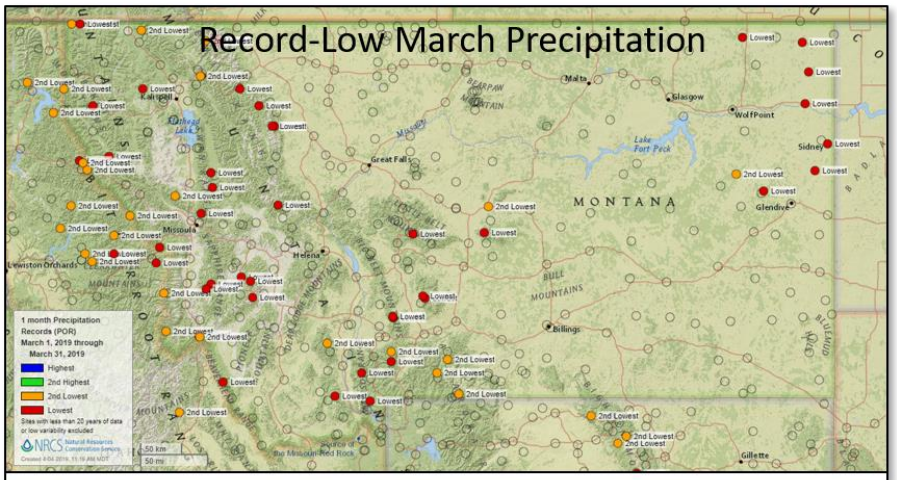
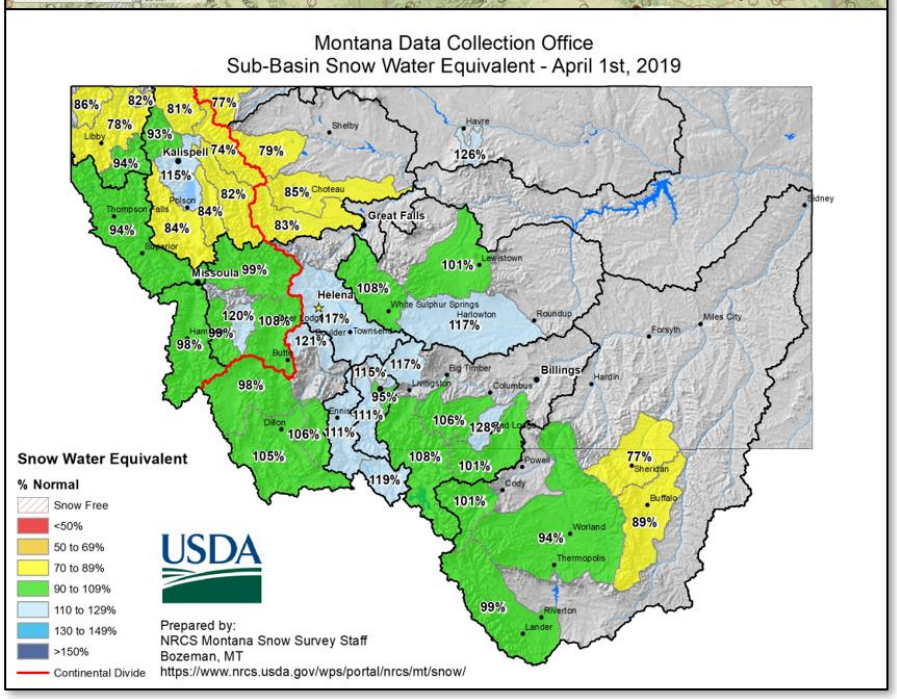
Montana
Water Supply Outlook Report
April 1st, 2019





Record-Low monthly precipitation across the state of March decreases snowpack percentages from March 1st. While it may not have seemed like an overtly dry March, largely due to all the snow left on the ground across the state from the cold and wet weather in February, it ended up being one of the driest on record at some SNOTEL sites. Fortunately, February ended up being such a big month that the snowpack totals on April 1st remain near to above normal, except in northern basins where snowpack for this date is below normal.

For more water supply and resource management information, contact:

Lucas Zukiewicz
Water Supply Specialist
Federal Building
10 East Babcock, Room 443
Bozeman, MT 59715
Phone 406-587-6843
lucas.zukiewicz@mt.usda.gov
http://www.nrcs.usda.gov/wps/portal/nrcs/main/mt/snow/

Montana Water Supply Outlook Report as of April 1st, 2019

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.

The United States Department of Agriculture (USDA) prohibits discrimination in its programs on the basis of race, color, national origin, sex, religion, age, disability, political beliefs and marital or familial status. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD).

To file a complaint, write the Secretary of Agriculture, U.S. Department of Agriculture, Washington, D.C., 20250, or call 1-800-245-6340 (voice) or (202) 720-1127 (TDD). USDA is an equal employment opportunity employer.

What's New?

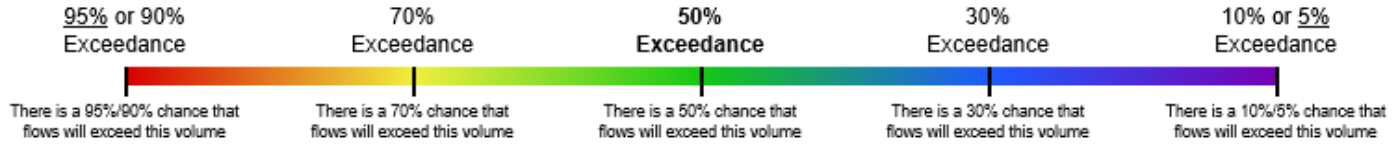
Official forecasts are being released by the NRCS Montana Snow Survey and Water Supply Forecasting Program for this coming spring runoff season, and the forecasts are being released in a new graphical format. If you are uncomfortable with this new format, the old format can still be found **here**.

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

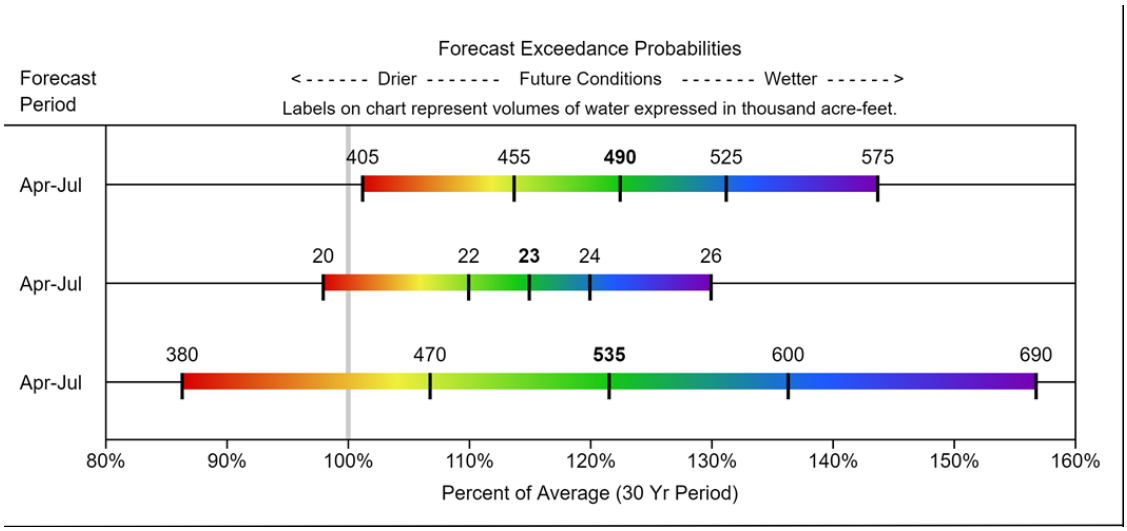
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
APR-JUL	315	375	420	187%	460	525	225

The Forecast Chart provides a visual alternative to the table. The forecast range is represented by a colored bar. Vertical lines on the bar signify the five forecast exceedances.



Below is an example. The numbers above the forecast bars are the five exceedance probability volumes in thousand acre-feet (KAF). Each exceedance forecast's percent of average can be estimated by looking at the horizontal axis. The gray line centered above 100% on the horizontal axis represents the 1981-2010 historical average streamflow for the forecast period.



In this example, almost all the forecast bars in the basin are shifted right of the gray vertical line indicating forecasts of above average streamflow. The 50% exceedance is represented by the black line in the green portion of the colored bar. For the top most line, this represents a forecast volume of 490KAF, which is ~123% of average. If drier than normal future conditions occur the 70% exceedance forecast may be more likely (455KAF or ~114% of average). If future conditions turn wetter than normal, the 30% exceedance forecast may be more likely (525KAF or ~132% of average). Water users are encouraged to consider the range of forecast exceedances instead of relying solely only on the 50% forecast.

Snowpack – Overview

Just when it looked like the cold and snowy patterns of February would stay in place through the first week of March, the weather changed rapidly. The first week of the month ushered in record low temperatures across the State, but little precipitation fell during this brutal cold snap. As the high pressure located over the Gulf of Alaska broke down, moving the cold arctic air out, the jet stream and storm patterns across Montana changed for the remainder of the month of March. The good news is that temperatures became more moderate and closer to seasonal averages, which was a relief to many in the Ag community who were hit hard during calving season. The bad news is that snowfall totals for the month of March were well below normal across the state. This might have been both a benefit and a curse. As the month progressed, the abundant valley snowpack began to melt, resulting in lowland flooding across the state where melt water could not infiltrate the still frozen soil. Impacts across the eastern half of Montana were wide-spread, though streams began to recede by the end of the month. Not to downplay the significant impacts of these flood events, but the flooding could have been far worse if snowfall had continued and the plains snowmelt had coupled with mountain runoff or a large-scale precipitation event later in the spring.

Mountain snowpack totals are down from March 1st as a result of the well below normal snowfall for the month. The snowpack feeding the northern river basins (Kootenai, Flathead, Sun-Teton-Marias) is below normal on April 1st, but snowpack conditions improve as you move from north to south. Central river basins remain near normal, and basins along the southern border of the state have above normal snowpack for April 1st.

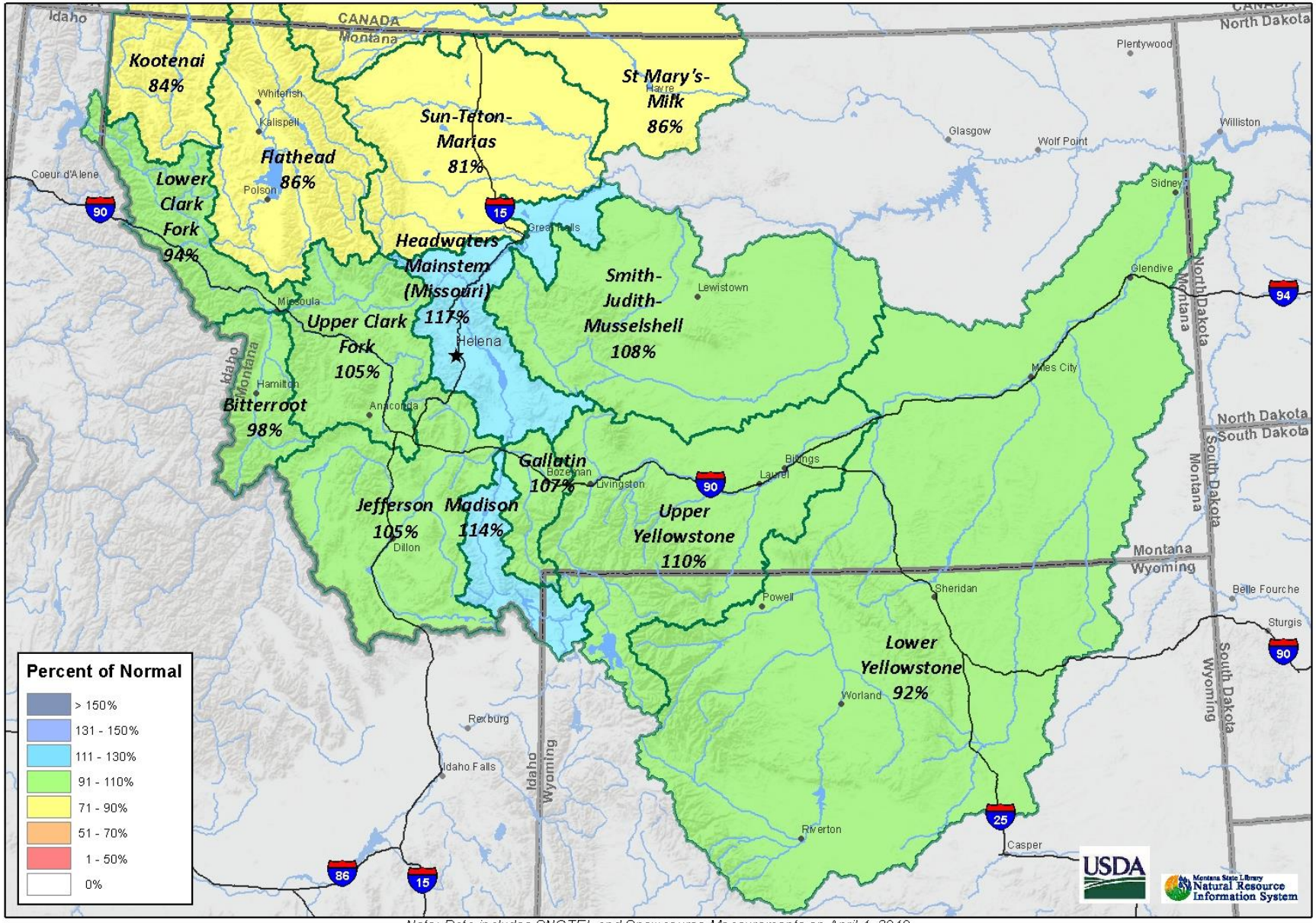
As of April 1st, we have a decent idea of what the snowpack component of runoff will produce this year, especially in basins west of the Divide where precipitation totals typically taper off through spring into summer. In the northern regions we have a snowpack in place that is below normal. Low-elevation melt has begun during the last half of the month at SNOTEL sites west of the Divide, priming those elevations for runoff should weather patterns allow. Snowpack east of the Divide still has another month or so before high elevation snowpack typically peaks, and low elevation sites have not begun their seasonal melt. Fortunately, early season and February snowfall helped to insulate many of these basins from the dry weather of March. The coming month will dictate how much snow we have for runoff this season and how reliant we may be on spring and summer precipitation should deficits in some areas persist.

Snow Water Equivalent

4/1/2019	***% Normal***	***% Last Year***
Columbia River Basin	93	67
Kootnenai in Montana	84	66
Flathead in Montana	86	63
Upper Clark Fork	105	67
Bitterroot	98	73
Lower Clark Fork	94	76
Missouri River Basin	106	79
Jefferson	105	77
Madison	114	92
Gallatin	107	84
Headwaters Mainstem	117	69
Smith-Judith-Musselshell	108	78
Sun-Teton-Marias	81	57
St. Mary-Milk	86	63
Yellowstone River Basin	100	74
Upper Yellowstone	110	72
Lower Yellowstone	92	76

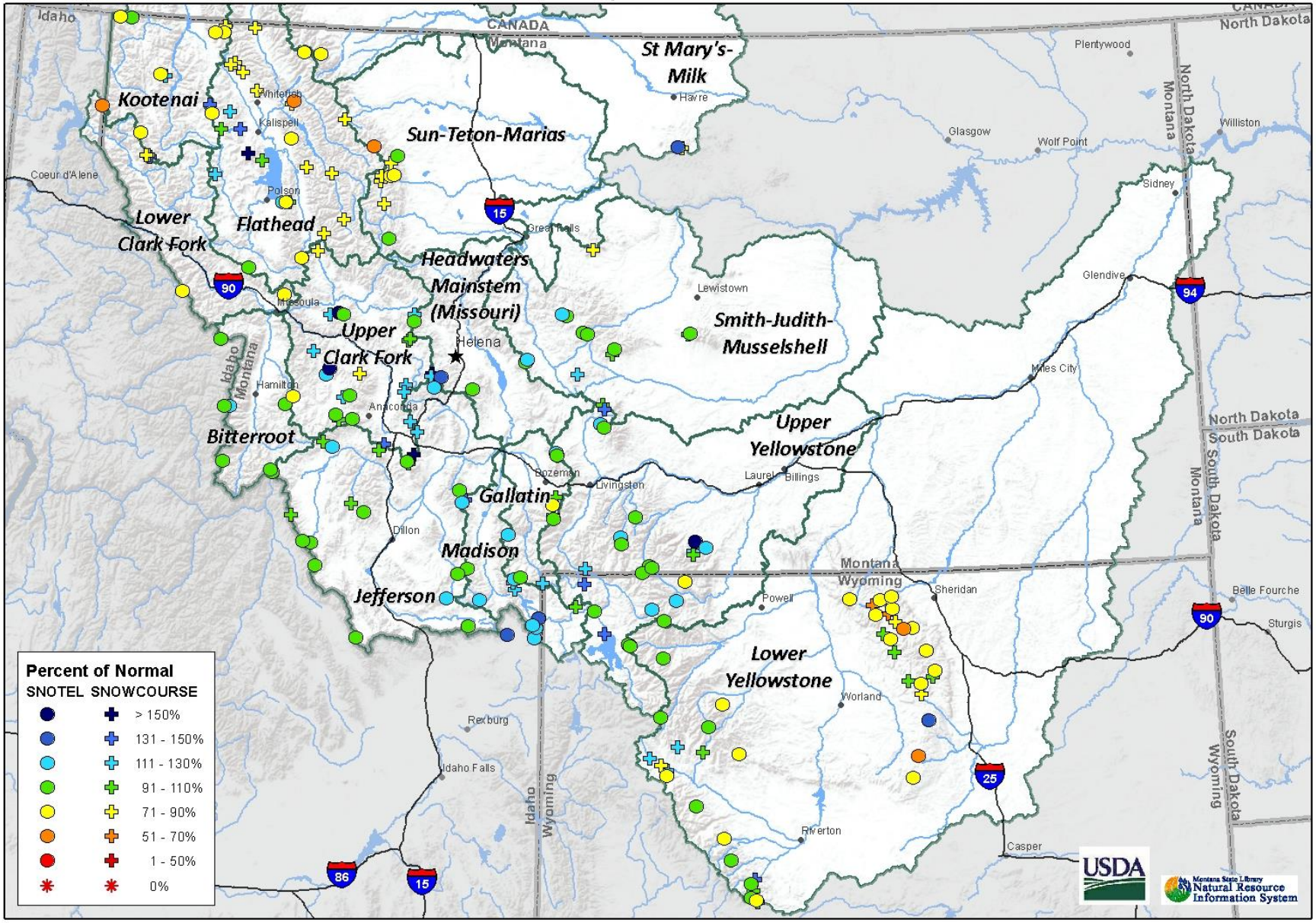
West of Divide	93	67
East of Divide	103	77
Montana State-Wide	100	72

Montana Data Collection Office
Current Snow Water Equivalent
Basin Percentage of Normal - April 1, 2019

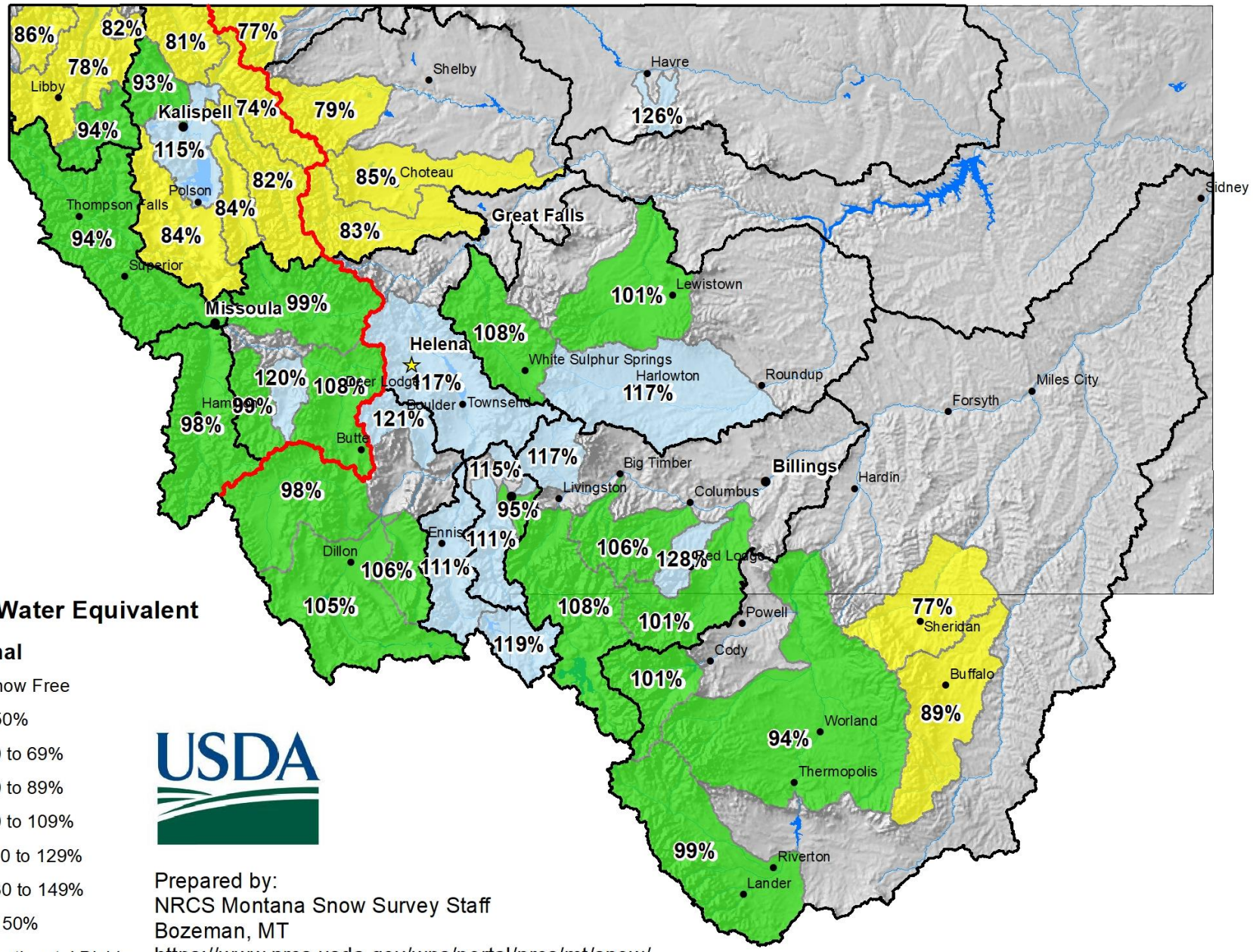


Note: Data includes SNOTEL and Snowcourse Measurements on April 1, 2019

Montana Data Collection Office
Current Snow Water Equivalent
April 1, 2019



Montana Data Collection Office
Sub-Basin Snow Water Equivalent - April 1st, 2019



Prepared by:
NRCS Montana Snow Survey Staff
Bozeman, MT
https://www.nrcs.usda.gov/wps/portal/nrcs/mt/snow/

Precipitation - Overview

Spring is here, finally. After a record-setting February in regard to temperatures and snowfall, many are ready for a thaw. While March started with frigid temperatures, it was a disappointing month for precipitation across the state. Precipitation totals at both mountain and valley locations were well below average for the month, with some SNOTEL sites and valley weather stations setting new record lows for March precipitation.

This has resulted in water-year totals which closely match snowpack percentages on April 1st, since October didn't yield significant precipitation before snow began to accumulate. Mountain precipitation totals are below to well-below average in the basins along the northern border, near average in central basins, and above average in basins along the southern border.

Moving forward into the rest of the spring, we typically expect basins east of the Divide to see increasing precipitation totals, while basins west of the Divide typically experience declines in monthly totals. In some areas where snowpack looks to contribute less than normal to spring and summer streamflows (Northern MT) these months may be particularly important.

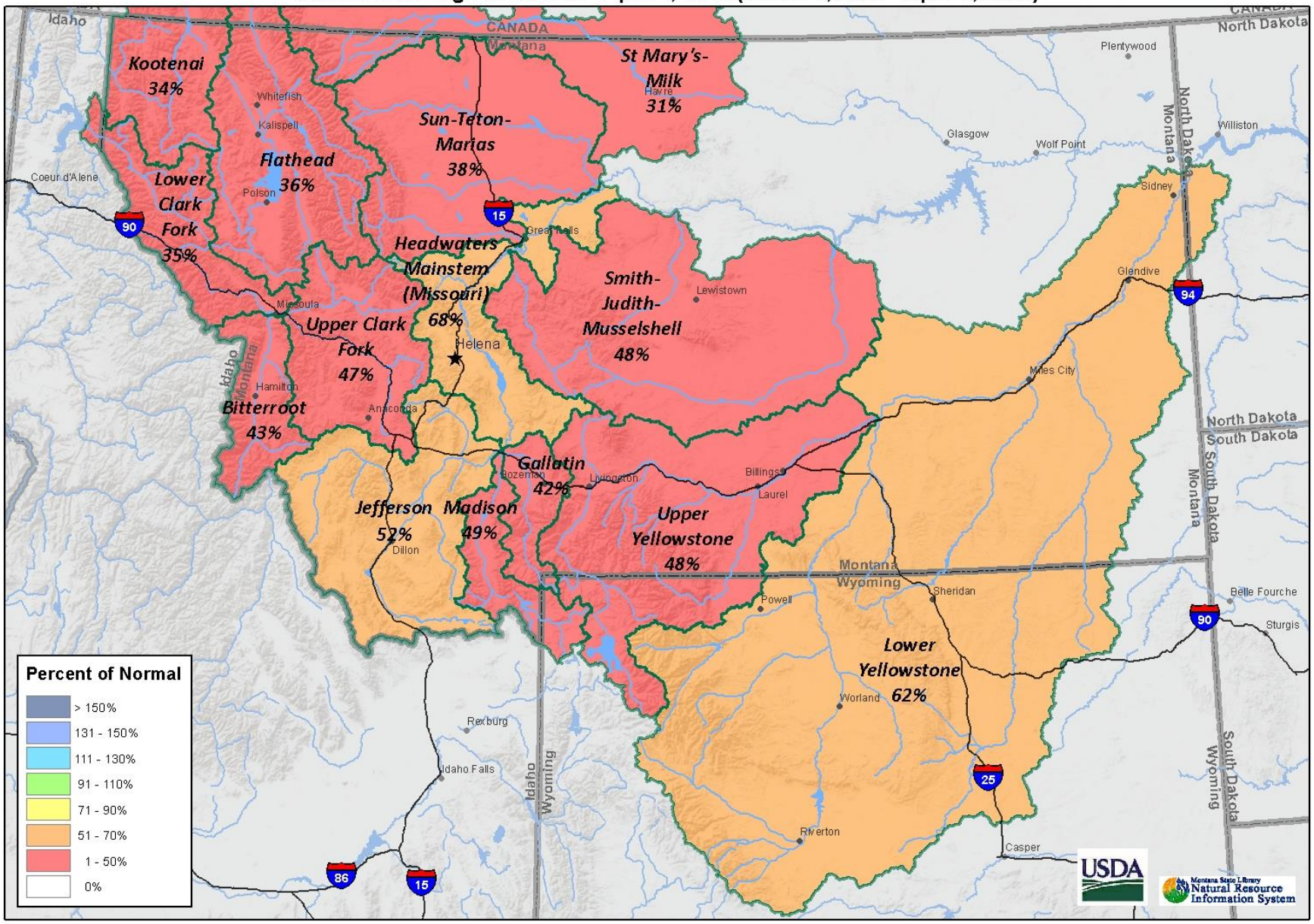
While long-range forecasts haven't been particularly accurate this winter in Montana, they indicate elevated chances of above average temperatures in western Montana, and equal chances of normal precipitation across the state for the month of April. Forecasts for April – June and May – July show a similar trend in above average temperatures in the western half of the State but indicate the possibility of above average precipitation.

Precipitation

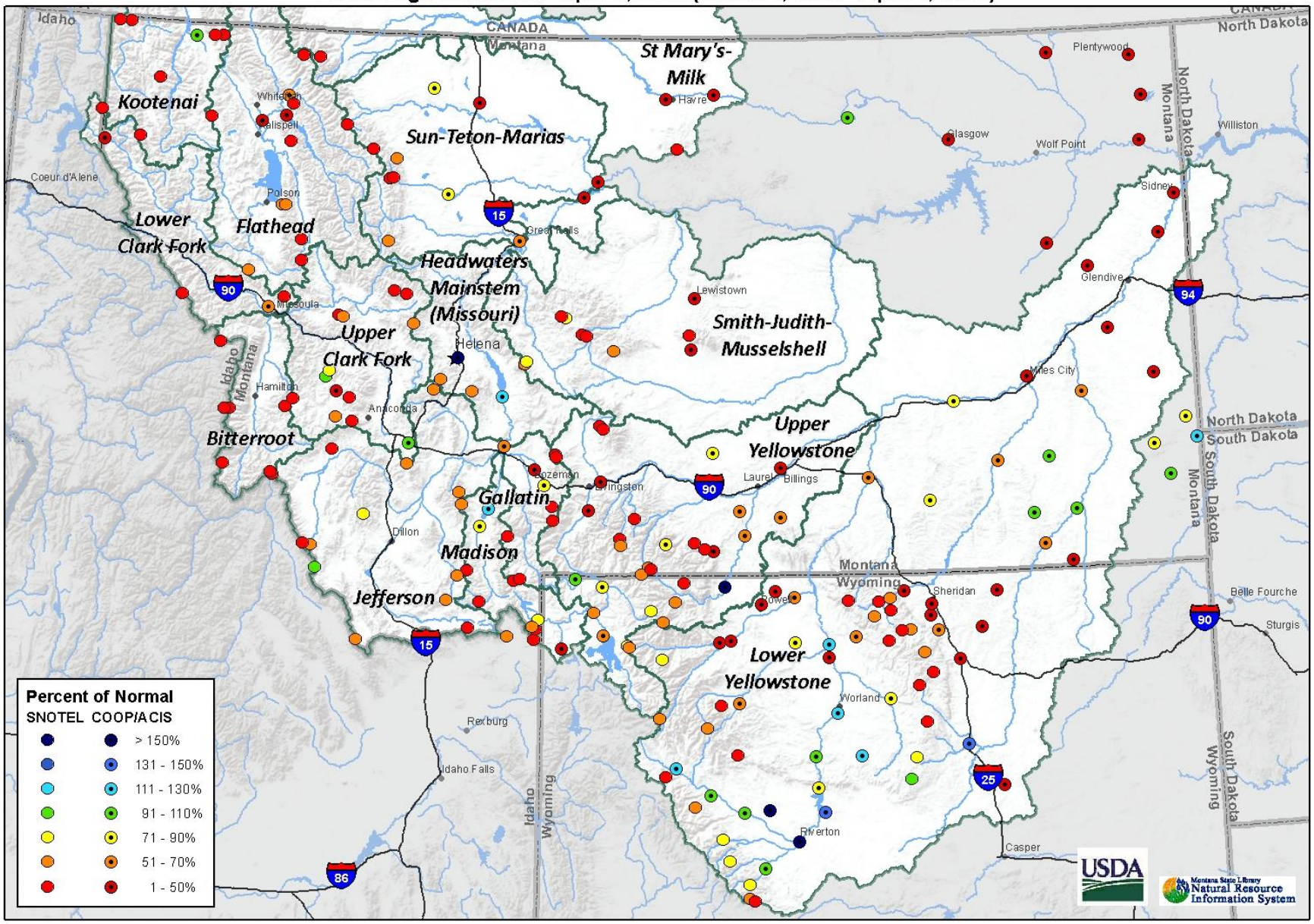
4/1/2019	***Monthly % Avg***	***Water Year % Avg***	***WY % Last Year***
Columbia River Basin	40	86	70
Kootnenai in Montana	34	75	66
Flathead in Montana	36	84	65
Upper Clark Fork	47	94	71
Bitterroot	43	95	80
Lower Clark Fork	35	85	74
Missouri River Basin	49	106	90
Jefferson	52	102	92
Madison	49	110	96
Gallatin	42	114	92
Headwaters Mainstem	68	110	80
Smith-Judith-Musselshell	48	103	90
Sun-Teton-Marias	38	85	62
St. Mary-Milk	31	86	66
Yellowstone River Basin	56	98	81
Upper Yellowstone	48	105	77
Lower Yellowstone	62	92	84

West of Divide	40	86	70
East of Divide	50	100	83
Montana State-Wide	45	96	77

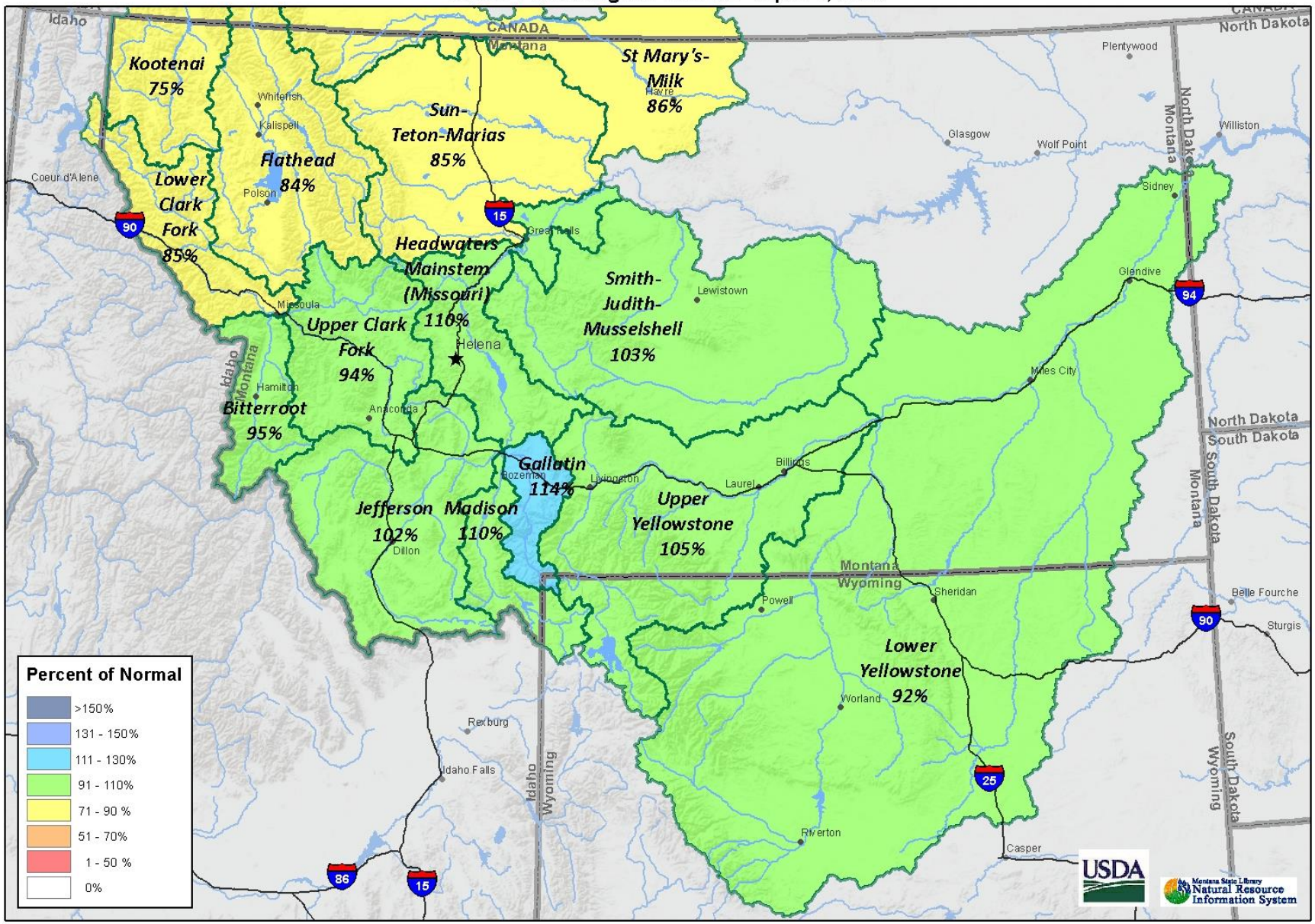
Montana Data Collection Office
Monthly Precipitation
Basin Percentage of Normal - April 1, 2019 (March 1, 2019 - April 1, 2019)



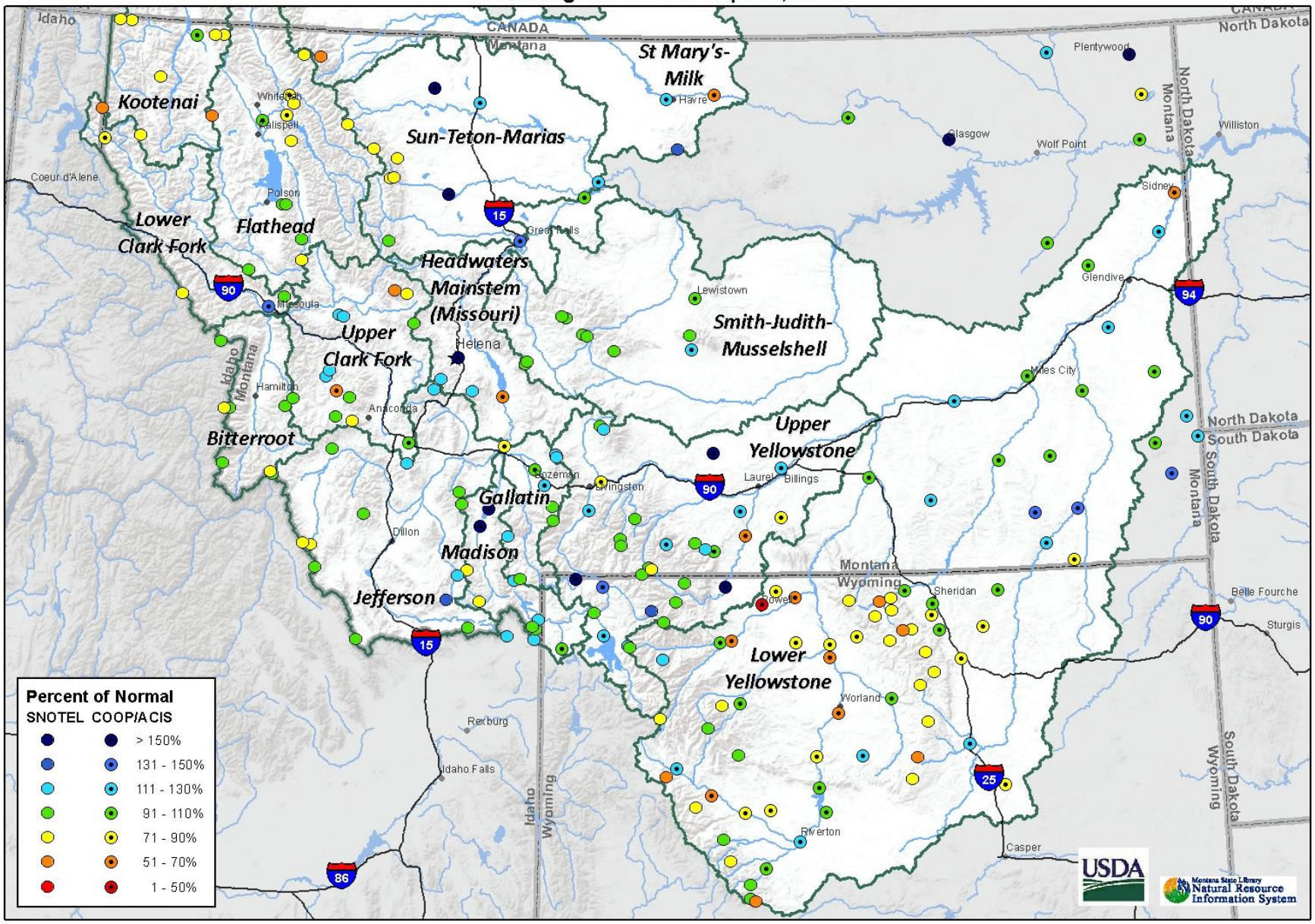
Montana Data Collection Office
Monthly Precipitation
Percentage of Normal - April 1, 2019 (March 1, 2019 - April 1, 2019)



Montana Data Collection Office
Water Year to Date Precipitation
Basin Percentage of Normal - April 1, 2019



Montana Data Collection Office
Water Year to Date Precipitation
Percentage of Normal - April 1, 2019



Reservoirs - Overview

It's getting to be that time of the year when water managers across the Montana start to fill the irrigator controlled and federally managed reservoirs, and this year some federal water managers will have their hands full. Record flooding along the Missouri River in the Midwest means that water managers in Montana are trying to hold back water so that the problem isn't amplified. For example, on March 27th inflows to Fort Peck Reservoir were estimated to be 52,000cfs, while outflows were only 6,700cfs. It's always important to note that water management in Montana isn't only about *our* resources, but also those downstream of us. Due to the "Bomb Cyclone" that caused the downstream flooding, federal water managers with the BOR and USACE will be closely watching weather patterns and streamflows in both Montana and other states downstream.

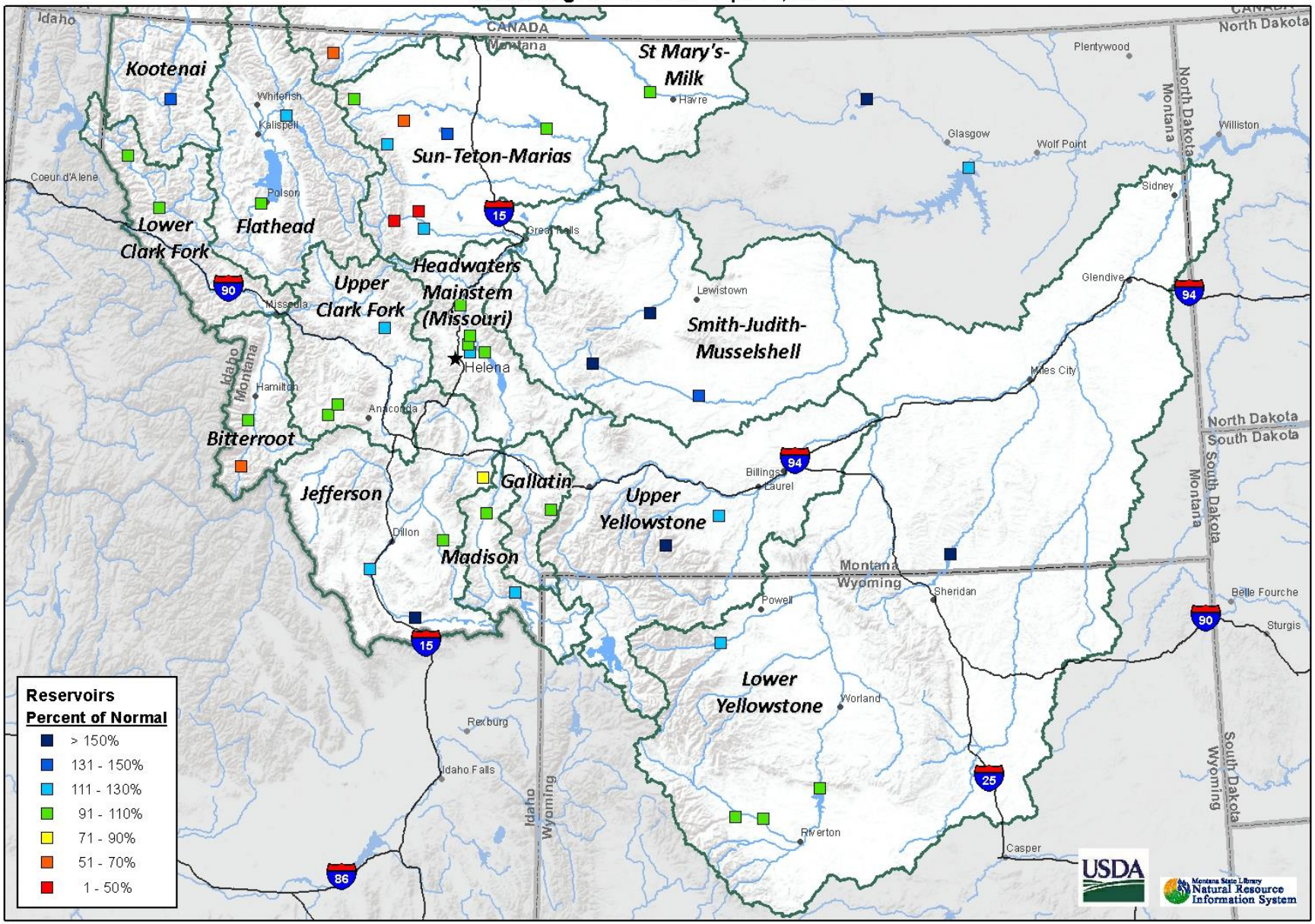
Smaller irrigator-controlled reservoirs in the State could also be impacted, but to a much lesser extent. Carryover storage from last year's ample runoff, combined with ample snowpack, looks to deliver full storage in many areas. However, some areas remain below normal for snowpack and water year precipitation and have storage that is below average for April 1st, but only at isolated locations. Overall, reservoir storage is above average in the state of Montana for April 1st.

Reservoir Storage

4/1/2019	***% Average***	***% Capacity***	***% Last Year***
Columbia River Basin	130	64	131
Kootnenai in Montana	148	62	163
Flathead in Montana	118	64	112
Upper Clark Fork	102	77	102
Bitterroot	94	34	65
Lower Clark Fork	104	97	104
Missouri River Basin	119	80	103
Jefferson	122	64	95
Madison	111	79	104
Gallatin	97	53	105
Headwaters Mainstem	122	84	103
Smith-Judith-Musselshell	139	87	105
Sun-Teton-Marias	105	55	105
St. Mary-Milk	112	51	127
Yellowstone River Basin	105	59	104
Upper Yellowstone	134	59	125
Lower Yellowstone	104	59	103

West of Divide	130	64	131
East of Divide	118	79	104
Montana State-Wide	121	74	110

Montana Data Collection Office
Reservoir Levels
Percentage of Normal - April 1, 2019



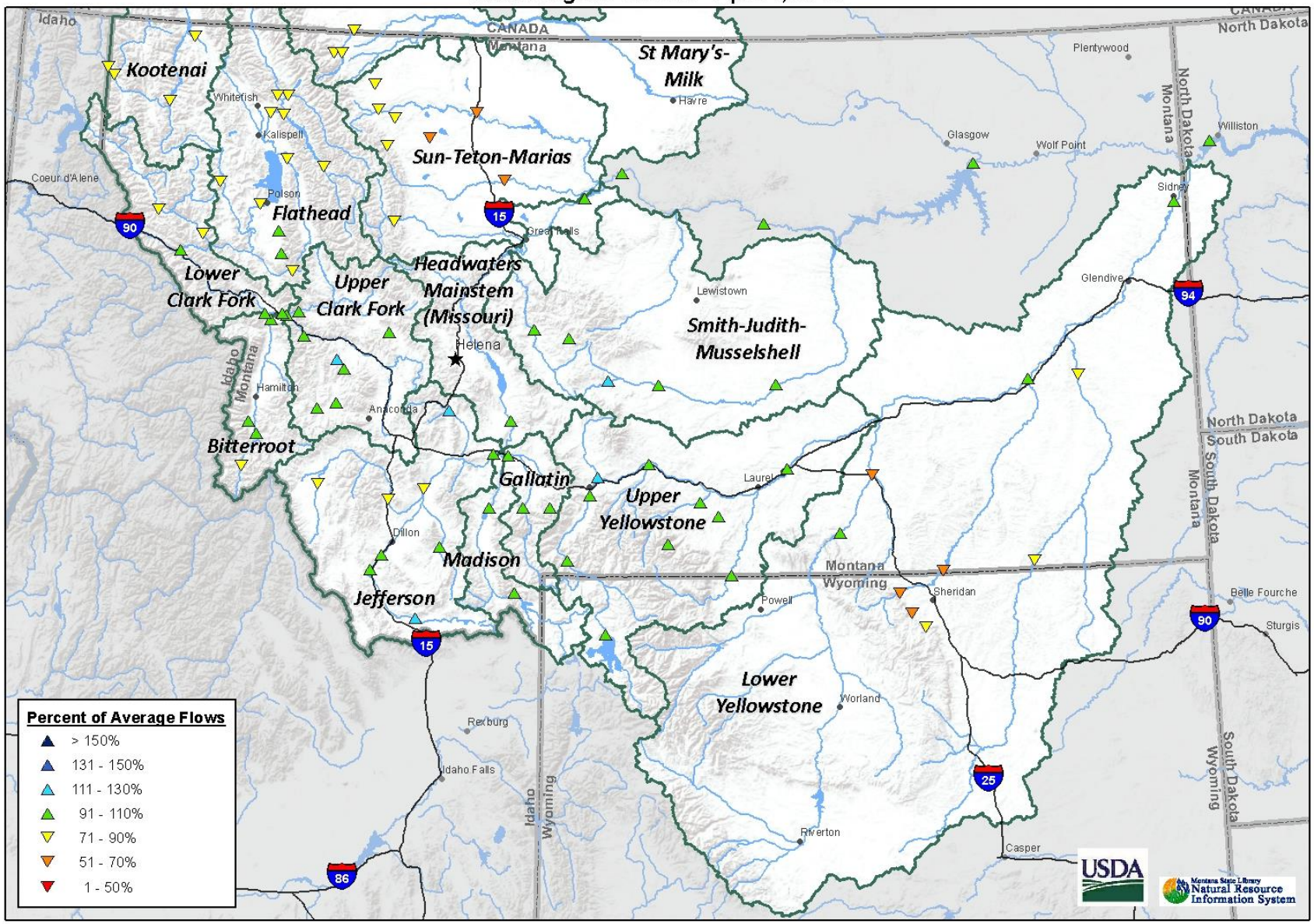
Streamflow Forecasts - Overview

With the passage of winter into spring comes the time of year when our mountain snowpack makes the transition to melt, typically providing long-duration water supply across the Montana. As April begins, streams across the State are on the rise in some areas west of the Divide and the seasonal melt has begun. Through the month of April, the solar angle will increase, days will get longer and the temperatures warmer. Our entire state relies not only the amount of water we get from the mountain snowpack, but when the water enters the rivers. This is mentioned as a way to introduce the potential impacts from faster than normal snowmelt runoff should long-term weather forecasts, which call for above average temperatures in the coming months, come true. Early snowmelt runoff makes us more reliant upon spring and summer precipitation, which enters and passes through the river systems relatively quickly and doesn't provide the long-duration supply like mountain snowpack does. A close eye will be kept on the weather as spring and summer progresses, since the impacts of early runoff and lack of spring/summer precipitation are usually felt later in the summer.

