Montana
Water Supply Outlook Report
June 1st, 2019

Installed in September of 2018, the JL Meadow SNOTEL site was the first SNOTEL site installed in the U.S. that went directly to transmitting via the GOES (Geostationary Operating Environmental Satellite) System. In 2018, 28 SNOTEL sites were moved to this new telemetry system for testing through the winter of 2018/2019, and the results have been excellent. As a result, during the summer of 2019 the NRCS Montana Snow Survey will be upgrading all SNOTEL sites in Montana with new dataloggers and new telemetry systems (cellular or satellite communications). This move to modernize the system is being made to provide more reliable snowpack and mountain weather information for our customers in the future.

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 June 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.

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Snowpack – Overview

Let's start this month's report with the most interesting subject possible, statistics. It bears discussing because looking at snowpack percentages on June 1st can be a little misleading. When looking at snowpack totals in this report, or on the online maps and reports, it's important to remember that it is being compared to this date, and not the peak snowpack for the year. The snow has been actively melting throughout May, and high percentages shouldn't be cause for alarm. In some basins, mostly west of the Divide, most of the snowpack has typically melted at monitoring locations with about one-third to half of the basin-wide annual peak snowpack remaining to melt at higher elevations. In southern Montana, where higher elevation helps to sustain snowpack a bit longer, about half of the snowpack is typically remaining to melt at mid and high elevations.

Putting these statistics into context, this month snowpack percentages are below average for this date in northwest river basins, meaning that melt out is ahead of schedule, amplified by the above average temperatures during the month of May. Snowpack in central and southern basins benefitted by the cool weather during the third week of May, which helped to prolong snowmelt, resulting in snowpack that is above normal for June 1st. So, there is good news and bad news hidden in these numbers.

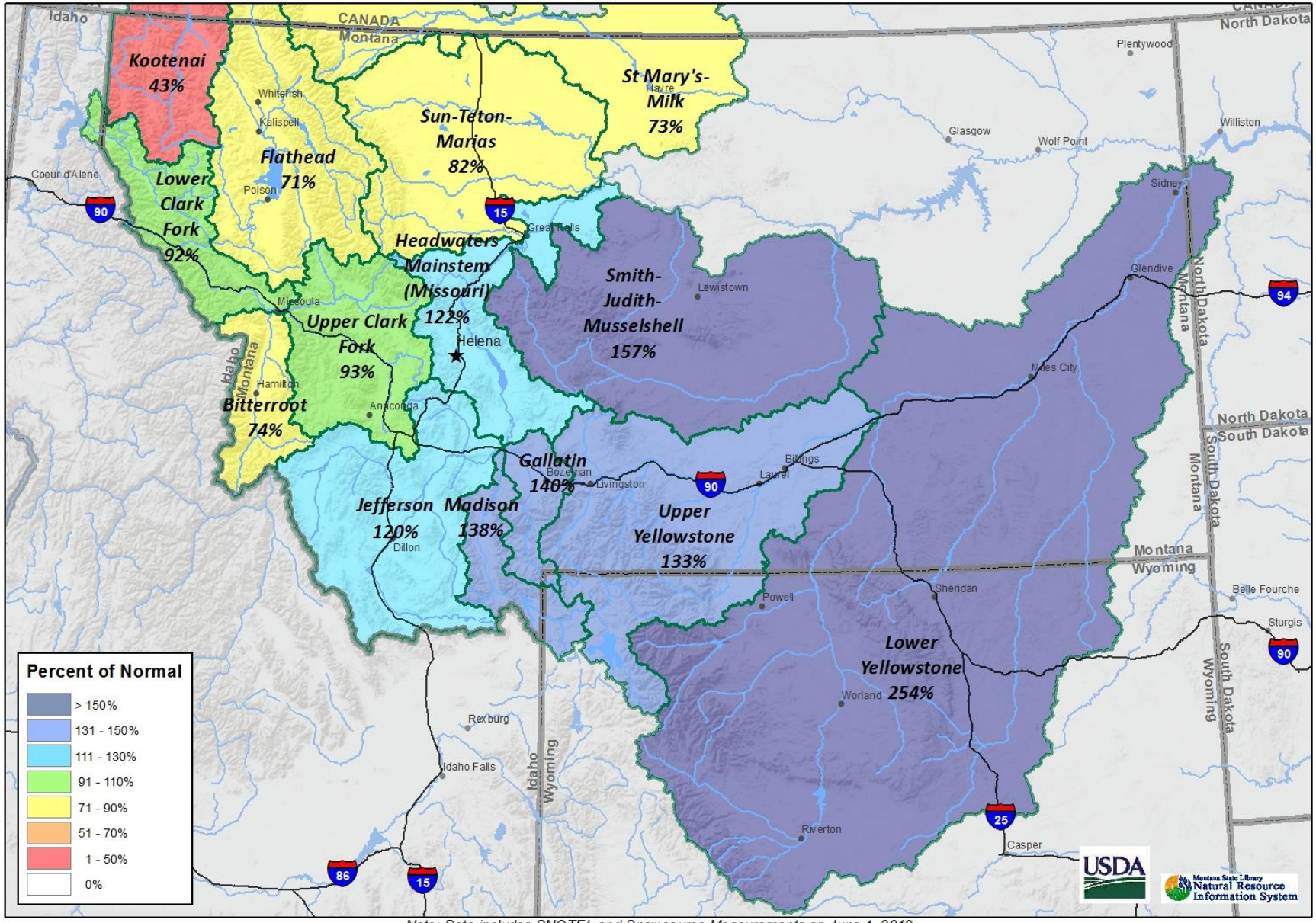
Well-above average temperatures during the last week of May (and first week of June) have once again accelerated snowmelt in the mountains. Rivers on the east side of the Divide are once again on the rise and will likely experience their snowmelt-driven peak flows during the next seven to fourteen days.

Snow Water Equivalent

6/1/2019	***% Normal***	***% Last Year***
Columbia River Basin	75	65
Kootnenai in Montana	43	43
Flathead in Montana	71	62
Upper Clark Fork	93	66
Bitterroot	74	65
Lower Clark Fork	92	62
Missouri River Basin	132	138
Jefferson	120	118
Madison	138	141
Gallatin	140	143
Headwaters Mainstem	122	122
Smith-Judith-Musselshell	157	253
Sun-Teton-Marias	82	99
St. Mary-Milk	73	72
Yellowstone River Basin	176	168
Upper Yellowstone	133	114
Lower Yellowstone	254	302

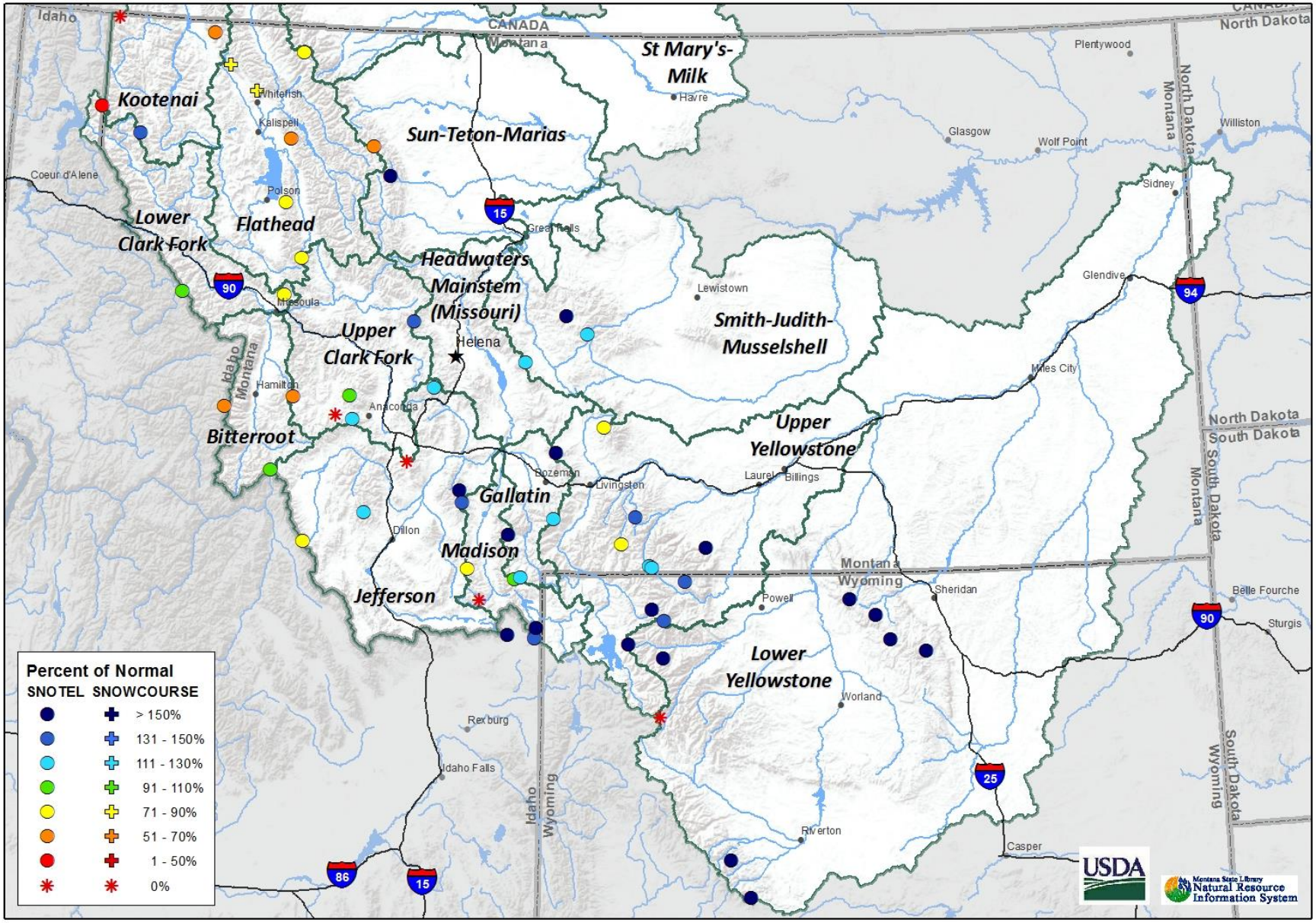
West of Divide	75	65
East of Divide	150	150
Montana State-Wide	104	94

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

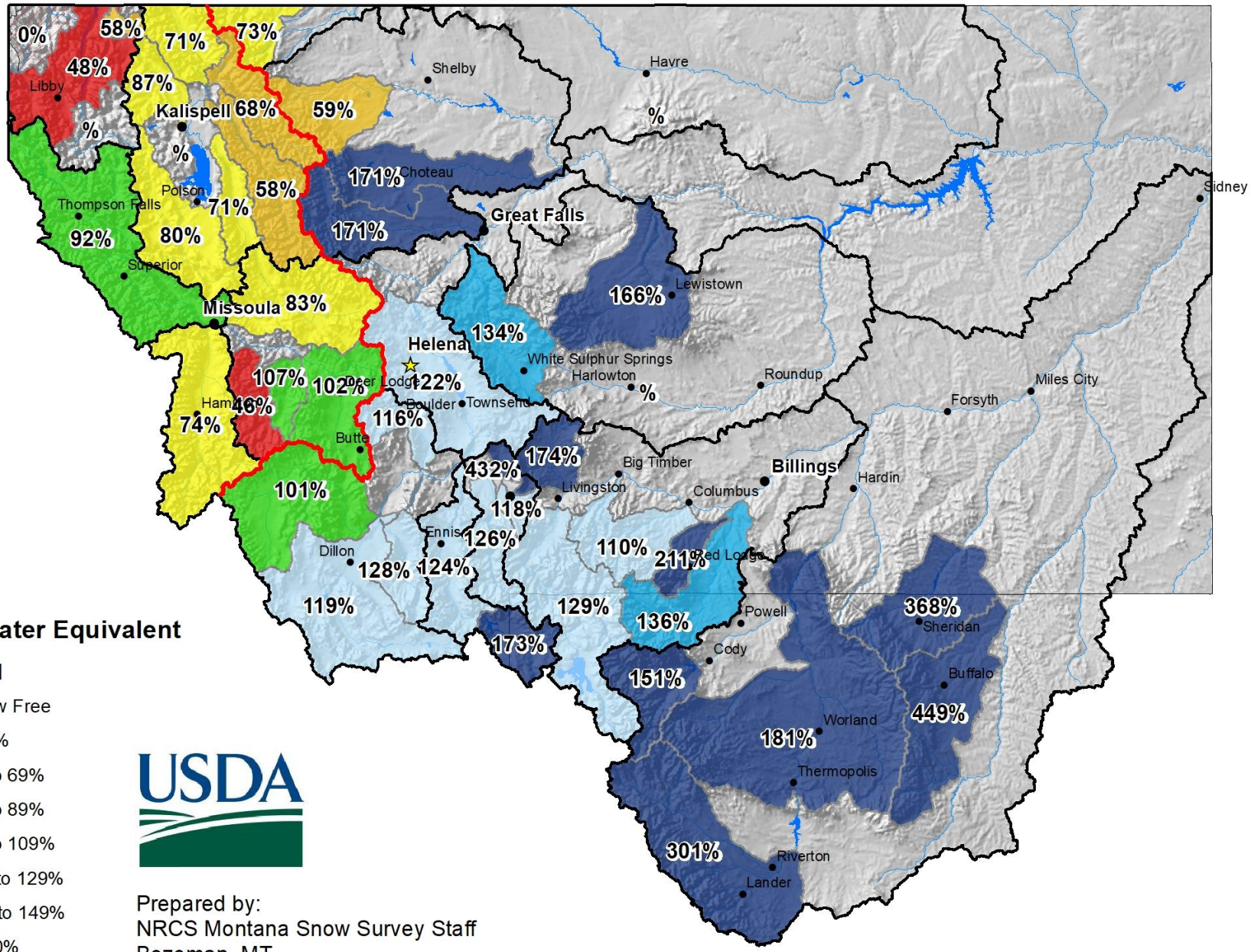


Note: Data includes SNOTEL and Snowcourse Measurements on June 1, 2019

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



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



Snow Water Equivalent

% Normal

- Snow Free
- <50%
- 50 to 69%
- 70 to 89%
- 90 to 109%
- 110 to 129%
- 130 to 149%
- >150%
- Continental Divide

USDA

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

Precipitation - Overview

May of 2019 can be best described as feast or famine. The first two weeks of the month were very dry across all of the western half of the state, with mountain and valley locations recording minimal precipitation during the period. The weather patterns changed mid-month with low-pressure systems dominating the weather across the western and central united states. This typical spring weather pattern favors some locations in the state over others, the east facing basins (along the plains) tend to receive the most precipitation from the counterclockwise rotation of low-pressure systems and resulting upslope flow. Precipitation totals during the last fourteen days of the month along the Rocky Mountain Front ranged from 4.3” to 9.0”, which caused quick and significant increases in river volumes with flooding widespread in many areas.

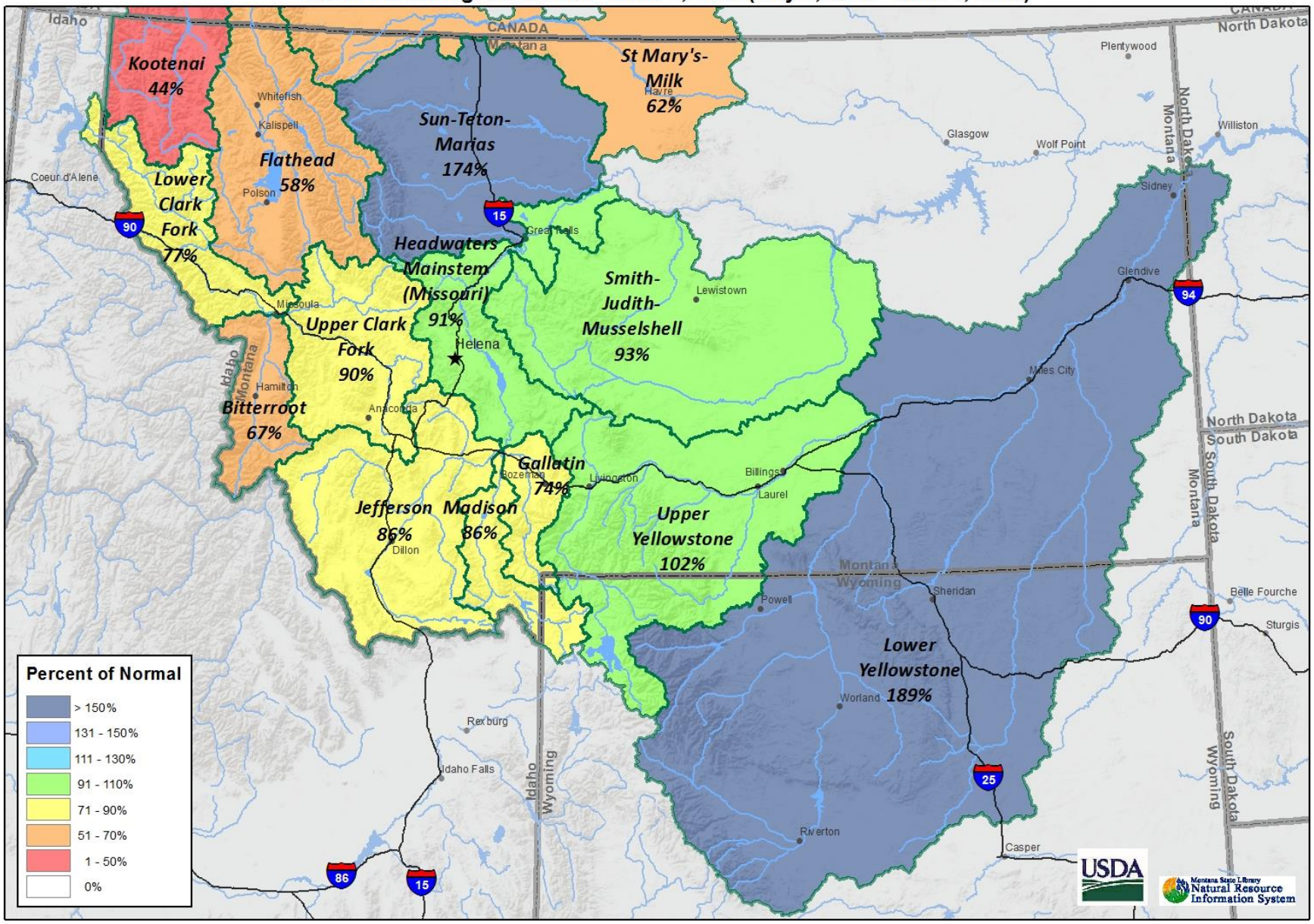
While the latter half of the month did yield some precipitation in other parts of the state, it wasn’t enough to make up for the early month deficit, and monthly precipitation ended up being below average in most western mountain and valley locations. Most river basins in central and southern Montana have water year precipitation totals that remain near to slightly above average, due to the winter snowfall and April precipitation. However, the northwest corner of the state made further declines in water year totals during the month due to well below average precipitation during May in the Kootenai (44%) and Flathead (58%) River basins. This is an area to keep an eye on this summer, as decreased spring and early summer precipitation increases the demand for irrigation water. This water year has been one of extremes, so hopefully, June yields closer to average precipitation across the state.

Precipitation

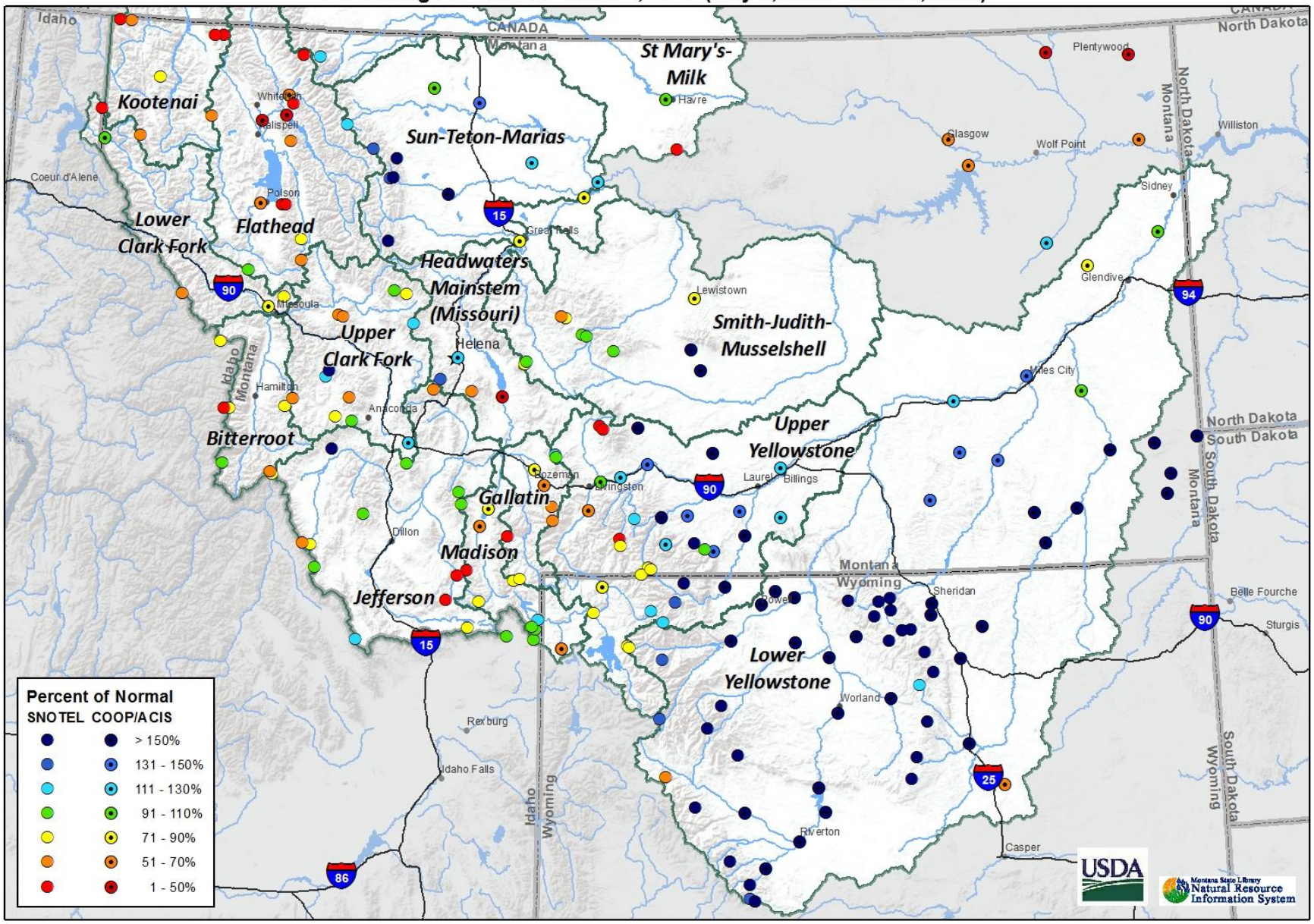
6/1/2019	***Monthly % Avg***	***Water Year % Avg***	***WY % Last Year***
Columbia River Basin	71	91	76
Kootnenai in Montana	44	76	70
Flathead in Montana	58	88	73
Upper Clark Fork	90	99	77
Bitterroot	67	99	84
Lower Clark Fork	77	92	81
Missouri River Basin	93	108	92
Jefferson	86	101	90
Madison	86	111	98
Gallatin	74	113	93
Headwaters Mainstem	91	107	81
Smith-Judith-Musselshell	93	105	87
Sun-Teton-Marias	174	107	84
St. Mary-Milk	62	85	76
Yellowstone River Basin	155	113	93
Upper Yellowstone	102	111	83
Lower Yellowstone	189	113	100

