USDA United States Department of Agriculture

Natural Resources Conservation Service

Montana

Water Supply Outlook Report

April 1, 2023

Photo of Montana Snow Survey Hydrologist Colin Kultys surveying Slag-A-Melt Lake Snow Course in the Beaverhead Mountains on March 28, 2023, a region that experienced active weather in March and rebounded from below normal conditions last month. Excluding Northwest Montana and the Rocky Mountain Front, March precipitation was above normal in Montana. Central Montana and Southwest Montana continued to build on an already exceptional snowpack. Peak snowpack season is upon us and much of the snowpack east of the Continental Divide is near or already exceeding normal peak levels. Snowpack conditions across the state are largely above normal, except in the far northwest region of Montana. April 1 streamflow forecasts are now available in the following report.

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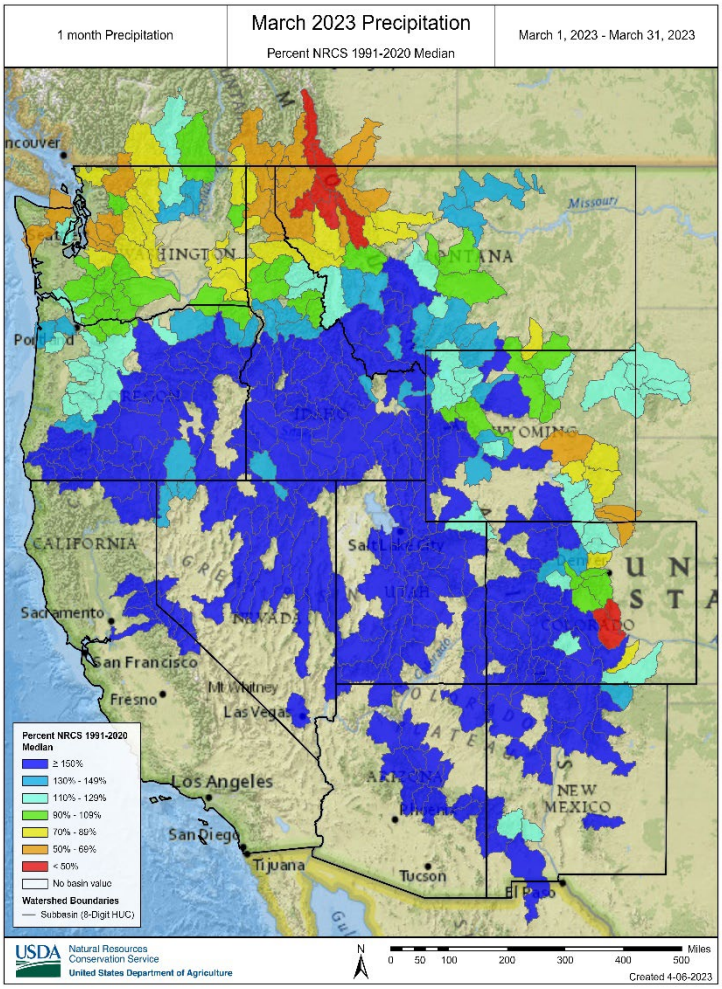
https://www.nrcs.usda.gov/wps/portal/wcc/home/quicklinks/states/montana/

Precipitation

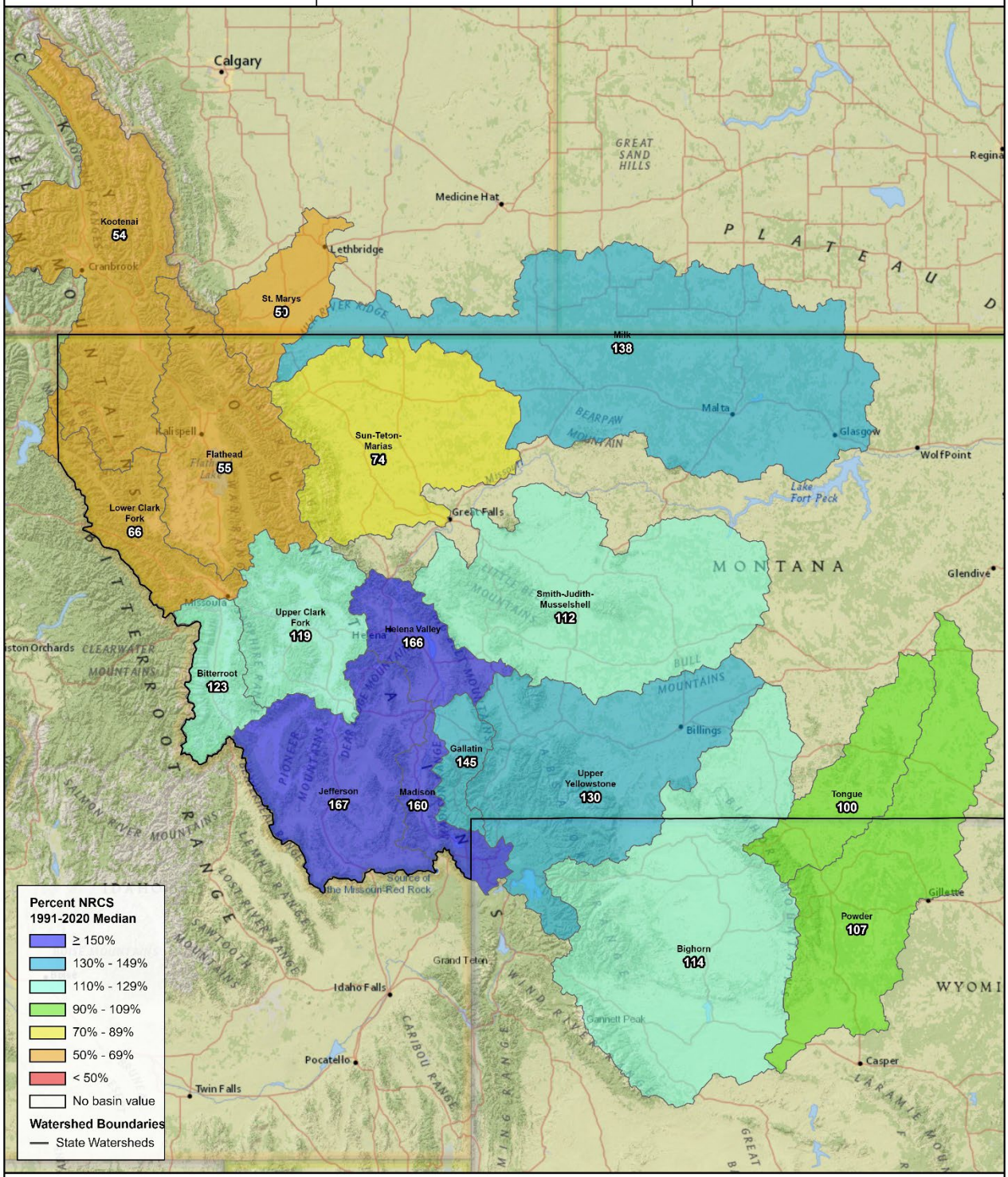
We have officially transitioned into spring, but winter remains persistent. While that is not uncommon this time of the year in Montana, it was fortunate to watch last month play out differently than March of 2022. Precipitation was consistent and near to above normal in basins east of the divide last month. Exceptional accumulations occurred in the Madison, Jefferson, Upper Clark Fork, and Helena area, which was particularly beneficial to the western Jefferson and the southern Bitterroot River basins. The snowpack in that region was 80-90% of normal on March 1 and since then that region received 150-200% of normal precipitation, increasing the snowpack to near normal conditions. The exception to March precipitation east of the divide was the Sun-Teton-Marias River basin which only received 70-80% of normal monthly precipitation and was similar to Northwest Montana at 50-70%. Montana was on the northern tier of the storms that tracked across California, Nevada, and Utah last month and provided record precipitation to those states. Those storms benefitted Southwest Montana more than Northwest Montana.



March 2023 precipitation in large, missed Northwest Montana.

Overall precipitation was consistent east of the Continental Divide, however a storm that occurred late in the month is worth highlighting. From March 24 to 27 SNOTEL stations near Red Lodge recorded snow water equivalent accumulations of 3 to 4 inches, which was the brunt of a very active weather period. From March 20 to April 1 SNOTEL stations across Southwest and South Central Montana reported to 2-5 inches of precipitation. Active March weather complemented an already snowy season and currently water year precipitation is about 110-130% of normal in the Jefferson, Madison, Gallatin, Smith-Judith-Musselshell, and Helena area. The Bears Paw Mountains near Havre have received about 140% of normal water year precipitation. The Upper Yellowstone, Bighorn, Powder, and Tongue have received about 105-110% of normal water year precipitation. All basins west of the divide, except Upper Clark Fork at about 95%, have only received about 70-80% of normal water year precipitation. Similar to Northwest Montana, the Rocky Mountain Front has received below normal water year precipitation at 75-85%.

1 month Precipitation	Monthly SNOTEL Precipitation Percent NRCS 1991-2020 Median	March 1, 2023 - March 31, 2023



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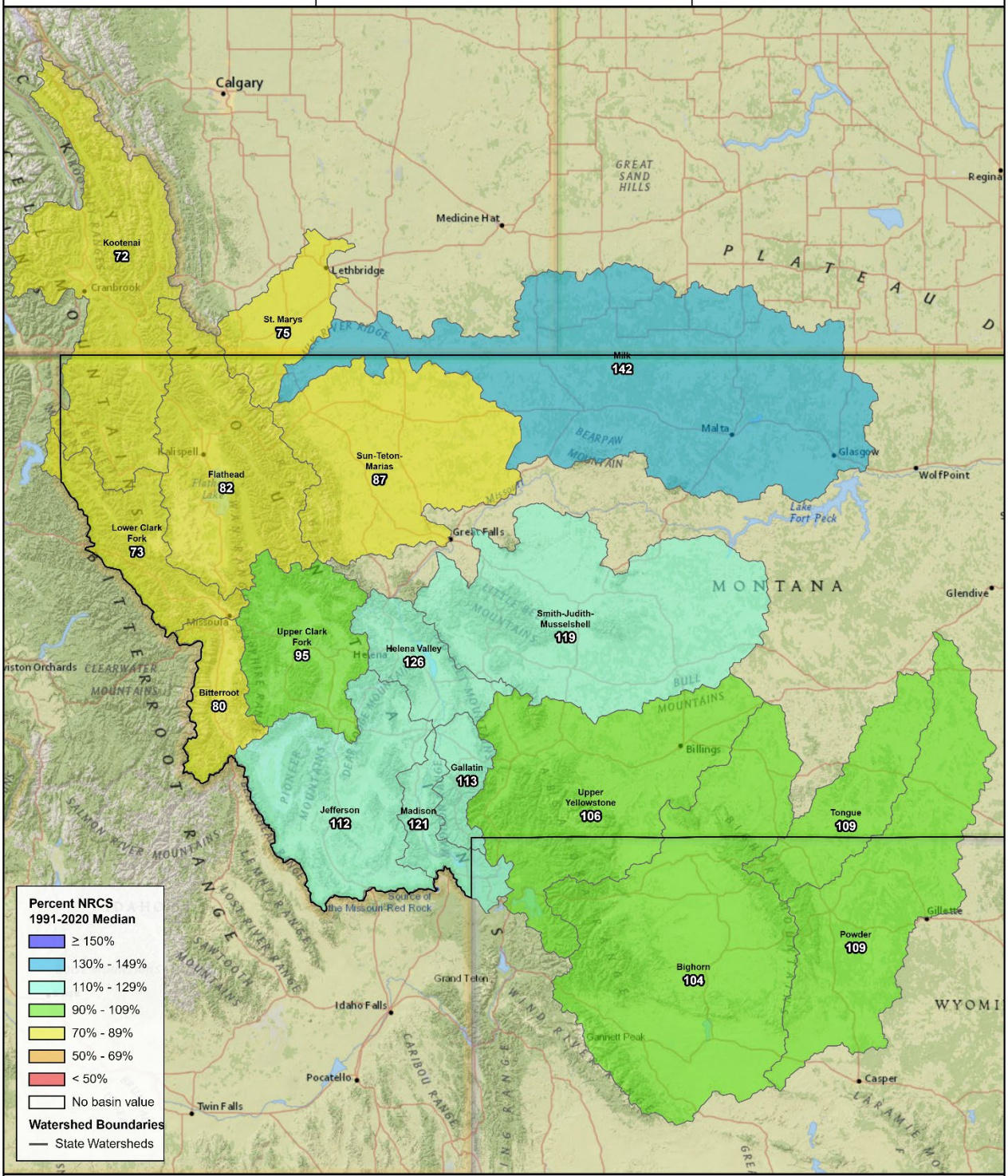
Water Year to Date Precipitation	Water Year SNOTEL Precipitation Percent NRCS 1991-2020 Median	October 1, 2022 - March 31, 2023



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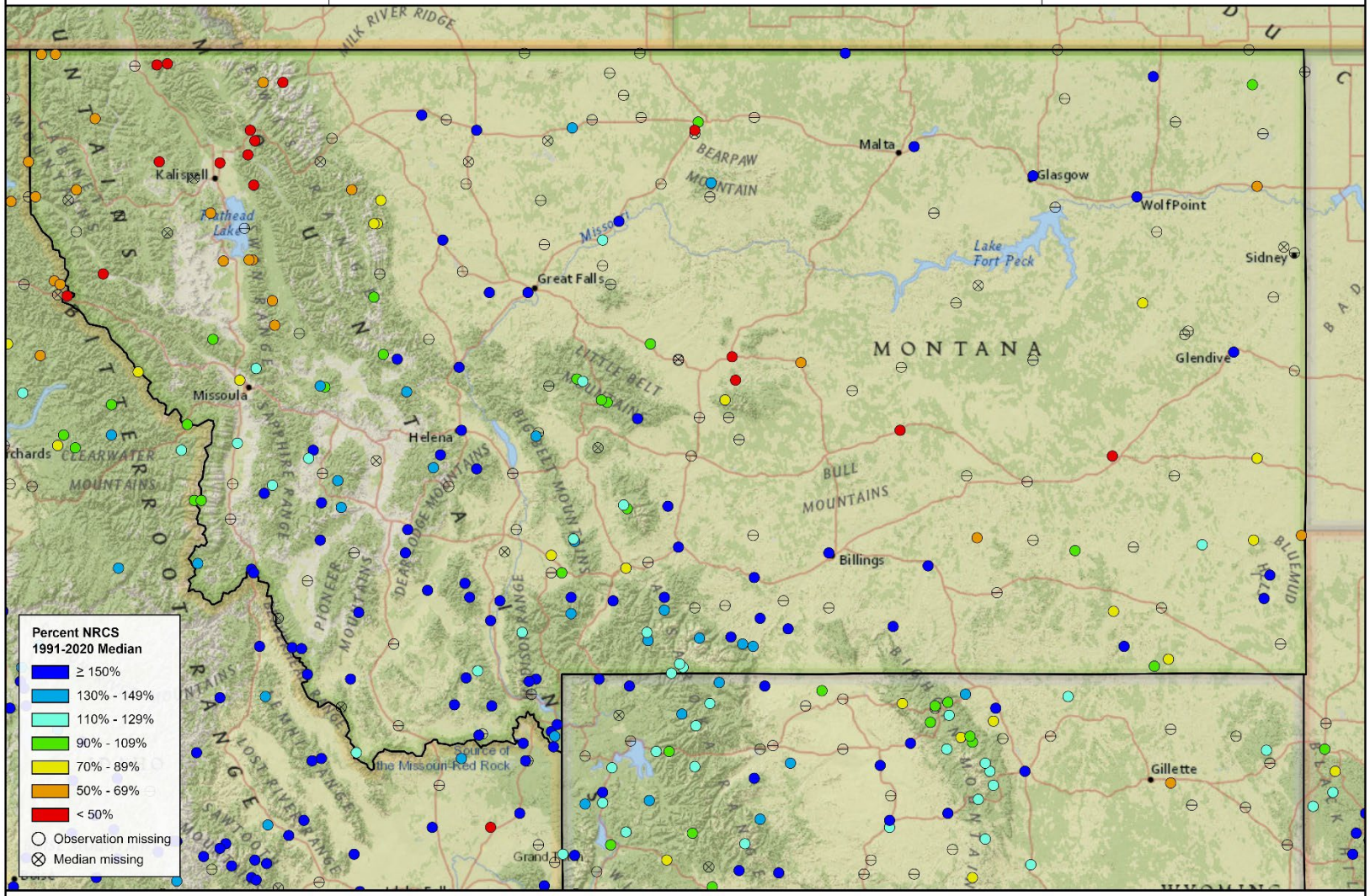
1 month Precipitation	Monthly Precipitation Percent NRCS 1991-2020 Median	March 1, 2023 - March 31, 2023