For now, forecasts issued on April 1st for the April 1st – July 31st period reflect the snowpack totals and water year precipitation. Northern basins have streamflow forecasts which suggest below average seasonal runoff volumes this spring and summer. A particularly dry 2018 summer, combined with below normal snowpack and below average water year precipitation (Oct 1 – Current) has led to the low forecasts. Of course, anomalously high spring and summer precipitation could offset these deficits, but water management plans shouldn't rely on it.

River forecasts improve as you move from north to south across the State, with the highest forecasts (percentage-wise) to be found in southwest and south-central Montana. At this point, central and southern basins look to receive average to above average seasonal volumes, but this will largely depend on the weather during the next three months. The snowpack component in these regions is near to above normal, but spring precipitation is critical, especially east of the Divide. In the high elevation basins of southern Montana, the May 1st forecast should provide better insight into the long-term water supply, as snowpack typically approaches peak by that time.

Montana Data Collection Office
Streamflow Forecast
Percentage of Normal - April 1, 2019



Kootenai River Basin

March was an extremely dry month in the Kootenai River basin, and snowpack totals continued their decline from earlier this winter. Mountain precipitation ranged from 28% to 41% of average for the month and was 32% of average for the combined basin total. This set new record lows for March precipitation at many SNOTEL stations within the basin. Only one storm added measurable snowpack to mountain locations mid-month, with high pressure dominating the weather patterns. Snowpack in the basin is below normal for April 1st and has been below normal throughout most of the winter. Current snowpack ranges from 69% to 85% within the basin, with only the Garver Creek SNOTEL site (107%) in the Yaak River basin reporting normal snowpack for today's date. Looking ahead, water supply forecasts for the April 1st – July 31st indicate below average streamflows within the greater Kootenai river basin. Water users within the basin are encouraged to keep a close eye on the rest of this spring and summer, as the snowpack component of runoff looks to be below normal this year. As a result, spring and summer precipitation will play a critical role in determining the extent of the water resources available. This situation is less than ideal, as precipitation during the last two summers was well below average to record-breaking low. This impacts the whole hydrologic system which continues to build upon these shortages, so a long-term change in weather patterns will be needed to counter the growing deficit.

Kootenai River Basin Data Summary

Snowpack	**Percent of 1981-2010 Normal (Median)**	**Last Year Percentage of Normal (Median)**
KOOTENAY in CANADA	70%	119%
KOOTENAI MAINSTEM	78%	117%
TOBACCO	82%	135%
FISHER	94%	135%
YAAK	86%	131%
KOOTENAI RIVER BASIN in MONTANA	78%	117%
KOOTENAI ab BONNERS FERRY	84%	130%
Basin-Wide Snowpack	**84%**	**128%**

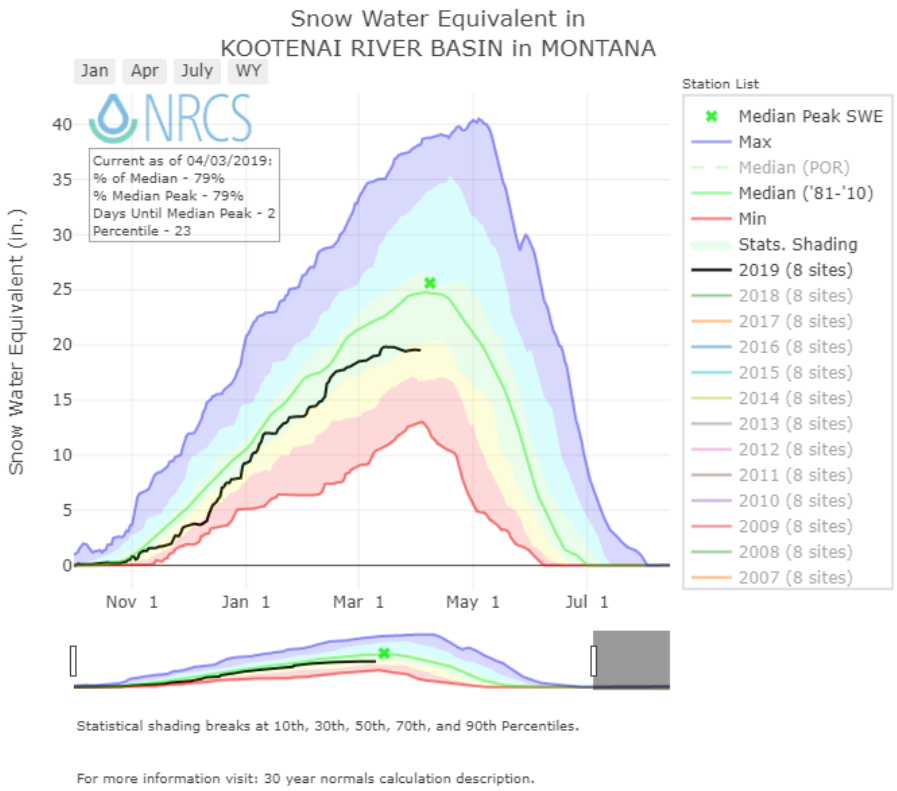
Precipitation	**Monthly Percentage of Average**	**WYTD Percentage of 1981-2010 Average***	**WYTD Last Year Percentage of Average**
Mountain Precipitation	32%	74%	113%
Valley Precipitation	91%	103%	138%
Basin-Wide Precipitation	**34%**	**75%**	**113%**

**WYTD Precipitation is October 1st- Current*

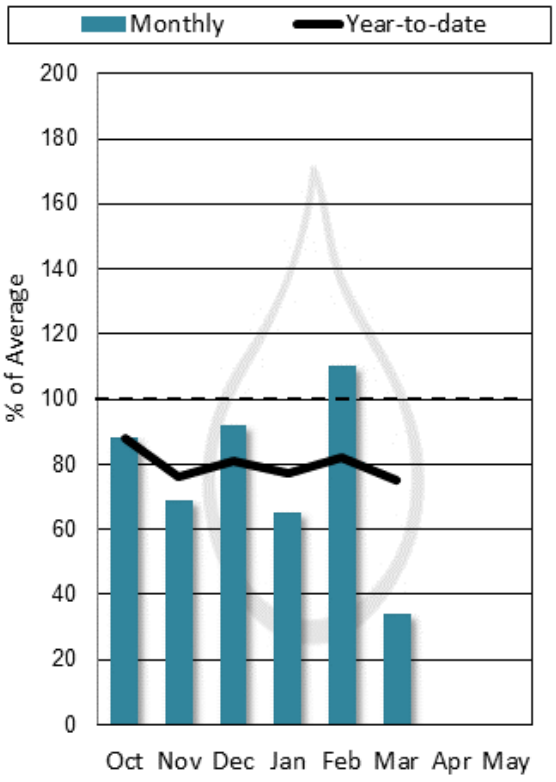
Reservoir Storage	**Percentage of Average**	**Percentage of Capacity (Total)**	**Last Year Percentage of Average**
Basin-Wide Reservoir Storage	**148%**	**62%**	**91%**

**See Reservoir Storage Table for storage in individual reservoirs*

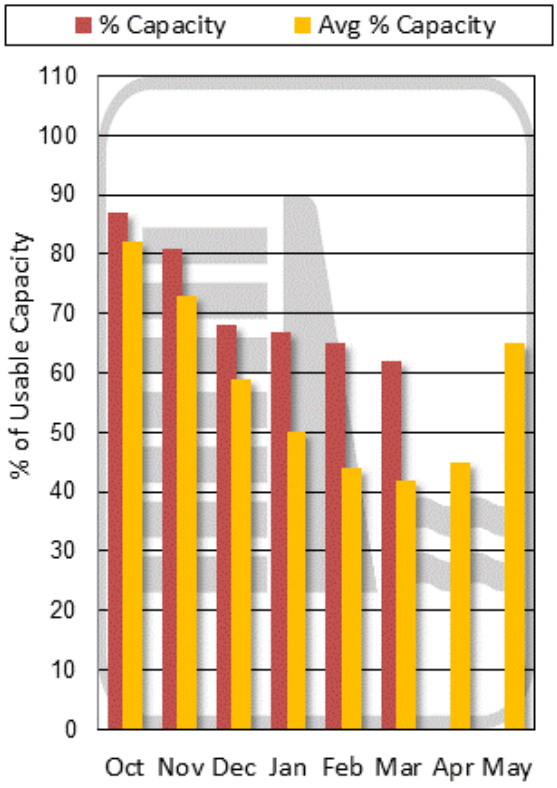
(click on chart below to navigate to online version with additional features)



Mountain and Valley Precipitation



End of Month Reservoir Storage

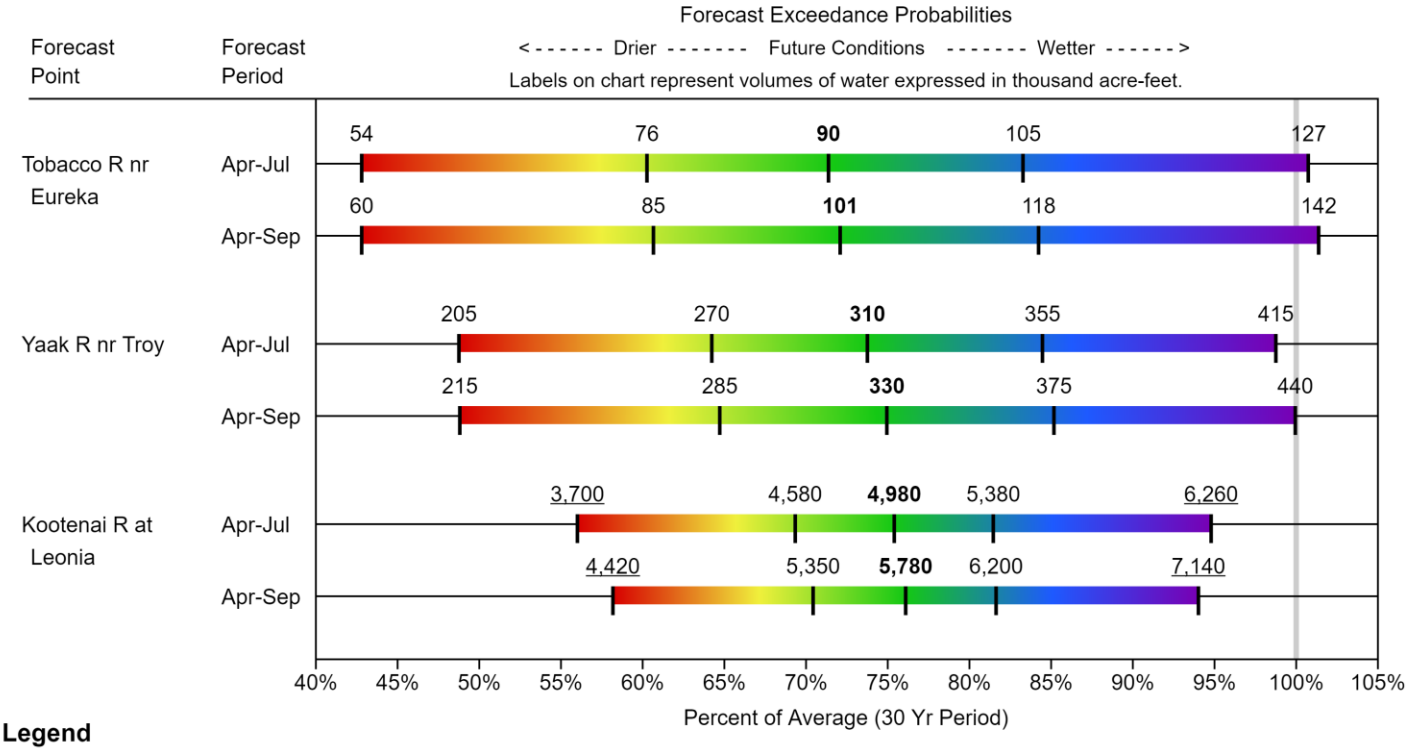


Storage above is averaged for all reservoirs in the basin. For individual reservoirs see table below.

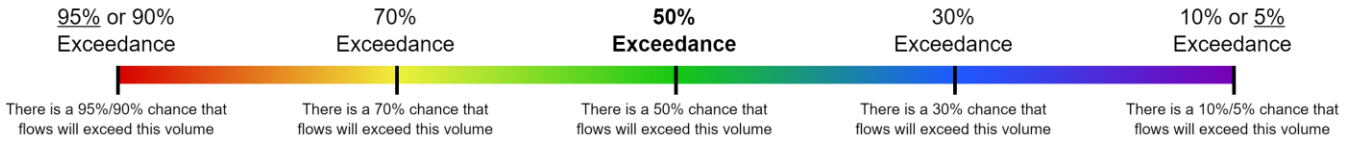
KOOTENAI RIVER BASIN in MONTANA

Water Supply Forecasts

April 1, 2019



Legend



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

Period of Record Minimum Streamflow KAF (Year)

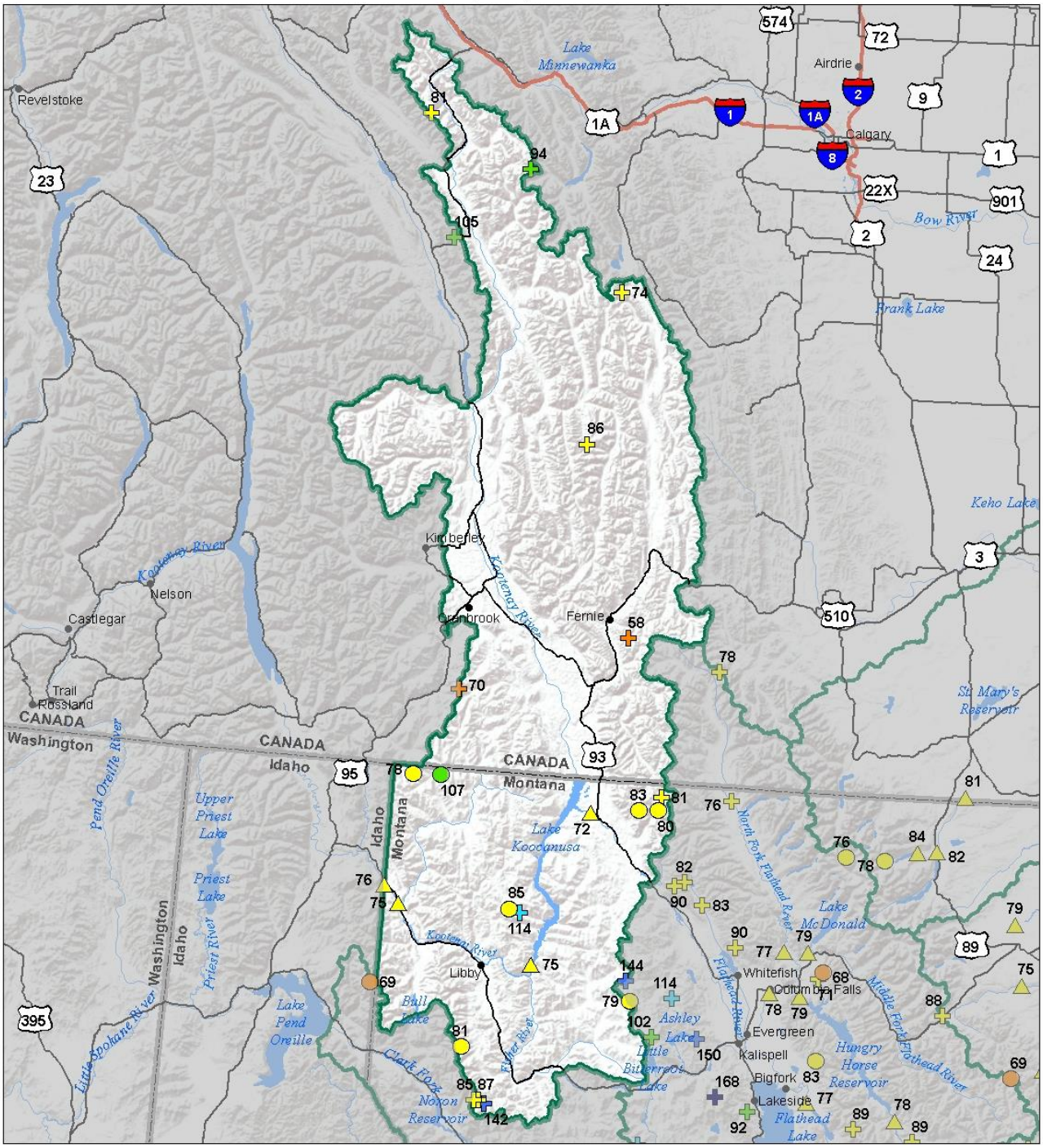
1981-2010 Normal Streamflow KAF

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.

Kootenai River Basin
Streamflow Forecast, Snow Water Equivalent
Percentage of Normal
April 1, 2019



Snow Water Equivalent
Percent of Normal

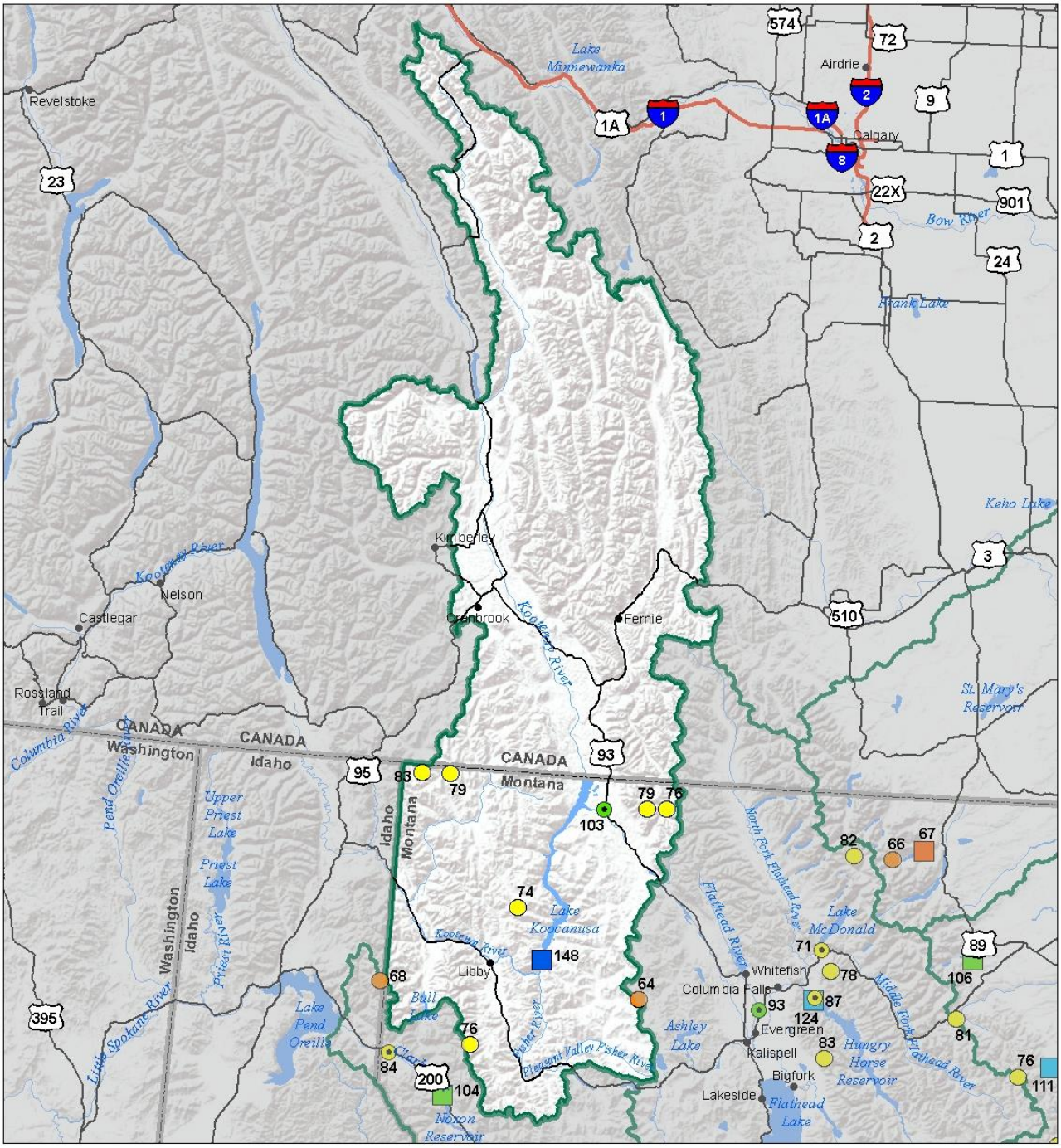
SNOTEL		Snowcourse	
> 150%	71 - 90%	> 150%	71 - 90%
131 - 150%	51 - 70%	131 - 150%	51 - 70%
111 - 130%	1 - 50%	111 - 130%	1 - 50%
91 - 110%	0%	91 - 110%	0%

Streamflow Forecast
Percent of Average Flows

- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%
- 71 - 90%
- 51 - 70%
- 1 - 50%

USDA
Montana State Library Natural Resource Information System

Kootenai River Basin
Water Year to Date Precipitation and Reservoir Levels
Percentage of Normal
April 1, 2019



Precipitation
Percent of Normal

SNOTEL		COOP/ACIS	
> 150%	71 - 90%	> 150%	71 - 90%
131 - 150%	51 - 70%	131 - 150%	51 - 70%
111 - 130%	1 - 50%	111 - 130%	1 - 50%
91 - 110%		91 - 110%	

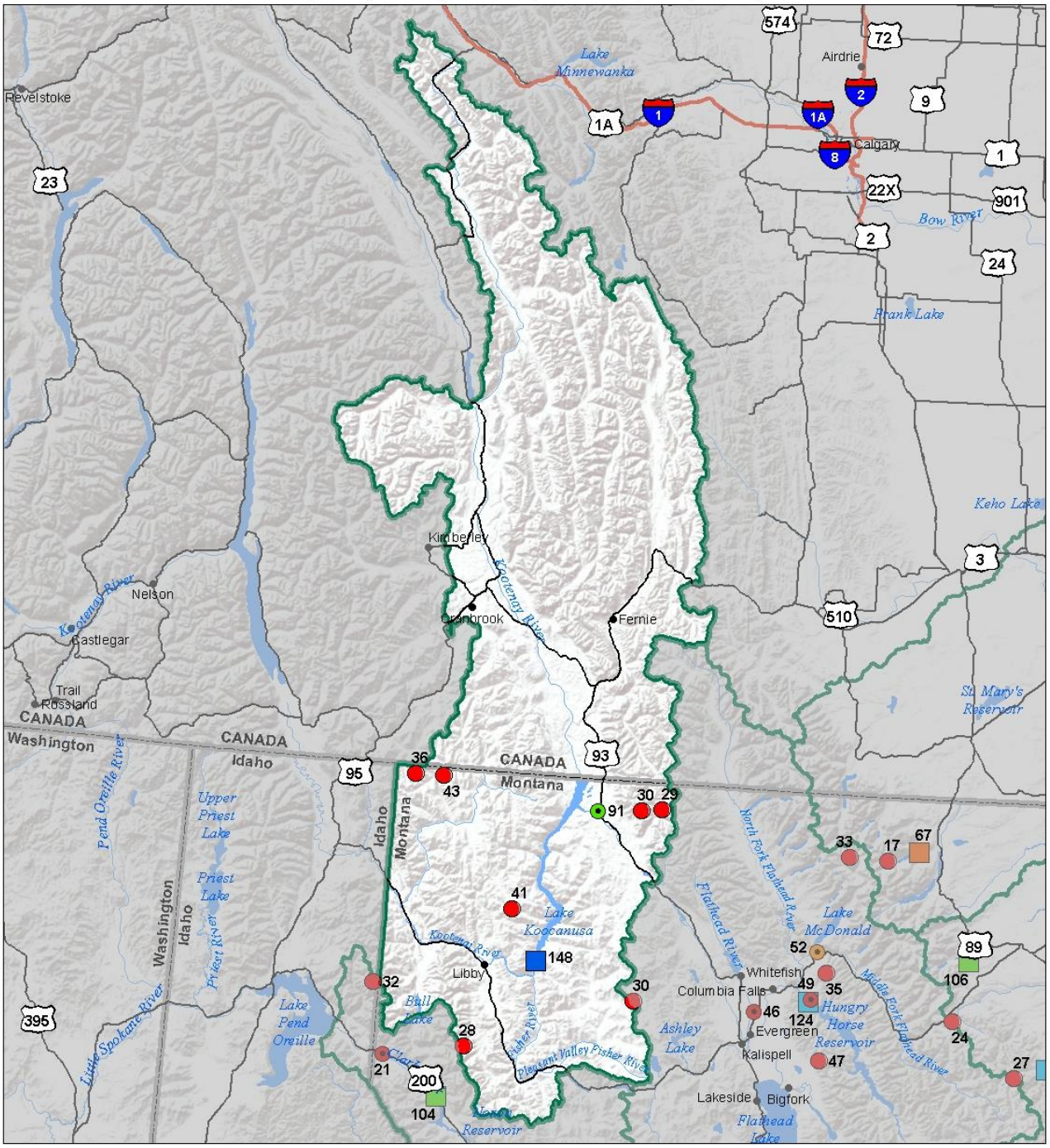
Reservoirs
Percent of Normal

- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%
- 71 - 90%
- 51 - 70%
- 1 - 50%

USDA

Montana State Library Natural Resource Information System

Kootenai River Basin
Monthly Precipitation and Reservoir Levels
Percentage of Normal
April 1, 2019 (March 1, 2019 - April 1, 2019)



Precipitation
Percent of Normal

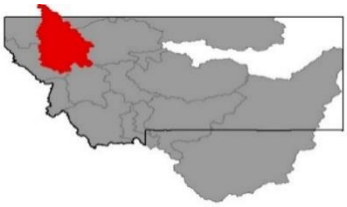
SNOTEL		COOP/ACIS	
> 150%	71 - 90%	> 150%	71 - 90%
131 - 150%	51 - 70%	131 - 150%	51 - 70%
111 - 130%	1 - 50%	111 - 130%	1 - 50%
91 - 110%		91 - 110%	

Reservoirs
Percent of Normal

- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%
- 71 - 90%
- 51 - 70%
- 1 - 50%

USDA

Montana State Library Natural Resource Information System



Flathead River Basin

Northern Montana river basins have been missed by this winter's passing storms, and basin-wide totals reflect the below average water year precipitation (October 1st – Current) and below normal snowpack for this date. March continued the dry trend across the Flathead, and this month was well below average to record-setting low with regards to mountain precipitation. Overall, basin-wide mountain precipitation totals were only 36% of average. As a result, many of the mountain ranges feeding the Flathead River basin have snowpack that is below normal for April 1st. However, there is one bright spot; some low elevation measurement locations in the Salish mountains west of Kalispell reported near to above-normal snowpack. Below average water-year precipitation and below normal snowpack has translated into volumetric streamflow forecasts that are below average for the April 1st – July 31st time-period. Aside from February of 2019, dryer than normal weather patterns have persisted in this area since last summer, leaving lingering deficits that will impact runoff this year. A major weather pattern change will be needed to make up these deficits, and water users should be prepared for below average water supply this spring and summer should that change fail to occur.

Flathead River Basin Data Summary

Snowpack	**Percent of 1981-2010 Normal (Median)**	**Last Year Percentage of Normal (Median)**
NF FLATHEAD in CANADA	%	%
NF FLATHEAD in MONTANA	81%	130%
MIDDLE FORK FLATHEAD	74%	132%
SOUTH FORK FLATHEAD	82%	151%
STILLWATER-WHITEFISH	93%	127%
SWAN	84%	144%
MISSION VALLEY	94%	134%
LITTLE BITTERROOT-ASHLEY	115%	130%
JOCKO	84%	136%
FLATHEAD in MONTANA	86%	137%
Basin-Wide Snowpack	***86%***	***137%***

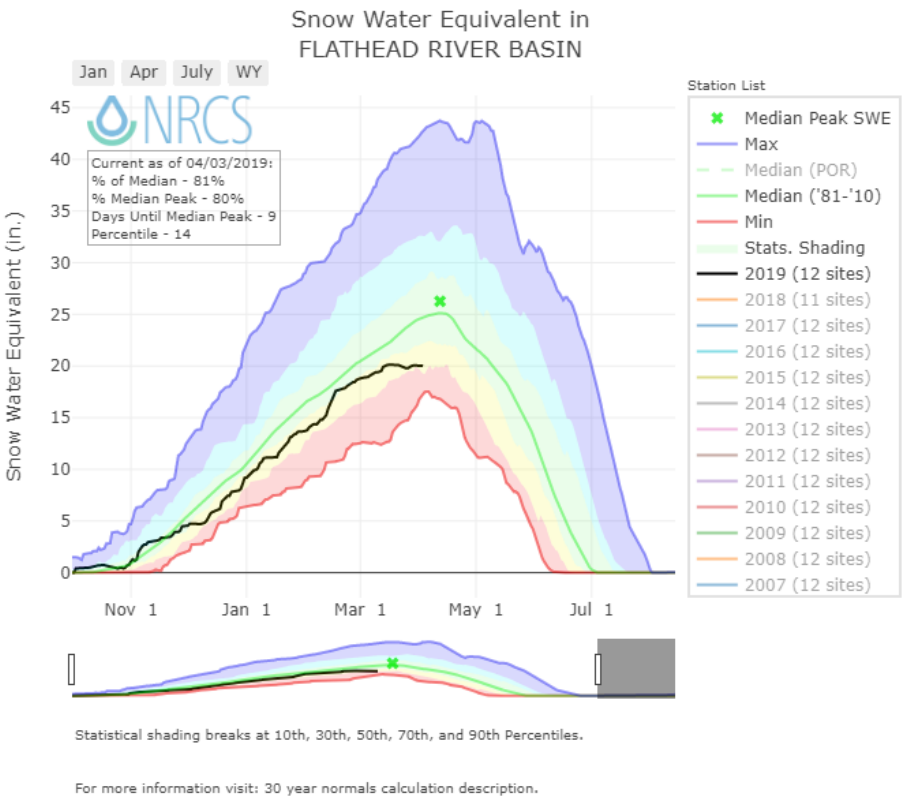
Precipitation	**Monthly Percentage of Average**	**WYTD Percentage of 1981-2010 Average***	**WYTD Last Year Percentage of Average**
Mountain Precipitation	36%	84%	129%
Valley Precipitation	46%	93%	120%
Basin-Wide Precipitation	**36%**	**84%**	**129%**

*Water Year-to-Date (WYTD) Precipitation is October 1st - Current

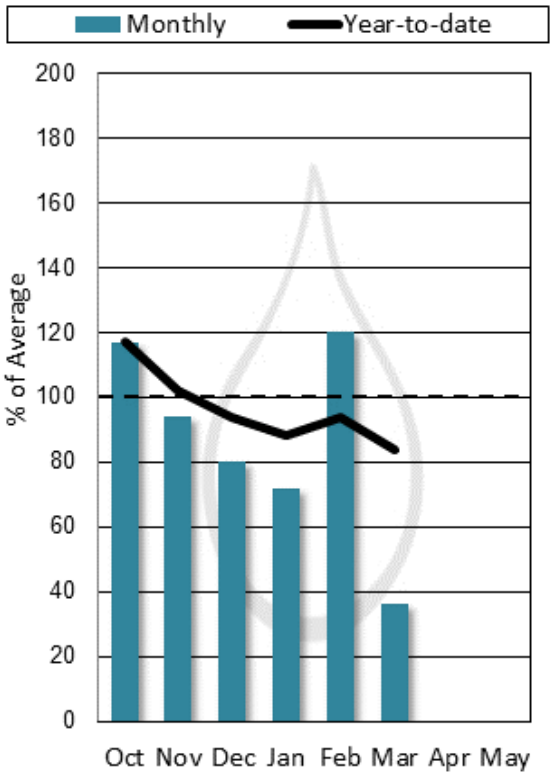
Reservoir Storage	**Percentage of Average**	**Percentage of Capacity (Total)**	**Last Year Percentage of Average**
Basin-Wide Reservoir Storage	118%	64%	105%

**See Reservoir Storage Table for storage in individual reservoirs*

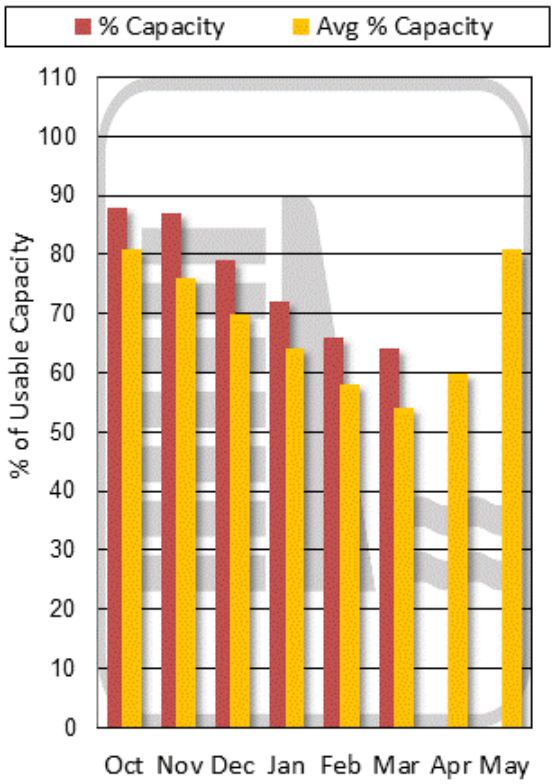
(click on chart below to navigate to online version with additional features)



Mountain and Valley Precipitation



End of Month Reservoir Storage

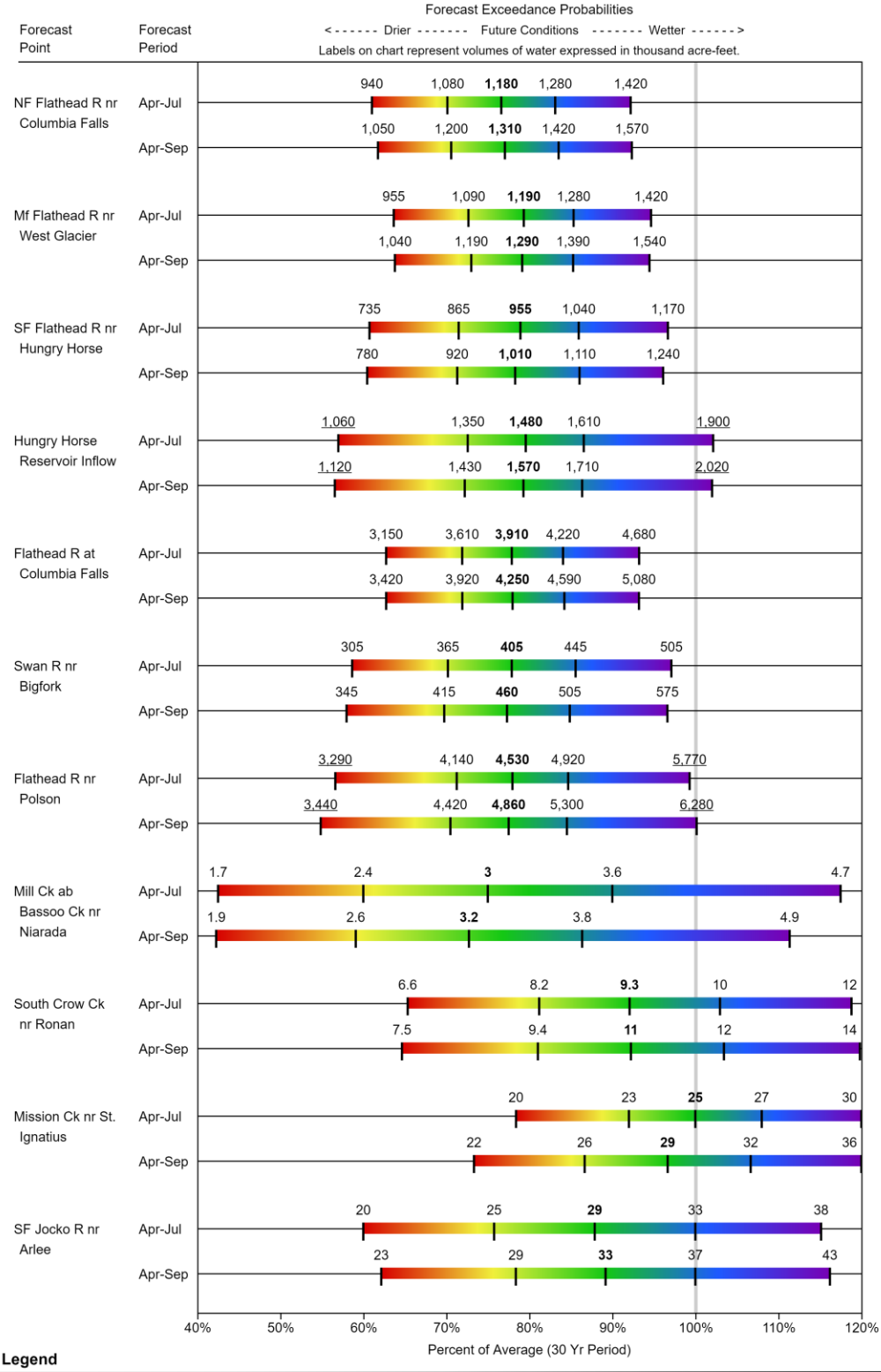


Storage above is averaged for all reservoirs in the basin. For individual reservoirs see table below.

FLATHEAD RIVER BASIN

Water Supply Forecasts

April 1, 2019



Legend

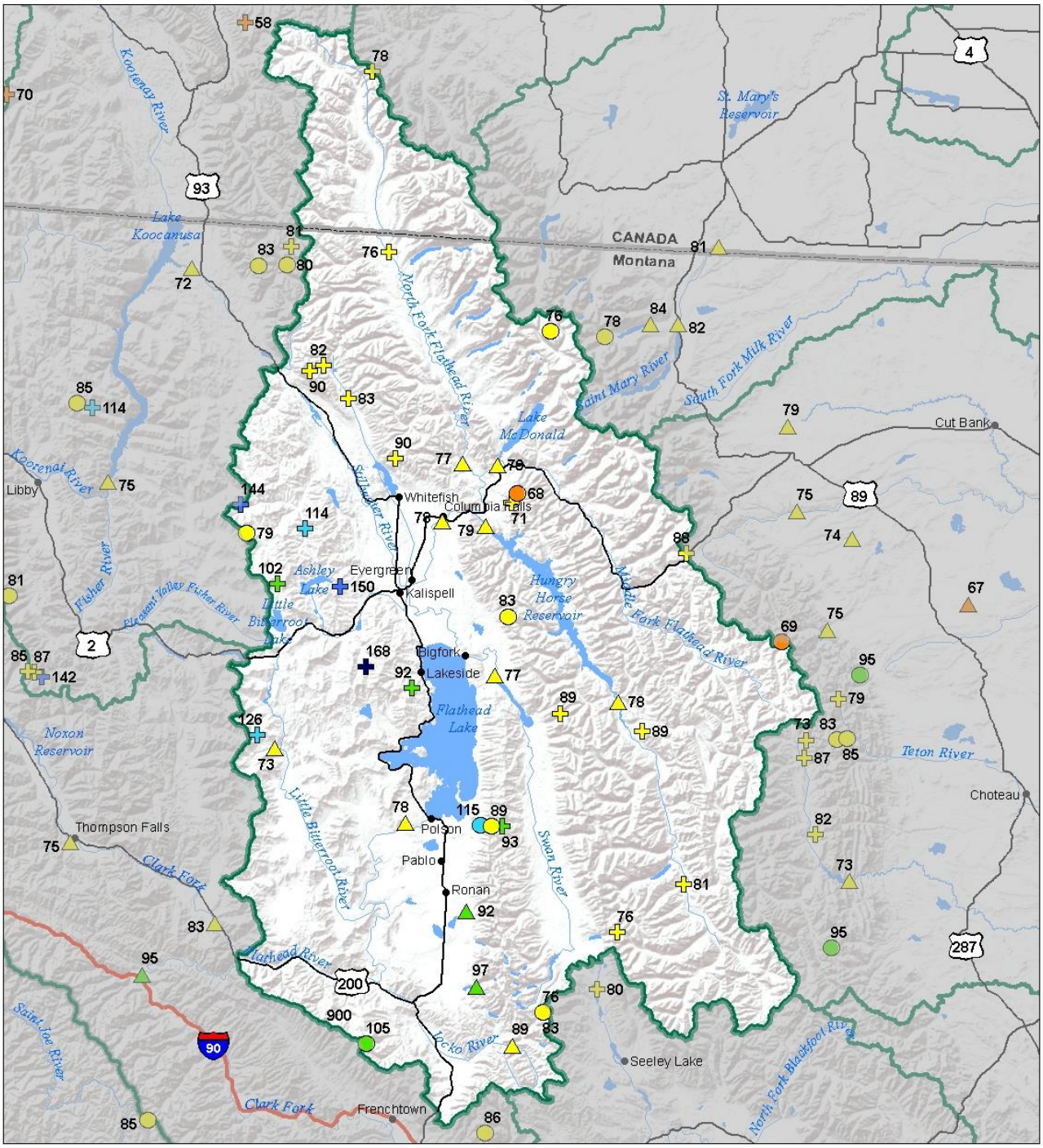
95% or 90% Exceedance	70% Exceedance	**50% Exceedance**	30% Exceedance	10% or 5% Exceedance
There is a 95%/90% chance that flows will exceed this volume	There is a 70% chance that flows will exceed this volume	There is a 50% chance that flows will exceed this volume	There is a 30% chance that flows will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

Flathead River Basin
Streamflow Forecast, Snow Water Equivalent
Percentage of Normal
April 1, 2019



Snow Water Equivalent
Percent of Normal

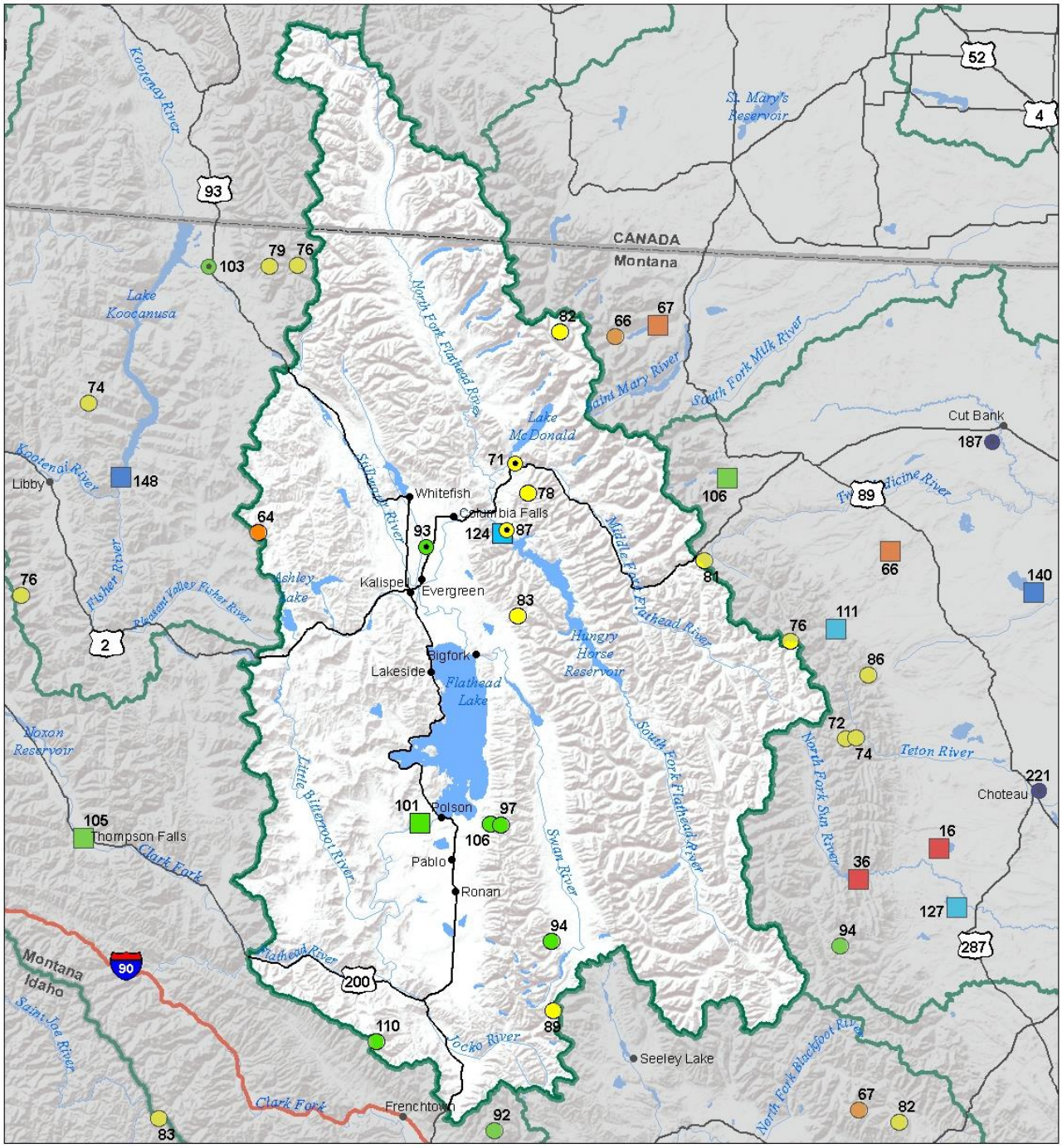
SNOTEL				Snowcourse			
> 150%	71 - 90%			> 150%	71 - 90%		
131 - 150%	51 - 70%			131 - 150%	51 - 70%		
111 - 130%	1 - 50%			111 - 130%	1 - 50%		
91 - 110%	0%			91 - 110%	0%		

Streamflow Forecast
Percent of Average Flows

- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%
- 71 - 90%
- 51 - 70%
- 1 - 50%

USDA
Montana State Library Natural Resource Information System

Flathead River Basin
Water Year to Date Precipitation and Reservoir Levels
Percentage of Normal
April 1, 2019



Precipitation
Percent of Normal

SNOTEL		COOP/ACIS	
> 150%	71 - 90%	> 150%	71 - 90%
131 - 150%	51 - 70%	131 - 150%	51 - 70%
111 - 130%	1 - 50%	111 - 130%	1 - 50%
91 - 110%		91 - 110%	

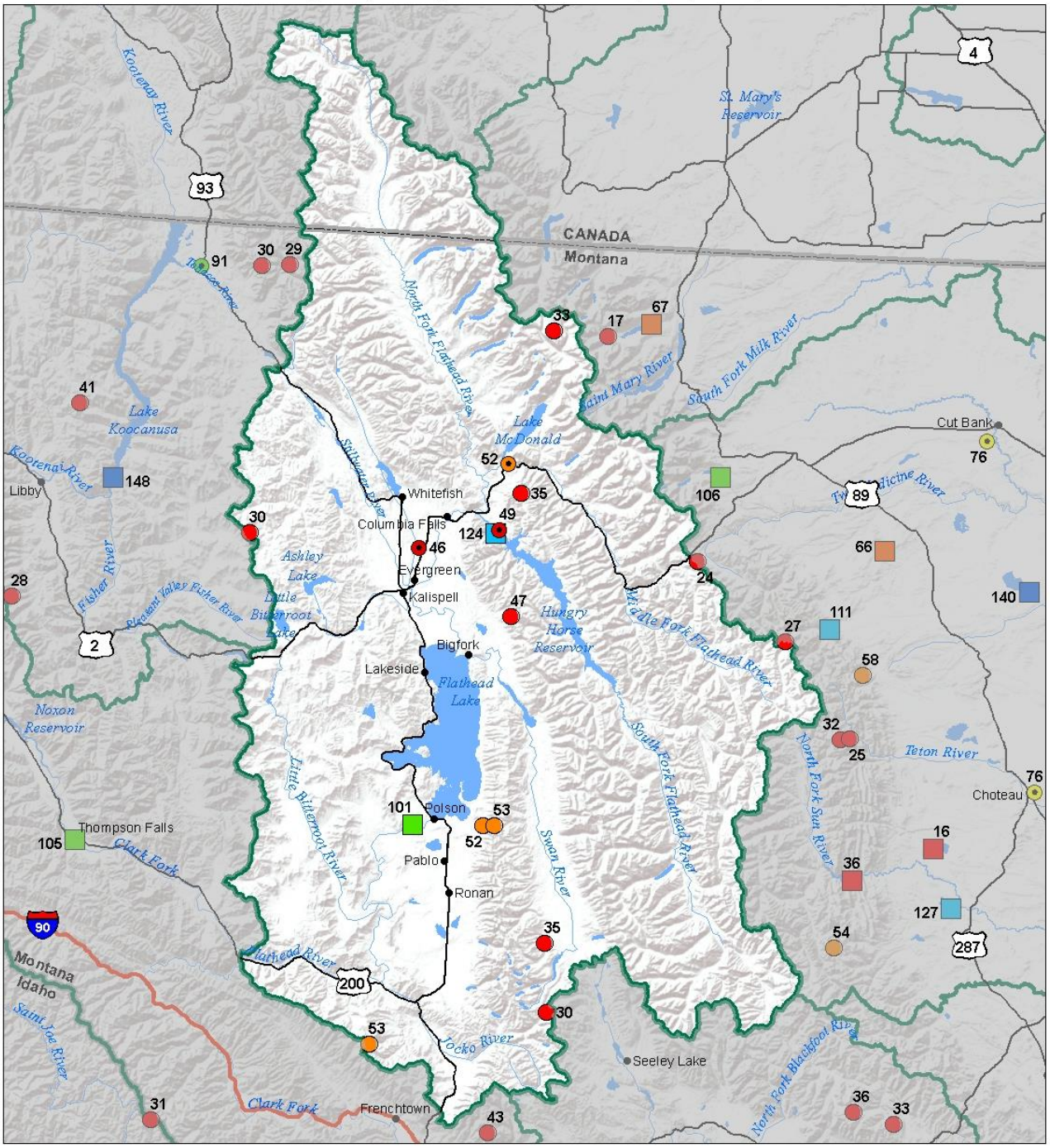
Reservoirs
Percent of Normal

- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%
- 71 - 90%
- 51 - 70%
- 1 - 50%

USDA

Montana State Library Natural Resource Information System

Flathead River Basin
Monthly Precipitation and Reservoir Levels
Percentage of Normal
April 1, 2019 (March 1, 2019 - April 1, 2019)



Precipitation
Percent of Normal

SNOTEL		COOP/ACIS	
> 150%	71 - 90%	> 150%	71 - 90%
131 - 150%	51 - 70%	131 - 150%	51 - 70%
111 - 130%	1 - 50%	111 - 130%	1 - 50%
91 - 110%		91 - 110%	

Reservoirs
Percent of Normal

- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%
- 71 - 90%
- 51 - 70%
- 1 - 50%

USDA

Montana State Library Natural Resource Information System

Upper Clark Fork River Basin

Even though 7 SNOTEL sites just recorded the driest March on record (30 to 40 years) in the Upper Clark Fork River basin, snowpack remains near to above-average in most regions. Boosted by early season and well above normal February snowfall, the mountains feeding Rock Creek, Flint Creek and the Upper Clark have ample snowpack for April 1st. Ranges in the Lower Blackfoot are the only areas where below normal snowpack exists (76% to 86% of normal), but the Upper Blackfoot has snowpack which is near to above normal. Winter is almost over, but historically many locations in the basin continue to receive late season snowfall. Most low-elevation snowpack monitoring locations peak in early April, while higher elevations peak in the middle to latter part of the month. Many sites in the Upper Clark above the Blackfoot have already reached or exceeded the average seasonal peak snowpack, so the snowmelt component of water supply is in good shape in these locations. In areas feeding the Blackfoot, this year's peak is still below average. Spring can yield significant precipitation, so hopefully the pattern breaks and we can reach a normal peak in all areas before runoff begins. Streamflow forecasts for the April 1st – July 31st time-period are near to slightly above average across the basin but vary depending on the river of interest. Please consult the forecast graphic below. Spring can be make or break it in the Upper Clark, and the next month should determine the extent of our water resources in the coming months.

