USDA United States Department of Agriculture

Natural Resources Conservation Service

Montana Water Supply Outlook Report

June 1, 2025

Kayakers sample this year's snowmelt, previously measured in its solid state at an upstream snow course. The nearby Onion Park SNOTEL peaked at 109% of normal snow water equivalent (SWE) and melted out only 2 days early, faring better than much of Montana and Wyoming. Despite several cold attempts to delay melting, warm temperatures in May accelerated snowmelt. Like Onion Park, most SNOTEL stations experienced near normal peak SWE. However, the warm spells that bookended May resulted in many sites melting out 1-2 weeks early. Faster melt rates may be fun for kayakers, but it means less water stored as snow come summer. (Photo: Eric Larson - June 1, 2025)

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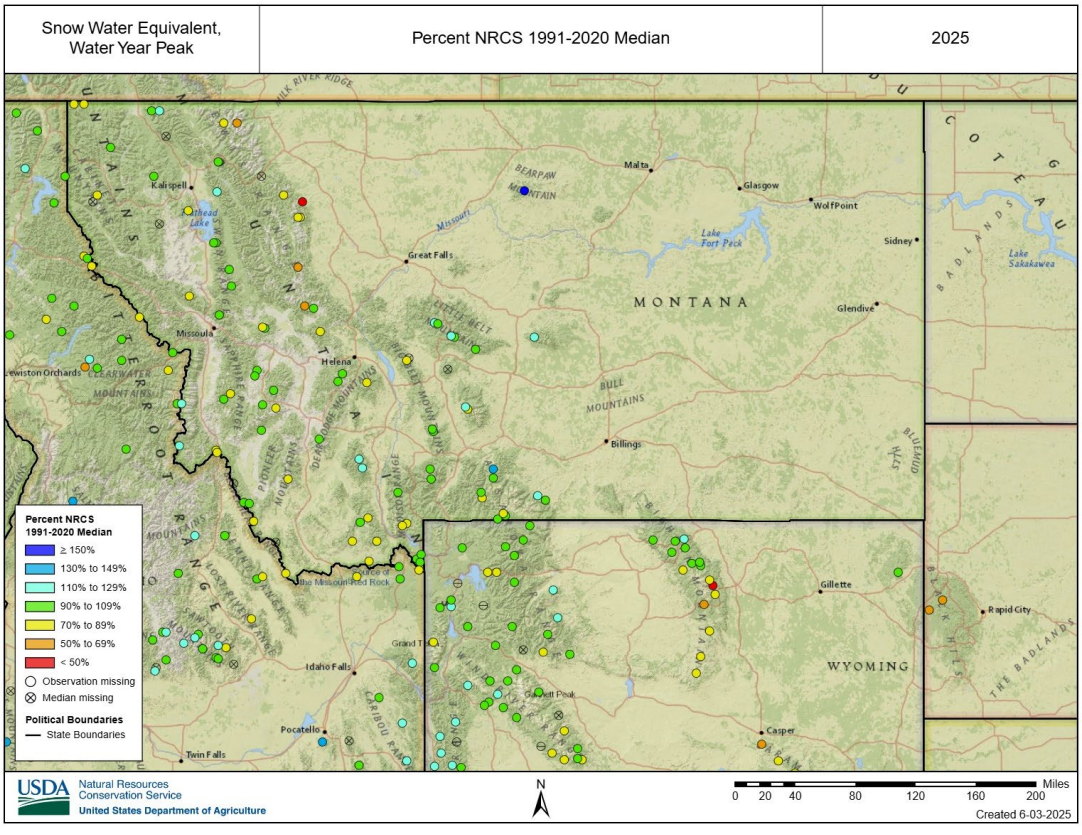
Statewide Overview

Summary

With summer in Montana just around the corner, warmer than normal May temperatures ushered in the seasonal transition and spurred rapid snowmelt. May precipitation varied drastically across the state. Northwest Montana and the Gallatin, Upper Yellowstone, and Bighorn basins had below normal May precipitation. Southwest, central Montana, and the Powder and Tongue basins experienced near to above normal May precipitation. This brings the water year precipitation to near normal across most of the state, and below normal in northwest Montana. The warm temperatures swiftly shepherded in spring runoff. Snowpack across Montana is 25%-70% of median, well below normal for June 1. This is a drastic drop from May 1 where snowpack was largely 75%-110% of median. One exception is the Bighorn Mountains, where June 1 snowpack in associated basins is 75%-120% of median.

With an early snowmelt season, most low to mid elevation SNOTEL sites have completely melted out, many one to three weeks earlier than normal. Another important metric is when snow water equivalent (SWE) peaked and whether normal peak accumulation was reached. Many sites reached peak SWE similarly early. As shown in the map below, SNOTEL sites reached 70%-120% of normal peak SWE, many within ±3” of normal peak snowpack accumulation. Some regions, such as the Rocky Mountain Front had larger deficits of 3”-9” of SWE, and SNOTEL sites only reached 50%-85% of median peak SWE. Central Montana sites, favored by several January and February storms, reached 100%-150% of normal peak SWE.

May 1 water supply forecasts were representative of peak SWE conditions. Most streamflow across the state was forecasted to be 70%-110% of normal. The rapid melt of snowpack throughout the month of May corresponds to less available water for the remainder of the summer. June 1 water supply forecasts decreased to around 50%-100% of normal statewide, with the Sun-Teton-Marias and Beaverhead basins forecasting for below 60% of normal streamflow.



Statewide Overview

Precipitation

May precipitation totals varied tremendously across the state, with southwest Montana and the Bighorn Mountains posting the largest totals, while northwest Montana recorded below average precipitation. The Jefferson, Upper Missouri, Tongue and Powder Basins received 110-125% of normal precipitation. Northwest Montana ranged from 55-75% of normal. SNOTEL sites in the Tobacco Root Mountains and around Helena faired much better than average where many sites recorded nearly 7" of water in May. With summer approaching, most precipitation fell in its liquid form. Only higher elevation sites, such as those in the Bighorn Mountains, recorded meaningful precipitation accumulation as snow.

May moisture arrived with a smaller precipitation event around May 5 and continued during a prolonged period of unsettled weather from May 13 to May 23. The May 5 event benefitted southwest and central Montana, where most SNOTEL sites recorded at least an inch of liquid water. The Albro Lake and Lower Twin Lake SNOTEL stations, in the Tobacco Root Mountains, recorded 3.7" and 3.0" of precipitation during this event respectively. Northwest Montana and the Yellowstone region received little to no precipitation from this storm.

The consistent precipitation throughout the middle of May benefitted the region more evenly. SNOTEL sites around southwest Montana, central Montana and the Bighorns picked up 2-4" of water, some of which accumulated as snow. Northwest Montana sites received 1-3" of water. Noisy Basin SNOTEL received nearly 6" water, however as one of the consistently wettest sites, the monthly total was only 107% of normal.

The Sun-Teton-Marias drainage received 59% of normal monthly precipitation and has now surpassed 2001 as the lowest season long precipitation totals on record. This is led by a 5-10" precipitation deficit at surrounding SNOTELs since October 1. In northwestern Montana, water year totals remain below average with the Kootenai, Lower Clark Fork, and Bitterroot basins recording 80% to 90% of normal precipitation. Water year precipitation totals in most other basins around Montana and northern Wyoming remain near to slightly below normal (90 to 100% of median) since October 1.

May - Highest Total Accumulated Precipitation - SNOTEL/SNOLITE

Station	Precipitation (Inches)	Median (Inches)	Elevation	Basin
Albro Lake	7.0	4.8	8500	Jefferson, Madison
Basin Creek	7.0	4.0	7120	Jefferson, Upper Clark Fork
Lower Twin	6.4	4.5	7920	Jefferson, Madison
Crystal Lake	6.3	4.8	6130	Smith-Judith-Musselshell
Noisy Basin	6.0	5.4	6070	Flathead

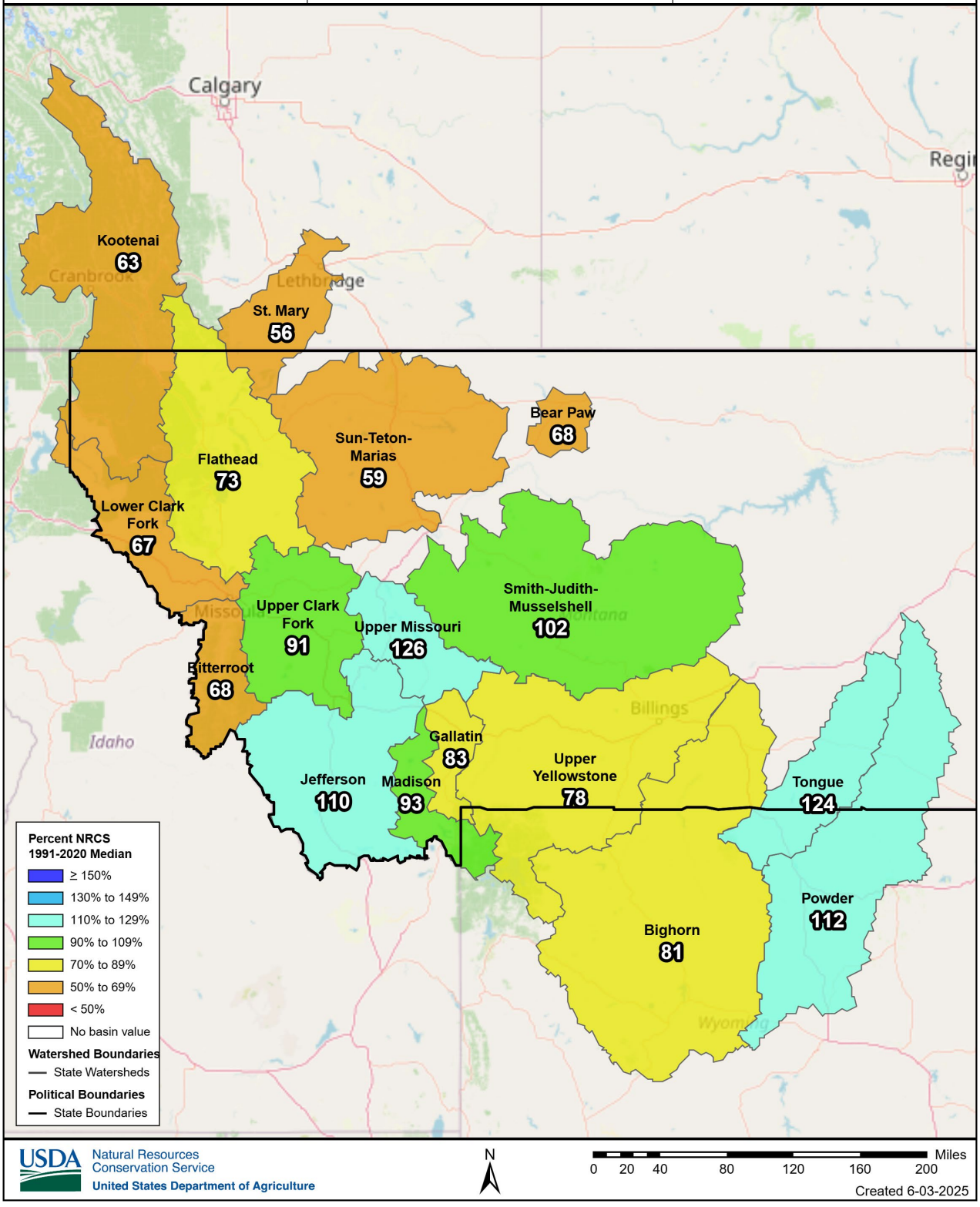
May - Lowest Total Accumulated Precipitation- SNOTEL/SNOLITE

Station	Precipitation (Inches)	Median (Inches)	Elevation	Basin
Stringer Creek	1.0	3.4	6550	Smith-Judith-Musselshell
Burroughs Creek	1.0	-	8760	Bighorn
Garver Creek	1.1	2.2	4250	Kootenai
Little Warm	1.1	2.8	9370	Bighorn
Cold Springs	1.1	2.8	9640	Bighorn

Statewide Overview

Precipitation (Continued)

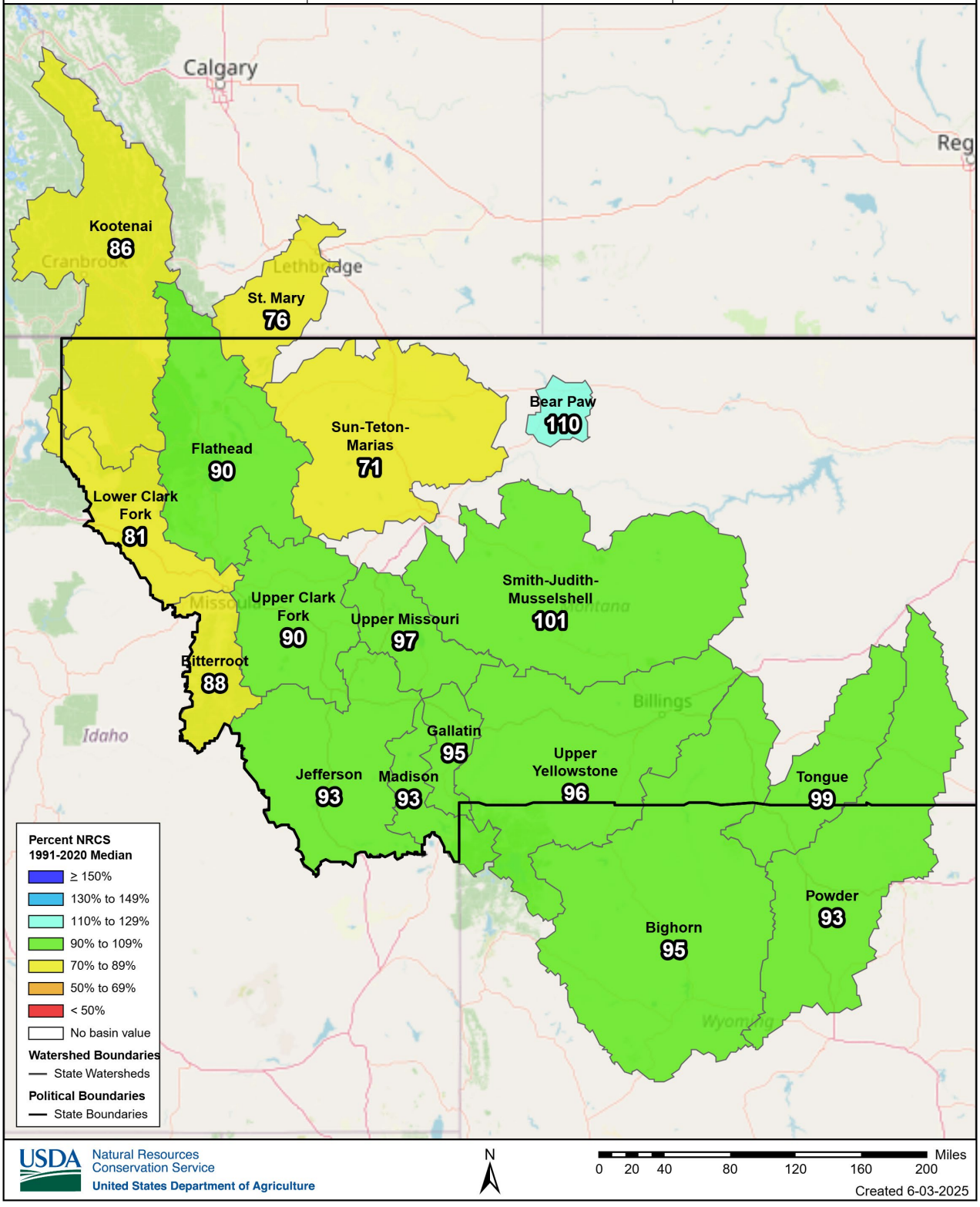
1 month Precipitation	Percent NRCS 1991-2020 Median	May 1, 2025 - May 31, 2025



Statewide Overview

Precipitation (Continued)

Water Year to Date Precipitation	Percent NRCS 1991-2020 Median	October 1, 2024 - May 31, 2025



Statewide Overview

Snowpack

Snowmelt season has arrived prematurely across Montana. Above normal May temperatures led to earlier than normal snowmelt statewide. Snowpack percentages decreased from approximately 75-110% of median statewide on May 1 to around 50-70% of median on June 1. Snowpack is similar to water years 2021 and 2013. The Rocky Mountain Front snowpack remains well below normal, with all SNOTEL sites in the Sun-Teton-Maris basin melted out. Snowpack in these basins is similar to water year 2015. The Bitterroot basin melted out especially rapidly, decreasing from around 75% of median on May 1 to around 25% of median on June 1. Spring storms continued to favor the northern Bighorn Mountains, with the Tongue River basin reporting an above normal June 1 snowpack of around 120% of median. The southern Bighorn Mountains and Powder River basins held steady near 75% of median snowpack from May 1 to June 1.

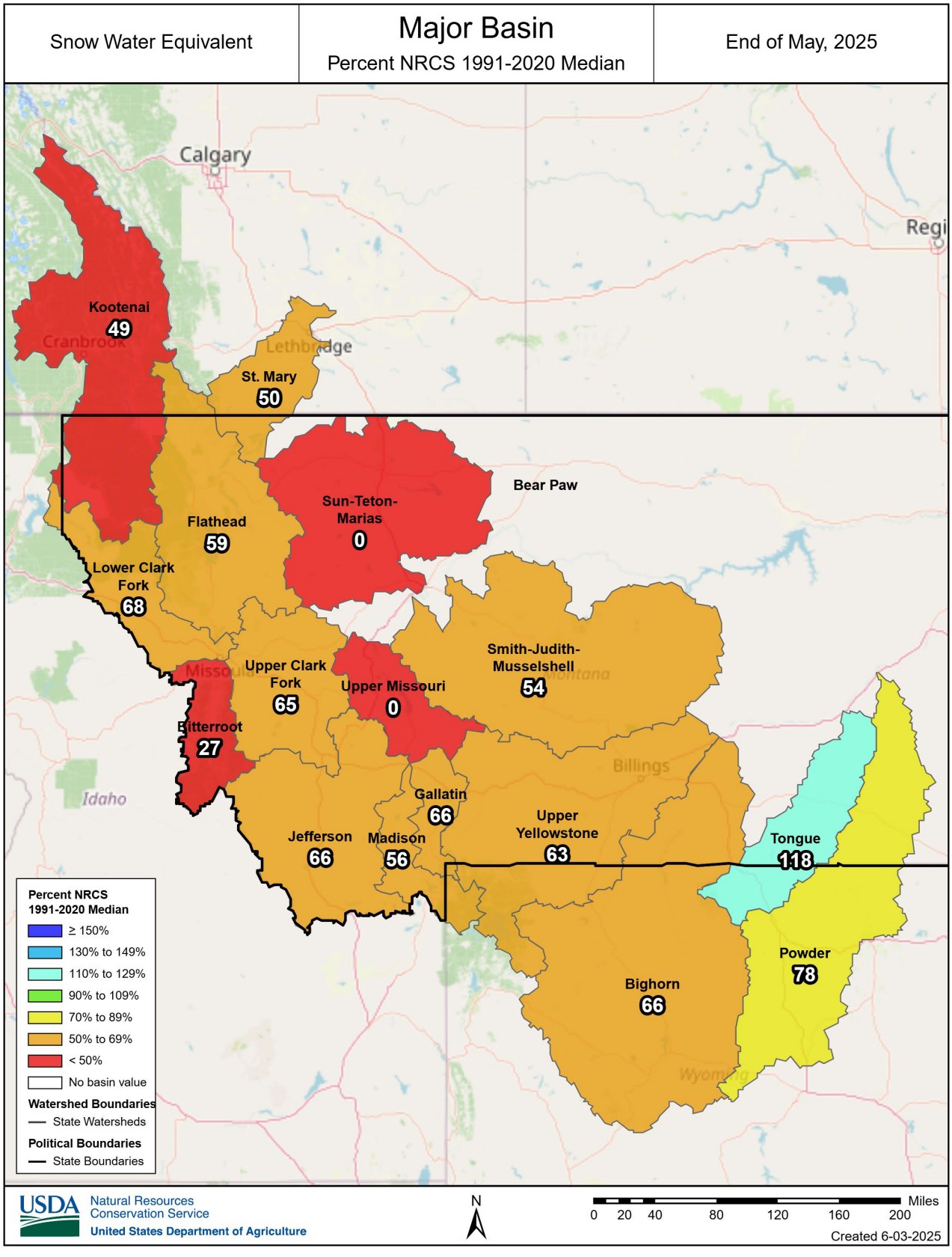
Most low and mid elevation snow monitoring stations have melted out. Many SNOTEL sites melted out one to three weeks earlier than normal. Around 3-30" of SWE and 10-60" of snow remain at higher elevation sites across the state. Snowmelt timing is an important component of summer streamflow, and this year's snowpack has rapidly transitioned from snowpack accumulation to snowmelt and runoff. However, whether the snowpack reached or neared peak SWE is a crucial for summer water supply. Across the state, SNOTEL sites typically reached 70-120% of median peak SWE, with higher elevation sites topping out around 20-50" of SWE for the snowpack accumulation season. Nearing or exceeding peak SWE values will be beneficial for summer water supply. Rocky Mountain Front SNOTELs in the St. Mary and Sun-Teton-Marias basins only reached 50-85% of normal peak SWE values. How the remaining snowpack melts will continue to influence summer streamflow. While much of our winter's snowpack has rapidly melted, a transition to cooler weather could help prolong the remaining snowpack and improve summer streamflow later in the season. Alternatively, a continuation of the hot, dry weather would continue the rapid runoff of this season's snowpack and further reduce summer streamflow outlooks.

Water Year 2025 - 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	56	127	117	80	82	90	83	49
Flathead	51	124	105	79	84	87	86	59
Upper Clark Fork	38	83	72	78	93	86	91	65
Bitterroot	74	99	91	80	97	95	76	27
Lower Clark Fork	55	134	112	80	85	91	85	68
Jefferson	44	82	75	82	95	93	89	66
Madison	56	87	84	80	94	96	86	56
Gallatin	53	85	93	92	110	104	101	66
Upper Missouri	-	67	67	77	93	90	74	-
Smith-Judith-Musselshell	2	86	91	131	118	115	108	54
Sun-Teton-Marias	25	81	70	56	71	70	61	-
St. Mary	50	106	94	67	72	77	89	50
Upper Yellowstone	42	62	73	78	98	99	101	63
Bighorn	54	65	69	81	99	103	95	66
Powder	54	65	60	81	74	78	75	78
Tongue	80	81	65	95	94	100	111	118
Bear Paw	-	222	136	228	158	107	-	-

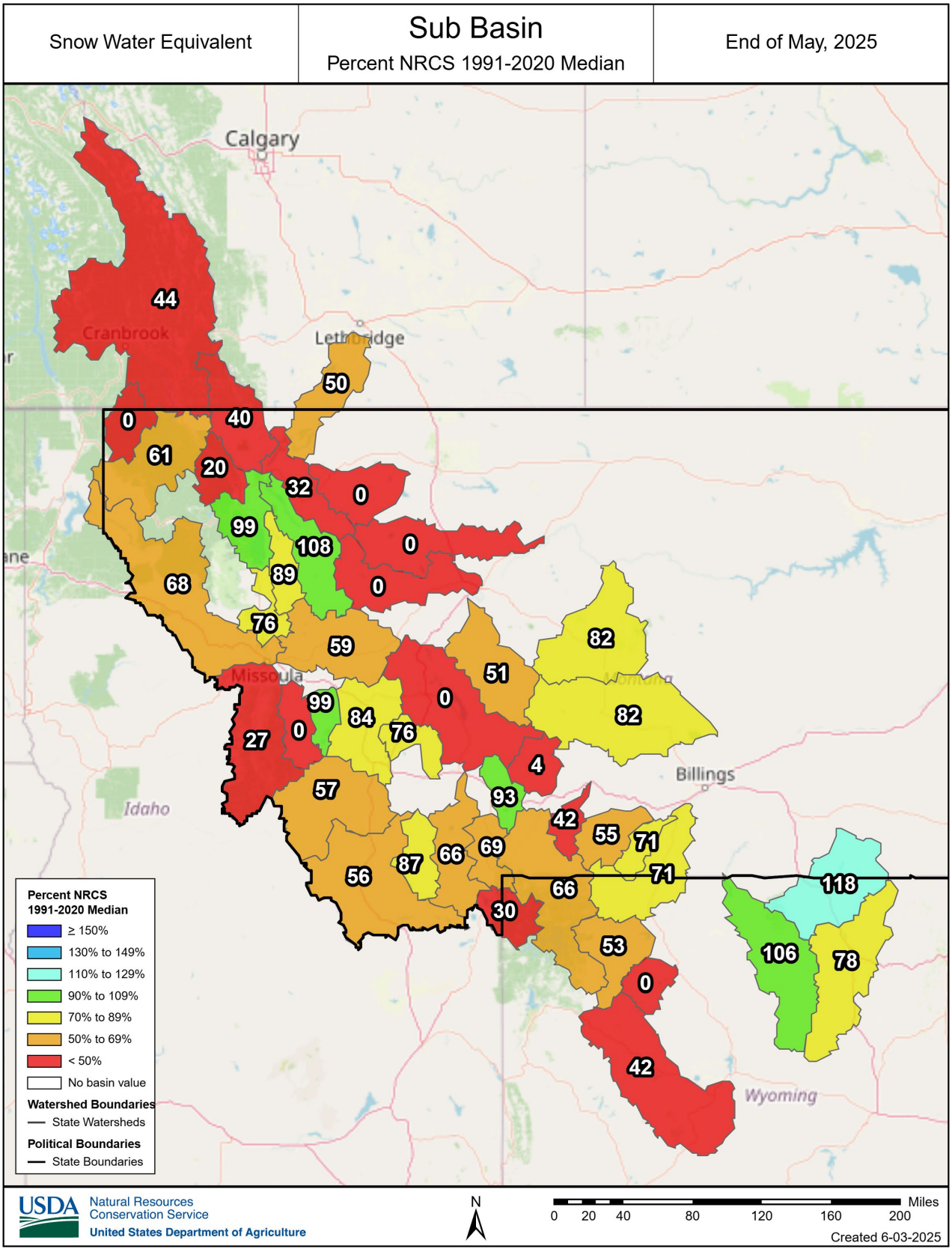
Statewide Overview

Snowpack (Continued)



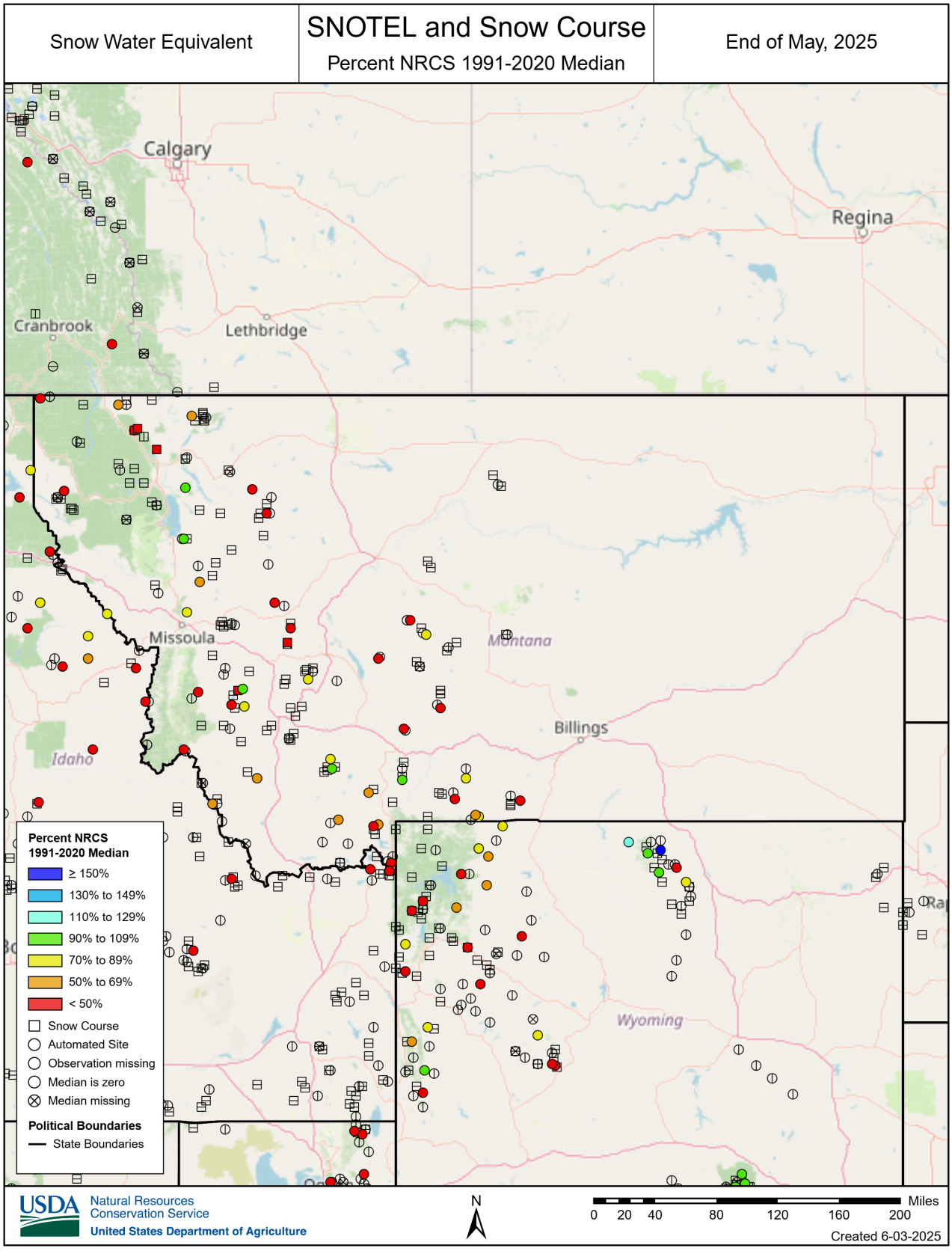
Statewide Overview

Snowpack (Continued)



Statewide Overview

Snowpack (Continued)



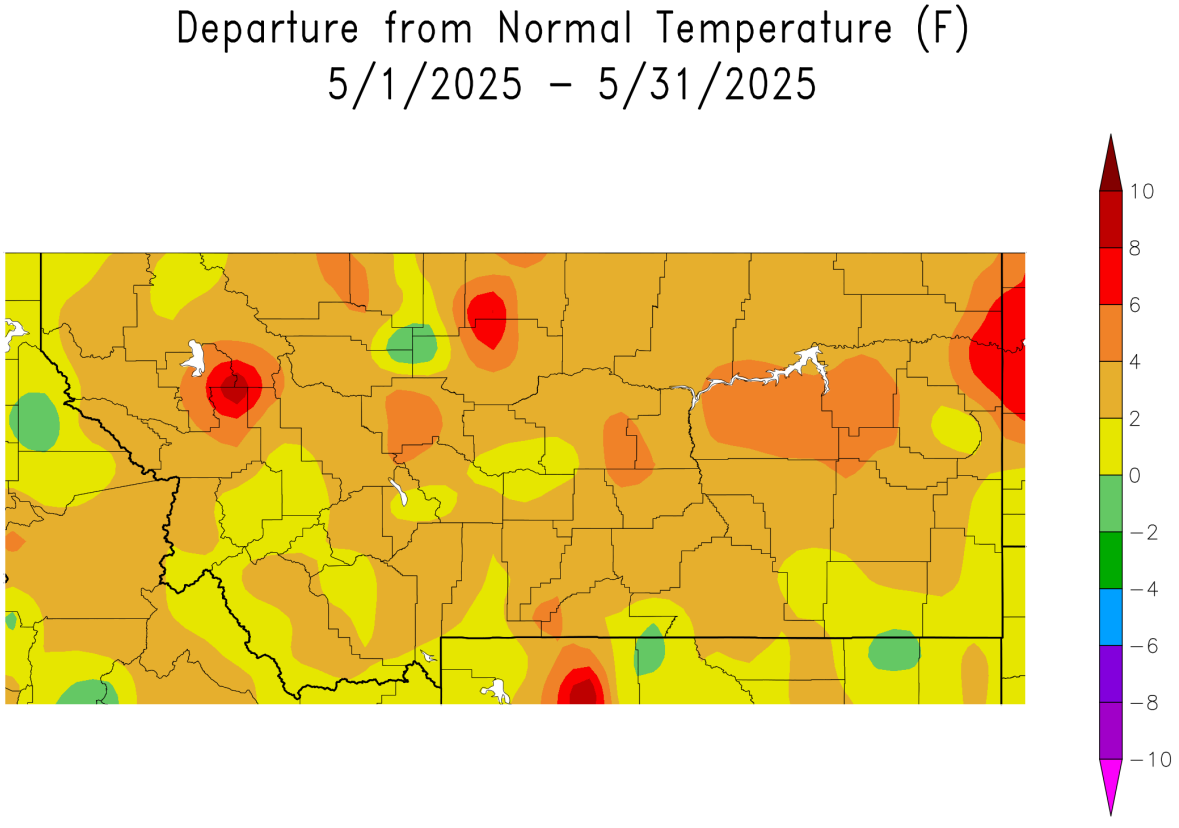
Statewide Overview

Temperature

May temperatures across Montana and northern Wyoming averaged to above normal in the month of May, with several pockets averaging well above normal. Strong warm spells bookended a colder middle of the month and dominated monthly averages. These heat waves broke daily temperature records across many SNOTEL sites in the region.