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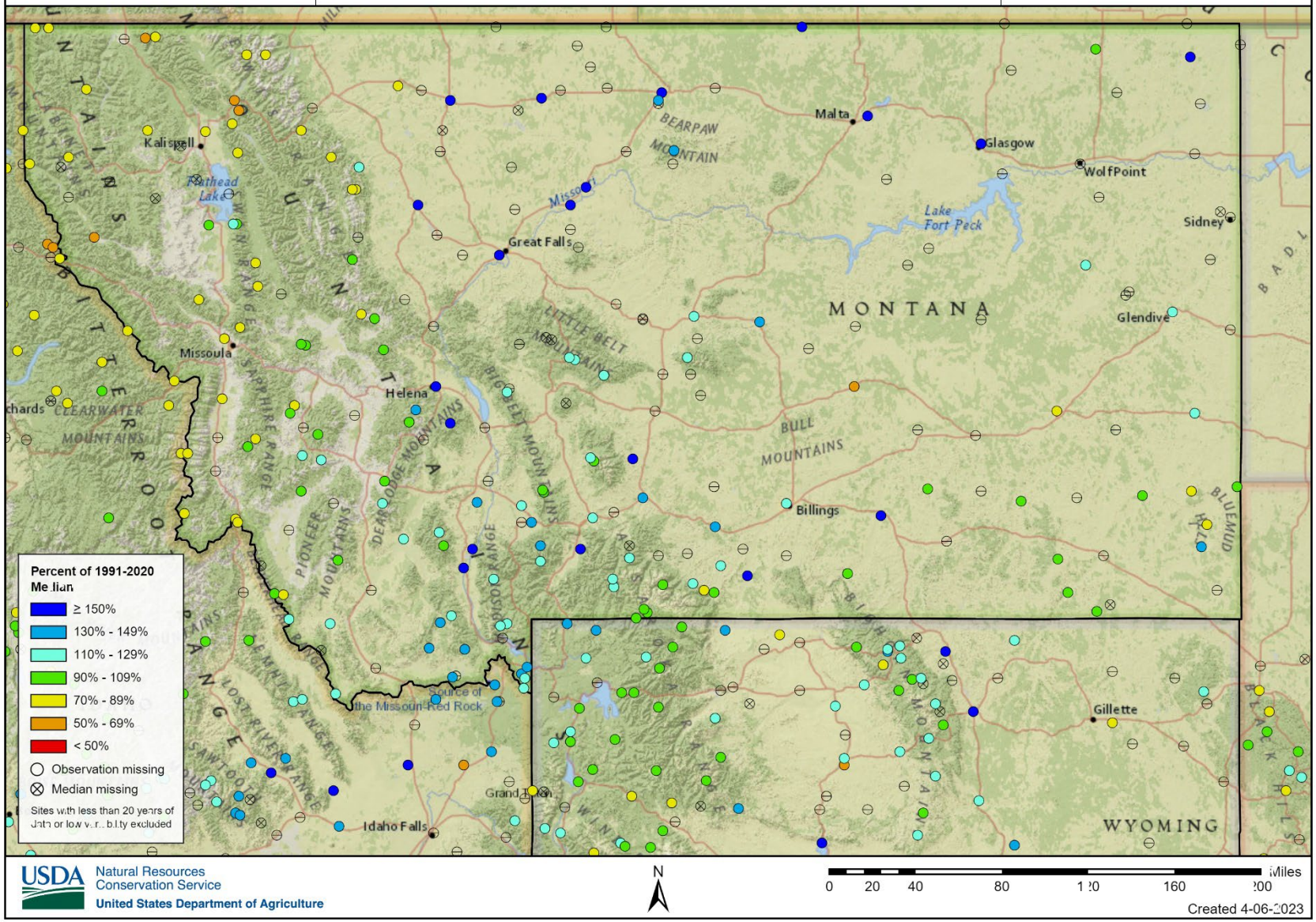
Water Year to Date Precipitation	Water Year Precipitation Percent of 1991-2020 Median	October 1, 2022 - March 31, 2023



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Snowpack

East of the Continental Divide

After above normal precipitation during March, snowpack percentages have again increased in most basins east of the divide. The snowpack is also much better compared to last year at this time when on April 1 all basin wide snowpack percentages were well below normal, except Rocky Mountain Front basins which were near normal. Many SNOTEL stations and snow courses reported the lowest or near lowest snowpack on record last year at this time. This year the snowpack is in much better shape as percentages east of the divide range from 114% in the Bighorn River basin to about 135% in Central Montana from Lewistown to Helena. A couple outliers are the Rocky Mountain Front where the snowpack is currently about 90-95% of normal, and the snowpack in the Bears Paw Mountains which is about 250% of normal.

While there is more snow east of the divide compared to the last couple years, there are several years that had more snow on April 1. Those years include 2018, 2014, 2011, 1999, 1997, 1996. With that said, SNOTEL stations in the southern Jefferson, Madison, Gallatin, Smith-Judith-Musselshell, and Tongue River basins are currently reporting snow water equivalent amounts in the 90th percentile of their 1991-2020 dataset. Additionally, Short Creek SNOTEL in the Gravelly Mountains, Highwood Station Snow Course in the Highwood Mountains, Tie Creek SNOTEL in the Bighorn Mountains, and Cole Canyon SNOTEL in Bear Lodge Mountains have their highest April 1 snowpack on record.

Snowpack peak season is nearly upon us and conditions are on track in most Montana river basins east of the divide. The snowpack generally peaks in early May at upper elevations and mid-April at lower mountain elevations east of the divide. Much of the lower mountain elevation snowpack has already reached normal peak levels, particularly in Central Montana and southern Gallatin and Madison counties where some SNOTEL stations have already exceeded their normal snow water equivalent peak by several inches. Elsewhere east of the divide, upper elevations are still generally 2-3 inches below normal peak levels. In those locations normal precipitation during April will be necessary in order to reach normal peak snow water equivalent values at a normal date.

West of the Continental Divide

Currently the snowpack in far Northwest Montana paints a slightly different picture and conditions are generally worse than last year at this time. Last year the April snowpack was mostly near normal, while now snowpack percentages are near 80% in the northern Kootenai and northern Flathead River basins. The highest elevation SNOTEL stations in that region currently have nearly a 9-inch snow water equivalent deficit. Current conditions in the northern Kootenai and Flathead are similar to 2021 and 2019, but not as low as 2015, 2005, and 2001 on April 1. Snowpack conditions are more favorable further south on the west side of the divide where snowpack percentages range from 90-105% of normal. The Upper Clark Fork River basin snowpack is more similar to east of the divide conditions at 113% and SNOTEL stations are generally reporting in 70th and 80th percentile. That is an improvement from last month for both the Upper Clark Fork and Bitterroot River basins where significant precipitation along the Continental Divide increased snowpack percentages about 10% from March 1.

The snowpack generally peaks slightly earlier on the west side of the divide and current deficits in the northern region will hopefully make some gains in the near future. Fortunately, the low elevation snowpack is close to normal, but is most likely not a significant enough surplus to buffer the lack of snow up high in the northern region. Generally continental circulation patterns favor Northwest Montana earlier in the winter, however, there have been very wet big springs in that region in the past. Some of those years include 2012, 2011, and 2010. A major change in weather patterns would be required, but April and May precipitation similar to those years would be welcomed over the next couple months in the northern Kootenai and Flathead region.

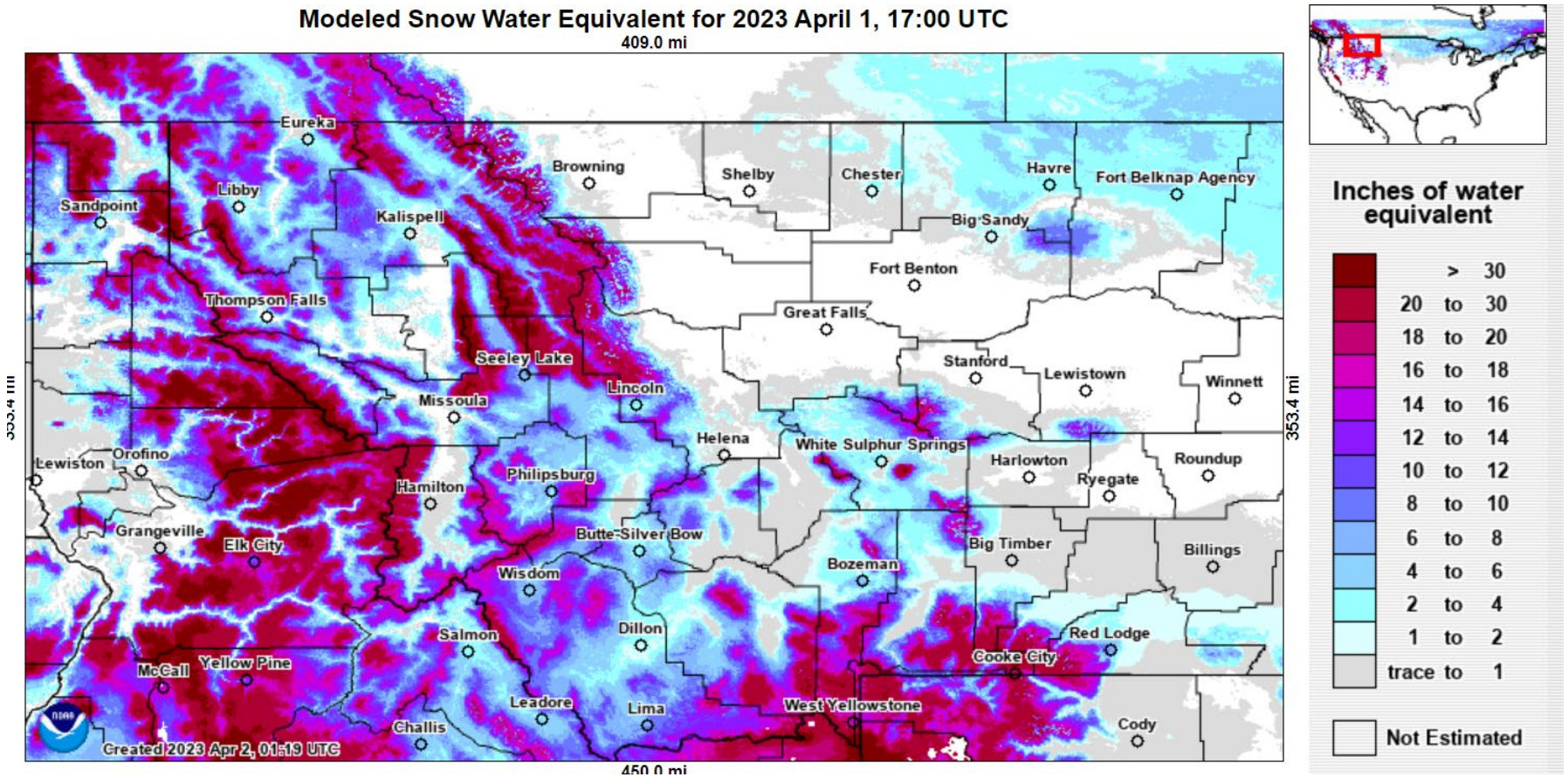
Low Elevation Snowpack - Statewide

As of the beginning of April, there is substantial low elevation snowpack across parts of Montana. NOAA National Operational Hydrologic Remote Sensing Center is currently showing about 3 to 6 inches of water in valley snowpack and many low mountain elevation SNOTEL stations across the state have 7 to 10 inches of snow water equivalent. Last year and many recent years, the April 1 valley snow was mostly nonexistent. While the 30 to 40 plus inches of snow water equivalent currently in the mountains will likely play a larger role in terms of seasonal water supply, it's worth noting a couple benefits that low elevation snow provides including soil moisture, drought severity reduction, and spring green up if temperatures and sunlight are optimum. With that said, keep an eye on National Weather Service alerts regarding a quick warm up and rapid snowmelt of the low elevation snowpack.

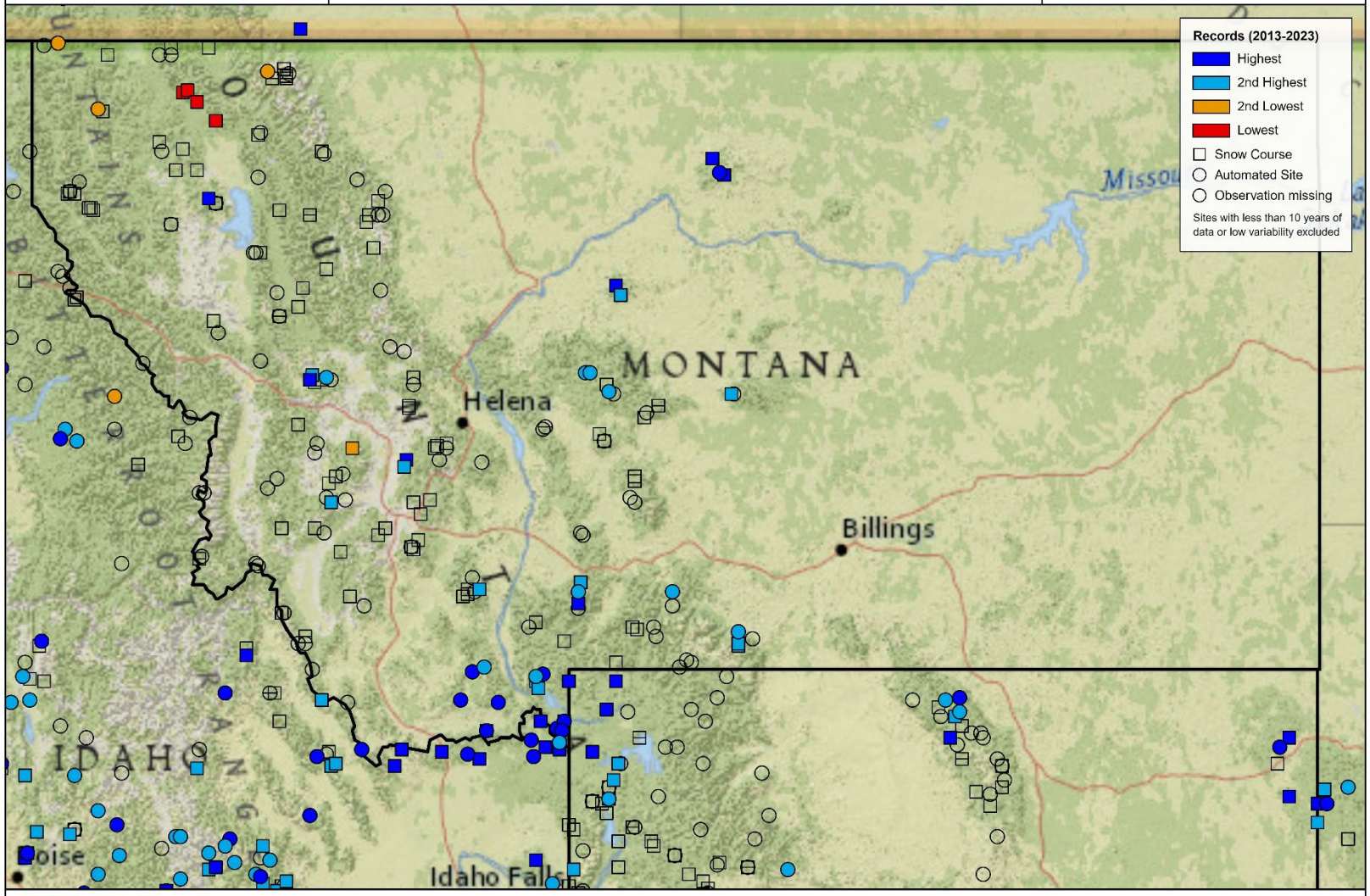
Major Basin Snow Water Equivalent (SWE) Percentage and Peak SWE Information

Basin	Last Year SWE % Normal 4/1/2022	Last Month SWE % Normal 3/1/2023	Current SWE % Normal 4/1/2023	Normal Peak Date -	Normal Peak SWE (inches)	April 1, 2023 SWE (inches)	Remaining SWE to Reach Normal Peak (inches)
St. Marys	96%	96%	91%	April 6	29.2	23.7	5.5
Kootenai	101%	84%	85%	April 8	25.6	20.3	5.3
Lower Clark Fork	91%	89%	90%	April 14	31.2	26.3	4.9
Flathead	93%	94%	92%	April 14	26.1	22.1	4.0
Sun-Teton-Marias	97%	97%	95%	April 16	17.1	13.3	3.8
Bitterroot	83%	84%	96%	April 6	21.4	19.4	2.0
Tongue	88%	115%	117%	April 29	13.5	12.1	1.4
Upper Yellowstone	73%	105%	116%	April 23	19.1	18.5	0.6
Gallatin	74%	113%	123%	April 24	21.9	21.3	0.6
Bighorn	81%	114%	114%	April 20	13.9	13.7	0.2
Powder	80%	117%	118%	April 14	10.8	10.6	0.2
Jefferson	76%	102%	116%	April 18	14.9	16.0	-1.1
Upper Clark Fork	77%	103%	113%	April 13	15.9	17.0	-1.1
Helena Valley	74%	116%	137%	April 16	13.6	15.0	-1.4
Smith-Judith-Musselshell	68%	126%	135%	April 16	15.4	17.0	-1.6
Madison	73%	116%	129%	April 22	21.9	23.9	-2.0
Milk	25%	167%	252%	March 26	5.4	9.2	-3.8

Modeled Snow Water Equivalent for 2023 April 1, 17:00 UTC



Snow Water Equivalent	April 1, 2023 Snowpack Compared to the Last 10 Years Records (2013-2023)	April 1st, 2023



