

Sheridan County Water Supply Report

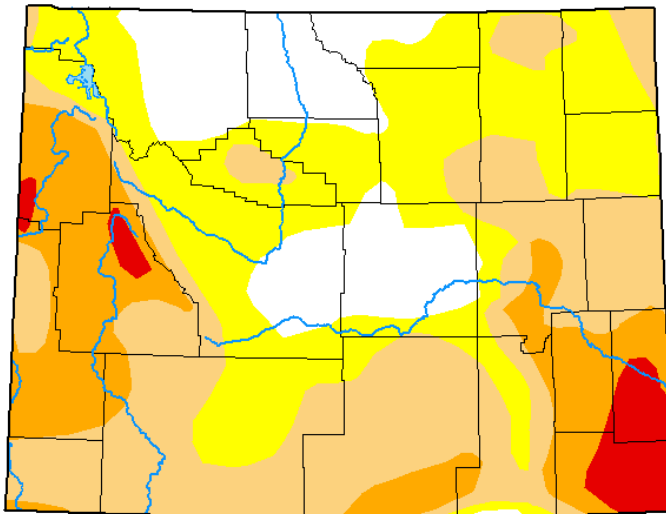
October - 2022

U.S. Drought Monitor Wyoming

September 27, 2022

(Released Thursday, Sep. 29, 2022)

Valid 8 a.m. EDT



Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	15.67	84.33	52.52	20.01	3.71	0.00
Last Week 09-20-2022	14.49	85.51	53.23	21.23	3.71	0.00
3 Months Ago 06-28-2022	12.80	87.20	59.34	27.94	3.64	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 09-28-2021	0.00	100.00	97.89	70.36	29.29	0.02
One Year Ago 09-28-2021	0.00	100.00	97.89	70.36	29.29	0.02

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

Compiled by The Sheridan Community Land Trust.

Contact scltwaterintern@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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Instead of combing the internet and clicking a million links to learn about water supply let us do the work for you! This report compiles a large range of resources into an easy to access format. It includes information about streamflow, snowpack, drought, soil moisture, and precipitation for the Tongue and Powder Rivers. This report is a one-stop shop that can help you 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.

Sources are precise and bring you as close as possible to the original source.

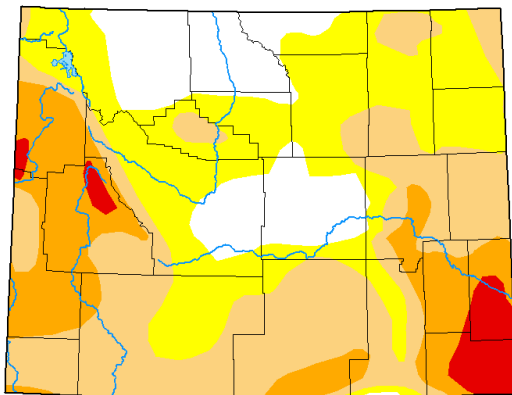


Drought Index and Change

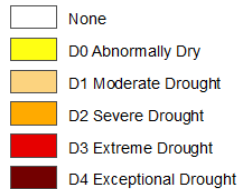
The U.S. Drought Monitor gives you a broad overview of the drought conditions in the US. Its strength is bringing together many ways of determining drought. It is useful as a large-scale view of drought, but local drought resiliency efforts are not considered.

U.S. Drought Monitor Wyoming

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Intensity:



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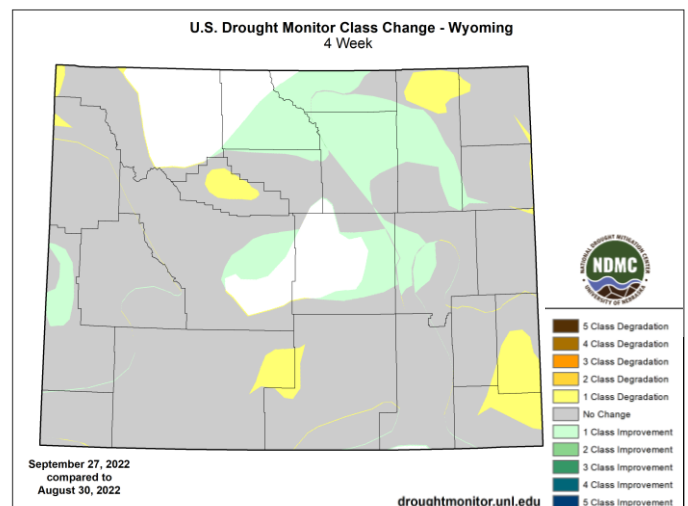
Current Drought Monitor:

50% of Sheridan County is experiencing abnormally dry (D0) conditions and the other 50% is not in drought conditions. This is an improvement from last month, with the complete removal of moderate drought (D1) and expansion of areas of experiencing no drought from 6% to 50%.