As May began, temperatures climbed with a warm spell centered on May 3. The average temperature of Montana SNOTELs peaked around 12 °F above normal, before falling to 7 °F below normal on May 5. The strongest heat wave of the month arrived shortly after. By May 10, SNOTEL sites averaged around 17 °F above normal setting a daily record by 5 °F. Southwest Montana and northern Wyoming especially felt the heat with most mid elevation SNOTEL sites reaching 70 °F degrees. From May 13 to May 23 temperatures hovered 5-8 °F degrees below normal while an extended period of active weather swept through the region. At many higher elevation SNOTEL sites, temperatures were cold enough to allow for snow accumulation. Temperatures slowly climbed the last week of May across all basins. SNOTEL sites in the Kootenai and Flathead basins edged above daily records on May 29 and May 31. Many lower elevation SNOTEL sites like Kraft Creek, Bassoo Peak and Garver Creek reached above 80 °F degrees for the first time this season.

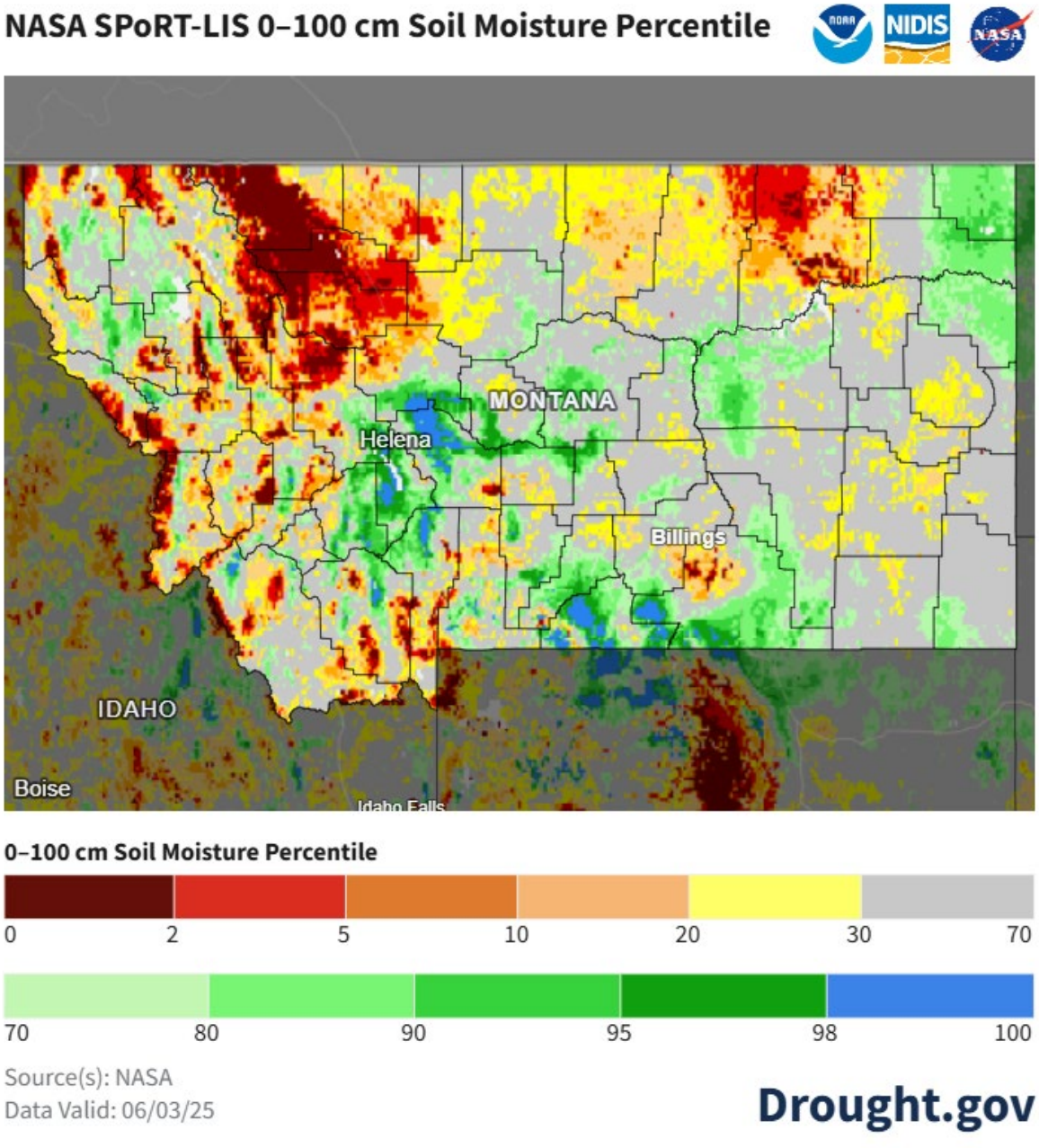
Warmer than normal temperatures in May meant faster than normal melting. The highest elevation stations, like those in the Bighorns, were cold enough to briefly slow snow melt. However, this only delayed melt out to a more usual timeline instead of 1-2 weeks early. Sites at lower elevations continue to melt at a quicker pace than usual.



Statewide Overview

Soil Moisture

Soil moisture in the top 100 cm has largely decreased from last month across Montana. The area north of Fort Peck Reservoir and the Rocky Mountain Front continue to have the lowest soil moisture levels in Montana, with most of it ranking in the 0-2 percentile. Soil moisture levels in central and south-central dropped from last month yet remain the highest compared to normal in the state. Soil moisture levels also dropped across western Montana, however several pockets of near normal soil moisture levels remain in that region. Notably, conditions worsened in the region extending from Hamilton to Augusta, where soil moisture levels are now in the 0-5 percentile. June precipitation will be critical for maintaining and improving soil moisture across Montana.



Statewide Overview

Drought Monitor

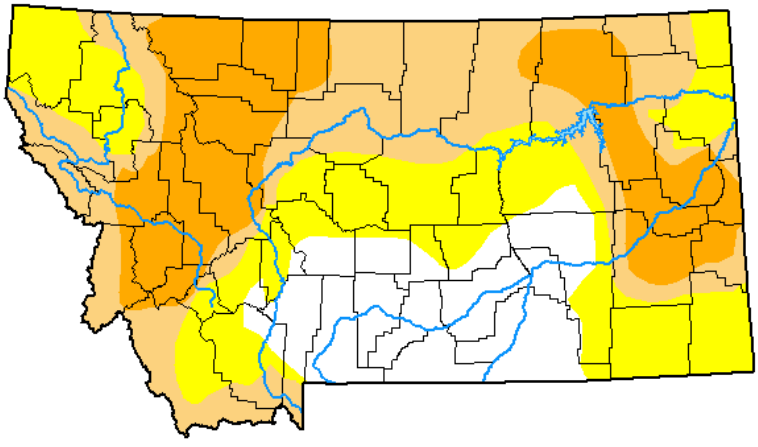
Spring moisture is critical for improving drought conditions on low snow years, particularly before heading into the drier summer season. Most locations in Montana received near normal snowfall this year, however some locations such as the Rocky Mountain Front did not. Unfortunately, regions that needed significant moisture during May were missed.

Since last month drought conditions have worsened along the Rocky Mountain Front and Sweet Grass Hills region. Cascade, Valley, and McCone counties also experienced a 1 class degradation. Spring rain was more abundant in parts of southwest Montana and along the state's eastern border. Drought conditions have improved by 1 class in those locations.

Drought is currently more widespread than last year at this time. On June 4, 2024, 56% of the state was experiencing drought (D0-D4). Currently 82% of the state is experiencing drought. Southwest Montana and part of northwest Montana are 1-2 classes better, while the entire Hi-line region and part of eastern Montana are 1-2 classes worse. Above normal precipitation during June is needed across the entire state.

U.S. Drought Monitor

Montana



June 3, 2025

(Released Thursday, Jun. 5, 2025)

Valid 8 a.m. EDT

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	18.45	81.55	52.87	23.45	0.00	0.00
Last Week 05-27-2025	22.17	77.83	53.50	23.21	0.00	0.00
3 Months Ago 03-04-2025	40.90	59.10	34.98	13.43	3.48	0.00
Start of Calendar Year 01-07-2025	6.70	93.30	54.22	27.25	13.79	0.00
Start of Water Year 10-01-2024	15.18	84.82	42.24	21.05	9.44	0.90
One Year Ago 06-04-2024	43.83	56.17	37.37	4.63	0.00	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

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CPC/NOAA

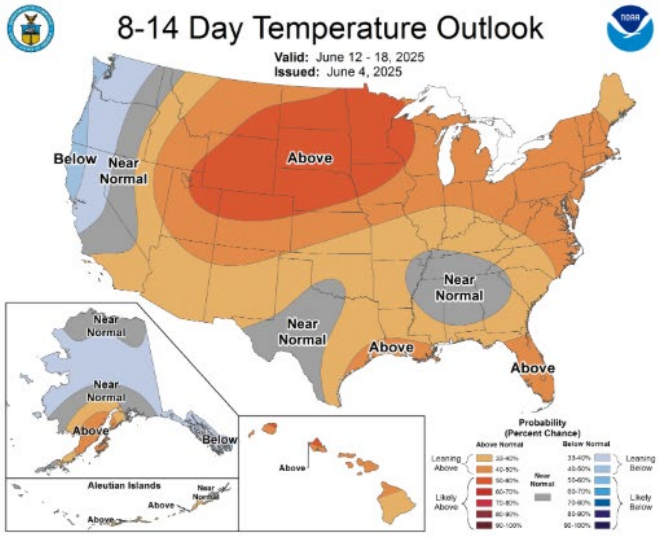
droughtmonitor.unl.edu

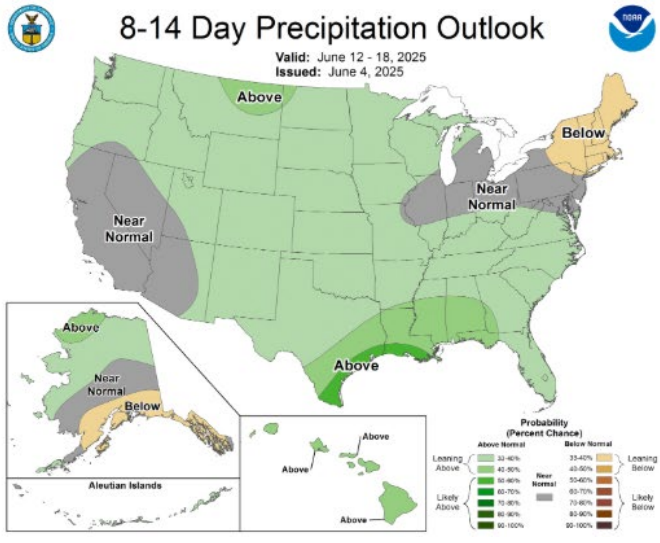
Statewide Overview

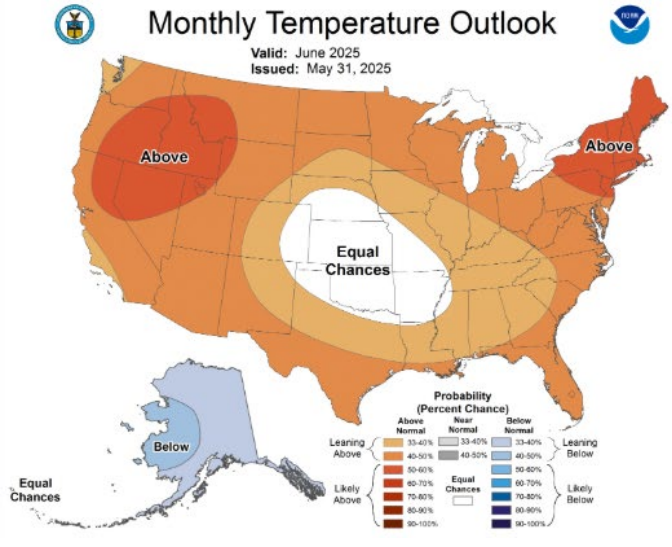
Weather Outlook

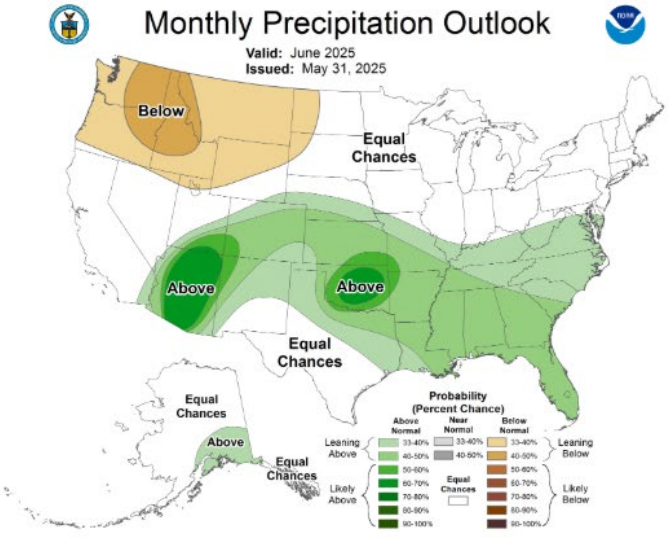
Probabilities from the NOAA Climate Prediction Center indicate there is a likely chance that Montana will have above normal temperatures over the next 8-14 days. It is most likely temperatures will be above normal in the southeast corner of the state, while the northwest corner has equal chances of experiencing either below or above normal temperatures. The entire state is likely to receive above normal precipitation over the next 8-14 days, however the northeast corner has slightly higher chances.

The monthly outlook is slightly less optimistic. Above normal temperatures during June are likely across the state, with the southwest corner having the highest chances of experiencing above normal temperatures. There is also a strong probability that total June precipitation will be below normal across the entire state, with the western border having the highest chance of below normal precipitation.





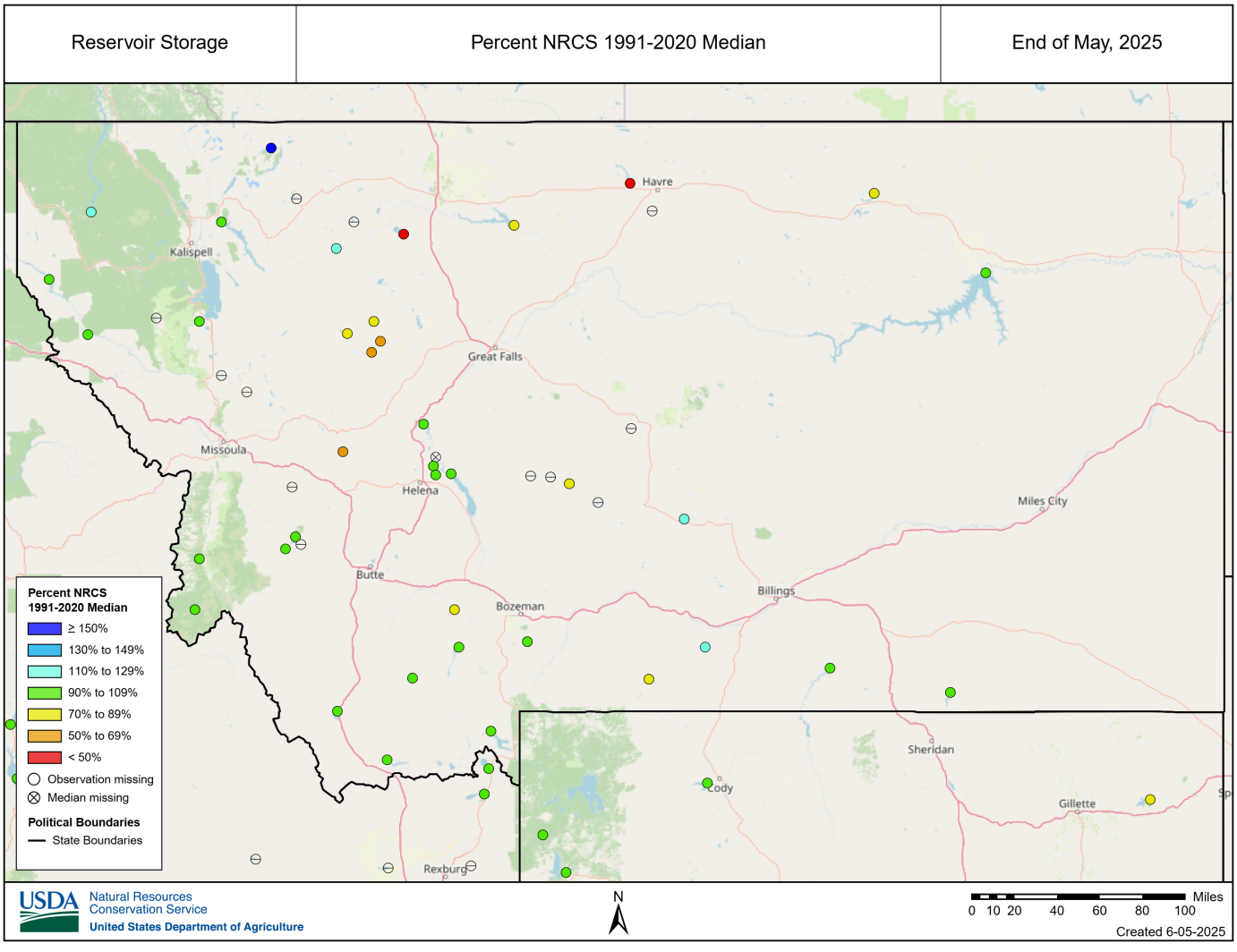




Statewide Overview

Reservoirs

End of May reservoir fill levels varied across Montana. Cooney, Deadman's Basin, Lake Koocanusa, Lake Sherburne, and Swift Reservoirs all had reservoir levels above 110% of median for the end of May, with Lake Sherburne over 150% of median. Bair, Gibson, Lake Elwell (Tiber), Mystic Lake, Nelson, Pishkun, and Willow Creek – Harrison Reservoirs recorded below normal levels at the end of May, with reservoir percentages between 70% and 90% of median. Nevada Creek, Nilan, and Willow Creek – Augusta Reservoirs had well below normal reservoir fill at 55%-65% of median. Fresno and Lake Frances Reservoirs reported reservoir fill levels below 50% of median for end of May. The remaining half of reservoirs across Montana reported near normal end of May levels between 90% to 110% of median.



Statewide Overview

Reservoirs (Continued)

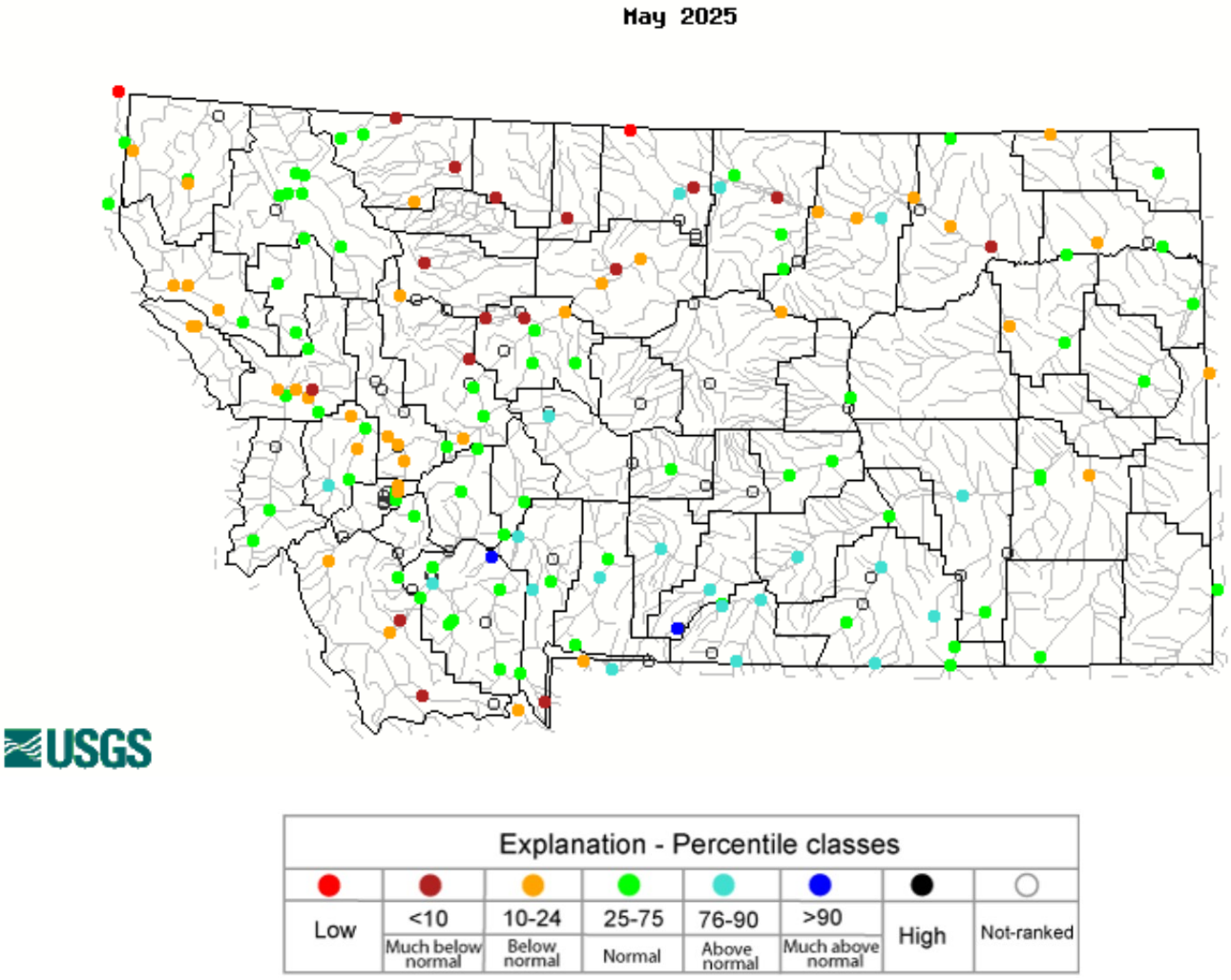
End of May - Reservoir Storage Percent of Capacity

Reservoir	Basin	Current % Capacity	Last Year % Capacity	Median % Capacity
Smith River Res	Smith-Judith-Musselshell	-	108	108
Deadman's Basin Res	Smith-Judith-Musselshell	105	105	87
Bair Res	Smith-Judith-Musselshell	70	87	83
Swift Res	Sun-Teton-Marias	89	100	77
Lake Frances	Sun-Teton-Marias	34	48	77
Lake Elwell (Tiber)	Sun-Teton-Marias	54	57	61
Gibson Res	Sun-Teton-Marias	77	88	92
Mystic Lake	Upper Yellowstone	20	17	27
Cooney Res	Upper Yellowstone	103	104	92
Ruby River Reservoir	Jefferson	97	98	99
Lima Reservoir	Jefferson	91	98	84
Clark Canyon Res	Jefferson	55	65	52
Painted Rocks Lake	Bitterroot	105	104	104
Lake Como	Bitterroot	96	107	103
Bull Lake	Bighorn	43	61	63
Buffalo Bill	Bighorn	72	74	69
Boysen	Bighorn	67	65	67
Bighorn Lake	Bighorn	64	61	64
Lake Helena	Upper Missouri	86	86	86
Holter Lake	Upper Missouri	99	99	99
Helena Valley Reservoir	Upper Missouri	86	84	93
Canyon Ferry Lake	Upper Missouri	83	85	81
Lake Koocanusa	Kootenai	80	74	69
Hungry Horse Lake	Flathead	89	95	86
Flathead Lake	Flathead	85	91	86
Nelson Res	Milk	62	78	79
Fresno Res	Milk	21	70	65
Noxon Rapids Reservoir	Lower Clark Fork	95	93	98
Fort Peck Lake	Lower Missouri	73	77	76
Nevada Creek Res	Upper Clark Fork	53	69	89
Georgetown Lake	Upper Clark Fork	97	96	96
Tongue River Res	Tongue	100	101	102
Lake Sherburne	St. Mary	92	63	59
Hebgen Lake	Madison	91	94	91
Ennis Lake	Madison	89	90	87
Middle Creek Res	Gallatin	101	99	97

Statewide Overview

Streamflow

Streamflow across Montana reflected many of the patterns in snowpack, precipitation and melting seen in May. South central Montana and tributaries to the Yellowstone saw much higher-than-normal stream flows. Southwest Montana and the Beaverhead River saw well below normal values. Areas around the Flathead saw near normal to slightly below normal flows. The most northwestern reaches of Montana and rivers near Missoula received below normal flows. Gauges to the east of the continental divide near the Sun, Teton and Marias Rivers reported well below normal streamflow. This matches the low snowpack, record low precipitation and severe drought conditions of the area.



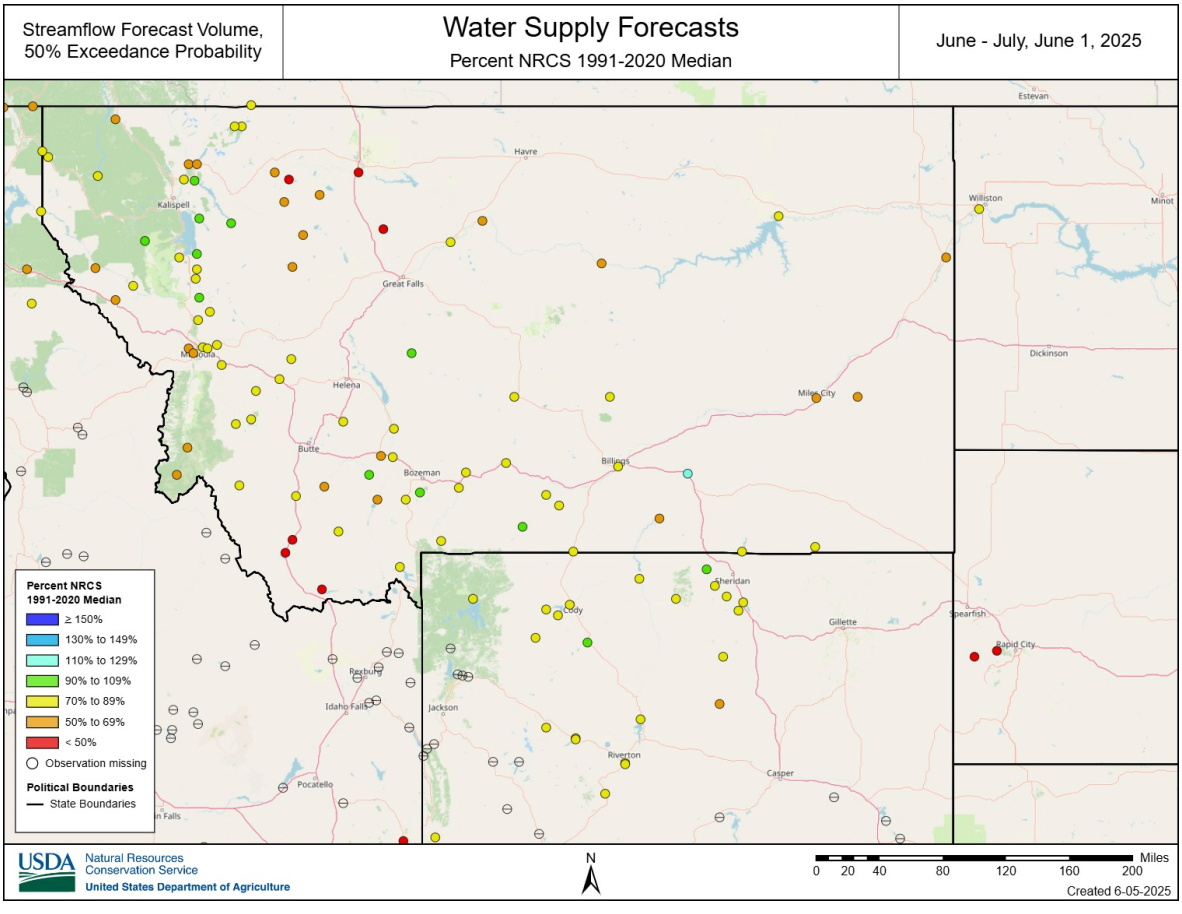
Statewide Overview

Water Supply Forecasts

The water supply forecasts for June 1 fell at almost all forecast points in Montana and northern Wyoming compared to May 1. Warm temperatures accelerated melting across the states leaving little snowpack to support streamflow later into the summer. Only the Little Bighorn River near Hardin remains forecasted above median due to higher-than-average May snowfall in the northern Bighorns. The Little Bighorn expects 120% of normal streamflow volumes in June and July. All other forecast points in the region are predicted to be near or below median.

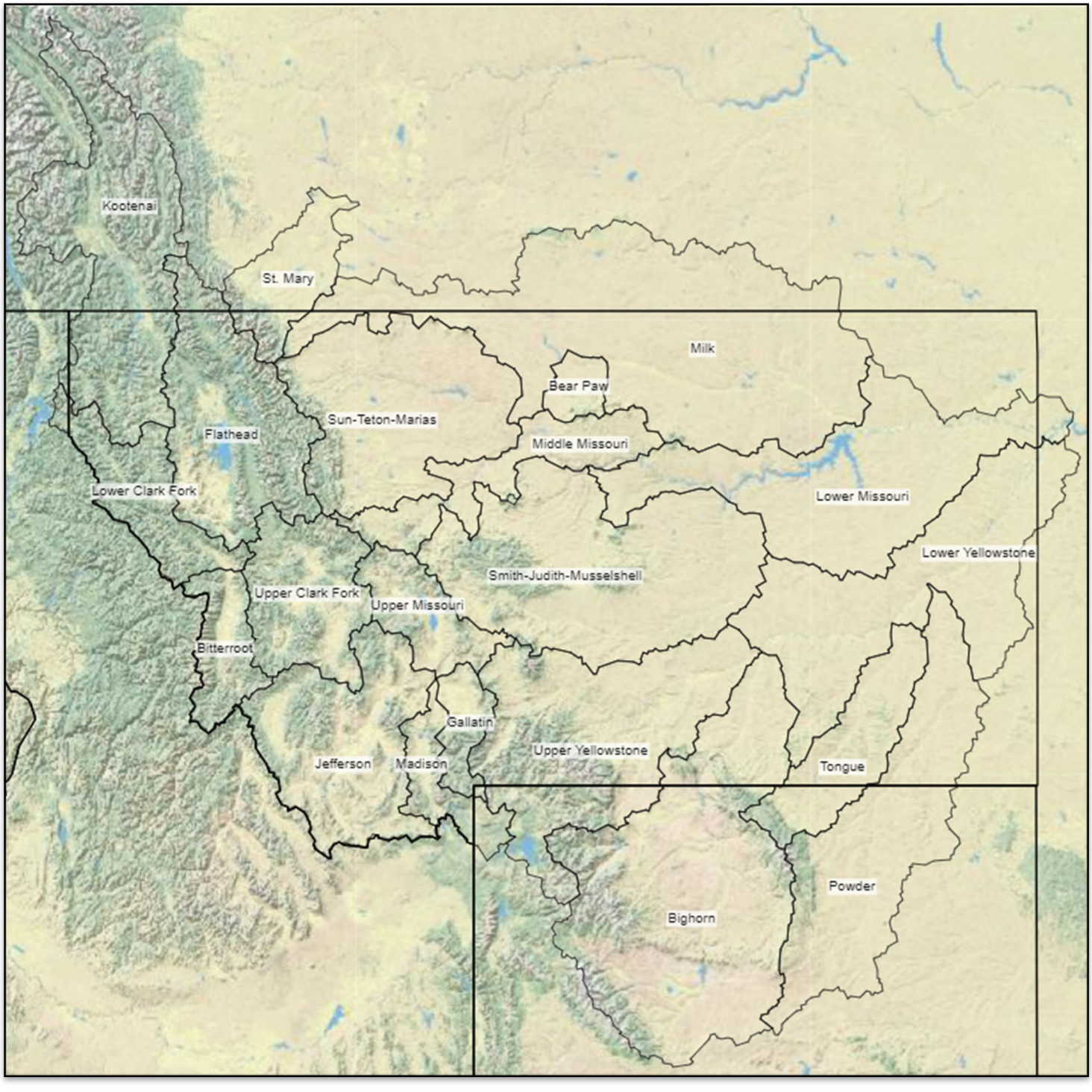
Forecast points around the Mission and Swan Ranges are the most likely to experience near normal stream flow with forecasts ranging from 89-95% of normal. However, the Flathead River itself, near Polson, only expects 80% of median streamflow due to low precipitation and snowpack totals along the headwaters of the North and Middle Forks of the Flathead. To the east of the continental divide, the Sun, Teton and Marias drainages are expected to produce extremely low runoff values with forecast points ranging from 35-60% of normal. The Yellowstone region ranges from 70-100% of median stream flow in June and July. Southcentral Montana can expect a wide range of run off with the Beaverhead River running particularly low with forecasts points below 50% of median. The Bitterroot River also expects well below normal stream flow with 50-60% of normal volume in June and July.

