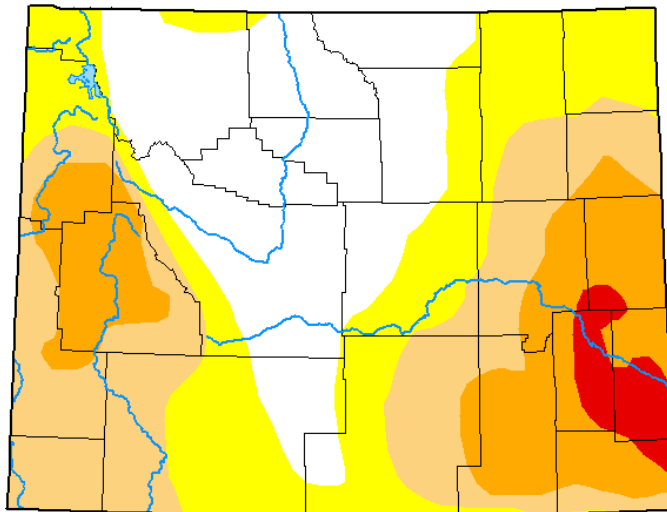


# Sheridan County Water Supply Report

February - 2023

## U.S. Drought Monitor Wyoming

**January 24, 2023**  
(Released Thursday, Jan. 26, 2023)  
Valid 7 a.m. EST



Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
<b>Current</b>	29.76	70.24	44.84	20.82	3.09	0.00
<b>Last Week</b> 01-17-2023	26.68	73.32	47.63	26.06	6.24	0.00
<b>3 Months Ago</b> 10-25-2022	14.07	85.93	53.51	26.16	3.54	0.00
<b>Start of Calendar Year</b> 01-03-2023	25.63	74.37	51.30	27.90	6.25	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> 01-25-2022	0.00	100.00	97.78	65.74	6.03	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:

Rocky Bilotta  
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.



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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

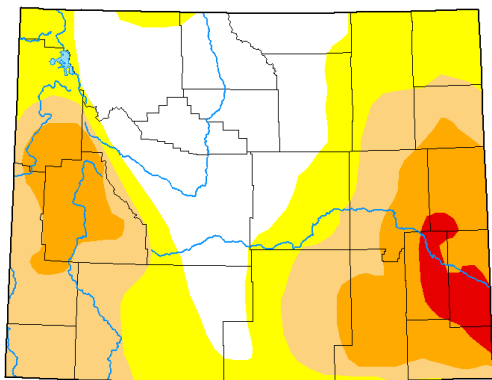
The U.S. Drought Monitor gives you a broad overview of the drought conditions in the US. Its strength is bringing together many ways of determining drought. It is useful as a large-scale view of drought, but local drought resiliency efforts are not considered.

## U.S. Drought Monitor Wyoming

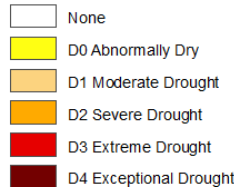
January 24, 2023  
(Released Thursday, Jan. 26, 2023)  
Valid 7 a.m. EST

### Current Drought Monitor:

7.44% of Sheridan County is experiencing abnormally dry (D0) conditions. This is a slight increase from last month, as abnormally dry areas (D0) grew by approximately 2.5%, but most of the county still experiences little-to-no drought symptoms.



