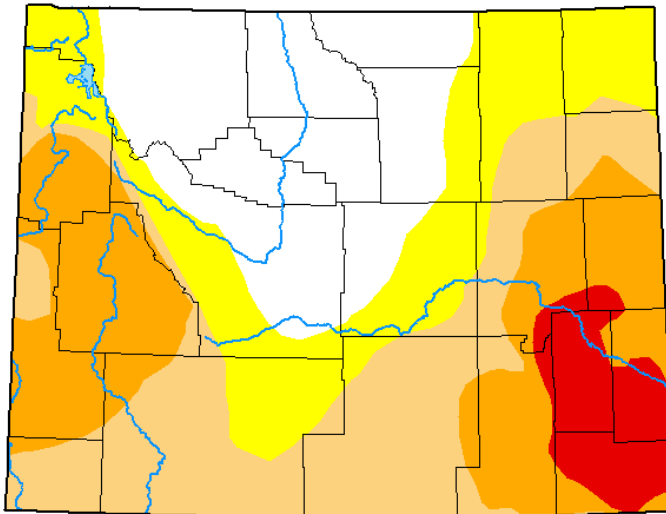


# Sheridan County Water Supply Report

January - 2023

## U.S. Drought Monitor Wyoming

**December 27, 2022**  
(Released Thursday, Dec. 29, 2022)  
Valid 7 a.m. EST



Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
<b>Current</b>	25.63	74.37	53.56	28.59	6.45	0.00
<b>Last Week</b> 12-20-2022	25.63	74.37	53.56	28.59	6.45	0.00
<b>3 Months Ago</b> 09-27-2022	15.67	84.33	52.52	20.01	3.71	0.00
<b>Start of Calendar Year</b> 01-04-2022	0.00	100.00	97.93	65.27	10.98	0.00
<b>Start of Water Year</b> 09-27-2022	15.67	84.33	52.52	20.01	3.71	0.00
<b>One Year Ago</b> 12-28-2021	0.00	100.00	96.71	61.30	14.20	0.00

Intensity:

- None
- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

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>

Author:

Richard Heim  
NCEI/NOAA



[droughtmonitor.unl.edu](https://droughtmonitor.unl.edu)

Compiled for SCLT by Iris Kurz, Undergraduate Research Assistant at University of Wyoming's Haub School. Contact [water@sheridanclt.org](mailto:water@sheridanclt.org) for questions and concerns.

Map Source: The U.S. Drought Monitor is jointly produced by the National Drought Mitigation Center (NDMC) at the University of Nebraska-Lincoln, the United States Department of Agriculture, and the National Oceanic and Atmospheric Administration.



Sheridan  
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# How to Use This Report

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## **What is this report?**

Instead of combing the internet and clicking a million links to learn about water supply in Sheridan County, let us do the work for you! This report compiles many trustworthy sources into an easy-to-read and access report. It includes information about streamflow, snowpack, drought, soil moisture, and precipitation for both the Tongue and Powder Rivers. This report is a one-stop shop for information that can help you be aware of water in Sheridan to make decisions for your ranch and your land.

## **Helpful Hints:**

- All forecasts have the word forecast underlined in the page's title.
- Each page has a little blurb at the top that gives you some helpful information.
- If you would like to know more about a topic, check out the sources at the bottom of the page!
- Sources are precise and bring you as close as possible to the original source.

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# Drought Index and Change

The U.S. Drought Monitor gives you a broad overview of the drought conditions in the US. Its strength is bringing together many ways of determining drought. It is useful as a large-scale view of drought, but local drought resiliency efforts are not considered.

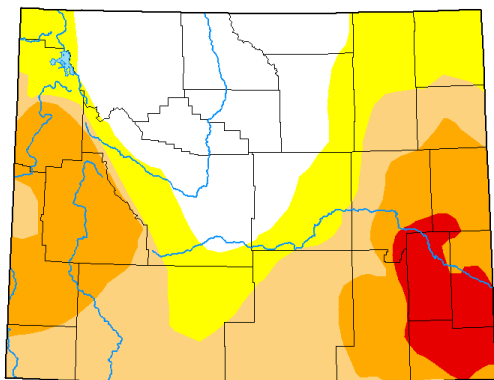
## U.S. Drought Monitor Wyoming

December 27, 2022  
(Released Thursday, Dec. 29, 2022)  
Valid 7 a.m. EST

### Current Drought Monitor:

5.01% of Sheridan County is experiencing abnormally dry (D0) conditions. This is a slight improvement from last month, as abnormally dry areas (D0) shrank by approximately 1% and most of the county experiences little-to-no drought symptoms.

Possible Impacts: D0 (Abnormally Dry) can cause slowing of plant growth.



