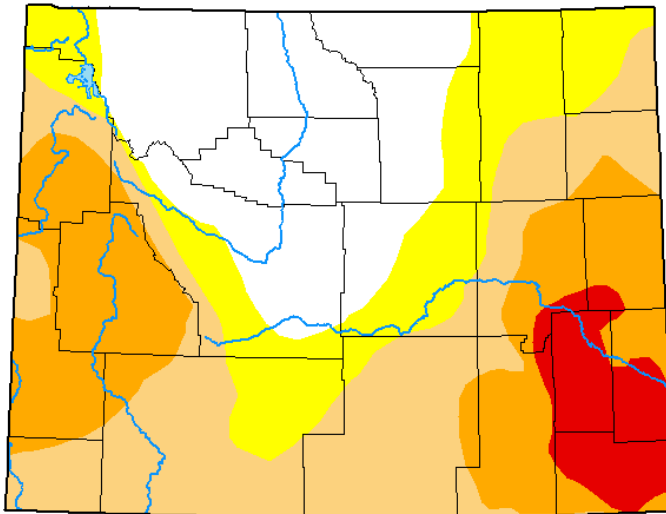


Sheridan County Water Supply Report

December - 2022

U.S. Drought Monitor Wyoming

November 29, 2022
(Released Thursday, Dec. 1, 2022)
Valid 7 a.m. EST



Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	25.67	74.33	55.88	28.59	6.45	0.00
Last Week 11-22-2022	18.41	81.59	56.81	28.63	6.45	0.00
3 Months Ago 08-30-2022	9.86	90.14	55.53	21.24	1.59	0.00
Start of Calendar Year 01-04-2022	0.00	100.00	97.93	65.27	10.98	0.00
Start of Water Year 09-27-2022	15.67	84.33	52.52	20.01	3.71	0.00
One Year Ago 11-30-2021	0.00	100.00	96.61	64.51	16.87	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:

David Simeral
Western Regional Climate Center



droughtmonitor.unl.edu

Compiled for SCLT by Iris Kurz, Undergraduate Research Assistant at University of Wyoming's Haub School. Contact 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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Connecting people to land and history

How to Use This Report

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

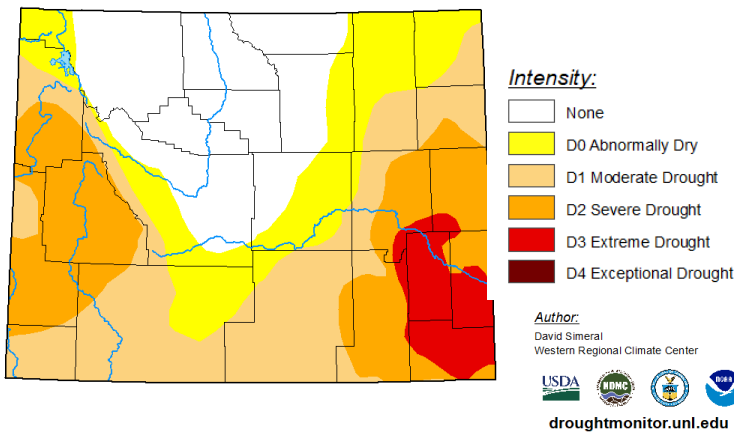
The U.S. Drought Monitor gives you a broad overview of the drought conditions in the US. Its strength is bringing together many ways of determining drought. It is useful as a large-scale view of drought, but local drought resiliency efforts are not considered.

U.S. Drought Monitor Wyoming

November 29, 2022
(Released Thursday, Dec. 1, 2022)
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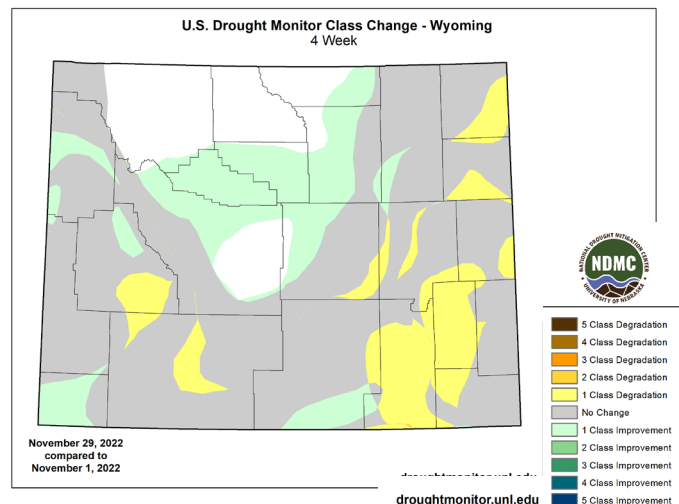
Current Drought Monitor:

6.48% of Sheridan County is experiencing abnormally dry (D0) conditions. This is an improvement from last month, as abnormally dry areas (D0) shrank by almost 15% and most of the country experiences little-to-no drought symptoms. Possible Impacts: D0 (Abnormally Dry) can cause slowing of plant growth.



Change in Drought Monitor:

Comparing the beginning and end of November, drought in the county has seen a fair amount of improvement. Southern Sheridan County saw some improvement with no degradation present across the entire county. To the east, Campbell County saw some improvement, but generally no change. Johnson County to the south experienced immense improvement across most of the county.



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	2022-11-29	93.52	6.48	0.00	0.00	0.00	0.00	6
Last Week	2022-11-22	62.25	37.75	0.00	0.00	0.00	0.00	38
3 Months Ago	2022-08-30	6.09	64.21	29.70	0.00	0.00	0.00	124
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	2021-11-30	0.00	0.00	0.00	68.77	31.23	0.00	331

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.”

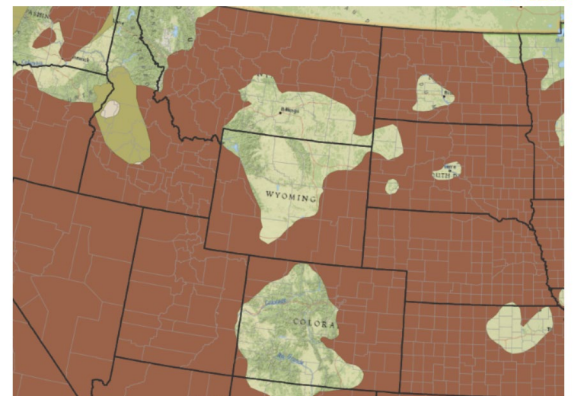
History of Drought Monitor: In November of 2021 Sheridan County was experiencing severe - extreme drought conditions (D2-D3), which persisted into the new year. Almost all the county is now out of drought, a significant improvement.

Forecast for Drought Monitor:

“On this week’s map, improvements were made on the map in the greater Denver-Boulder area of Colorado and in portions of eastern Wyoming in response to above-normal precipitation in the short-term...According to NOAA NCEI, the Great Plains Region saw its 9th warmest (+3.0-deg F anomaly) and 8th driest (-1.4-inch anomaly) September-October on record. Statewide, Wyoming experienced its 3rd warmest (+4.2-deg F anomaly)...September-October period on record.”¹

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

U.S. Monthly Drought Outlook



Basemap Sources: National Geographic, Esri, Garmin, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, INCREMENT P
 Legend:
 - Brown: Drought persists
 - Tan: Drought remains but improves
 - Green: Drought removal likely
 - Yellow: Drought development likely
 - White: No drought predicted
 Source(s): Climate Prediction Center
 Updates Monthly - 11/30/22