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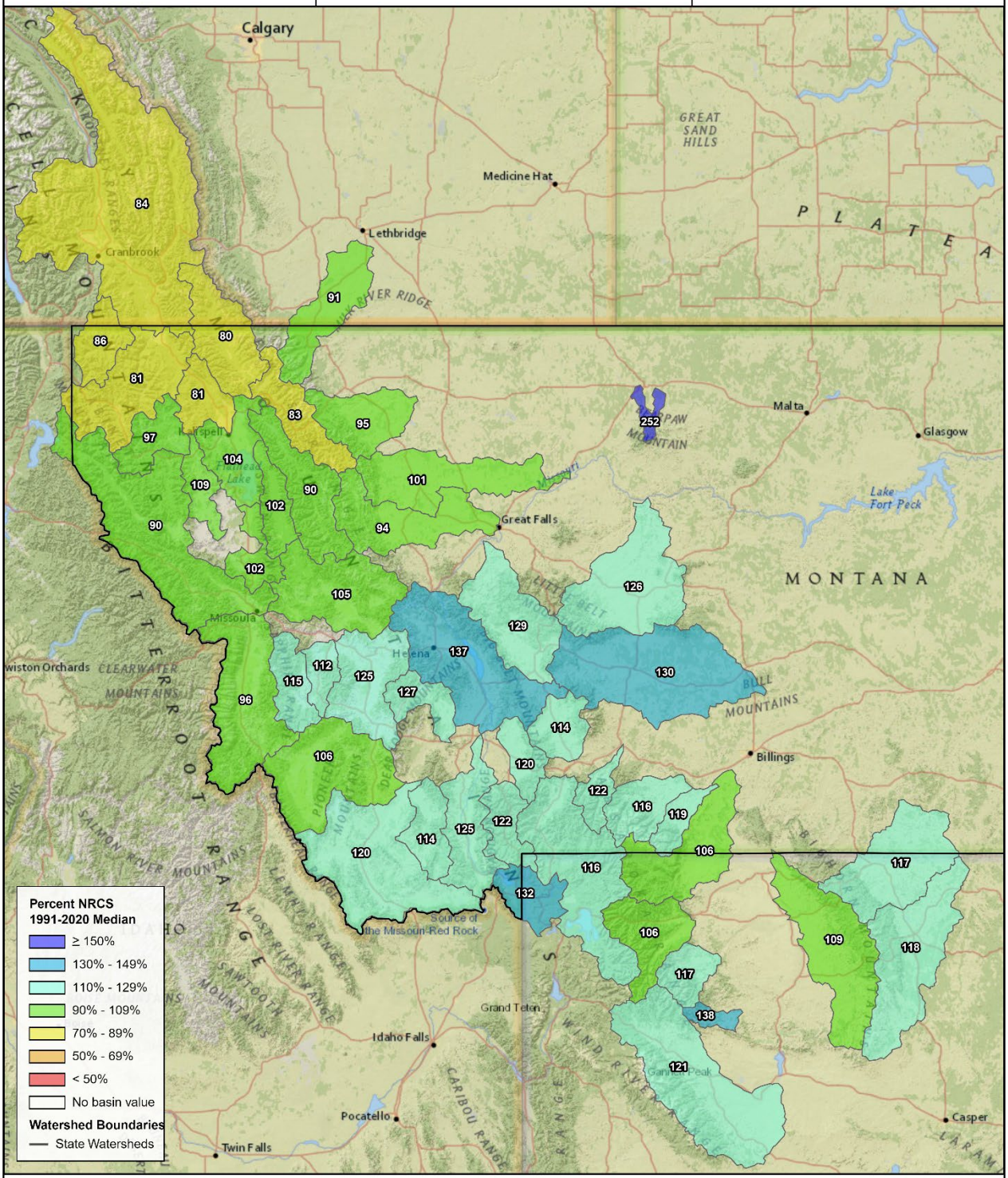
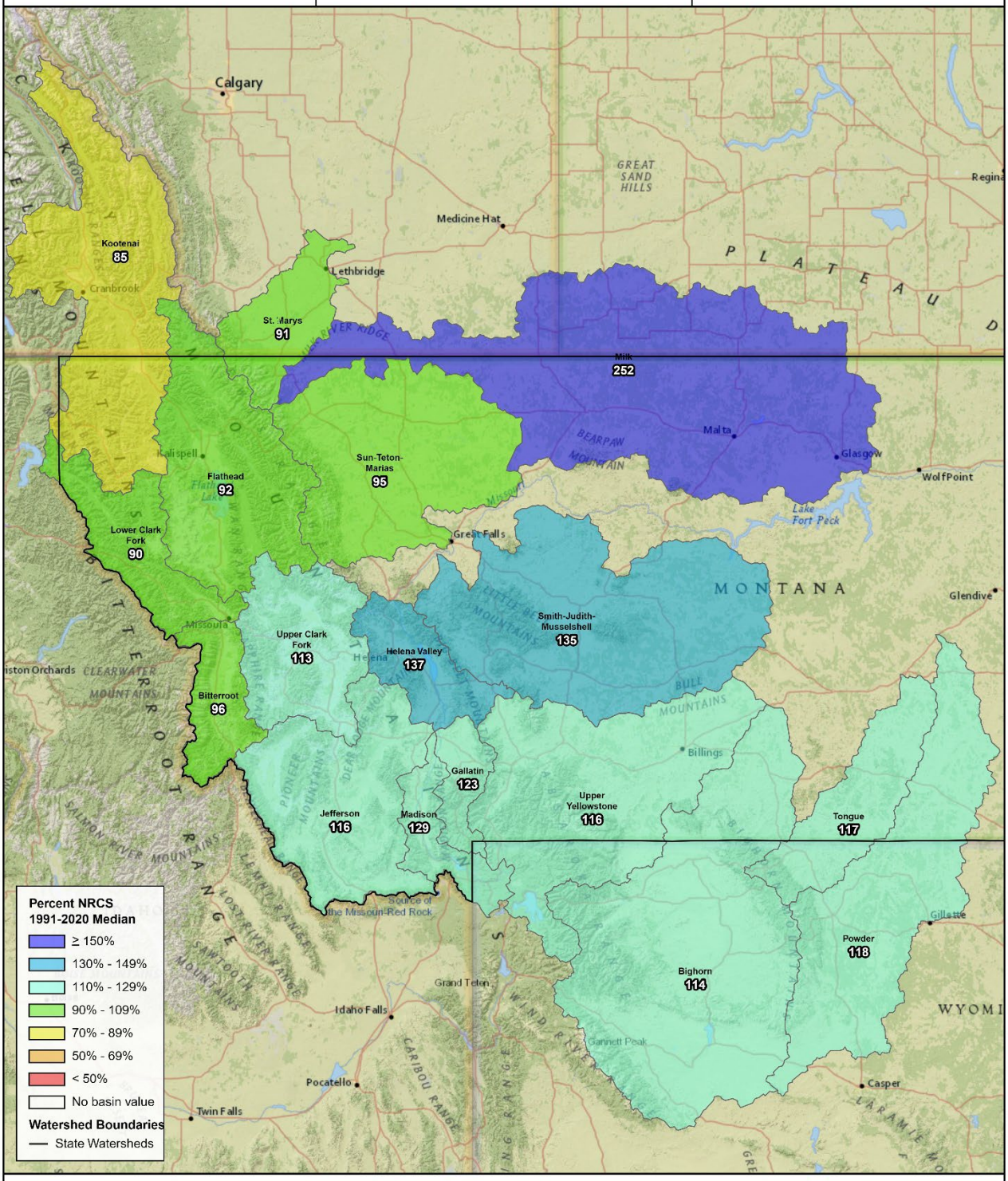
Sub-Basin Snow Water Equivalent – Current Compared to Last Month

River Basin Name	March 1, 2023 SWE % Normal	April 1, 2023 SWE % Normal	SWE % Difference
Bear Paw	167%	252%	+85%
Beaverhead	100%	120%	+20%
Big Hole	91%	106%	+15%
Big Horn	110%	109%	-1%
Bitterroot	84%	96%	+12%
Blackfoot	98%	105%	+7%
Boulder (Jefferson)	112%	127%	+15%
Boulder (Yellowstone)	110%	122%	+12%
Clarks Fork Yellowstone	101%	106%	+5%
Fisher	94%	97%	+3%
Flathead Lake	107%	104%	-3%
Flint	99%	112%	+13%
Gallatin ab Gateway	112%	122%	+10%
Greybull-Wood	103%	117%	+14%
Helena Valley	116%	137%	+21%
Judith	125%	126%	+1%
Kootenai in Canada	85%	84%	-1%
Kootenai in Montana	79%	81%	+2%
Little Bitterroot	96%	109%	+13%
Lower Clark Fork	89%	90%	+1%
Madison ab Hebgen	116%	132%	+16%
Madison bw Hebgen	114%	125%	+11%
Marias	100%	95%	-5%
Middle Fork Flathead	90%	83%	-7%
Musselshell	119%	130%	+11%
North Fork Flathead	84%	80%	-4%
Northern Gallatin	111%	120%	+9%
Owl	133%	138%	+5%
Powder	117%	118%	+1%
Rock (Clark Fork)	102%	115%	+13%
Rock (Yellowstone)	91%	119%	+28%
Ruby	109%	114%	+5%
Shields	100%	114%	+14%
Shoshone	100%	106%	+6%
Smith	124%	129%	+5%
South Fork Flathead	95%	90%	-5%
Southern Flathead	103%	102%	-1%
St. Marys	96%	91%	-5%
Stillwater (Flathead)	81%	81%	+0%
Stillwater (Yellowstone)	105%	116%	+11%
Sun	94%	94%	+0%
Swan	108%	102%	-6%
Teton	101%	101%	+0%
Tongue	115%	117%	+2%
Upper Clark	111%	125%	+14%
Wind	125%	121%	-4%
Yaak	88%	86%	-2%
Yellowstone ab Livingston	109%	116%	+7%

Snow Water Equivalent	Sub-Basin Snow Water Equivalent Percent NRCS 1991-2020 Median	April 1st, 2023



Snow Water Equivalent	Major Basin Snow Water Equivalent Percent NRCS 1991-2020 Median	April 1st, 2023



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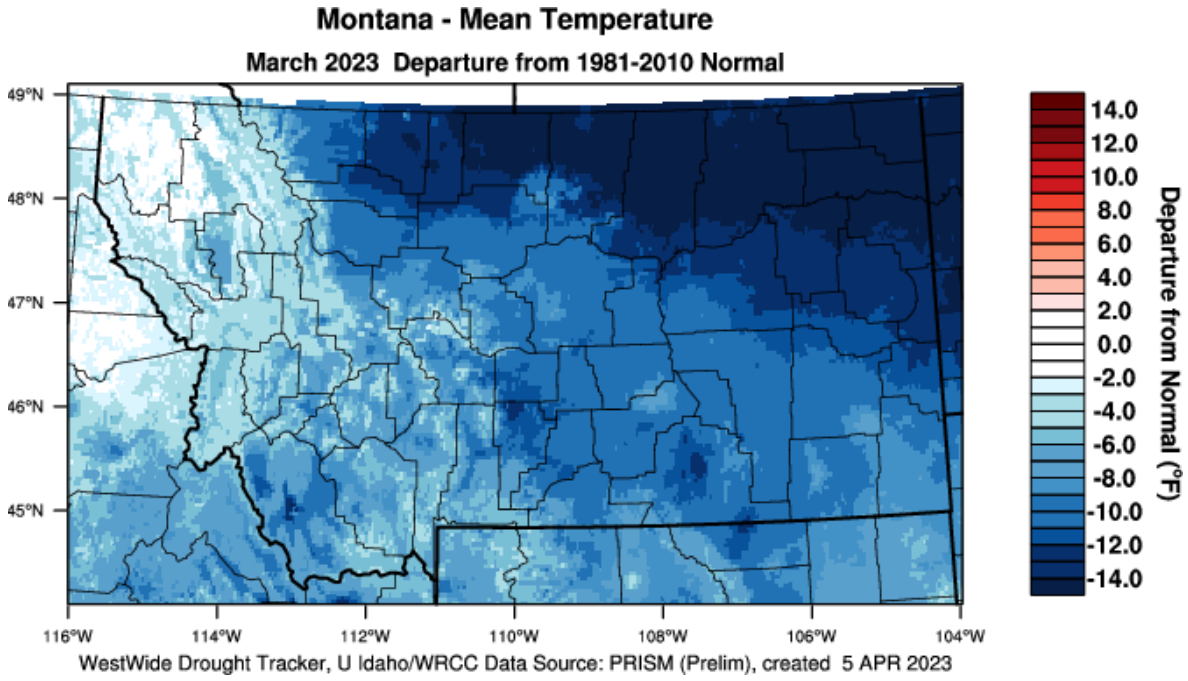
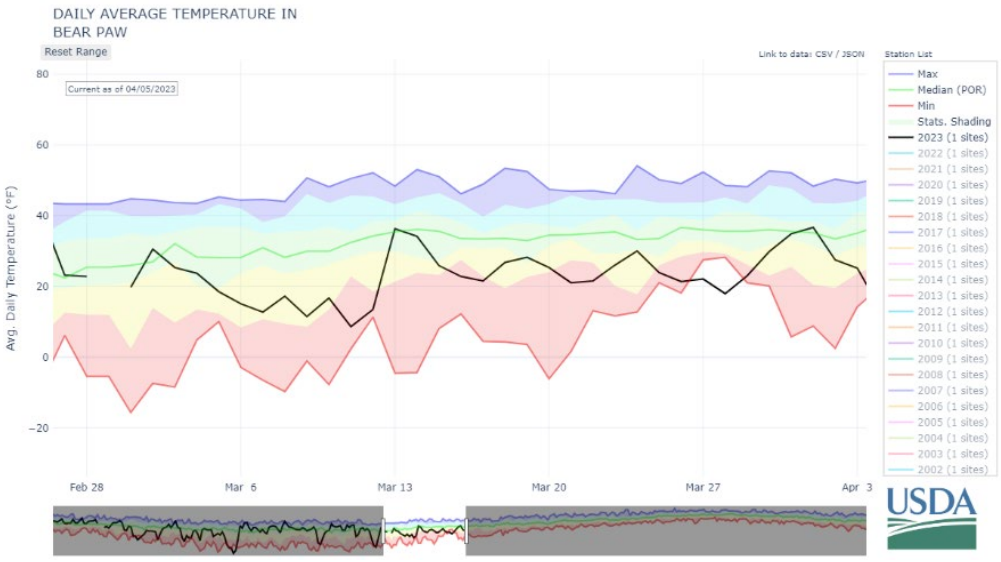
Temperature

March temperatures throughout Montana were largely below normal. Northwestern Montana was an exception to this trend, where temperatures were overall near normal. North Central and Northeast Montana experienced the most anomalous temperatures that ranged from 9-15°F below normal.



Below is a plot of daily average temperatures from the Bears Paw Mountains. There is a pattern of below average temperatures that exhibits the colder conditions Montana experienced during March.



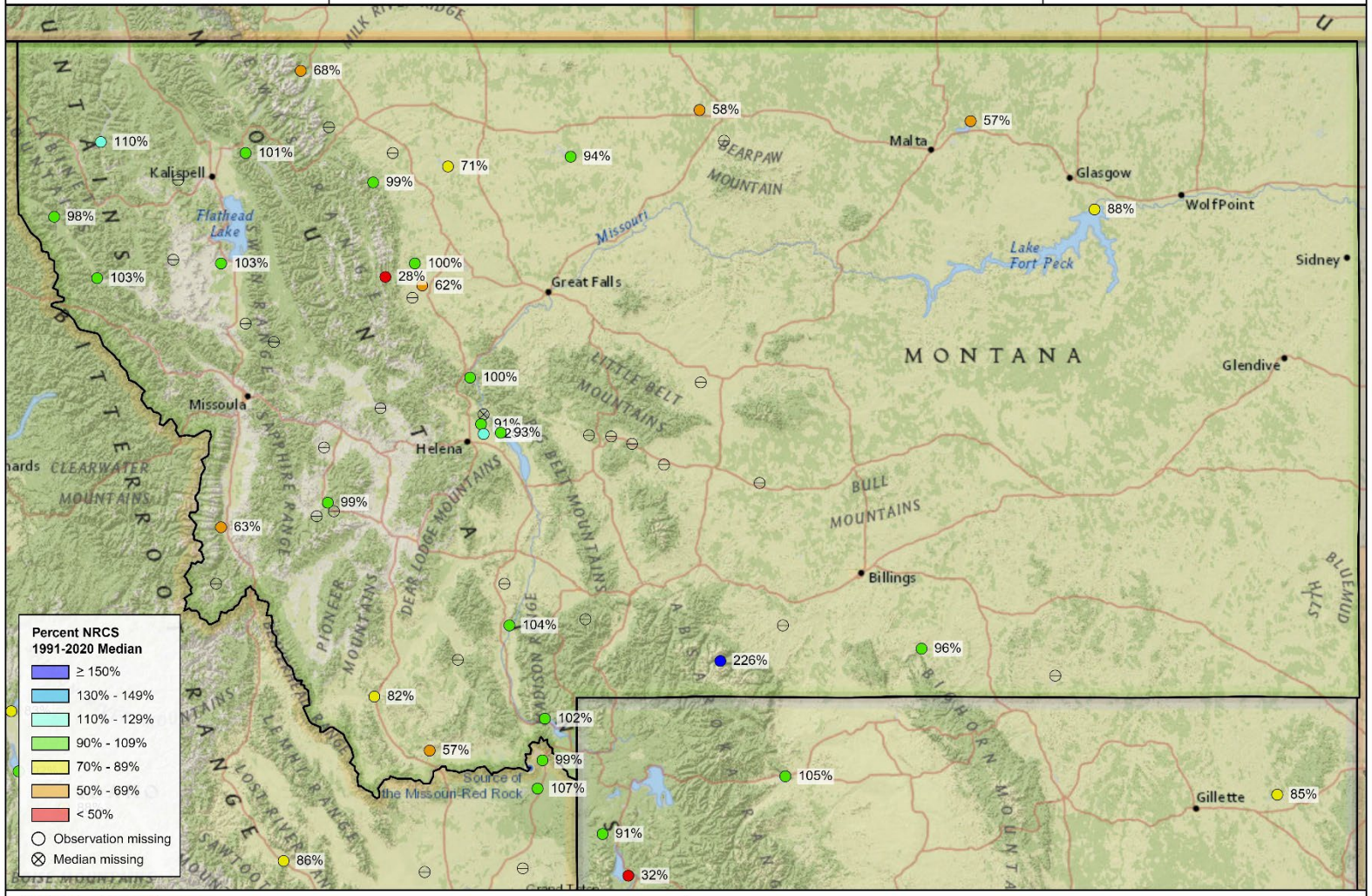
Reservoirs

April 1 reservoir storage levels as a percent of normal are similar to last month across Montana. Fresno, Gibson, Lake Como, Lake Sherburne, Lima, Nelson, and Willow Creek (Augusta) are well below normal for this time of year. Helena Valley, Lake Koocanusa, and Mystic Lake are well above normal for this time of year. All other reservoirs are near normal for this time of year. Several reservoirs were not available at the time of this report. Please refer to this link for current data.

