USDA Natural Resources Conservation Service
U.S. DEPARTMENT OF AGRICULTURE

# Montana Water Supply Outlook Report

May 1, 2026

Each month snow surveyors ascend from the valleys to manually measure snowpack at over 100 snow courses across Montana's watersheds. The data from these snow courses supplements the data from SNOTEL sites to help produce the monthly water supply forecasts. In the pictures above, surveyors navigate the tricky access to Mudd Lake Snow Course in the Anaconda-Pintler Range and experience conditions that defined the winter of 2026. Dirt up to 7000 feet in the Big Hole Valley meant carrying skis for the first portion of the survey. At 7630 feet, the snow course measured 44" of snow and 15.9" of SWE, or 82% of median for its 39 years of observations. December, January, February and March brought higher than normal temperatures resulting in a stubbornly high snow line. (Photo: Javier Colton – April 28th, 2026)

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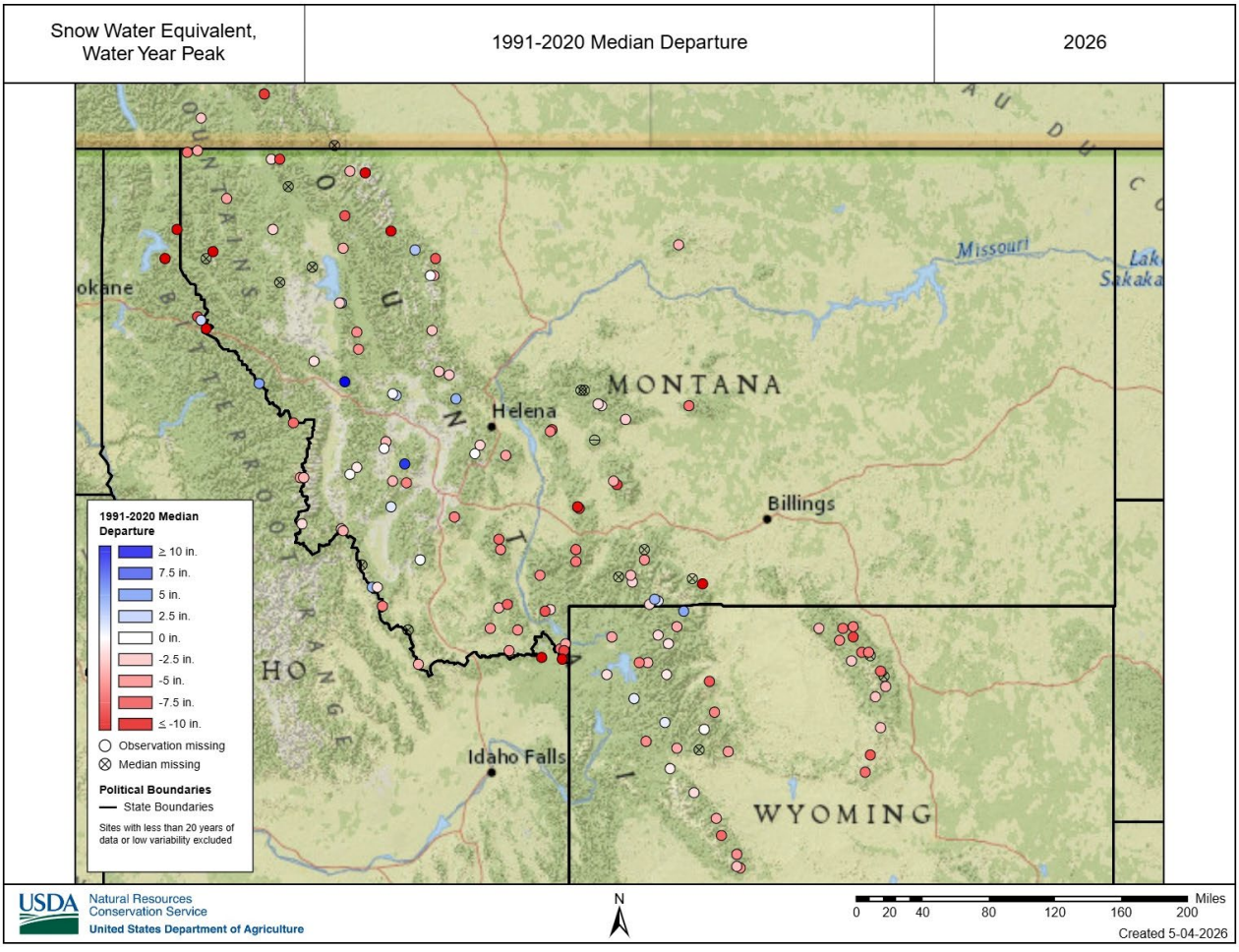
# Statewide Overview

## Summary

Statewide, the season's snowpack accumulation has peaked and is transitioning to snowmelt and runoff season. This year's snowpack was defined by warm temperatures and spatially and temporally variable precipitation. This resulted in high snowlines, early snowmelt events, and conditions that varied greatly across aspect and elevation. December precipitation built high elevation snowpack early and has continued to carry water-year-to-date precipitation totals. Strong March storms benefited the western part of the state but were quickly offset by warm temperatures that spurred early runoff events statewide at the end of the month. April storms stalled higher elevation snowmelt but fell short of meaningfully improving snowpack conditions. As a result, snowpack statewide is well below normal for May 1.

When assessing the volume of water stored in the snowpack, peak snowpack, the highest snow water equivalent (SWE) measured over the winter, is a good indicator of how full the snowpack reservoir became. As shown in the figure below, most SNOTEL sites recorded peak SWE values that were 1 to 14" inches below normal. A few higher elevation sites were the exception, reporting surpluses of 3 to 10". Snowpack reached its peak early this year, and snowmelt began one to six weeks sooner than usual at most SNOTEL sites. As a result, snowmelt driven runoff has shifted earlier in the season with both March and April recording well above normal streamflow across most of the state. Subsequently, below normal spring and summer streamflows are forecasted across much of the state. Spring precipitation and cooler temperatures to delay snowmelt could help improve these forecasts, though full recovery is unlikely. The current prediction of warm temperatures and below normal precipitation could further deteriorate the current snowpack and streamflow outlooks, indicating the possibility of well below normal summer streamflows.



# Statewide Overview

## Precipitation

April precipitation was near normal across Montana. There was less variability in precipitation statewide this month compared to March. The Madison, Gallatin, Bighorn, Tongue and Powder basins all received much needed precipitation after the previous month of below normal accumulations. Madison basin SNOTELs were at around 50% of median March monthly precipitation but bounced back with over 120% in April. The other basins mentioned ranged from 65-85% of normal monthly precipitation in March. In April the lowest of these basins was the Powder at 90%.

Water-year-to-date precipitation remains near to above normal across the state, with the near normal April precipitation in most basins. Values are still sustained by the early season precipitation experienced statewide. For water-year-to-date precipitation to remain near or above normal, future monthly precipitation will also have to be near or above normal. Otherwise, basin percentages could decrease in the coming months.

Closer to normal temperatures in April allowed snowpack accumulation to occur at some sites. The higher elevations continued to accumulate snowpack while the mid and low elevations saw mixed precipitation. The increased precipitation in April benefited drought conditions in some areas of the state. Although the active pattern of precipitation was appreciated across the region, spring precipitation will be vital to mitigate the effects of this winter on water supply deficits and drought conditions.

**April - Highest Total Accumulated Precipitation - SNOTEL/SNOLITE**

| Station | Precipitation (Inches) | Median (Inches) | Elevation | Basin |
|---|---|---|---|---|
| **Noisy Basin** | 9.6 | 5.6 | 6070 | Flathead |
| **Moss Peak** | 7.8 | 6.6 | 6760 | Flathead |
| **Hoodoo Basin** | 7.7 | 5.2 | 6060 | Lower Clark Fork |
| **Black Bear** | 7.2 | 5.0 | 8160 | Madison |
| **White Elephant** | 7.2 | 4.2 | 7670 | Jefferson |

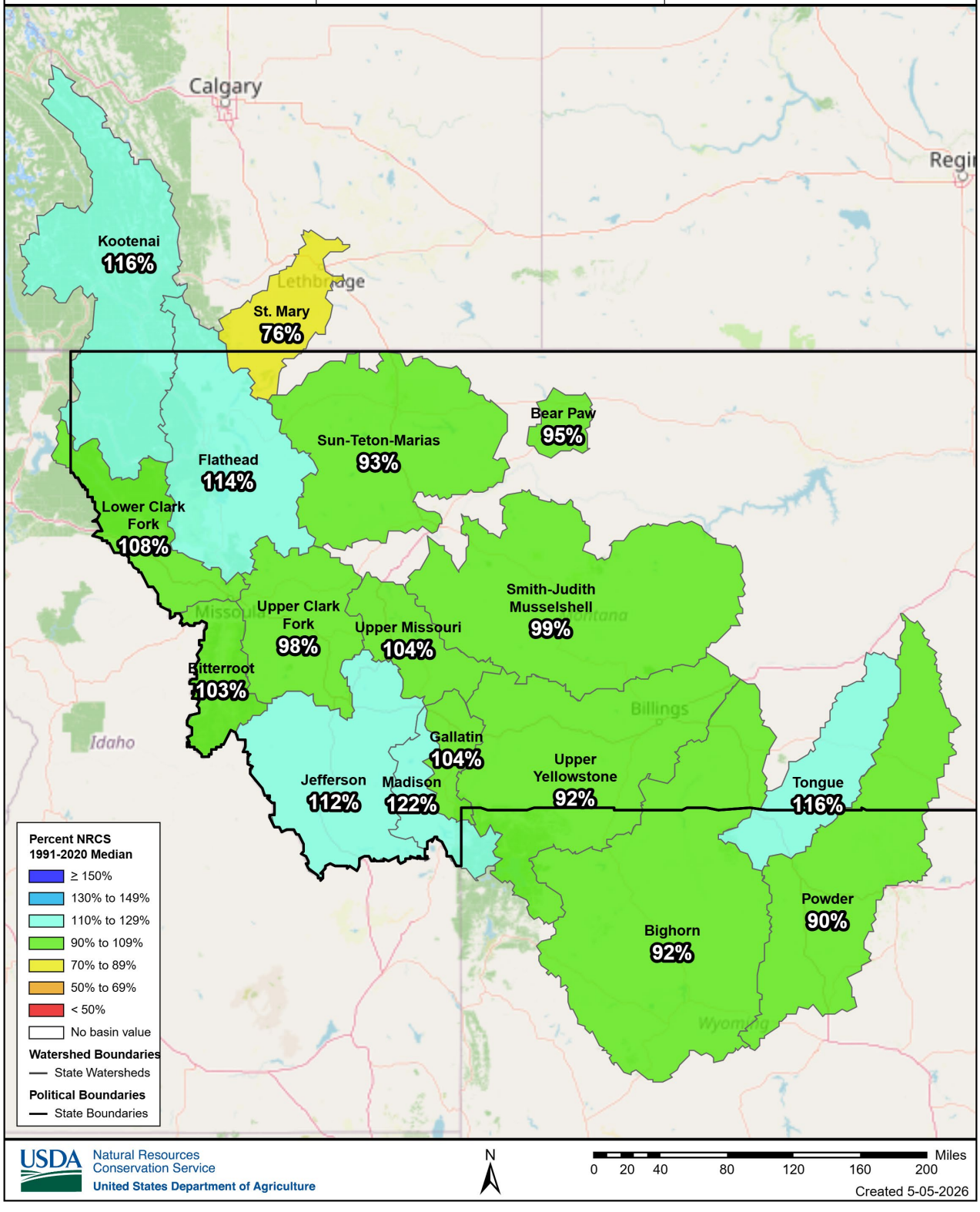
**April - Lowest Total Accumulated Precipitation- SNOTEL/SNOLITE**

| Station | Precipitation (Inches) | Median (Inches) | Elevation | Basin |
|---|---|---|---|---|
| **Copper Bottom** | 1.1 | 1.8 | 5200 | Upper Clark Fork |
| **St. Lawrence Alt** | 1.2 | - | 8610 | Bighorn |
| **Timber Creek** | 1.3 | 2.6 | 7910 | Bighorn |
| **Calvert Creek** | 1.5 | 1.3 | 6410 | Jefferson |
| **Castle Creek** | 1.5 | 2.2 | 8410 | Bighorn |

# Statewide Overview

## Precipitation (Continued)

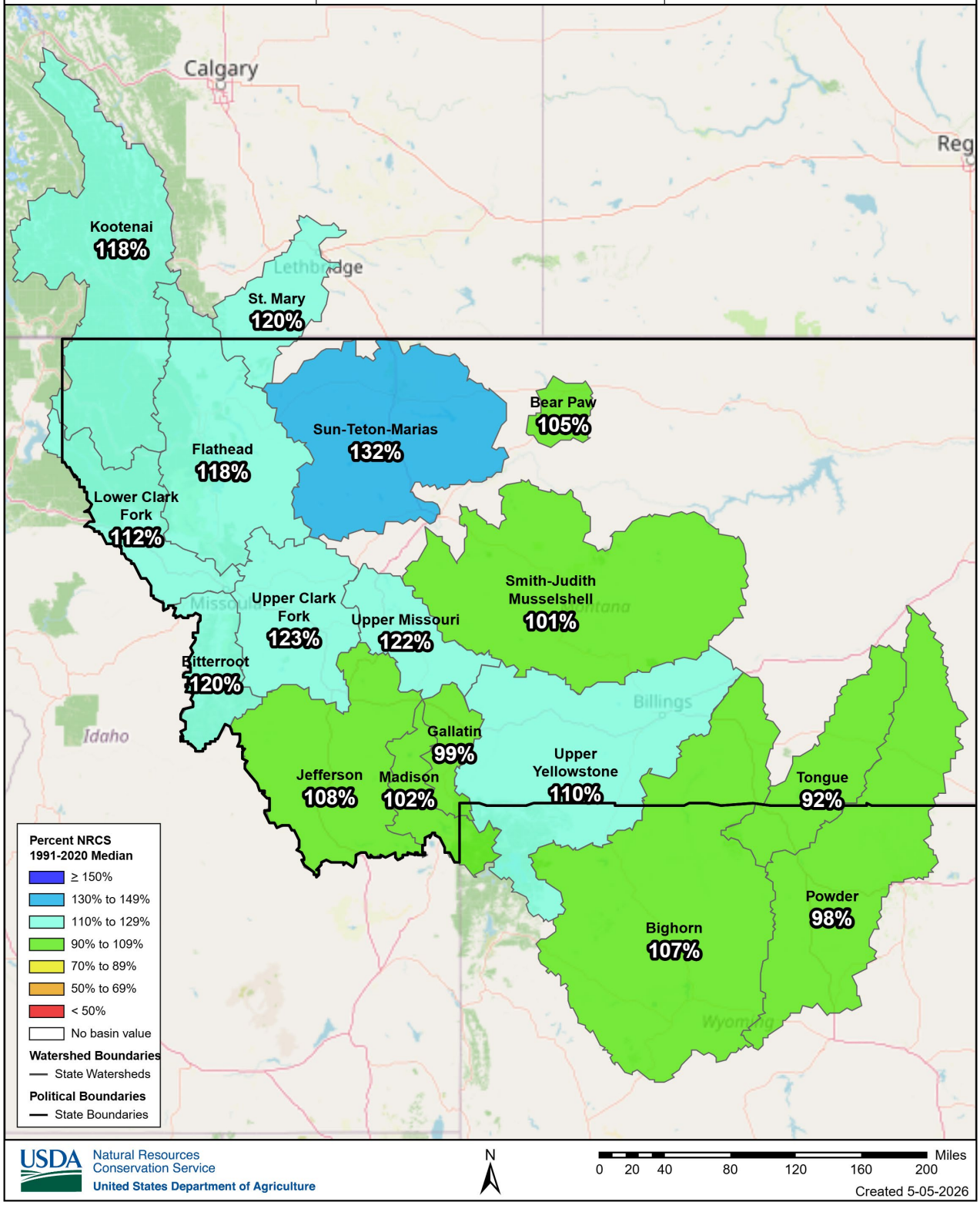
| 1 month Precipitation | Percent NRCS 1991-2020 Median | April 1, 2026 - April 30, 2026 |
|---|---|---|



# Statewide Overview

## Precipitation (Continued)

| Water Year to Date Precipitation | Percent NRCS 1991-2020 Median | October 1, 2025 - April 30, 2026 |
|---|---|---|



# Statewide Overview

## Snowpack

As of May 1, most Montana subbasins range from 40-100% of normal SWE. In general, conditions are around 0-10% further below median than on April 1. Basin conditions slightly worsened in Northwest Montana, especially around the Sun-Teton-Marias basins. Areas around Missoula, such as Flint Creek, the Blackfoot and Swan stayed between 70-100% of normal, and saw snowpack increase at high elevation sites. The April storms also kept median SWE similar from April 1 to May 1 in Southwest and central Montana, ranging from 50-80% of normal.

Many sites have peak water year SWE deficits of 1 to 10 inches. Some sites, such as Many Glacier and Poorman Creek in Northwest Montana, have deficits of 10 to 15 inches of water. Poorman Creek has a median peak SWE of around 35 inches, but had a peak SWE of only around 22 inches this year. Higher elevation sites around the Upper Clark Fork basin and the Beartooth mountains are faring the best with 1 to 10 inch surpluses of water.

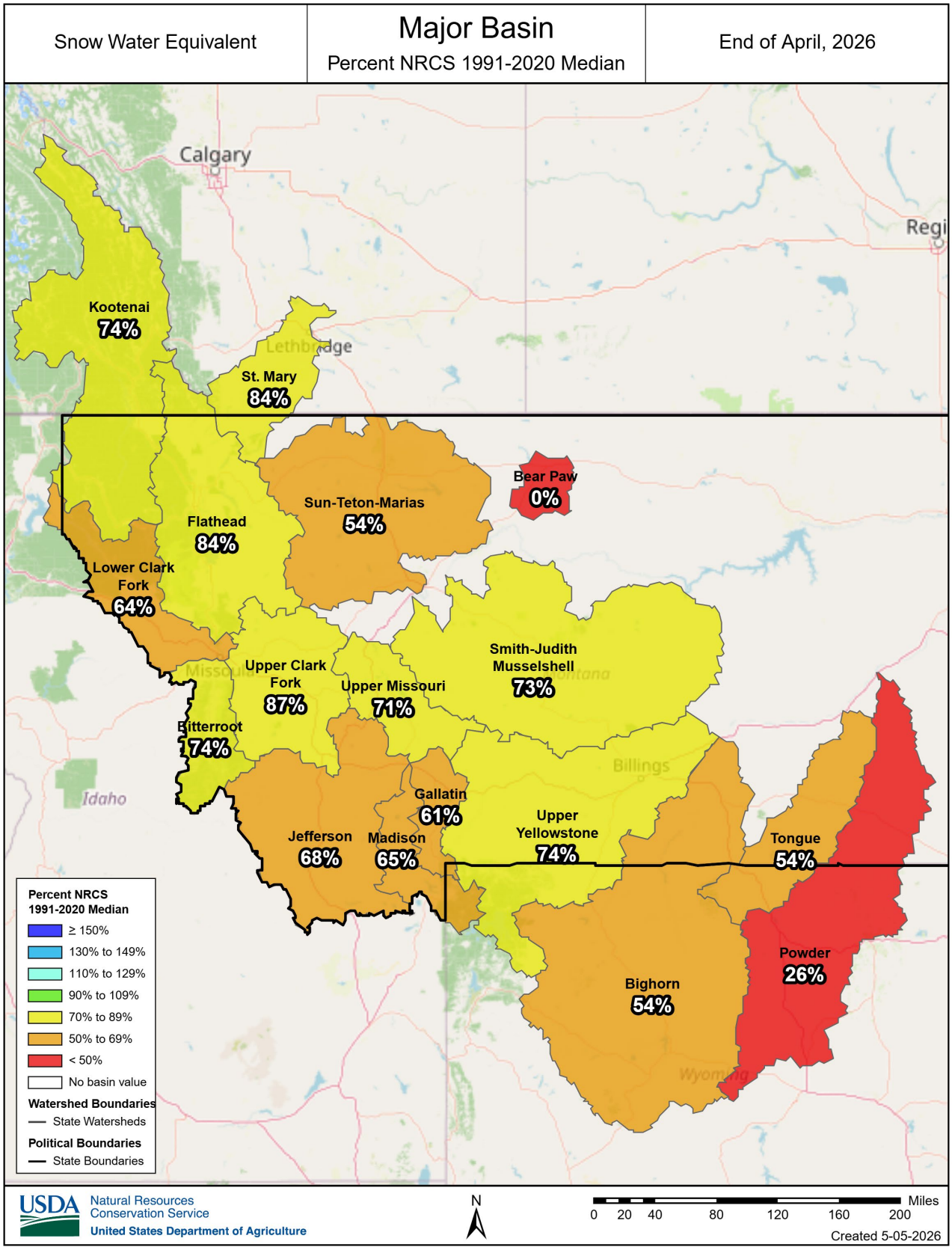
Most sites have begun to melt, and 48 sites fully melted by May 1. Many of the sites that melted out did so 1 to 2 months earlier than normal. The Sacajawea SNOTEL site in the Bridger mountains melted out about 47 days early; Most years the site still has about 10 inches of SWE on May 1. The story of this winter has been that high elevations experienced near to above normal snowpack while low and mid elevation sites had record low levels of snow. This trend has continued through April, a month when most sites reach peak SWE on a normal year but have already started to melt or are snow free this year.

**Water Year 2026 - Major Basin - Snowpack Percent of Normal ('91-'20)**

| Basin | Nov 1 | Dec 1 | Jan 1 | Feb 1 | Mar 1 | Apr 1 | May 1 | Jun 1 |
|---|---|---|---|---|---|---|---|---|
| **Kootenai** | 198 | 68 | 107 | 95 | 86 | 86 | 74 | - |
| **Flathead** | 208 | 93 | 109 | 82 | 73 | 76 | 84 | - |
| **Upper Clark Fork** | 161 | 60 | 101 | 84 | 84 | 84 | 87 | - |
| **Bitterroot** | 116 | 29 | 90 | 75 | 77 | 79 | 74 | - |
| **Lower Clark Fork** | 266 | 51 | 86 | 67 | 66 | 70 | 64 | - |
| **Jefferson** | 73 | 40 | 93 | 79 | 79 | 69 | 68 | - |
| **Madison** | 97 | 43 | 96 | 89 | 86 | 61 | 65 | - |
| **Gallatin** | 110 | 53 | 107 | 86 | 82 | 63 | 61 | - |
| **Upper Missouri** | 116 | 58 | 99 | 80 | 83 | 81 | 71 | - |
| **Smith-Judith-Musselshell** | 66 | 57 | 100 | 79 | 72 | 74 | 73 | - |
| **Sun-Teton-Marias** | 182 | 75 | 116 | 86 | 73 | 67 | 54 | - |
| **St. Mary** | 155 | 76 | 117 | 88 | 67 | 58 | 84 | - |
| **Upper Yellowstone** | 99 | 58 | 120 | 98 | 89 | 71 | 74 | - |
| **Bighorn** | 80 | 50 | 111 | 98 | 94 | 61 | 54 | - |
| **Powder** | 126 | 49 | 89 | 79 | 68 | 26 | 26 | - |
| **Tongue** | 40 | 28 | 73 | 68 | 63 | 49 | 54 | - |
| **Bear Paw** | - | 122 | 100 | 46 | 28 | - | - | - |

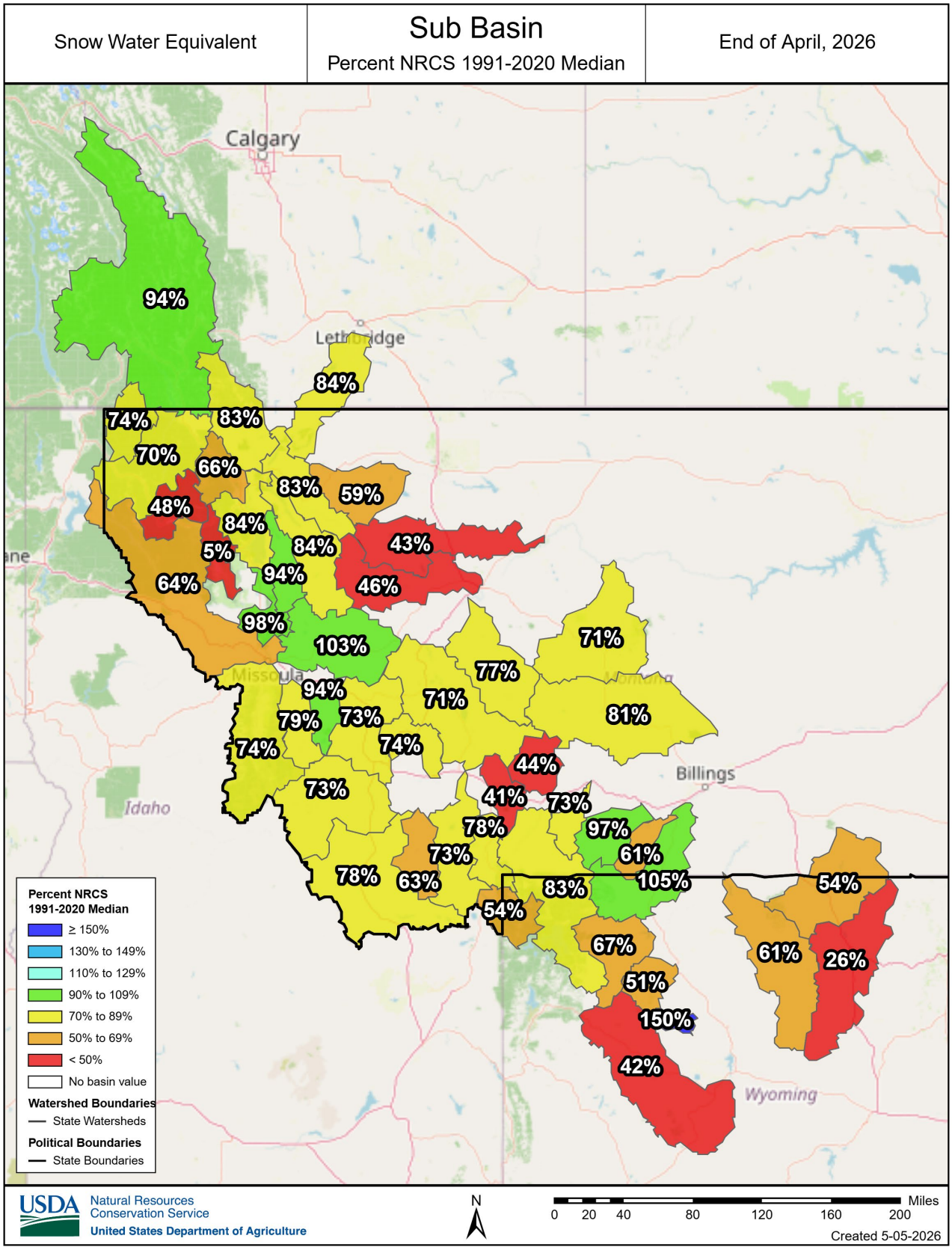
# Statewide Overview

## Snowpack (Continued)



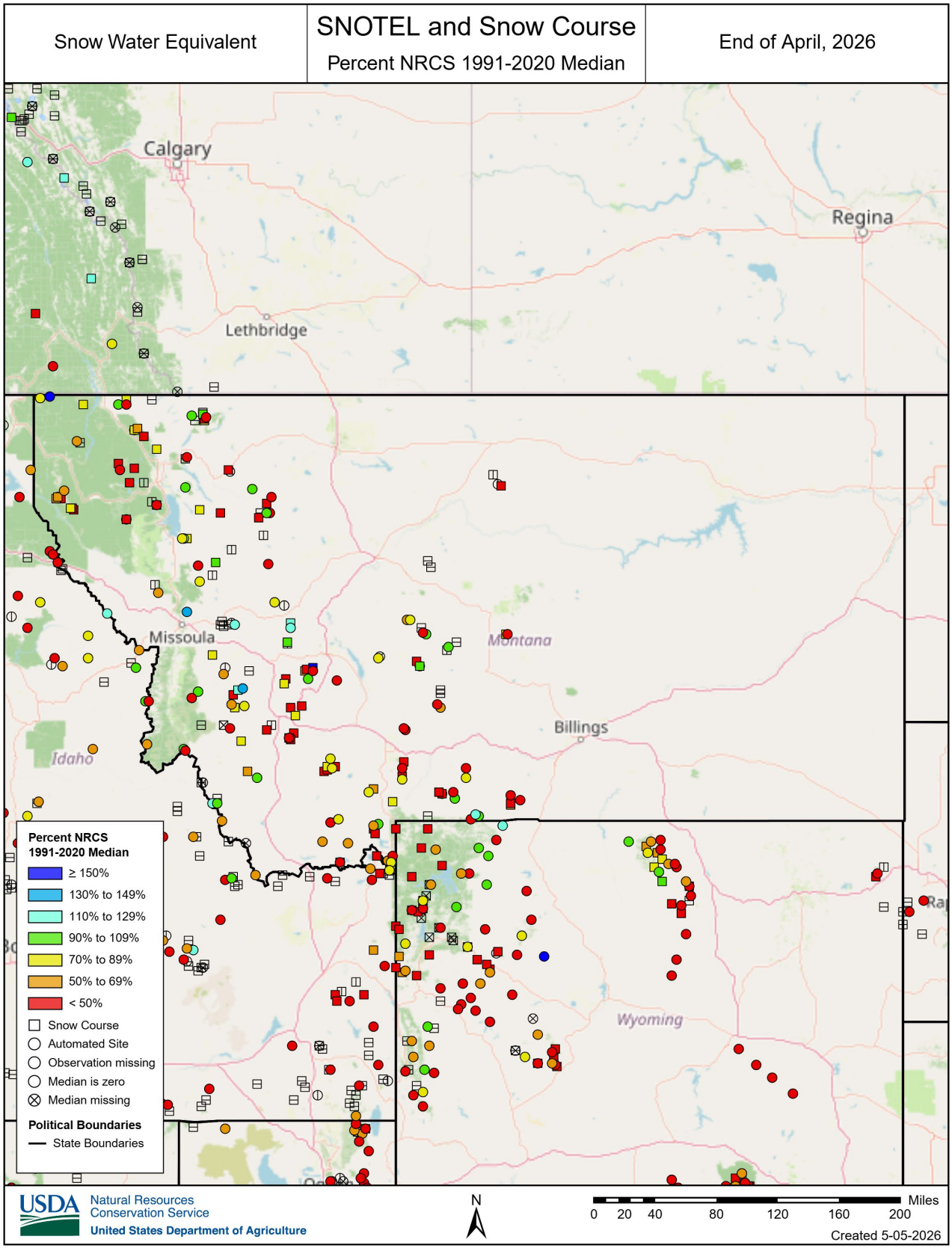
# Statewide Overview

## Snowpack (Continued)



# Statewide Overview

## Snowpack (Continued)

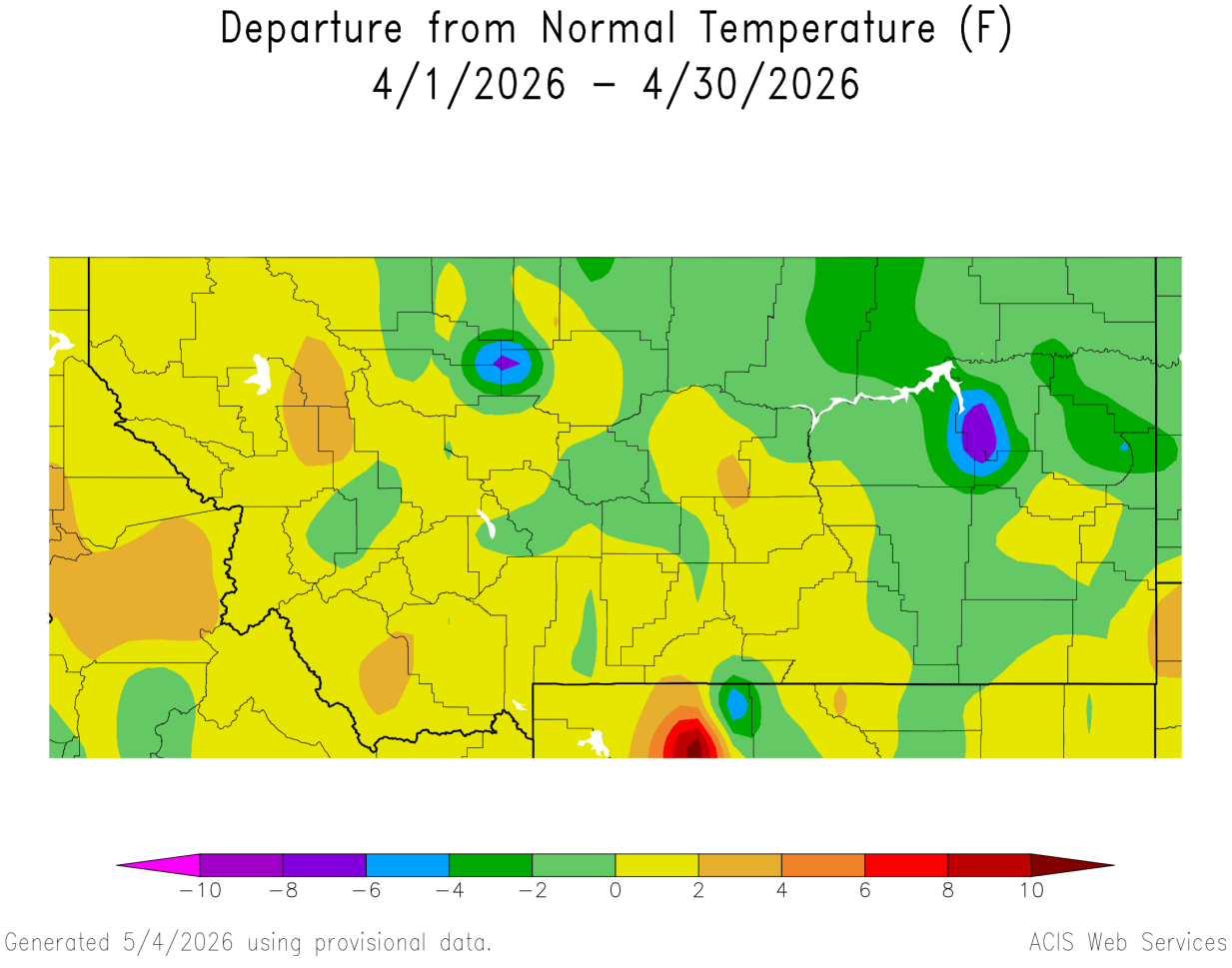


# Statewide Overview

## Temperature

April was the first month this winter with temperatures near normal across the state. While January, February and March brought record highs to parts of the state, most of Montana ranged from 3 °F above to 5 °F below normal in April. The mountainous regions of the state had near normal to slightly above normal temperatures while the plains recorded near to slightly below normal temperatures in April.