West of Divide	71	91	76
East of Divide	120	108	91
Montana State-Wide	93	102	84

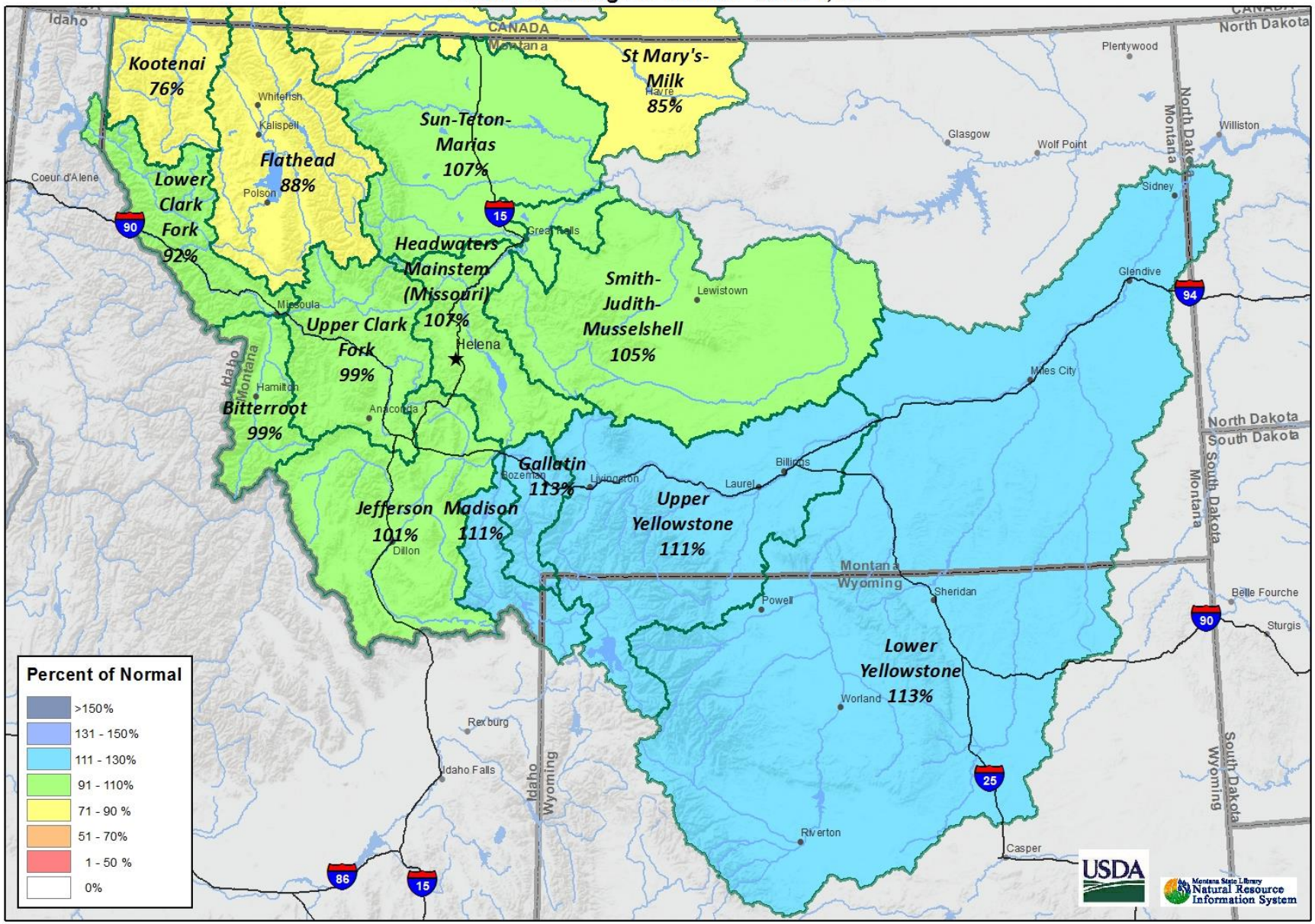
Montana Data Collection Office
Monthly Precipitation
Basin Percentage of Normal - June 1, 2019 (May 1, 2019 - June 1, 2019)



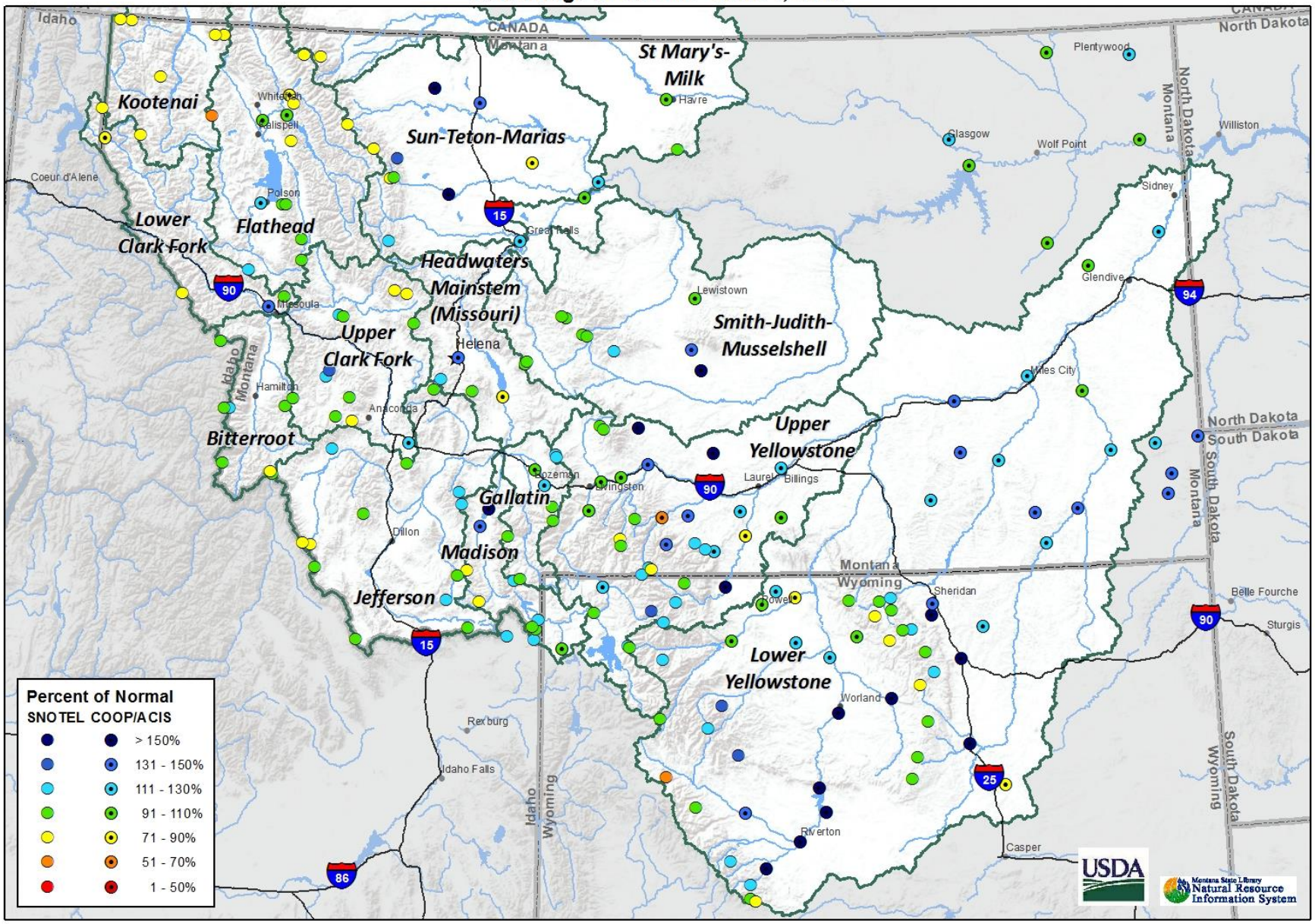
Montana Data Collection Office
Monthly Precipitation
Percentage of Normal - June 1, 2019 (May 1, 2019 - June 1, 2019)



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



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



Reservoirs - Overview

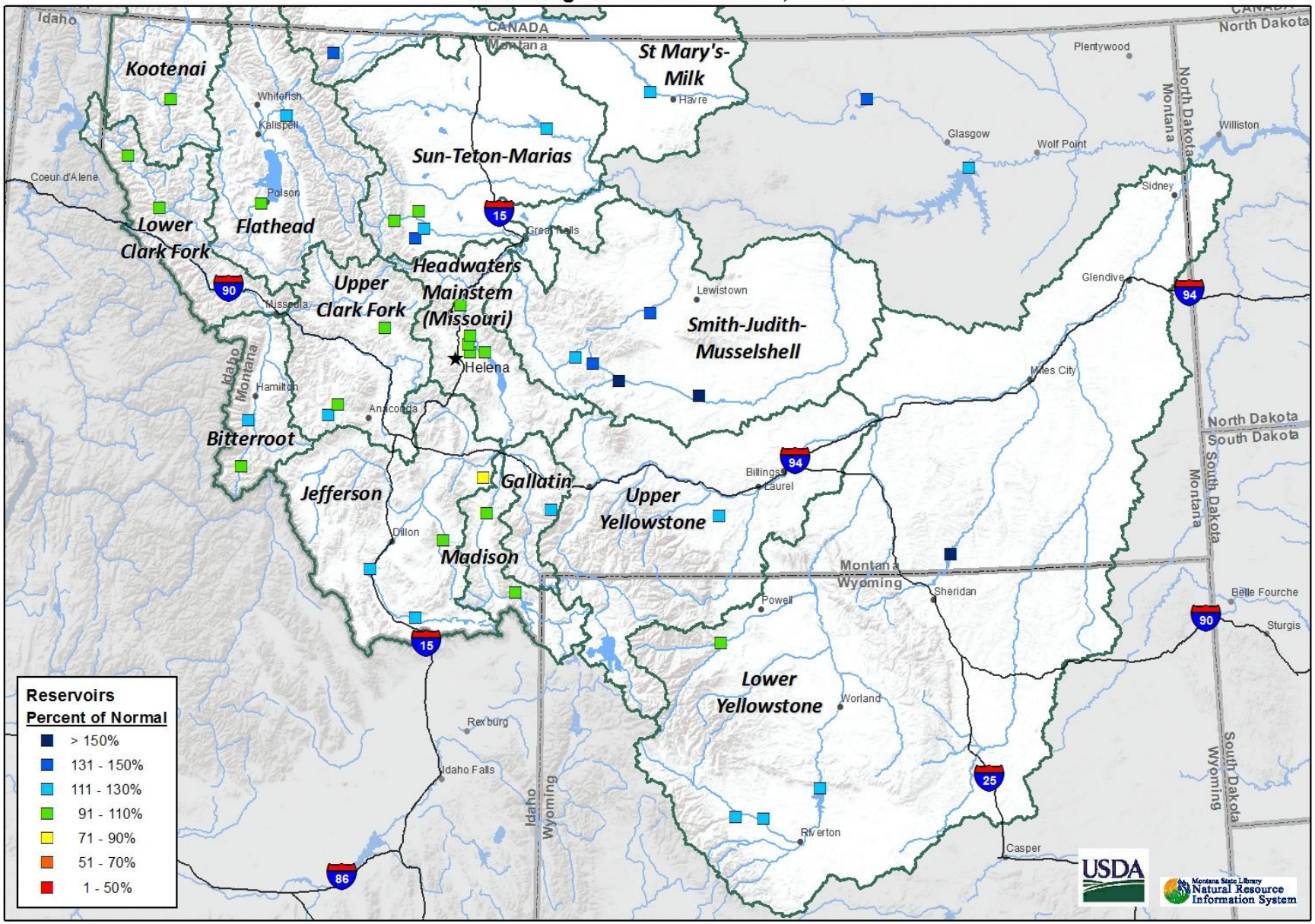
As of June 1st, most reservoirs across the state are approaching full, or are full and spilling. The snowpack this year was sufficient to fill most reservoirs, and summer water supply from reservoirs looks to be adequate in most locations.

Reservoir Storage

6/1/2019	***% Average***	***% Capacity***	***% Last Year***
Columbia River Basin	107	79	93
Kootnenai in Montana	106	69	88
Flathead in Montana	109	89	98
Upper Clark Fork	108	93	92
Bitterroot	108	106	100
Lower Clark Fork	102	98	100
Missouri River Basin	124	88	99
Jefferson	116	72	91
Madison	95	84	90
Gallatin	120	101	101
Headwaters Mainstem	128	91	98
Smith-Judith-Musselshell	149	104	101
Sun-Teton-Marias	119	75	106
St. Mary-Milk	133	74	96
Yellowstone River Basin	109	69	96
Upper Yellowstone	119	103	100
Lower Yellowstone	108	68	96

West of Divide	107	79	93
East of Divide	123	87	98
Montana State-Wide	118	85	97

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



Streamflow - Overview

It's that time of the year that Snow Hydrologists live for, the seasonal snowmelt runoff! Spring and early summer are when all the real action happens across the state of Montana, and this year hasn't disappointed, so far. Rivers across the state began their seasonal rises from snowmelt in April, which continued through May when all elevations started to melt, causing significant increases in river volumes. Many rivers west of the Continental Divide likely experienced their snowmelt-driven peak flows between May 17th and May 19th, after a period of dry and warm weather caused rapid melt across the state, which was followed by a moderate rain event.

Peak flows in the river flowing from the Rocky Mountain Front likely occurred during the end of May, due to a significant rain event, which added a large amount of water to rivers which were already high from snowmelt. These peaks occurred during the Memorial Day weekend with many peaks occurring on Memorial Day. This is the second year in a row where a significant rain event has caused rapid increases in streams and rivers, and flooding occurred as a result. Last year's high flows and flooding occurred around June 19th, which is a good reminder that there is still time for another precipitation event to push flows back up. Rivers and streams in the region have continued to run high since later May, so a close eye should be kept on the weather.

This statement holds true in many rivers east of the Divide, which are reaching their seasonal peaks during the first week of June. Warm weather at the end of May caused significant melt rates at the high elevation locations, and rivers began to rise quickly after Memorial Day. Peak snowmelt drive flows this year will likely occur during the coming week or two, and the volumes for this year look to be above average for many locations. A significant rain event occurring while these rivers reach snowmelt-driven peaks could only amplify the flows.

One concern this year is the rate at which snow has been melting, especially west of the Divide. The snowpack was below normal in many northern basins, but overall river volumes this year have been above average since March and peak flows were above average. This could translate to lower than average flows on non-controlled (naturally flowing, non-reservoir controlled) streams and rivers later in the summer.

As always, summer weather will determine what ends up happening with regards to the overall volumes this water year. June is the last typically "wet" month in the state, before more convective weather patterns set in. Typically, June helps to provide some precipitation to provide additional water to the snowmelt runoff. Long-range outlooks for the month of June show equal chances of above or below average precipitation but indicate increased chances of temperatures being above average across the state. Given the how erratic and unpredictable weather patterns have been this water year (Oct 1st – current), the best option might be to wait and see what happens.

Kootenai River Basin

It has been a dry winter and spring in the Kootenai River basin and the month of May followed suit. Typically, at this time of the year, only the high elevation snowpack monitoring sites are holding snow, and this year the snowpack at these elevations is well below normal. Early melt at many locations during April and May has resulted in a snowpack that is 48% of normal for June 1st. The high elevation Hawkins Lake SNOTEL site in the Yaak River basin, which typically has ~40% of the annual peak snow water remaining, has melted out. This is two weeks earlier than normal for this site. Other high elevation sites in the region are also melting ahead of schedule this year but have 25% to 40% of this year's peak snowpack remaining. More notably, precipitation during May was well below average and the water year deficit continues to grow across the region. Monthly precipitation totals ranged from 17% to 75% of average at mountain SNOTEL sites, with basin-wide precipitation reported as 44% of average. Water-year precipitation for the basin dropped further this month and is 76% of average for June 1st. Early snowmelt and below normal snowpack for this date, coupled with below-average precipitation totals, means that surface water could be a concern later in the summer on non-reservoir-controlled streams in the region.

Kootenai River Basin Data Summary

Snowpack	**Percent of 1981-2010 Normal (Median)**	**Last Year Percentage of Normal (Median)**
KOOTENAY in CANADA	71%	49%
KOOTENAI MAINSTEM	48%	139%
TOBACCO	58%	109%
FISHER	%	%
YAAK	0%	0%
KOOTENAI RIVER BASIN in MONTANA	43%	101%
KOOTENAI ab BONNERS FERRY	57%	73%
Basin-Wide Snowpack	**43%**	**101%**

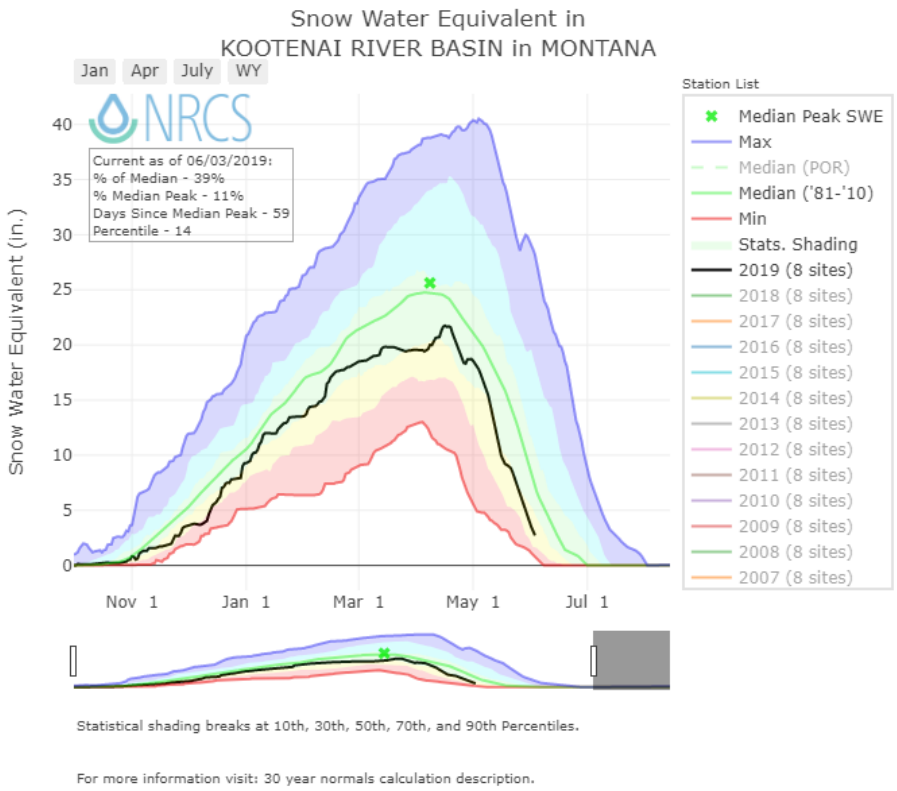
Precipitation	**Monthly Percentage of Average**	**WYTD Percentage of 1981-2010 Average***	**WYTD Last Year Percentage of Average**
Mountain Precipitation	44%	76%	109%
Valley Precipitation	%	%	%
Basin-Wide Precipitation	**44%**	**76%**	**109%**

**WYTD Precipitation is October 1st- Current*

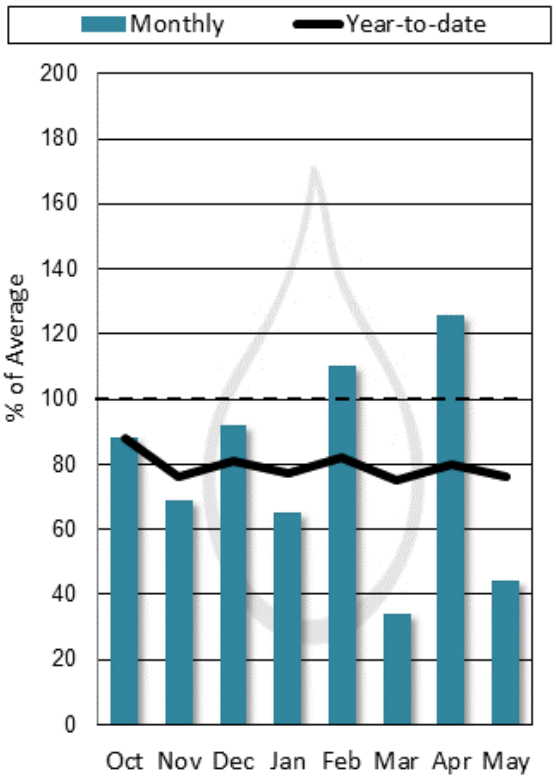
Reservoir Storage	**Percentage of Average**	**Percentage of Capacity (Total)**	**Last Year Percentage of Average**
Basin-Wide Reservoir Storage	**106%**	**69%**	**120%**

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

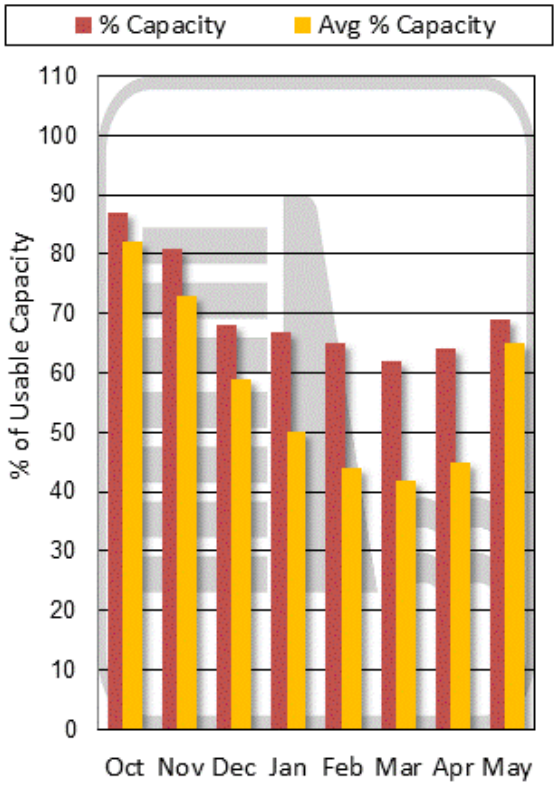
(click on chart below to navigate to online version with additional features)



Mountain and Valley Precipitation

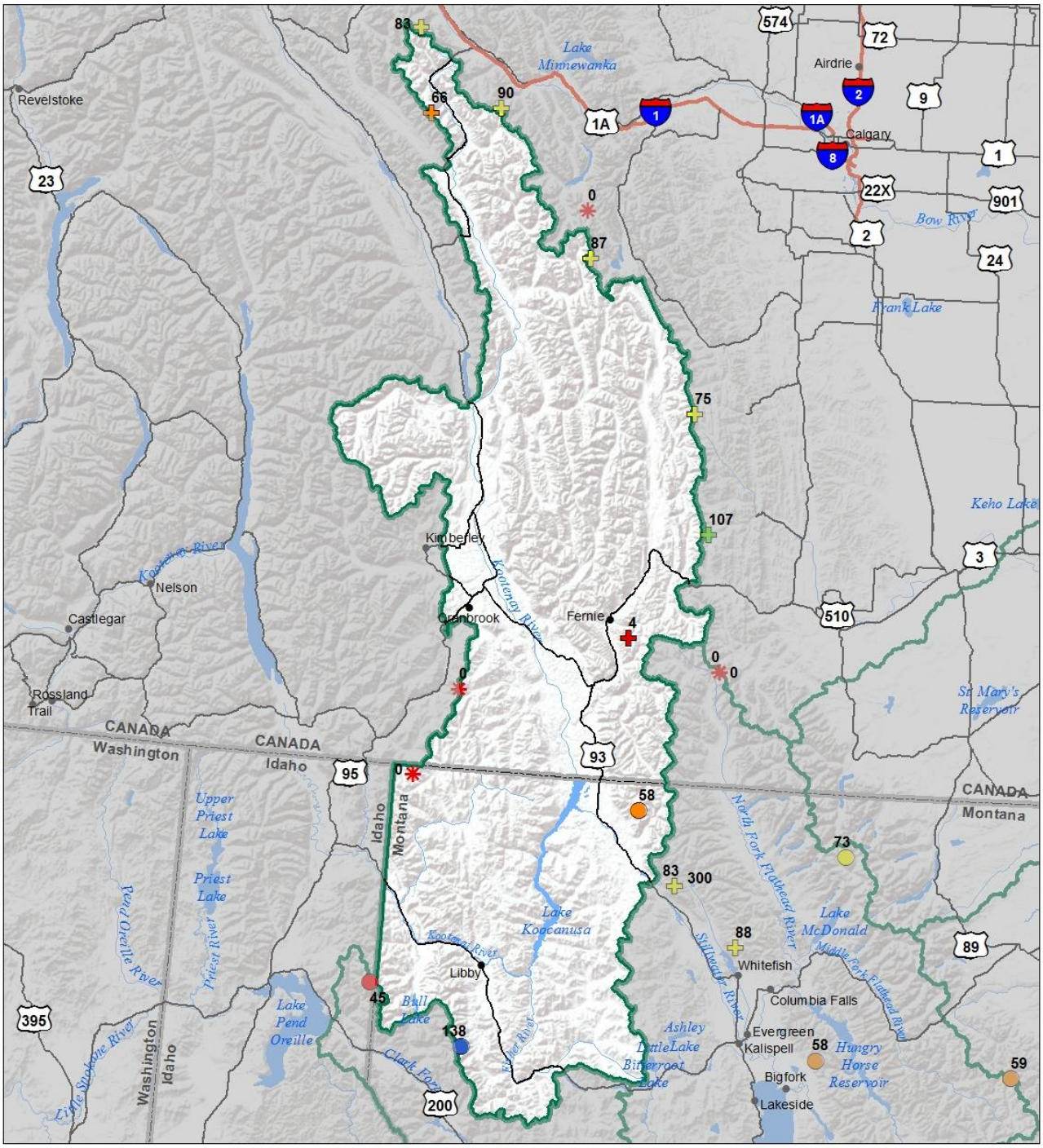


End of Month Reservoir Storage



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

Kootenai River Basin
Snow Water Equivalent
Percentage of Normal
June 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%