Upper Clark Fork River Basin Data Summary

Snowpack	**Percent of 1981-2010 Normal (Median)**	**Last Year Percentage of Normal (Median)**
CLARK FORK ab FLINT CREEK	107%	154%
FLINT CREEK	120%	160%
ROCK CREEK	99%	146%
CLARK FORK ab BLACKFOOT	108%	153%
BLACKFOOT	99%	161%
Basin-Wide Snowpack	**105%**	**156%**

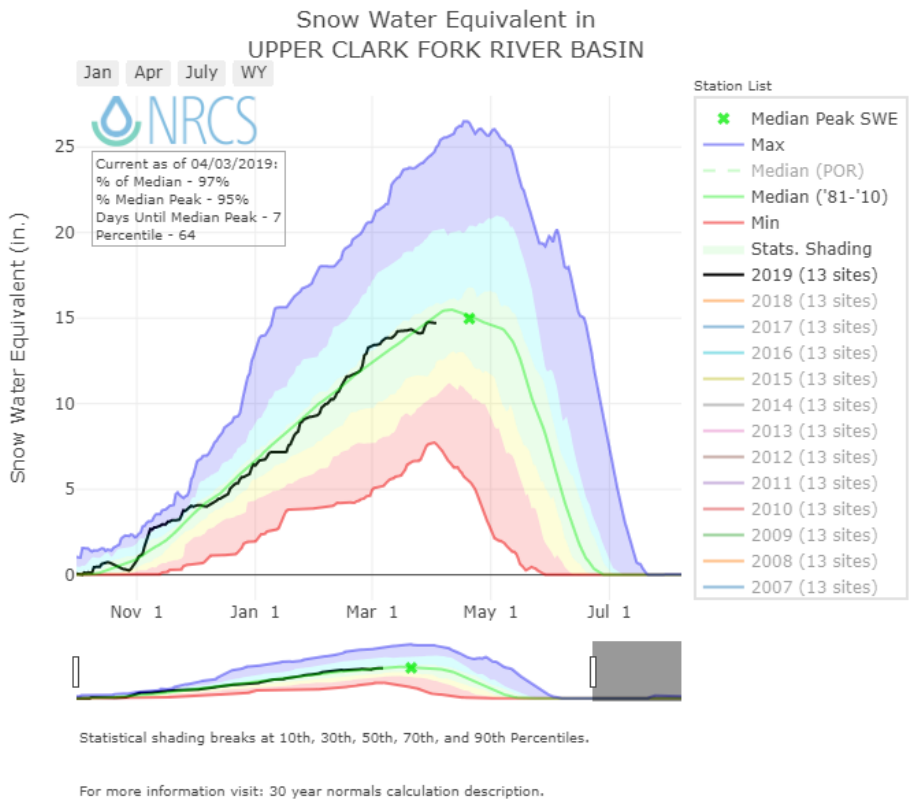
Precipitation	**Monthly Percentage of Average**	**WYTD Percentage of 1981-2010 Average***	**WYTD Last Year Percentage of Average**
Mountain Precipitation	48%	95%	131%
Valley Precipitation	40%	77%	165%
Basin-Wide Precipitation	**47%**	**94%**	**132%**

*Water Year-to-Date (WYTD) Precipitation is October 1st - Current

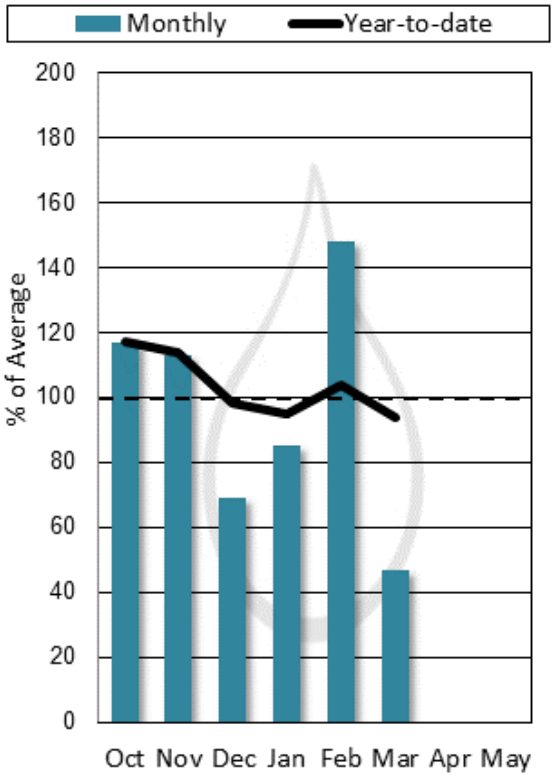
Reservoir Storage	**Percentage of Average**	**Percentage of Capacity (Total)**	**Last Year Percentage of Average**
Basin-Wide Storage	**102%**	**77%**	**100%**

**See Reservoir Storage Table for storage in individual reservoirs*

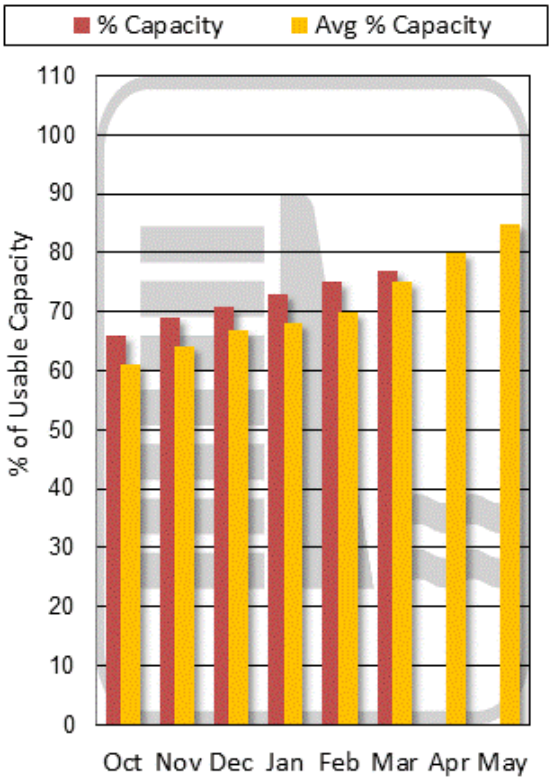
(click on chart below to navigate to online version with additional features)



Mountain and Valley Precipitation



End of Month Reservoir Storage



Storage above is averaged for all reservoirs in the basin. For individual reservoirs see table below.

UPPER CLARK FORK RIVER BASIN

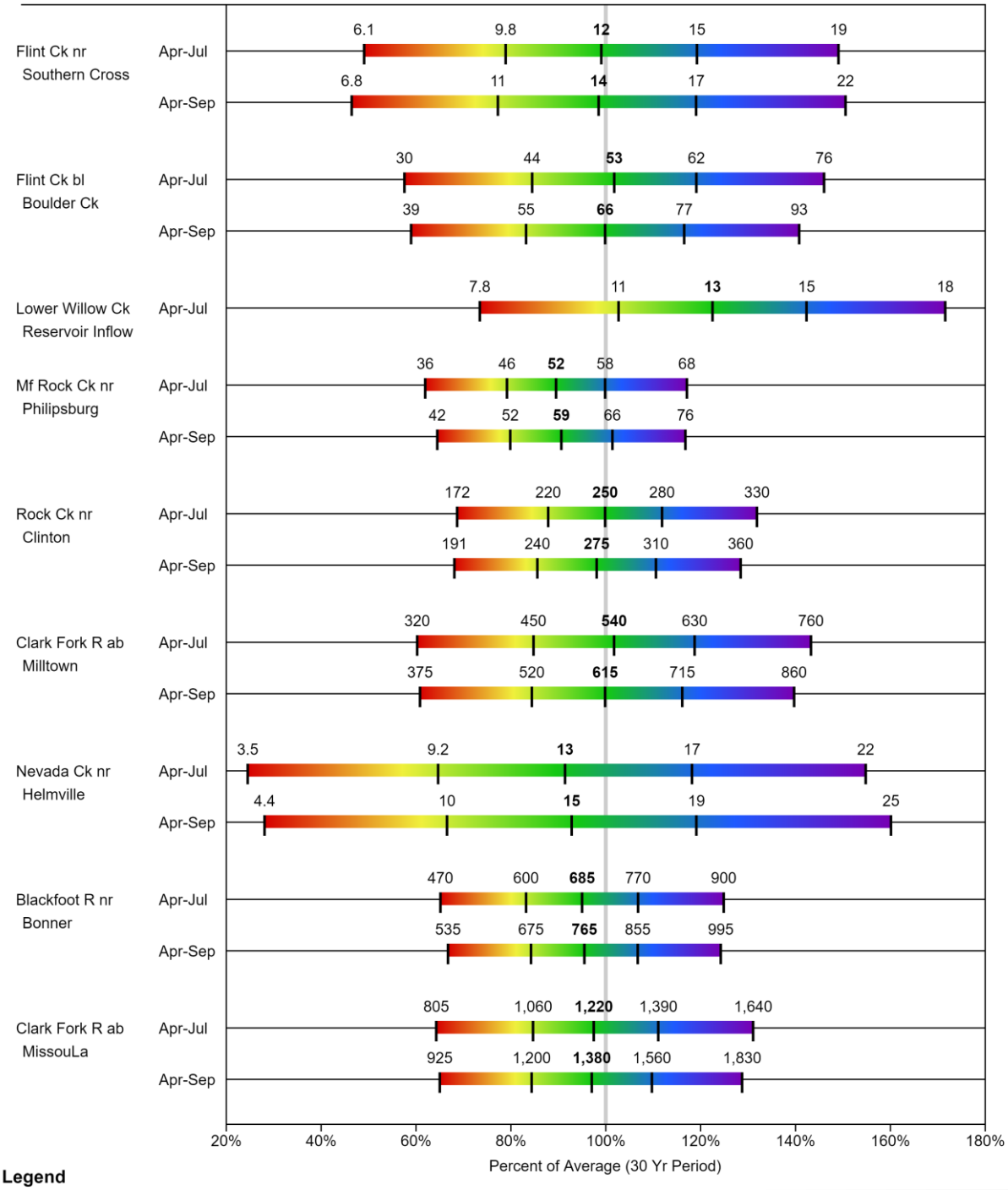
Water Supply Forecasts

April 1, 2019

Forecast Exceedance Probabilities

< - - - - - - Drier - - - - - - - Future Conditions - - - - - - - Wetter - - - - - - >

Labels on chart represent volumes of water expressed in thousand acre-feet.



Legend

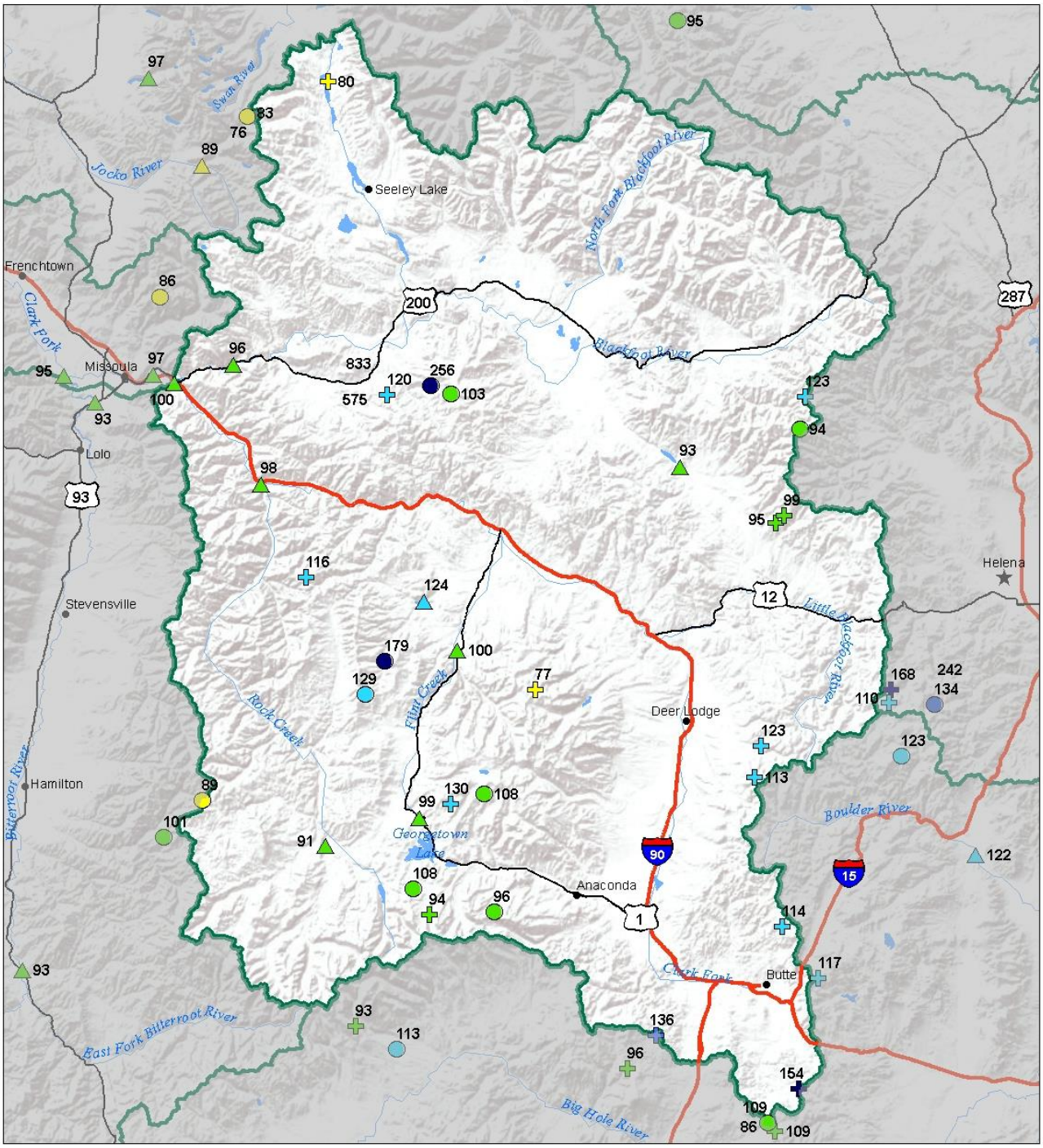
95% or 90% Exceedance	70% Exceedance	**50% Exceedance**	30% Exceedance	10% or 5% Exceedance
There is a 95%/90% chance that flows will exceed this volume	There is a 70% chance that flows will exceed this volume	There is a 50% chance that flows will exceed this volume	There is a 30% chance that flows will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

Upper Clark Fork River Basin
Streamflow Forecast, Snow Water Equivalent
Percentage of Normal
April 1, 2019



Snow Water Equivalent
Percent of Normal

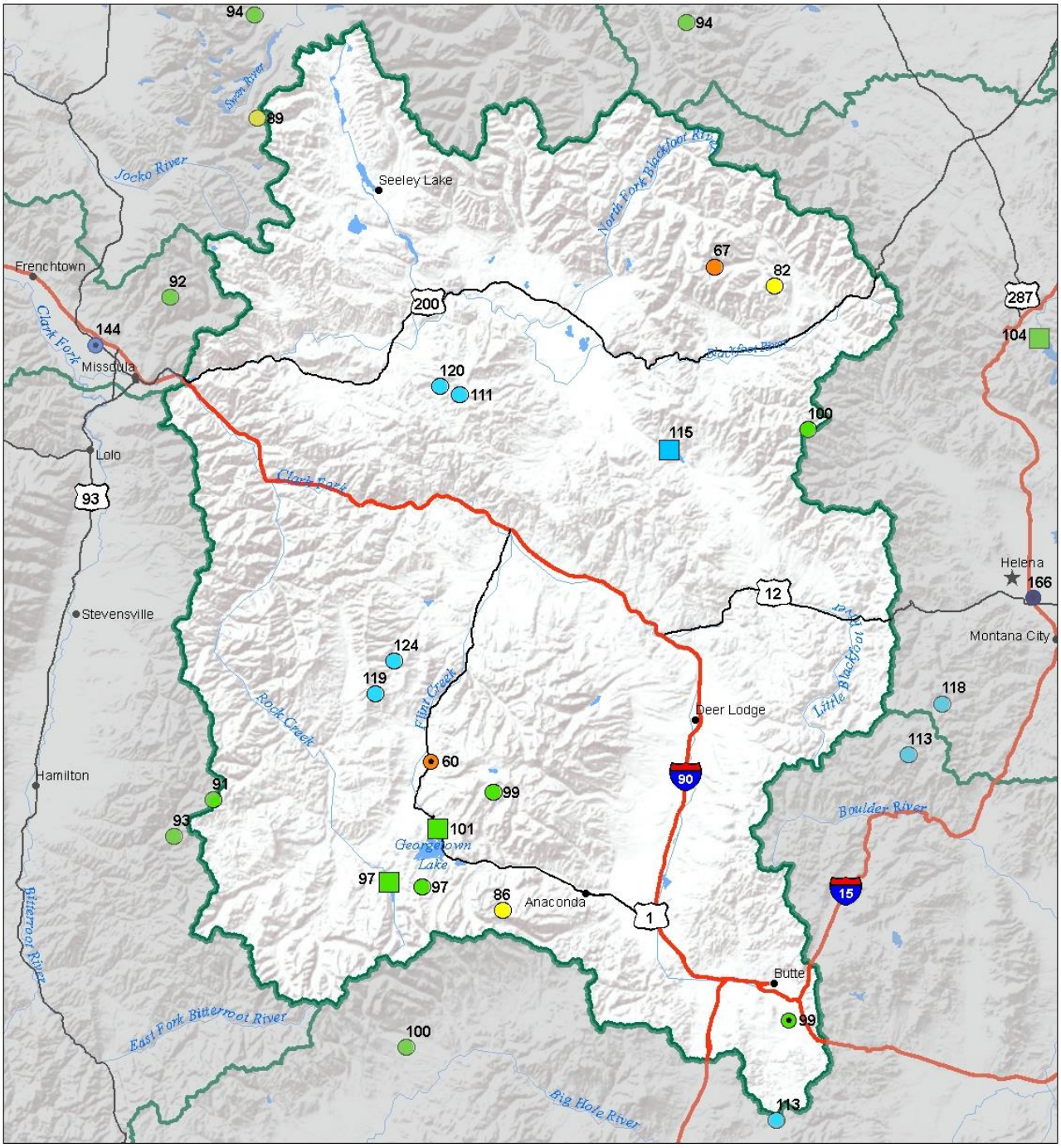
SNOTEL		Snowcourse	
> 150%	71 - 90%	> 150%	71 - 90%
131 - 150%	51 - 70%	131 - 150%	51 - 70%
111 - 130%	1 - 50%	111 - 130%	1 - 50%
91 - 110%	0%	91 - 110%	0%

Streamflow Forecast
Percent of Average Flows

- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%
- 71 - 90%
- 51 - 70%
- 1 - 50%

USDA
Montana State Library Natural Resource Information System

Upper Clark Fork River Basin
Water Year to Date Precipitation and Reservoir Levels
Percentage of Normal
April 1, 2019



Precipitation
Percent of Normal

SNOTEL
- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%
- 71 - 90%
- 51 - 70%
- 1 - 50%

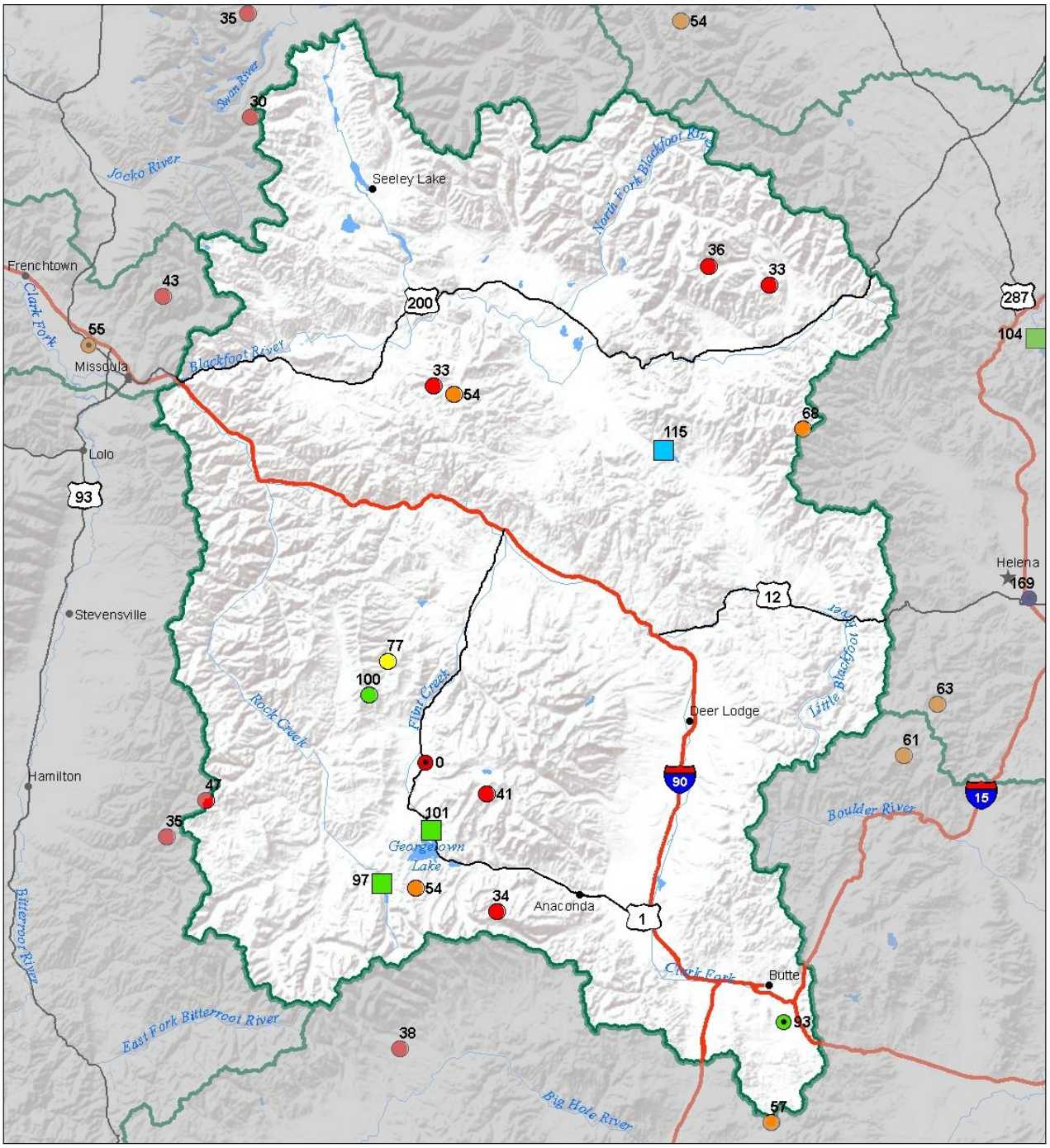
COOP/ACIS
- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%
- 71 - 90%
- 51 - 70%
- 1 - 50%

Reservoirs
Percent of Normal
- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%
- 71 - 90%
- 51 - 70%
- 1 - 50%

USDA

Montana State Library Natural Resource Information System

Upper Clark Fork River Basin
Monthly Precipitation and Reservoir Levels
Percentage of Normal
April 1, 2019 (March 1, 2019 - April 1, 2019)



Precipitation
Percent of Normal

SNOTEL		COOP/ACIS	
> 150%	71 - 90%	> 150%	71 - 90%
131 - 150%	51 - 70%	131 - 150%	51 - 70%
111 - 130%	1 - 50%	111 - 130%	1 - 50%
91 - 110%		91 - 110%	

Reservoirs
Percent of Normal

- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%
- 71 - 90%
- 51 - 70%
- 1 - 50%

USDA

Montana State Library Natural Resource Information System

Bitterroot River Basin

If you live in the Bitterroot Valley and wanted a break from the abundant February snowfall, you got what you wanted this month. March was extremely dry across the Bitterroot River basin, and all but one SNOTEL site reported the lowest, or second lowest, March precipitation totals on record. So where does that leave the mountain snowpack? Fortunately, the region benefitted from the early winter and February snowfall. As of April 1st, snowpack measurements ranged from slightly above normal in the western Bitterroot Range, near to slightly below normal in the Sapphire Range and the southern Bitterroots. This is good news considering how dry March was, but the bad news is that streamflow prospects have dropped during the month. Streamflow forecasts in the Bitterroot River basin for the April 1st – July 31st time-period are down from last month and are near to slightly below average. Snowpack typically peaks during the month of April, so there is still time to put additional water into the mountain snowpack reservoir. After this winter's crazy swings in weather, a few months of "normal" would do just nicely.

Bitterroot River Basin Data Summary

Snowpack	**Percent of 1981-2010 Normal (Median)**	**Last Year Percentage of Normal (Median)**
WEST FORK BITTERROOT	92%	134%
EAST SIDE BITTERROOT	92%	143%
WEST SIDE BITTERROOT	103%	131%
Basin-Wide Snowpack	**98%**	**134%**

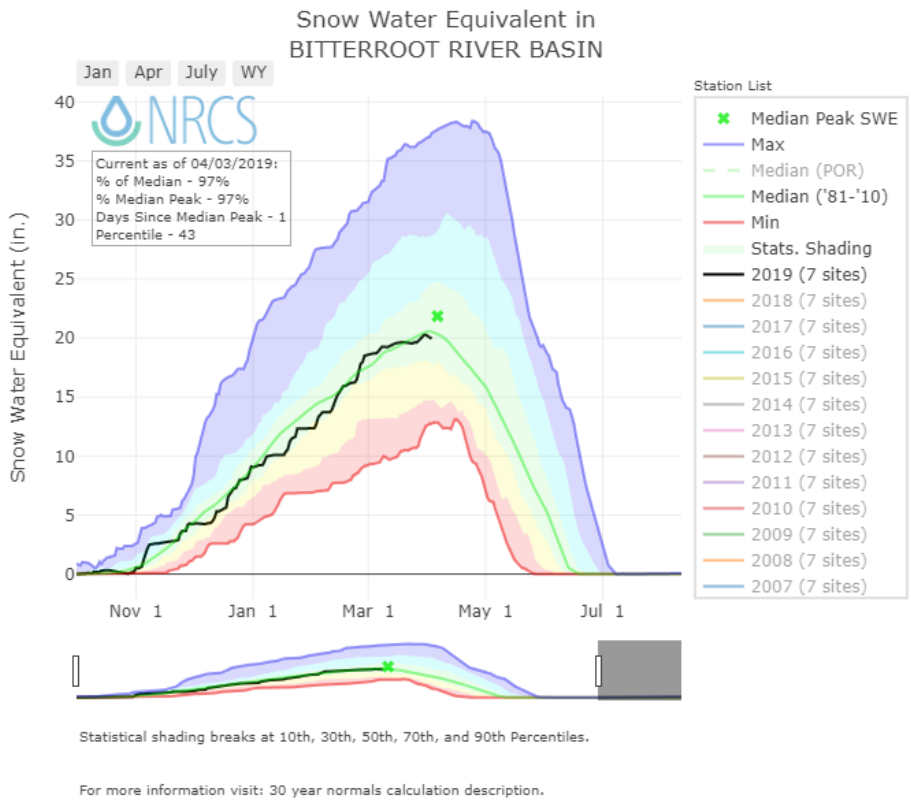
Precipitation	**Monthly Percentage of Average**	**WYTD Percentage of 1981-2010 Average***	**WYTD Last Year Percentage of Average**
Mountain Precipitation	43%	95%	119%
Valley Precipitation	%	%	%
Basin-Wide Precipitation	**43%**	**95%**	**119%**

*Water Year-to-Date (WYTD) Precipitation is October 1st - Current

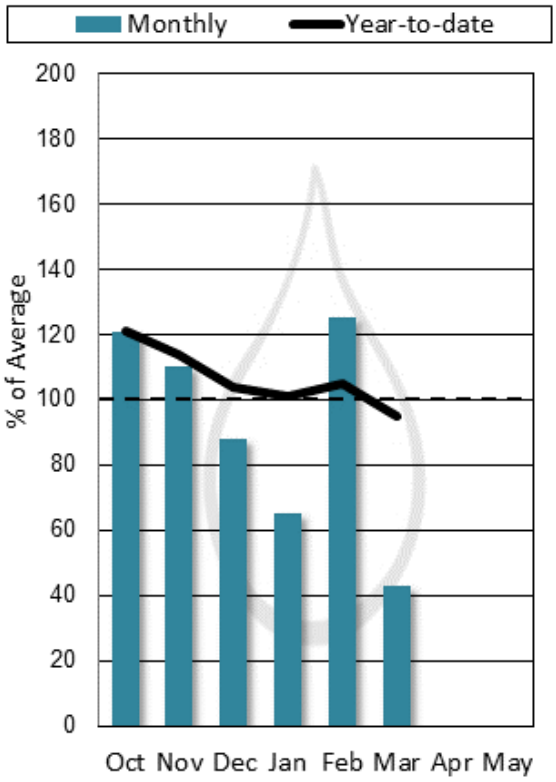
	Percentage of Average	**Percentage of Capacity (Total)**	**Last Year Percentage of Average**
Basin-Wide Storage	**94%**	**34%**	**144%**

**See Reservoir Storage Table for storage in individual reservoirs*

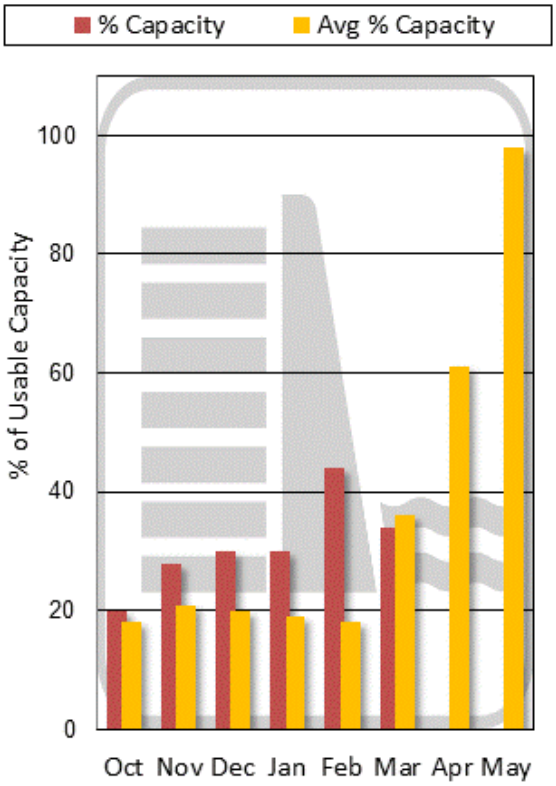
(click on chart below to navigate to [online version]() with additional features)



Mountain and Valley Precipitation



End of Month Reservoir Storage

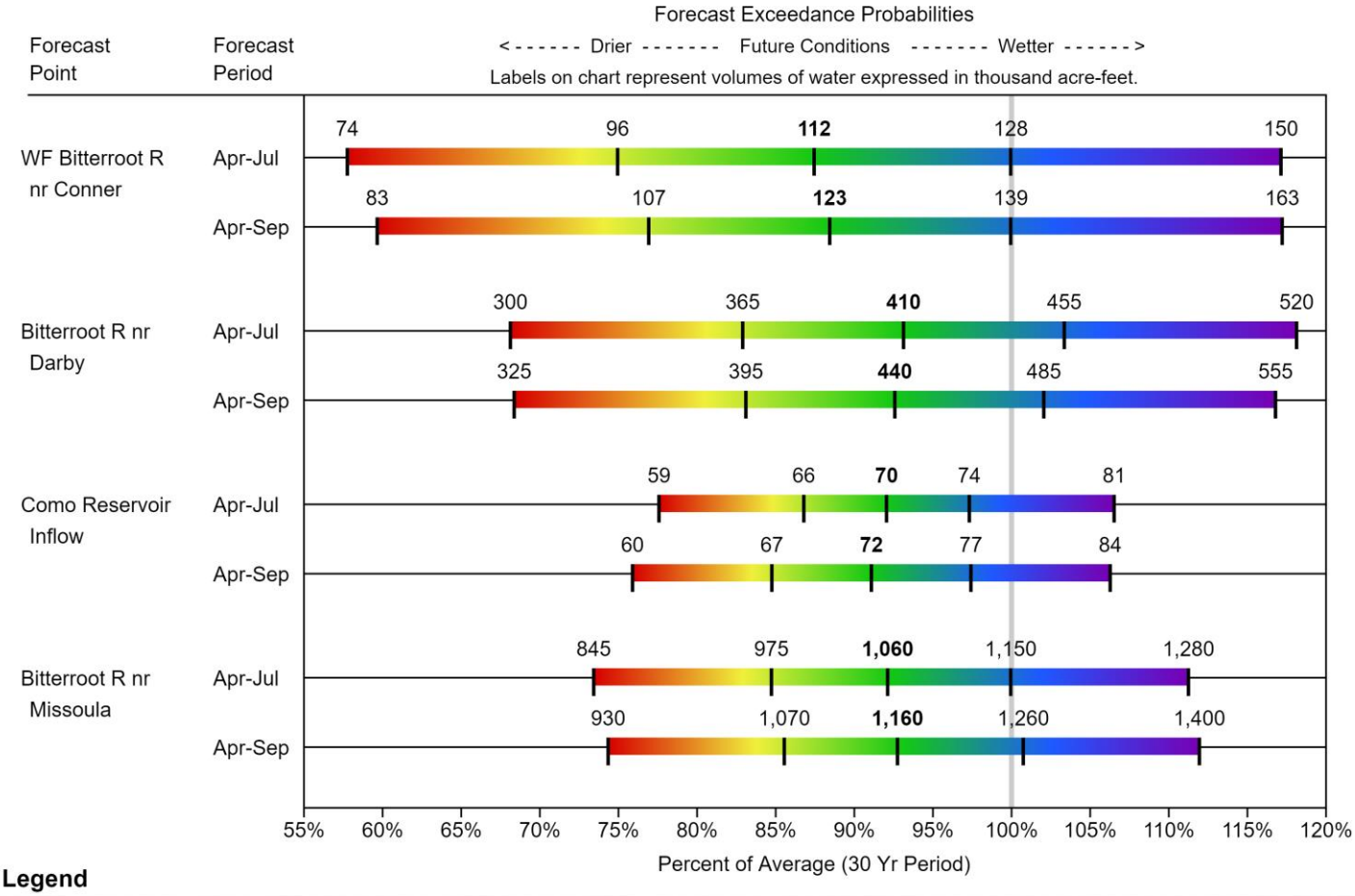


Storage above is averaged for all reservoirs in the basin. For individual reservoirs see table below.

BITTERROOT RIVER BASIN

Water Supply Forecasts

April 1, 2019



Legend

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

Period of Record Minimum Streamflow KAF (Year)

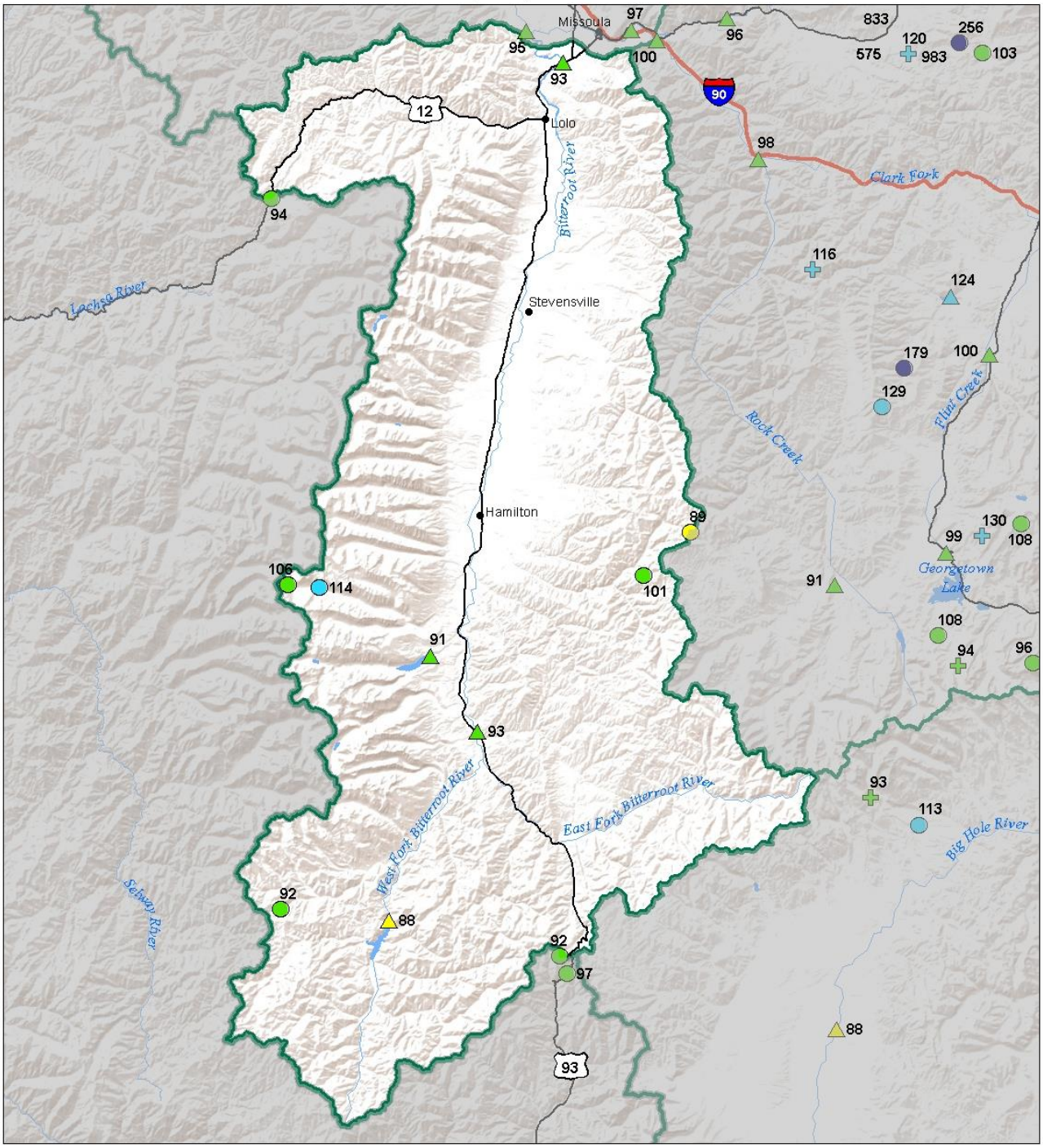
1981-2010 Normal Streamflow KAF

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.

Bitterroot River Basin
Streamflow Forecast, Snow Water Equivalent
Percentage of Normal
April 1, 2019



Snow Water Equivalent
Percent of Normal

SNOTEL		Snowcourse	
> 150%	71 - 90%	> 150%	71 - 90%
131 - 150%	51 - 70%	131 - 150%	51 - 70%
111 - 130%	1 - 50%	111 - 130%	1 - 50%
91 - 110%	0%	91 - 110%	0%

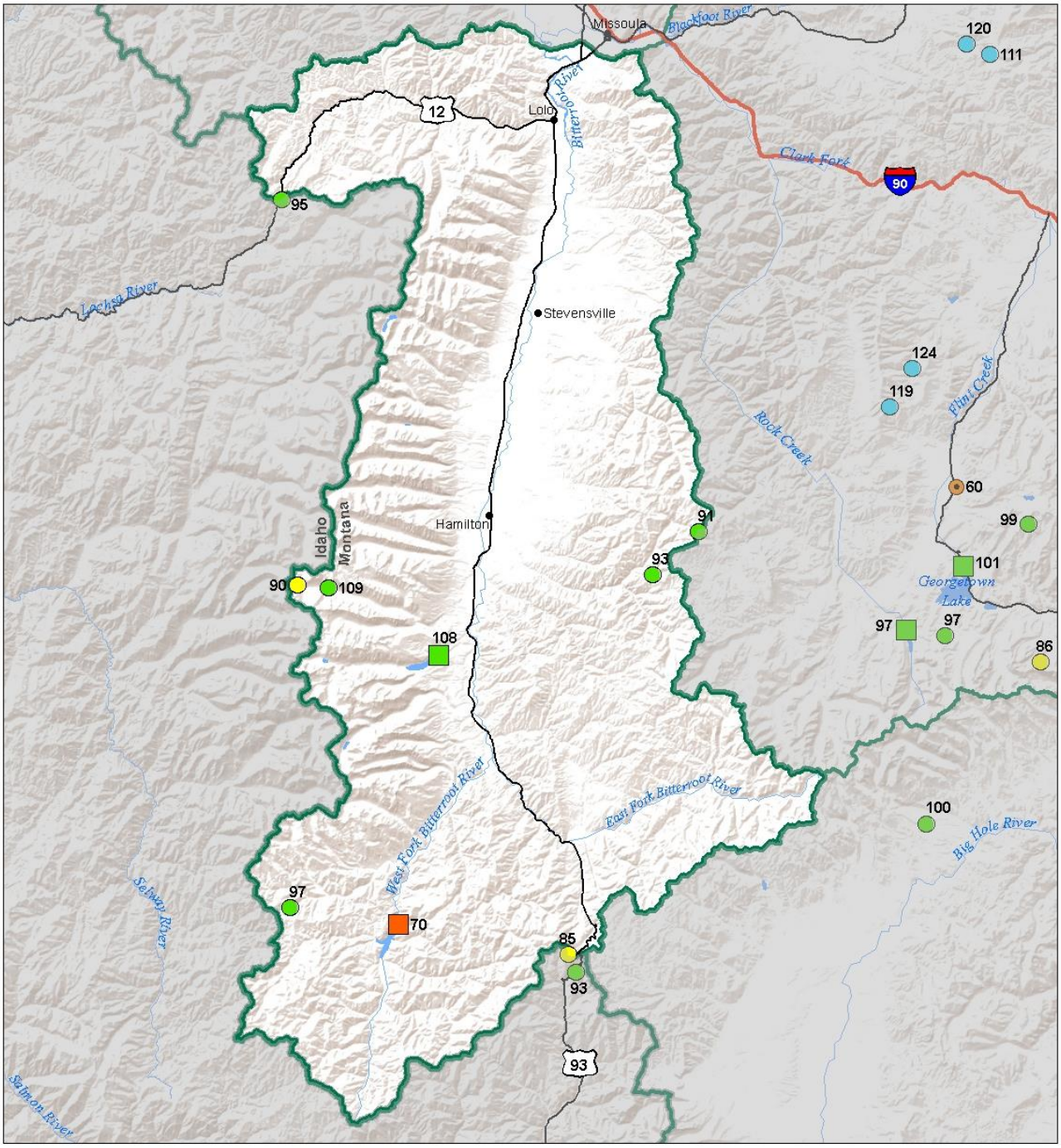
Streamflow Forecast
Percent of Average Flows

- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%
- 71 - 90%
- 51 - 70%
- 1 - 50%

USDA

Montana State Library Natural Resource Information System

Bitterroot River Basin
Water Year to Date Precipitation and Reservoir Levels
Percentage of Normal
April 1, 2019



Precipitation
Percent of Normal

SNOTEL		COOP/ACIS	
> 150%	71 - 90%	> 150%	71 - 90%
131 - 150%	51 - 70%	131 - 150%	51 - 70%
111 - 130%	1 - 50%	111 - 130%	1 - 50%
91 - 110%		91 - 110%	

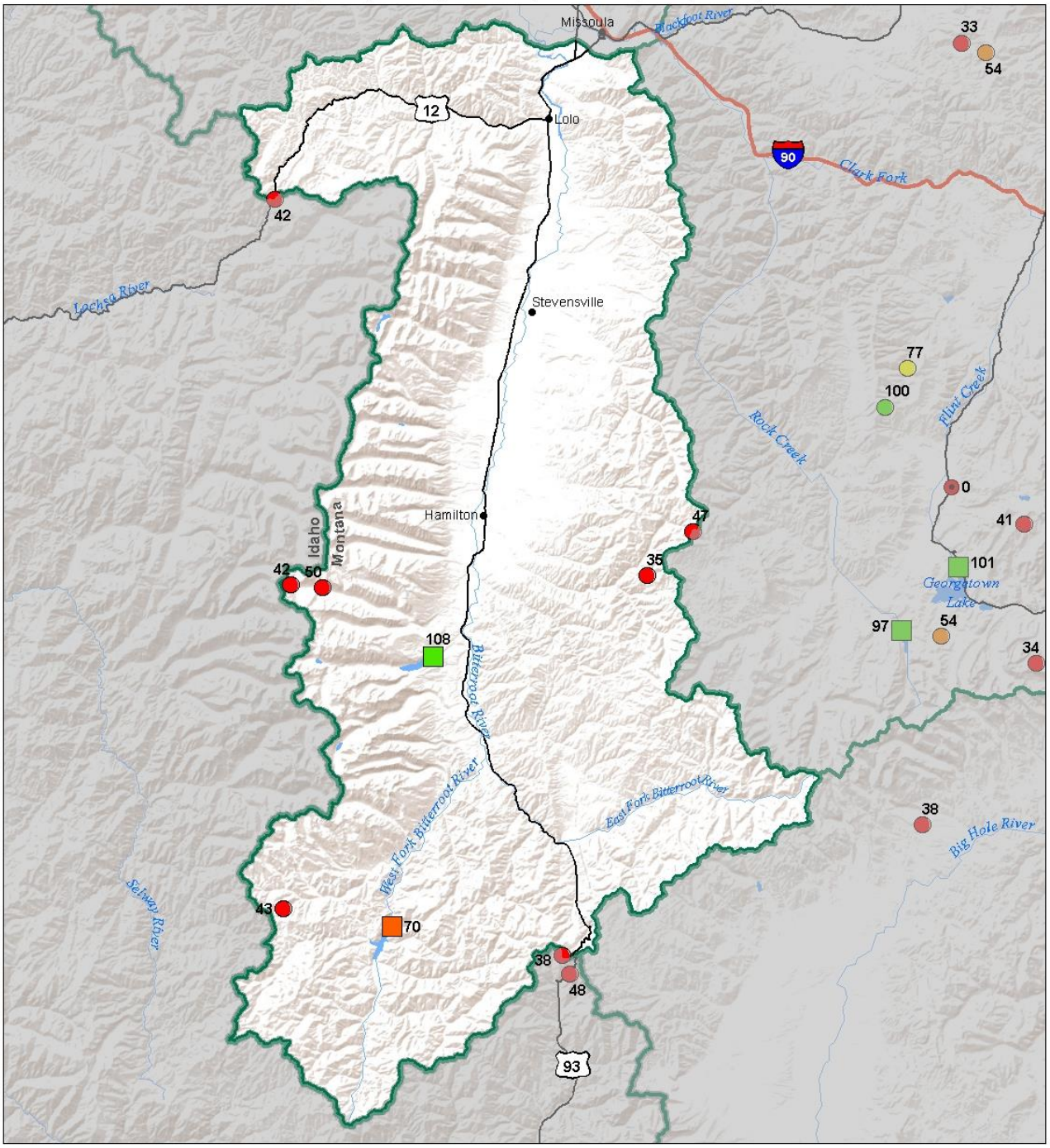
Reservoirs
Percent of Normal

- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%
- 71 - 90%
- 51 - 70%
- 1 - 50%

USDA

Montana State Library Natural Resource Information System

Bitterroot River Basin
Monthly Precipitation and Reservoir Levels
Percentage of Normal
April 1, 2019 (March 1, 2019 - April 1, 2019)



Precipitation
Percent of Normal

SNOTEL
- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%
- 71 - 90%
- 51 - 70%
- 1 - 50%

COOP/ACIS
- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%
- 71 - 90%
- 51 - 70%
- 1 - 50%

Reservoirs
Percent of Normal
- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%
- 71 - 90%
- 51 - 70%
- 1 - 50%

USDA

Montana State Library Natural Resource Information System

Lower Clark Fork River Basin

Many were ready for a change in weather after the month of February, and it sure changed quickly. March was extremely dry and all SNOTEL sites used to gauge the snowpack and mountain precipitation were second lowest, or lowest on record for March monthly precipitation totals. Basin-wide precipitation totals were only 35% of average. Due to the lack of snowfall during the month, snowpack percentages have dropped since March 1st and range from near normal in the mountains surrounding Missoula to below normal as you move downstream into the northern Bitterroot and Cabinet Ranges. It is in these areas where there is the biggest concern regarding water resources this spring and summer. Smaller streams could face shortages later this summer due to the lack of snowpack and water year precipitation. Streamflow forecasts issued for the April 1st – July 31st period indicate only slightly below average volumes on the mainstem rivers due to the near to above normal snowpack in the mountains which feed the rivers upstream. The next month or two will dictate the timing and magnitude of snowmelt runoff and streamflows, and water users are encouraged to read the May 1st report to find out how conditions have changed during April.

