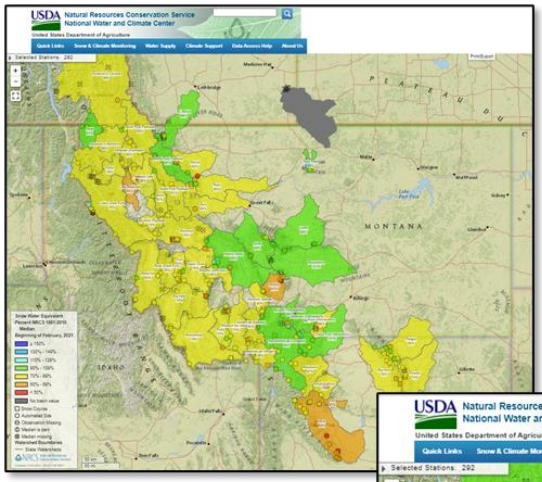
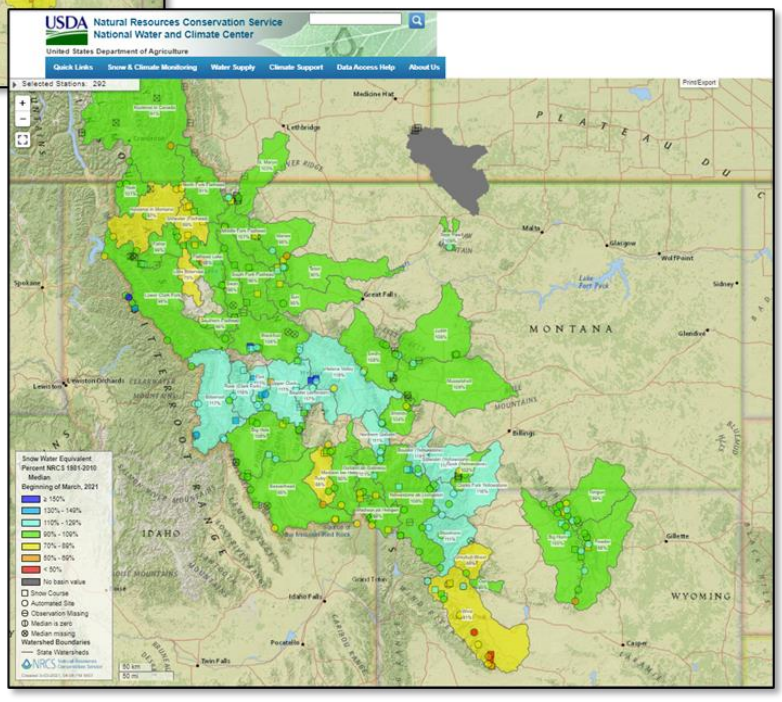
Montana
Water Supply Outlook Report
March 1st, 2021

February 1st, 2021 Snowpack



March 1st, 2021 Snowpack



Heavy snowfall, days of sub-zero temperatures, and high winds. Just another Montana February, right? Not exactly, snowfall was record-setting for February at some mountain locations, and temperatures would set records for days below zero and daily low temperatures at some locations east of the Divide. Fortunately, this winter blast would help the statewide snowpack improve from February 1st, with most river basins reporting near to slightly above normal snowpack on March 1st. Readers can find further information on February's weather, current snowpack, and anticipated water supply in this month's report.

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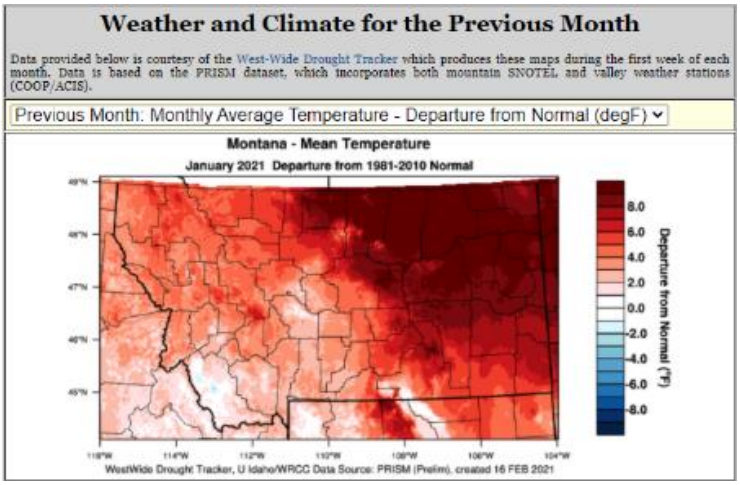
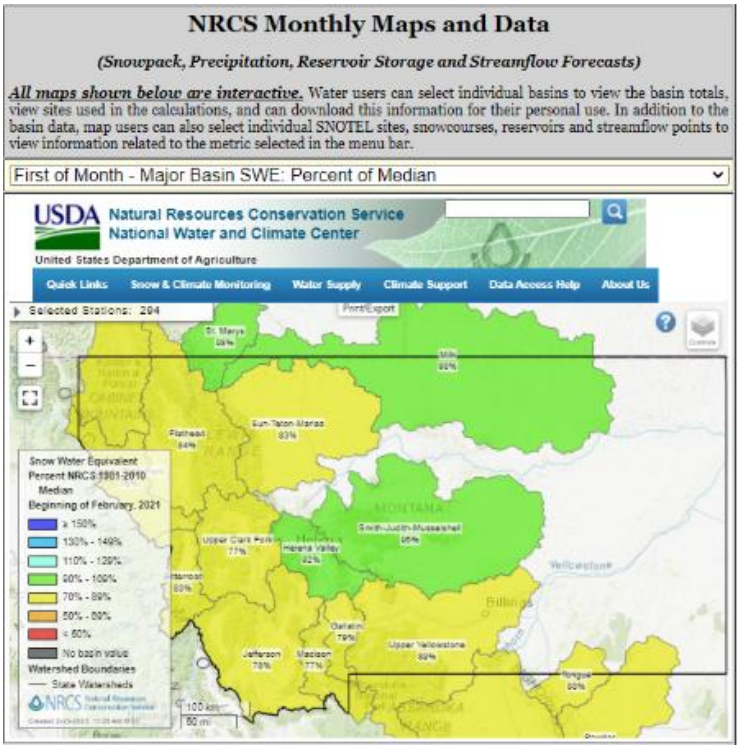
NRCS Snow Survey – Product Highlights

Monthly Statewide Summary Webpage

Have you ever wished you could dive deeper into the numbers we publish monthly or zoom in to a specific area of interest? Well, now you can access all the monthly data and maps compiled to produce the monthly Water Supply Outlook Report via newly created NRCS Montana Snow Survey webpages. This year, water users can find new interactive summaries for both statewide and river basin-specific conditions for the monthly time scale on Montana NRCS Snow Survey webpages.

You might ask, "why should I use monthly data when there is daily information also available from the Montana Snow Survey webpages?" Every month between January and June, there are manual snow courses measured across the state by a dedicated crew of snow surveyors. These manual measurements help to supplement the automated SNOTEL network and vastly expand the number of locations and elevations used to characterize the snowpack for a given area. For some basins, like the Sun River basin, which has its headwaters in the Bob Marshall Wilderness, these are the only direct snowpack measurements within the river basin. As such, the monthly snowpack numbers (1st of month data) can be significantly different than if you looked at only automated data, which is what is used to create daily products.





Also, additional parameters are collected for the monthly time scale, including valley precipitation (ACIS/COOP network), reservoir storage (irrigator managed, USBR, USACE), and observed streamflow (USGS).

All of this additional information helps to put the whole water system into context. You can view how much water is currently stored in the valley reservoirs and mountain snowpack, how much precipitation valley locations have been receiving, and how much water to anticipate by looking at the streamflow forecasts.

The best place to start for this interactive content is the "Monthly Statewide Overview" webpage, which emulates the traditional look and content of the WSOR, but makes the content and maps selectable and interactive.

Other monthly webpages have been created for several other products put out by the NRCS Montana Snow Survey. Links to these pages can be found below or by navigating to the "Water Supply" button in the header drop-down menu on the Montana Snow Survey homepage.

Monthly Water Supply Product Webpages

- Monthly Statewide Overview
- Official Monthly Streamflow Forecasts (available by 5th business day of the month)
- Reservoir Storage
- Historical Water Supply Outlook Reports

NRCS Snow Survey – Operational News

There's no major news on SNOTEL data outages this month within the state of Montana. The network operated by the Montana Data Collection Office (DCO) in MT, WY, and SD did well through the storm system, with only intermittent outages at a few SNOTEL sites caused by heavy snowfall rates.

There has been an issue with the Hobbs Park SNOTEL site, located on the east side of the Wind River Range in Wyoming, since early winter. This month, the Montana Snow Survey crew made the trek down to Lander and flew into the site to get it back up and running. The site is now fully operational as of March 3rd, 2021.

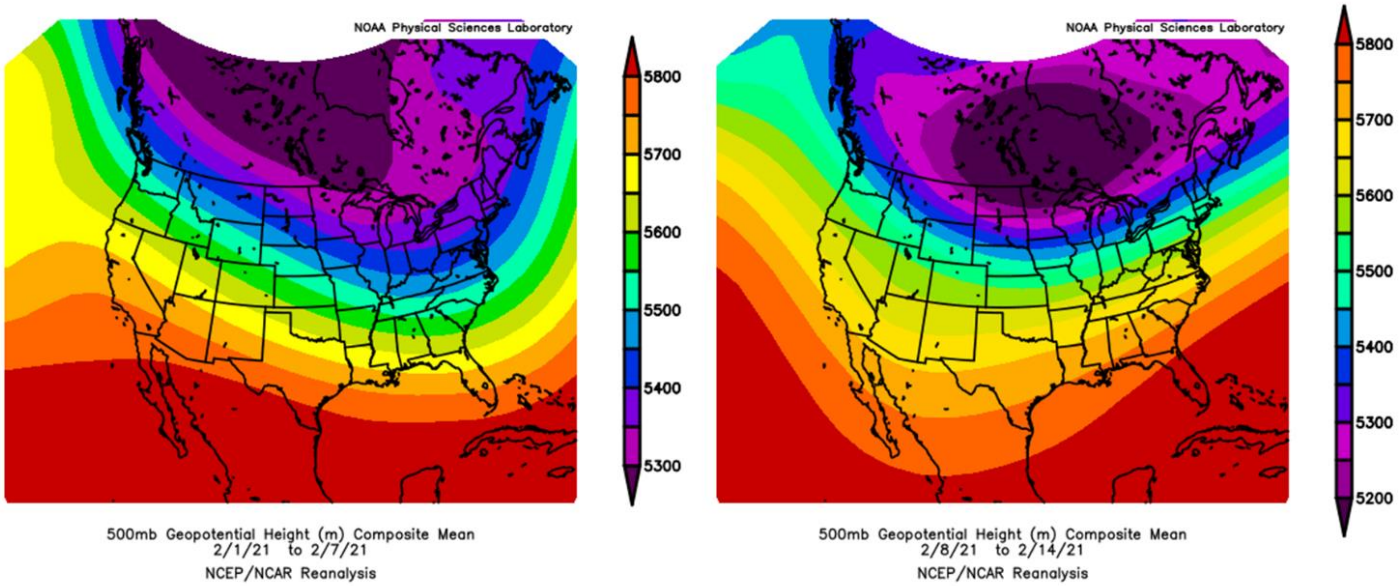
The excitement this month will be welcoming a new staff member to the Montana Snow Survey staff. **Lauren Austin** was selected as our new Hydrologist and will be joining the crew in mid-March. Lauren brings a wealth of knowledge with her, having spent two years with the Colorado DCO and almost five years with the Oregon DCO.

Lauren has come to Montana to work with our staff multiple times over the last few years, helping with SNOTEL maintenance (shown below helping with an experimental load cell at the Lick Creek SNOTEL site), and doing a Wilderness First Responder Refresher with our staff in May of 2019. We are very excited about the skillset and positivity she will bring to our crew. Welcome aboard, Lauren!



Monthly Weather: Weather and Climate

Circulation Patterns

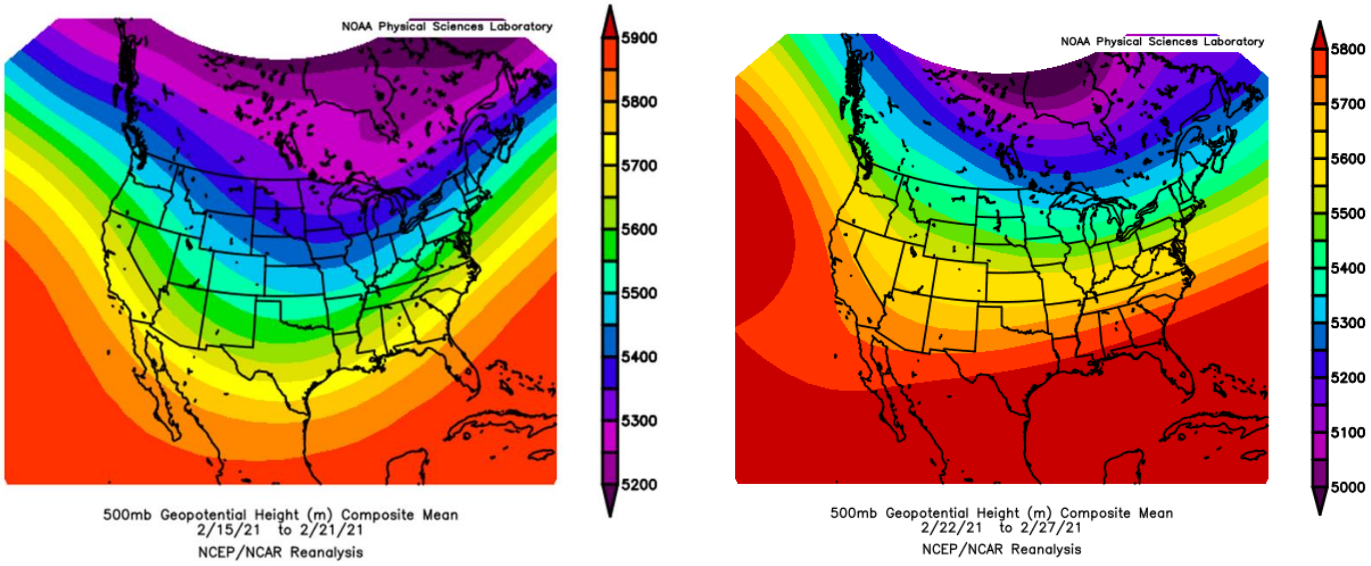


500mb Composite Mean Flow for the first two weeks of February. Westerly flow yielded to northwest flow as the cold air pushed south out of the arctic at the end of the first week of the month. This would be a productive pattern for snowfall for many regions of Montana.

During the first week of the month, west-northwest flow yielded snowfall for most areas of the state of Montana, with the Big Hole, Bitterroot, Upper Clark Fork, Blackfoot, and Gallatin River basins experiencing the highest totals for mountain snowfall. Beginning the period on February 1st, mountain temperatures were well above normal for most mountain locations, but daily average temperatures approached near-record high in northwest river basins. The transition to northwest flow, which would be the dominant weather pattern during the first two weeks of February, would cause a slow decline in temperatures through the week as cold air pushed south out of the arctic.

The latter part of the first week of February into the second week of the month would usher in Montana's coldest temperatures since February/March of 2019, with new record cold temperatures set for many locations. Livingston, MT would set a new record for consecutive days below zero, reporting seven straight days of frigid temperatures. Winnett, MT east of Lewistown, would set a new record low for February 12th of -42 degrees Fahrenheit. The cold temperatures weren't confined to valley and plains locations east of the Divide during this period; many locations west of the Divide also experienced these frigid temperatures at valley and mountain locations. Many mountain SNOTEL sites west of the Divide would match or set new record lows for February 12th for daily average temperature; although temperatures were cold, they didn't reach the extremes of eastern Montana. While temperatures in some locations were on the extreme side during this week, snowfall wasn't, with little precipitation falling during the prolonged period of cold weather.

As cold temperatures moved east of the state, this would open the gates for moisture to once again stream into the state and collide with the evacuating cold air mass during the third week of February. This pattern favored snowfall at mountain locations for many areas of the state, with the Big Hole, Bitterroot, Upper Clark, and Gallatin experiencing the highest snow totals during the week. Aside from far northwestern Montana, this second week would start a prolonged period of snowfall which would last into the last week of the month for many mountain locations.



500mb Composite Mean Flow for the last two weeks of February. Northwest flow dominated the third week of the month, which benefitted river basins west of the Divide and north facing ranges east of the Divide. The final week of the month would yield west-northwest flow which would favor river basins west of the Divide for snowfall.

The transition into the last week of the month yielded another significant weather event, severe winds and blowing snow in many parts of central and eastern Montana. Foothills wind gusts exceeded 90 miles an hour in the Rocky Mountain Front on February 22nd and were reported as over 70 miles an hour in Livingston and the Crazy Mountains to the north. Elsewhere, wind gusts ranged from 50 to 70 miles an hour in eastern Montana. During the last week of the month, another significant occurrence was the warm temperatures across the state on February 21st and 22nd. The combination of high winds and warm temperatures would make quick work of the snowpack at most valley and plains locations, all but erasing the snow cover that had accumulated during the first two weeks of the month. Data from NOAA's National Operational Hydrologic Remote Sensing Center, which uses satellites to estimate snow's spatial distribution, showed a significant amount of valley and plains snow on February 21st, 2021. Just two days later, after the winds and above normal temperatures passed through, the plains and valley snow cover would be significantly reduced on February 23rd, 2021. During the final weekend of the month, west-northwest flow ushered in moisture from the Pacific would resulting in mountain snowfall for many locations across western Montana.

Air Temperatures

As mentioned earlier, February was cold, Montana cold. It was an abrupt change from some of the temperatures experienced so far this winter, and for some, it couldn't have come at a worse time. Cow-calf operations were impacted by the very cold temperatures, with calving for some beginning in February. Periods of prolonged cold temperatures, like those experienced in mid-February, are life-threatening to young calves. Ranchers work day and night to make sure their herds have enough hay and straw to stay warm, provide shelter where they can, and monitor their herds constantly for cows ready to calf. It's tough work. Fortunately, as the month progressed, temperatures moderated to near or above seasonal normals for the remainder of February. For the month overall, the whole state was below to well below average for monthly air temperatures. The state's central third would report temperatures that were more than 15 degrees below normal for the monthly average.

Snowpack – Overview

What a turnaround. Montana's snowpack is in much better shape than it was on February 1st due to the abundant snowfall during the month. It snowed, and in some places, it snowed a LOT. The table below shows the top 30 accumulations this month at SNOTEL sites in Montana. The highest SWE totals were found west of the Divide, with Twin Lakes SNOTEL, located in the headwaters of Lost Horse Creek feeding the Bitterroot, netting almost 16 inches of water added to the snowpack this month. Totals elsewhere were equally impressive, with many areas recovering from below normal for snowpack on February 1st to near or above normal on March 1st.