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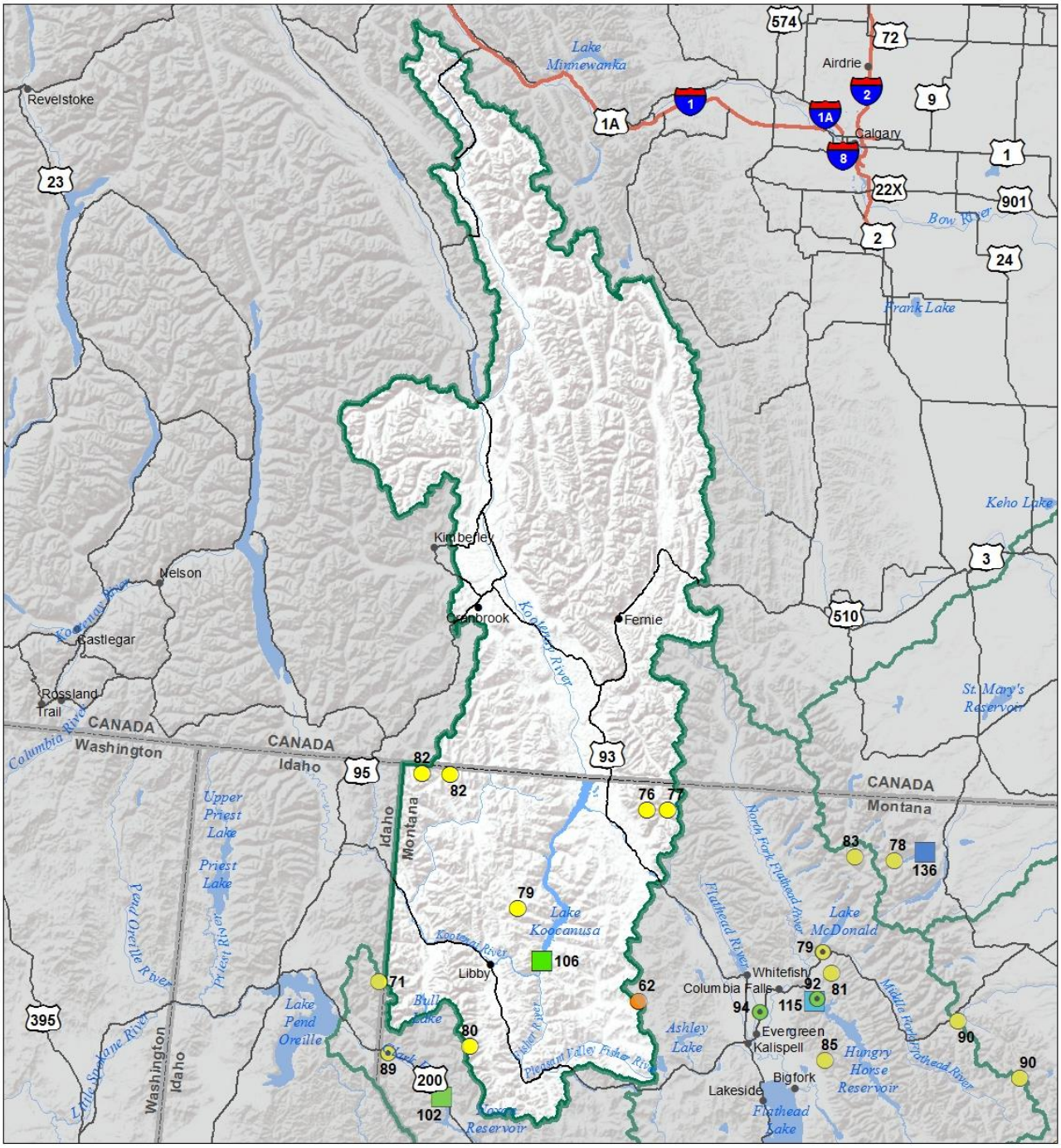
Montana State Library Natural Resource Information System

Kootenai River Basin
Water Year to Date Precipitation and Reservoir Levels
Percentage of Normal
June 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%

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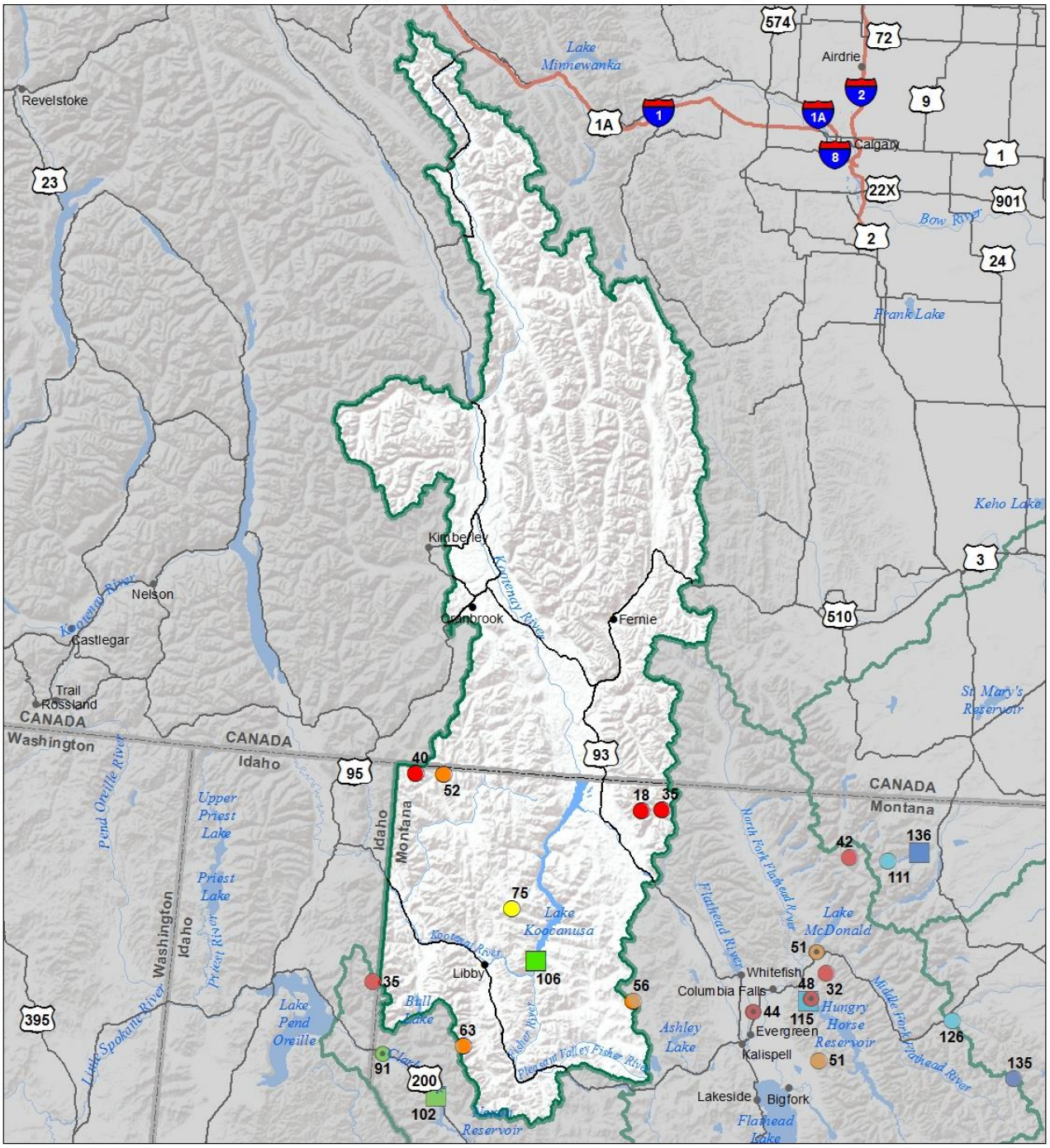
Montana State Library Natural Resource Information System

Kootenai River Basin
Monthly Precipitation and Reservoir Levels
Percentage of Normal
June 1, 2019 (May 1, 2019 - June 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%

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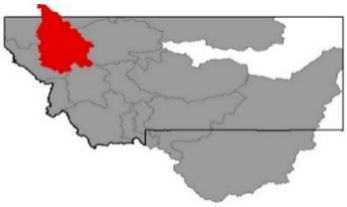


Flathead River Basin

The hope that May would deliver some moisture to the Flathead River basin, and help to offset the winter and spring deficits in snowfall and precipitation, was short lived this month. High elevation snowpack monitoring locations began their seasonal melt at the beginning of the month, and low mid elevations melted out during the first half of May. High elevation snowmelt is ahead of schedule this year (7 to 10 days), with 40% to 64% of this year's peak snowpack remaining. The impacts of this early melt will be felt later in the summer. More significant this month is the lack of precipitation during May. Monthly precipitation totals ranged from 31% to 56% in the northern two-thirds of the Flathead River basin, while the southern third received closer to average precipitation (65% to 98%). This north to south trend has played out throughout the winter and water year precipitation totals reflect this gradient. Northern locations are reporting 62% to 85% of average water-year precipitation (October 1st – current), while sites south of Flathead Lake are reporting 92% to 117% of average. The good news for local water users is that water managers have been keeping tabs on the below normal snowpack conditions throughout this winter. As a result, reservoir storage in Hungry Horse and Flathead Lake is near to above average for this time of year. Non-reservoir-controlled streams in the region will see drops in streamflows as the remaining high elevation snow melts, but the rate at which the rivers drop and how low they drop will be a function of summer precipitation and temperature.

Flathead River Basin Data Summary

Snowpack	**Percent of 1981-2010 Normal (Median)**	**Last Year Percentage of Normal (Median)**
NF FLATHEAD in CANADA	0%	0%
NF FLATHEAD in MONTANA	71%	113%
MIDDLE FORK FLATHEAD	68%	85%
SOUTH FORK FLATHEAD	58%	115%
STILLWATER-WHITEFISH	87%	98%
SWAN	71%	142%
MISSION VALLEY	78%	114%
LITTLE BITTERROOT-ASHLEY	%	%
JOCKO	80%	172%
FLATHEAD in MONTANA	69%	115%
Basin-Wide Snowpack	***69%***	***111%***

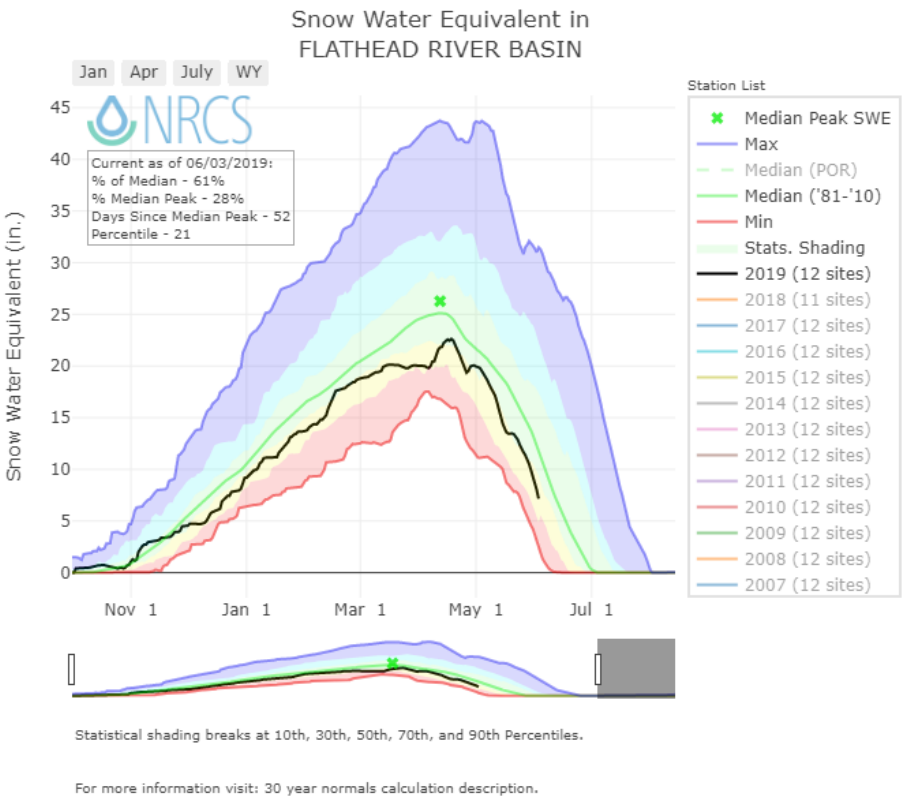
Precipitation	**Monthly Percentage of Average**	**WYTD Percentage of 1981-2010 Average***	**WYTD Last Year Percentage of Average**
Mountain Precipitation	59%	87%	122%
Valley Precipitation	54%	104%	105%
Basin-Wide Precipitation	**58%**	**88%**	**121%**

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

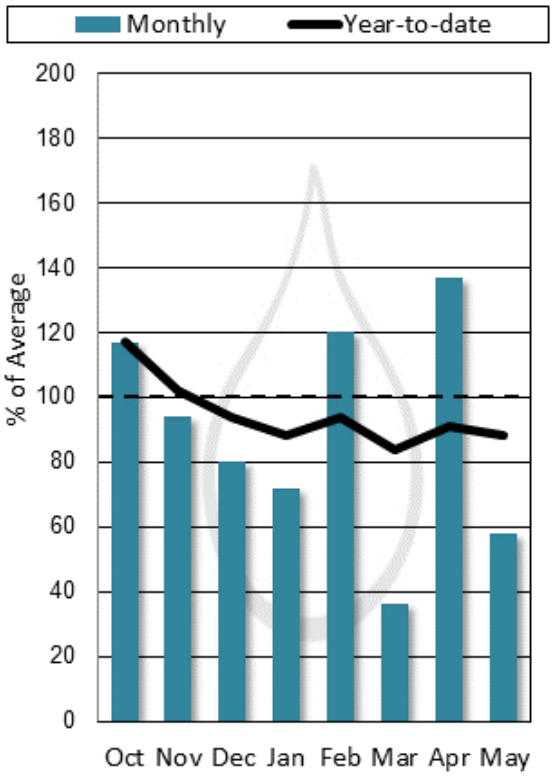
Reservoir Storage	**Percentage of Average**	**Percentage of Capacity (Total)**	**Last Year Percentage of Average**
Basin-Wide Reservoir Storage	109%	89%	111%

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

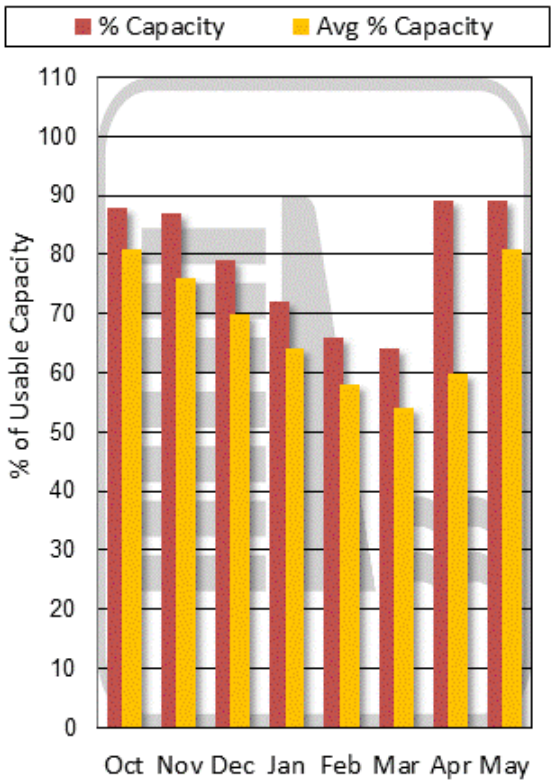
(click on chart below to navigate to online version with additional features)



Mountain and Valley Precipitation

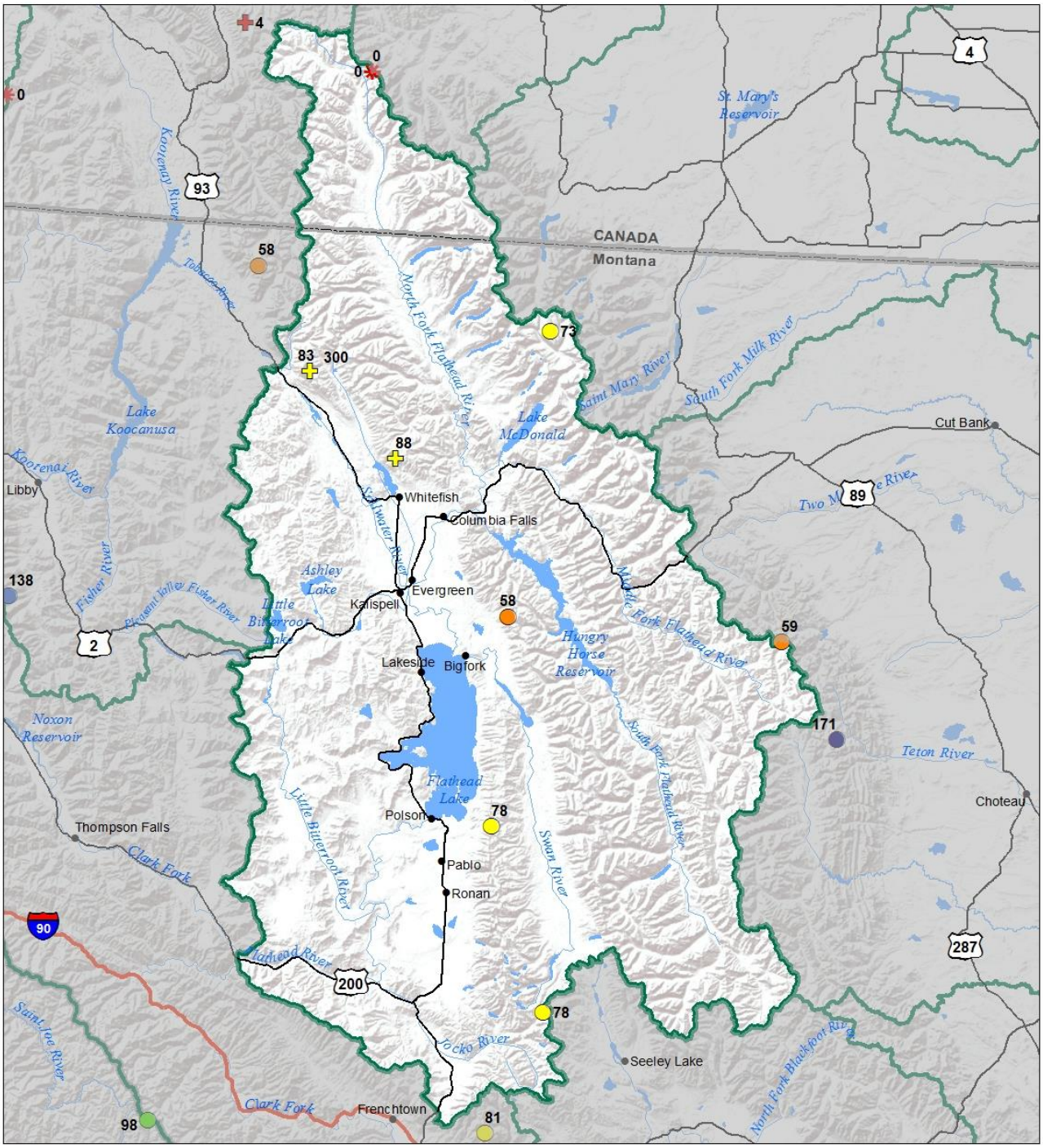


End of Month Reservoir Storage



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

Flathead River Basin
Snow Water Equivalent
Percentage of Normal
June 1, 2019



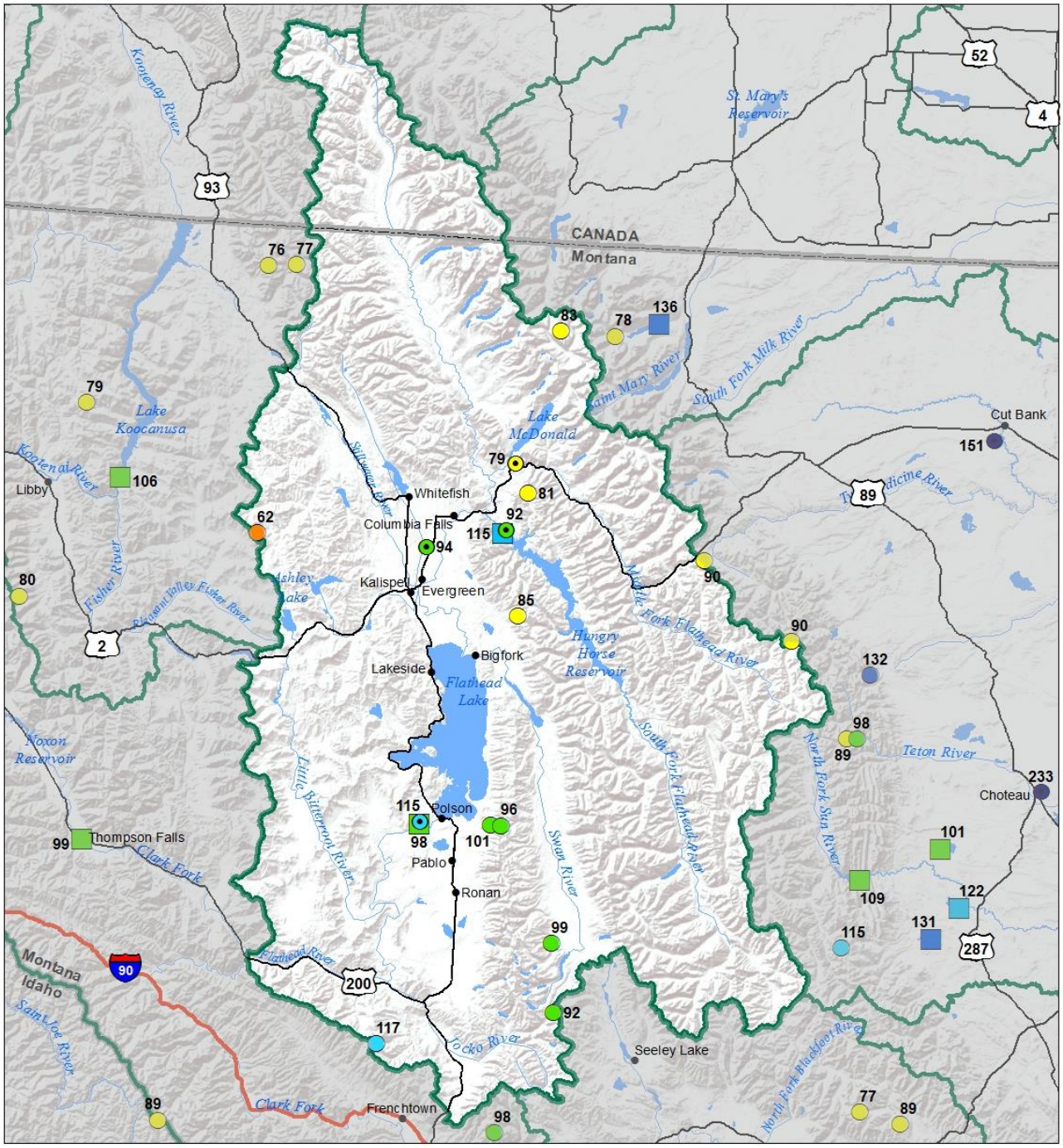
Snow Water Equivalent
Percent of Normal

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%		

USDA

Montana State Library Natural Resource Information System

Flathead River Basin
Water Year to Date Precipitation and Reservoir Levels
Percentage of Normal
June 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%