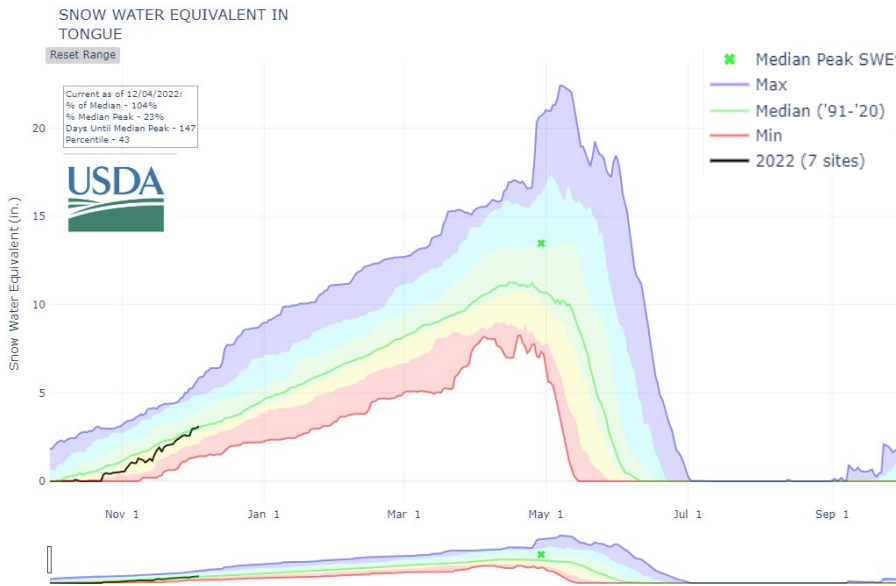
Drought.gov

Sources: https://droughtmonitor.unl.edu/CurrentMap/StateDroughtMonitor.aspx?fips_56033
<https://www.drought.gov/forecasts>
https://www.cpc.ncep.noaa.gov/products/expert_assessment/mdo_summary.php
 1 https://www.cpc.ncep.noaa.gov/products/expert_assessment/mdo_discussion.php



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.

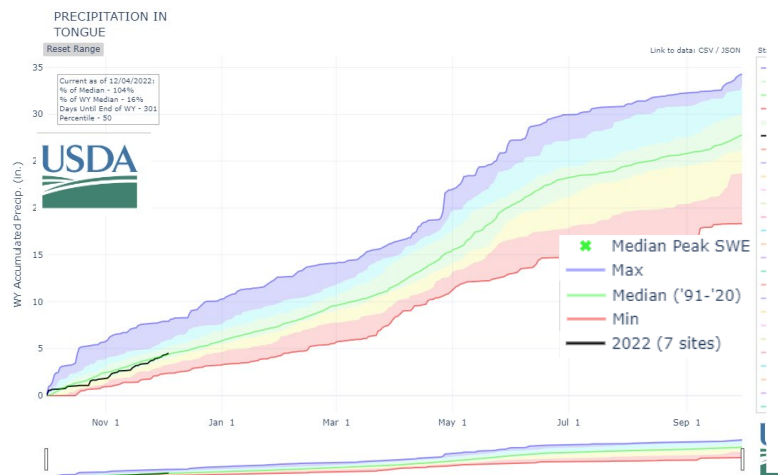


Snowpack in Tongue River Watershed:

The USDA's water year annually begins on October 1st. Since the beginning November snow has begun to accumulate more quickly in the Tongue River watershed. Across the watershed there is 3.1 in of SWE, which is just slightly above median. 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 has risen back above the median in November. It is currently 104% of the median which is in the 50th percentile. As of December 4th, the stations have recorded approximately 4.5 inches of precipitation for the water year.



Sources:

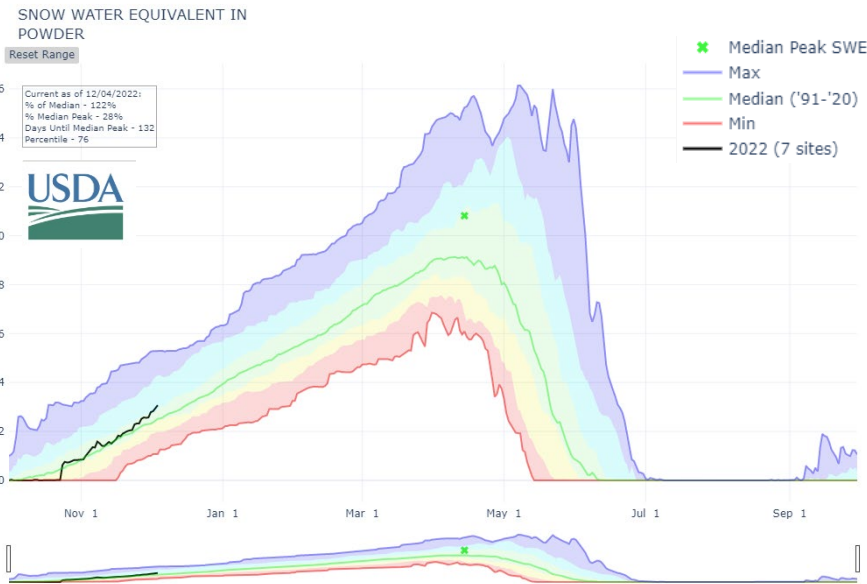
https://www.nrcs.usda.gov/Internet/WCIS/AWS_PLOTS/basinCharts/POR/WTEQ/assocHUC6/100901_Tongue.html

https://www.nrcs.usda.gov/Internet/WCIS/AWS_PLOTS/basinCharts/POR/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.

