Sheridan County Water Supply Report

June 2024

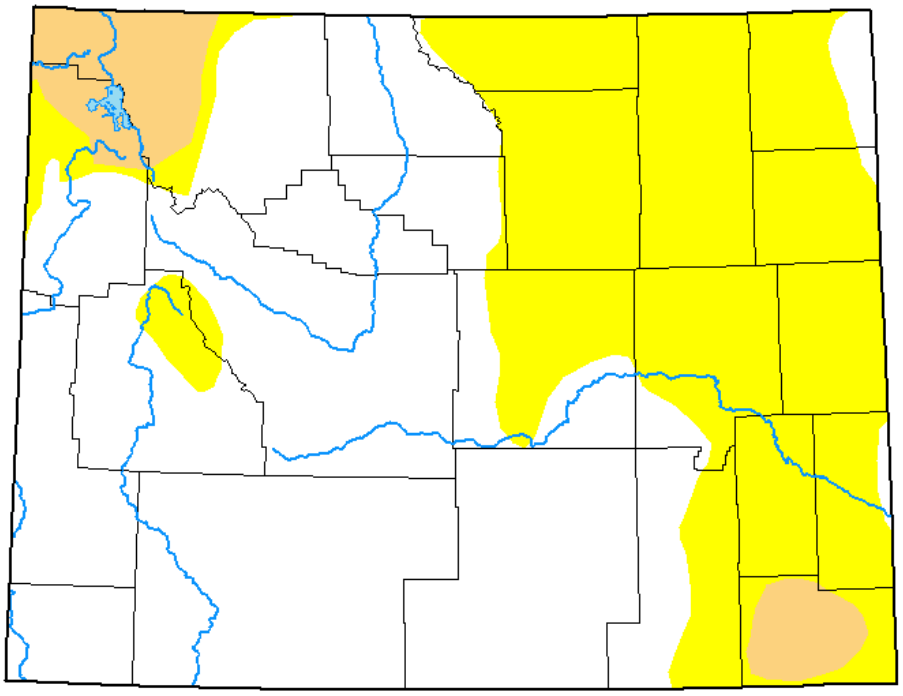
U.S. Drought Monitor

Wyoming

May 28, 2024

(Released Thursday, May. 30, 2024)

Valid 8 a.m. EDT



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

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

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.

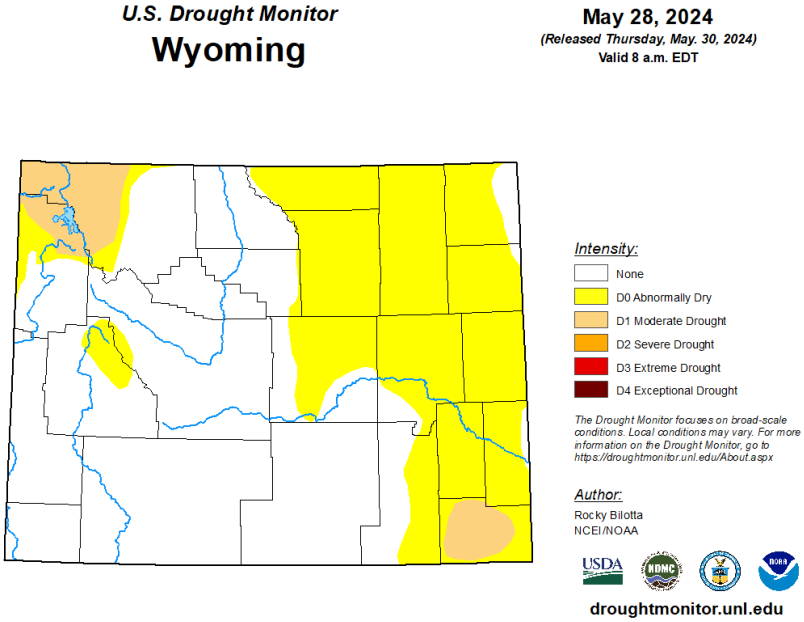
Helpful Hints:

- 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

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.

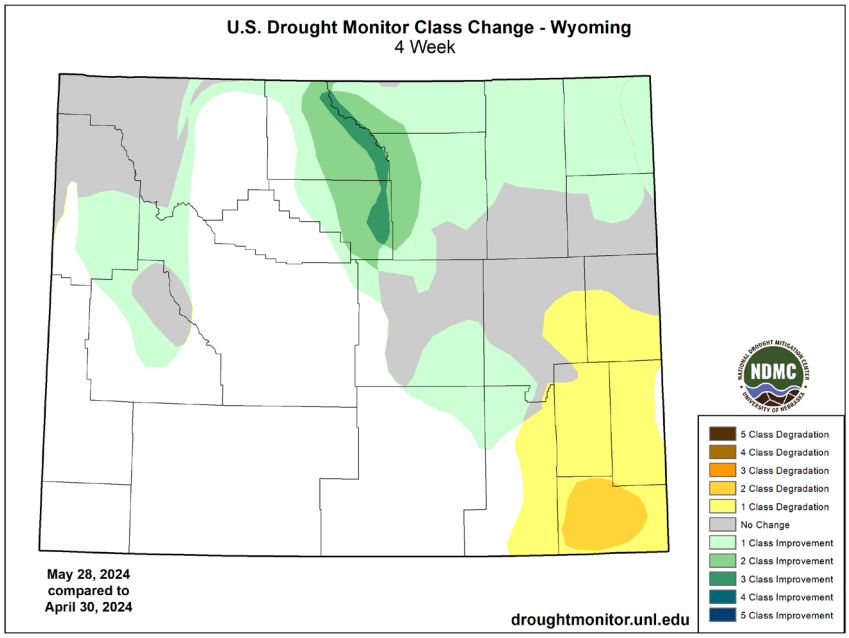


Current Drought Monitor:

Sheridan County is in D0, Abnormally Dry. This is consistent across the county, and the eastern side of the state.

Change in Drought Monitor:

The entire county improved in terms of drought conditions, but this improvement was especially strong in the mountains and foothills. Only a small pocket of Sheridan County experienced No Change.