Lower Clark For River Basin Data Summary

Snowpack	**Percent of 1981-2010 Normal (Median)**	**Last Year Percentage of Normal (Median)**
LOWER CLARK FORK RIVER BASIN	94%	124%
Basin-Wide	**94%**	**124%**

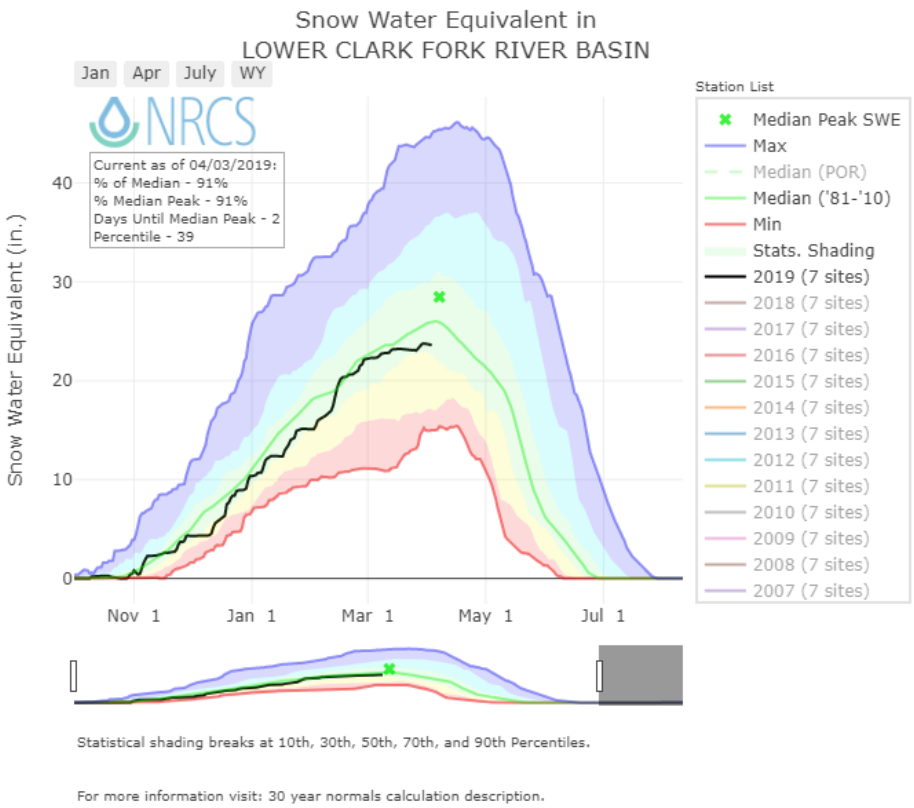
Precipitation	**Monthly Percentage of Average**	**WYTD Percentage of 1981-2010 Average***	**WYTD Last Year Percentage of Average**
Mountain Precipitation	35%	84%	115%
Valley Precipitation	55%	144%	126%
Basin-Wide Precipitation	**35%**	**85%**	**115%**

*Water Year-to-Date (WYTD) Precipitation is October 1st - Current

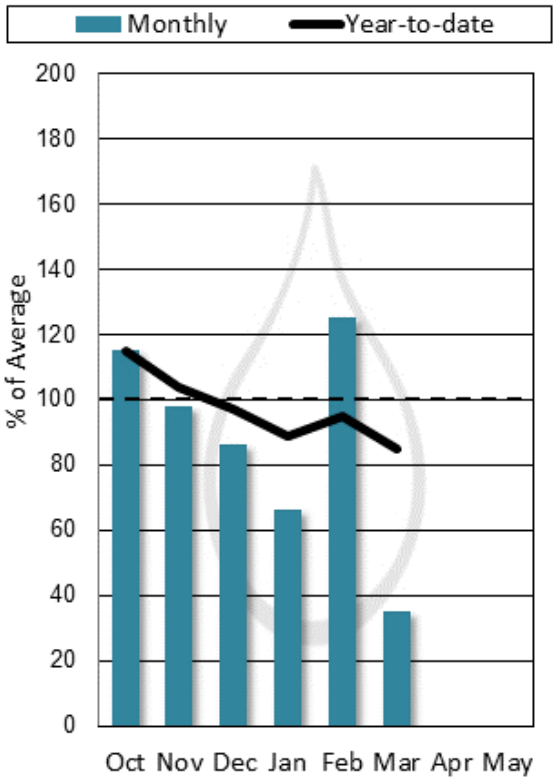
Reservoir Storage	**Percentage of Average**	**Percentage of Capacity (Total)**	**Last Year Percentage of Average**
Basin-Wide Storage	**104%**	**97%**	**100%**

**See Reservoir Storage Table for storage in individual reservoirs*

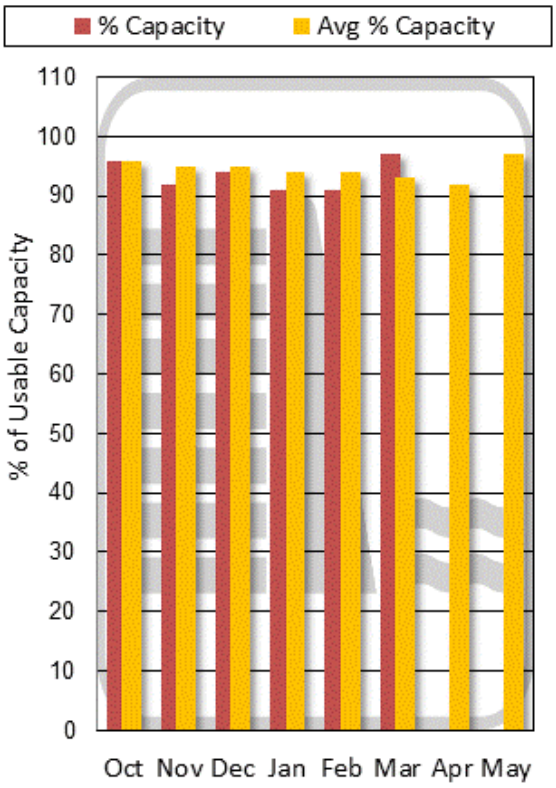
(click on chart below to navigate to online version with additional features)



Mountain and Valley Precipitation



End of Month Reservoir Storage

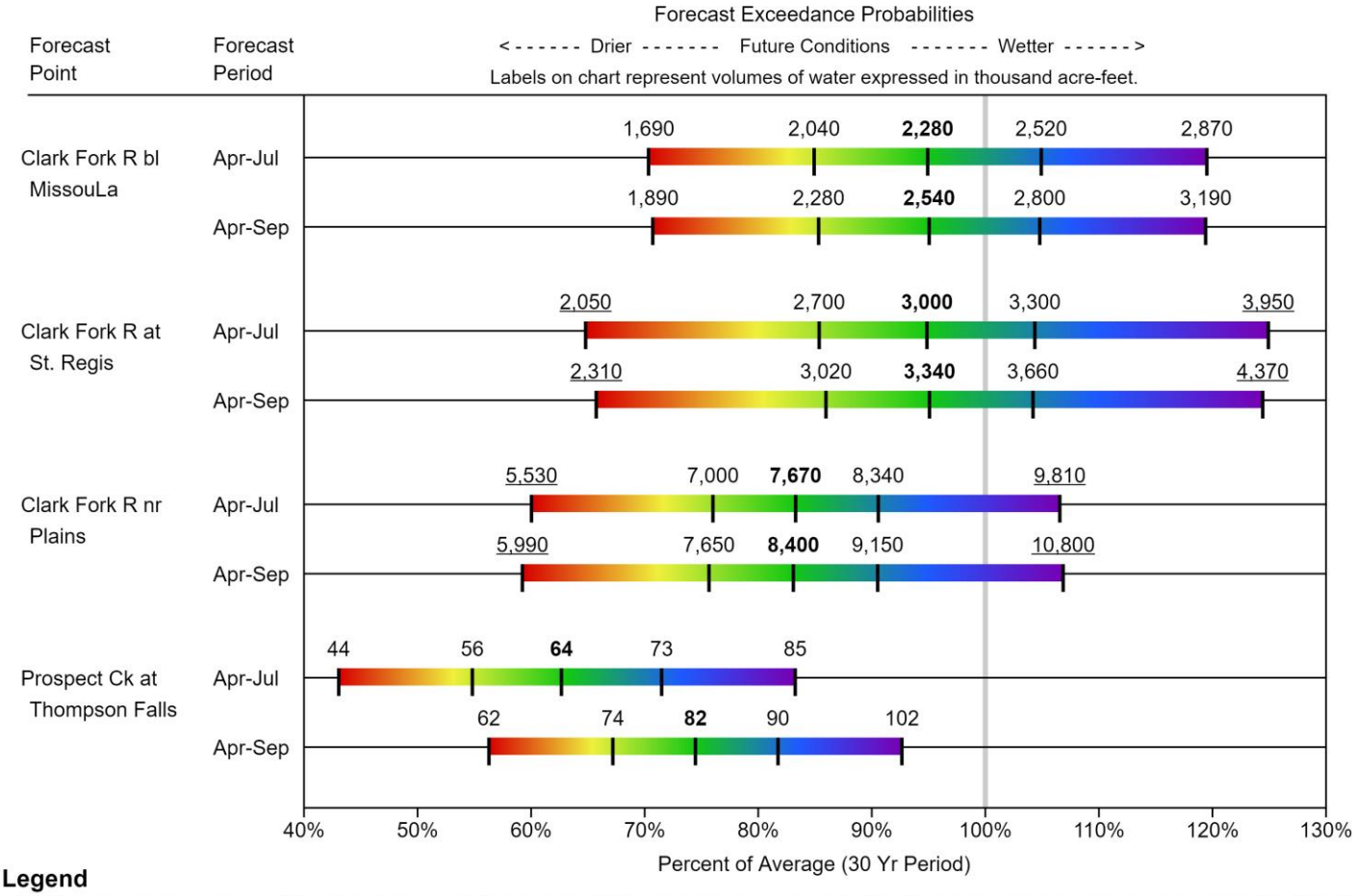


Storage above is averaged for all reservoirs in the basin. For individual reservoirs see table below.

LOWER CLARK FORK RIVER BASIN

Water Supply Forecasts

April 1, 2019



Legend

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

Period of Record Minimum Streamflow KAF (Year)

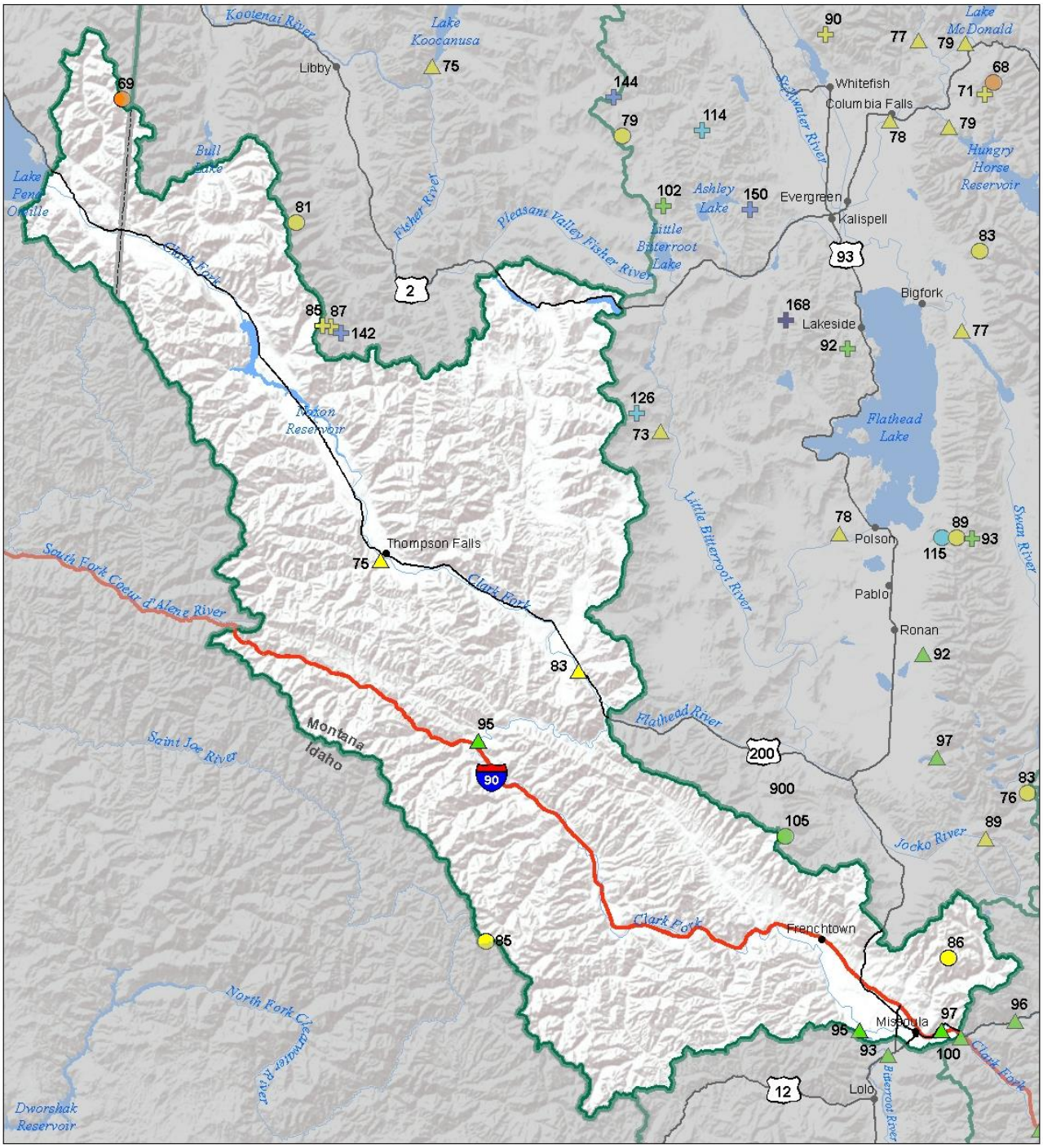
1981-2010 Normal Streamflow KAF

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.

Lower Clark Fork River Basin
Streamflow Forecast, Snow Water Equivalent
Percentage of Normal
April 1, 2019



Snow Water Equivalent
Percent of Normal

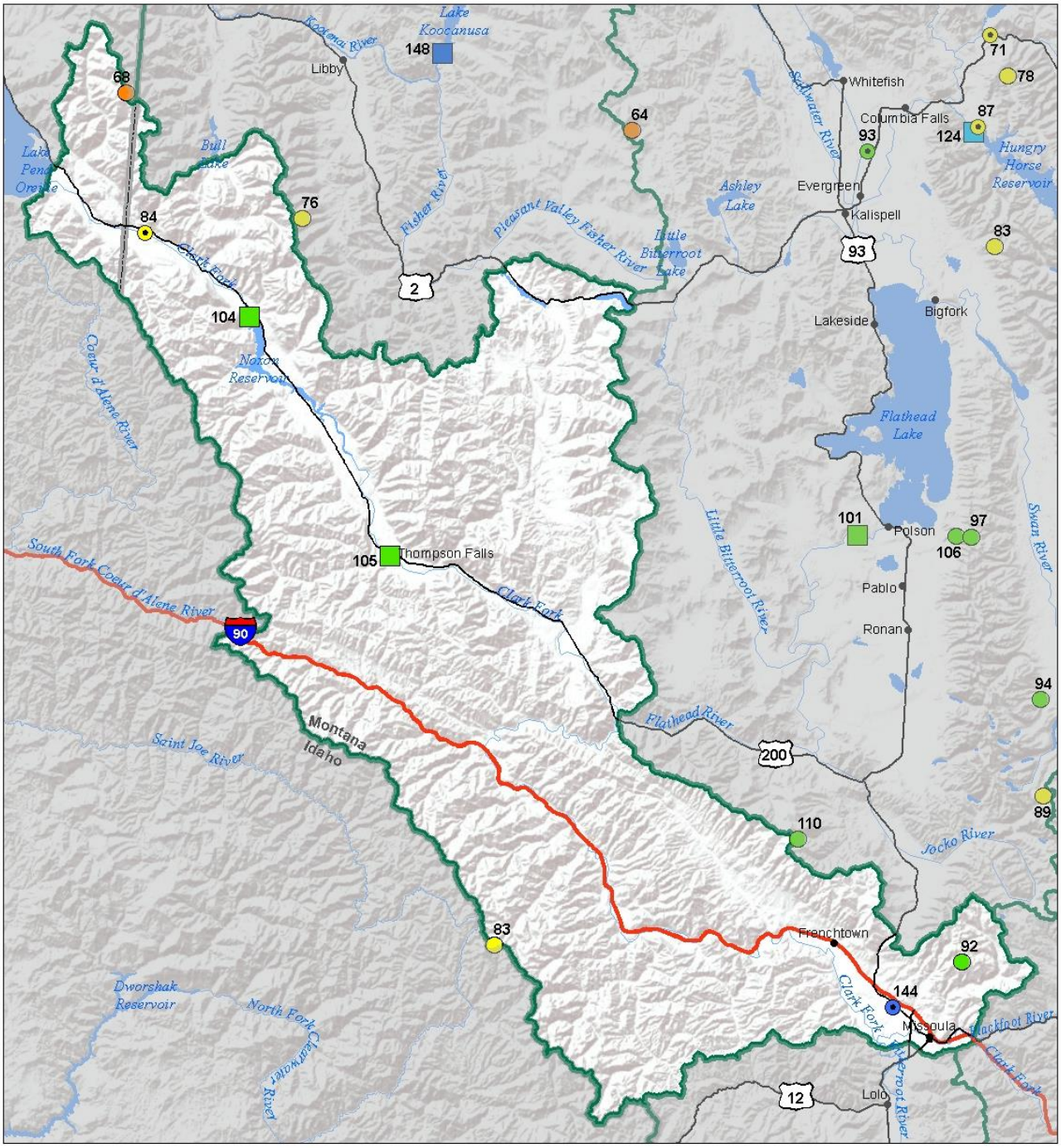
SNOTEL		Snowcourse	
> 150%	71 - 90%	> 150%	71 - 90%
131 - 150%	51 - 70%	131 - 150%	51 - 70%
111 - 130%	1 - 50%	111 - 130%	1 - 50%
91 - 110%	0%	91 - 110%	0%

Streamflow Forecast
Percent of Average Flows

- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%
- 71 - 90%
- 51 - 70%
- 1 - 50%

USDA
Montana State Library Natural Resource Information System

Lower Clark Fork River Basin
Water Year to Date Precipitation and Reservoir Levels
Percentage of Normal
April 1, 2019



Precipitation
Percent of Normal

SNOTEL		COOP/ACIS	
> 150%	71 - 90%	> 150%	71 - 90%
131 - 150%	51 - 70%	131 - 150%	51 - 70%
111 - 130%	1 - 50%	111 - 130%	1 - 50%
91 - 110%		91 - 110%	

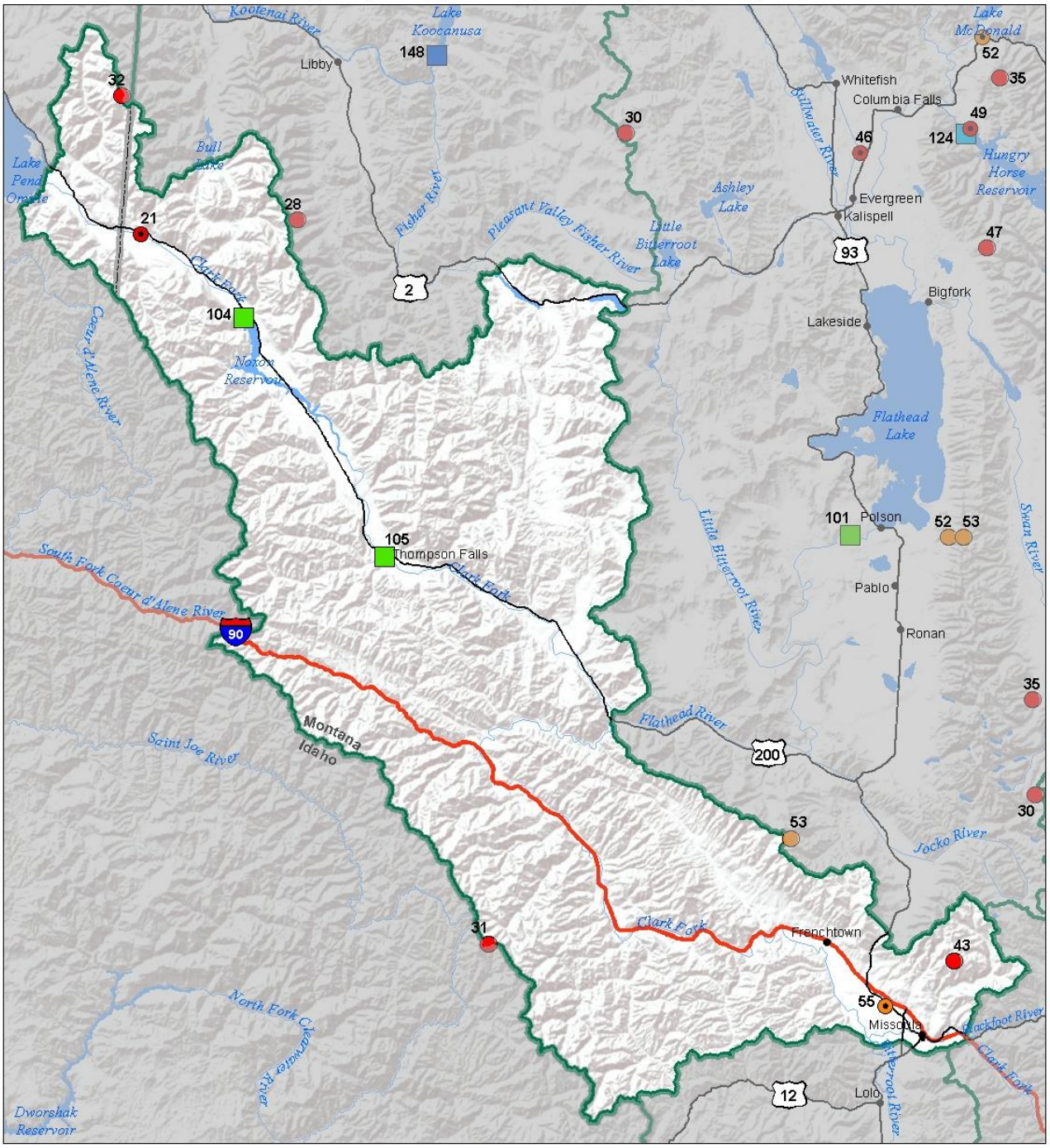
Reservoirs
Percent of Normal

- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%
- 71 - 90%
- 51 - 70%
- 1 - 50%

USDA

Montana State Library Natural Resource Information System

Lower Clark Fork River Basin
Monthly Precipitation and Reservoir Levels
Percentage of Normal
April 1, 2019 (March 1, 2019 - April 1, 2019)



Precipitation
Percent of Normal

SNOTEL		COOP/ACIS	
> 150%	71 - 90%	> 150%	71 - 90%
131 - 150%	51 - 70%	131 - 150%	51 - 70%
111 - 130%	1 - 50%	111 - 130%	1 - 50%
91 - 110%		91 - 110%	

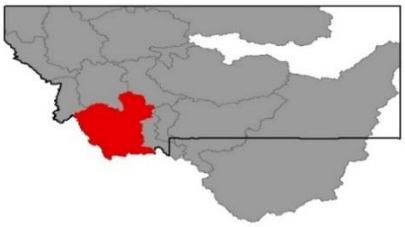
Reservoirs
Percent of Normal

- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%
- 71 - 90%
- 51 - 70%
- 1 - 50%

USDA

Montana State Library Natural Resource Information System

Jefferson River Basin



After receiving 220% of normal precipitation in the month of February, March brought unseasonably dry weather. Luckily, as of March 1st the basin had snowpack that was above normal at 115%, giving us a buffer for this change in storm tracks, and the dry month resulted in snowpack that is 105% on April 1st. The Gravellys and Tobacco Roots, coming off a record setting February, still hold 108%-113% of normal snowpack, even after setting records with the lowest precipitation over the month of March. Due to lack of snowfall, like the rest of the basin, the upper reaches of the Big Hole saw snowpack percentages slip during the month where 97% of normal snowpack war reported on April 1st. What a roller coaster this last two months has been with record-setting precipitation at both ends of the spectrum. Thankfully, we have some money in the bank to offset these swings: with reservoir storage at 64% of capacity and 121% of average for April 1st, the Jefferson is doing okay for a now, but still needs some more snow in throughout April to provide ample summer water supply. Streamflow forecasts for the April 1st – July 31st period within the basin range from slightly below average to above average, so water users are encouraged to look at the forecasts for their rivers of interest.

Jefferson River Basin Data Summary

Snowpack	**Percent of 1981-2010 Normal (Median)**	**Last Year Percentage of Normal (Median)**
BEAVERHEAD	105%	124%
RUBY	106%	124%
BIGHOLE	98%	142%
BOULDER	121%	164%
Basin-Wide Snowpack	**136%**	**105%**

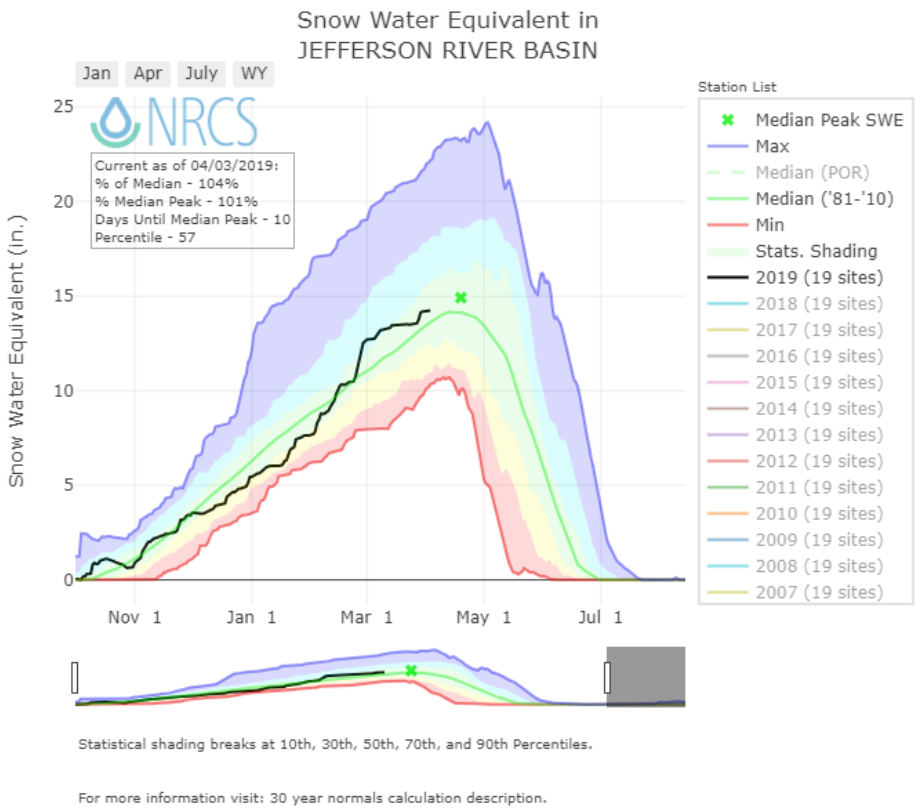
Precipitation	**Monthly Percentage of Average**	**WYTD Percentage of 1981-2010 Average***	**WYTD Last Year Percentage of Average**
Mountain Precipitation	52%	102%	111%
Valley Precipitation	%	%	%
Basin-Wide Precipitation	**52%**	**102%**	**111%**

*Water Year-to-Date (WYTD) Precipitation is October 1st - Current

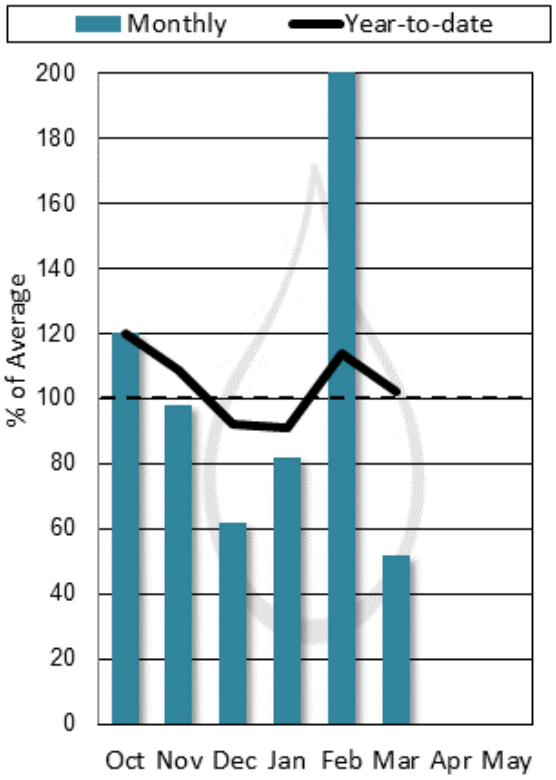
Reservoir Storage	**Percentage of Average**	**Percentage of Capacity (Total)**	**Last Year Percentage of Average**
Basin-Wide Storage	**122%**	**64%**	**128%**

**See Reservoir Storage Table for storage in individual reservoirs*

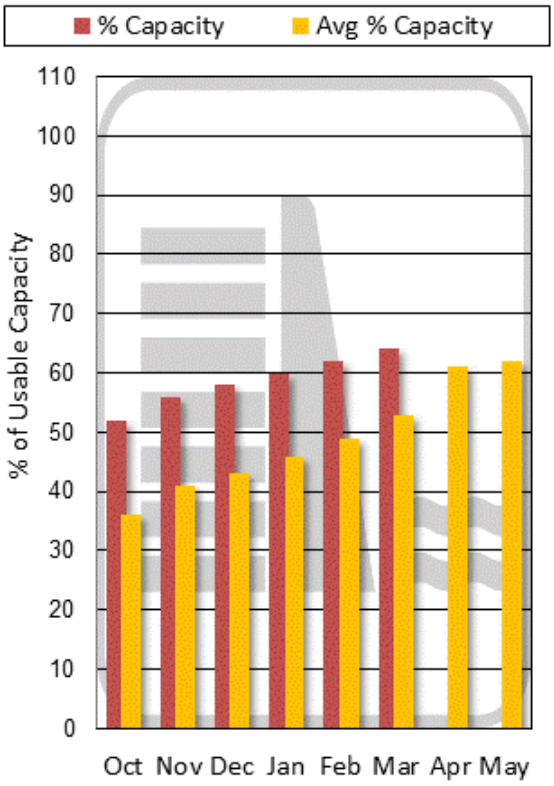
(click on chart below to navigate to online version with additional features)



Mountain and Valley Precipitation



End of Month Reservoir Storage



Storage above is averaged for all reservoirs in the basin. For individual reservoirs see table below.

JEFFERSON RIVER BASIN

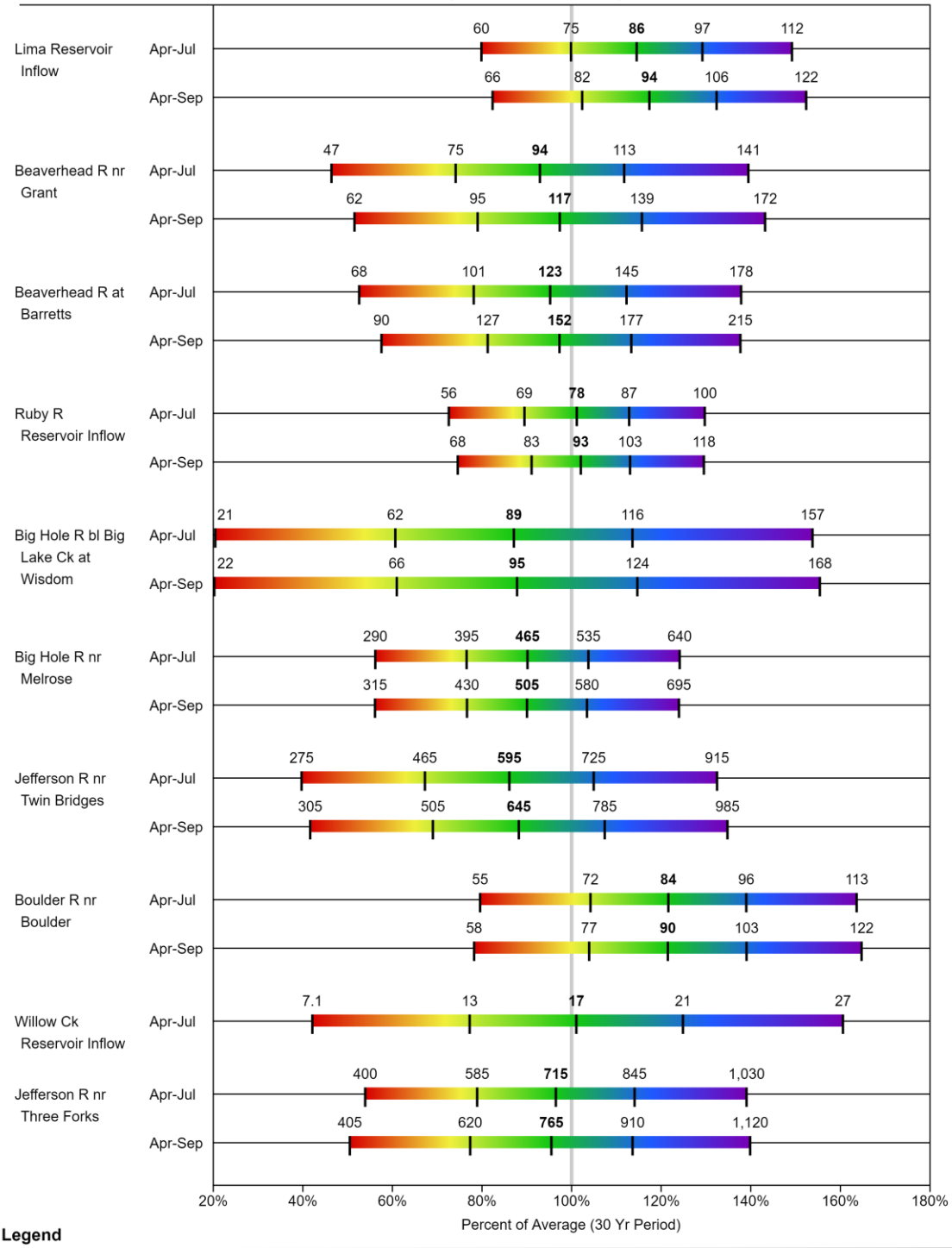
Water Supply Forecasts

April 1, 2019

Forecast Exceedance Probabilities

< - - - - - - Drier - - - - - - - Future Conditions - - - - - - - Wetter - - - - - - >

Labels on chart represent volumes of water expressed in thousand acre-feet.



Legend

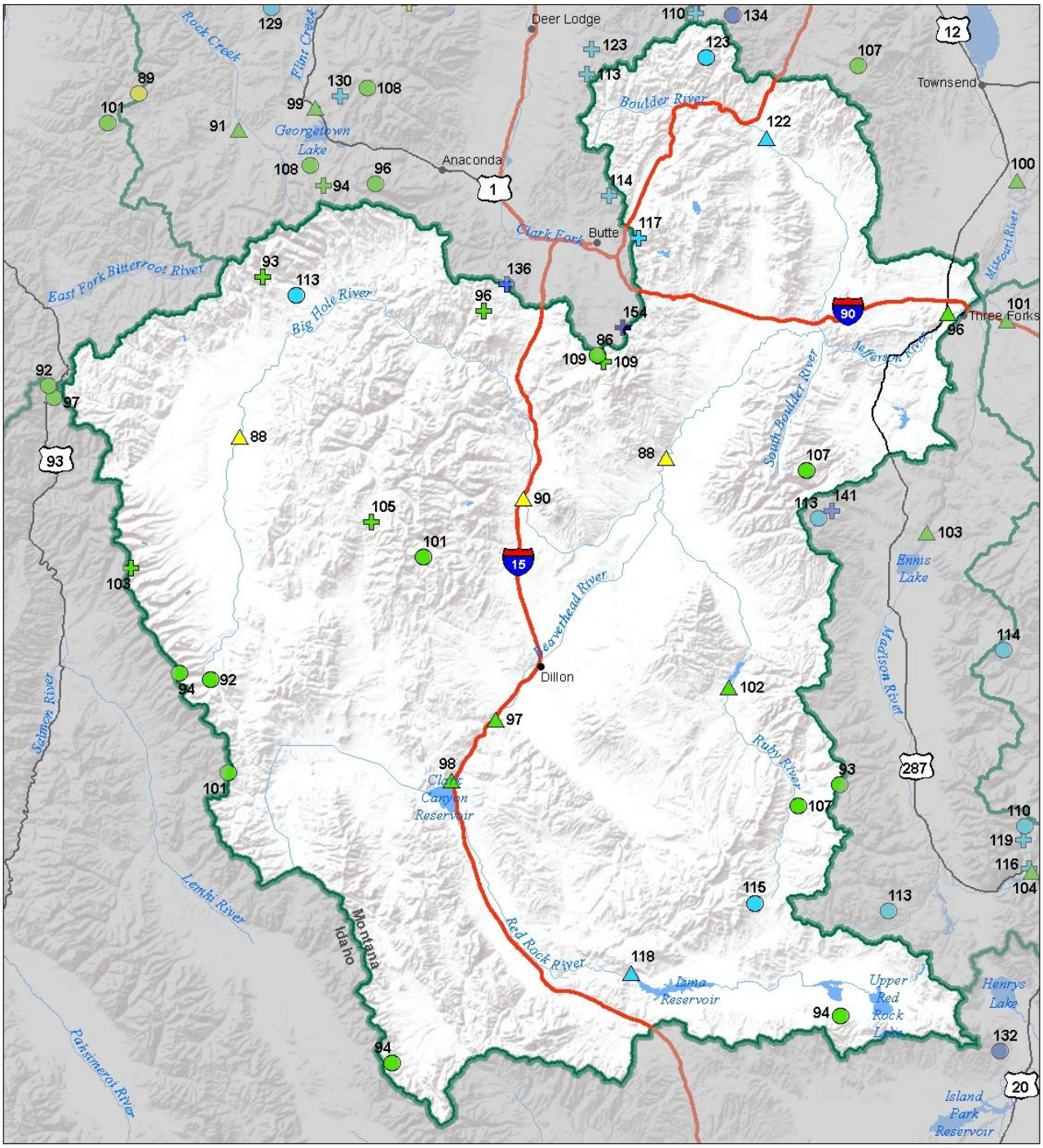
95% or 90% Exceedance	70% Exceedance	**50% Exceedance**	30% Exceedance	10% or 5% Exceedance
There is a 95%/90% chance that flows will exceed this volume	There is a 70% chance that flows will exceed this volume	There is a 50% chance that flows will exceed this volume	There is a 30% chance that flows will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

Jefferson River Basin
Streamflow Forecast, Snow Water Equivalent
Percentage of Normal
April 1, 2019



Snow Water Equivalent
Percent of Normal

SNOTEL		Snowcourse	
> 150%	71 - 90%	> 150%	71 - 90%
131 - 150%	51 - 70%	131 - 150%	51 - 70%
111 - 130%	1 - 50%	111 - 130%	1 - 50%
91 - 110%	0%	91 - 110%	0%

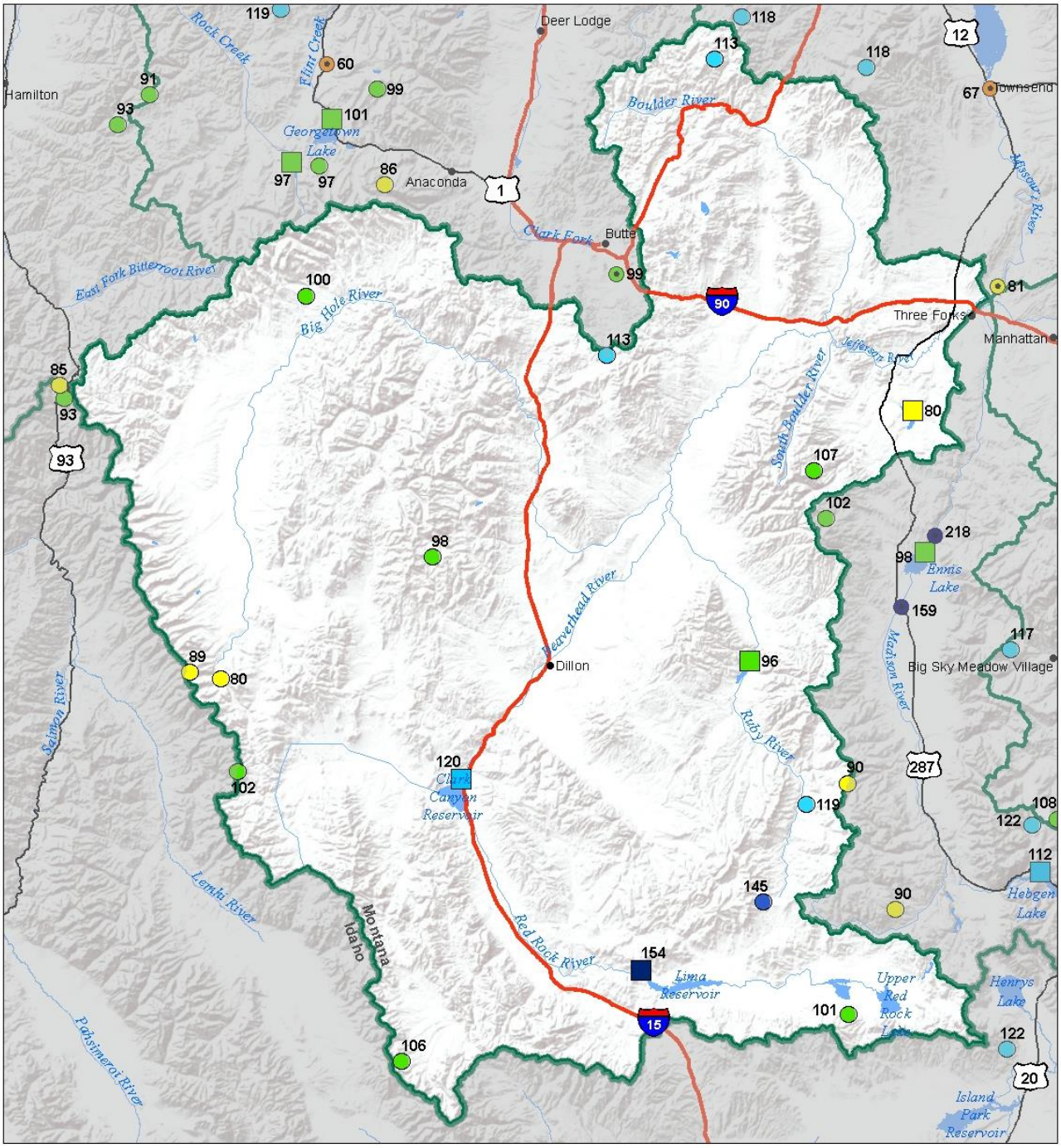
Streamflow Forecast
Percent of Average Flows

- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%
- 71 - 90%
- 51 - 70%
- 1 - 50%

USDA

Montana State Library Natural Resource Information System

Jefferson River Basin
Water Year to Date Precipitation and Reservoir Levels
Percentage of Normal
April 1, 2019



Precipitation
Percent of Normal

SNOTEL		COOP/ACIS	
> 150%	71 - 90%	> 150%	71 - 90%
131 - 150%	51 - 70%	131 - 150%	51 - 70%
111 - 130%	1 - 50%	111 - 130%	1 - 50%
91 - 110%		91 - 110%	

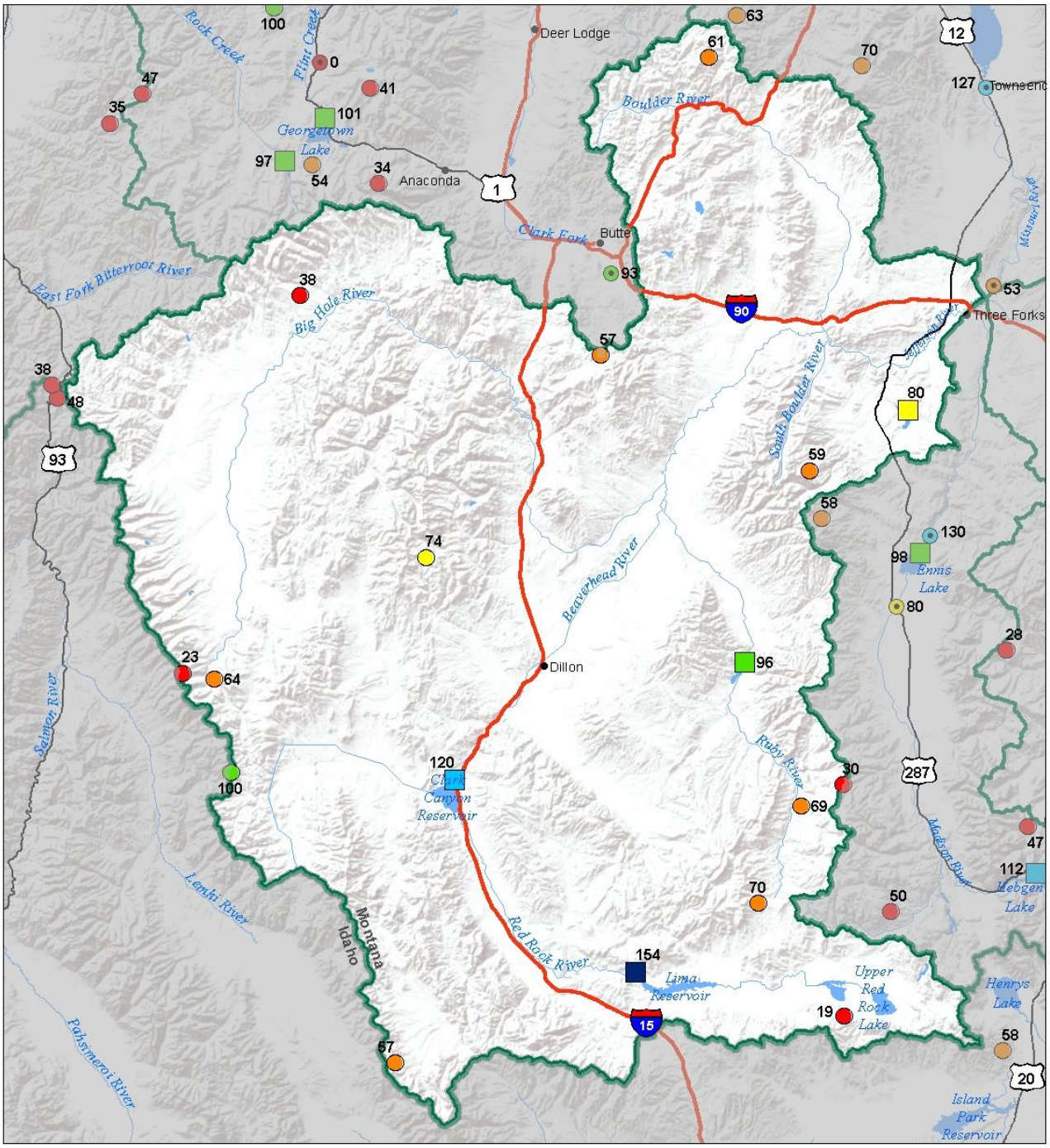
Reservoirs
Percent of Normal

- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%
- 71 - 90%
- 51 - 70%
- 1 - 50%

USDA

Montana State Library Natural Resource Information System

Jefferson River Basin
Monthly Precipitation and Reservoir Levels
Percentage of Normal
April 1, 2019 (March 1, 2019 - April 1, 2019)



Precipitation
Percent of Normal

SNOTEL
- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%
- 71 - 90%
- 51 - 70%
- 1 - 50%

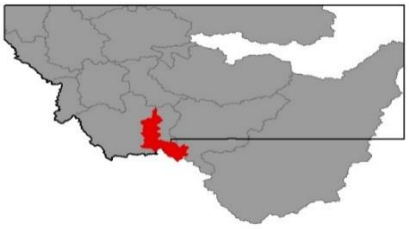
COOP/ACIS
- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%
- 71 - 90%
- 51 - 70%
- 1 - 50%

Reservoirs
Percent of Normal
- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%
- 71 - 90%
- 51 - 70%
- 1 - 50%

USDA

Montana State Library Natural Resource Information System

Madison River Basin



It has been feast or famine in the upper Madison this winter. Monthly precipitation was 292% of average for the month of February, followed by March totaling just 49% of average. Some SNOTEL sites in the Lower Madison (below Hebgen) set new record lows for monthly precipitation for the month of February in the Gravelly and Tobacco Root Ranges. In just one month's time the basin-wide snowpack has declined from 130% of normal to 115%; thankfully February's storms were already stored for spring runoff. Reservoir storage is the mitigator for these ebbs and flows, and with above average storage in Ennis and Hebgen Lake, the Madison River looks to have near normal flows barring anomalously low spring and summer precipitation. Snowpack in the higher reaches of the Madison drainage normally peaks in late April, so there is a few more weeks of accumulation to really seal the deal for this spring's runoff season. Currently, volumetric streamflow forecasts for the April 1st – July 31st period indicate slightly above average inflows to the two reservoirs on the Madison, but spring precipitation could change that with time. Thanks goodness for February!

