

Montana Drought Outlook Report – Summer 2023



Arrowleaf Balsamroot near Wolf Creek, May 29, 2023



Summary of Antecedent and Current Conditions

As the 2022 water year (October 1, 2021 – September 30, 2022) closed, weather extremes remained the norm. Despite much warmer than average temperatures (August – October was the warmest on record), statewide precipitation last fall was mostly average, falling to well below average in the northwest. Parts of central Montana proved the exception, receiving nearly twice the average rainfall in October.

From the end of December through the third week in February, temperatures rose 4 to 6 degrees Fahrenheit above average statewide. With lower-than-average precipitation and higher-than-average temperatures in January, the prairie and mid and low elevations in the foothills lost accumulated snowpack in many areas. Isolated local flooding and complaints of mud-season in February were not uncommon. In the last week of February, temperatures flipped again, plummeting to 8 to 10 degrees Fahrenheit below average with the cold trend dominating through March. April was more moderate, although temperatures averaged 4 to 6 degrees Fahrenheit below normal across the state. Northwest Montana proved the exception where temperatures remained closer to average.

Conditions since mid-April are best described as hit and miss with central and eastern Montana consistently receiving above average precipitation. Areas in the Northwest received good precipitation amounts in May, but the much below average snowpack resulted in drier than normal conditions with stream flows falling to record lows through June. Parts of Lincoln, Sanders, Flathead and Glacier counties are currently in D2 (severe) drought with much of the rest of the northwest in D1 (moderate) and D0 (abnormally dry). Following a near record snowfall in March, conditions in Southwest Montana fell to much below average in April and May. However, the combination of strong snowpack and above normal accumulations in June have greatly improved conditions there. Statewide, temperatures in late April through all of May were 6 to 8 degrees Fahrenheit above average with temperatures reaching into the low 90's in places across the state. High temperatures melted off the snowpack more quickly than usual, with nearly all basins melted out by June 1. That date is ten to as much as 20 days earlier than the median over the last 30 years.

U.S. Drought Monitor Montana

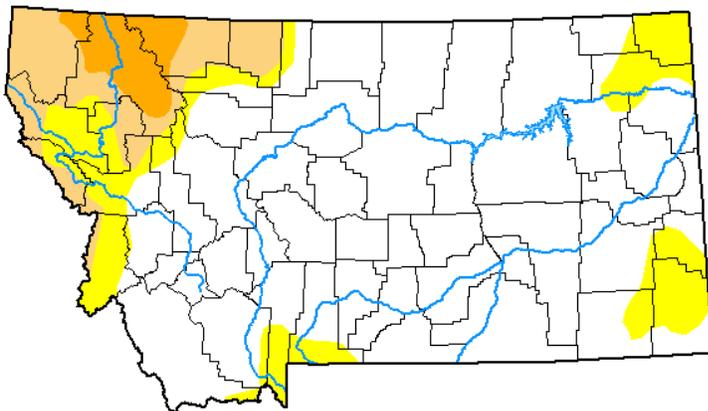
June 27, 2023

(Released Thursday, Jun. 29, 2023)

Valid 8 a.m. EDT

Drought Conditions (Percent Area)

	None	D0	D1	D2	D3	D4
Current	75.09	13.17	8.22	3.52	0.00	0.00
Last Week <i>06-20-2023</i>	70.30	12.77	13.41	3.52	0.00	0.00
3 Months Ago <i>03-28-2023</i>	18.94	36.05	34.97	10.04	0.00	0.00
Start of Calendar Year <i>01-03-2023</i>	8.71	31.37	23.58	25.53	10.80	0.00
Start of Water Year <i>09-27-2022</i>	5.40	17.13	32.41	32.70	12.35	0.00
One Year Ago <i>06-28-2022</i>	44.72	15.10	20.63	12.14	4.41	3.01



Intensity:

- None
- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

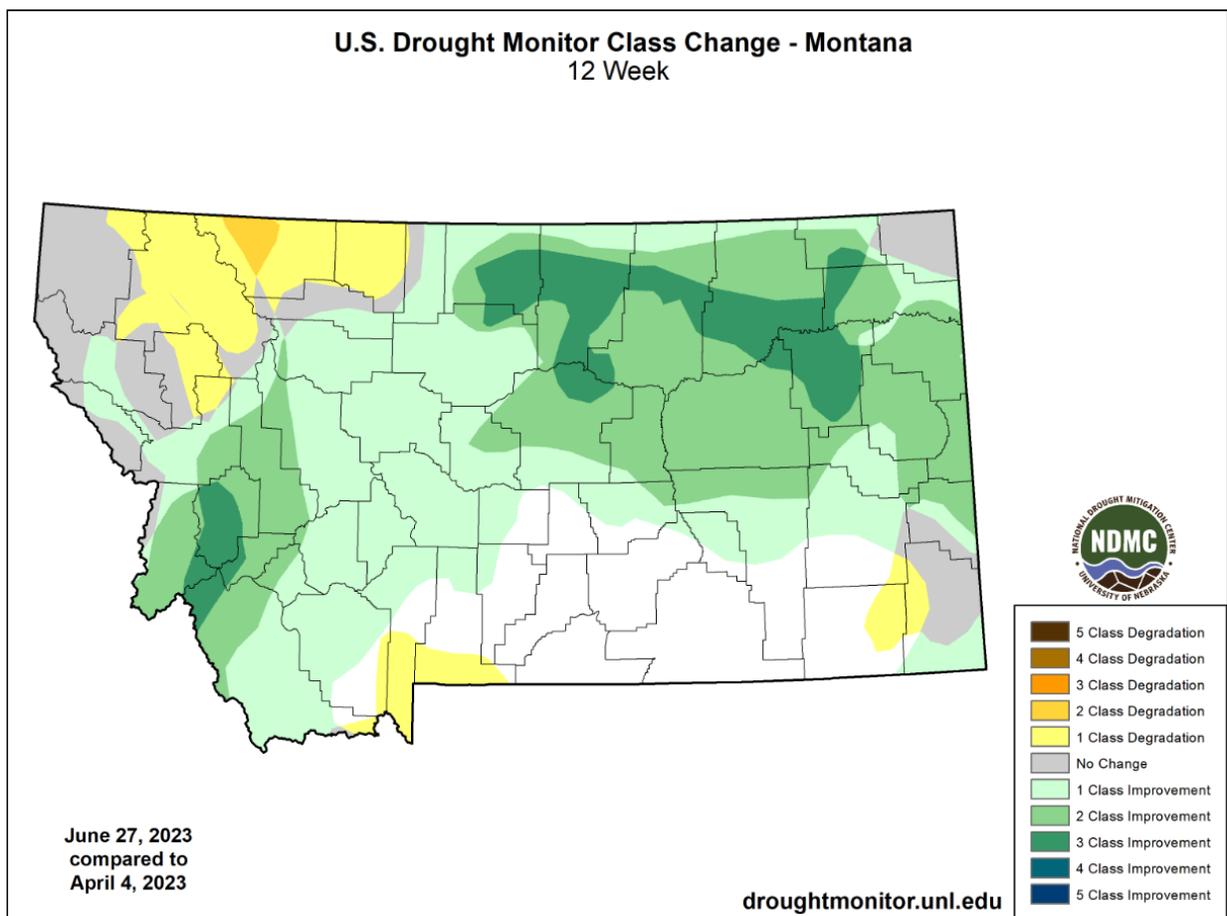
The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. For more information on the Drought Monitor, go to <https://droughtmonitor.unl.edu/About.aspx>