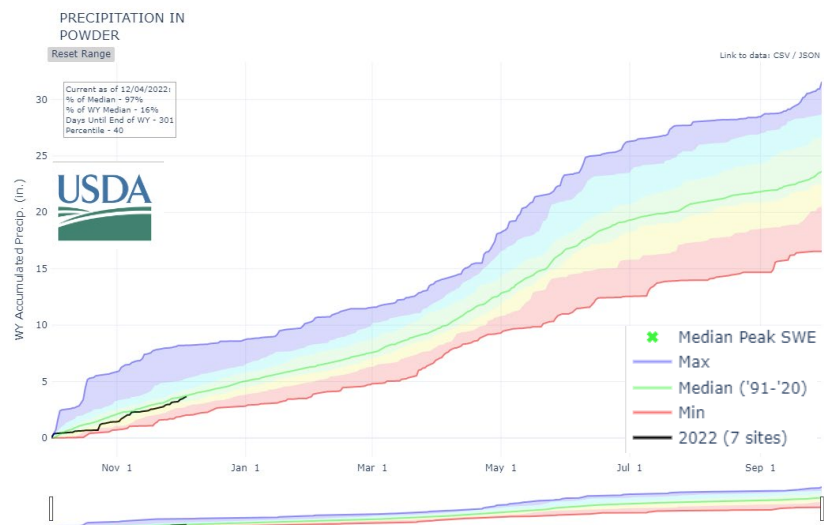


Snowpack in Powder River Watershed:

The Powder River watershed has accumulated approximately 3.1 in. of snowpack by December 4th, leaving the overall at 122% of the median snowpack for this time of year, and in the 76th percentile compared to previous years.

Precipitation in Powder River

Watershed: Precipitation in the Big Horn Mountains for the Powder River watershed is still slightly below median. It is currently 97% of median which is in the 40th percentile. As of December 4th, the stations have recorded close to 3.7 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/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

Data for Lake Desmet was not available at time of publication, but will be included in next month's report.

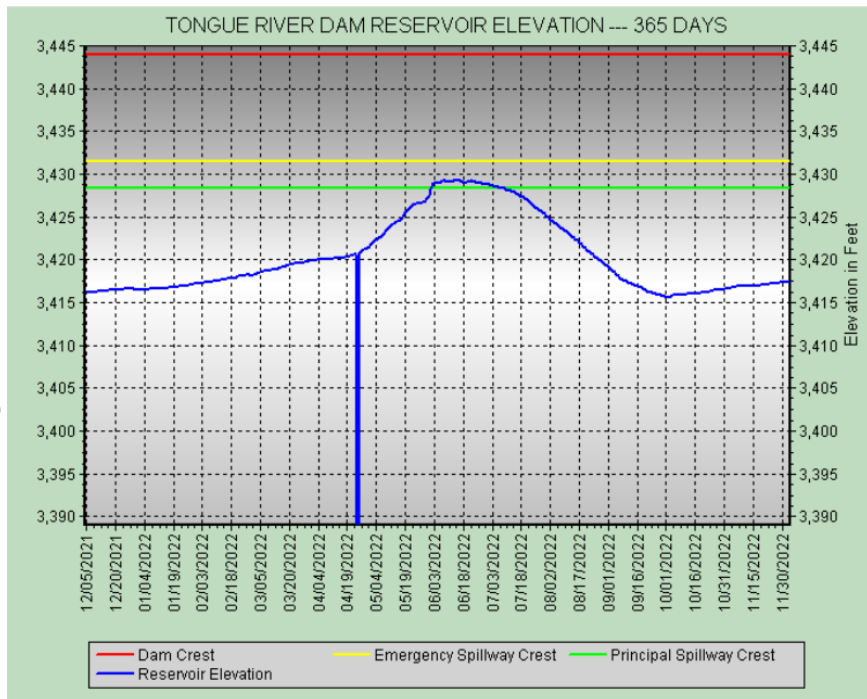
Reservoir	Current Storage (Acre-ft)	Total Storage (Acre-ft)	Total Storage (%)
Bighorn	1,549	5,756	26.92%
Cross Creek	0	798	0.00%
Dome Lake No.1	1,355	2,030	66.74%
Kearney Lake	1,665	7,500	22.20%
Park	3,805	12,500	30.44%
Sawmill	917	1,831	50.08%

Tongue River Reservoir

Tongue River Reservoir has 45,161 acre-ft of water stored, an increase of about 3,000 A.F. from last month. Its maximum capacity is 79,071 acre-ft. In the spring, Tongue River Reservoir can call on post 1950s water rights if it is not predicted to fill to 72,500 acre-ft of water.