#### Intensity:



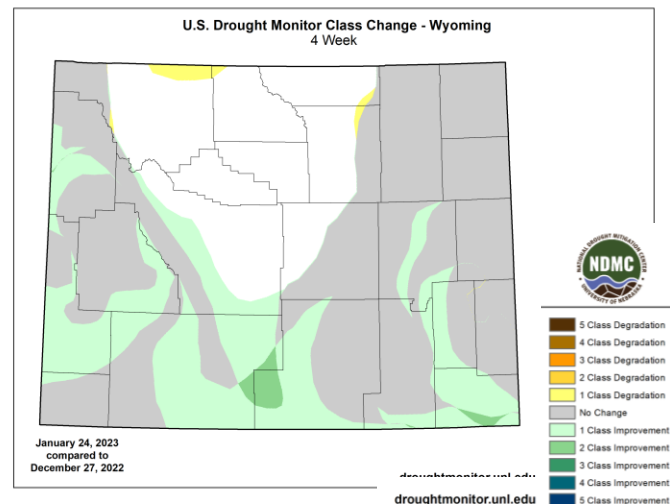
Author:  
Rocky Bilotta  
NCEI/NOAA



droughtmonitor.unl.edu

### Change in Drought Monitor:

Comparing the beginning and end of January, drought in the county has seen some amount of degradation. The entire county is still relatively free of drought conditions, except for the southeast corner. Counties to the west and south show slight signs of drought conditions.



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	2023-01-24	92.56	7.44	0.00	0.00	0.00	0.00	7
Last Week	2023-01-17	92.56	7.44	0.00	0.00	0.00	0.00	7
3 Months Ago	2022-10-25	62.25	37.75	0.00	0.00	0.00	0.00	38
Start of Calendar Year	2022-12-27	94.99	5.01	0.00	0.00	0.00	0.00	5
Start of Water Year	2022-09-27	49.02	50.98	0.00	0.00	0.00	0.00	51
One Year Ago	2022-01-25	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.”

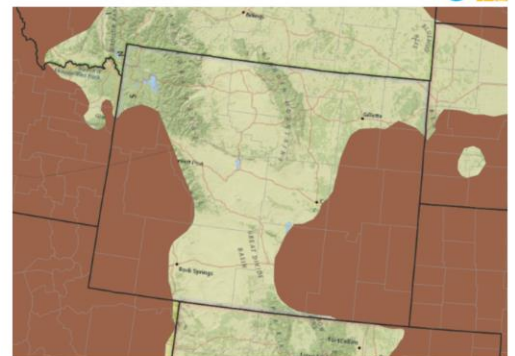
**History of Drought Monitor:** In January of 2022 Sheridan County was experiencing severe - extreme drought conditions (D2-D3), Conditions improved steadily through 2022, especially with the start of the new water year in September, and have stayed improved—even with slight degradation over the last month.

### **Forecast for Drought Monitor:**

“Drought coverage slowly declined across the High Plains Region from about 69 percent in late December to about 65 percent in late January. Several winter storms brought heavy snow and blizzard conditions to parts of Wyoming, Colorado and Nebraska areas and some drought conditions were improved over the region. However, nearly two-thirds of the region is still experiencing some degree of drought... **The first week of the month could see light precipitation over the higher elevations in Wyoming**”<sup>1</sup>

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

U.S. Monthly Drought Outlook



Base map Sources: National Geographic, Esri, Garmin, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, INCREMENT P

Drought persists  
Drought remains but improves  
Drought removal likely  
Drought development likely  
No drought predicted

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 - 01/31/23

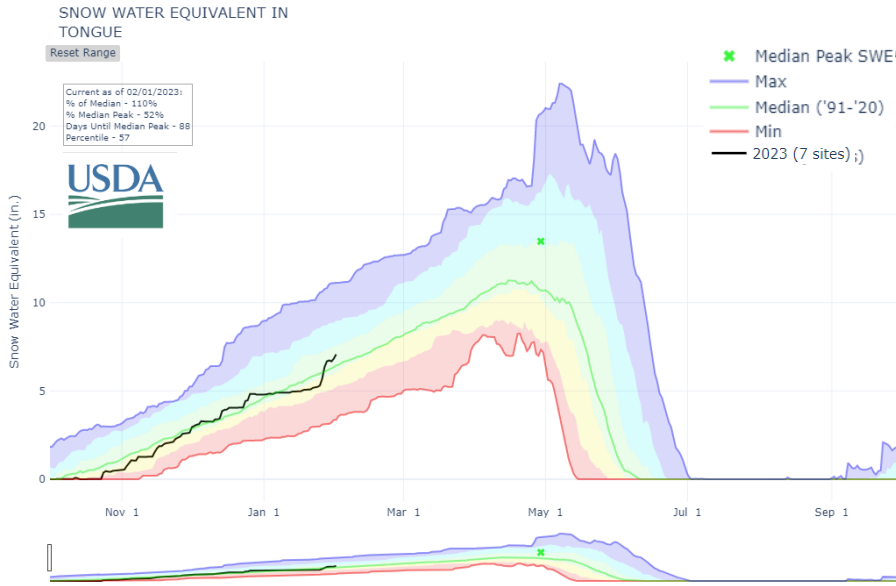
[Drought.gov](https://drought.gov)