Author:

Curtis Riganti
National Drought Mitigation Center

Seasonal Drought Forecast

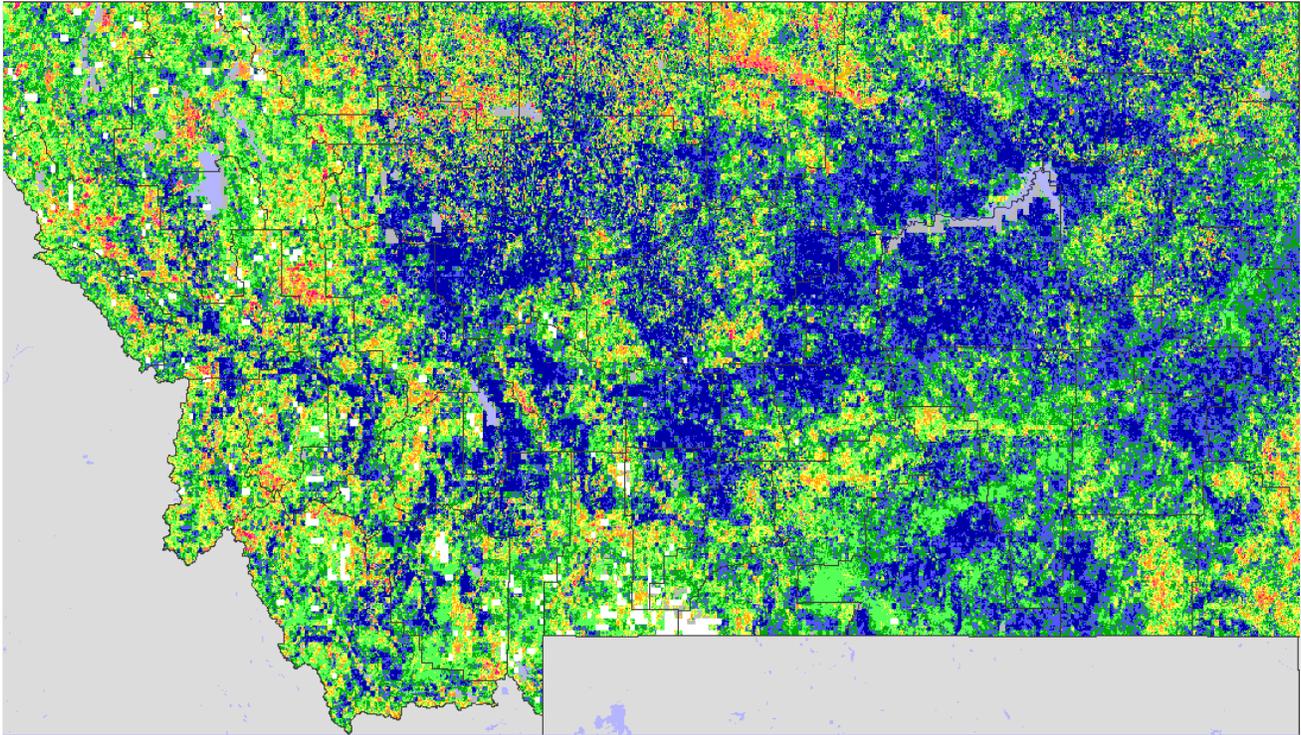
Late June to early July typically mark the end of Montana's high precipitation months with the onset of the hot and dry summer season. As is often the case, some clear winners emerged this spring and early summer as storm tracks delivered above normal precipitation across much of the state. Accumulations in the northwest, southwest and northeast generally fell short of expectations while accumulations in central and southeast Montana were above normal. Wetter than normal conditions this spring and early summer have greatly improved drought conditions and this summer's drought outlook. With a July forecast trending normal for temperature and above normal for precipitation, there is a chance that conditions will continue to improve in the coming weeks, however, drought conditions will likely persist in the northwest. It is unclear at this point if conditions will worsen or improve there, and that will depend largely on temperature since July and August are typically dry months in the northwest. The map below illustrates improvements and degradations in drought conditions across Montana over the last 12 weeks.



