The Montana Department of Natural Resources & Conservation

Montana Drought & Water Supply Outlook Report – Spring 2025

Upper Big Hole River, near Wisdom, MT Photo: Mike Roberts

This report was prepared by the Montana Department of Natural Resources & Conservation on behalf of the Drought & Water Supply Advisory Committee

Key Takeaways

- Much of the State of Montana is entering the fifth consecutive year of abnormally dry or drought conditions. Exceptionally dry and hot conditions last fall greatly depleted soil moisture, leaving many regions starting from a moisture deficit entering the spring and summer months.
- Although there is additional opportunity to add to the mountain snowpack in the coming weeks, low elevation snowpack has already melted. A warmer and drier forecast for mid-April threatens to accelerate the onset of spring run-off. However, the longer-term forecast for the spring is more neutral. The outlook for spring and summer runoff is positive but will depend on the rate of snowmelt. Without sustained spring and summer precipitation, streamflow is likely to taper off earlier than normal this summer due to low soil moisture and depleted shallow aquifers that typically feed rivers and streams during the dry season.
- Most of Montana's state and federal water storage projects are expected to fill this spring. However, reservoir conditions for the summer will depend on the rate of late spring and summer inflows, which could fall short due to low soil moisture and severely depleted watersheds following last year's below average snowpack.
- Warmer than average temperatures in late March and early April have hastened snowmelt and the potential for local flooding will increase over the next several weeks. With near normal snowpack in the mountains, a rain on snow event could result in severe to extreme flooding in some locations. Residents living near rivers or streams are encouraged to develop a flood evacuation plan and consider the following precautions:
    - Purchase flood insurance. Most policies have a 30-day waiting period before becoming effective.
    - Ensure you have an adequate supply of drinking water. Flooding may compromise local water systems.
- The next eight weeks are critical, and water supplies have the potential to improve or degrade statewide. Diminished forage for livestock and wildlife is forecast in the southeast, northwest, and southwest east of the continental divide as a result of dry soils that have persisted since last fall. Grazing conditions in central Montana are forecasted to be average to above average but remain dependent on spring and early summer precipitation and temperatures.

Summary of Recent Conditions

The 2024 water year (Oct. 1, 2023 – Sept. 30, 2024) closed following a drier than average and record hot summer that resulted in extreme (D3) and exceptional (D4) drought conditions in western and eastern Montana. Last year's record low snowpack translated into record low streamflow in the west, and low water coupled with high temperatures led to widespread fishing closures that lasted into the fall. Late summer rains in August and September brought relief to some; however, record heat and below average precipitation in October led to worsening conditions across Montana through the fall and early winter. The period from September through December was the warmest on record with temperatures exceeding the average by 5.5 degrees Fahrenheit statewide, and some areas reaching more than 10 degrees Fahrenheit above normal. The southeast was particularly hard hit, with a broad expansion of severe (D2) and extreme (D3) drought conditions that worsened through November and remained through late January.

Water levels in storage facilities on Dec. 31 varied widely with snowpack dependent reservoirs in the west, like Nevada Creek Reservoir, falling much below average at 47% of normal on that date. Other facilities, like Deadman's Basin in central Montana, were holding 120% of normal by year's end. Delay of the first killing freeze until late October extended the growing season and coupled with hot and dry weather, severely depleted soil moisture. Impacts of the hot and dry fall are likely to have negative consequences for soil moisture emerging from winter.

