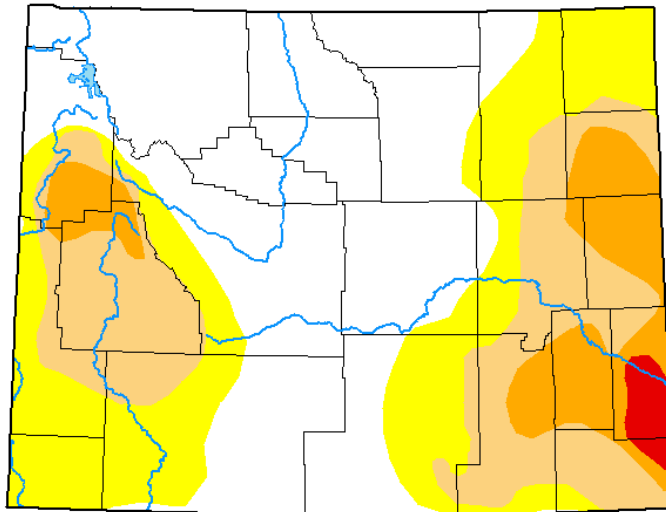


# Sheridan County Water Supply Report

May - 2023

## U.S. Drought Monitor Wyoming

**April 25, 2023**  
(Released Thursday, Apr. 27, 2023)  
Valid 8 a.m. EDT



Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
<b>Current</b>	46.13	53.87	29.85	10.55	1.28	0.00
<b>Last Week</b> 04-18-2023	44.54	55.46	31.30	8.92	1.28	0.00
<b>3 Months Ago</b> 01-24-2023	29.76	70.24	44.84	20.82	3.09	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> 04-26-2022	0.00	100.00	94.14	58.87	18.29	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 Tinker  
CPC/NOAA/NWS/NCEP



[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  
Community  
LAND TRUST  
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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.

# Table of Contents

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# Drought Index and Change

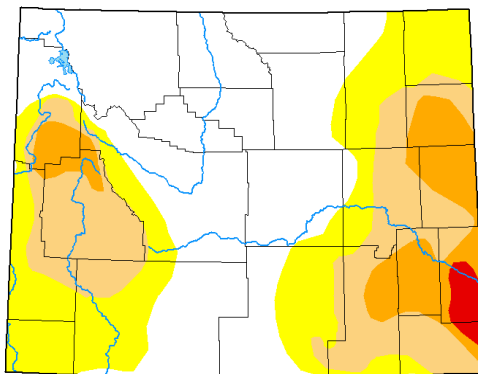
The U.S. Drought Monitor gives you a broad overview of the drought conditions in the US. Its strength is bringing together many ways of determining drought. It is useful as a large-scale view of drought, but local drought resiliency efforts are not considered.

## U.S. Drought Monitor Wyoming

April 25, 2023  
(Released Thursday, Apr. 27, 2023)  
Valid 8 a.m. EDT

### Current Drought Monitor:

No portion of Sheridan County is experiencing drought conditions. This is a constant from last month, as well as a complete change from last year's conditions. Elevated precipitation over the past water year has alleviated drought in the county.



**Intensity:**  
None  
D0 Abnormally Dry  
D1 Moderate Drought  
D2 Severe Drought  
D3 Extreme Drought  
D4 Exceptional Drought

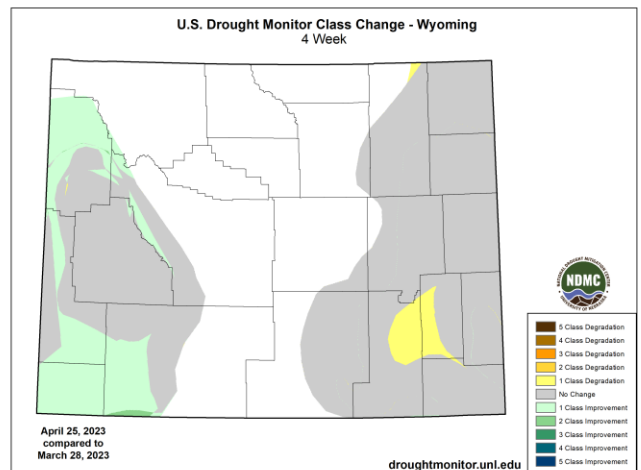
*The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. For more information on the Drought Monitor, go to <https://droughtmonitor.unl.edu/About.aspx>*

**Author:**  
Richard Tinker  
CPC/NOAA/NWS/NCEP



### Change in Drought Monitor:

Comparing the beginning and end of April, drought in the county has remained alleviated. The entire county is free of drought conditions. Counties to the east and south show signs of drought conditions, but improvement has plateaued from the previous month.