Madison River Basin Data Summary

Snowpack	**Percent of 1981-2010 Normal (Median)**	**Last Year Percentage of Normal (Median)**
MADISON abv HEBGEN LAKE	119%	120%
MADISON blw HEBGEN LAKE	111%	126%
Basin-Wide Snowpack	**124%**	**114%**

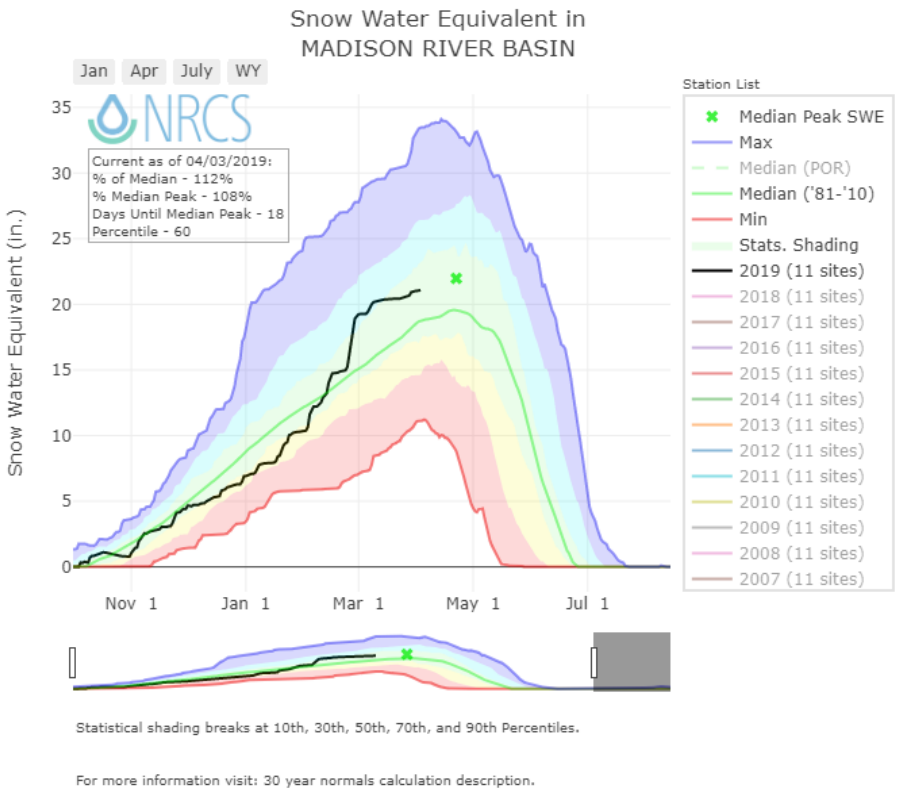
Precipitation	**Monthly Percentage of Average**	**WYTD Percentage of 1981-2010 Average***	**WYTD Last Year Percentage of Average**
Mountain Precipitation	48%	107%	110%
Valley Precipitation	63%	136%	152%
Basin-Wide Precipitation	**49%**	**110%**	**114%**

*Water Year-to-Date (WYTD) Precipitation is October 1st - Current

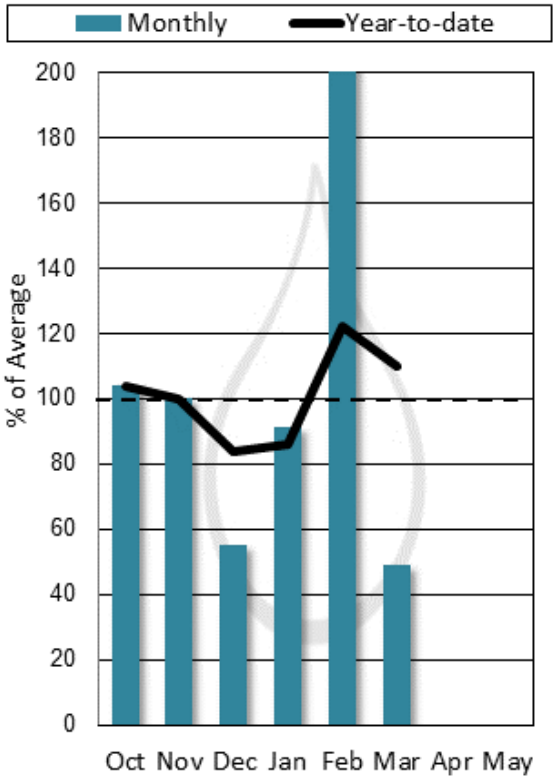
Reservoir Storage	**Percentage of Average**	**Percentage of Capacity (Total)**	**Last Year Percentage of Average**
Basin-Wide Storage	**111%**	**79%**	**107%**

**See Reservoir Storage Table for storage in individual reservoirs*

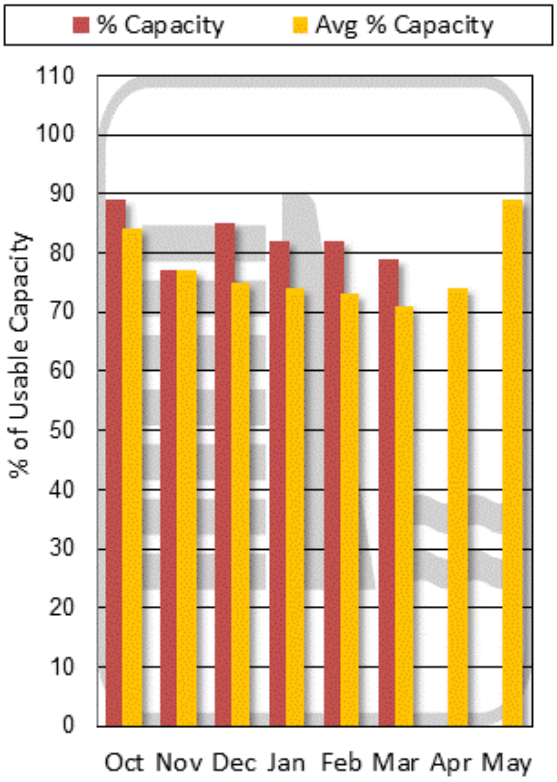
(click on chart below to navigate to online version with additional features)



Mountain and Valley Precipitation



End of Month Reservoir Storage

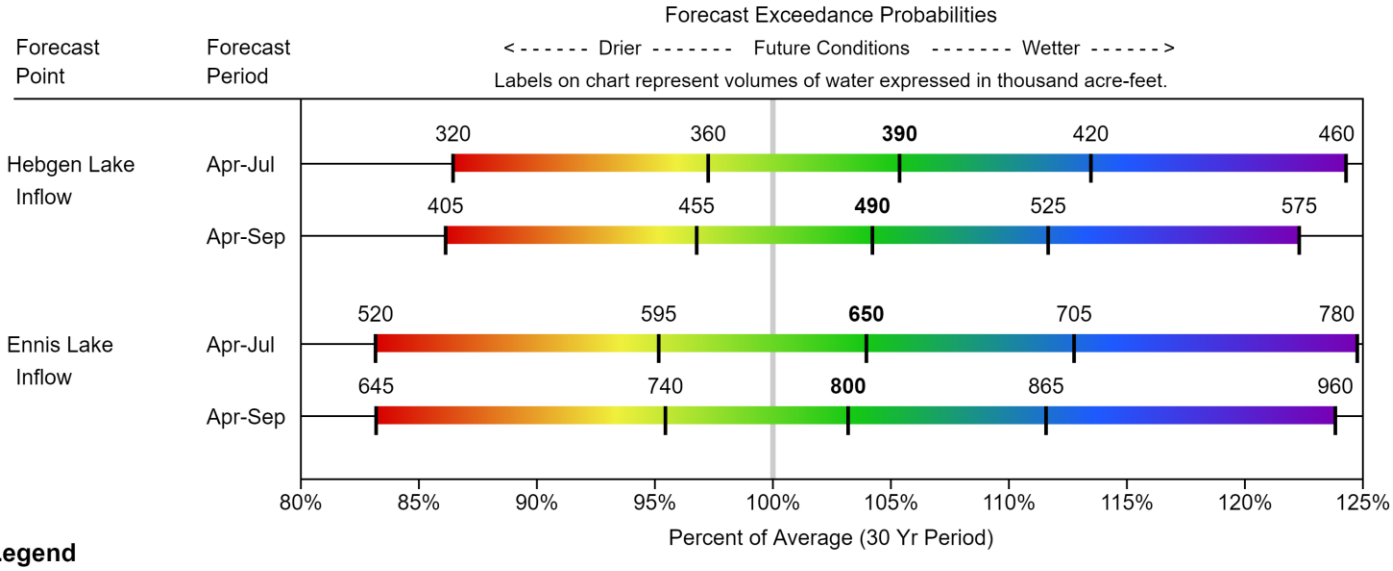


Storage above is averaged for all reservoirs in the basin. For individual reservoirs see table below.

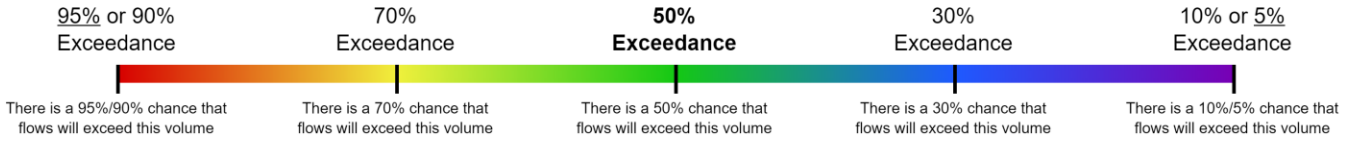
MADISON RIVER BASIN

Water Supply Forecasts

April 1, 2019



Legend



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

Period of Record Minimum Streamflow KAF (Year)

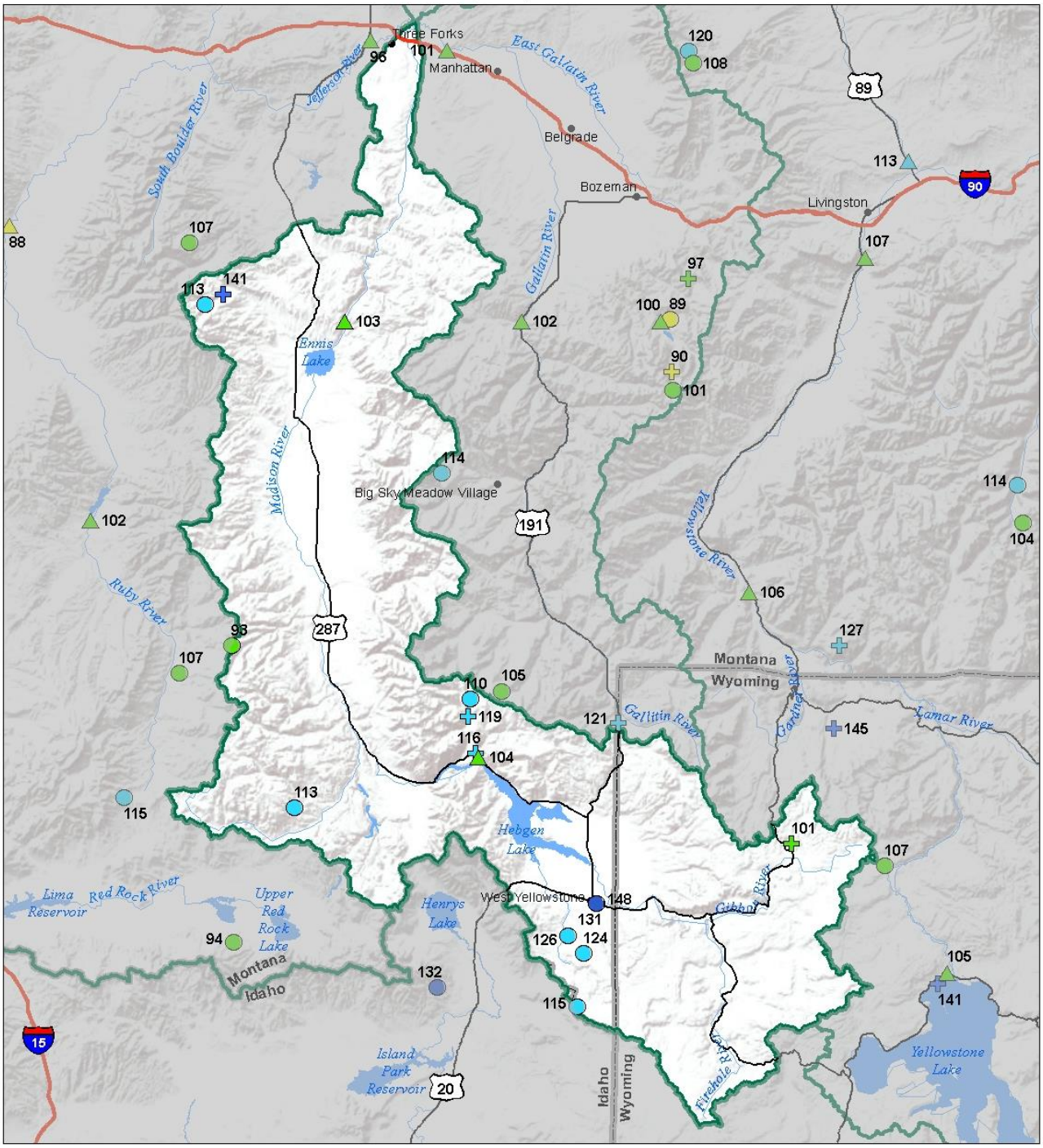
1981-2010 Normal Streamflow KAF

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.

Madison River Basin
Streamflow Forecast, Snow Water Equivalent
Percentage of Normal
April 1, 2019



Snow Water Equivalent
Percent of Normal

SNOTEL		Snowcourse	
> 150%	71 - 90%	> 150%	71 - 90%
131 - 150%	51 - 70%	131 - 150%	51 - 70%
111 - 130%	1 - 50%	111 - 130%	1 - 50%
91 - 110%	0%	91 - 110%	0%

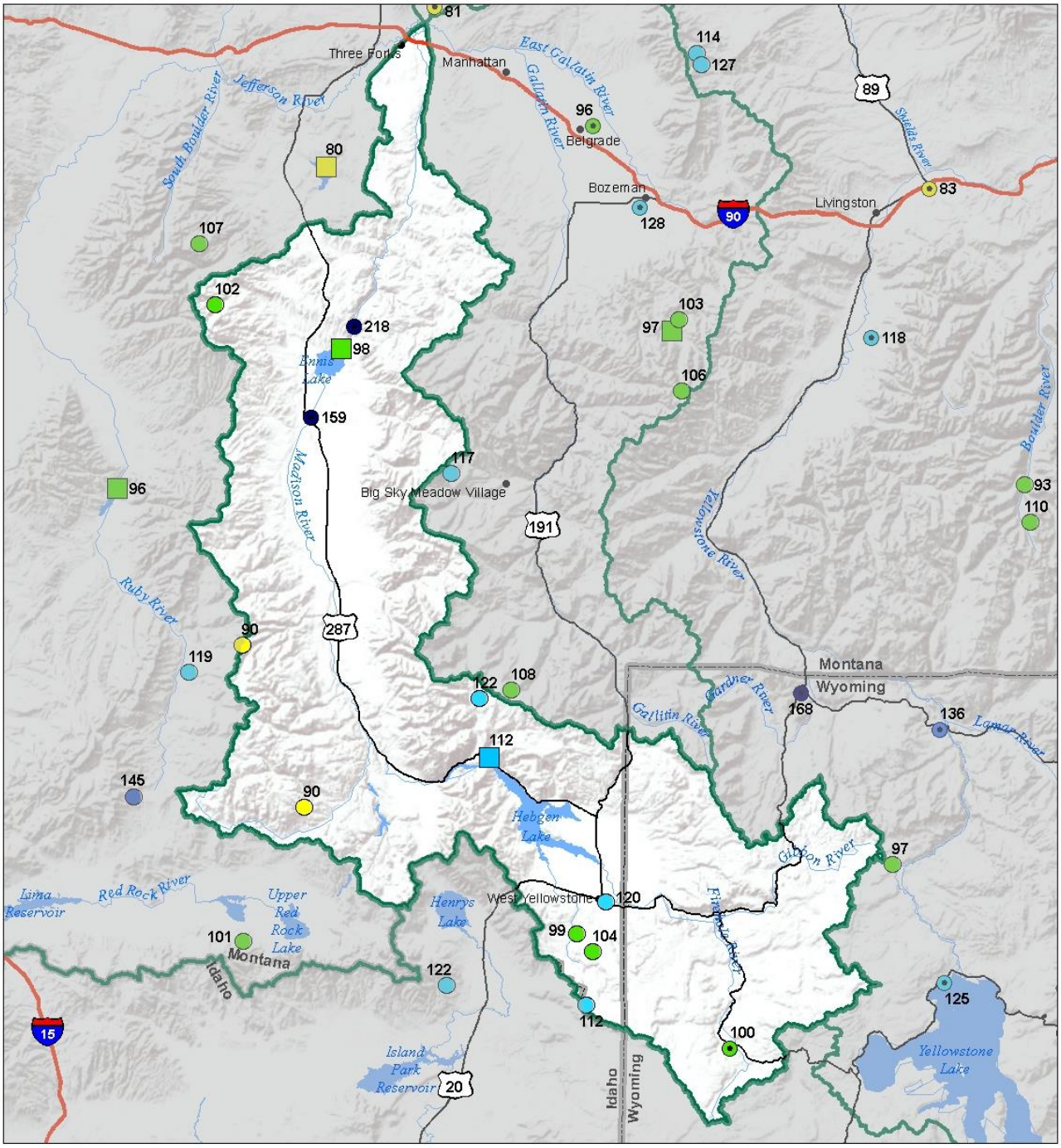
Streamflow Forecast
Percent of Average Flows

- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%
- 71 - 90%
- 51 - 70%
- 1 - 50%

USDA

Montana State Library Natural Resource Information System

Madison River Basin
Water Year to Date Precipitation and Reservoir Levels
Percentage of Normal
April 1, 2019



Precipitation
Percent of Normal

SNOTEL		COOP/ACIS	
> 150%	71 - 90%	> 150%	71 - 90%
131 - 150%	51 - 70%	131 - 150%	51 - 70%
111 - 130%	1 - 50%	111 - 130%	1 - 50%
91 - 110%		91 - 110%	

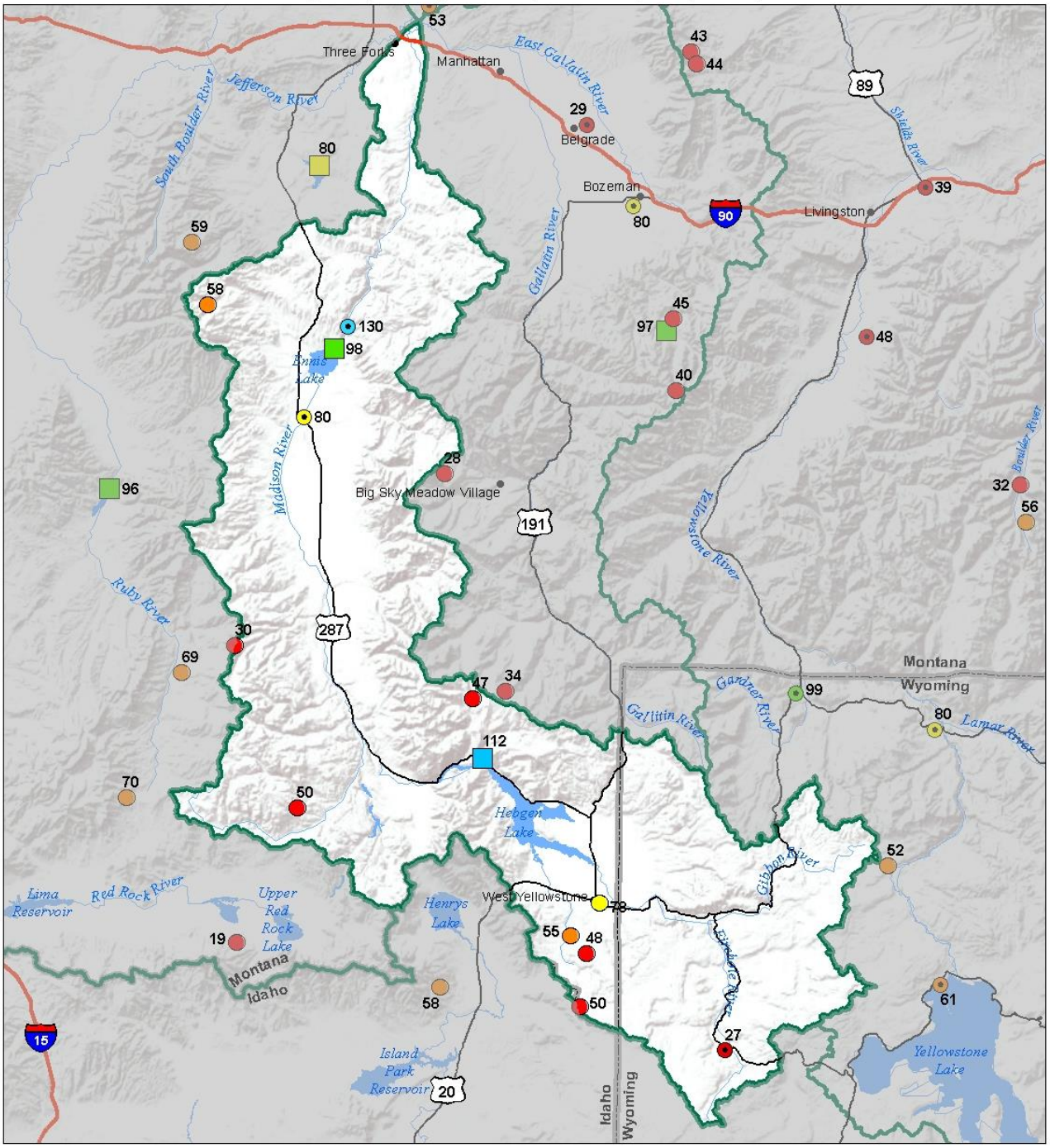
Reservoirs
Percent of Normal

- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%
- 71 - 90%
- 51 - 70%
- 1 - 50%

USDA

Montana State Library Natural Resource Information System

Madison River Basin
Monthly Precipitation and Reservoir Levels
Percentage of Normal
April 1, 2019 (March 1, 2019 - April 1, 2019)



Precipitation
Percent of Normal

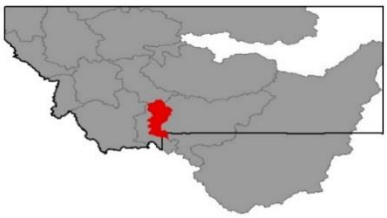
SNOTEL		COOP/ACIS	
> 150%	71 - 90%	> 150%	71 - 90%
131 - 150%	51 - 70%	131 - 150%	51 - 70%
111 - 130%	1 - 50%	111 - 130%	1 - 50%
91 - 110%		91 - 110%	

Reservoirs
Percent of Normal

- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%
- 71 - 90%
- 51 - 70%
- 1 - 50%

USDA

Montana State Library Natural Resource Information System



Gallatin River Basin

After a record-setting February blanketed the basin and left one the deepest valley snowpacks on record at the beginning of March, almost every SNOTEL site in the Gallatin River drainage experienced its lowest March precipitation on record, sparing Lick Creek, which was 2nd to lowest on record. Coming off a bumper February with 209% of average mountain precipitation, the month of March yielded just 40% of average. The Bridger Range, which was the highest in the basin on March 1st, lost a lot of headway declining from 140% of normal on March 1st to 115% on April 1st. The snowpack which feeds Middle Creek Reservoir in Hyalite also experienced a decline this month due to the below normal monthly snowfall, dipping to 95% of normal for this date. The Upper Gallatin, which looked bleak until February snowfalls totals increased the snowpack from below normal to well above normal, also experienced a drop by April 1st but remains slightly above normal. Winter isn't over yet. April is normally the icing on the cake for high-elevation SNOTEL sites, which typically build snowpack through the month and peak in late April. For now, streamflow forecasts issued on April 1st for the April 1st – July 31st period indicate slightly above average seasonal volumes in the rivers and streams in the basin. The next month will fill in the details on whether the higher elevations reach their normal peaks before spring runoff begins.

Gallatin River Basin Data Summary

Snowpack	**Percent of 1981-2010 Normal (Median)**	**Last Year Percentage of Normal (Median)**
UPPER GALLATIN	*111%*	*126%*
HYALITE	*95%*	*121%*
BRIDGER	*115%*	*147%*
Basin-Wide Snowpack	**107%**	**128%**

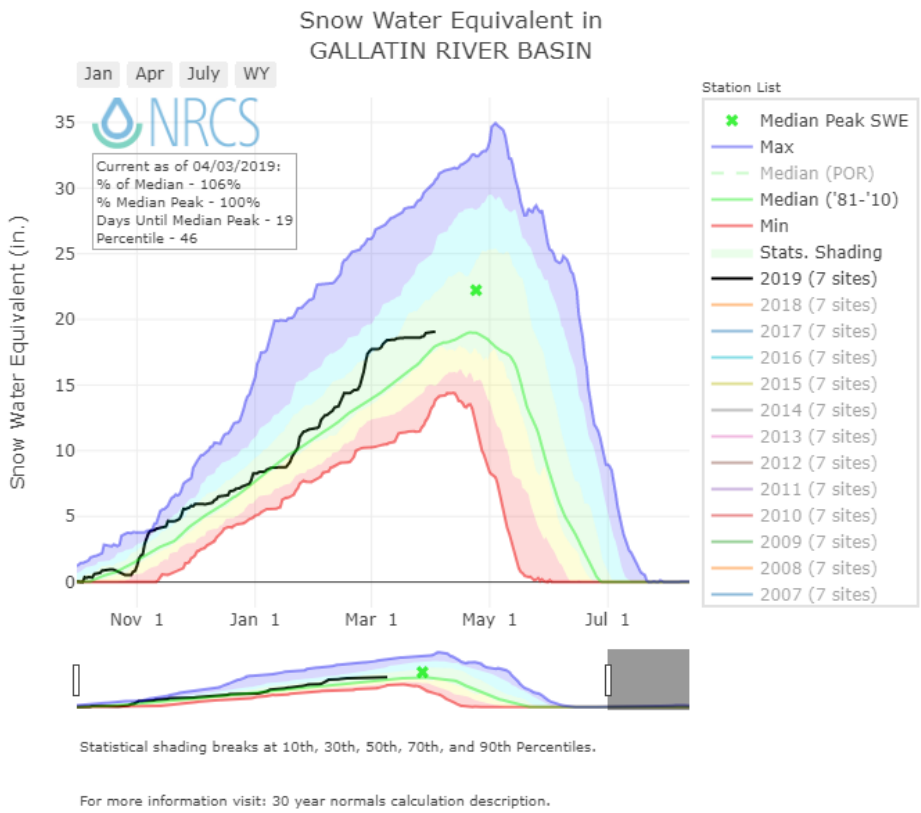
Precipitation	**Monthly Percentage of Average**	**WYTD Percentage of 1981-2010 Average***	**WYTD Last Year Percentage of Average**
Mountain Precipitation	40%	114%	123%
Valley Precipitation	59%	116%	126%
Basin-Wide Precipitation	**42%**	**114%**	**124%**

*Water Year-to-Date (WYTD) Precipitation is October 1st - Current

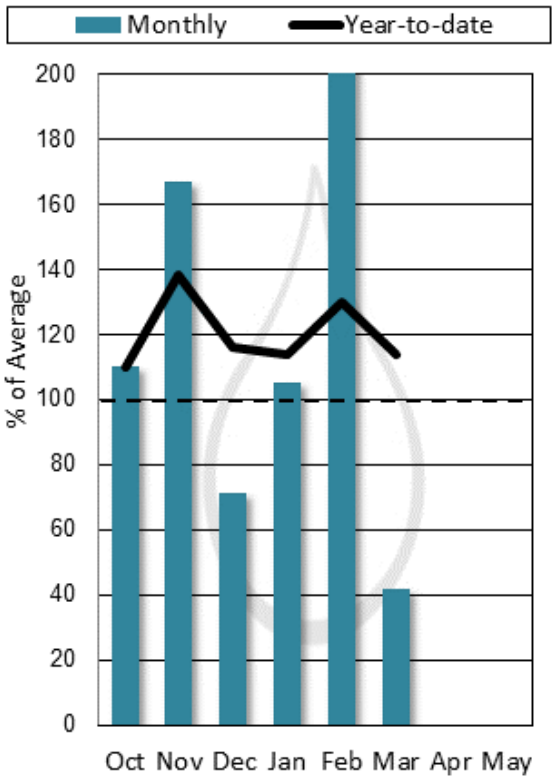
Reservoir Storage	**Percentage of Average**	**Percentage of Capacity (Total)**	**Last Year Percentage of Average**
Basin-Wide Storage	**97%**	**53%**	**99%**

**See Reservoir Storage Table for storage in individual reservoirs*

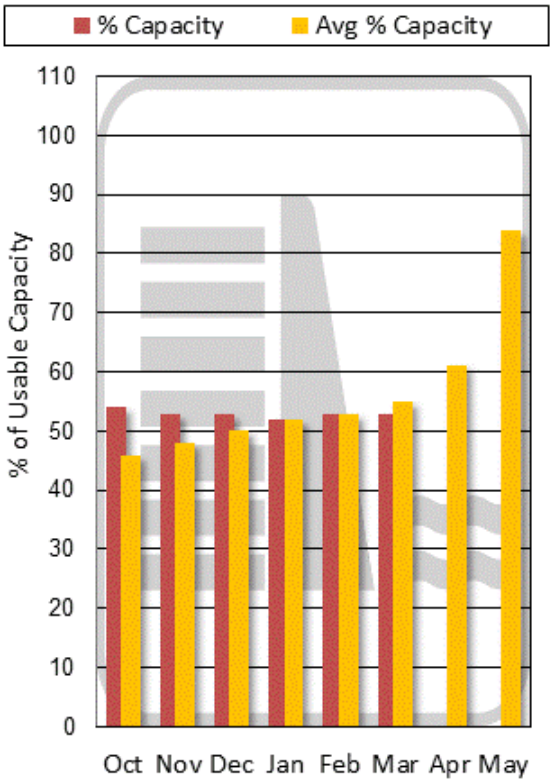
(click on chart below to navigate to online version with additional features)



Mountain and Valley Precipitation



End of Month Reservoir Storage

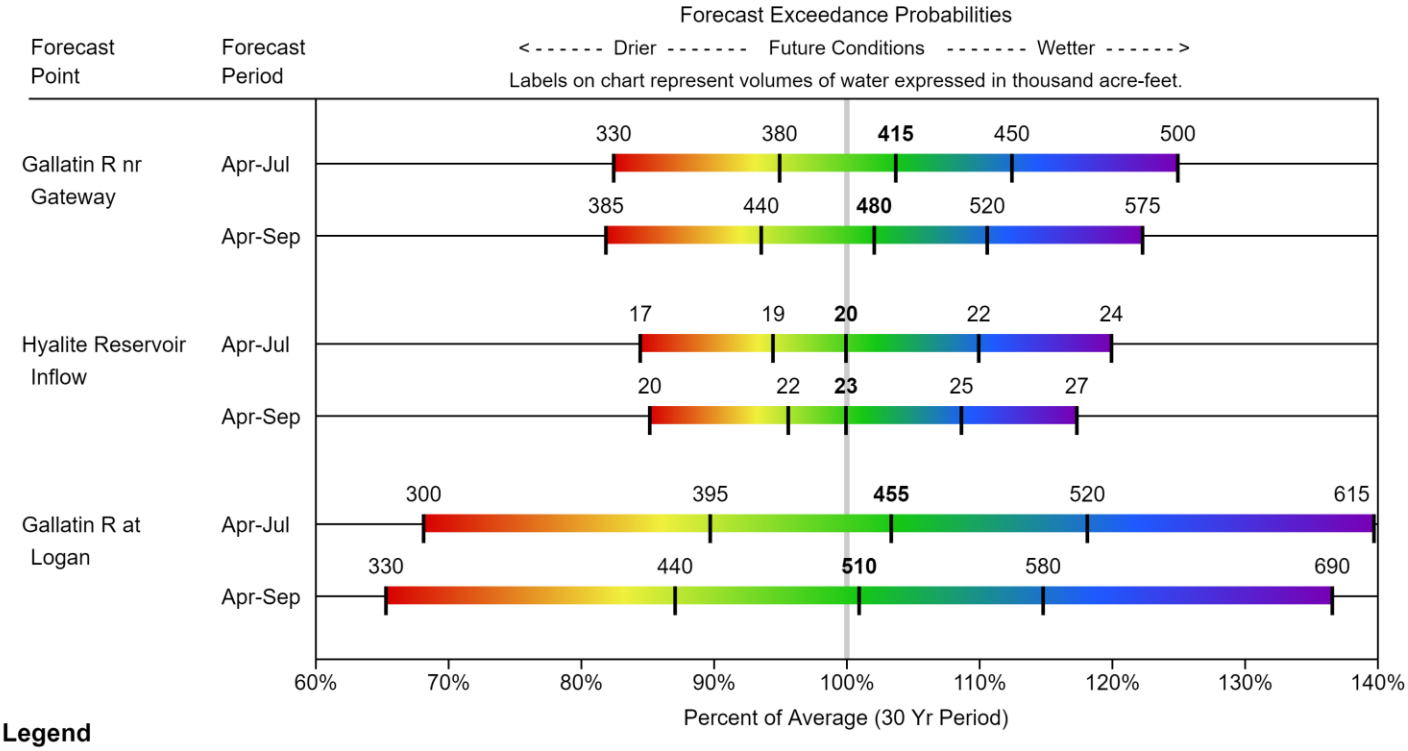


Storage above is averaged for all reservoirs in the basin. For individual reservoirs see table below.

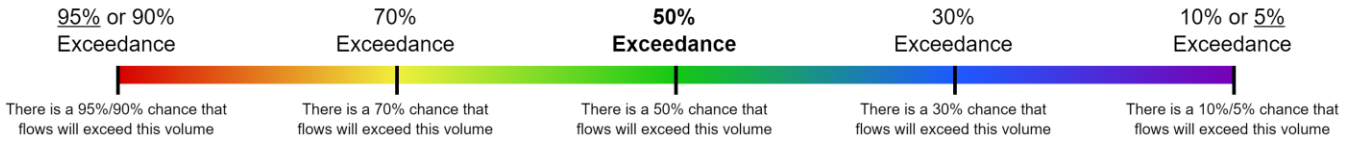
GALLATIN RIVER BASIN

Water Supply Forecasts

April 1, 2019



Legend



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

Period of Record Minimum Streamflow KAF (Year)

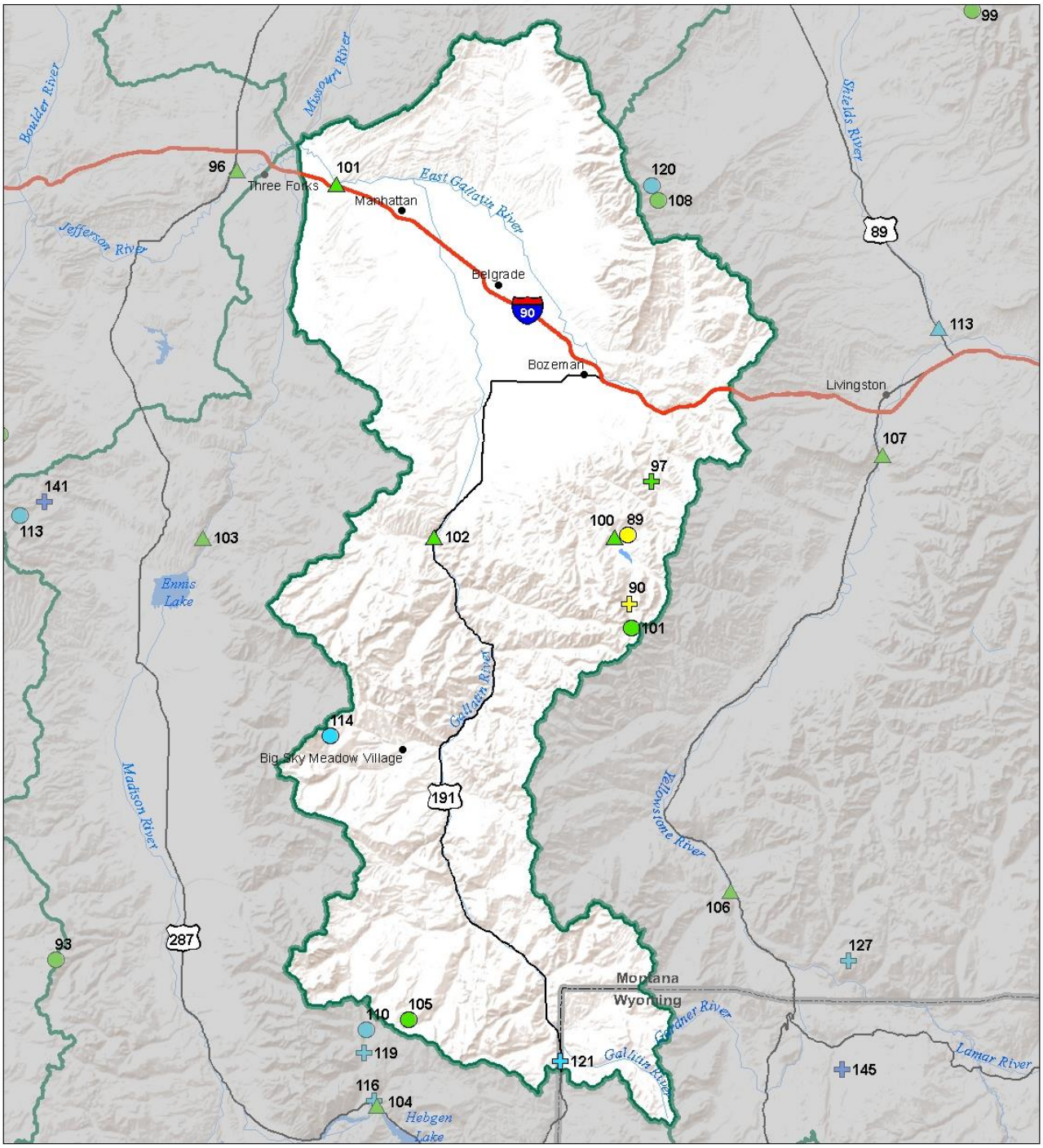
1981-2010 Normal Streamflow KAF

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.

Gallatin River Basin
Streamflow Forecast, Snow Water Equivalent
Percentage of Normal
April 1, 2019



Snow Water Equivalent
Percent of Normal

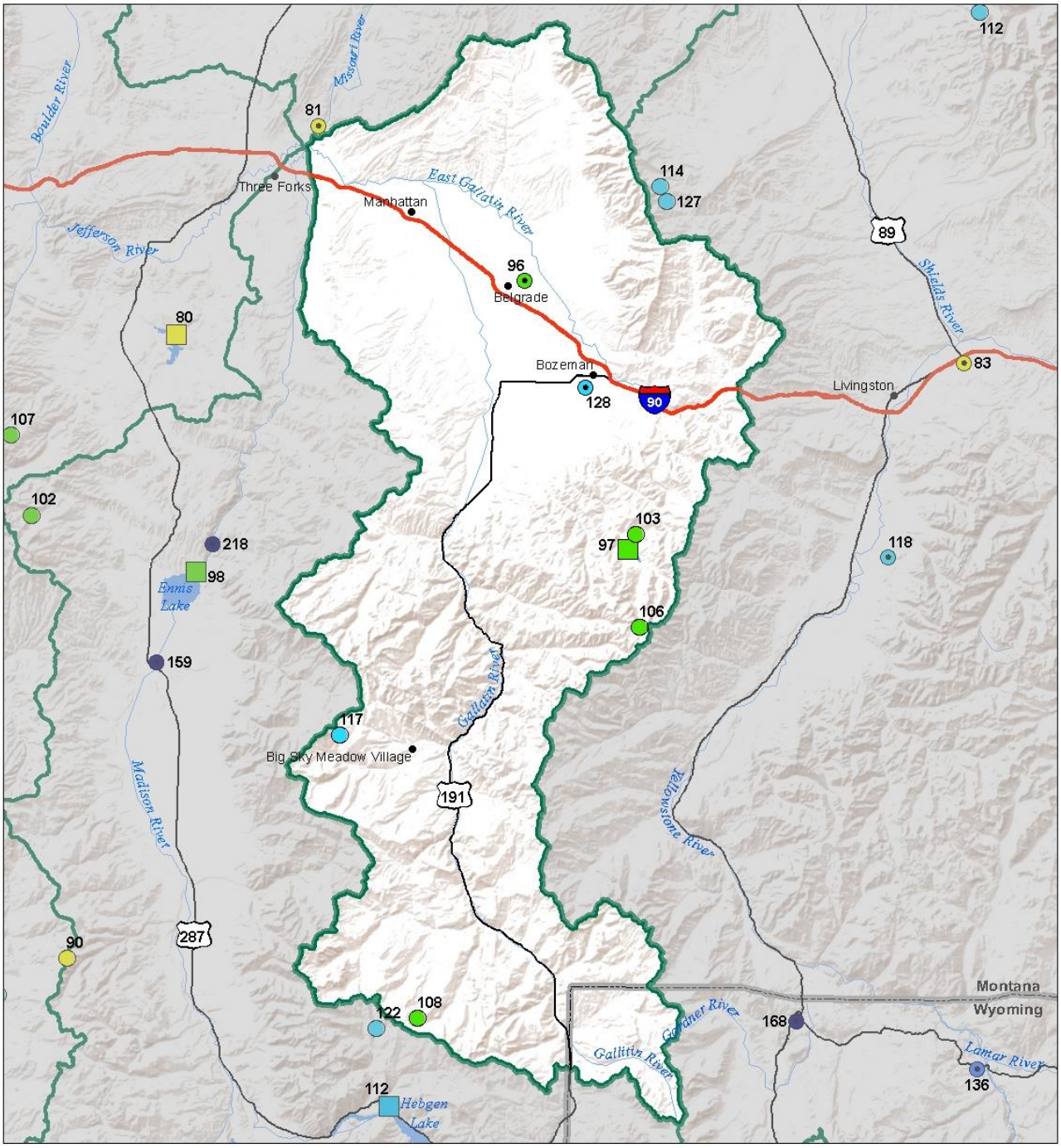
SNOTEL		Snowcourse	
> 150%	71 - 90%	> 150%	71 - 90%
131 - 150%	51 - 70%	131 - 150%	51 - 70%
111 - 130%	1 - 50%	111 - 130%	1 - 50%
91 - 110%	0%	91 - 110%	0%

Streamflow Forecast
Percent of Average Flows

- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%
- 71 - 90%
- 51 - 70%
- 1 - 50%

USDA
Montana State Library Natural Resource Information System

Gallatin River Basin
Water Year to Date Precipitation and Reservoir Levels
Percentage of Normal
April 1, 2019



Precipitation
Percent of Normal

SNOTEL
- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%
- 71 - 90%
- 51 - 70%
- 1 - 50%

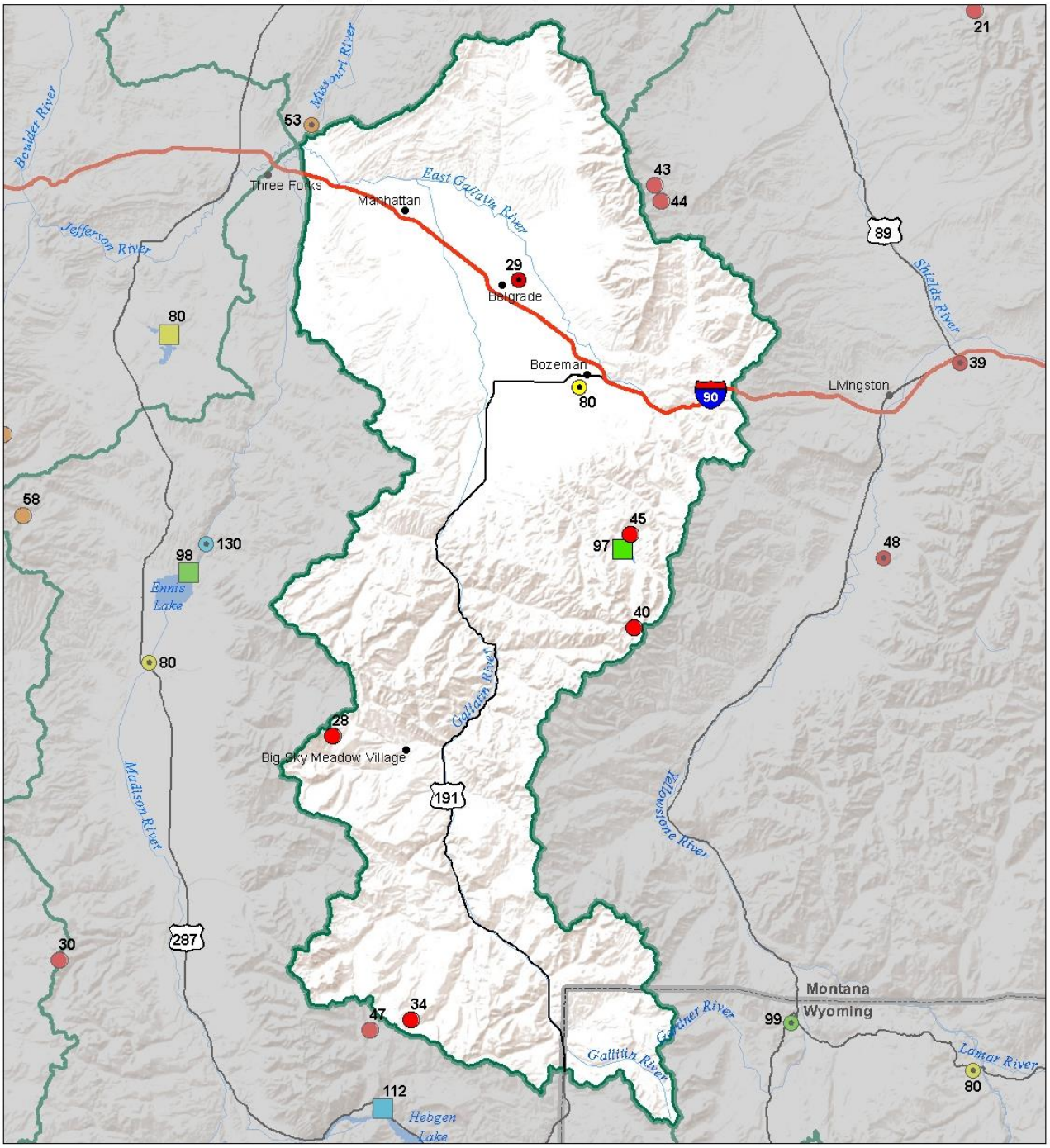
COOP/ACIS
- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%
- 71 - 90%
- 51 - 70%
- 1 - 50%

Reservoirs
Percent of Normal
- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%
- 71 - 90%
- 51 - 70%
- 1 - 50%

USDA

Montana State Library Natural Resource Information System

Gallatin River Basin
Monthly Precipitation and Reservoir Levels
Percentage of Normal
April 1, 2019 (March 1, 2019 - April 1, 2019)



Precipitation
Percent of Normal

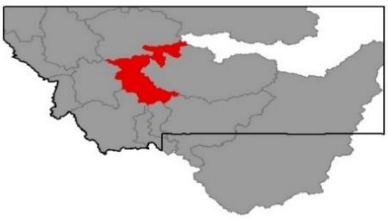
SNOTEL
- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%
- 71 - 90%
- 51 - 70%
- 1 - 50%

COOP/ACIS
- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%
- 71 - 90%
- 51 - 70%
- 1 - 50%

Reservoirs
Percent of Normal
- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%
- 71 - 90%
- 51 - 70%
- 1 - 50%

USDA

Montana State Library Natural Resource Information System



Headwaters Mainstem (Missouri) River Basin

Based on basin-wide percentages for mountain snowpack, the mountains surrounding the Missouri River valley below Toston, MT have the best snowpack in the state. Snowpack at all locations remains above normal on April 1st, despite lackluster March mountain precipitation. Almost all sites within the basin have above to well above normal snowpack for this date, with only one exception. Nevada Ridge SNOTEL, in the Nevada Mountains, is slightly below normal at 94%. This is good news for water users in the area, and we have heard from many in the valley that they were ready for a change in weather after a record February. Streamflow forecasts issued on April 1st within the basin align with the snowpack and precipitation totals and are above average for the April 1st – July 31st period. Assuming we can continue to add some snow water to the higher elevations over the next month, and weather doesn't take a major turn towards the warm side, streams look to have ample water in the region this spring and summer. Only time will tell.