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. 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.

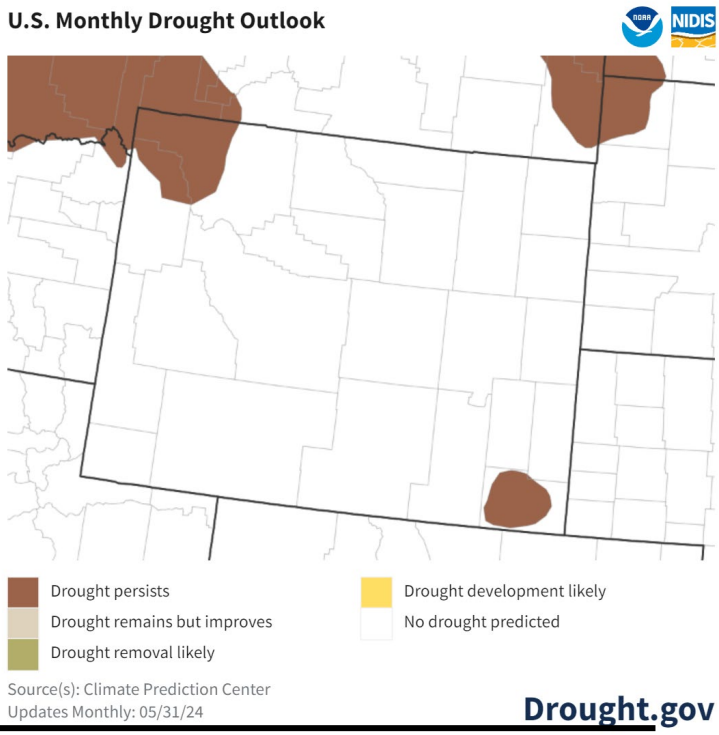
Drought in Sheridan County Over Time: Shown in Percentage Area in Drought

Week	Date	None	D0-D4	D1-D4	D2-D4	D3-D4	D4	DSCI
Current	2024-05-28	4.18	95.82	0.00	0.00	0.00	0.00	96
Last Week to Current	2024-05-21	0.00	100.00	0.00	0.00	0.00	0.00	100
3 Months Ago to Current	2024-02-27	0.00	100.00	100.00	75.90	0.00	0.00	276
Start of Calendar Year to Current	2023-12-26	90.06	9.94	0.00	0.00	0.00	0.00	10
Start of Water Year to Current	2023-09-26	100.00	0.00	0.00	0.00	0.00	0.00	0
One Year Ago to Current	2023-05-30	100.00	0.00	0.00	0.00	0.00	0.00	0

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: While drought conditions have improved even compared to last week, and have dramatically improved since 3 months ago.

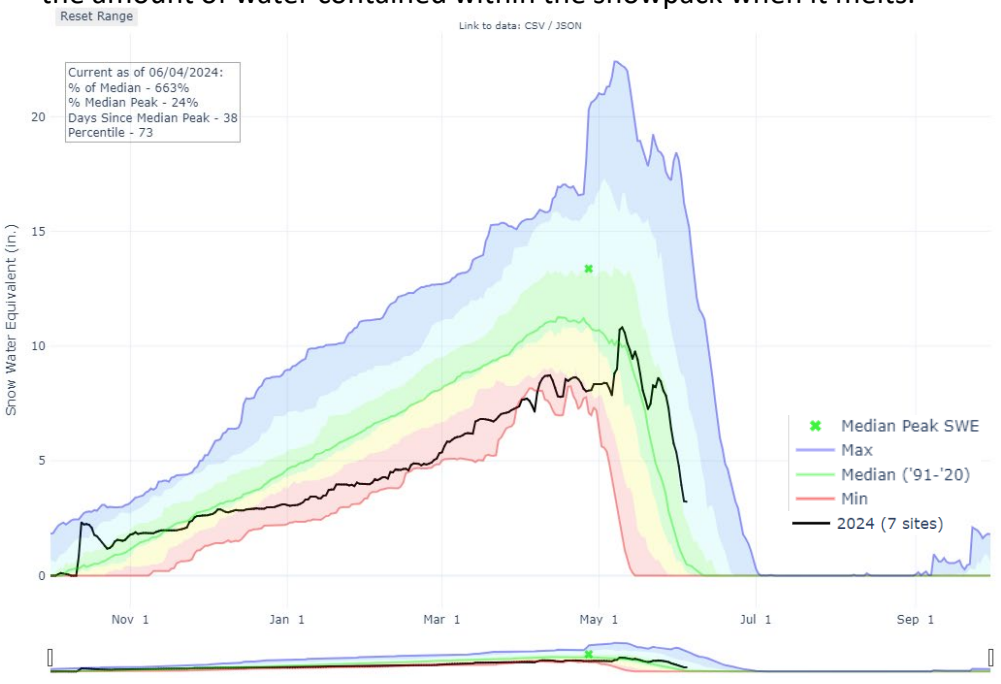
Forecast for Drought Monitor:
Looking into June, NOAA reports: "Despite warmer and drier conditions favored across the northern and western High Plains during much of June, antecedent wetness for several locations may be enough to stave off any development by the end of the month. Additionally, in the climatological context, much of the High Plains region is in the midst of their wettest time of year. However, as June progresses, the wetter climate normals do drop off a bit for these western-most areas."[1]