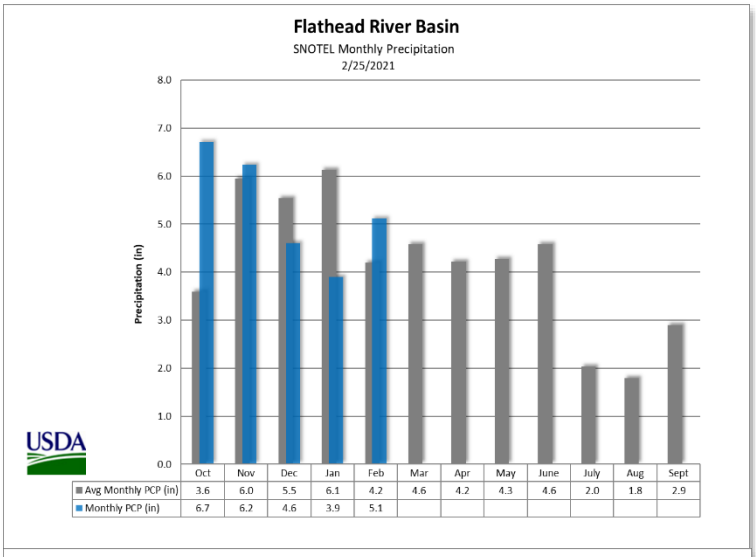
Feb 1, 2021 to Mar 1, 2021 – Top 30 Snow Water Equivalent (SWE) Increments at SNOTEL Sites

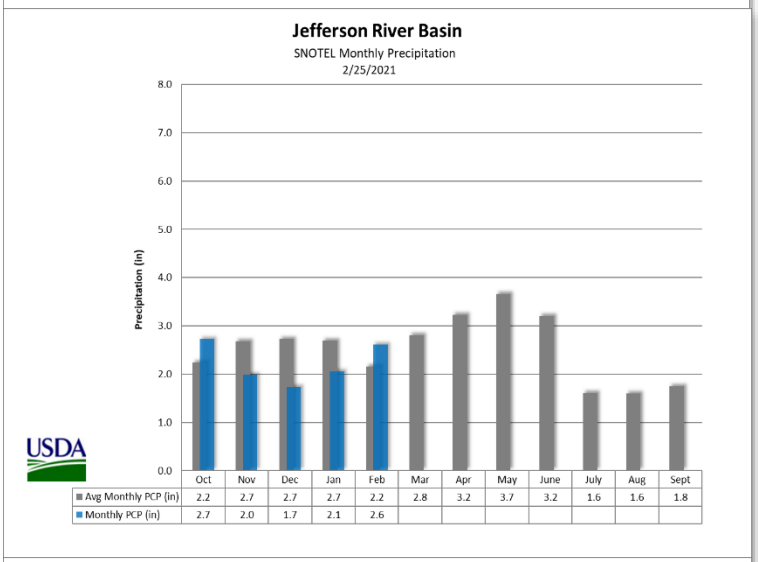
SNOTEL Site	River Basin	Delta (SWE in)	Monthly % Normal	Feb 1 SWE % Normal	Mar 1 SWE % Normal	SWE % Change	% of Total Snowpack
Twin Lakes	Bitterroot	**+15.7**	296%	83%	121%	+38%	**43%**
North Fork Jocko	Swan/Jocko	**+11.9**	186%	75%	96%	+21%	**37%**
Noisy Basin	Swan/SF Flathead	**+10.6**	174%	91%	107%	+16%	**32%**
Poorman Creek	Kootenai Mainstem	**+10.6**	141%	74%	90%	+16%	**38%**
Moss Peak	Flathead/Swan	**+10.2**	159%	94%	109%	+15%	**33%**
Slagamelt Lakes	Big Hole	**+9.9**					**39%**
Lolo Pass	Bitterroot	**+9.9**	236%	74%	104%	+30%	**42%**
Copper Camp	Blackfoot	**+9.8**					**38%**
Hoodoo Basin	Lower Clark Fork	**+9.8**	163%	80%	96%	+16%	**32%**
Bear Mountain	Kootenai Mainstem	**+9.6**	81%	83%	82%	-1%	**24%**
Stuart Mountain	Lower Clark Fork	**+9.1**	165%	80%	98%	+18%	**36%**
Sunset	Lower Clark Fork	**+9.0**	250%	59%	95%	+36%	**50%**
Darkhorse Lake	Big Hole	**+8.7**	189%	86%	107%	+21%	**37%**
Flattop Mtn.	North Fork Flathead	**+8.7**	164%	108%	117%	+9%	**22%**
Badger Pass	Marias	**+8.6**	205%	107%	124%	+17%	**29%**
Humboldt Gulch	Lower Clark Fork	**+8.5**	708%	117%	190%	+73%	**46%**
Skalkaho Summit	Rock Creek/Bitterroot	**+8.2**	234%	79%	110%	+31%	**42%**
Saddle Mtn.	Bitterroot/Big Hole	**+8.0**	250%	86%	114%	+28%	**37%**
S Fork Shields	Shields	**+8.0**	308%	39%	98%	+59%	**69%**
Elk Peak	Smith/Musselshell	**+7.8**					**50%**
Nez Perce Camp	Bitterroot	**+7.8**	355%	88%	143%	+55%	**51%**
Warm Springs	Flint/Upper Clark Fork	**+7.6**	304%	98%	133%	+35%	**39%**
Brackett Creek	Shields/N. Gallatin	**+7.4**	247%	85%	119%	+34%	**43%**
Lookout	Lower Clark Fork	**+7.4**	145%	75%	90%	+15%	**34%**
Black Bear	Upper Madison	**+7.4**	117%	79%	87%	+8%	**29%**
Shower Falls	Northern Gallatin	**+7.3**	209%	96%	121%	+25%	**39%**
Evening Star	Clarks Fork	**+7.0**	259%	104%	126%	+22%	**29%**
Fisher Creek	Clarks Fork	**+6.2**	119%	101%	105%	+4%	**23%**
Twelvemile Creek	Bitterroot	**+6.2**	221%	95%	121%	+26%	**37%**
Sacajawea	Shields/N. Gallatin	**+6.0**	200%	65%	99%	+34%	**51%**

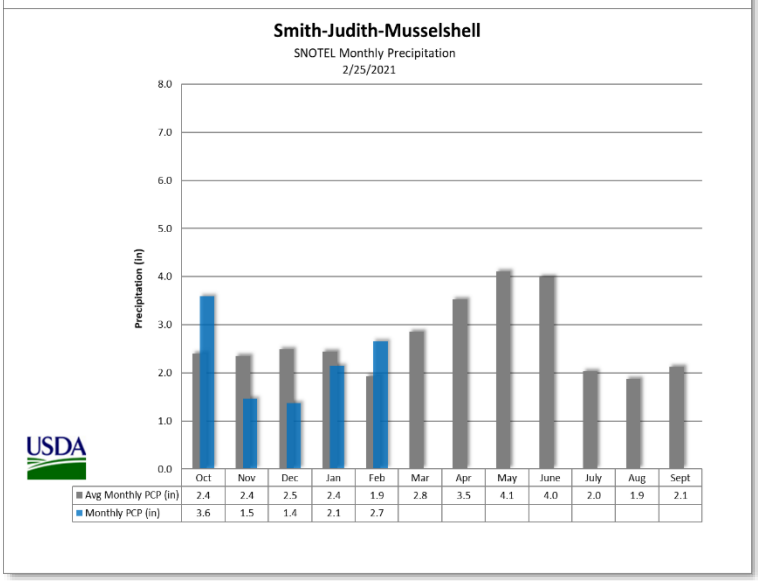
What is most impressive about February is the current percentage of the total snowpack on March 1st that is made up of February snowfall. At Twin Lakes SNOTEL, February snowfall represents 43 percent of the overall snowpack for this date, and elsewhere in the state, February accounts for as much as 69 percent of this year's snowpack. Snowfall totals were record-setting, or second-highest on record, for February snowfall at some snow measurement locations in the Upper Clark Fork, Bitterroot, Lower Clark Fork, Jefferson, Gallatin, and Upper Yellowstone River basins. Elsewhere, snow totals for the month were well above normal (shown in the map as a percentile ranking) but not record-setting. Only a few locations in the northwestern and southwestern regions of the state would receive below-normal snowfall.

The reason that this one month accounts for so much of the March 1 total are two-fold. Some areas had snowpack below to well below normal during the month due to the dry December and January. This, combined with the above-normal snowfall, is why so much of the snowpack is made up of February snow.

The news of recovery in snowpack totals put the right foot forward towards ensuring water supply come spring and runoff season. However, time remains before the snowpack reaches its peak before runoff occurs. Lower elevations in the state typically peak for snowpack in late March to early April, while mid to high elevations reach their peaks during April or early May. Suppose you compare the current snow water equivalent to the normal seasonal peak (current snowpack shown as the percentage of normal seasonal peak). In that case, you can see that although the snowpack has improved for this date, many areas still have a long way to go before they reach their normal peak for the year.







The plots to the right show precipitation for the water year for a few river basins. West of the Divide, precipitation (and snowfall totals) are typically on the decline from earlier in the winter. In contrast, east of the Divide, the precipitation totals typically begin to increase through May and June.

The difference in these snow climates in Montana means that mountains and rivers east of the Divide are entering the months which are make or break, especially this year with slightly below normal snowpack on March 1 in some southwest river basins. If spring and early summer precipitation doesn't materialize in this region, it will have a significant impact on both surface water irrigators who use diverted water and dryland irrigators who rely on precipitation from the sky as their center pivot.

For the most part, the snowpack on March 1 is near to above normal for many of Montana's river basins. Only a few sub-basins of the state have a snowpack that remains below normal after the February snowfall. The Kootenai Mainstem in Montana, Stillwater (Flathead), and Little Bitterroot River basins in northwest Montana are below normal for this date. Improvements in southwestern Montana over the month helped make up for early season deficits in some river basins; however, the Upper Red Rock and Ruby River basins remain below normal.

As mentioned earlier, this year's peak snowpack will give a better indication of the total volume of water available from snowmelt runoff, and April 1st snowpack numbers will better refine the April 1 through July 31st runoff forecasts.

Basin-wide Snow Water Equivalent –Percentage of Normal and Monthly Change

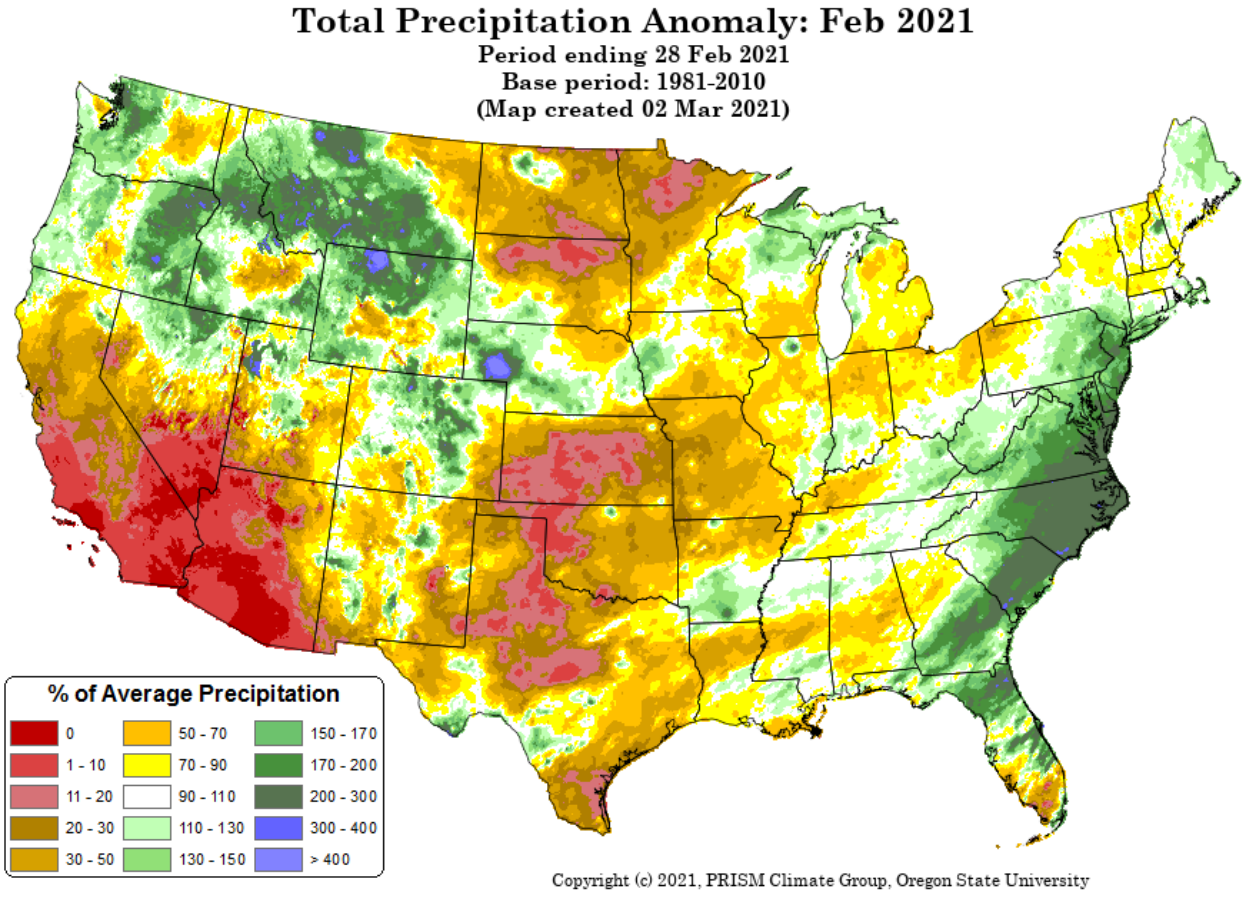
River Basin Name	Feb 1 SWE % normal	Mar 1 SWE % normal	SWE % Change
Bear Paw	98%	109%	+11%
Beaverhead	78%	95%	+17%
Big Hole	78%	104%	+26%
Big Horn	78%	100%	+22%
Bitterroot	83%	117%	+34%
Blackfoot	75%	105%	+30%
Boulder (Jefferson)	86%	115%	+29%
Boulder (Yellowstone)	99%	119%	+20%
Clarks Fork Yellowstone	101%	116%	+15%
Fisher	78%	99%	+21%
Flathead Lake	86%	95%	+9%
Flint	80%	113%	+33%
Gallatin ab Gateway	80%	101%	+21%
Greybull-Wood	70%	88%	+18%
Helena Valley	92%	119%	+27%
Judith	99%	109%	+10%
Kootenai in Canada	89%	91%	+2%
Kootenai in Montana	84%	87%	+3%
Little Bitterroot	69%	75%	+6%
Lower Clark Fork	78%	98%	+20%
Madison ab Hebgen	78%	90%	+12%
Madison bw Hebgen	74%	90%	+16%
Marias	82%	98%	+16%
Middle Fork Flathead	97%	107%	+10%
Musselshell	101%	109%	+8%
North Fork Flathead	89%	91%	+2%
Northern Gallatin	83%	111%	+28%
Owl	61%	95%	+34%
Powder	74%	98%	+24%
Rock (Clark Fork)	76%	116%	+40%
Rock (Yellowstone)	86%	102%	+16%
Ruby	73%	88%	+15%
Shields	63%	104%	+41%
Shoshone	87%	111%	+24%
Smith	94%	108%	+14%
South Fork Flathead	81%	96%	+15%
Southern Flathead	79%	98%	+19%
St. Marys	98%	103%	+5%
Stillwater (Flathead)	80%	89%	+9%
Stillwater (Yellowstone)	98%	110%	+12%
Sun	85%	95%	+10%
Swan	81%	98%	+17%
Teton	80%	90%	+10%
Tongue	88%	99%	+11%
Upper Clark	76%	109%	+33%
Wind	69%	79%	+10%
Yaak	97%	101%	+4%
Yellowstone ab Livingston	94%	109%	+15%

Color Scale						
<50%	50 to 69%	70 to 89%	90 to 109%	110 to 129%	130 to 149%	>150%

Precipitation – Overview

After a month like February, it would be easy to forget that most of this winter has been mild and dry. While the weather patterns yielded well below average temperatures to this month, they also resulted in well below normal precipitation for parts of eastern and northeastern Montana for the third month in a row. It is also important to keep this in context; take Phillips County, for example, in northeast Montana. November through February are typically the "driest" of the year, with less than 0.5 inches being normal for the month. A dry spell during that period might not have as significant of an impact as a dry spell during the wet spring and summer months of May through July are when the bulk of the precipitation typically falls. However, water year precipitation (beginning October 1st) remains well below normal for some locations along the Dakota borders, so a close eye is being kept on this region by local producers and the national drought monitor.

Elsewhere in the state, February yielded above-average precipitation to all areas except the Red Rock River's headwaters in the Centennial Valley and the northwest corner of the state in the Tobacco and Yaak River basins. Currently, most river basins have water year precipitation totals that are near to above average, with the exceptions found in the Red Rock River basin and Madison River basin above Hebgen Lake. The prolonged period of below-average precipitation in these areas, which spanned from mid-November until the beginning of February, was too much to overcome, and slight water year deficits remain at this time.

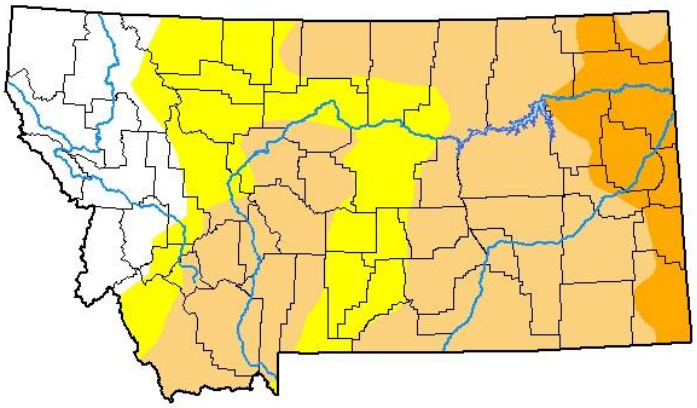


Reservoirs - Overview

Reservoir storage values typically change very little during the winter months and are very similar to last month. Most regions have reservoir storage that is near to above average for March 1st. The reservoirs mentioned throughout this winter, Fresno and Gibson, continue to have storage that is below average for this date.

Drought

The most recent National Drought Monitor map, released on March 2nd, 2021, shows a reduction in the category of drought along the Wyoming border in southeastern Montana since February 1st. Much of the state remains in some drought classification, even with the abundant February snowfall for many locations. At this time, roughly 40 percent of the state is classified as Abnormally Dry (DO), 48 percent is classified as Moderate Drought (D1), and 8 percent is classified as Severe Drought (D2).