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

Change in Drought Monitor:

Comparing the beginning and end of September, drought in Sheridan has seen significant improvement. Almost all of Sheridan saw some improvement with no degradation present. To the east, Campbell County saw some degradation and some improvement. To the west and south, Big Horn County and Johnson County saw improvements.



September 27, 2022
compared to
August 30, 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

Current and historical data is based on known measured data, while the outlook is a prediction of the future. When using forecasts consider the addition level of uncertainty and the consequences of different outcomes in your decisions.

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

Week	Date	None	D0	D1	D2	D3	D4	DSCI
Current	2022-09-27	49.02	50.98	0.00	0.00	0.00	0.00	51
Last Week	2022-09-20	50.38	49.62	0.00	0.00	0.00	0.00	50
3 Months Ago	2022-06-28	6.81	60.79	32.41	0.00	0.00	0.00	126
Start of Calendar Year	2021-12-28	0.00	0.00	0.00	76.21	23.79	0.00	324
Start of Water Year	2021-09-28	0.00	0.00	0.00	84.17	15.83	0.00	316
One Year Ago	2021-09-28	0.00	0.00	0.00	84.17	15.83	0.00	316

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.”

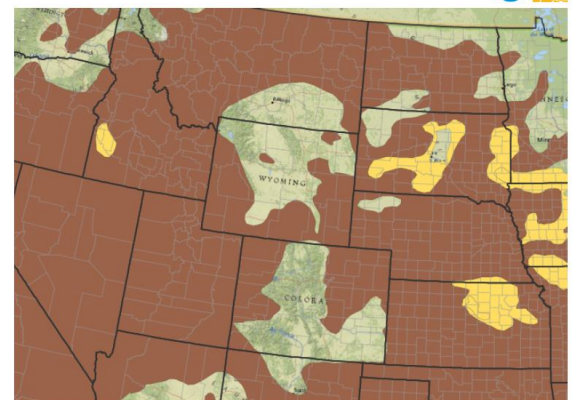
History of Drought Monitor: Drought levels in Sheridan County have improved compared to last month, three months ago and a year ago.

Forecast for Drought Monitor:

“During October, precipitation climatology dries out considerably. [...] Cooler temperatures, declining sun angle, and reducing agricultural water usage tend to lessen evapotranspiration rates as well, which decreases the potential for rapid drought onset. However, during October, an unfavorable pattern of above-normal temperatures and below-normal precipitation is generally favored. Given the situation, drought persistence for the existing drought areas and development in parts of areas already abnormally dry are favored for the region”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

Drought persists
 Drought remains but improves
 Drought development likely
 Drought removal 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 - 09/30/22

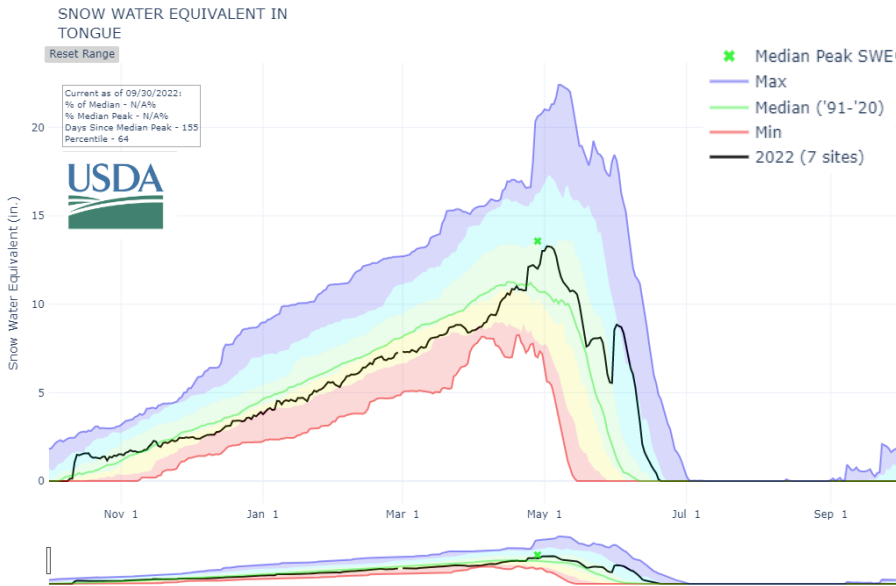
[Drought.gov](https://drought.gov)

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 represents the amount of water contained within the snowpack when it melts.