Forecasts are subject to uncertainty due to the unpredictable nature of spring weather, and these forecasts provide a range of possible runoff values. It is important to consider all exceedance probabilities to fully understand the water supply outlook and possible associated error. Below average precipitation, as indicated by the seasonal weather outlook, could push streamflow values well below normal even at forecast points with near normal flow probabilities.



Basin Overview

Montana River Basin Definitions

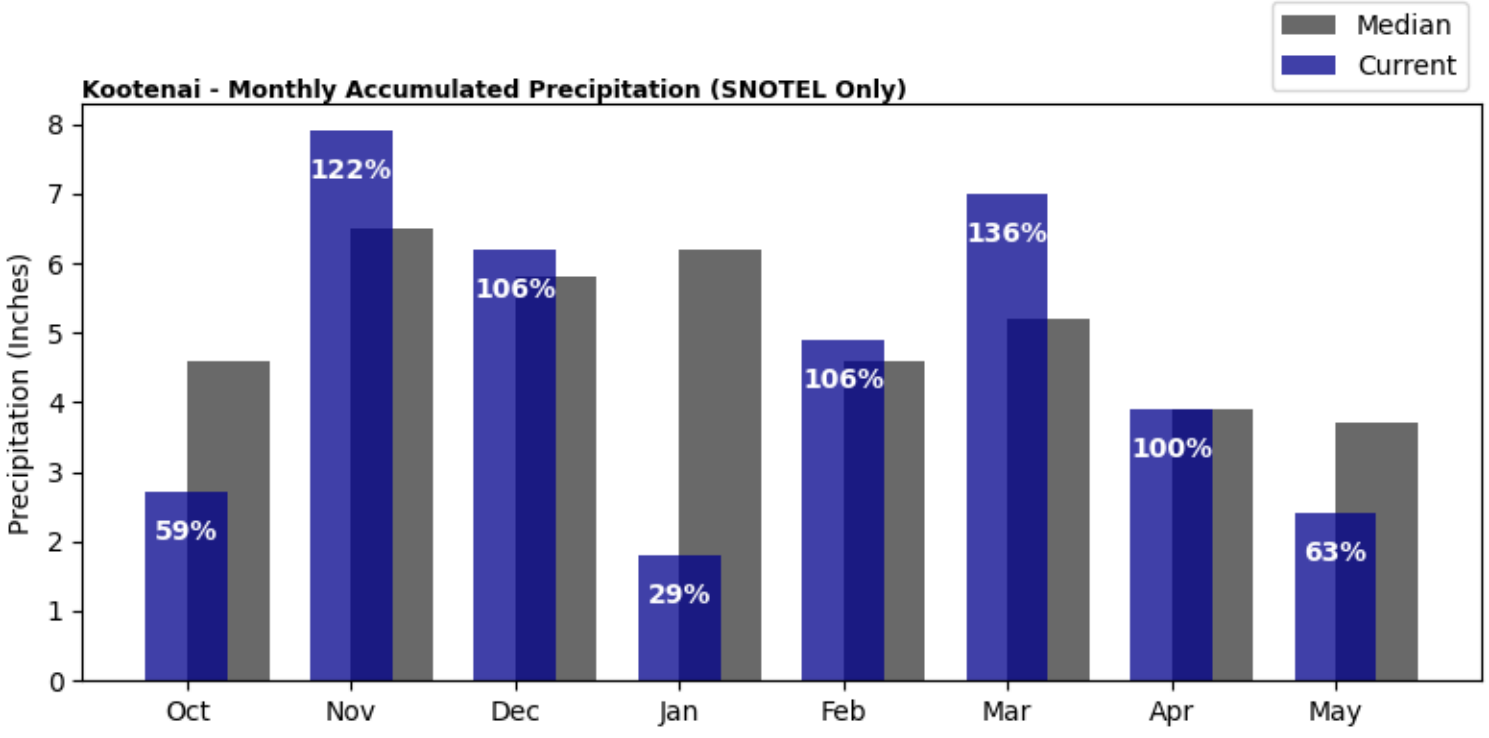


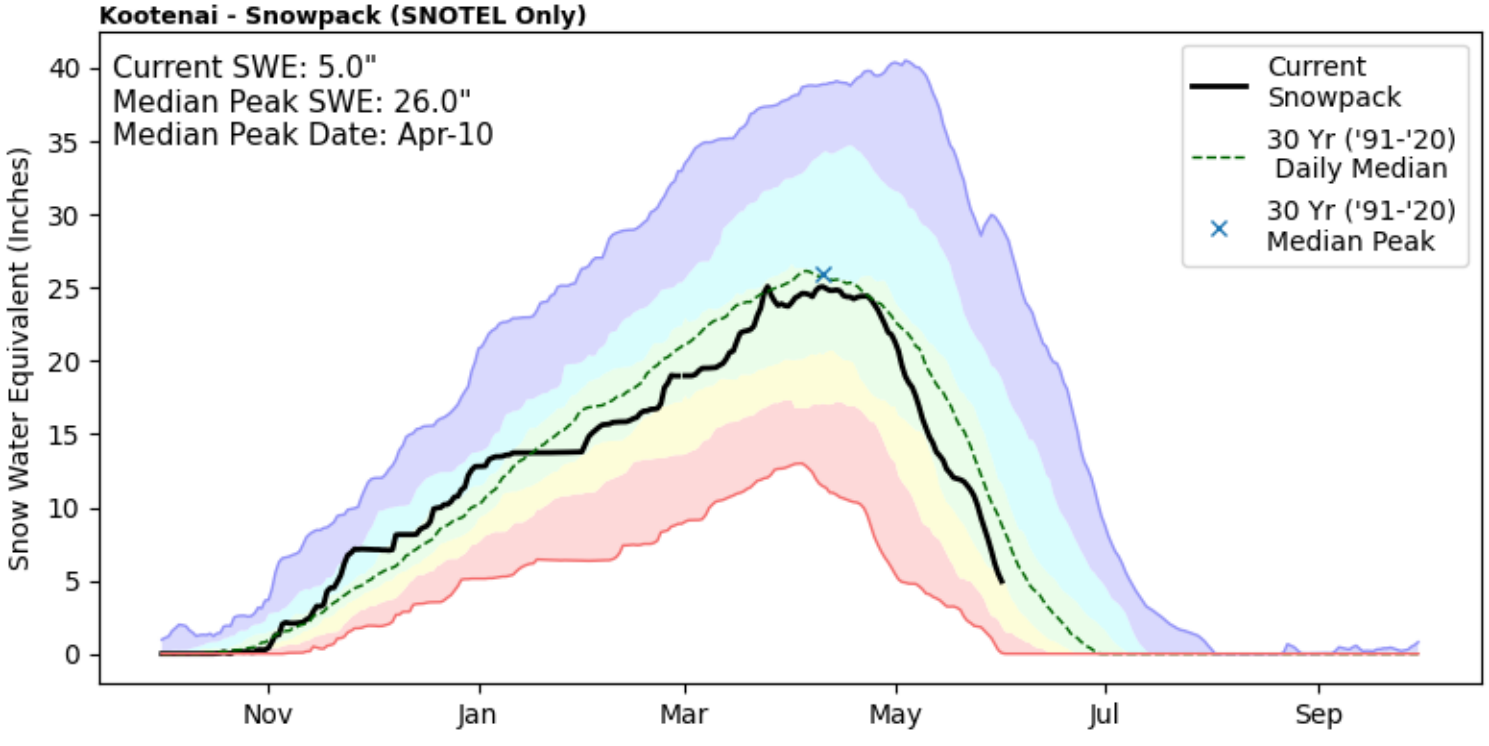
The following basin overview sections only include basins that have SNOTEL sites. For example, there is no basin overview for the Lower Yellowstone, because there are no SNOTEL sites associated with that basin. Water supply information for basins not included in the following sections can be found at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

Basin Overview

Kootenai

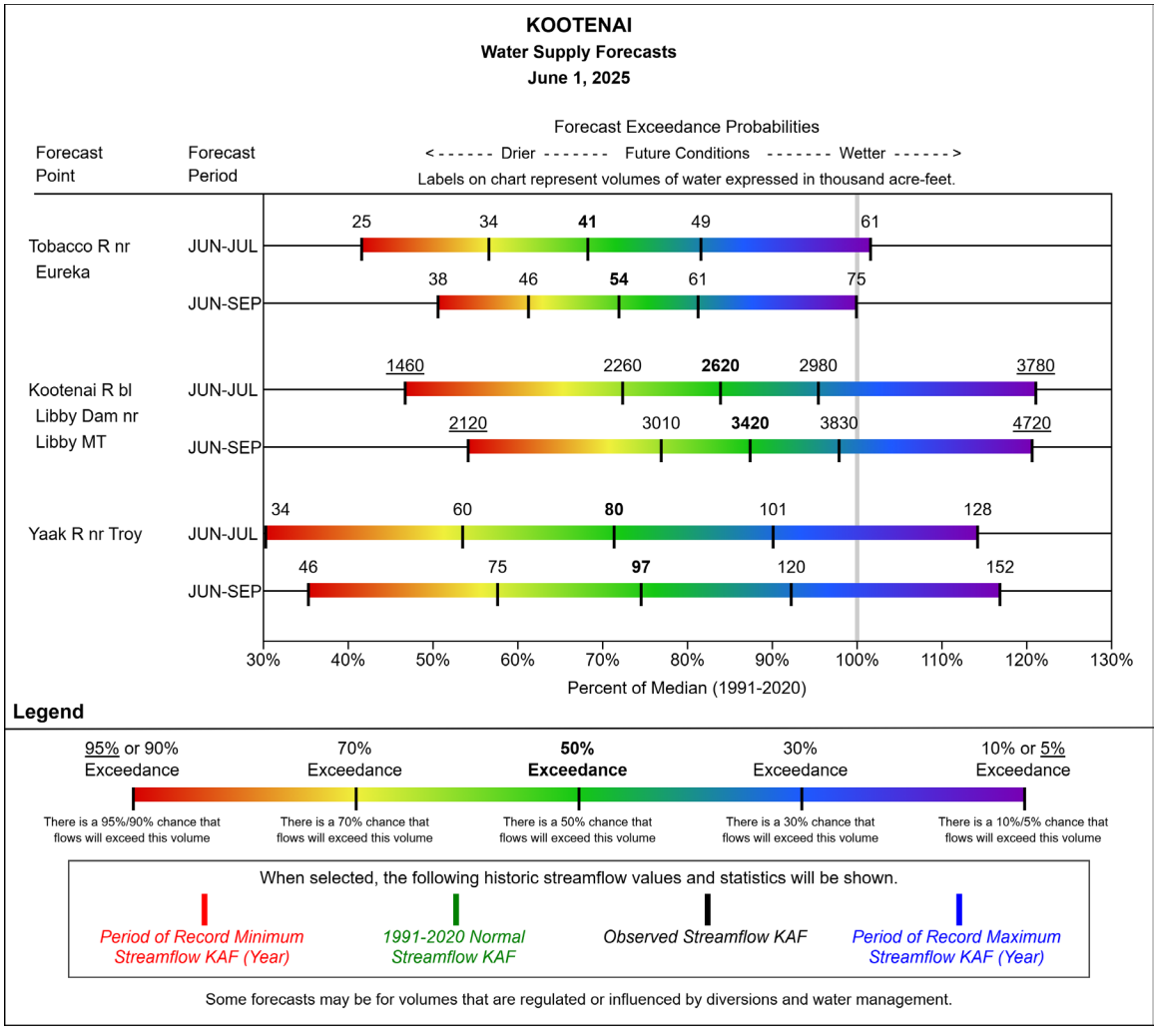
Precipitation in May was well below normal at 63%, which brings the seasonal accumulation (October-May) to 86% of median. The snowpack in the Kootenai is well below normal at 49% of median, compared to 77% at this time last year.





Basin Overview

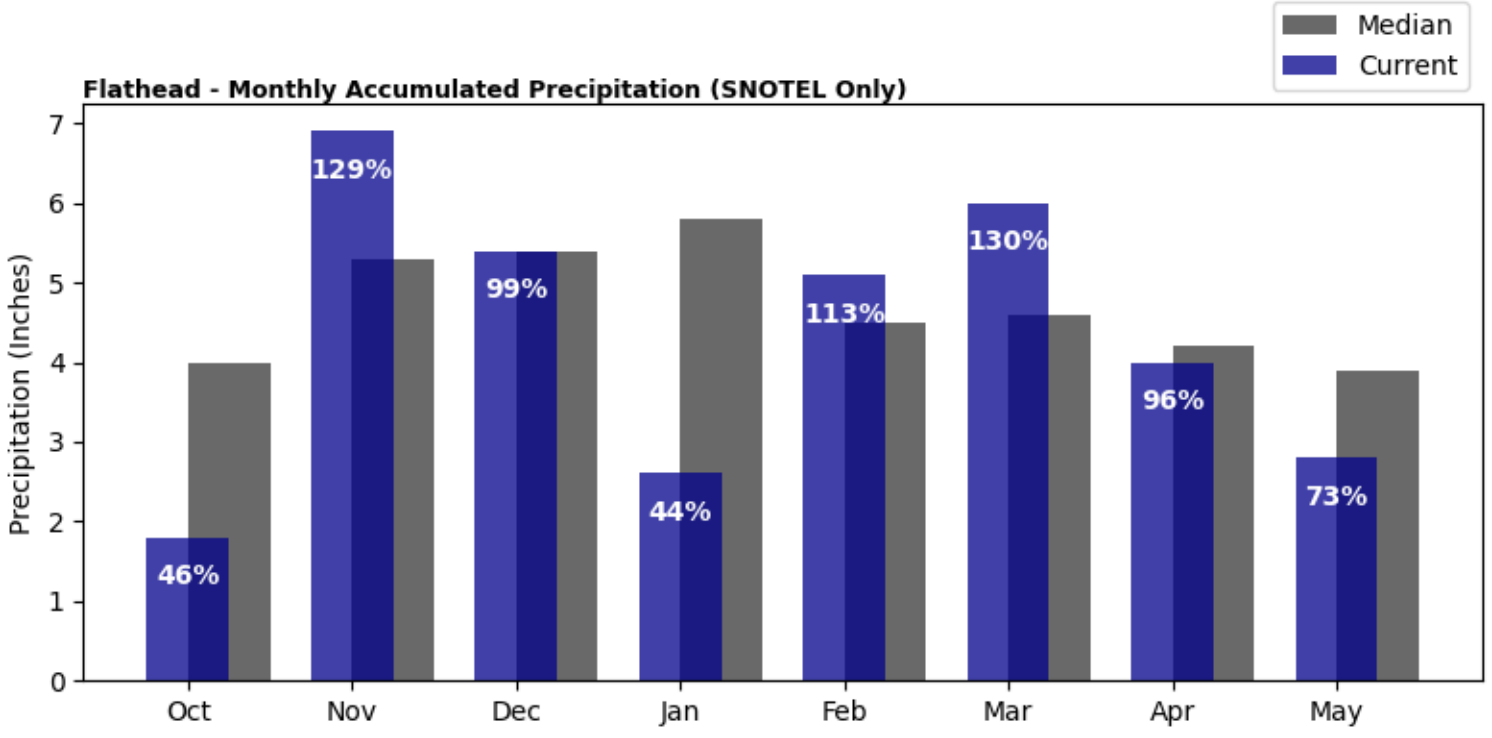
Kootenai (Continued)

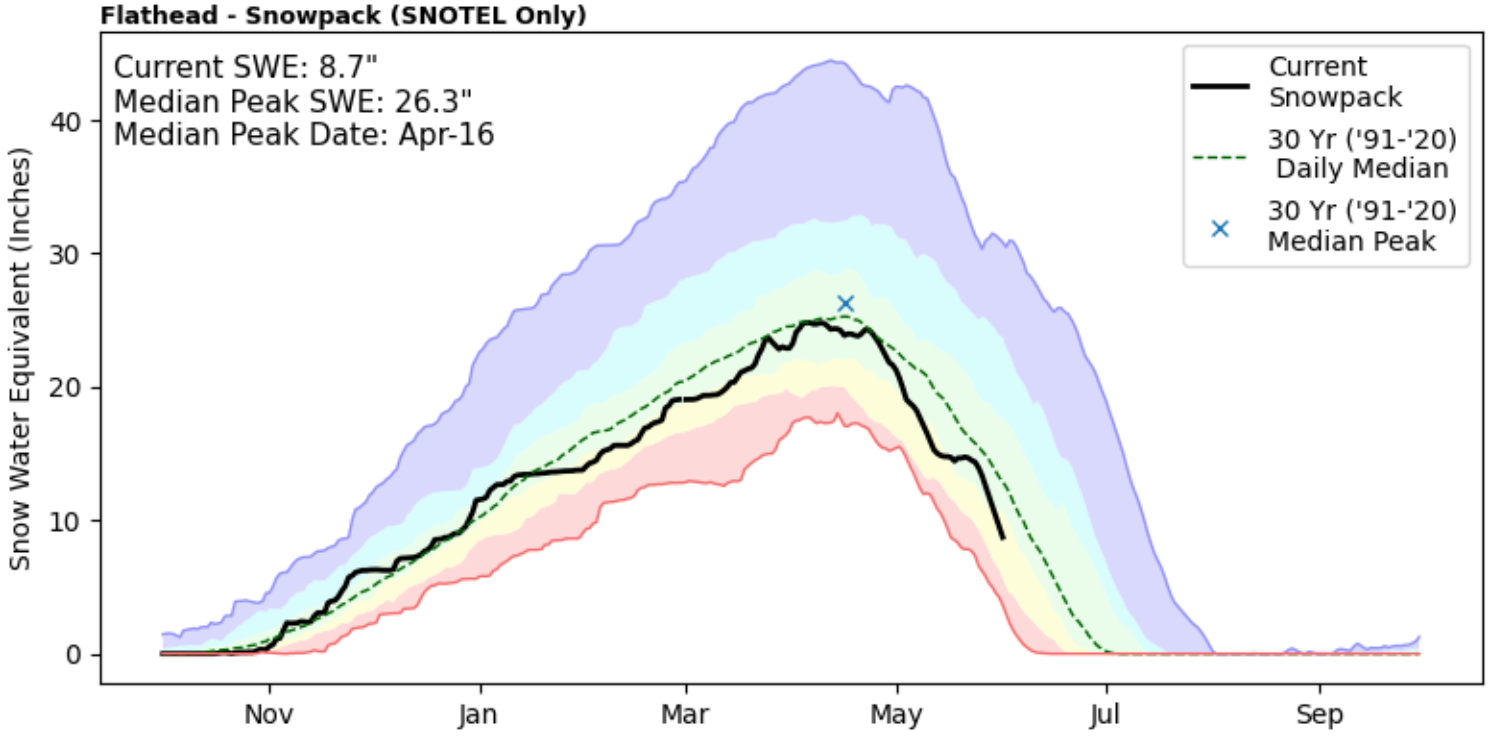


Basin Overview

Flathead

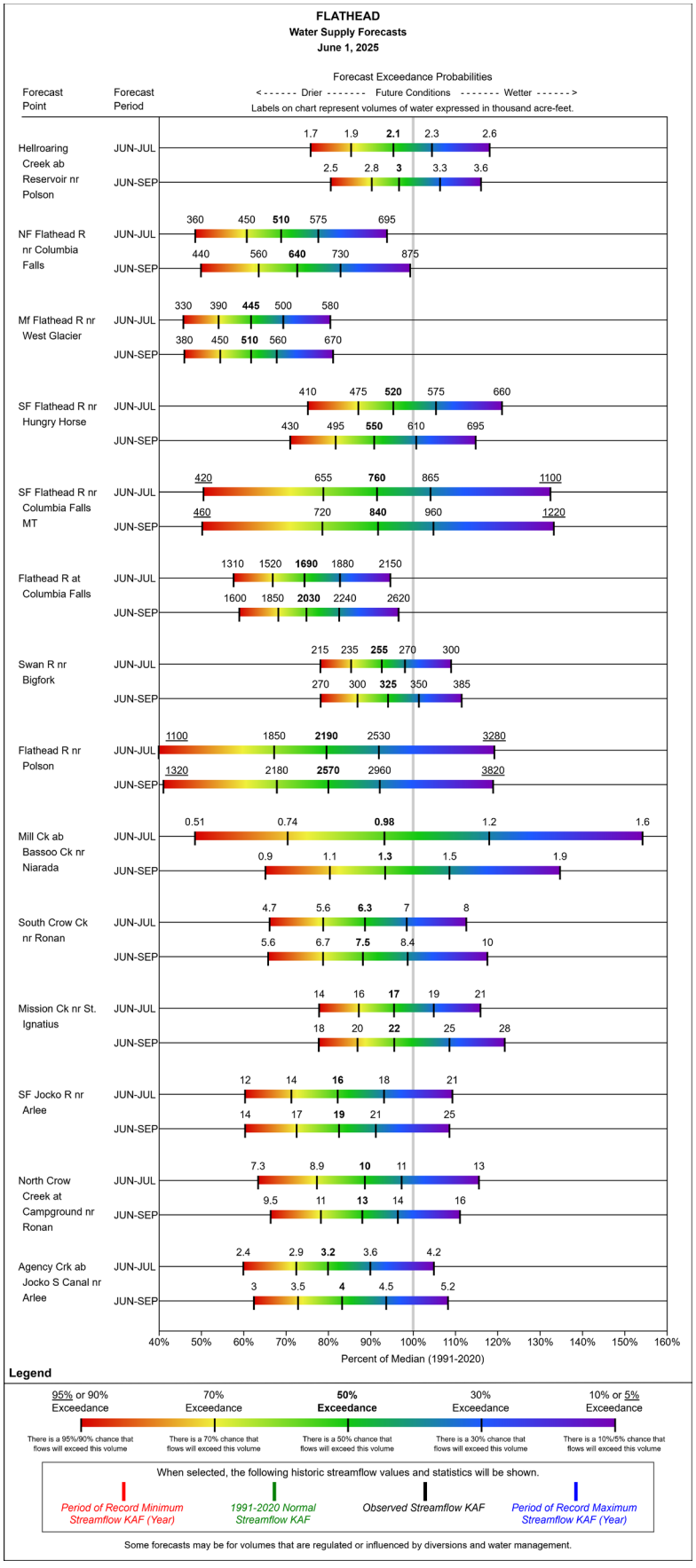
Precipitation in May was well below normal at 73%, which brings the seasonal accumulation (October-May) to 90% of median. The snowpack in the Flathead is well below normal at 59% of median, compared to 83% at this time last year.





Basin Overview

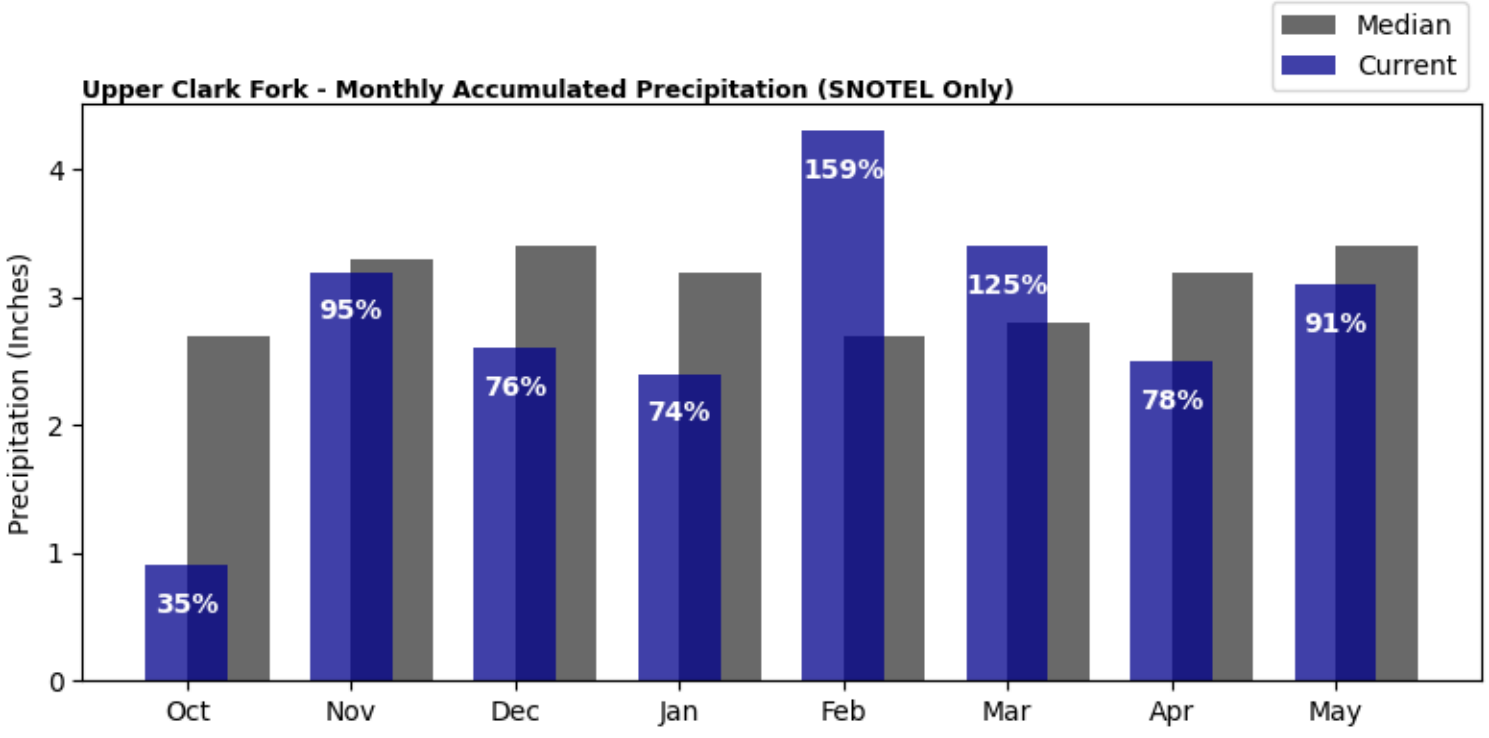
Flathead (Continued)

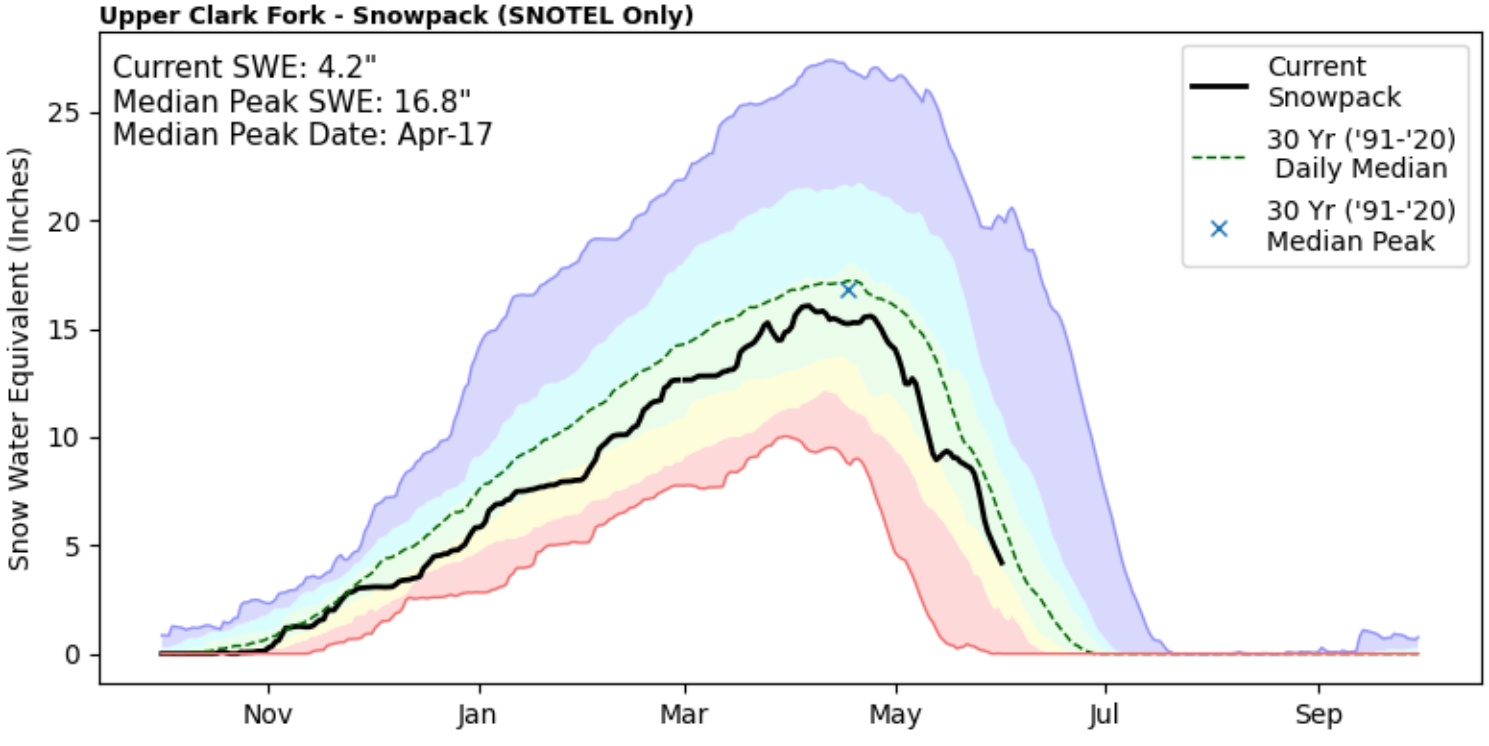


Basin Overview

Upper Clark Fork

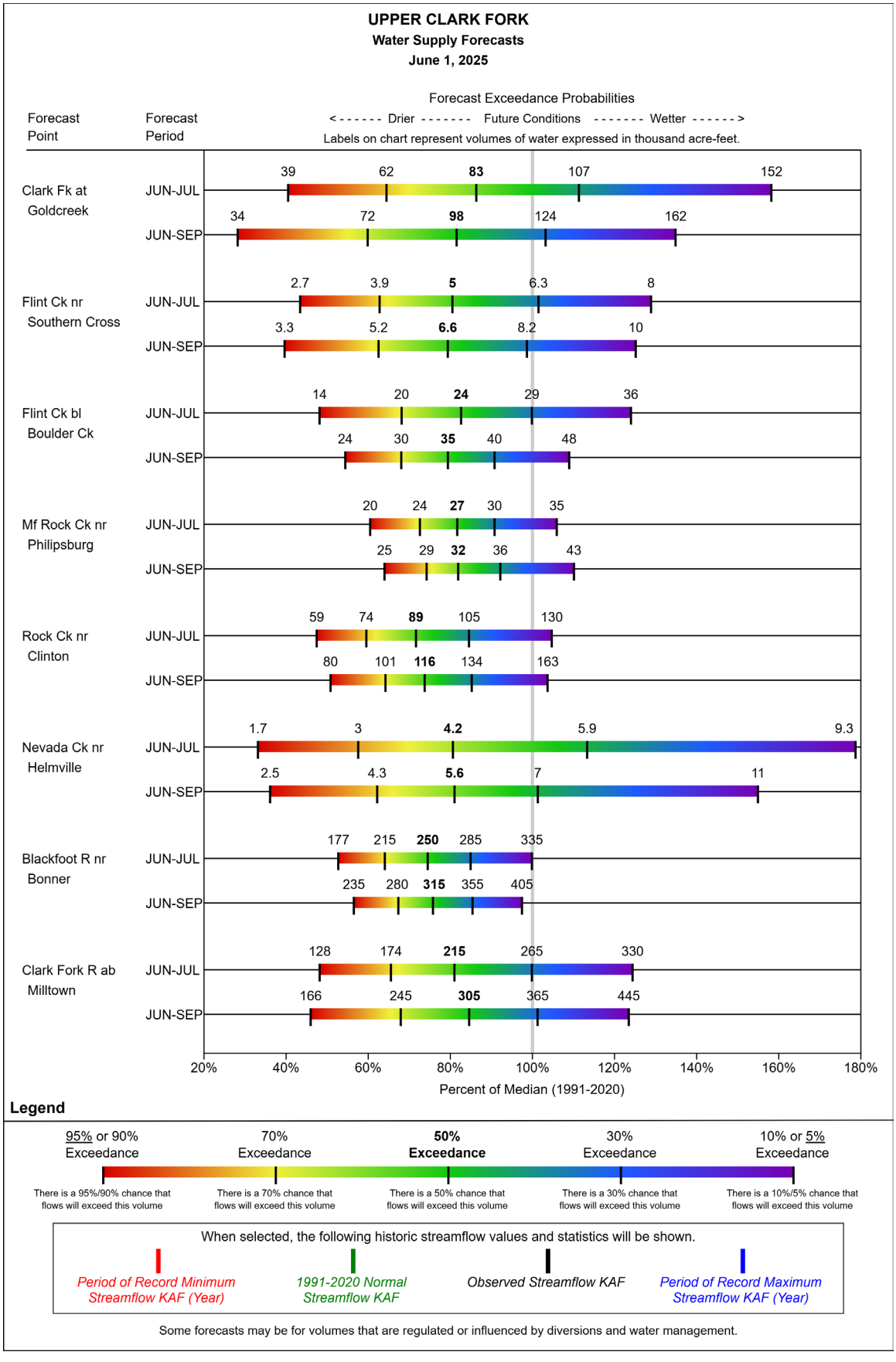
Precipitation in May was below normal at 91%, which brings the seasonal accumulation (October-May) to 90% of median. The snowpack in the Upper Clark Fork is well below normal at 65% of median, compared to 66% at this time last year.