Reservoir Storage – Current Compared to Last Month and Last Year

Reservoir	% of Median (1991-2020)		
	April 1, 2023	March 1, 2023	April 1, 2022
Ackley Lake	na	99%	87%
Bair Res	na	50%	65%
Bighorn Lake	96%	95%	98%
Canyon Ferry Lake	93%	93%	89%
Clark Canyon Res	82%	83%	73%
Cooney Res	na	108%	113%
Deadman's Basin Res	na	74%	73%
East Fork Rock Creek Res	na	94%	97%
Ennis Lake	104%	105%	102%
Flathead Lake	103%	98%	112%
Fort Peck Lake	88%	89%	93%
Fresno Res	58%	78%	61%
Georgetown Lake	99%	97%	98%
Gibson Res	28%	35%	66%
Hebgen Lake	102%	104%	94%
Helena Valley Reservoir	125%	124%	116%
Holter Lake	100%	100%	100%
Hungry Horse Lake	101%	103%	121%
Lake Como	63%	67%	138%
Lake Elwell (Tiber)	94%	96%	100%
Lake Frances	71%	72%	107%
Lake Helena	91%	91%	90%
Lake Koocanusa	110%	113%	75%
Lake Sherburne	68%	65%	137%
Lima Reservoir	57%	61%	67%
Middle Creek Res	na	94%	92%
Mystic Lake	226%	121%	231%
Nelson Res	57%	61%	62%
Nevada Creek Res	na	75%	84%
Nilan Reservoir	na	na	67%
Noxon Rapids Reservoir	98%	97%	99%
Painted Rocks Lake	na	115%	144%
Pishkun Res	100%	98%	97%
Ruby River Reservoir	na	113%	95%
Smith River Res	na	na	72%
Swift Res	99%	90%	91%
Thompson Falls Res	103%	102%	99%
Tongue River Res	na	112%	107%
Willow Creek Res (Harrison)	na	87%	78%
Willow Creek Res - Augusta	62%	61%	80%

Reservoir Storage	Reservoir Storage Percent NRCS 1991-2020 Median	April 1st, 2023



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Drought Status

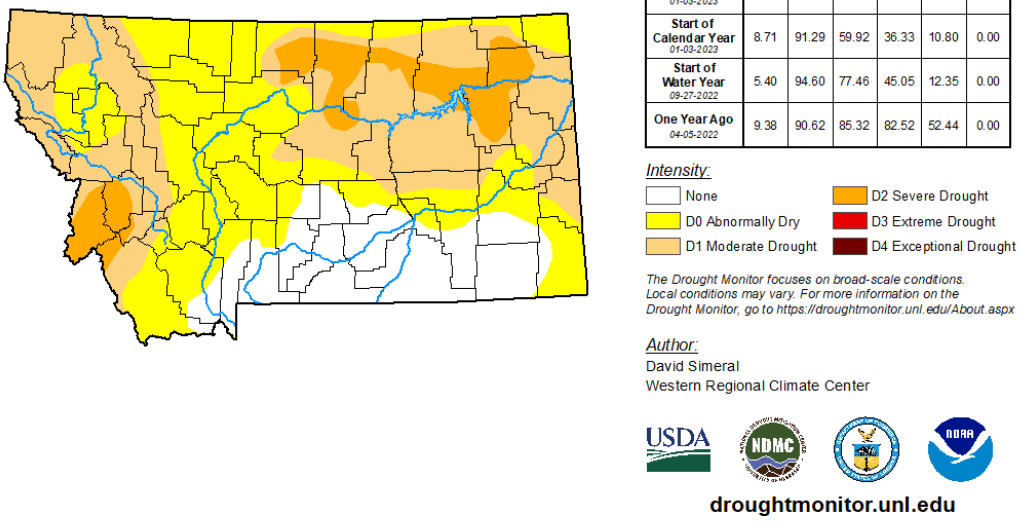
The most recent U.S. Drought Monitor map, released on April 6, 2023, indicates that 81% of Montana is under drought designation. While much of the state is still under drought status, the improvement in designation (D0-D4) has been significant over the last year. Currently only 10% of the state is designated D2 (0% D3-D4), while last year on April 1, 52% of Montana was designated D3 (Extreme Drought).

Drought severity has improved in most of Montana except in the northwest region, where it went from no drought designation to D0-D1 over the last year. Areas of highest drought severity include the Hi-Line region, where a large part of Hill, Blaine, Phillips, Valley, Roosevelt, and McCone counties are designated D2. A majority of Ravalli and Granite counties are also designated D2 (Severe Drought).

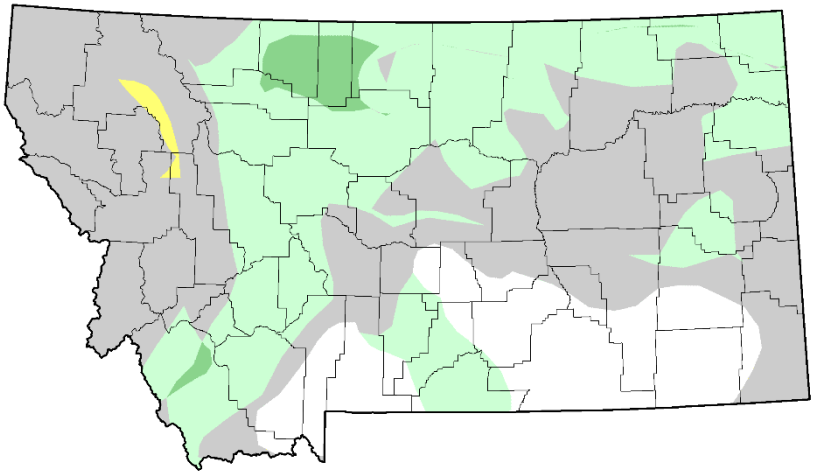
If you want more information about drought conditions or need assistance due to drought, the links below can help you gather information and provide information for contacting appropriate agencies.

Drought Links:

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



U.S. Drought Monitor Class Change - Montana
4 Week

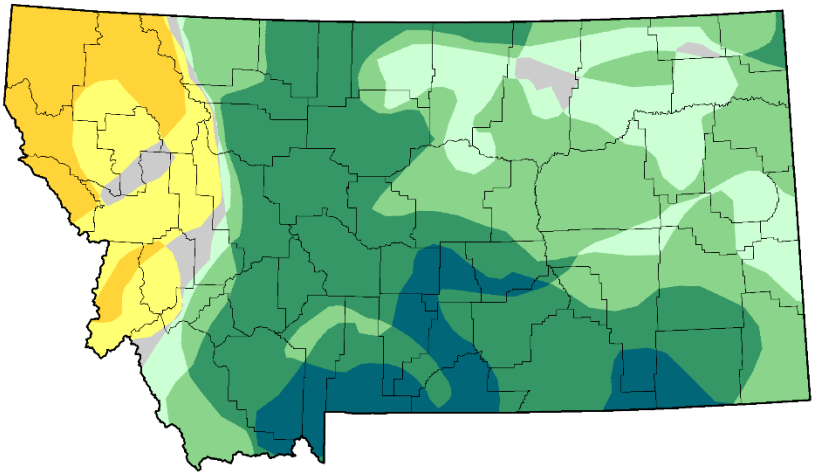


April 4, 2023
compared to
March 7, 2023

droughtmonitor.unl.edu

- 5 Class Degradation
- 4 Class Degradation
- 3 Class Degradation
- 2 Class Degradation
- 1 Class Degradation
- No Change
- 1 Class Improvement
- 2 Class Improvement
- 3 Class Improvement
- 4 Class Improvement
- 5 Class Improvement

U.S. Drought Monitor Class Change - Montana
52 Week



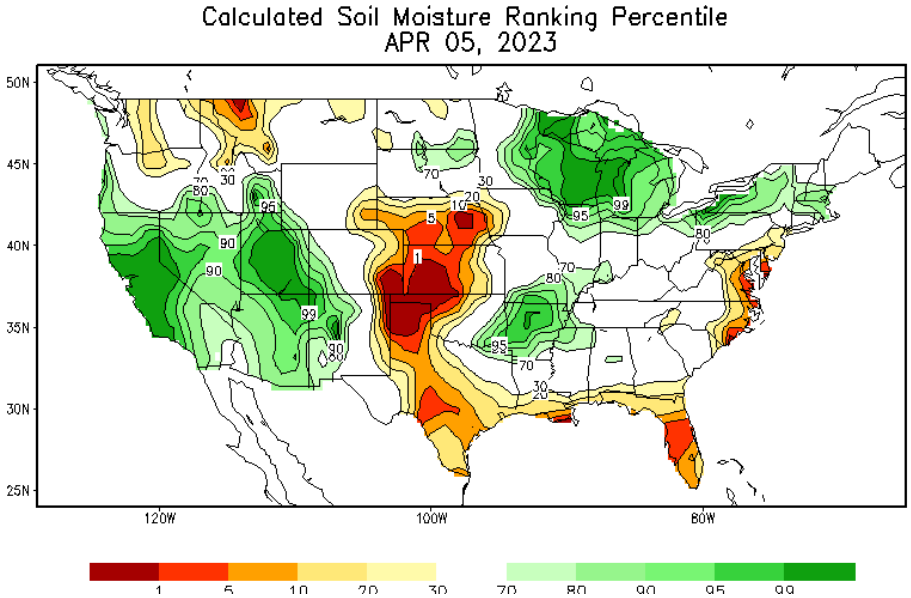
April 4, 2023
compared to
April 5, 2022

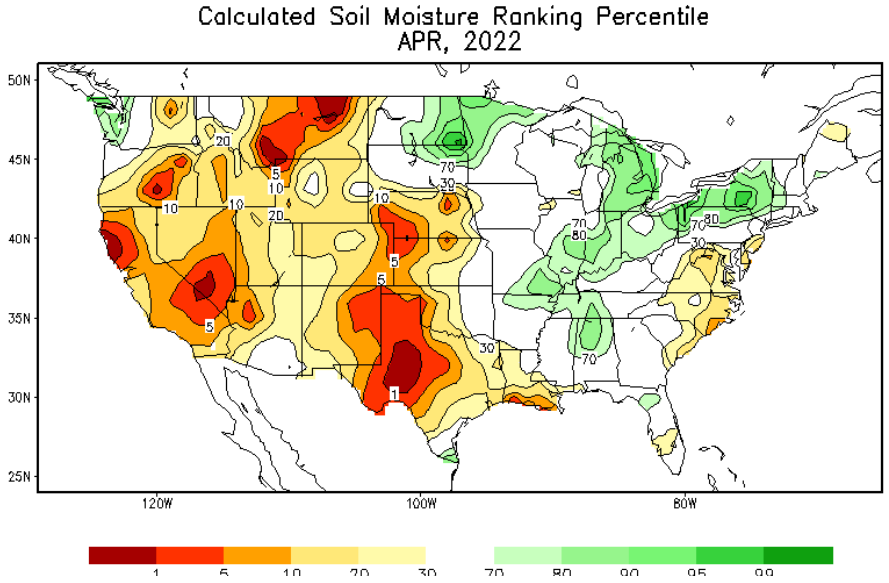
droughtmonitor.unl.edu

- 5 Class Degradation
- 4 Class Degradation
- 3 Class Degradation
- 2 Class Degradation
- 1 Class Degradation
- No Change
- 1 Class Improvement
- 2 Class Improvement
- 3 Class Improvement
- 4 Class Improvement
- 5 Class Improvement

Soil Moisture

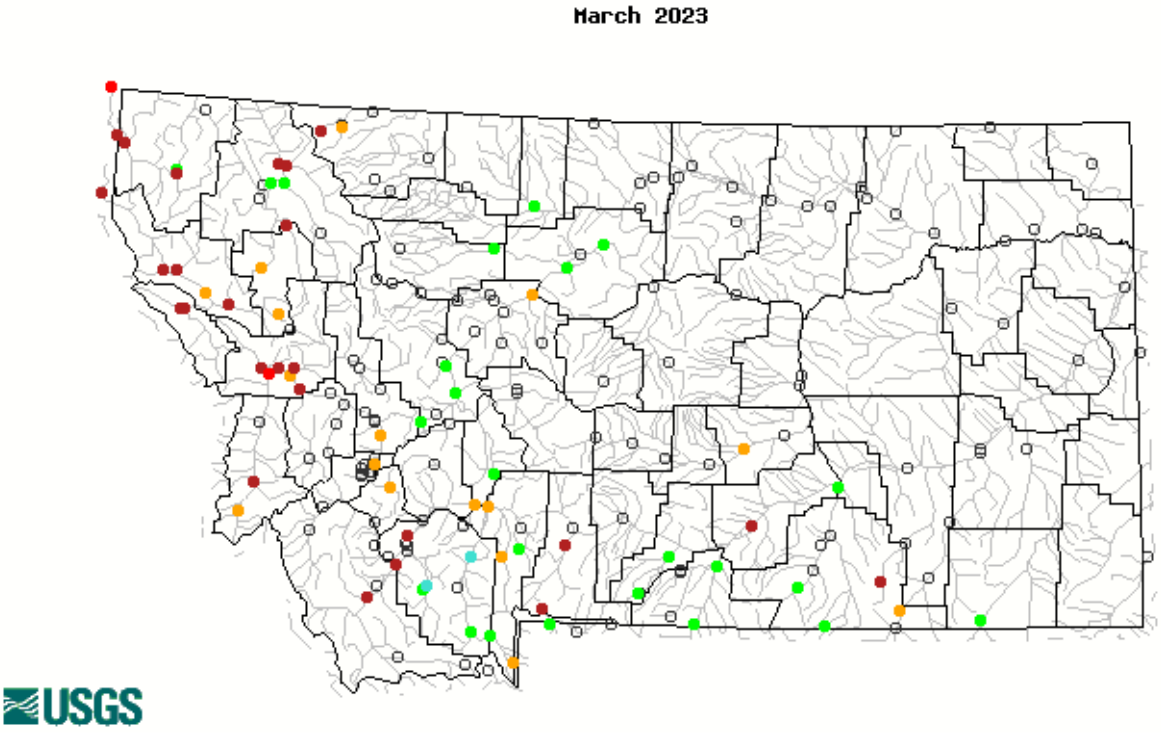
Modeled soil moisture for April 1, 2023, is in the 50th percentile (normal) across most of Montana. Soil moisture percentiles are lowest (below normal) west of the Continental Divide, particularly in Northwest Montana where soil moisture is less than the 25th percentile. Modeled soil moisture was significantly less (drier) in Southwest Montana and Central Montana last year in April when it was less than the 25th percentile.





Current Streamflows

East of the divide, total volumetric streamflows for March were mostly near normal for this time of year. West of the divide, streamflows were generally much below normal. March consisted of cool weather in Montana and as of April 1 the mountain snowpack has not transitioned to active melt. Short term weather forecasts indicate above normal temperatures ahead, which will induce some melt and streamflows will increase. Mountain snowpack density is currently about 25-35% east of the divide and 30-40% west of the divide. Densities will need to increase slightly before the mountain snowpack transitions into active melt, which will occur with time, extended warm weather, or rain. Until then, rising streamflows will primarily be the result of low elevation melt.

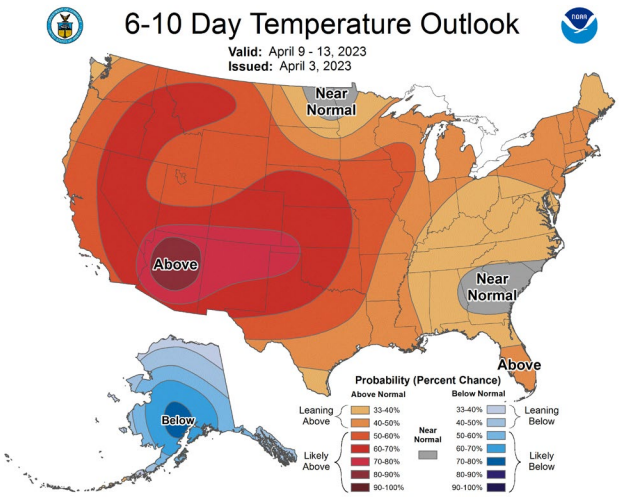


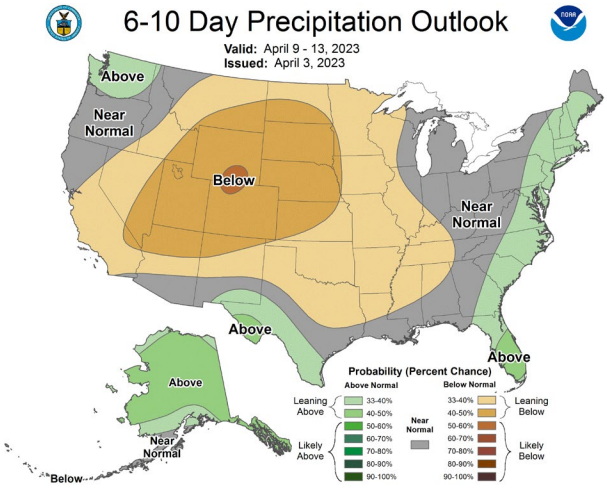
Explanation - Percentile classes							
Low	<10 Much below normal	10-24 Below normal	25-75 Normal	76-90 Above normal	>90 Much above normal	High	Not-ranked

Weather and Climate Outlook

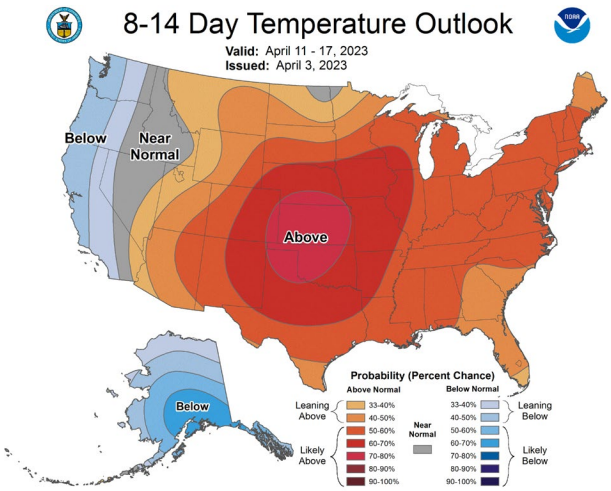
NOAA's Climate Prediction Center indicates that above average temperatures will likely cover much of Montana for the next two weeks. Precipitation will mostly lean below average next week proceeded by a slight chance of above average precipitation the following week. NOAA's 1-month outlook indicates an increased chance of below normal temperatures throughout most of the state and equal chances for above or below normal precipitation. There is a slight chance that Northeast Montana's average temperature for the next three months will be below normal, while the rest of the state has equal chances of above or below normal temperature and precipitation.