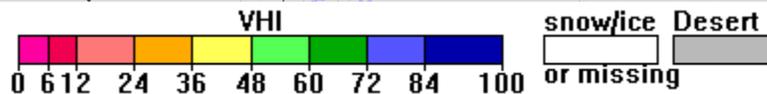
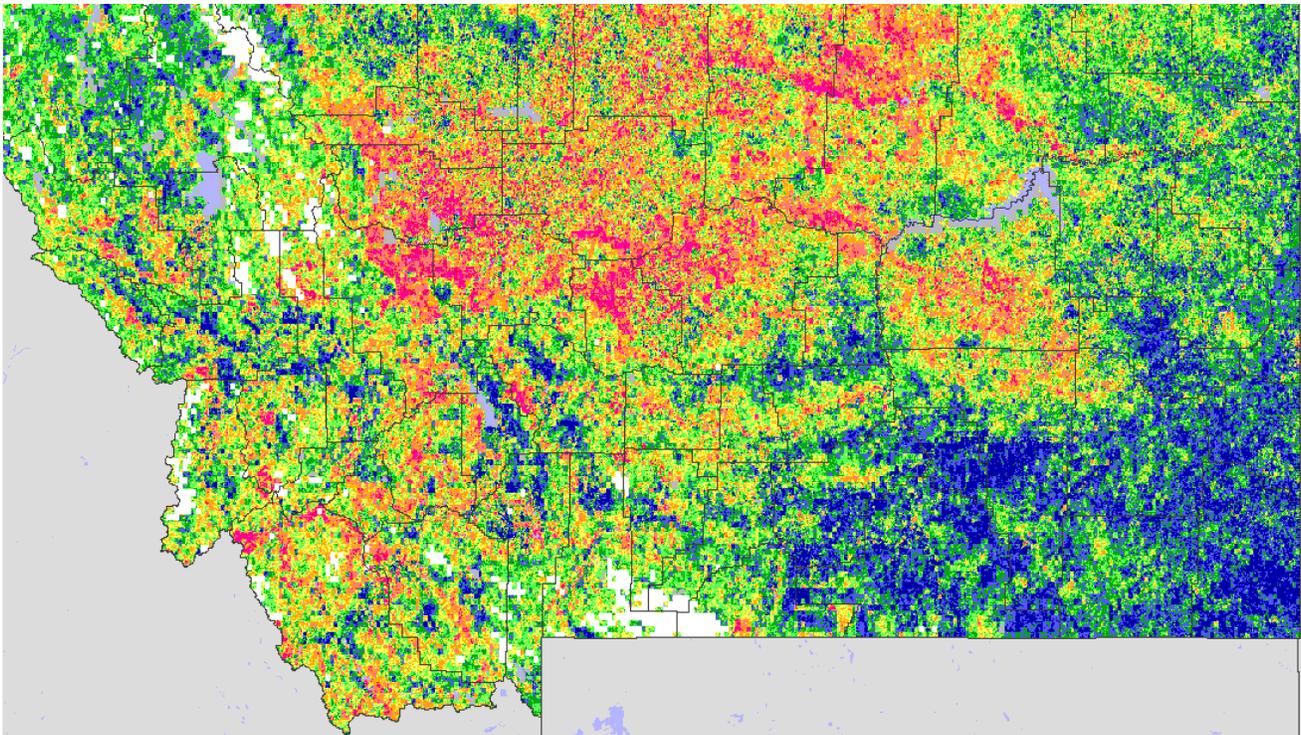
The potential for significant summer precipitation in the coming weeks is waning, although regional summer precipitation can materialize as late as mid-July. After that, summer precipitation is mostly limited to thunderstorms which can be locally significant. NOAA's Climate Prediction Center [one-month weather forecast](#) offers no clear indication for above or below normal temperatures but does indicate a 30 to 50 percent chance for above normal precipitation. The [three-month outlook](#) indicates a 30 to 40 percent chance for above normal temperatures and 30 to 40 percent chance for above normal precipitation across most of Montana. July and August are typically hot and dry in Montana and despite the forecast for hot weather ahead, wetter conditions in May and June have greatly improved drought

conditions relative to last year. This fact is illustrated by maps showing the Vegetative Health Index (a satellite-based product) this year as compared with the same date last year. Green to blue colors indicate a positive trend and red to yellow colors more compromised conditions.

Montana, Vegetative Health Index, week 25 – June 24, 2023



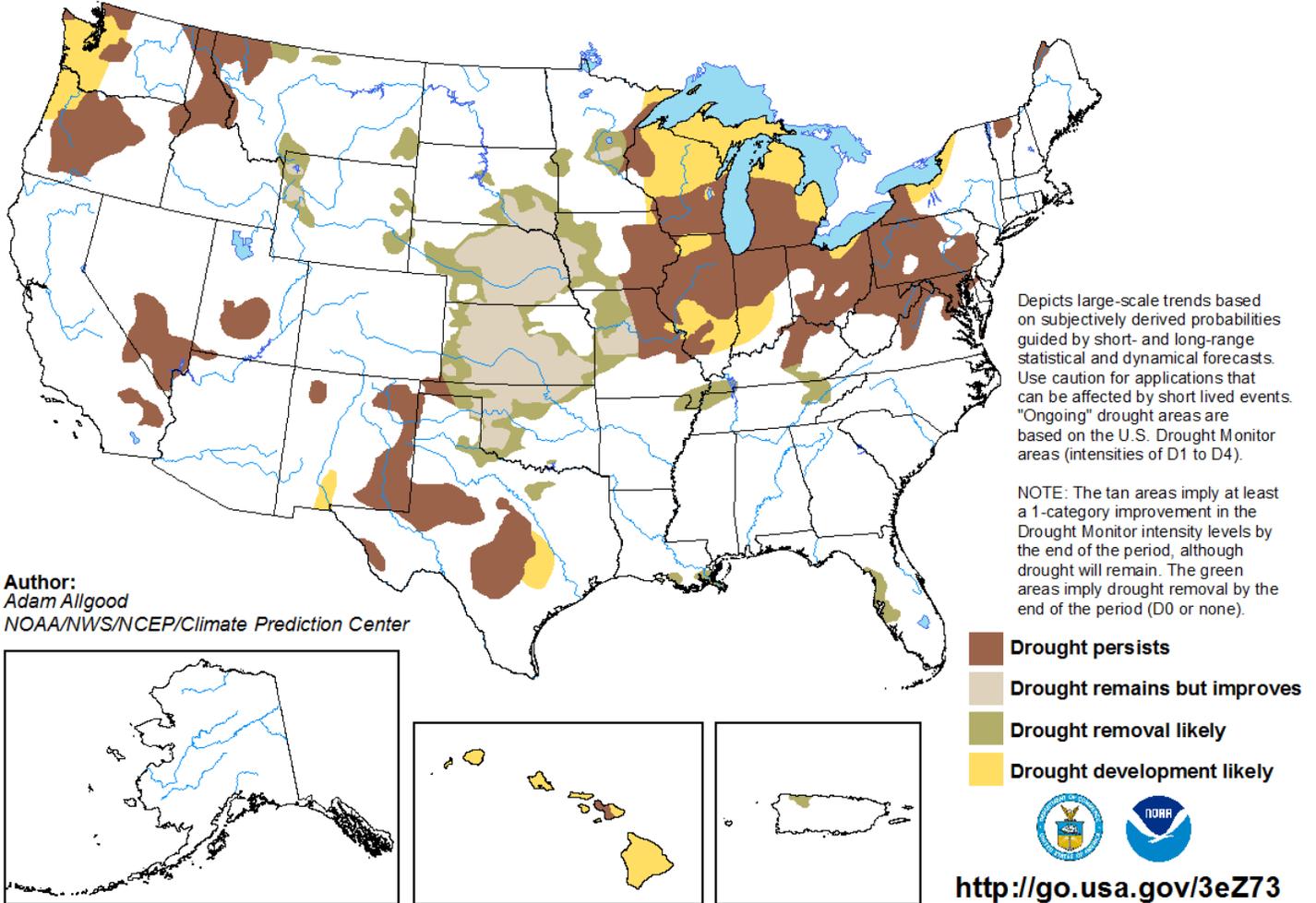
Montana, Vegetative Health Index, week 25 – June 24, 2022