Basin Overview

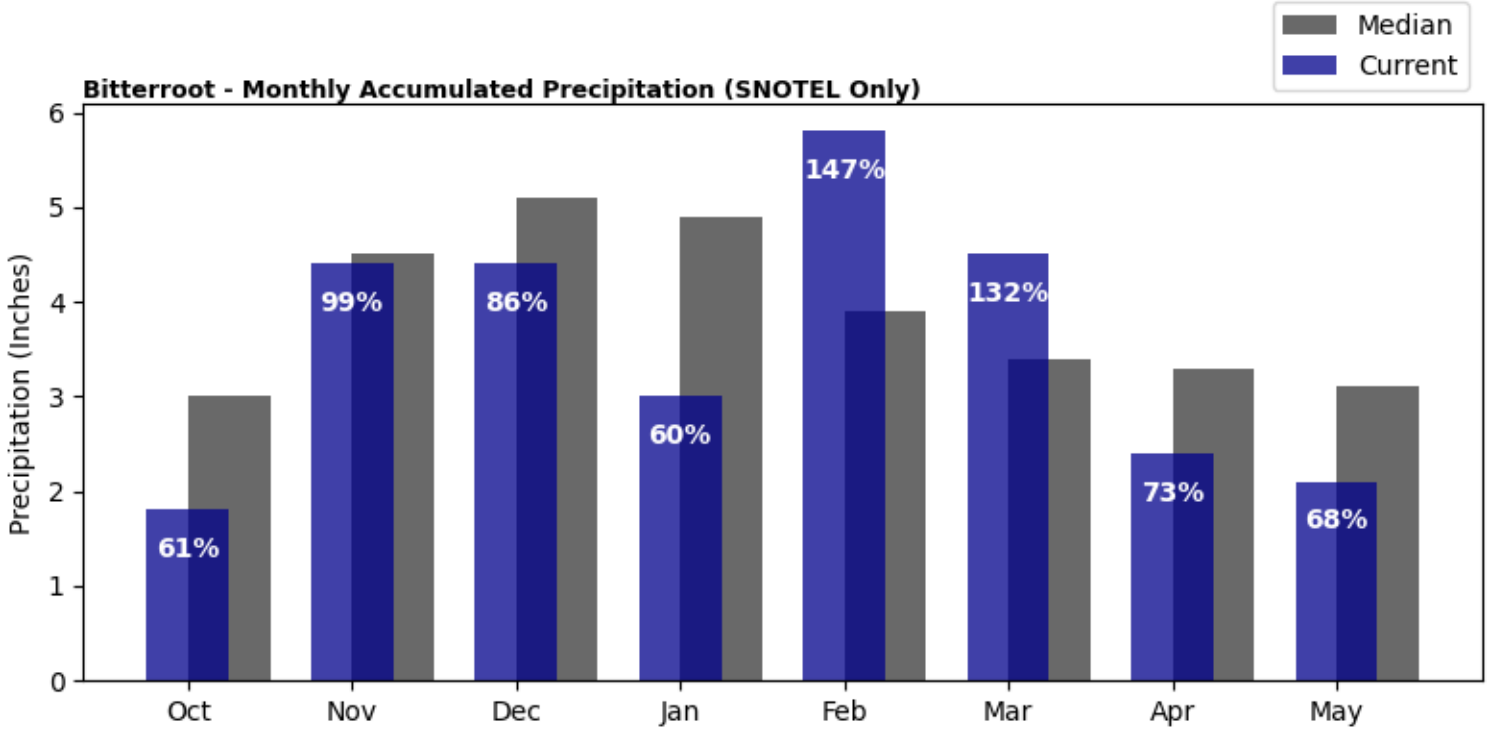
Upper Clark Fork (Continued)

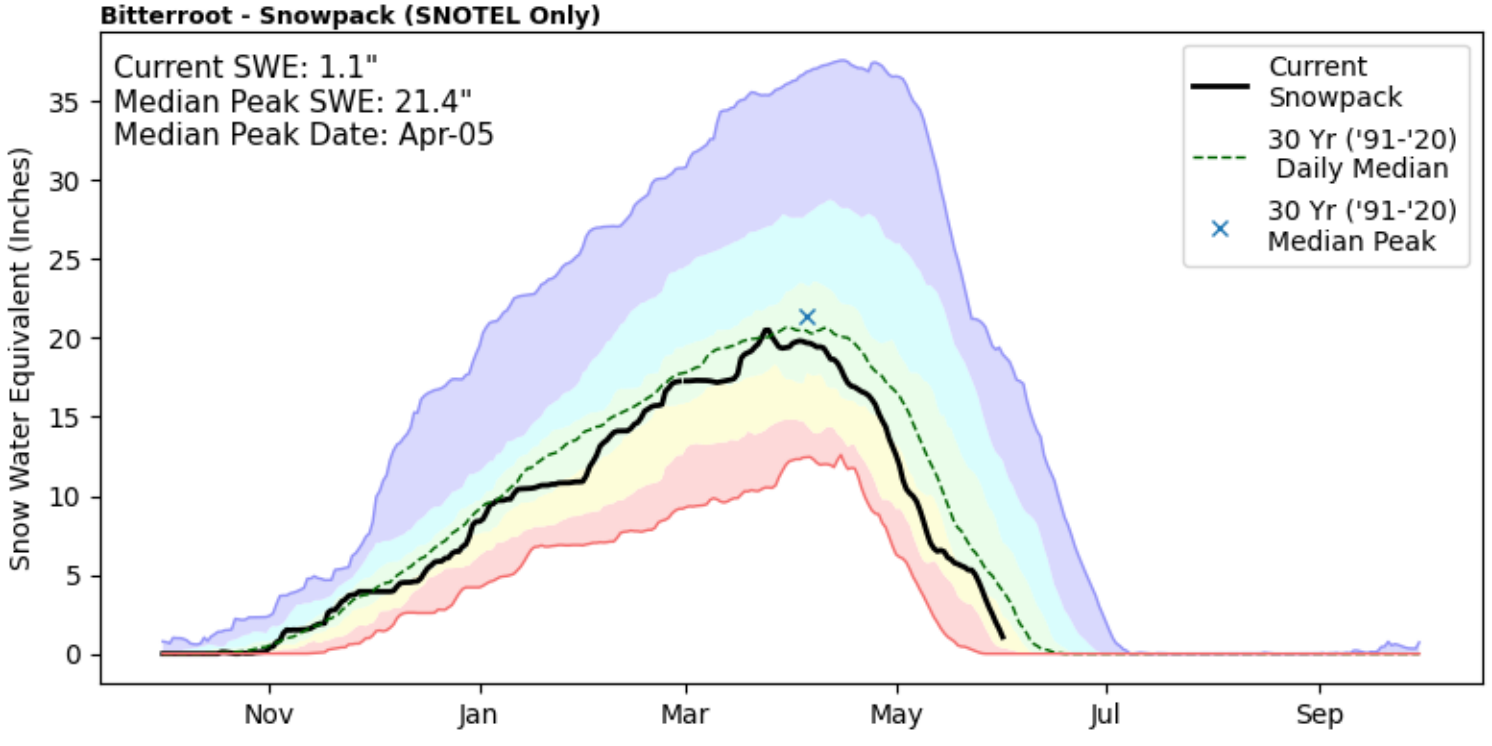


Basin Overview

Bitterroot

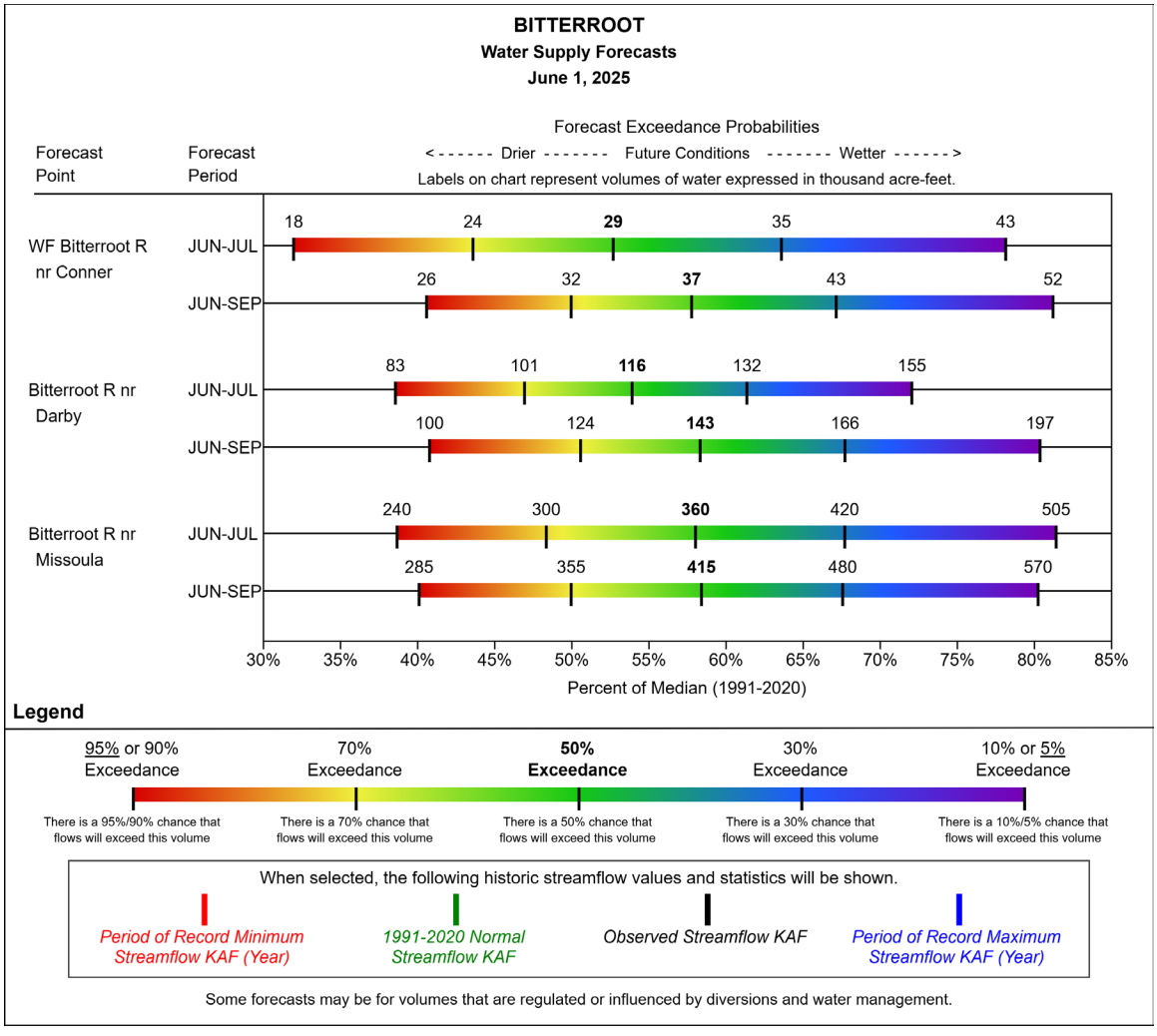
Precipitation in May was well below normal at 68%, which brings the seasonal accumulation (October-May) to 88% of median. The snowpack in the Bitterroot is well below normal at 27% of median, compared to 67% at this time last year.





Basin Overview

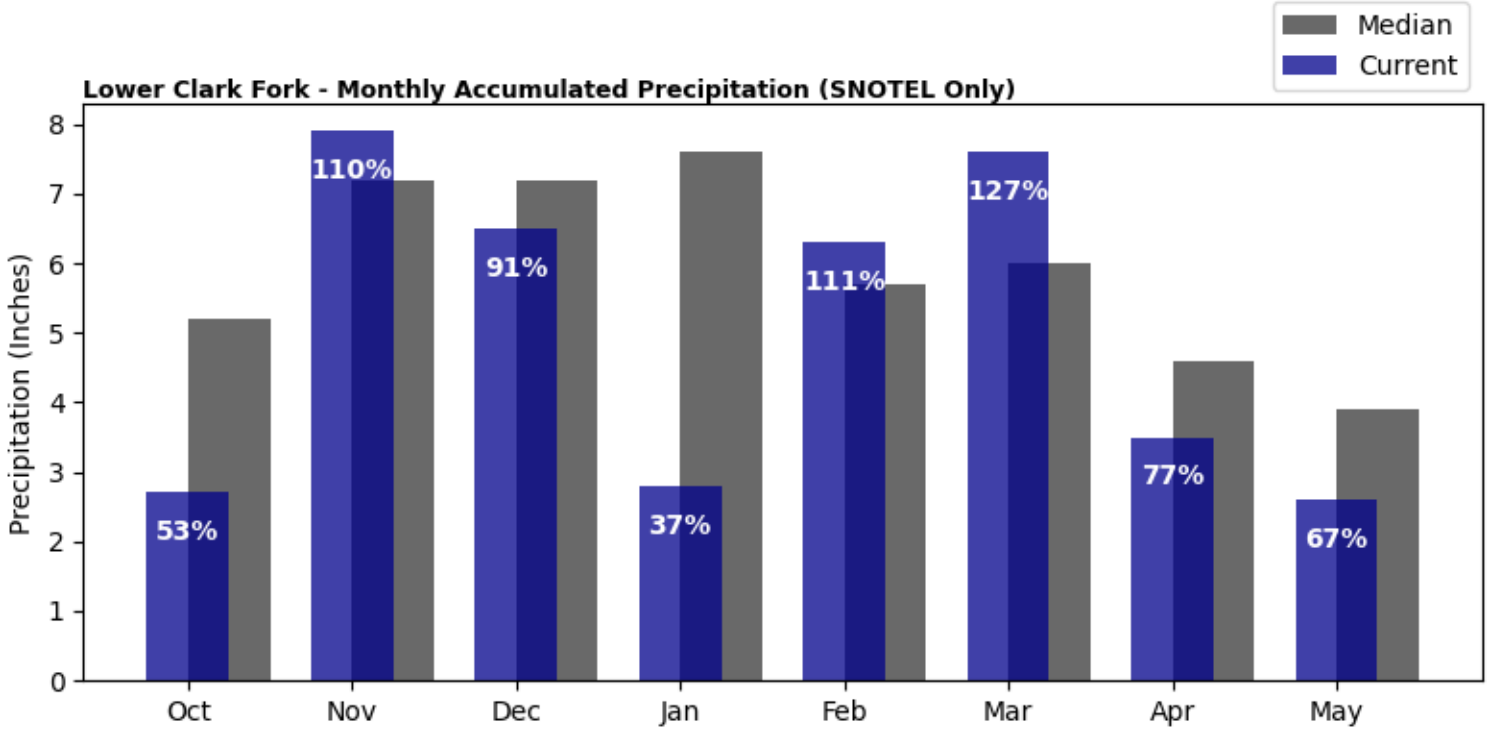
Bitterroot (Continued)

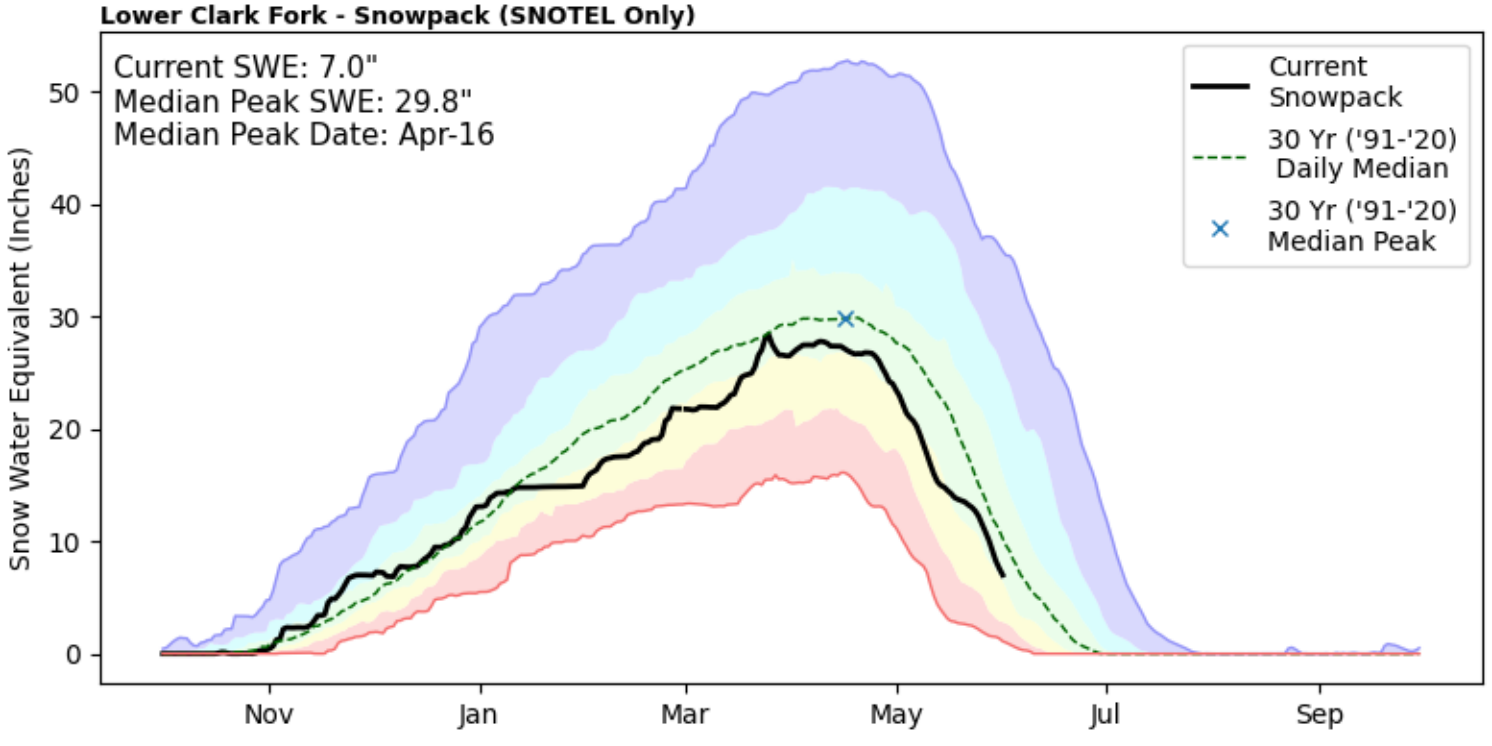


Basin Overview

Lower Clark Fork

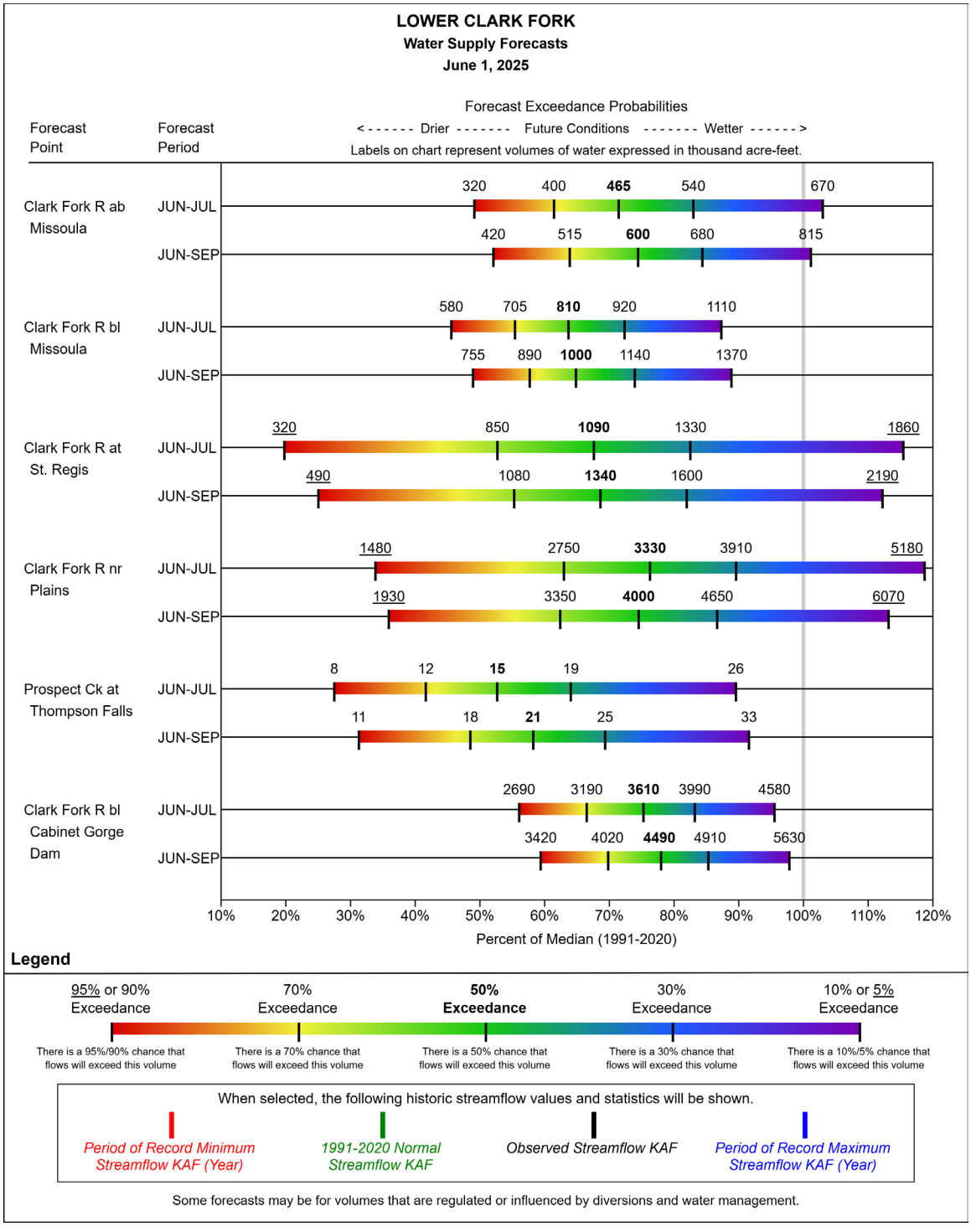
Precipitation in May was well below normal at 67%, which brings the seasonal accumulation (October-May) to 81% of median. The snowpack in the Lower Clark Fork is well below normal at 68% of median, compared to 72% at this time last year.





Basin Overview

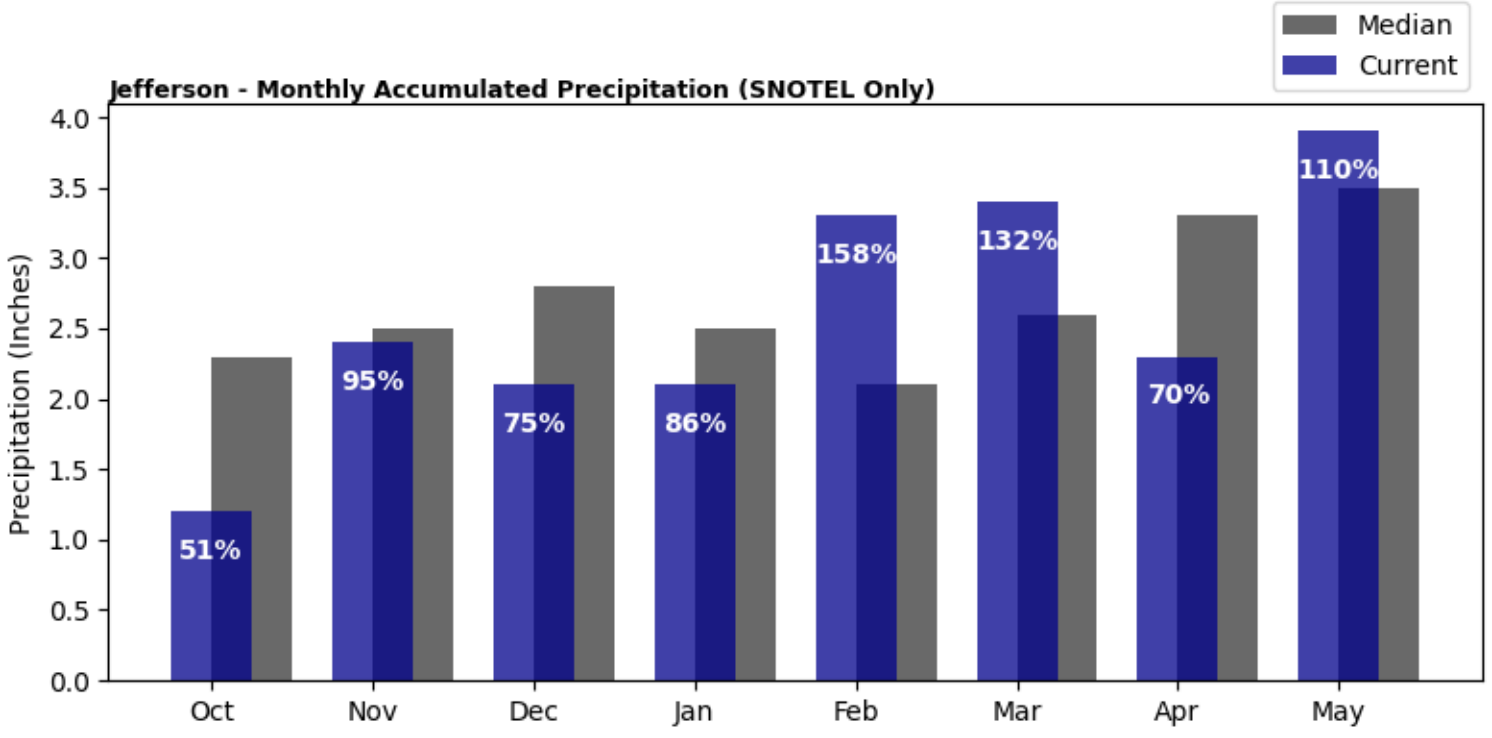
Lower Clark Fork (Continued)

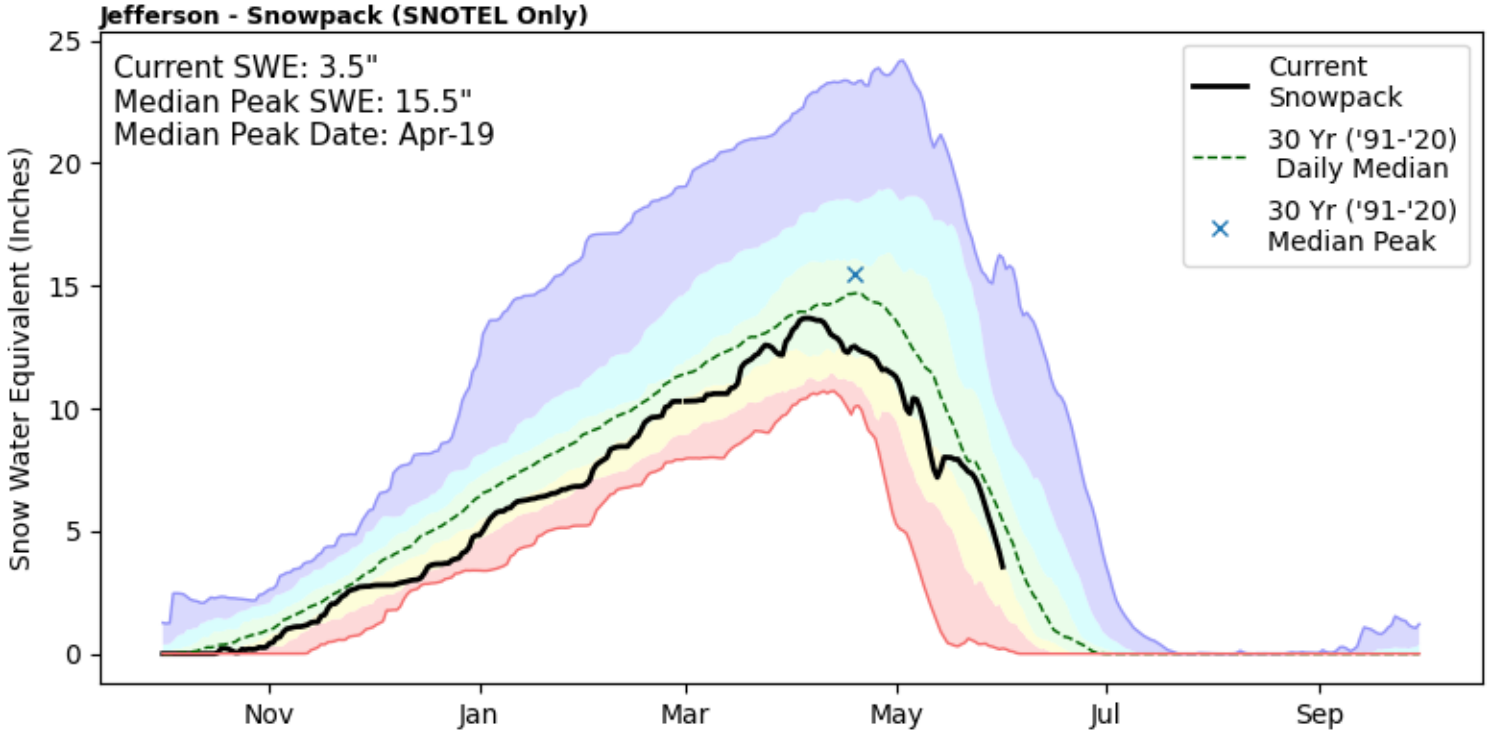


Basin Overview

Jefferson

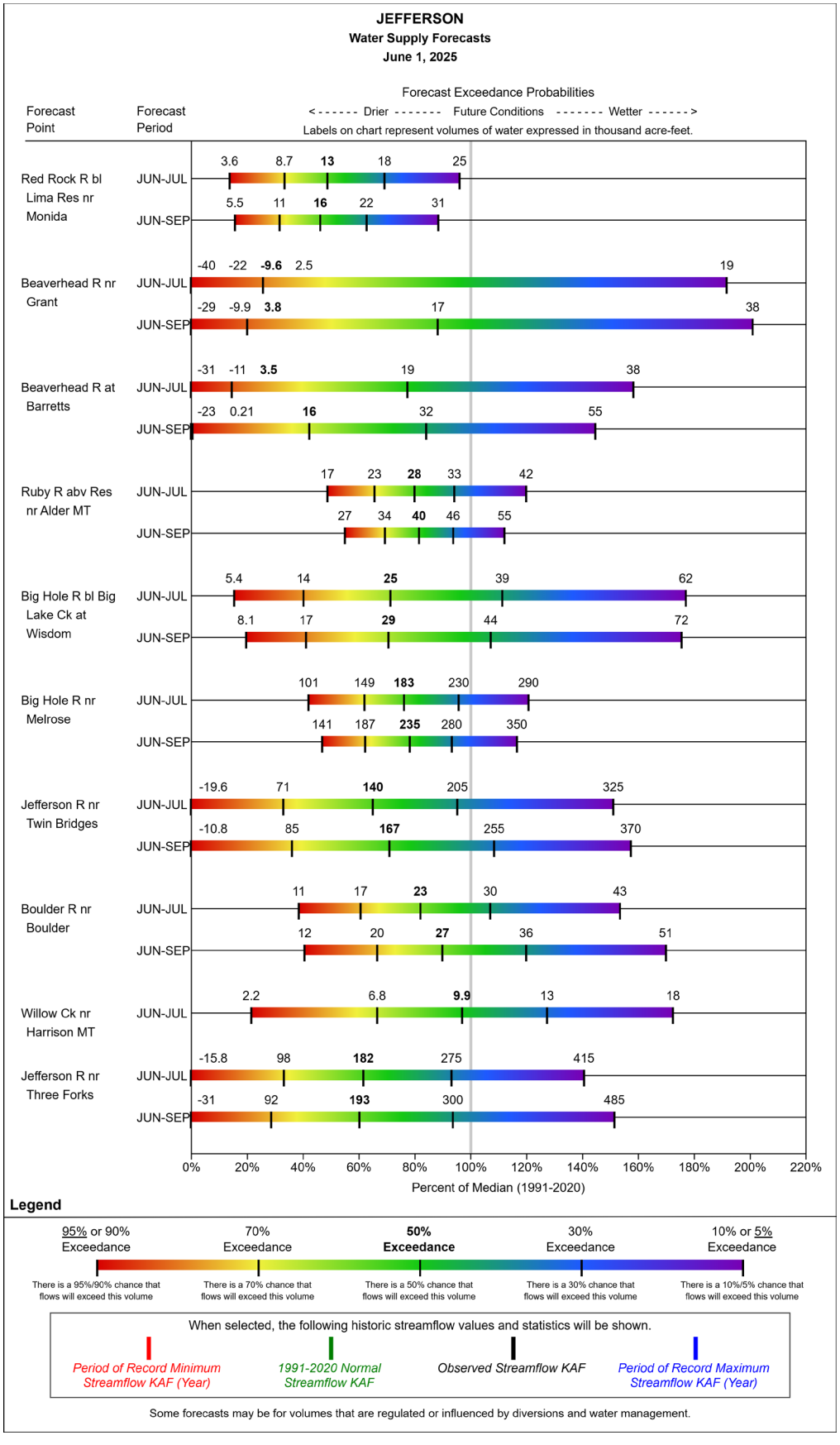
Precipitation in May was above normal at 110%, which brings the seasonal accumulation (October-May) to 93% of median. The snowpack in the Jefferson is well below normal at 66% of median, compared to 83% at this time last year.