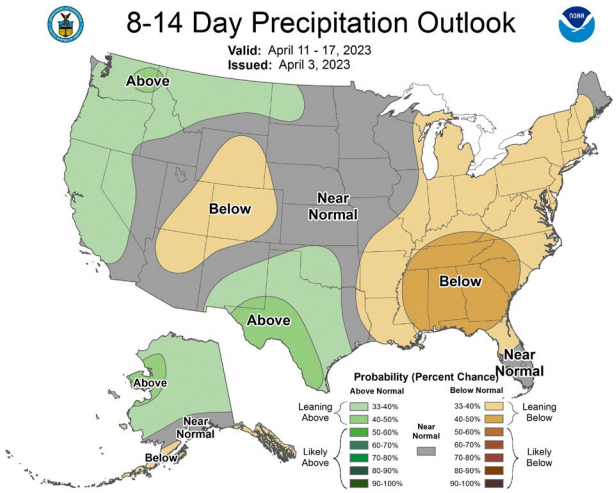
6-10 Day Outlook



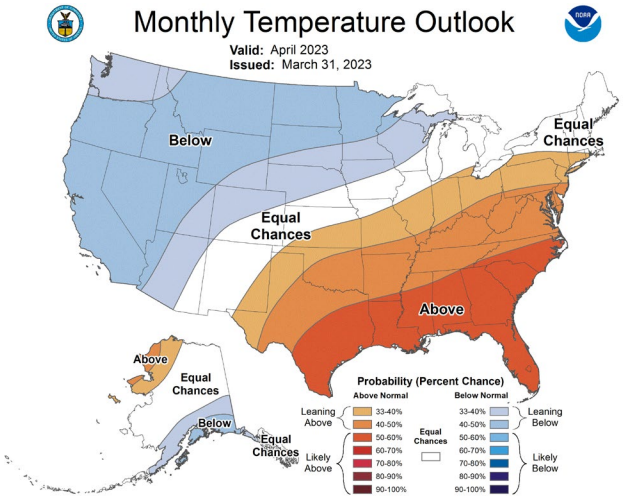


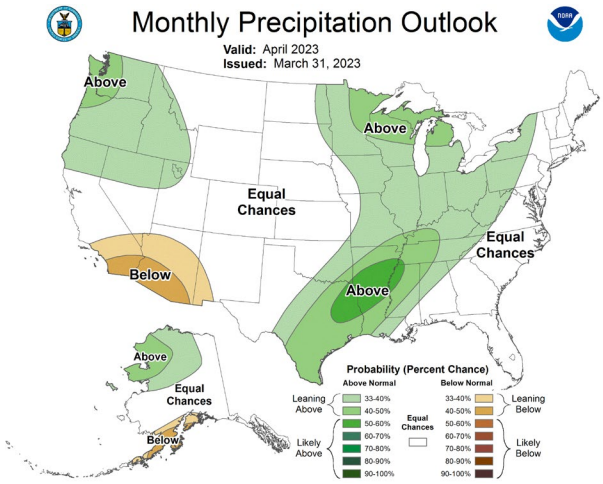
8-14 Day outlook



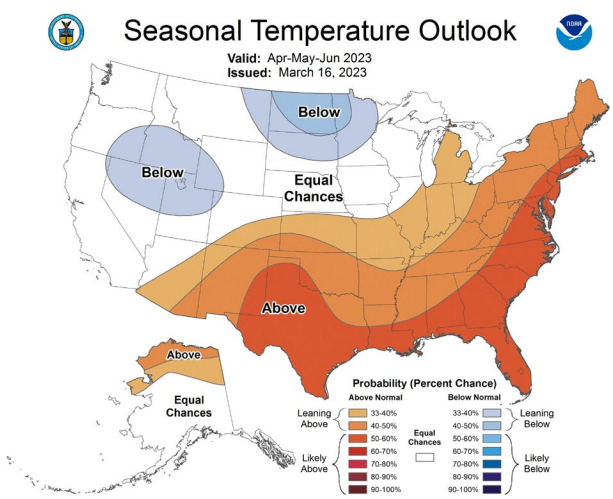


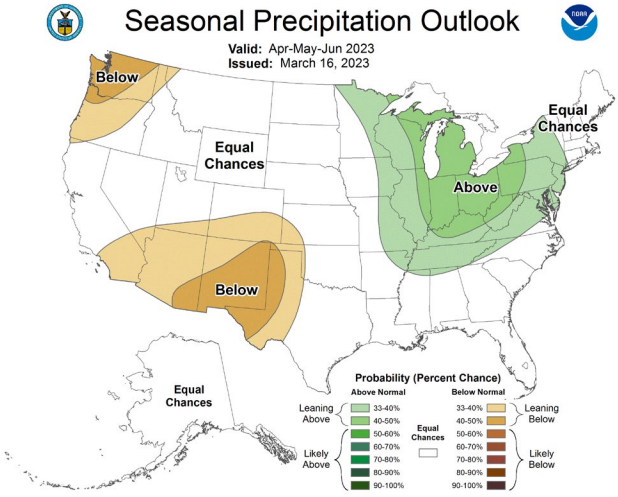
1 Month Outlook





3 Month Outlook





Official Streamflow Forecasts

How Forecasts Are Made

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.

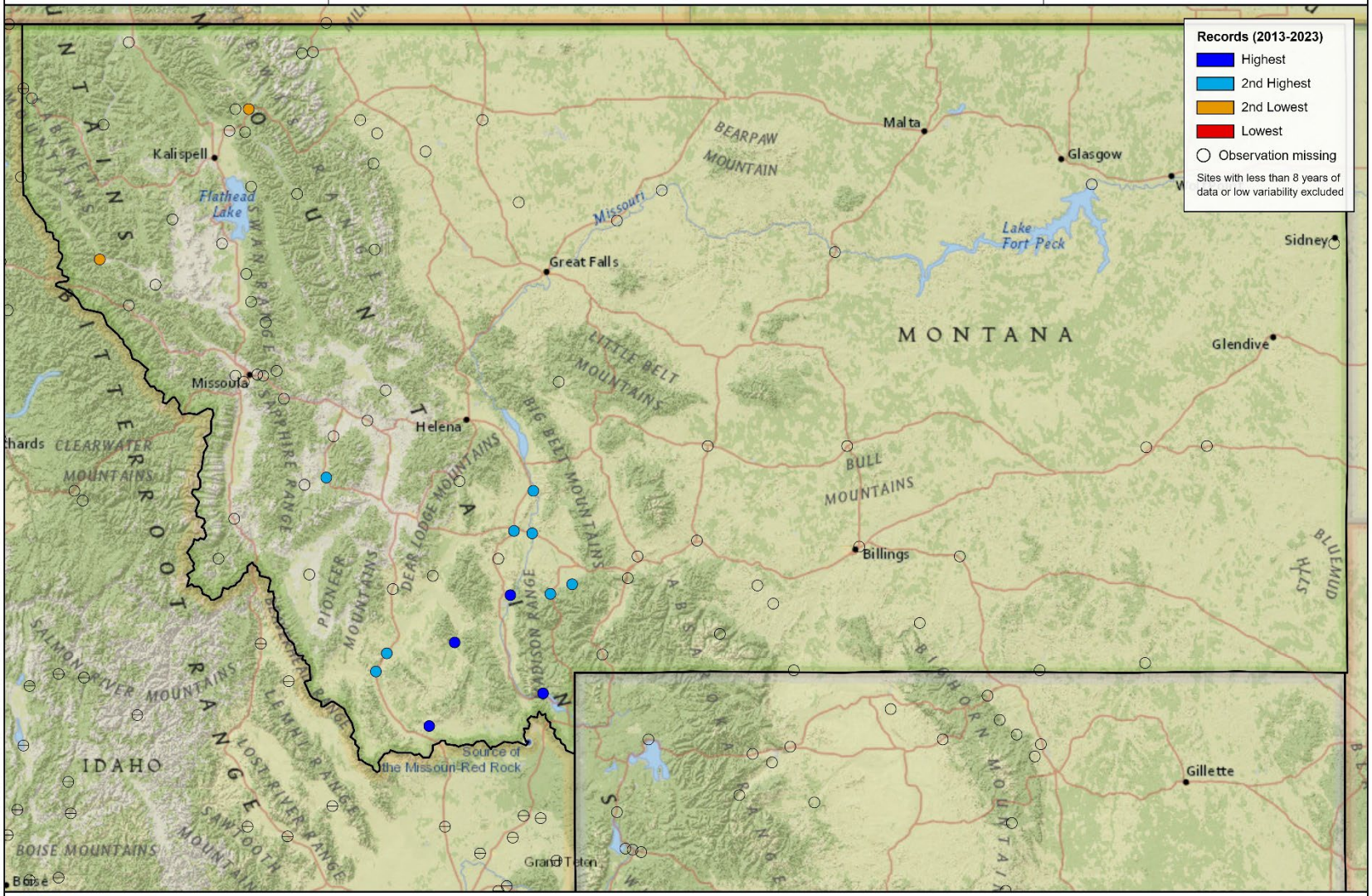
Snowpack measurements are obtained by using a combination of manual and automated SNOTEL measurement methods. Manual readings of snow depth and water equivalent are taken at locations called snow courses on a monthly or semi-monthly schedule during the winter. At automated stations, snow depth and snow water equivalent as well as precipitation and temperature are monitored on a daily basis. Both monthly and daily data are used to project snowmelt runoff.

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.

Summary – April 1, 2023

Similar to last month, April 1 streamflow forecasts are in line with current water year precipitation and the resulting snowpack. March brought above normal precipitation across much of Montana and many streamflow forecasts have increased from last month. The snowpack in the southern parts of Beaverhead, Madison, and Gallatin counties is exceptional and resulting in 50% exceedance forecasts that currently range from about 120-180% of normal. In that region many of those forecasts are the highest or second highest in 10 years and comparable to 2018 and 2014. 50% exceedance forecasts in northern Wyoming are generally within 10% of normal. West of the divide streamflow forecasts are highest in the southern Mission Mountain region and also the Upper Clark Fork River basin at about 110-130% of normal. Northern Kootenai and northern Flathead River basin streamflows are forecasted at about 70-90% of normal.

Forecast Volume, 50% Exceedance Probability	April 1, 2023 Streamflow Forecasts Compared to the Last 10 Years Records (2013-2023)	April - July, April 1, 2023



USDA Natural Resources Conservation Service
United States Department of Agriculture

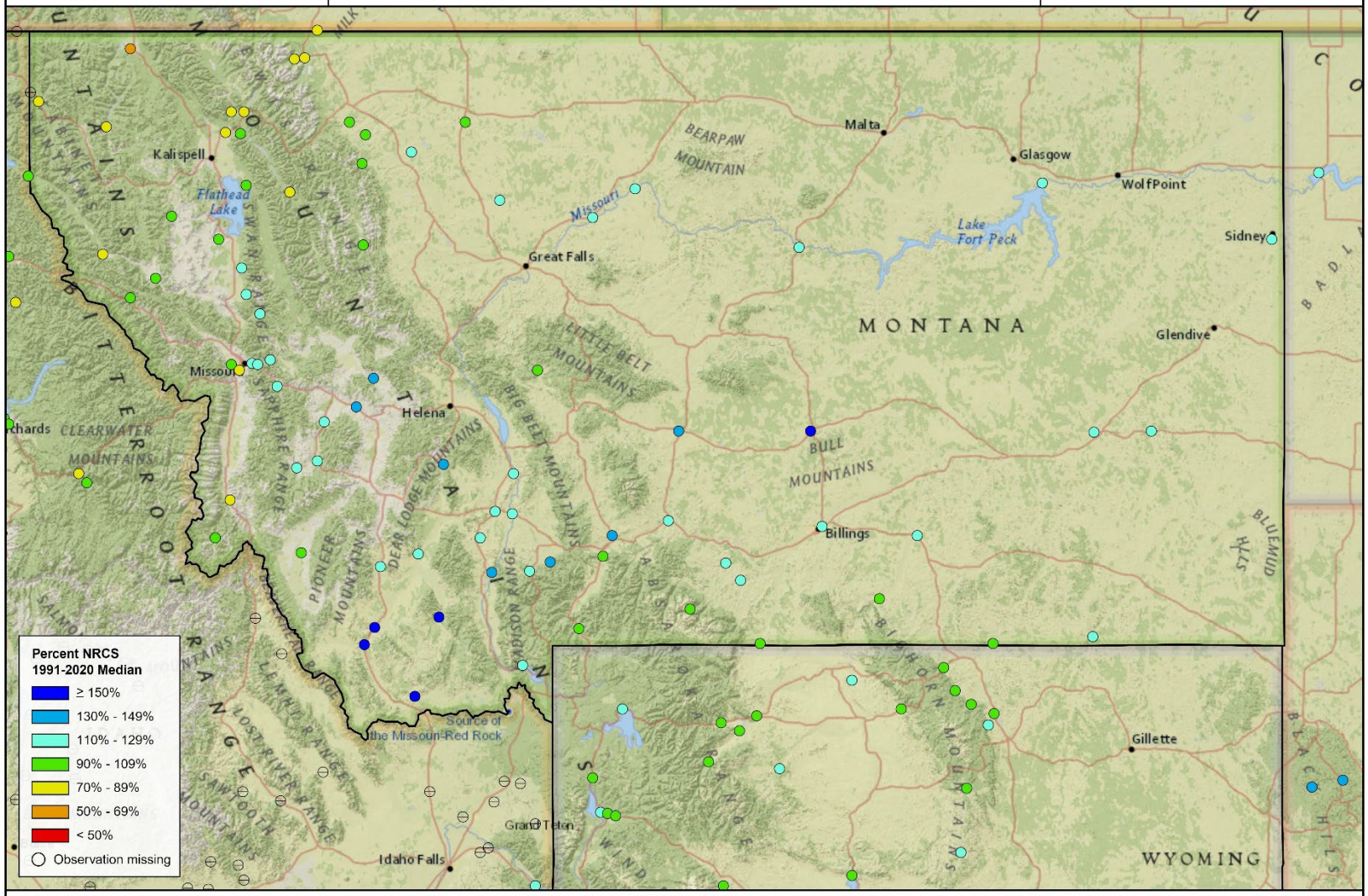
Created 4-06-2023

Forecast Volume,
50% Exceedance Probability

April 1 Streamflow Forecasts

Percent NRCS 1991-2020 Median

April - July, April 1, 2023



USDA Natural Resources Conservation Service
United States Department of Agriculture