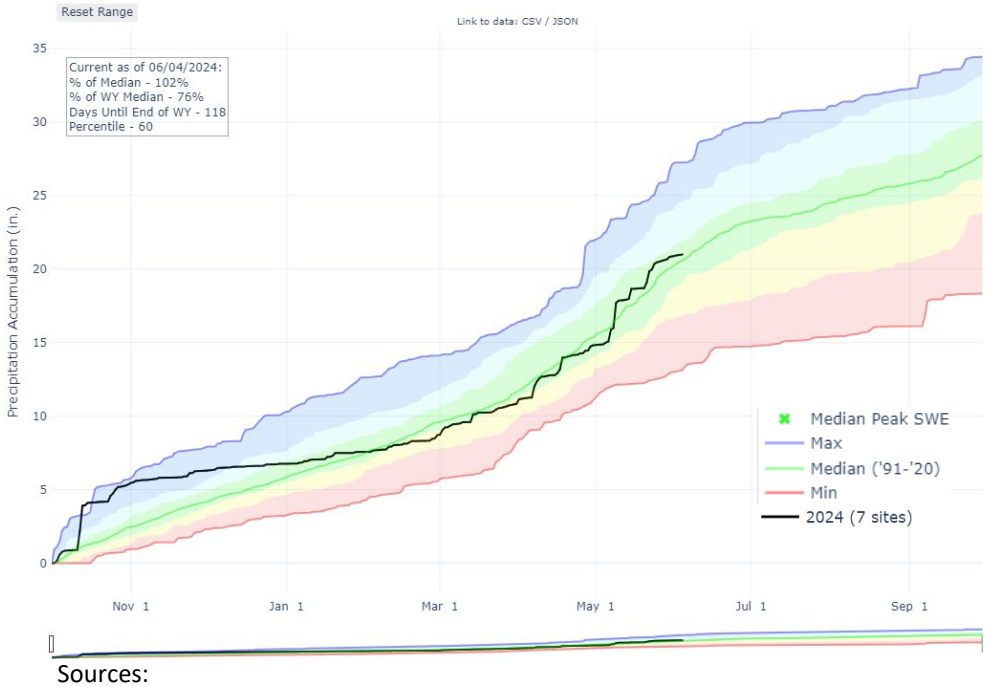


Sources: https://droughtmonitor.unl.edu/CurrentMap/StateDroughtMonitor.aspx?fips_56033
https://www.drought.gov/forecasts
1https://www.cpc.ncep.noaa.gov/products/expert_assessment/mdo_summary.php
https://droughtmonitor.unl.edu/Summary.aspx

Precipitation - Tongue River

These graphs represent precipitation affecting the Tongue River. Snow water equivalent (SWE) represents the amount of water contained within the snowpack when it melts.





Sources:
https://nwcc-apps.sc.egov.usda.gov/awdb/basin-plots/POR/WTEQ/assocHUCwy_8/tongue.html
https://nwcc-apps.sc.egov.usda.gov/awdb/basin-plots/POR/PREC/assocHUCwy_8/tongue.html

Snow Water Equivalent and Precipitation in Tongue River Watershed:

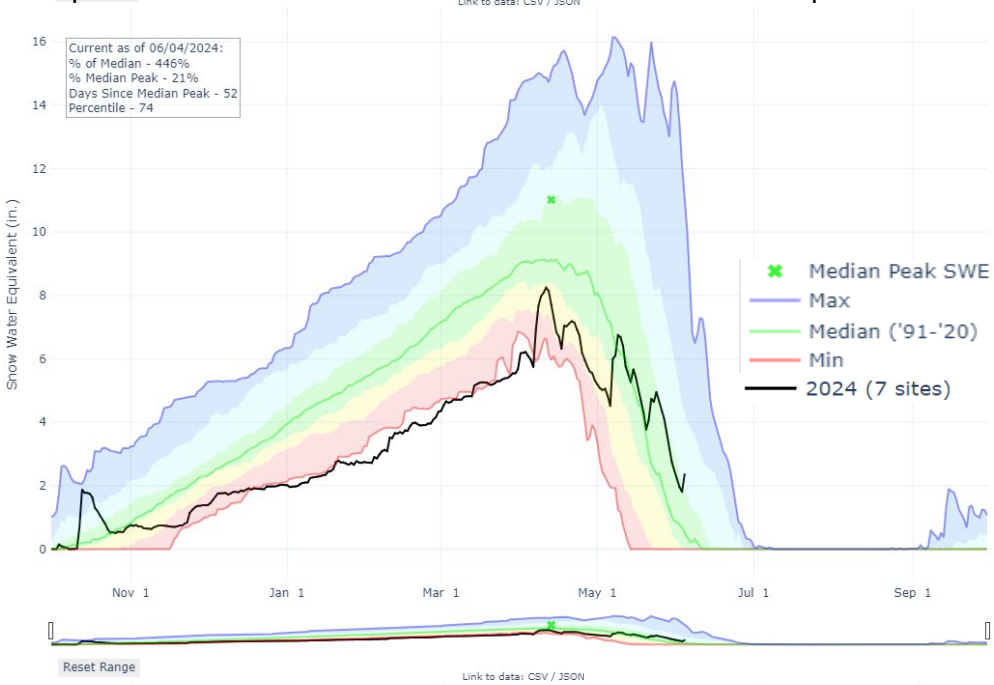
Snow-water equivalent is at a reported 663% of median. This puts it in the 73rd percentile for the time of year. This continues to be similar to the year 2019.

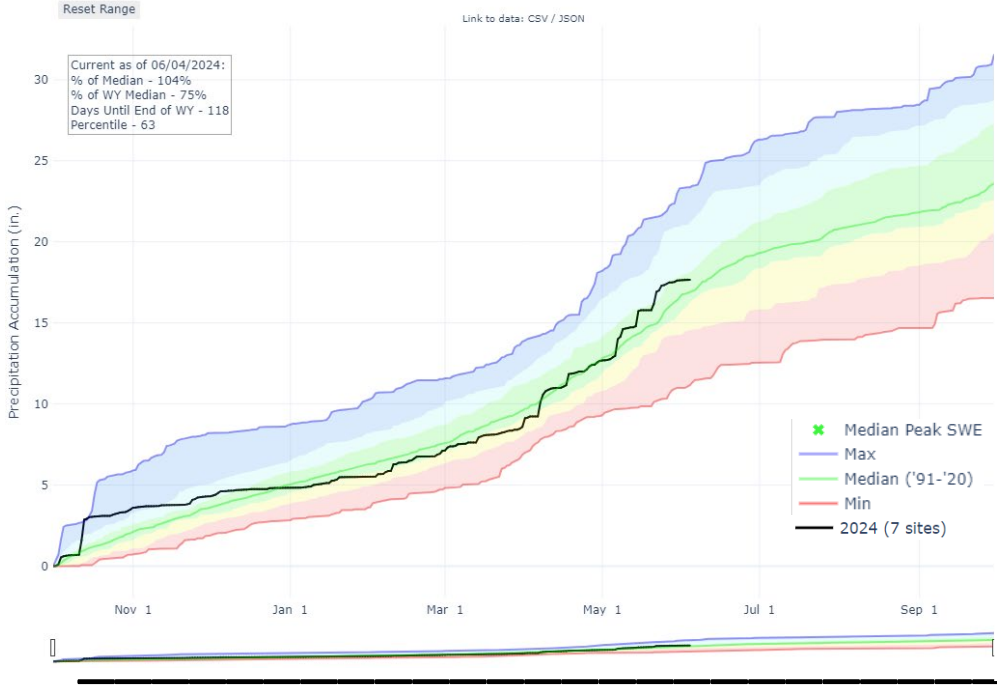
In terms of precipitation, the Tongue River watershed is at 102% of median. This puts it in the 60th percentile for the time of year.