This summer's seasonal drought outlook has improved considerably as compared with outlooks issued earlier this year. As shown in the map below, northwest Montana will likely remain in drought through the summer and into the fall with drought conditions easing across the rest of the state.

U.S. Seasonal Drought Outlook Drought Tendency During the Valid Period

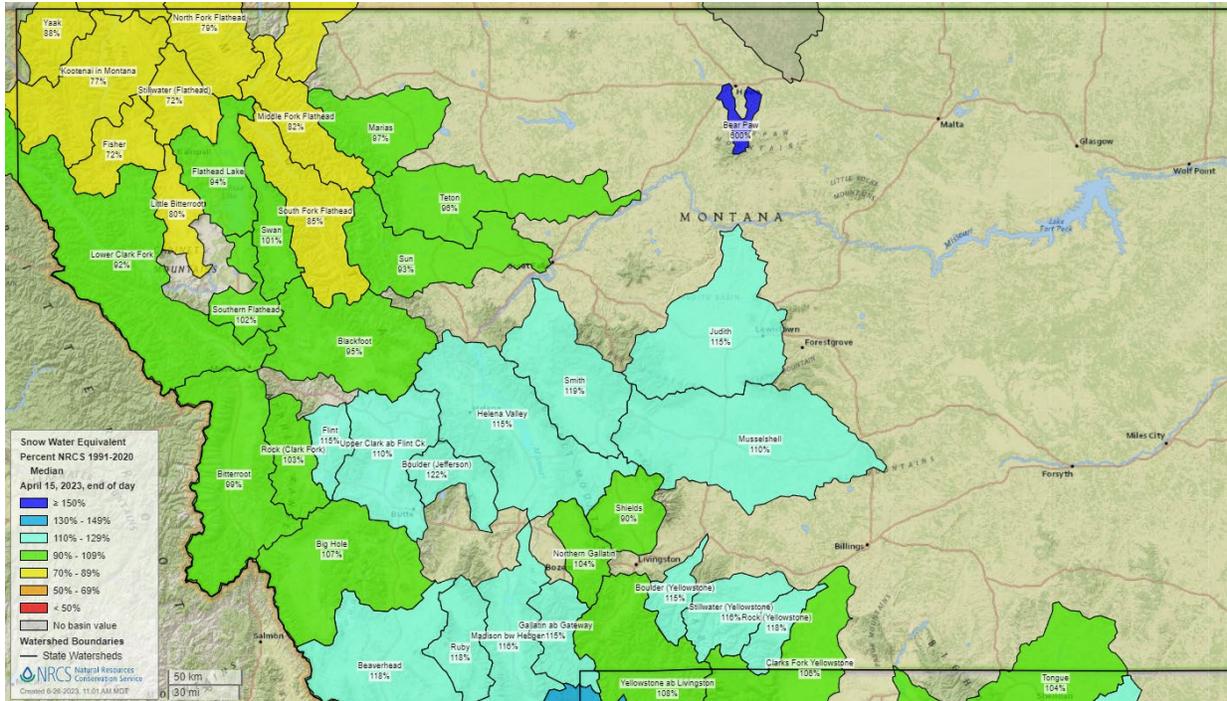
Valid for June 15 - September 30, 2023
Released June 15