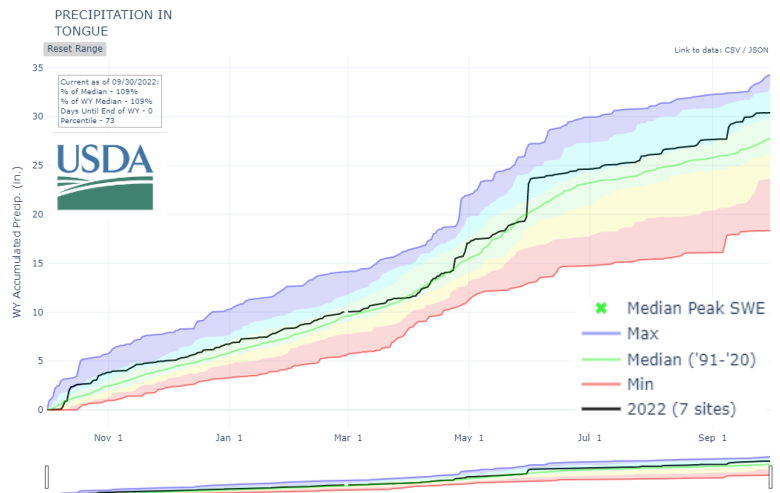


Snowpack in Tongue River Watershed:

The snowpack has melted out and we have had no recent snow.

Precipitation in Tongue River Watershed:

Precipitation in the Bighorn Mountains for the Tongue River watershed continues to be above median. It is currently 109% of median which is in the 73rd percentile. The stations have recorded a close to 30 inches of precipitation throughout the water year.



Sources:

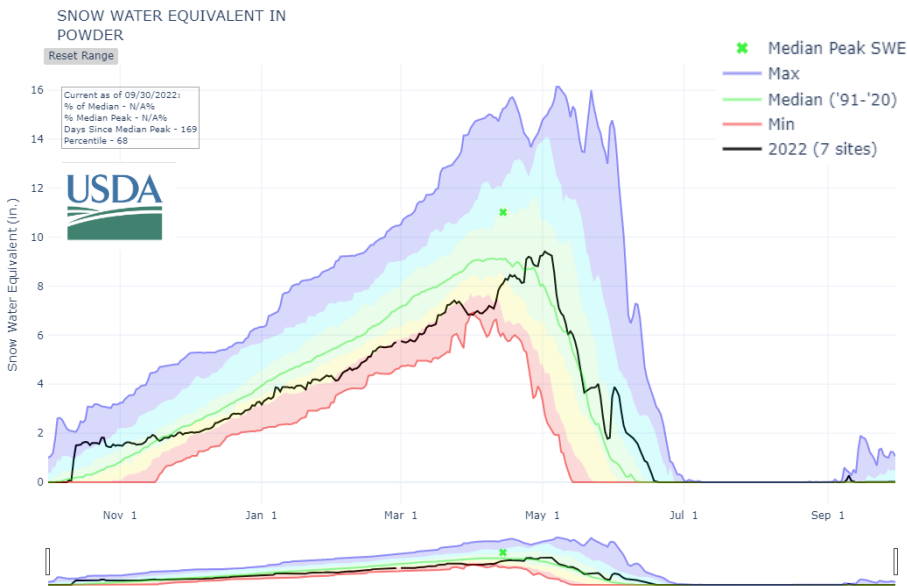
https://www.nrcs.usda.gov/Internet/WCIS/AWS_PLOTS/basinCharts/POR/WTEQ/assocHUC6/100901_Tongue.html

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.