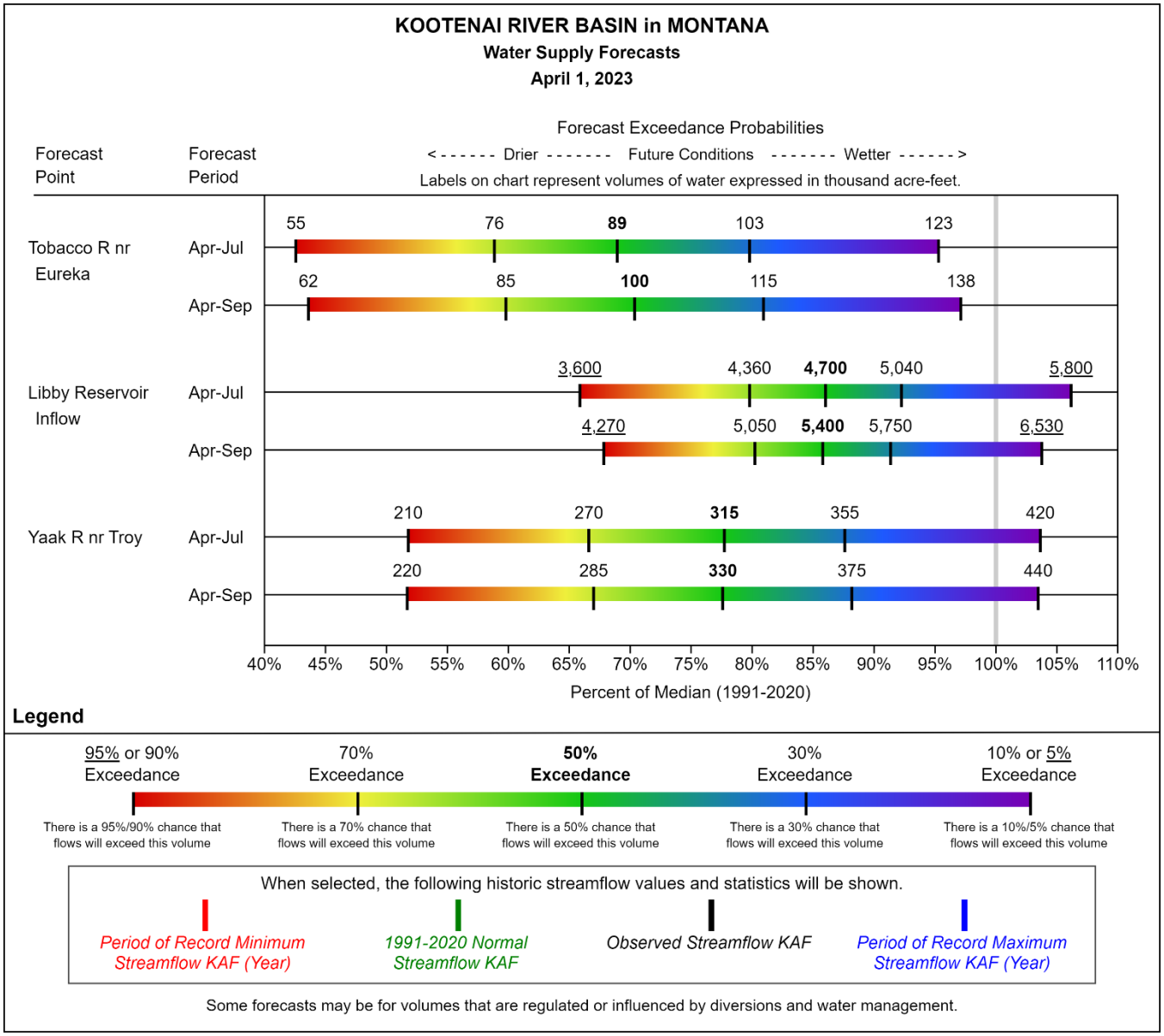
N

0 20 40 80 120 160 200 Miles

Created 4-06-2023

Streamflow Forecast Charts

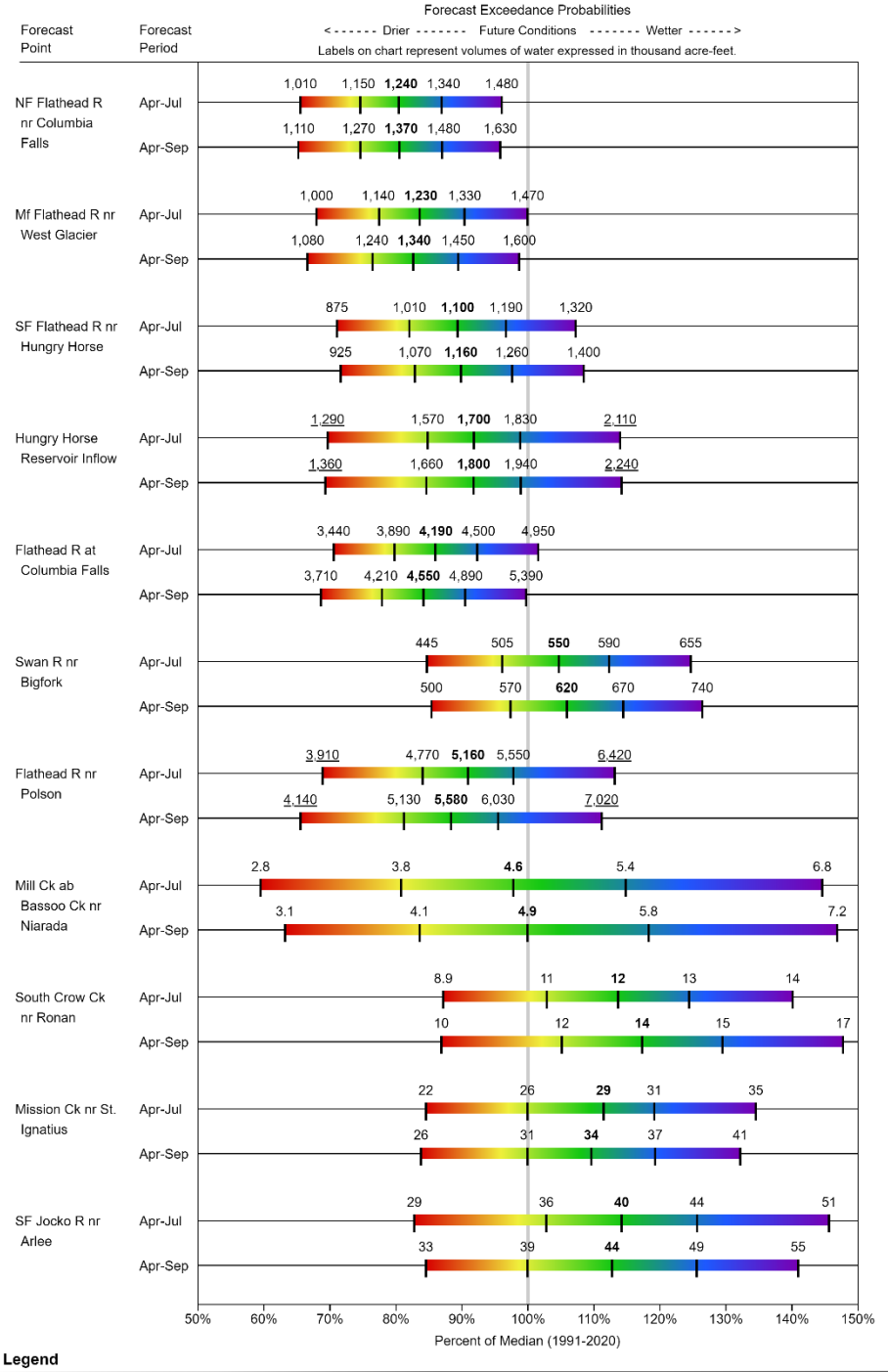
Interpreting Water Supply Forecast Charts - Link



FLATHEAD RIVER BASIN

Water Supply Forecasts

April 1, 2023



Legend

95% or 90% Exceedance | 70% Exceedance | **50% Exceedance** | 30% Exceedance | 10% or 5% Exceedance

There is a 95%/90% chance that flows will exceed this volume | There is a 70% chance that flows will exceed this volume | There is a 50% chance that flows will exceed this volume | There is a 30% chance that flows will exceed this volume | There is a 10%/5% chance that flows will exceed this volume

When selected, the following historic streamflow values and statistics will be shown.

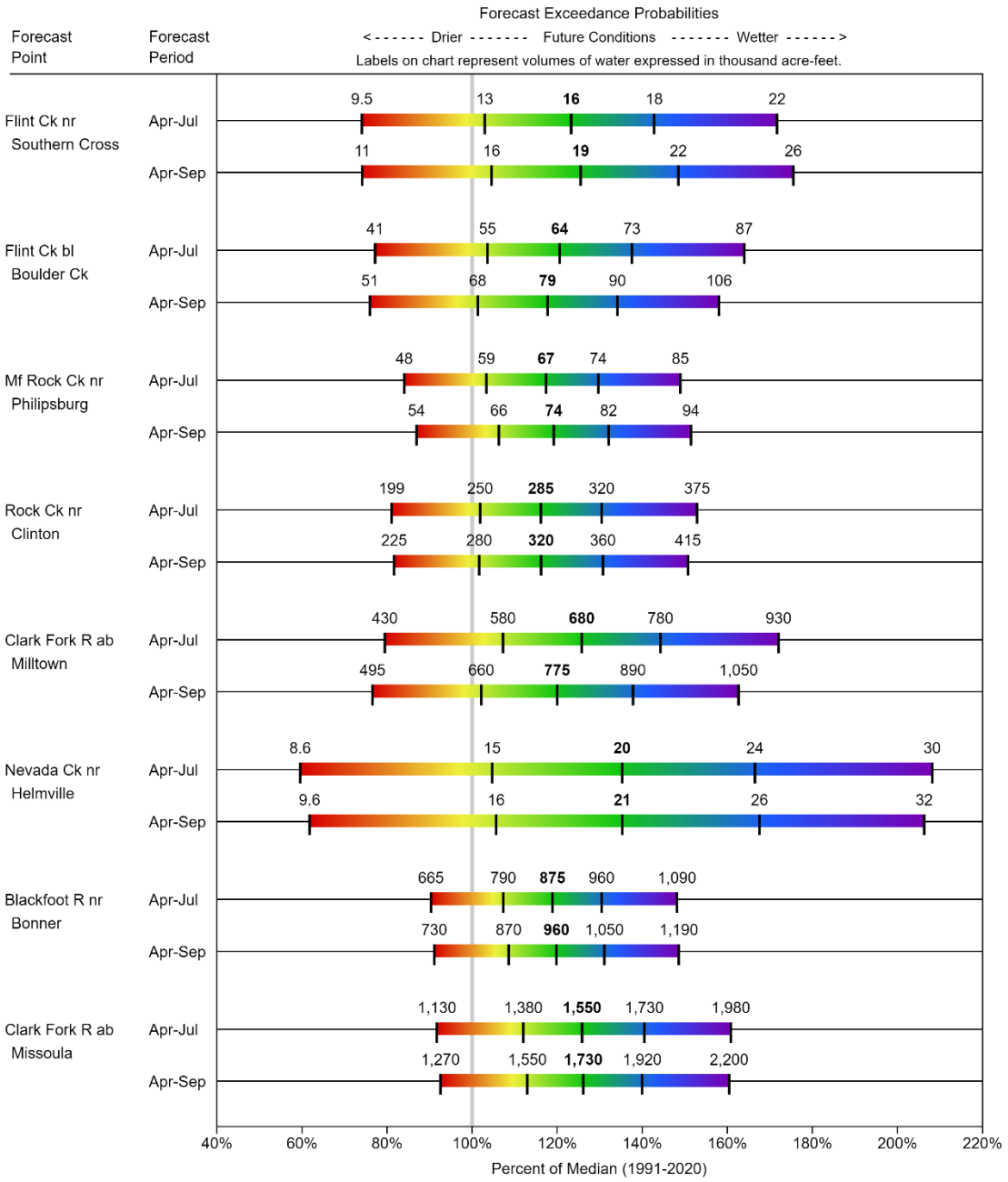
Period of Record Minimum Streamflow KAF (Year) | *1991-2020 Normal Streamflow KAF* | *Observed Streamflow KAF* | *Period of Record Maximum Streamflow KAF (Year)*

Some forecasts may be for volumes that are regulated or influenced by diversions and water management.

UPPER CLARK FORK RIVER BASIN

Water Supply Forecasts

April 1, 2023



Legend

95% or 90% Exceedance	70% Exceedance	**50% Exceedance**	30% Exceedance	10% or 5% Exceedance
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When selected, the following historic streamflow values and statistics will be shown.

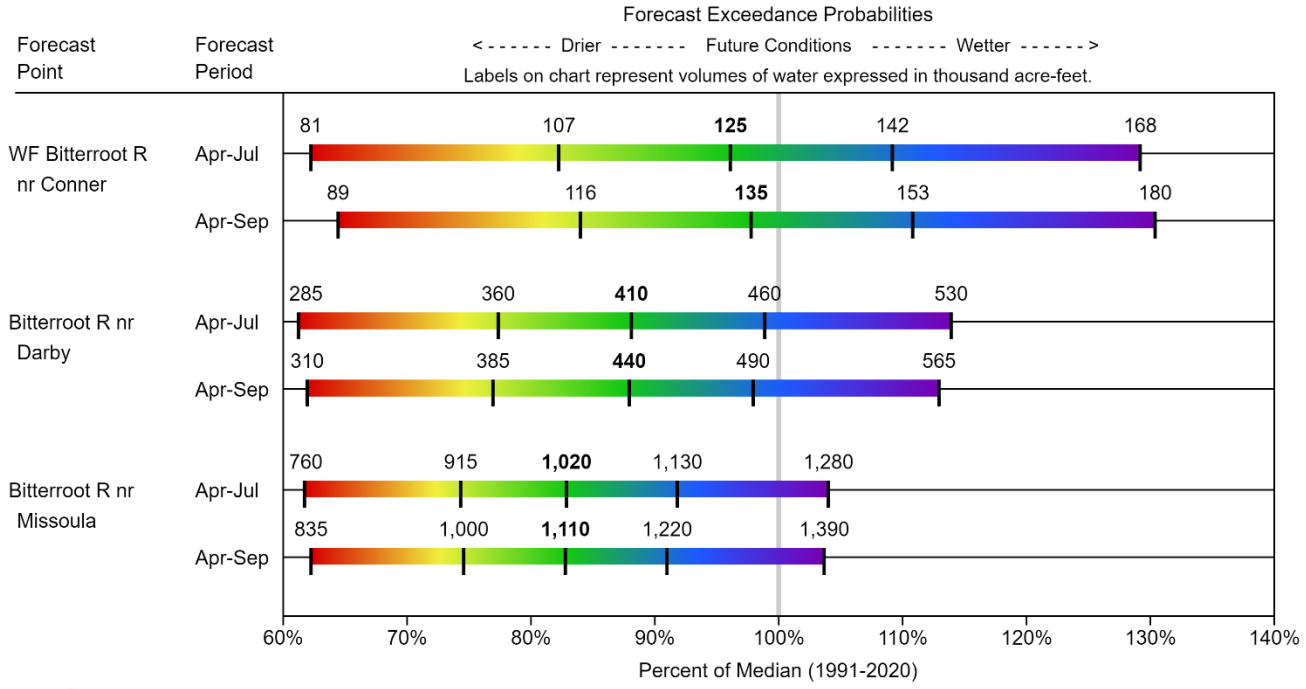
Period of Record Minimum Streamflow KAF (Year)	*1991-2020 Normal Streamflow KAF*	*Observed Streamflow KAF*	*Period of Record Maximum Streamflow KAF (Year)*

Some forecasts may be for volumes that are regulated or influenced by diversions and water management.

BITTERROOT RIVER BASIN

Water Supply Forecasts

April 1, 2023



Legend

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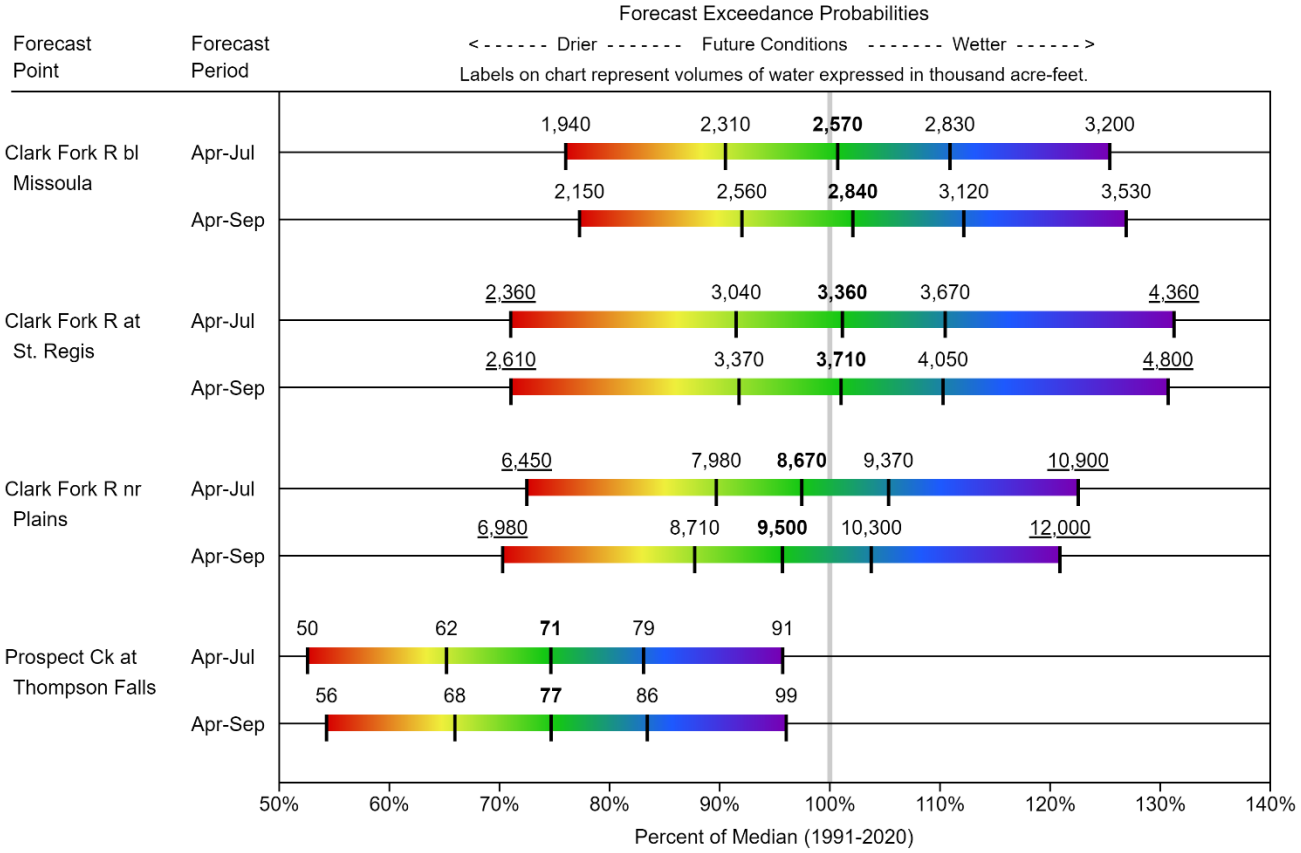
Period of Record Minimum Streamflow KAF (Year)	*1991-2020 Normal Streamflow KAF*	*Observed Streamflow KAF*	*Period of Record Maximum Streamflow KAF (Year)*

Some forecasts may be for volumes that are regulated or influenced by diversions and water management.

LOWER CLARK FORK RIVER BASIN

Water Supply Forecasts

April 1, 2023



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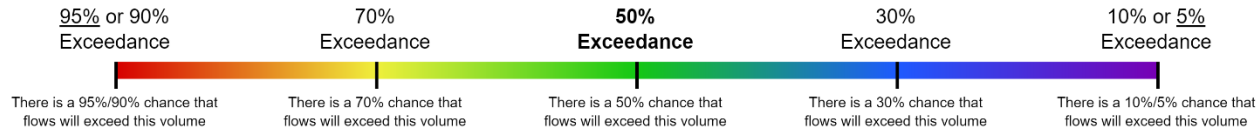


When selected, the following historic streamflow values and statistics will be shown.

Period of Record Minimum Streamflow KAF (Year)

1991-2020 Normal Streamflow KAF

Observed Streamflow KAF

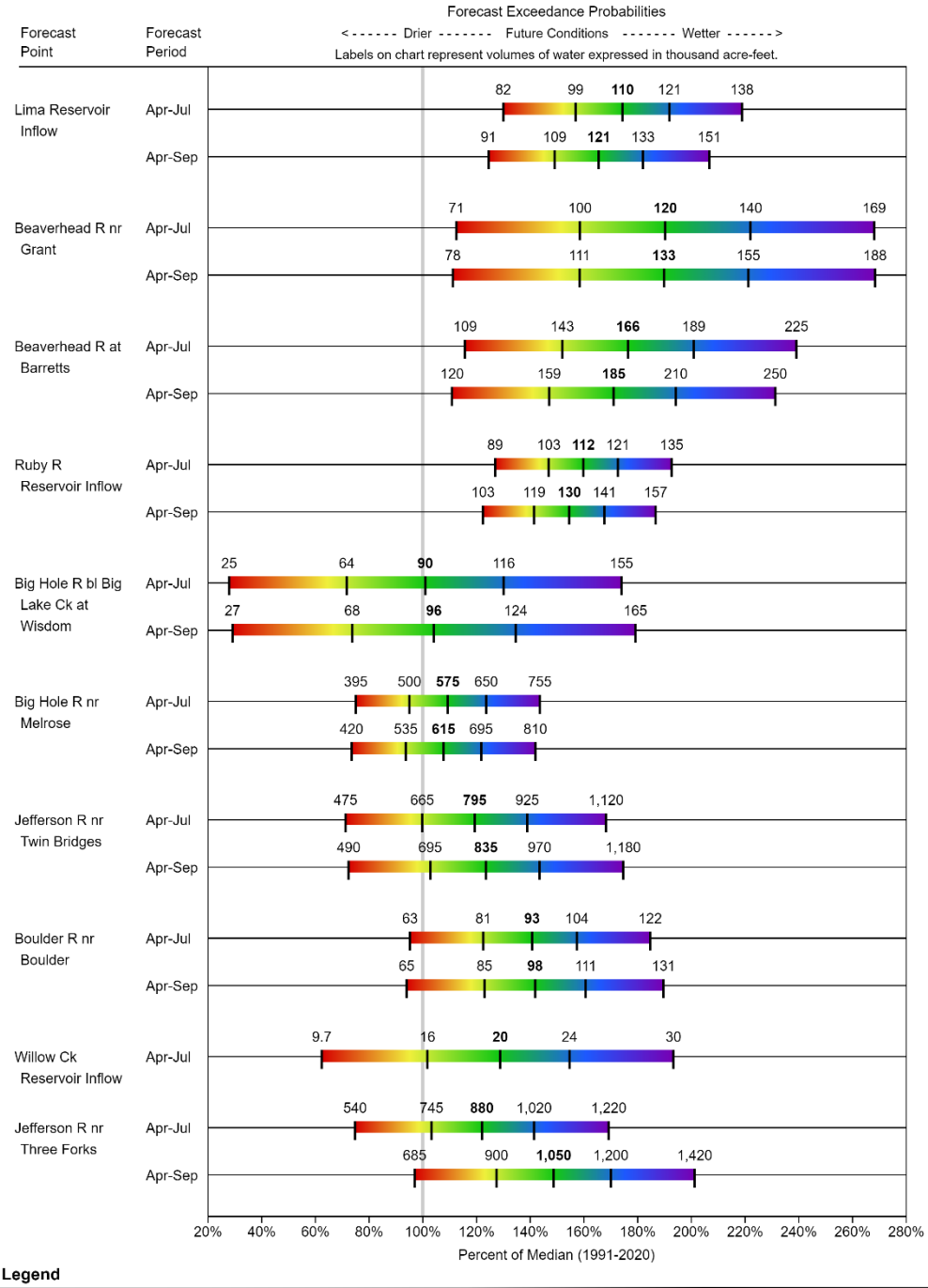
Period of Record Maximum Streamflow KAF (Year)

Some forecasts may be for volumes that are regulated or influenced by diversions and water management.