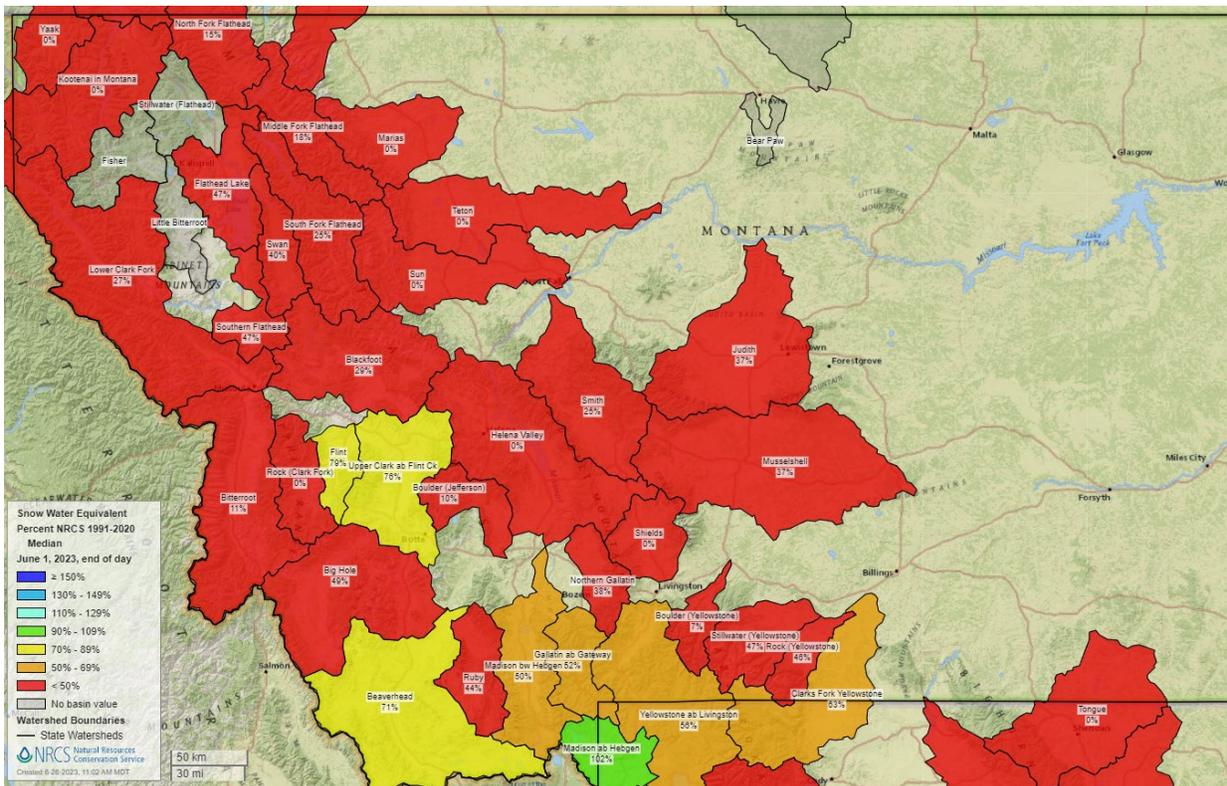
Snowpack / Precipitation – Overview:

The June NRCS Snow Survey Report offers a good summation of current conditions. Faster than normal snowmelt during May resulted in a dramatic decrease in snowpack percentages from last month and the seasonal snowpack at many monitoring stations melted out earlier than normal. The snowpack remains only at the highest elevations across Montana. While much of the seasonal snow has melted, the total volume of snow water equivalent accumulated this year was near to above normal in all but part of northwest Montana and the northern Rocky Mountain Front. Last month's rapid snowmelt resulted in reduced water supply forecasts for the summer at most stream gages. Given the quick melt, at least a normal amount of precipitation over the next several months will be necessary to sustain normal streamflows late into the summer.

Snow Water Equivalent as a percentage of median April 15, 2023



Snow Water Equivalent as a percentage of median June 1, 2023

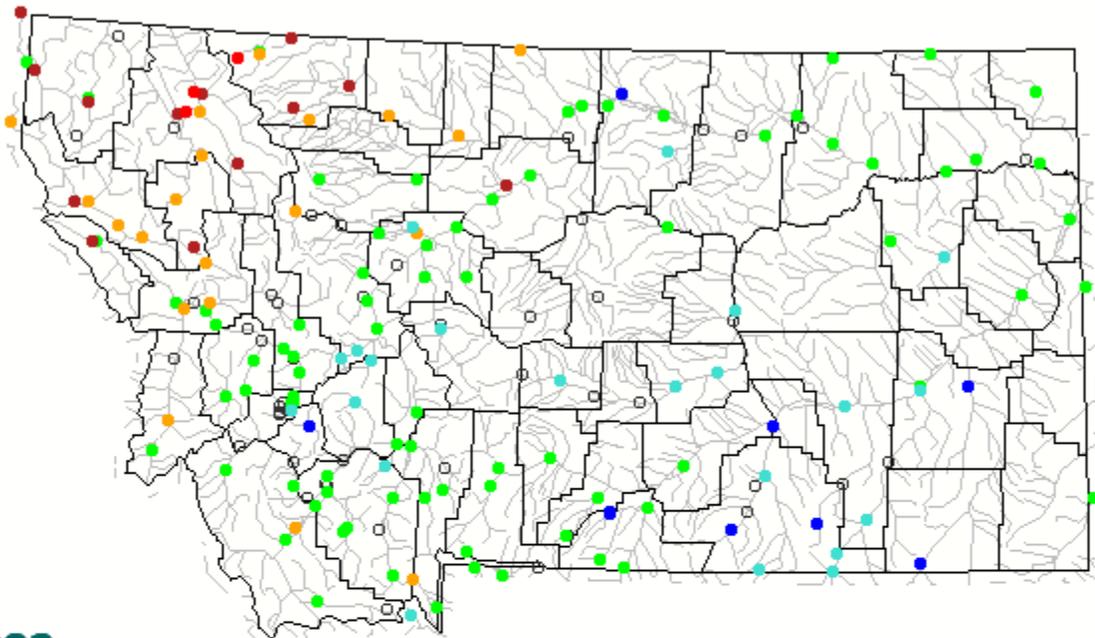


The large drop in snowpack percentages was the result of weeks of faster than normal snowmelt. Snowmelt in May at high mountain elevations across Montana is typically about 0.5-1.5 inches of snow water equivalent per day. Last month snowmelt rates exceeded 2.5 inches of snow water equivalent per day.

Streamflow: ([DNRC/USGS/MBMG Gaging Stations](#), [USGS Water Watch Dashboard](#), [Missouri Basin Forecast Center](#), [Northwest River Forecast Center](#))

Much below normal temperatures in March and early April sustained the low and mid-elevation snowpack longer than usual this spring. However, as temperatures in May jumped to much above average, the snowpack came off quickly and streamflows jumped into the 80th and 90th percentiles across much of the state. Northwest Montana remained the outlier where much below normal snowpack resulted in much below average to record low flows on some rivers in May and June. Wetter than average conditions in June will help offset the early melt in the high elevations and may help to sustain streamflows in July. However, in the event of hotter than average temperatures and without continued precipitation into July, streamflows could drop off quickly as the summer advances.