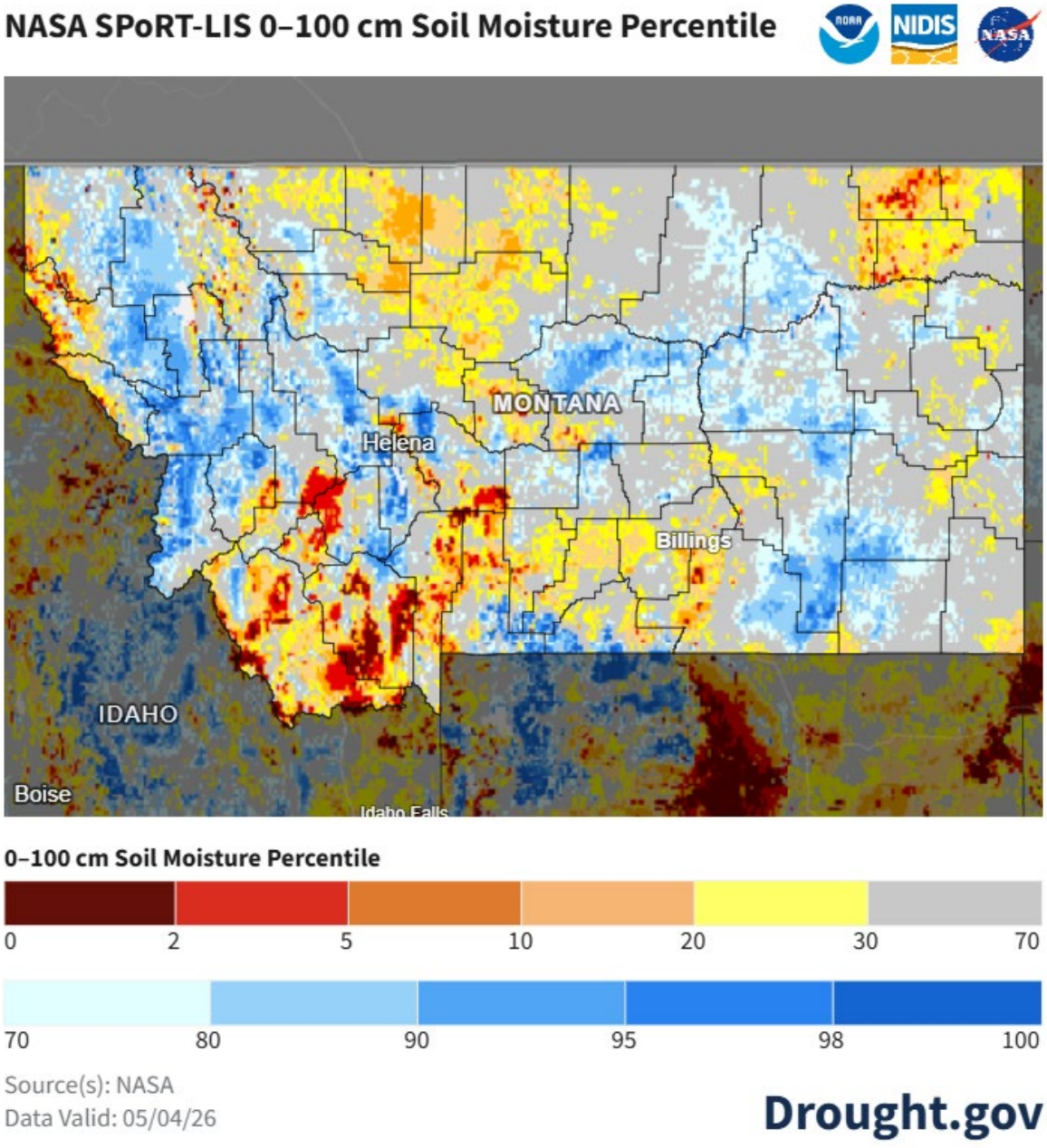
Temperatures were near normal due to a series of storms that brought cooler air to the state, especially during the last week of April which brought snow and persistent cool temperatures to SNOTEL sites. The warmest period in the mountains came the few days before the last storm cycle where temperatures broke into the 60s at SNOTEL sites, with the hottest areas being the Little Belt mountains and Northwest Montana. With temperatures predicted to bump back to above normal this month, it is likely that rapid melting of the snowpack will start again everywhere but areas above around 9,000 ft.



# Statewide Overview

## Soil Moisture

Soil moisture in the top 0-100 cm remains variable across the state. Portions of southwest Montana have the largest areas with soil moisture below the fifth percentile. Soil moisture has remained persistently low in this region. Northwest Montana and some plains of eastern Montana continue to have regions of soil moisture above the 80$^{th}$ percentile. Most areas of the state experienced a decrease in soil moisture percentiles since last month but remain in similar categories.



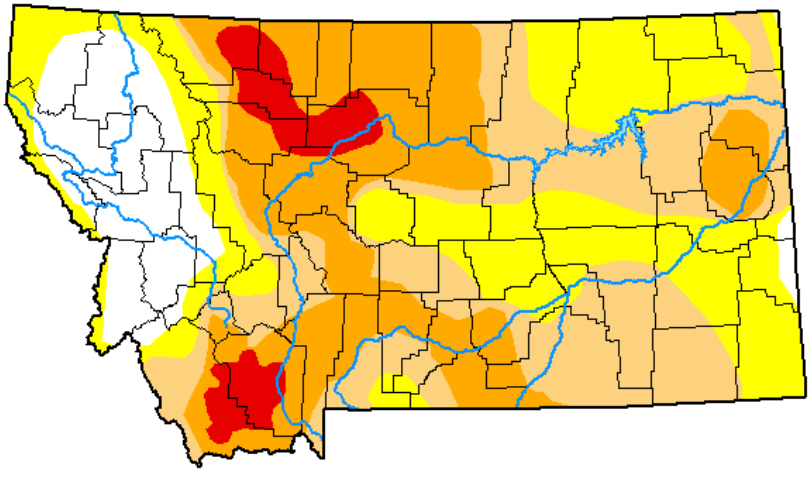
# Statewide Overview

## Drought Monitor

Similar to last month, most of the state remains under drought conditions. The Upper Clark Fork and Flathead Lake area are the exceptions; currently these regions are not designated under drought conditions. The Flathead Lake area improved to no drought designation since last month. Abnormally dry to extreme drought conditions continue across most of the state east of the continental divide. Severe drought conditions developed around Sydney and extreme drought conditions persist in southwest Montana and the greater Golden Triangle region.

***U.S. Drought Monitor***

**Montana**



**May 5, 2026**

***(Released Thursday, May. 7, 2026)***

**Valid 8 a.m. EDT**

*Drought Conditions (Percent Area)*

| | None | D0-D4 | D1-D4 | D2-D4 | D3-D4 | D4 |
|---|---|---|---|---|---|---|
| **Current** | 12.68 | 87.32 | 57.84 | 30.03 | 5.17 | 0.00 |
| **Last Week** 04-28-2026 | 5.72 | 94.28 | 57.18 | 28.30 | 5.17 | 0.00 |
| **3 Months Ago** 02-03-2026 | 36.73 | 63.27 | 31.29 | 9.70 | 1.46 | 0.00 |
| **Start of Calendar Year** 01-06-2026 | 48.61 | 51.39 | 19.79 | 8.08 | 1.46 | 0.00 |
| **Start of Water Year** 09-30-2025 | 27.06 | 72.94 | 40.74 | 31.81 | 8.55 | 0.00 |
| **One Year Ago** 05-06-2025 | 22.68 | 77.32 | 55.75 | 13.25 | 1.01 | 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:*

Adam Allgood

NOAA/NWS/NCEP/CPC

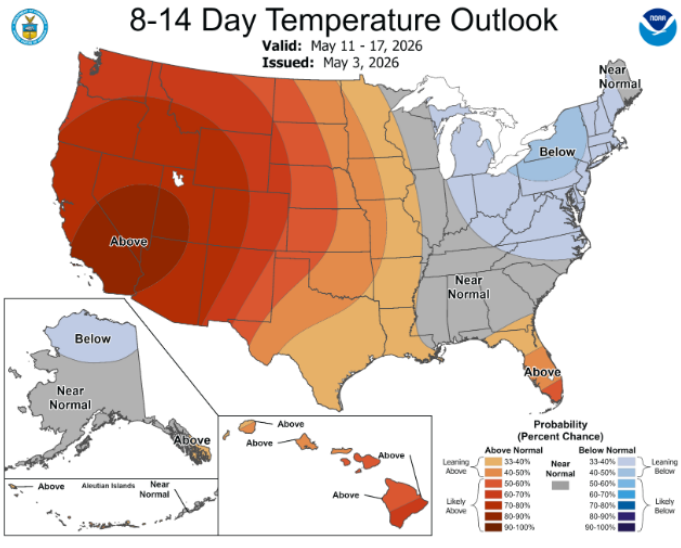
**droughtmonitor.unl.edu**

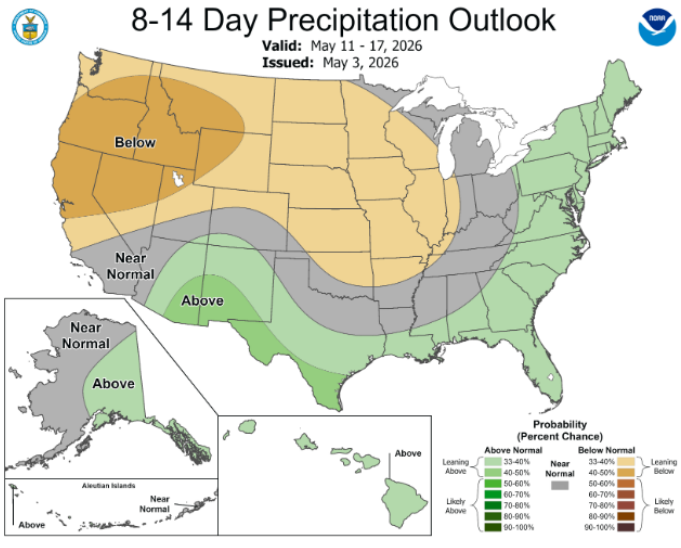
# Statewide Overview

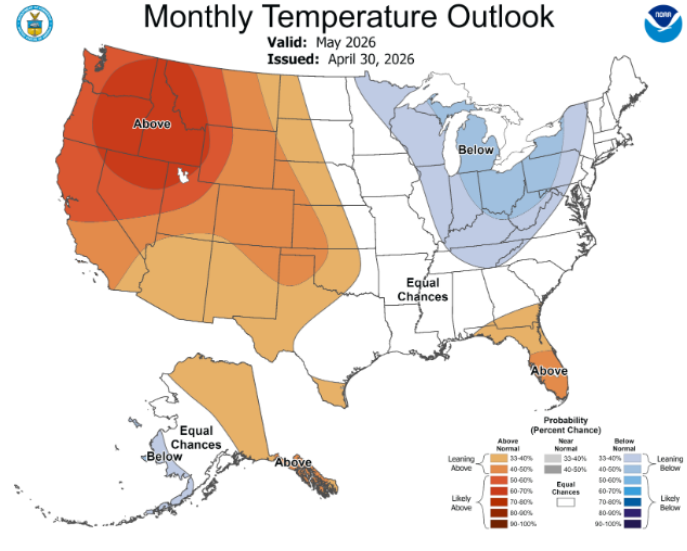
## Weather Outlook

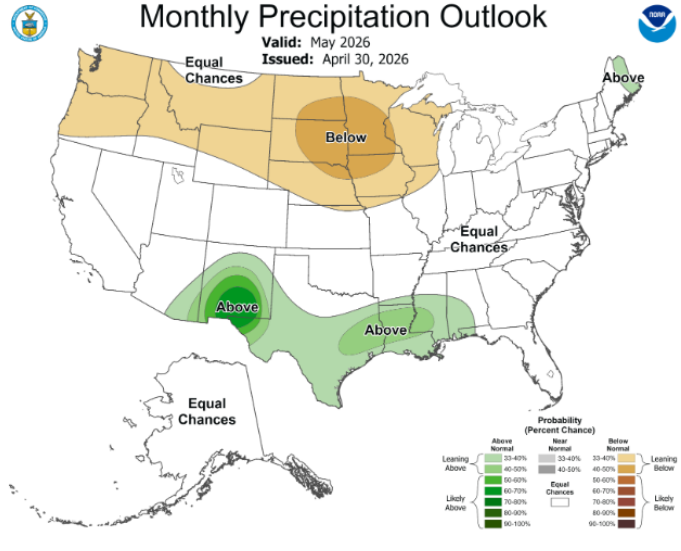
The NOAA Climate Prediction Center projects all of Montana to have above normal temperatures in the next 8-14 days. Below normal precipitation is predicted during this time period. Southwest Montana has the highest chances of both above normal temperatures and below normal precipitation in the state over the next 8-14 days.

Similarly, the monthly outlook projects above normal temperatures across Montana, with the highest chances in the western portion of the state. All regions of the state lean towards below normal precipitation in May, besides north of the highline, which has equal chances of above or below normal precipitation.



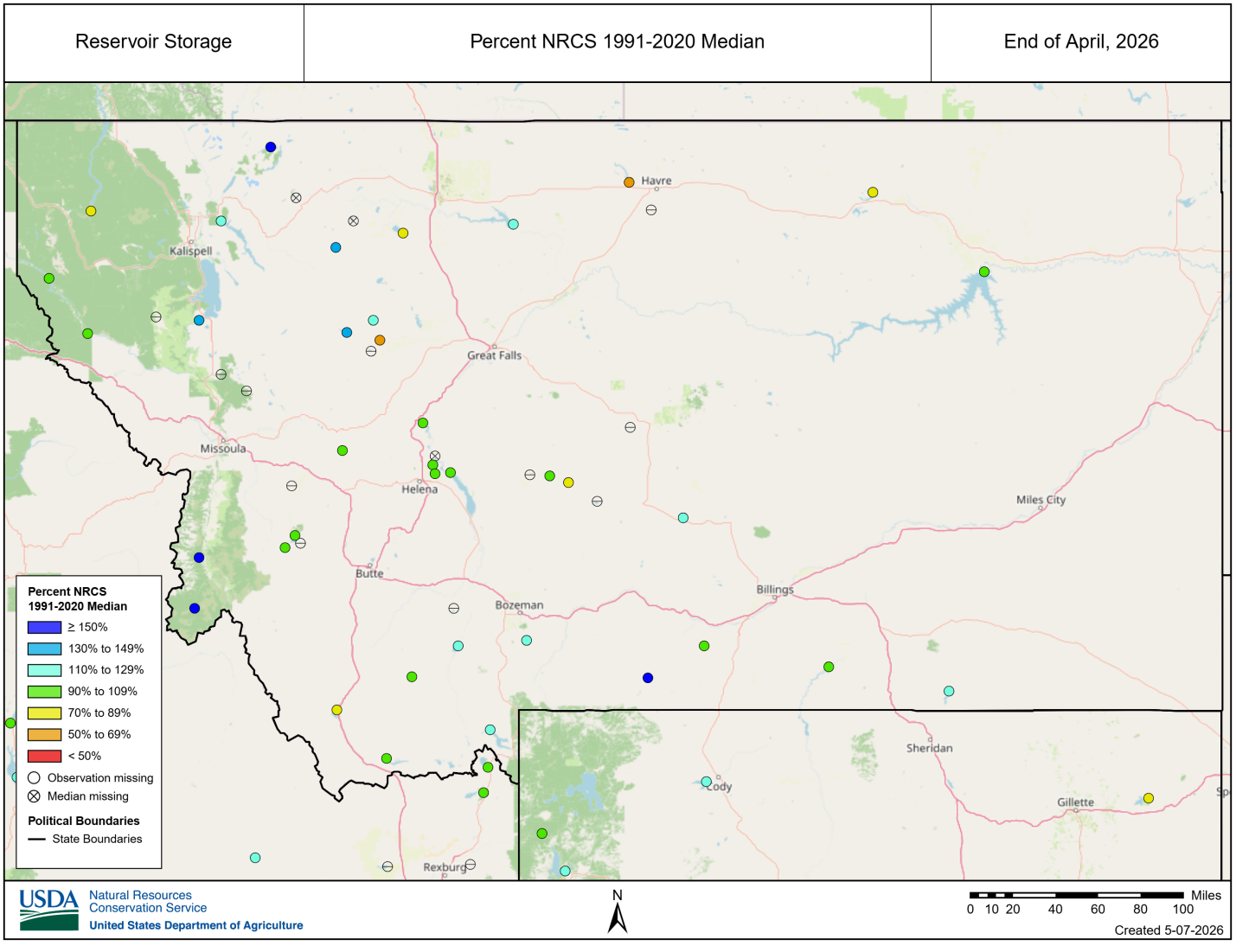



# Statewide Overview

## Reservoirs

Most Montana reservoirs reported near to above normal end of April storage levels. Deadman's Basin, Ennis Lake, Flathead Lake, Gibson, Hebgen Lake, Hungry Horse Lake, Lake Elwell, Middle Creek, Pishkun Lake, Swift, and Tongue River Reservoirs reported above normal reservoir levels of 110-150% of median for end of April. Lake Como, Lake Sherburne, Mystic Lake, and Painted Rocks Lake Reservoirs reported well above normal reservoir levels of greater than 150% of median. Bair, Clark Canyon, Lake Frances, Lake Koocanusa, and Nelson Reservoirs had below normal end of April reservoir levels of 70-85% of median. Fresno and Willow Creek-Augusta Reservoirs reported well below normal reservoir fill at 55-65% of median. The remaining reservoir storage facilities across the state reported near normal reservoir storage. While early snowmelt driven runoff is helping to fill reservoirs this spring, it remains to be seen how the below normal snowpack will support continued reservoir levels.



# Statewide Overview

## Reservoirs (Continued)

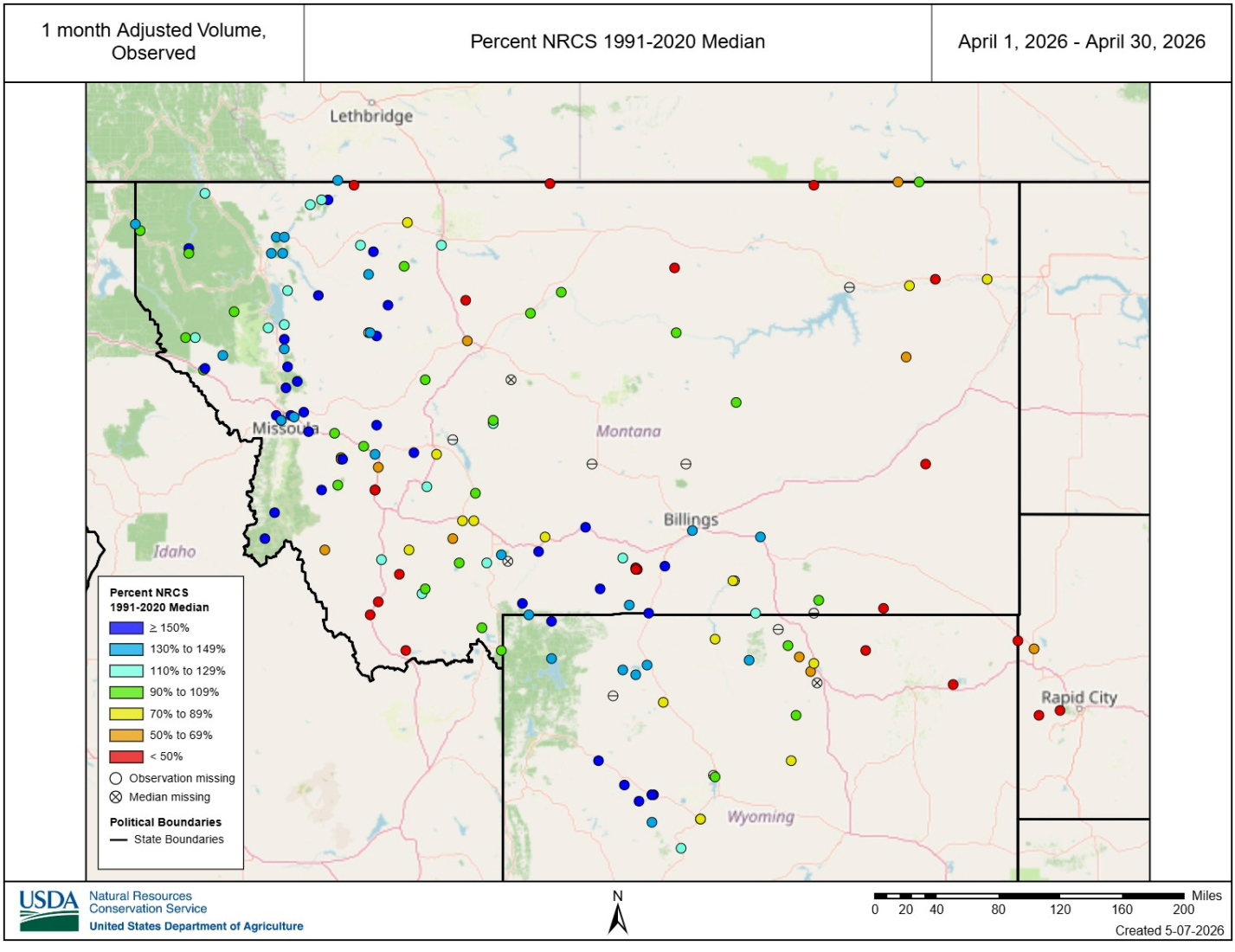
### End of April - Reservoir Storage Percent of Capacity

| Reservoir | Basin | Current % Capacity | Last Year % Capacity | Median % Capacity |
|---|---|---|---|---|
| **Lake Sherburne** | St. Mary | 74 | 77 | 32 |
| **Clark Canyon Res** | Jefferson | 43 | 58 | 54 |
| **Lima Reservoir** | Jefferson | 74 | 78 | 74 |
| **Ruby River Reservoir** | Jefferson | 98 | 94 | 97 |
| **Ennis Lake** | Madison | 89 | 89 | 80 |
| **Hebgen Lake** | Madison | 87 | 80 | 75 |
| **Middle Creek Res** | Gallatin | 74 | 65 | 66 |
| **Canyon Ferry Lake** | Upper Missouri | 76 | 73 | 72 |
| **Helena Valley Reservoir** | Upper Missouri | 96 | 90 | 95 |
| **Holter Lake** | Upper Missouri | 99 | 99 | 99 |
| **Lake Helena** | Upper Missouri | 86 | 86 | 87 |
| **Bair Res** | Smith-Judith-Musselshell | 50 | 52 | 70 |
| **Deadman's Basin Res** | Smith-Judith-Musselshell | 100 | 97 | 89 |
| **Smith River Res** | Smith-Judith-Musselshell | 81 | 98 | 80 |
| **Gibson Res** | Sun-Teton-Marias | 86 | 34 | 62 |
| **Lake Elwell (Tiber)** | Sun-Teton-Marias | 61 | 50 | 55 |
| **Lake Frances** | Sun-Teton-Marias | 46 | 36 | 66 |
| **Swift Res** | Sun-Teton-Marias | 88 | 80 | 61 |
| **Fort Peck Lake** | Lower Missouri | 68 | 72 | 74 |
| **Fresno Res** | Milk | 36 | 34 | 68 |
| **Nelson Res** | Milk | 60 | 85 | 75 |
| **Cooney Res** | Upper Yellowstone | 86 | 104 | 83 |
| **Mystic Lake** | Upper Yellowstone | 8 | 3 | 1 |
| **Bighorn Lake** | Bighorn | 57 | 59 | 57 |
| **Boysen** | Bighorn | 64 | 63 | 67 |
| **Buffalo Bill** | Bighorn | 69 | 59 | 61 |
| **Bull Lake** | Bighorn | 33 | 26 | 55 |
| **Tongue River Res** | Tongue | 82 | 80 | 70 |
| **Lake Koocanusa** | Kootenai | 43 | 65 | 52 |
| **Georgetown Lake** | Upper Clark Fork | 96 | 95 | 92 |
| **Nevada Creek Res** | Upper Clark Fork | 91 | 46 | 84 |
| **Noxon Rapids Reservoir** | Lower Clark Fork | 89 | 89 | 95 |
| **Lake Como** | Bitterroot | 96 | 64 | 62 |
| **Painted Rocks Lake** | Bitterroot | 104 | 64 | 68 |
| **Flathead Lake** | Flathead | 82 | 49 | 57 |
| **Hungry Horse Lake** | Flathead | 89 | 77 | 72 |

# Statewide Overview

## Streamflow

April streamflow varied across Montana. Streamflows were well below normal along the Beaverhead and Powder Rivers. Northwest Montana, the Rocky Mountain Front, and the Clark Fork drainage recorded well above normal April streamflow volumes. The Yellowstone, Clarks Fork of the Yellowstone, and their surrounding tributaries all had above to well above normal monthly streamflow Further east in the plains of Montana more typical or reduced April streamflow volumes were observed. Earlier than normal snowmelt runoff has contributed to the above normal streamflow conditions in most areas.



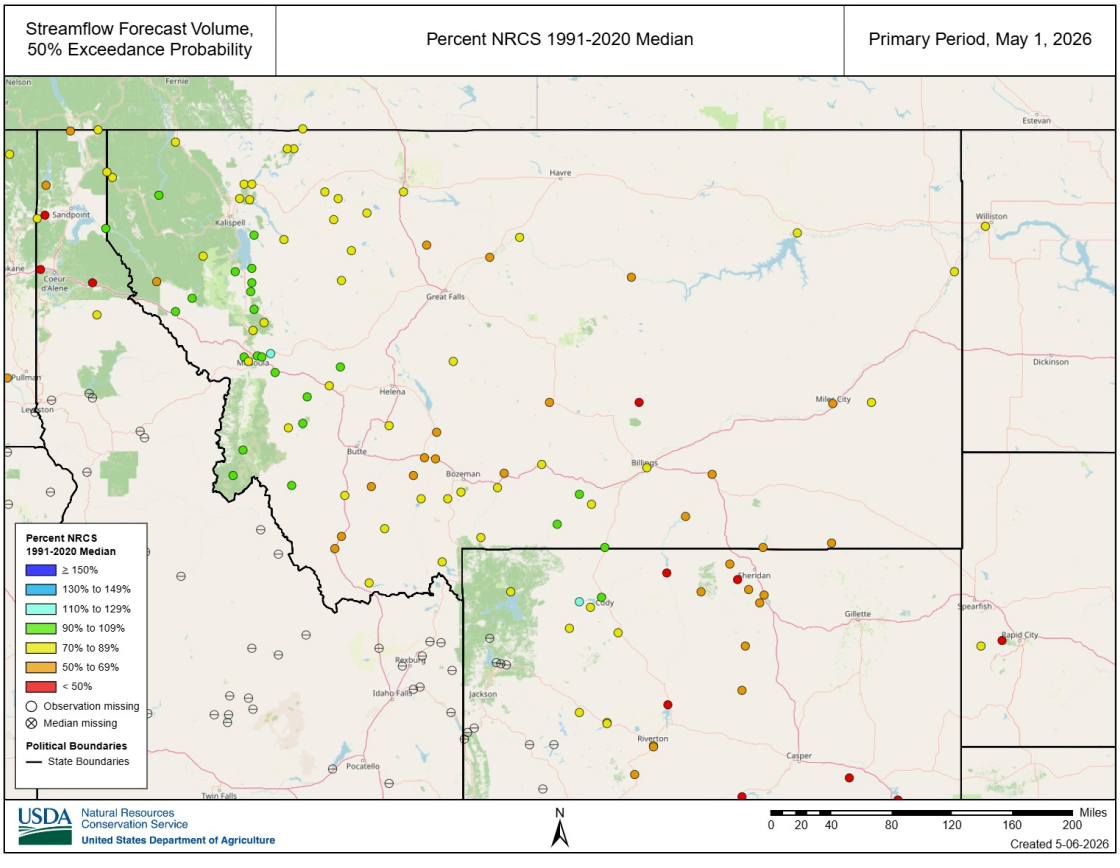
# Statewide Overview

## Water Supply Forecasts

Seasonally appropriate temperatures and near normal April precipitation meant that water supply forecasts on May 1 remained relatively stable compared to April 1. Some forecast points, especially those west of the continental divide, experienced small gains, while points deeper in the plains experienced a slight decrease in predicted May-July streamflow. Despite relatively stable conditions, April did not improve the water supply deficit created by the rest of winter 2026, as forecast points in most areas of the state still predict below normal streamflow.

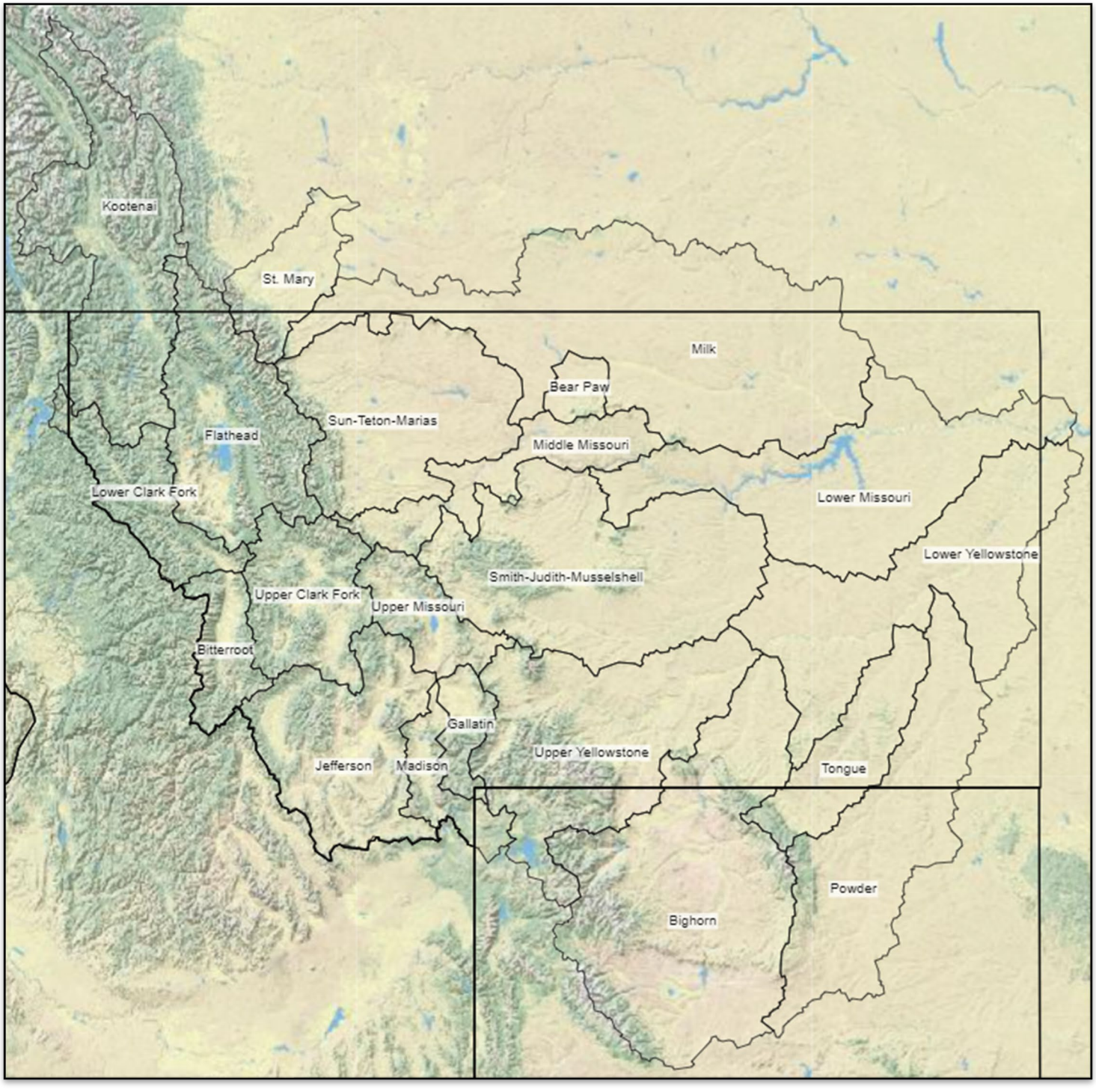
Only a handful of areas can expect near normal flows between May and July. Tributaries of the Upper Clark Fork and Bitterroot along with drainages of the Swan and Mission Mountains range between 85%-115% of normal. Additionally, several forecast points with headwaters in the high elevation Absaroka-Beartooth Ranges predict close to normal flows. Forecast points on the major tributaries of the Flathead River predict streamflow of around 80% of normal. East of the divide most forecast points fall between 70% to 90% of normal with select areas around the Beaverhead, Jefferson and Missouri basins forecasting below 70% of normal stream flow. The Musselshell, Tongue, Powder and Bighorn Rivers are among the lowest forecasts with less than 65% of normal streamflow predicted between May and July.

Streamflow at each forecast point, especially in watersheds east of the divide with greater plains influence, are heavily influenced by spring precipitation. This is why each forecast has a range of potential volumes shown in the exceedance probability plots. Heavier spring precipitation will cause higher streamflow within that range of predictions, while drier conditions will likely reduce streamflow. It is important to consider the whole range of potential forecasts for a forecast point. The values of the 50% exceedance probability shown in the map below are predictions based on average future conditions, and perfectly average rarely happens.