This trend is most similar to the year 2000, where precipitation hovered around median for the entire water year. Comparing this year to 2019, 2024 is at nearly the same level of accumulated precipitation but has more regular, smaller precipitation events than 2019.

Precipitation - Powder River

These graphs represent precipitation affecting the Powder River watershed. Snow water equivalent represents the amount of water contained within the snowpack when it melts.





Precipitation in Powder River Watershed: Snow Water Equivalent (SWE) is at 446% of median, which is at the 74th percentile. This represents a deviation from the normal trend, with less snow accumulated through the winter and more in the late spring. 2019 was a more consistent snow year than 2024, but shows a similar pattern of substantial late spring snow storms.

Precipitation is at 104% of median, in the 63rd percentile. This is an increase from last month. These levels are above last year's amount of precipitation at the end of May.

Sources: https://nwcc-apps.sc.egov.usda.gov/awdb/basin-plots/POR/WTEQ/assocHUCwy_8/powder.html
https://nwcc-apps.sc.egov.usda.gov/awdb/basin-plots/POR/PREC/assocHUCwy_8/powder.html

Reservoir Capacity and Stream Flow

The total capacity of reservoirs and current water storage includes inactive storage below the outlet.

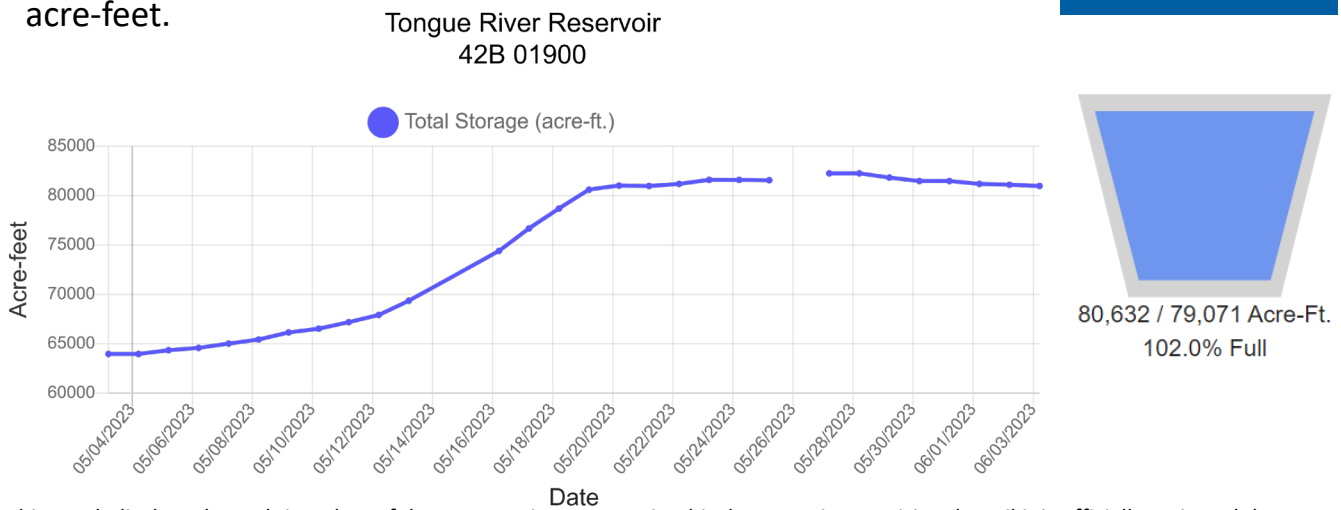
Lake DeSmet

As of June 1, Lake DeSmet has a total of 209,957 acre-feet in storage, an increase of approximately 6,000 feet since May. The intake facility on Piney Creek was turned off May 20th, and the first seasonal releases from the South Dam began on May 17th.

Reservoir	Total Storage (Acre-ft)	Current Storage (Acre-ft)	Percent of Total Capacity (%)
Bighorn	4,624	3,885	84.0
Cross Creek	824	824	100.0
Dome Lake No.1	1,506	1,446	96.0
Kearney Lake	6,324	3,451	54.6
Park	10,362	8,700	84.0
Sawmill	1,275	943	74.0

Tongue River Reservoir

Water levels at Tongue River Reservoir increased 26% over the last month to overfill the reservoir, from 63,976 acre-feet to 80,632 acre-feet.