Sunday, June 25, 2023



Search USGS streamgage

Choose a data retrieval option and select a location on the map

List of all stations Single station Nearest stations

Explanation - Percentile classes							
Low	<10 Much below normal	10-24 Below normal	25-75 Normal	76-90 Above normal	>90 Much above normal	High	Not-ranked

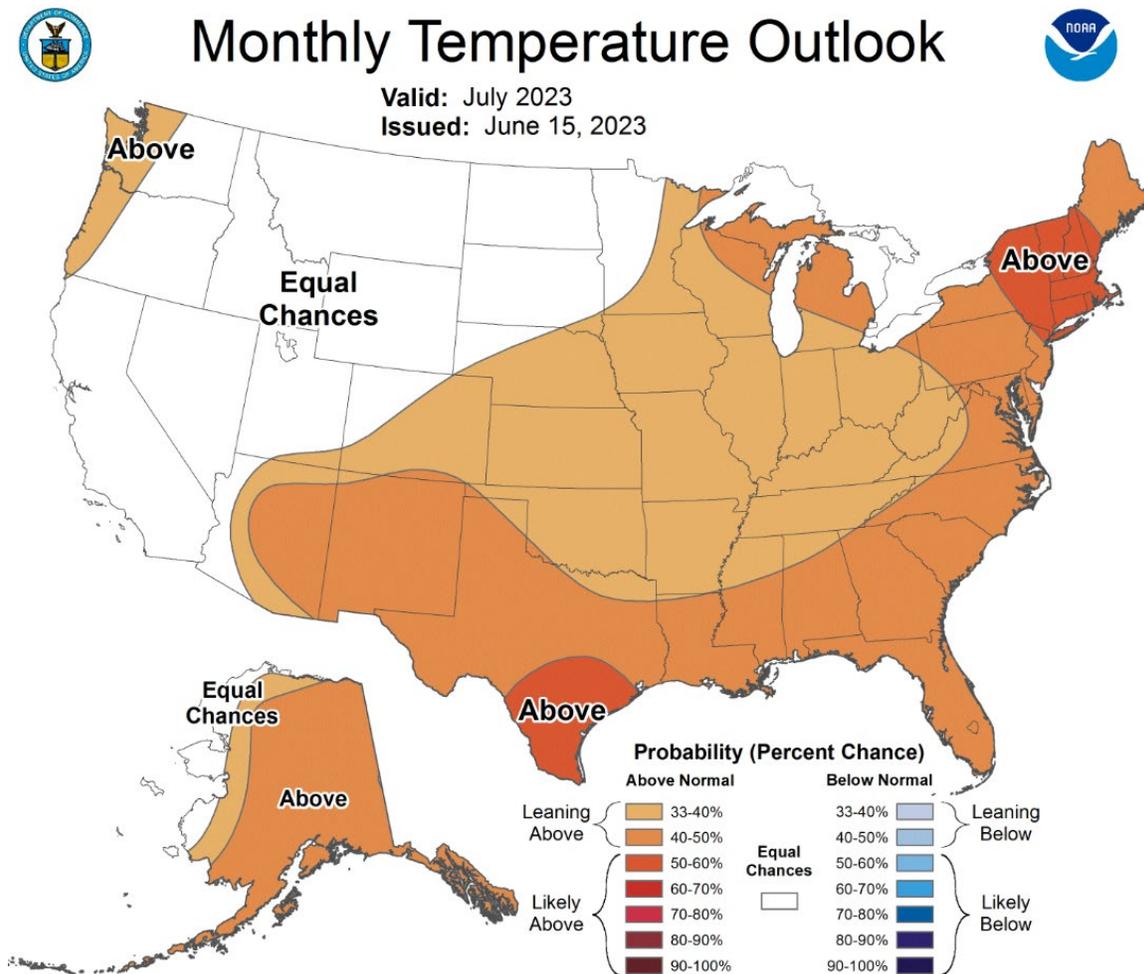
Reservoirs: ([Bureau of Reclamation Reservoirs](#), [State Reservoirs](#))

Water storage across Montana is in better condition than we have experienced since the spring of 2019. Water elevations at state-owned reservoirs across Montana were mostly above normal as of June 1 (reservoir elevation status for July 1 was unavailable in time for this report). Private dams, stockwater ponds and dugouts mostly filled this spring and flooding in low-lying fields and pastures has been common. Temperatures and associated surface water demands in July and August will have the greatest impact on reservoir elevations later this summer and into next fall.

Long Term Weather Forecast:

The [Climate Prediction Center's](#) current temperature outlook for July does not offer a clear signal for above or below normal temperatures. The precipitation outlook, however, is more positive indicating a 30% to 50% chance for above normal precipitation in July. The maps below show the 1-month forecast for both temperature and precipitation. The 3-month forecast does indicate an increased chance for warmer than average temperatures and slightly wetter conditions in the months ahead. However, the longer timespan makes this forecast much less reliable. July and August are typically Montana's hottest and driest months.