# Basin Overview

## Montana River Basin Definitions

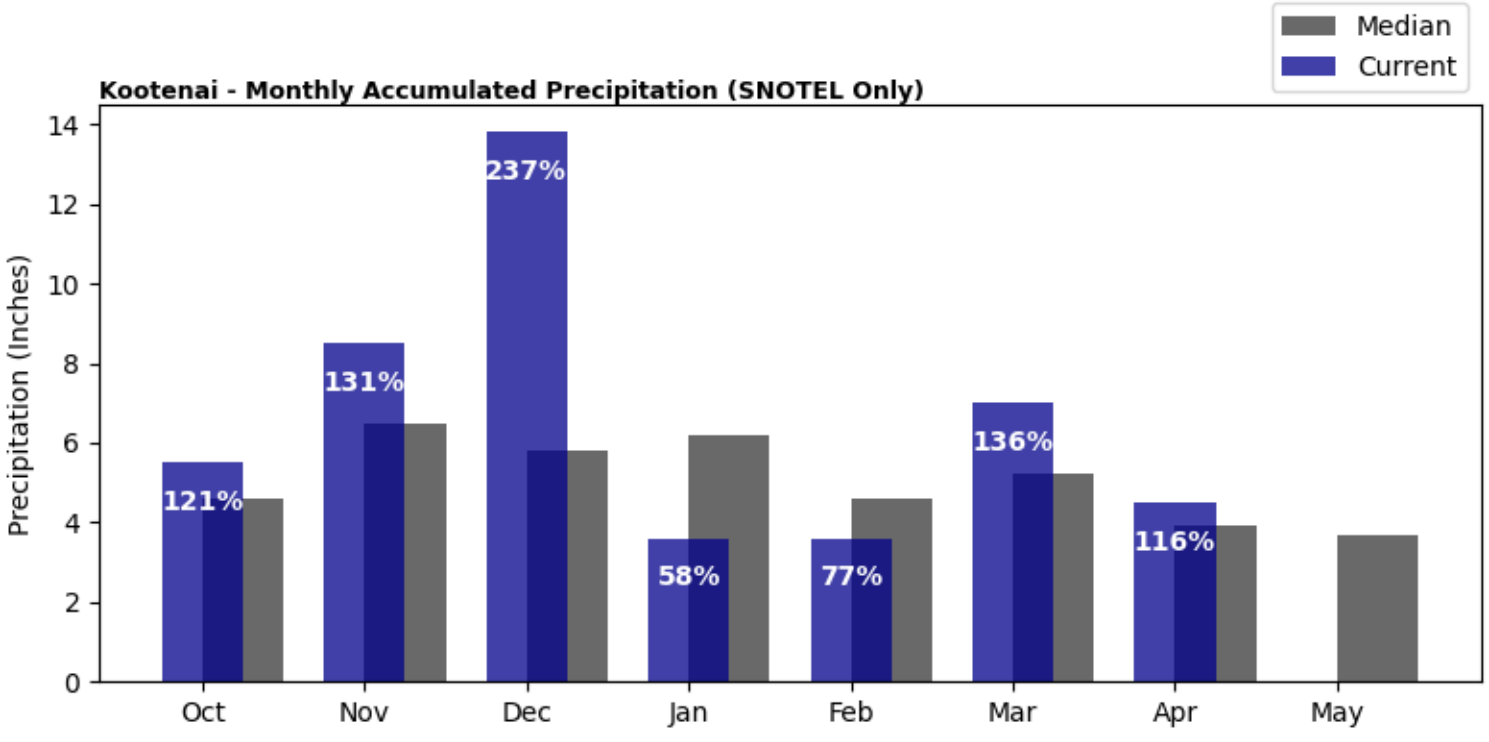


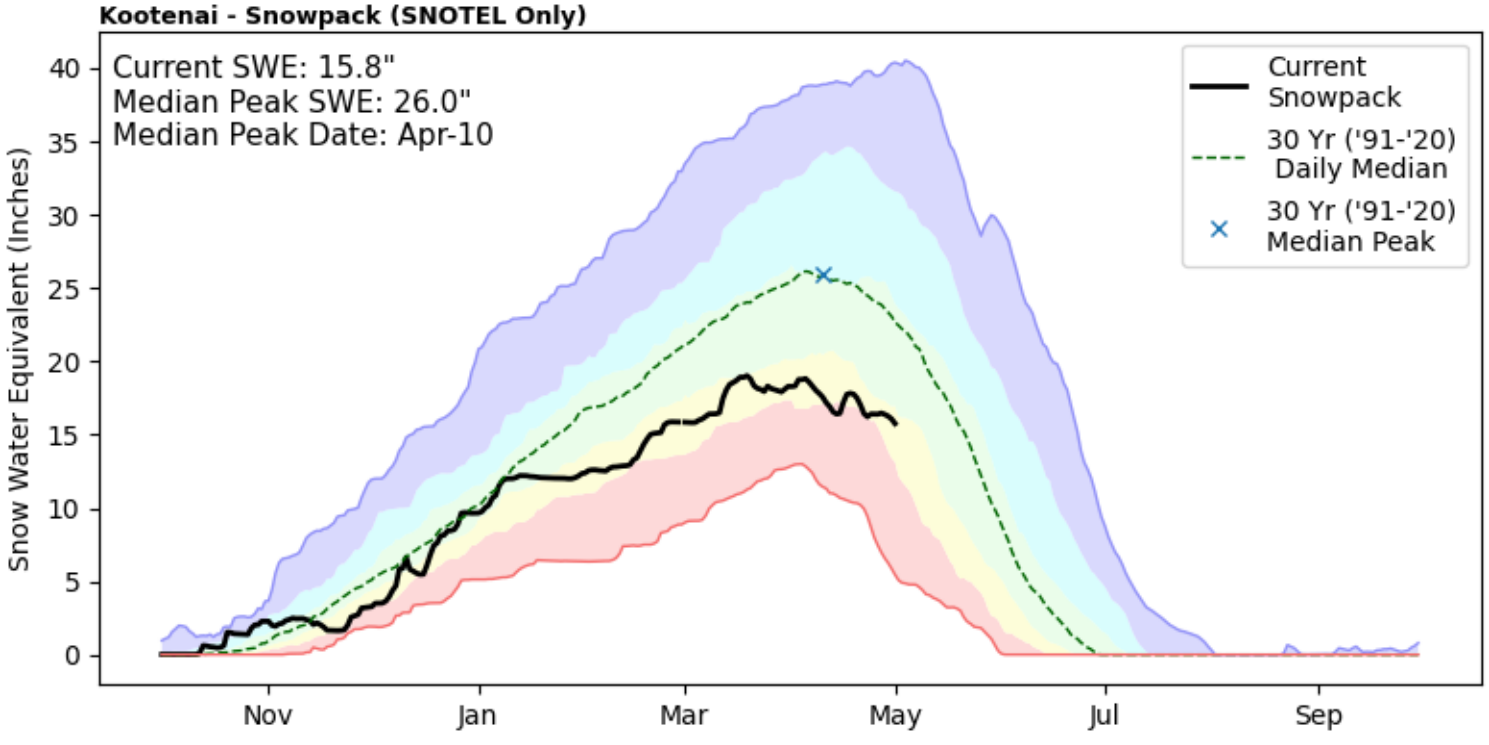

The following basin overview sections only include basins that have SNOTEL sites. For example, there is no basin overview for the Lower Yellowstone, because there are no SNOTEL sites associated with that basin. Water supply information for basins not included in the following sections can be found at https://nwcc-apps.sc.egov.usda.gov/

# Basin Overview

## Kootenai

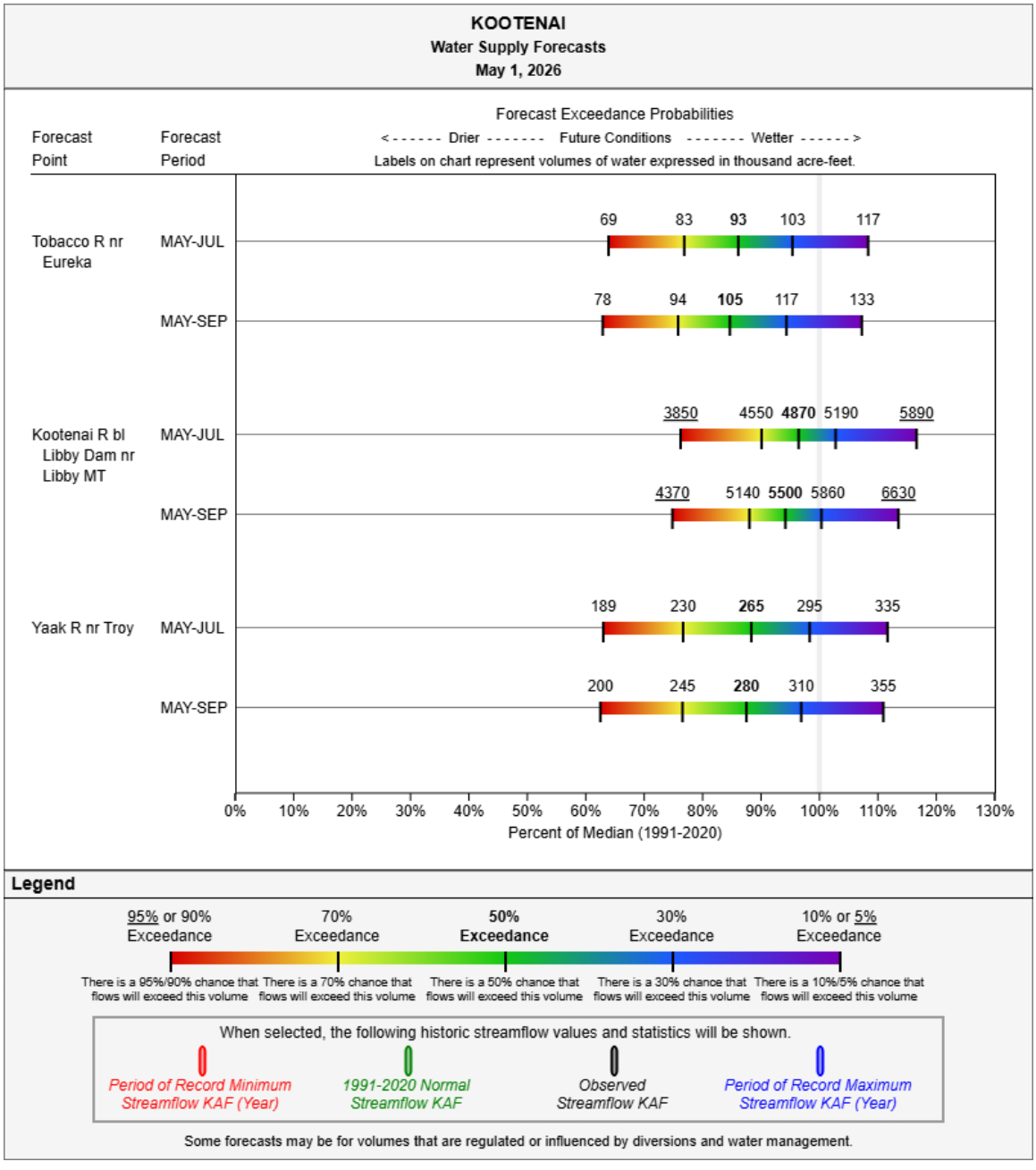
Precipitation in April was above normal at 116%, which brings the seasonal accumulation (October-April) to 118% of median. The snowpack in the Kootenai is well below normal at 74% of median, compared to 83% at this time last year.



# Basin Overview

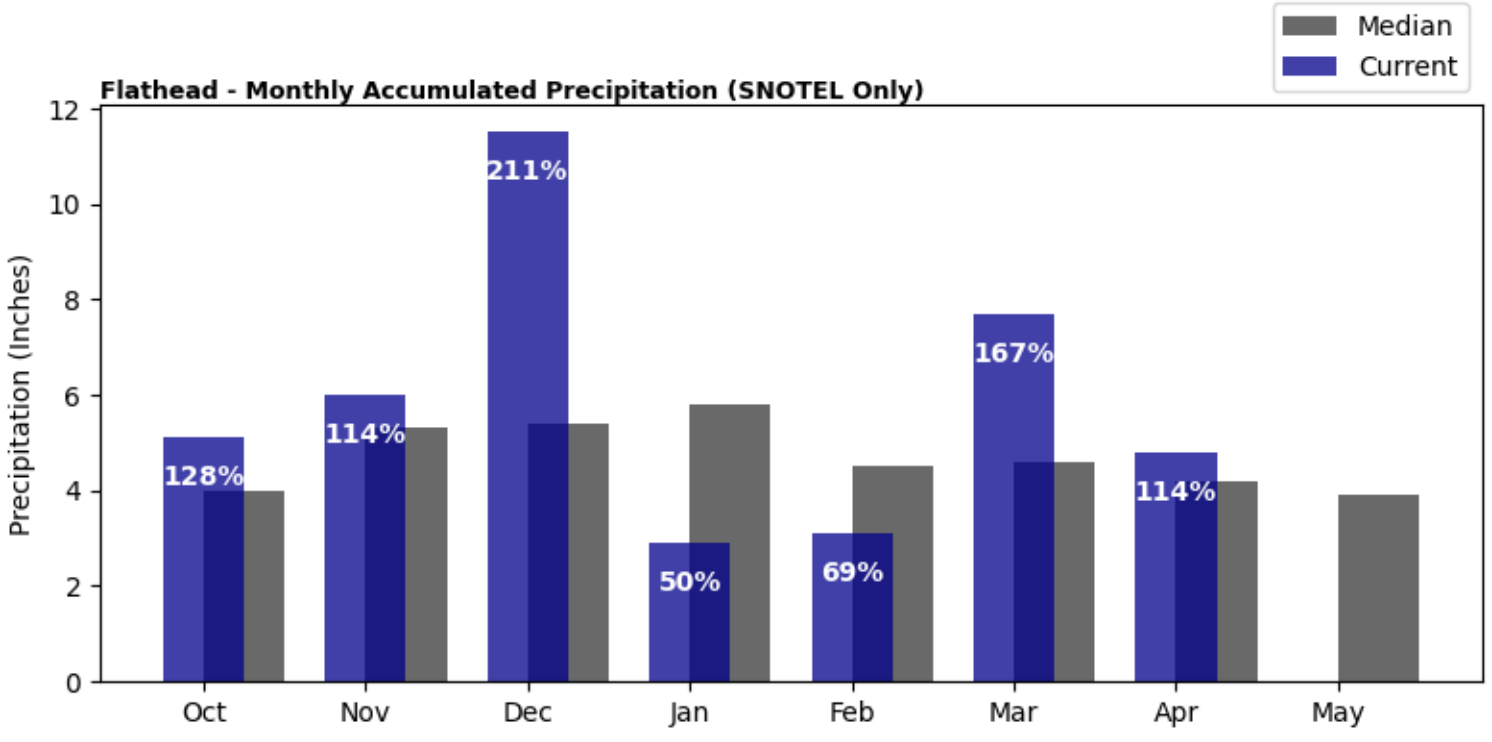
## Kootenai (Continued)

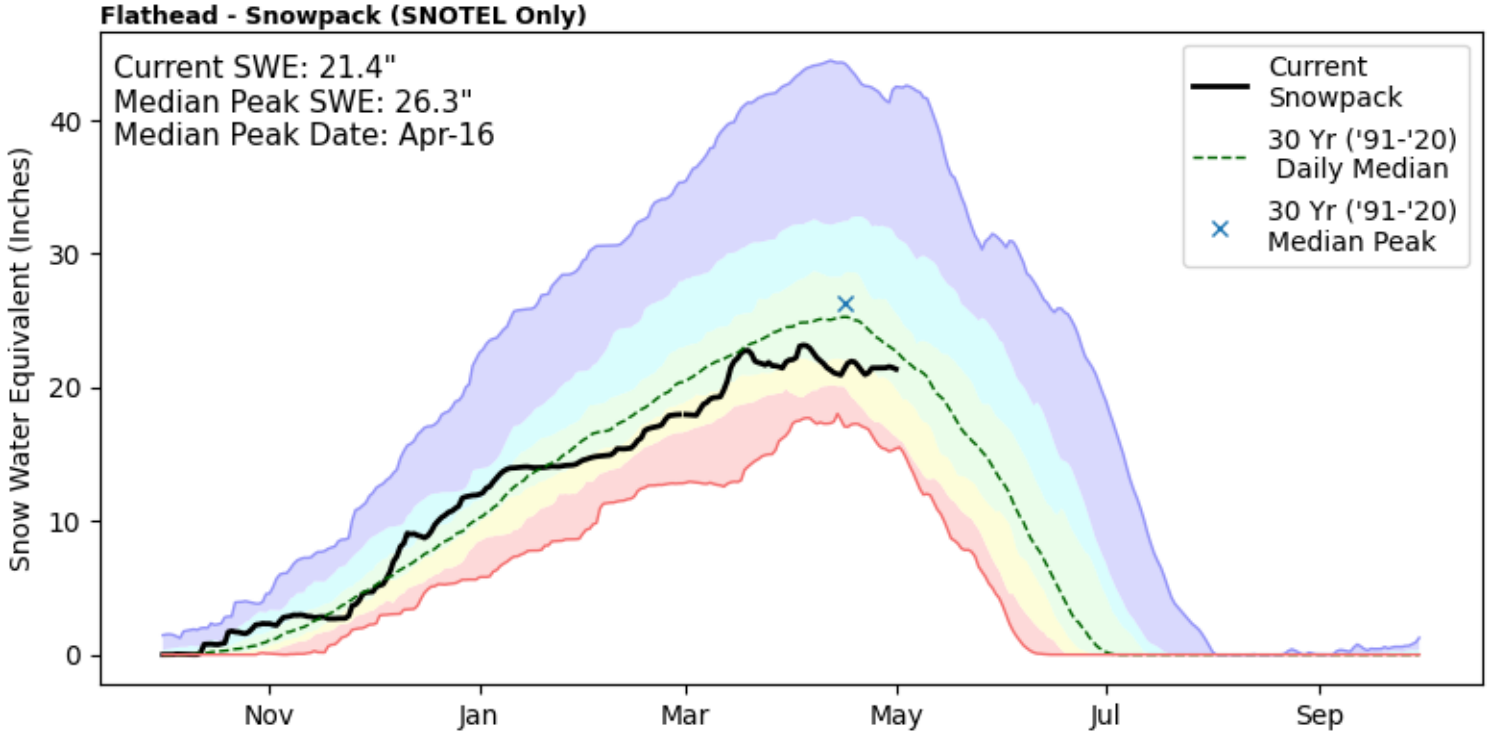


# Basin Overview

## Flathead

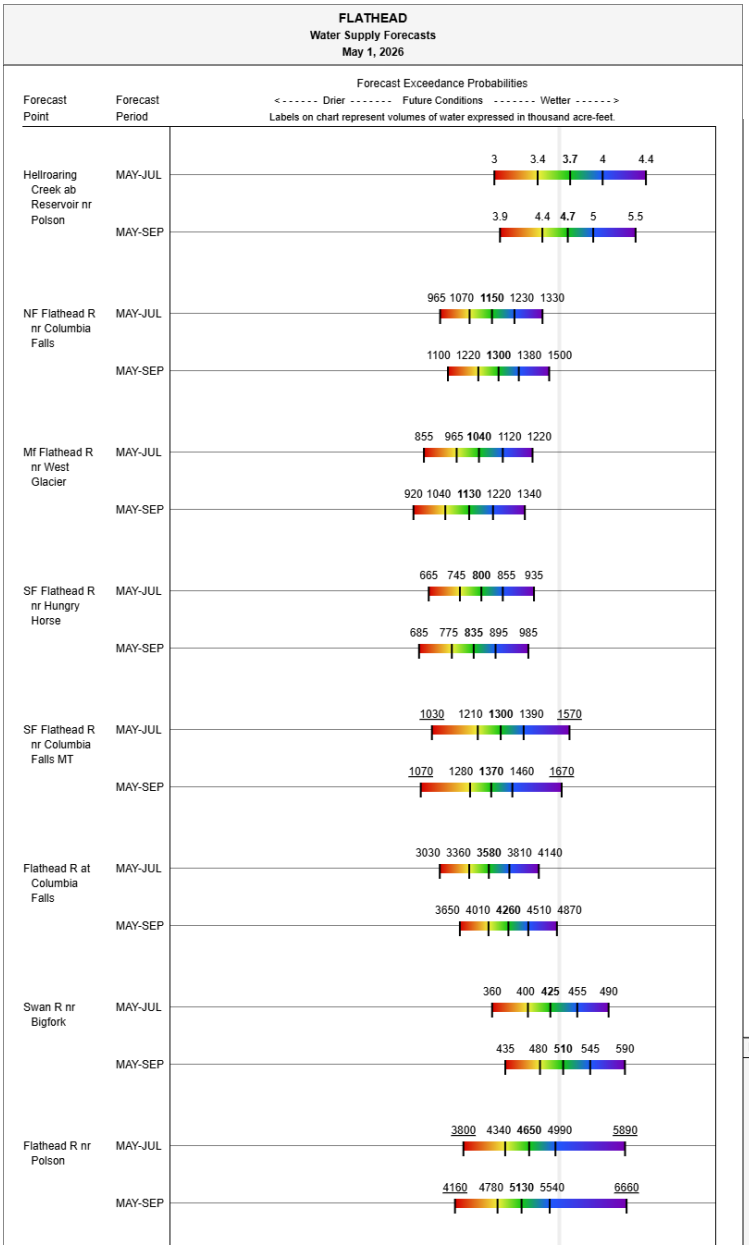
Precipitation in April was above normal at 114%, which brings the seasonal accumulation (October-April) to 118% of median. The snowpack in the Flathead is below normal at 84% of median, compared to 86% at this time last year.

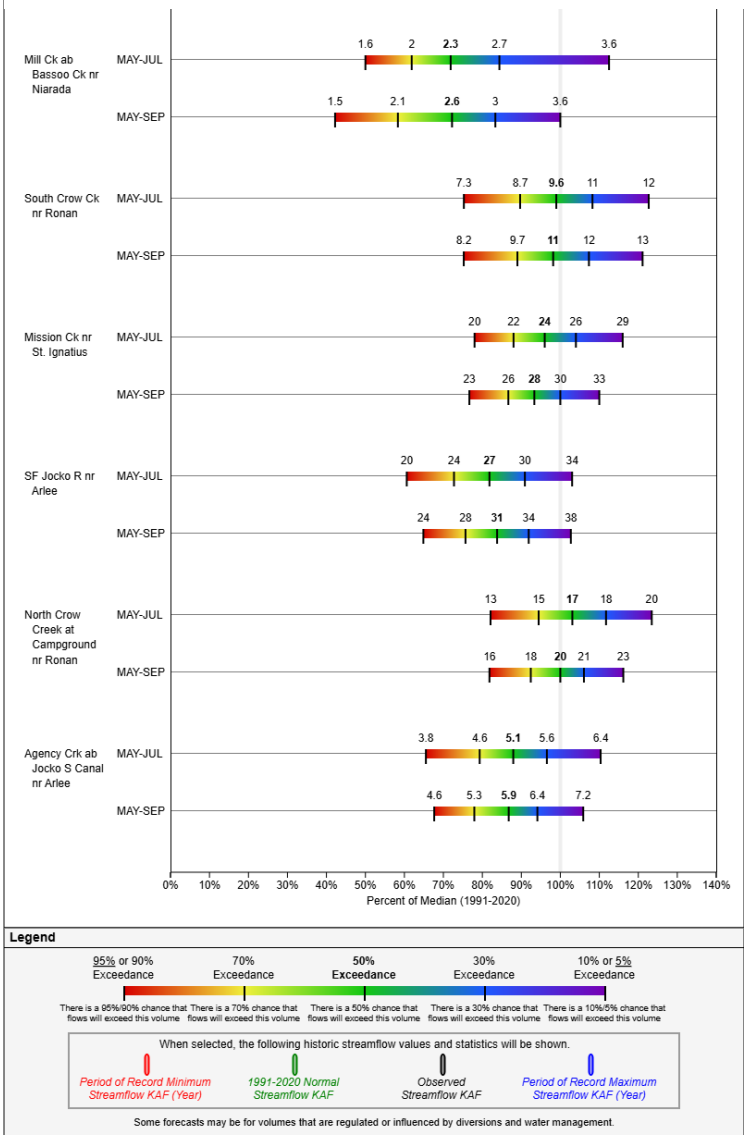


# Basin Overview

## Flathead (Continued)

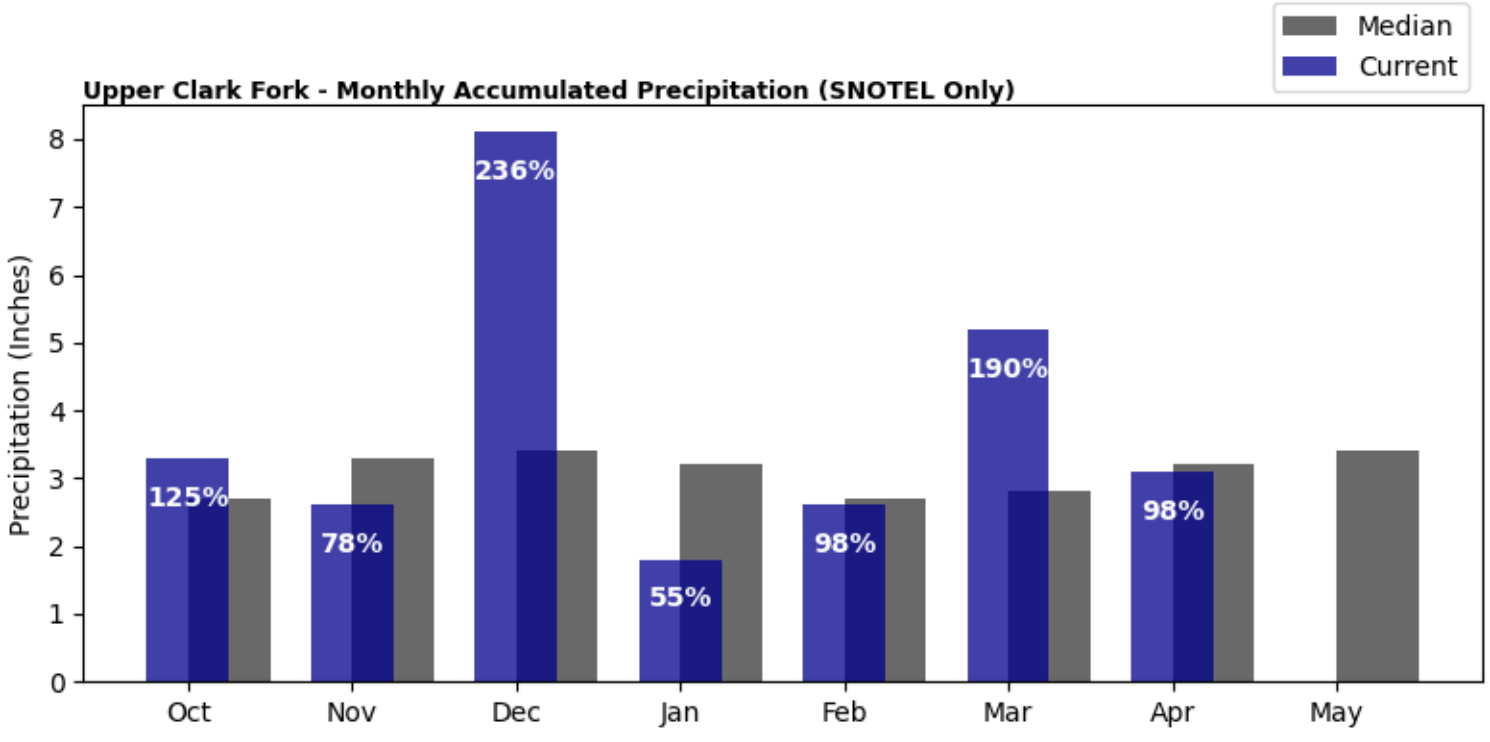


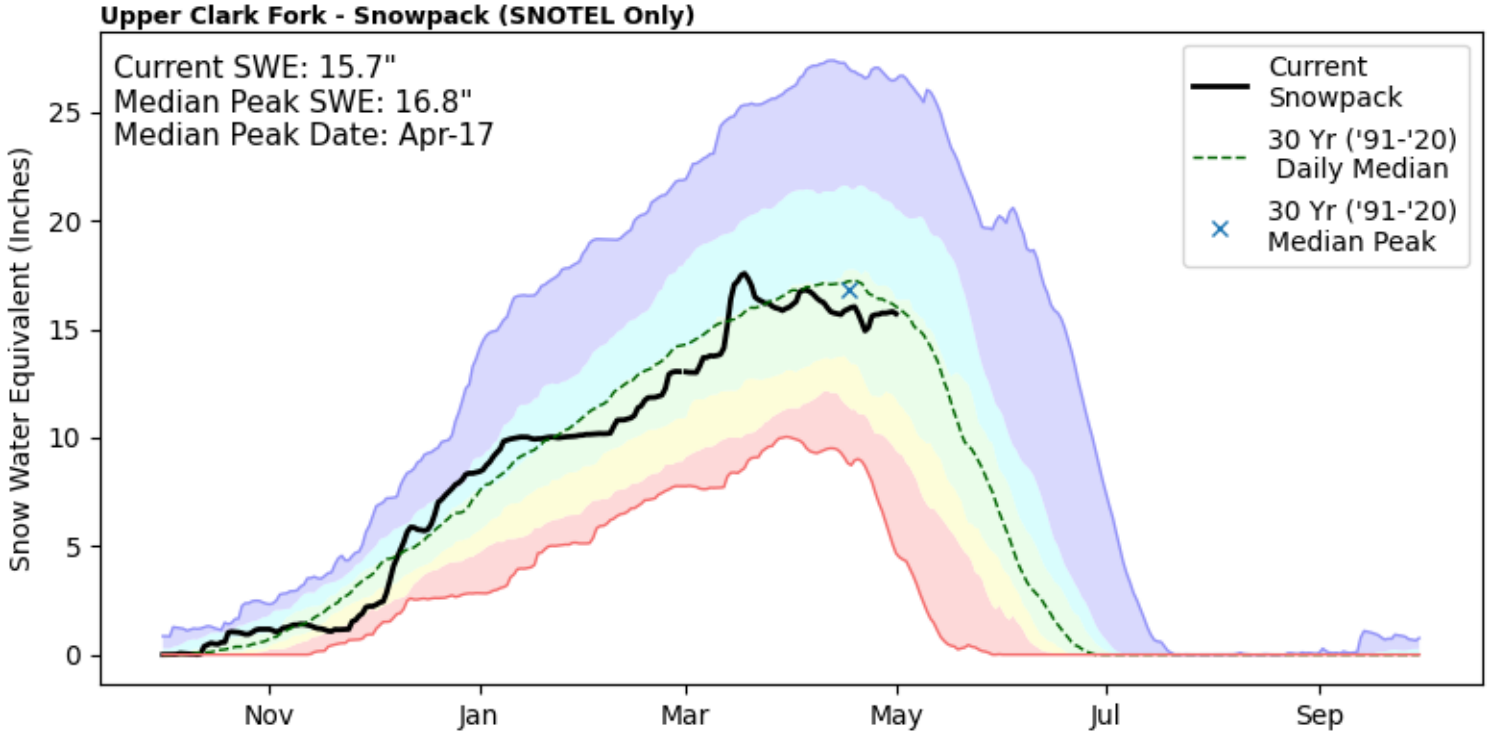



# Basin Overview

## Upper Clark Fork

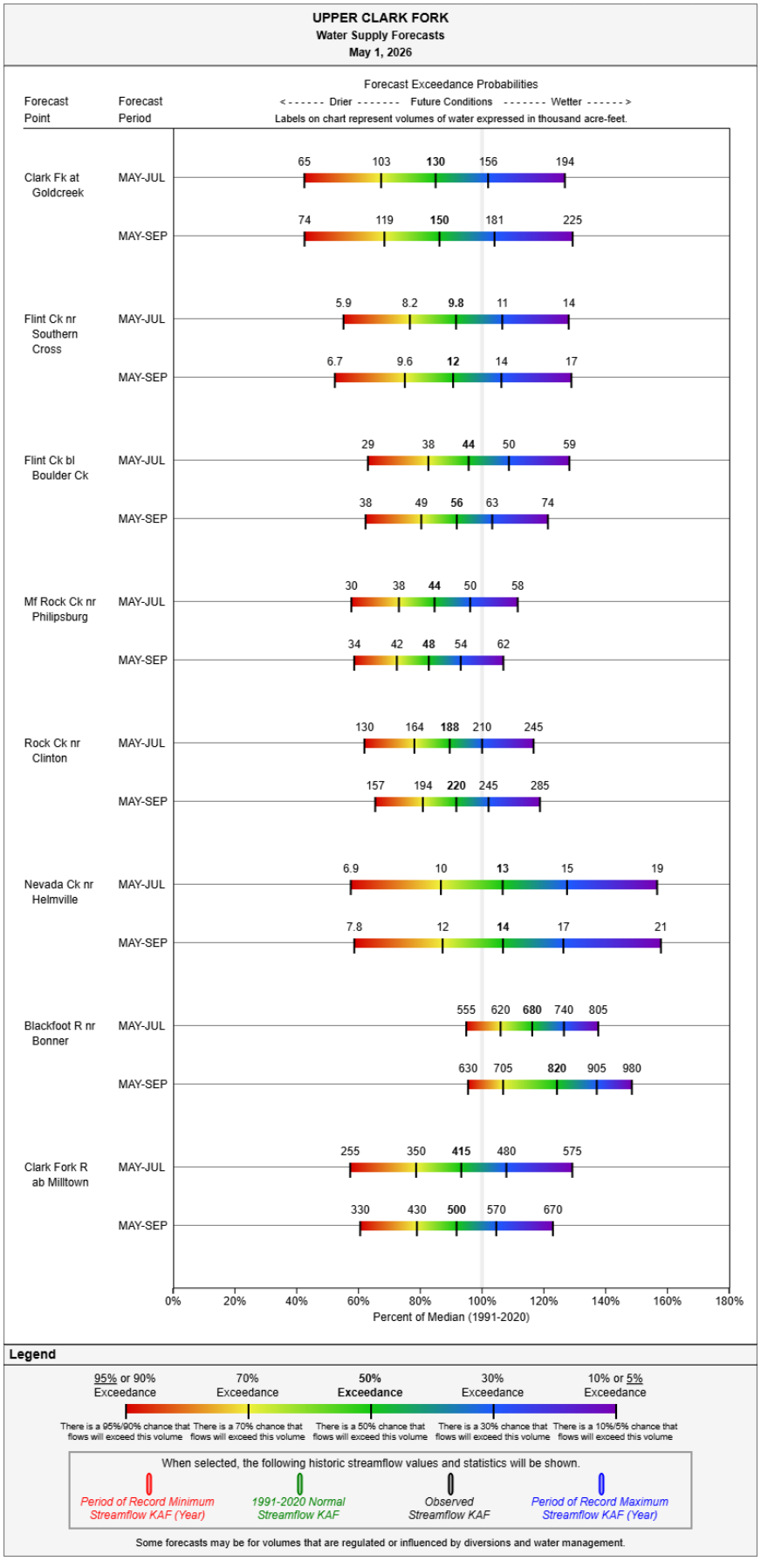
Precipitation in April was near normal at 98%, which brings the seasonal accumulation (October-April) to 123% of median. The snowpack in the Upper Clark Fork is below normal at 87% of median, compared to 91% at this time last year.