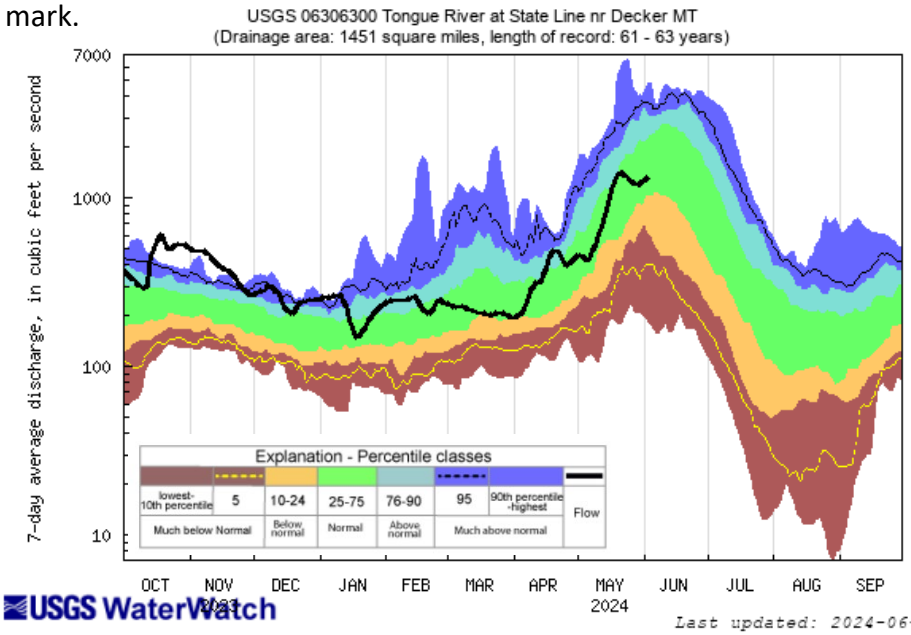


This graph displays the real time data of the Tongue River Reservoir. This data remains provisional until it is officially reviewed due to variables that can affect the gages. These include but are not limited to algal and aquatic growth, sediment movement, malfunction of recording equipment, and back water from ice or debris such as log jams.

Sources:
Lake DeSmet Operating Department at 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/

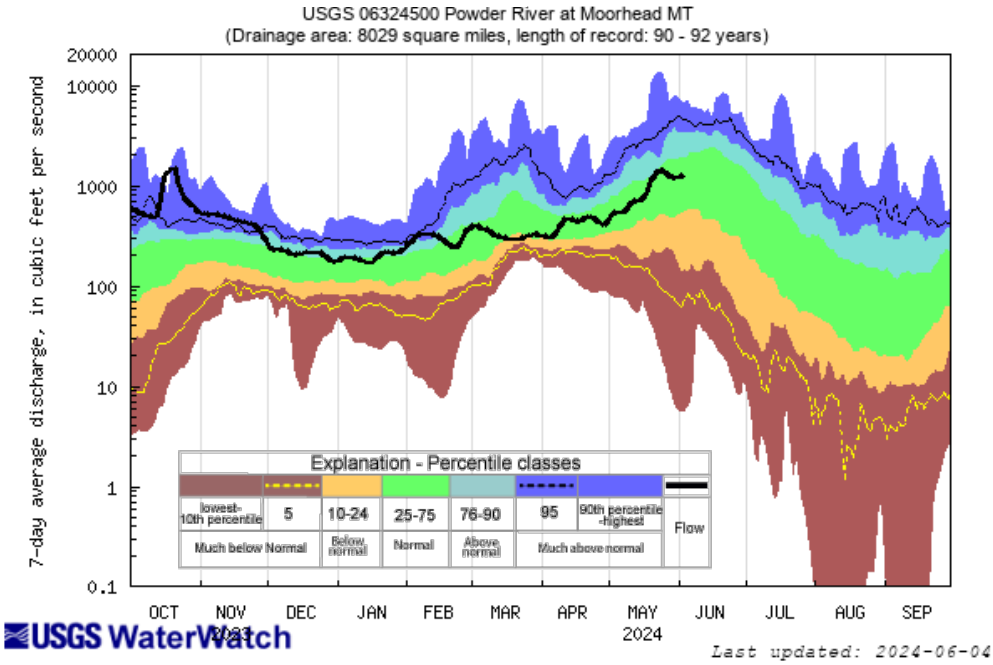
Select Stream Flow Stations

These graphs give context to stream flow percentile classes. The selected USGS stream gauges are on the stateline 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.



<u>Tongue River Border Station Stream Flow</u>
Streamflow has generally remained in the "Normal" range, or 25-75th percentile, as we move into summer. Streamflow generally peaks in June, so it is nearing its peak flows.

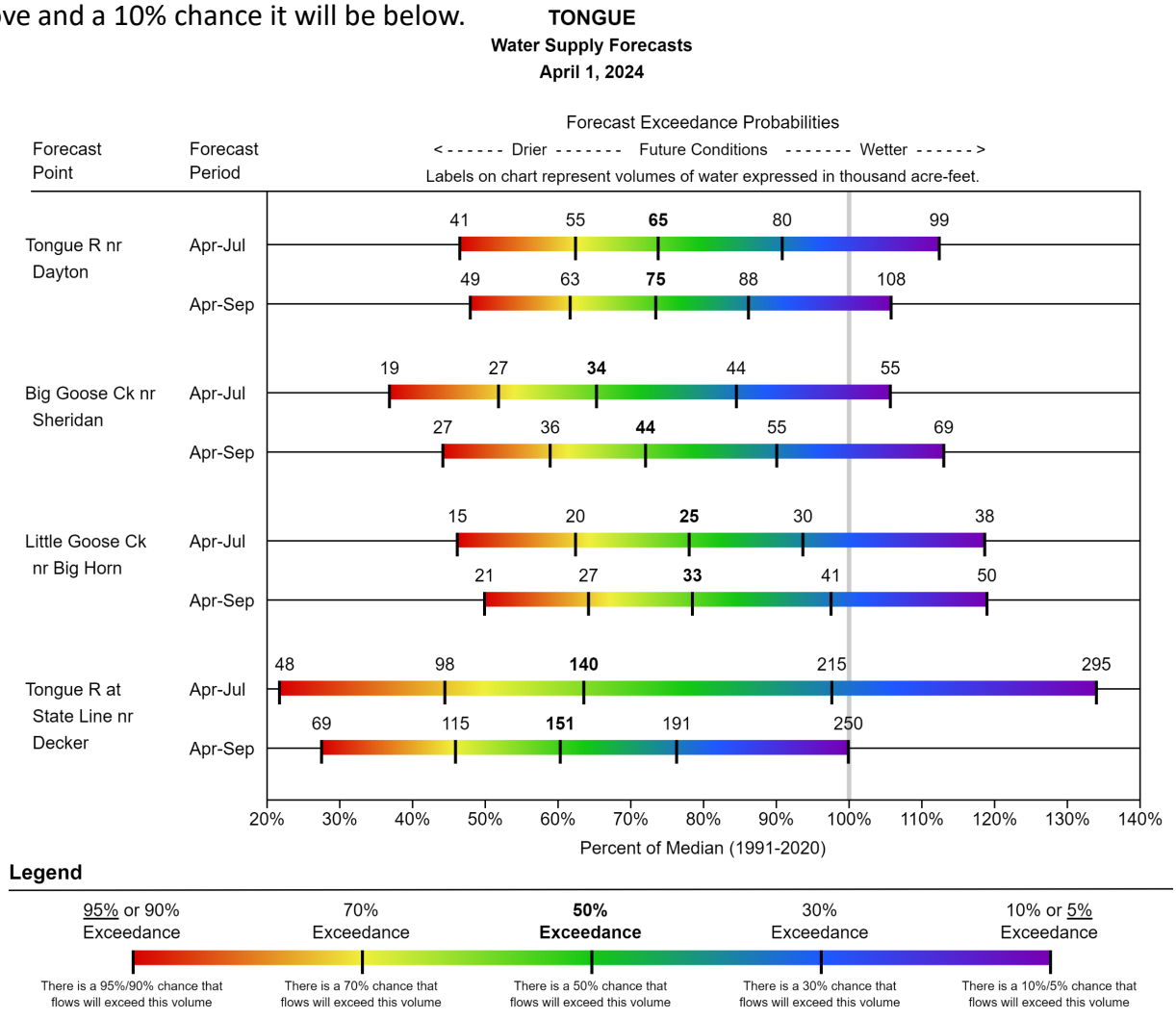
<u>Powder River Border Station Stream Flow</u>: Streamflow is near the top of the "Normal" range or 25-75th percentile. Streamflow climbed steadily through May, and is expected to peak in late June.