Basin Overview

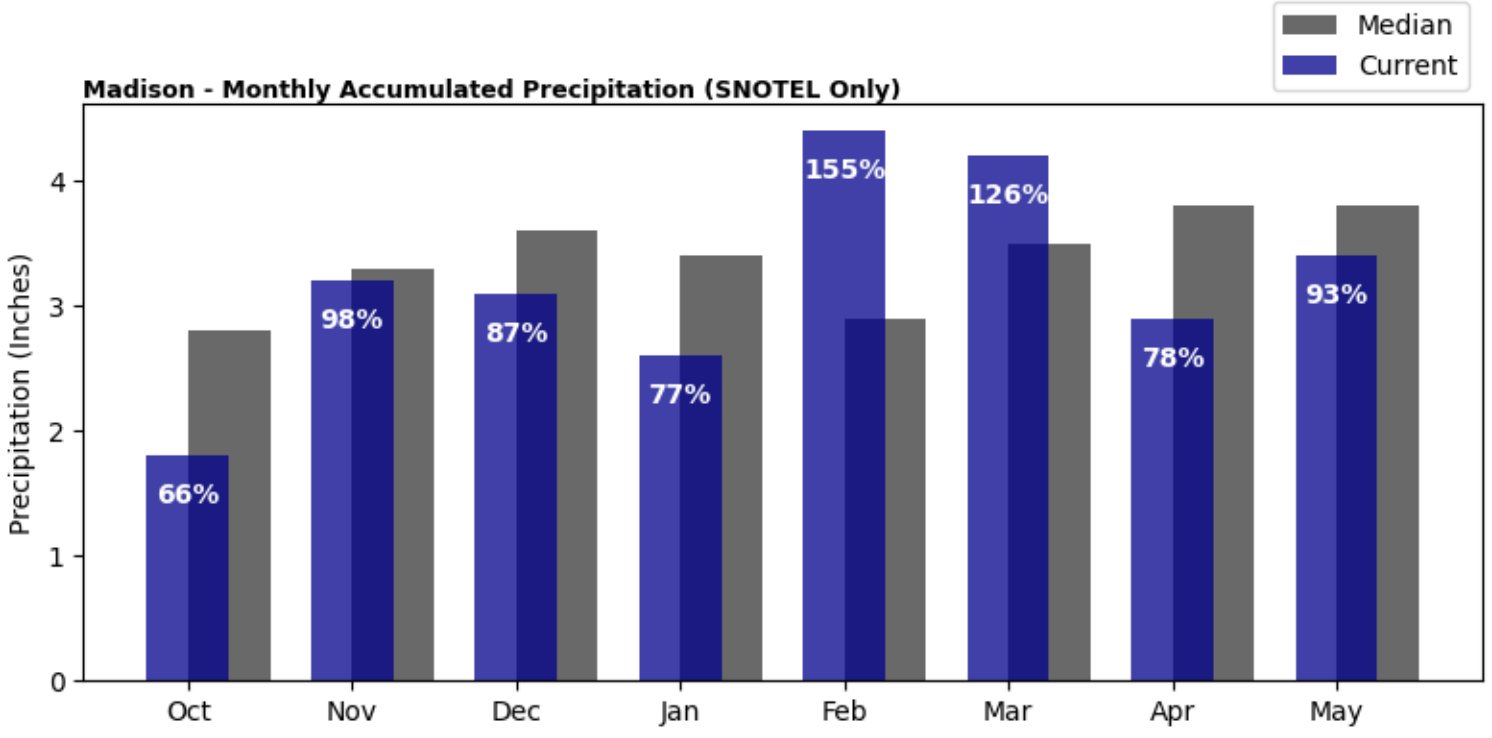
Jefferson (Continued)

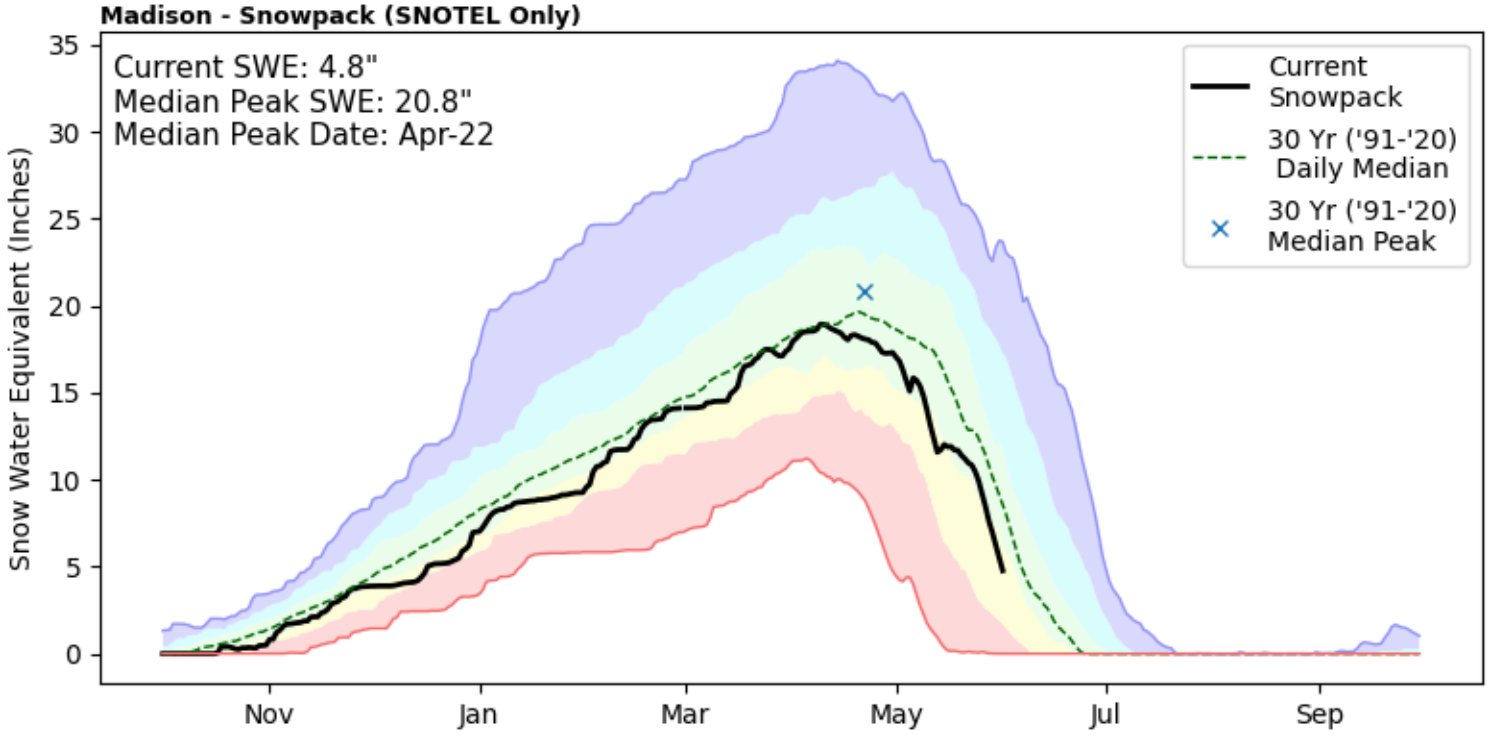


Basin Overview

Madison

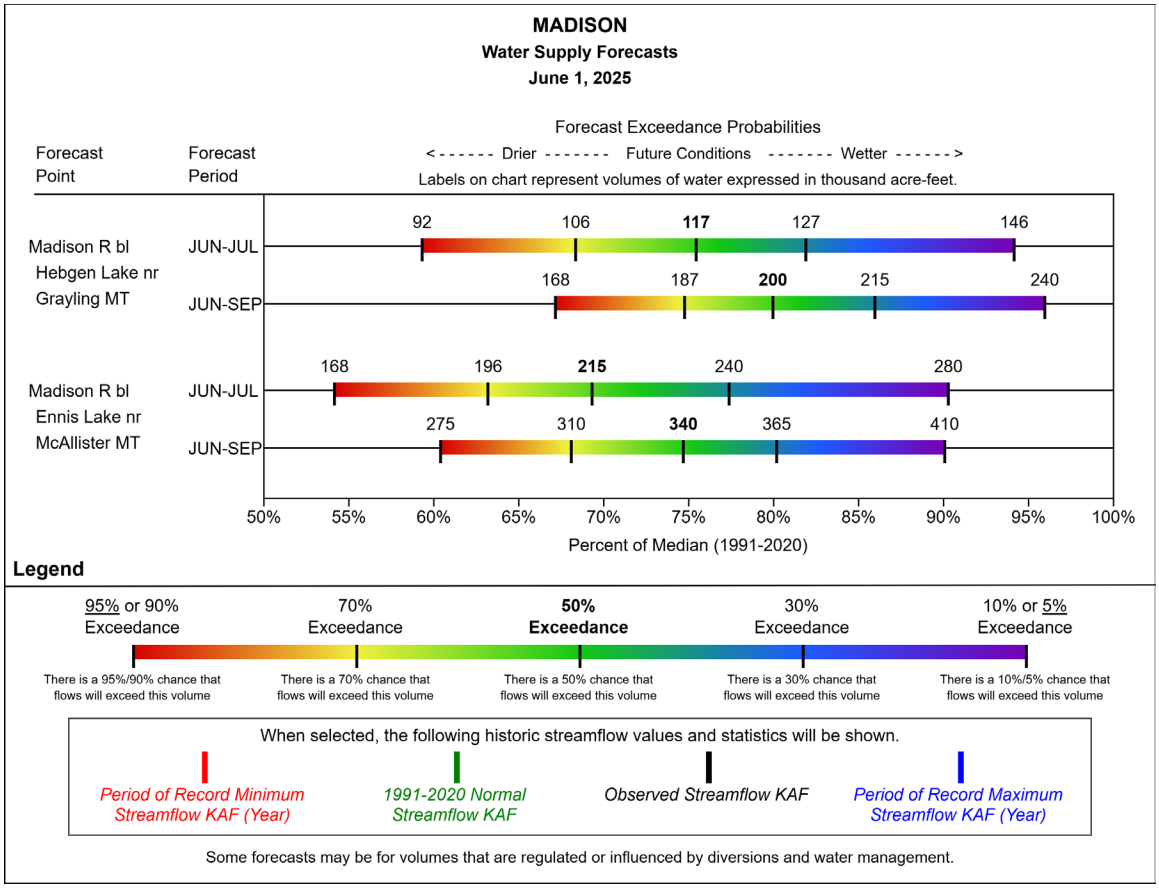
Precipitation in May was below normal at 93%, which brings the seasonal accumulation (October-May) to 93% of median. The snowpack in the Madison is well below normal at 56% of median, compared to 98% at this time last year.





Basin Overview

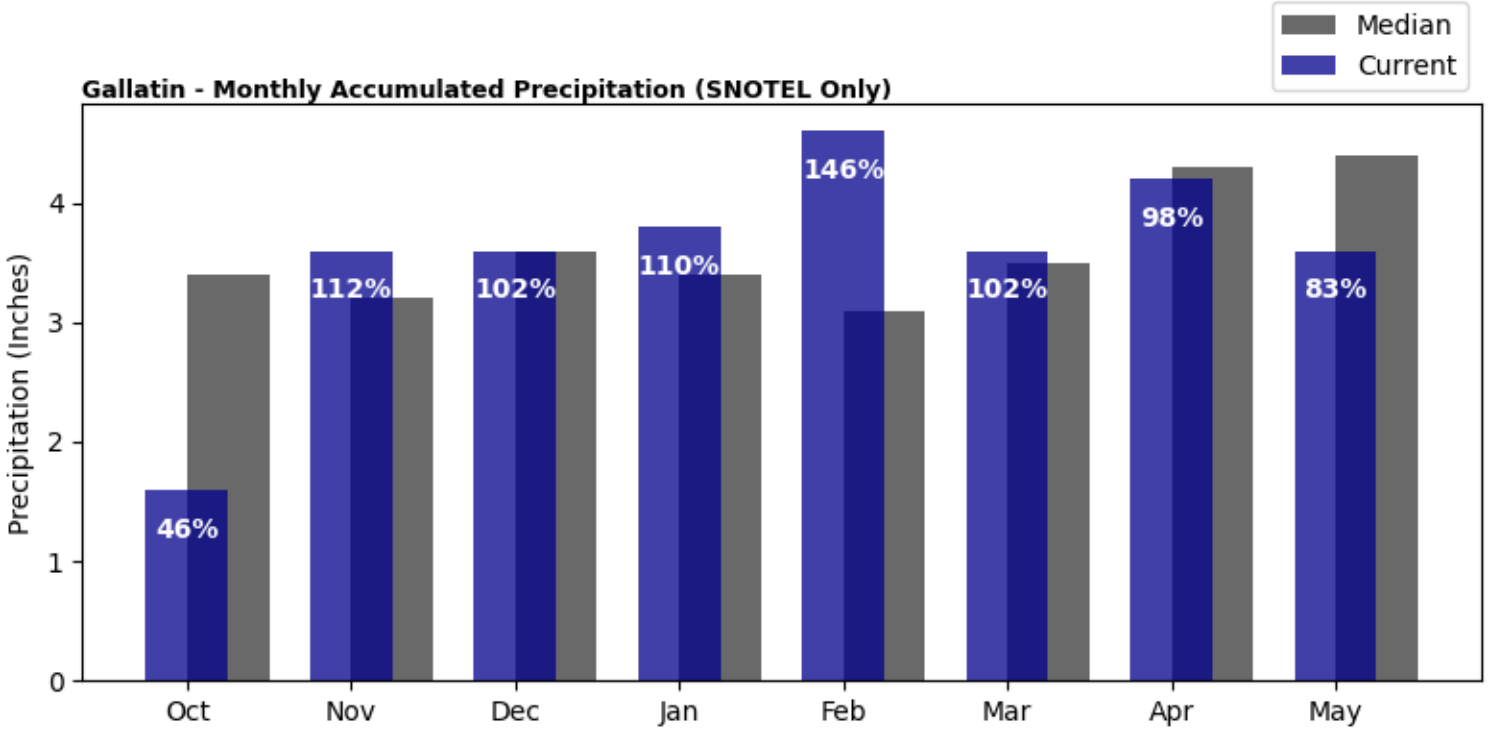
Madison (Continued)

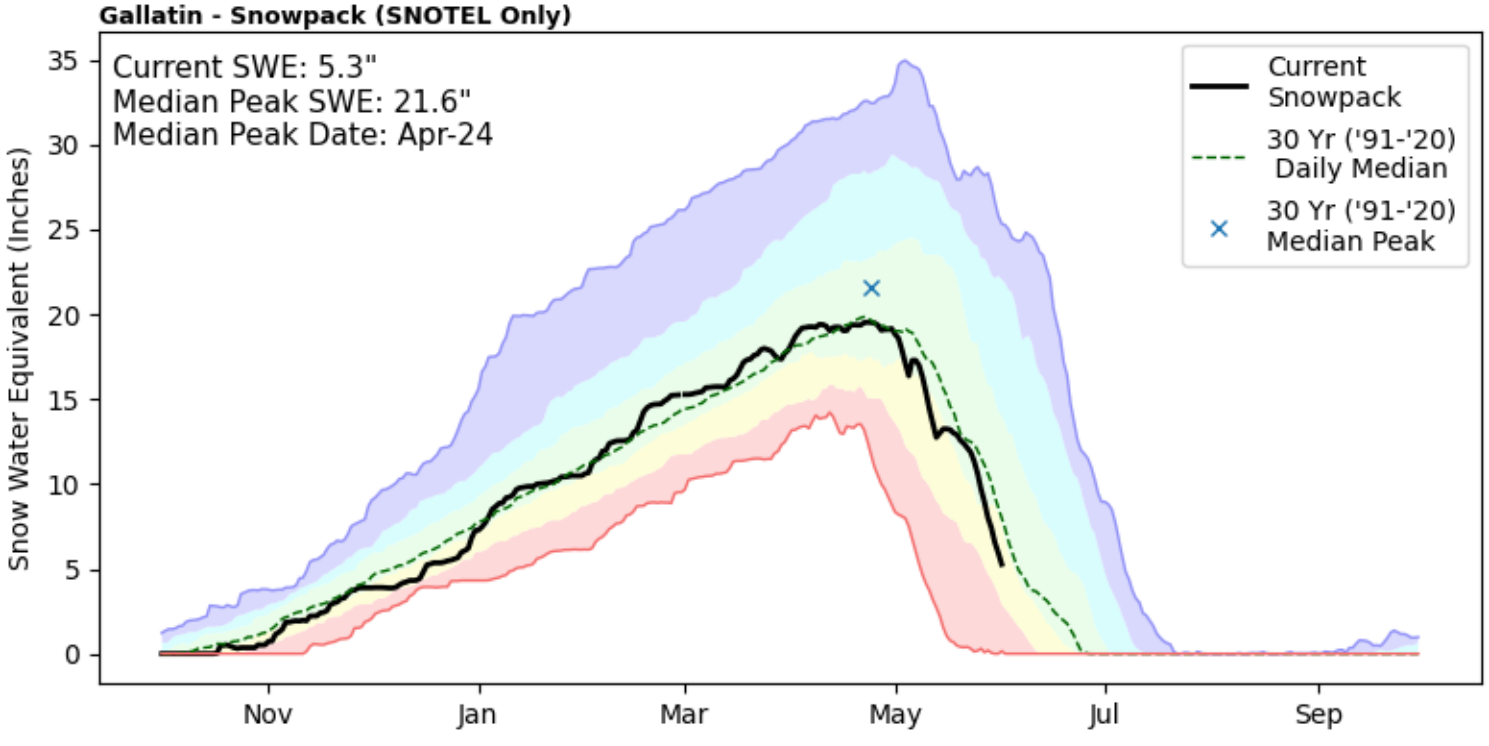


Basin Overview

Gallatin

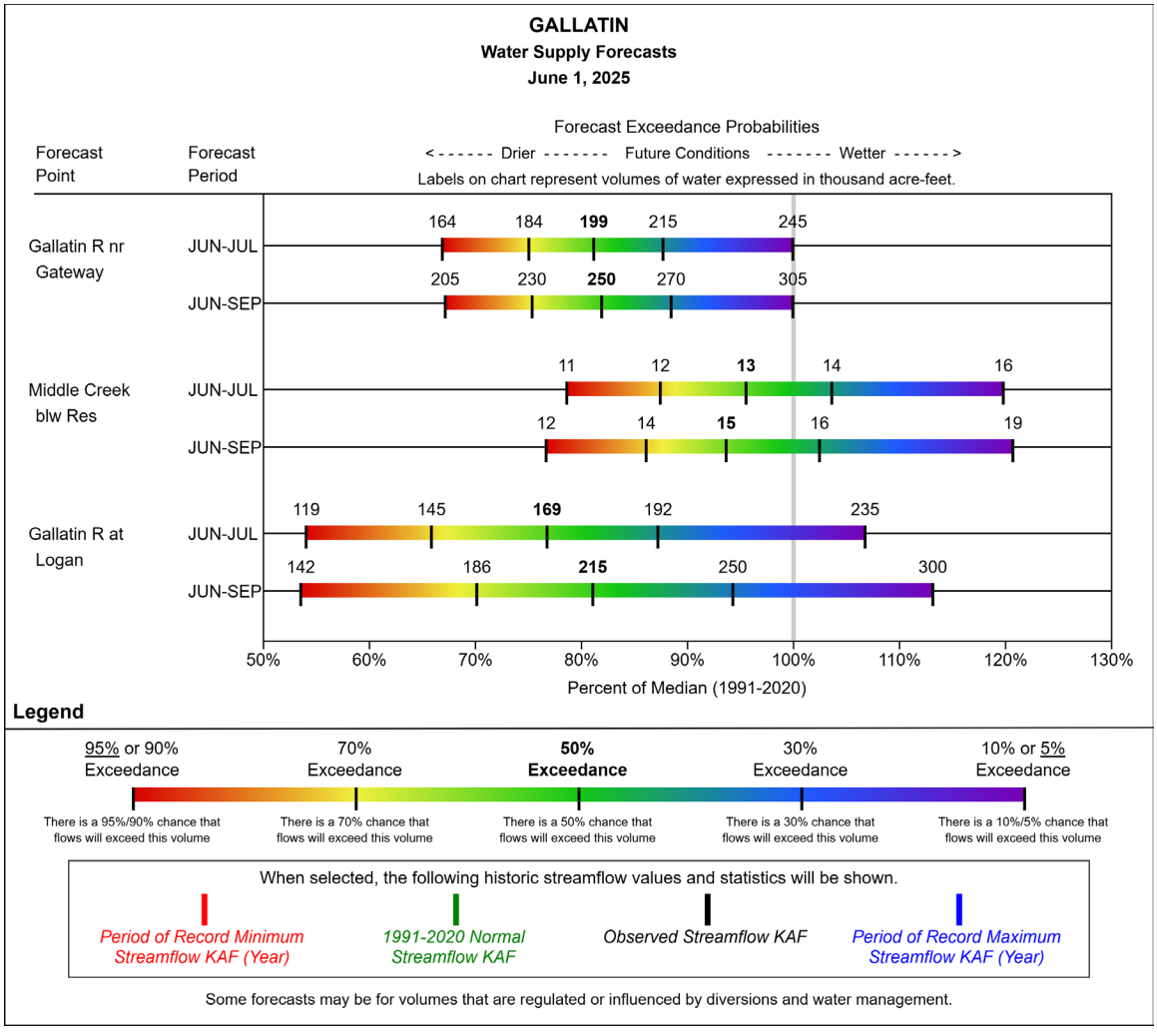
Precipitation in May was below normal at 83%, which brings the seasonal accumulation (October-May) to 95% of median. The snowpack in the Gallatin is well below normal at 66% of median, compared to 104% at this time last year.





Basin Overview

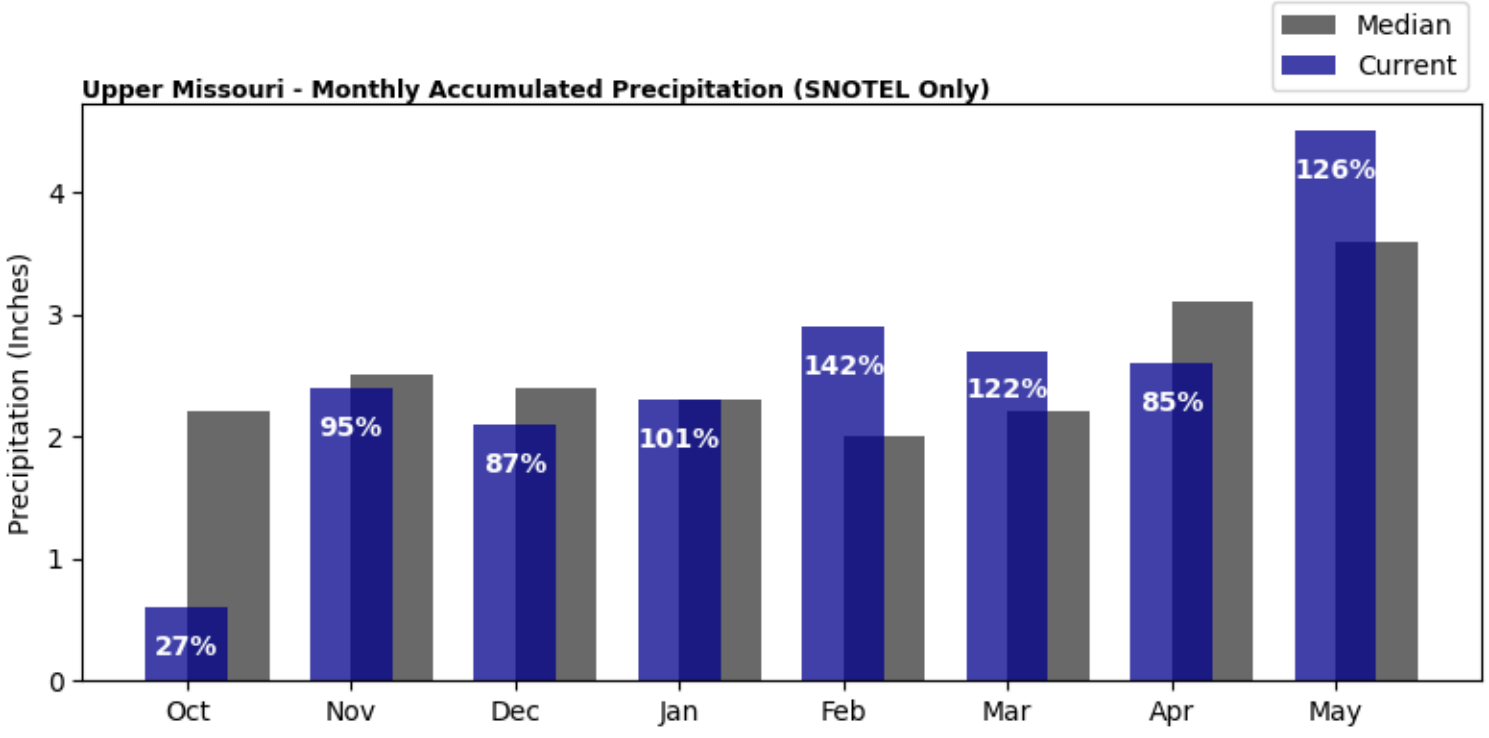
Gallatin (Continued)

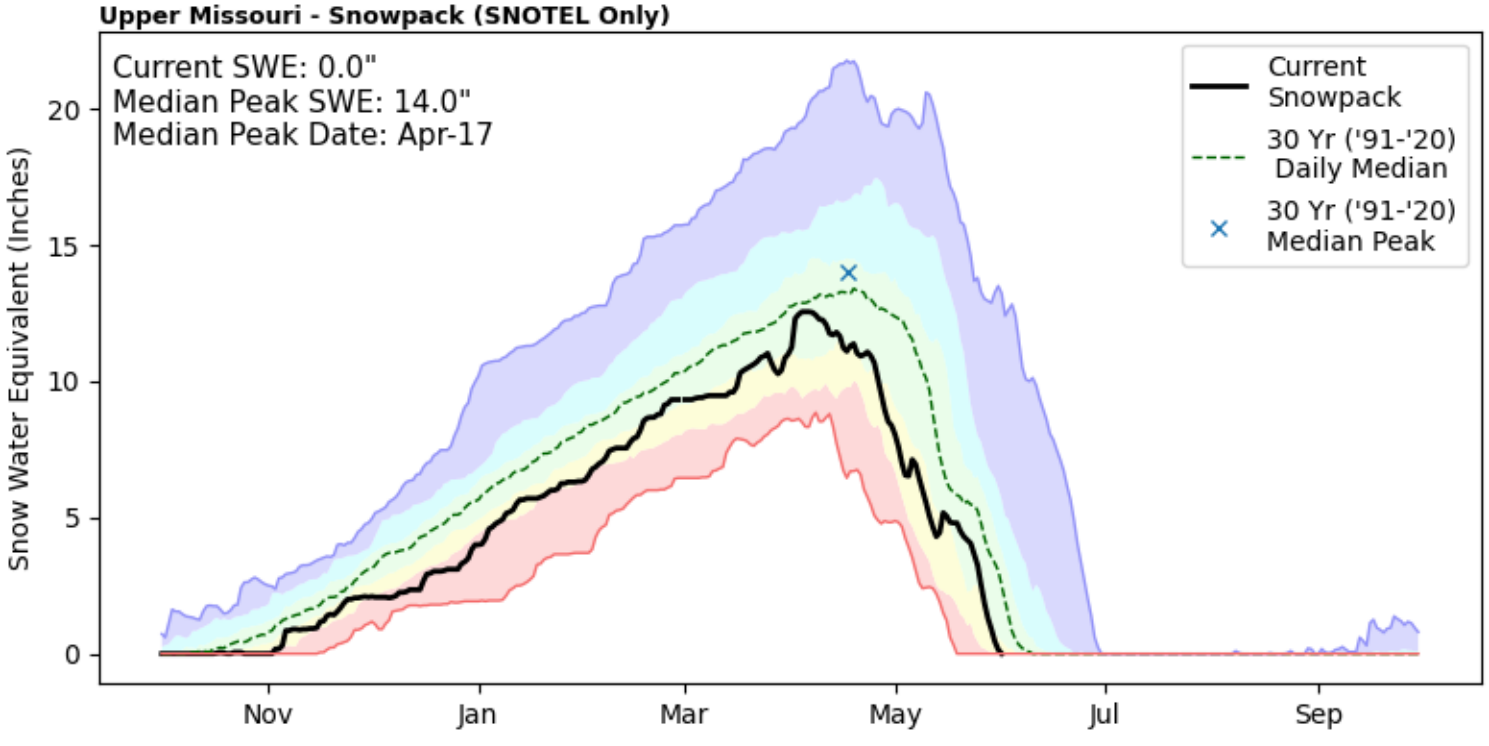


Basin Overview

Upper Missouri

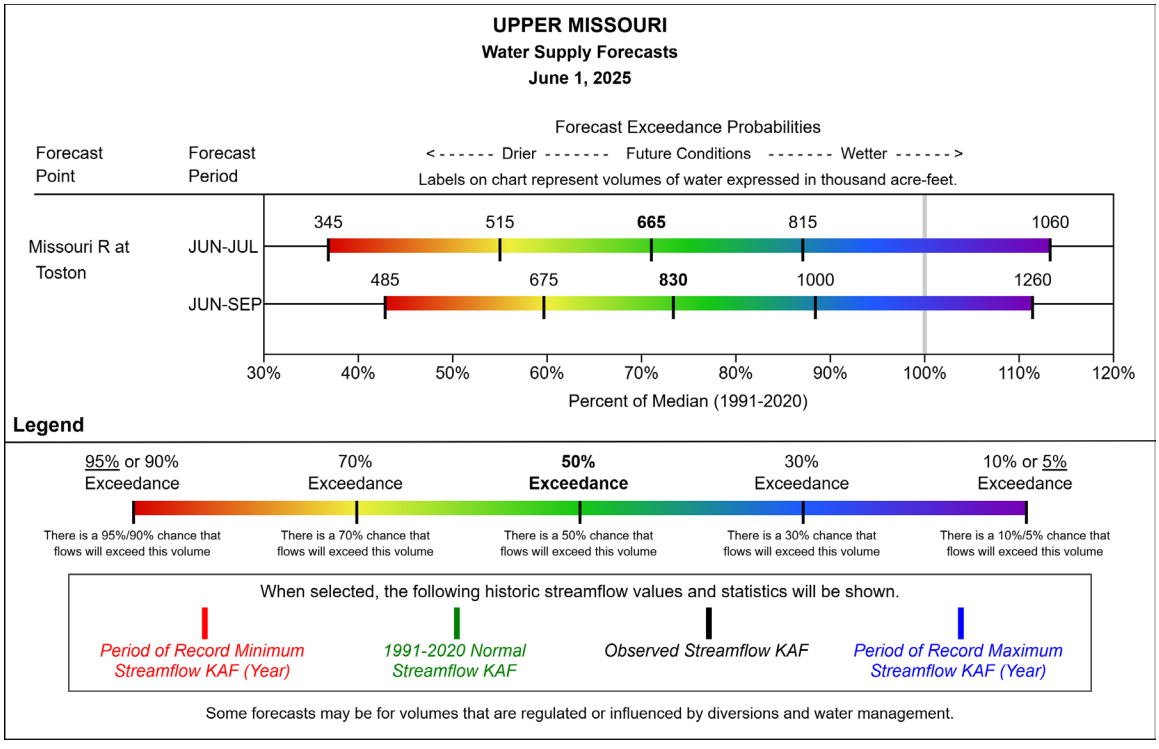
Precipitation in May was well above normal at 126%, which brings the seasonal accumulation (October-May) to 97% of median. The snowpack in the Upper Missouri is None at None% of median, compared to 3% at this time last year.