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	2023-04-25	100.00	0.00	0.00	0.00	0.00	0.00	0
Last Week	2023-04-18	100.00	0.00	0.00	0.00	0.00	0.00	0
3 Months Ago	2023-01-24	92.56	7.44	0.00	0.00	0.00	0.00	7
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	2022-04-26	0.00	0.00	0.00	28.14	71.86	0.00	372

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.”

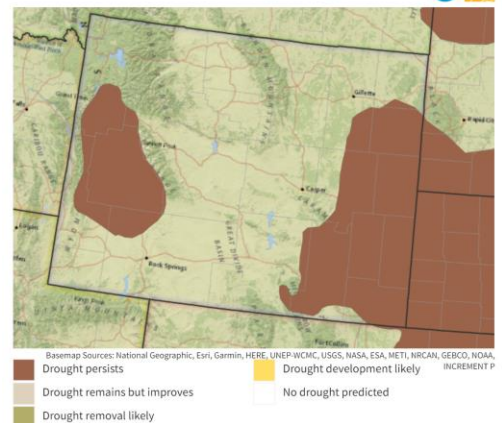
**History of Drought Monitor:** Last year, in April of 2022, Sheridan County was experiencing severe - extreme drought conditions (D2-D3). Conditions improved steadily through 2022, especially with the start of the new water year in September, and have remained constant with 100% of the county being free of drought conditions.

### Forecast for Drought Monitor:

“To the west, conditions remained generally unchanged in eastern parts of Wyoming and Colorado, with deterioration (to D2) limited to a small area in southeastern Wyoming. In the other area of extant dryness and drought in western Wyoming – adjacent to Utah and Idaho - some areas saw improved conditions, as did states to the north and west.”<sup>1</sup>

Forecast confidence is moderate 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: 04/30/23

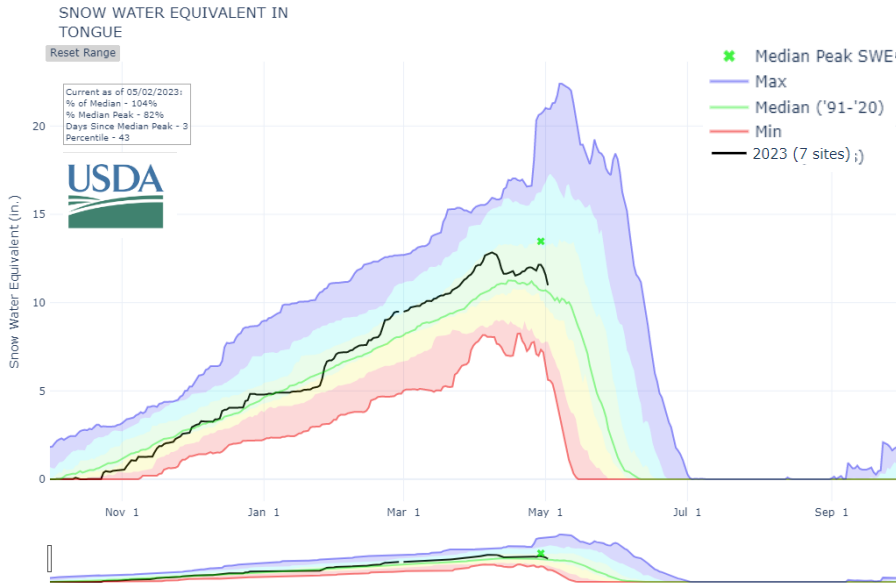
[Drought.gov](https://drought.gov)

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.



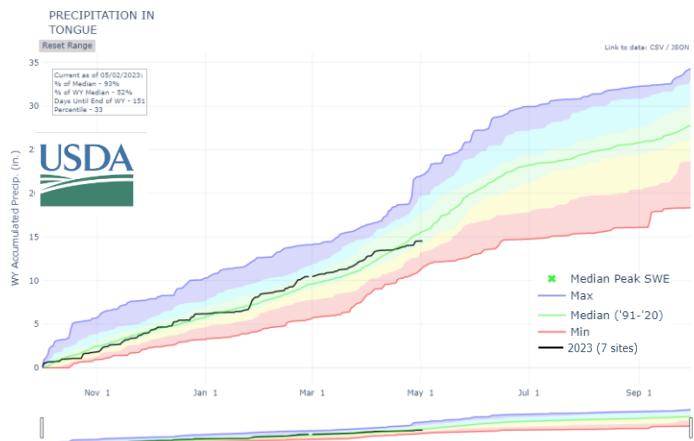
## Snowpack in Tongue River Watershed:

Mid-April saw the beginnings of decrease in the snowpack—spring has arrived and seems to be here to stay. As of May 2nd, there is 11.0 in of SWE, which is 0.4 in above median. This is 82% of the highest SWE we've seen this year: 12.8 in on Apr 8. Snowpack for the 2023 water year is currently in the 43rd percentile.