#### Intensity:

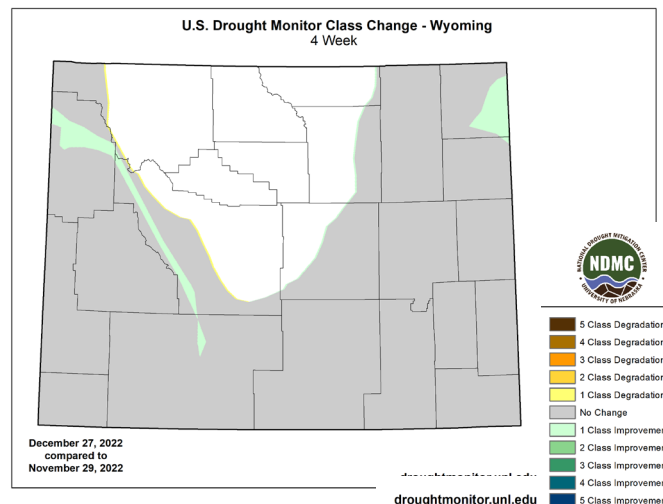
- None
- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

Author:  
Richard Heim  
NCEI/NOAA



### Change in Drought Monitor:

Comparing the beginning and end of December, drought in the county has seen some amount of improvement. The entire county is relatively free of drought conditions, except for the southeast corner. No counties to the west show signs of drought conditions, but generally saw no change. Johnson County to the south experienced immense improvement across most of the county.



December 27, 2022  
compared to  
November 29, 2022

droughtmonitor.unl.edu

Cooler tones represent improvement. Warm tones represent degradation.

Sources: <https://droughtmonitor.unl.edu/Maps/MapArchive.aspx>  
<https://droughtmonitor.unl.edu/Maps/ChangeMaps.aspx>  
<https://droughtmonitor.unl.edu/Summary.aspx>





# Drought History and Forecast

The first half of this page shows current conditions, followed by the forecast. Current and historical data is based on known measured data. The outlook is a prediction of the future, so while it is helpful for making decisions be sure to factor in the level of uncertainty.

## Drought in Sheridan County Over Time: Shown in Percentage Area in Drought

Week	Date	None	D0	D1	D2	D3	D4	DSCI
Current	2022-12-27	94.99	5.01	0.00	0.00	0.00	0.00	5
Last Week	2022-12-20	94.99	5.01	0.00	0.00	0.00	0.00	5
3 Months Ago	2022-09-27	49.02	50.98	0.00	0.00	0.00	0.00	51
Start of Calendar Year	2021-12-28	0.00	0.00	0.00	76.21	23.79	0.00	324
Start of Water Year	2022-09-27	49.02	50.98	0.00	0.00	0.00	0.00	51
One Year Ago	2021-12-28	0.00	0.00	0.00	76.21	23.79	0.00	324

DSCI stands for Drought Severity and Coverage Index. It is “an experimental method for converting drought levels from the U.S. Drought Monitor map to a single value for an area.”

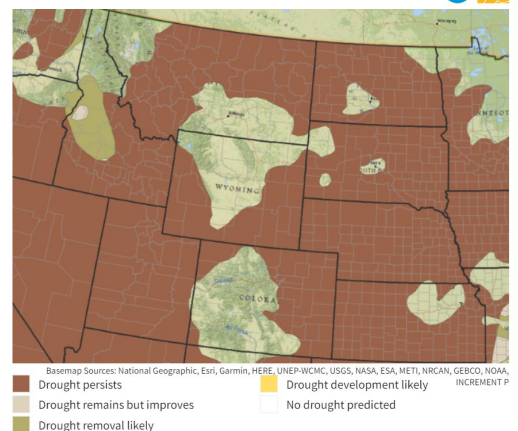
**History of Drought Monitor:** In December of 2021 Sheridan County was experiencing severe - extreme drought conditions (D2-D3), which persisted into the new year. Almost all the county is now out of drought, a significant improvement.

## **Forecast for Drought Monitor:**

“Most of the High Plains region received less than half an inch of precipitation. Pockets of half to 1 inch of precipitation were found over North Dakota and the mountains of Colorado and Wyoming. The precipitation was above normal in parts of all of the High Plains states, but late December is in the dry season for much of the region and normals are low.”<sup>1</sup>

Forecast confidence is moderate to high for the Western and High Plains Regions.

U.S. Monthly Drought Outlook



The National Weather Service Climate Prediction Center's Monthly Drought Outlook is issued at the end of each calendar month and is valid for the upcoming month. The outlook predicts whether drought will persist, develop, improve, or be removed over the next 30 days or so.