Compared to the past 365 days, water elevation was at its lowest in October, but has increased to be equal to that of February.

This is a good sign for overall watershed trends should storage continue to increase, or remain stable, throughout the winter months.



Sources:

Lake DeSmet Operating Department at lakedesmet@johnsoncowy.us

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

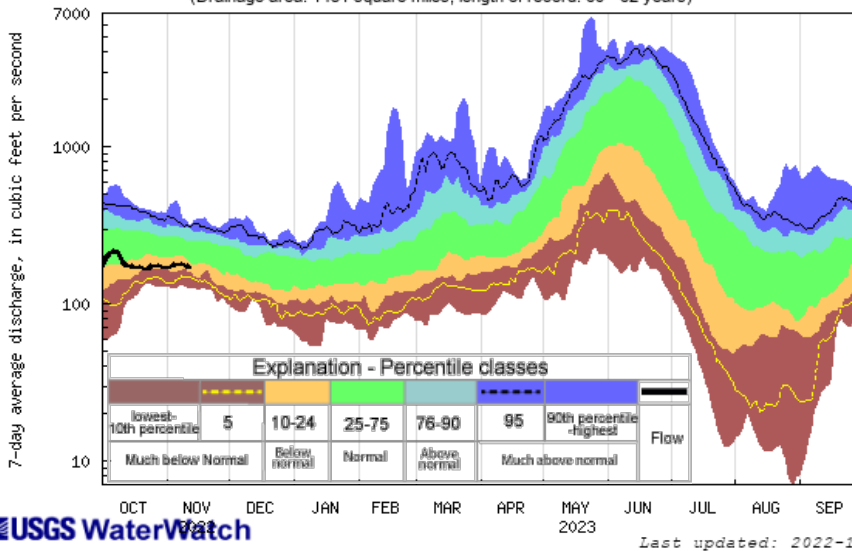
<http://dnrc.mt.gov/divisions/water/projects/tongue-river>



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)



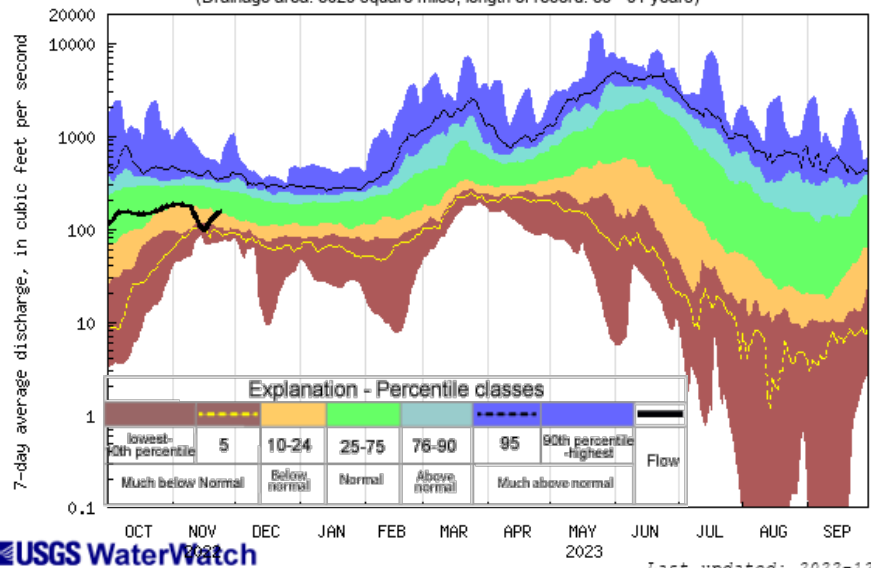
Tongue River Border Station

Stream Flow: The average stream flow for the beginning of November was in the 10th percentile and steadily decreased from 177 cfs until November 10th when ice began interfering with readings.

Powder River Border Station

Stream Flow: The average stream flow for November was in the 24th percentile with a discharge that averaged 145 cfs. Streamflow fell below normal for a majority of November has steadily declined through the beginning of December.