## Precipitation in Tongue River

### Watershed:

Precipitation in the Bighorn Mountains for the Tongue River watershed tapered off halfway through the month of April. It is currently 93% of the median which is in the 33rd percentile. As of May 2nd, the stations have recorded approximately 14.5 inches of precipitation for the water year.



Sources:

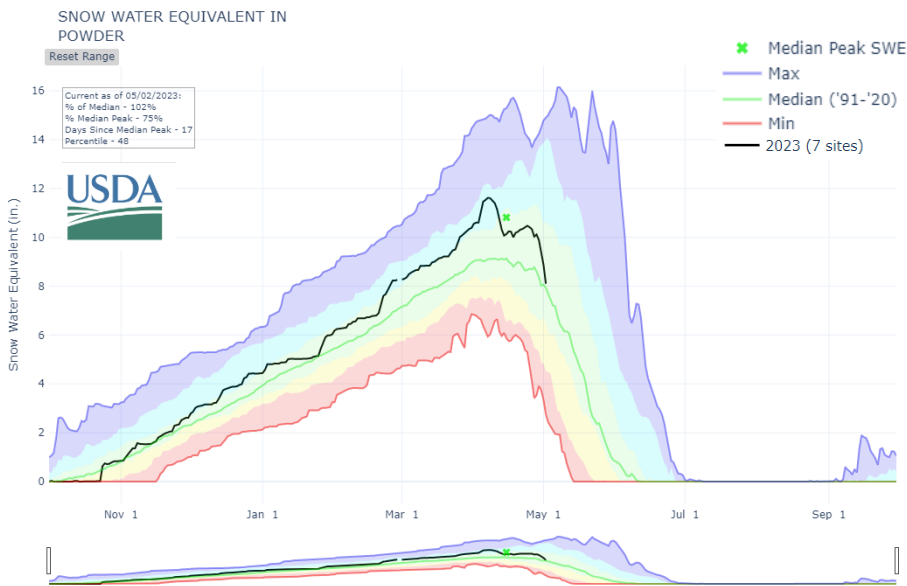
[https://www.nrcs.usda.gov/Internet/WCIS/AWS\\_PLOTS/basinCharts/POR/WTEQ/assocHUC6/100901\\_Tongue.html](https://www.nrcs.usda.gov/Internet/WCIS/AWS_PLOTS/basinCharts/POR/WTEQ/assocHUC6/100901_Tongue.html)

[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.

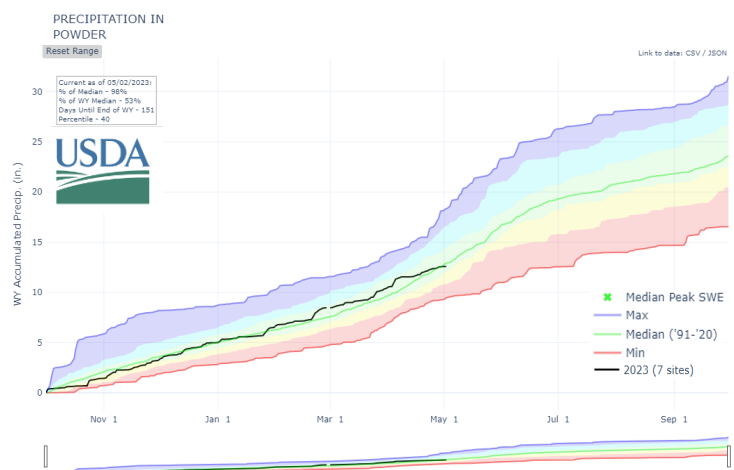


## Snowpack in Powder River Watershed:

Snowpack for the Powder River has deviated from the median a fair amount throughout April. SWE peaked earlier than expected on April 6th at 11.6 in. Following the 8th, the snowpack began deteriorating rather rapidly, and on May 2nd—there is only 8.1 in of accumulated snow. This is 102% of the expected median, and in the 48th percentile of previous years.