Basin Overview

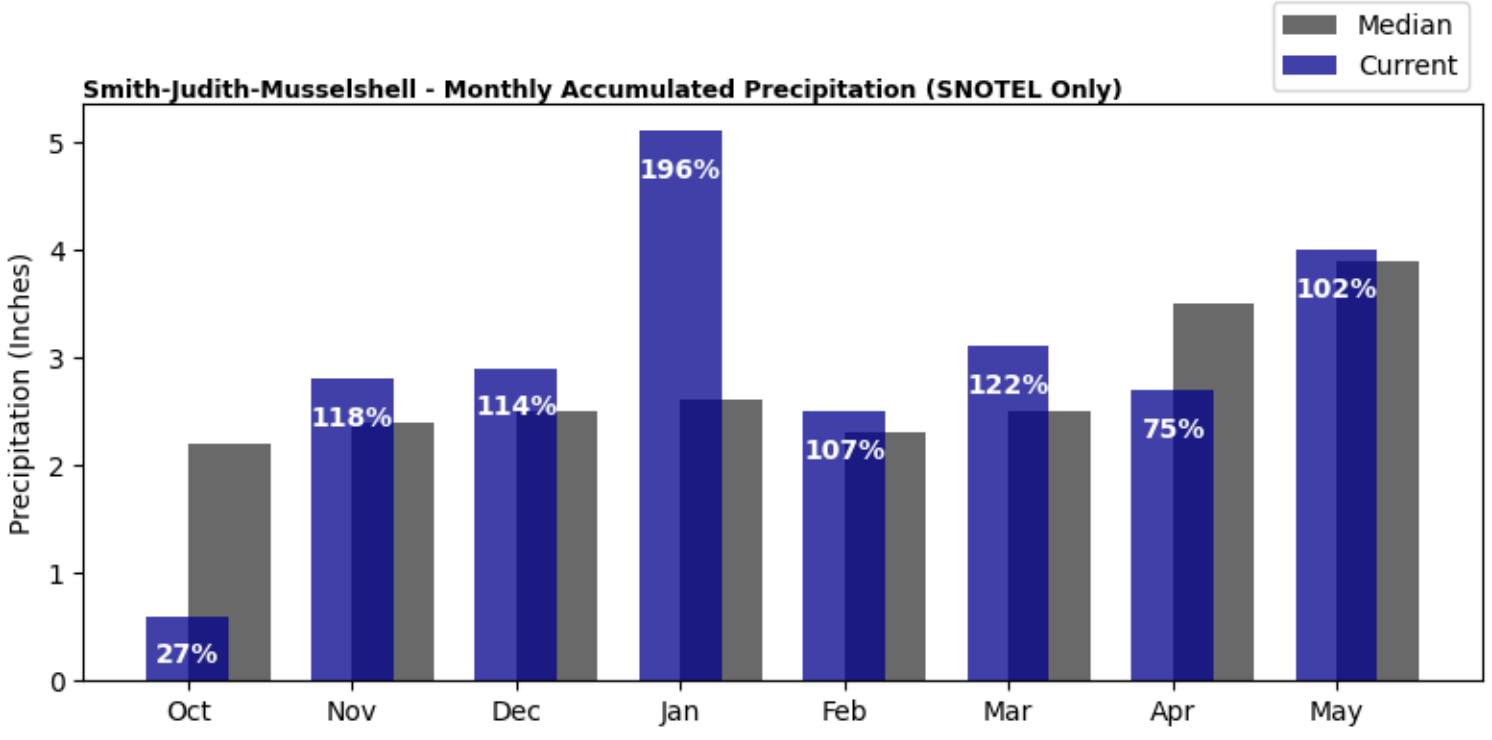
Upper Missouri (Continued)

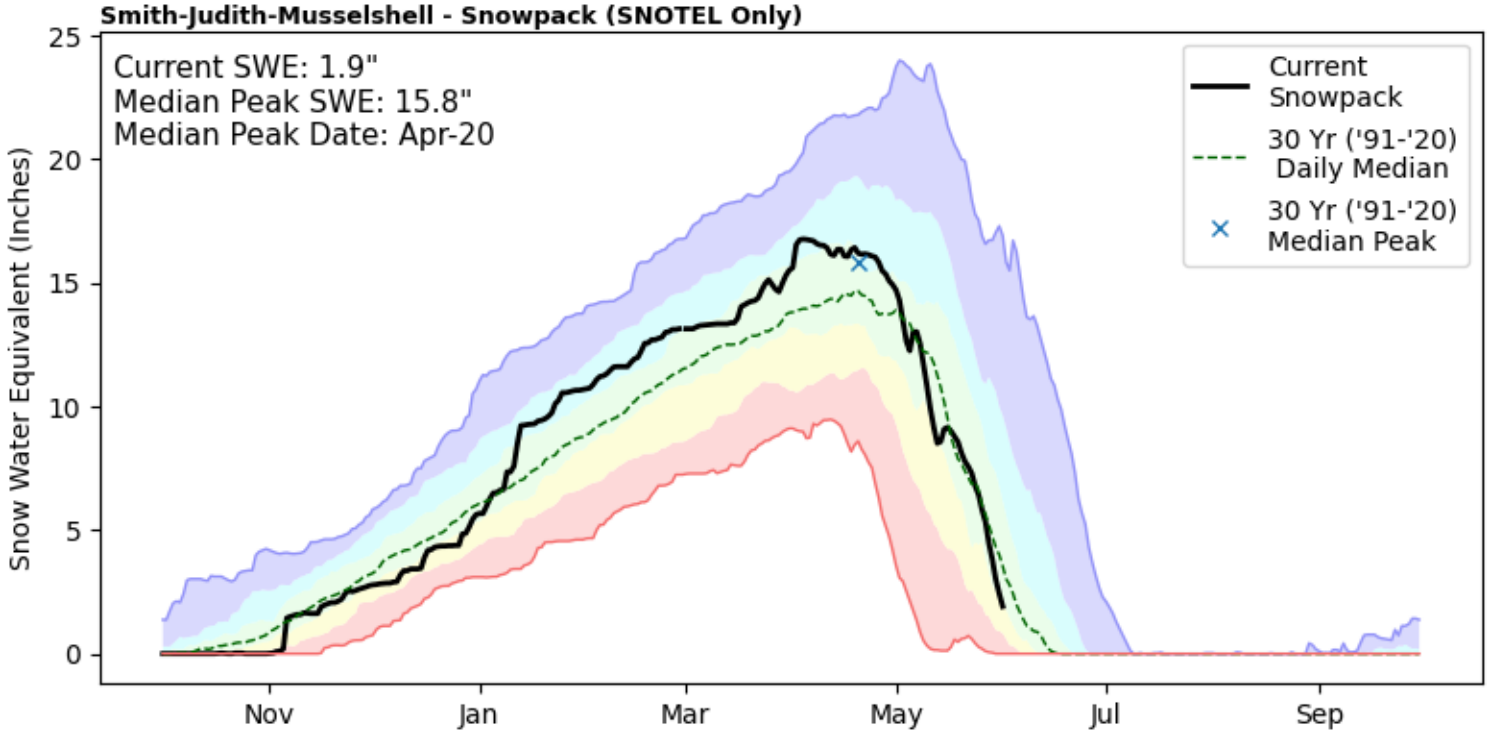


Basin Overview

Smith-Judith-Musselshell

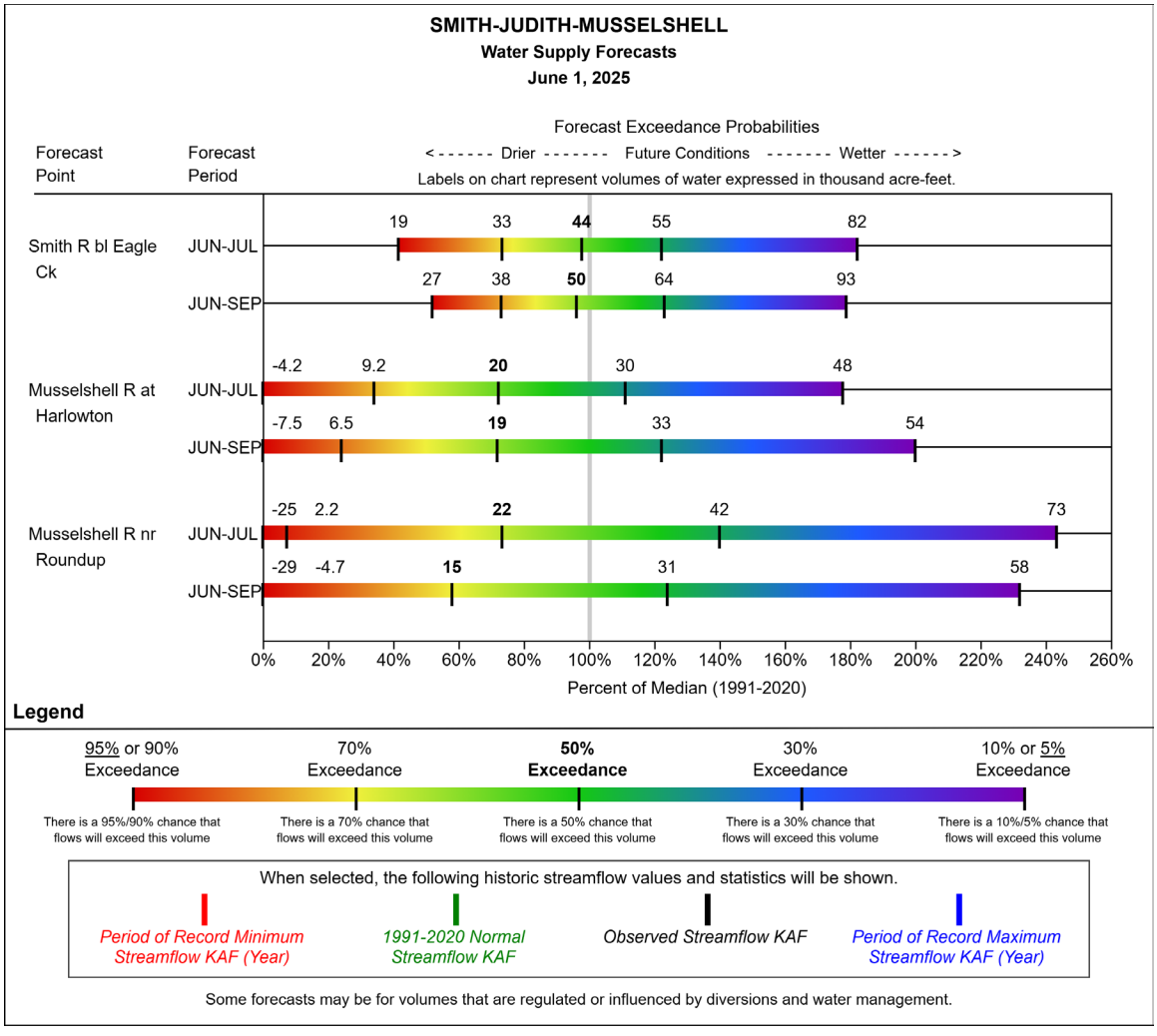
Precipitation in May was near normal at 102%, which brings the seasonal accumulation (October-May) to 101% of median. The snowpack in the Smith-Judith-Musselshell is well below normal at 54% of median, compared to 104% at this time last year.





Basin Overview

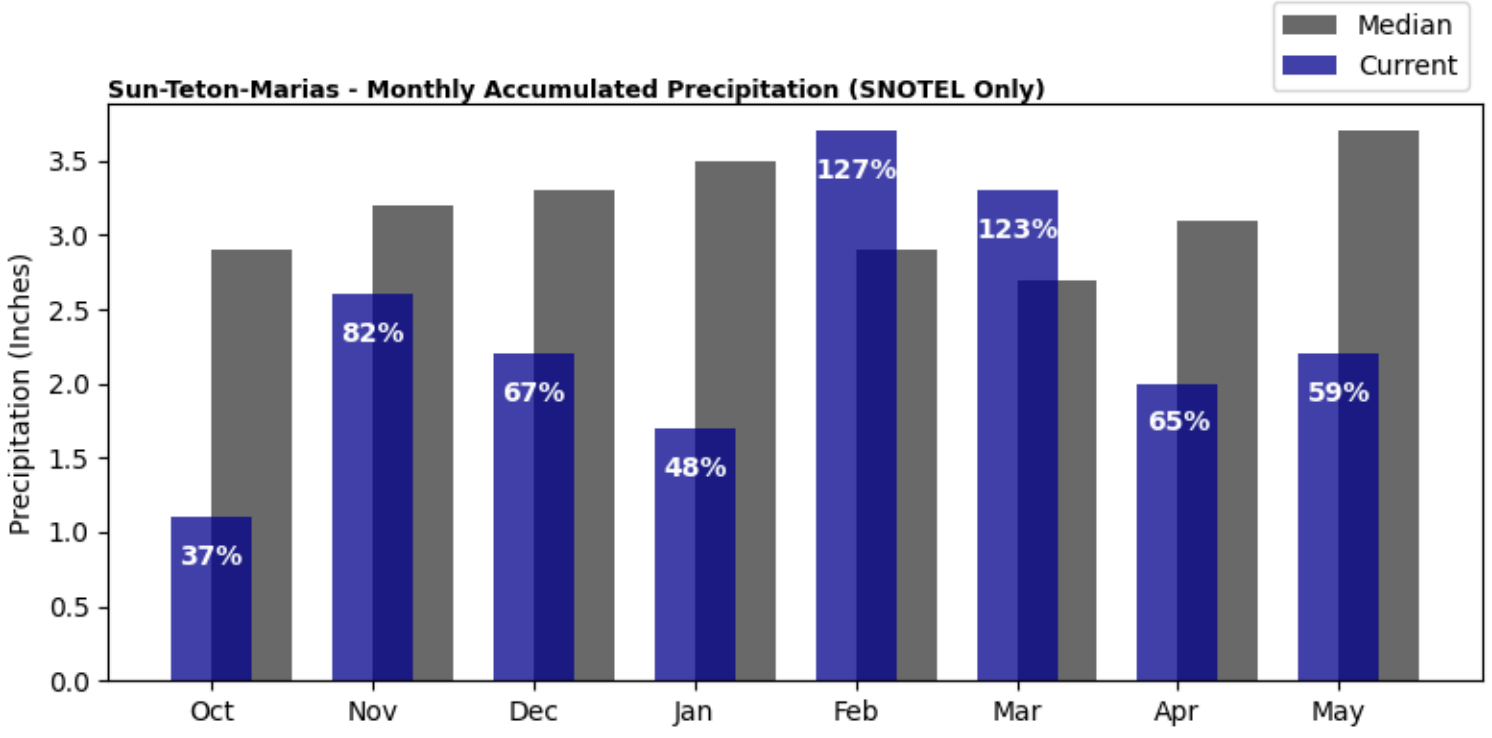
Smith-Judith-Musselshell (Continued)

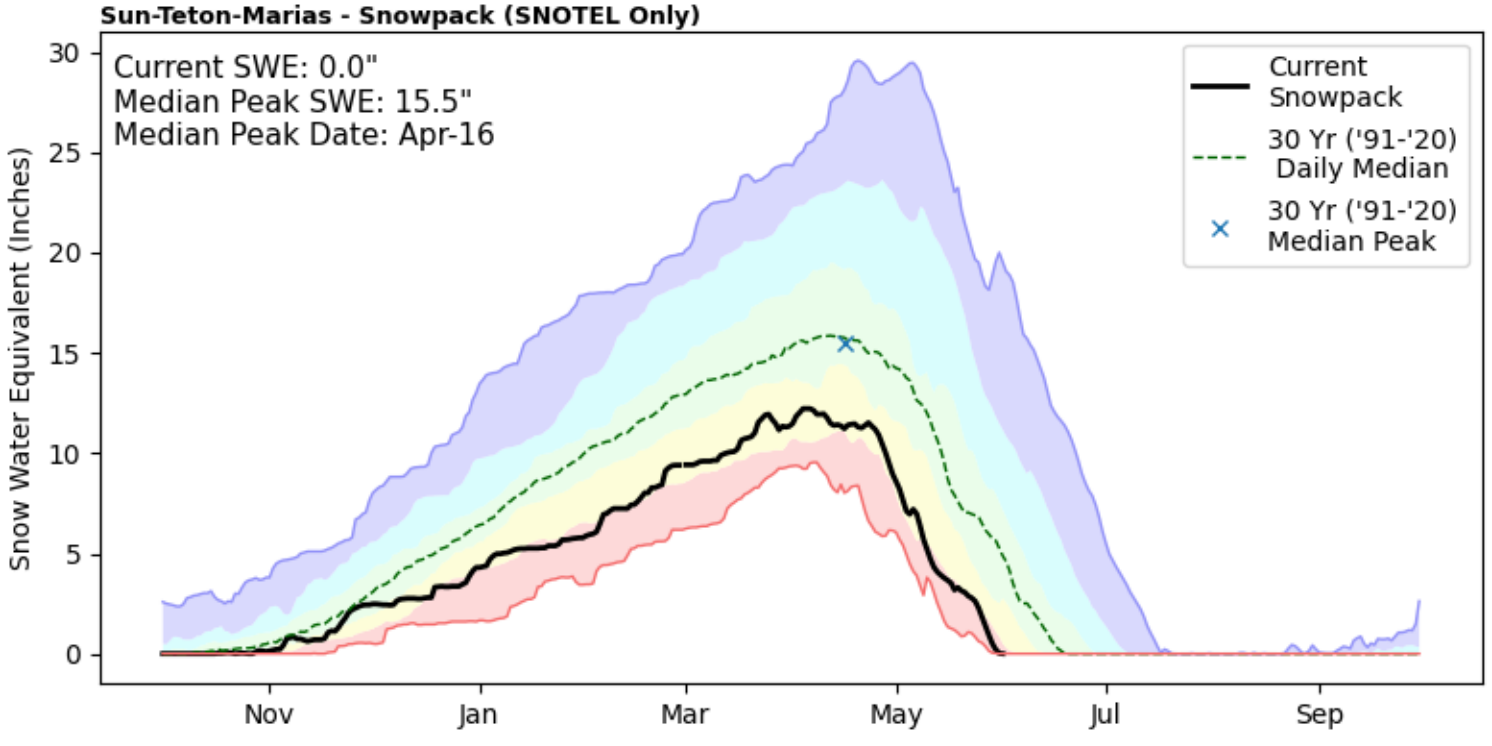


Basin Overview

Sun-Teton-Marias

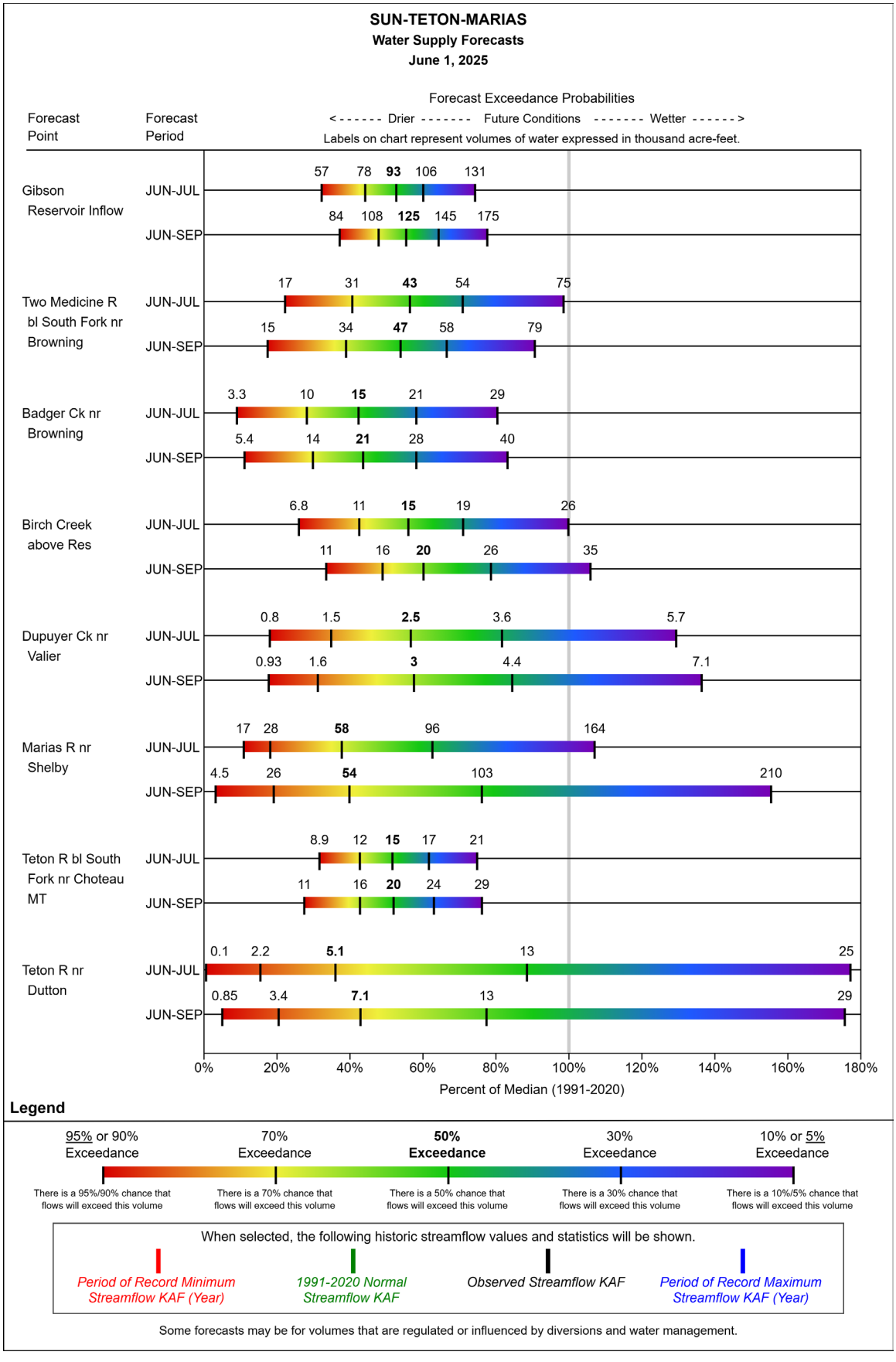
Precipitation in May was well below normal at 59%, which brings the seasonal accumulation (October-May) to 71% of median. The snowpack in the Sun-Teton-Marias is None at None% of median, compared to 16% at this time last year.





Basin Overview

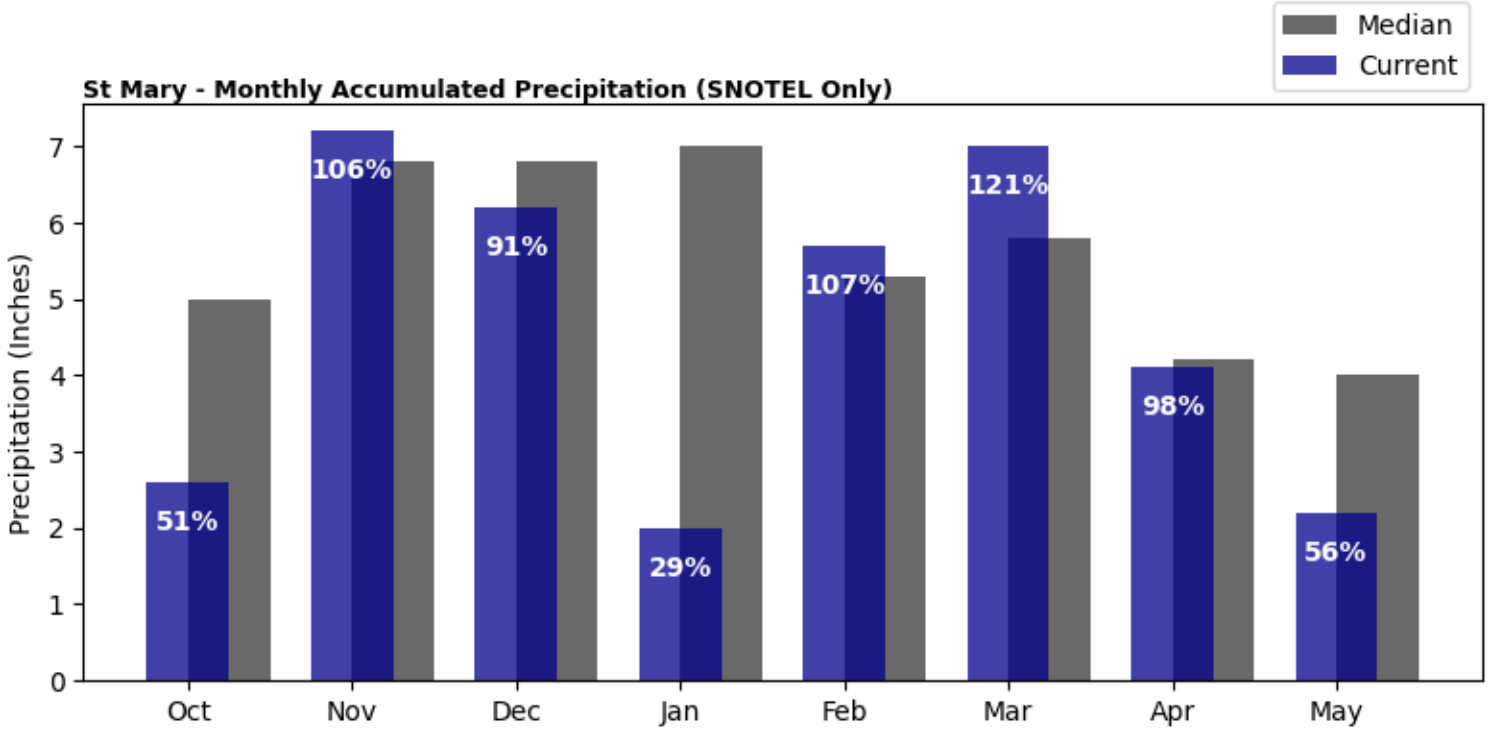
Sun-Teton-Marias (Continued)

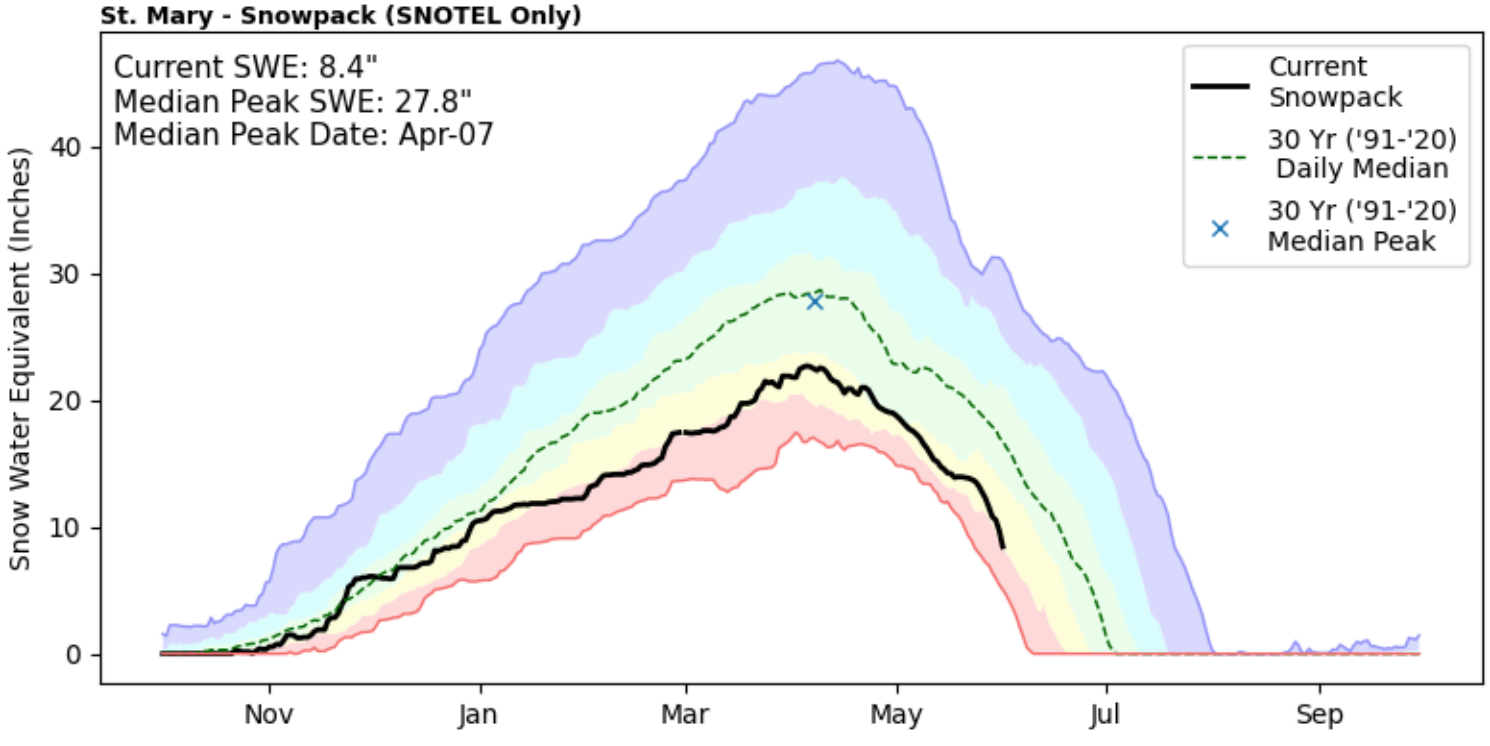


Basin Overview

St. Mary

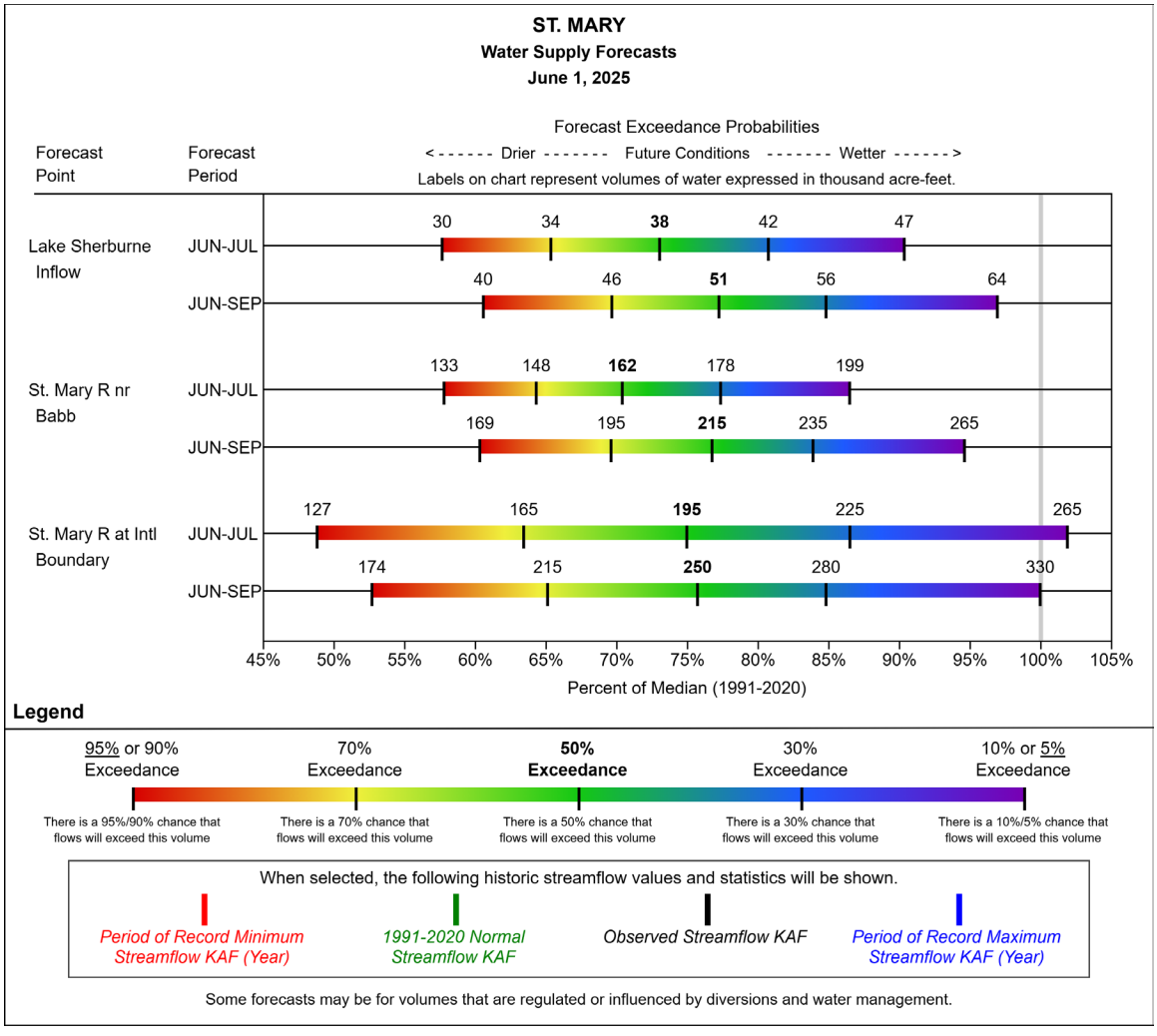
Precipitation in May was well below normal at 56%, which brings the seasonal accumulation (October-May) to 76% of median. The snowpack in the St. Mary is well below normal at 50% of median, compared to 90% at this time last year.