Headwaters Missouri Mainstem River Basin Data Summary

Snowpack	**Percent of 1981-2010 Normal (Median)**	**Last Year Percentage of Normal (Median)**
HEADWATERS MAINSTEM	117%	169%
Basin-Wide Snowpack	**% Median%**	**Last Year % Median%**

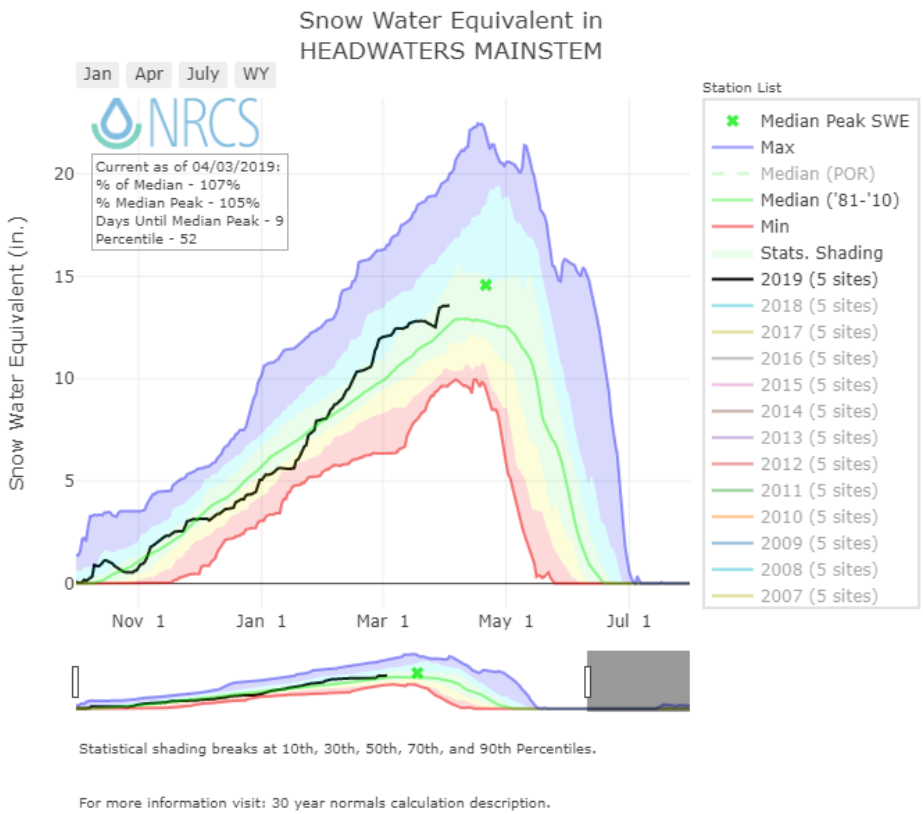
Precipitation	**Monthly Percentage of Average**	**WYTD Percentage of 1981-2010 Average***	**WYTD Last Year Percentage of Average**
Mountain Precipitation	62%	110%	135%
Valley Precipitation	150%	123%	170%
Basin-Wide Precipitation	**68%**	**110%**	**137%**

*Water Year-to-Date (WYTD) Precipitation is October 1st - Current

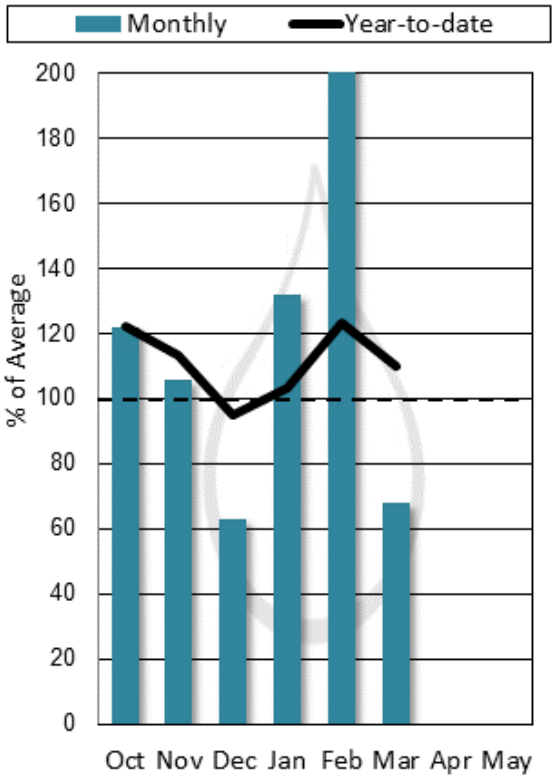
Reservoir Storage	**Percentage of Average**	**Percentage of Capacity (Total)**	**Last Year Percentage of Average**
Basin-Wide Storage	**119%**	**83%**	**116%**

**See Reservoir Storage Table for storage in individual reservoirs*

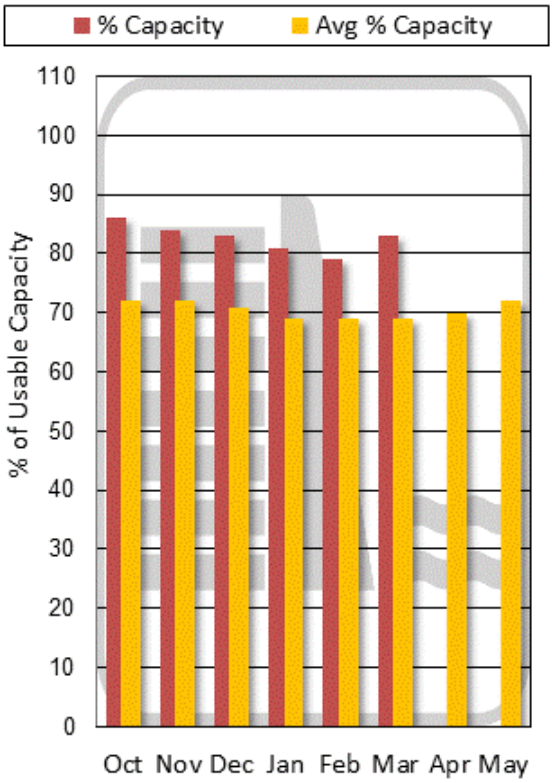
(click on chart below to navigate to [online version]() with additional features)



Mountain and Valley Precipitation



End of Month Reservoir Storage

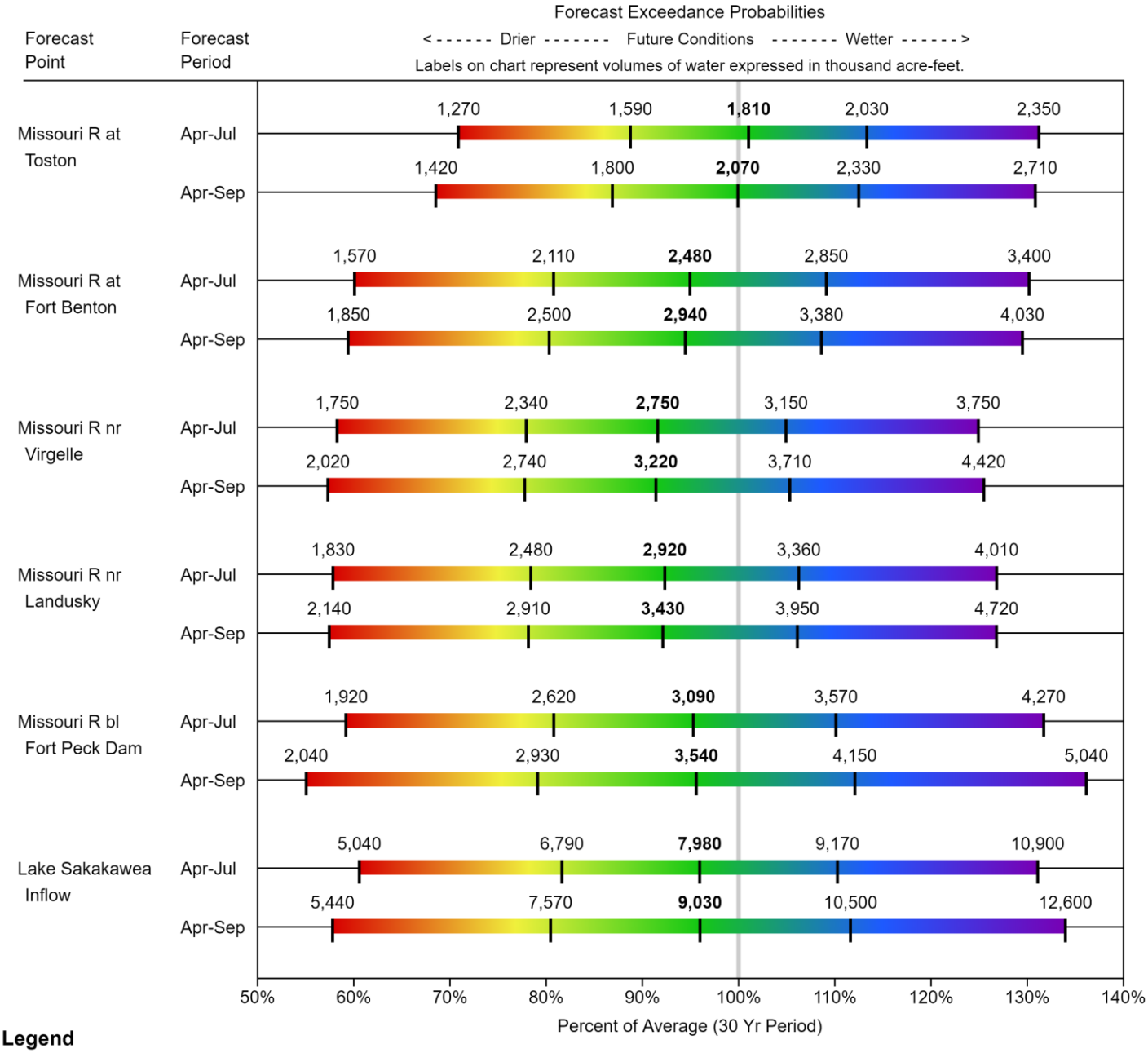


Storage above is averaged for all reservoirs in the basin. For individual reservoirs see table below.

MISSOURI MAINSTEM BASIN

Water Supply Forecasts

April 1, 2019



Legend

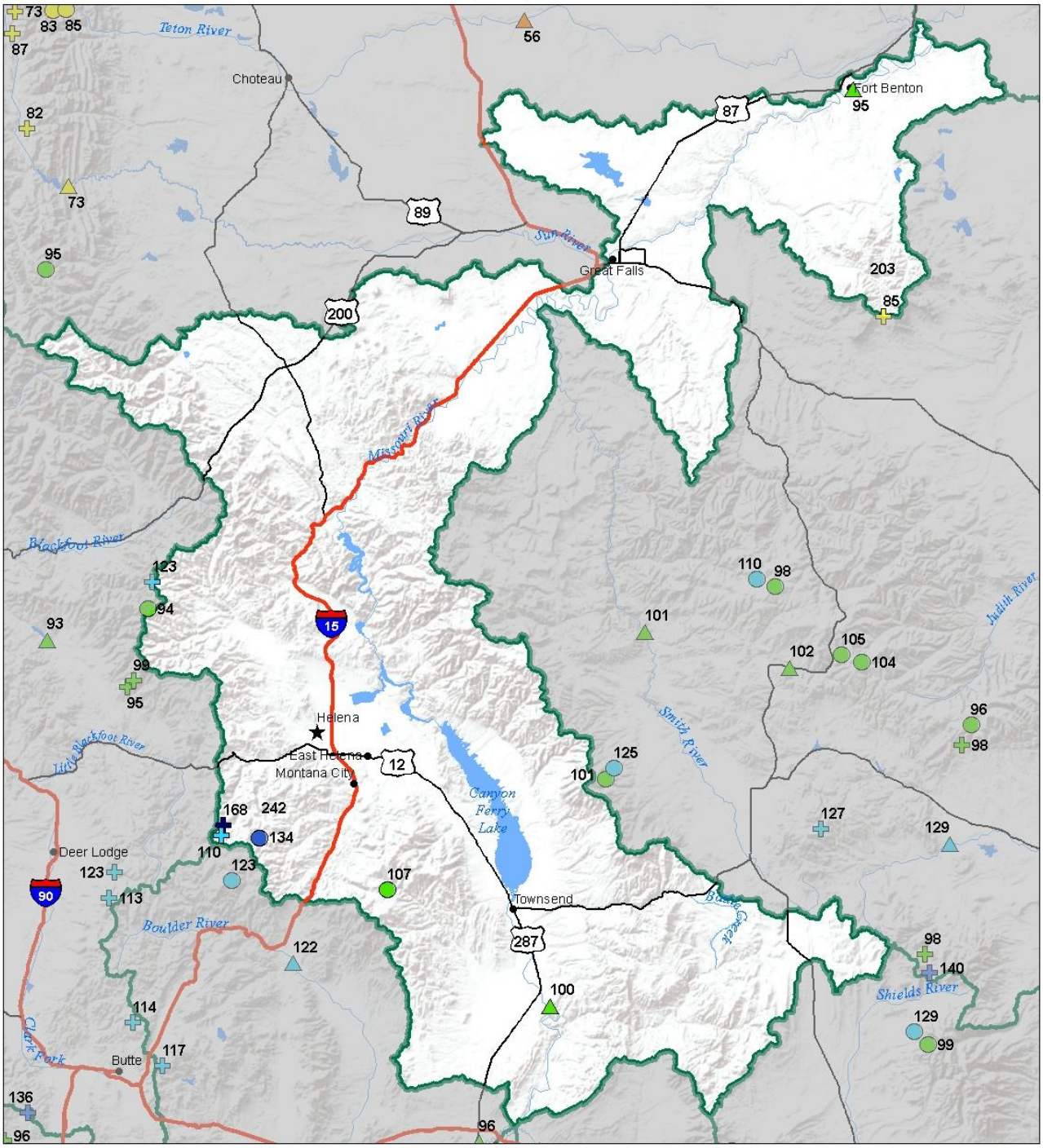
95% or 90% Exceedance	70% Exceedance	**50% Exceedance**	30% Exceedance	10% or 5% Exceedance
There is a 95%/90% chance that flows will exceed this volume	There is a 70% chance that flows will exceed this volume	There is a 50% chance that flows will exceed this volume	There is a 30% chance that flows will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

Headwaters Mainstem (Missouri) River Basin
Streamflow Forecast, Snow Water Equivalent
Percentage of Normal
April 1, 2019



Snow Water Equivalent
Percent of Normal

SNOTEL

- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%
- 71 - 90%
- 51 - 70%
- 1 - 50%
- 0%

Snowcourse

- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%
- 71 - 90%
- 51 - 70%
- 1 - 50%
- 0%

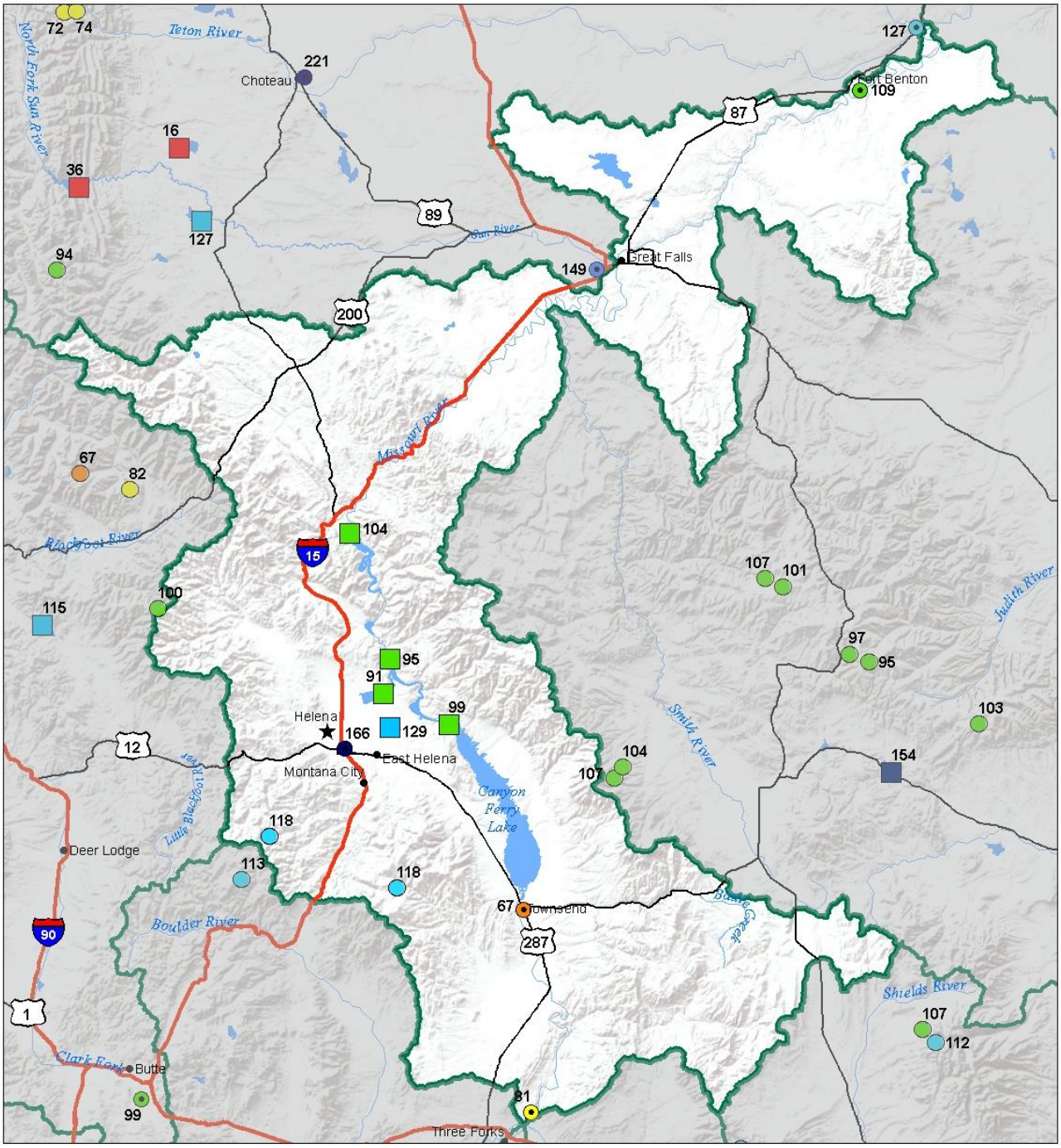
Streamflow Forecast
Percent of Average Flows

- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%
- 71 - 90%
- 51 - 70%
- 1 - 50%

USDA

Montana State Library Natural Resource Information System

Headwaters Mainstem (Missouri) River Basin
Water Year to Date Precipitation and Reservoir Levels
Percentage of Normal
April 1, 2019



Precipitation
Percent of Normal

SNOTEL		COOP/ACIS	
> 150%	71 - 90%	> 150%	71 - 90%
131 - 150%	51 - 70%	131 - 150%	51 - 70%
111 - 130%	1 - 50%	111 - 130%	1 - 50%
91 - 110%		91 - 110%	

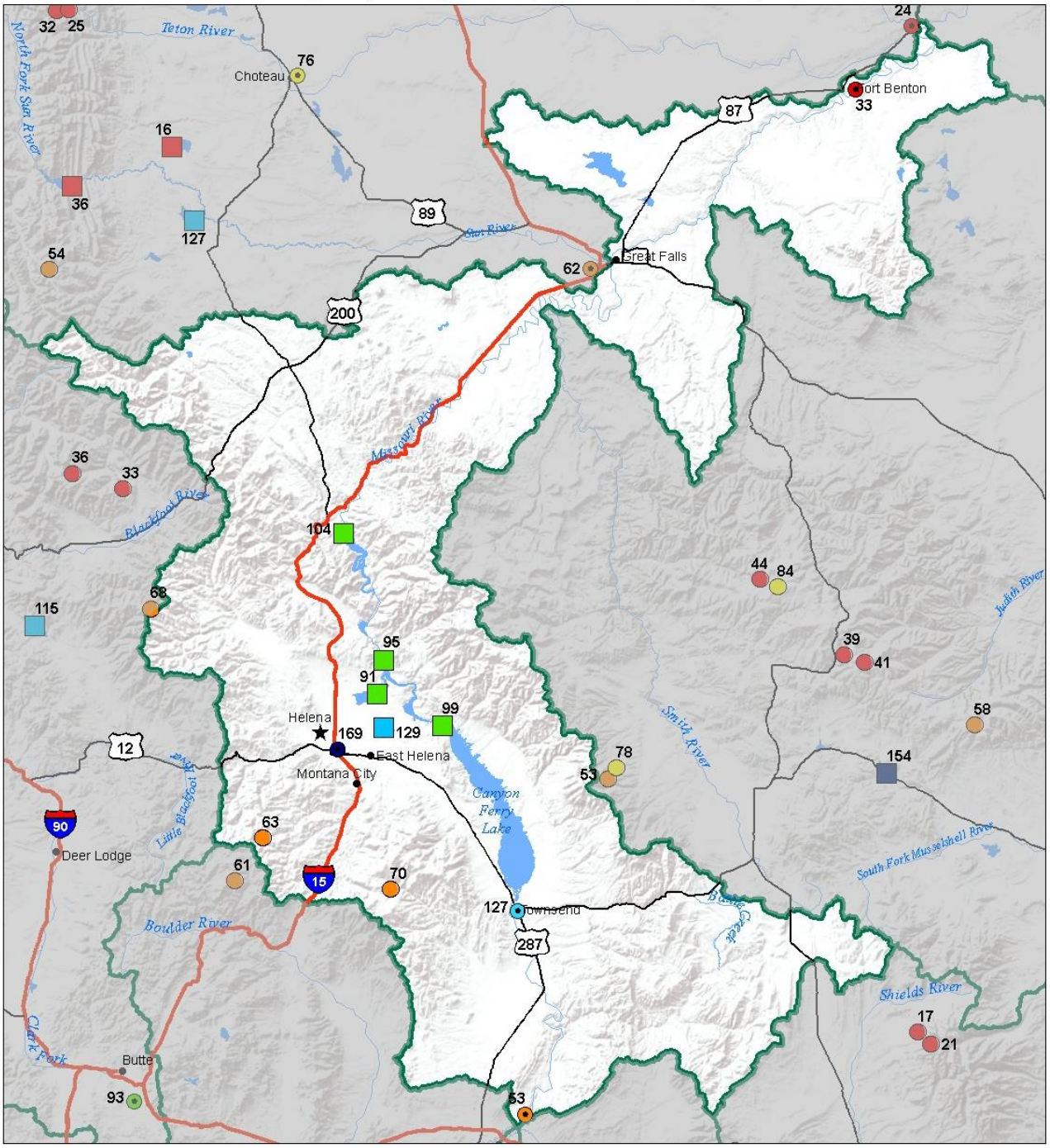
Reservoirs
Percent of Normal

- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%
- 71 - 90%
- 51 - 70%
- 1 - 50%

USDA

Montana State Library Natural Resource Information System

Headwaters Mainstem (Missouri) River Basin
Monthly Precipitation and Reservoir Levels
Percentage of Normal
April 1, 2019 (March 1, 2019 - April 1, 2019)



Precipitation
Percent of Normal

SNOTEL		COOP/ACIS	
> 150%	71 - 90%	> 150%	71 - 90%
131 - 150%	51 - 70%	131 - 150%	51 - 70%
111 - 130%	1 - 50%	111 - 130%	1 - 50%
91 - 110%		91 - 110%	

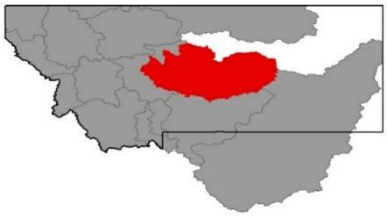
Reservoirs
Percent of Normal

- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%
- 71 - 90%
- 51 - 70%
- 1 - 50%

USDA

Montana State Library Natural Resource Information System

Smith-Judith-Musselshell River Basin



Good snowpack, above average storage in reservoirs, and valleys finally melting…everything seems to be aligning for water users in the Smith-Judith-Musselshell River basin this year. But the story of this year's runoff isn't over yet. March ended up being record dry at a few sites in the Little Belt, Crazy and Big Snowy Mountains. This is in stark contrast to February. That said, February was such a big month that it helped to insulate the snowpack percentages on April 1st, and two-month precipitation totals are still above average. However, if this trend continues into spring and summer, the final chapter of the story could be very different. This is because spring and early summer precipitation play a critical role in the hydrology of the rivers in this area and it has been said that "winter doesn't start in the basin until spring." April through June are typically the biggest months with regards to precipitation for the whole year, and below normal precipitation would certainly impact runoff prospects. For now, the snowpack component of runoff is in good shape in the basin, but the coming months will dictate the timing and magnitude of runoff this spring and summer. Will it stay dry like March or be wet like February?

Smith Judith Musselshell River Basin Data Summary

Snowpack	**Percent of 1981-2010 Normal (Median)**	**Last Year Percentage of Normal (Median)**
SMITH	108%	129%
HIGHWOOD	128%	97%
JUDITH	101%	120%
MUSSELSHELL	117%	180%
Basin-Wide Snowpack	**108%**	**139%**

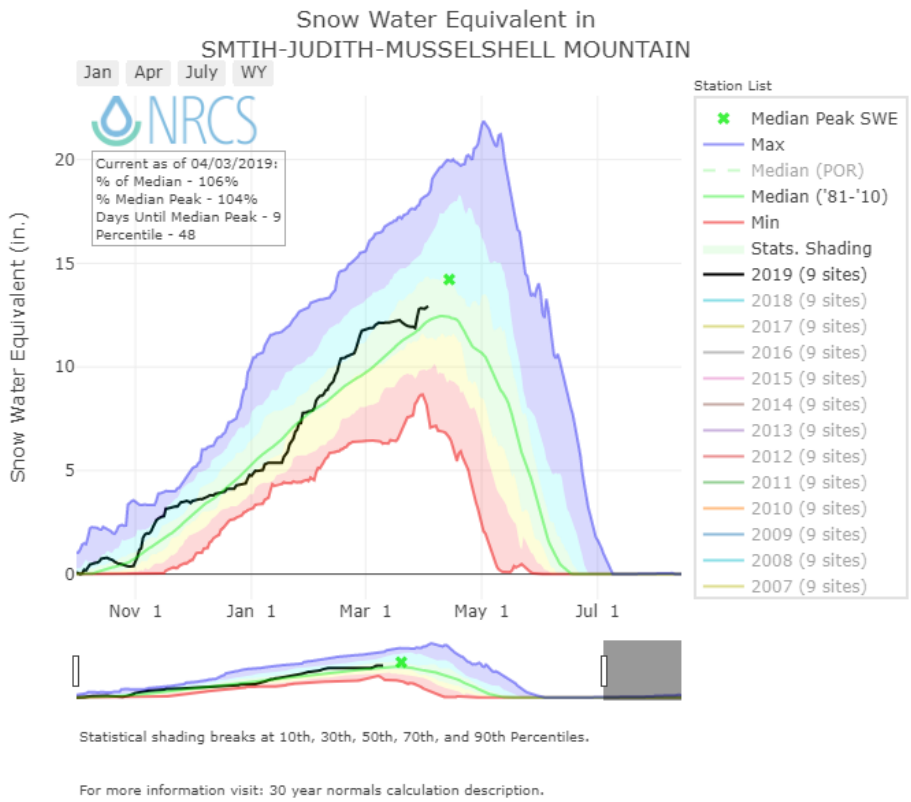
Precipitation	**Monthly Percentage of Average**	**WYTD Percentage of 1981-2010 Average***	**WYTD Last Year Percentage of Average**
Mountain Precipitation	50%	103%	115%
Valley Precipitation	16%	103%	106%
Basin-Wide Precipitation	**48%**	**103%**	**115%**

*Water Year-to-Date (WYTD) Precipitation is October 1st - Current

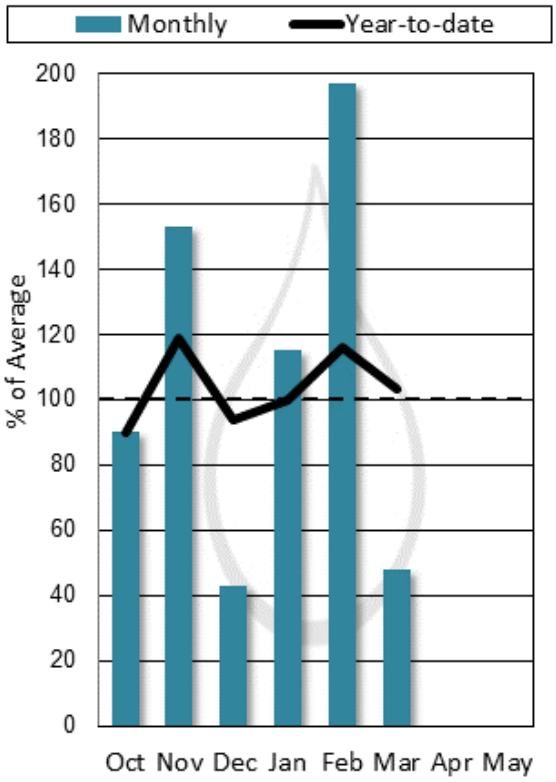
Reservoir Storage	**Percentage of Average**	**Percentage of Capacity (Total)**	**Last Year Percentage of Average**
Basin-Wide Storage	**139%**	**87%**	**133%**

**See Reservoir Storage Table for storage in individual reservoirs*

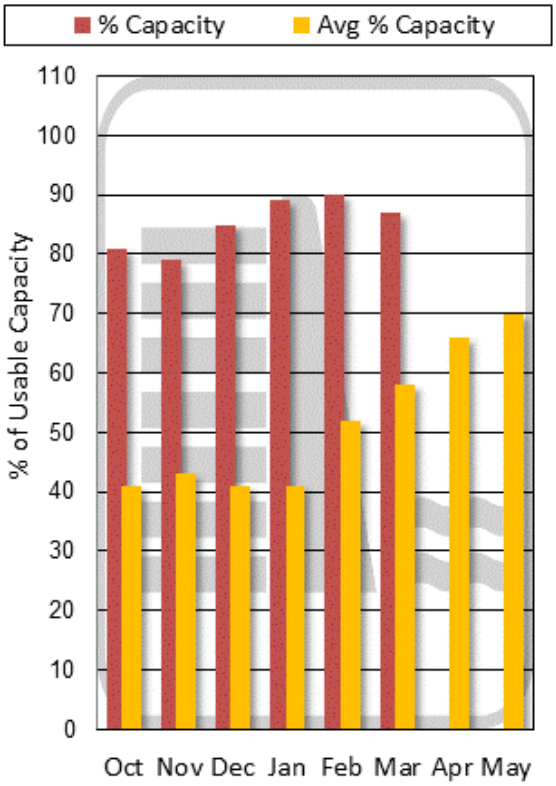
(click on chart below to navigate to online version with additional features)



Mountain and Valley Precipitation



End of Month Reservoir Storage

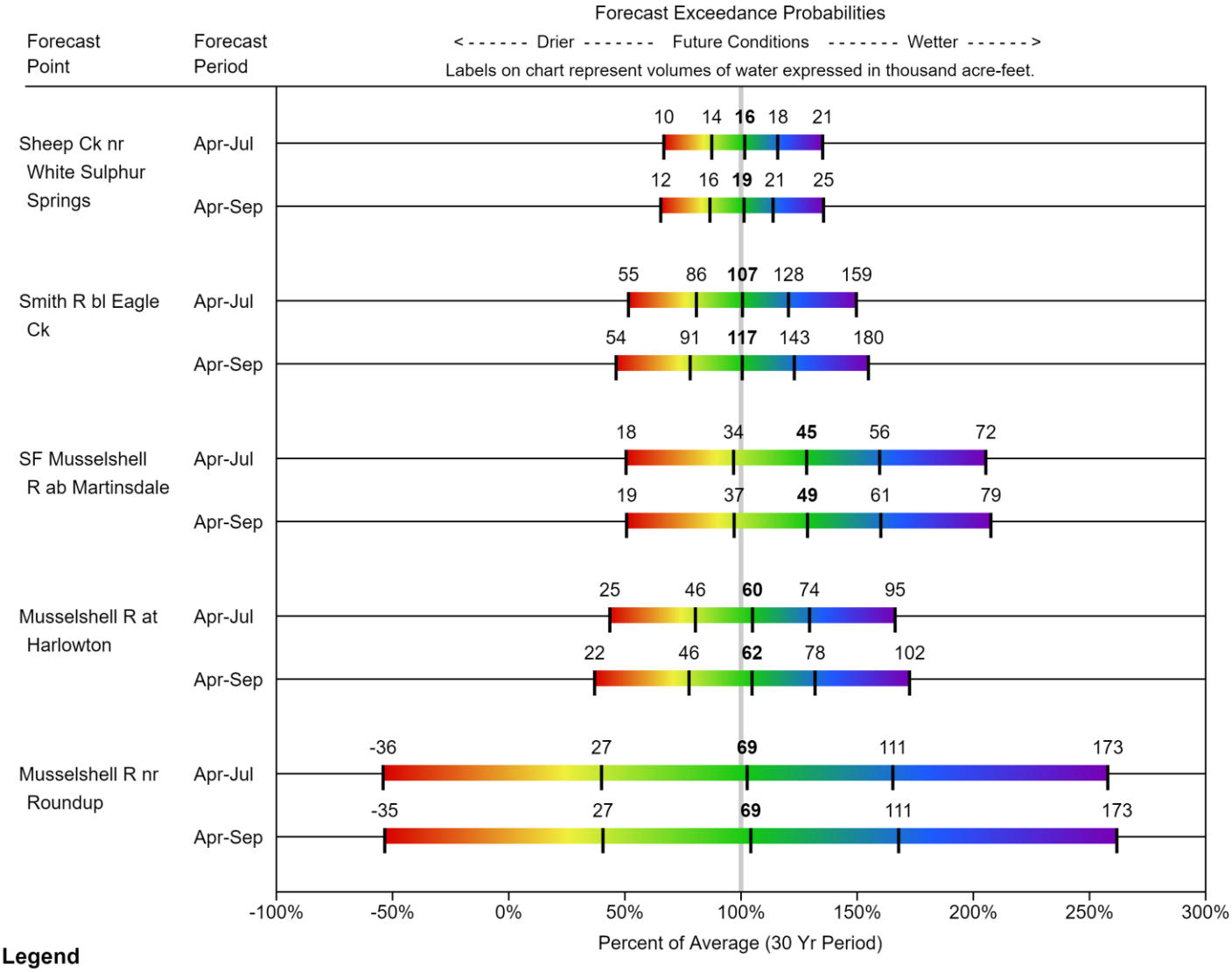


Storage above is averaged for all reservoirs in the basin. For individual reservoirs see table below.

SMITH-JUDITH-MUSSELSHELL

Water Supply Forecasts

April 1, 2019



Legend

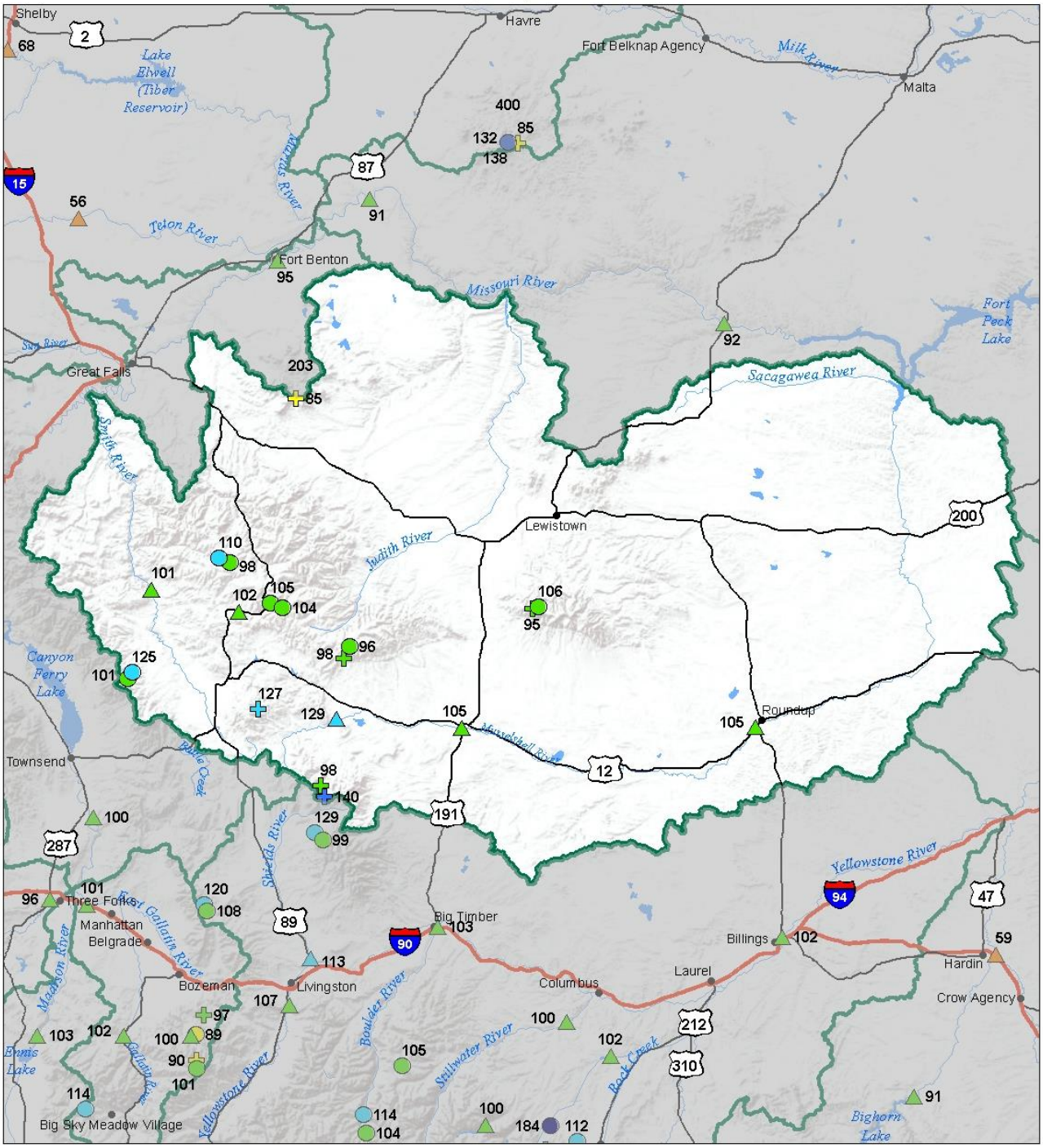
95% or 90% Exceedance	70% Exceedance	**50% Exceedance**	30% Exceedance	10% or 5% Exceedance
There is a 95%/90% chance that flows will exceed this volume	There is a 70% chance that flows will exceed this volume	There is a 50% chance that flows will exceed this volume	There is a 30% chance that flows will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

Smith-Judith-Musselshell River Basin
Streamflow Forecast, Snow Water Equivalent
Percentage of Normal
April 1, 2019



Snow Water Equivalent
Percent of Normal

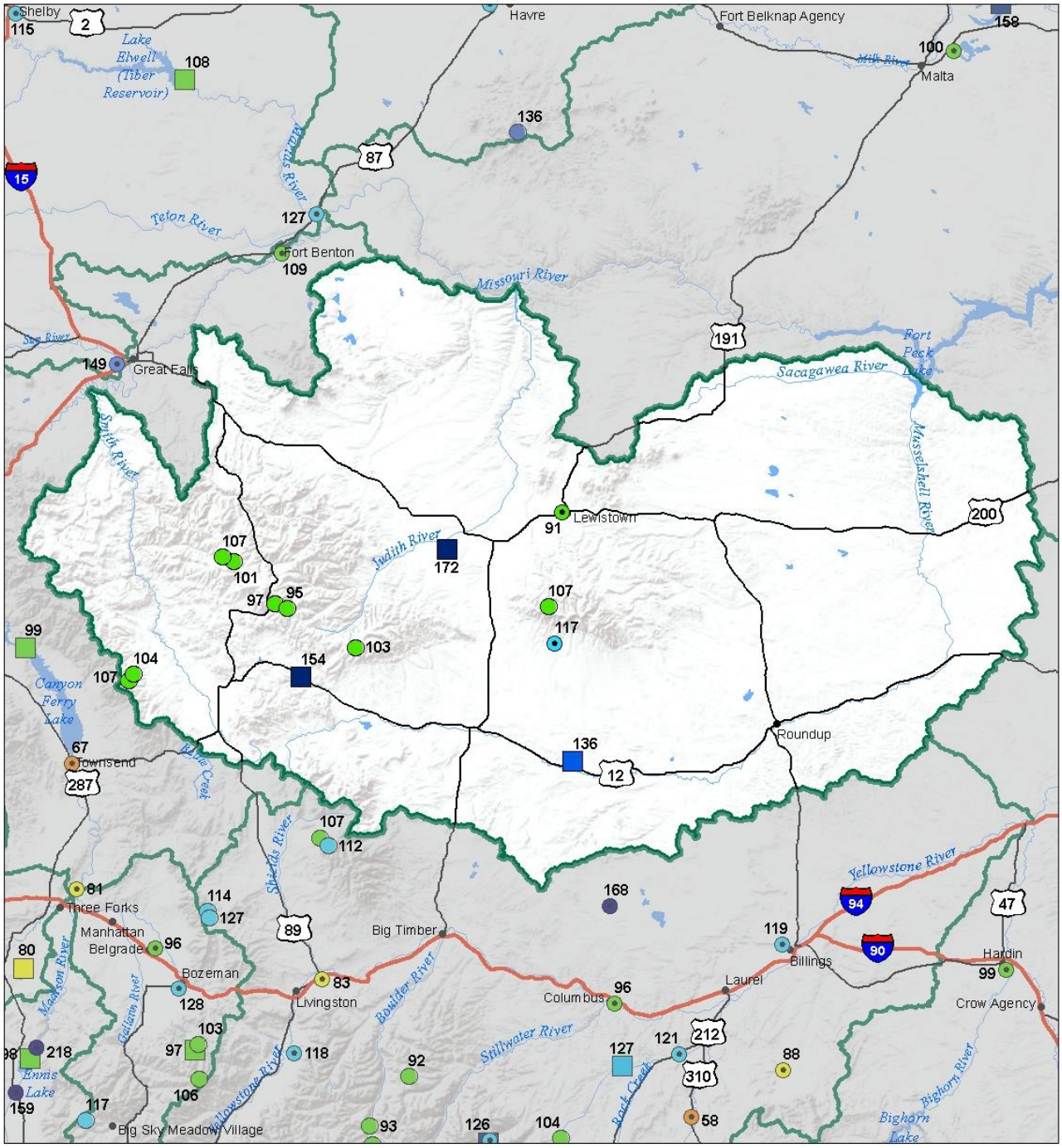
SNOTEL				Snowcourse			
> 150%	71 - 90%			> 150%	71 - 90%		
131 - 150%	51 - 70%			131 - 150%	51 - 70%		
111 - 130%	1 - 50%			111 - 130%	1 - 50%		
91 - 110%	0%			91 - 110%	0%		

Streamflow Forecast
Percent of Average Flows

- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%
- 71 - 90%
- 51 - 70%
- 1 - 50%

USDA
Montana State Library Natural Resource Information System

Smith-Judith-Musselshell River Basin
Water Year to Date Precipitation and Reservoir Levels
Percentage of Normal
April 1, 2019



Precipitation
Percent of Normal

SNOTEL		COOP/ACIS	
> 150%	71 - 90%	> 150%	71 - 90%
131 - 150%	51 - 70%	131 - 150%	51 - 70%
111 - 130%	1 - 50%	111 - 130%	1 - 50%
91 - 110%		91 - 110%	

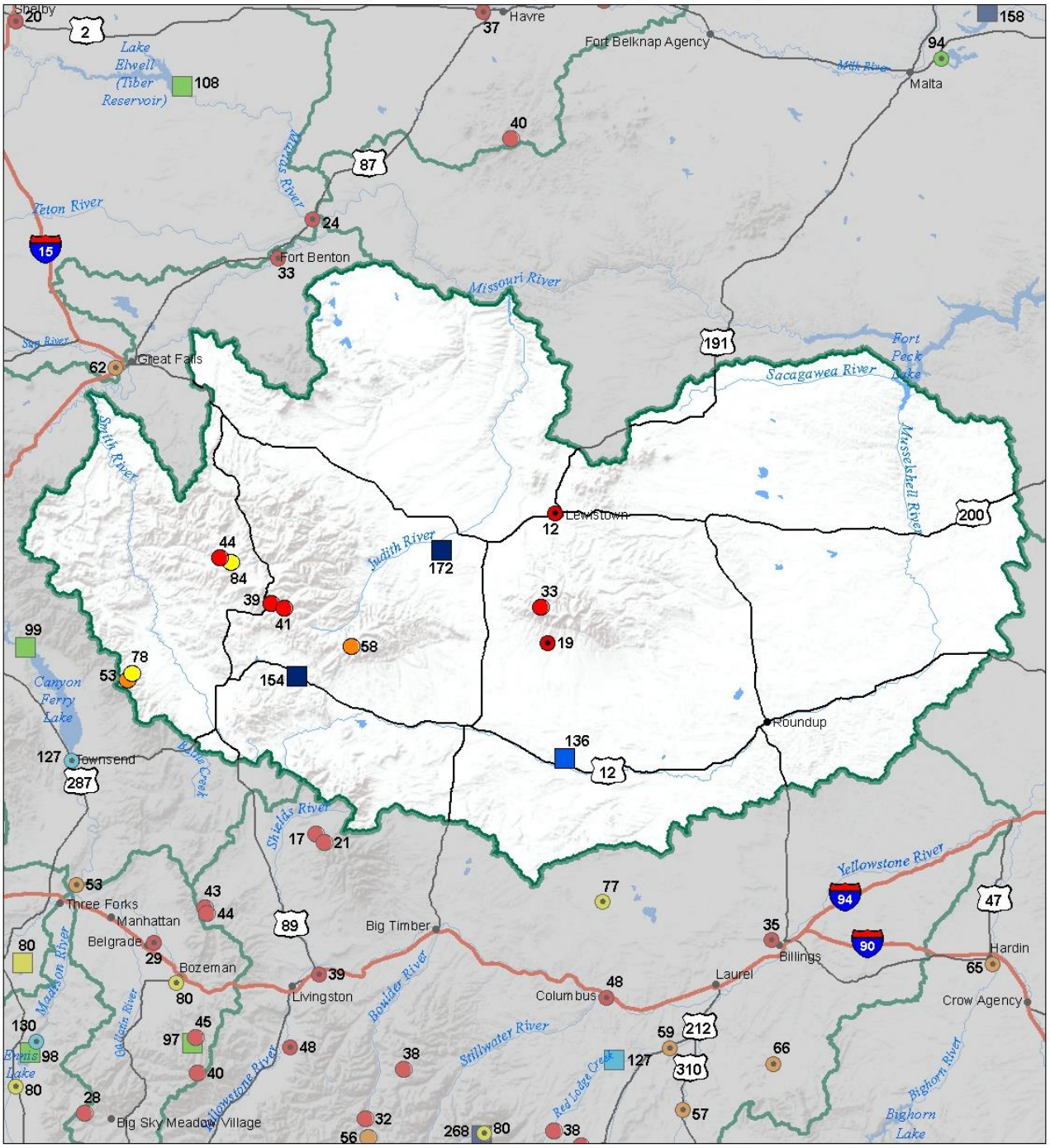
Reservoirs
Percent of Normal

- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%
- 71 - 90%
- 51 - 70%
- 1 - 50%

USDA

Montana State Library Natural Resource Information System

Smith-Judith-Musselshell River Basin
Monthly Precipitation and Reservoir Levels
Percentage of Normal
April 1, 2019 (March 1, 2019 - April 1, 2019)



Precipitation
Percent of Normal

SNOTEL		COOP/ACIS	
> 150%	71 - 90%	> 150%	71 - 90%
131 - 150%	51 - 70%	131 - 150%	51 - 70%
111 - 130%	1 - 50%	111 - 130%	1 - 50%
91 - 110%		91 - 110%	

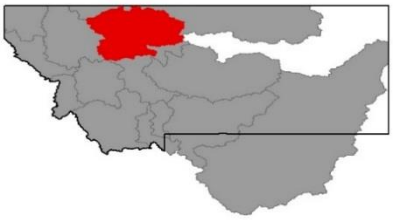
Reservoirs
Percent of Normal

- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%
- 71 - 90%
- 51 - 70%
- 1 - 50%

USDA

Montana State Library Natural Resource Information System

Sun-Teton-Marias River Basin



Winter hasn't been particularly kind with regards to snowfall in the Sun, Teton or Marias River basins. February and early March was a rough for those calving and at low elevations due to the brutally cold temperatures and abundant low elevation snow, but after the first week of March temperatures moderated to closer to seasonal normal. Unfortunately, the return to normal temperatures was accompanied by well below average monthly precipitation at mountain locations. 3 SNOTEL sites in the basin set new record lows for March monthly precipitation, resulting in decreases in snowpack totals from March 1st. Mid and high elevation SNOTEL sites within the basin are reporting below normal snowpack for April 1st (69% to 87%), while low elevation sites are reporting snowpack that is close to normal for this date. Valley locations have been more fortunate precipitation-wise and reported below normal precipitation for the month but remain well above average for water-year precipitation. Storage in local reservoirs is on the rise this month due to melting of low elevation snowpack and will continue to rise through April. What remains to be seen is if this dry pattern continues into the historically wet spring and summer months (April – June). It is important to remember that the snowpack also acts as our biggest reservoir and typically delivers water slowly through the spring and summer. Streamflow forecasts issued on April 1st are currently below average across the basin, but there is still time for those to change. One thing is for certain: spring and summer precipitation will play a critical role this year in the seasonal runoff.