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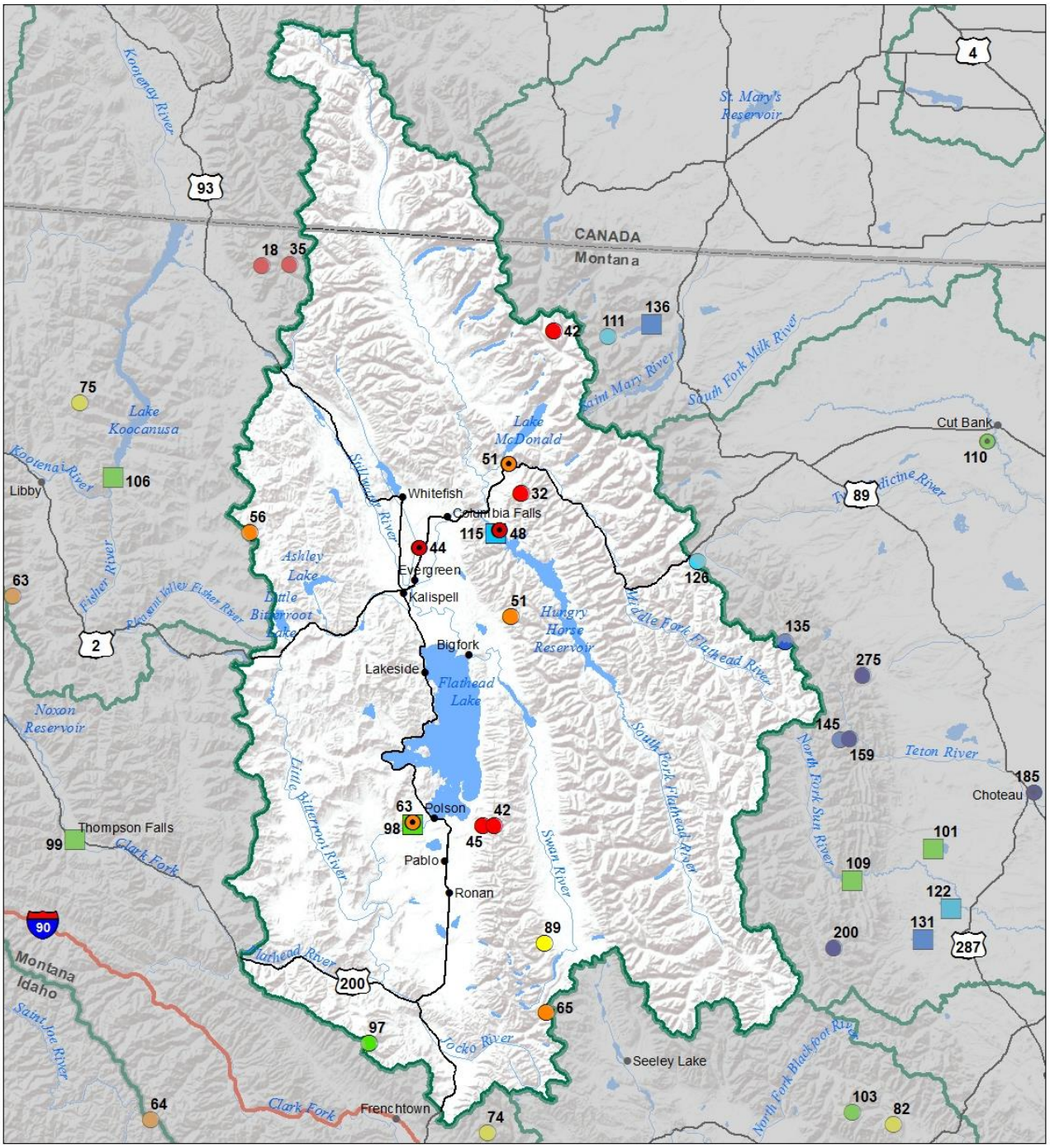
Montana State Library Natural Resource Information System

Flathead River Basin
Monthly Precipitation and Reservoir Levels
Percentage of Normal
June 1, 2019 (May 1, 2019 - June 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

Most low and mid-elevations melted out during the month of May in the Upper Clark Fork River basins, causing rivers to rise across the region. Snowmelt driven peak flows (flows driven only by snowmelt) likely occurred on many rivers during the third week of the month, but rivers have remained high through the end of the month. Snowpack on June 1st remains at the high elevations in the basin, which will help to sustain flows over the coming month, is slightly below normal for the basin overall, but above normal in some of the sub-basins in the headwaters of the Clark Fork. Precipitation during May was variable, with some sites reporting well below average precipitation, while others reported above average precipitation. This was likely due to the convective nature of storms this spring (thunderstorms and not large fronts). June is the last "wet" month in the region before more typical summer weather patterns play out and will play an important role in the flows later in the summer 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	114%	131%
FLINT CREEK	107%	0%
ROCK CREEK	46%	62%
CLARK FORK ab BLACKFOOT	102%	117%
BLACKFOOT	83%	169%
Basin-Wide Snowpack	**93%**	**140%**

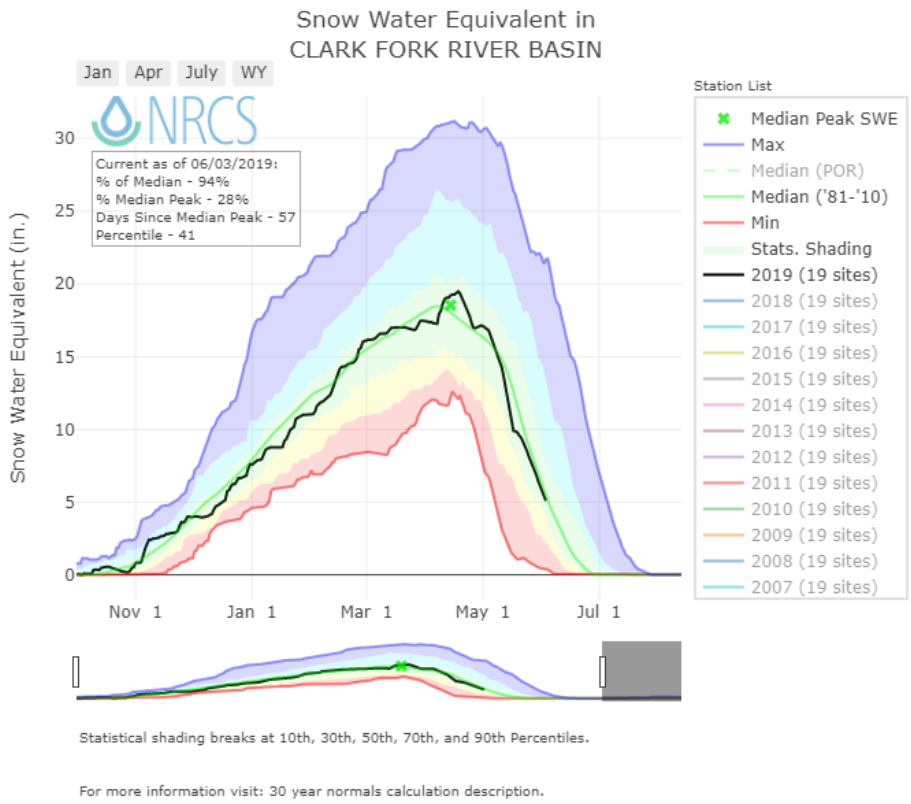
Precipitation	**Monthly Percentage of Average**	**WYTD Percentage of 1981-2010 Average***	**WYTD Last Year Percentage of Average**
Mountain Precipitation	89%	98%	128%
Valley Precipitation	122%	116%	119%
Basin-Wide Precipitation	**90%**	**99%**	**128%**

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

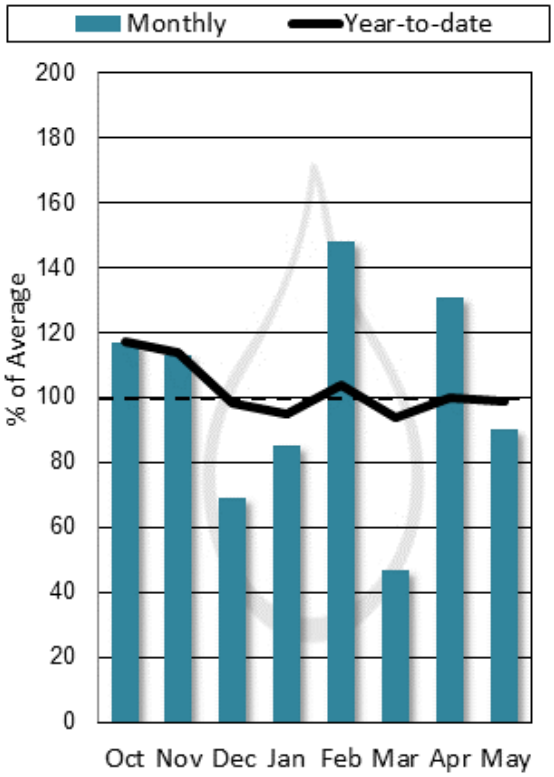
Reservoir Storage	**Percentage of Average**	**Percentage of Capacity (Total)**	**Last Year Percentage of Average**
Basin-Wide Storage	**108%**	**93%**	**118%**

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

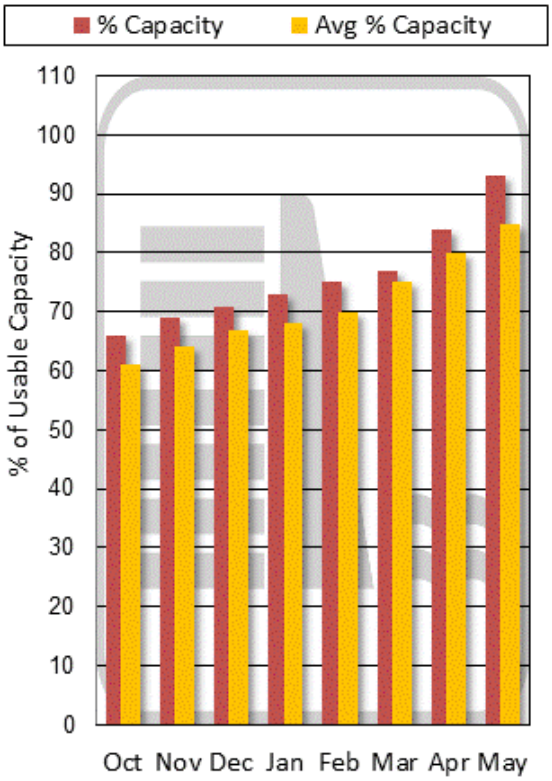
(click on chart below to navigate to online version with additional features)



Mountain and Valley Precipitation

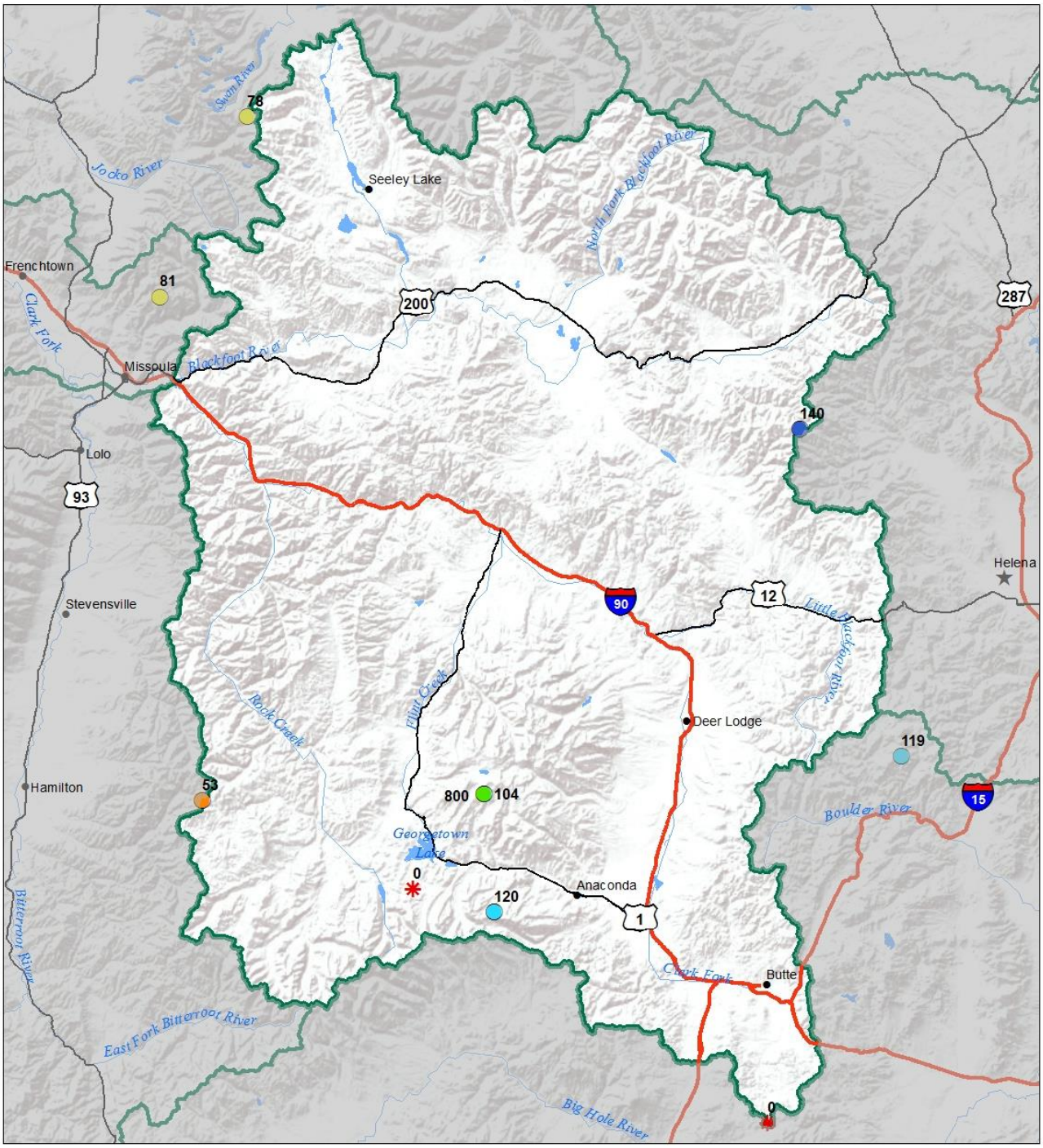


End of Month Reservoir Storage



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

Upper Clark Fork River Basin
Snow Water Equivalent
Percentage of Normal
June 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%	

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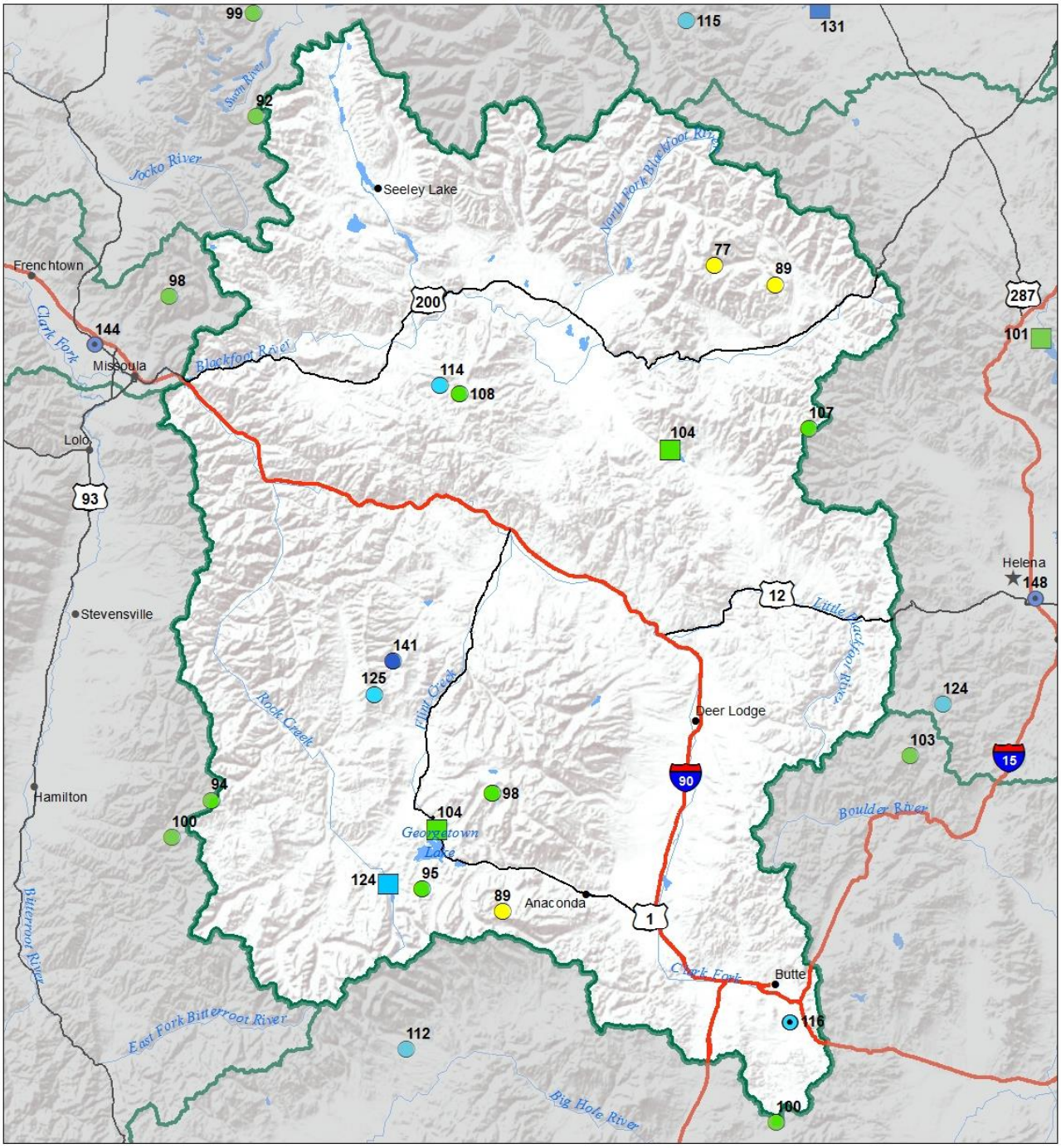
Upper Clark Fork River Basin
Water Year to Date Precipitation and Reservoir Levels
Percentage of Normal
June 1, 2019



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

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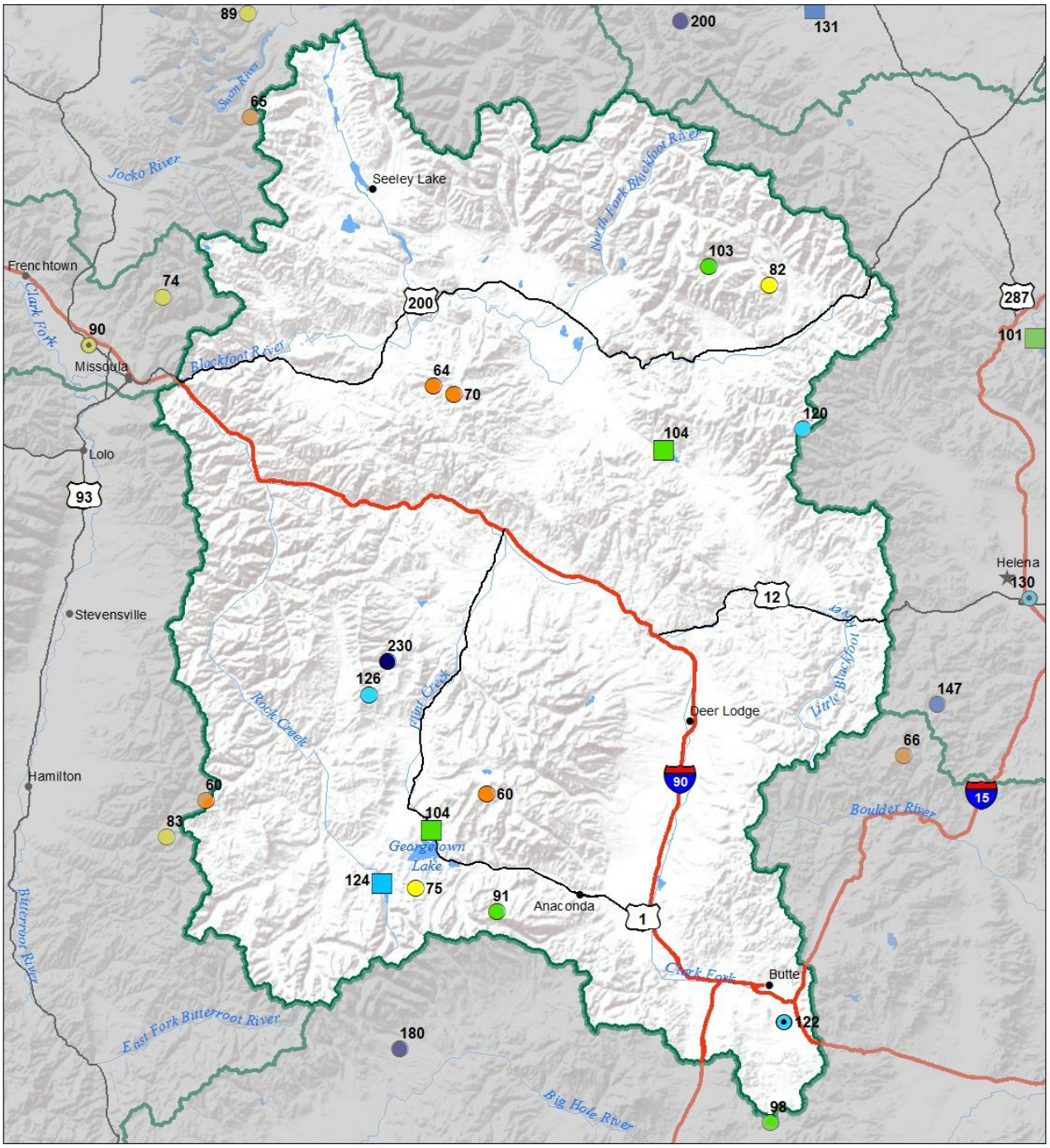
Upper Clark Fork River Basin
Monthly Precipitation and Reservoir Levels
Percentage of Normal
June 1, 2019 (May 1, 2019 - June 1, 2019)



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%

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Bitterroot River Basin

What's left to say about snowpack and snowmelt in the river basin on June 1st? Compared to last year, it's kind of boring. Snowmelt has been right on schedule this year, if not a little ahead of schedule at high elevations. What was interesting this month was the below average precipitation for May. The month started out slowly with little precipitation falling during the first two weeks of the month. Fortunately, a few storms that pushed through towards the end of the month delivered 2 to 3" of moisture before the month ended. Overall water year precipitation (October 1st – current) remains near average for most mountain locations in the basin. Looking forward, the remaining high elevation snowpack will melt, and the river volumes will drop from their snowmelt-driven levels. Summer flows will be driven by how fast the remaining snow melts, and how much summer precipitation falls, so hope for a cool and wet June to keep water in the rivers and streams later in the summer.