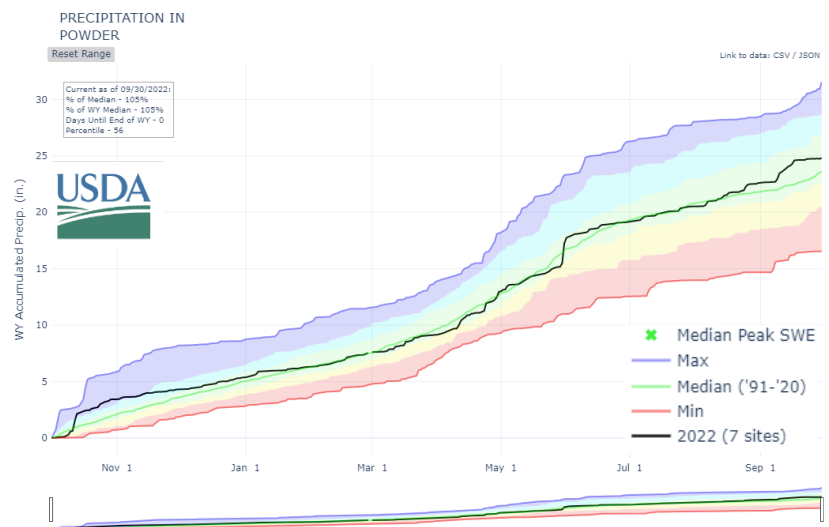


Snowpack in Powder River Watershed:

The Powder River watershed received 0.3 inches of Snow Water Equivalent in September that quickly melted out.

Precipitation in Powder River

Watershed: Precipitation in the Bighorn Mountains for the Powder River watershed is above median. It is currently 105% of median which is in the 56th percentile. We have had a slight improvement from last month going from 104% of median to 105% of median. The stations have recorded close to 25 inches of precipitation throughout the water year.



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



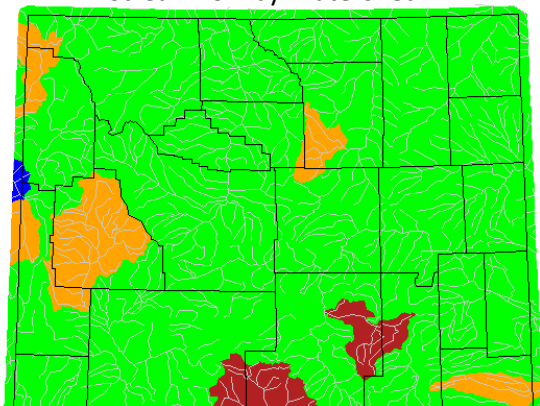
Stream Flow and Reservoirs

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



September 2022

Streamflow by Watershed



Stream Flow: In September, stream flow in the Tongue watershed was within its typical range. In the Powder River watershed streamflow was below normal in a section of the headwaters, but by the time it reached Sheridan County it was within its normal range.

Explanation - Percentile classes

Low	<10	10-24	25-75	76-90	>90	High	No Data
	Much below normal	Below normal	Normal	Above normal	Much above normal		

Lake DeSmet

The current water storage of Lake DeSmet is 199,732 acre-feet which is 85% of its total capacity.

Tongue River Reservoir

Tongue River Reservoir has 40,367 acre-ft of water stored. 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.

Reservoir	Current Storage (Acre-ft)	Total Capacity (Acre-ft)	Total Storage (%)
Bighorn	973	4,624	21.0
Cross Creek	0	798	0.0
Dome Lake No.1	612	1,506	40.6
Kearney Lake	1,308	6,324	20.7
Park	3,468	10,362	33.5
Sawmill	824	1,275	64.6