Sun-Teton-Marias River Basin Data Summary

Snowpack	**Percent of 1981-2010 Normal (Median)**	**Last Year Percentage of Normal (Median)**
SUN	83%	156%
TETON	85%	138%
MARIAS	79%	130%
Basin-Wide Snowpack	**81%**	**142%**

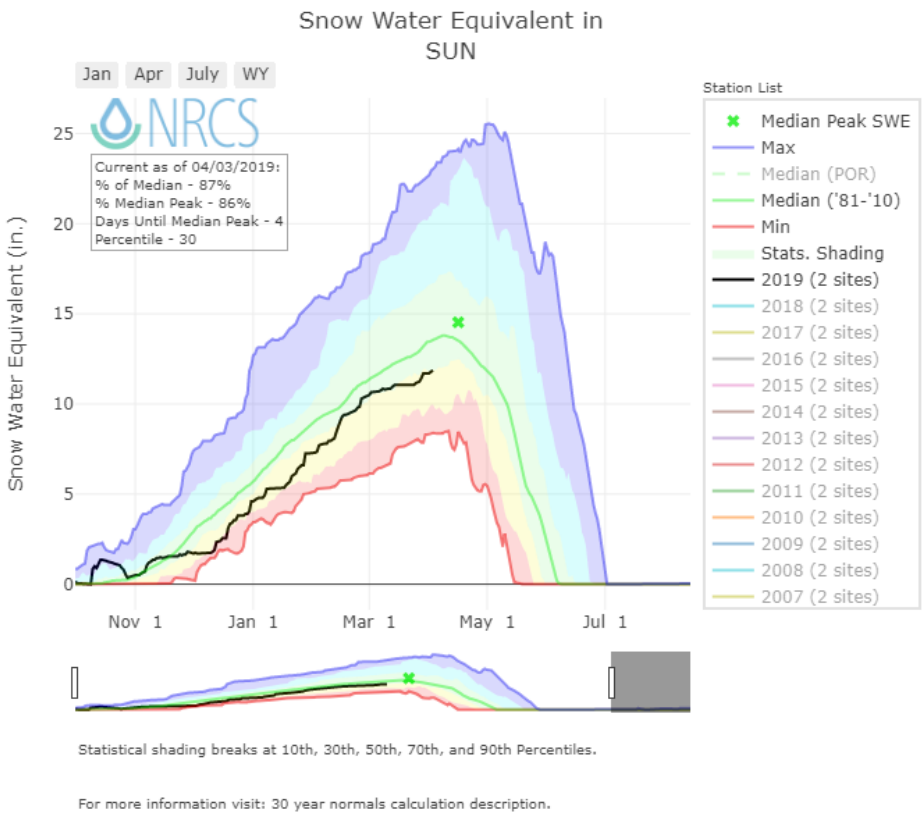
Precipitation	**Monthly Percentage of Average**	**WYTD Percentage of 1981-2010 Average***	**WYTD Last Year Percentage of Average**
Mountain Precipitation	36%	80%	133%
Valley Precipitation	76%	204%	252%
Basin-Wide Precipitation	**38%**	**85%**	**138%**

*Water Year-to-Date (WYTD) Precipitation is October 1st - Current

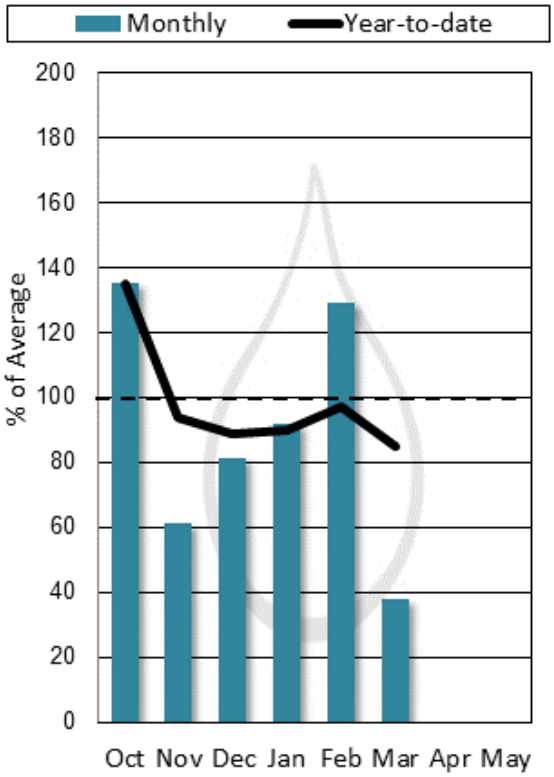
Reservoir Storage	**Percentage of Average**	**Percentage of Capacity (Total)**	**Last Year Percentage of Average**
Basin-Wide Storage	**105%**	**55%**	**100%**

**See Reservoir Storage Table for storage in individual reservoirs*

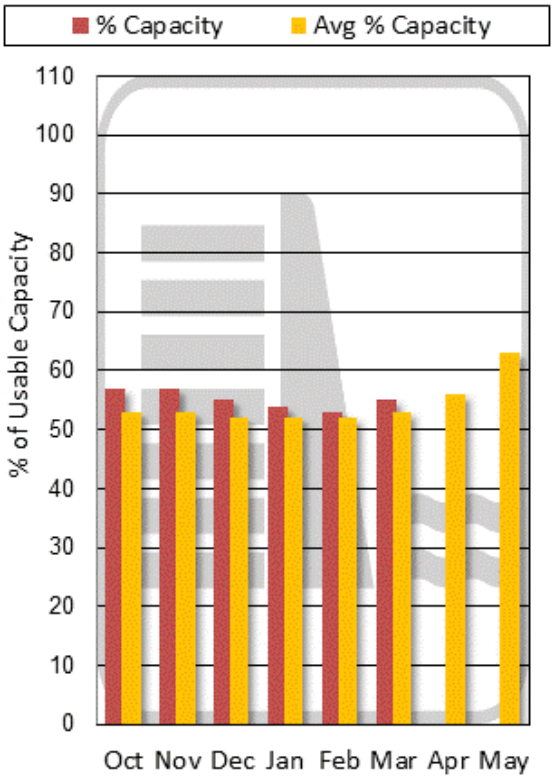
(click on chart below to navigate to online version with additional features)



Mountain and Valley Precipitation

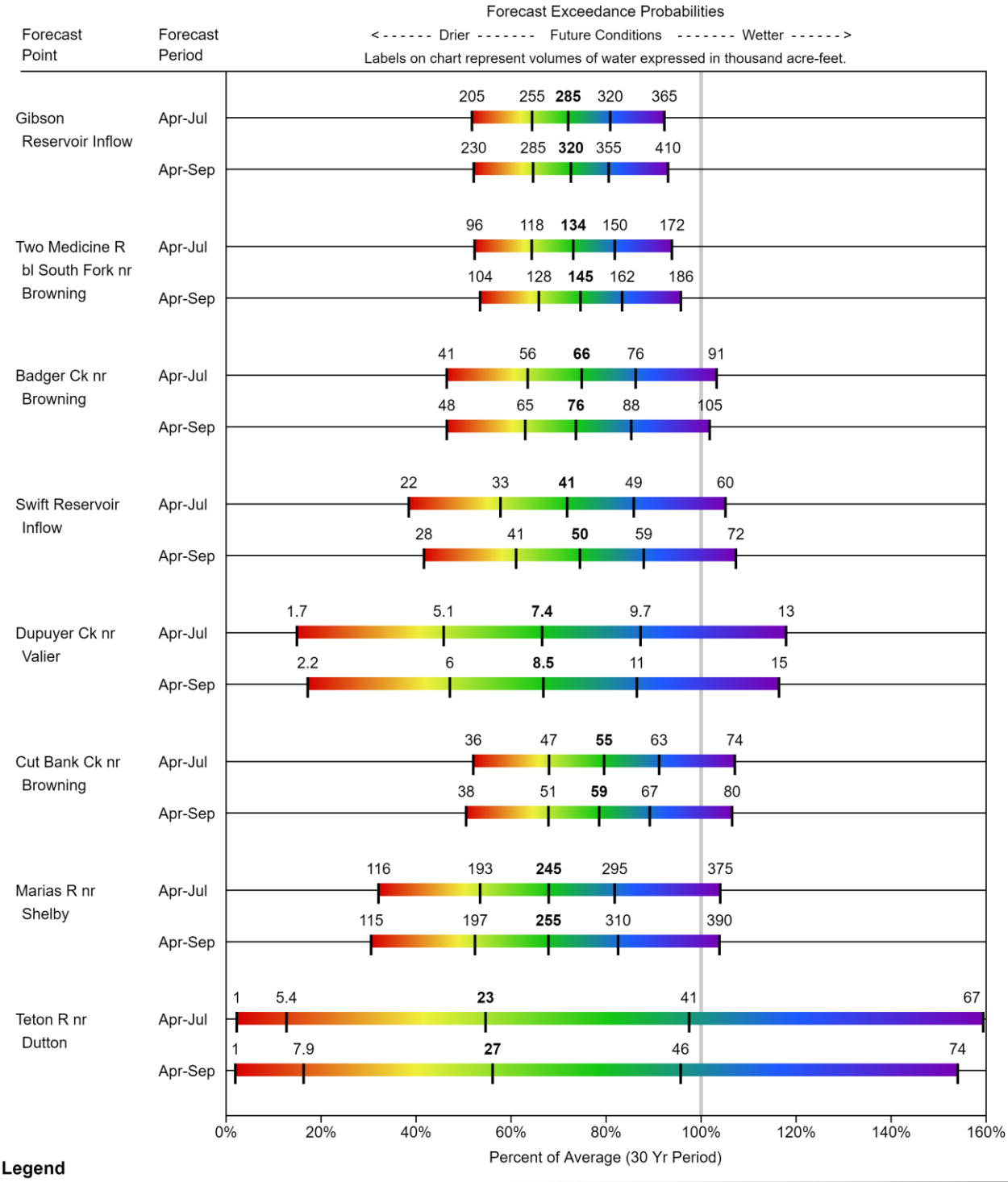


End of Month Reservoir Storage



Storage above is averaged for all reservoirs in the basin. For individual reservoirs see table below.

SUN-TETON-MARIAS
Water Supply Forecasts
April 1, 2019



Legend

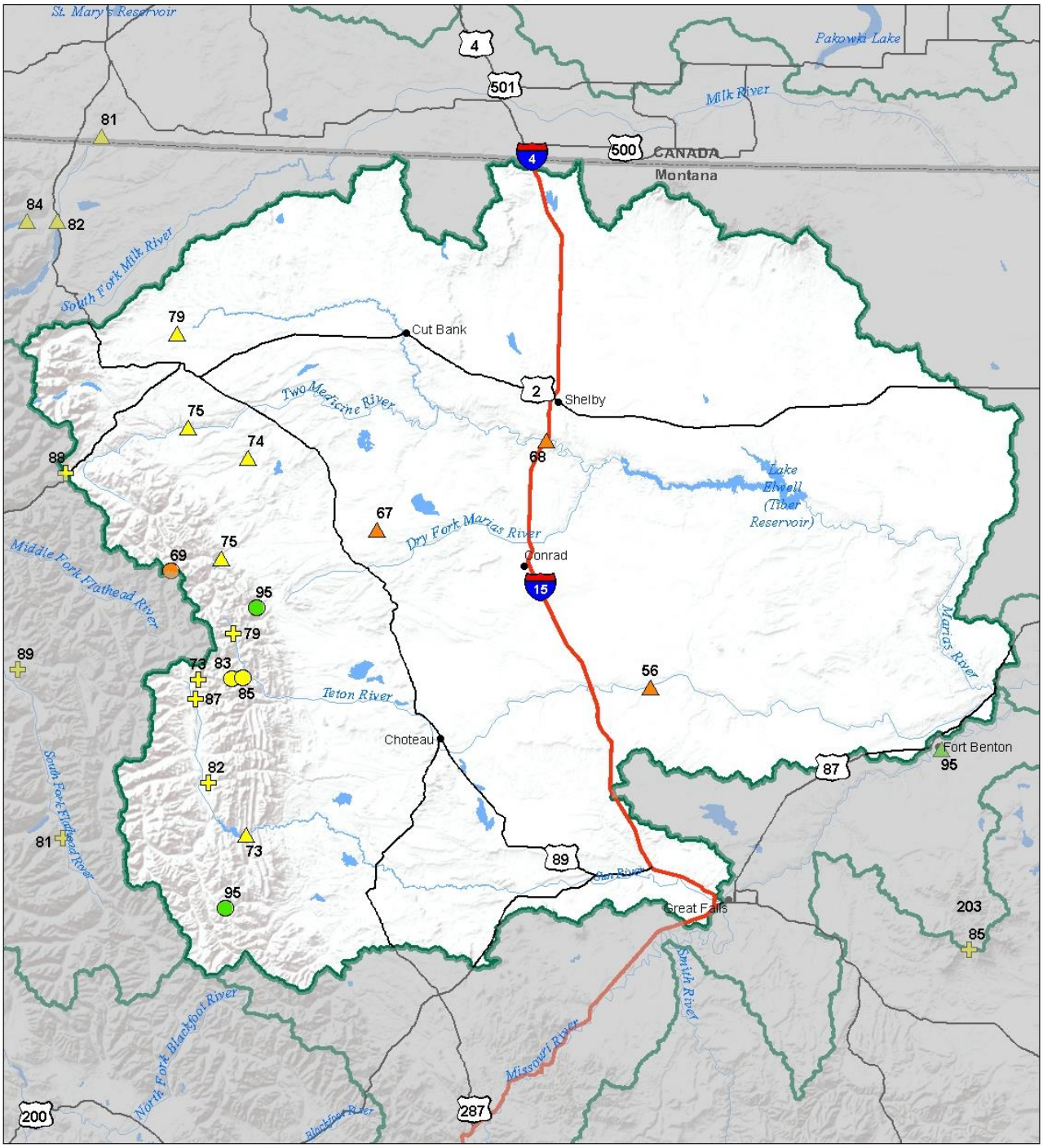
95% or 90% Exceedance	70% Exceedance	**50% Exceedance**	30% Exceedance	10% or 5% Exceedance
There is a 95%/90% chance that flows will exceed this volume	There is a 70% chance that flows will exceed this volume	There is a 50% chance that flows will exceed this volume	There is a 30% chance that flows will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

Sun-Teton-Marias River Basin
Streamflow Forecast, Snow Water Equivalent
Percentage of Normal
April 1, 2019



Snow Water Equivalent
Percent of Normal

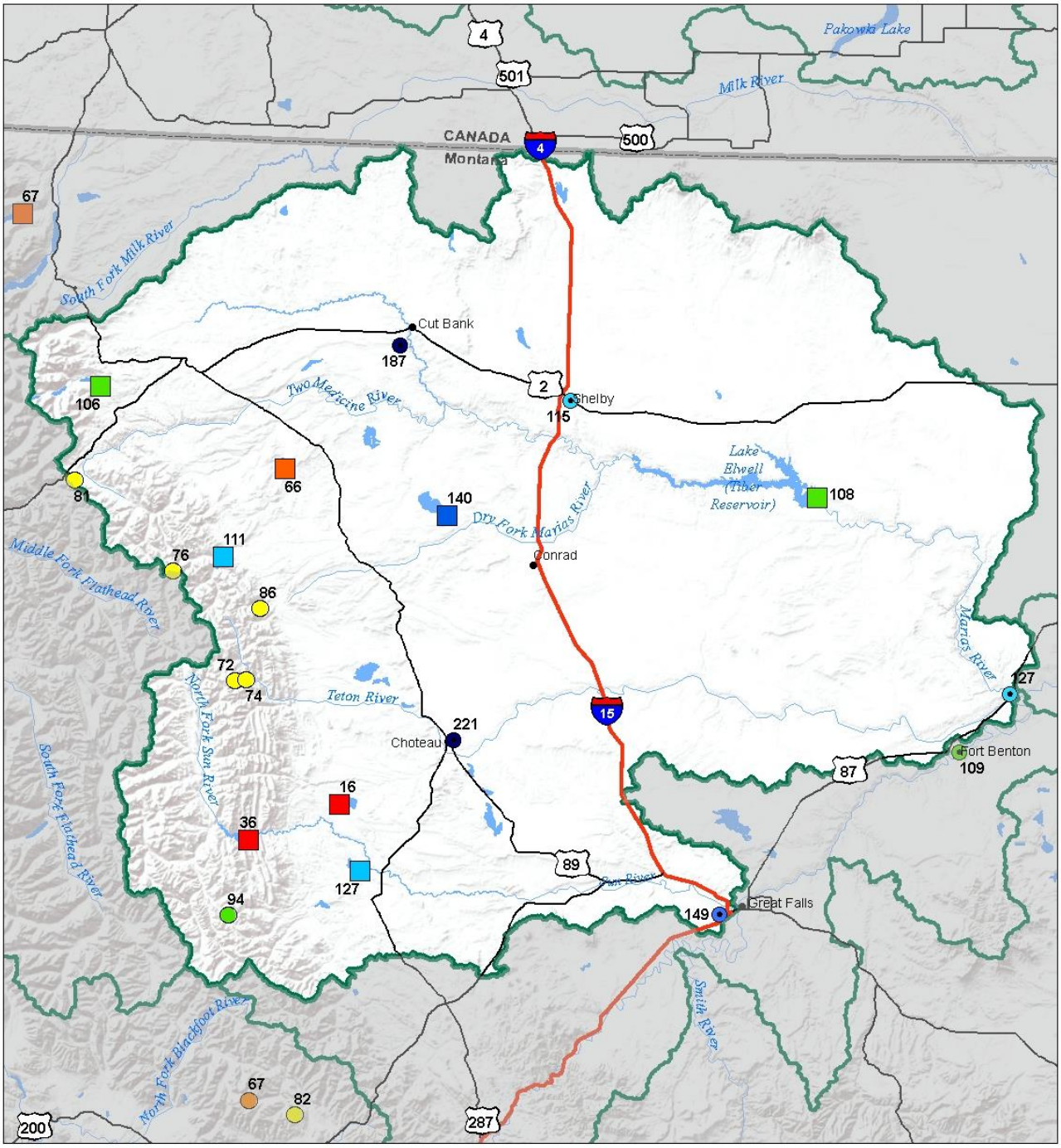
SNOTEL		Snowcourse	
> 150%	71 - 90%	> 150%	71 - 90%
131 - 150%	51 - 70%	131 - 150%	51 - 70%
111 - 130%	1 - 50%	111 - 130%	1 - 50%
91 - 110%	0%	91 - 110%	0%

Streamflow Forecast
Percent of Average Flows

- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%
- 71 - 90%
- 51 - 70%
- 1 - 50%

USDA
Montana State Library Natural Resource Information System

Sun-Teton-Marias River Basin
Water Year to Date Precipitation and Reservoir Levels
Percentage of Normal
April 1, 2019



Precipitation
Percent of Normal

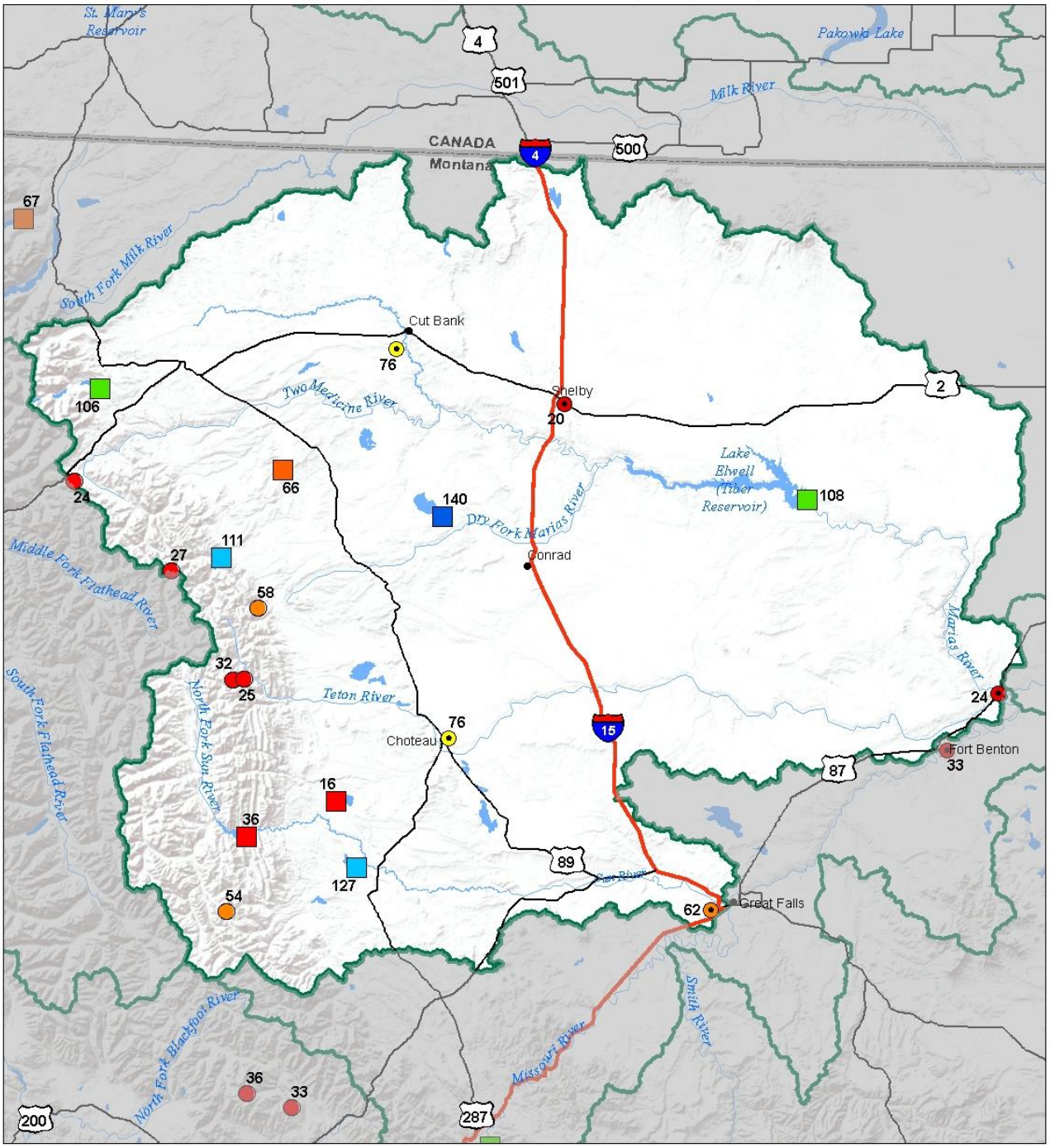
SNOTEL
- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%
- 71 - 90%
- 51 - 70%
- 1 - 50%

COOP/ACIS
- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%
- 71 - 90%
- 51 - 70%
- 1 - 50%

Reservoirs
Percent of Normal
- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%
- 71 - 90%
- 51 - 70%
- 1 - 50%

USDA
Montana State Library Natural Resource Information System

Sun-Teton-Marias River Basin
Monthly Precipitation and Reservoir Levels
Percentage of Normal
April 1, 2019 (March 1, 2019 - April 1, 2019)



Precipitation
Percent of Normal

SNOTEL		COOP/ACIS	
> 150%	71 - 90%	> 150%	71 - 90%
131 - 150%	51 - 70%	131 - 150%	51 - 70%
111 - 130%	1 - 50%	111 - 130%	1 - 50%
91 - 110%		91 - 110%	

Reservoirs
Percent of Normal

- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%
- 71 - 90%
- 51 - 70%
- 1 - 50%

USDA

Montana State Library Natural Resource Information System

St. Mary-Milk River Basin

March ended up as one of the driest on record, with monthly totals either second lowest or lowest on record at both SNOTEL sites located in Glacier National Park. These sites have had below normal snowpack throughout the winter and this month didn't help. Snowpack in the St. Mary River basin ranges from 76% to 78% of normal for April 1st, down from last month. Streamflow forecasts for the St. Mary reflect the below normal snowpack and water year precipitation and indicate below average seasonal volumes for the April 1st – July 31st time period.

Further east in the Milk River basin, snowcover on the plains melted during the latter half of the month in both Montana and Canada, causing significant increases in river volumes and some flooding in the region. Snowpack in the Bearpaw Mountains remains above average but also made the transition to melt during the middle of the month. Plains precipitation was well below average for the month of March in almost all locations except Malta. However, even with the below average month, water-year precipitation (October 1st – Current) remains above average across many parts of the basin.

St. Mary-Milk River Basin Data Summary

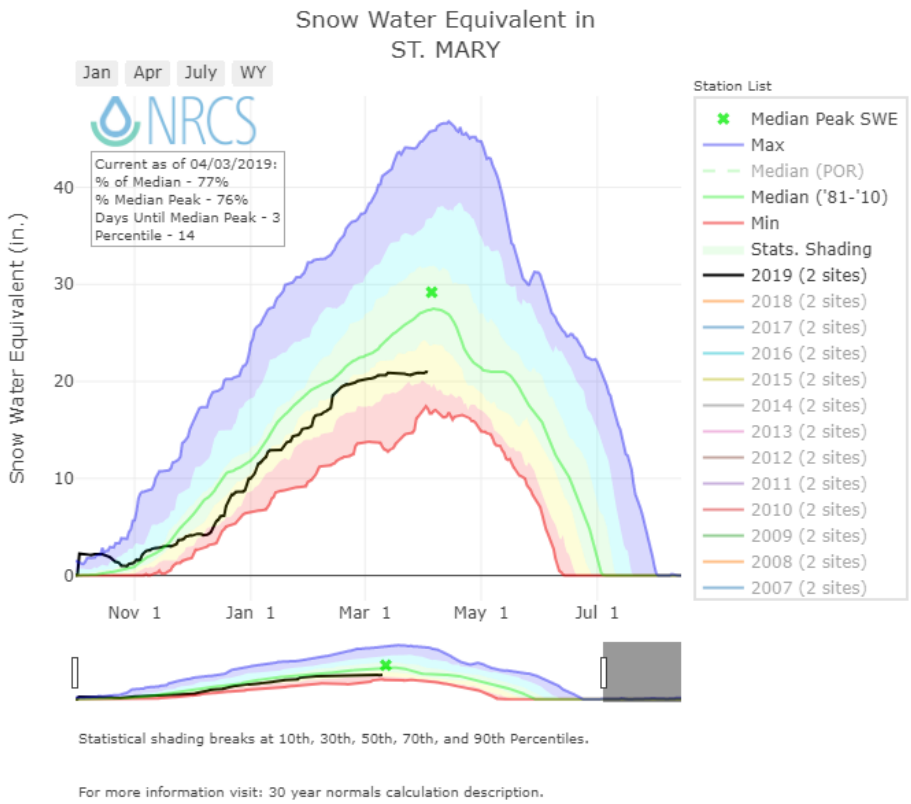
Snowpack	**Percent of 1981-2010 Normal (Median)**	**Last Year Percentage of Normal (Median)**
ST. MARY	77%	132%
BEARPAW MOUNTAINS	126%	164%
MILK RIVER BASIN	126%	164%
Basin-Wide	**126%**	**164%**

Precipitation	**Monthly Percentage of Average**	**WYTD Percentage of 1981-2010 Average***	**WYTD Last Year Percentage of Average**
Mountain Precipitation (St. Mary)	27%	75%	122%
Mountain Precipitation (Bearpaw Mtns)	40%	136%	159%
Valley Precipitation	47%	111%	160%
Basin-Wide Precipitation	**31%**	**86%**	**130%**

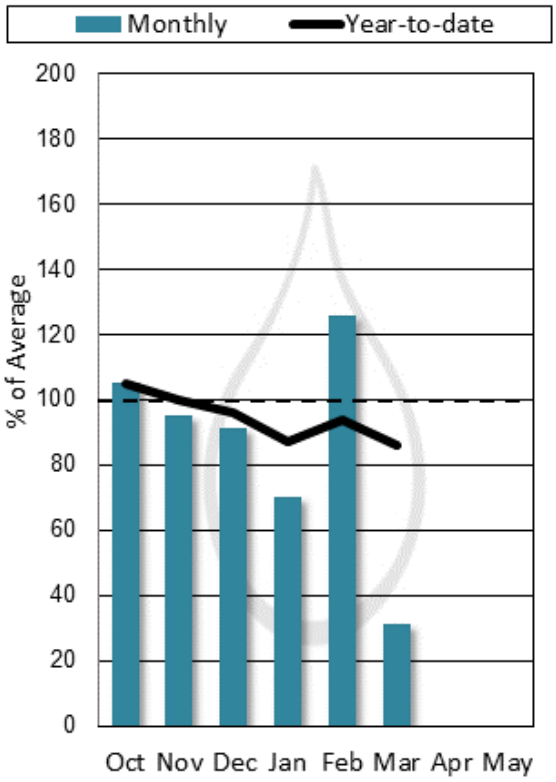
*Water Year-to-Date (WYTD) Precipitation is October 1st - Current

Reservoir Storage	**Percentage of Average**	**Percentage of Capacity (Total)**	**Last Year Percentage of Average**
Basin-Wide Storage	**112%**	**51%**	**88%**

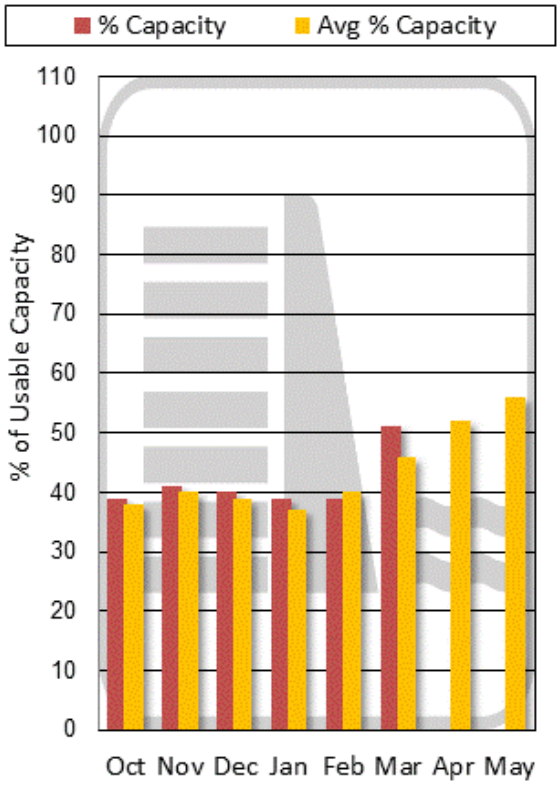
(click on chart below to navigate to online version with additional features)



Mountain and Valley Precipitation



End of Month Reservoir Storage

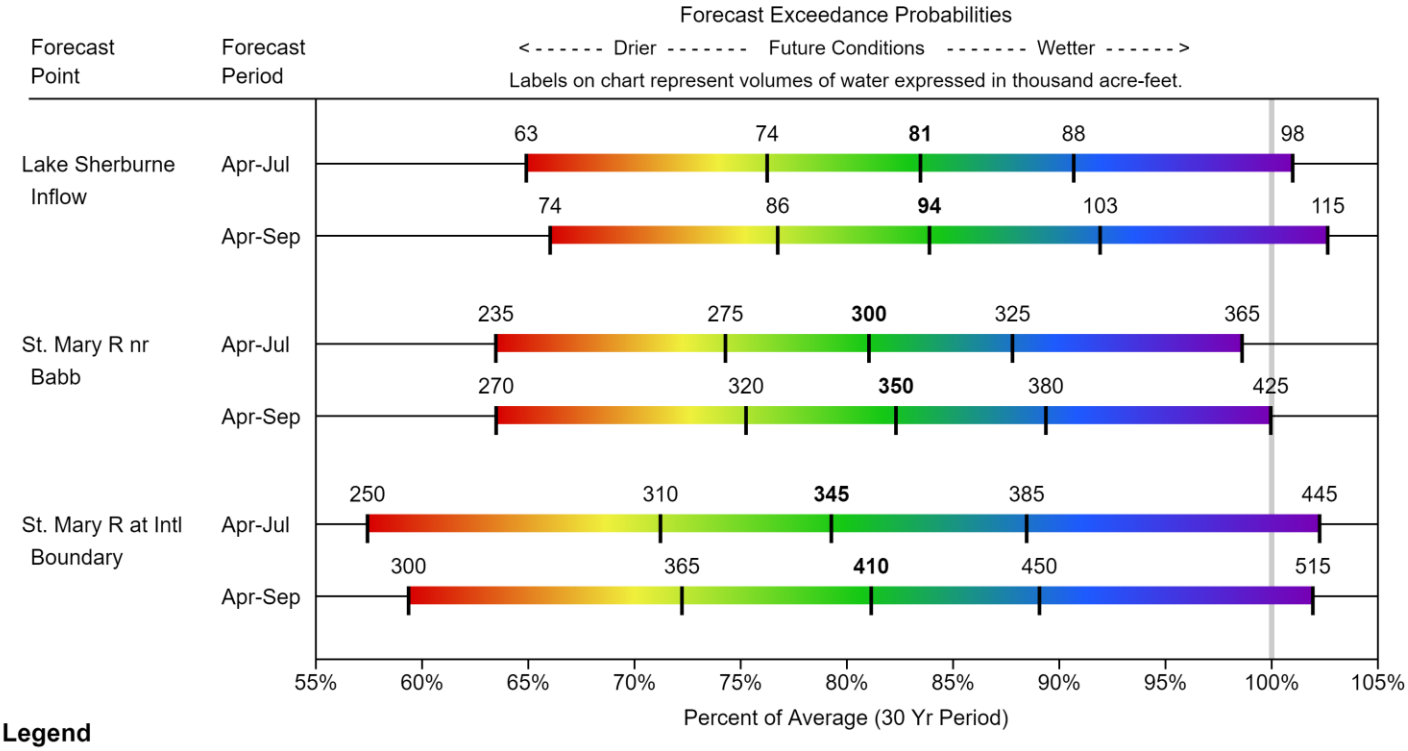


Storage above is averaged for all reservoirs in the basin. For individual reservoirs see table below.

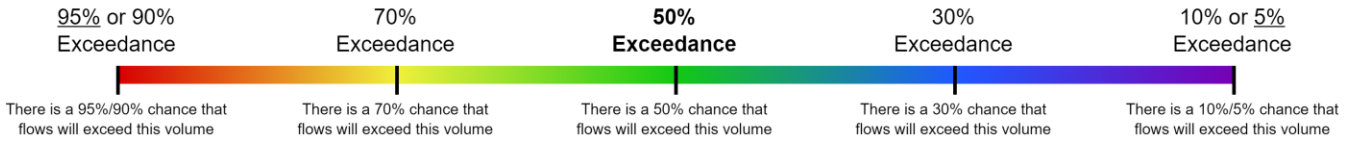
ST. MARY & MILK BASINS

Water Supply Forecasts

April 1, 2019



Legend



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

Period of Record Minimum Streamflow KAF (Year)

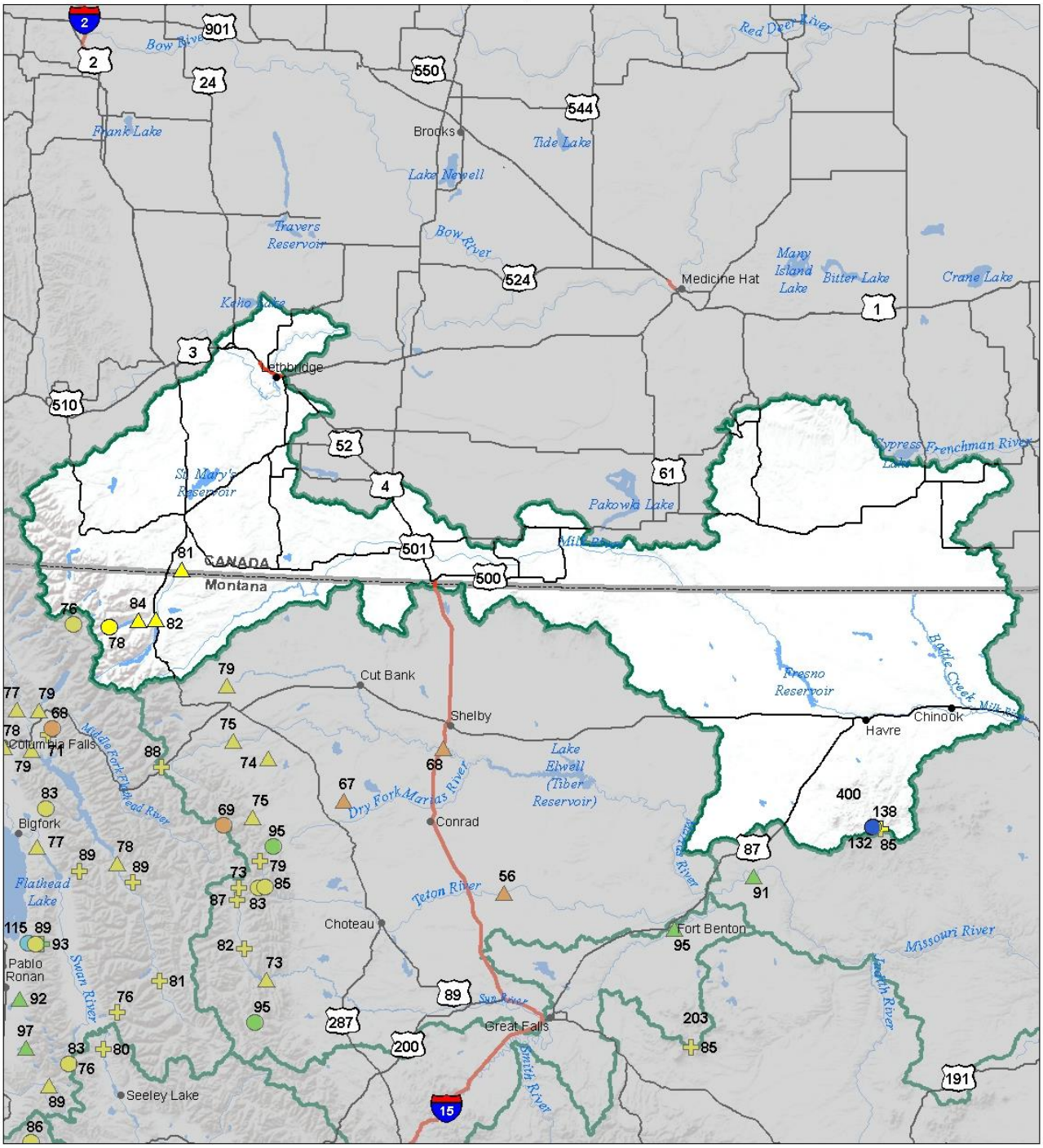
1981-2010 Normal Streamflow KAF

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.

St Mary's-Milk River Basin
Streamflow Forecast, Snow Water Equivalent
Percentage of Normal
April 1, 2019



Snow Water Equivalent
Percent of Normal

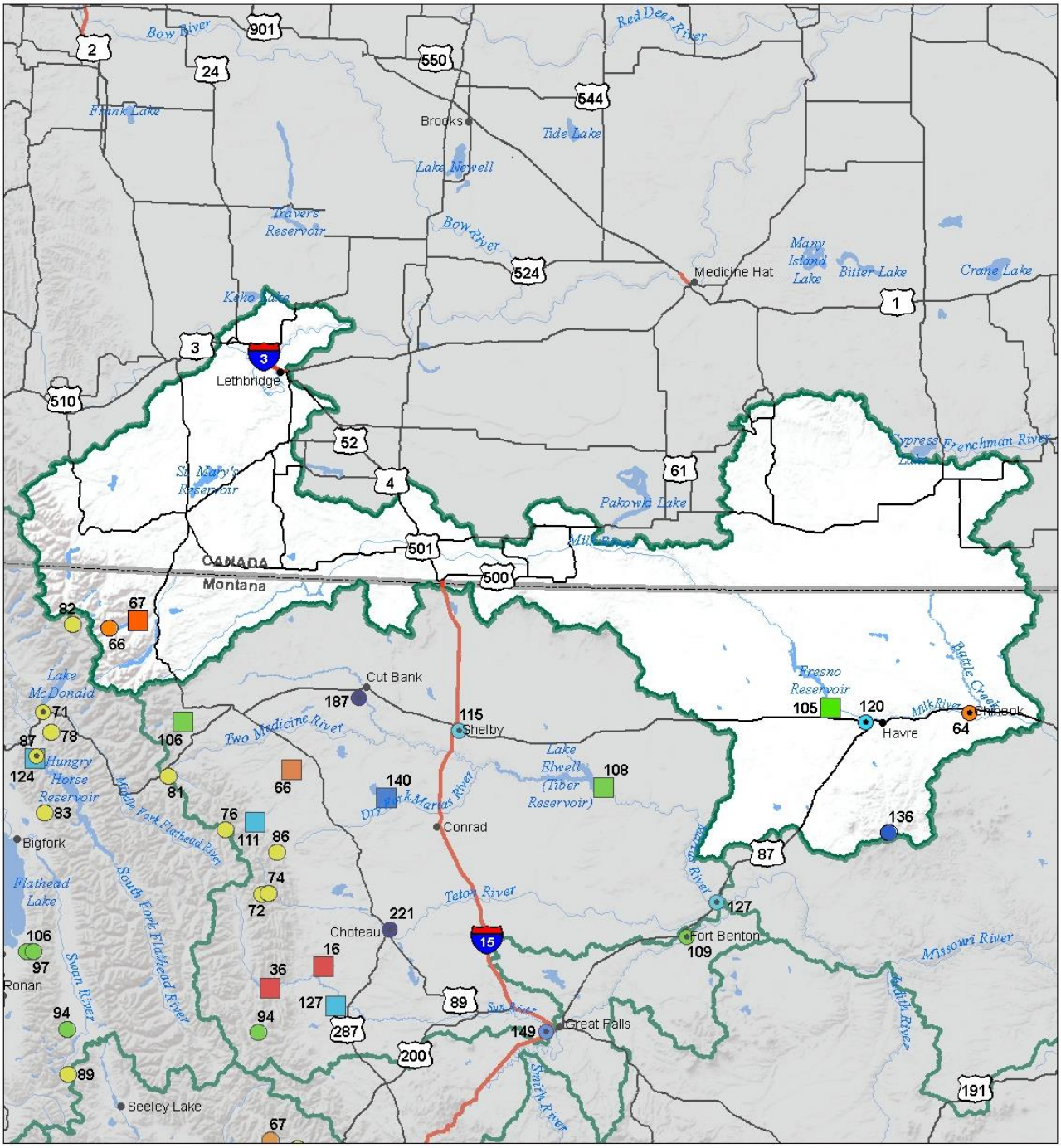
SNOTEL		Snowcourse	
> 150%	71 - 90%	> 150%	71 - 90%
131 - 150%	51 - 70%	131 - 150%	51 - 70%
111 - 130%	1 - 50%	111 - 130%	1 - 50%
91 - 110%	0%	91 - 110%	0%

Streamflow Forecast
Percent of Average Flows

- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%
- 71 - 90%
- 51 - 70%
- 1 - 50%

USDA
Montana State Library Natural Resource Information System

St Mary's-Milk River Basin
Water Year to Date Precipitation and Reservoir Levels
Percentage of Normal
April 1, 2019



Precipitation
Percent of Normal

SNOTEL		COOP/ACIS	
> 150%	71 - 90%	> 150%	71 - 90%
131 - 150%	51 - 70%	131 - 150%	51 - 70%
111 - 130%	1 - 50%	111 - 130%	1 - 50%
91 - 110%		91 - 110%	

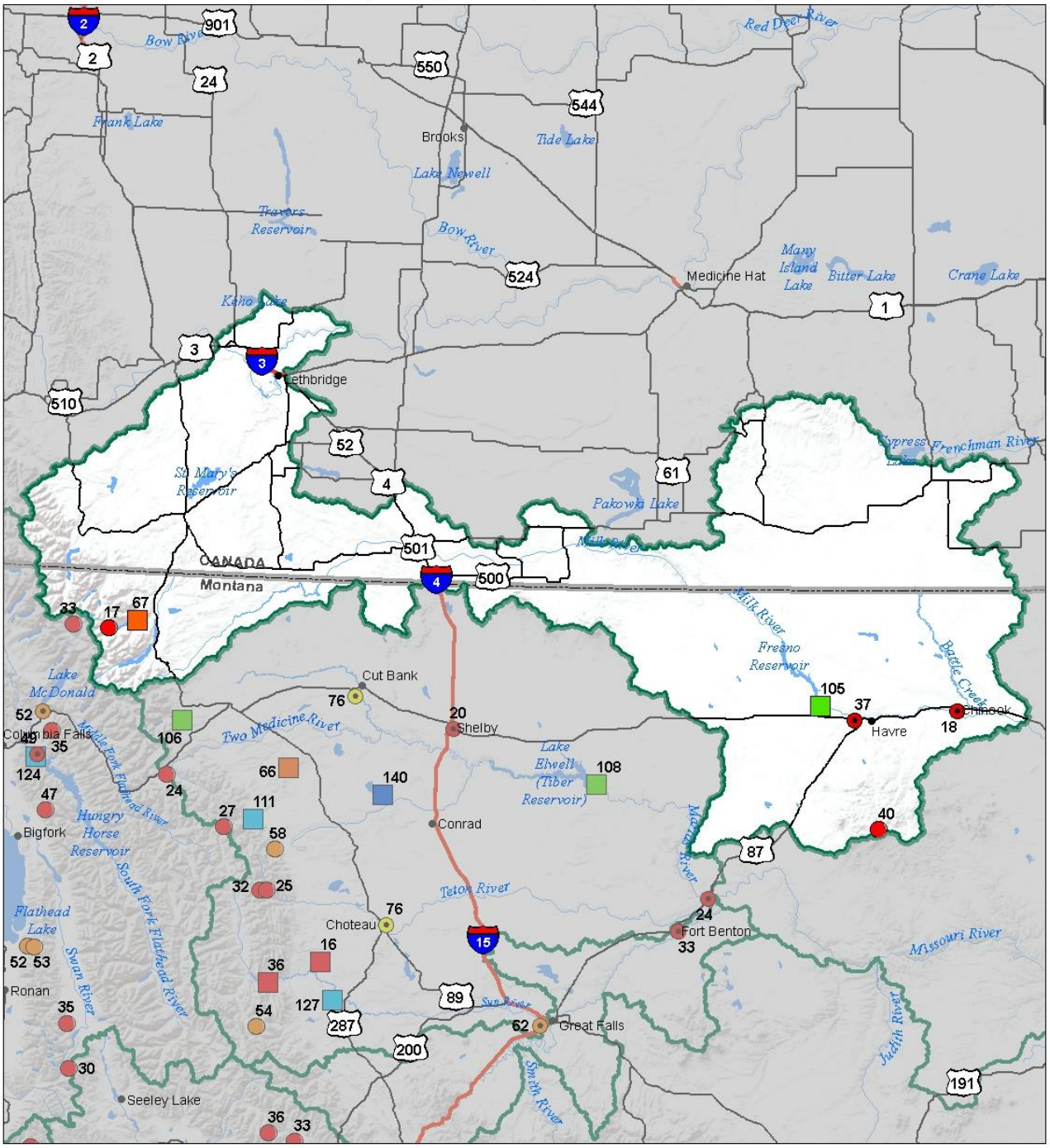
Reservoirs
Percent of Normal

- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%
- 71 - 90%
- 51 - 70%
- 1 - 50%

USDA

Montana State Library Natural Resource Information System

St Mary's-Milk River Basin
Monthly Precipitation and Reservoir Levels
Percentage of Normal
April 1, 2019 (March 1, 2019 - April 1, 2019)



Precipitation
Percent of Normal

SNOTEL		COOP/ACIS	
> 150%	71 - 90%	> 150%	71 - 90%
131 - 150%	51 - 70%	131 - 150%	51 - 70%
111 - 130%	1 - 50%	111 - 130%	1 - 50%
91 - 110%		91 - 110%	

Reservoirs
Percent of Normal

- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%
- 71 - 90%
- 51 - 70%
- 1 - 50%

USDA

Montana State Library Natural Resource Information System

Upper Yellowstone River Basin

After making huge gains in snowpack during the month of February, the month of March ended up being a disappointment snowpack-wise in the Upper Yellowstone River basin. Monthly snowfall totals were well below average, and some mountain SNOTEL sites within the northern half of the river basin set new record lows for March monthly precipitation. While the pattern change was of some concern, snowpack totals within the sub-basins remain near to above normal for April 1st. February was just that big. That said, it's not time to rest on our laurels as it would be unwise to assume this will translate into average to above-average runoff. April through June are historically the "biggest" months with regards to mountain and valley precipitation, so if the current dry pattern holds it would certainly impact the runoff prospects of this spring and summer. Streamflow forecasts issued on April 1st for the April 1st – July 31st period indicate near to above-average seasonal volumes but vary across the basin based on the river of interest. Please consult the forecast graphic below for individual forecasts. The next few months will dictate runoff in the Upper Yellowstone and by May 1st the snowpack component of runoff should be clearer, as snowpack typically peaks in mid-April to early May within the basin. For now, the snowpack is right where it needs to be, which is good news considering how dry it was in March.