Bitterroot River Basin Data Summary

Snowpack	**Percent of 1981-2010 Normal (Median)**	**Last Year Percentage of Normal (Median)**
WEST FORK BITTERROOT	102%	128%
EAST SIDE BITTERROOT	82%	104%
WEST SIDE BITTERROOT	64%	127%
Basin-Wide Snowpack	**74%**	**113%**

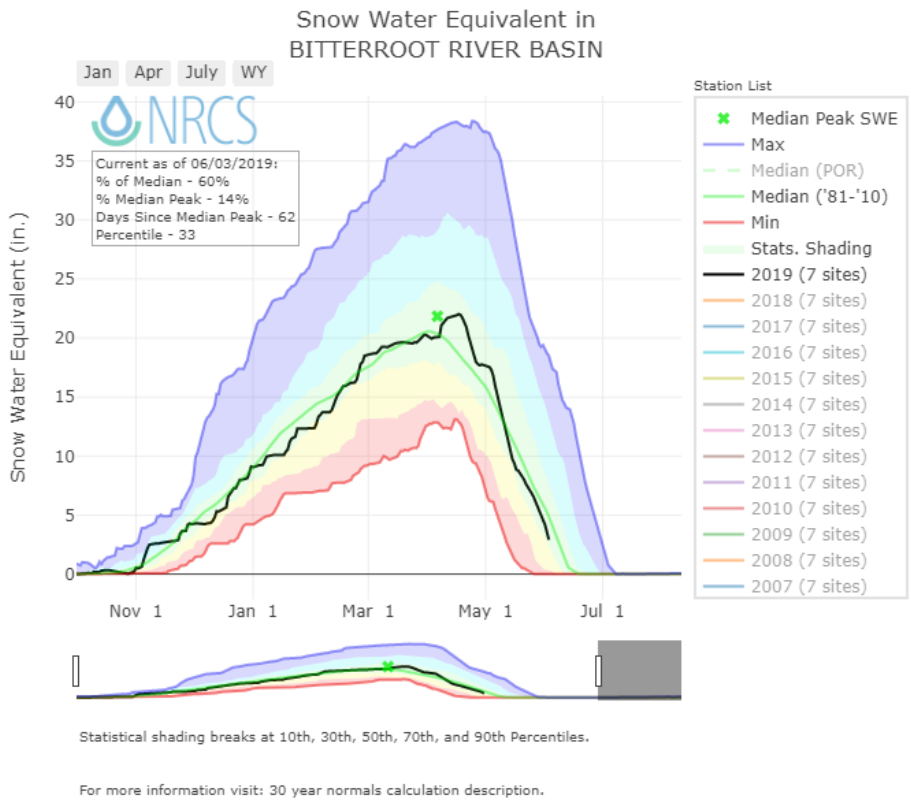
Precipitation	**Monthly Percentage of Average**	**WYTD Percentage of 1981-2010 Average***	**WYTD Last Year Percentage of Average**
Mountain Precipitation	67%	99%	118%
Valley Precipitation	%	%	%
Basin-Wide Precipitation	**67%**	**99%**	**118%**

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

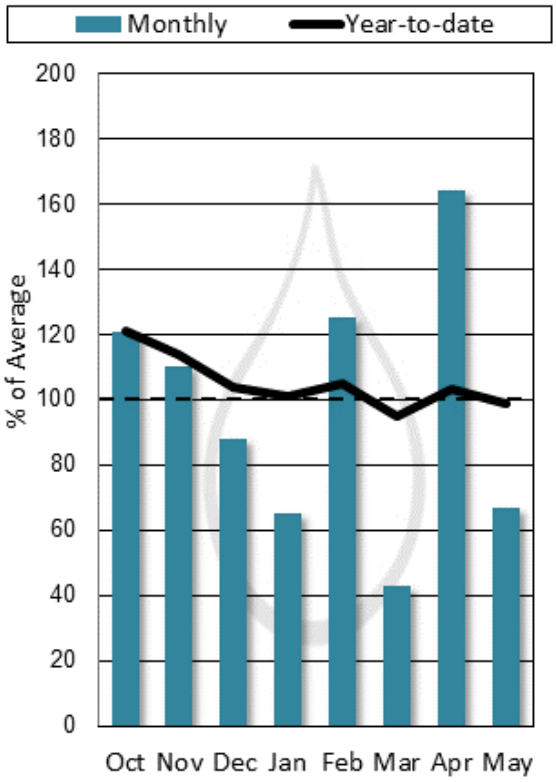
	Percentage of Average	**Percentage of Capacity (Total)**	**Last Year Percentage of Average**
Basin-Wide Storage	**108%**	**106%**	**108%**

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

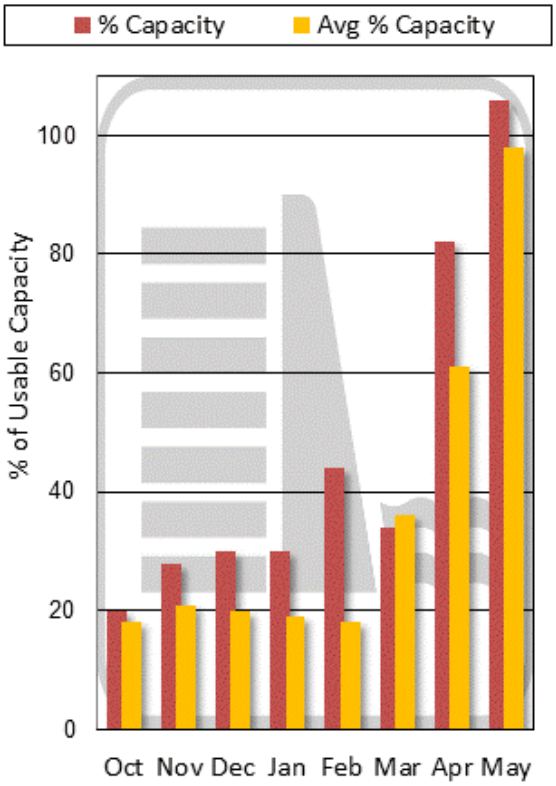
(click on chart below to navigate to [online version]() with additional features)



Mountain and Valley Precipitation

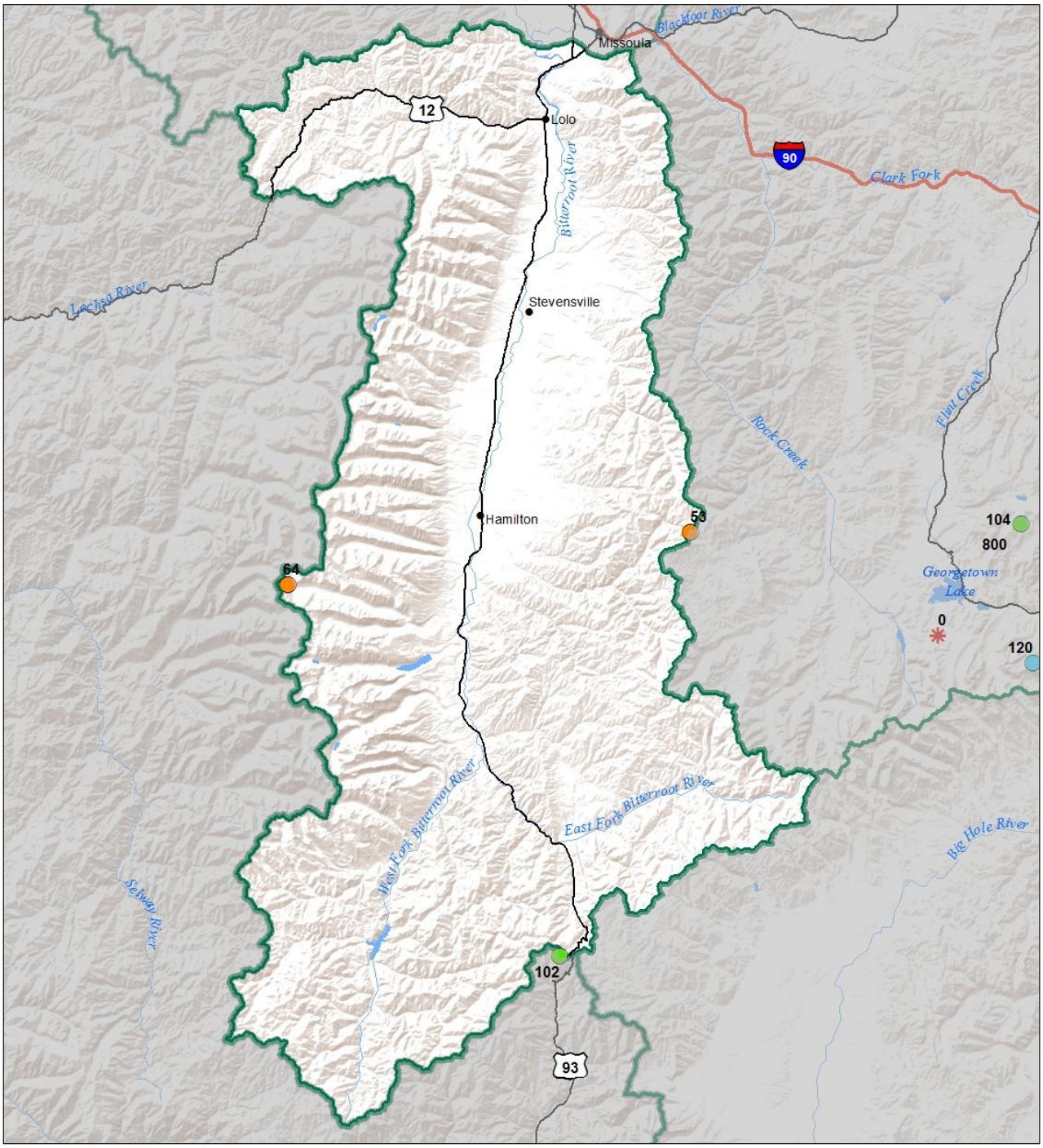


End of Month Reservoir Storage



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

Bitterroot River Basin
Snow Water Equivalent
Percentage of Normal
June 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%		

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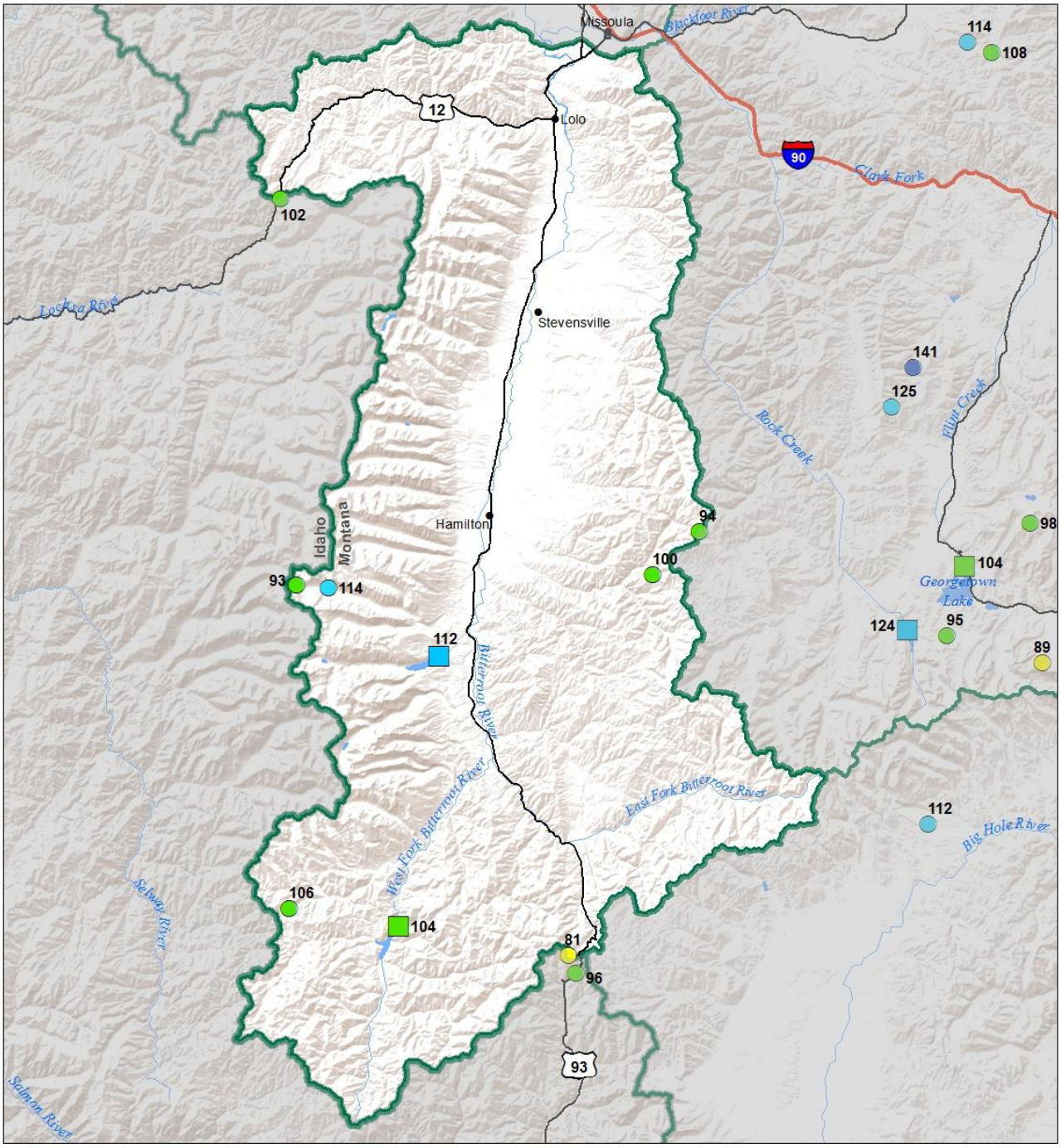
Bitterroot River Basin
Water Year to Date Precipitation and Reservoir Levels
Percentage of Normal
June 1, 2019



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%

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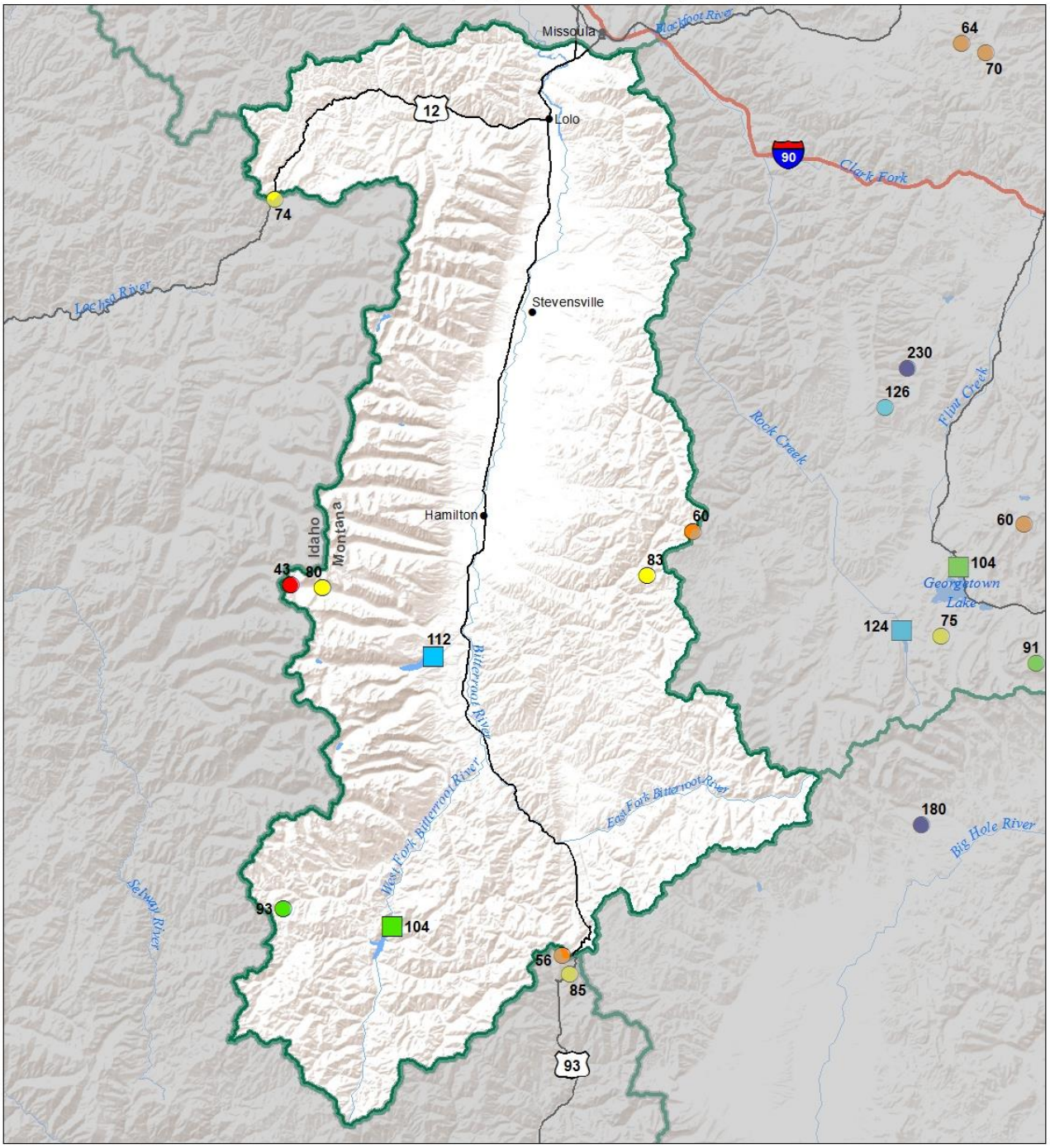
Bitterroot River Basin
Monthly Precipitation and Reservoir Levels
Percentage of Normal
June 1, 2019 (May 1, 2019 - June 1, 2019)



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%

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Lower Clark Fork River Basin

Only three sites in the Lower Clark Fork River basin have snowpack remaining on June 1st. These high elevation sites benefitted from the cooler weather during the middle of the month, which helped to slow melt that was occurring at during the first two weeks of the month and helped to sustain the snowpack into June. The month of May yielded below-average precipitation across the basin with most of the precipitation falling during the last two weeks of the month. Although both March and May were disappointing for precipitation, water year precipitation totals (October 1st) are hovering near to slightly above average in the upper basin (near Missoula), but decline to below normal as you move down the basin toward the Idaho border. Rivers began their seasonal rise in April but made their big snowmelt drives pushes during the month of May. Seasonal snowmelt-driven river peaks likely occurred during the third week of May, and rivers have been on the slow decline since.

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	92%	148%
Basin-Wide	**92%**	**148%**

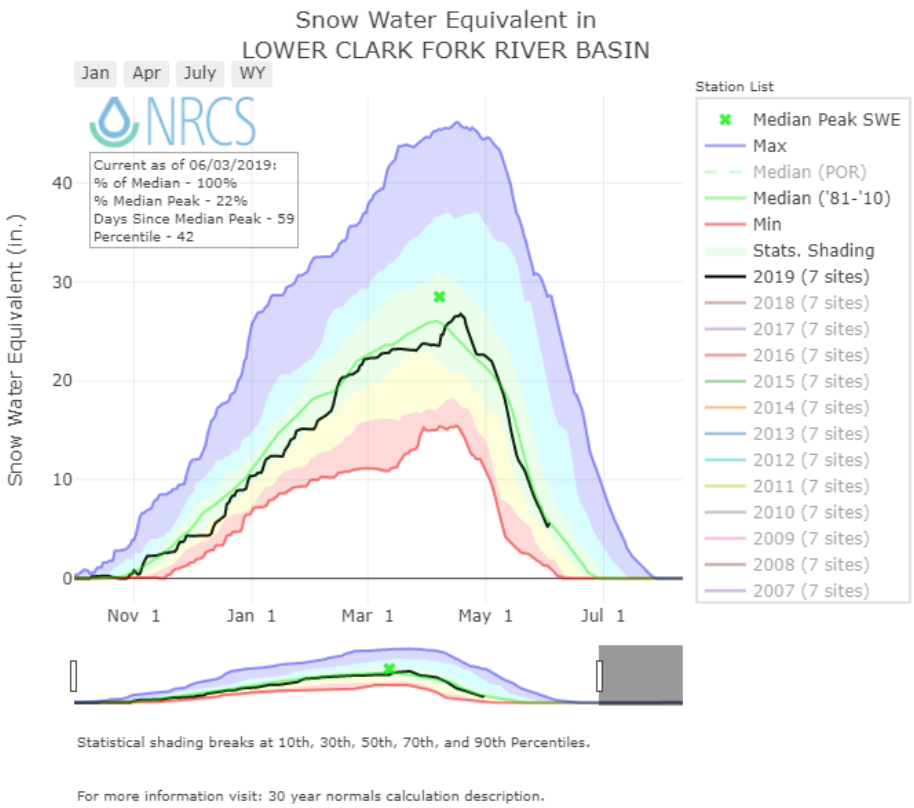
Precipitation	**Monthly Percentage of Average**	**WYTD Percentage of 1981-2010 Average***	**WYTD Last Year Percentage of Average**
Mountain Precipitation	76%	90%	114%
Valley Precipitation	90%	144%	134%
Basin-Wide Precipitation	**77%**	**92%**	**114%**

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

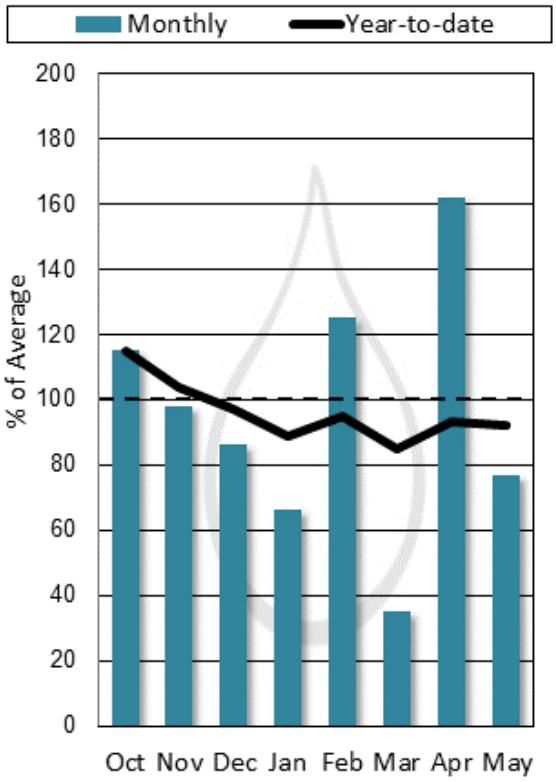
Reservoir Storage	**Percentage of Average**	**Percentage of Capacity (Total)**	**Last Year Percentage of Average**
Basin-Wide Storage	**102%**	**98%**	**102%**

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

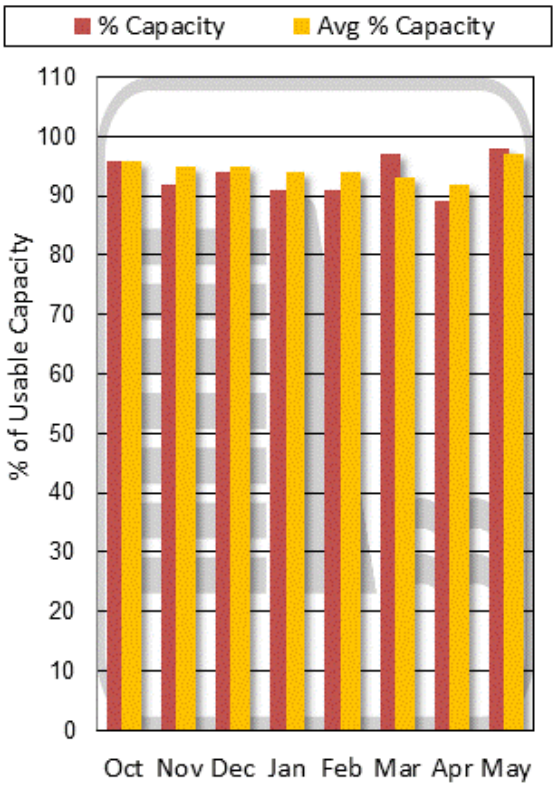
(click on chart below to navigate to online version with additional features)