1 Month Temperature Forecast:



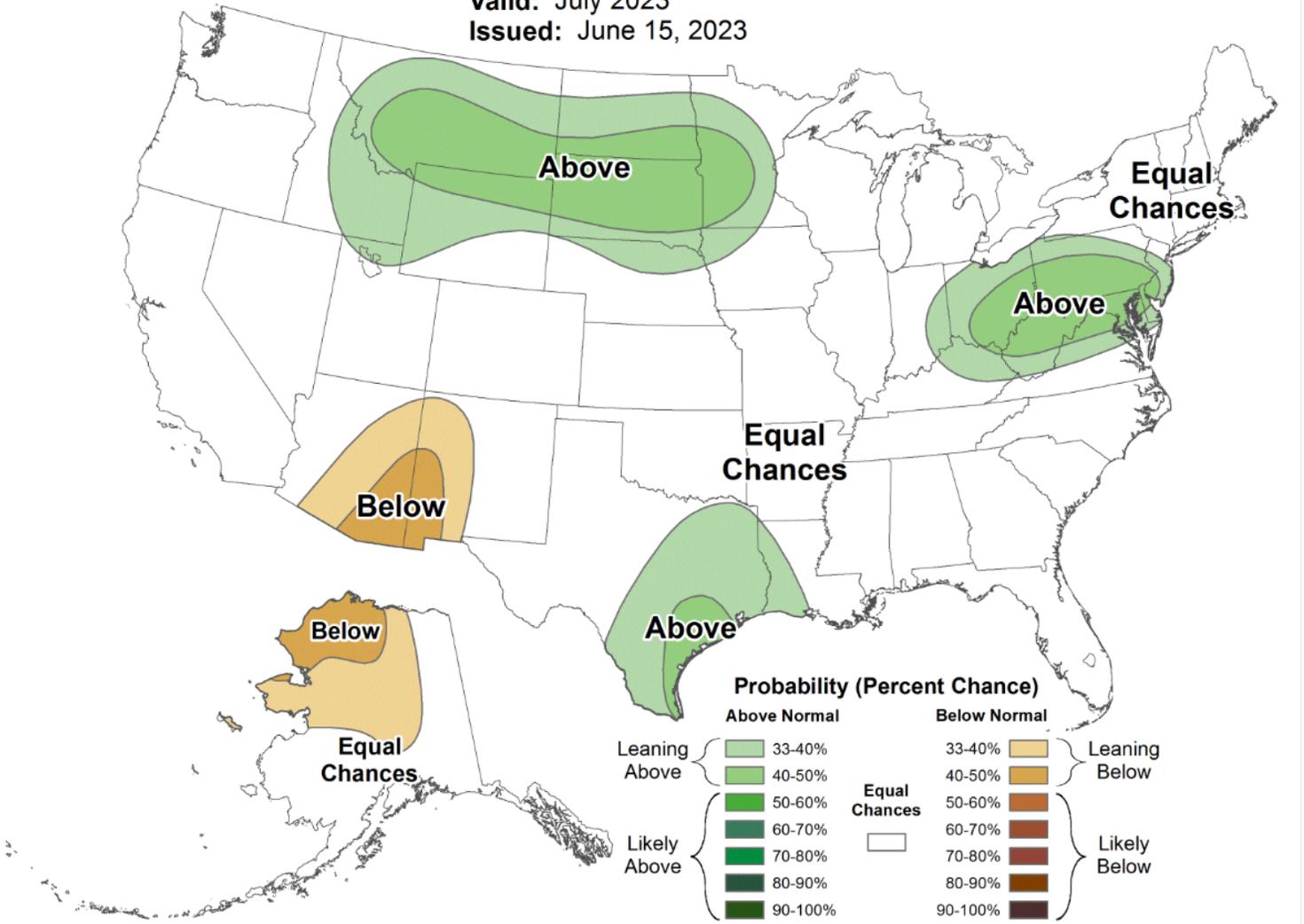
1 Month Precipitation Forecast:



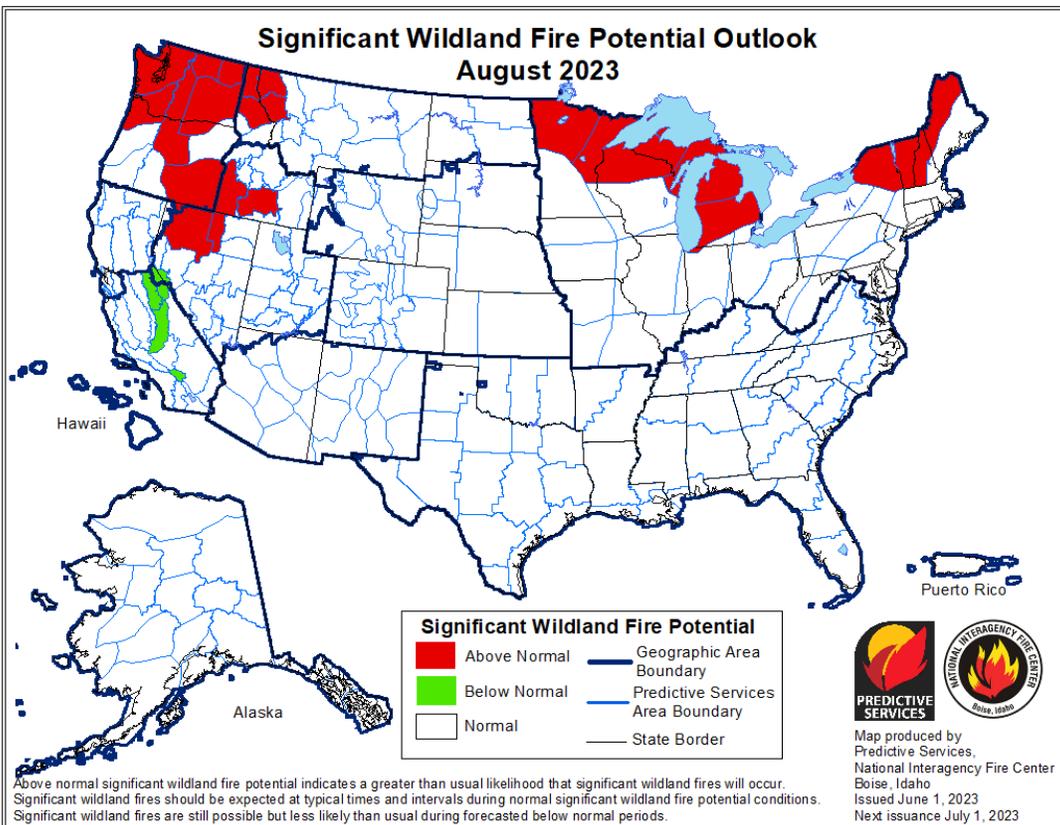
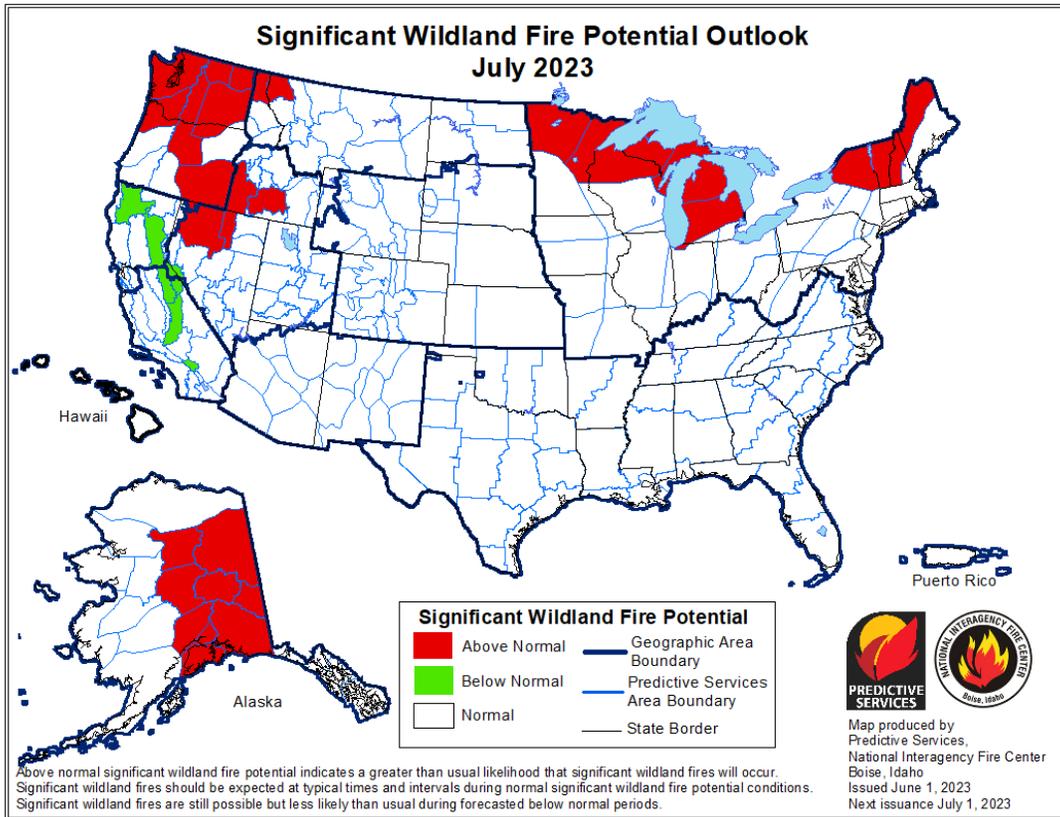
Monthly Precipitation Outlook