Sources: [https://droughtmonitor.unl.edu/CurrentMap/StateDroughtMonitor.aspx?fips\\_56033](https://droughtmonitor.unl.edu/CurrentMap/StateDroughtMonitor.aspx?fips_56033)  
<https://www.drought.gov/forecasts>  
<sup>1</sup>[https://www.cpc.ncep.noaa.gov/products/expert\\_assessment/mdo\\_summary.php](https://www.cpc.ncep.noaa.gov/products/expert_assessment/mdo_summary.php)  
<https://droughtmonitor.unl.edu/Summary.aspx>



# 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.



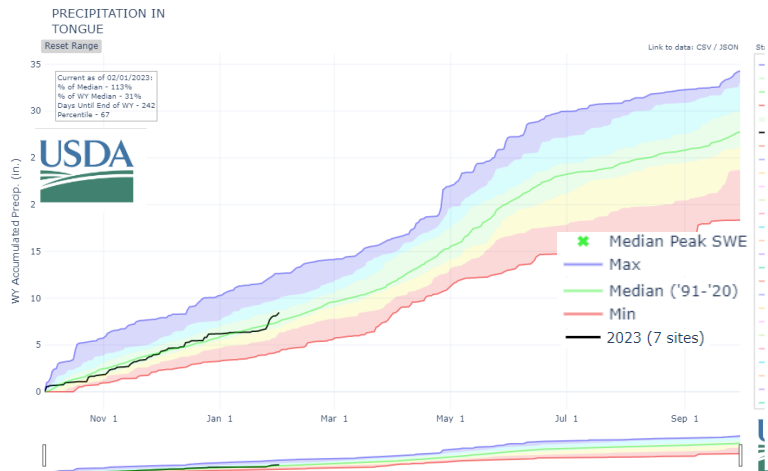
## Snowpack in Tongue River Watershed:

The USDA's water year annually begins on October 1st. Accumulation plateaued in January, except for a large spike at the end of the month. Across the watershed there is 7.1 in of SWE, which is 0.7 in above median. Snowpack for the 2023 water year is currently in the 57th percentile.

## Precipitation in Tongue River

### Watershed:

Precipitation in the Bighorn Mountains for the Tongue River watershed plateaued for a majority of January. It is currently 113% of the median which is in the 67th percentile. As of February 1st, the stations have recorded approximately 8.5 inches of precipitation for the water year.



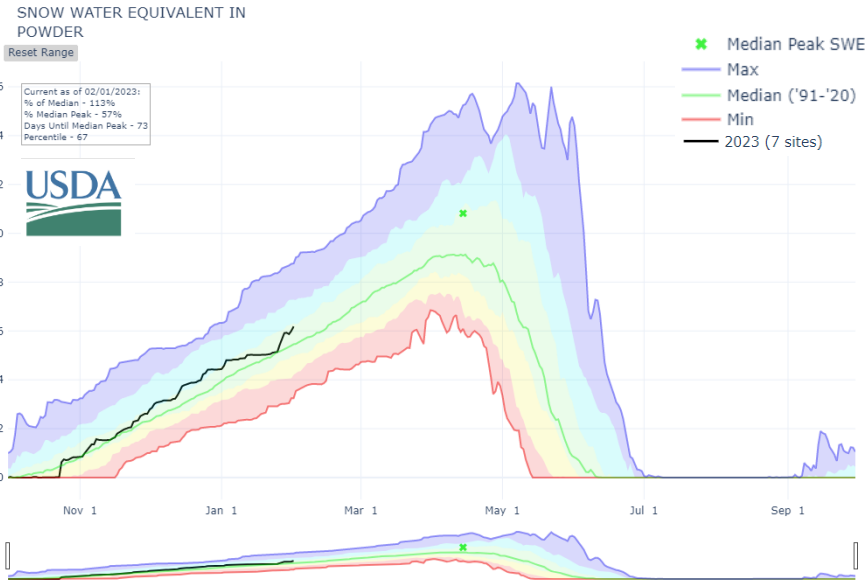
Sources:

[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.