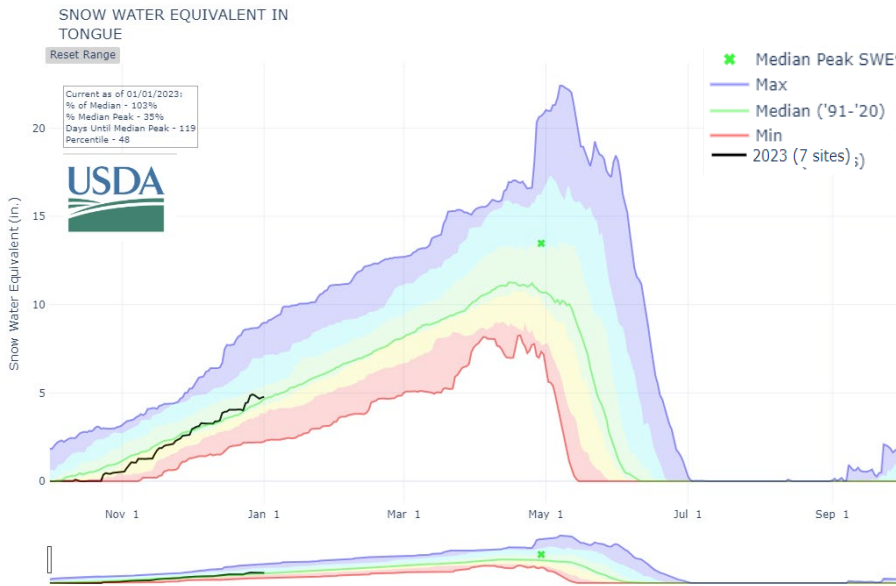
Source(s): Climate Prediction Center  
Updates Monthly - 11/30/22

[Drought.gov](https://www.drought.gov)



# Precipitation - Tongue River

These graphs represent precipitation in the Big Horn Mountains that affect the Tongue River. Snow water equivalent (SWE) represents the amount of water contained within the snowpack when it melts.

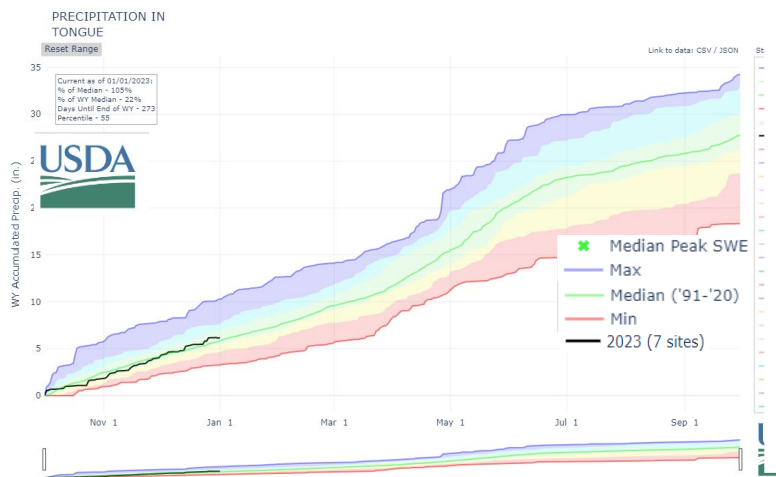


## Snowpack in Tongue River Watershed:

The USDA's water year annually begins on October 1st. Snow has accumulated consistently throughout December. Across the watershed there is 4.8 in of SWE, which is just slightly above median. Snowpack for the 2023 water year is currently in the 48th percentile.

## Precipitation in Tongue River Watershed:

Precipitation in the Bighorn Mountains for the Tongue River watershed has stayed above average for the month of December. It is currently 105% of the median which is in the 55th percentile. As of January 1st, the stations have recorded approximately 6.2 inches of precipitation for the water year.



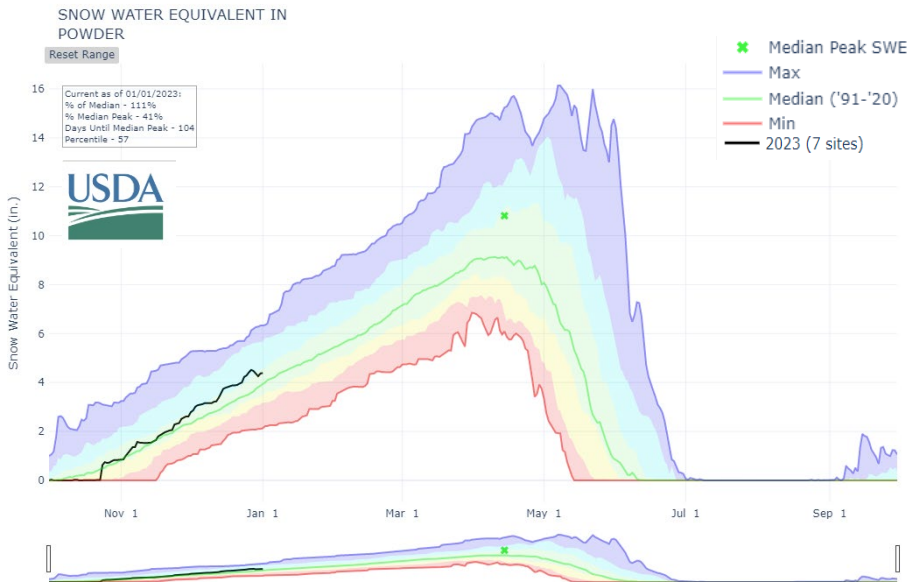
Sources:

[https://www.nrcs.usda.gov/Internet/WCIS/AWS\\_PLOTS/basinCharts/POR/WTEQ/assocHUC6/100901\\_Tongue.html](https://www.nrcs.usda.gov/Internet/WCIS/AWS_PLOTS/basinCharts/POR/WTEQ/assocHUC6/100901_Tongue.html)  
[https://www.nrcs.usda.gov/Internet/WCIS/AWS\\_PLOTS/basinCharts/POR/PREC/assocHUC6/100901\\_Tongue.html](https://www.nrcs.usda.gov/Internet/WCIS/AWS_PLOTS/basinCharts/POR/PREC/assocHUC6/100901_Tongue.html)



# Precipitation - Powder River

These graphs represent precipitation in the Big Horn Mountains that affect the Powder River. Snow water equivalent represents the amount of water contained within the snowpack when it melts.

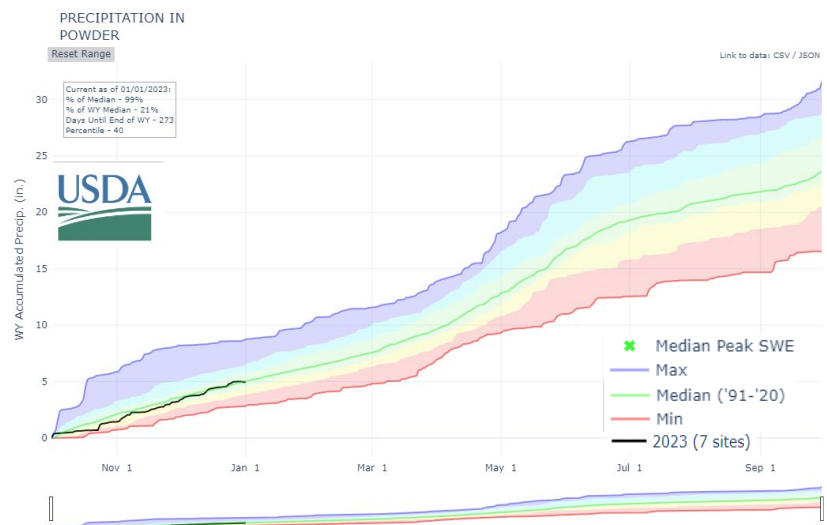


## Snowpack in Powder River Watershed:

The Powder River watershed has accumulated approximately 4.4 in. of snowpack as of January 1st, leaving the overall at 111% of the median snowpack for this time of year, and in the 57th percentile compared to previous years.

## Precipitation in Powder River

**Watershed:** Precipitation in the Big Horn Mountains for the Powder River watershed is still just barely below median. It is currently 99% of median which is in the 40th percentile. As of January 1st, the stations have recorded close to 4.9 inches of precipitation.



Sources:

[https://www.nrcs.usda.gov/Internet/WCIS/AWS\\_PLOTS/basinCharts/POR/WTEQ/assocHUC6/100902\\_Powder.html](https://www.nrcs.usda.gov/Internet/WCIS/AWS_PLOTS/basinCharts/POR/WTEQ/assocHUC6/100902_Powder.html)

[https://www.nrcs.usda.gov/Internet/WCIS/AWS\\_PLOTS/basinCharts/POR/PREC/assocHUC6/100902\\_Powder.html](https://www.nrcs.usda.gov/Internet/WCIS/AWS_PLOTS/basinCharts/POR/PREC/assocHUC6/100902_Powder.html)





# Reservoir Capacity & Stream Flow

The total capacity of reservoirs and current water storage includes all the water in the reservoir including unusable water beneath the outtake.

