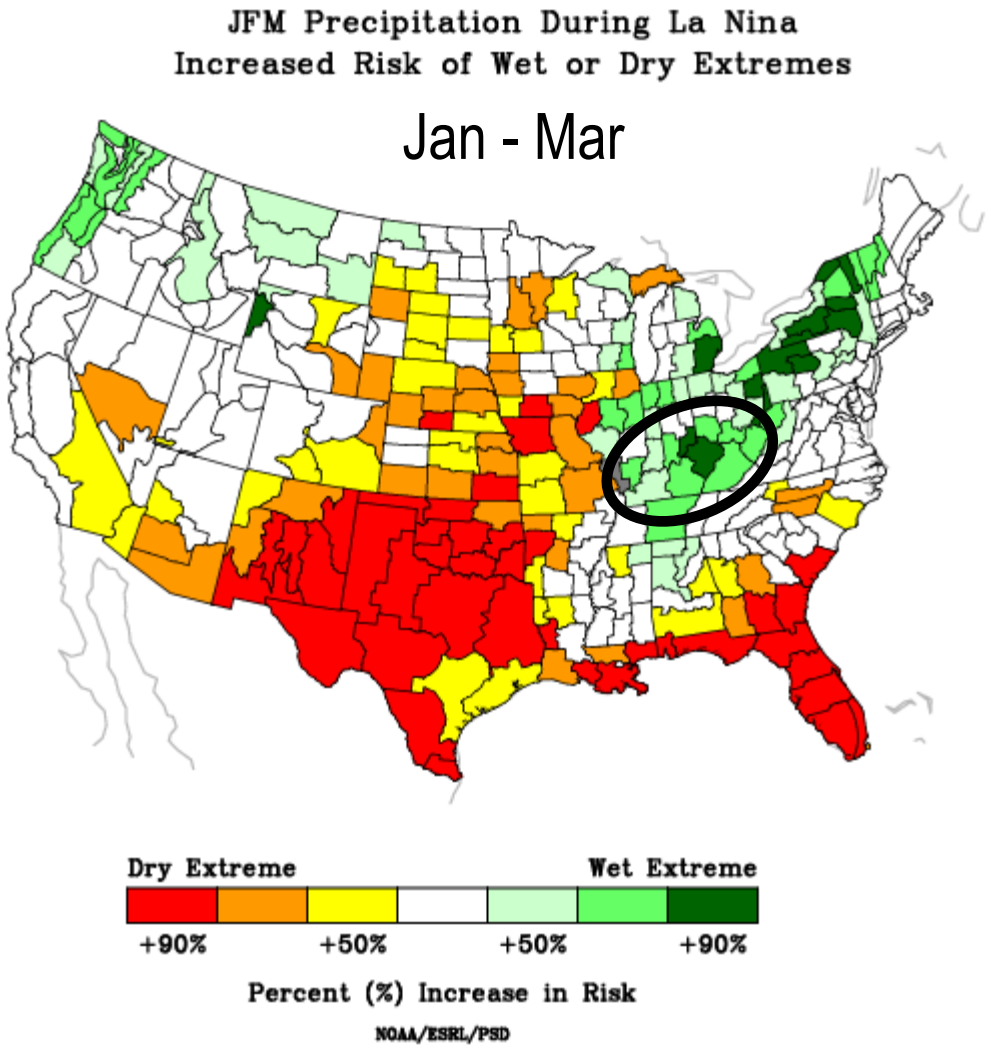
Key Points

- **December** shows a trend for increasing precipitation across much of Central Region.
- **January** is essentially unchanged.
- **February** shows an increase in precipitation over the Ohio Valley.
- The **Winter** (DJF) shows an increase in precipitation across much of Central Region.

Data Source: 5km Gridded Dataset (nClimGrid)
National Centers for Environmental Information