Sources: <https://waterwatch.usgs.gov/index.php?id=mv01d>

Lake DeSmet Operating Department at lakedesmet@johnsoncowy.us

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

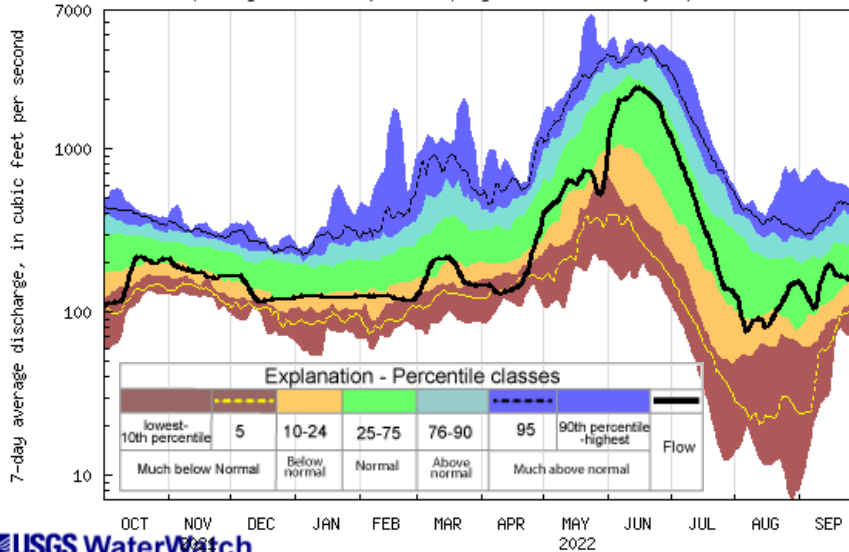
<https://seoflow.wyo.gov/Data/Map/Parameter/Total%20Storage/Location/Identifier/Interval/Latest>



Select Stream Flow Stations

These graphs give context to stream flow percentile classes. The selected stations are on the state line with Montana. The flow represent average 7-day flows. The vertical axis is logarithmic meaning it goes up by 10x for each major tick mark. Instead of going from 10 to 20 to 30 it goes from 10 to 100 to 1000 in the same distance.

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



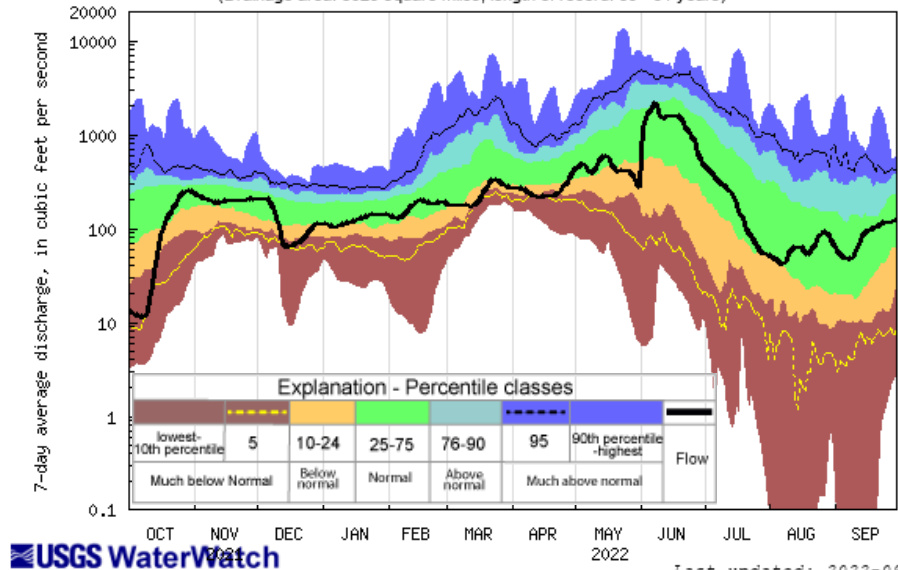
Tongue River Border Station

Stream Flow: The average stream flow for September was in the 30th percentile with a discharge that averaged 153 cfs. Streamflow was within normal for most of September.

Powder River Border Station

Stream Flow: The average stream flow for September was in the 48th percentile with a discharge that averaged 93 cfs. Streamflow stayed within its normal range.

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



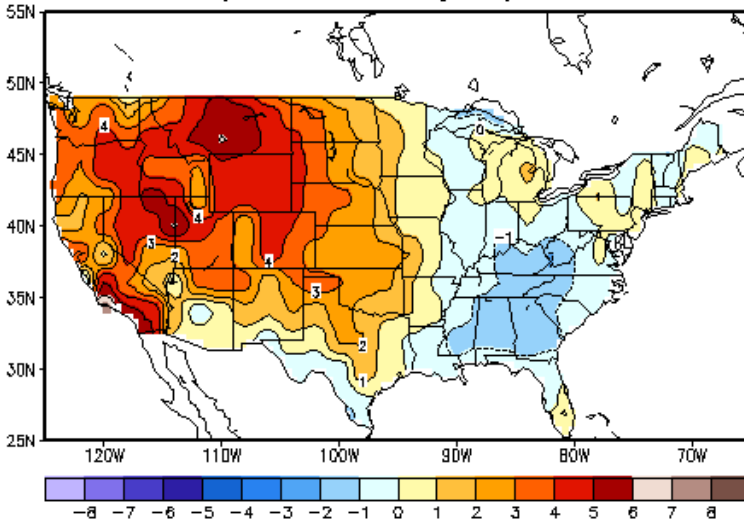
Sources: <https://waterwatch.usgs.gov/index.php?id=mv01d>
https://waterwatch.usgs.gov/?id=wwchart_sitedur&ofmt=plot_mvbg&site_no=06306300
https://waterwatch.usgs.gov/?id=wwchart_sitedur&ofmt=plot_mvbg&site_no=06324500