March 2, 2021
(Released Thursday, Mar. 4, 2021)
Valid 7 a.m. EST

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	15.31	84.69	61.18	10.56	0.00	0.00
Last Week 02-23-2021	3.34	96.66	56.54	8.55	0.00	0.00
3 Months Ago 12-01-2020	36.04	63.96	31.85	7.84	0.36	0.00
Start of Calendar Year 12-29-2020	36.37	63.63	34.41	8.27	0.36	0.00
Start of Water Year 09-29-2020	11.86	88.14	40.59	4.22	0.02	0.00
One Year Ago 03-03-2020	89.35	10.65	0.00	0.00	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

Author:
Brian Fuchs
National Drought Mitigation Center

droughtmonitor.unl.edu

As of December 23rd, 2020, numerous primary and contiguous counties in eastern Montana fall within Secretarial Drought Designations. A map of these designations for Crop Year 2020 can provide information on whether your county meets assistance requirements.

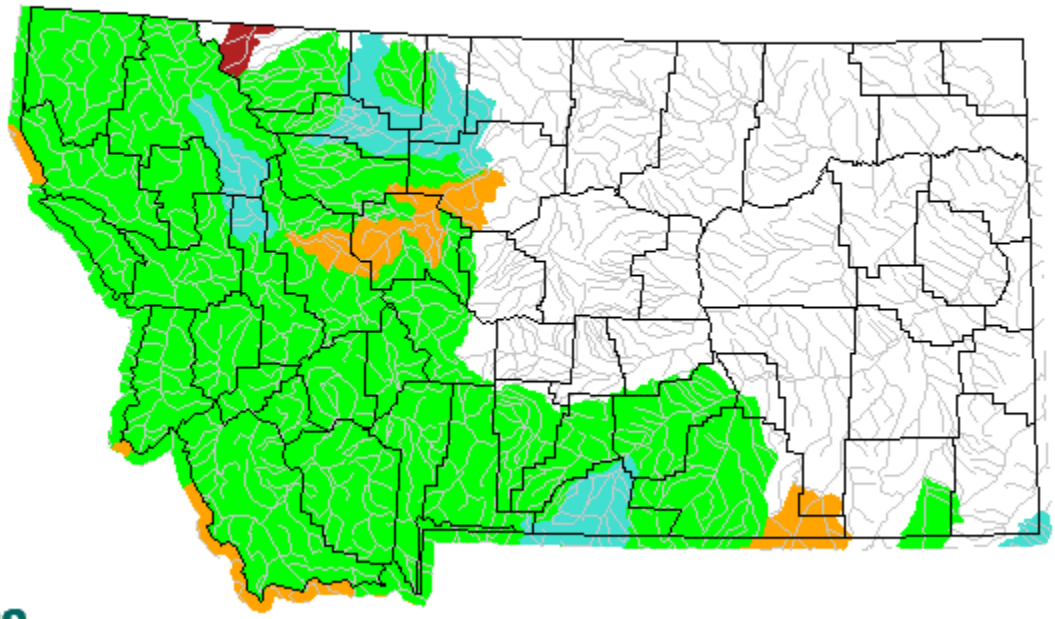
If you would like more information about current drought conditions or require assistance due to drought, the links below can help you gather information and assist you in getting in touch with the appropriate agencies.

Drought Links:

- USDA Drought Portal (News and Impacts)
- Farm Services Agency News – Montana (Information on Programs and Deadlines)
- Farm Services Agency – National (Disaster Assistance Programs)
- List of Available Disaster Emergency Services (Drought/Fire)
- Montana Department of Natural Resources and Conservation (Drought Management)

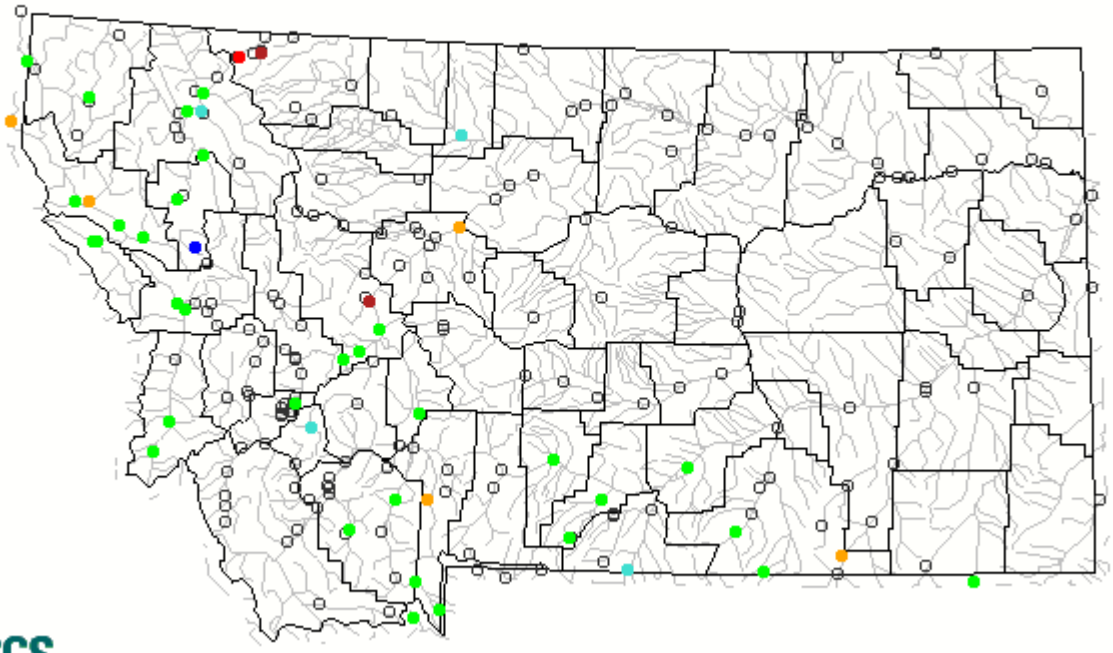
Current Streamflows

Sunday, February 28, 2021



USGS

Monday, March 01, 2021 10:30ET



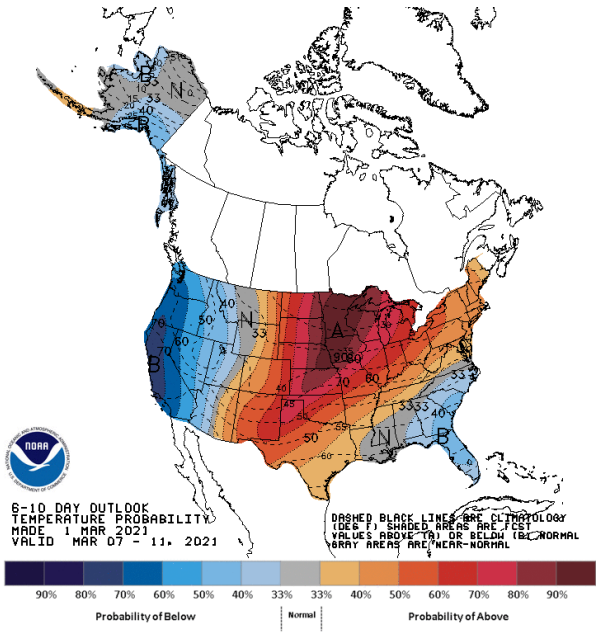
USGS

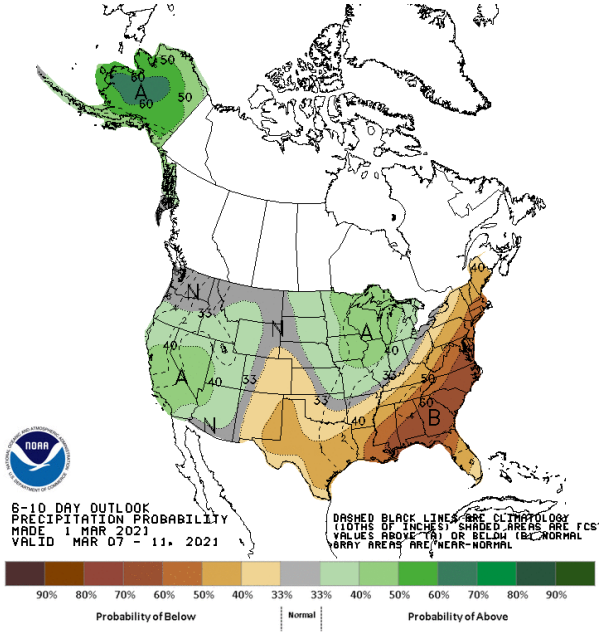
Explanation - Percentile classes							
Low	<10	10-24	25-75	76-90	>90	High	No Data
	Much below normal	Below normal	Normal	Above normal	Much above normal		

Looking Ahead

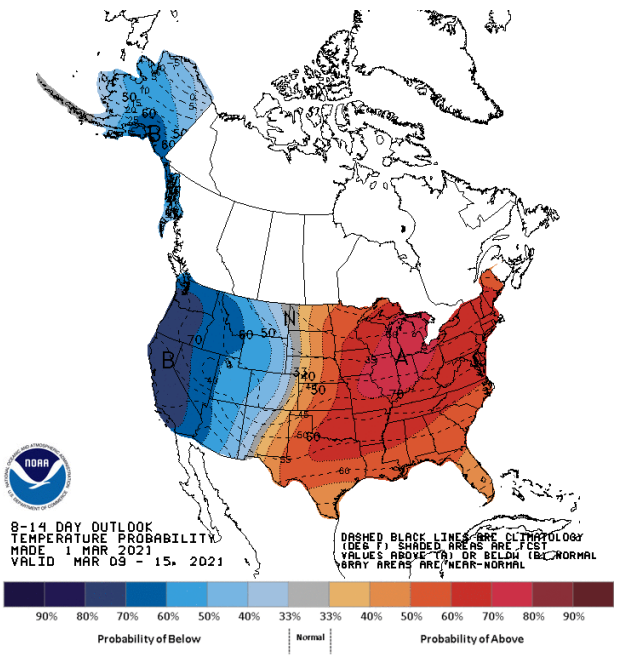
Medium and Long-range forecasts issued by NOAA's Climate Prediction Center beyond the first week of March indicate a return to more seasonal weather from March 7 -11, with increased chances of precipitation in southwest Montana. Longer range forecasts, issued through mid-month, indicate increased possibilities of below normal temperatures and increased chances for above-normal precipitation across the state's central and southern portions. One month (March) outlooks increased chances of above-normal temperatures for the easternmost quarter of the state with equal chances for precipitation statewide. Long-range seasonal forecasts (March-May) indicate increased chances of below-normal temperatures and above-normal precipitation for parts of northwest Montana and equal chances for normal precipitation and temperatures elsewhere in the state.

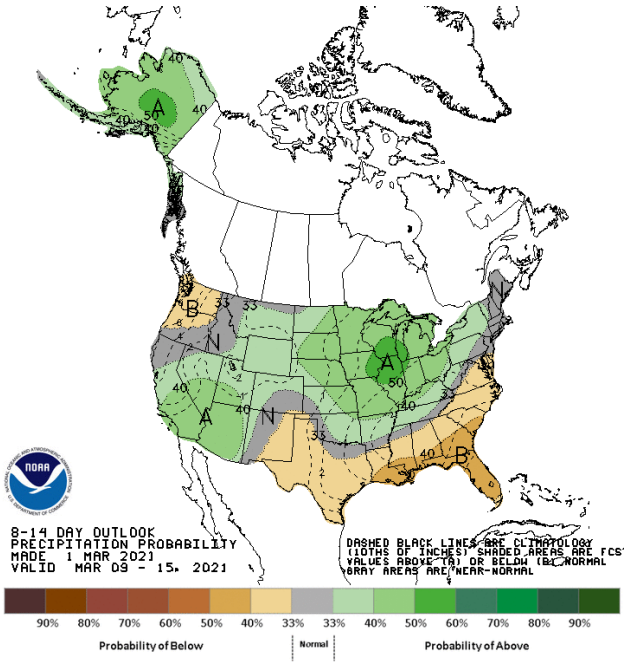
6 to 10 Day Outlook (Published Mar 1, 2021)



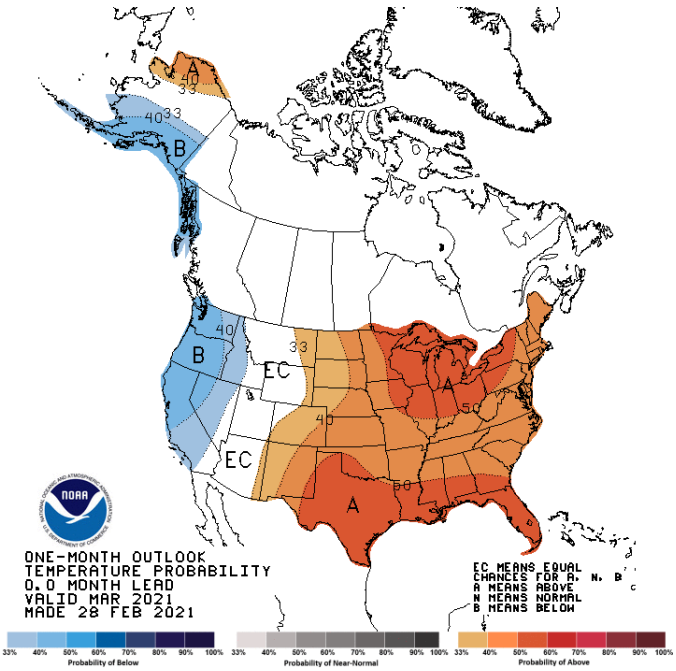


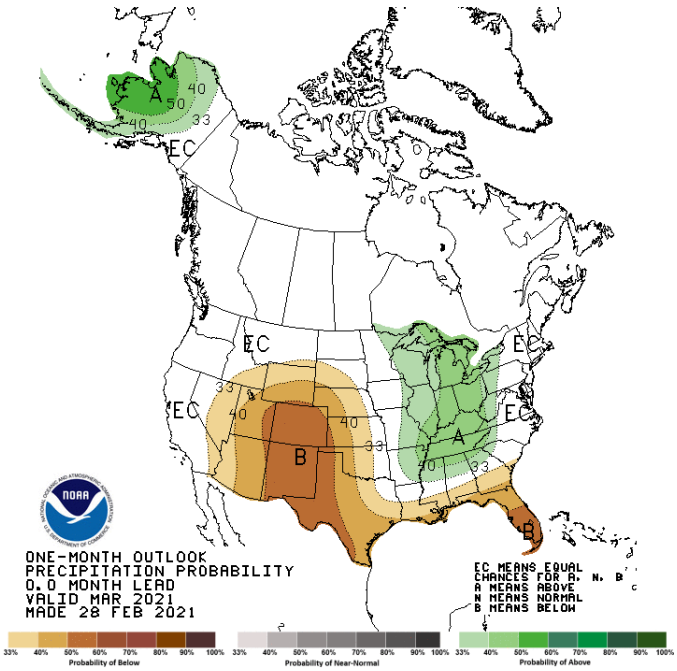
8 to 14 Day Outlook (Published Mar 1, 2021)



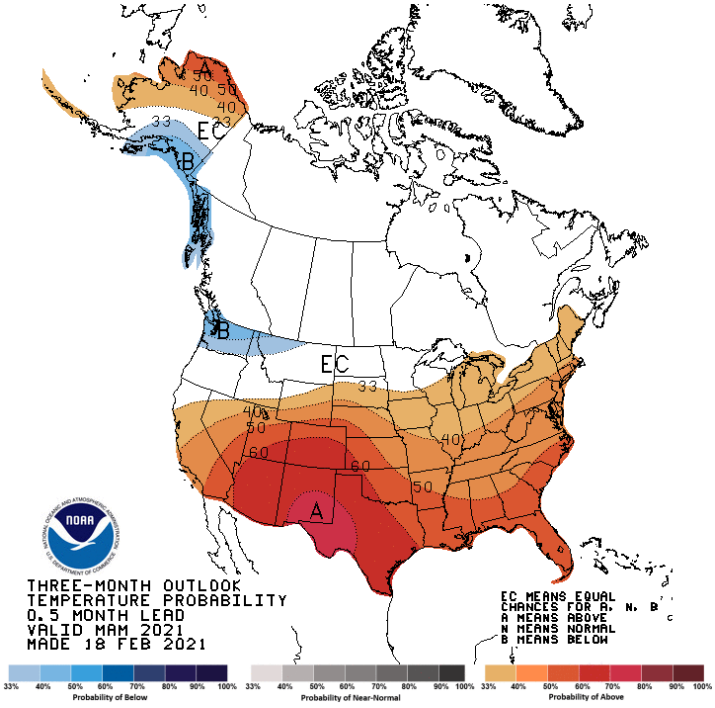


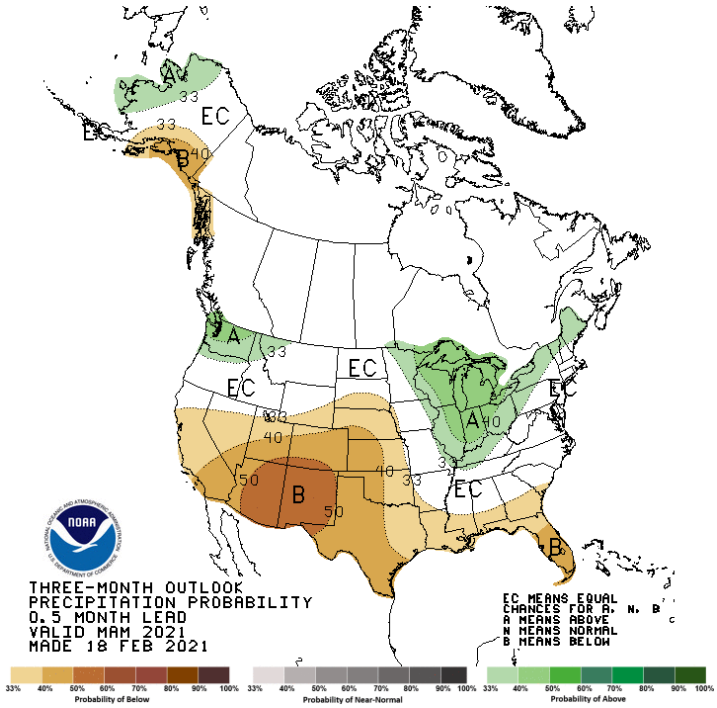
One Month Outlook (Published Feb 28, 2021)





Three Month Outlook (Published Feb 18, 2021)





Streamflow Forecast Charts

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. Streamflow forecasts are coordinated by Natural Resources Conservation Service and National Weather Service hydrologists. This report presents a comprehensive picture of water supply conditions for areas dependent upon surface runoff. It includes selected streamflow forecasts, summarized snowpack and precipitation data, reservoir storage data, and narratives describing current conditions.

Snowpack data 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. In addition, snow water equivalent, precipitation and temperature are monitored on a daily basis and transmitted via meteor burst telemetry to central data collection facilities. 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; 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 forecast.

Summary

March 1st, 2021 marks the first official forecasts issued for streamflow points in the state of Montana by the NRCS for Water Year 2021. This month**, forecasts generally indicate near to slightly above average volumetric streamflows for most rivers and streams in Montana**; however, there is one area where forecasts are below normal, which bears mentioning.

Median streamflow forecasts (50% exceedance probability) for some rivers and streams in the Jefferson and Madison River basin in southwest Montana indicate below-average to well below average volumetric streamflows this spring and summer based on current snowpack and water year precipitation. Forecasts for Lima Reservoir inflow, Clark Canyon Inflow, and Ruby Reservoir Inflow are well below normal for the April 1st – July 31st period.