## Precipitation in Powder River

**Watershed:** Precipitation in the Bighorn Mountains for the Powder River watershed has tapered off with spring's mid-April arrival. It is currently 98% of median which is in the 40th percentile. As of May 2nd, the stations have recorded 12.6 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.

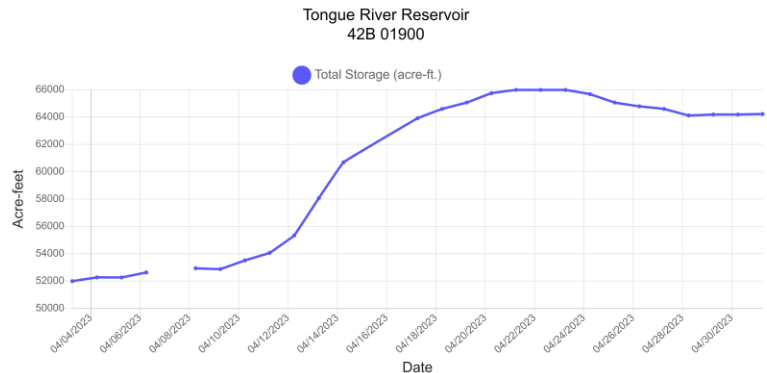
## Lake DeSmet

As of April 3rd, 2023, Lake DeSmet has 201,524 A.F. in storage, which is 86% of its total capacity.

Reservoir	Current Storage (Acre-ft)	Total Storage (Acre-ft)	Total Storage (%)
Bighorn	2,308	4,627	49.88%
Cross Creek	0	798	0.00%
Dome Lake No.1	1,364	2,030	67.20%
Kearney Lake	1,478	6,324	23.37%
Park	3,147	10,362	30.37%
Sawmill	790	1,275	61.93%

## Winter Watersheds

Although winter is beginning to retreat and make way for spring, most of the reservoirs affecting the Sheridan community the most are still relying on provisional data. Reservoirs like these will take much longer to fully thaw out and allow use of stream gages. Keeping that in mind, some storage reports may not be 100% accurate to what is truly stored in the reservoir. After a very wet April, however, May should bring warmer temperatures to thaw out these measurement devices.



64,216 / 79,071 Acre-Ft.  
81.2% 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/gage-report/location/3f087fe86bde421f857dfedff4e40e93/1680476400000-1683154740000/>



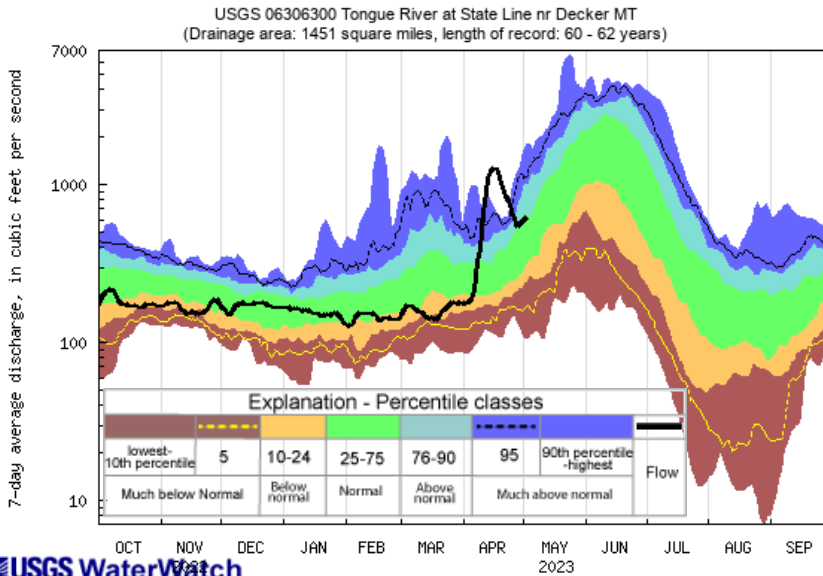


# Select Stream Flow Stations

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.