# Basin Overview

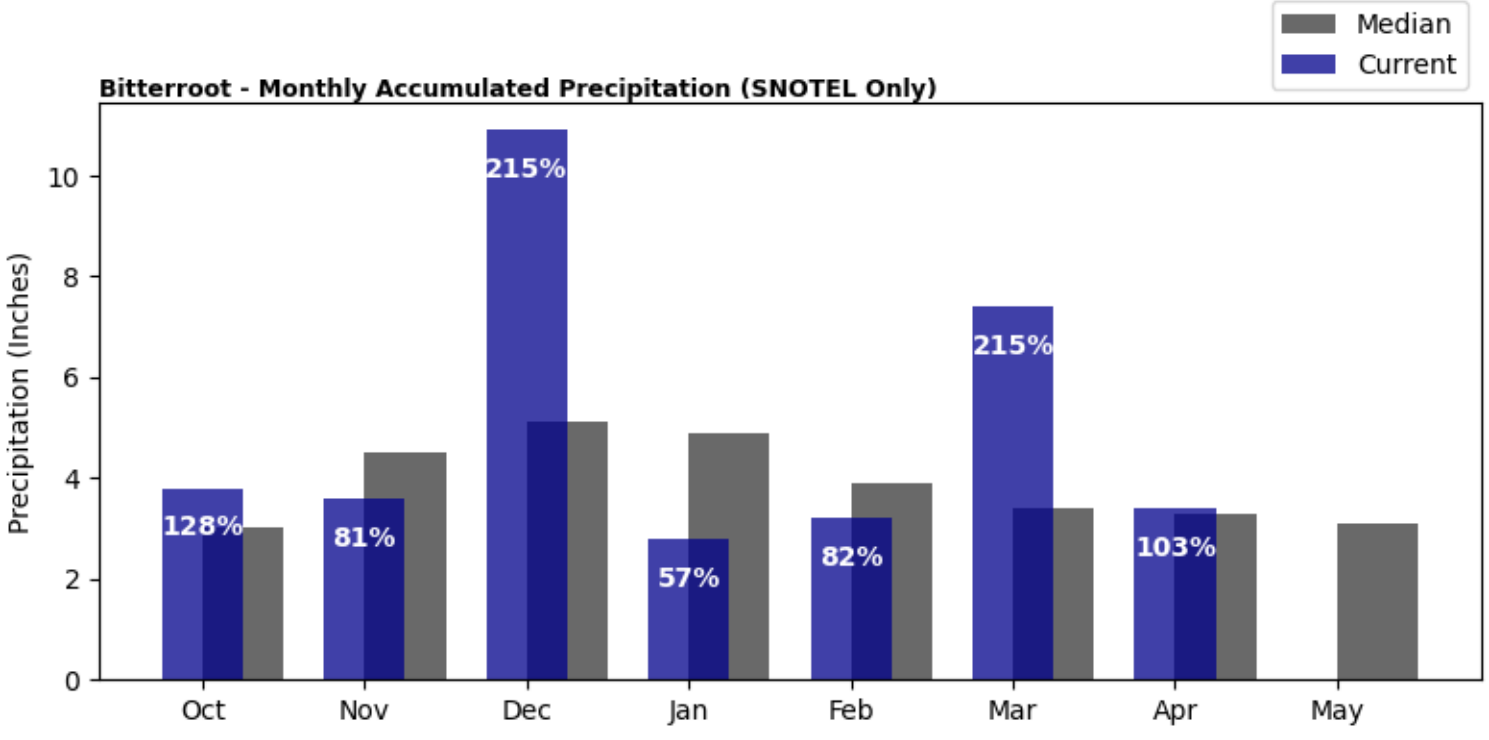
## Upper Clark Fork (Continued)

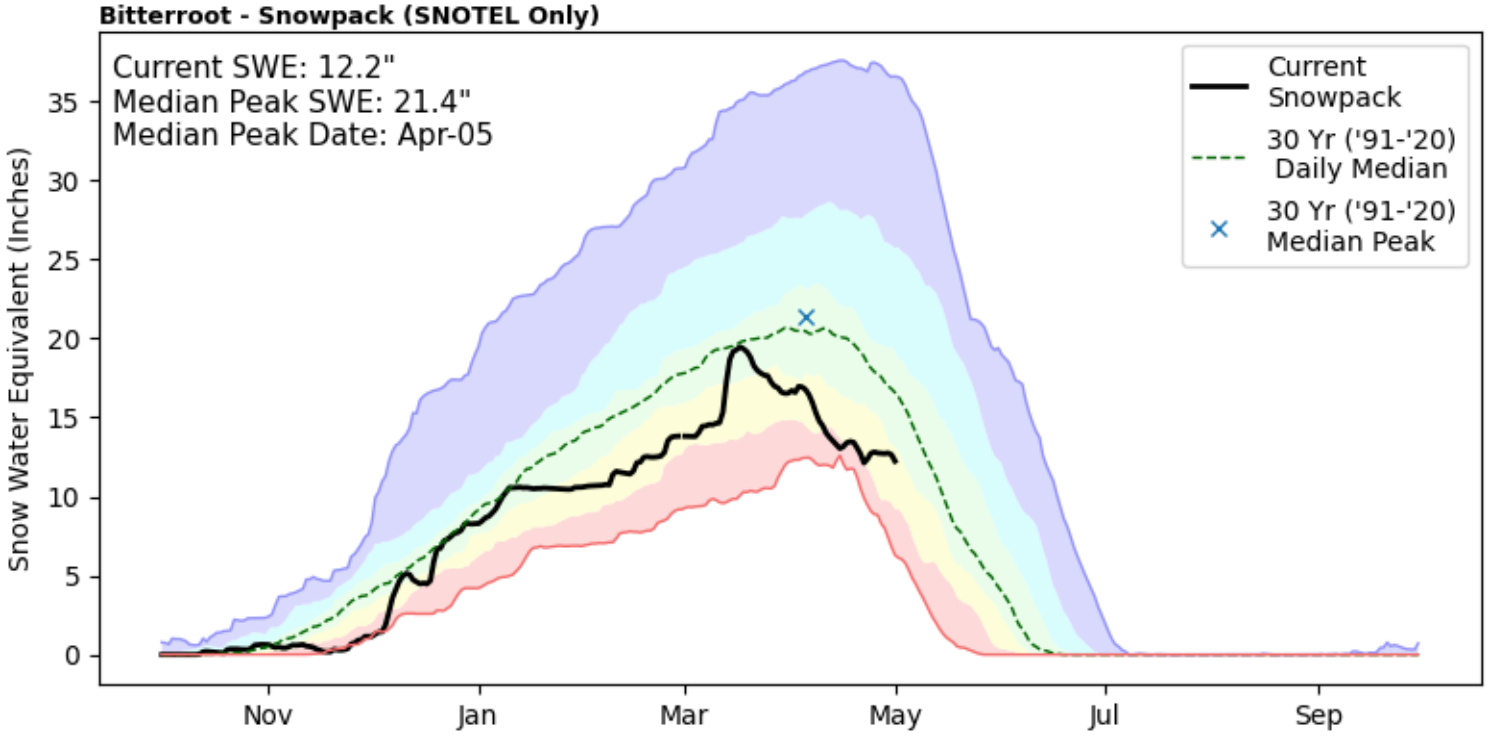


# Basin Overview

## Bitterroot

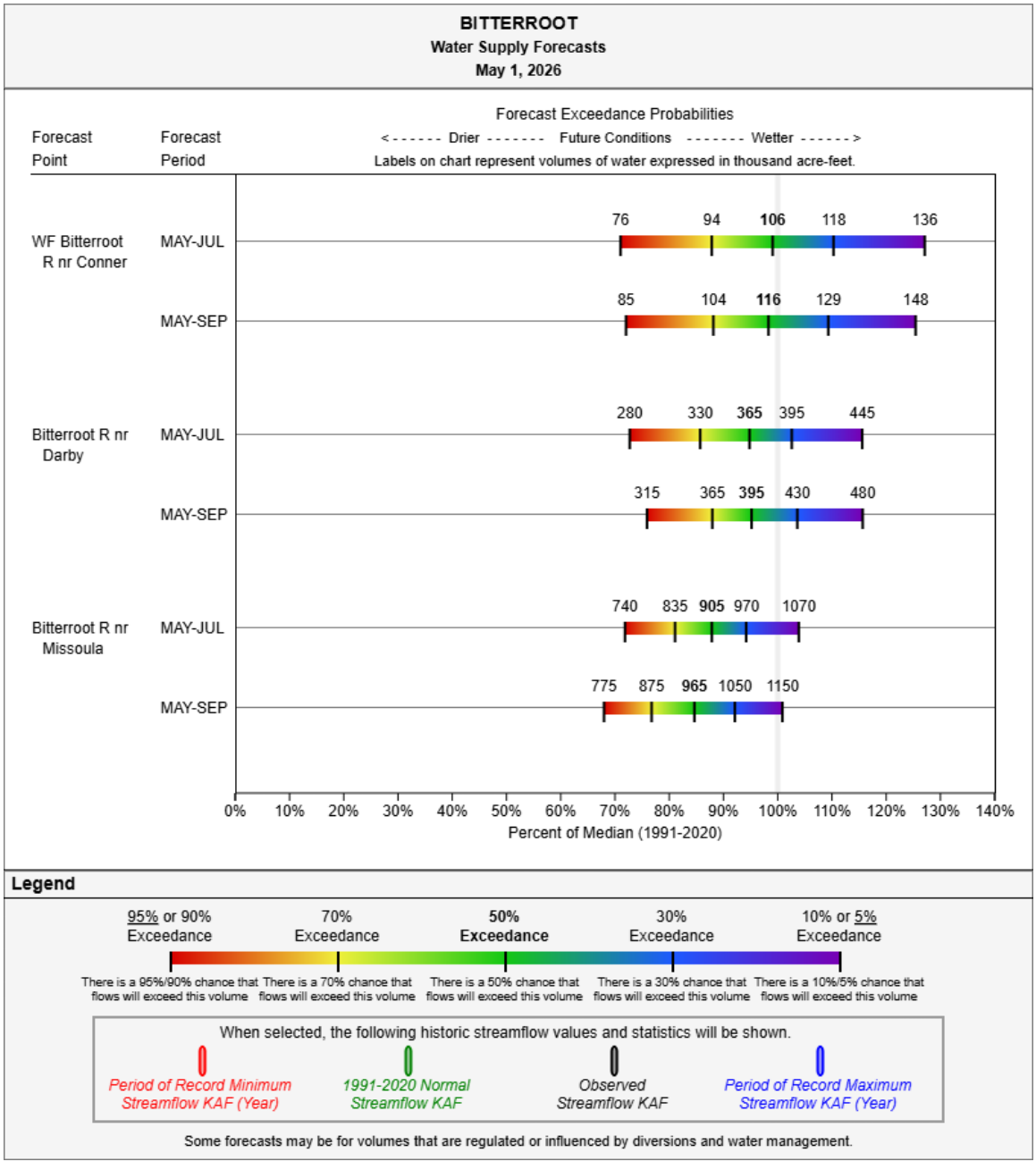
Precipitation in April was near normal at 103%, which brings the seasonal accumulation (October-April) to 120% of median. The snowpack in the Bitterroot is well below normal at 74% of median, compared to 76% at this time last year.



# Basin Overview

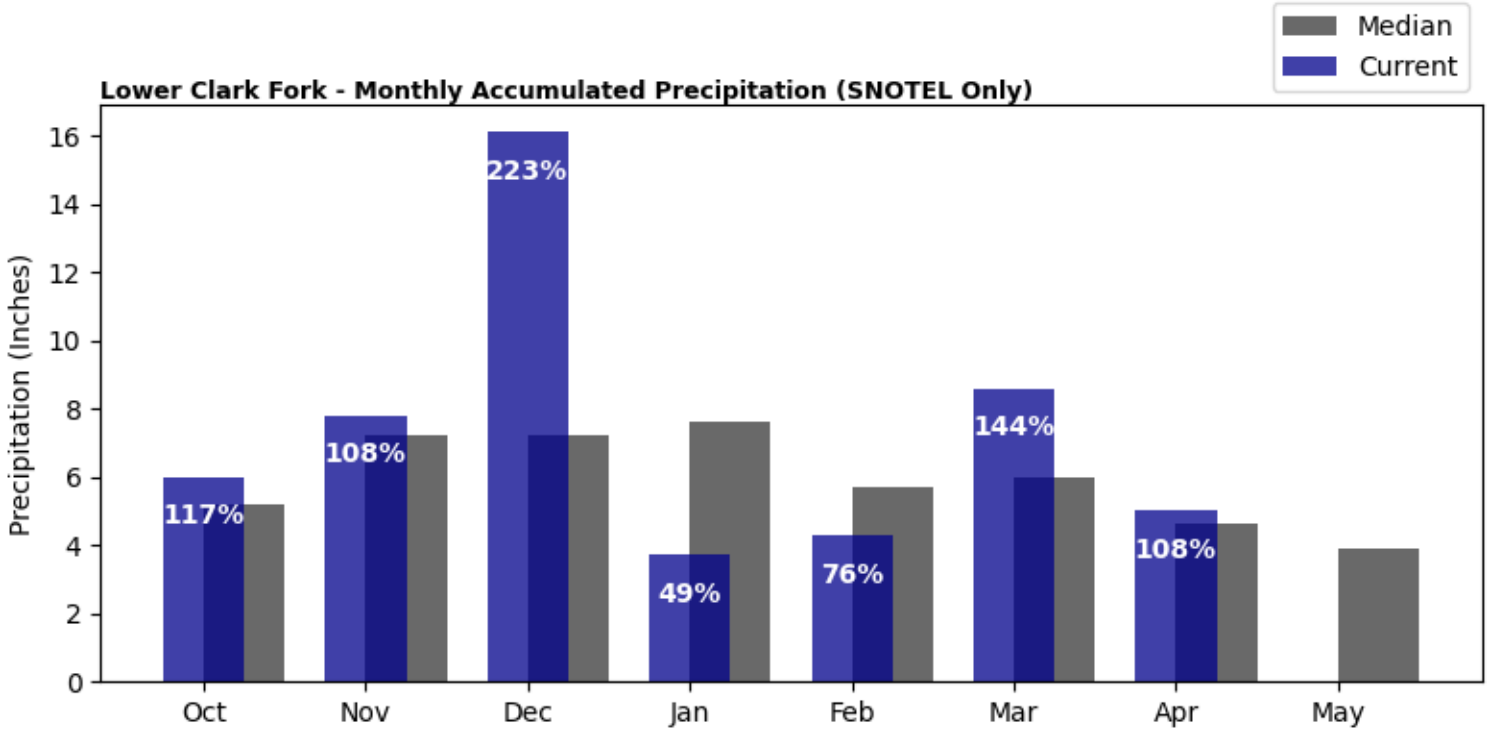
## Bitterroot (Continued)

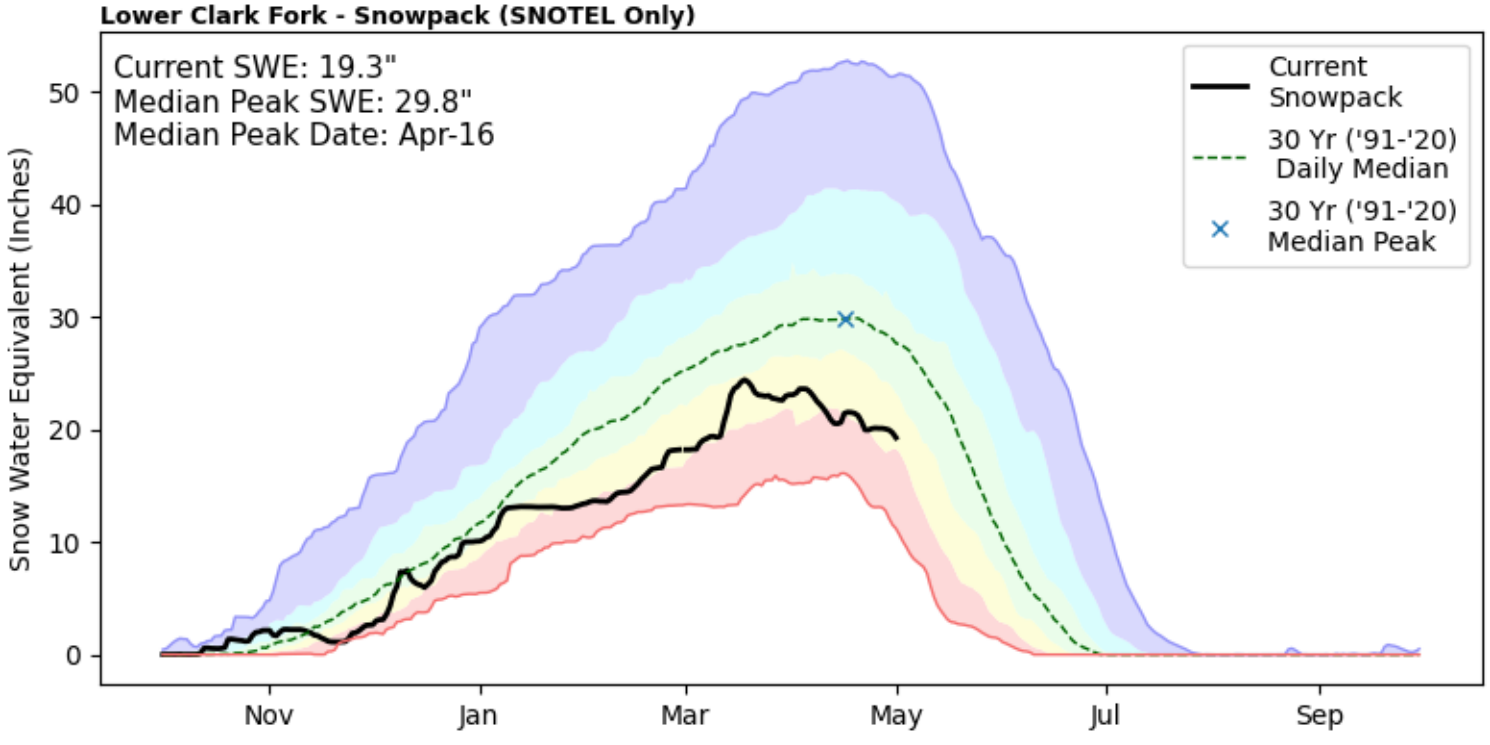


# Basin Overview

## Lower Clark Fork

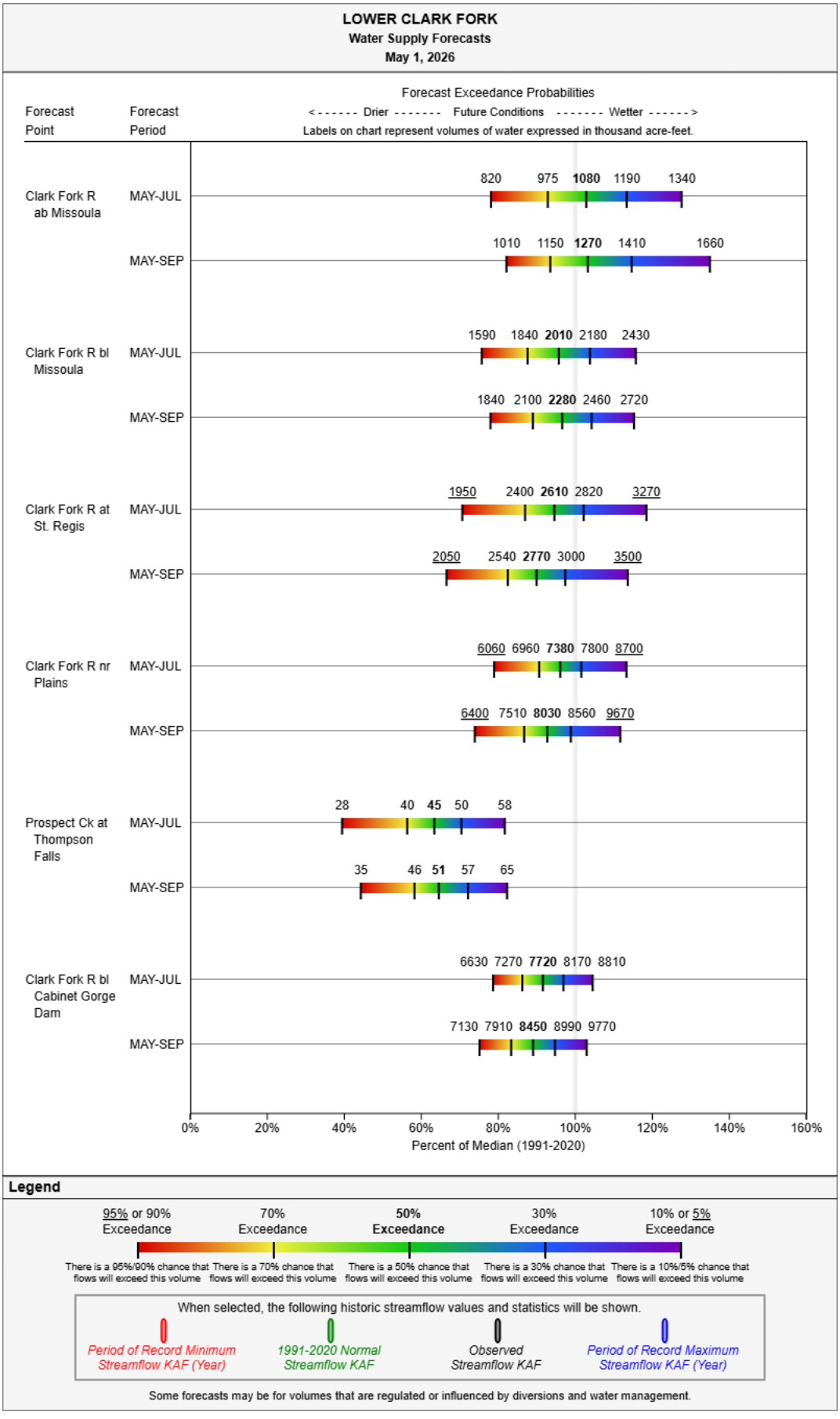
Precipitation in April was above normal at 108%, which brings the seasonal accumulation (October-April) to 112% of median. The snowpack in the Lower Clark Fork is well below normal at 64% of median, compared to 85% at this time last year.



# Basin Overview

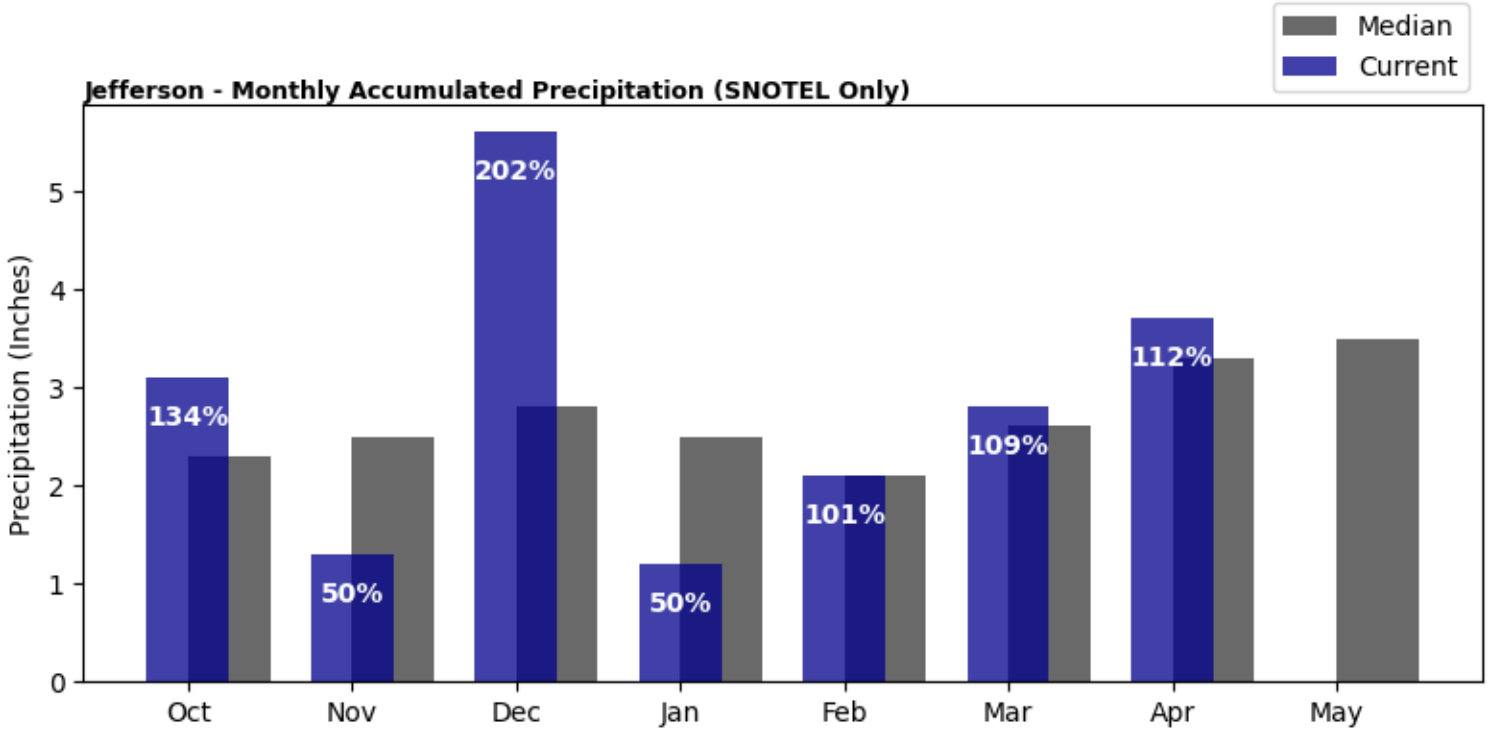
## Lower Clark Fork (Continued)

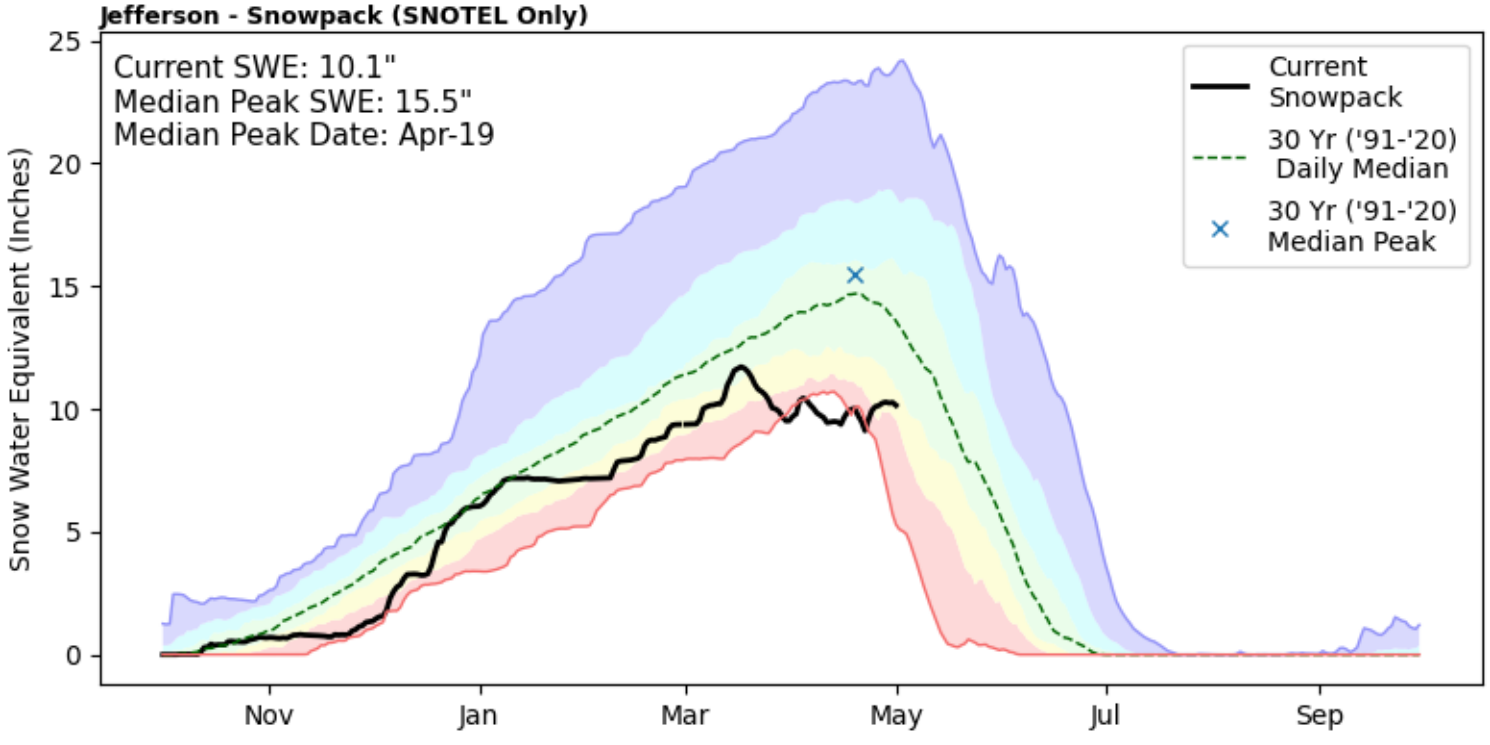


# Basin Overview

## Jefferson

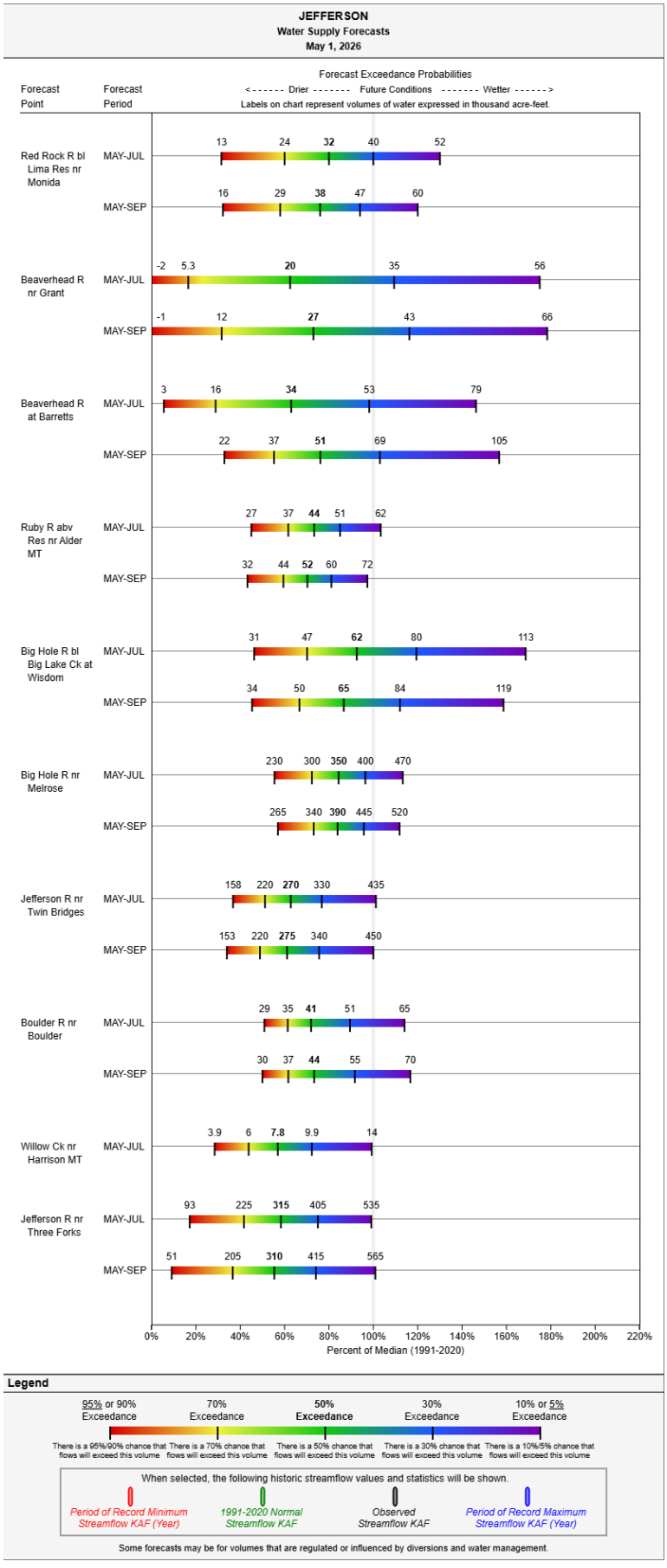
Precipitation in April was above normal at 112%, which brings the seasonal accumulation (October-April) to 108% of median. The snowpack in the Jefferson is well below normal at 68% of median, compared to 89% at this time last year.