While the current level of the mountain snowpack “reservoir” is known at this time, future weather will be the dominant factor in the upcoming spring and summer runoff (future snowfall, summer precipitation, temperatures, etc.). For this reason, the forecasts are presented as a range of outcomes from the 10% exceedance (wet outcome- occurs 10% of the time) through the 90% exceedance (dry outcome - occurs 90% of the time). Looking at the range of forecasts for the areas where median (50% exceedance) forecasts are below average on March 1st, the range of outcomes indicates a chance that if wet patterns continue, near to above-average flows are still possible, though less likely.

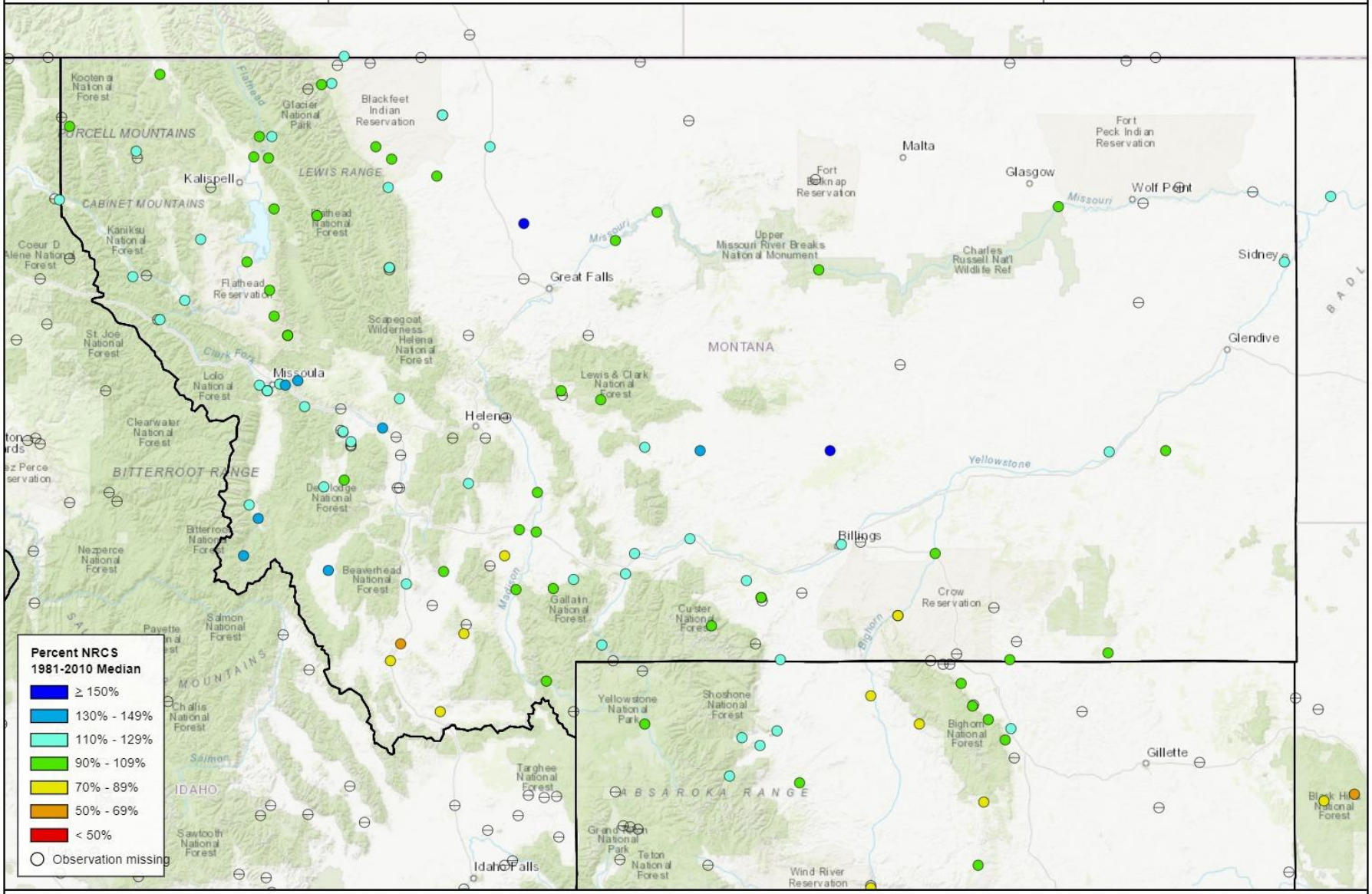
Please see the individual river basin charts below for individual forecast point ranges or click on the map below to be redirected to an interactive product displaying the forecasts.

Forecast Volume,
50% Exceedance Probability

Streamflow Forecasts - April 1st - July 31st, 2021

Percent NRCS 1981-2010 Median

Primary Period, March 1, 2021



USDA Natural Resources Conservation Service
United States Department of Agriculture

N

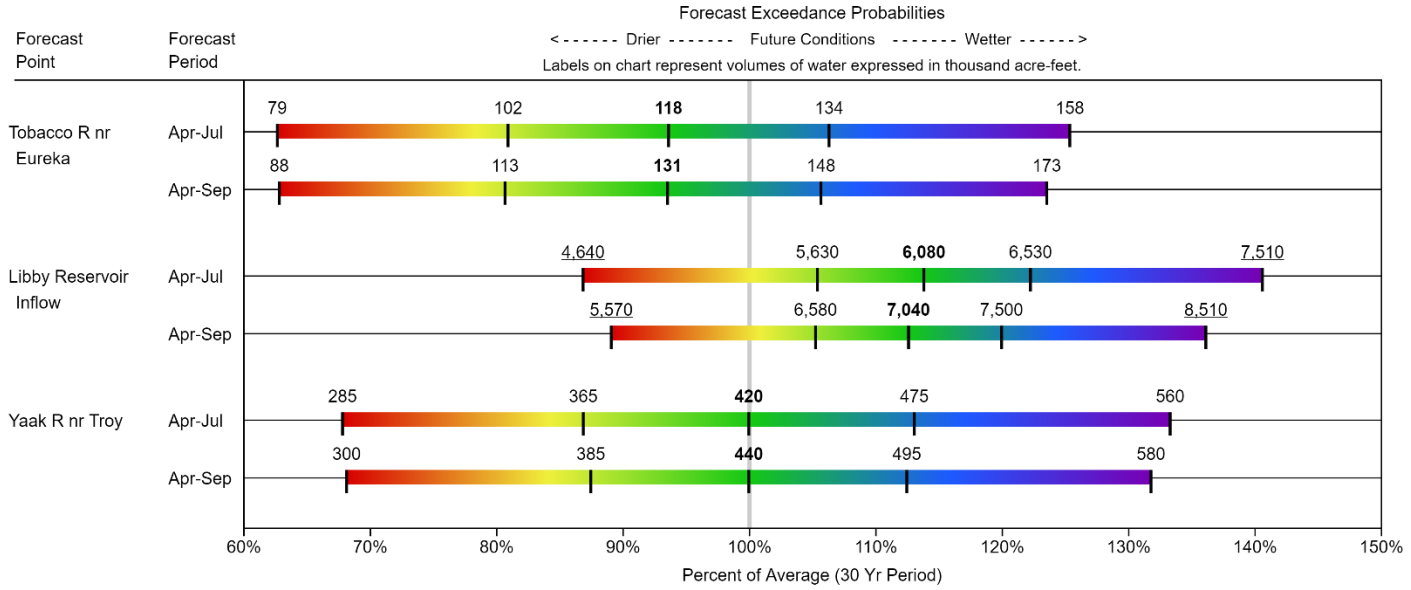
0 20 40 80 120 160 200 Miles

Created 3-04-2021

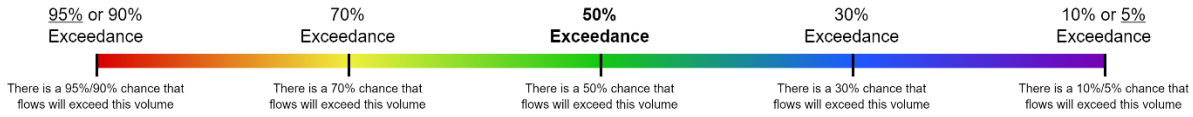
KOOTENAI RIVER BASIN in MONTANA

Water Supply Forecasts

March 1, 2021



Legend



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

Period of Record Minimum Streamflow KAF (Year)

1981-2010 Normal Streamflow KAF

Observed Streamflow KAF

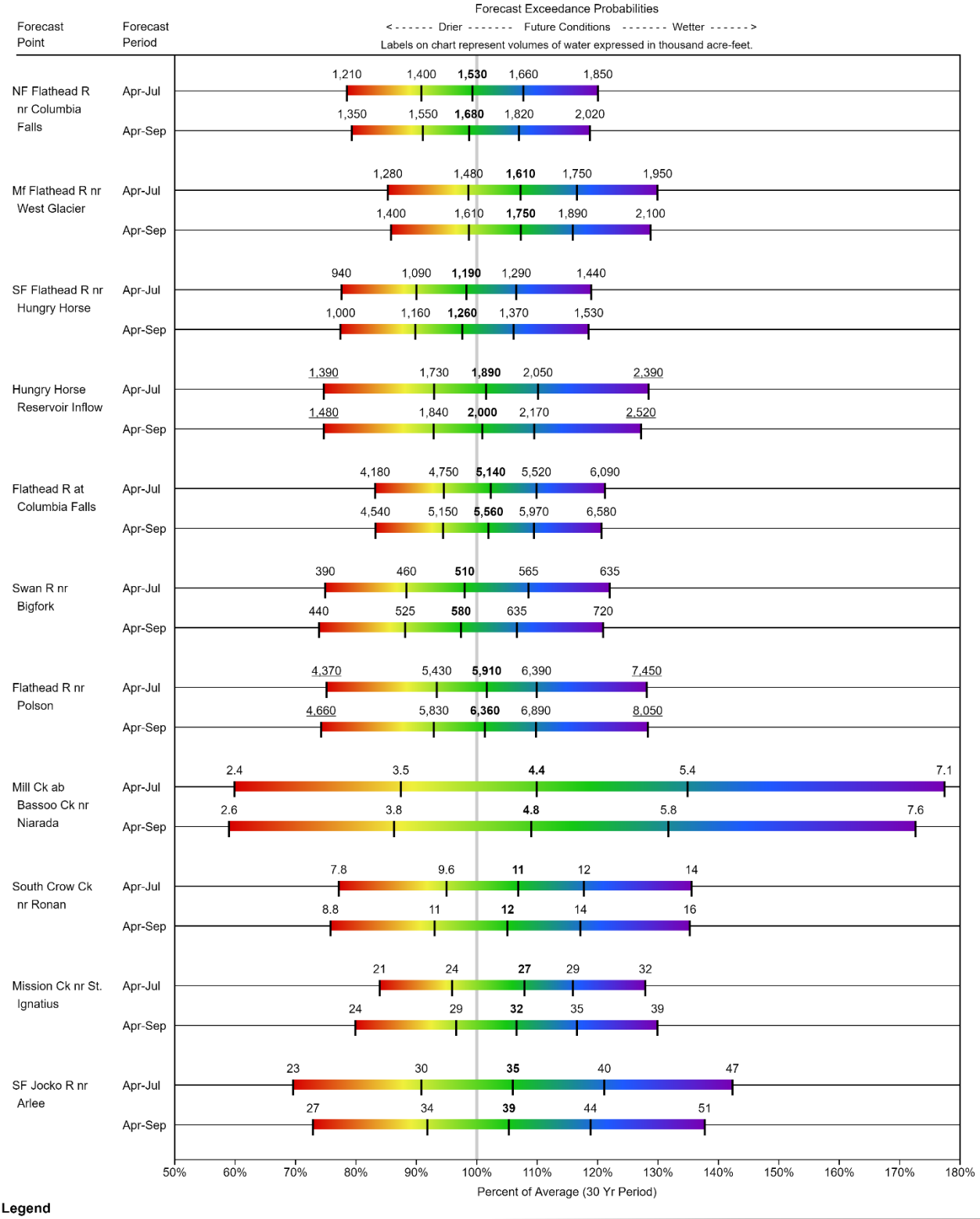
Period of Record Maximum Streamflow KAF (Year)

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

FLATHEAD RIVER BASIN

Water Supply Forecasts

March 1, 2021



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)

1981-2010 Normal Streamflow KAF

Observed Streamflow KAF

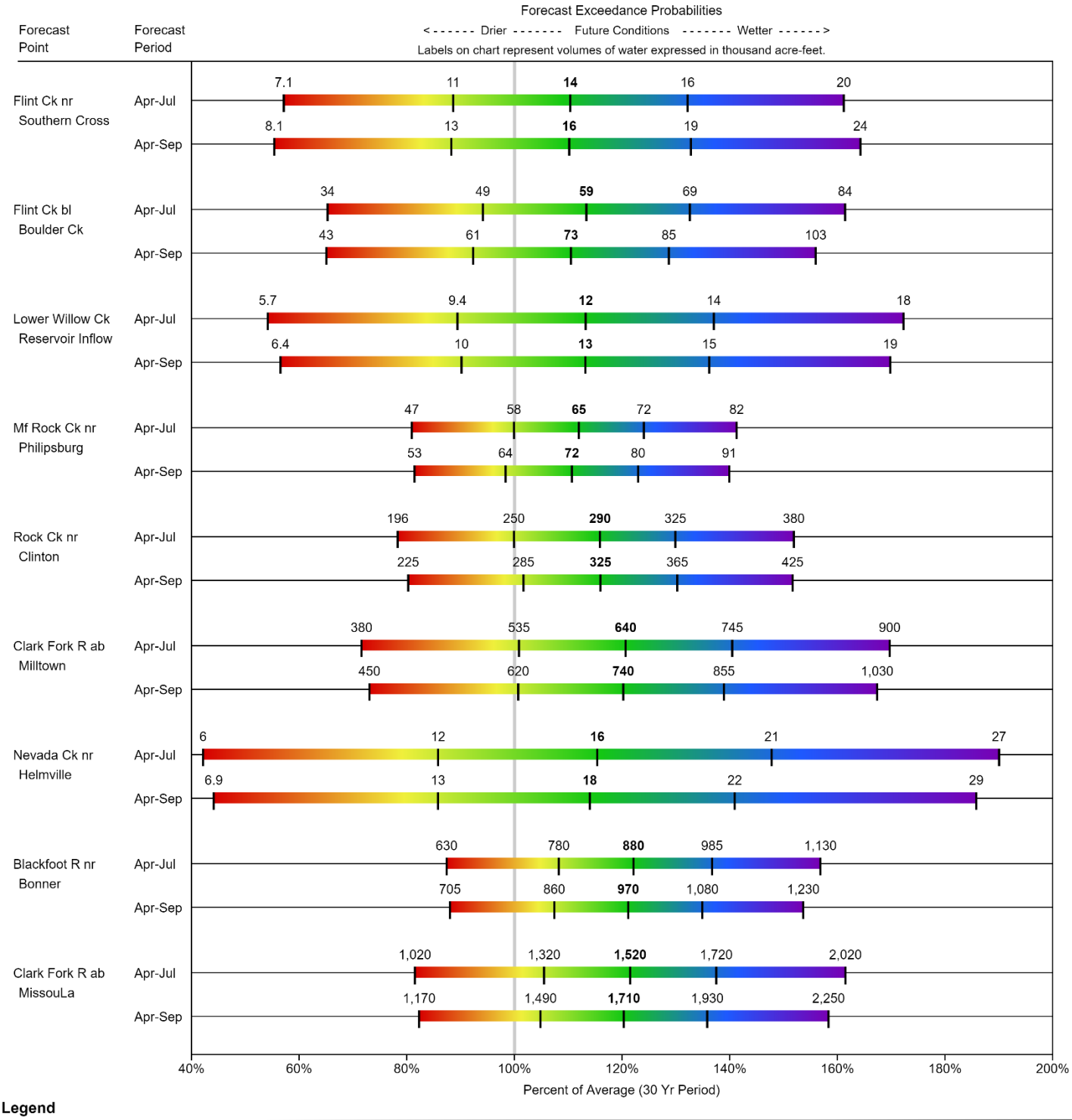
Period of Record Maximum Streamflow KAF (Year)

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

UPPER CLARK FORK RIVER BASIN

Water Supply Forecasts

March 1, 2021



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.

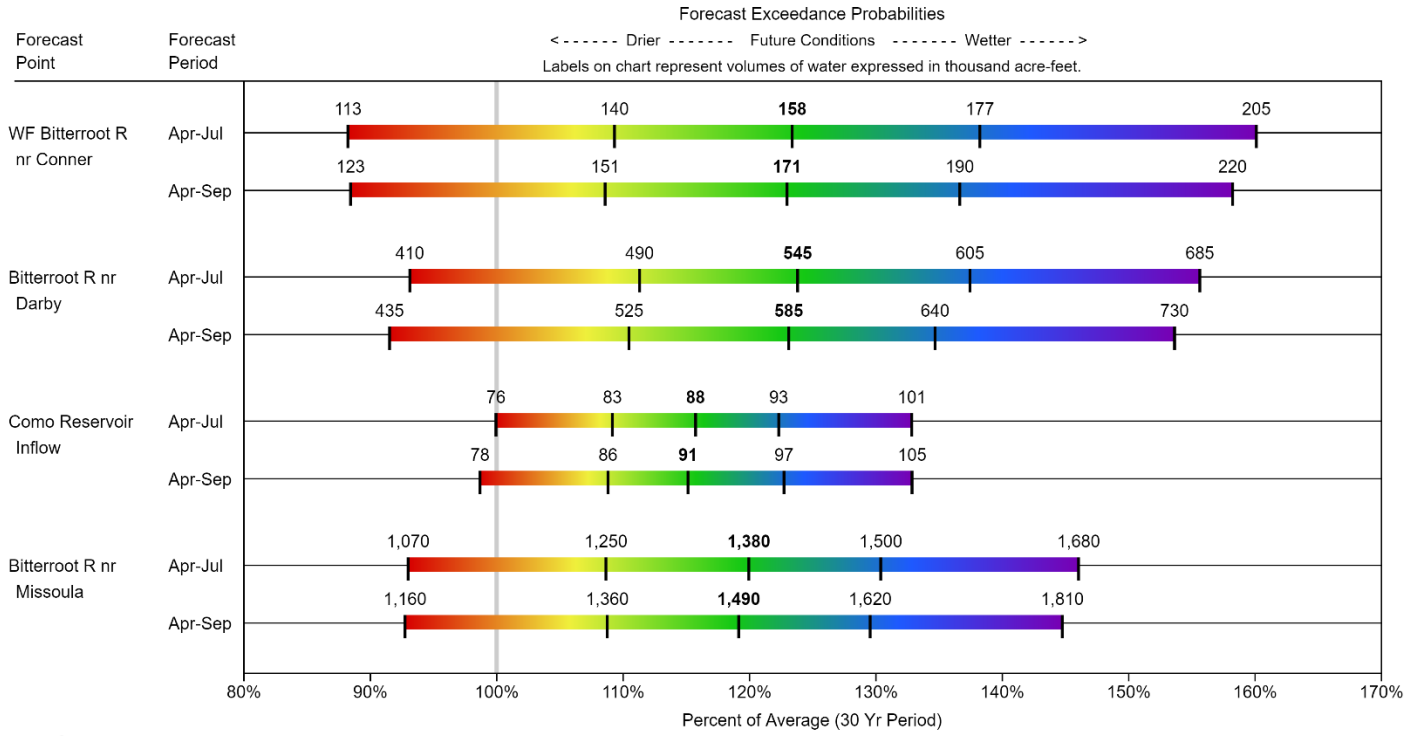
Period of Record Minimum Streamflow KAF (Year)	*1981-2010 Normal Streamflow KAF*	*Observed Streamflow KAF*	*Period of Record Maximum Streamflow KAF (Year)*

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

BITTERROOT RIVER BASIN

Water Supply Forecasts

March 1, 2021



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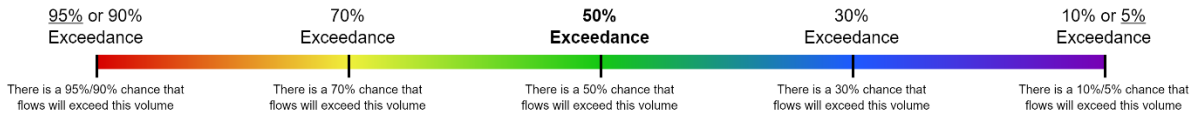


When selected, the following historic streamflow values and statistics will be shown.