Increased Risk of Wet Extremes Dec – Mar in the Ohio Valley



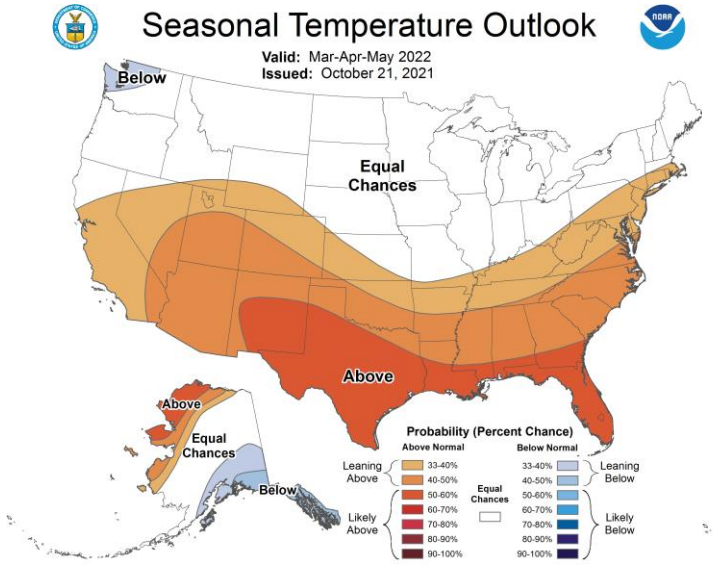


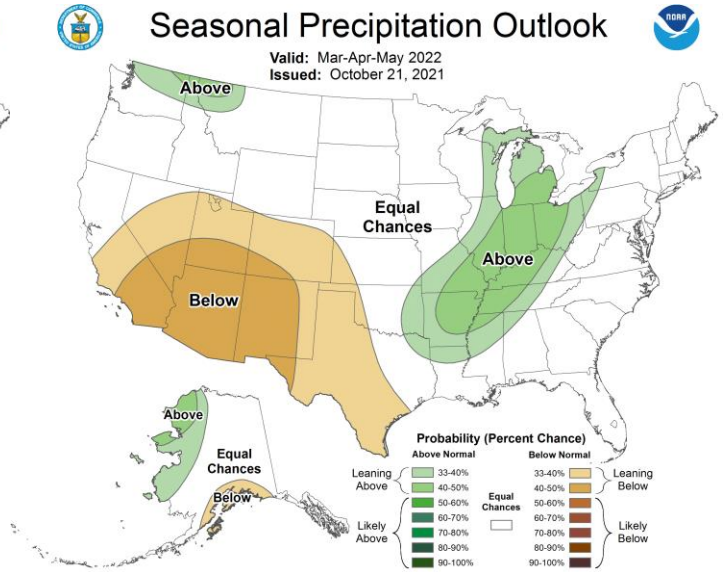
Severe Spring?

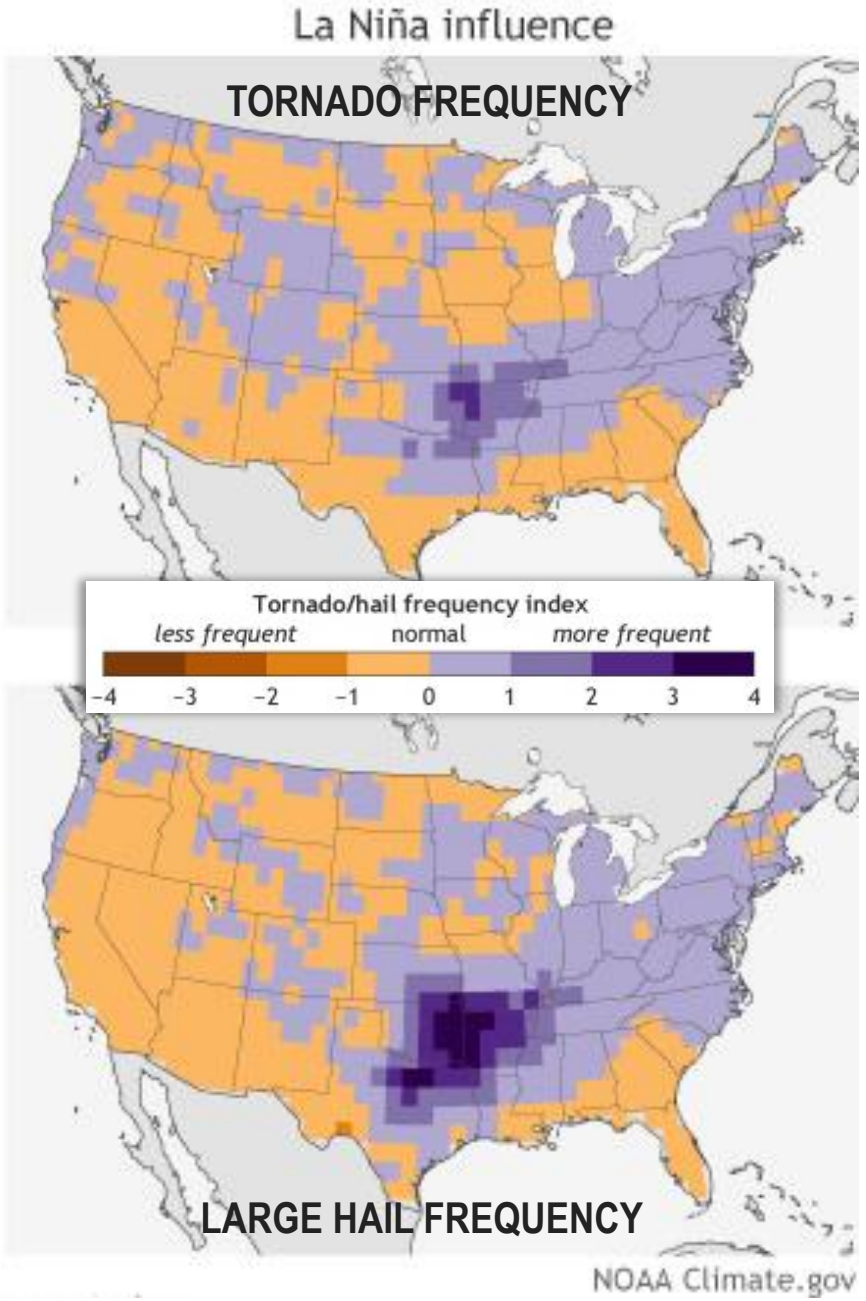
The maps on the right show tornado and hail frequencies for the spring months (March-May) during La Niña. Purple favors higher storm event frequency, and brown favors lower storm event frequency. Specifics vary, but in general, springtime tornadoes and hailstorms are more frequent during La Niña from the southern Plains through the Ozarks to the lower Ohio Valley.