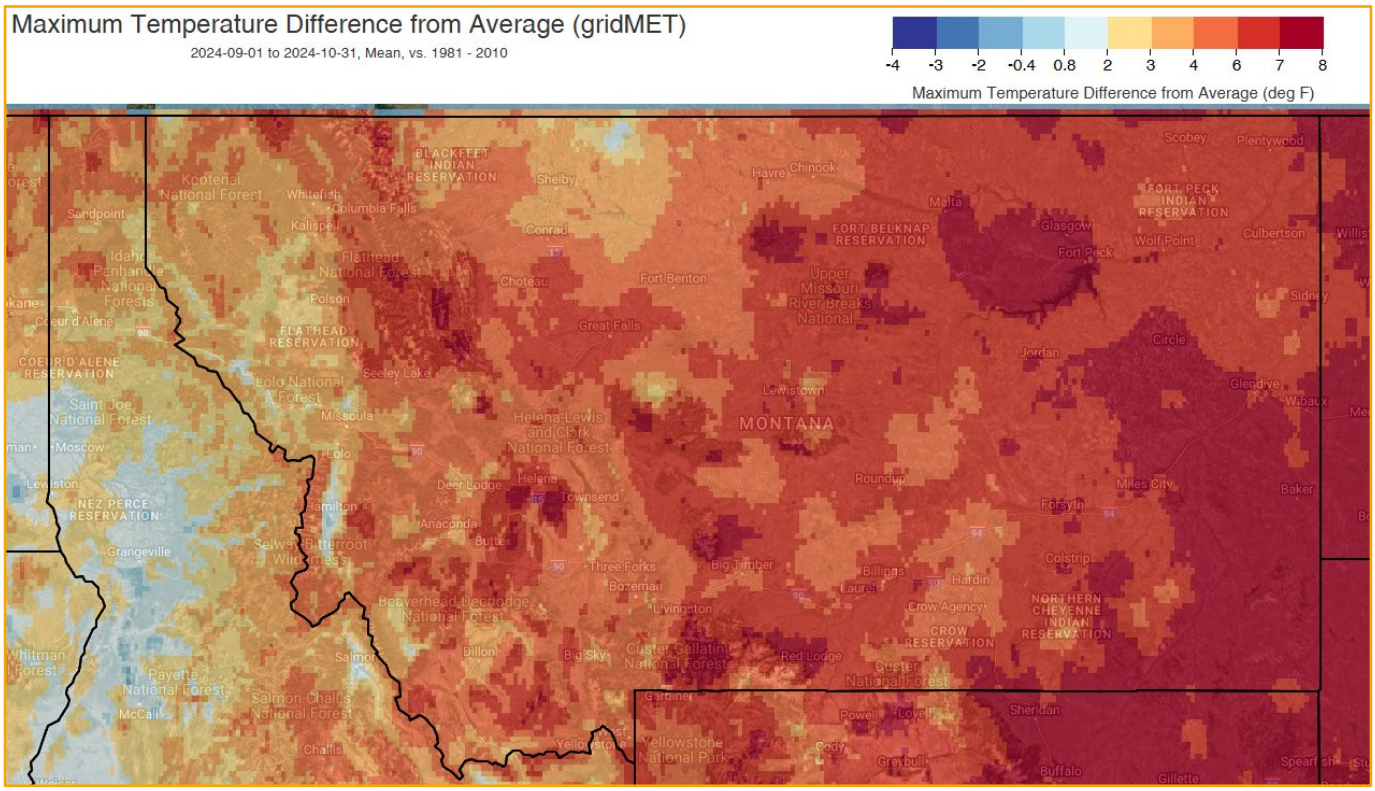

Figure 1- Temperature – Difference from Average 9/1/24 – 10/31/24 **Map generated by Climate Engine**

Near average temperatures in November offered welcome relief and above average precipitation across the north boosted snowpack above normal across the Hi-Line and in the northwest. In the southeast, above average precipitation in December eased severely dry conditions there while south central Montana, particularly the Beartooth Plateau, continued to fall behind. Unfortunately, December temperatures averaged 8.4 degrees above normal, erasing the low and mid elevation snowpack statewide. Nominal improvements in snowpack were recorded at higher elevations through the end of the year.

Precipitation in the new year got off to a slow start, with less than normal precipitation in the west and east. Central Montana was the outlier with record accumulations in the Little Belt, Snowy, and Bears Paw ranges. Heavy snowfall in Lewistown on Jan. 13 and 14 brought more than two feet of snow in some areas, making roads impassable. Residents were advised to shelter in place and schools were closed for several days.

Bitterly cold temperatures arrived in early February. Apart from the northwest, where accumulations were closer to average, snow accumulations across Montana in February were considerably above average. Basins in the southwest received upwards of 180% of normal precipitation. The Upper Yellowstone basin, for example, typically receives about two inches of snow water equivalent (SWE) in the month of February. This February, the Upper Yellowstone received four inches of SWE.

The cold snap quickly gave way to significantly above average temperature in late February and March, once again erasing the gains in low and mid elevation snowpack. Soil moisture monitors across the state indicated that much of the moisture released in the early thaw was absorbed into the soil profile. A warm and dry March across north central and northeast Montana has concerned agricultural producers. April, May, and June are the highest precipitation months east of the Continental Divide so there is still time to overcome this early season deficit.

Current Drought Conditions

Drought conditions degraded through the summer with half the state in moderate to extreme drought (D1 to D3) by late July. A small area of D4 (exceptional) drought emerged in the Blackfoot watershed due to record low streamflow driven by the previous winter's exceptionally low snowpack in that basin. Conditions continued to deteriorate through the fall, reaching their largest extent in late November with 59% percent of the state in moderate to extreme (D1 to D4) drought.