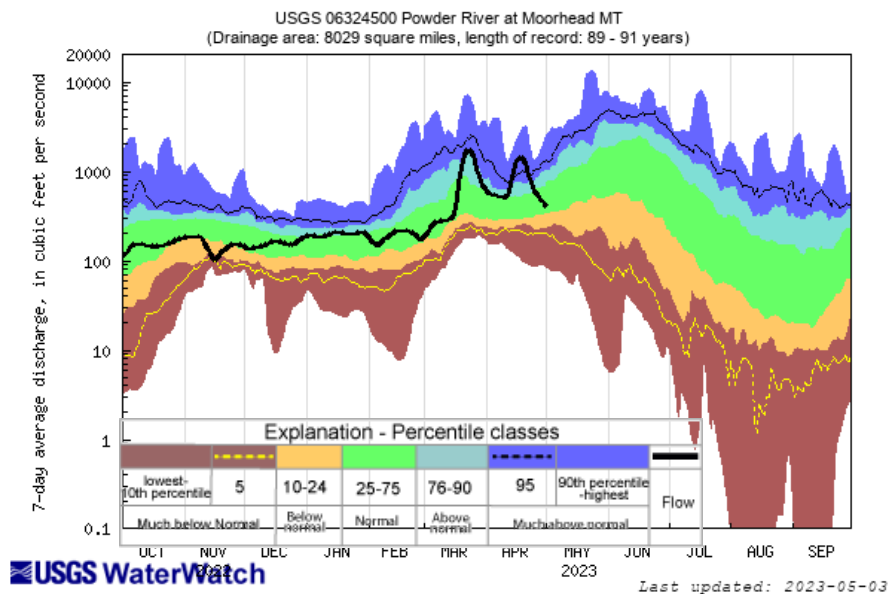
## Tongue River Border Station

**Stream Flow:** The month of April brought heavy rain-and-snow falls, majorly increasing the streamflow of the Tongue River. Discharge rate peaked in mid-April at approximately 1830 cfs, but this rate has fallen recently and settled at approximately 658 cfs—which is in the 74th percentile for this time of year.



## Powder River Border Station

**Stream Flow:** Discharge rates for the month of April saw a lot of fluctuation. Peaking at 2,070 cfs on April 14th—this system has received a great amount of water. The streamflow has since fallen by 80%, landing at 406 cfs on May 1st—but this is still above average, in the 51st percentile.