Period of Record Minimum Streamflow KAF (Year)

1981-2010 Normal Streamflow KAF

Observed Streamflow KAF

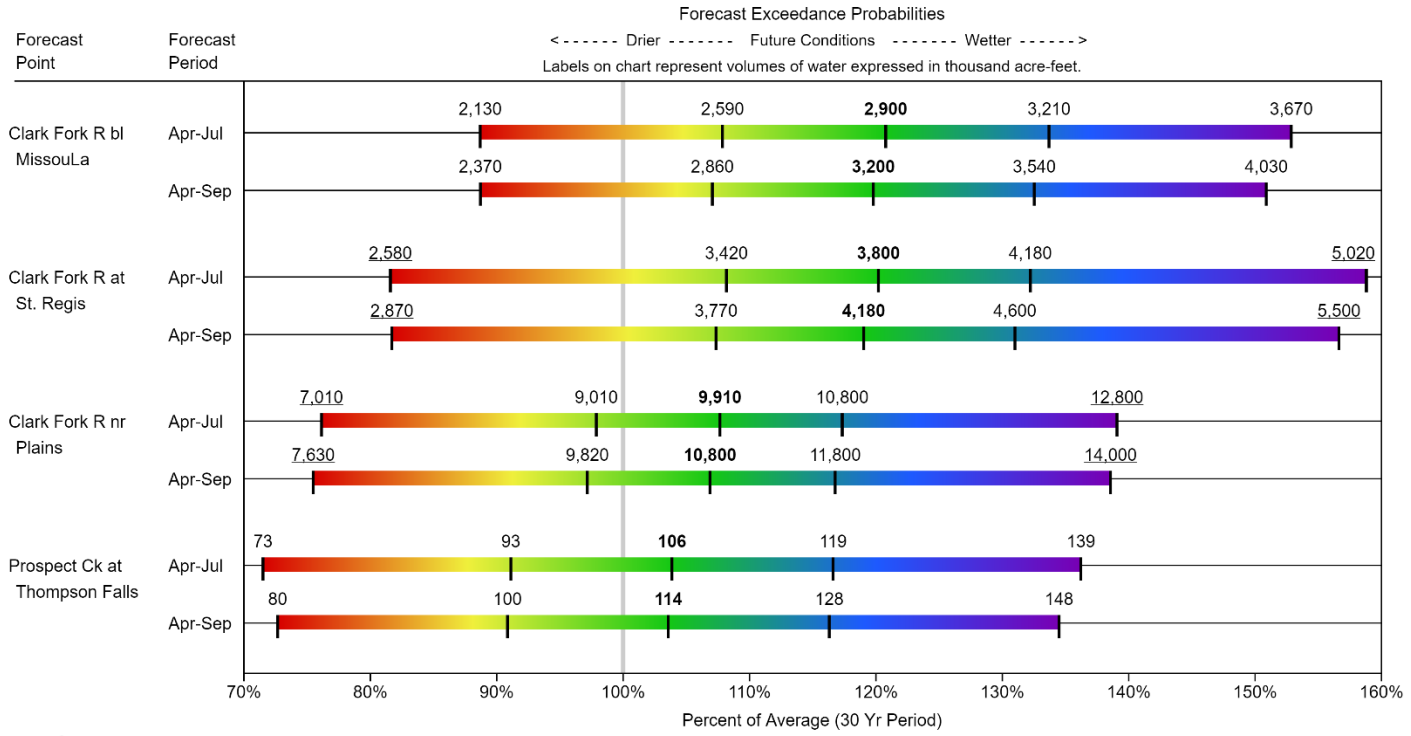
Period of Record Maximum Streamflow KAF (Year)

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

LOWER CLARK FORK RIVER BASIN

Water Supply Forecasts

March 1, 2021



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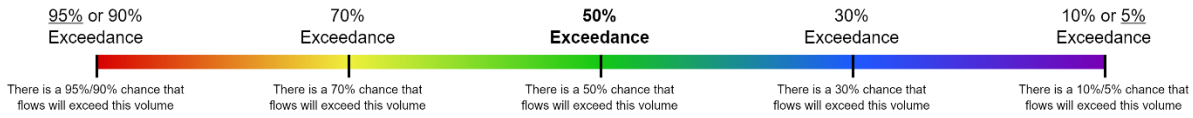


When selected, the following historic streamflow values and statistics will be shown.

Period of Record Minimum Streamflow KAF (Year)

1981-2010 Normal Streamflow KAF

Observed Streamflow KAF

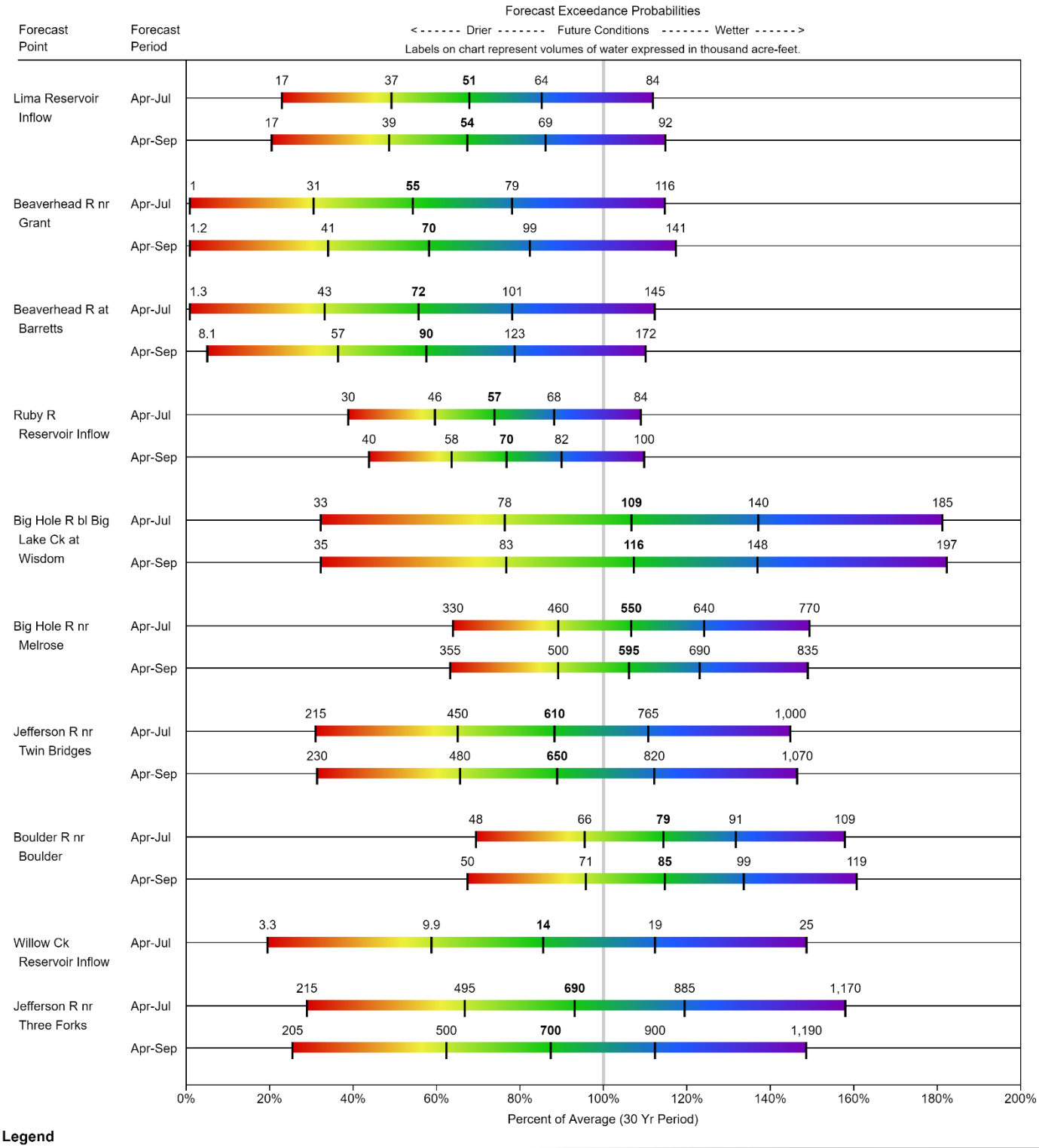
Period of Record Maximum Streamflow KAF (Year)

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

JEFFERSON RIVER BASIN

Water Supply Forecasts

March 1, 2021



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)

1981-2010 Normal Streamflow KAF

Observed Streamflow KAF

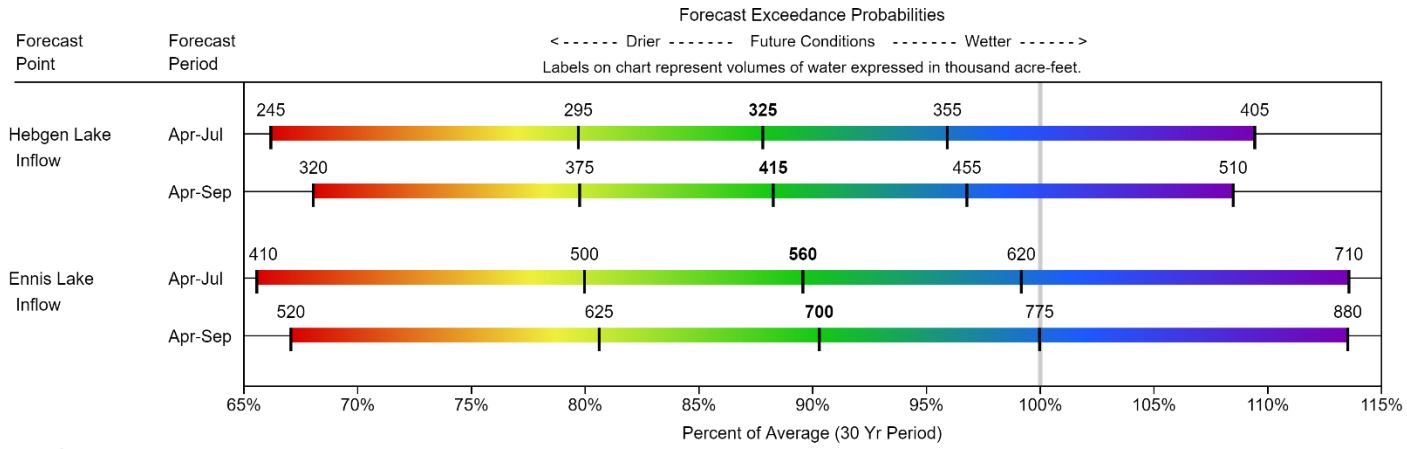
Period of Record Maximum Streamflow KAF (Year)

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

MADISON RIVER BASIN

Water Supply Forecasts

March 1, 2021



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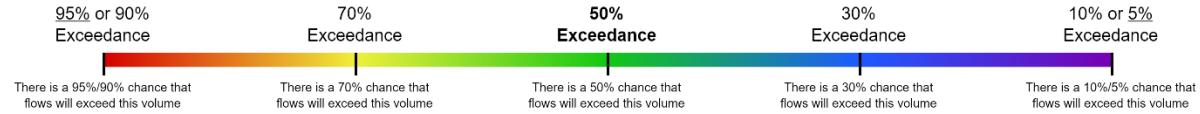


When selected, the following historic streamflow values and statistics will be shown.

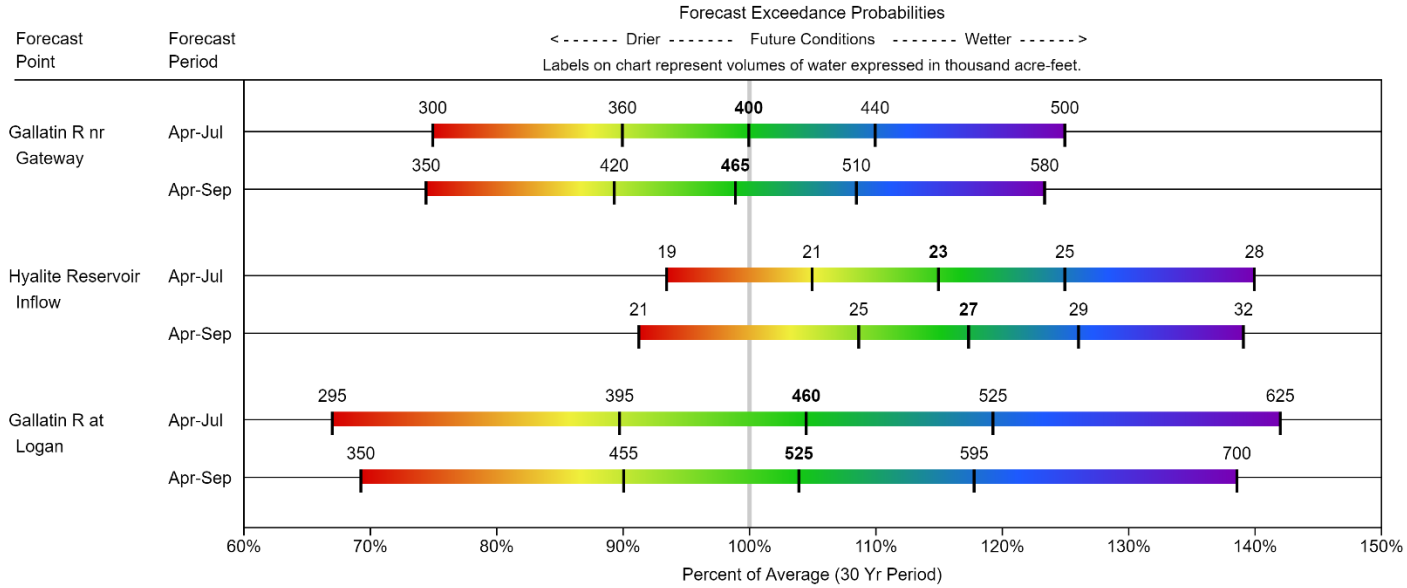
Period of Record Minimum Streamflow KAF (Year) | *1981-2010 Normal Streamflow KAF* | *Observed Streamflow KAF* | *Period of Record Maximum Streamflow KAF (Year)*

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

GALLATIN RIVER BASIN

Water Supply Forecasts

March 1, 2021



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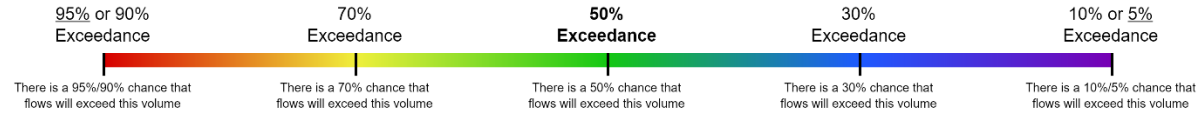


When selected, the following historic streamflow values and statistics will be shown.

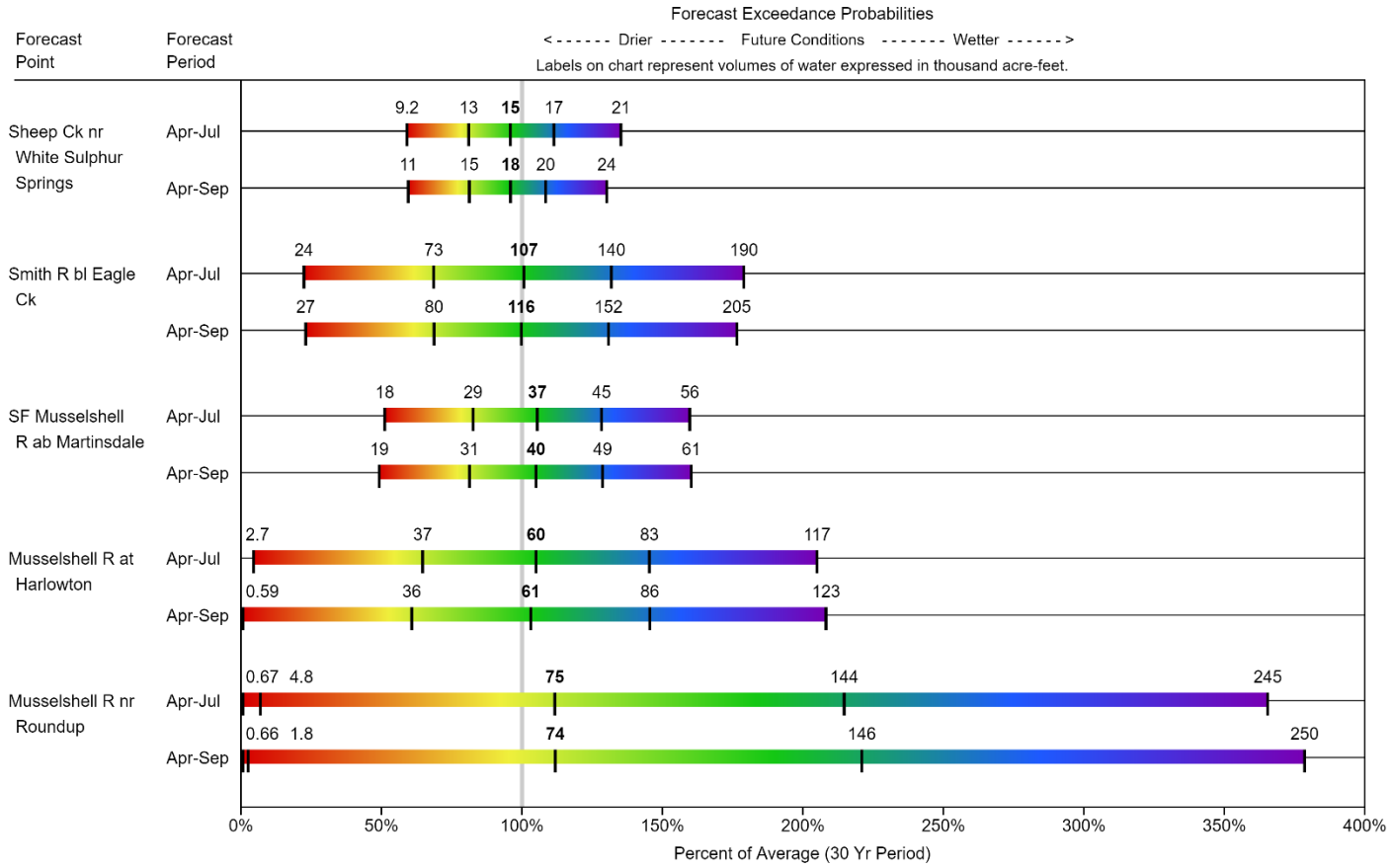
Period of Record Minimum Streamflow KAF (Year) | *1981-2010 Normal Streamflow KAF* | *Observed Streamflow KAF* | *Period of Record Maximum Streamflow KAF (Year)*

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

SMITH-JUDITH-MUSSELSHELL

Water Supply Forecasts

March 1, 2021



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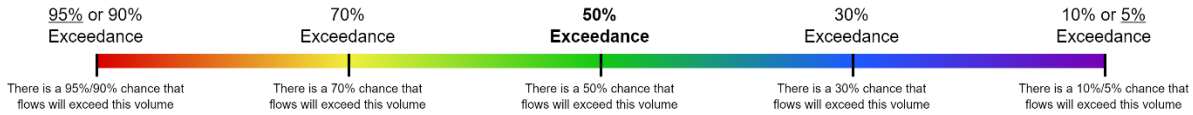


When selected, the following historic streamflow values and statistics will be shown.