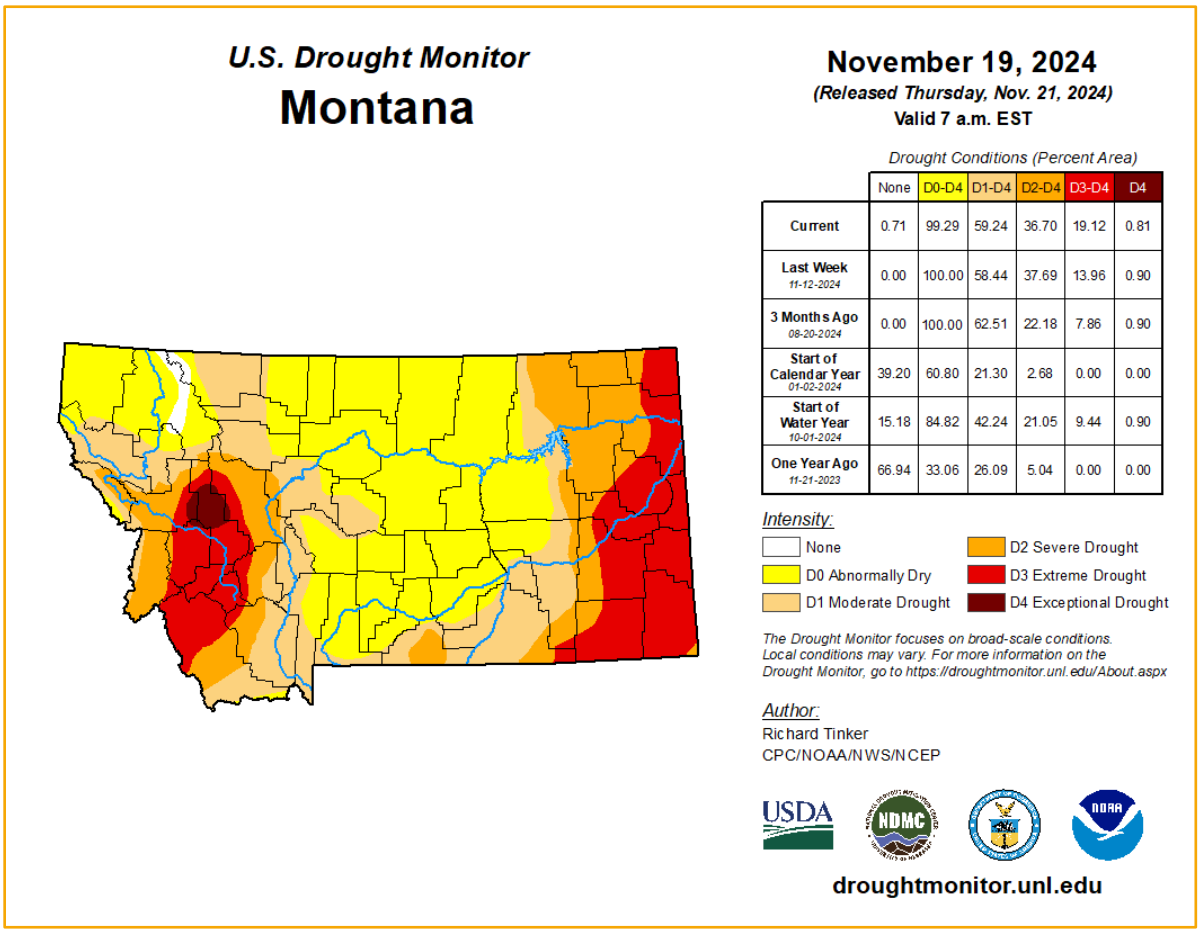

Figure 2 – Drought Categories, November19, 2024

With warm and dry conditions persisting through December, widespread improvements remained elusive until late January and early February with central Montana mostly drought free by late February. A week of unsettled and cooler weather in late March and early April has improved snowpack across the western mountains and eased unusually dry conditions on the prairie. Drought conditions could worsen quickly depending on the outcome and timing of spring precipitation and the onset of warmer temperatures. Above average precipitation and cooler temperatures in the next eight weeks will be necessary in the southwest, north central, and east to relieve long-term drought and avoid the onset of more severe conditions in those areas. April, May and June are some of Montana's wettest months and there is time for conditions to improve between now and the end of June. Figure 3 shows current drought conditions as of April 1, 2025. Figure 4 shows the change in drought categories since September as compared with current conditions.