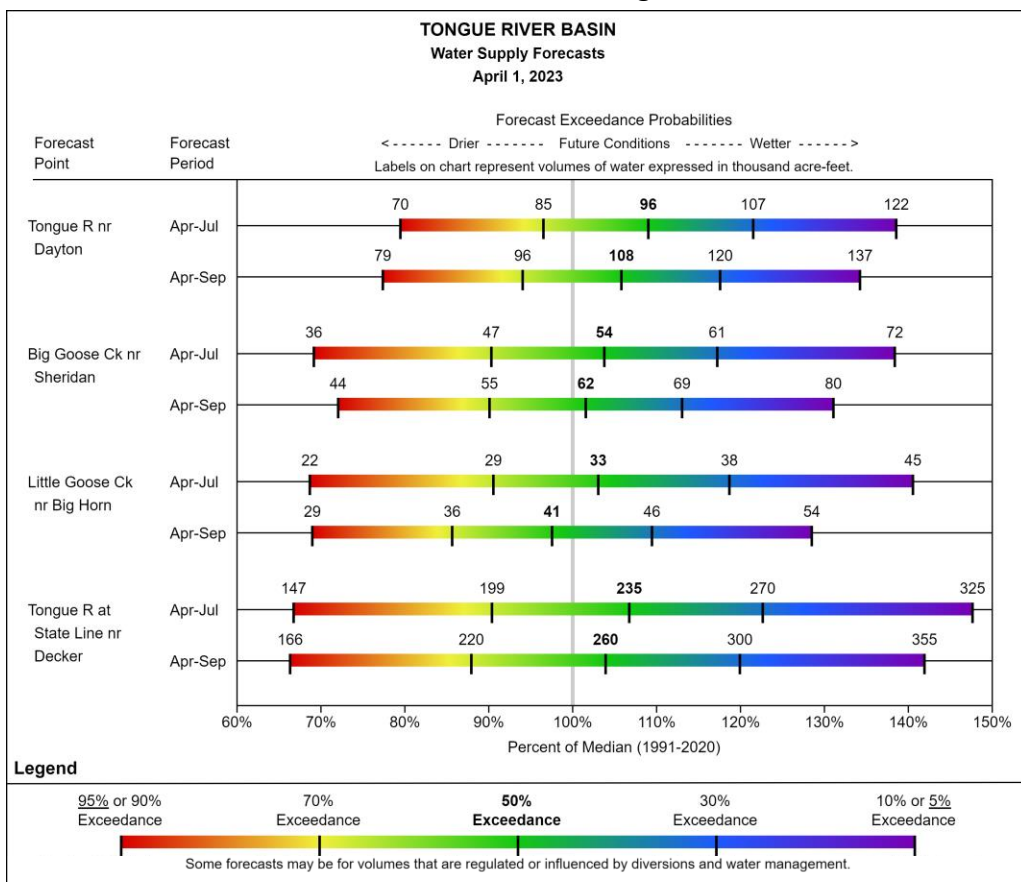


Sources: <https://waterwatch.usgs.gov/index.php?id=mv01d>  
[https://waterwatch.usgs.gov/?id=wwchart\\_sitedur&ofmt=plot\\_mvbg&site\\_no=06306300](https://waterwatch.usgs.gov/?id=wwchart_sitedur&ofmt=plot_mvbg&site_no=06306300)  
[https://waterwatch.usgs.gov/?id=wwchart\\_sitedur&ofmt=plot\\_mvbg&site\\_no=06324500](https://waterwatch.usgs.gov/?id=wwchart_sited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



# Tongue Water Supply Forecast

This chart takes a while to understand but take your time to look at the axes and the legend. It holds valuable information. The exceed value is percent chance that flows exceed will exceed a given volume. For instance, 90% exceedance means there is a 90% chance it will be above and a 10% chance it will be below. It's still a 1/10 chance of being below.



**Tongue River Water Supply:** In the Tongue River watershed it is likely to be close to what the median stream flow was between 1990-2020, although perhaps a little greater than expected. Most sites are above the median, but only by a little bit.

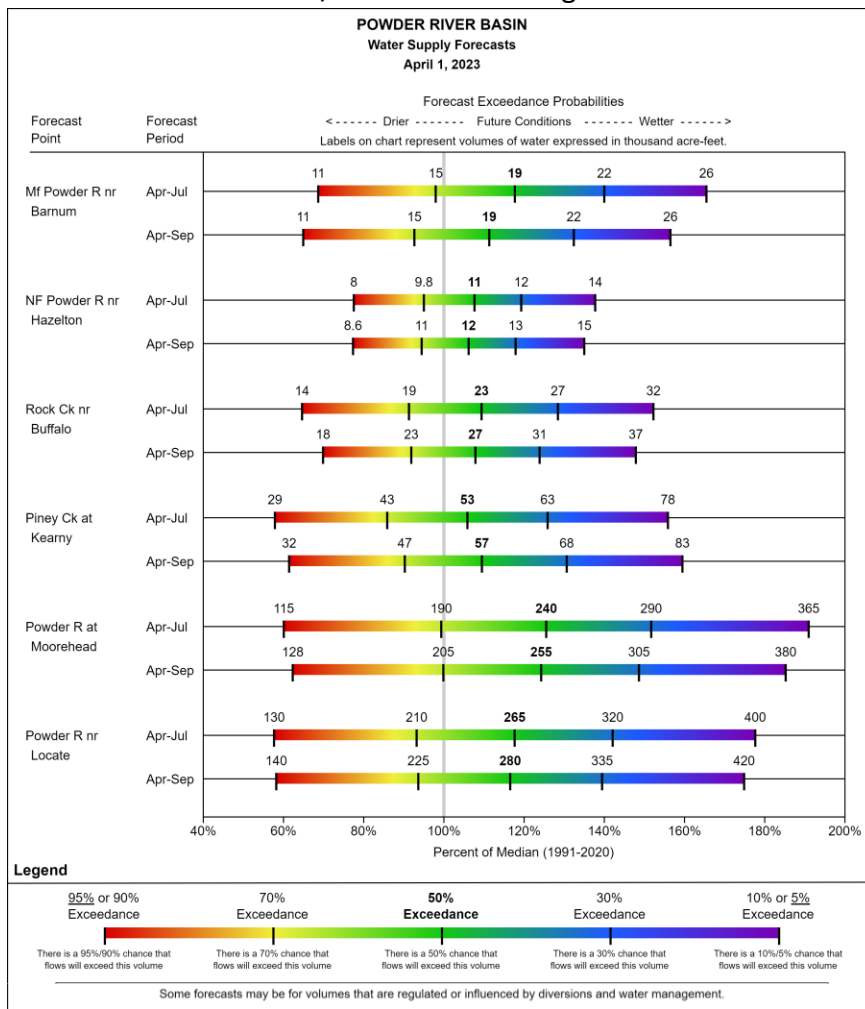
Sources:

<https://www.nrcs.usda.gov/wps/portal/wcc/home/waterSupply/waterSupplyForecasts/>



# Powder Water Supply Forecast

This chart takes a while to understand but take your time to look at the axes and the legend. It holds valuable information. The exceed value is percent chance that flows exceed will exceed a given volume. For instance, 90% exceedance means there is a 90% chance it will be above and a 10% chance it will be below. It's still a 1/10 chance of being below.