# Basin Overview

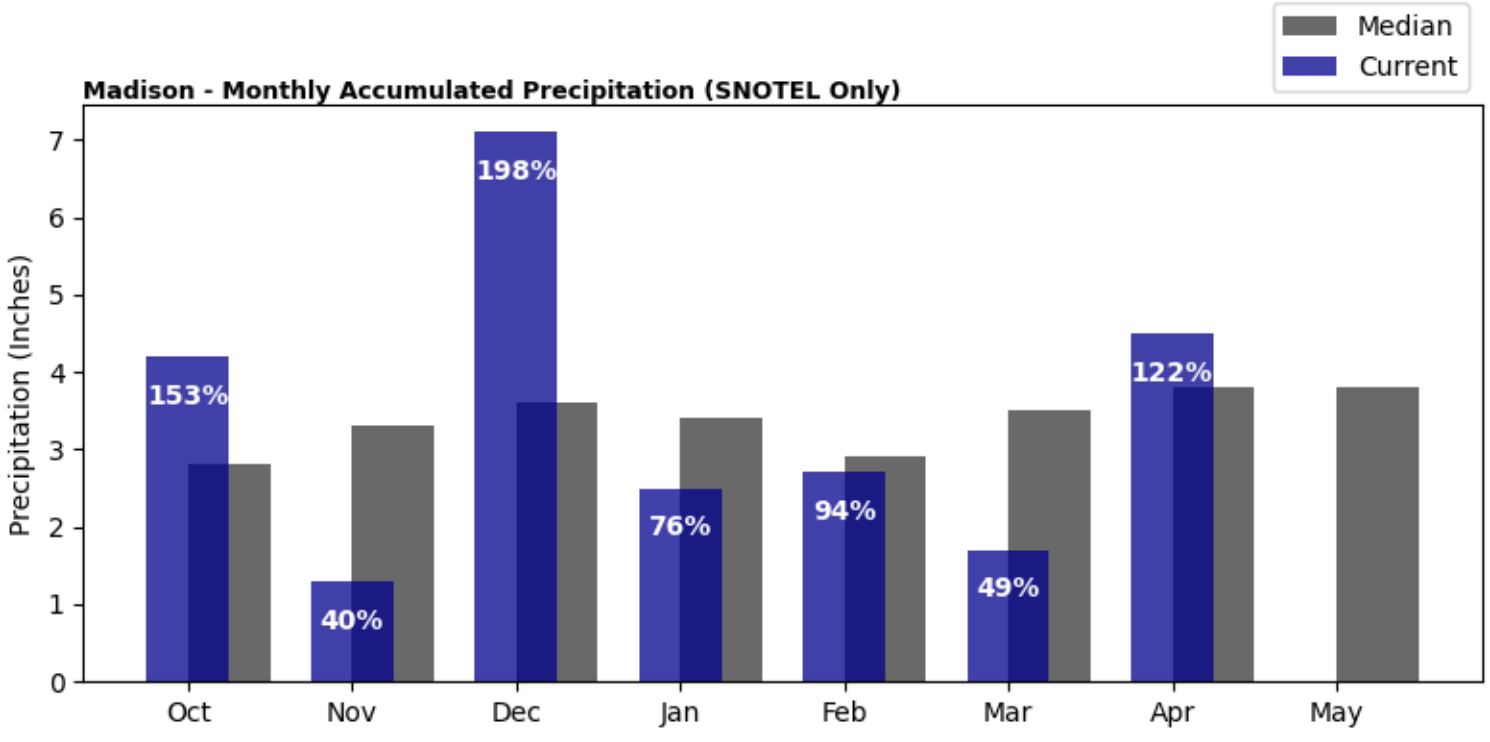
## Jefferson (Continued)

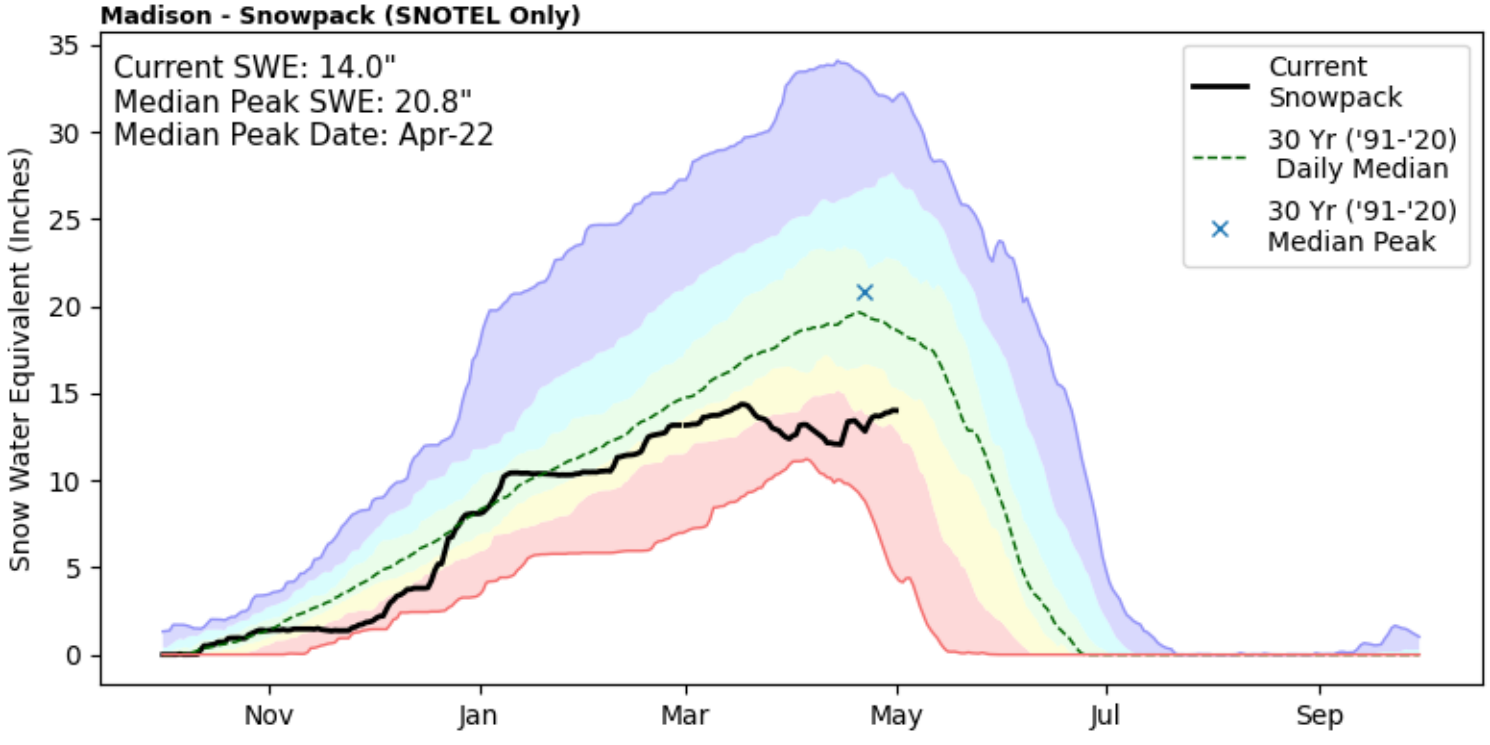


# Basin Overview

## Madison

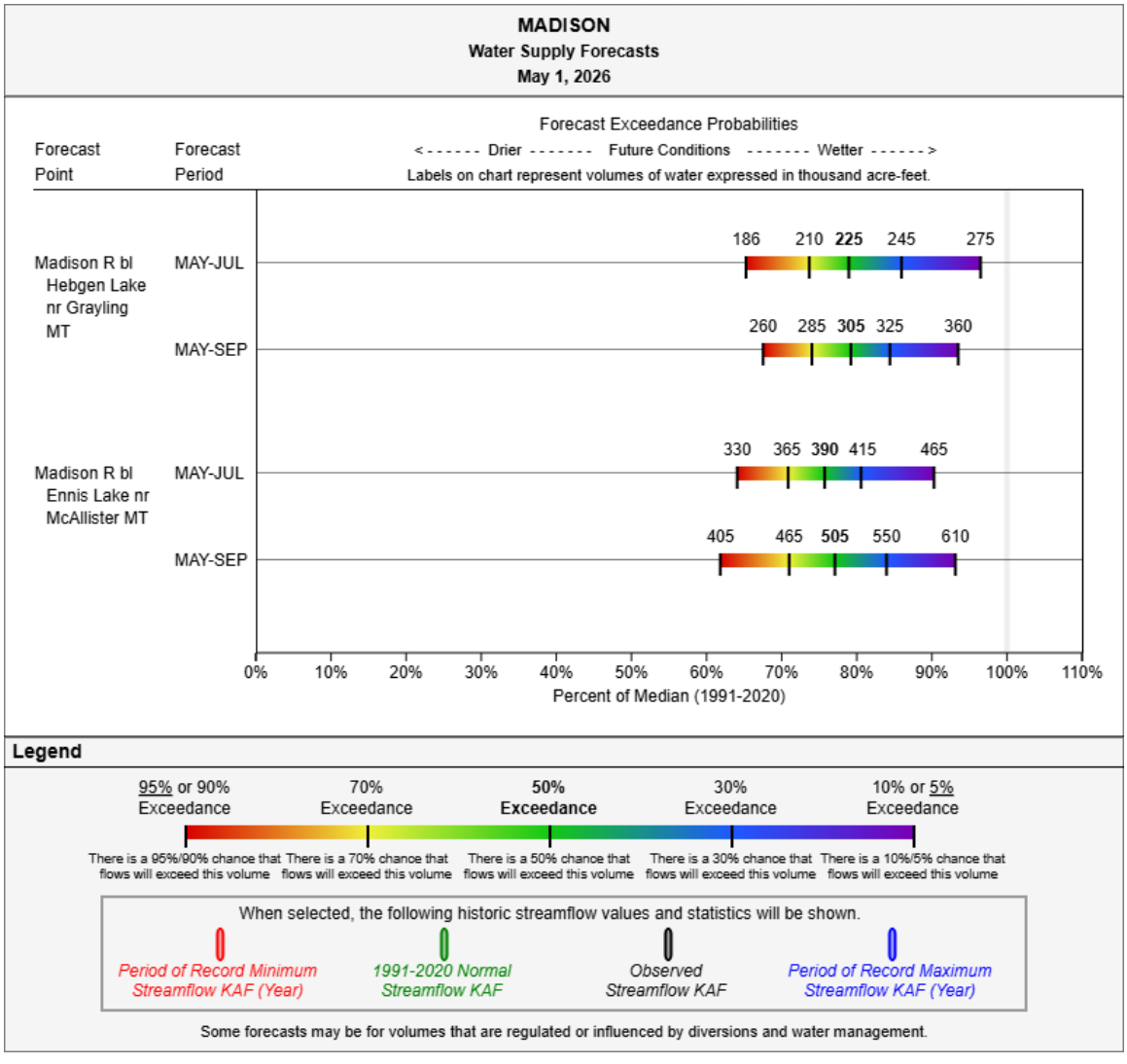
Precipitation in April was well above normal at 122%, which brings the seasonal accumulation (October-April) to 102% of median. The snowpack in the Madison is well below normal at 65% of median, compared to 86% at this time last year.



# Basin Overview

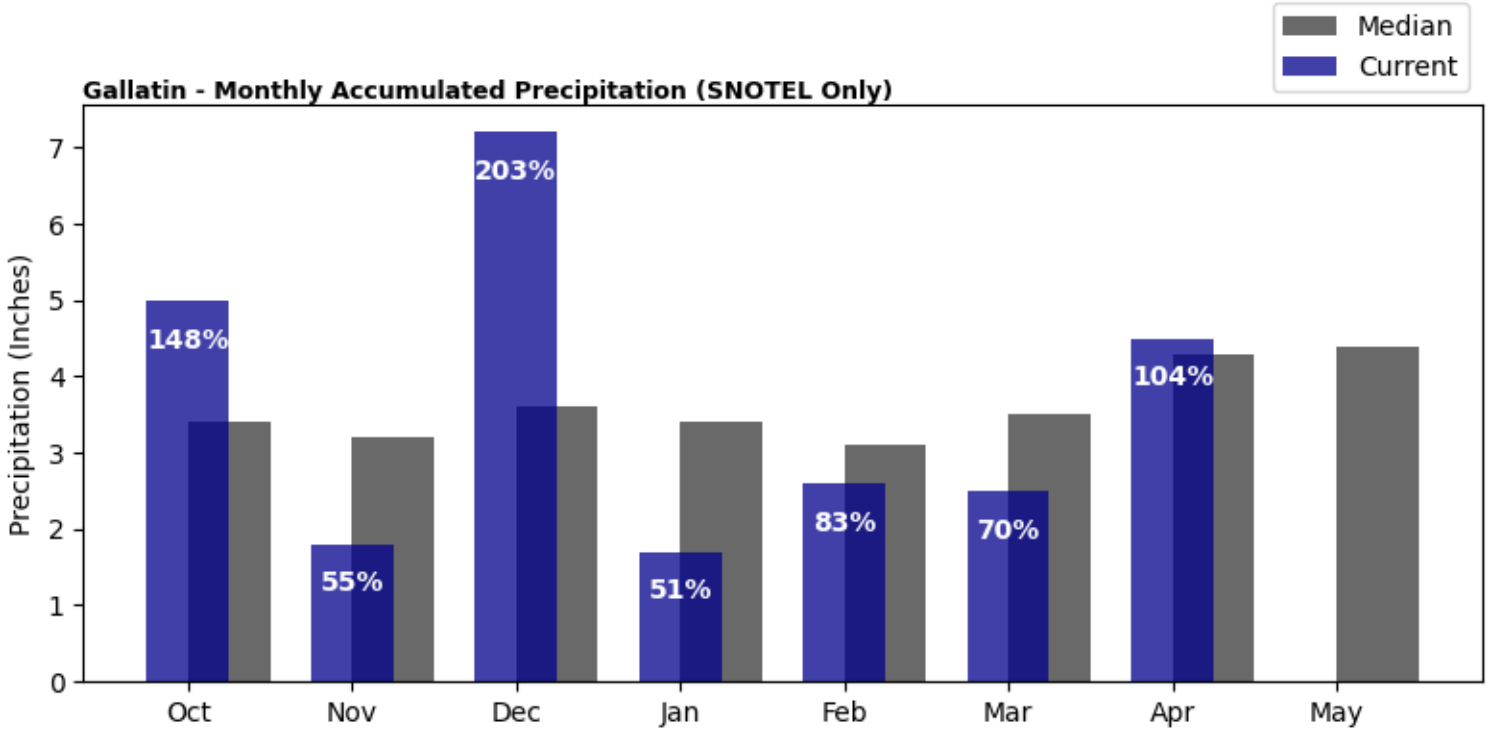
## Madison (Continued)

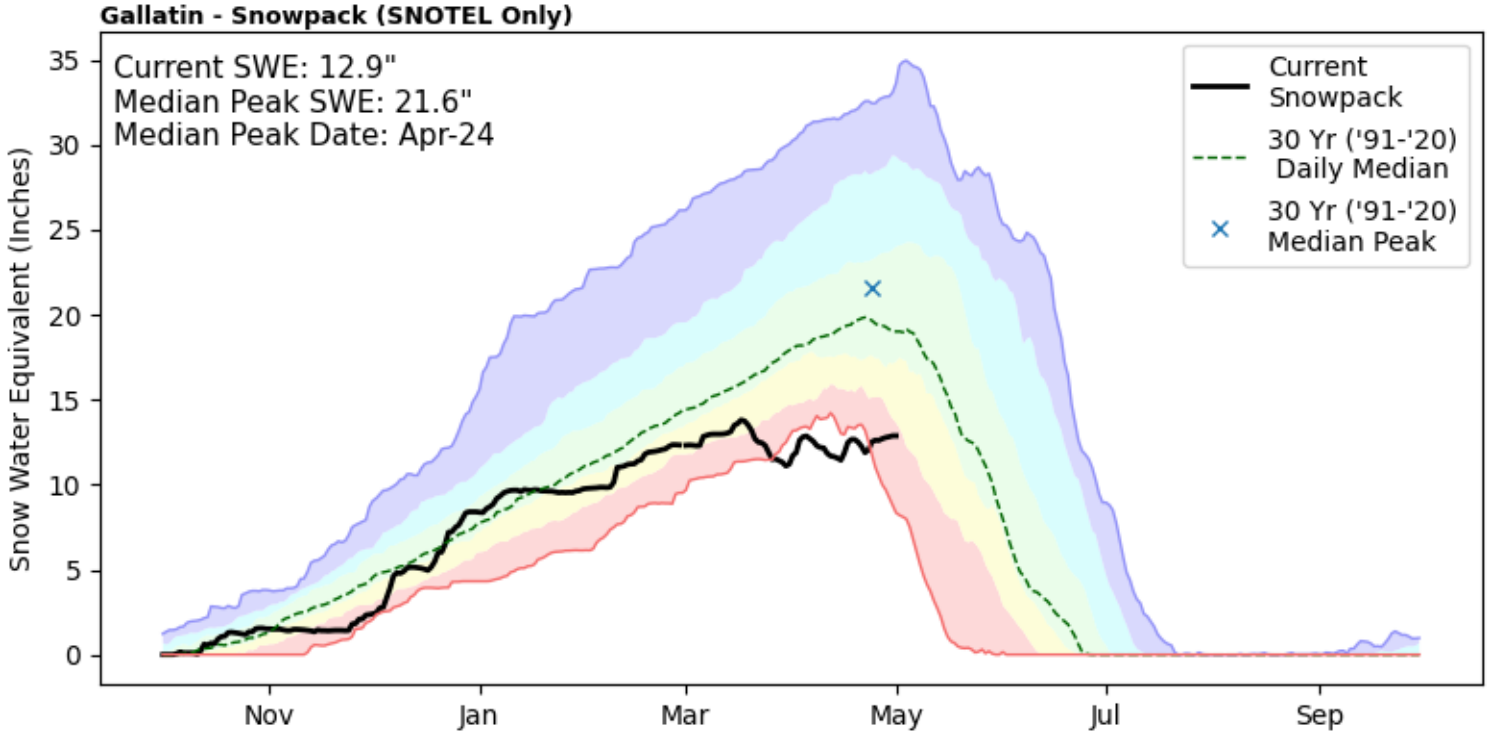


# Basin Overview

## Gallatin

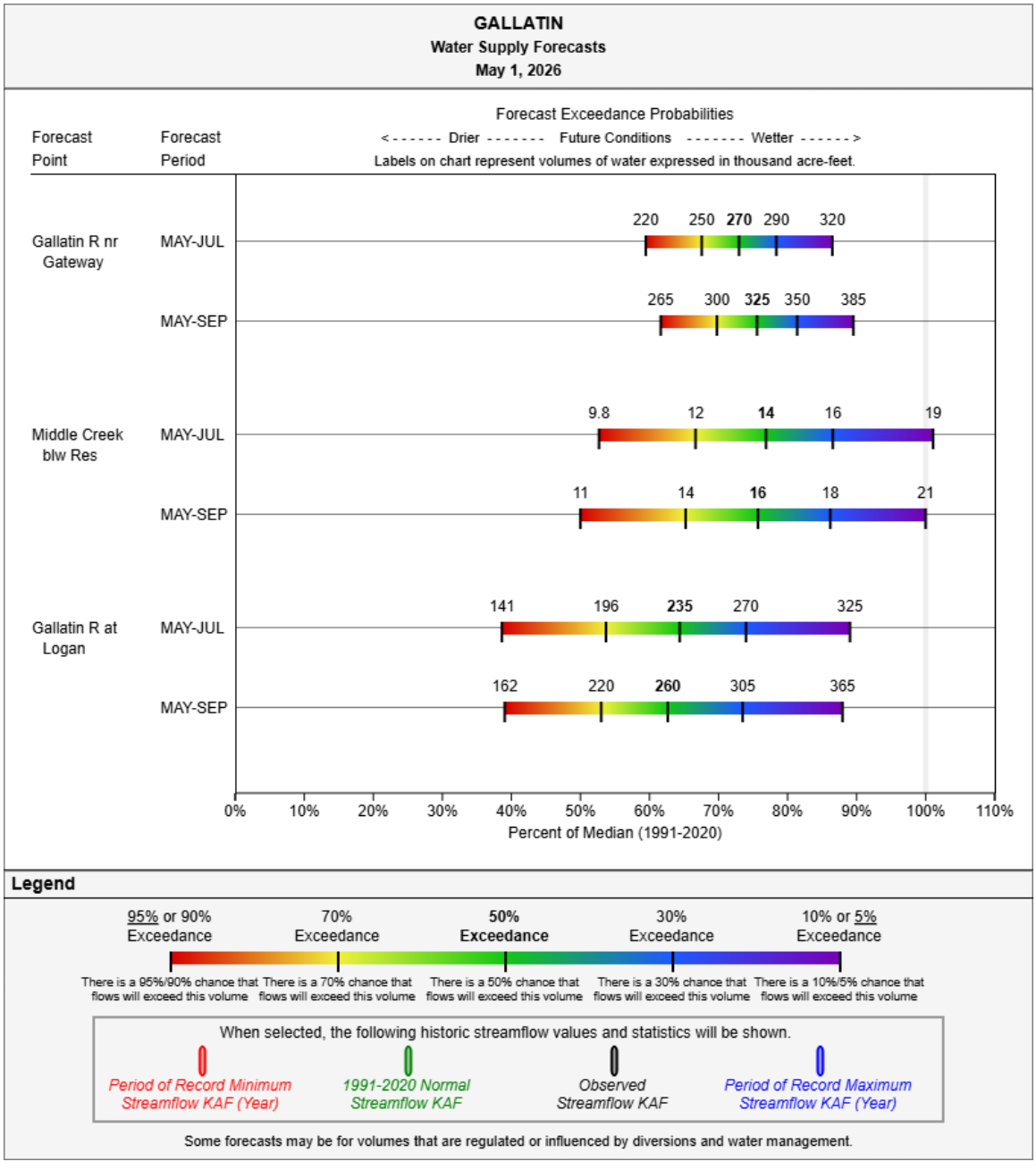
Precipitation in April was near normal at 104%, which brings the seasonal accumulation (October-April) to 99% of median. The snowpack in the Gallatin is well below normal at 61% of median, compared to 101% at this time last year.



# Basin Overview

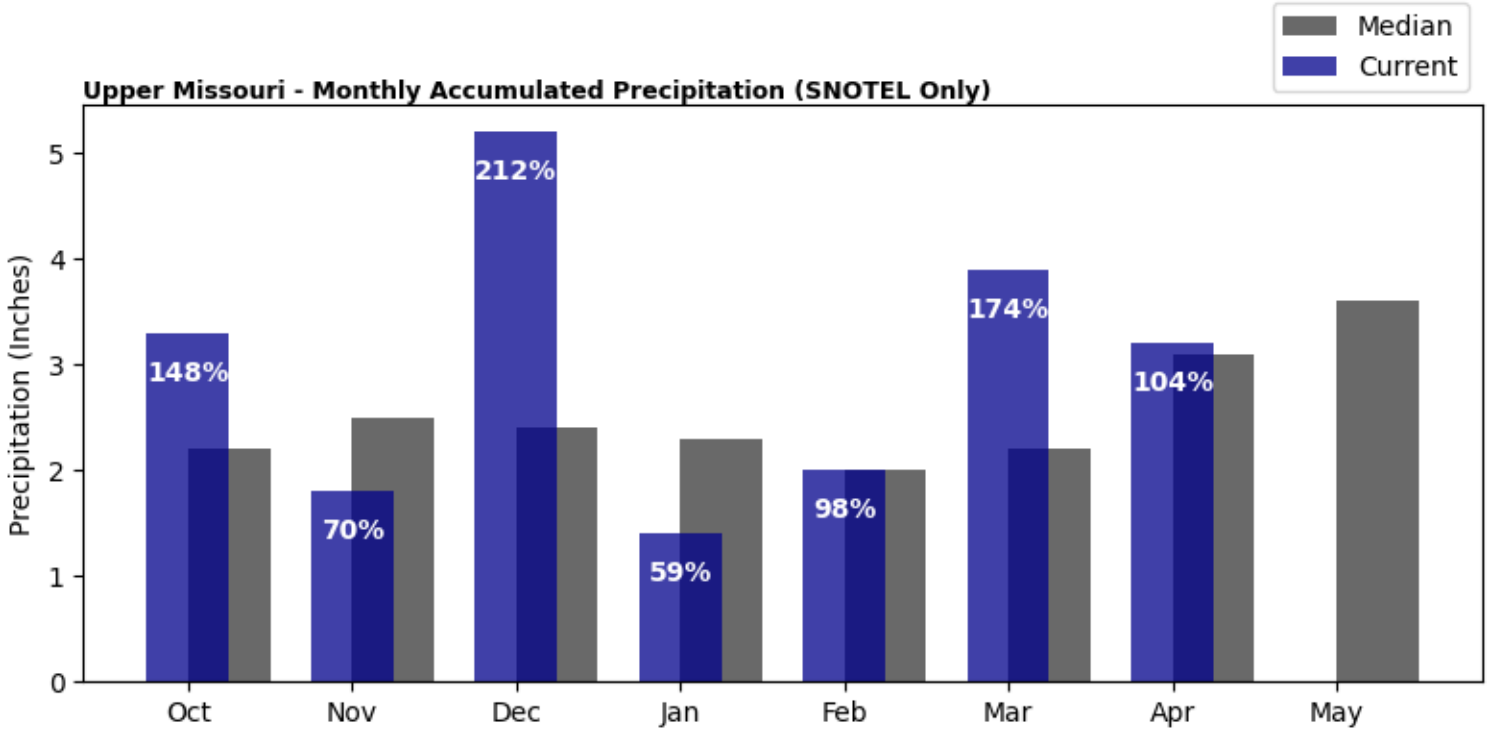
## Gallatin (Continued)

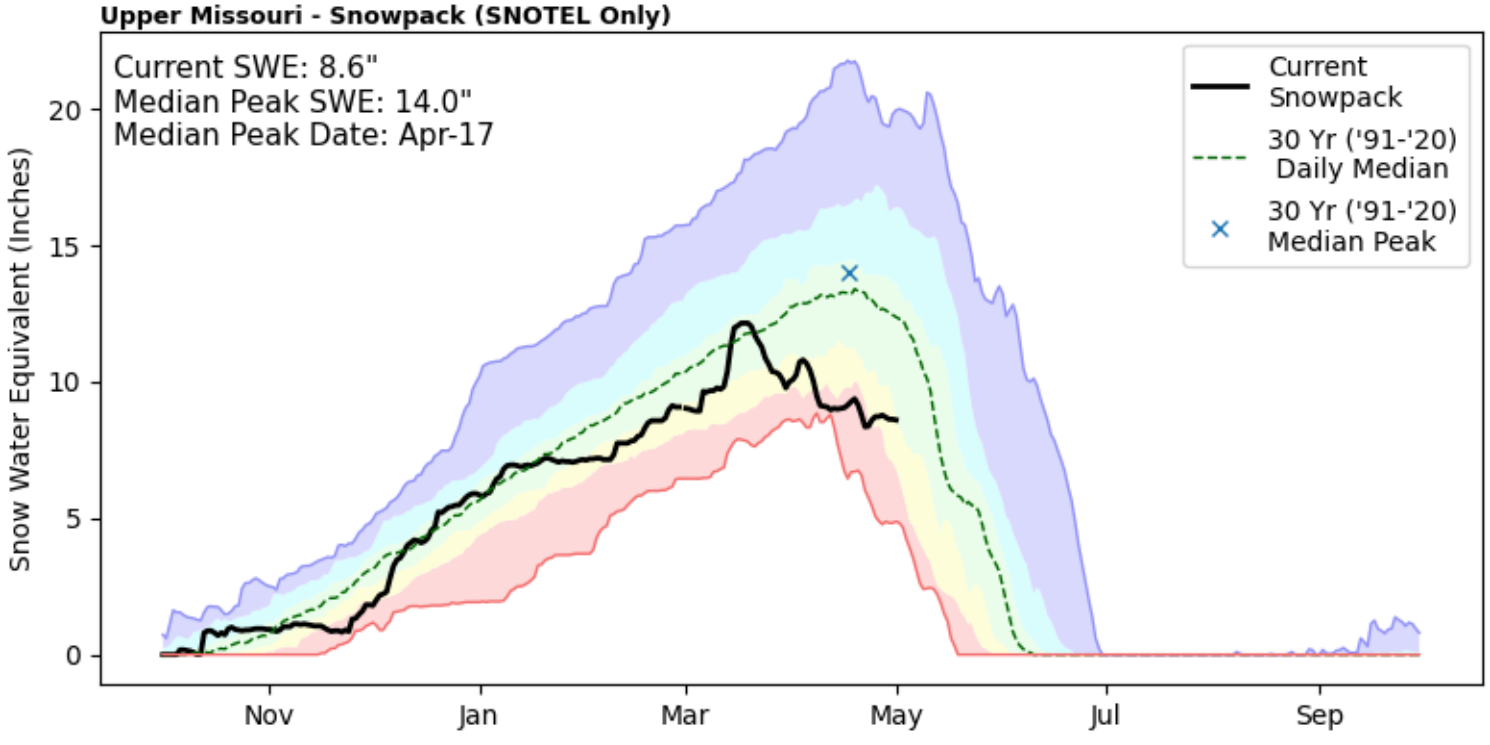


# Basin Overview

## Upper Missouri

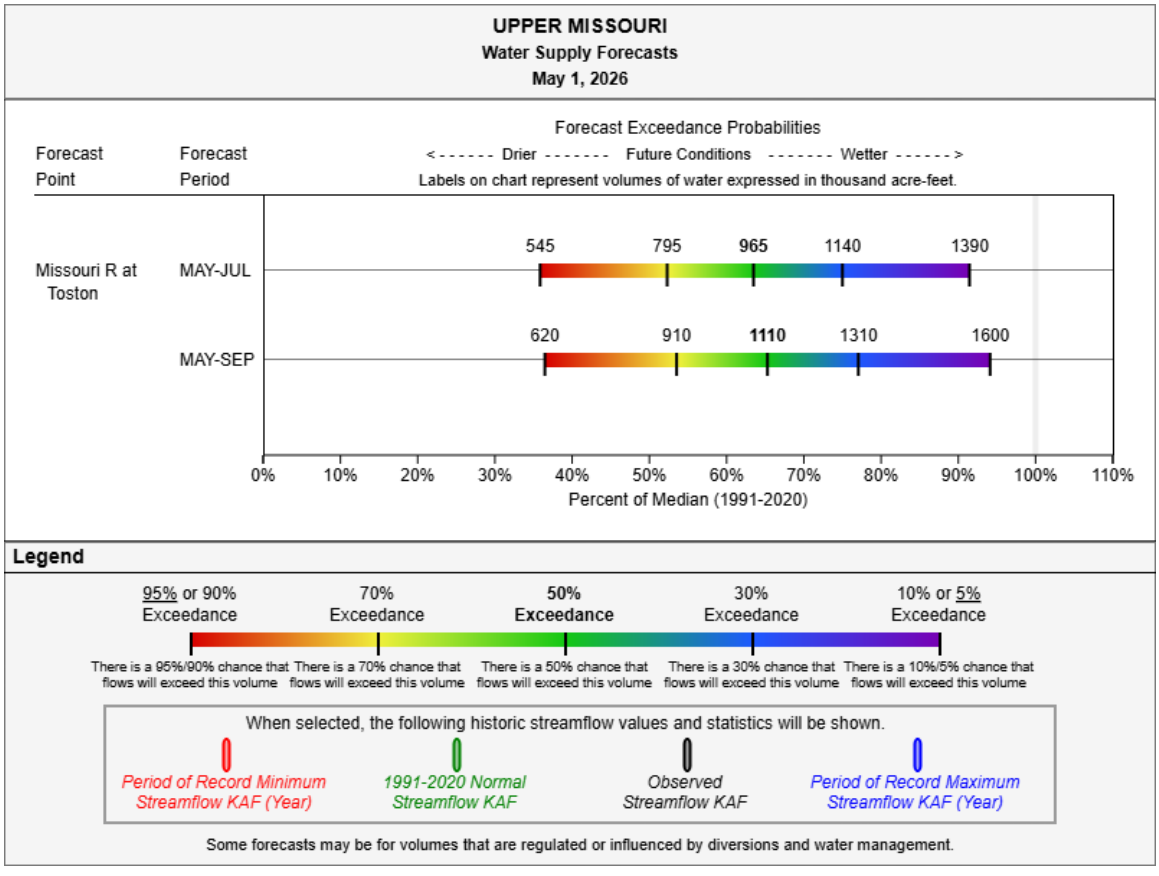
Precipitation in April was near normal at 104%, which brings the seasonal accumulation (October-April) to 122% of median. The snowpack in the Upper Missouri is well below normal at 71% of median, compared to 74% at this time last year.