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



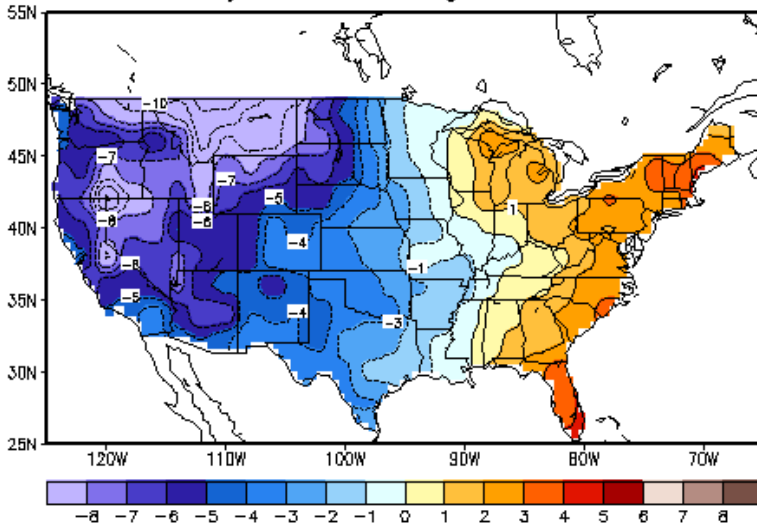
Sources: <https://waterwatch.usgs.gov/index.php?id=mv01d>
https://waterwatch.usgs.gov/?id=wwchart_sitedur&ofmt=plot_mvbg&site_no=06306300
https://waterwatch.usgs.gov/?id=wwchart_sitedur&ofmt=plot_mvbg&site_no=06324500



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.

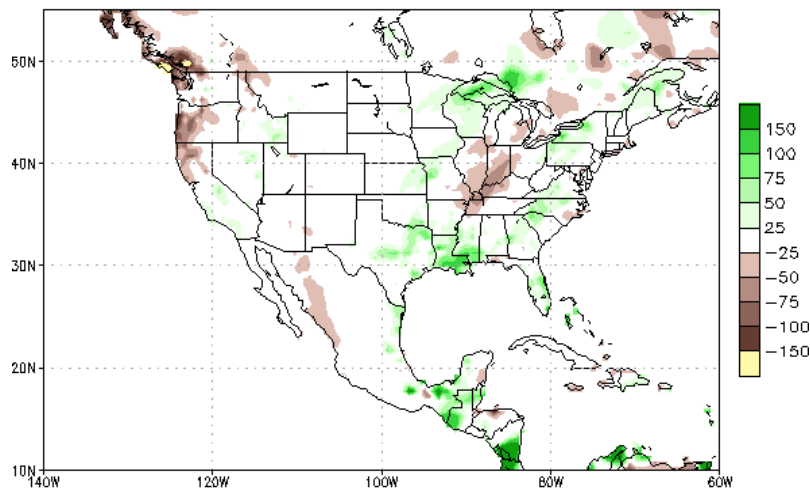
Mean Temp (F) Anomaly
30-day mean ending Nov 30 2022



Temperature Anomaly: In November, the average temperature was 8°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 November in Sheridan County is within 25 mm (~1 inch) of what is average. Sustained monthly precipitation has alleviated drought 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) 04NOV2022-03DEC2022



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/Global_Monsoons/American_Monsoons/NAMS_precip_monitoring.shtml
2 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

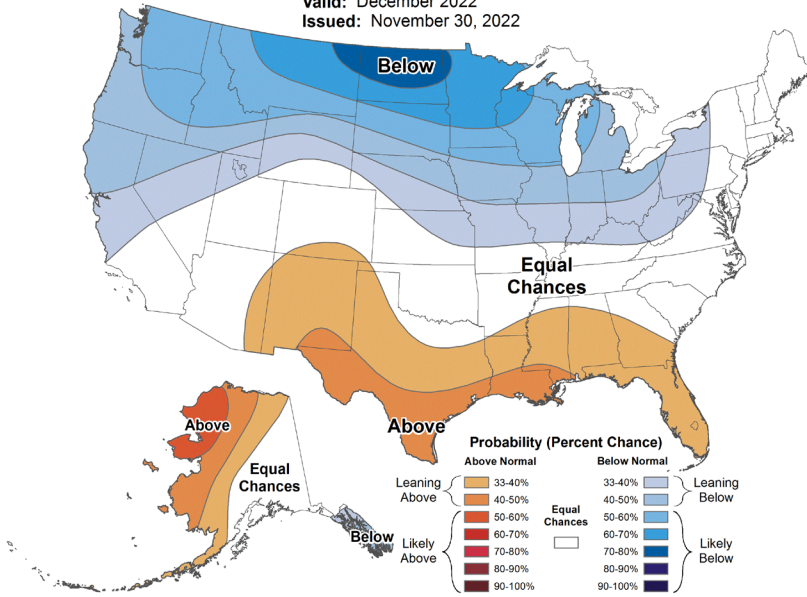
Explore link above for an Interactive map that displays percentage chance above and below normal for any point in US.