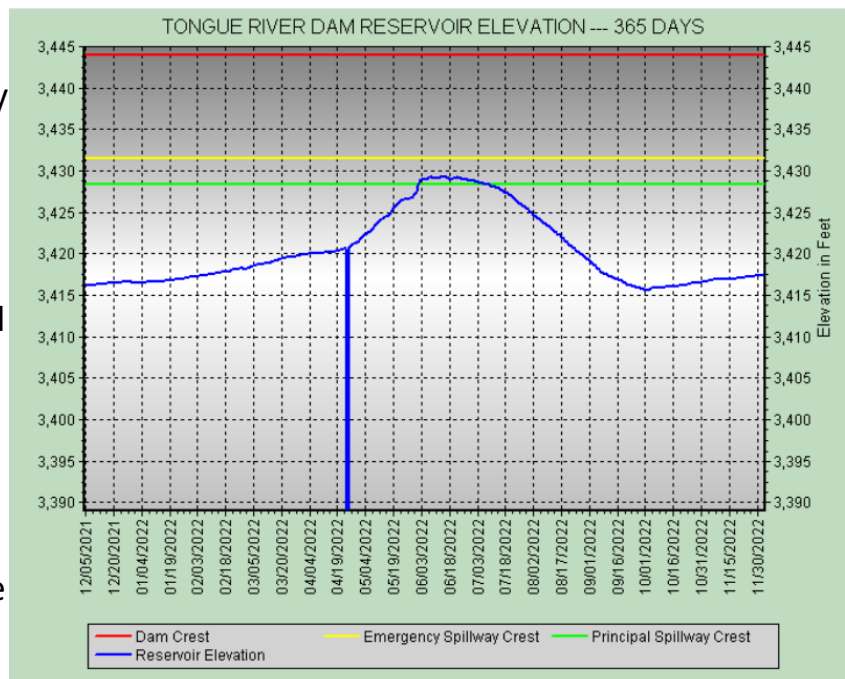
## Lake DeSmet

As of December 30, 2022, Lake DeSmet has 197,456 A.F. in storage, which is 84% of its total capacity.

Reservoir	Current Storage (Acre-ft)	Total Storage (Acre-ft)	Total Storage (%)
Bighorn	1,722	5,756	29.91%
Cross Creek	0	798	0.00%
Dome Lake No.1	1,355	2,030	66.74%
Kearney Lake	1,665	7,500	22.20%
Park	3,805	12,500	30.44%
Sawmill	917	1,831	50.08%

## Winter Watersheds

As winter progresses, it is important to note that many of the tools used to obtain storage and elevation data will be obstructed by ice. This forces management groups to rely on provisional data (which is based off the last accurate reading) in order to predict the current levels in various reservoirs. Such is the case for all the reservoirs in the above table (except for the Bighorn Reservoir) and the Tongue



River Dam. As these datasets are provisionally approved, it is important to use the data skeptically—while it could be accurate, it could also not be.

Sources:

Lake DeSmet Operating Department at [lakedesmet@johnsoncowy.us](mailto:lakedesmet@johnsoncowy.us)

<https://seoflow.wyo.gov/Data/Map/Parameter/Total%20Storage/Location/Identifier/Interval/Latest>

<http://dnrc.mt.gov/divisions/water/projects/tongue-river>

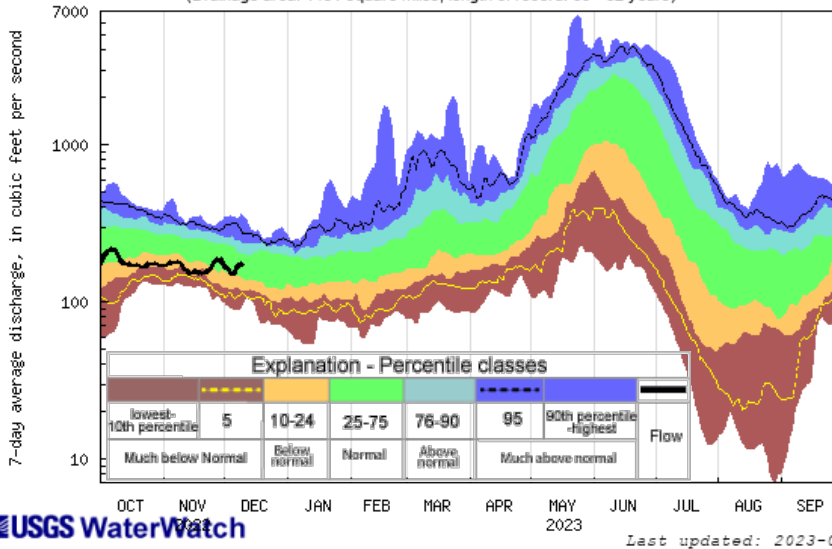




# Select Stream Flow Stations

These graphs give context to stream flow percentile classes. The selected USGS stream gauges are on the stateliness with Montana, being the downstream end of the Tongue and Powder within our region. The flow represent average 7-day flows. The vertical axis is logarithmic meaning it goes up by 10x for each major tick mark.