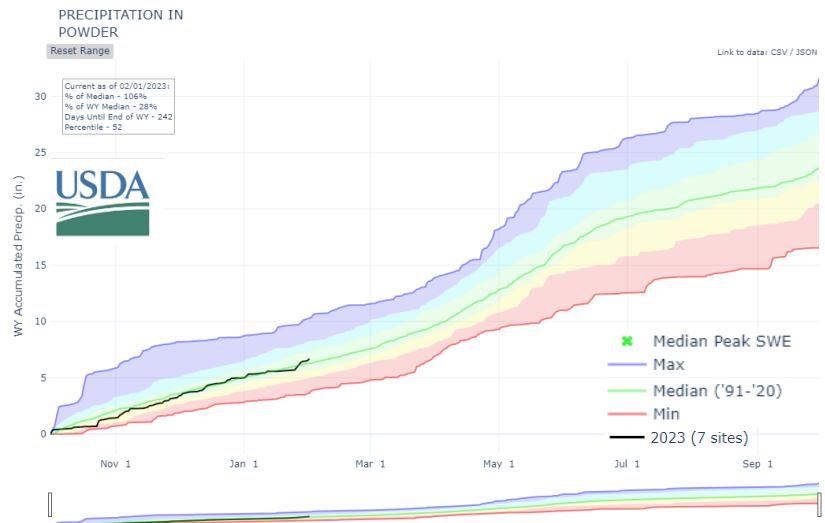


## Snowpack in Powder River Watershed:

The Powder River watershed has accumulated approximately 6.2 in. of snowpack as of January 1st, leaving the overall at 113% of the median snowpack for this time of year, and in the 67th percentile compared to previous years.

## Precipitation in Powder River

**Watershed:** Precipitation in the Bighorn Mountains for the Powder River watershed is now above median. It is currently 106% of median which is in the 52nd percentile. As of February 1st, the stations have recorded close to 6.7 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 February 1st, 2022, Lake DeSmet has 197,878 A.F. in storage, which is 84% of its total capacity.

Reservoir	Current Storage (Acre-ft)	Total Storage (Acre-ft)	Total Storage (%)
Bighorn	1,837	5,756	31.91%
Cross Creek	0	798	0.00%
Dome Lake No.1	1,355	2,030	66.74%
Kearney Lake	1,642	7,500	21.89%
Park	3,552	12,500	28.42%
Sawmill	883	1,831	48.21%