**Powder River Water Supply:** In the Powder River watershed, the streamflow is likely higher than average for the summer of 2023. Most sites are predicted to fall around the 60% exceedance mark, with no sites being below median.

Sources:

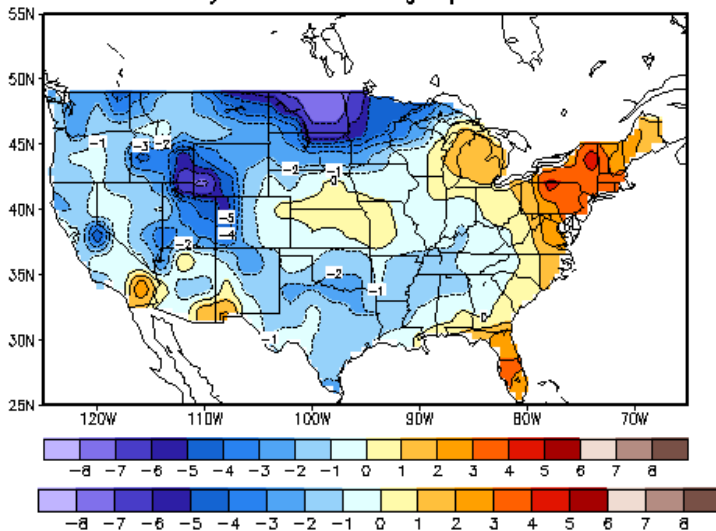
<https://www.nrcs.usda.gov/wps/portal/wcc/home/waterSupply/waterSupplyForecasts/>



# 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.

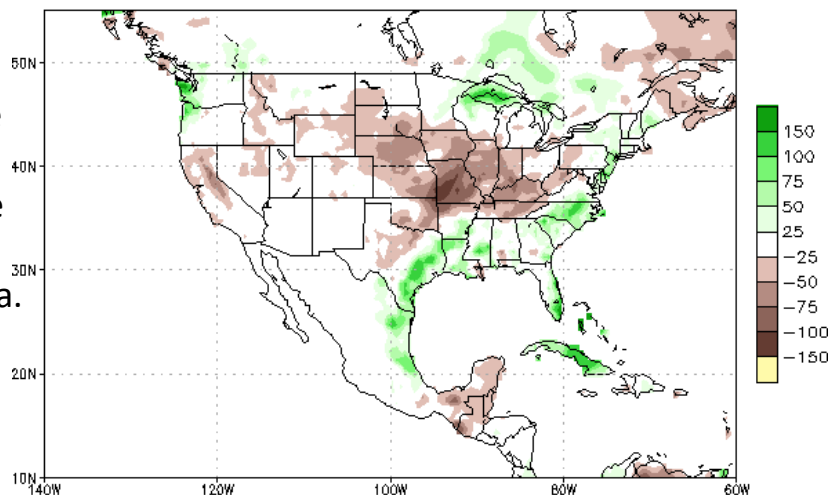
Mean Temp (F) Anomaly  
30-day mean ending Apr 30 2023



**Temperature Anomaly:** In April, the average temperature was 3°F lower than what we generally see in Sheridan County.

**Precipitation:** The rainfall for April in Sheridan County was 25 mm (~1 inch) below what is average for the month. Monthly precipitation, although having increased over the past month, is beginning to fall below what is expected for the area.

Prcp Anomalies (mm) 03APR2023-02MAY2023



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)