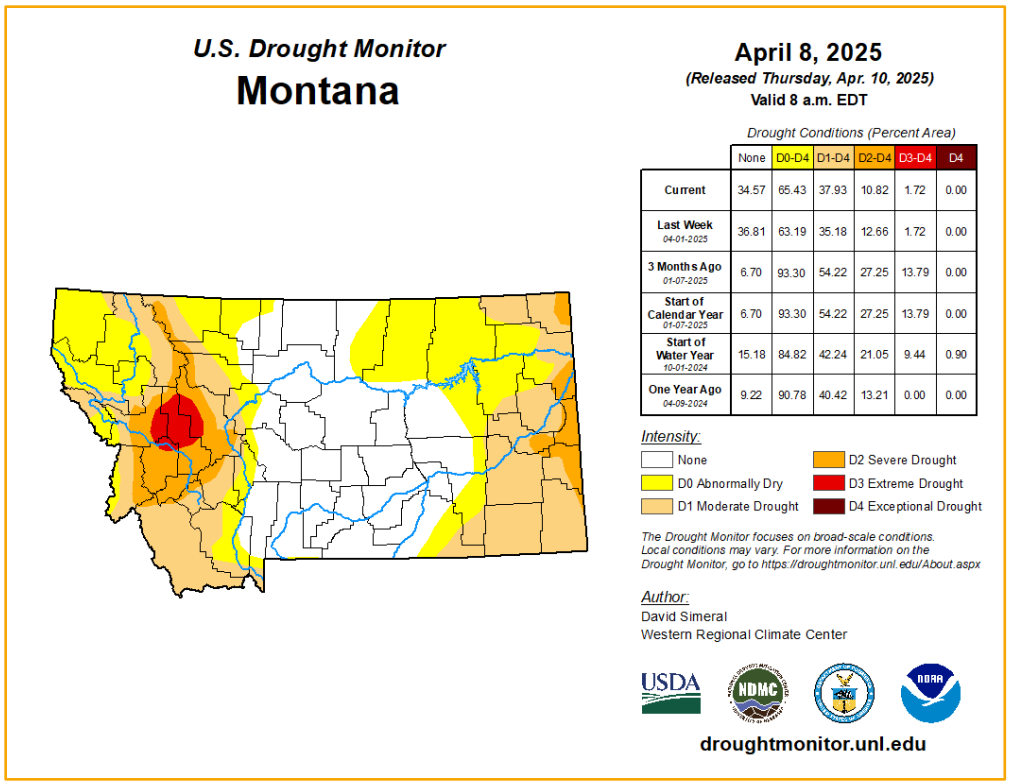

Figure 3 – Current Drought Categories

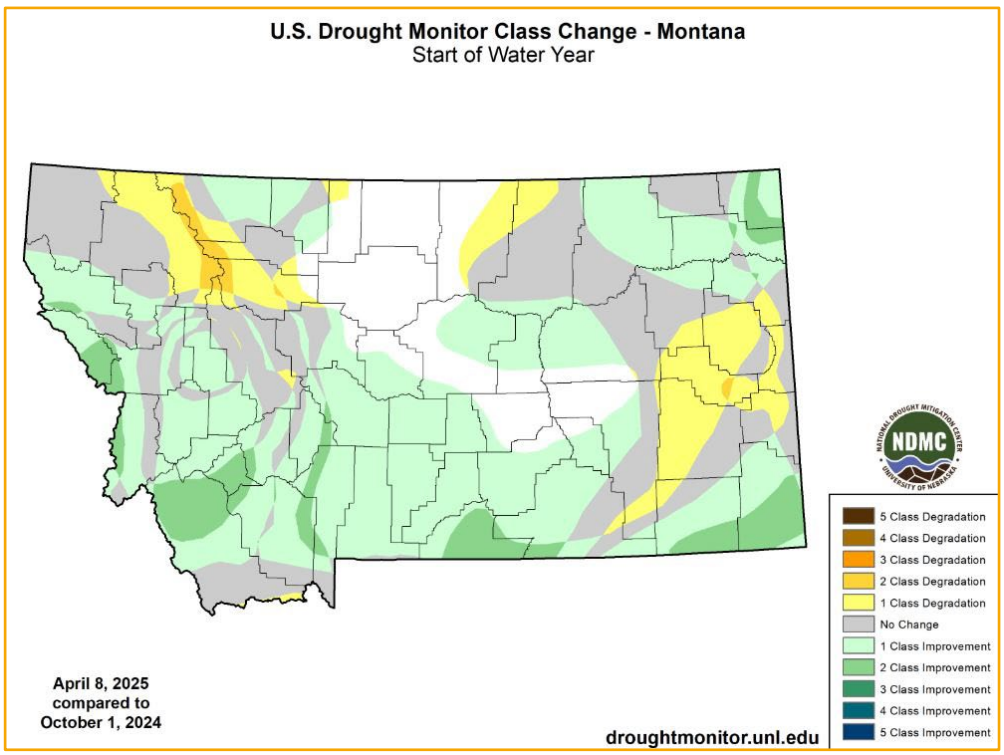

Figure 4 – Change in Drought Categories since the end of 2024 Water Year

Snowpack

Late October typically marks the onset of seasonal snowpack accumulation in Montana. Fall and early winter are the most important precipitation months in the northwest, while east of the Continental Divide, late fall, and early winter are some of the driest months of the year. In late fall of 2024, a stubborn high pressure weather system delayed snow accumulation until November. The weather pattern through late November favored northern Montana with above normal accumulations in the northwest and northeast corners of the state. The fall's high-pressure system resumed in December. Warmer and drier than average conditions stalled snow accumulations along the Rocky Mountain Front and across the south, with accumulations falling much below average. By the start of the New Year, the snowpack varied widely from 135% of average in the South Fork of the Flathead to 68% of average in the Beaverhead and 64% of average in the Upper Tongue River drainages. January precipitation was mixed: basins in the west fell below average, while basins in the south received above average precipitation. Total accumulations remained below average due to early season deficits. Some Basins in central Montana broke records, with large accumulations occurring in most of Montana's central island ranges.

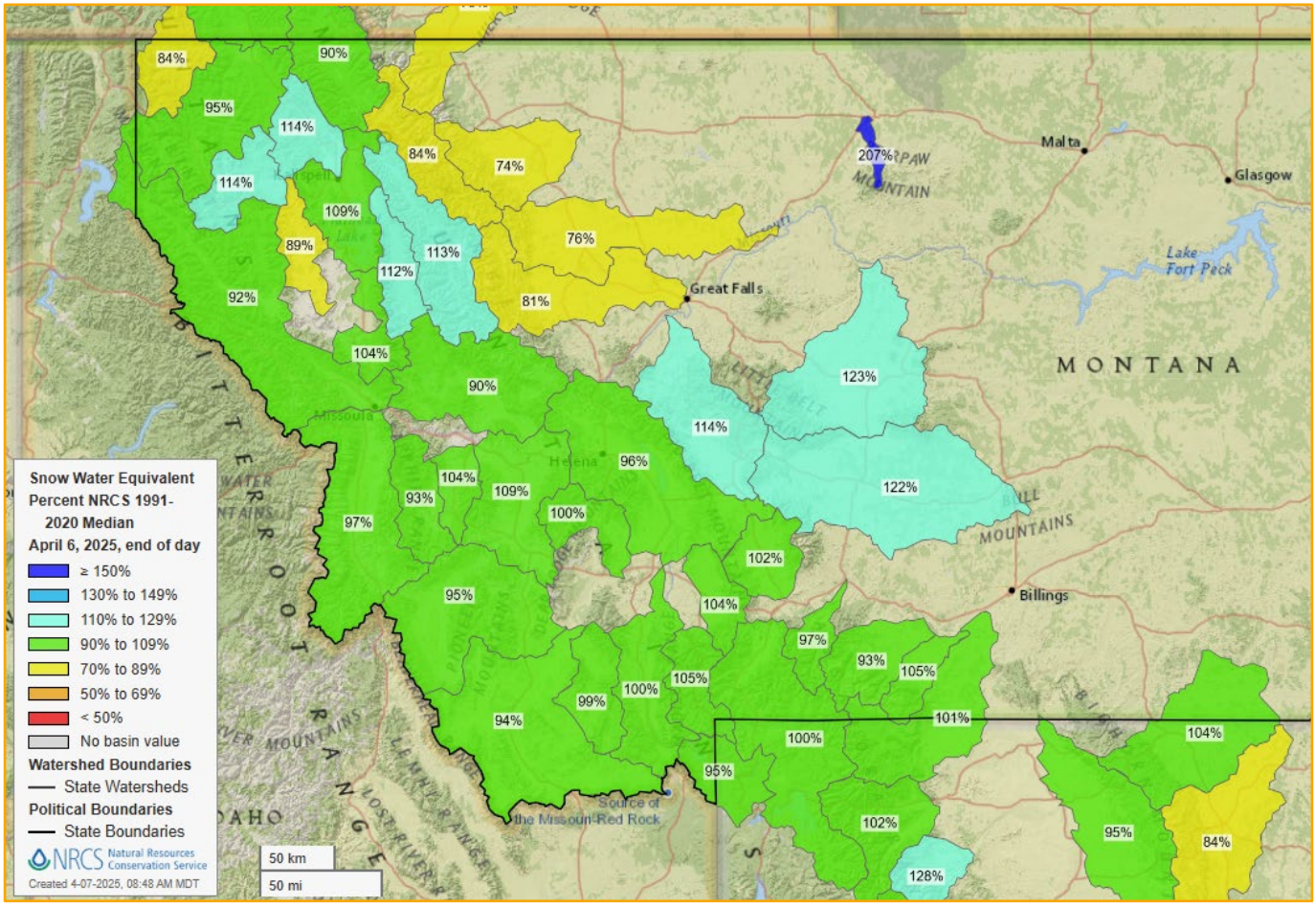

Figure 5 – Daily Snowpack 4/6/25, Percent of Normal by Basin USDA – NRCS – Snow Survey Program

February brought bitter cold and a pattern of steady snow accumulation across Montana. However, during the last week of February, the pattern shifted dramatically to much above average temperatures and drier conditions. Storm tracks in March favored the west and south-central regions of the state, pushing snowpack to near average in almost every drainage west and near east of the Continental Divide. Drainages along the Rocky Mountain Front improved in March but remained well below average

– near 80% of the median on April 1. With the median date for peak snowpack approaching quickly, it is unlikely these drainages will reach their median annual peak.