Valid: July 2023
Issued: June 15, 2023



Wildfire Outlook Summary



Drought Forecast Report Summary

- Conditions in the fall of 2022 and winter of 2023 were near average for most of the state except northwest Montana which was warmer and drier than normal. Cold temperatures and above average snowfall in March and early April boosted the snowpack and preserved the low and mid-elevation snowpack.
- Much above normal temperatures in May resulted in an early run-off, but above average precipitation and cooler temperatures in June greatly diminished drought conditions across the state except the northwest corner which degraded into D2 (severe) drought.
- While drought has diminished considerably across much of Montana, it is likely to persist in the northwest through the summer and into the fall.
- Streamflow is currently average to well above average across Montana except the northwest where flows are much below normal to record lows in some places. The early snowpack melt-off could result in greatly diminished streamflows by late summer. Conditions will depend largely on temperature and summer precipitation.
- Surface water storage levels at state and private reservoirs, stock ponds and dugouts are above average.
- The outlook for significant wildfire potential is above normal in the northwest and normal across the rest of Montana.
- These combined indicators offer a more positive drought outlook than we have seen since early summer of 2019. Conditions could change quickly depending upon temperature and precipitation over the coming weeks and months.

Drought Evaluation Tools and Resources – The following resources provide useful tools that DNRC and their partners use to evaluate drought and water supply conditions on a weekly basis across Montana.

[Upper Missouri River Drought Indicators Dashboard](#)

Montana Drought Impacts Reporter - Submit a report: <https://nris.mt.gov/droughtsurvey>

View results: <https://nris.mt.gov/droughtimpacts>

[NRCS Interactive Precip Portal](#)

[USGS Water Watch Dashboard](#)

[Montana Mesonet Data Downloader](#)

DNRC can help answer questions about water resources in your area or provide information about water management tools like stream gages, near you. DNRC also provides planning assistance and technical support for local water supply planning for your community and in your watershed.

In partnership with other state and federal agencies and Tribes, experts in climate science, snowpack, streamflow and weather information collect and evaluate drought and water supply data on a weekly basis throughout the year. This information is distilled into weekly recommendations to the U.S. Drought Monitor, which tracks drought conditions nationally. Much of the information contained in this report comes from the [NRCS Water Supply Outlook Report](#), [U.S. Drought Monitor](#), [Climate Prediction Center](#), [National Integrated Drought Information System](#), [National Interagency Coordination Center](#) and other sources. Please contact [Michael Downey](#), at DNRC (mdowney2@mt.gov) with questions or feedback about the information contained in this report.

Working on behalf of the Governor's Drought and Water Supply Advisory Committee, DNRC has compiled this Summer Drought Forecast. This report provides a synopsis of statewide conditions gleaned from multiple sources and offers links to additional resources with more in-depth information. This report would not be possible without the ongoing participation and contributions of our local, university, state, tribal and federal partners, some of which are listed below:



This report was developed by DNRC on behalf of the Governor's Drought & Water Supply Advisory Committee pursuant to MCA 2-15-3308(5).



DNRC is seeking public comment on the draft Montana Drought Management Plan following a multi-year, stakeholder-driven planning effort. A draft of the plan is now available for review and public comment through August 4, 2023, at mtdroughtinfo.org.