Period of Record Minimum Streamflow KAF (Year)

1981-2010 Normal Streamflow KAF

Observed Streamflow KAF

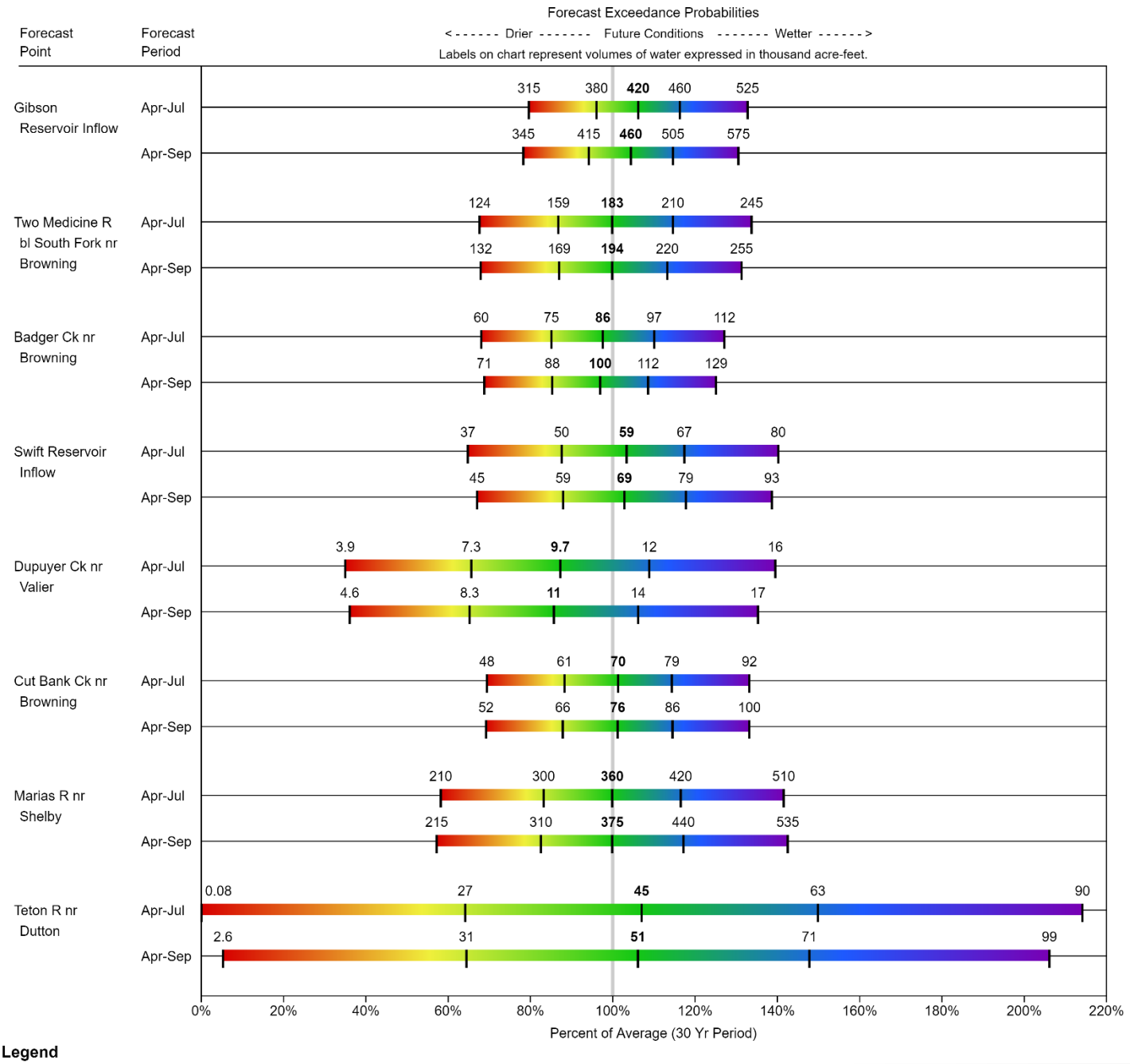
Period of Record Maximum Streamflow KAF (Year)

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

SUN-TETON-MARIAS

Water Supply Forecasts

March 1, 2021



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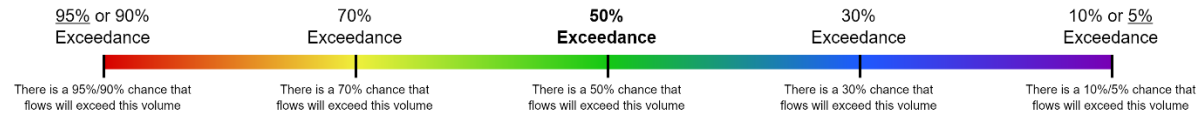


When selected, the following historic streamflow values and statistics will be shown.

Period of Record Minimum Streamflow KAF (Year)

1981-2010 Normal Streamflow KAF

Observed Streamflow KAF

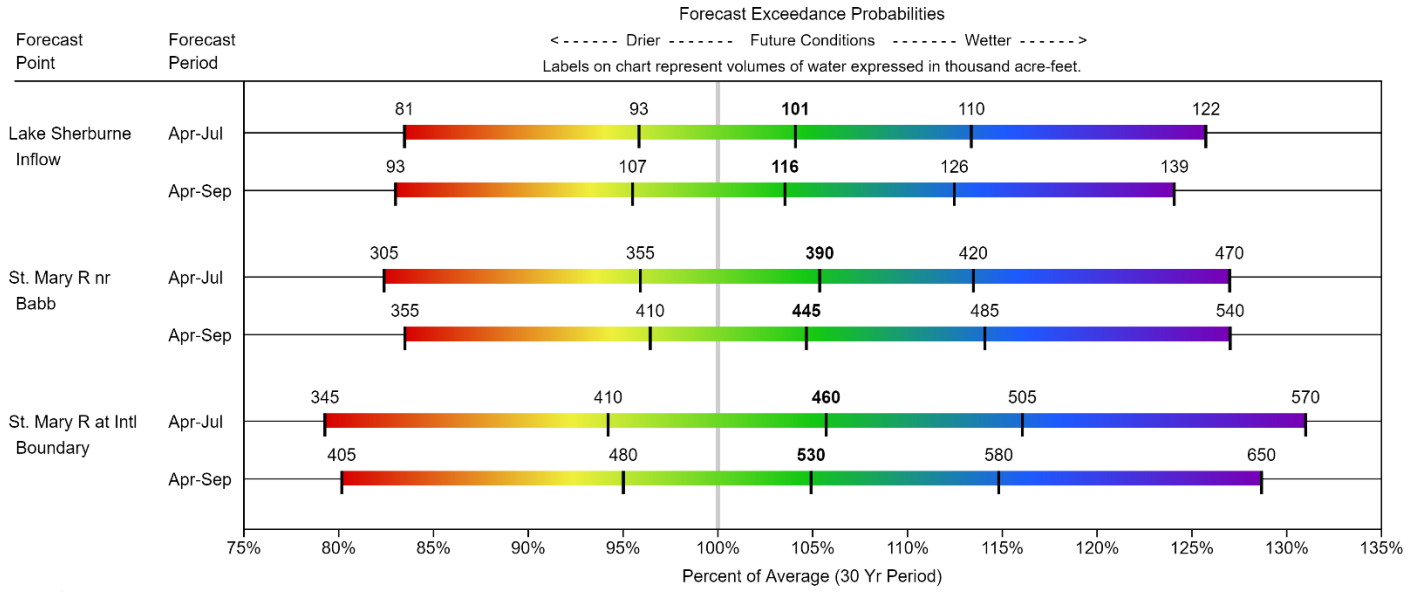
Period of Record Maximum Streamflow KAF (Year)

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

ST. MARY & MILK BASINS

Water Supply Forecasts

March 1, 2021



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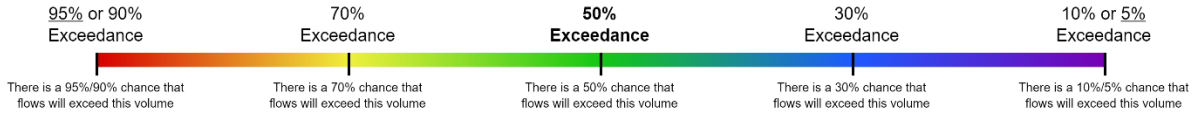

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1981-2010 Normal Streamflow KAF

Observed Streamflow KAF

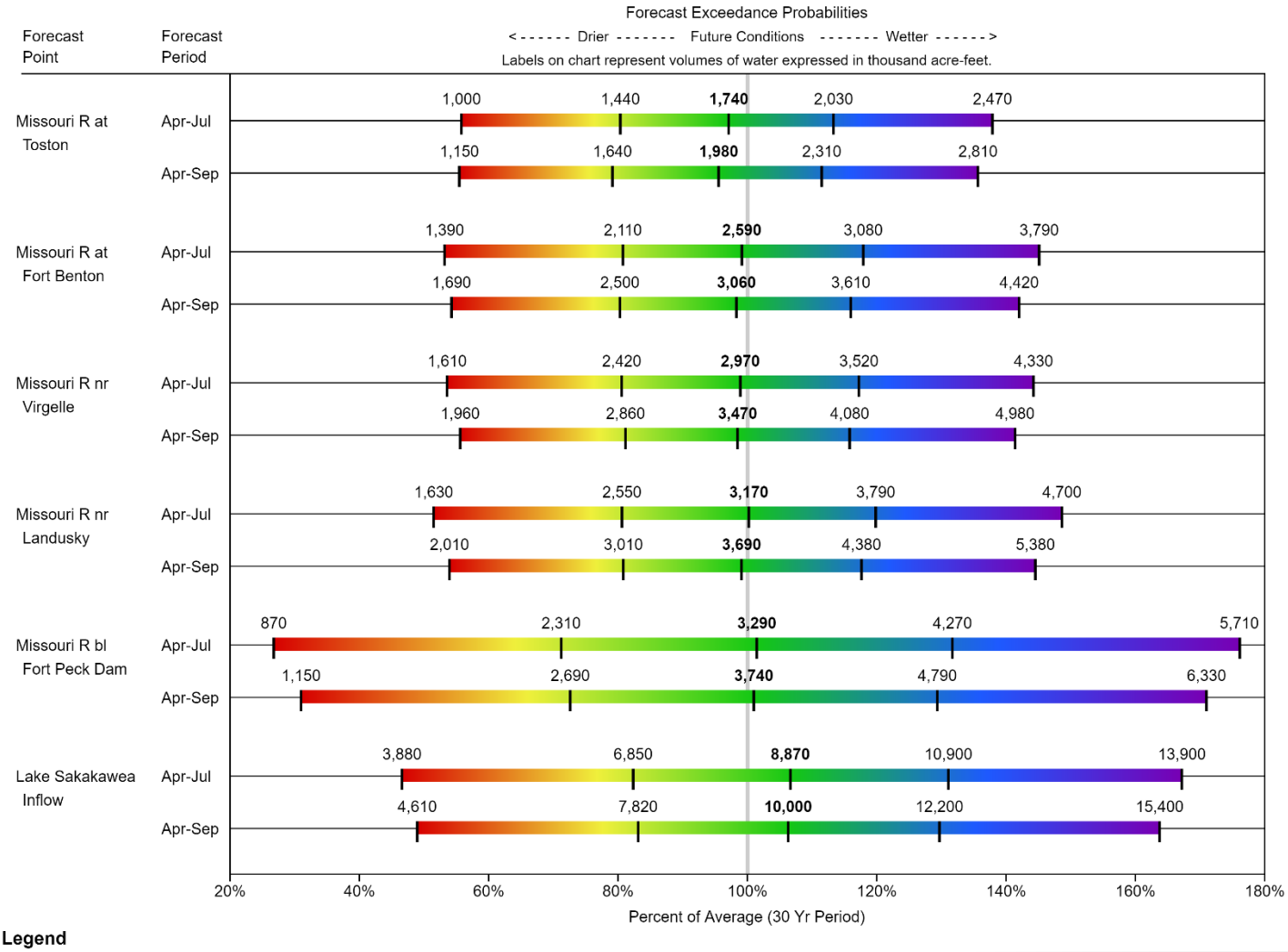
Period of Record Maximum Streamflow KAF (Year)

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

MISSOURI MAINSTEM BASIN

Water Supply Forecasts

March 1, 2021



Legend

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

Period of Record Minimum Streamflow KAF (Year)

1981-2010 Normal Streamflow KAF

Observed Streamflow KAF

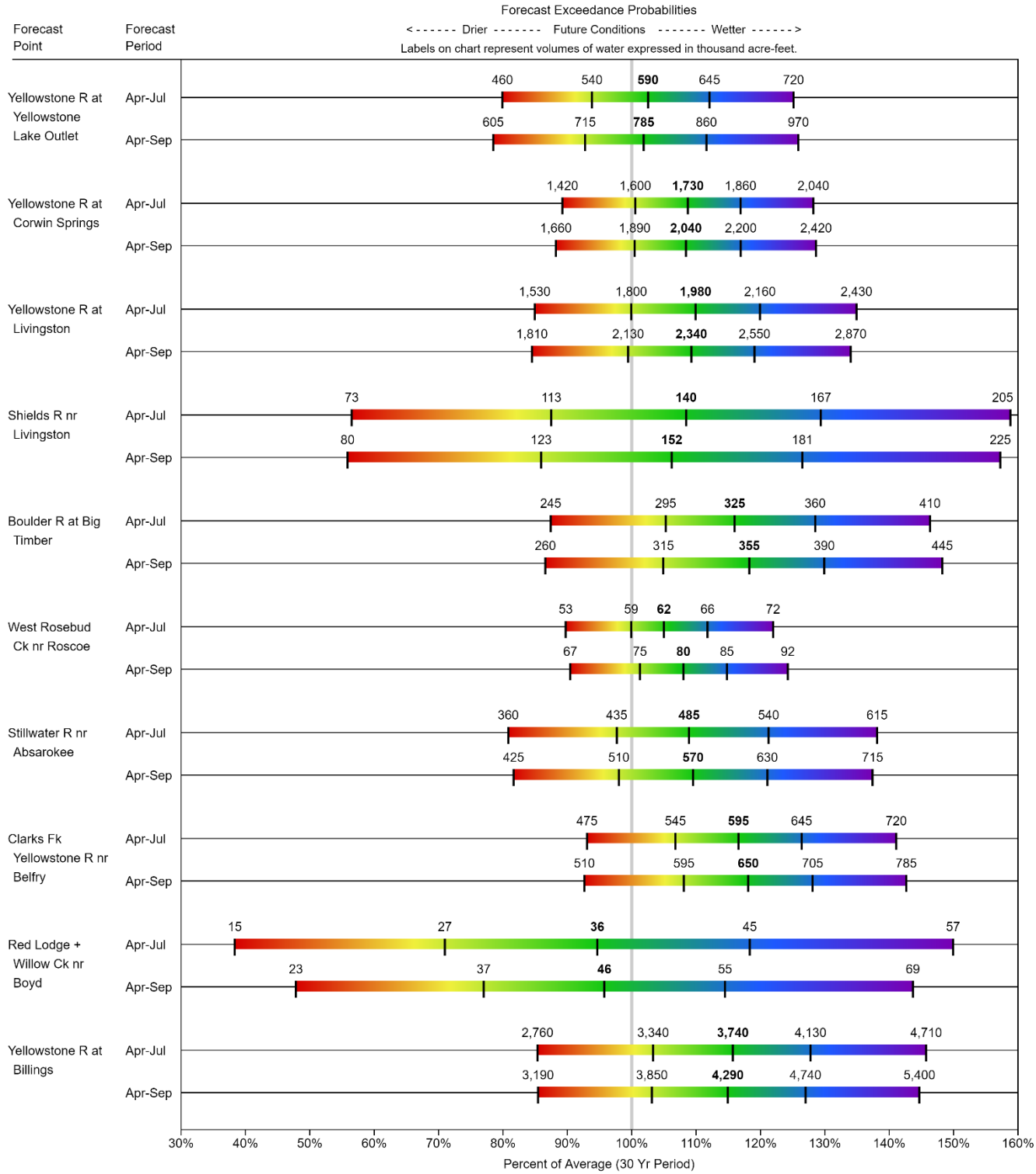
Period of Record Maximum Streamflow KAF (Year)