Much above average temperatures arrived during the last two weeks in March with high temperatures in the high 60s to low 70s. Even high elevation areas lost snowpack in most of Montana's watersheds, and streamflow in many streams and rivers in the west rose to much above normal levels with the warmer weather. Although snowpack across much of Montana is greatly improved over 2024, long-term precipitation deficits and depleted soil moisture in many watersheds are likely to result in below average streamflow following the early season run-off without above average precipitation in the spring and early summer.

Moving through spring, April, May, and June are typically some of the wettest months of the year in watersheds east of the divide. West of the divide, precipitation generally tapers off as summer approaches. With warmer than average temperatures and below average precipitation forecast for mid-April, it is possible that the lower elevation snowpack has already reached its peak for the season in most watersheds. High elevation sites will likely continue to increase snowpack into early May.

Streamflow (DNRC/USGS/Gaging Stations, USGS WaterWatch, Missouri Basin River Forecast Center)

Currently, streamflow varies widely across Montana. It is a dynamic time of year and extremely difficult to determine if current flows are the result of melting snowpack or enhanced baseflow resulting from groundwater infiltration that occurred during several unseasonal warm-ups that melted the low and mid-elevation snowpack. It is most likely a combination of both. Gages indicating higher than normal flows are probably the result of premature snow melt due to warmer temperatures in late March. A cold and wet front in early April improved high elevation snowpack and slowed melt-off. On larger rivers, such as the Missouri, low flows this time of year are also indicative of dam operators diminishing releases to fill reservoirs. Water managers will be watching streamflow closely in the coming weeks to develop better forecasts for late spring and early summer.

According to the Natural Resources Conservation Service (NRCS) April Water Supply Outlook Report, April through July streamflow is forecasted for near to below normal at 80-105% of the median in Montana. Regions with larger water year precipitation and snowpack deficits like the Powder and Tongue River basins are predicting below normal streamflow of 60-90% of median. Streamflow forecasts are near to above the median in most watersheds in northwest and southwest Montana. Streams on the Rocky Mountain Front east of the Continental Divide like the St. Mary, Sun-Teton-Marias are forecast for below average flow, however, conditions are improved compared with last year. The streamflow forecast on the Smith, Judith and Musselshell are much improved with snowpack at 115% of the median compared with 67% of the median at this time last year. This area received above normal precipitation in November through March.

The translation of current snowpack into summer stream forecasts remains uncertain and will depend on the rate of snowmelt and evaporation, which is driven primarily by temperature. Warmer temperatures will accelerate runoff, while cooler than average temperatures could suppress runoff, effectively extending the season. A prolonged period of high pressure with abundant sunshine, high

daily temperatures, and nights with above freezing temperatures could release a substantial amount of water in a short period, resulting in local and potentially regional flooding. Snowpack is a critical component of early season streamflow across the state, but it is not the only component. Total water year precipitation, peak snowpack accumulation, spring and summer precipitation, and the departure from seasonal average temperatures all contribute to the overall water volume available during the growing season.