## 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 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.



47,859 / 79,071 Acre-Ft.  
60.5% Full

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>

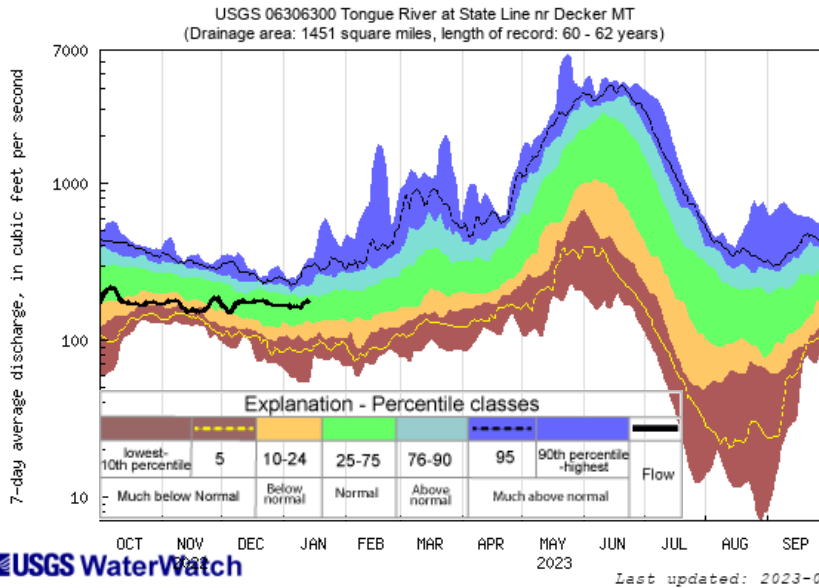
<https://gis.dnrc.mt.gov/apps/StAGE/>





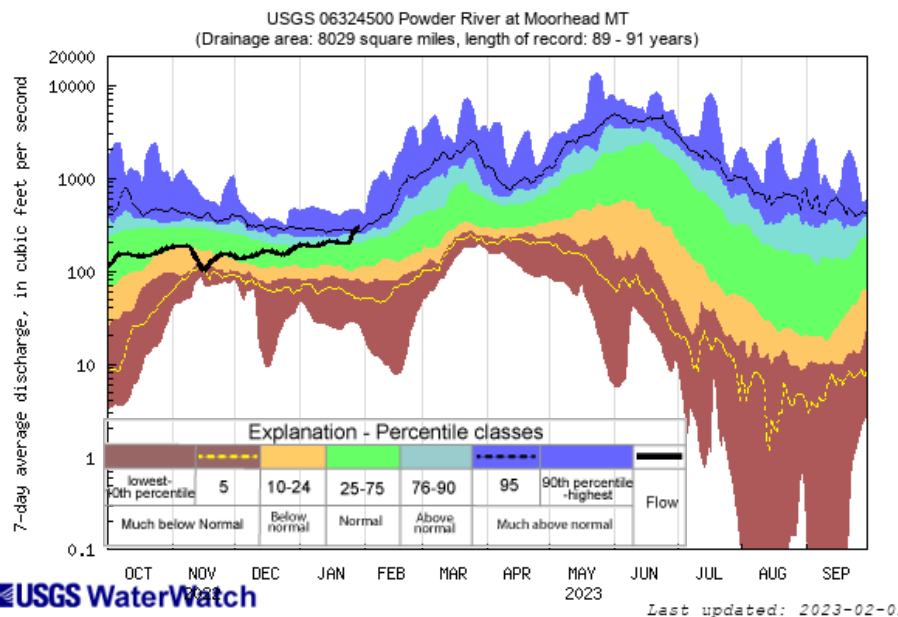
# Select Stream Flow Stations

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.



**Tongue River Border Station Stream Flow:** The stream flow for the beginning of January was in the 50th percentile and stayed relatively consistent throughout the month. As of February 1st, the stream flow is approximately 200 cfs.

**Powder River Border Station Stream Flow:** The stream flow at the beginning January was in the smack dab along the median with a discharge of 160 cfs. Streamflow increased dramatically through January, ending at approximately 347 cfs (97th percentile).



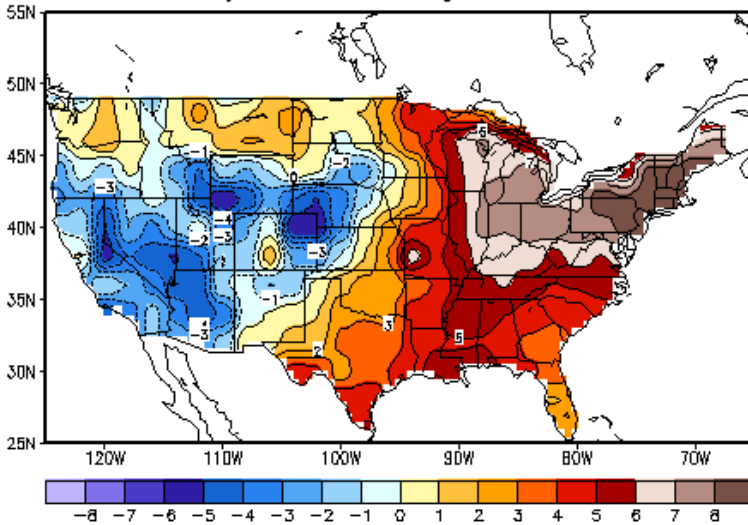
Sources: <https://waterwatch.usgs.gov/index.php?id=mv01d>  
[https://waterwatch.usgs.gov/?id=wwchart\\_sitedur&ofmt=plot\\_mvbg&site\\_no=06306300](https://waterwatch.usgs.gov/?id=wwchart_sitedur&ofmt=plot_mvbg&site_no=06306300)  
[https://waterwatch.usgs.gov/?id=wwchart\\_sitedur&ofmt=plot\\_mvbg&site\\_no=06324500](https://waterwatch.usgs.gov/?id=wwchart_sited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