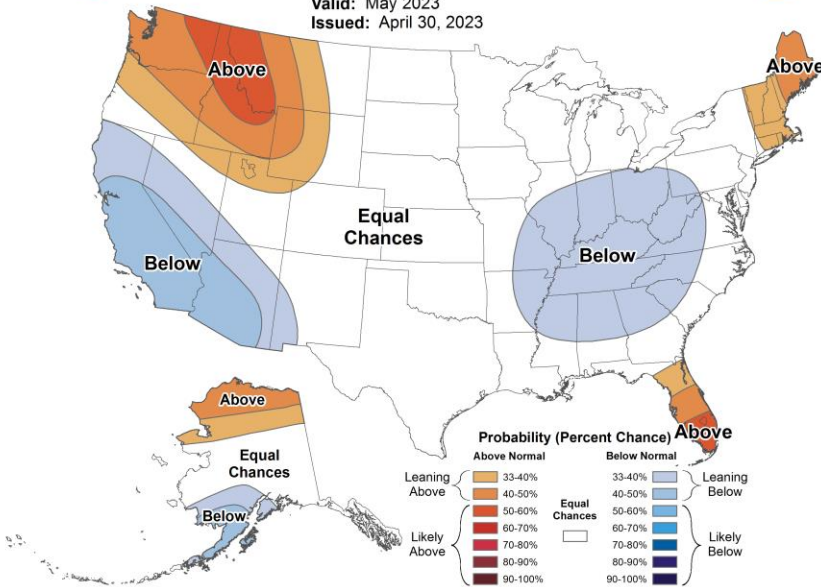
Explore link above for an Interactive map that displays percentage chance above and below normal for any point in US.



## Monthly Temperature Outlook



Valid: May 2023  
Issued: April 30, 2023



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

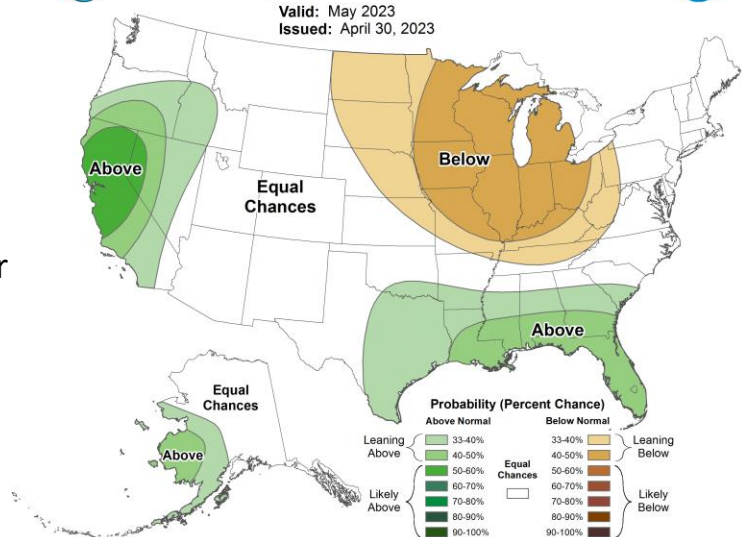
**Precipitation:** Sheridan County has equal chances of seeing precipitation rates either above or below average for the coming month.



## Monthly Precipitation Outlook



Valid: May 2023  
Issued: April 30, 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)

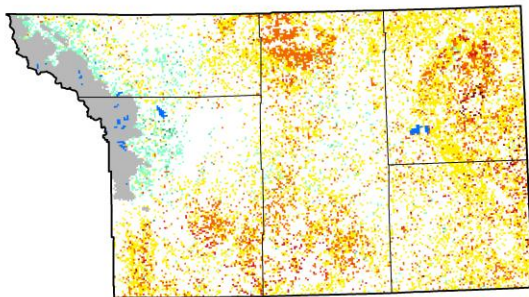


# Vegetation Drought Response and Soil Moisture

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

April 30, 2023



**Vegetation Condition**

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



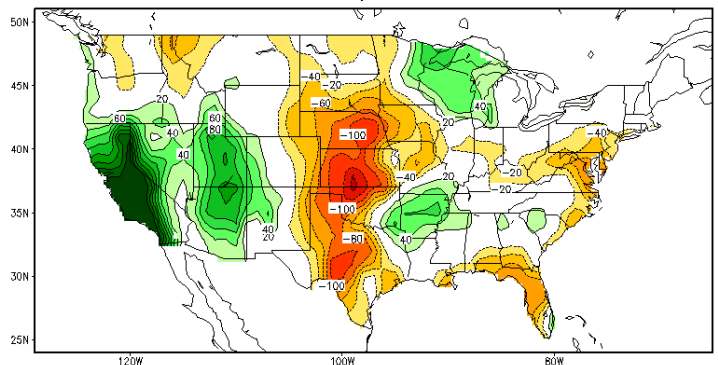
**Vegetation Drought Response:**

The Vegetation Drought Response Index shows that approximately 80% of the county's vegetation is now back in season, with a majority of the county experiencing pre-drought stress.

**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)  
APR, 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)