JEFFERSON RIVER BASIN

Water Supply Forecasts

April 1, 2023



Legend

95% or 90% Exceedance	70% Exceedance	**50% Exceedance**	30% Exceedance	10% or 5% Exceedance
There is a 95%/90% chance that flows will exceed this volume	There is a 70% chance that flows will exceed this volume	There is a 50% chance that flows will exceed this volume	There is a 30% chance that flows will exceed this volume	There is a 10%/5% chance that flows will exceed this volume

When selected, the following historic streamflow values and statistics will be shown.

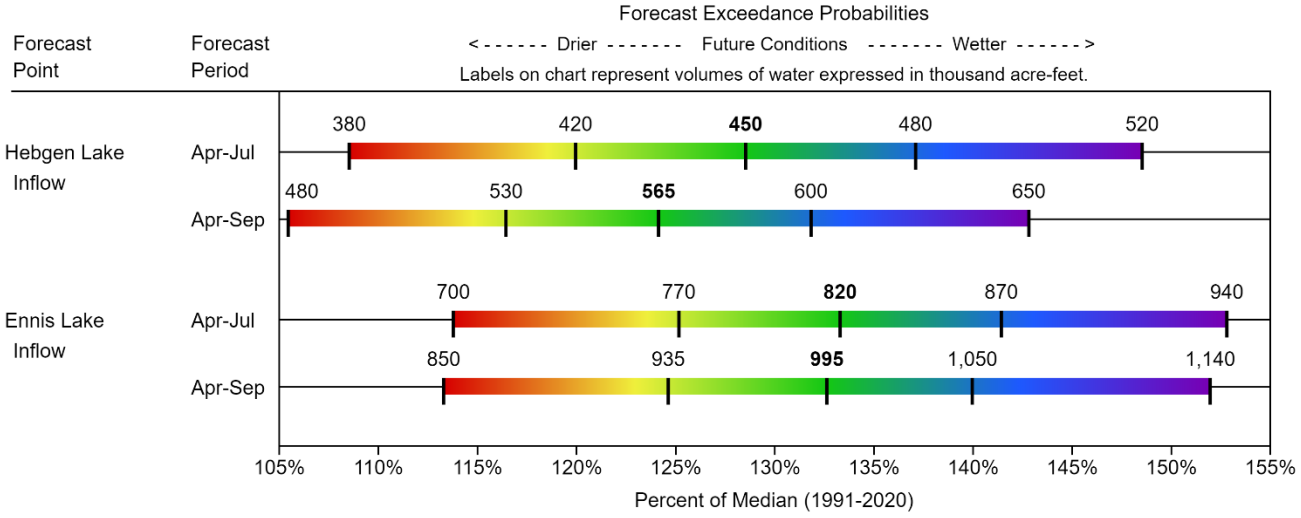
Period of Record Minimum Streamflow KAF (Year) | *1991-2020 Normal Streamflow KAF* | *Observed Streamflow KAF* | *Period of Record Maximum Streamflow KAF (Year)*

Some forecasts may be for volumes that are regulated or influenced by diversions and water management.

MADISON RIVER BASIN

Water Supply Forecasts

April 1, 2023



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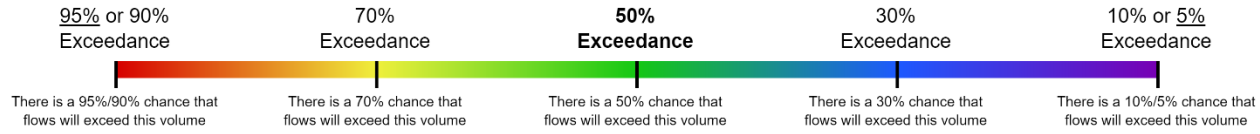


When selected, the following historic streamflow values and statistics will be shown.

Period of Record Minimum Streamflow KAF (Year)

1991-2020 Normal Streamflow KAF

Observed Streamflow KAF

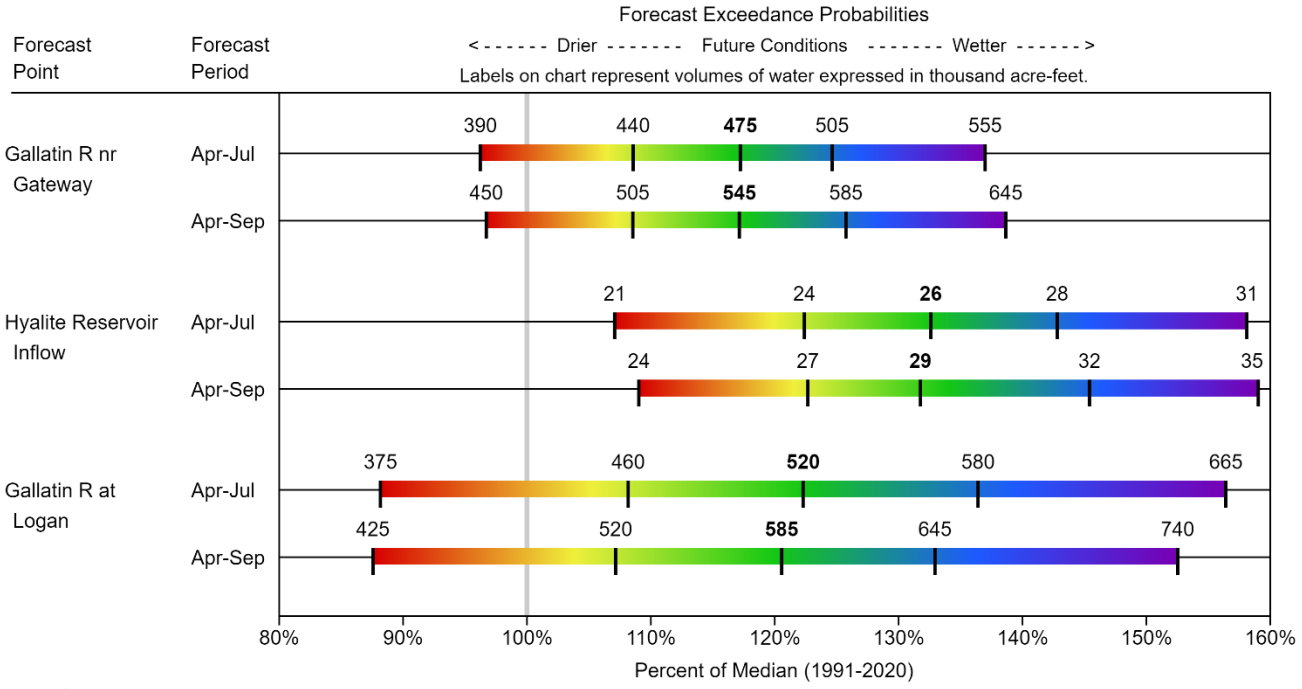
Period of Record Maximum Streamflow KAF (Year)

Some forecasts may be for volumes that are regulated or influenced by diversions and water management.

GALLATIN RIVER BASIN

Water Supply Forecasts

April 1, 2023



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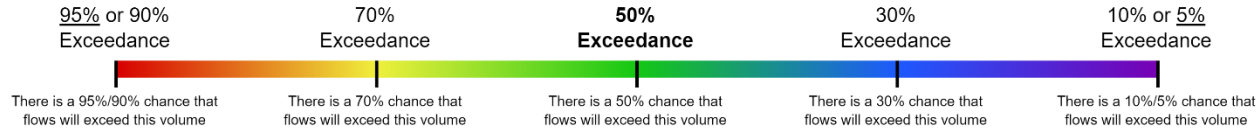


When selected, the following historic streamflow values and statistics will be shown.

Period of Record Minimum Streamflow KAF (Year)

1991-2020 Normal Streamflow KAF

Observed Streamflow KAF

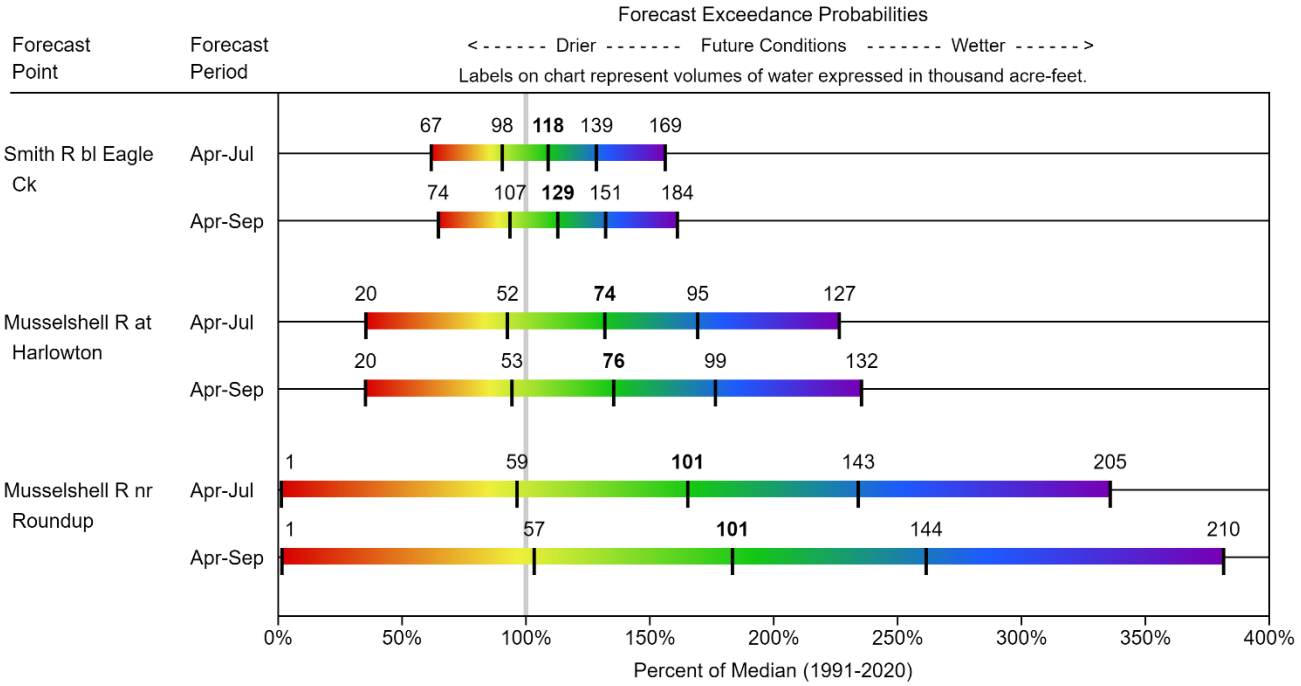
Period of Record Maximum Streamflow KAF (Year)

Some forecasts may be for volumes that are regulated or influenced by diversions and water management.

SMITH-JUDITH-MUSSELSHELL

Water Supply Forecasts

April 1, 2023



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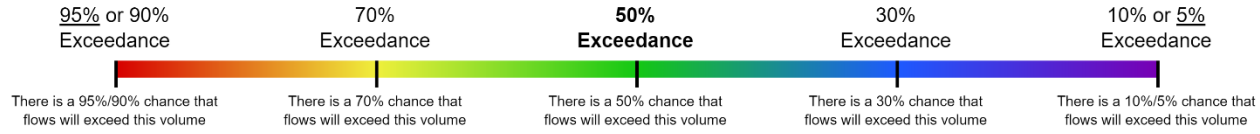

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Period of Record Minimum Streamflow KAF (Year)

1991-2020 Normal Streamflow KAF

Observed Streamflow KAF

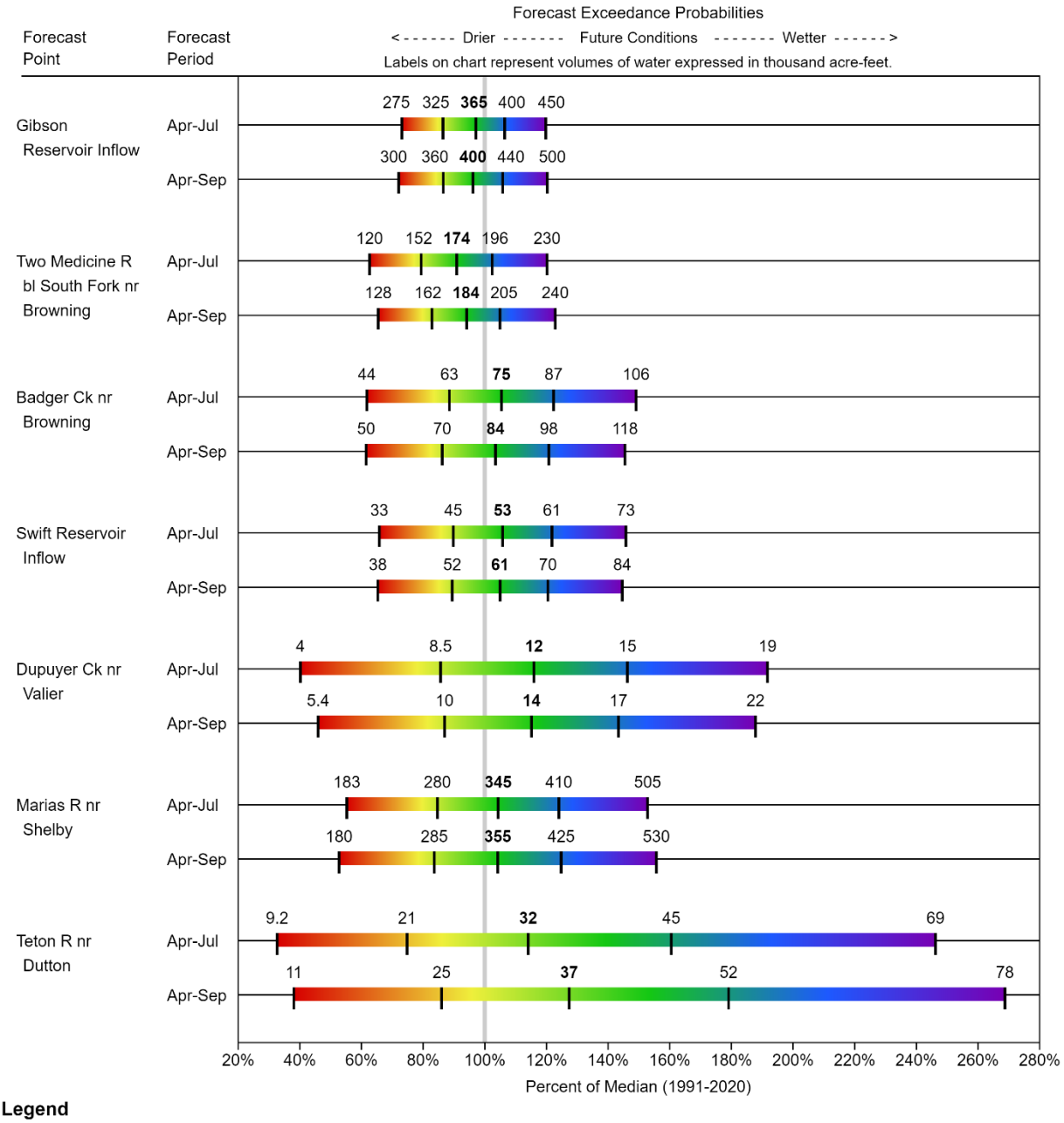
Period of Record Maximum Streamflow KAF (Year)

Some forecasts may be for volumes that are regulated or influenced by diversions and water management.