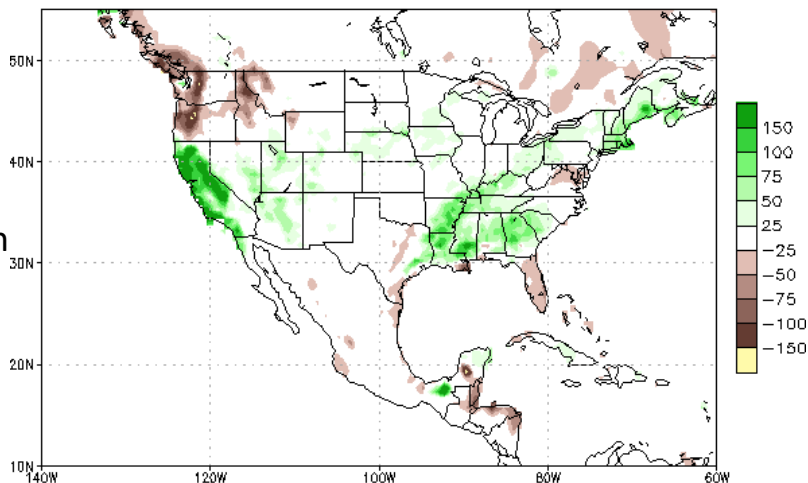
**Mean Temp (F) Anomaly**  
30-day mean ending Jan 31 2023



**Temperature Anomaly:** In February, the average temperature was within 1°F of what we generally see in Sheridan County.

**Precipitation:** The rainfall for January in Sheridan County was within 25 mm (~1 inch) of what is average. Monthly precipitation has slowed down, causing slight drought conditions to form in the southeastern corner of Sheridan County.

Prep Anomalies (mm) 02JAN2023-31JAN2023



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)

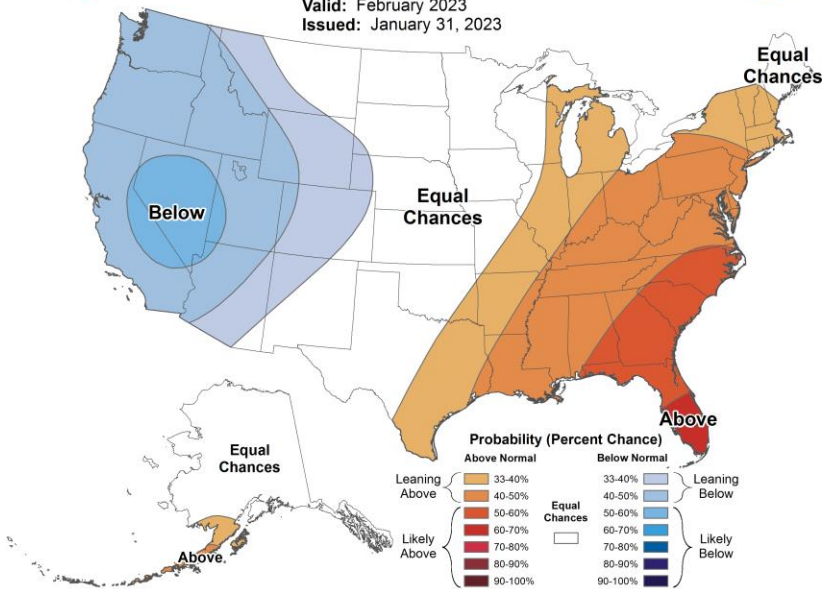
Explore link above for an Interactive map that displays percentage chance above and below normal for any point in US.