# Basin Overview

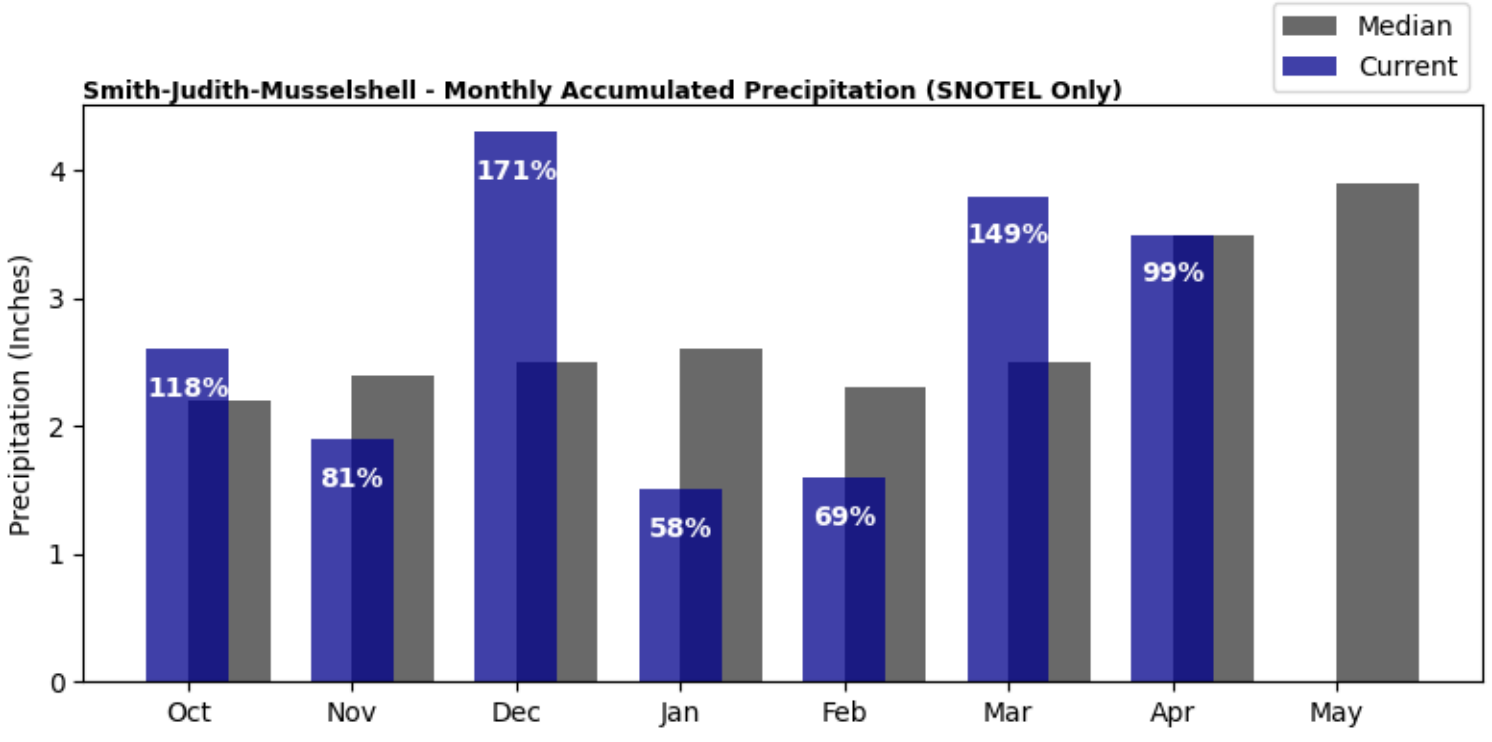
## Upper Missouri (Continued)

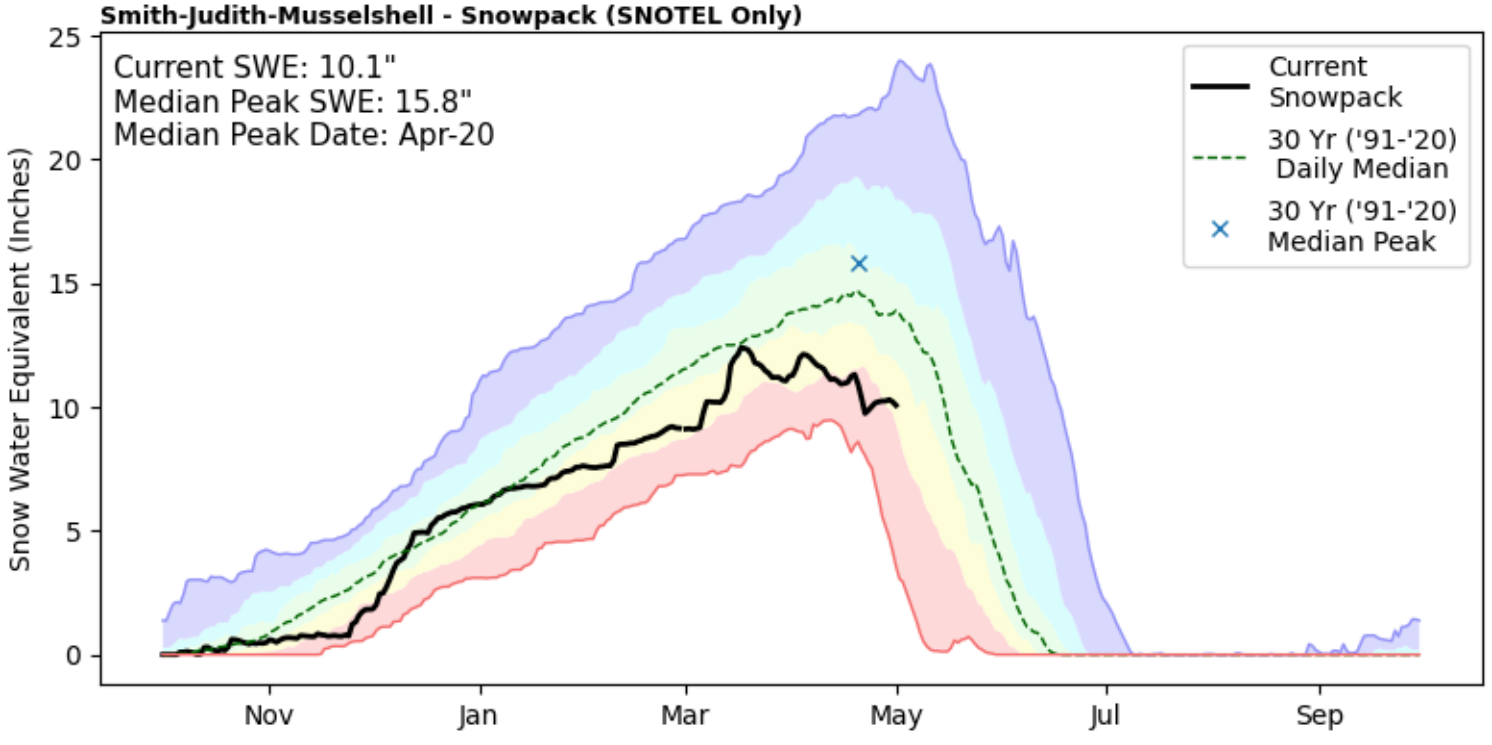


# Basin Overview

## Smith-Judith-Musselshell

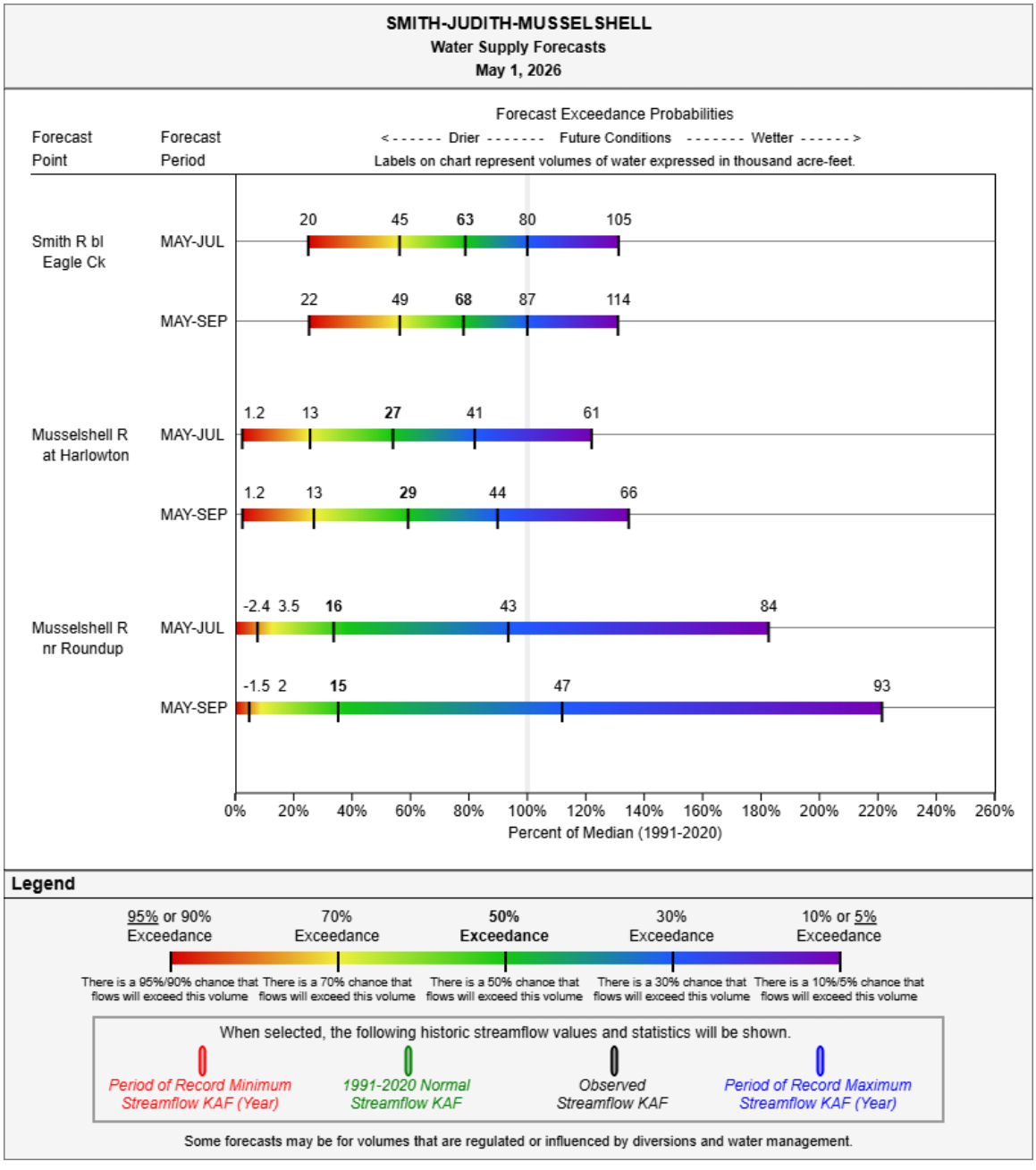
Precipitation in April was near normal at 99%, which brings the seasonal accumulation (October-April) to 101% of median. The snowpack in the Smith-Judith-Musselshell is well below normal at 73% of median, compared to 108% at this time last year.



# Basin Overview

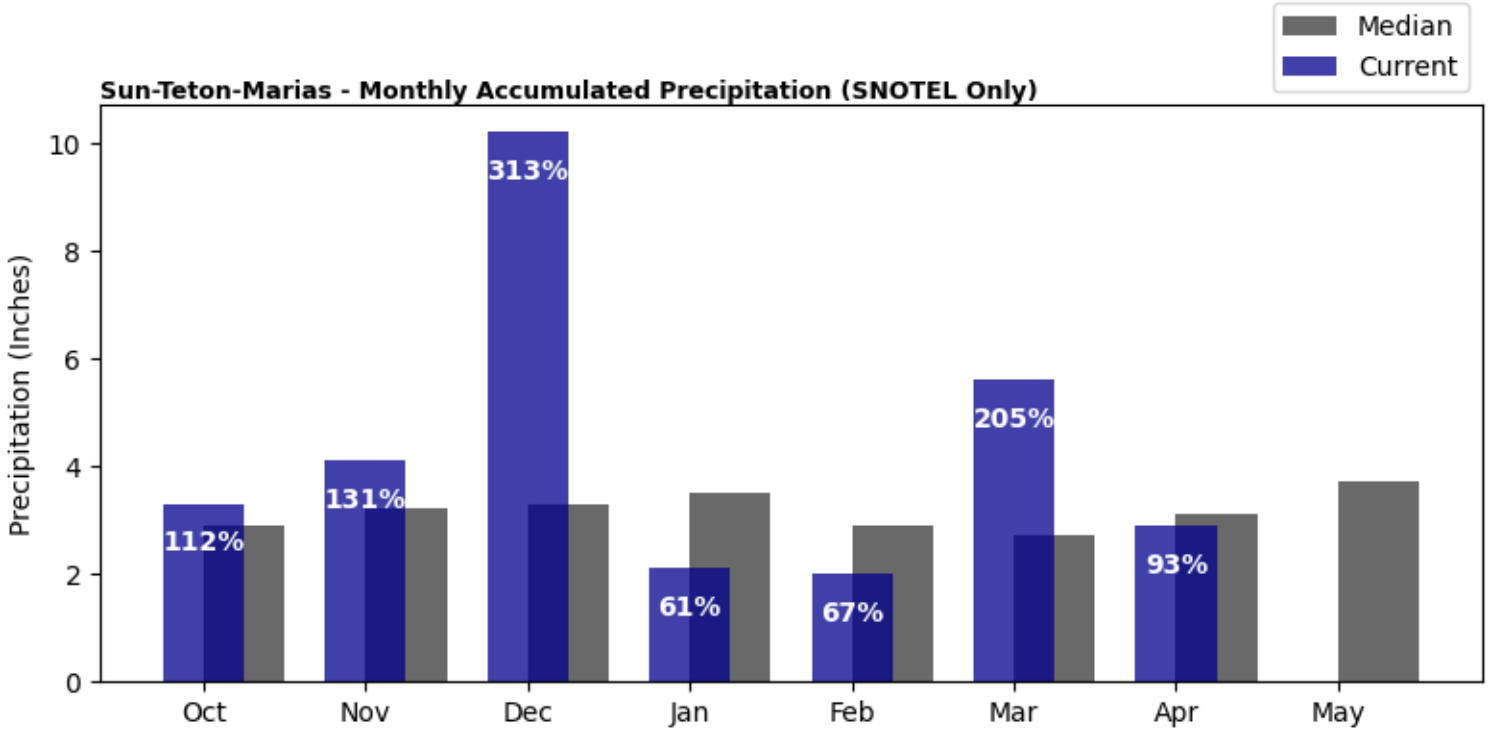
## Smith-Judith-Musselshell (Continued)

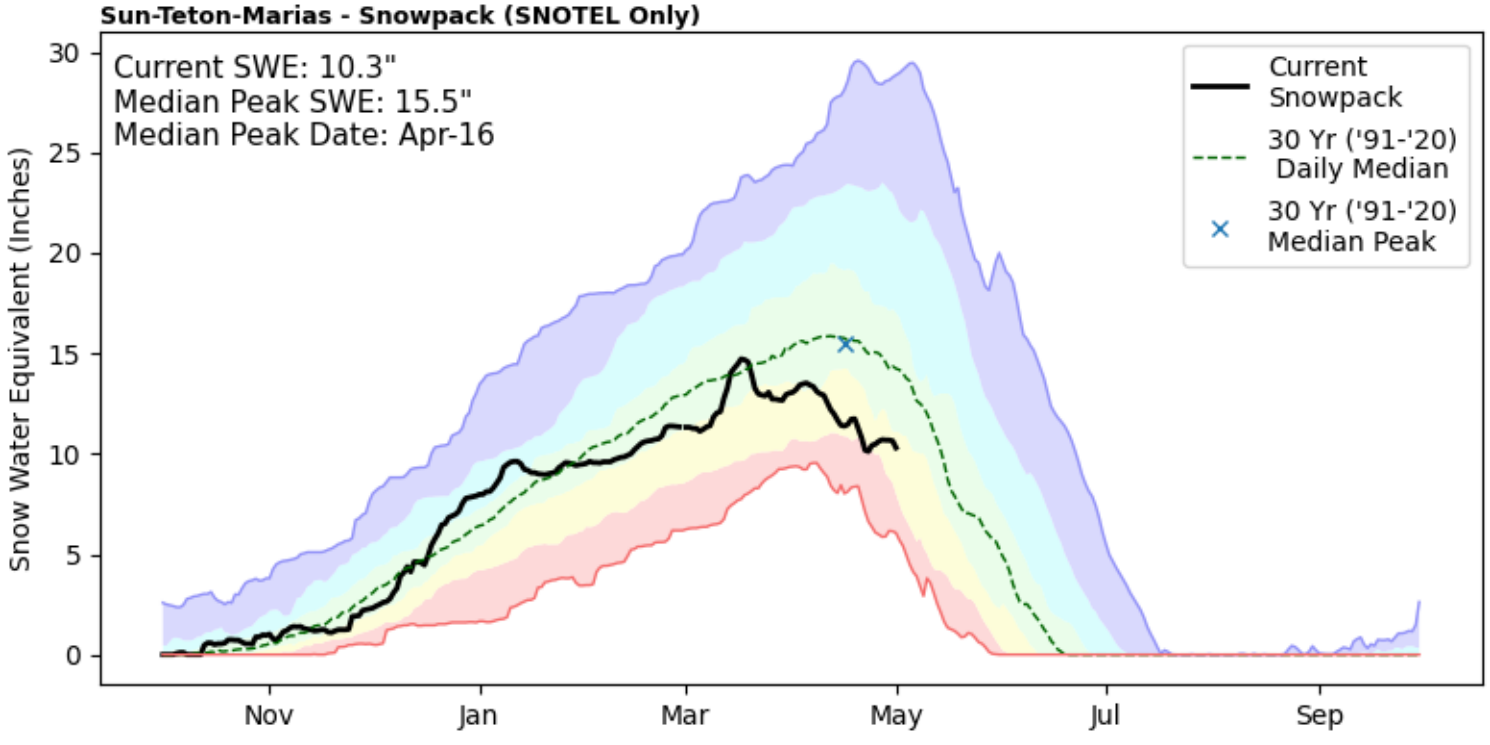


# Basin Overview

## Sun-Teton-Marias

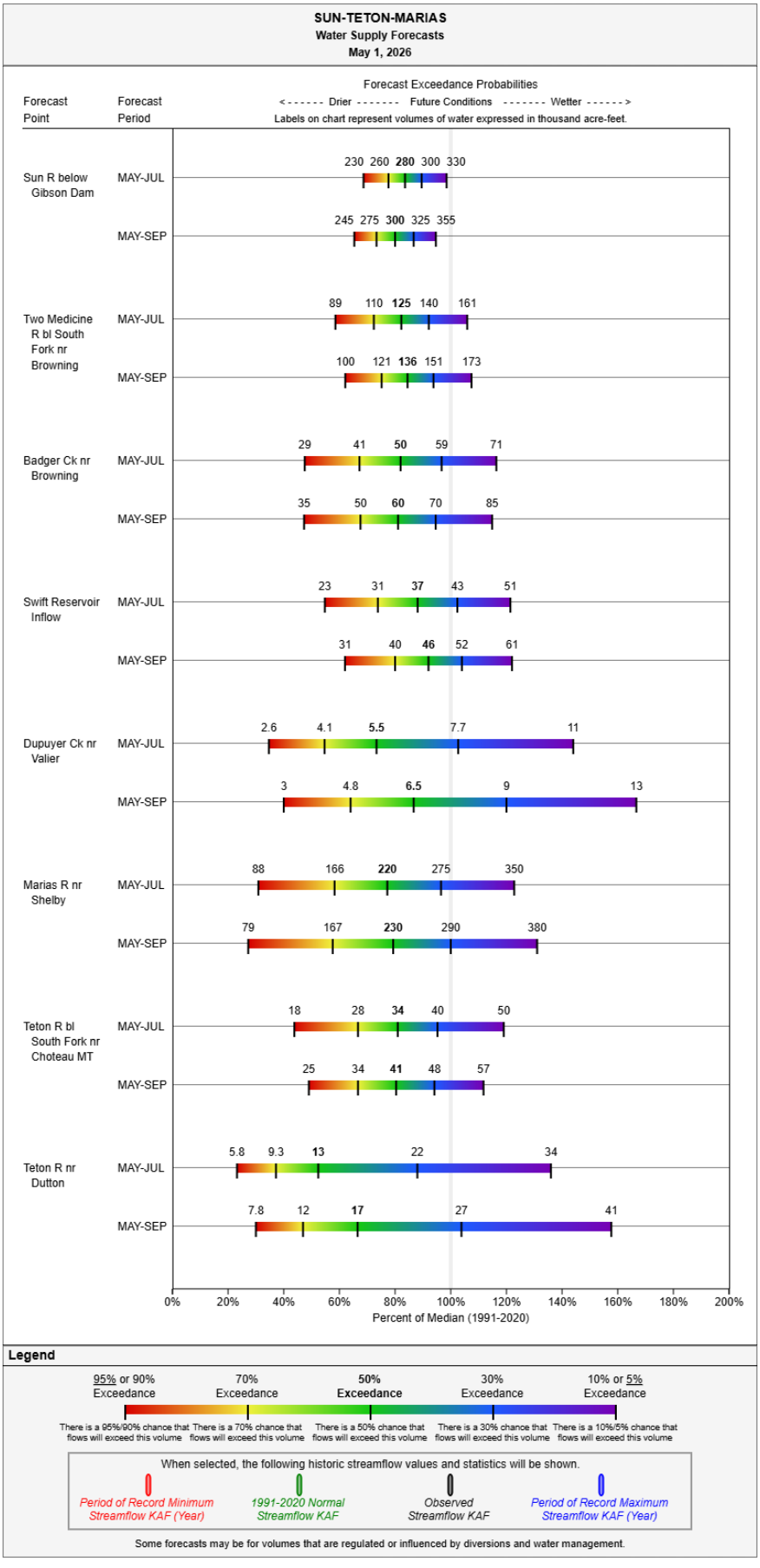
Precipitation in April was below normal at 93%, which brings the seasonal accumulation (October-April) to 132% of median. The snowpack in the Sun-Teton-Marias is well below normal at 54% of median, compared to 61% at this time last year.



# Basin Overview

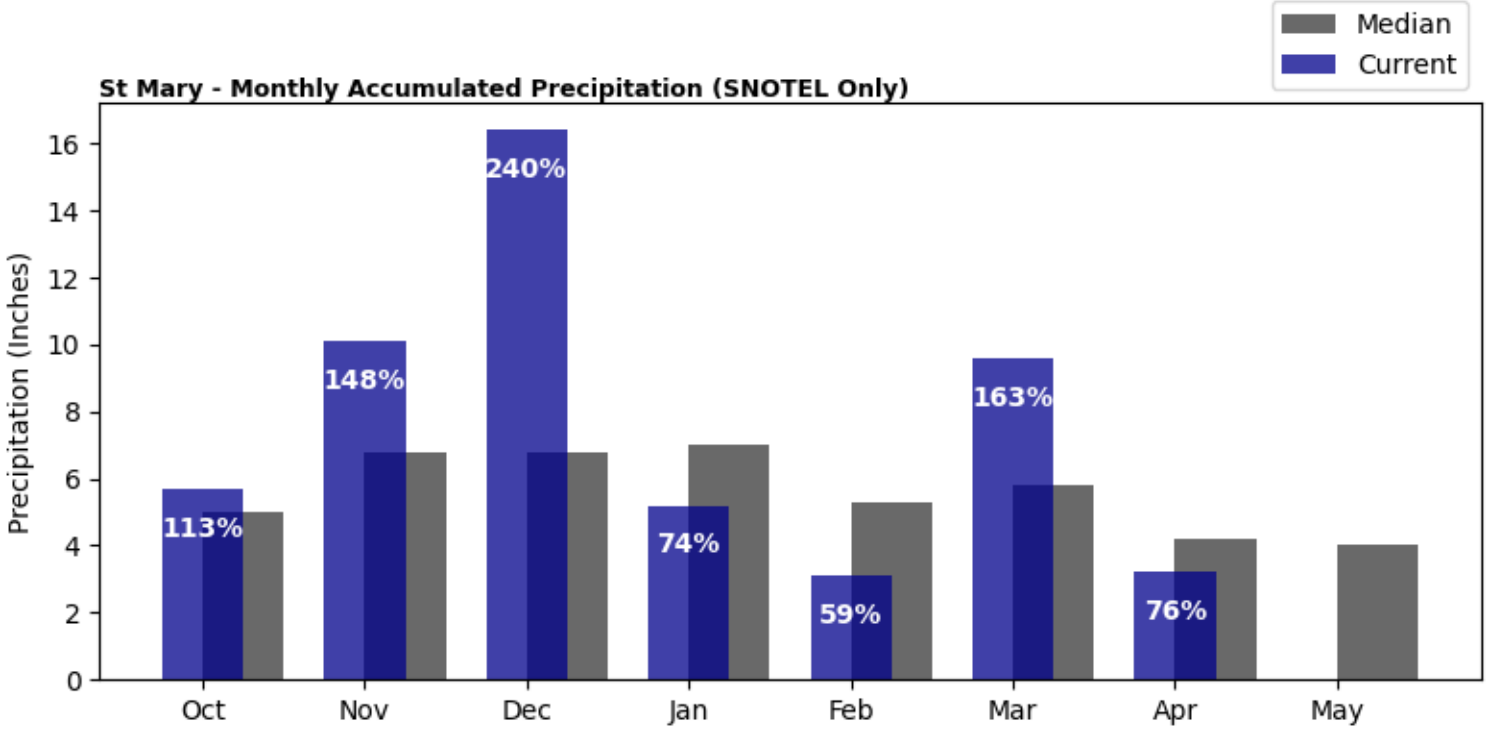
## Sun-Teton-Marias (Continued)

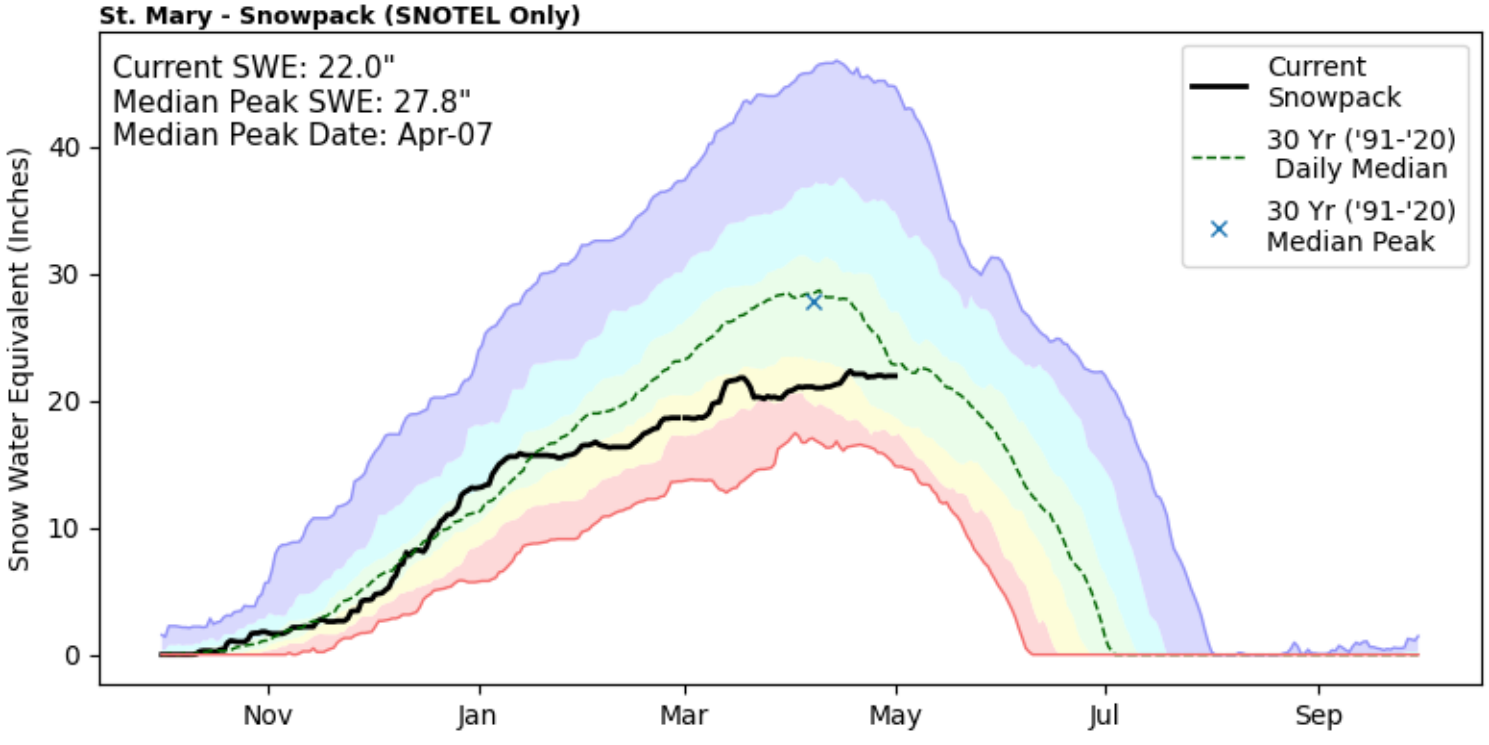


# Basin Overview

## St. Mary

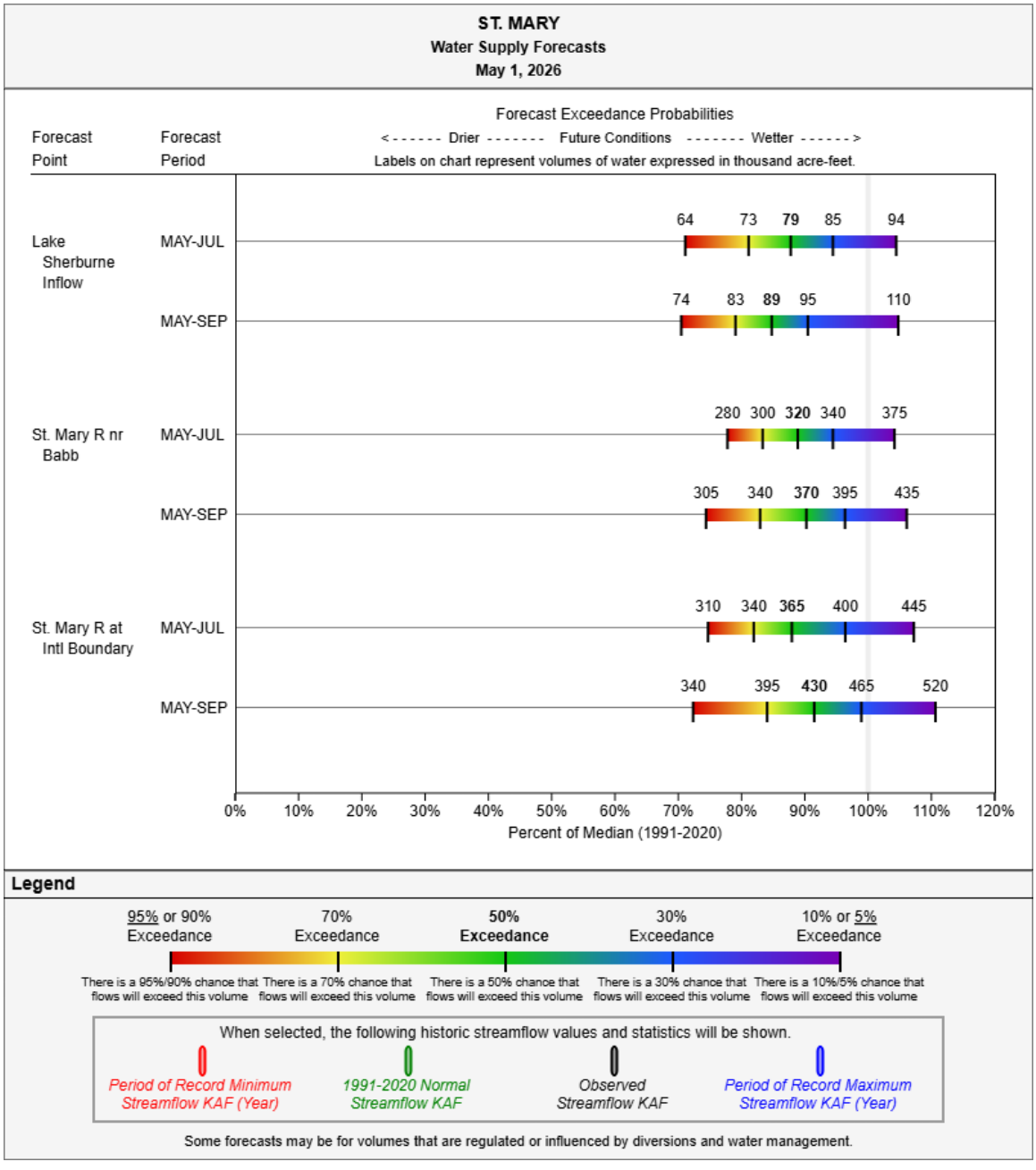
Precipitation in April was well below normal at 76%, which brings the seasonal accumulation (October-April) to 120% of median. The snowpack in the St. Mary is below normal at 84% of median, compared to 89% at this time last year.