There are no guarantees, however. For example, last winter (2020-21) was a La Niña winter but we did not have a particularly active severe weather season in spring 2021 in southern Indiana or central Kentucky.

Spring Outlook

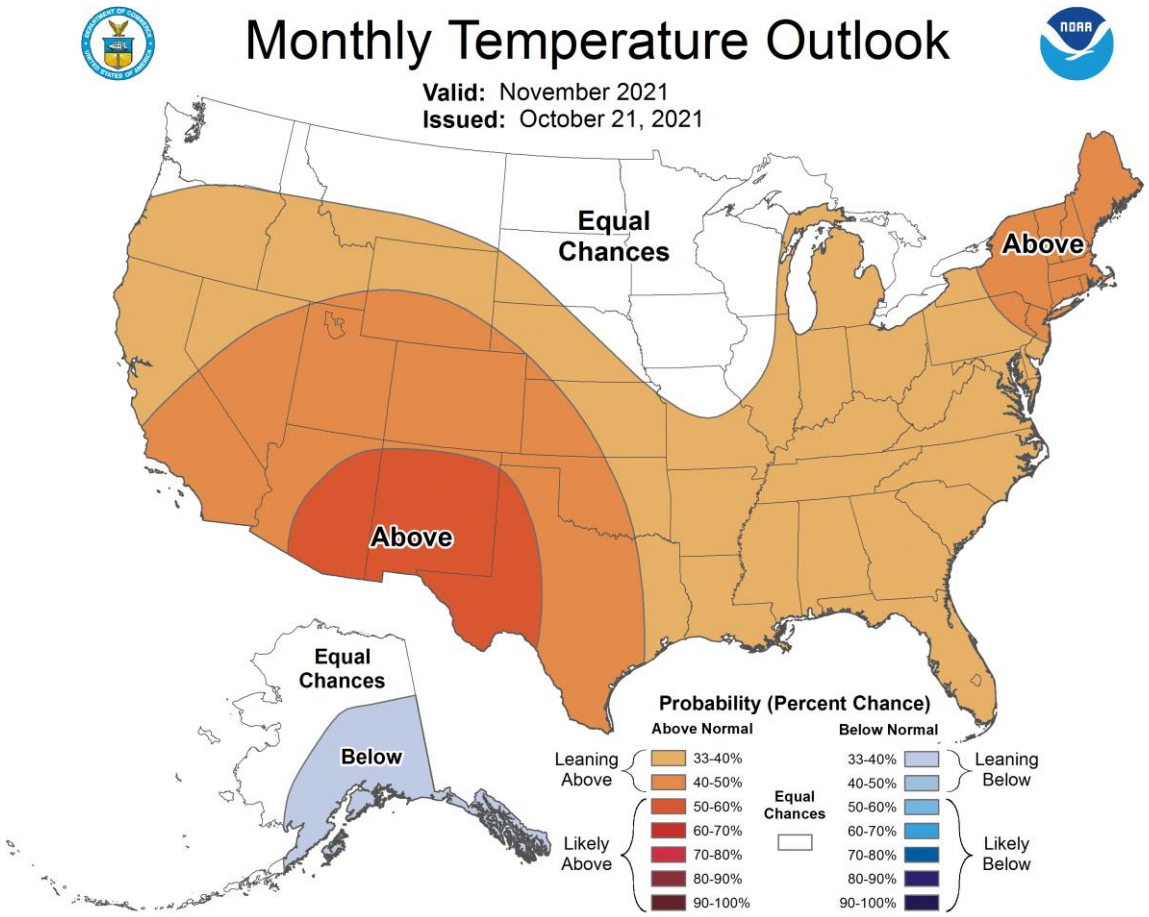


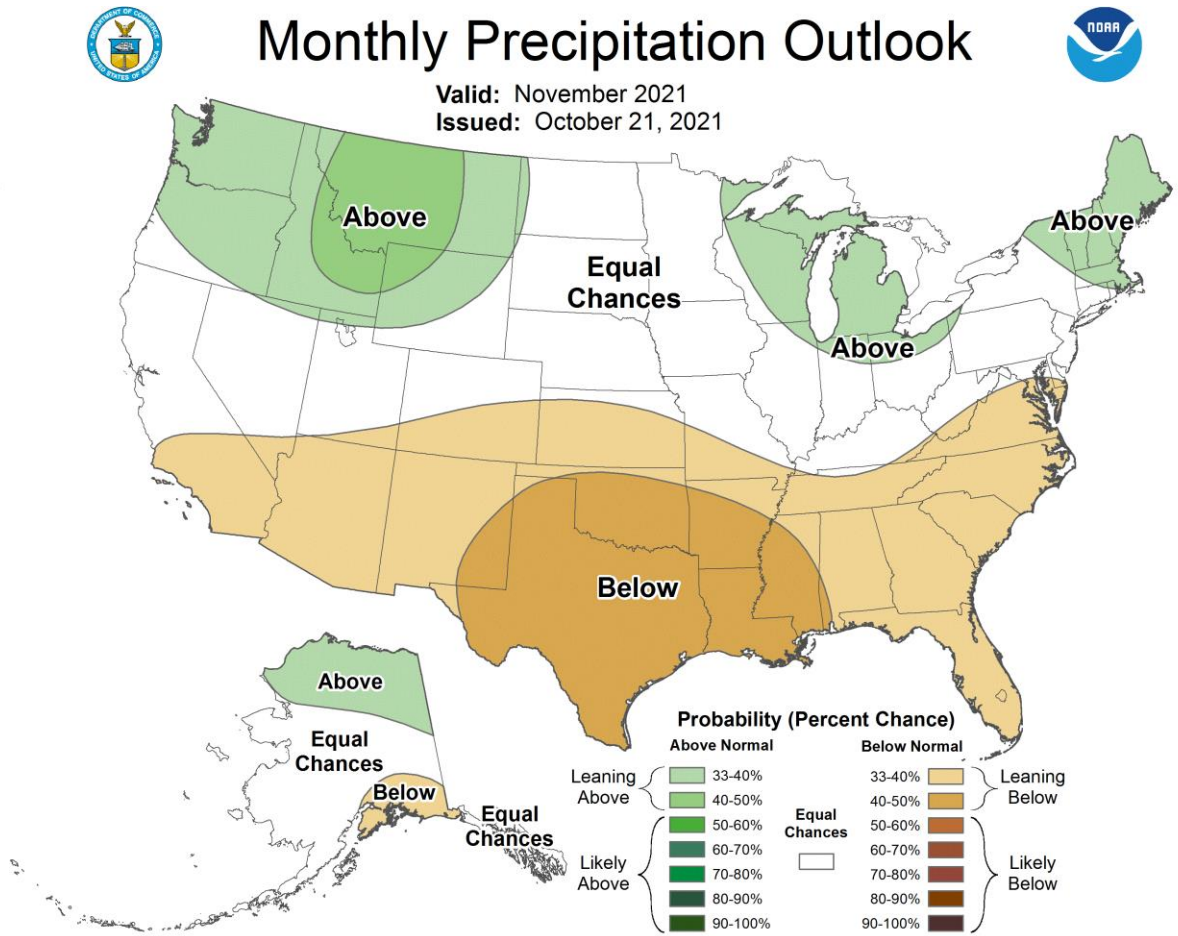




Climate Prediction Center November Outlook

NOVEMER OUTLOOK 2021

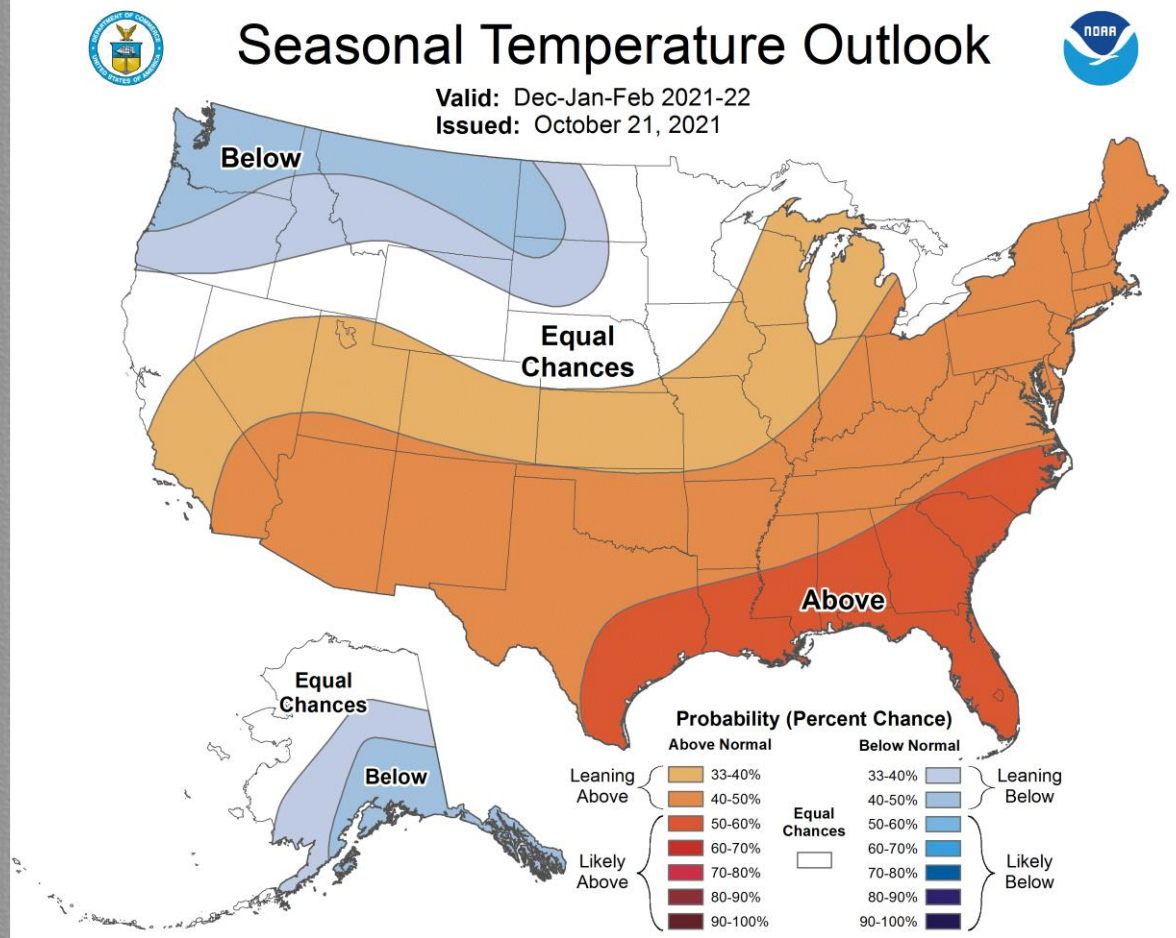


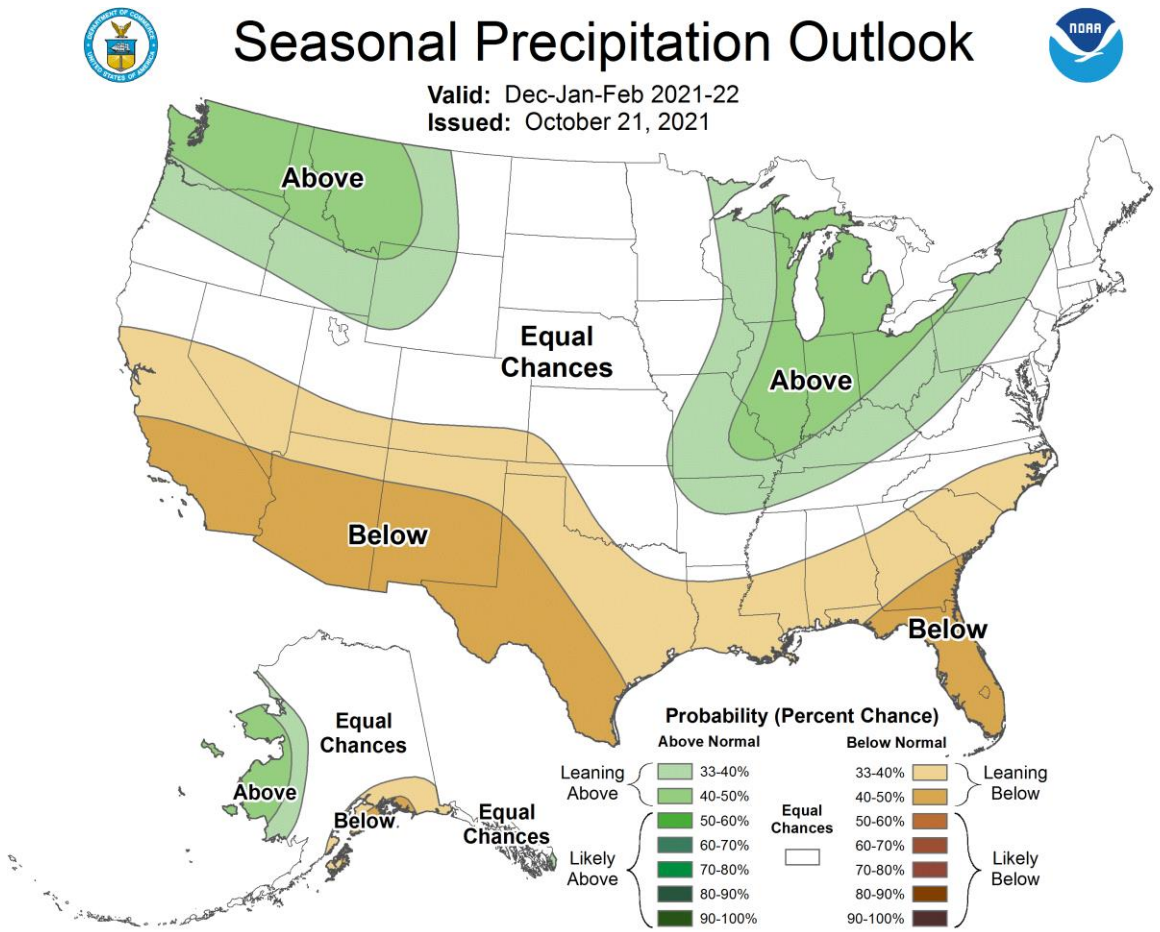


Images courtesy of the Climate Prediction Center (CPC)

Climate Prediction Center Winter (Dec-Feb) Outlook

WINTER OUTLOOK 2021-22





Images courtesy of the Climate Prediction Center (CPC)

Summary

What's Currently Expected

- La Niña is expected to impact the 2021-22 Meteorological Winter (December 1-February 28).
- Enhanced chances for **above-normal** temperatures across southern & eastern United States.
- Enhanced chances for **below-normal temperatures** in the Northern Plains and Pacific Northwest.
- Enhanced chances for **wetter-than-normal** conditions in the Northwest, and from Kentucky & Missouri north into the Great Lakes.
- Enhanced chances for **drier-than-normal** conditions in the Southwest and Southeast U.S.

What's Uncertain

- On shorter time scales, other—less predictable—climate patterns can cancel out or amplify the typical influence of La Niña.
- Strong cold outbreaks (like February 2021) typically last a few weeks and are difficult to predict more than 1 to 2 weeks in advance.
- Snow storms will likely occur at times this winter. However, the frequency, number, and intensity of these events cannot be predicted on a seasonal timescale.

The next Winter Outlook will be issued on Thursday, November 18, 2021.

Questions / Comments?

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