Temperature and Precipitation

Temperature and precipitation are large drivers of changes in drought conditions. It might not shock you to learn hot and dry is bad for drought while cold and wet helps improve it.

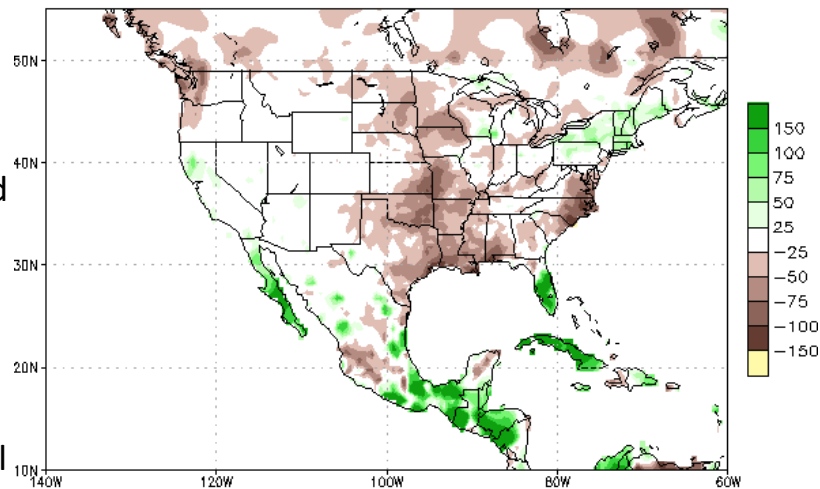
Mean Temp (F) Anomaly
30-day mean ending Sep 29 2022



Temperature Anomaly: In September, the average temperature was 4 degrees °F above what we generally see in Sheridan. This increases evaporation and the transpiration rate of plants.

Precipitation: The rainfall for September in Sheridan is within 25 mm (~1 inch) of what is average. Sheridan was an area of localized rainfall that brought us relief from drought. “In the past month, although localized convection brought spotty relief to portions of the southern High Plains and north-central Wyoming, the broader signal across the region has been degradation of drought conditions, with below-normal rainfall and above-normal temperatures observed during September.”²

Prpc Anomalies (mm) Q1SEP2022-29SEP2022



Data Source: CPC Unified (gauge-based) Precipitation 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

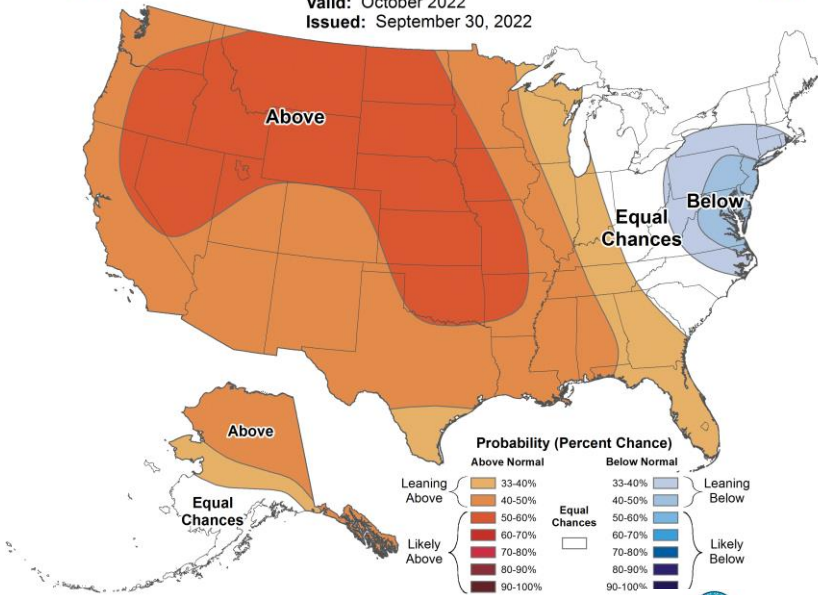
Explore link above for an Interactive map that displays percentage chance above and below normal for any point in US.