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

Tongue Water Supply Forecast

This chart takes a while to understand 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.

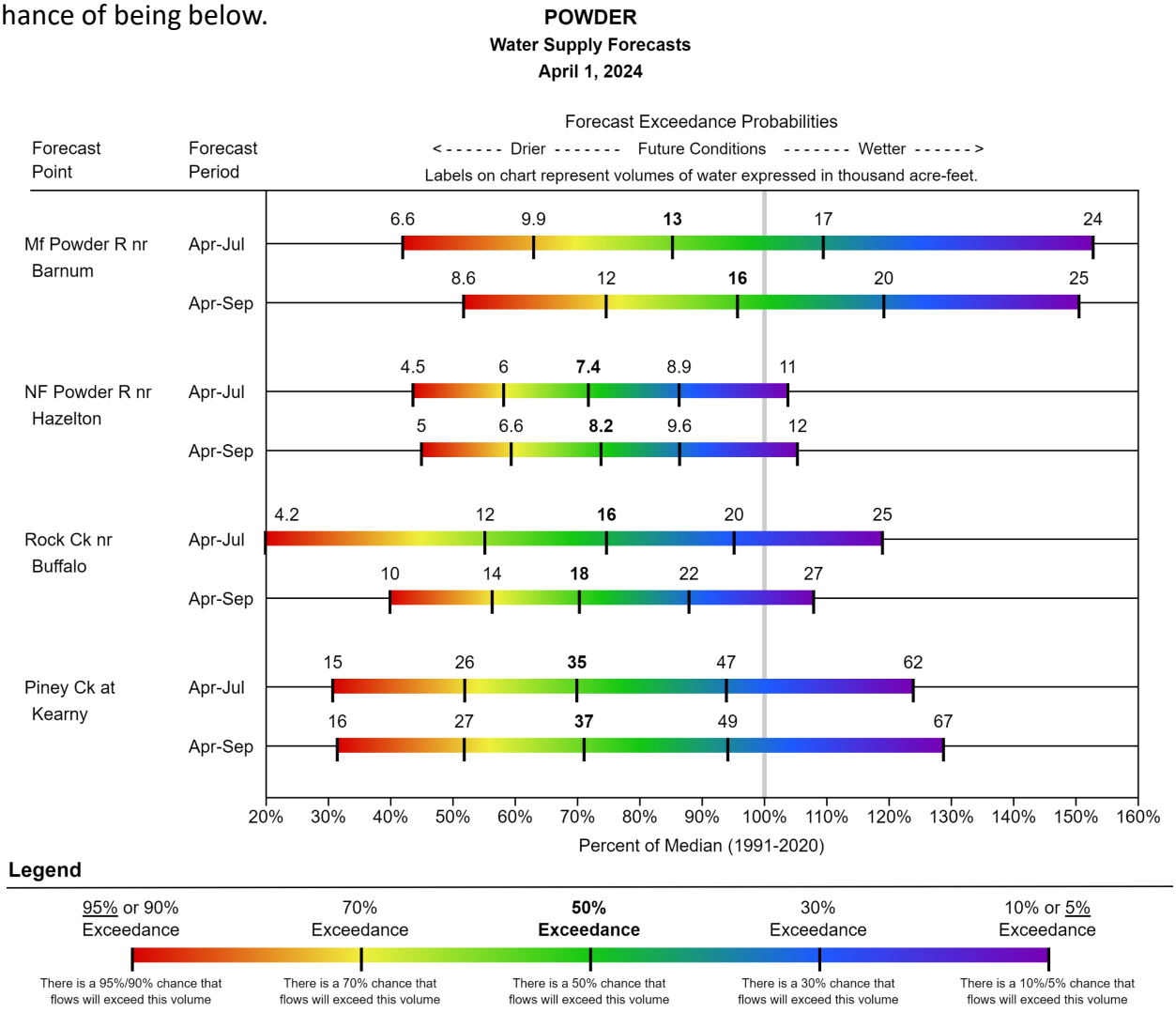


Tongue River Water Supply: An updated forecast for May or June is not available, with April being the most recently published data. This forecast shows drier conditions are still expected for the Tongue River basin from April to September. For most areas, there is an equal chance of being above or below 70% of median. This is true for both the short term and long term forecasts.