USGS 06306300 Tongue River at State Line nr Decker MT  
(Drainage area: 1451 square miles, length of record: 60 - 62 years)

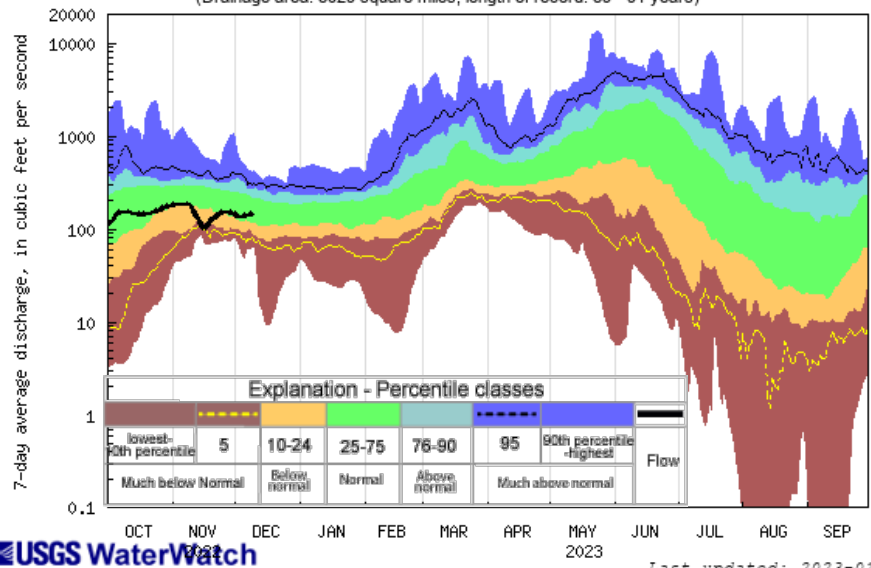


**Tongue River Border Station Stream Flow:** The average stream flow for the beginning of December was in the 10th percentile and steadily increased to approximately 200 cfs until December 20th, which is the time of the last reading.

## Powder River Border Station

**Stream Flow:** The average stream flow for December was in the 25th percentile with a discharge that averaged 160 cfs. Streamflow was normal for a majority of December and slowly increased through the month.

USGS 06324500 Powder River at Moorhead MT  
(Drainage area: 8029 square miles, length of record: 89 - 91 years)



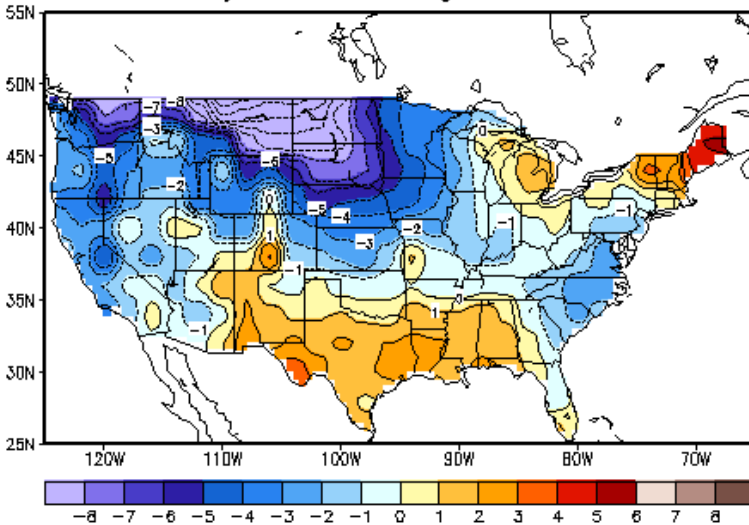
Sources: <https://waterwatch.usgs.gov/index.php?id=mv01d>  
[https://waterwatch.usgs.gov/?id=wwchart\\_sitedur&ofmt=plot\\_mvbg&site\\_no=06306300](https://waterwatch.usgs.gov/?id=wwchart_sitedur&ofmt=plot_mvbg&site_no=06306300)  
[https://waterwatch.usgs.gov/?id=wwchart\\_sitedur&ofmt=plot\\_mvbg&site\\_no=06324500](https://waterwatch.usgs.gov/?id=wwchart_sitedur&ofmt=plot_mvbg&site_no=06324500)



# Temperature and Precipitation

Temperature and precipitation are large drivers of changes in drought conditions. As you might expect, high temperatures and low precipitation can worsen drought conditions while low temperature and high precipitations can improve them.