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

UPPER YELLOWSTONE RIVER BASIN

Water Supply Forecasts

March 1, 2021



Legend

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

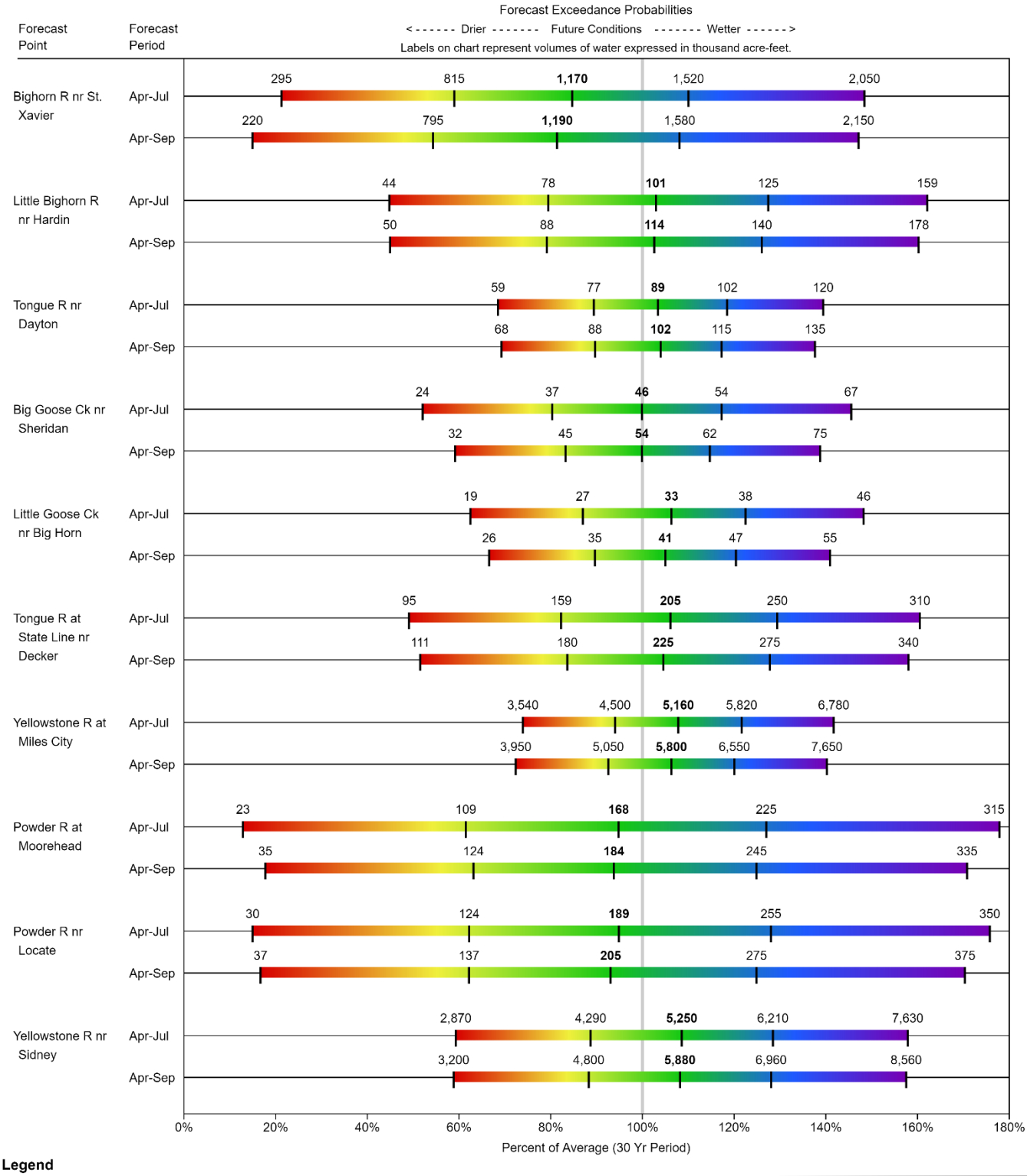
Period of Record Minimum Streamflow KAF (Year)	*1981-2010 Normal Streamflow KAF*	*Observed Streamflow KAF*	*Period of Record Maximum Streamflow KAF (Year)*

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

LOWER YELLOWSTONE RIVER BASIN (Wyoming)

Water Supply Forecasts

March 1, 2021



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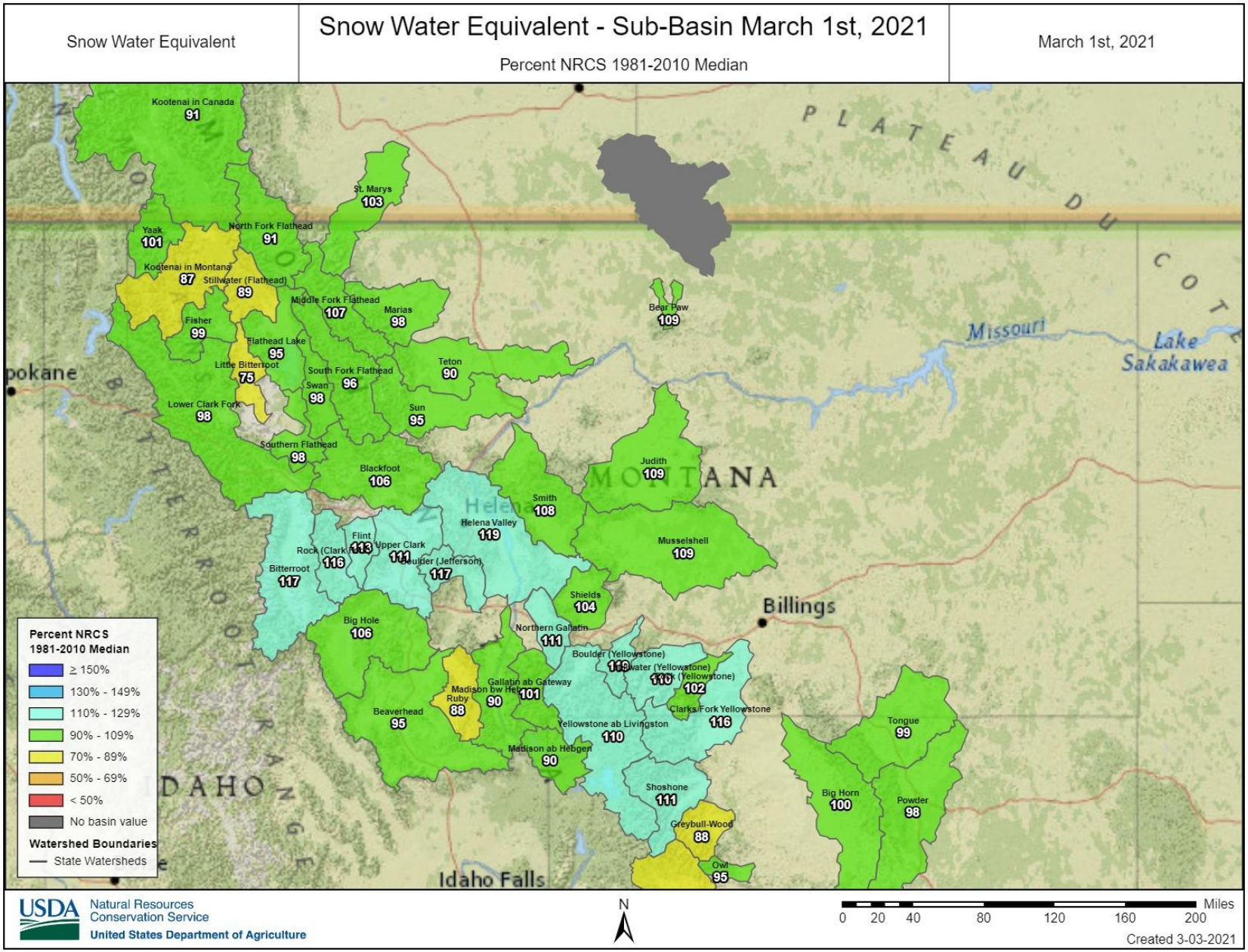
1981-2010 Normal Streamflow KAF

Observed Streamflow KAF

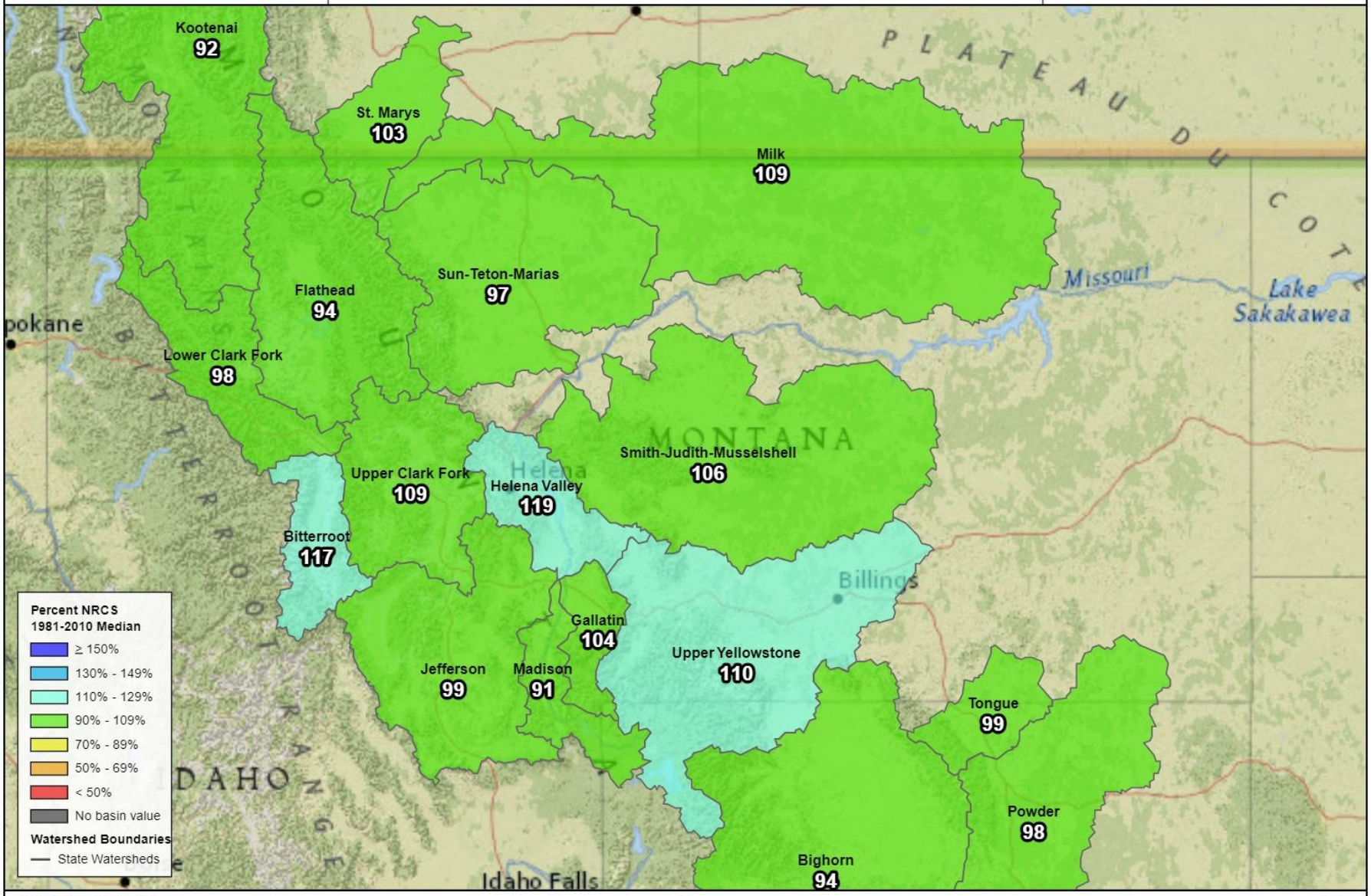
Period of Record Maximum Streamflow KAF (Year)

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

Maps


Snow Water Equivalent
Snow Water Equivalent - Sub-Basin March 1st, 2021
Percent NRCS 1981-2010 Median
March 1st, 2021
Kootenai in Canada 91
St. Marys 103
Yaak 101
North Fork Flathead 91
Kootenai in Montana 87
Stillwater (Flathead) 89
Middle Fork Flathead 107
Marias 98
Fisher 99
Flathead Lake 95
Little Bitterroot 75
South Fork Flathead 96
Swan 98
Teton 90
Lower Clark Fork 98
Sun 95
Southern Flathead 98
Blackfoot 106
Bear Paw 109
Judith 109
Smith 108
Helena Valley 119
Flint 113
Upper Clark 111
Rock (Clark Fk) 116
Boulder (Jefferson) 117
Bitterroot 117
Musselshell 109
Shields 104
Billings
Big Hole 106
Northern Gallatin 111
Boulder (Yellowstone) 110
Madison bw Hebgen Ruby 88
Gallatin ab Gateway 101
Beaverhead 95
Clarks Fork Yellowstone 116
Yellowstone ab Livingston 110
Madison ab Hebgen 90
Tongue 99
Shoshone 111
Big Horn 100
Powder 98
Greybull-Wood 88
Owl 95
Idaho Falls
Missouri
Lake Sakakawea
Percent NRCS 1981-2010 Median
≥ 150%
130% - 149%
110% - 129%
90% - 109%
70% - 89%
50% - 69%
< 50%
No basin value
Watershed Boundaries
State Watersheds
USDA Natural Resources Conservation Service
United States Department of Agriculture
N
Miles
0 20 40 80 120 160 200
Created 3-03-2021

Snow Water Equivalent	Snow Water Equivalent - Major Basin -March 1st, 2021 Percent NRCS 1981-2010 Median	March 1st, 2021



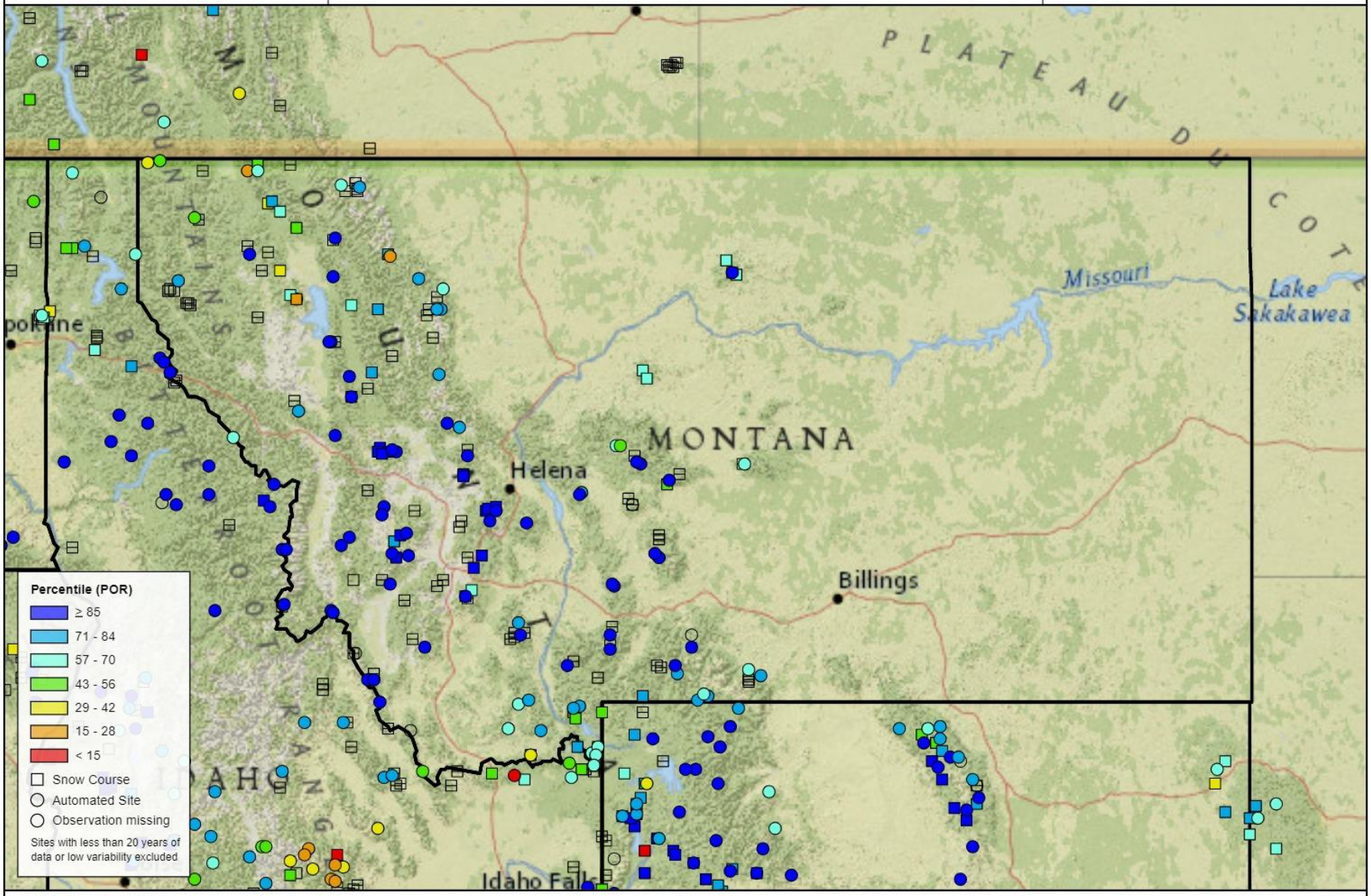
USDA Natural Resources Conservation Service
United States Department of Agriculture

N

0 20 40 80 120 160 200 Miles

Created 3-03-2021

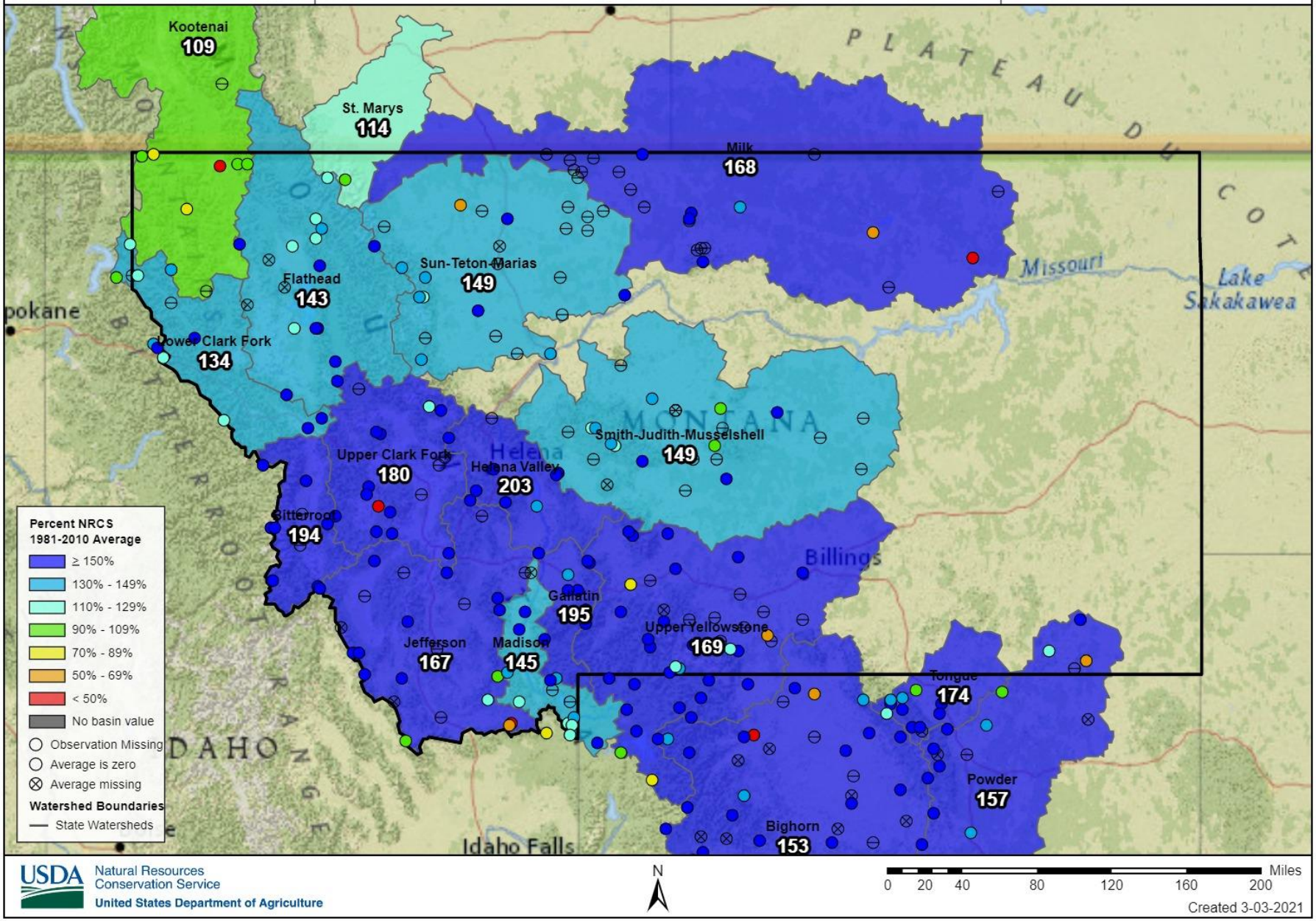
Snow Water Equivalent Delta	Snow Water Equivalent - Monthly Change Percentile - March 1st, 2021 Percentile (POR)	March 1st, 2021 - February 1st, 2021