## Monthly Temperature Outlook



Valid: February 2023  
Issued: January 31, 2023



**Temperature:** Sheridan County has a 33% of seeing temperatures below average for the month of February.

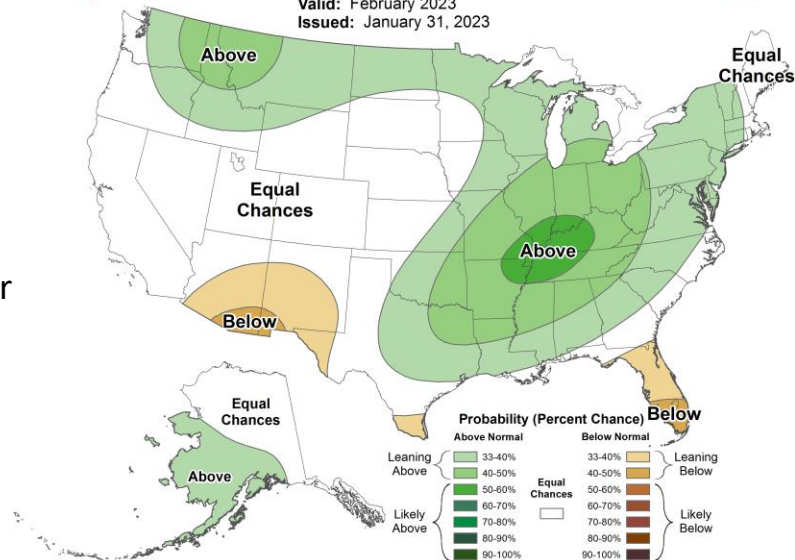
**Precipitation:** Sheridan County has equal chances of seeing precipitation rates either above or below average for the following month.



## Monthly Precipitation Outlook



Valid: February 2023  
Issued: January 31, 2023



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)



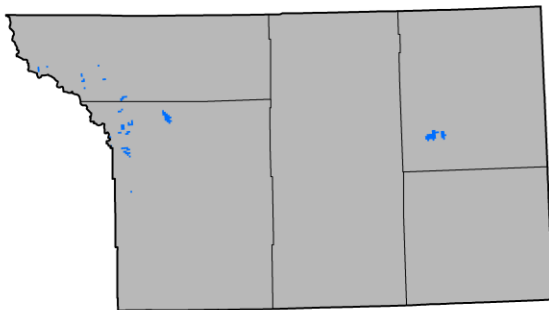


# Vegetation Drought Response and Soil Moisture

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

January 29, 2023



**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:**

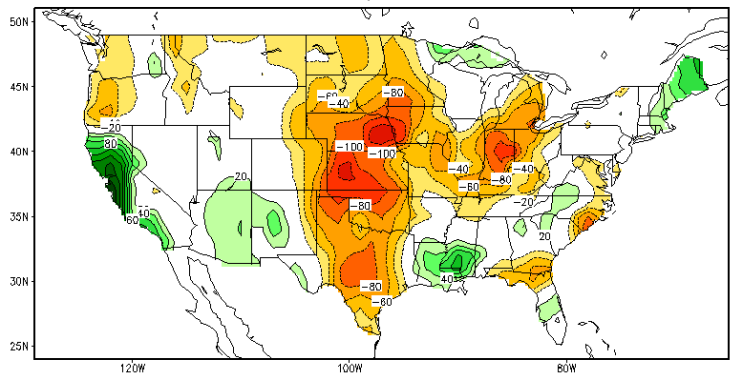
The Vegetation Drought Response Index shows that all of the county's vegetation is now out-of-season.



**Soil Moisture:**

Soil moisture is normal in Sheridan County, a constant from last month, but eastern Wyoming is currently experiencing lowered soil moisture. Soil conditions to the west and north have stayed constant.

Calculated Soil Moisture Anomaly (mm)  
JAN, 2023



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)