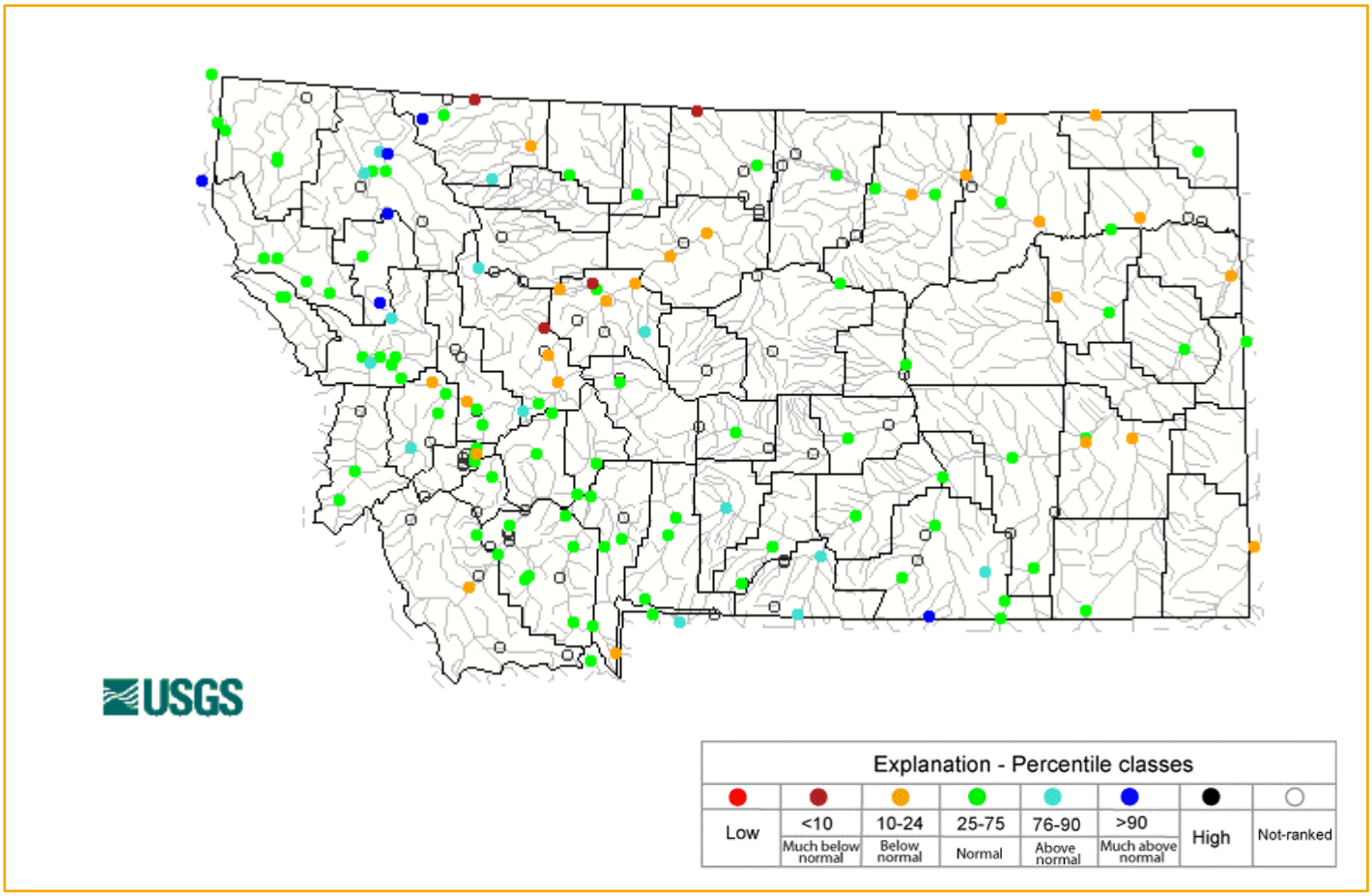

Figure 6 – 14-day average streamflow as compared to historical streamflow for Monday April 7, 2025

Reservoirs (Bureau of Reclamation Reservoirs, State Reservoirs)

Water elevations at most state water projects across Montana are close to average for this time of year. Projects in central Montana are currently above average while some in the west, like Nevada Creek, Willow Creek, and Nilan reservoirs on the Rocky Mountain Front, are considerably below average. Some of the higher reservoir pools this spring are partly due to warmer than average temperatures in March that briefly accelerated spring run-off. The return of cooler temperatures in early April could extend the run-off season. Water managers are doing their best to retain run-off at many projects in anticipation of diminished inflows due to last summer and fall's hot temperatures and diminished inflows. This year's much improved snowpack and near to above average reservoir pools have all but assured that most storage facilities will fill to capacity this spring.

The Bureau of Reclamation (USBOR) and Army Corps of Engineers (USACE) are actively managing large reservoir projects across the state. Hungry Horse, Lake Kootenai, and Flathead Lake should see improved inflows as compared to last year due to the near to above average snowpack in the northwest basins.

How the snowpack translates into lake levels this summer will depend on how long the snow accumulation season lasts, how rapidly run-off occurs, streamflow post run-off, summer precipitation, and evaporation. The Missouri headwaters and mainstem reservoirs are all expected to fill due to substantial carry-over from last year and recent improvements in snowpack in southwest Montana and the Upper Missouri River Basin. Despite the siphon failure on the St. Mary's diversion last summer, the milder than average winter along the Rocky Mountain Front enabled the Bureau of Reclamation (BOR) to make continued progress on those repairs through the winter. Barring unforeseen obstacles or set-backs, BOR anticipates completing repairs by late summer which would enable water transfers in 2025 to support the irrigation season in 2026.

Soil Moisture

Soil moisture indicators from satellite generated soil moisture maps and data from Montana's Mesonet Soil Moisture Monitoring Network vary widely statewide. Spring soil moisture values are heavily influenced by carry-over from last summer and fall, in addition to accumulations this spring. Not surprisingly, conditions in central Montana are the most promising with the western and eastern regions of the state appearing more compromised. Last year's poor snowpack, a hot and dry summer, and record hot and dry fall have combined to leave large areas of Montana severely depleted of soil moisture as shown in Figure 7. The Mesonet network is still in the early stages of build-out, and many stations have less than five years of monitoring data. This shorter period of record means those sites are less reliable as indicators of average soil moisture but are useful as near-term indicators of changes in soil moisture due to factors such as recent precipitation and the impacts of evaporation from wind, temperature, and plant transpiration.