USDA Natural Resources Conservation Service
United States Department of Agriculture

Created 3-03-2021

1 month Precipitation	Monthly Precipitation - Major Basin - March 1st, 2021 Percent NRCS 1981-2010 Average	February 1, 2021 - February 28, 2021



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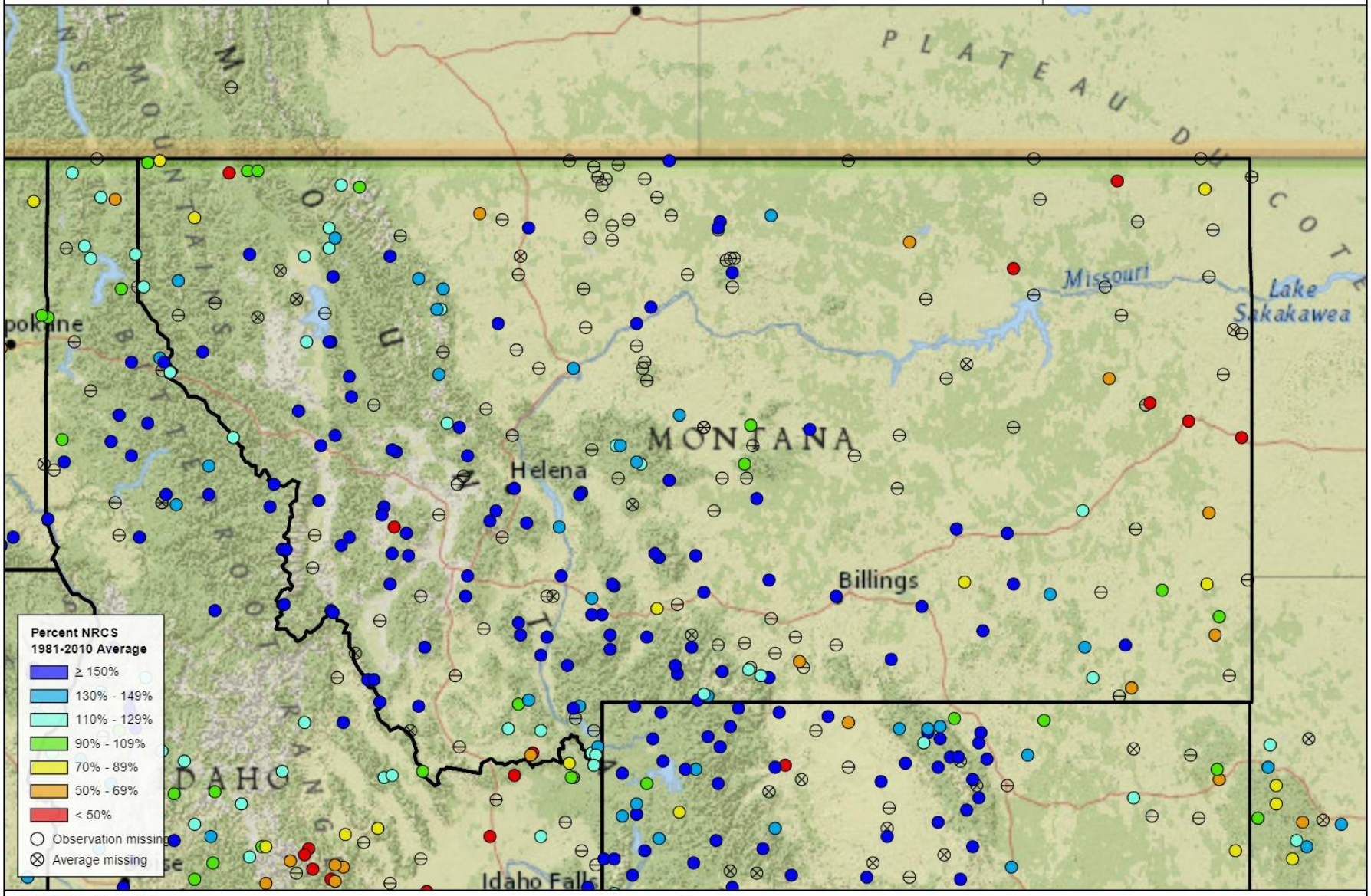
United States Department of Agriculture

Created 3-03-2021

1 month Precipitation	Monthly Precipitation - Station Data - March 1st, 2021 Percent NRCS 1981-2010 Average	February 1, 2021 - February 28, 2021



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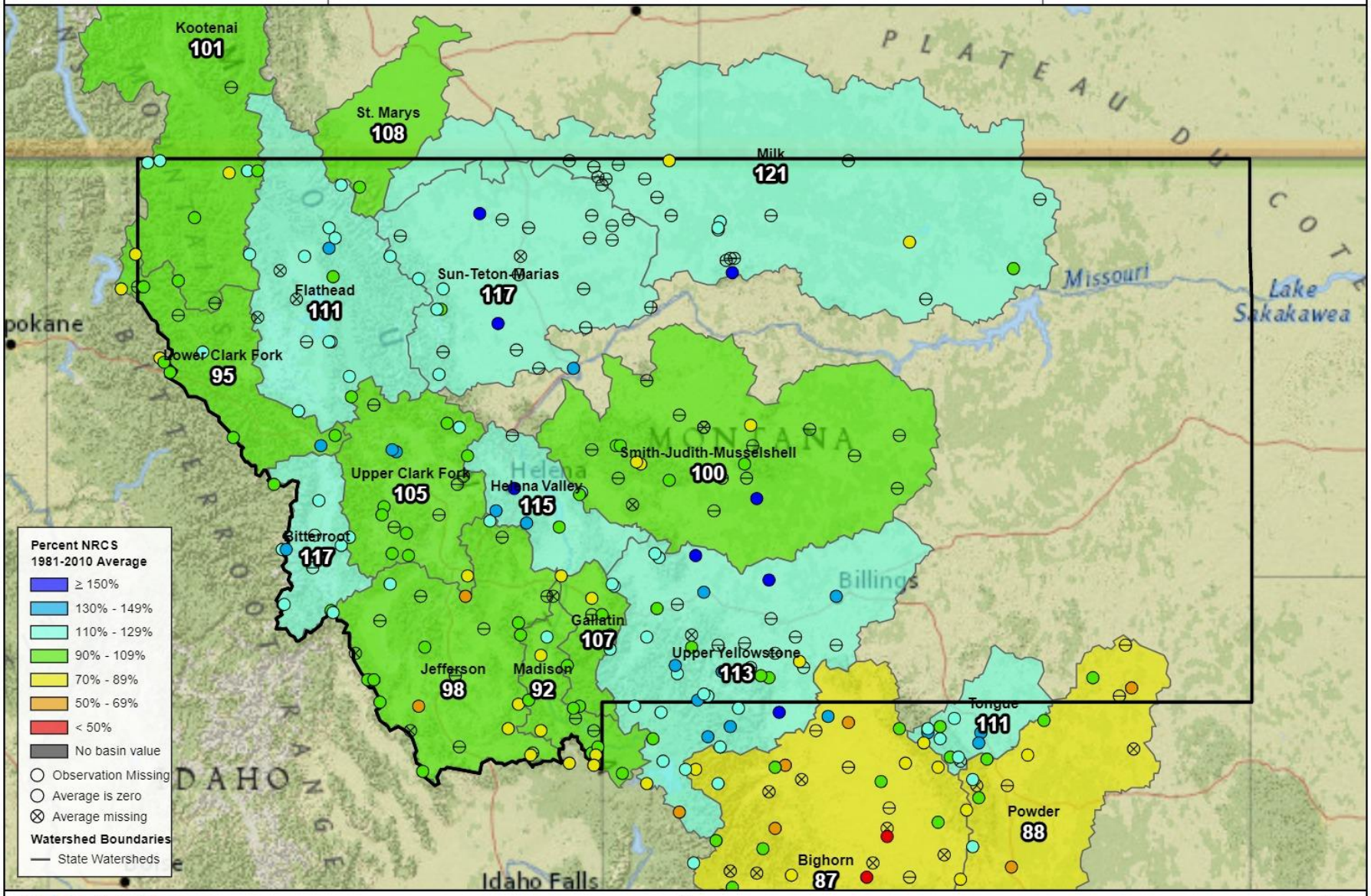
United States Department of Agriculture

Created 3-03-2021

Water Year to Date Precipitation	Water Year Precipitation - Major Basin -March 1st, 2021 Percent NRCS 1981-2010 Average	October 1, 2020 - February 28, 2021



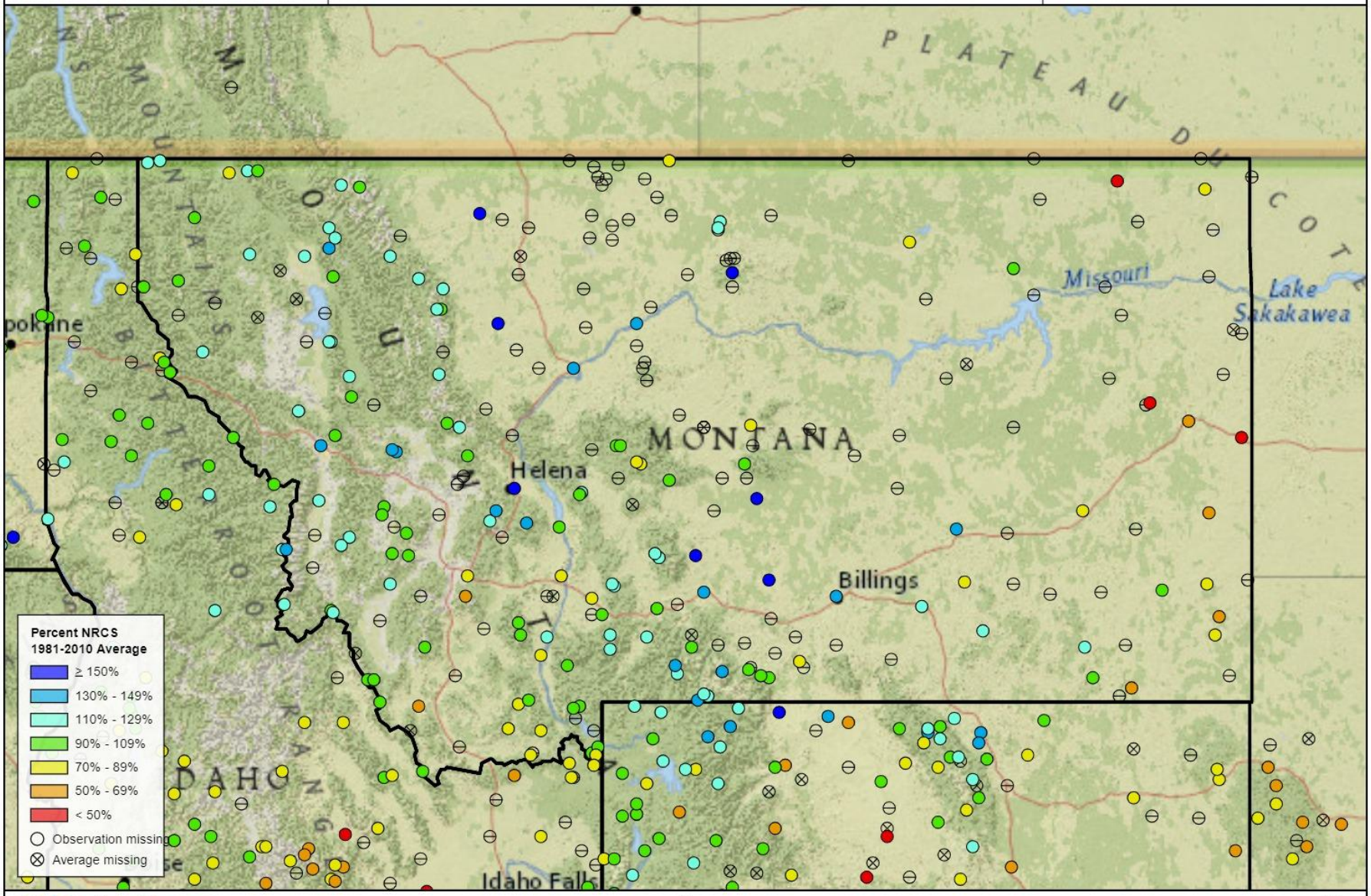
USDA Natural Resources Conservation Service
United States Department of Agriculture

N

0 20 40 80 120 160 200 Miles

Created 3-03-2021

Water Year to Date Precipitation	Water Year Precipitation - Station Data - March 1st, 2021 Percent NRCS 1981-2010 Average	October 1, 2020 - February 28, 2021



USDA Natural Resources Conservation Service
United States Department of Agriculture

N

0 20 40 80 120 160 200 Miles

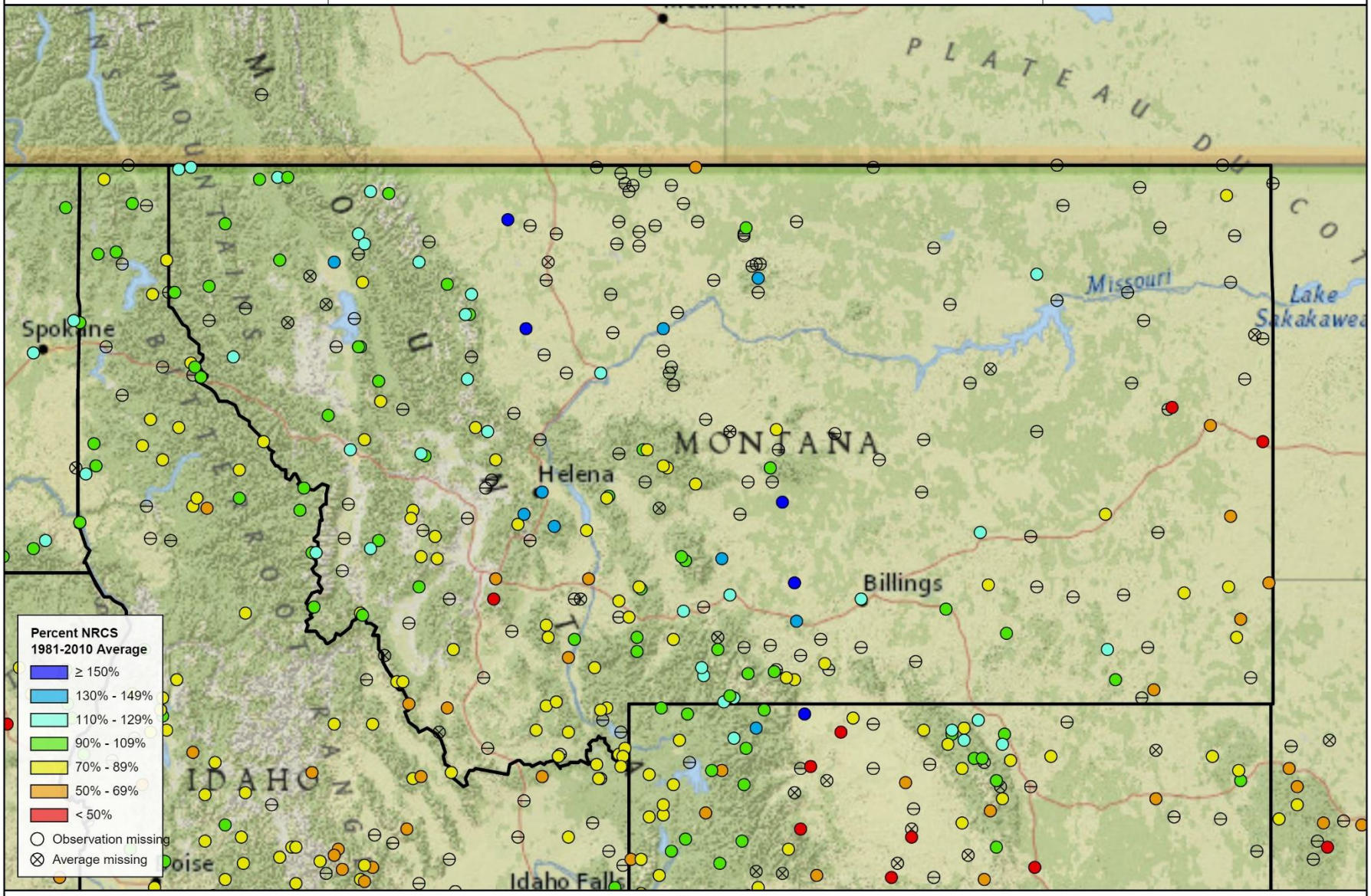
Created 3-03-2021

Water Year to Date Precipitation

Water Year Precipitation - All Stations - Feb. 1, 2020

Percent NRCS 1981-2010 Average

October 1, 2020 - January 31, 2021



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N

0 20 40 80 120 160 200 Miles

Created 2-02-2021

WSOR Web Page Access

The links below will take you to web pages dedicated to the individual river basins and statewide overview for presenting the monthly data. Users are encouraged to interact with the maps presented, select different maps using the drop-down menu, and hover over or click on points or basins of interest to view data and plots.

All of the same information that was traditionally included in the legacy monthly river basin summaries is available in these pages. However, if there are sections of the river basin summaries that you miss, please send an email so that we can continue to improve these new webpages and products.

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**	**U. Yellowstone**
Flathead	**Madison**	**Wyoming**
Upper Clark	**Gallatin**	
Bitterroot	**Helena Valley**	
Lower Clark	**Smith-Judith**	
	Sun-Teton	
	St. Mary	
	Milk	

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Montana Water Supply Outlook Report

Natural Resources Conservation Service