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

Powder Water Supply Forecast

This chart takes a while to understand but 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.

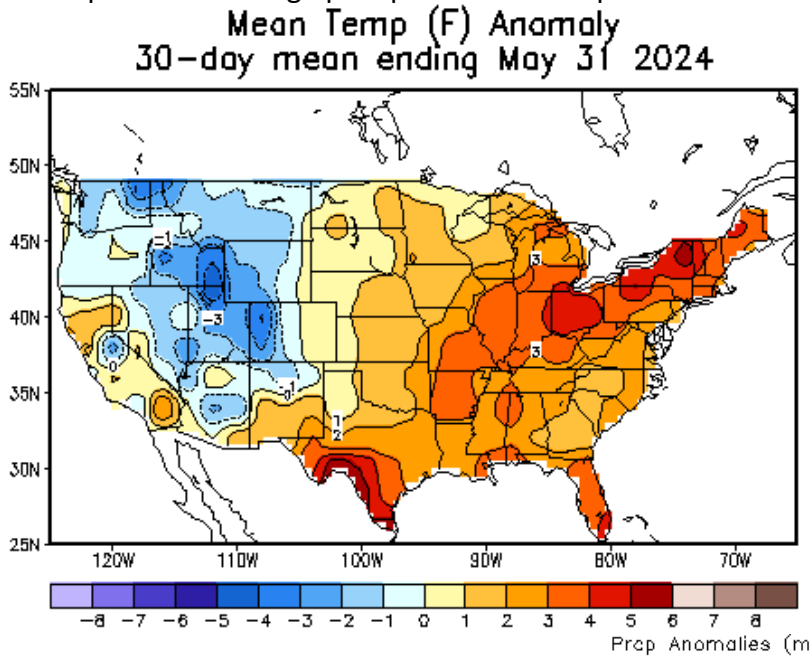


Powder River Water Supply: Updated data is not available for May or June. This is the most recent forecast. For most forecast points, there is a 30% chance that flows will exceed 95% of median. The forecast is greater near Barnum, where there is a 50% chance that flows will exceed 95% of median. There is also a greater range of uncertainty at this forecast point.

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

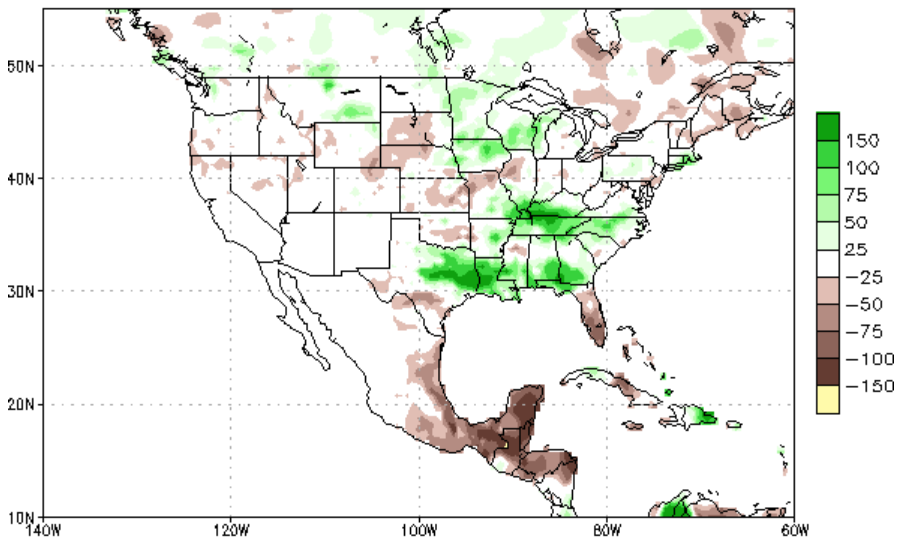
Temperature and Precipitation

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.



Temperature Anomaly: May was slightly cooler than most years, with a temperature anomaly 1 to 2 degrees below average. The average temperature in May was between 50 and 55 degrees across Sheridan County.

Precipitation Anomaly:
The precipitation anomaly for most of Sheridan County was 0 mm, indicating normal or near normal precipitation for May compared to other years.

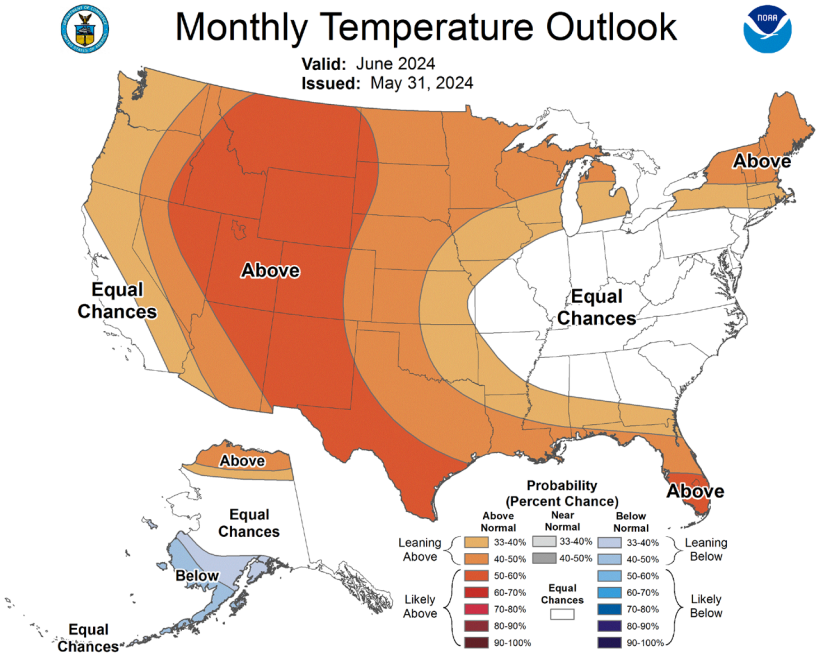


Data Source: CPC Unified (gauge-based & 0.5x0.5 deg resolution) Precipitation Analysis Climatology (1991-2020)