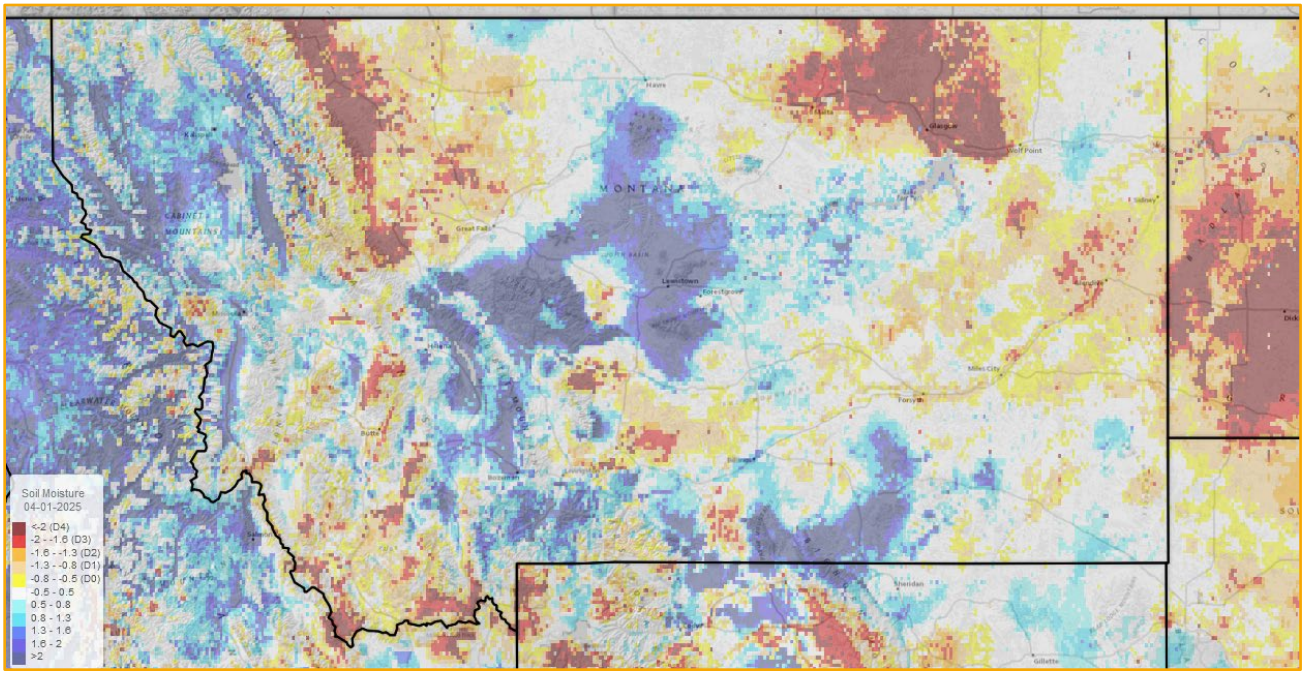

Figure 7 – SPoRT Soil Moisture Model – 4/1/25 **UMRB Drought Indicators Dashboard - MT Climate Office**

Drought Outlook

Extreme variability in temperature, precipitation accumulation, and spatial extent over the last six months have made the status of current water supply and drought conditions difficult to characterize. This variability coupled with four years of above average temperatures and below average precipitation in some locations has resulted in drought conditions that vary from abnormally dry (D0) to extremely dry (D3) statewide. While conditions improved considerably across central Montana in 2024, western, north central, and eastern Montana remain especially vulnerable to drought onset due to multi-year precipitation deficits and highly variable winter temperatures that depleted the low and mid-elevation snowpack. Looking ahead, record high temperatures and much below average precipitation last fall may prove critical as the influence of depleted soil moisture and diminished shallow aquifers have reduced the spring water supply. These short-term deficits are compounded by long-term shortages as Montana enters its fifth consecutive year of drought. Conditions this summer will hinge on both temperature and precipitation over the next three months. Everyone should prepare for a challenging summer ahead. The next 60 days are critical precipitation months and will likely determine conditions this summer and early fall. However, even the benefits of a cool and wet spring could vanish quickly with the onset of unusually hot and dry conditions.

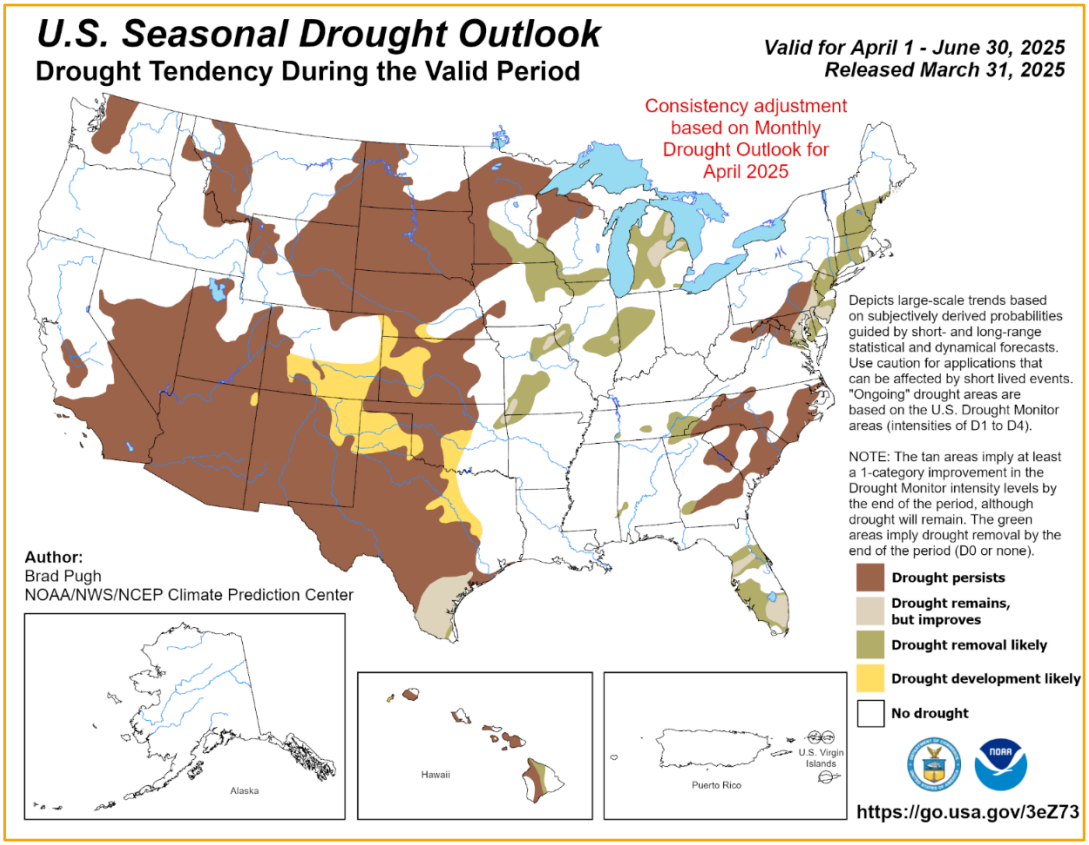

Figure 8 – Seasonal Drought Outlook Apri1 1 – June 30 **Climate Prediction Center**

Long-term Forecast

The long-term weather outlook (three months) offers no clear indicators for temperatures across Montana this spring and early summer. The long-term precipitation forecast is similarly unclear but does indicate a 30% - 40% chance of below average precipitation across the southern extent of the state.