Monthly Temperature Outlook



Valid: October 2022
Issued: September 30, 2022



Temperature: There is a 50-60% chance that Sheridan will experience temperatures higher than normal.

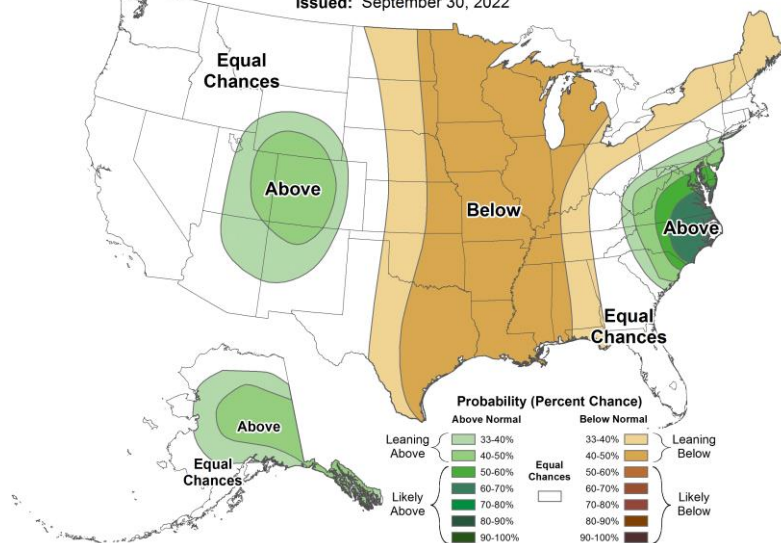
Precipitation: Sheridan has equal chances of being above or below normal precipitation.



Monthly Precipitation Outlook



Valid: October 2022
Issued: September 30, 2022



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

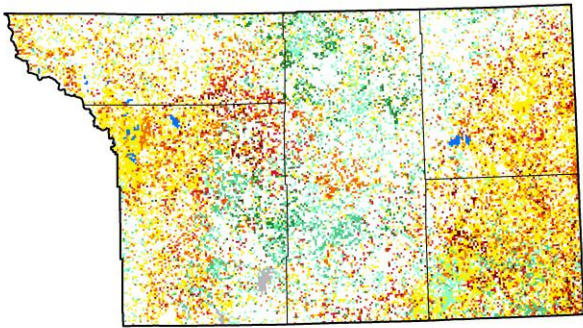


Vegetation Drought Response and Soil Moisture

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

September 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



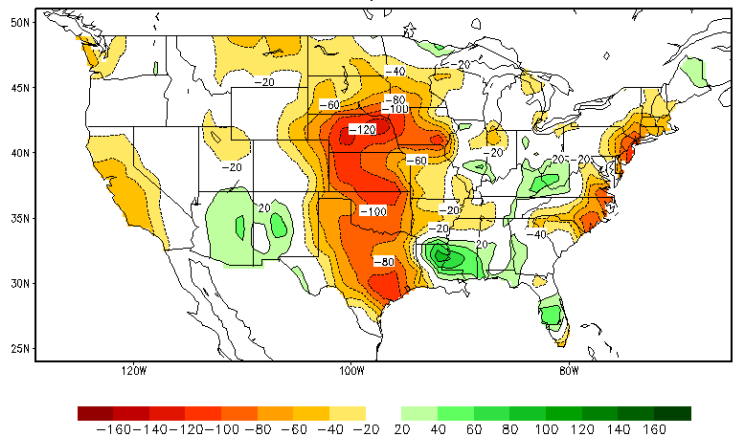
Vegetation Drought Response:

The Vegetation Drought Response Index shows that although the county is still feeling the affects of drought. Much of it is near normal. While other parts of the county are feeling drought effects, the southeast corner is feeling the effects the most.

Soil Moisture:

Soil moisture is normal in Sheridan County, but Wyoming is still on the edge and surrounded by poor soil moisture. Last month Sheridan was abnormally dry, but Sheridan's soil moisture is now normal.

Calculated Soil Moisture Anomaly (mm)
SEP, 2022



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