# Basin Overview

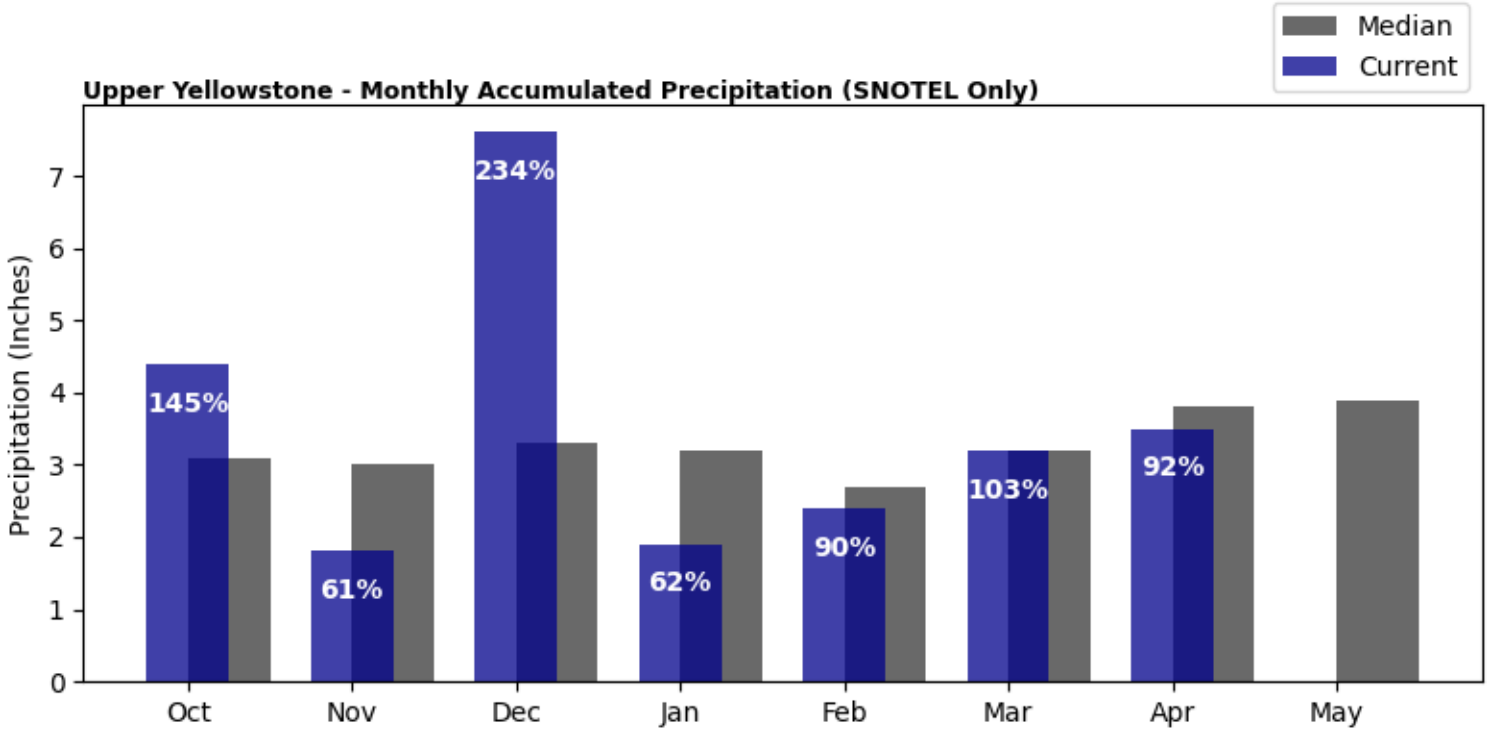
## St. Mary (Continued)

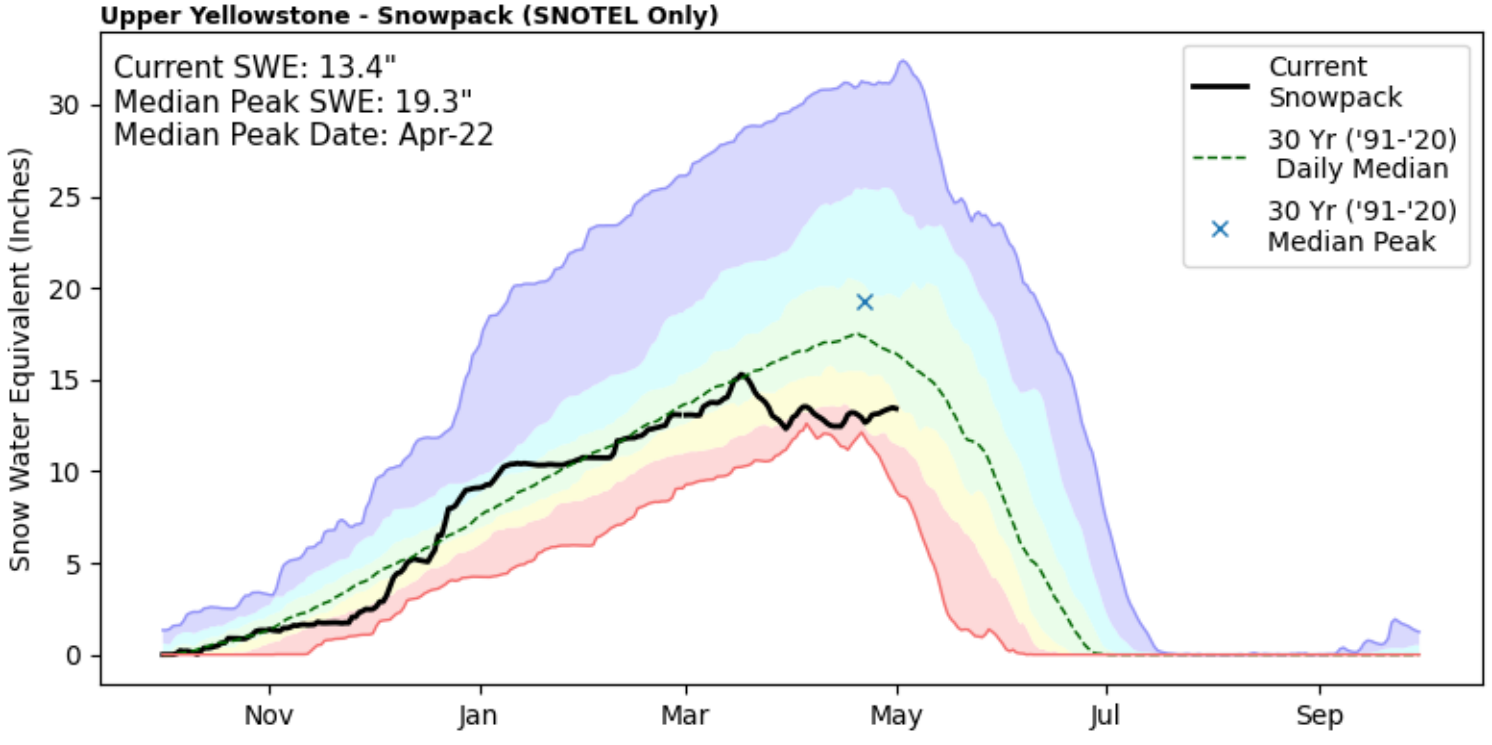


# Basin Overview

## Upper Yellowstone

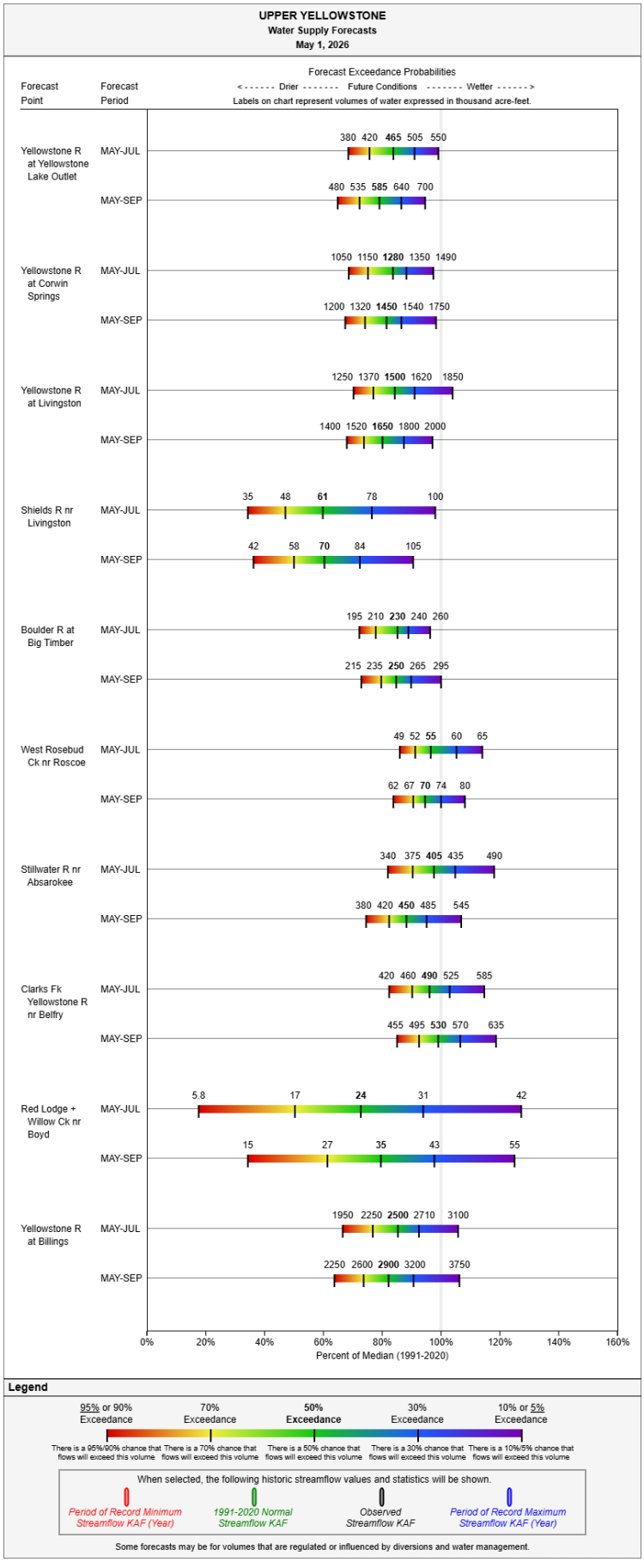
Precipitation in April was below normal at 92%, which brings the seasonal accumulation (October-April) to 110% of median. The snowpack in the Upper Yellowstone is well below normal at 74% of median, compared to 101% at this time last year.



# Basin Overview

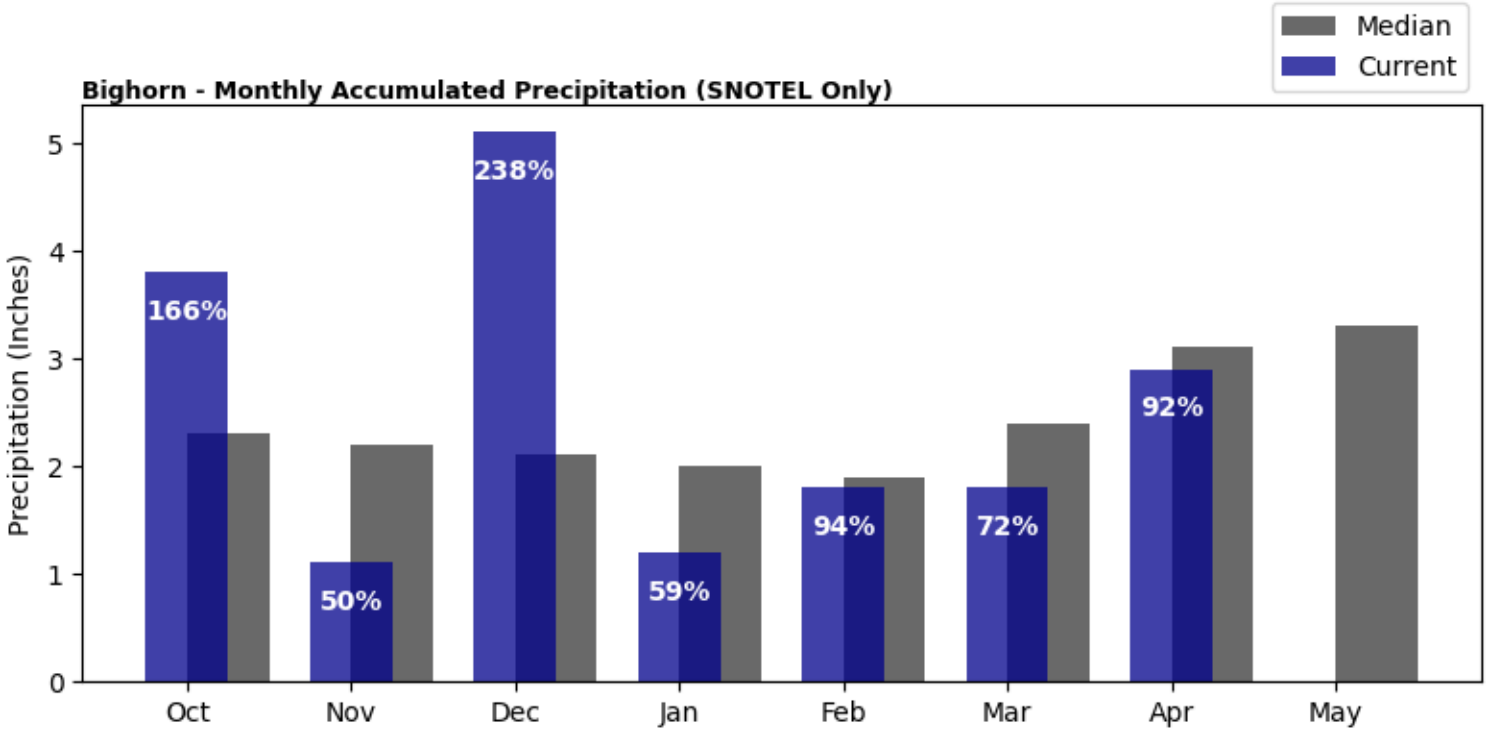
## Upper Yellowstone (Continued)

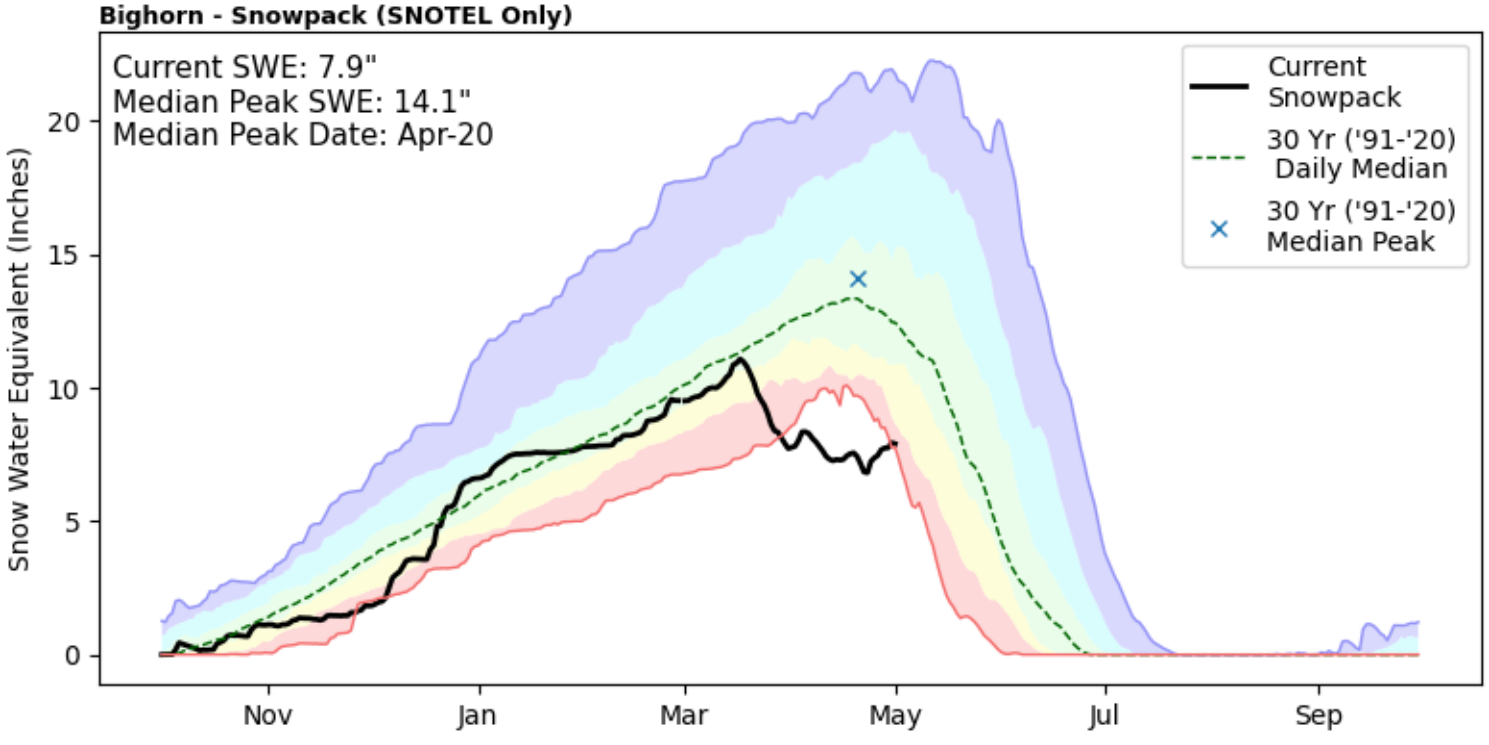


# Basin Overview

## Bighorn

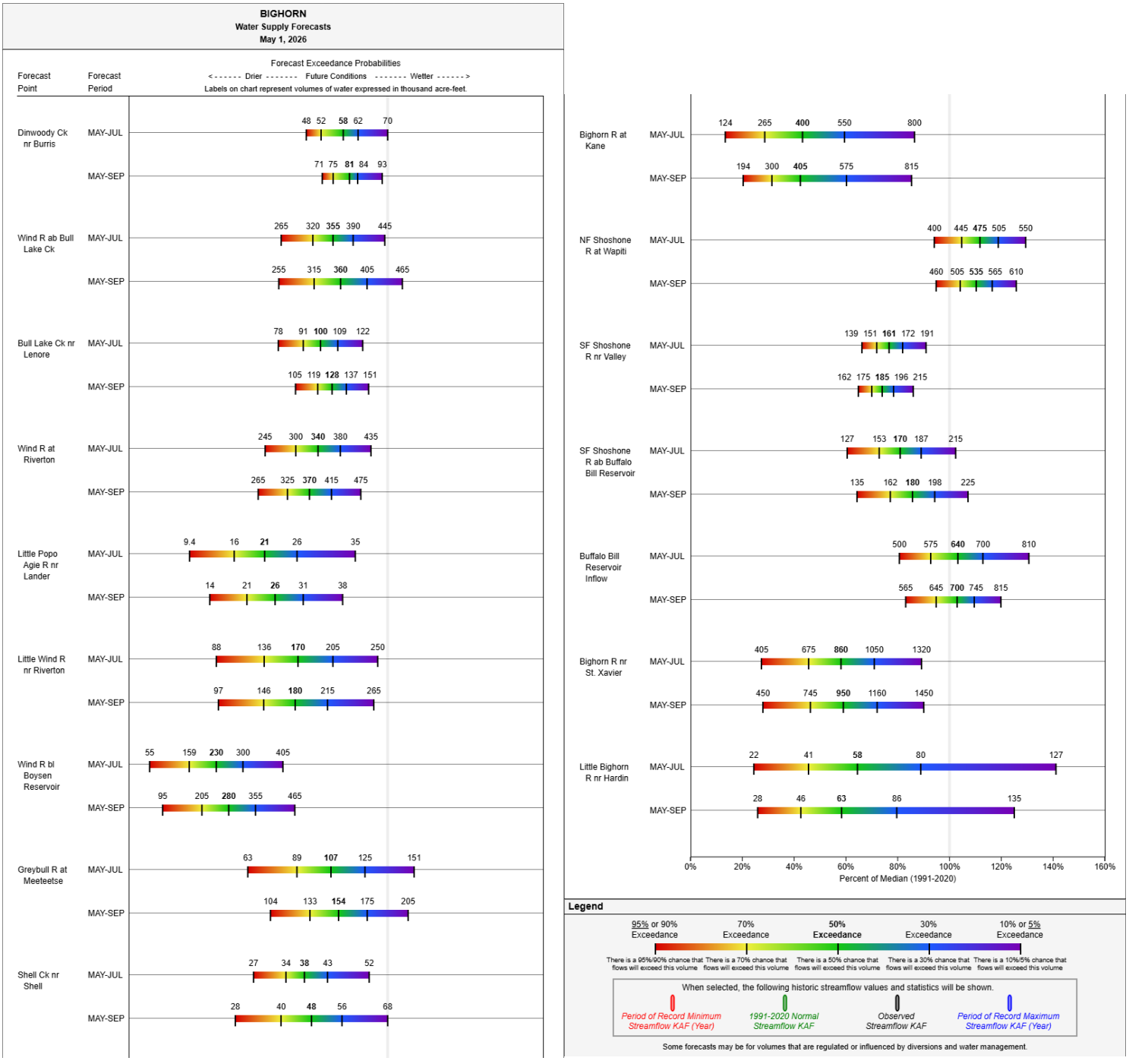
Precipitation in April was below normal at 92%, which brings the seasonal accumulation (October-April) to 107% of median. The snowpack in the Bighorn is well below normal at 54% of median, compared to 95% at this time last year.



# Basin Overview

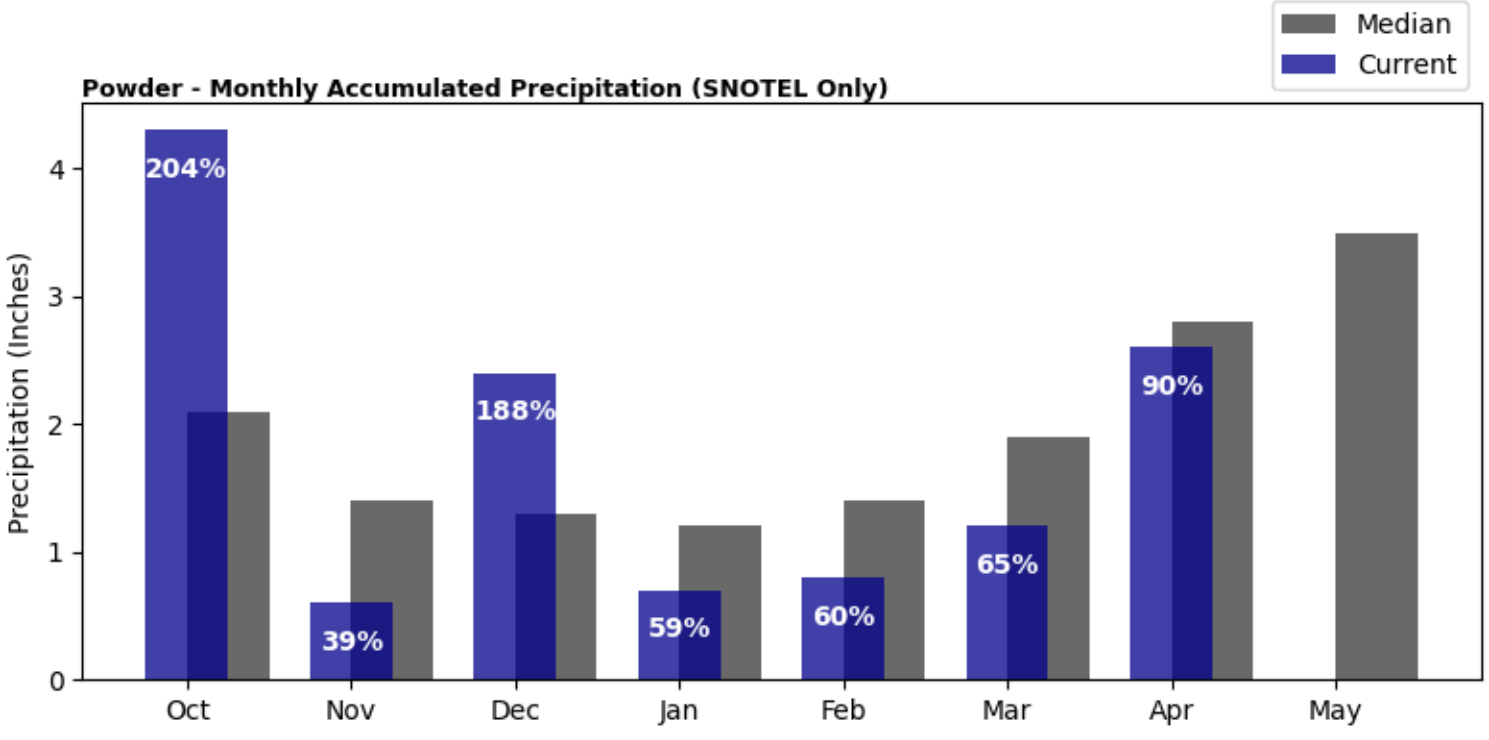
## Bighorn (Continued)

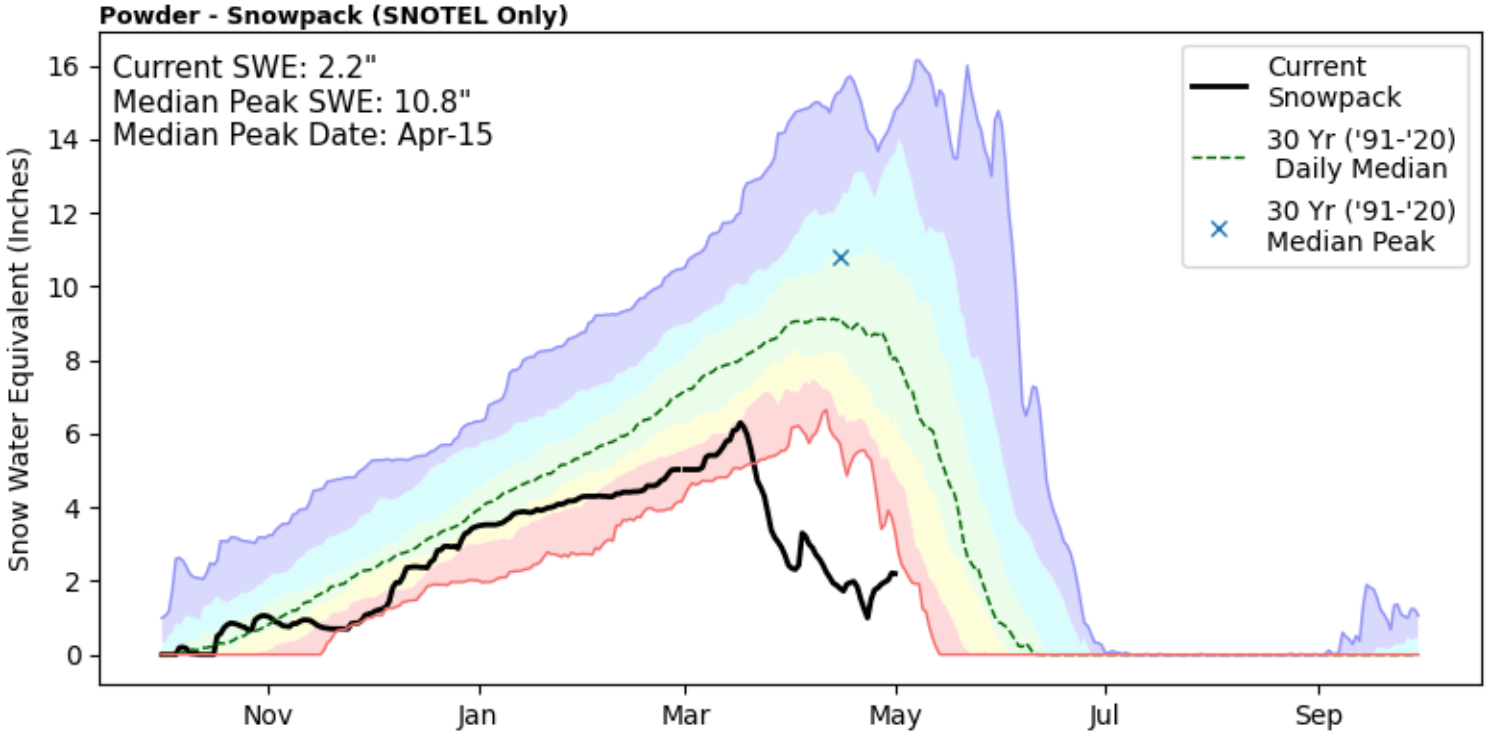


# Basin Overview

## Powder

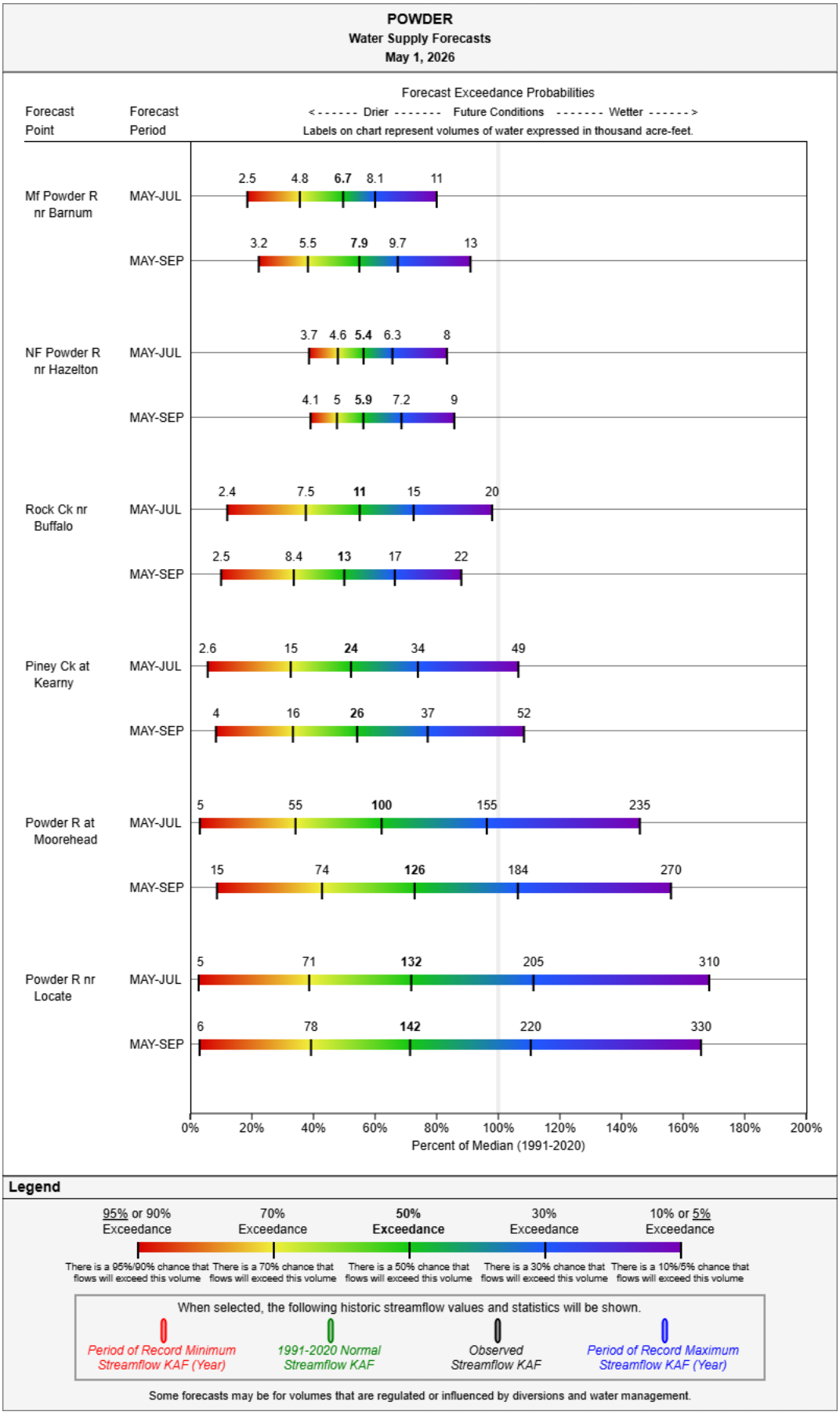
Precipitation in April was below normal at 90%, which brings the seasonal accumulation (October-April) to 98% of median. The snowpack in the Powder is well below normal at 26% of median, compared to 75% at this time last year.