SUN-TETON-MARIAS

Water Supply Forecasts

April 1, 2023



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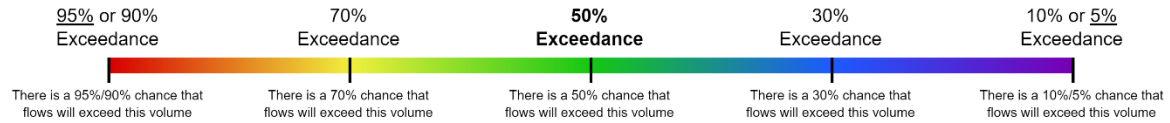

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1991-2020 Normal Streamflow KAF

Observed Streamflow KAF

Period of Record Maximum Streamflow KAF (Year)

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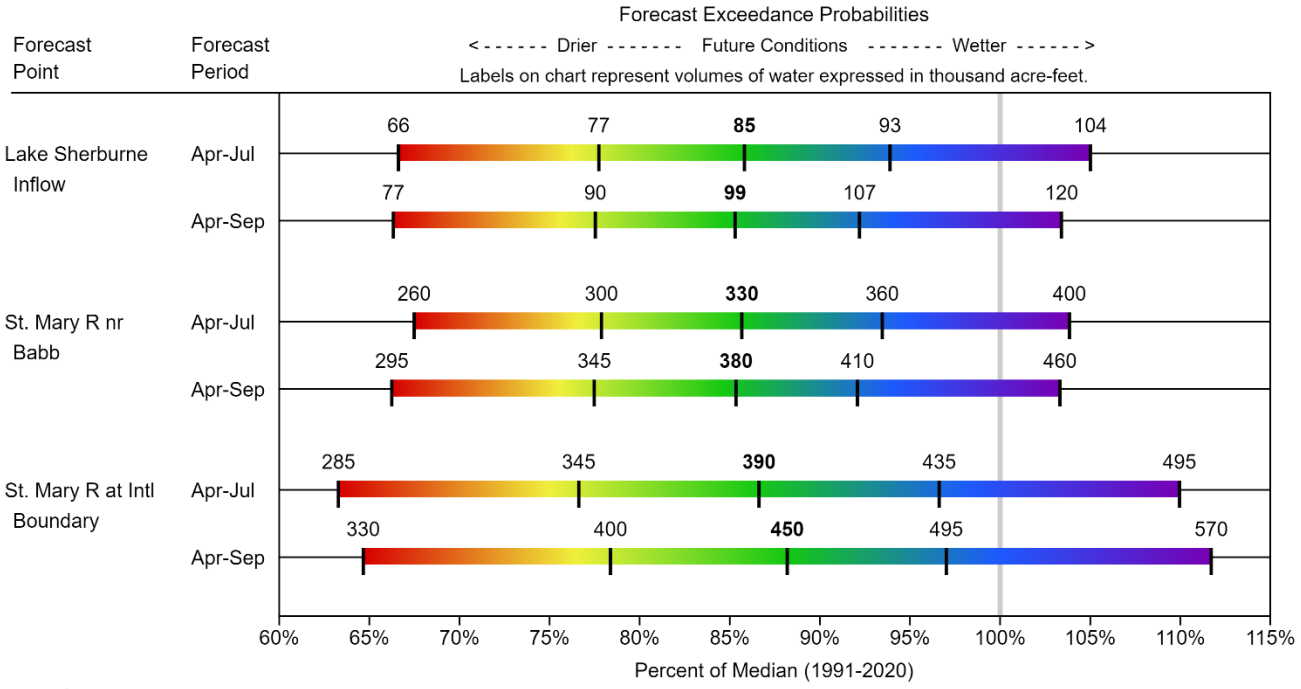
ST. MARY & MILK BASINS

Water Supply Forecasts

April 1, 2023



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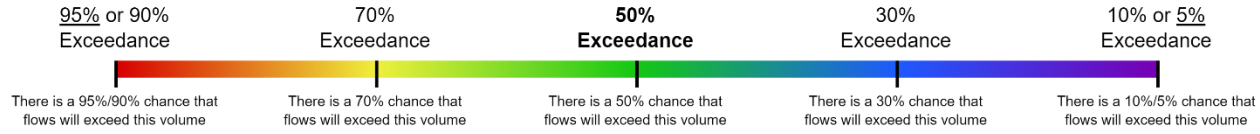

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Period of Record Minimum Streamflow KAF (Year)

1991-2020 Normal Streamflow KAF

Observed Streamflow KAF

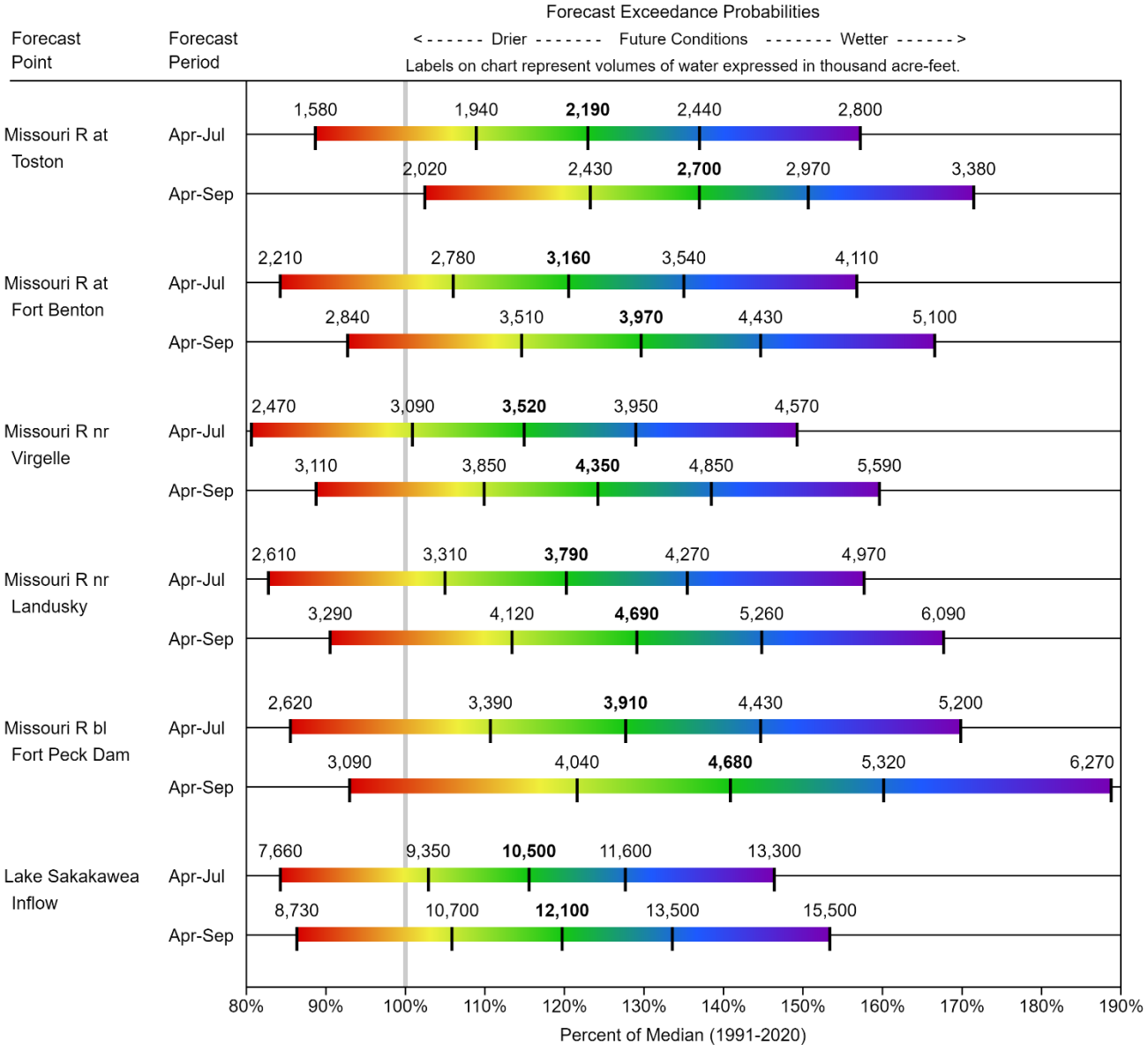
Period of Record Maximum Streamflow KAF (Year)

Some forecasts may be for volumes that are regulated or influenced by diversions and water management.

MISSOURI MAINSTEM BASIN

Water Supply Forecasts

April 1, 2023



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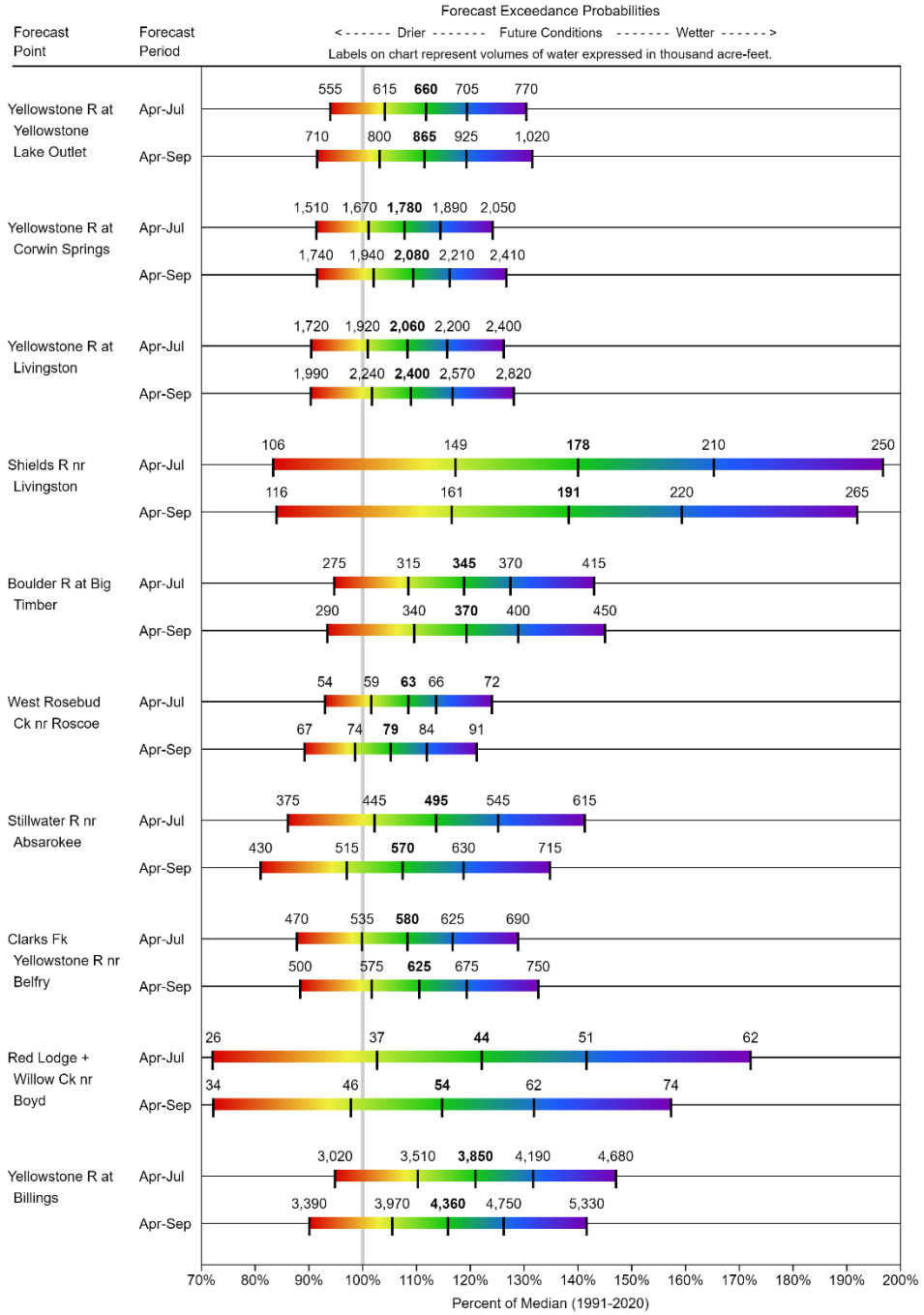
Some forecasts may be for volumes that are regulated or influenced by diversions and water management.

UPPER YELLOWSTONE RIVER BASIN

Water Supply Forecasts

April 1, 2023



Legend

95% or 90% Exceedance — There is a 95%/90% chance that flows will exceed this volume

70% Exceedance — There is a 70% chance that flows will exceed this volume

50% Exceedance — There is a 50% chance that flows will exceed this volume

30% Exceedance — There is a 30% chance that flows will exceed this volume

10% or 5% Exceedance — There is a 10%/5% chance that flows will exceed this volume

When selected, the following historic streamflow values and statistics will be shown.

Period of Record Minimum Streamflow KAF (Year)

1991-2020 Normal Streamflow KAF

Observed Streamflow KAF

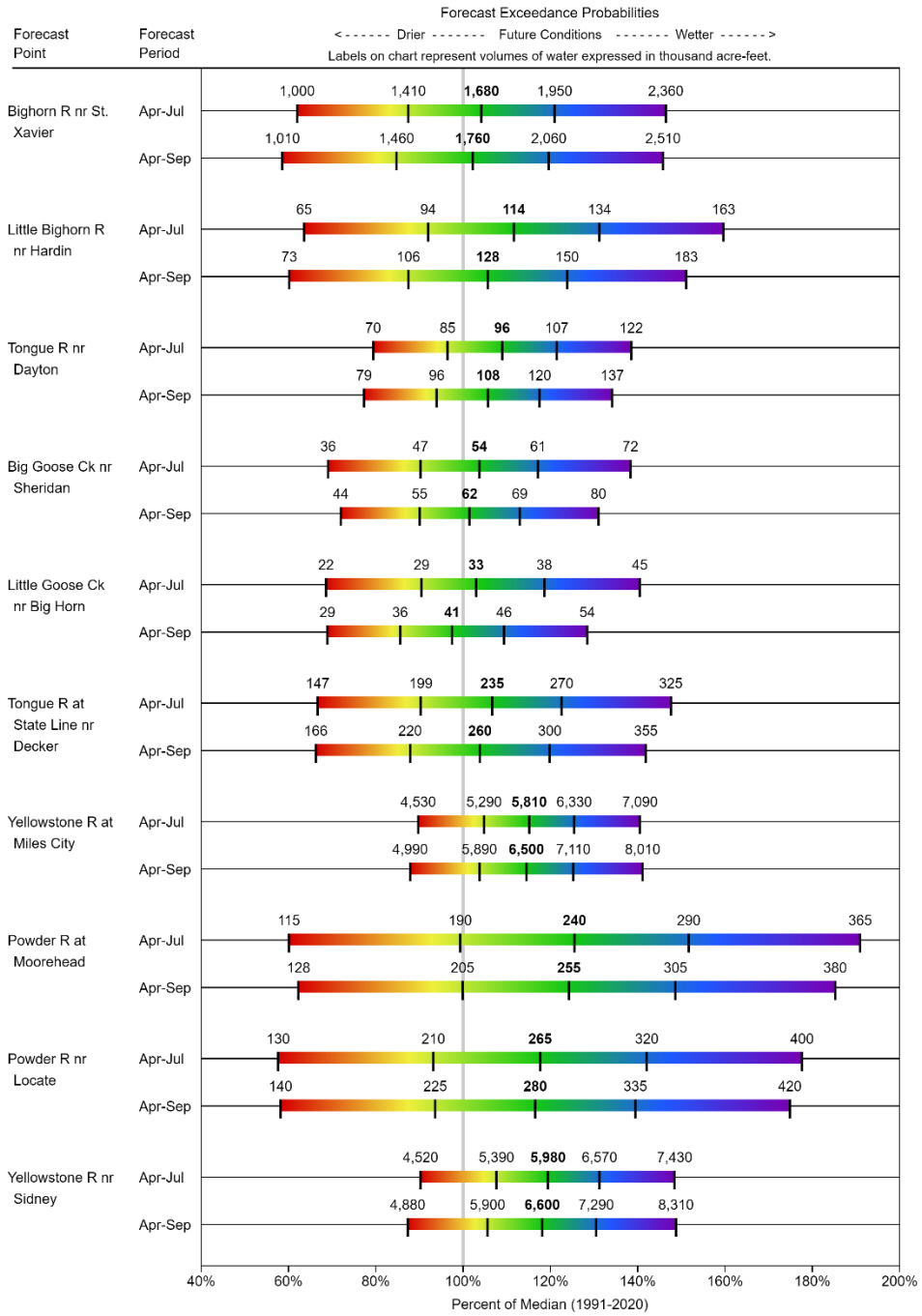
Period of Record Maximum Streamflow KAF (Year)

Some forecasts may be for volumes that are regulated or influenced by diversions and water management.

LOWER YELLOWSTONE RIVER BASIN (Wyoming)

Water Supply Forecasts

April 1, 2023



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Period of Record Minimum Streamflow KAF (Year) | *1991-2020 Normal Streamflow KAF* | *Observed Streamflow KAF* | *Period of Record Maximum Streamflow KAF (Year)*

Some forecasts may be for volumes that are regulated or influenced by diversions and water management.

Water Supply Outlook Report - Webpage Access

The following links will take you to Snow Survey webpages dedicated to Montana's major river basins and a statewide overview. Various water supply related maps are available using the drop-down menus. Hover over and click on points or basins of interest to view data and charts.

Monthly Data - Interactive Web Pages		
Monthly Data - Statewide Overview		
Monthly Statewide Overview		
Monthly Data - River Basin Summaries		
Columbia River Basin	**Missouri River Basin**	**Yellowstone River Basin**
Kootenai	**Jefferson**	**Upper Yellowstone**
Flathead	**Madison**	**Bighorn-Powder-Tongue**
Upper Clark	**Gallatin**	
Bitterroot	**Helena Valley**	
Lower Clark	**Smith-Judith-Musselshell**	
	Sun-Teton	
	St. Mary	
	Milk	

Links and Resources

The following links will take you to the external (non-NRCS) resources used in this report:

Precipitation

- PRISM Climate Group – Oregon State University
- West Wide Drought Tracker
- Montana Climate Office – University of Montana
    - Drought Indicator Dashboard

Temperature

- West Wide Drought Tracker
- NOAA NWS – Climate Offices

Drought Information

- Montana | U.S. Drought Monitor (unl.edu)
- Outlooks | U.S. Drought Monitor (unl.edu)
- Montana | Drought.gov

Soil Moisture

- USDA – National Agricultural Statistics Service – National Crop Progress
- NOAA NWS Climate Prediction Center - Calculated Soil Moisture Ranking Percentiles

Current Streamflow

- USGS WaterWatch -- Streamflow conditions

Weather and Climate Predications

- Climate Prediction Center (noaa.gov)

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U.S. Department of Agriculture

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Bozeman, Montana

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Bozeman, MT 59715

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Montana Water Supply Outlook Report

Natural Resources Conservation Service