Mountain and Valley Precipitation

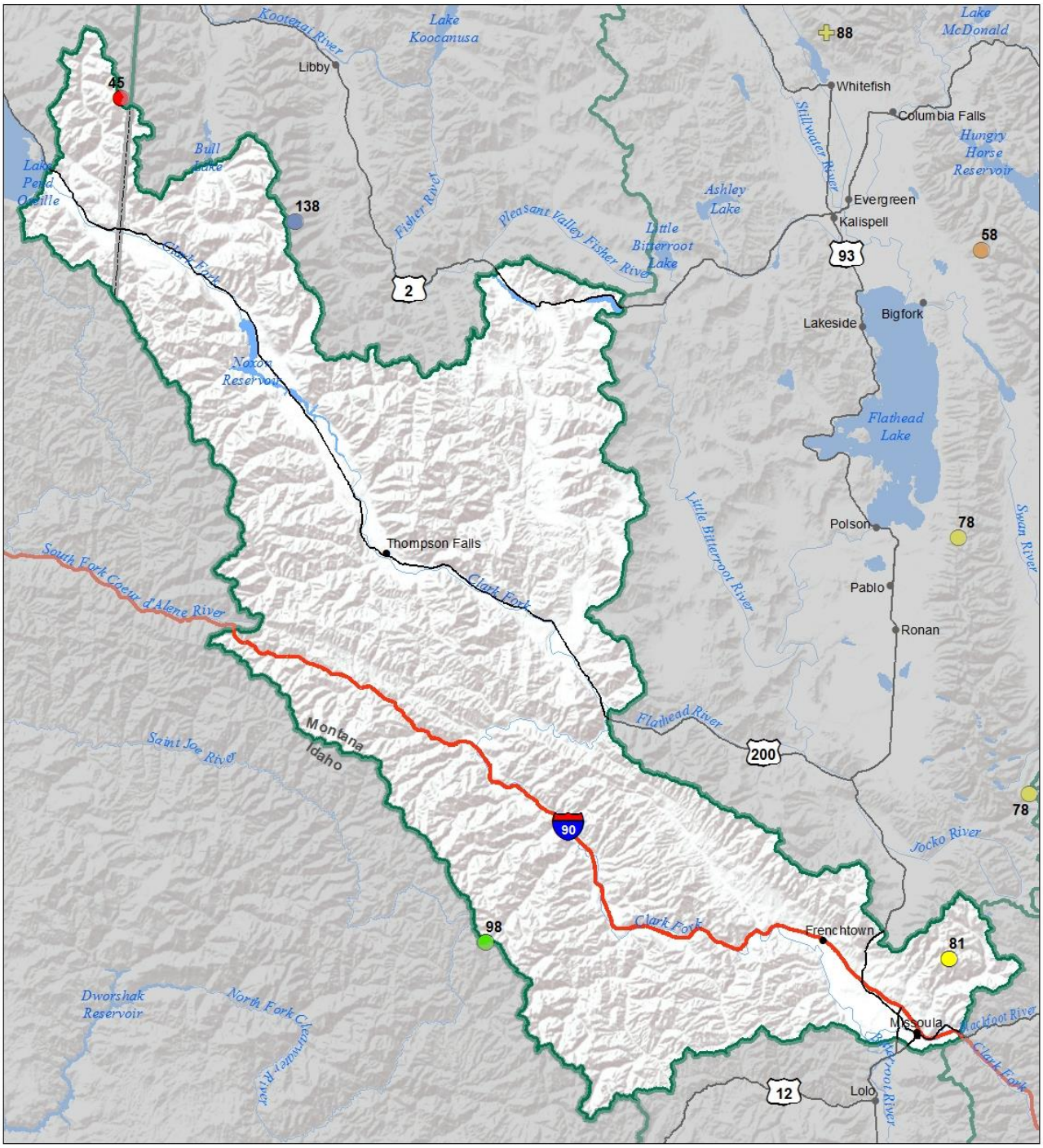


End of Month Reservoir Storage



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

Lower Clark Fork River Basin
Snow Water Equivalent
Percentage of Normal
June 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%

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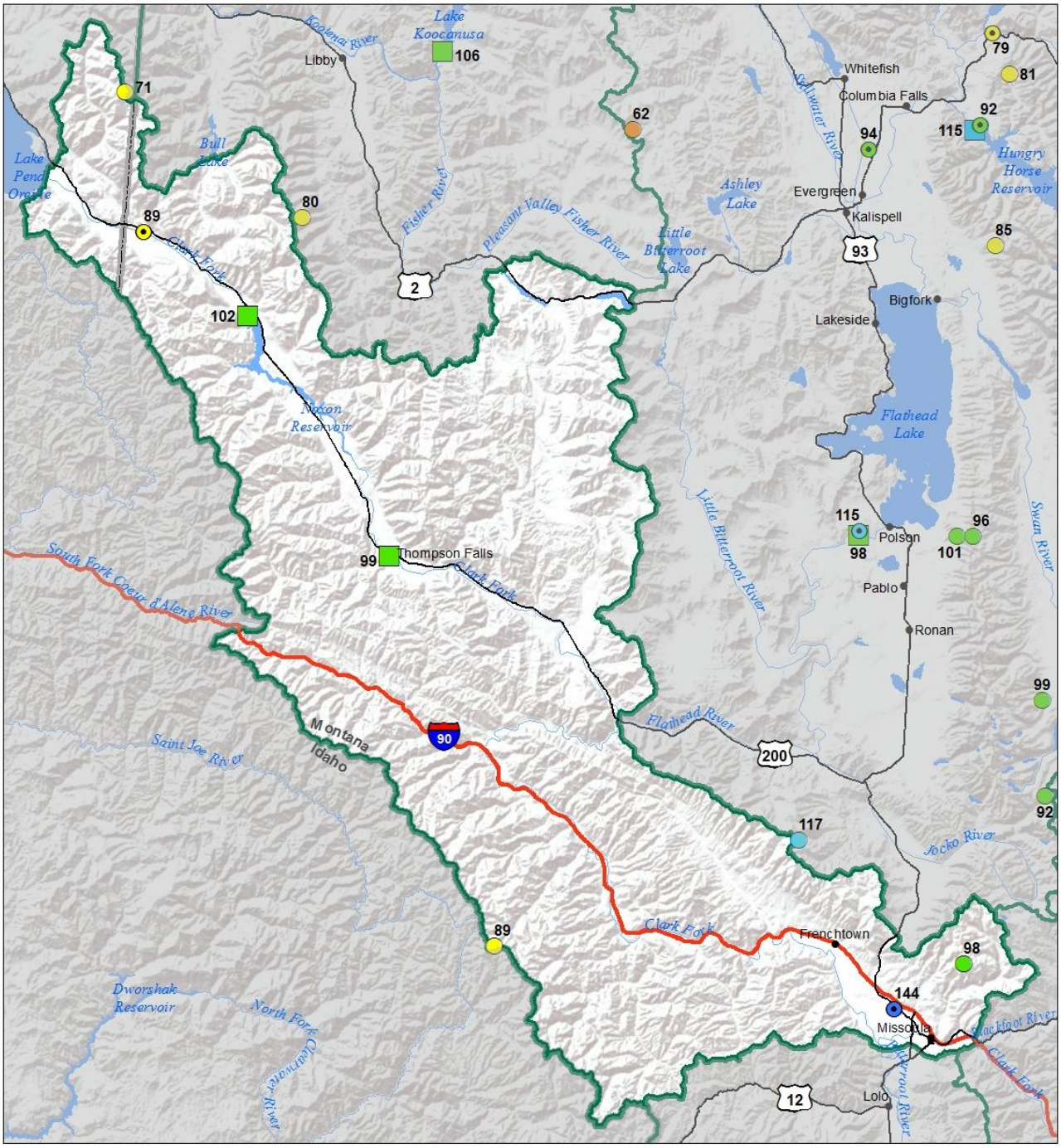
Montana State Library Natural Resource Information System

Lower Clark Fork River Basin
Water Year to Date Precipitation and Reservoir Levels
Percentage of Normal
June 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%	

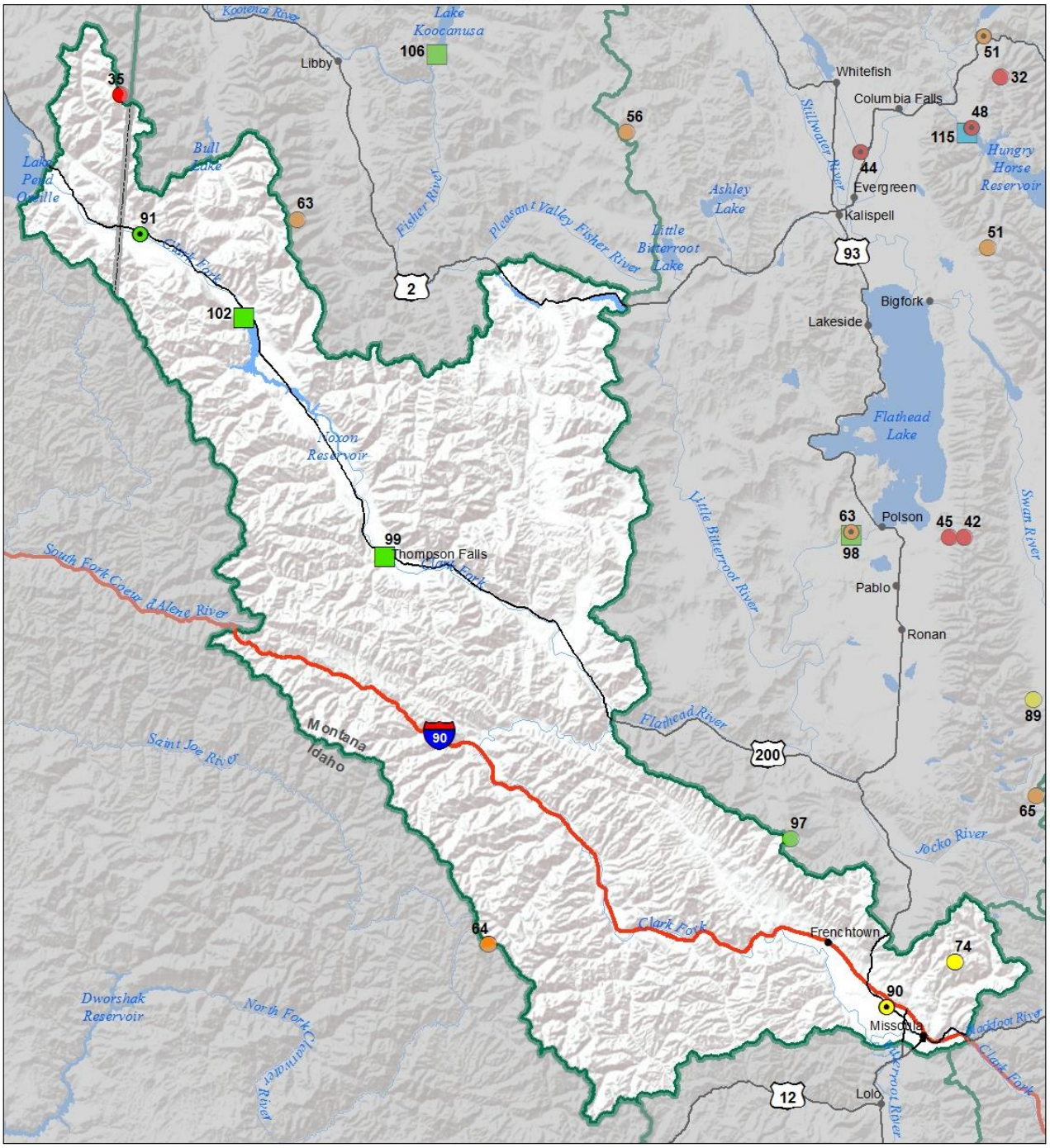
Reservoirs
Percent of Normal

- > 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
June 1, 2019 (May 1, 2019 - June 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%	

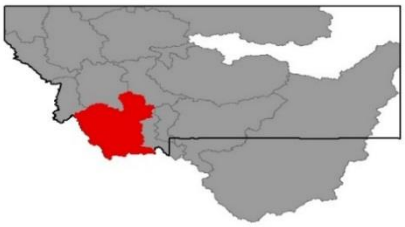
Reservoirs
Percent of Normal

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

USDA

Montana State Library Natural Resource Information System

Jefferson River Basin



May yielded variable precipitation to the Jefferson Drainage as the Ruby received just a third of its average while the Bighole, Beaverhead, and Boulder were only slightly below normal. The good news is water year to date numbers are spot on at 101% of average and snowpack in the Ruby is 128% of normal while the basin-wide average is near normal. Reservoir storage is up to 119% of average as water managers are trying to hold back as much as they can with an average snowpack above them in the mountains. Water supplies are looking sufficient for now, but keep in mind that we still need to receive normal amounts of precipitation from June to August to avoid water shortages towards the end of the irrigation season.

Jefferson River Basin Data Summary

Snowpack	**Percent of 1981-2010 Normal (Median)**	**Last Year Percentage of Normal (Median)**
BEAVERHEAD	119%	94%
RUBY	128%	90%
BIGHOLE	101%	113%
BOULDER	116%	124%
Basin-Wide Snowpack	**102%**	**120%**

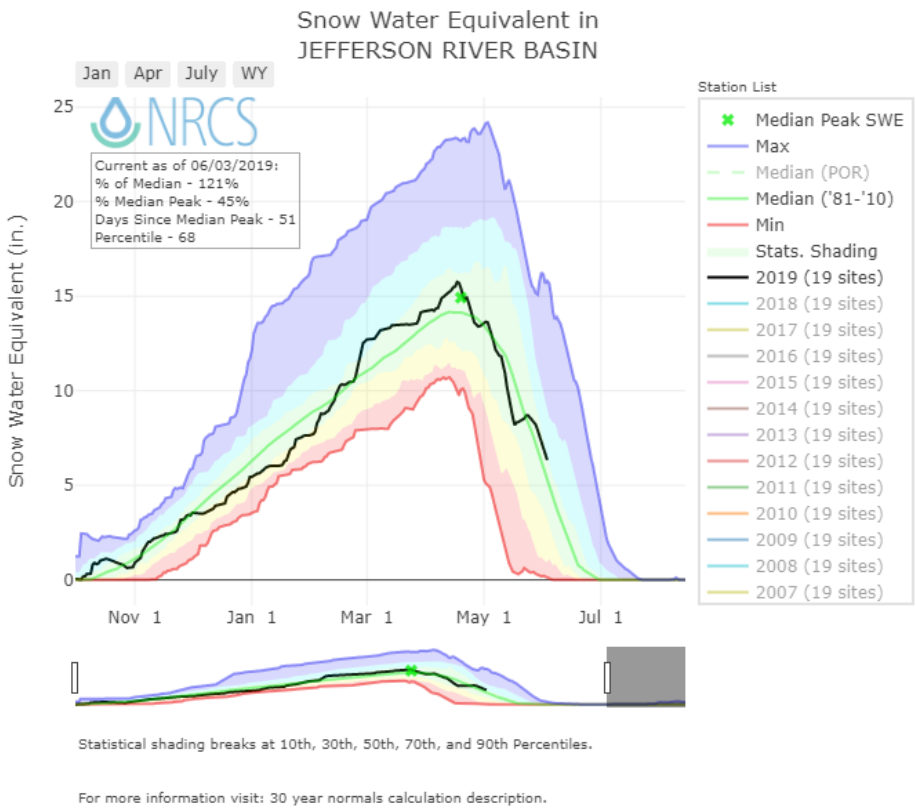
Precipitation	**Monthly Percentage of Average**	**WYTD Percentage of 1981-2010 Average***	**WYTD Last Year Percentage of Average**
Mountain Precipitation	86%	101%	112%
Valley Precipitation	%	%	%
Basin-Wide Precipitation	**86%**	**101%**	**112%**

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

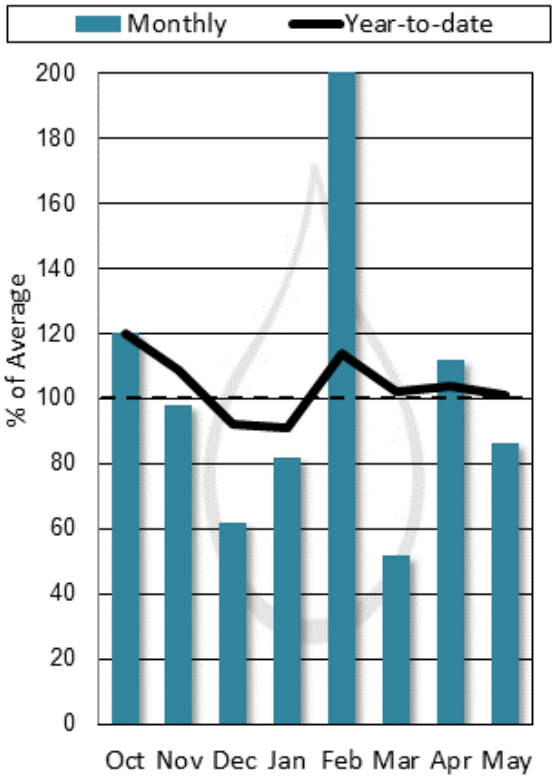
Reservoir Storage	**Percentage of Average**	**Percentage of Capacity (Total)**	**Last Year Percentage of Average**
Basin-Wide Storage	**116%**	**72%**	**127%**

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

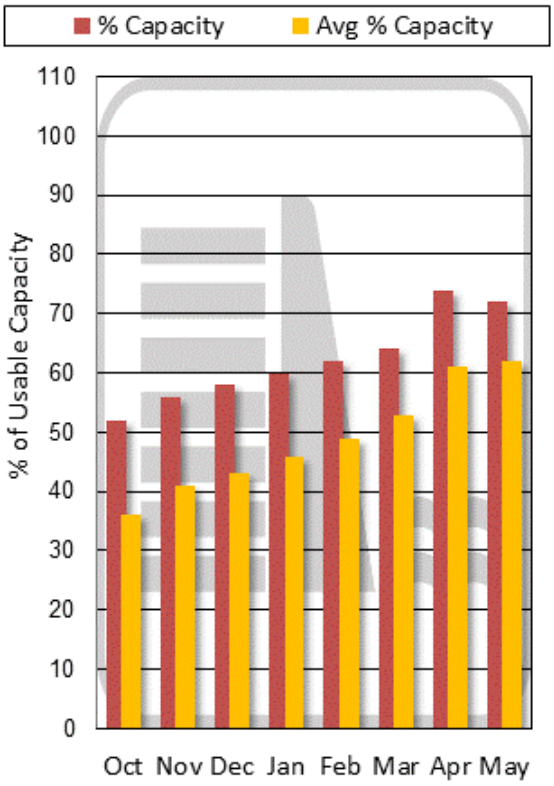
(click on chart below to navigate to [online version]() with additional features)



Mountain and Valley Precipitation

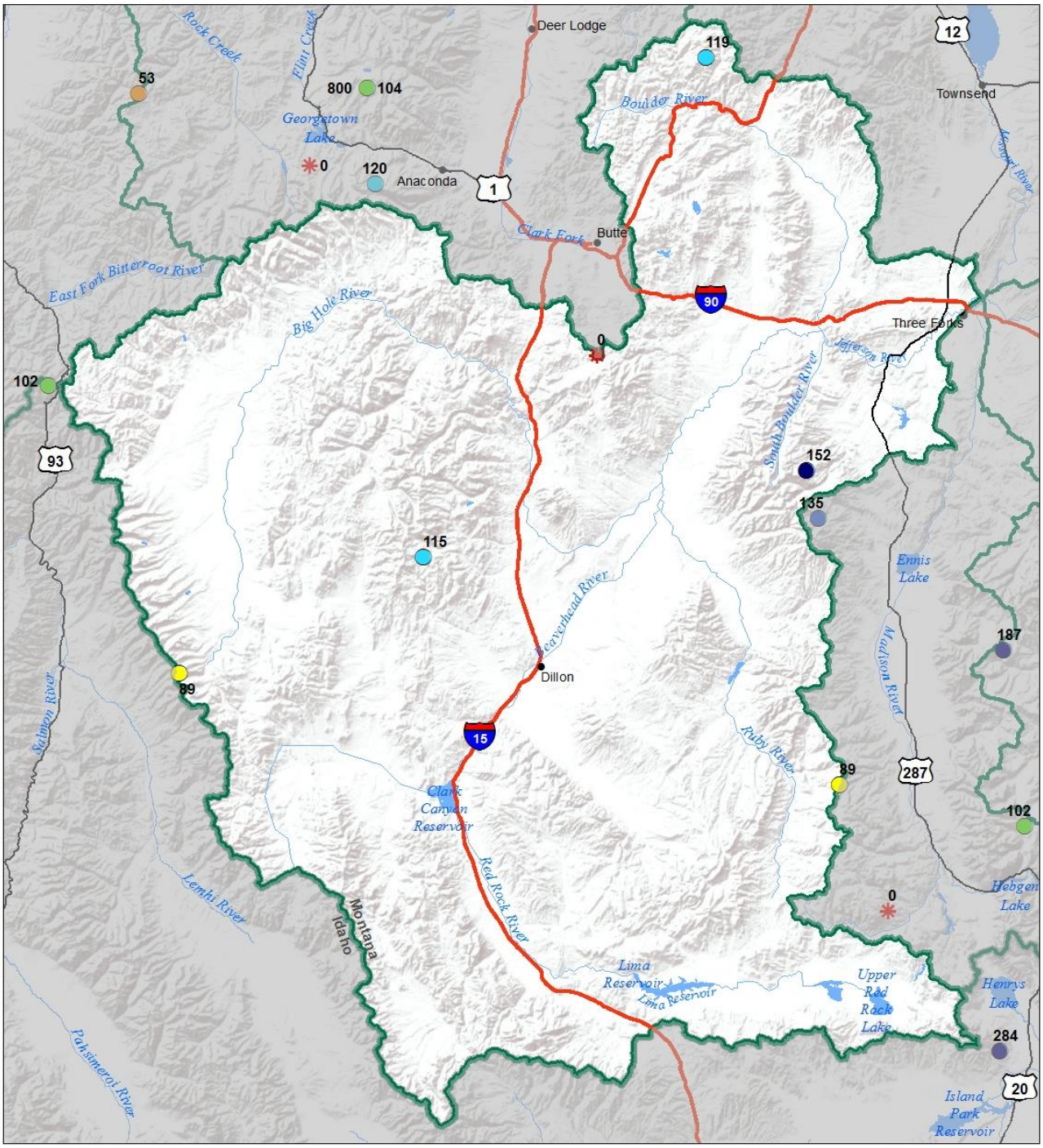


End of Month Reservoir Storage



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

Jefferson River Basin
Snow Water Equivalent
Percentage of Normal
June 1, 2019



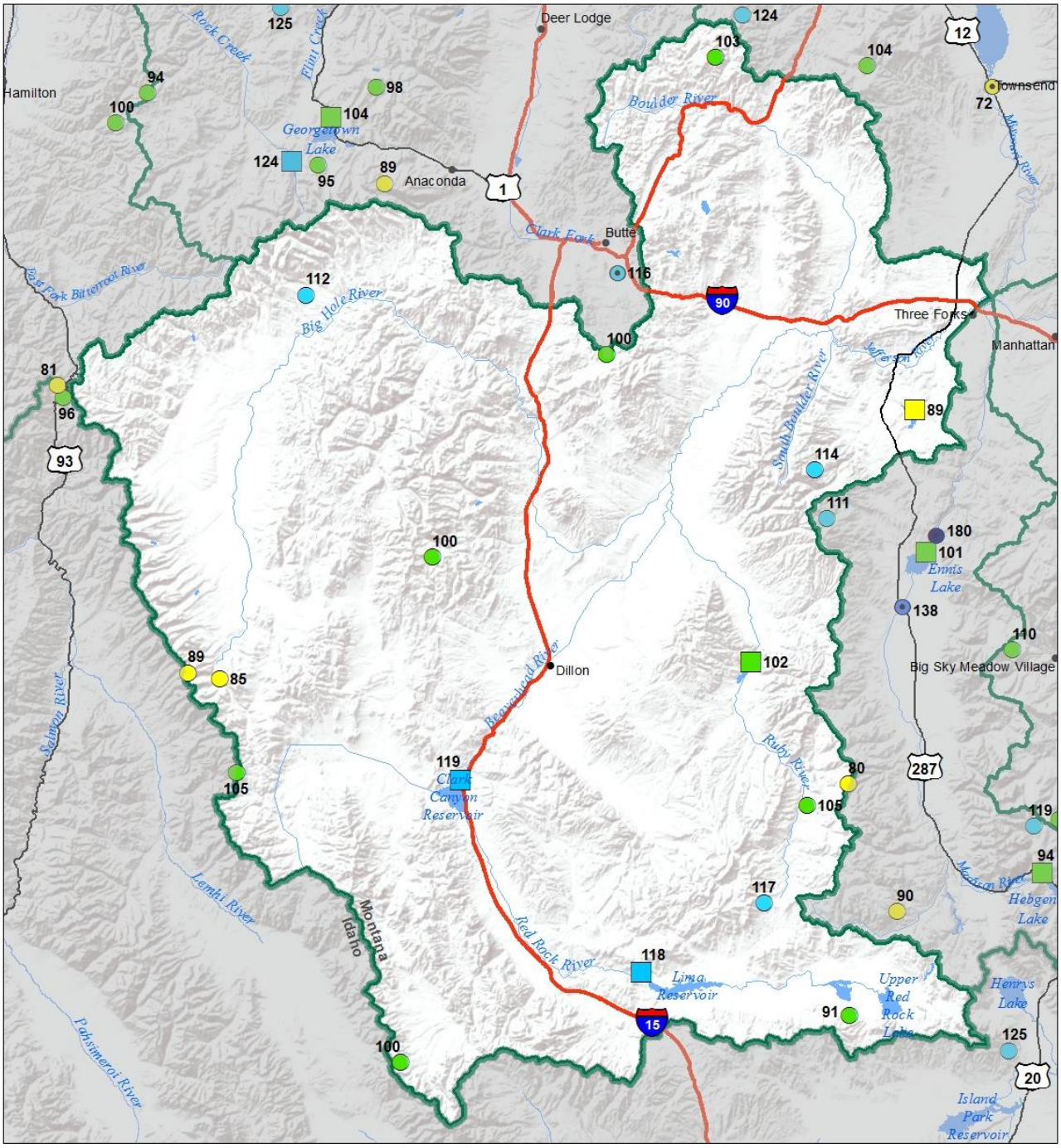
Snow Water Equivalent
Percent of Normal

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%		

USDA

Montana State Library Natural Resource Information System

Jefferson River Basin
Water Year to Date Precipitation and Reservoir Levels
Percentage of Normal
June 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%	