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
3 https://www.weather.gov/byz/daily_records?city=Sheridan

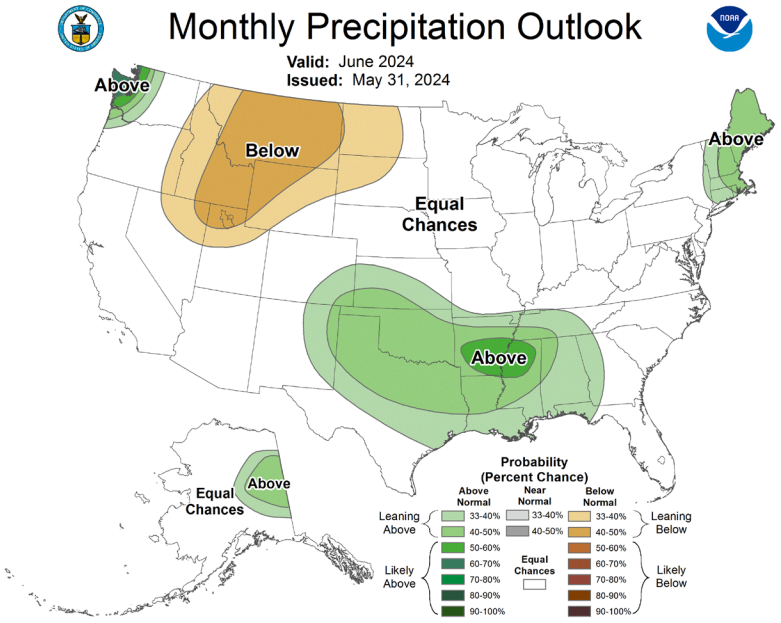
Temperature Forecast and Precipitation Forecast

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.



Temperature: Sheridan has 50-60% probability of temperature above normal for June. There is 0% chance it will be below average.

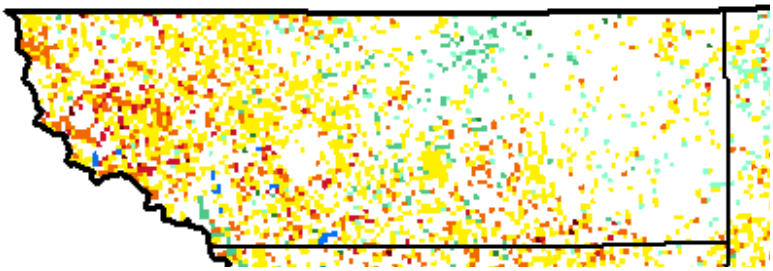
Precipitation: Most of Sheridan County has a 33-40% probability of precipitation being below normal in June, indicating a hot and dry month ahead. The northwestern tip of Sheridan County has an even higher probability of below normal precipitation.



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 Condition

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

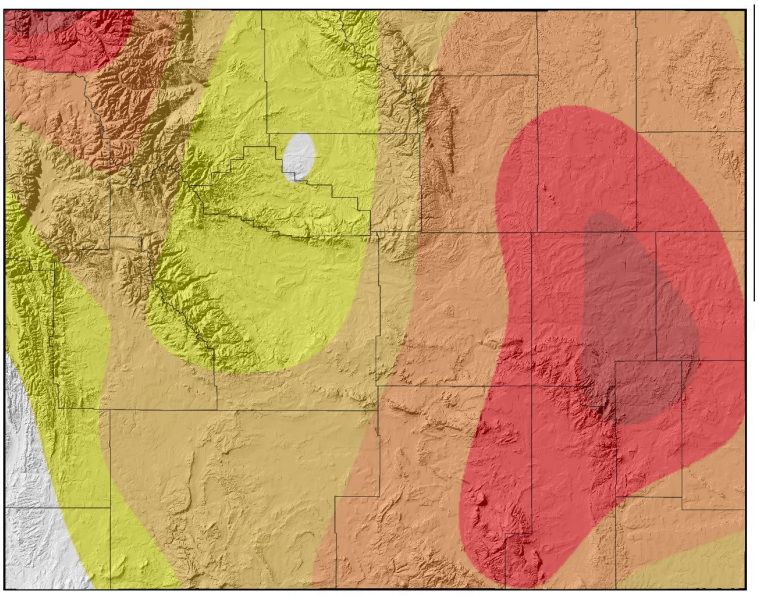
Vegetation Drought Response:

Despite an improvement in drought conditions, vegetation is showing pre-drought to moderate drought stress. This is primarily on the western side of the county. On the eastern side, less drought stress is seen with some vegetation even exhibiting unusually moist condition.

Soil Moisture:

Soil moisture percentile decreases west to east, with mountain soils at 30 to 40% and declining to 10 to 20% on the east side of the county. This is contradictory to the vegetative stress seen in the graph above.

Soil Moisture Percentile for 02 Jun 2024



Provisional data, subject to revision

Modeled Soil Moisture Percentile https://www.cpc.ncep.noaa.gov/products/GIS/GIS_DATA/USDM_Products/soil/soil_percentile.php
Map Created 03 Jun 2024 http://www.wrds.uwyo.edu

Sources: https://vegdri.unl.edu/Home/VegDRIQuad.aspx?WY,2
https://www.cpc.ncep.noaa.gov/products/Soilmst_Monitoring/US/Soilmst/Soilmst.shtml
http://www.wrds.uwyo.edu/Soil/SM-Ptile-Current.html

SCLT

Additional Resources

These are the broad sources we got information from. These websites are trustworthy and are reliable sources for additional information. In the future we hope to add more source for additional information.

- https://droughtmonitor.unl.edu
- https://www.drought.gov
- https://www.cpc.ncep.noaa.gov
- https://www.nrcs.usda.gov/wps/portal/wcc/home
- https://waterwatch.usgs.gov
- 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
- https://vegdri.unl.edu/Home/VegDRIQuad.aspx?WY,2