Basin Overview

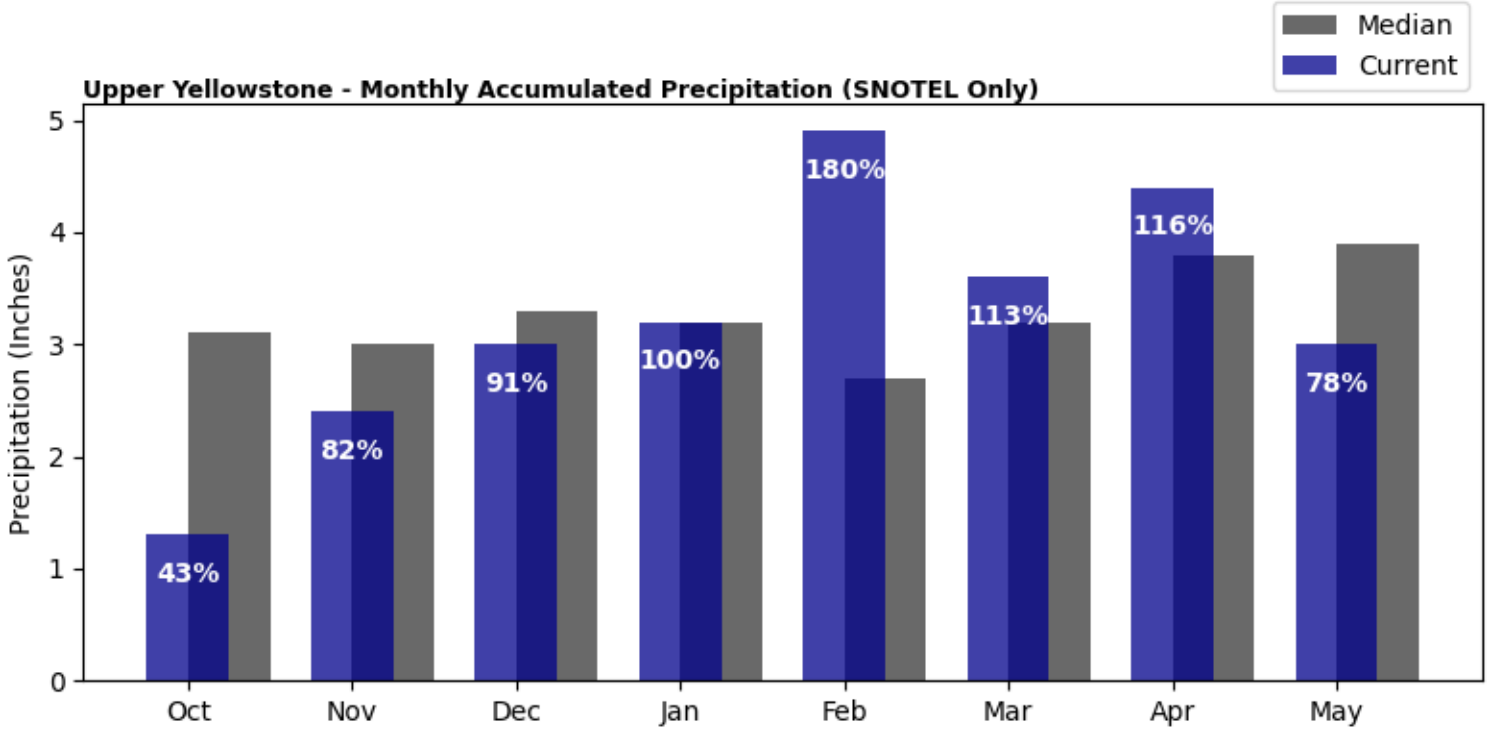
St. Mary (Continued)

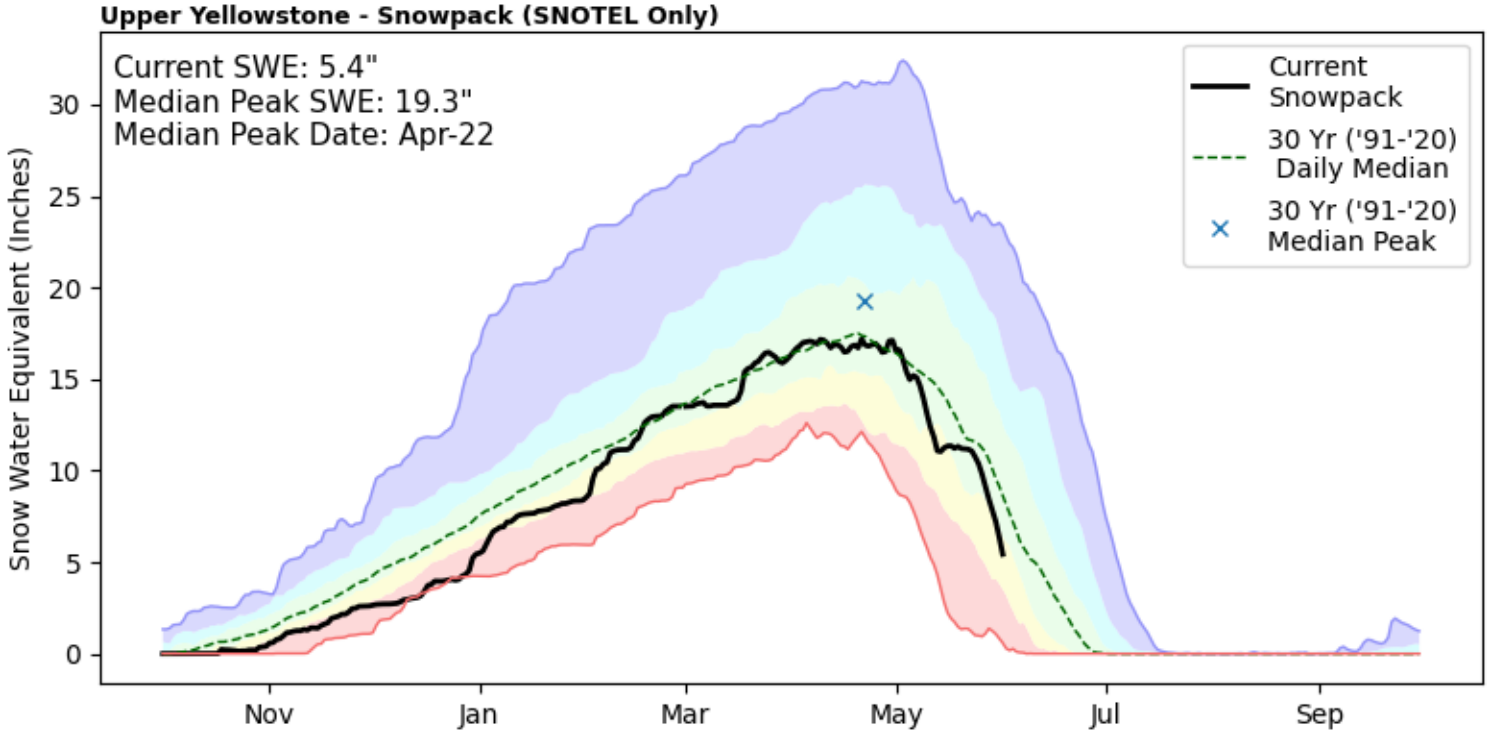


Basin Overview

Upper Yellowstone

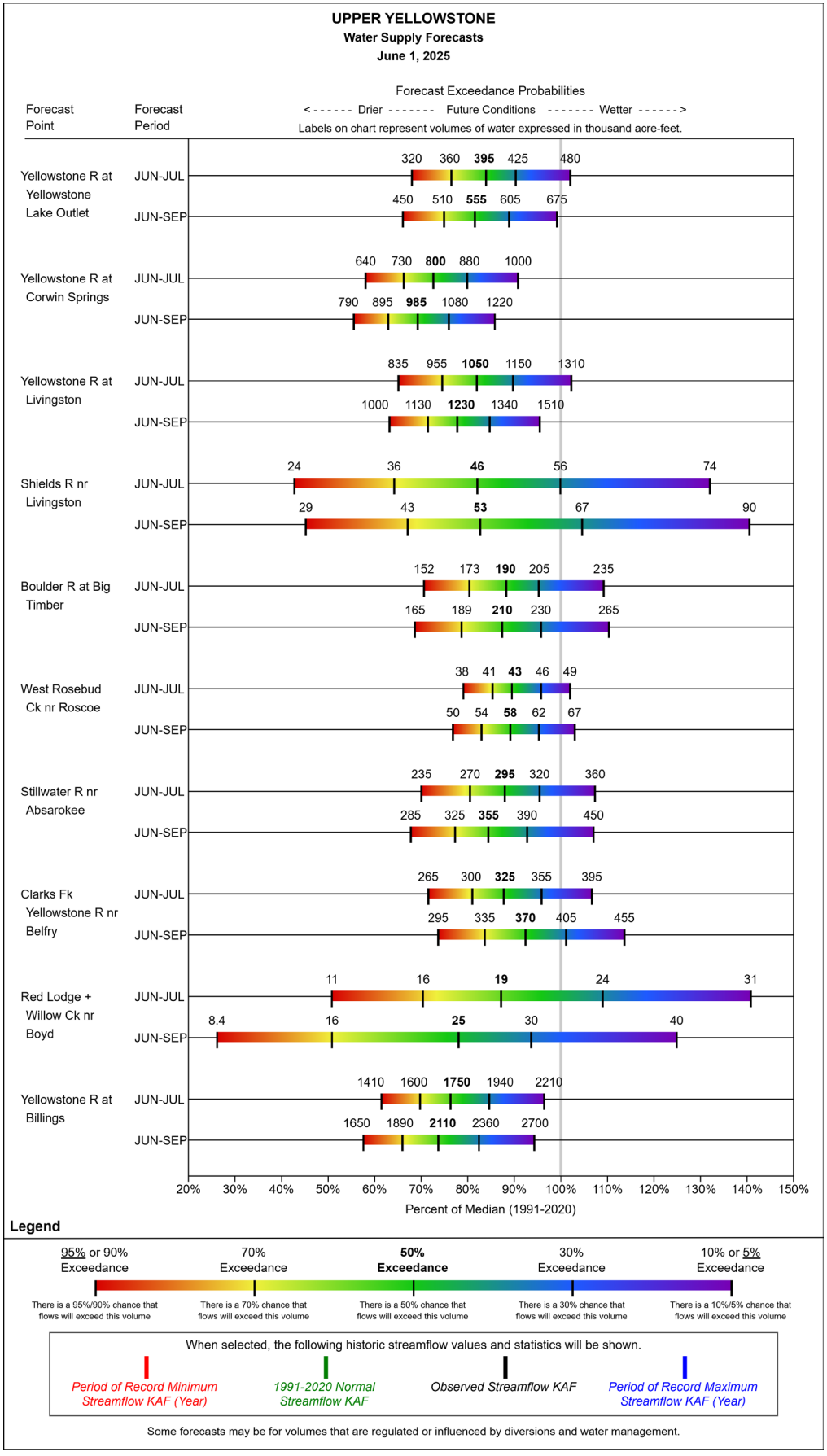
Precipitation in May was well below normal at 78%, which brings the seasonal accumulation (October-May) to 96% of median. The snowpack in the Upper Yellowstone is well below normal at 63% of median, compared to 94% at this time last year.





Basin Overview

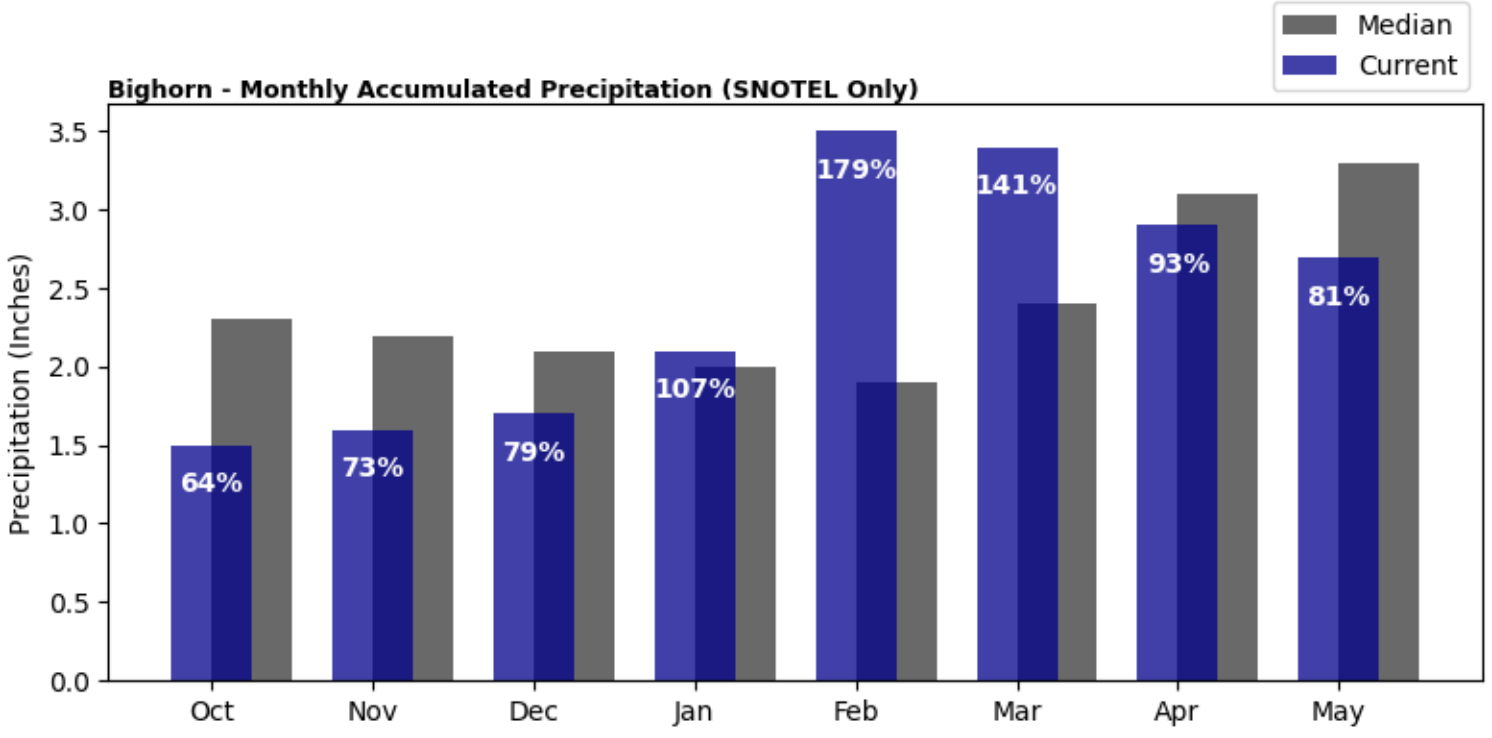
Upper Yellowstone (Continued)

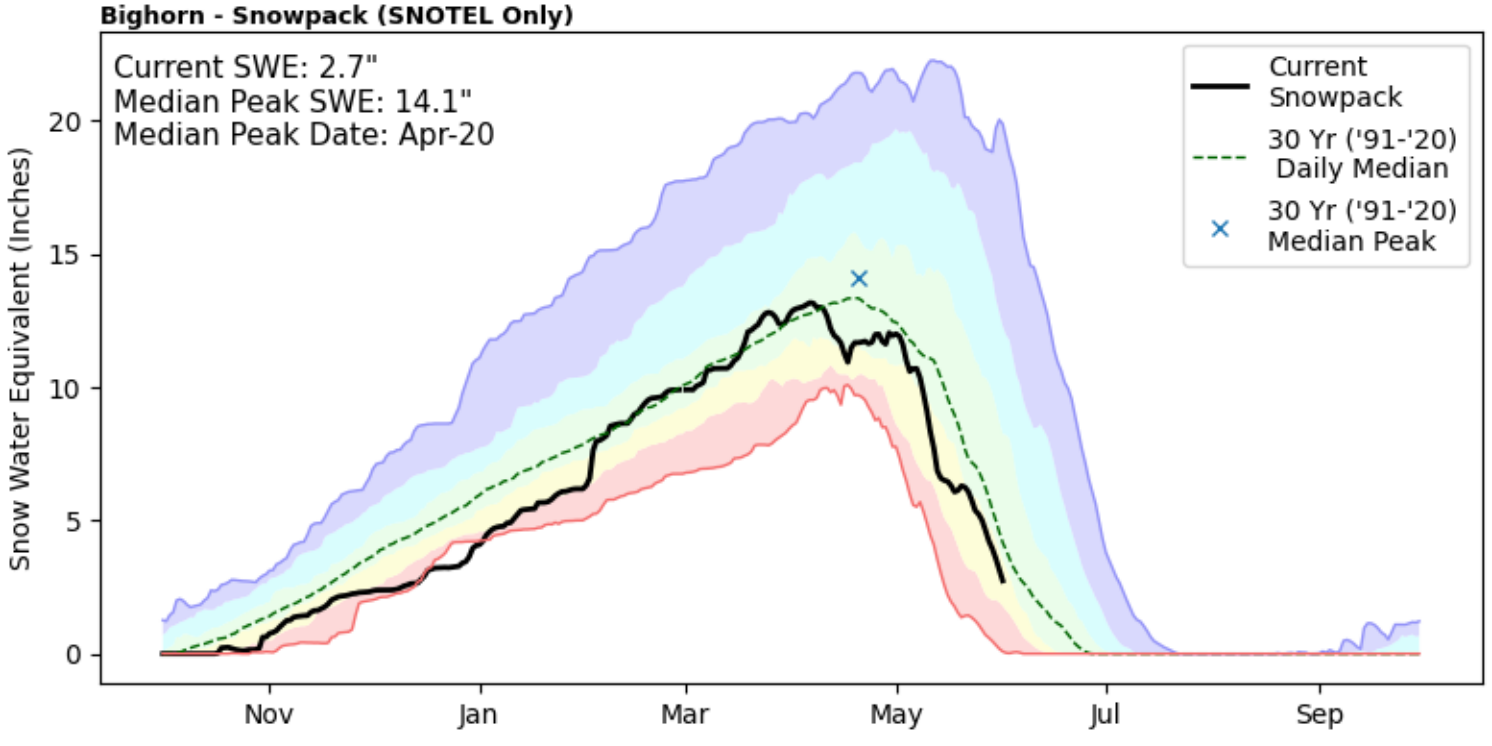


Basin Overview

Bighorn

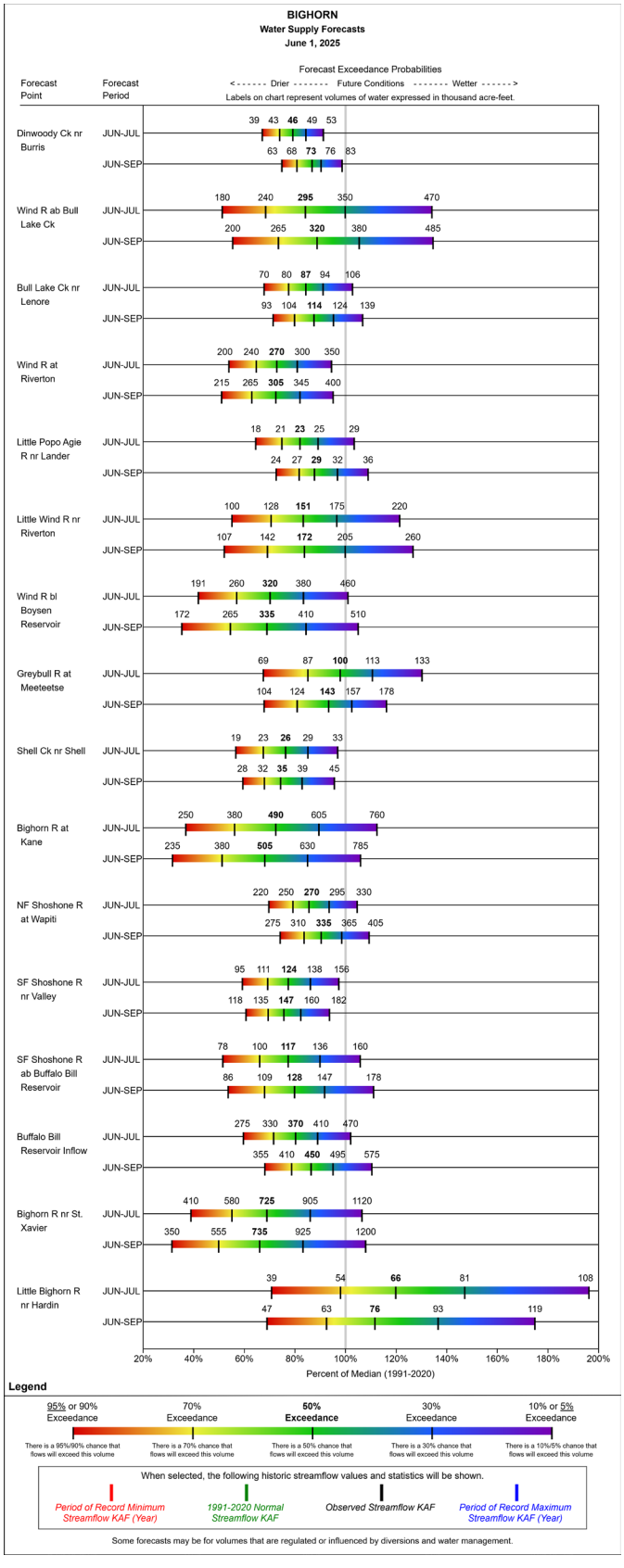
Precipitation in May was below normal at 81%, which brings the seasonal accumulation (October-May) to 95% of median. The snowpack in the Bighorn is well below normal at 66% of median, compared to 134% at this time last year.





Basin Overview

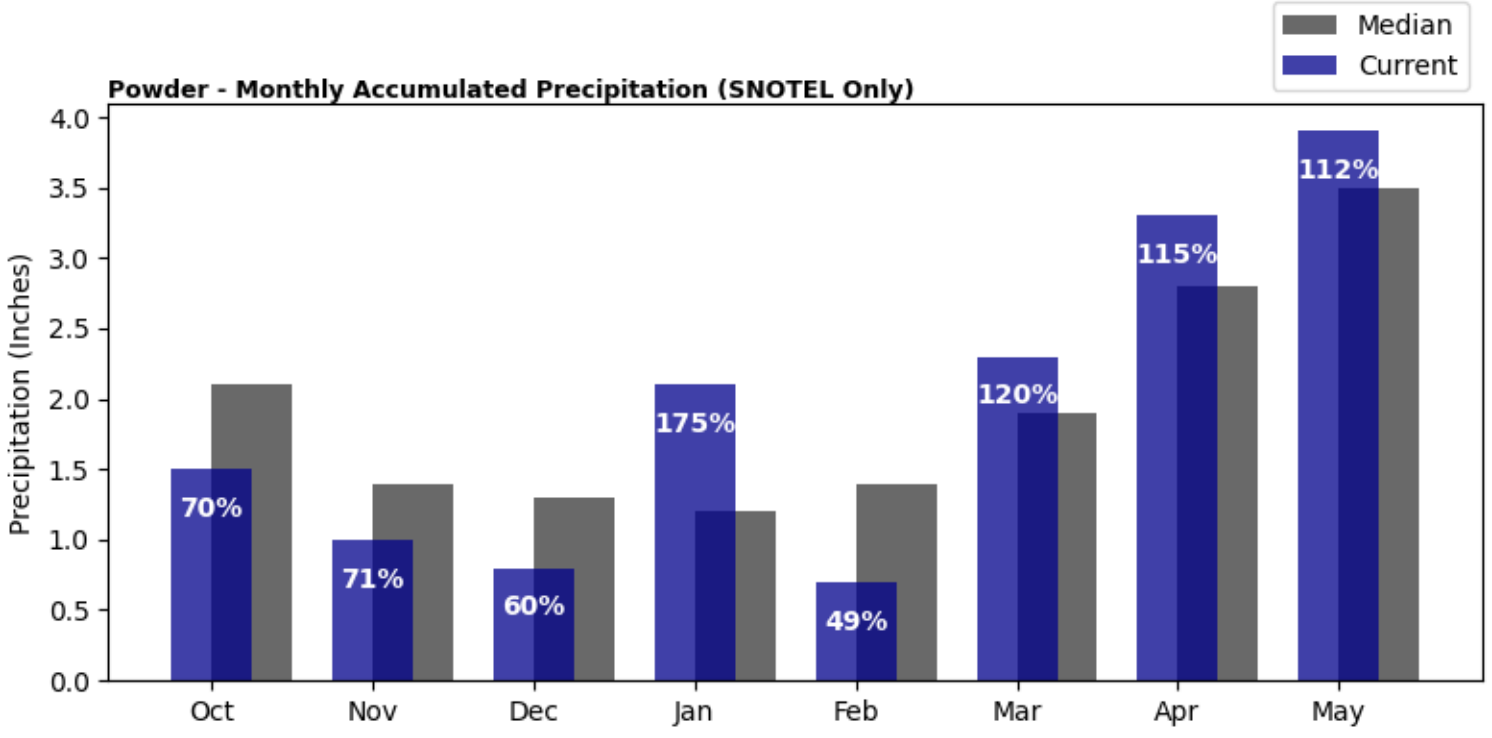
Bighorn (Continued)

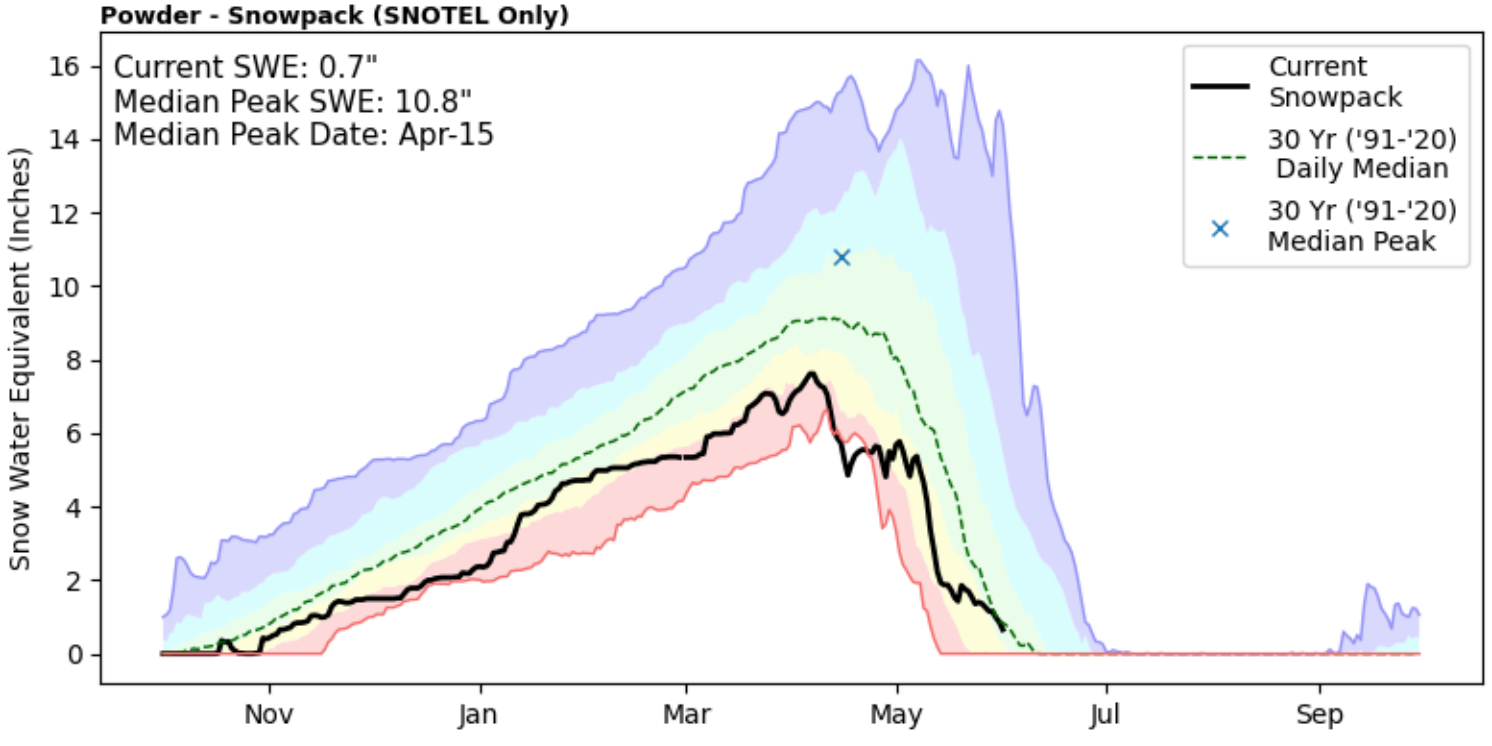


Basin Overview

Powder

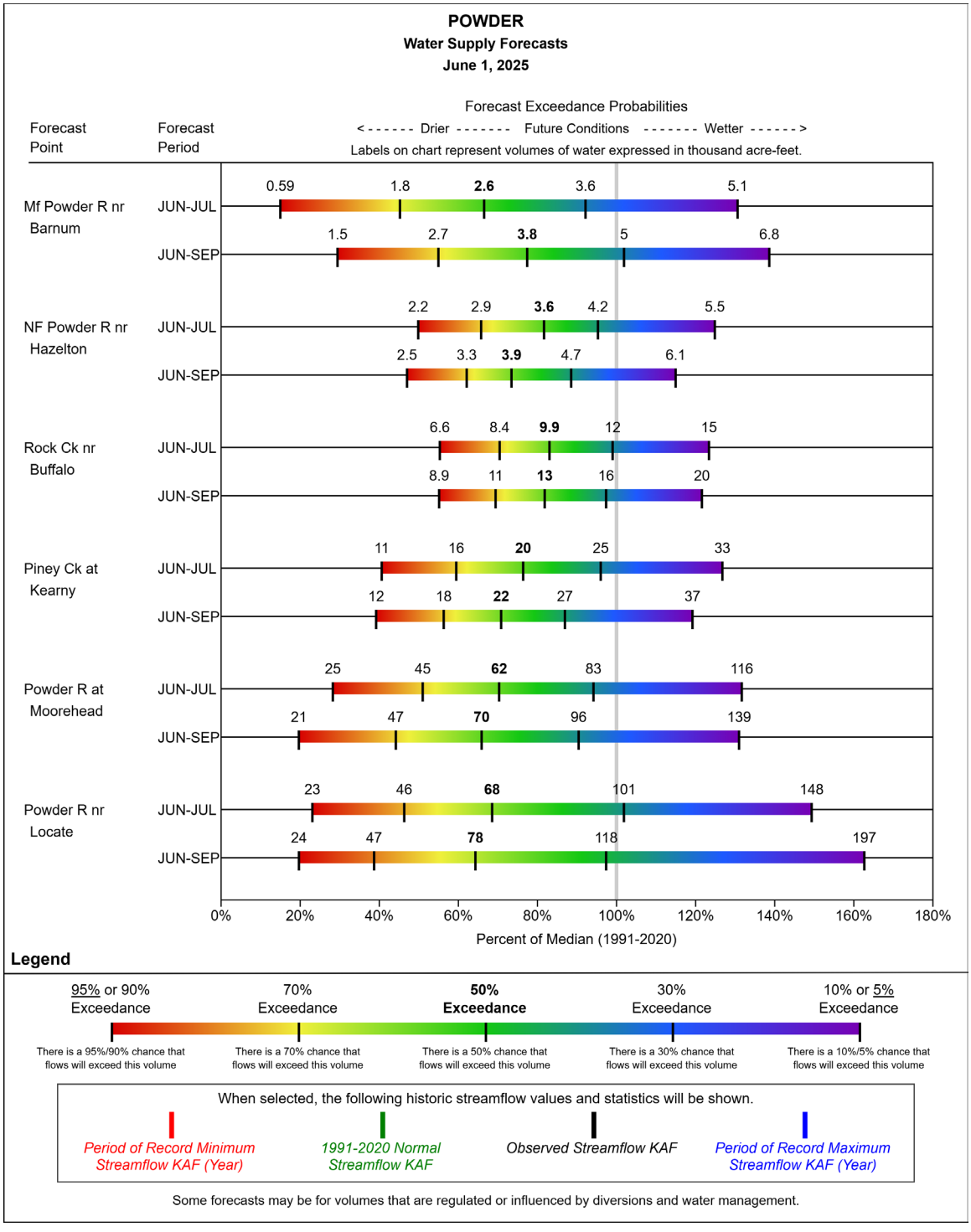
Precipitation in May was above normal at 112%, which brings the seasonal accumulation (October-May) to 93% of median. The snowpack in the Powder is well below normal at 78% of median, compared to 261% at this time last year.