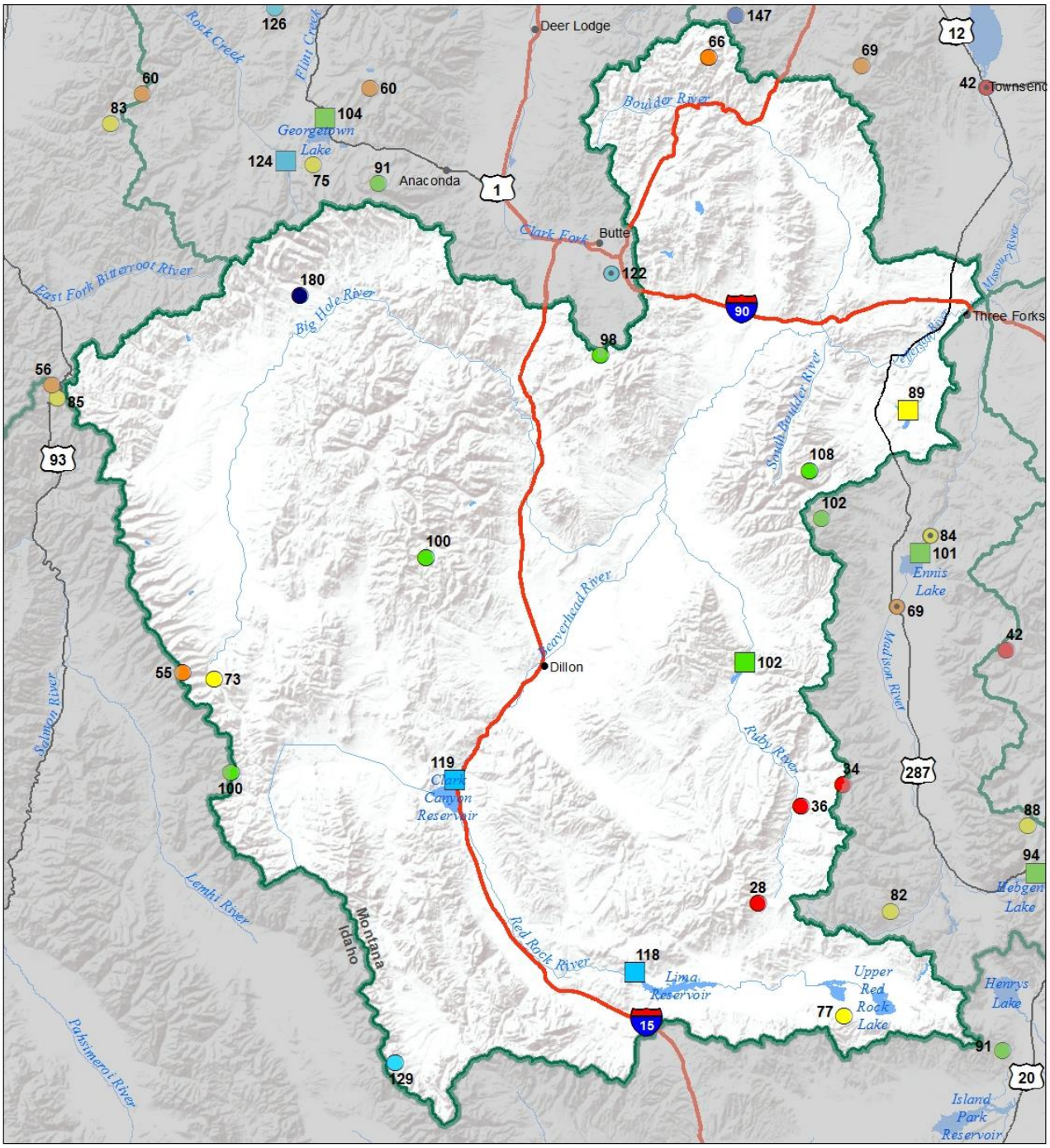
Reservoirs
Percent of Normal

- > 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
June 1, 2019 (May 1, 2019 - June 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%	

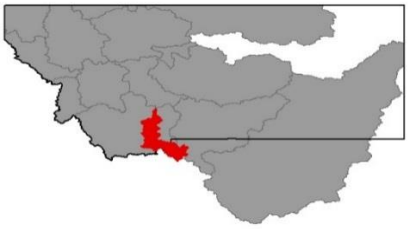
Reservoirs
Percent of Normal

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

USDA

Montana State Library Natural Resource Information System

Madison River Basin



The Madison still holds 138% of normal snowpack as of June 1st, which has been slowly melting off over the month of May. All of the Madison Plateau sites reached their peak snowpack in late April, while the Gravellys, Tobacco Roots and northern Madisons peaked in early May. Precipitation was also near normal for the month of May, which is a first for this winter, as we have been see-sawing back and forth from record breaking dry spells, to record accumulation. Amazingly, as of June, the Madison has pulled through with well above average snowpack. There's still 173% of normal snowpack above Hebgen Lake which is starting to enter the streams, while Hebgen is already at 84% of capacity. The first surge of melt came in mid-May, bumping the Madison River above Hebgen to 3000 CFS and now we are seeing the higher elevation snowpack enter the system, of which reservoir managers are only passing half of the inflow. Above normal snowpack, above average water-year precipitation, and excellent reservoir storage for this date should ensure adequate water supply in the Madison River this summer.

Madison River Basin Data Summary

Snowpack	**Percent of 1981-2010 Normal (Median)**	**Last Year Percentage of Normal (Median)**
MADISON abv HEBGEN LAKE	173%	126%
MADISON blw HEBGEN LAKE	124%	86%
Basin-Wide Snowpack	**138%**	**98%**

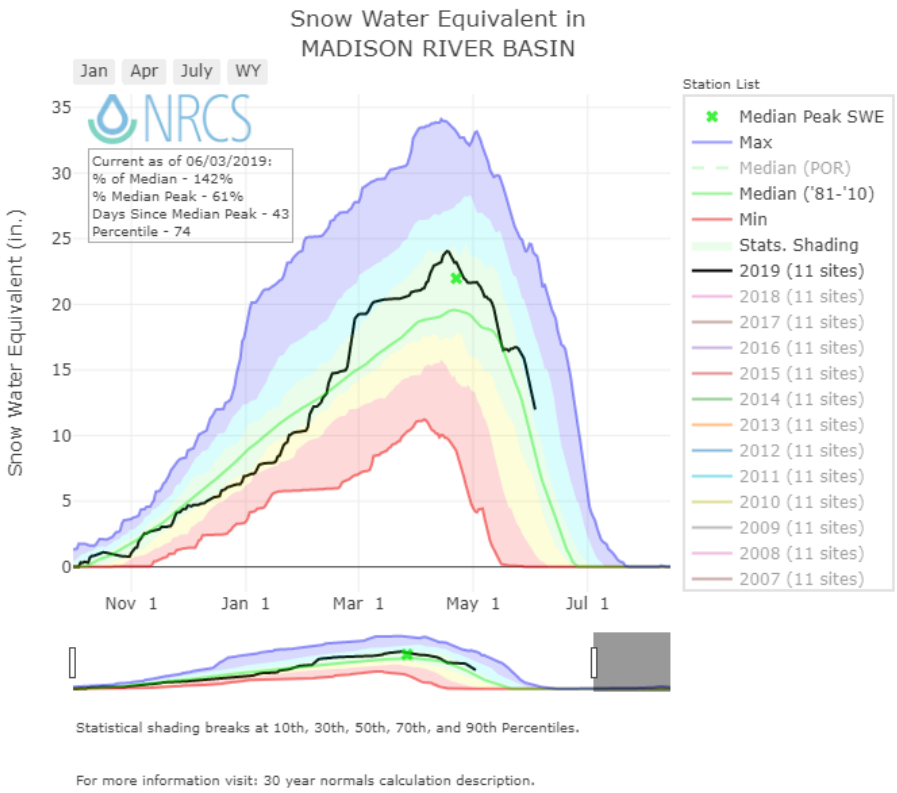
Precipitation	**Monthly Percentage of Average**	**WYTD Percentage of 1981-2010 Average***	**WYTD Last Year Percentage of Average**
Mountain Precipitation	87%	108%	110%
Valley Precipitation	78%	162%	152%
Basin-Wide Precipitation	**86%**	**111%**	**113%**

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

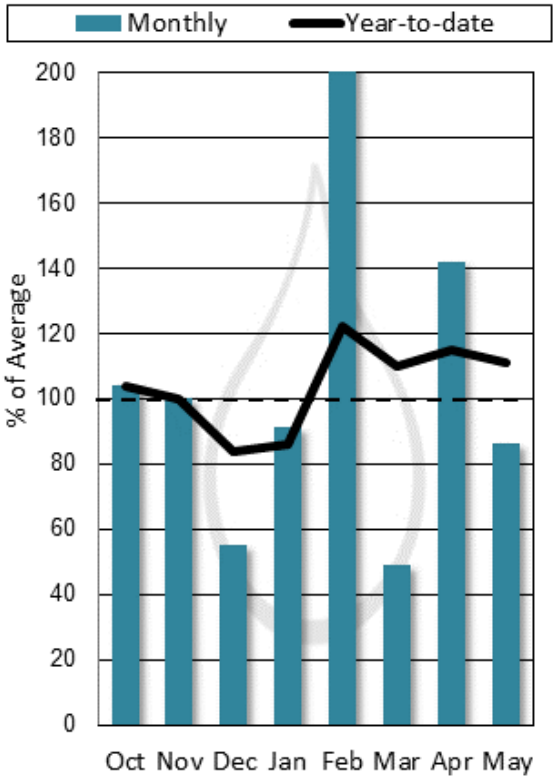
Reservoir Storage	**Percentage of Average**	**Percentage of Capacity (Total)**	**Last Year Percentage of Average**
Basin-Wide Storage	**95%**	**84%**	**105%**

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

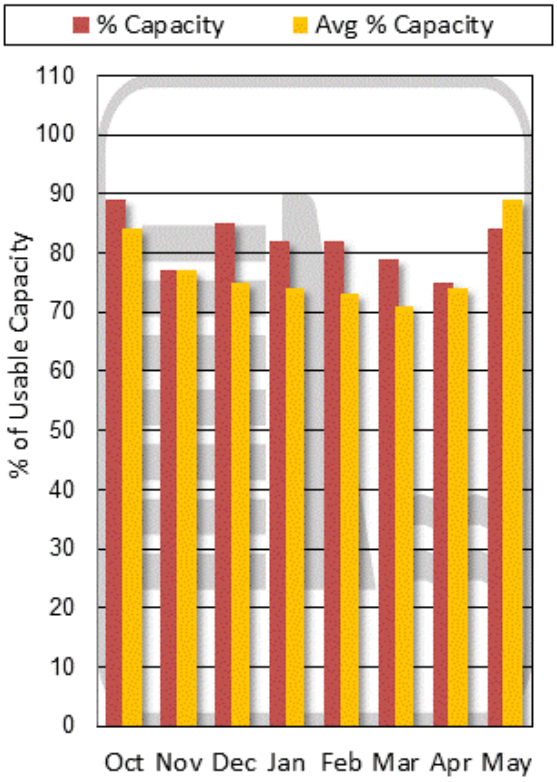
(click on chart below to navigate to online version with additional features)



Mountain and Valley Precipitation

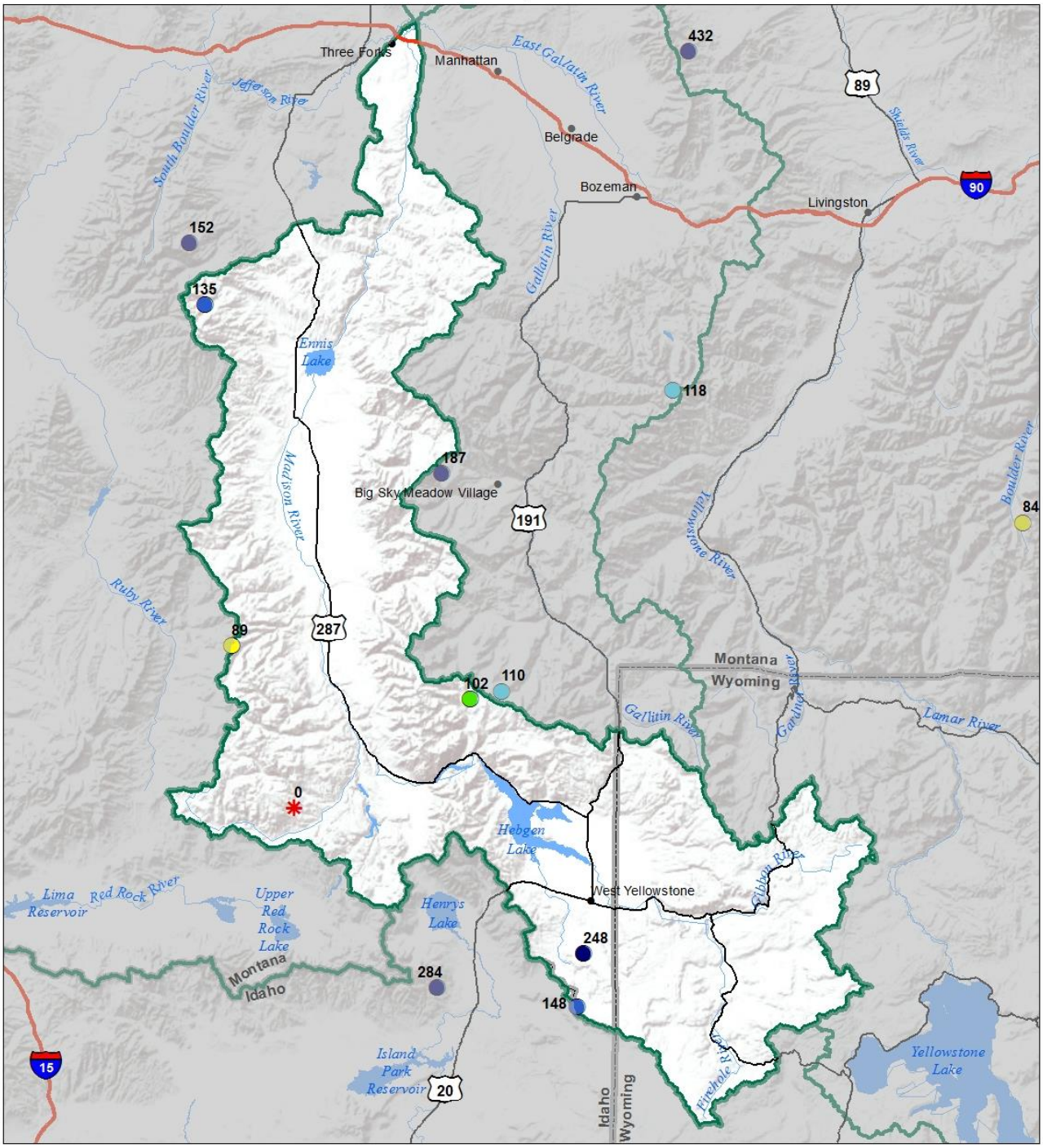


End of Month Reservoir Storage



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

Madison River Basin
Snow Water Equivalent
Percentage of Normal
June 1, 2019



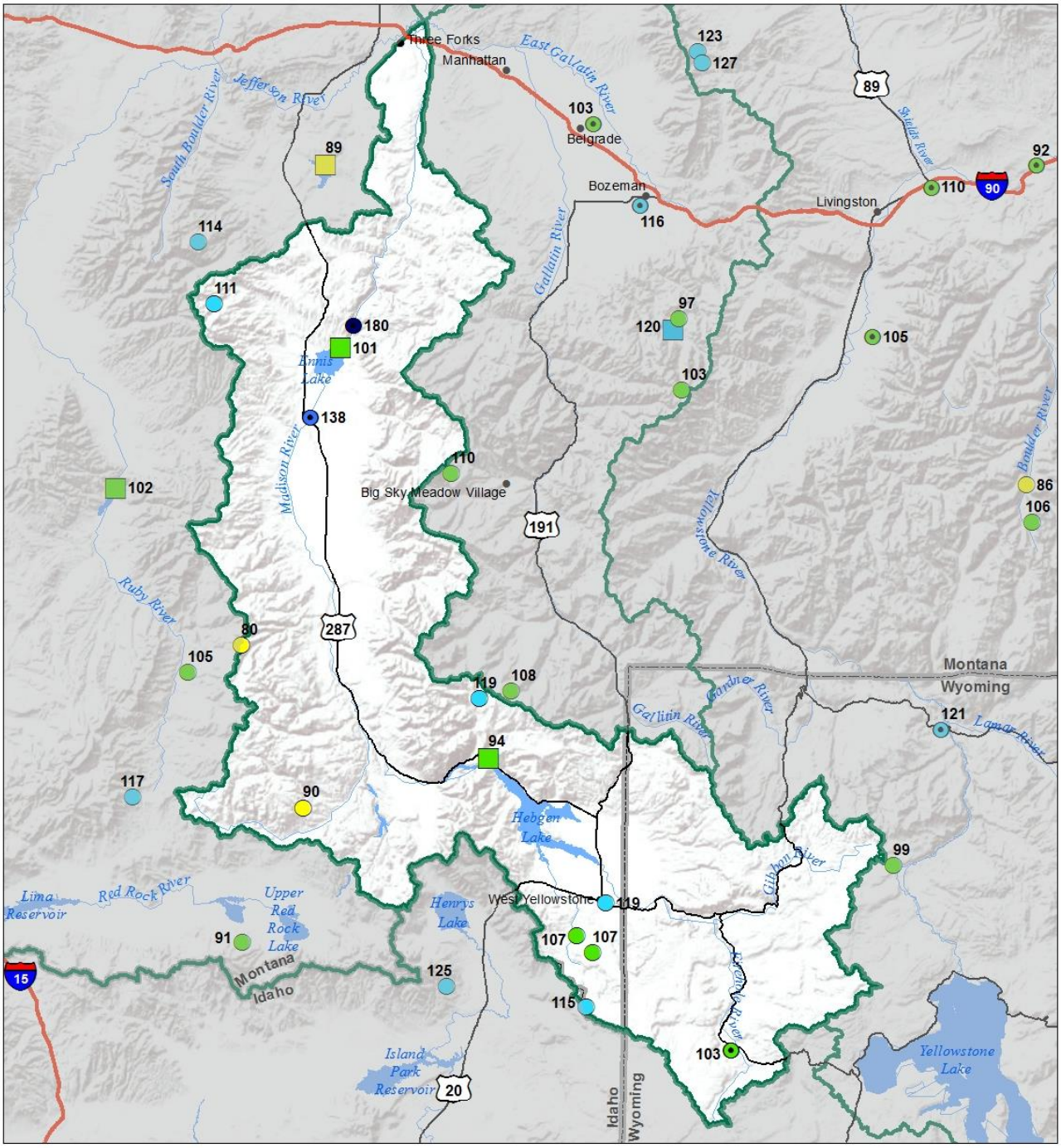
Snow Water Equivalent
Percent of Normal

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%

USDA

Montana State Library Natural Resource Information System

Madison River Basin
Water Year to Date Precipitation and Reservoir Levels
Percentage of Normal
June 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%	

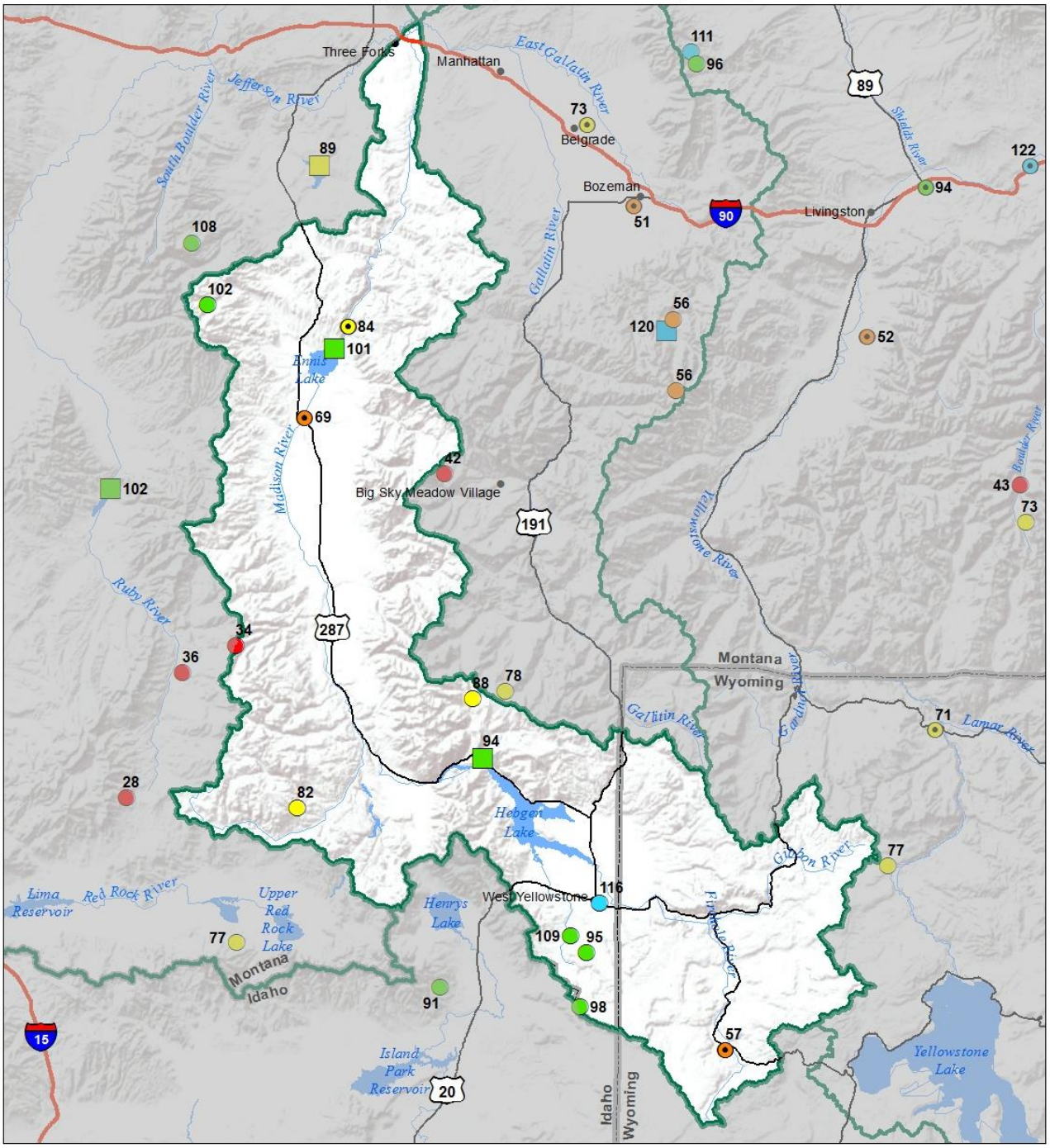
Reservoirs
Percent of Normal

- > 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
June 1, 2019 (May 1, 2019 - June 1, 2019)



Precipitation
Percent of Normal

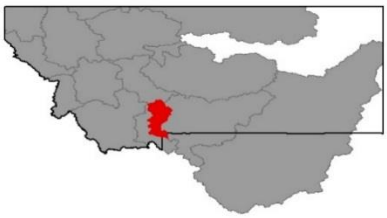
SNOTEL		COOP/ACIS	
> 150%	71 - 90%	> 150%	71 - 90%
131 - 150%	51 - 70%	131 - 150%	51 - 70%
111 - 130%	1 - 50%	111 - 130%	1 - 50%
91 - 110%		91 - 110%	

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

High elevation sites in the Gallatin basin reached their peak snowpack in the first week of May and have been slowly melting over the last three weeks with 140% of normal snowpack remaining. Thankfully, these snow water stores are making up for lack luster May precipitation, as only the Bridgers received near normal amounts. Nonetheless, Middle Creek Reservoir is topping up with over 10,000 acre-feet, and water users that use water from Middle Creek should have adequate water for irrigation and municipal water supply. The Gallatin is making it's big seasonal push for snowmelt-driven flows and has been rapidly rising during the first week of June due to the well above average temperatures that have persisted since Memorial Day. Cool weather forecasted should help to slow the melt of the remaining snowpack. As mentioned last month, May and June are historically big precipitation months, and we still need June to come through to supplement the snowmelt and help keep water in the river and streams later in the summer.