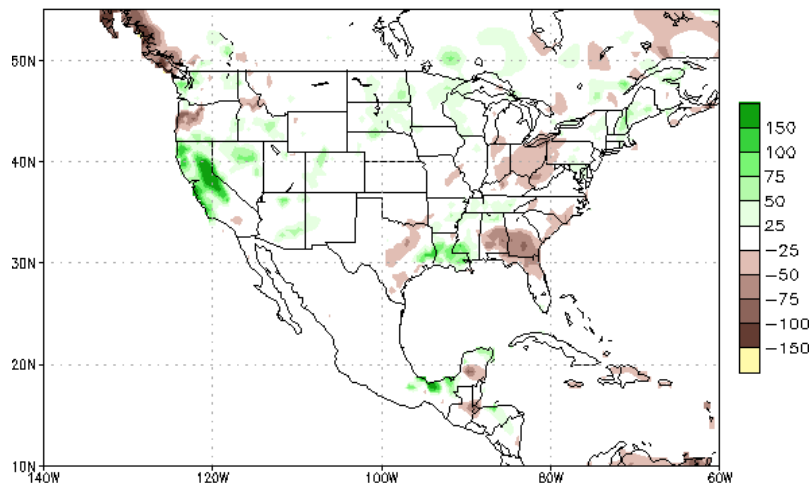
Mean Temp (F) Anomaly  
30-day mean ending Dec 31 2022



**Temperature Anomaly:** In December, the average temperature was 6°F below what we generally see in Sheridan County. This decreases evaporation and snowmelt and accelerates the dormancy rate of plants.

**Precipitation:** The rainfall for December in Sheridan County is within 25 mm (~1 inch) of what is average. Sustained monthly precipitation has helped to alleviate drought conditions in Sheridan County, with most of the county now clear of any drought symptoms save for a small portion in the southeast corner.

Prep Anomalies (mm) 02DEC2022-31DEC2022



Data Source: CPC Unified (gauge-based & 0.5x0.5 deg resolution) Precipitation Analysis Climatology (1991-2020)

Sources: [https://www.cpc.ncep.noaa.gov/products/tanal/temp\\_analyses.php](https://www.cpc.ncep.noaa.gov/products/tanal/temp_analyses.php)  
[https://www.cpc.ncep.noaa.gov/products/Global\\_Monsoons/American\\_Monsoons/NAMS\\_precip\\_monitoring.shtml](https://www.cpc.ncep.noaa.gov/products/Global_Monsoons/American_Monsoons/NAMS_precip_monitoring.shtml)  
2 [https://www.cpc.ncep.noaa.gov/products/expert\\_assessment/mdo\\_discussion.php](https://www.cpc.ncep.noaa.gov/products/expert_assessment/mdo_discussion.php)



# Temperature Forecast and Precipitation Forecast

[https://www.cpc.ncep.noaa.gov/products/predictions/long\\_range/lead14/interactive/index.php](https://www.cpc.ncep.noaa.gov/products/predictions/long_range/lead14/interactive/index.php)

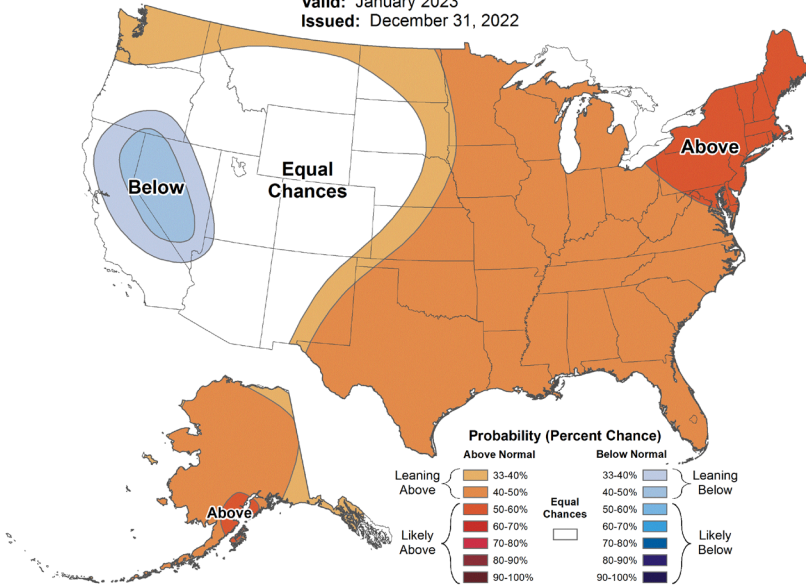
Explore link above for an Interactive map that displays percentage chance above and below normal for any point in US.



## Monthly Temperature Outlook



Valid: January 2023  
Issued: December 31, 2022



**Temperature:** Sheridan County has equal chances of seeing temperatures either above or below average for the month of January.