Upper Yellowstone River Basin Data Summary

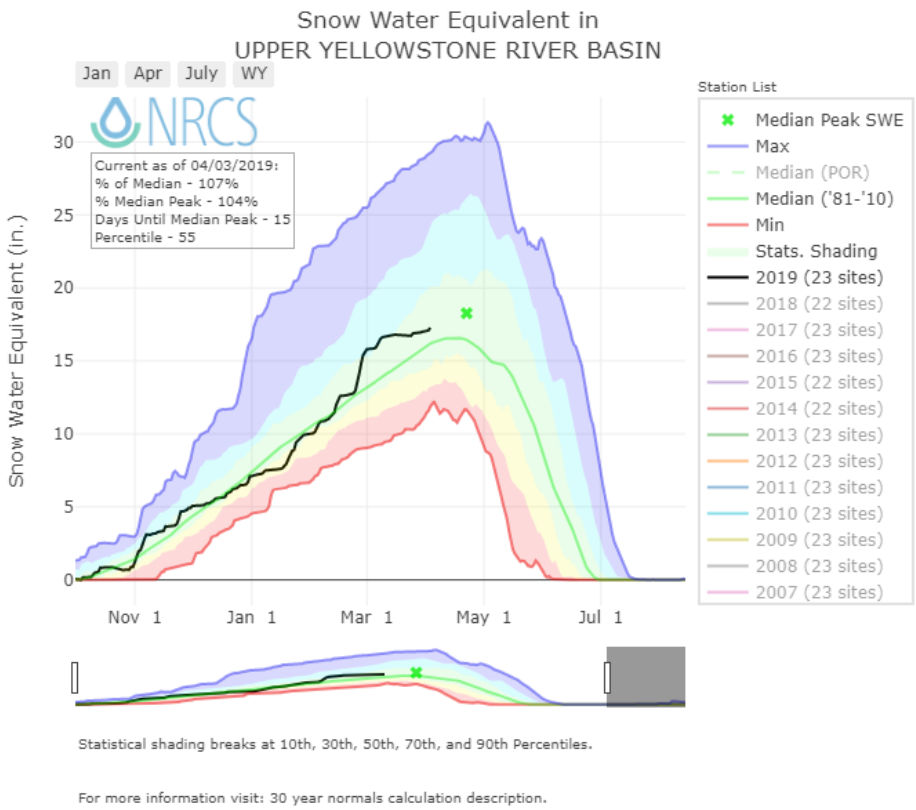
Snowpack	**Percent of 1981-2010 Normal (Median)**	**Last Year Percentage of Normal (Median)**
YELLOWSTONE ab LIVINGSTON	108%	148%
SHIELDS	117%	160%
BOULDER-STILLWATER	106%	166%
RED LODGE-ROCK CREEK	128%	129%
CLARK'S FORK	101%	173%
Basin-Wide Snowpack	**110%**	**153%**

Precipitation	**Monthly Percentage of Average**	**WYTD Percentage of 1981-2010 Average***	**WYTD Last Year Percentage of Average**
Mountain Precipitation	47%	105%	136%
Valley Precipitation	50%	111%	147%
Basin-Wide Precipitation	**48%**	**105%**	**137%**

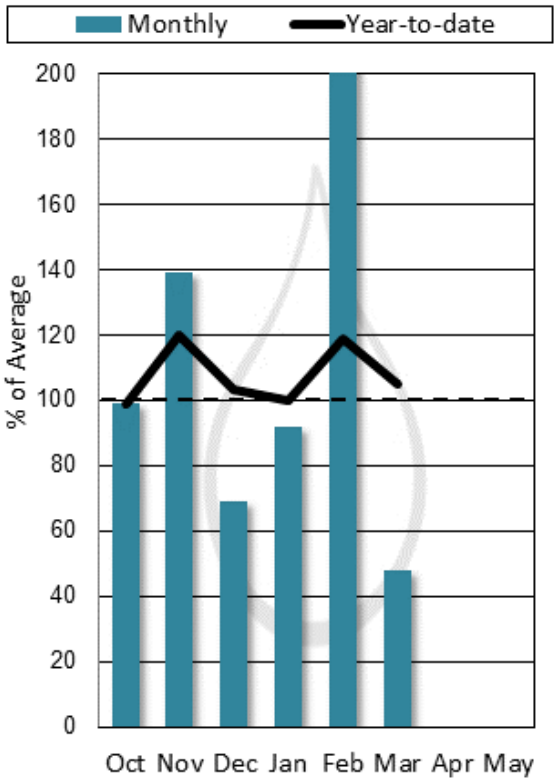
*Water Year-to-Date (WYTD) Precipitation is October 1st - Current

Reservoir Storage	**Percentage of Average**	**Percentage of Capacity (Total)**	**Last Year Percentage of Average**
Basin-Wide Storage	**134%**	**59%**	**107%**

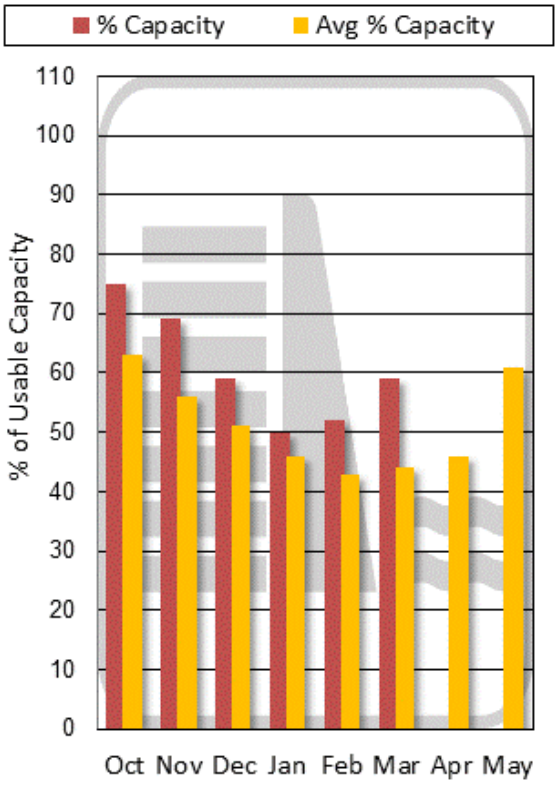
(click on chart below to navigate to [online version]() with additional features)



Mountain and Valley Precipitation



End of Month Reservoir Storage

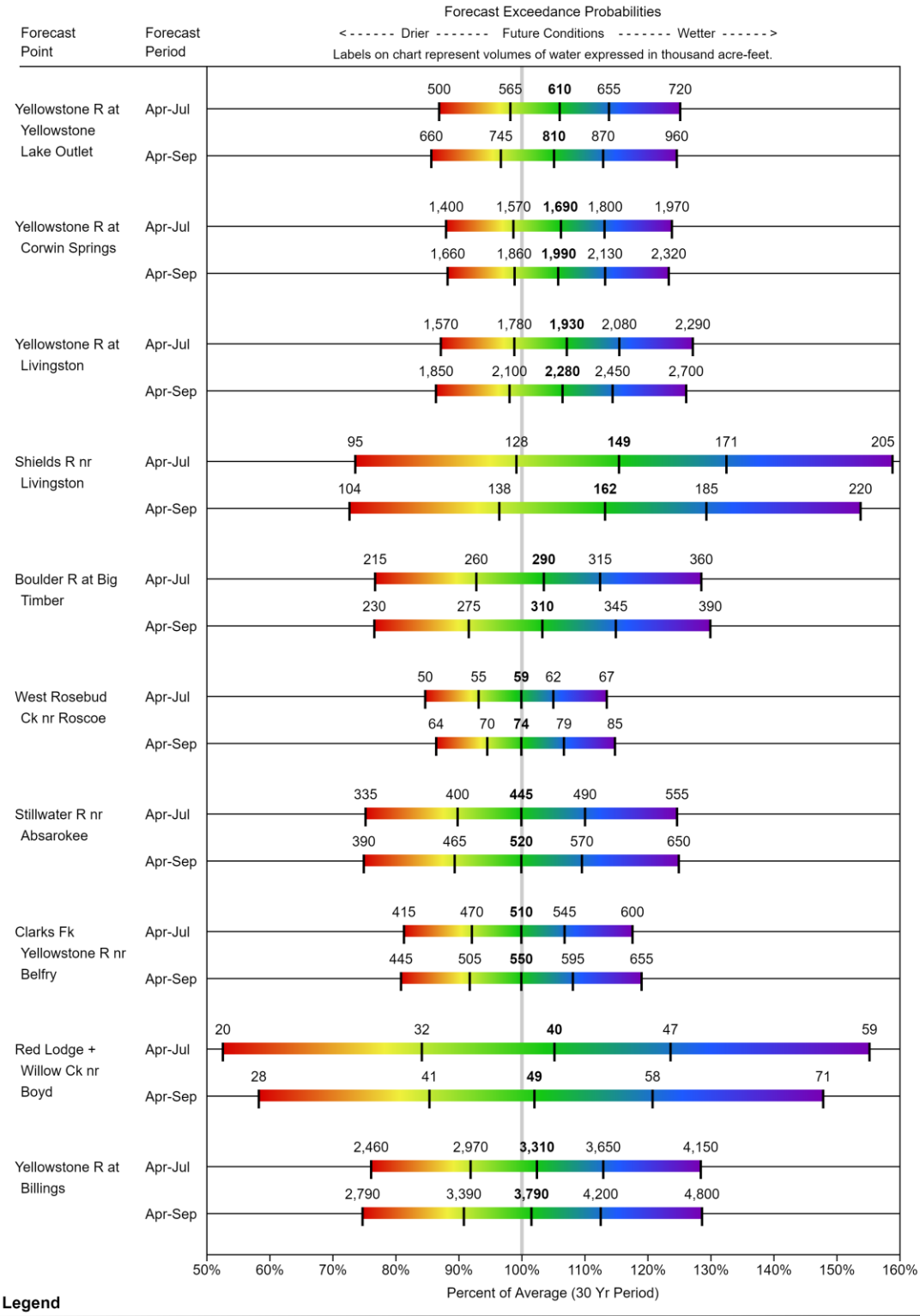


Storage above is averaged for all reservoirs in the basin. For individual reservoirs see table below.

UPPER YELLOWSTONE RIVER BASIN

Water Supply Forecasts

April 1, 2019



Legend

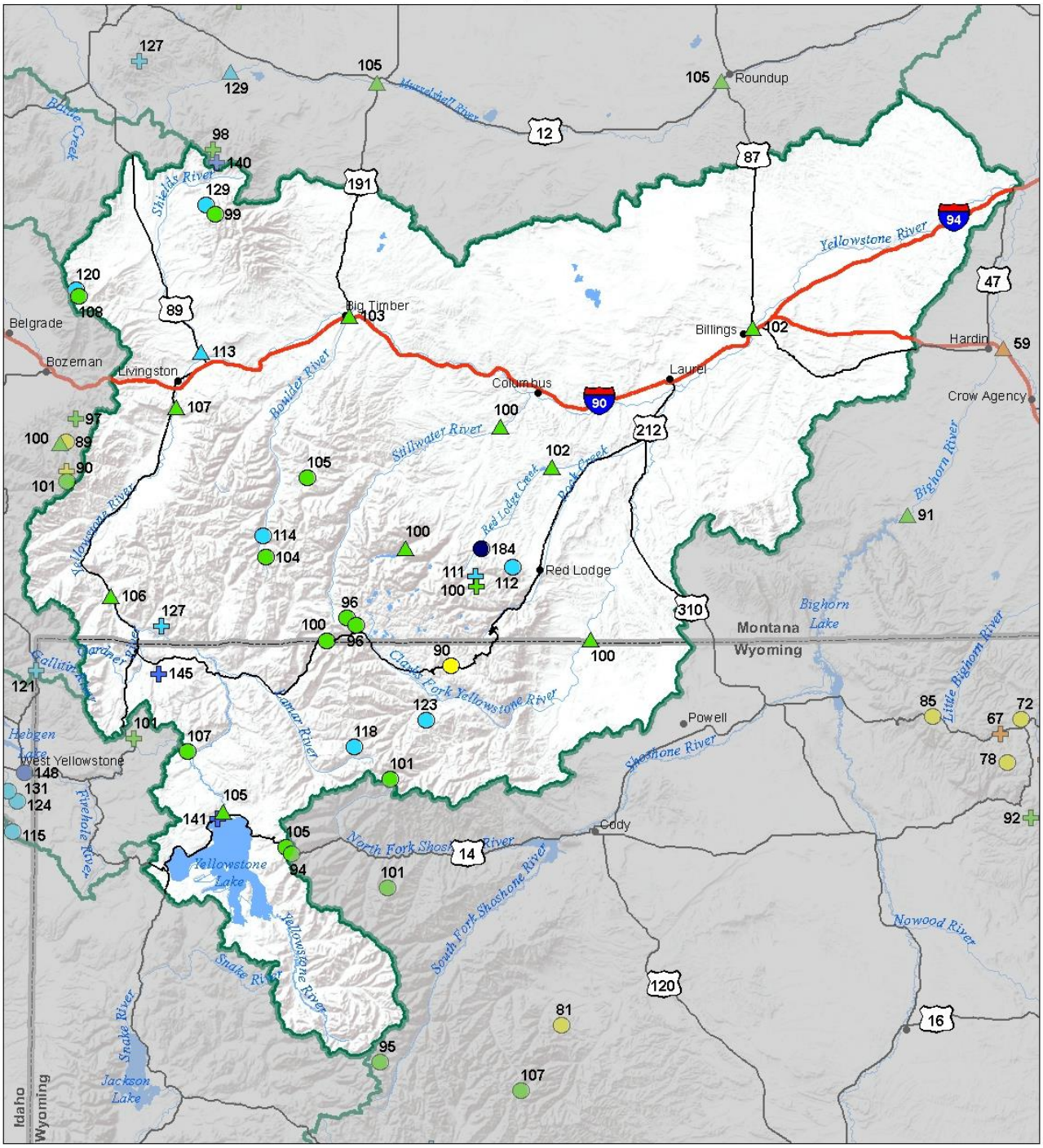
95% or 90% Exceedance	70% Exceedance	**50% Exceedance**	30% Exceedance	10% or 5% Exceedance
There is a 95%/90% chance that flows will exceed this volume	There is a 70% chance that flows will exceed this volume	There is a 50% chance that flows will exceed this volume	There is a 30% chance that flows will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

Upper Yellowstone River Basin
Streamflow Forecast, Snow Water Equivalent
Percentage of Normal
April 1, 2019



Snow Water Equivalent
Percent of Normal

SNOTEL		Snowcourse	
> 150%	71 - 90%	> 150%	71 - 90%
131 - 150%	51 - 70%	131 - 150%	51 - 70%
111 - 130%	1 - 50%	111 - 130%	1 - 50%
91 - 110%	0%	91 - 110%	0%

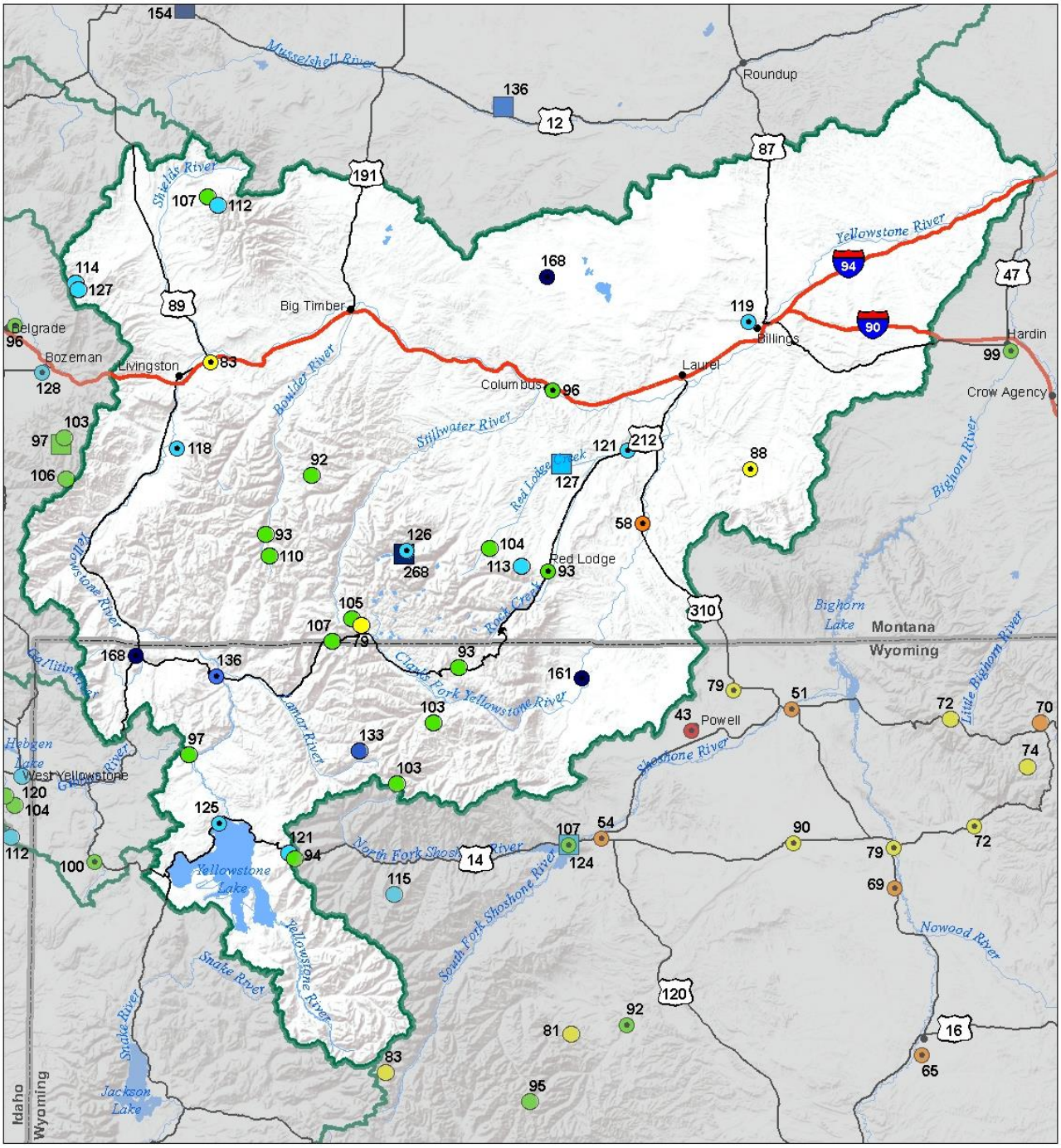
Streamflow Forecast
Percent of Average Flows

- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%
- 71 - 90%
- 51 - 70%
- 1 - 50%

USDA

Montana State Library Natural Resource Information System

Upper Yellowstone River Basin
Water Year to Date Precipitation and Reservoir Levels
Percentage of Normal
April 1, 2019



Precipitation
Percent of Normal

SNOTEL
- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%
- 71 - 90%
- 51 - 70%
- 1 - 50%

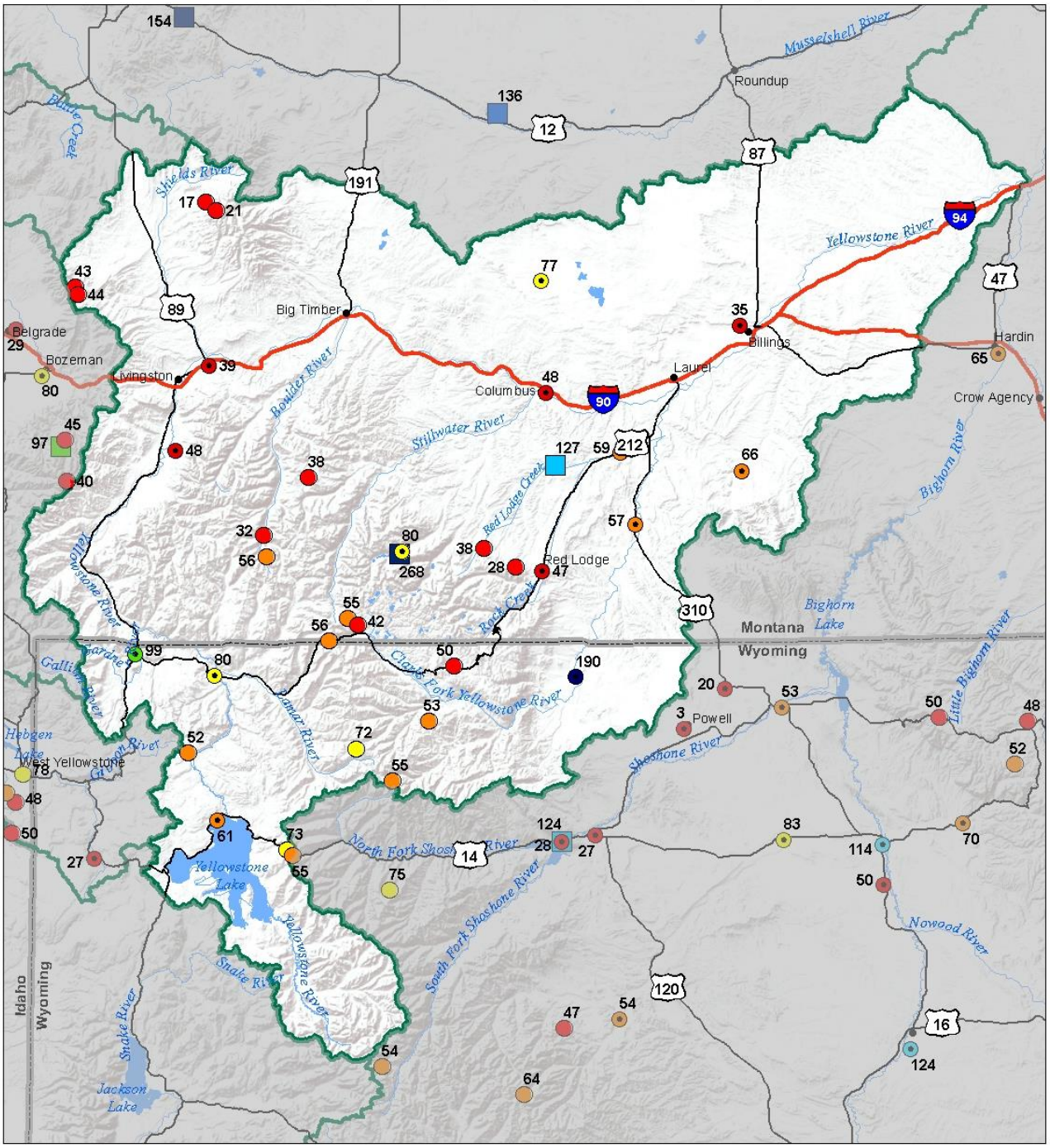
COOP/ACIS
- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%
- 71 - 90%
- 51 - 70%
- 1 - 50%

Reservoirs
Percent of Normal
- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%
- 71 - 90%
- 51 - 70%
- 1 - 50%

USDA

Montana State Library Natural Resource Information System

Upper Yellowstone River Basin
Monthly Precipitation and Reservoir Levels
Percentage of Normal
April 1, 2019 (March 1, 2019 - April 1, 2019)



Precipitation
Percent of Normal

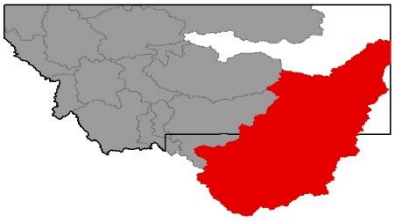
SNOTEL		COOP/ACIS	
> 150%	71 - 90%	> 150%	71 - 90%
131 - 150%	51 - 70%	131 - 150%	51 - 70%
111 - 130%	1 - 50%	111 - 130%	1 - 50%
91 - 110%		91 - 110%	

Reservoirs
Percent of Normal

- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%
- 71 - 90%
- 51 - 70%
- 1 - 50%

USDA

Montana State Library Natural Resource Information System



Lower Yellowstone River Basin

It was noted last month that the river basins in the Lower Yellowstone region typically receive the bulk of their snowpack between March 1 and April 15th. These basins typically benefit when warm, moist air from the south brings spring precipitation; unfortunately, this scenario did not pan out this March. It was a very quiet month for snow accumulation across the entire basin with just a couple minor storm systems visiting the region. For the Big Horn Mountains this was the second month in a row with below normal snow accumulation. Five of the sixteen SNOTEL sites in the Big Horns recorded the lowest or second lowest precipitation totals for March and most sites in the region reported less than 1 ½ inches of precipitation for the month. Snowpack percentages in all sub-basins have declined this month but the Shoshone and Wind River basins are still hovering near normal for April 1 thanks to the banner snowfall received in February. The Little Bighorn, Powder and Tongue's percentages dropped significantly, and below normal streamflow conditions should be expected in these basins for the spring and summer.

Lower Yellowstone River Basin Data Summary

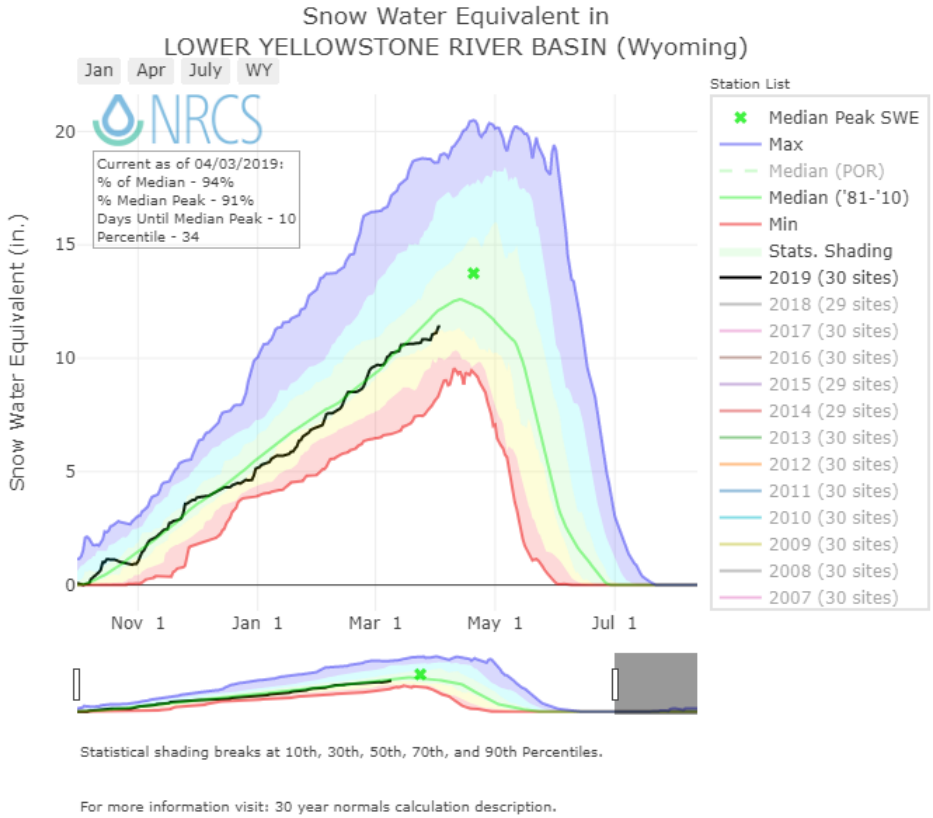
Snowpack	**Percent of 1981-2010 Normal (Median)**	**Last Year Percentage of Normal (Median)**
WIND RIVER BASIN	99%	118%
SHOSHONE RIVER BASIN	101%	144%
BIGHORN RIVER BASIN	93%	135%
LITTLE BIGHORN BASIN	77%	99%
TONGUE RIVER BASIN	77%	107%
POWDER RIVER BASIN	87%	126%
Basin-Wide Snowpack	**92%**	**121%**

Precipitation	**Monthly Percentage of Average**	**WYTD Percentage of 1981-2010 Average***	**WYTD Last Year Percentage of Average**
Mountain Precipitation	58%	86%	105%
Valley Precipitation	71%	104%	119%
Basin-Wide Precipitation	**62%**	**92%**	**109%**

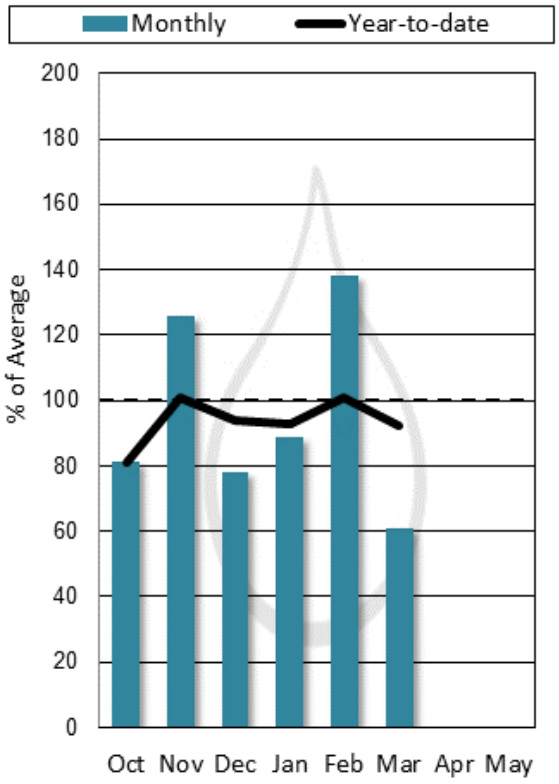
*Water Year-to-Date (WYTD) Precipitation is October 1st - Current

Reservoir Storage	**Percentage of Average**	**Percentage of Capacity (Total)**	**Last Year Percentage of Average**
Basin-Wide Storage	**104%**	**59%**	**101%**

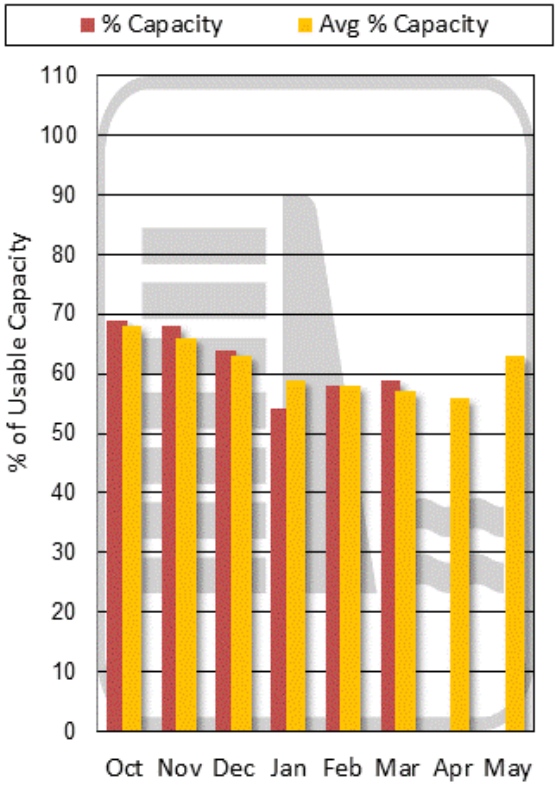
(click on chart below to navigate to online version with additional features)



Mountain and Valley Precipitation



End of Month Reservoir Storage

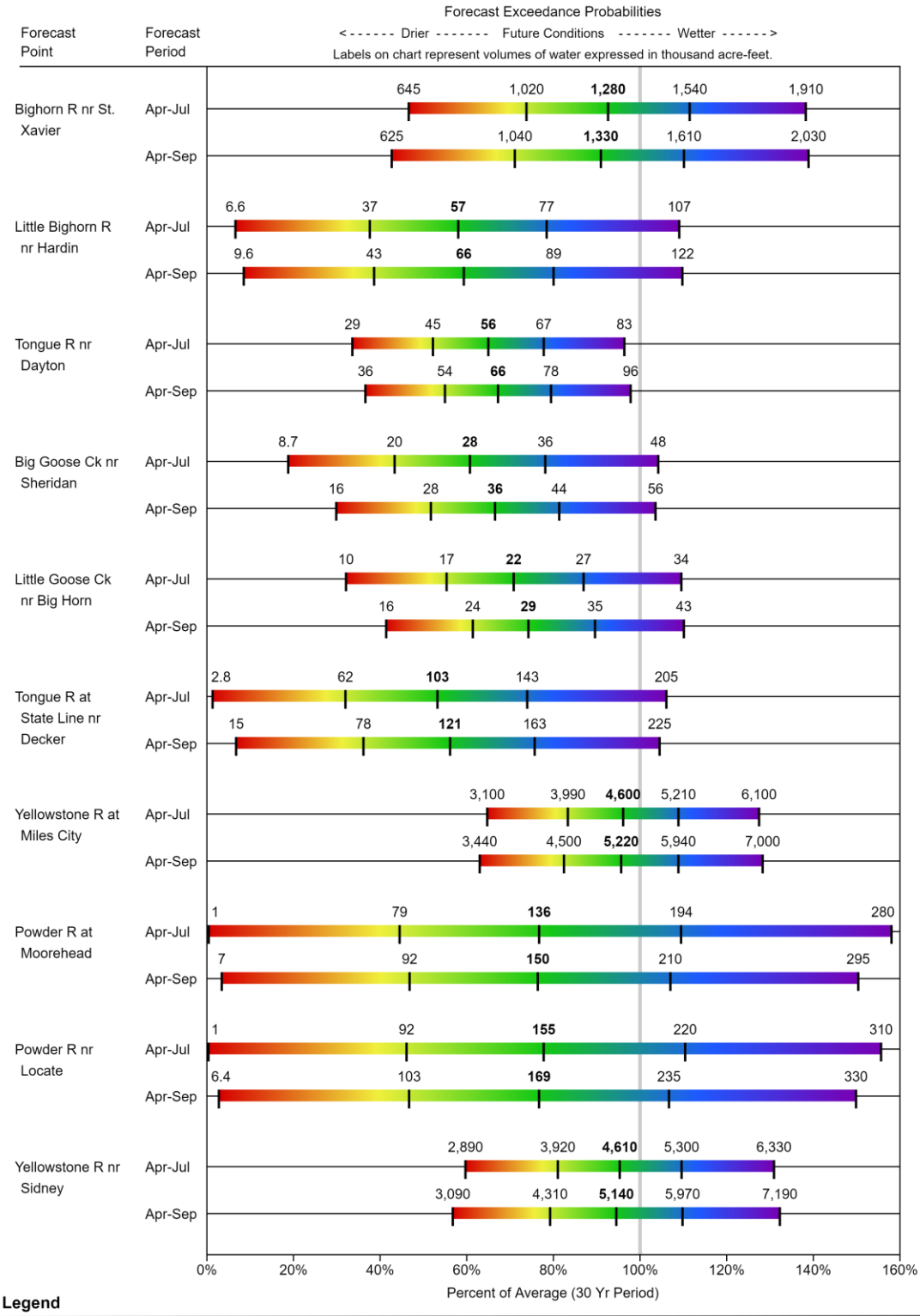


Storage above is averaged for all reservoirs in the basin. For individual reservoirs see table below.

LOWER YELLOWSTONE RIVER BASIN (Wyoming)

Water Supply Forecasts

April 1, 2019



Legend

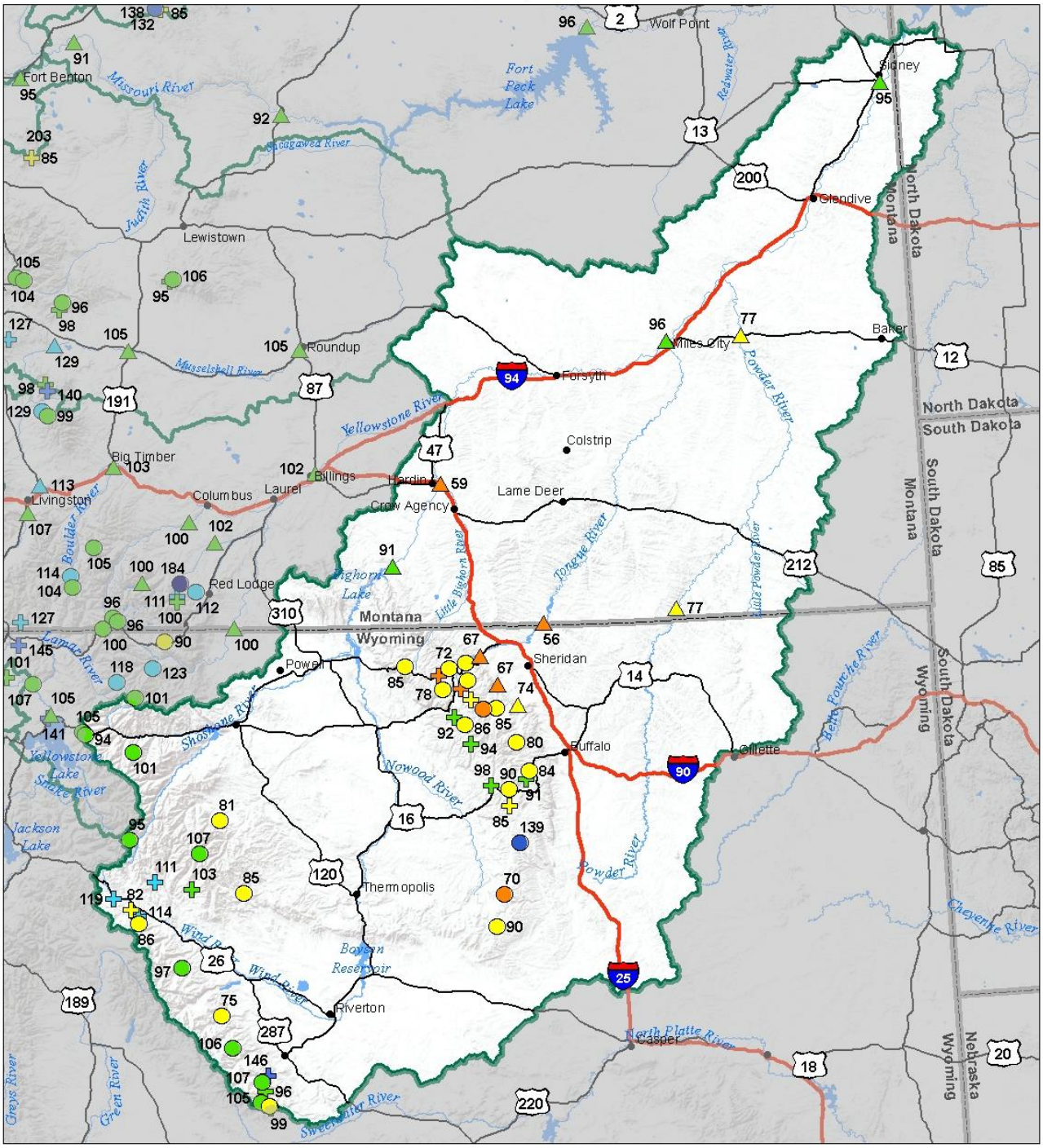
95% or 90% Exceedance	70% Exceedance	**50% Exceedance**	30% Exceedance	10% or 5% Exceedance
There is a 95%/90% chance that flows will exceed this volume	There is a 70% chance that flows will exceed this volume	There is a 50% chance that flows will exceed this volume	There is a 30% chance that flows will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

Lower Yellowstone River Basin
Streamflow Forecast, Snow Water Equivalent
Percentage of Normal
April 1, 2019



Snow Water Equivalent
Percent of Normal

SNOTEL		Snowcourse	
> 150%	71 - 90%	> 150%	71 - 90%
131 - 150%	51 - 70%	131 - 150%	51 - 70%
111 - 130%	1 - 50%	111 - 130%	1 - 50%
91 - 110%	0%	91 - 110%	0%

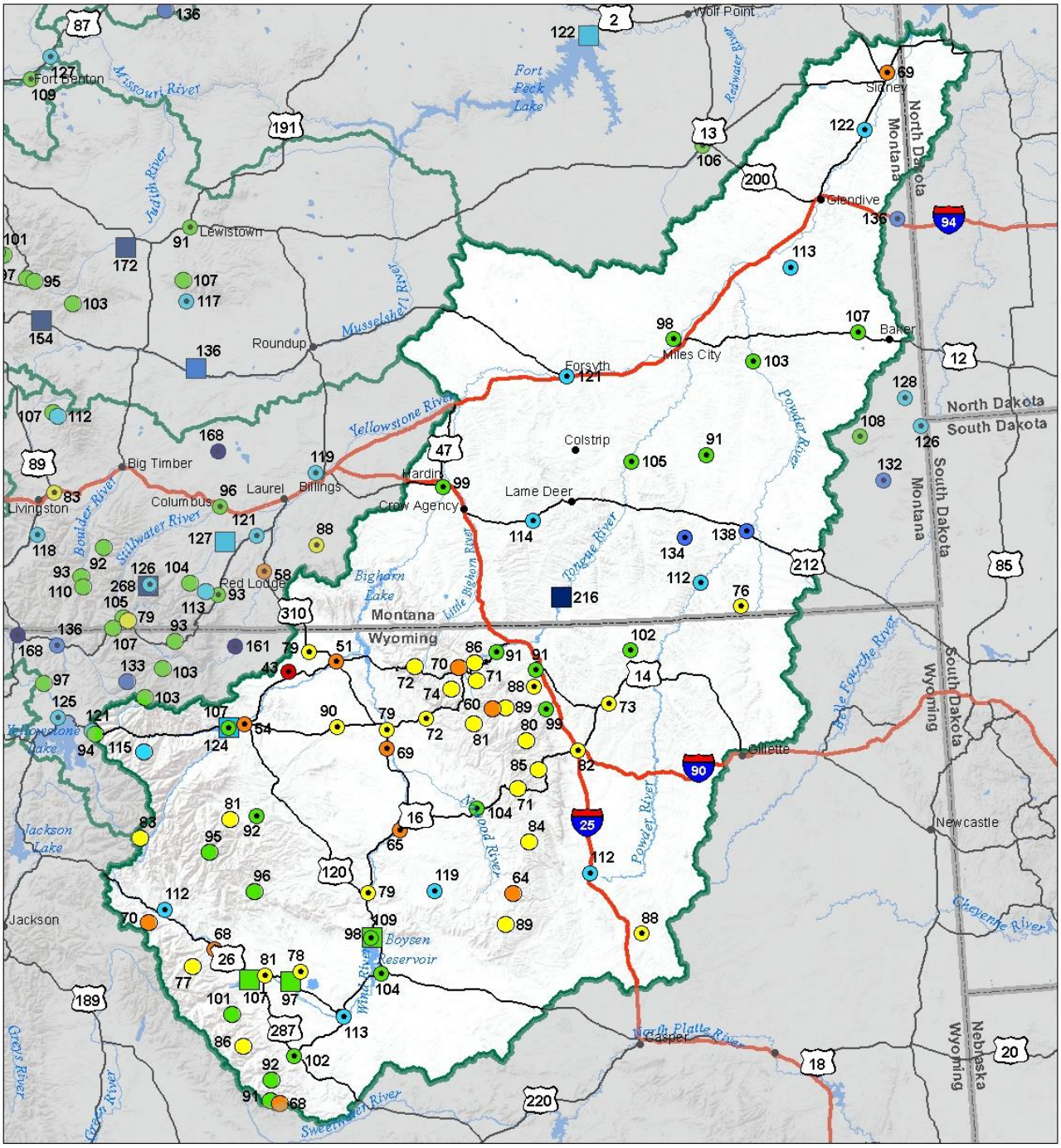
Streamflow Forecast
Percent of Average Flows

- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%
- 71 - 90%
- 51 - 70%
- 1 - 50%

USDA

Montana State Library Natural Resource Information System

Lower Yellowstone River Basin
Water Year to Date Precipitation and Reservoir Levels
Percentage of Normal
April 1, 2019



Precipitation
Percent of Normal

SNOTEL		COOP/ACIS	
> 150%	71 - 90%	> 150%	71 - 90%
131 - 150%	51 - 70%	131 - 150%	51 - 70%
111 - 130%	1 - 50%	111 - 130%	1 - 50%
91 - 110%		91 - 110%	

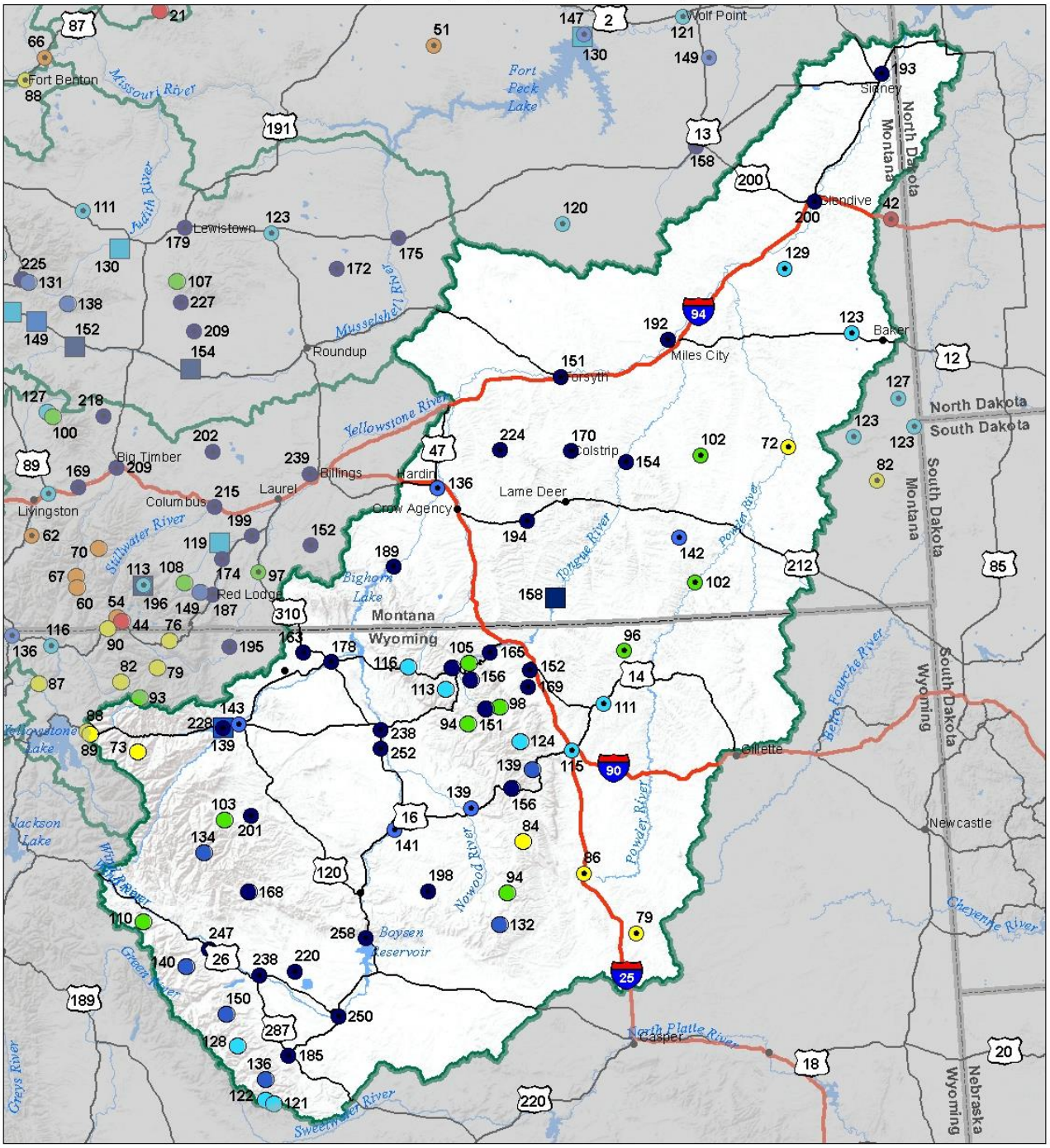
Reservoirs
Percent of Normal

- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%
- 71 - 90%
- 51 - 70%
- 1 - 50%

USDA

Montana State Library Natural Resource Information System

Lower Yellowstone River Basin
Monthly Precipitation and Reservoir Levels
Percentage of Normal
June 1, 2018 (May 1, 2018 - June 1, 2018)



Precipitation
Percent of Normal

SNOTEL		COOP/ACIS	
> 150%	71 - 90%	> 150%	71 - 90%
131 - 150%	51 - 70%	131 - 150%	51 - 70%
111 - 130%	1 - 50%	111 - 130%	1 - 50%
91 - 110%		91 - 110%	

Reservoirs
Percent of Normal

- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%
- 71 - 90%
- 51 - 70%
- 1 - 50%

USDA

Montana State Library Natural Resource Information System

Issued by:

Matt Lohr
Chief
Natural Resources Conservation Service
U.S. Department of Agriculture

Released by:

Tom Watson
State Conservationist
Natural Resources Conservation Service
Bozeman, Montana

Report Created by:

Montana Snow Survey Staff
10 East Babcock St, Room 443
Bozeman, MT 59715
Email: MT-nrcs-snow@one.usda.gov

Montana Water Supply Outlook Report

Natural Resources Conservation Service