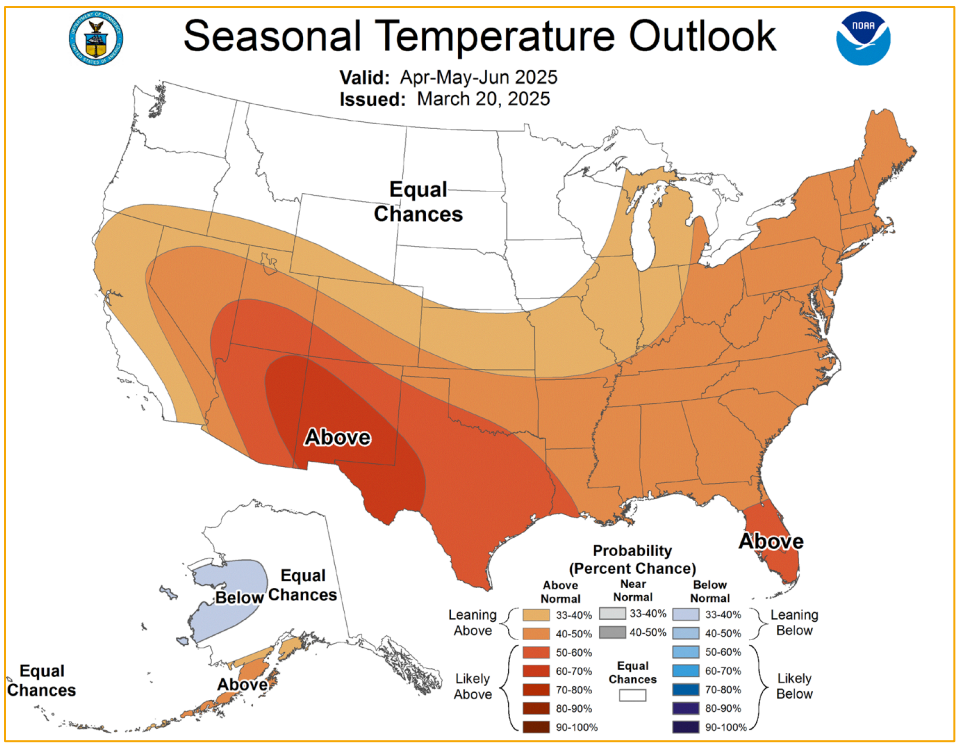

Figure 9 – Seasonal Temperature Outlook Apri1 1 – June 30 **Climate Prediction Center**

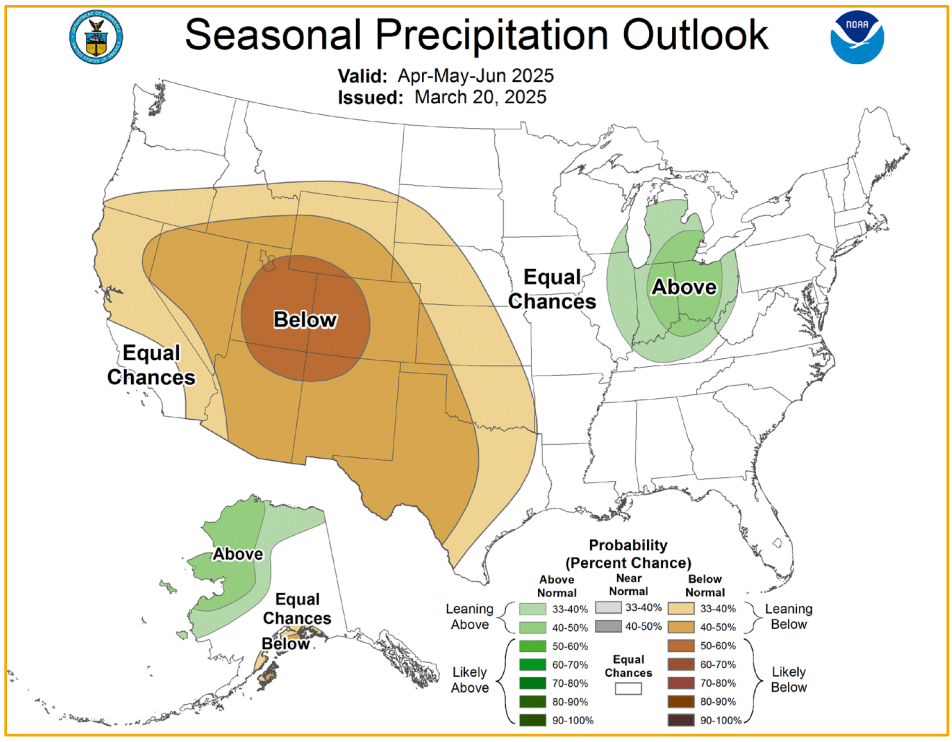

Figure 10 – Seasonal Precipitation Outlook Apri1 1 – June 3 **Climate Prediction Center**

Drought Evaluation Tools and Resources – The following resources provide useful tools that the Montana Department of Natural Resources & Conservation (DNRC) and 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
NRCS Interactive Precipitation Portal
NOAA/Climate-At-A-Glance
USGS Water Watch Dashboard
Montana Mesonet Data Downloader

The DNRC has compiled this Spring Water Supply and Drought Outlook on behalf of the Drought and Water Supply Advisory Committee. This report provides a synopsis of statewide conditions gleaned from multiple sources and offers links to additional resources with more in-depth information.

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 year-round. 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 Montana Climate Office, NRCS Water Supply Outlook Reports, U.S. Drought Monitor, Climate Prediction Center, National Integrated Drought Information System and others. Please contact Michael Downey, at DNRC (mdowney2@mt.gov) if you have any questions or feedback about any of the information contained in this report. Keep an eye out for the next drought update in late June.

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 Drought & Water Supply Advisory Committee pursuant to MCA 2-15-3308(5).