# Basin Overview

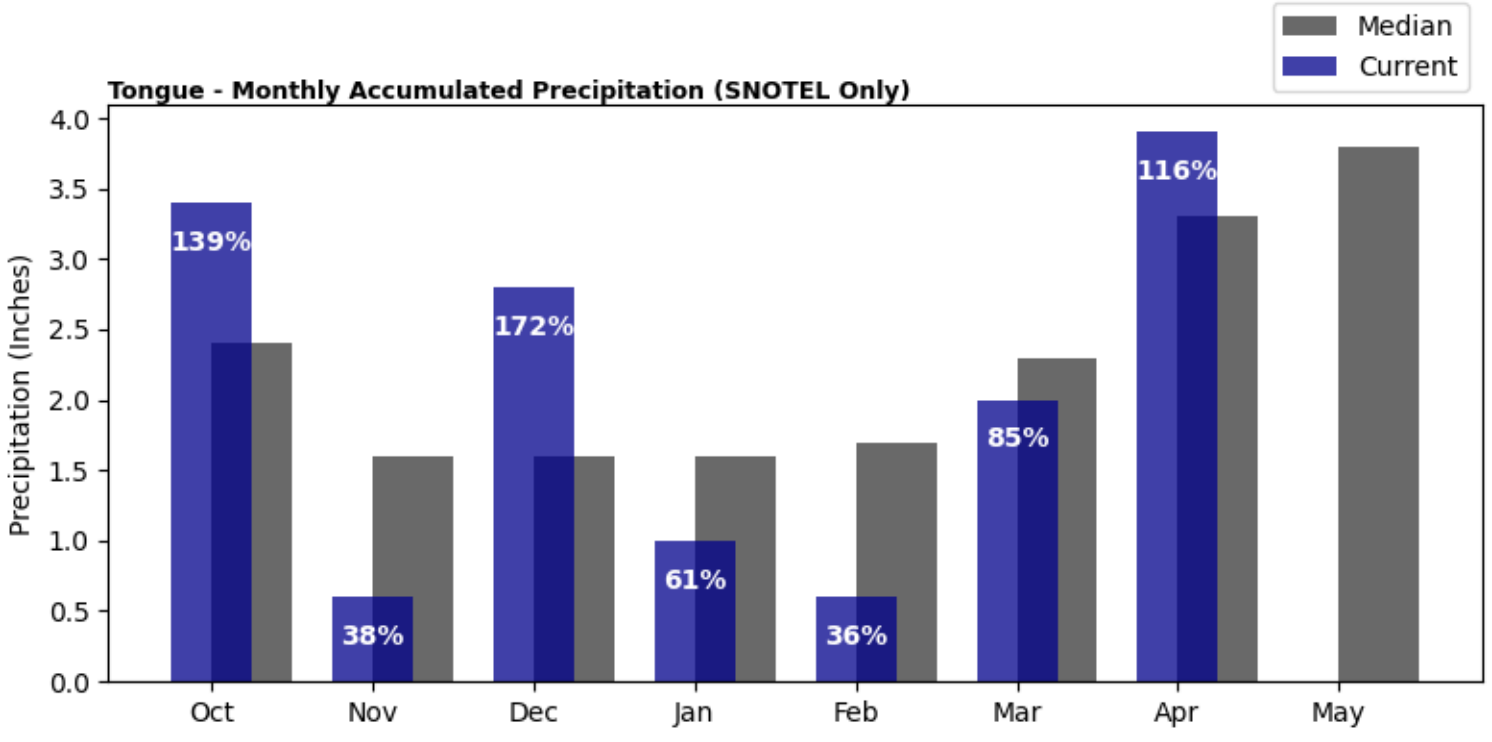
## Powder (Continued)

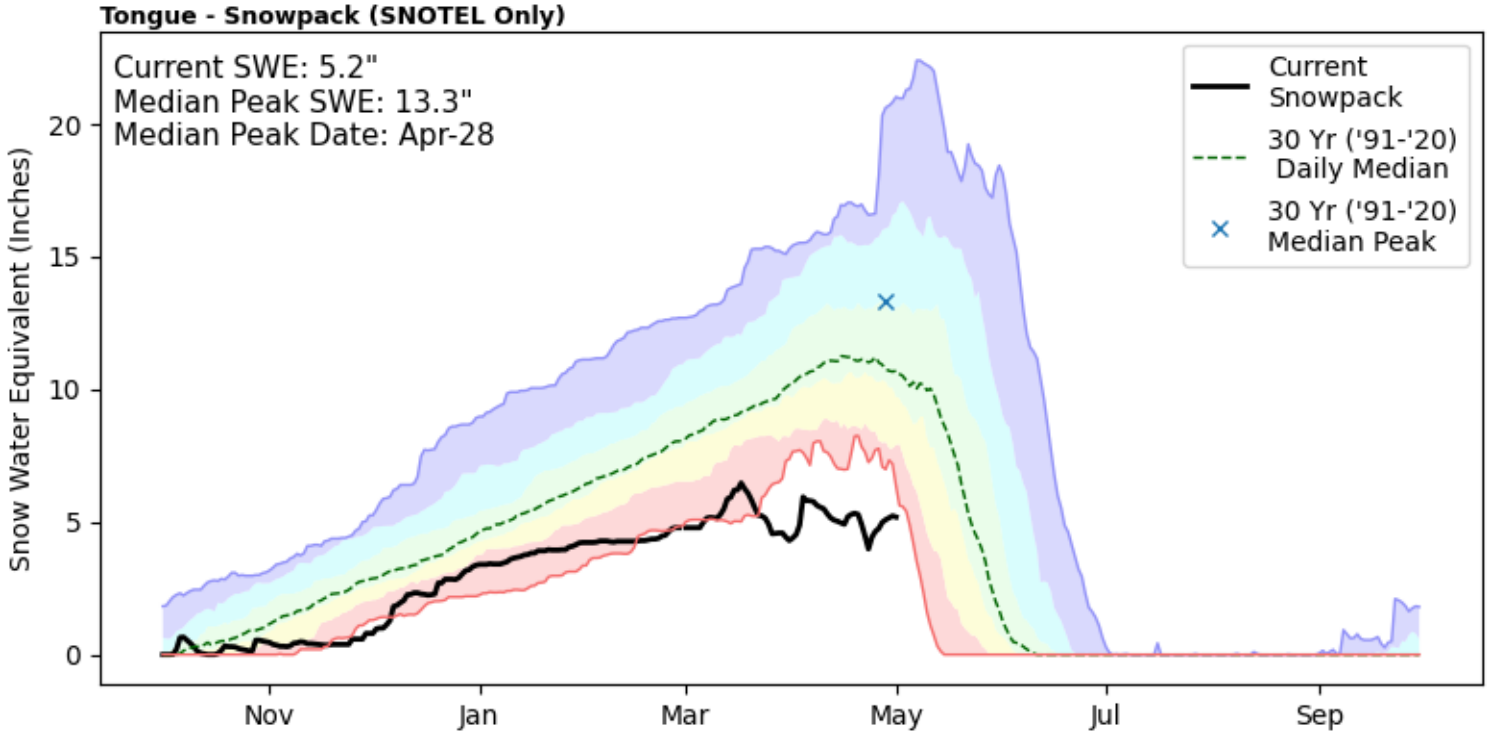


# Basin Overview

## Tongue

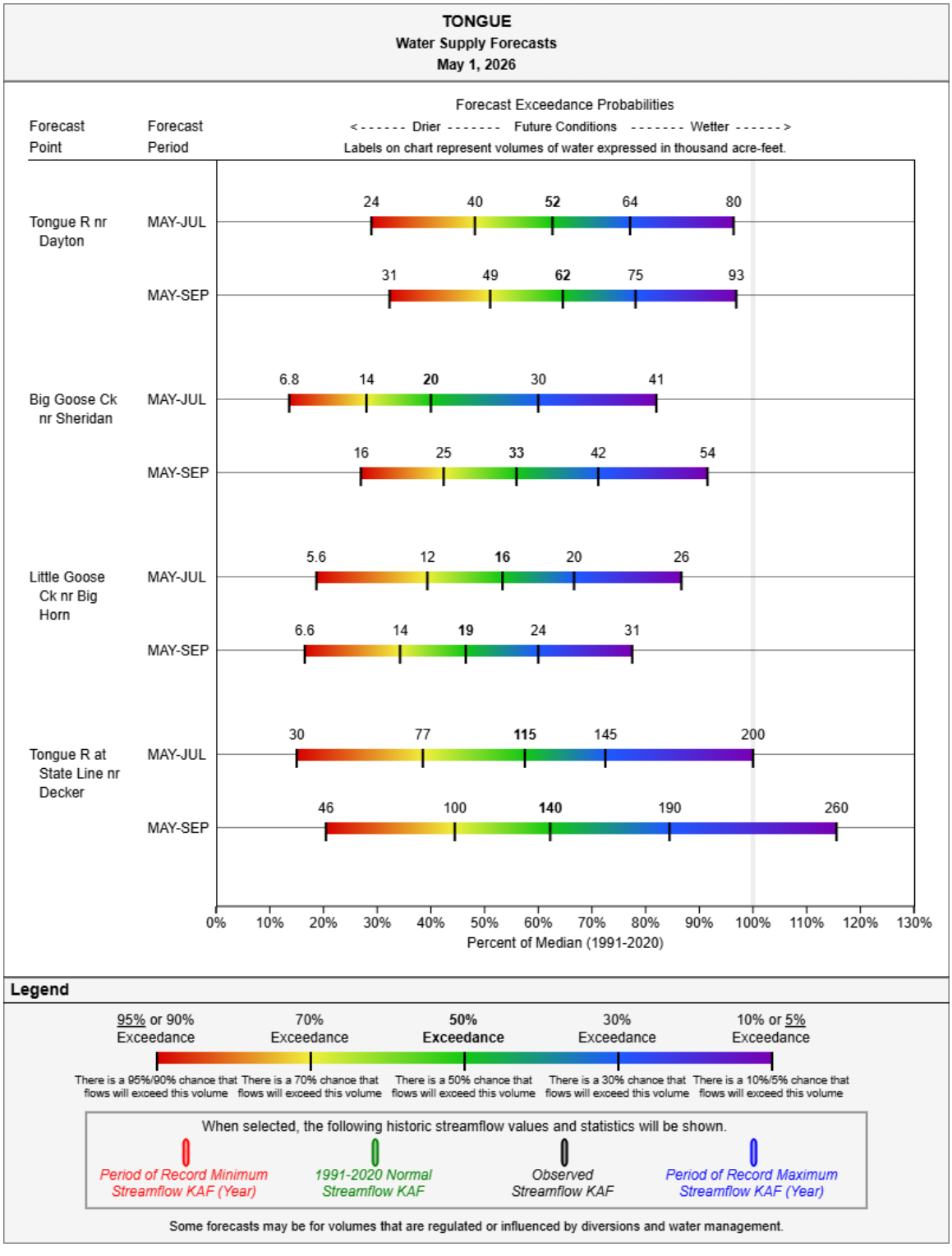
Precipitation in April was above normal at 116%, which brings the seasonal accumulation (October-April) to 92% of median. The snowpack in the Tongue is well below normal at 54% of median, compared to 111% at this time last year.



# Basin Overview

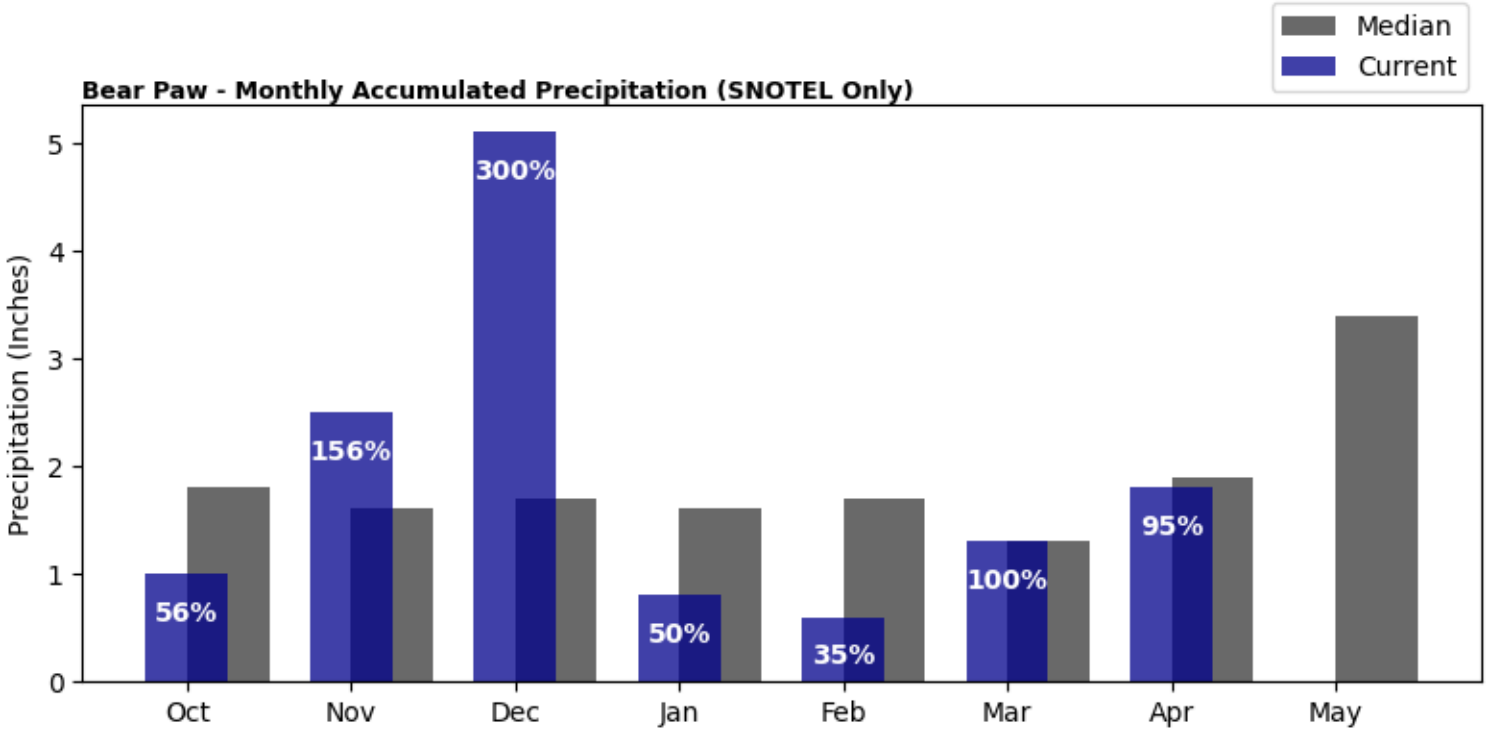
## Tongue (Continued)

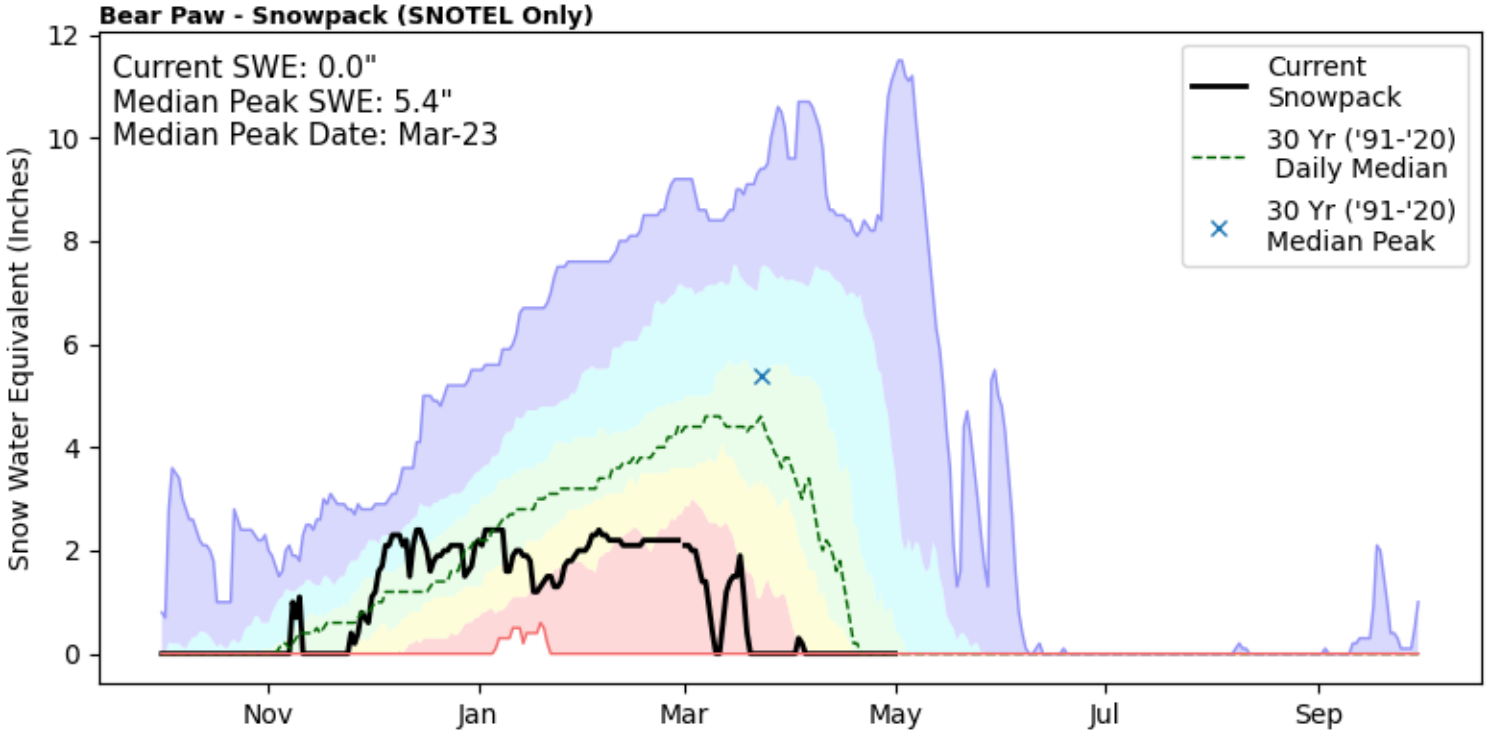


# Basin Overview

## Bear Paw

Precipitation in April was near normal at 95%, which brings the seasonal accumulation (October-April) to 105% of median. The snowpack in the Bear Paw is None at None% of median, compared to None% at this time last year.



# Appendix

## Water Supply Forecast Information

Most of the annual streamflow in the Western United States originates as snowfall that has accumulated high in the mountains during winter and early spring. As the snowpack accumulates, hydrologists estimate the runoff that will occur when it melts. Predictions are based on careful measurements of snow water equivalent at selected index points. Precipitation, temperature, soil moisture and antecedent streamflow data are combined with snowpack data to prepare runoff forecasts.

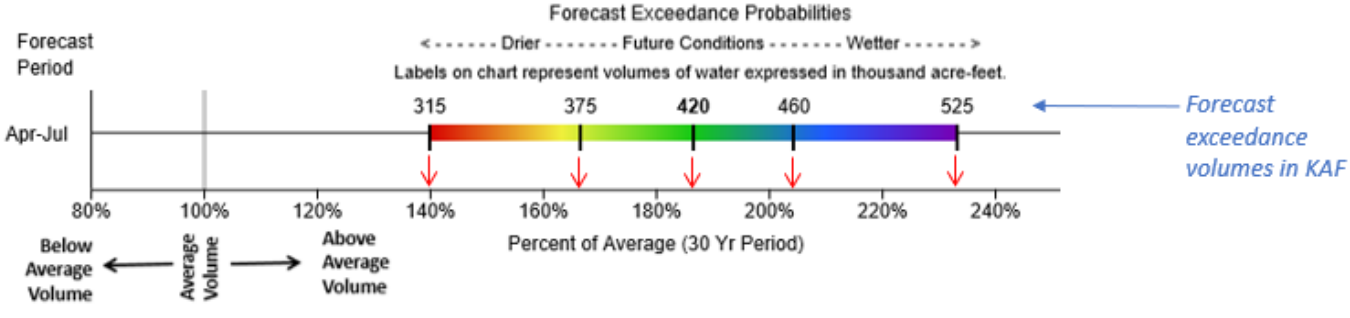
Forecast uncertainty originates from two sources: (1) uncertainty of future hydrologic and climatic conditions, and (2) error in the forecasting procedure. To express the uncertainty in the most probable forecast, four additional forecasts are provided. The actual streamflow can be expected to exceed the most probable forecast 50% of the time. Similarly, the actual streamflow volume can be expected to exceed the 90% forecast volume 90% of the time. The same is true for the 70%, 30%, and 10% forecasts. Generally, the 90% and 70% forecasts reflect drier than normal hydrologic and climatic conditions in the coming months; the 30% and 10% forecasts reflect wetter than normal conditions. As the forecast season progresses, a greater portion of the future hydrologic and climatic uncertainty will become known, and the additional forecasts will move closer to the most probable forecasts.

### Interpreting Water Supply Forecast Charts

Typically, the Natural Resources Conservation Service (NRCS) has presented streamflow forecasts as a table format showing the five exceedance probabilities compared to the 30-year average as follows:

| | Forecast Exceedance Probabilities for Risk Assessment<br>Chance that actual volume will exceed forecast | | | | | | |
|---|---|---|---|---|---|---|---|
| Forecast Period | 90% (KAF) | 70% (KAF) | 50% (KAF) | % Avg | 30% (KAF) | 10% (KAF) | 30yr Avg (KAF) |
| APR-JUL | 315 | 375 | 420 | 187% | 460 | 525 | 225 |

The Forecast Chart provides a visual alternative to the table. The forecast range is represented by a colored bar. Vertical lines on the bar signify the five forecast exceedances. Below is an example. The numbers above the forecast bar are the five exceedance probability volumes in thousand acre-feet (KAF). Each exceedance forecasts percent of median can be estimated by looking at the horizontal axis. The gray line centered above 100% on the horizontal axis represents the 1991-2020 historical median streamflow for the forecast period.



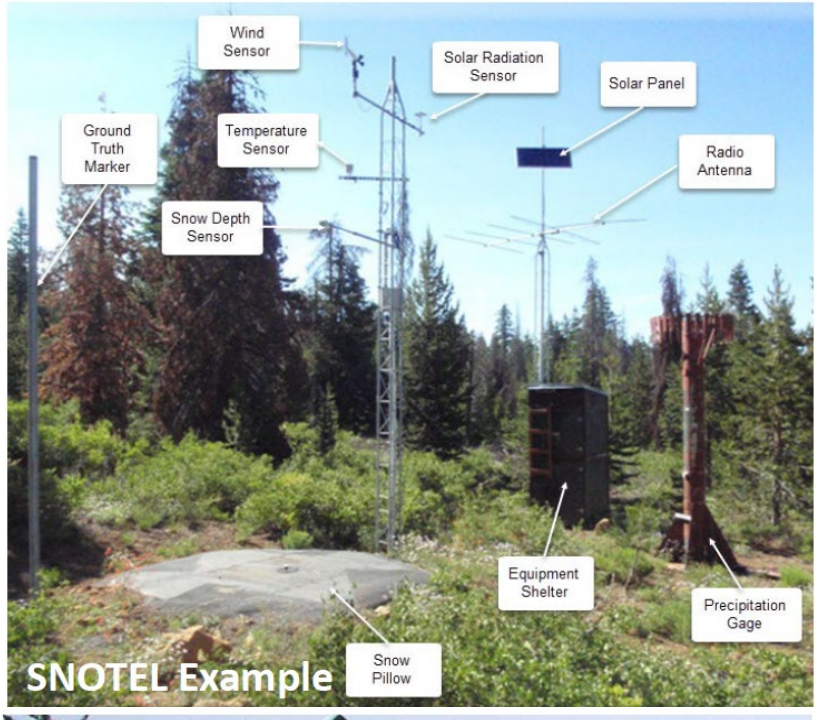

In the example, the entire forecast bar is shifted right of the gray line indicating a forecast for above normal streamflow. The 50% exceedance is represented by the black line in the green portion of the colored bar. This represents a forecast volume of 420KAF which is ~185% of average. If drier than normal future conditions occur the 70% exceedance forecast may be more likely (375KAF or ~165% of average). If future conditions turn wetter than normal, the 30% exceedance forecast may be more likely (460KAF or ~205% of average). Water users are encouraged to consider the range of forecast exceedances instead of relying solely only on the 50% forecast.

# Appendix

## Monitoring Station Overview

### SNOTEL

The NRCS operates an extensive, automated data collection network called SNOTEL (short for Snow Telemetry). SNOTEL sites are designed to operate unattended in remote mountain locations. Data are collected and transmitted hourly and available on the internet. Daily data (midnight values) are quality checked by NRCS hydrologists on at least a weekly basis. SNOTEL sites provide snowpack water content data via a pressure-sensing snow pillow. Other data include snow depth, water year precipitation accumulation, air temperature with daily maximums, minimums, and averages. The earliest NRCS SNOTEL sites have data back to the mid-1970s.



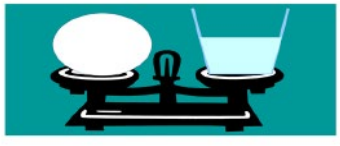

### Snow Course

Snow courses are measurement transects where snow tubes are used by snow surveyors during the winter season to determine the depth and water content of the snowpack. Hollow snow tubes are used to vertically core the snowpack. The tubes are then weighed to determine the water content of the snow. Generally, snow courses are situated in meadows or forest openings protected from the wind. A snow course measurement is the average of a number of sample points, typically 5 or 10. Snow courses are measured on a monthly basis typically between January 1 and June 1. Snow courses provide a longer record than SNOTEL. The earliest snow courses in the Montana have data back to the 1920s.


### Snow Water Equivalent (SWE)

Sometimes also called snow water content, this is the amount of water contained within the snowpack. It can be thought of as the depth of water (in inches) that would result if you melted the snowpack. For example, if a snowpack containing 12 inches of SWE melted instantaneously, there would be a puddle of water 12 inches deep on the ground.

SWE measurements made by snow pillows or snow tubes rely on the fact that water weighs the same whether it is liquid or frozen.



Weight of frozen water = Weight of liquid water

Snow core inside snow tubes

# Appendix

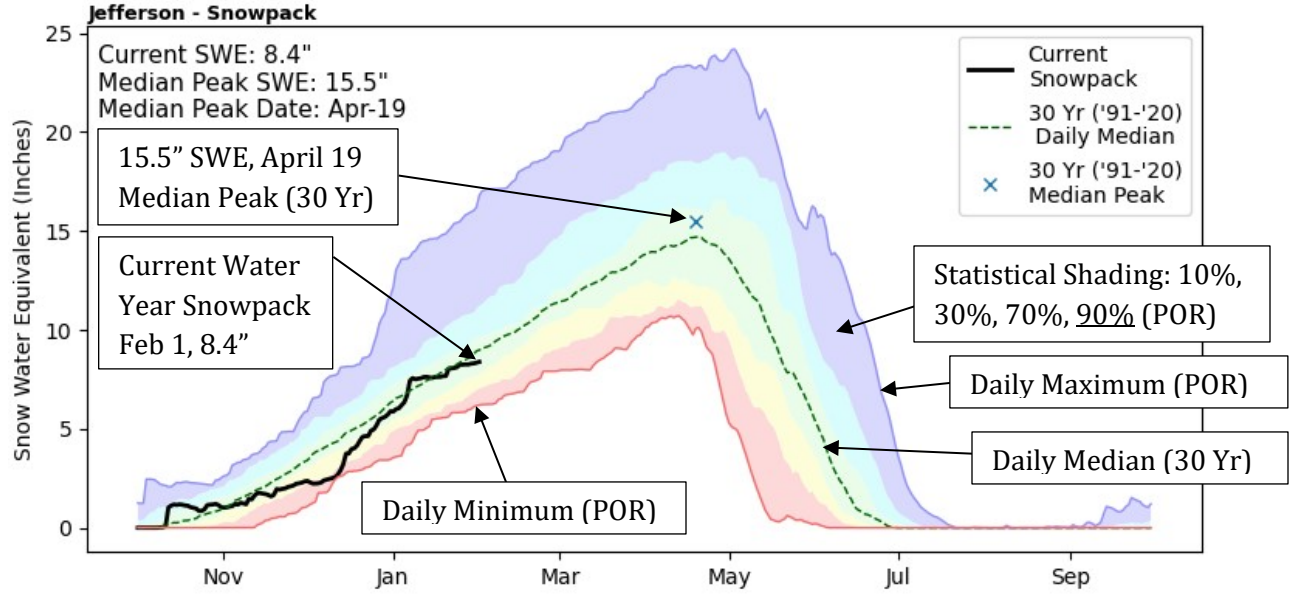
## Additional Information

### Climatic and Hydrologic Normals

The Snow Survey and Water Supply Forecasting (SSWSF) normals are site-specific measures of central tendency (either the median or average) for a data type, such as snow water equivalent (SWE). The statistics are calculated over a 30-year period and updated each decade, in agreement with World Meteorological Organization (WMO) standards. This 30-year reference period was chosen to characterize the current hydroclimatology at each station. The most recent medians and averages have been updated to include data for the water years 1991-2020. The National Water and Climate Center (NWCC) also provides medians and averages for the 1981-2010 and 1971-2000 reference periods for stations with sufficient data. The normals available from the NWCC include the median and average for SWE, snow depth (snow courses only), precipitation, volumetric streamflow, and reservoir storage. Values are calculated from data collected by NRCS-managed stations and external agencies such as the U.S. Geological Survey (USGS), National Weather Service (NWS), state agencies, and private organizations. Normal is calculated for various durations including daily, month-to-date, semi-monthly, monthly, seasonal, and annual based on the data type. More information is available here: https://www.nrcs.usda.gov/resources/data-and-reports/climatic-and-hydrologic-normals

### Interpreting Snowpack Charts

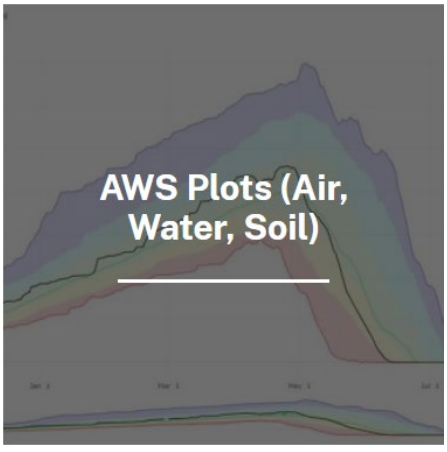
Snowpack charts displayed in this report are created using daily (midnight) snow water equivalent (SWE) values at SNOTEL sites determined to represent the basin. Snow Course data is not included. Plotted lines are the average of each SNOTEL's individual values. For example, the "Current Snowpack" on January 1st is the average all SNOTEL SWE values in that basin for that day. The "30 Yr. ('91-'20) Daily Median" is the average of each SNOTEL's median SWE value for a given day. The upper and lower extent (blue/red lines) show the maximum/minimum daily SWE values, which is determined using the "Current Snowpack" SWE value for all days in the period of record (POR). Snowpack peak SWE dates differ from season to season, as a result the high point on the "30 Yr. ('91-'20) Daily Median" line is not the true median peak SWE. The point "X" is plotted by calculating the median peak date and median peak value independently. Similar charts with other basin definitions are available here: https://nwcc-apps.sc.egov.usda.gov/basin-plots/#mt

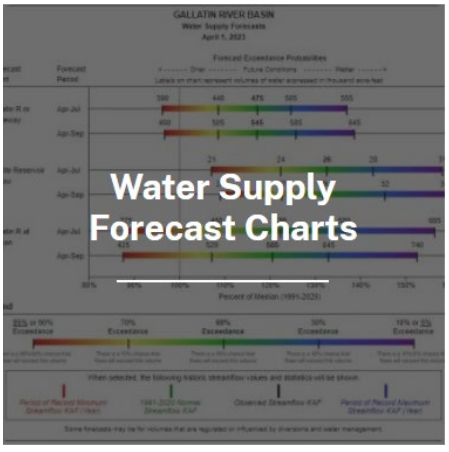


# Appendix

## Links and Resources

**Products and Reports** (click image)





**Interactive Map Predefined Links**

Snow

- Snow Water Equivalent > Daily > Percent of 1991-2020 Median > **Stations** | **Basins**
- Snow Water Equivalent > End of Previous Month (SNOTEL and Snow Course) > Percent of 1991-2020 Median > **Stations** | **Basins**
- Snow Depth > Daily > **Stations**
- Snow Density > End of Previous Month (SNOTEL and Snow Course) > **Stations**

Precipitation

- Month-to-Date > Daily > **Stations**
- Water Year-to-Date > Daily > Percent of 1991-2020 Median > **Stations** | **Basins**
- Previous Month > Percent of 1991-2020 Median > **Stations** | **Basins**
- Previous 3 Months > Percent of 1991-2020 Average > **Stations** | **Basins**

Streamflow

- Observed (Adjusted Volume) > Previous Month > Percent of 1991-2020 Median > **Stations** | **Basins**
- Forecast (Adjusted Volume) > Most Recent (Available March 1 through June 1) > Percent of 1991-2020 Median > **Stations** | **Basins**

Reservoir Storage

- End of Previous Month > Percent of 1991-2020 Median > **Stations**

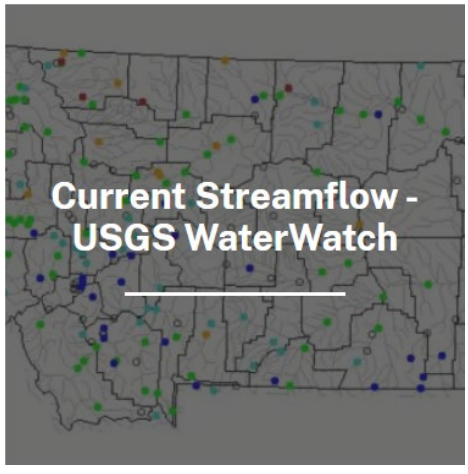
Other

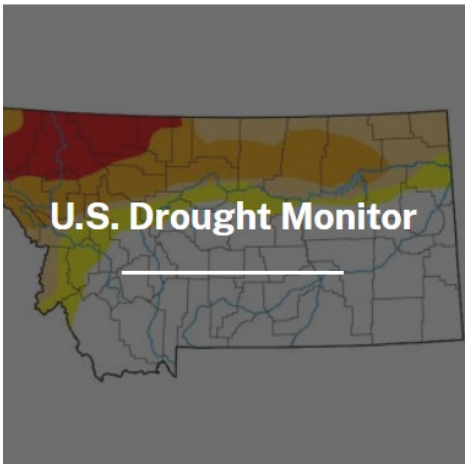
- Snow Water Equivalent > Daily > Compared to POR > **Stations**
- Snow Water Equivalent > End of Previous Month (SNOTEL and Snow Course) > Percentile > **Stations**
- Water Year-to-Date Precipitation > Daily > Compared to POR > **Stations**

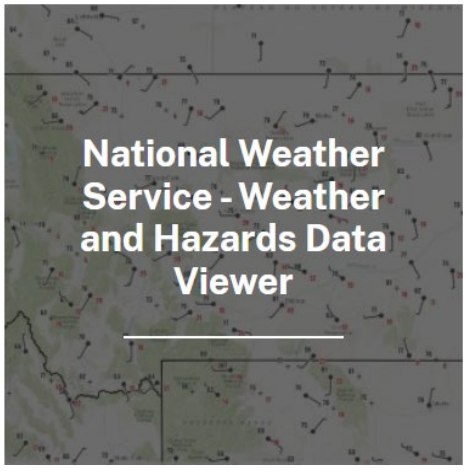
# Appendix

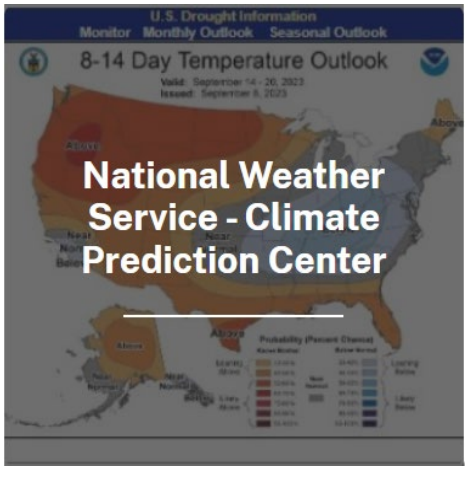
## Links and Resources (Continued)

**External Agencies** (click image)






**Additional Drought Information**

- U.S. Drought Monitor
- National Integrated Drought System (Drought.gov)
- USDA Drought Portal (News and Resources)
- Farm Services Agency Montana (Information on Programs and Deadlines)
- Farm Services Agency Disaster Assistance Programs
- Montana Department of Natural Resources and Conservation Drought Management

**Snow Survey Program FAQ**

Frequently Asked Snow Survey Questions - Montana | Natural Resources Conservation Service (usda.gov)

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