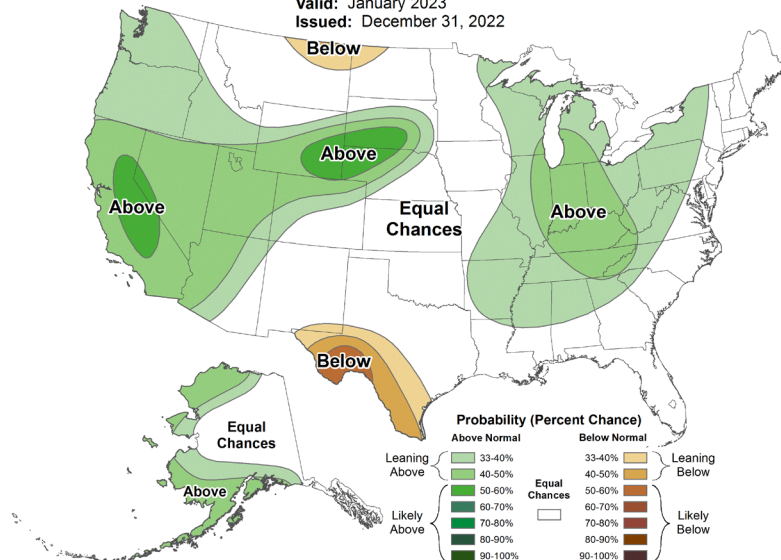
**Precipitation:** Sheridan County has equal chances of seeing precipitation rates either above or below average for the following month.



## Monthly Precipitation Outlook



Valid: January 2023  
Issued: December 31, 2022



Sources: <https://www.cpc.ncep.noaa.gov/>

[https://www.cpc.ncep.noaa.gov/products/predictions/long\\_range/lead14/interactive/index.php](https://www.cpc.ncep.noaa.gov/products/predictions/long_range/lead14/interactive/index.php) – Interactive with percentages

[https://www.cpc.ncep.noaa.gov/products/expert\\_assessment/mdo\\_discussion.php](https://www.cpc.ncep.noaa.gov/products/expert_assessment/mdo_discussion.php)



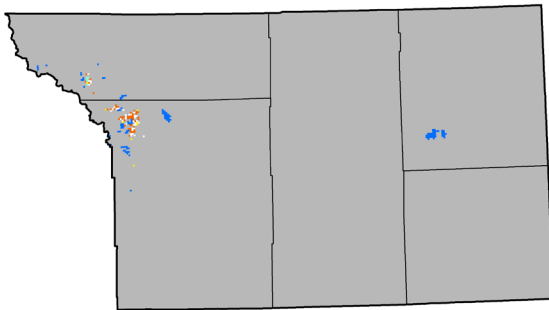


# Vegetation Drought Response and Soil Moisture

The graphs below are two ways of visualizing on-ground conditions. The vegetation Drought Response Index (Vegdri) uses a satellite to estimate vegetative stress. Soil moisture is helpful when looking at many things. Soil acts as a bank for moisture and can buffer drought degradation or improvement. It is also the water that plants have available to them so is linked to vegetative stress.

**Vegetation Drought Response Index**  
Complete: Wyoming, Region 2

December 25, 2022



**Vegetation Condition**

- Extreme Drought
- Severe Drought
- Moderate Drought
- Pre-drought stress
- Near Normal
- Unusually Moist
- Very Moist
- Extreme Moist
- Out of Season
- Water



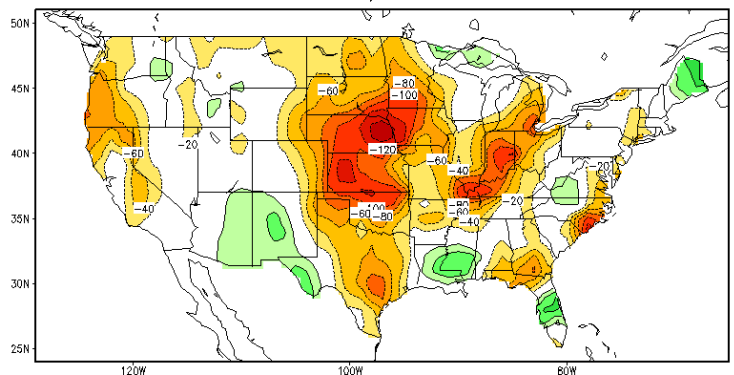
**Vegetation Drought Response:**

The Vegetation Drought Response Index shows that basically all of the county's vegetation is now out-of-season. The portions that are still in-season, however, are experiencing levels of moisture typically ranging from near normal to extremely moist—with a few drought-like outliers.

**Soil Moisture:**

Soil moisture is normal in Sheridan County, a constant from last month, but eastern Wyoming currently experiencing lowered soil moisture. Soil conditions to the north and west have improved, however, signaling the end of a drought period.

Calculated Soil Moisture Anomaly (mm)  
DEC, 2022



Sources: <https://vegdiri.unl.edu/Home/VegDRIQuad.aspx?WY,2>  
[https://www.cpc.ncep.noaa.gov/products/Soilmst\\_Monitoring/US/Soilmst/Soilmst.shtml](https://www.cpc.ncep.noaa.gov/products/Soilmst_Monitoring/US/Soilmst/Soilmst.shtml)