Basin Overview

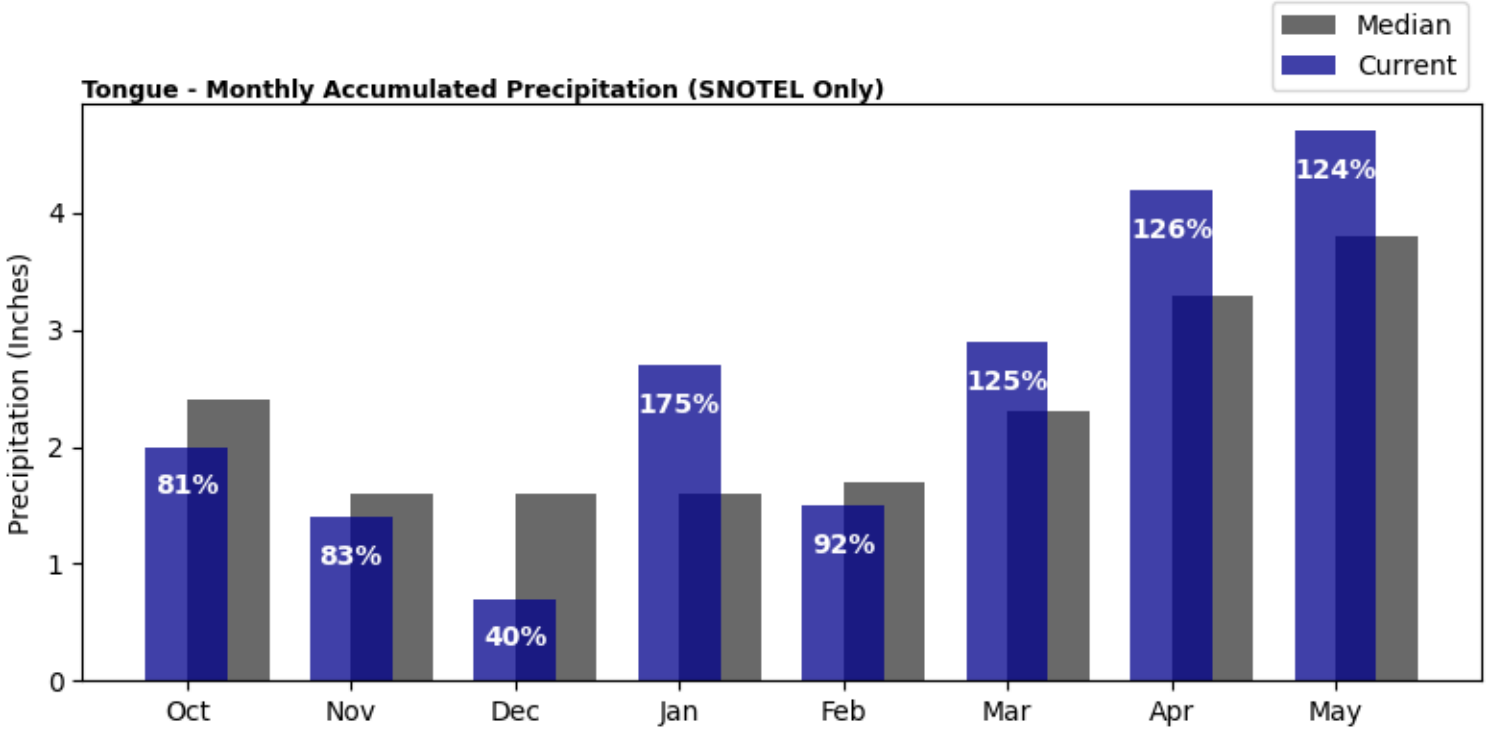
Powder (Continued)

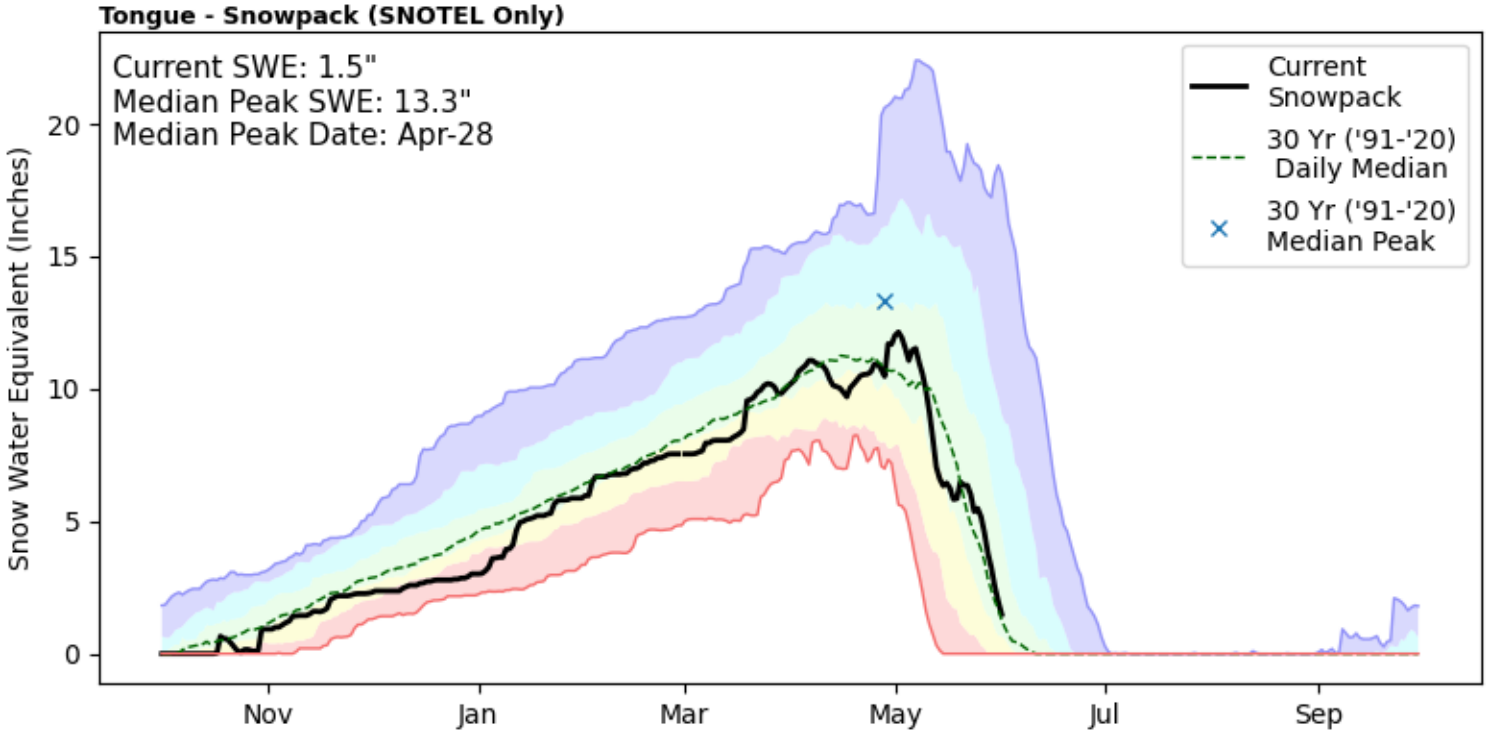


Basin Overview

Tongue

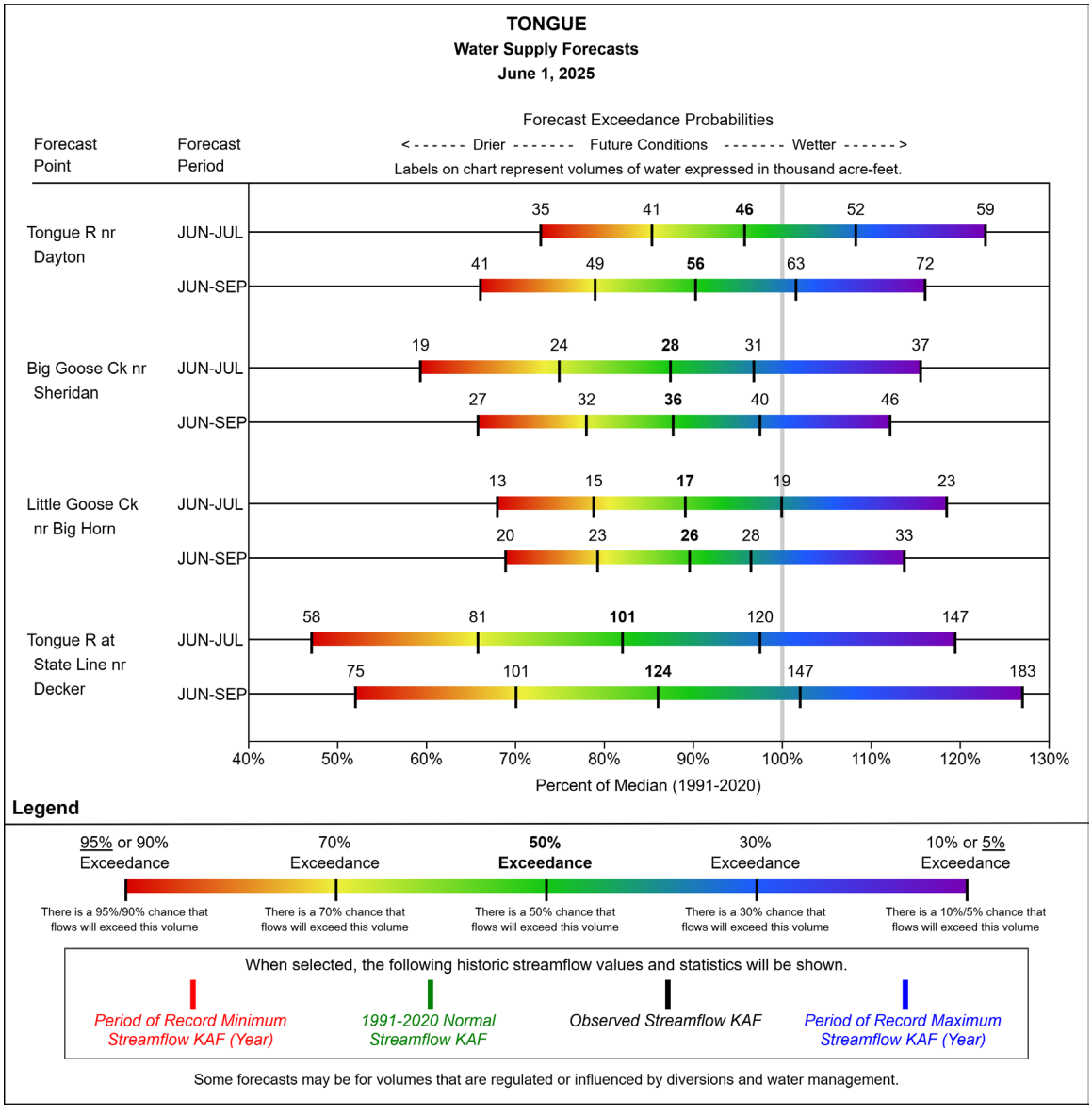
Precipitation in May was well above normal at 124%, which brings the seasonal accumulation (October-May) to 99% of median. The snowpack in the Tongue is above normal at 118% of median, compared to 380% at this time last year.





Basin Overview

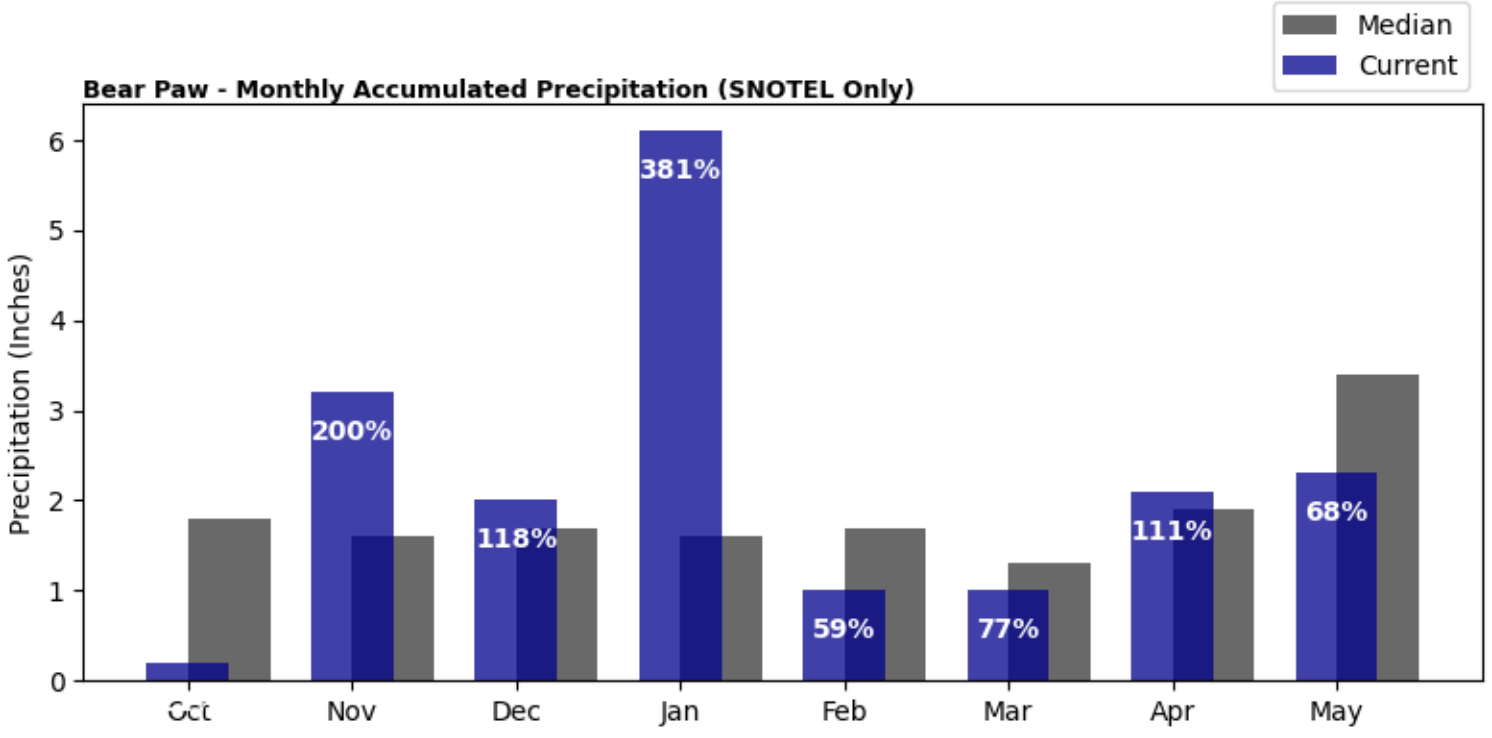
Tongue (Continued)

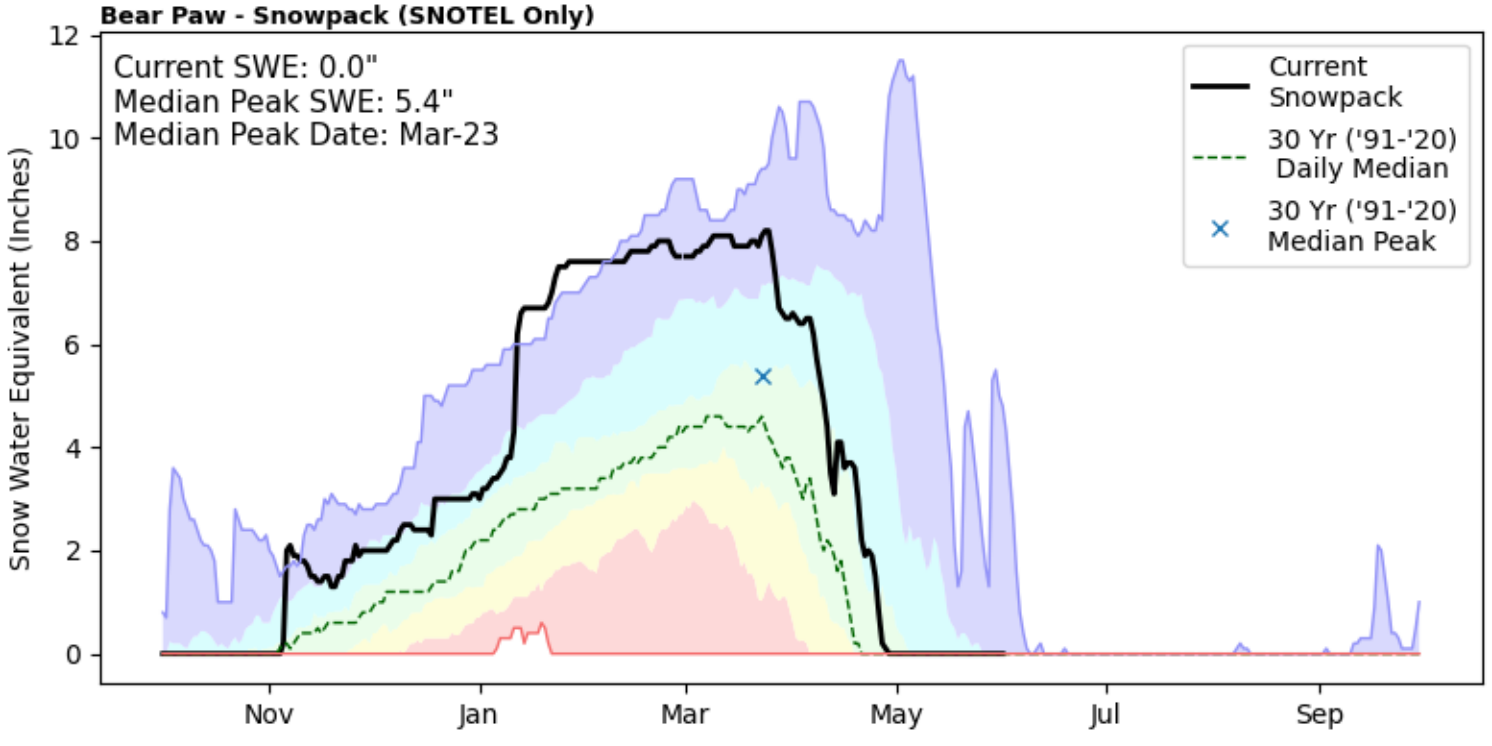


Basin Overview

Bear Paw

Precipitation in May was well below normal at 68%, which brings the seasonal accumulation (October-May) to 110% 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.

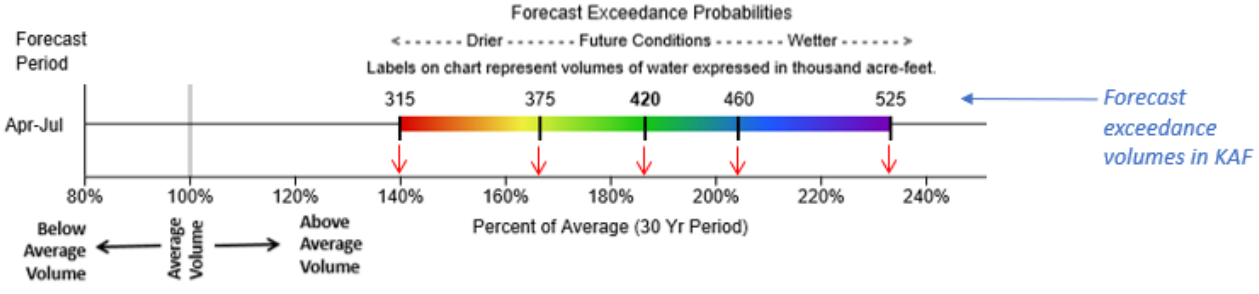
Forecast uncertainty originates from two sources: (1) uncertainty of future hydrologic and climatic conditions, and (2) error in the forecasting procedure. To express the uncertainty in the most probable forecast, four additional forecasts are provided. The actual streamflow can be expected to exceed 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 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.



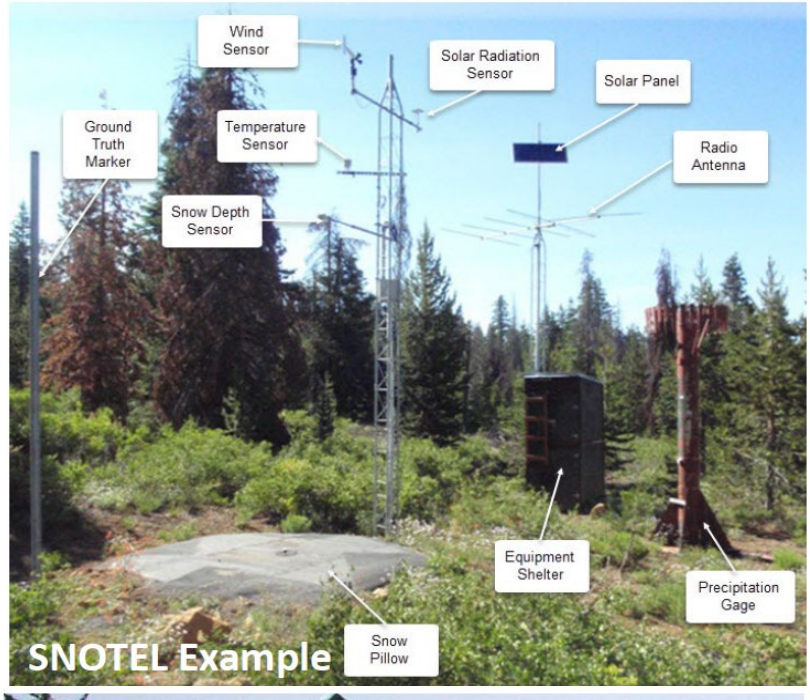
In the example, the entire forecast bar is shifted right of the gray line indicating a forecast for above normal streamflow. The 50% exceedance is represented by the black line in the green portion of the colored bar. This represents a forecast volume of 420KAF which is ~185% of average. If drier than 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.



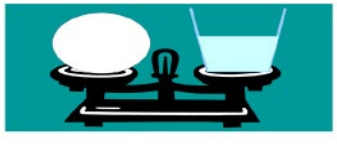
Snow Course

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.



Snow core inside snow tubes

Appendix

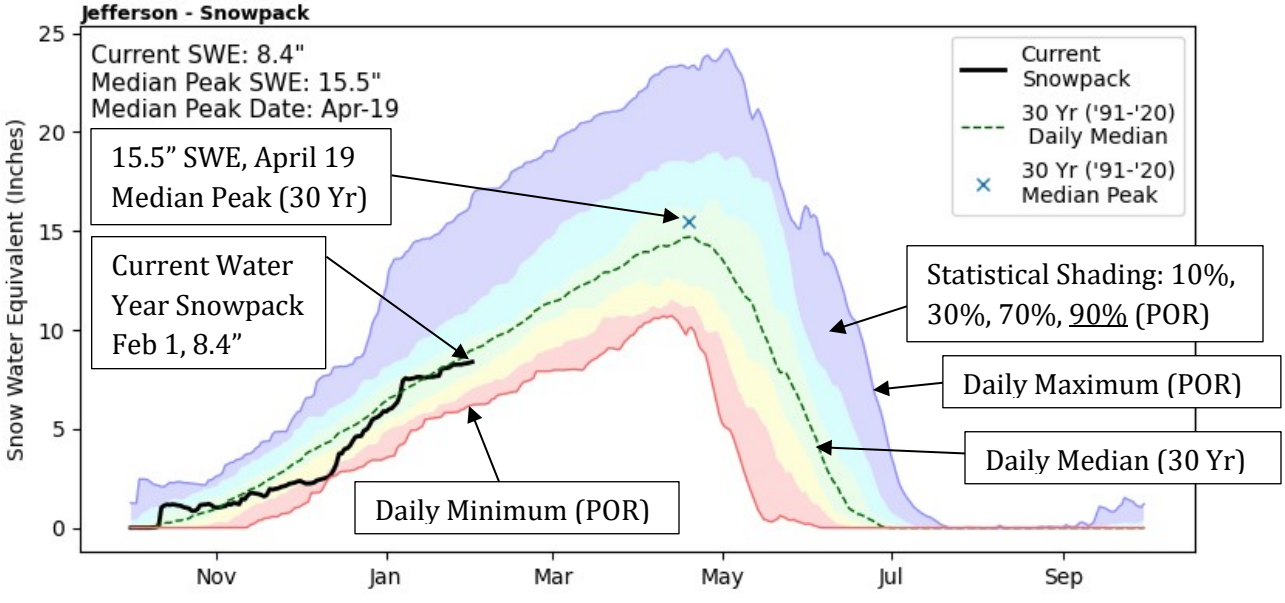
Additional Information

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

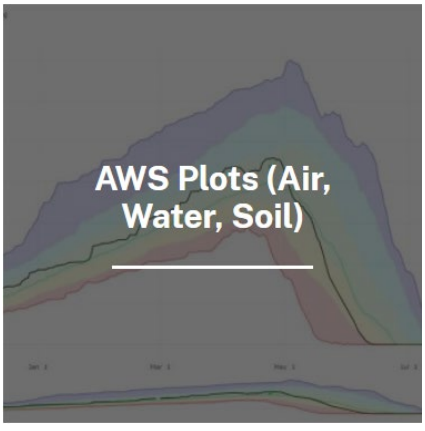
Snowpack charts displayed in this report are created using daily (midnight) snow water equivalent (SWE) values at SNOTEL sites determined to represent the basin. Snow Course data is not included. Plotted lines are the average of each SNOTEL's individual values. For example, the "Current Snowpack" on 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

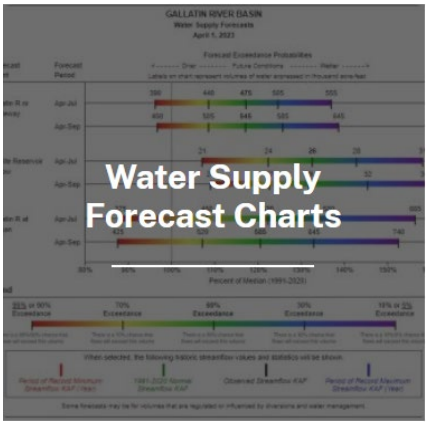


Appendix

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**

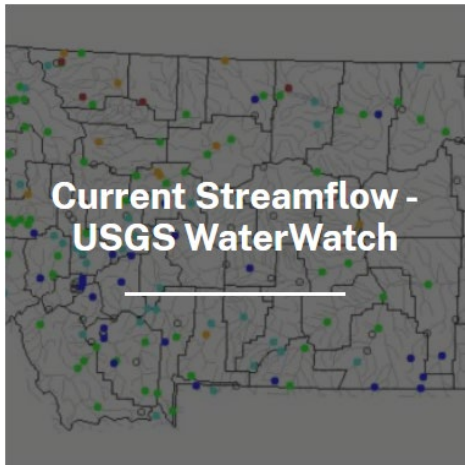
Other

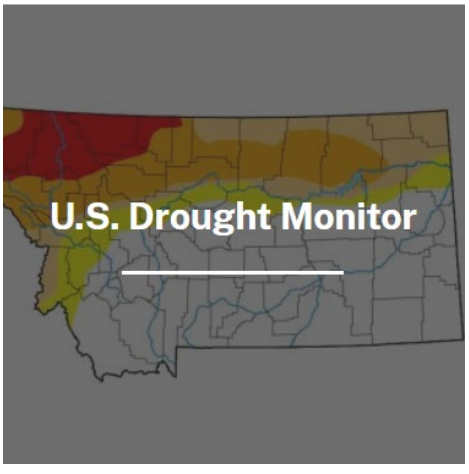
- Snow Water Equivalent > Daily > Compared to POR > **Stations**
- Snow Water Equivalent > End of Previous Month (SNOTEL and Snow Course) > Percentile > **Stations**
- Water Year-to-Date Precipitation > Daily > Compared to POR > **Stations**

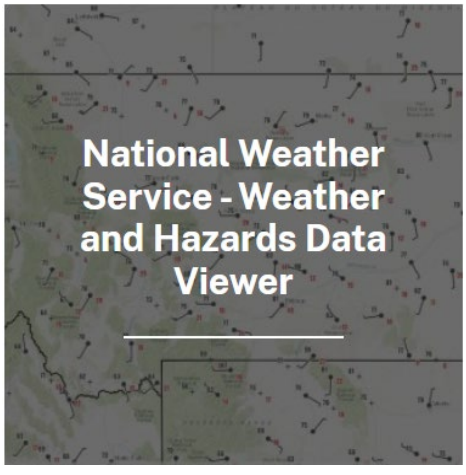
Appendix

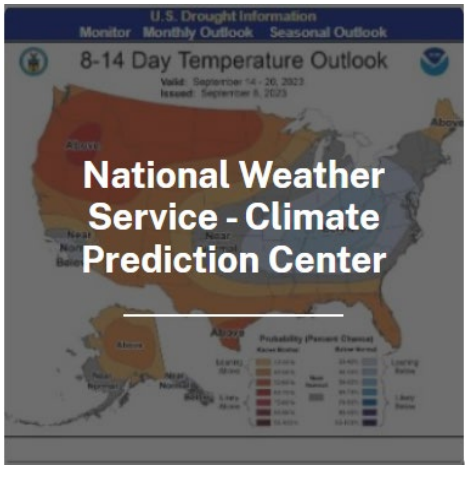
Links and Resources (Continued)

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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https://www.nrcs.usda.gov/montana/snow-survey

Montana Water Supply Outlook Report

Natural Resources Conservation Service