Monthly Temperature Outlook



Valid: December 2022
Issued: November 30, 2022



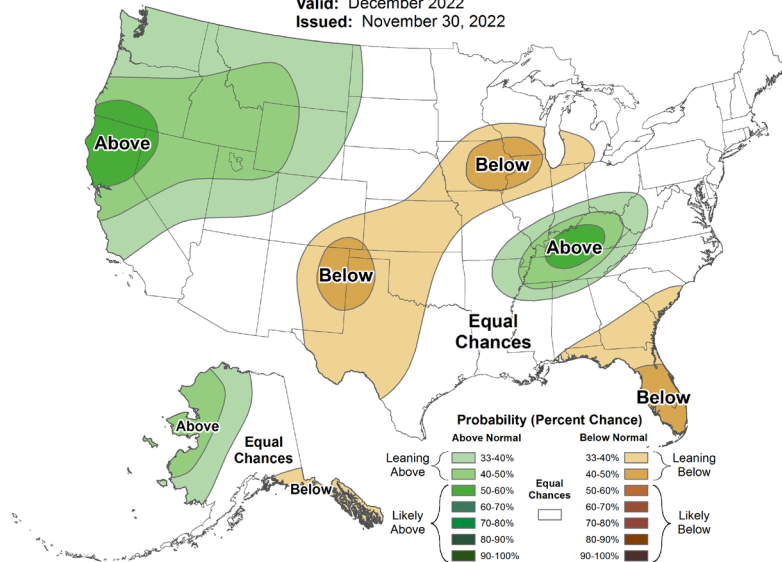
Temperature: Sheridan County has a 40-50% chance of seeing temperatures lower than average for this month.



Monthly Precipitation Outlook



Valid: December 2022
Issued: November 30, 2022



Precipitation: Sheridan has 30-40% chances of being above normal precipitation for the following month.

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

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

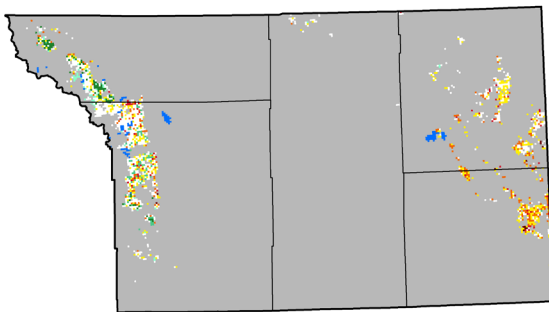


Vegetation Drought Response and Soil Moisture

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

November 27, 2022



Vegetation Condition

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



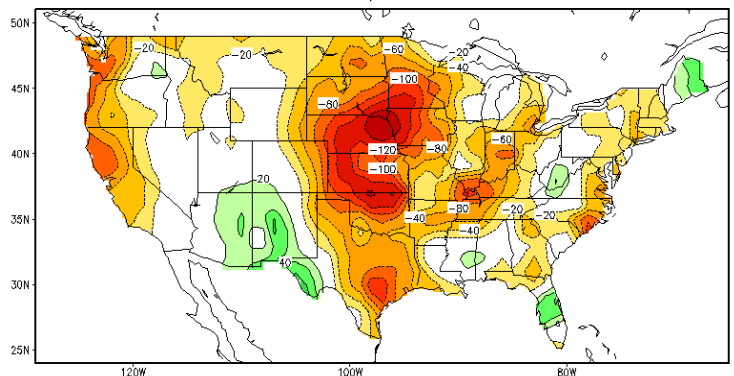
Vegetation Drought Response:

The Vegetation Drought Response Index shows that a majority 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)
NOV, 2022



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