Gallatin River Basin Data Summary

Snowpack	**Percent of 1981-2010 Normal (Median)**	**Last Year Percentage of Normal (Median)**
UPPER GALLATIN	*126%*	*86%*
HYALITE	*118%*	*125%*
BRIDGER	*432%*	*87%*
Basin-Wide Snowpack	**140%**	**98%**

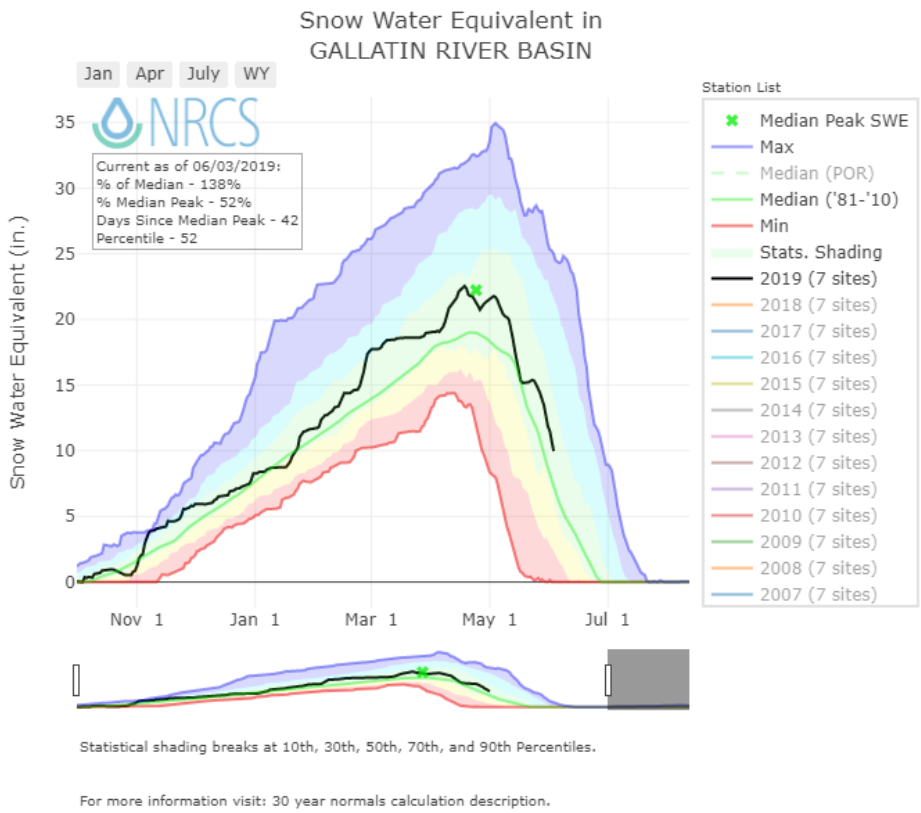
Precipitation	**Monthly Percentage of Average**	**WYTD Percentage of 1981-2010 Average***	**WYTD Last Year Percentage of Average**
Mountain Precipitation	77%	113%	121%
Valley Precipitation	60%	111%	129%
Basin-Wide Precipitation	**74%**	**113%**	**122%**

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

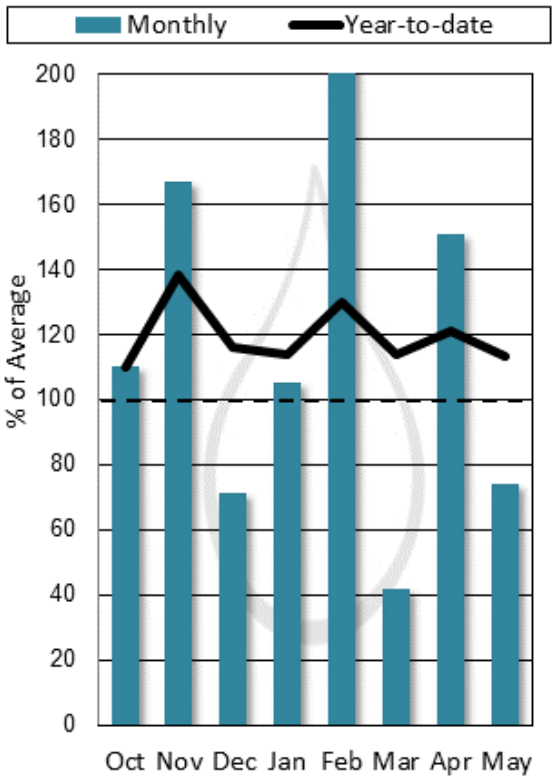
Reservoir Storage	**Percentage of Average**	**Percentage of Capacity (Total)**	**Last Year Percentage of Average**
Basin-Wide Storage	**120%**	**101%**	**120%**

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

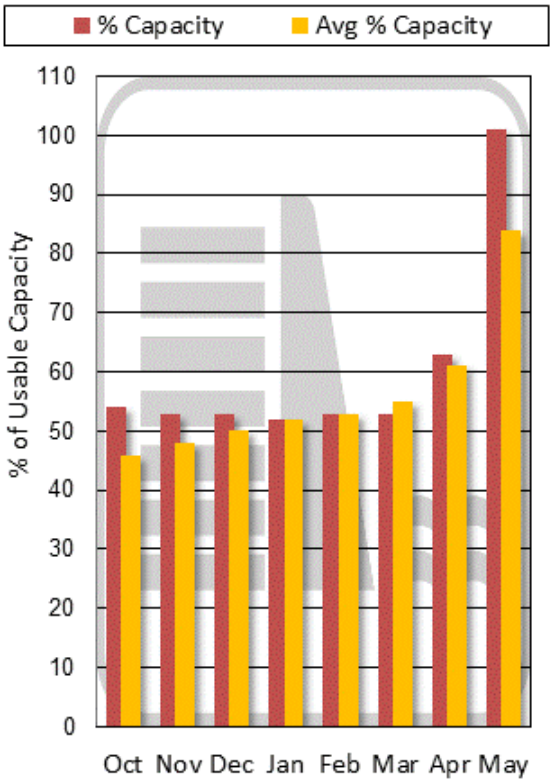
(click on chart below to navigate to online version with additional features)



Mountain and Valley Precipitation

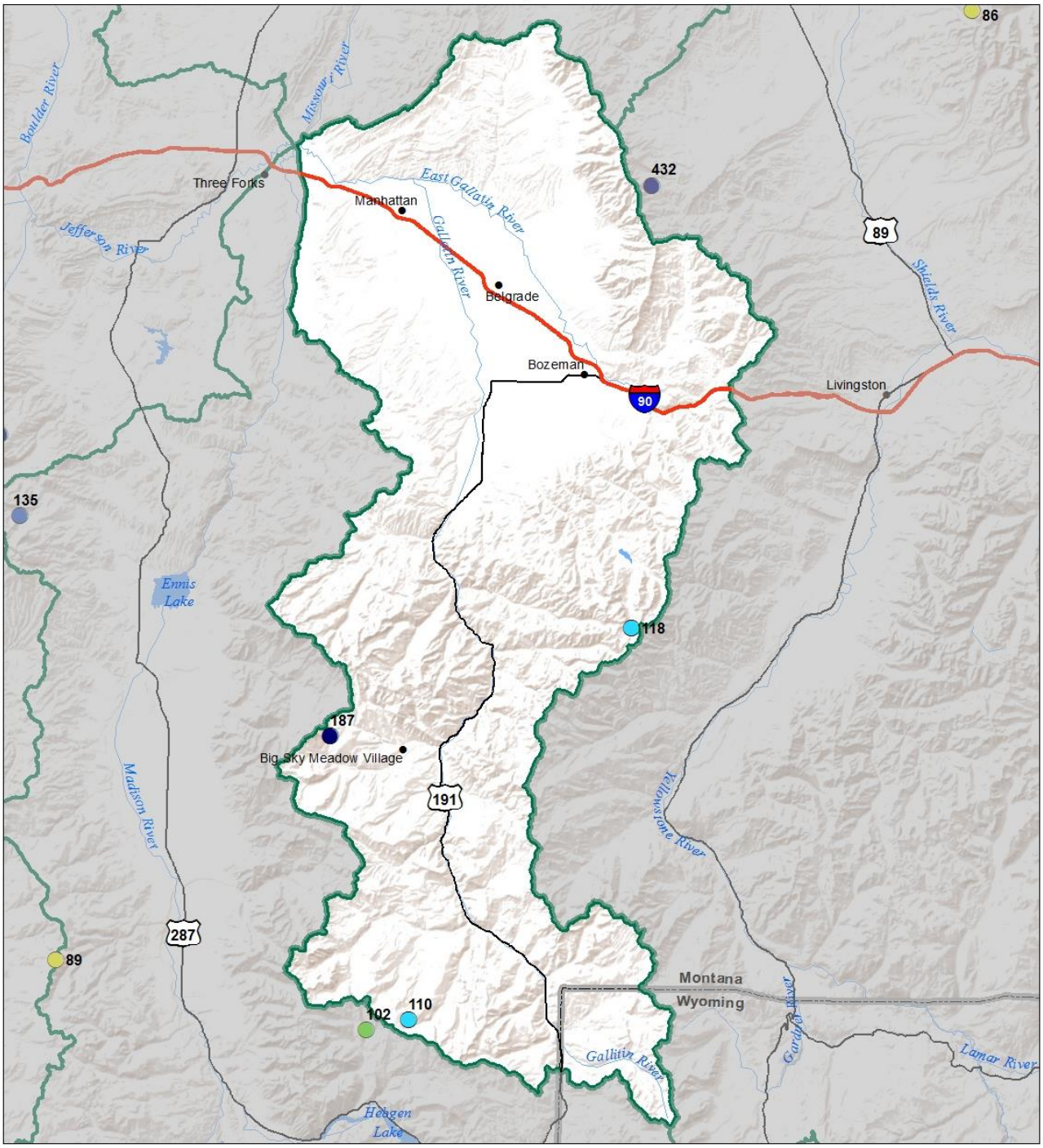


End of Month Reservoir Storage



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

Gallatin River Basin
Snow Water Equivalent
Percentage of Normal
June 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%		

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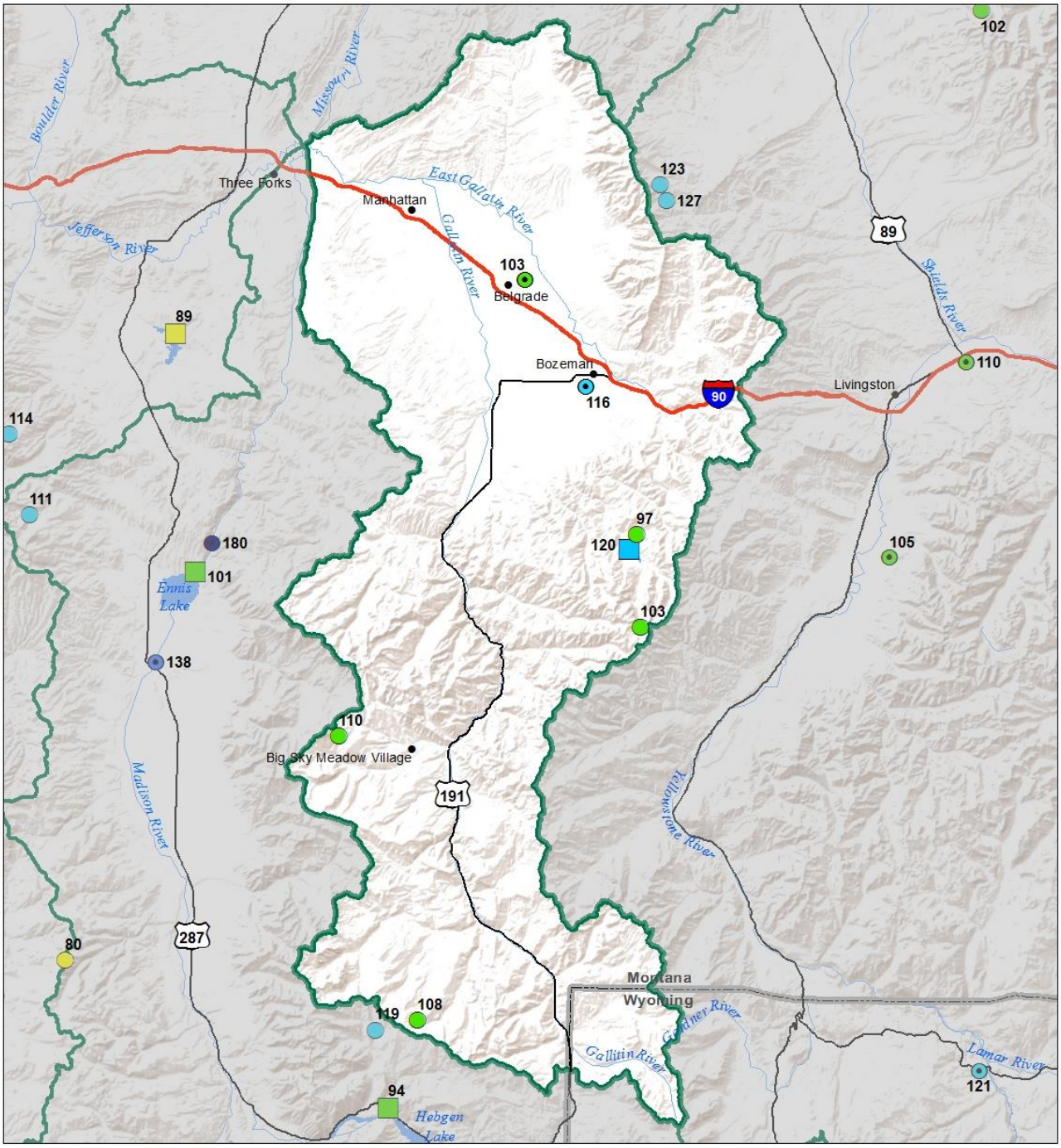
Gallatin River Basin
Water Year to Date Precipitation and Reservoir Levels
Percentage of Normal
June 1, 2019



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

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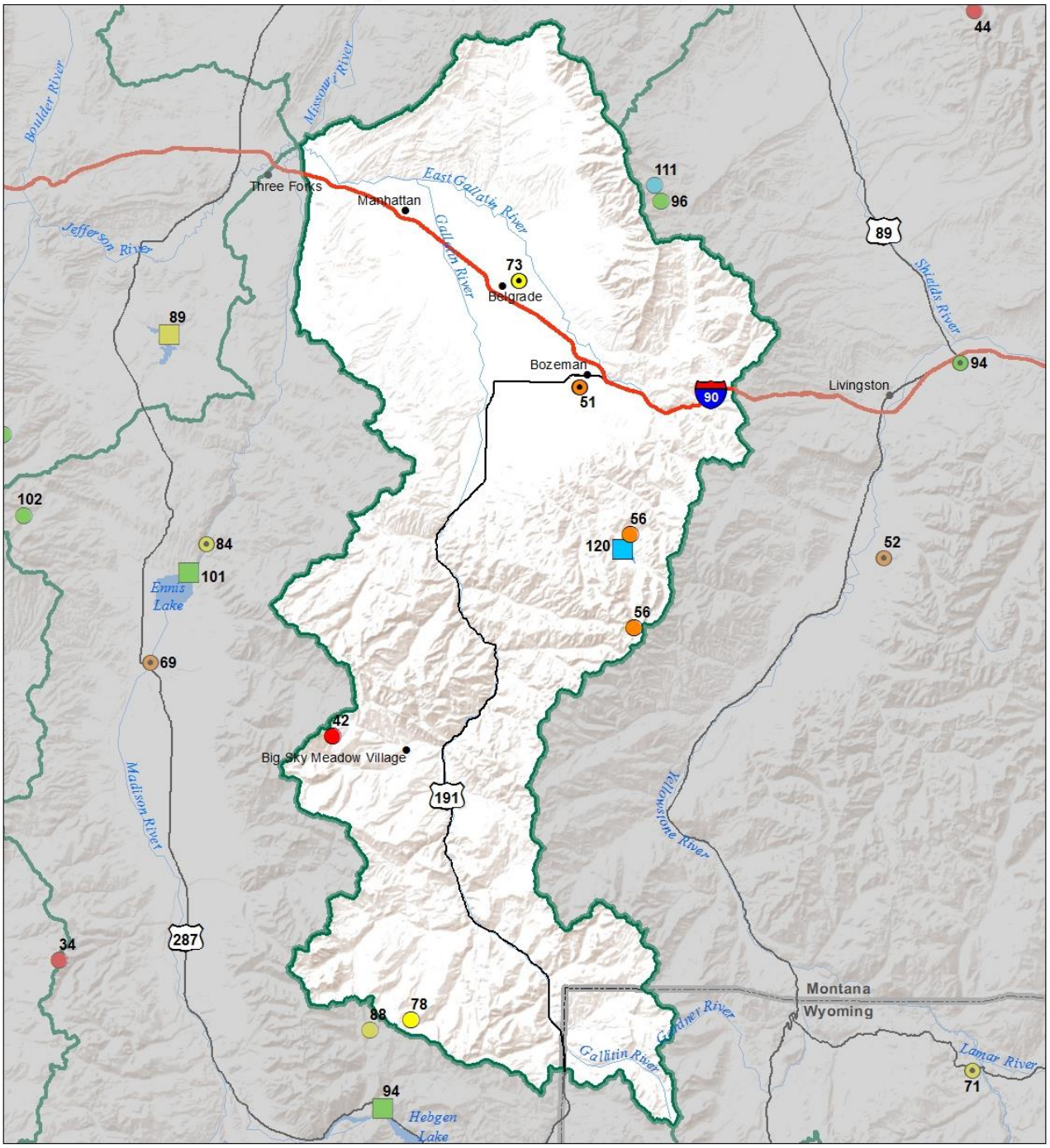
Gallatin River Basin
Monthly Precipitation and Reservoir Levels
Percentage of Normal
June 1, 2019 (May 1, 2019 - June 1, 2019)



Precipitation
Percent of Normal

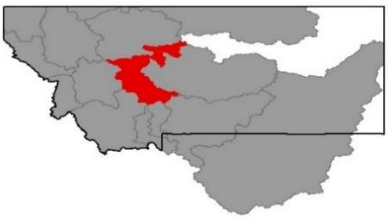
SNOTEL		COOP/ACIS	
> 150%	71 - 90%	> 150%	71 - 90%
131 - 150%	51 - 70%	131 - 150%	51 - 70%
111 - 130%	1 - 50%	111 - 130%	1 - 50%
91 - 110%		91 - 110%	

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

Only three snowpack monitoring sites have snowpack remaining in the mountains surrounding Helena on June 1st, and these high elevation sites are above normal for snowpack on this date. Snowpack at these elevations is typically 40% to 70% of the seasonal peak for this date, and totals are slightly above normal this year. These high elevation sites help to sustain flows as rivers recede from the "big push" of snowmelt from all elevations, so it's good news. Like many other regions in the state, eastern facing parts of mountain ranges received above-average precipitation during May, while other parts of these ranges experienced below-average precipitation. This is due to the counterclockwise flow of the low-pressure systems that dominated the latter half of the month. Valley locations were hit or miss, with Townsend reporting below average precipitation, while Helena was above average. Canyon Ferry Lake has been filling during the month of May and is currently 87% full. The weather ending May and beginning June (well above average temperatures) will likely cause the upstream rivers feeding the Missouri to make their final big push for the season. This should help to top off the reservoirs in the region.

Headwaters Missouri Mainstem River Basin Data Summary

Snowpack	**Percent of 1981-2010 Normal (Median)**	**Last Year Percentage of Normal (Median)**
HEADWATERS MAINSTEM	122%	100%
Basin-Wide Snowpack	**123%**	**84%**

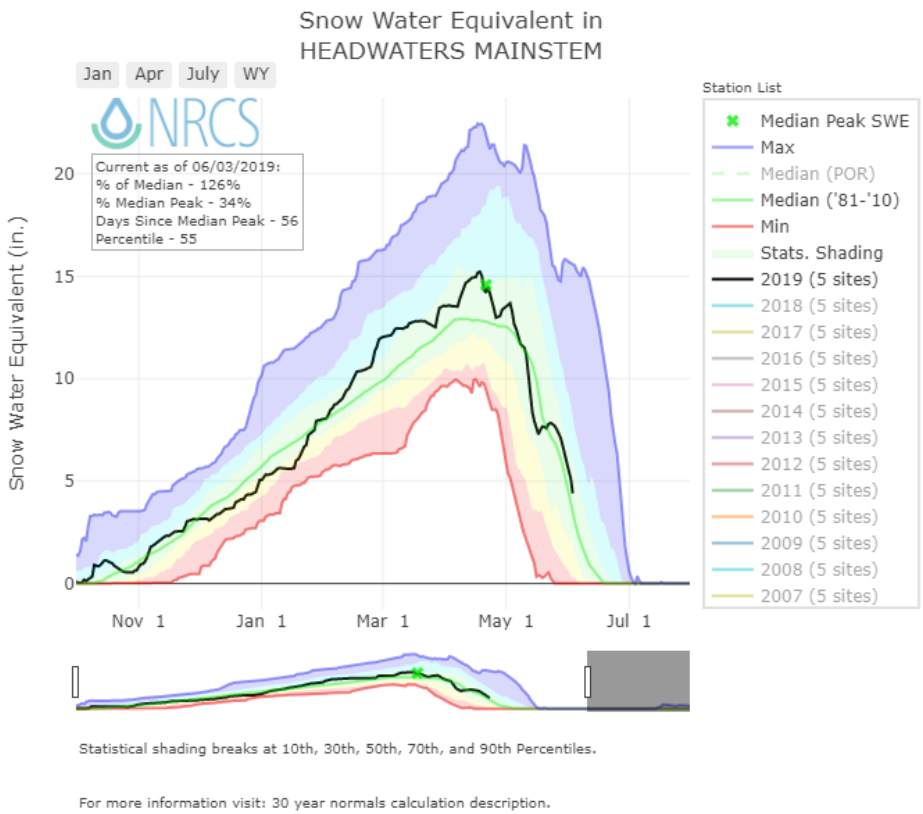
Precipitation	**Monthly Percentage of Average**	**WYTD Percentage of 1981-2010 Average***	**WYTD Last Year Percentage of Average**
Mountain Precipitation	92%	107%	129%
Valley Precipitation	88%	113%	156%
Basin-Wide Precipitation	**91%**	**107%**	**132%**

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

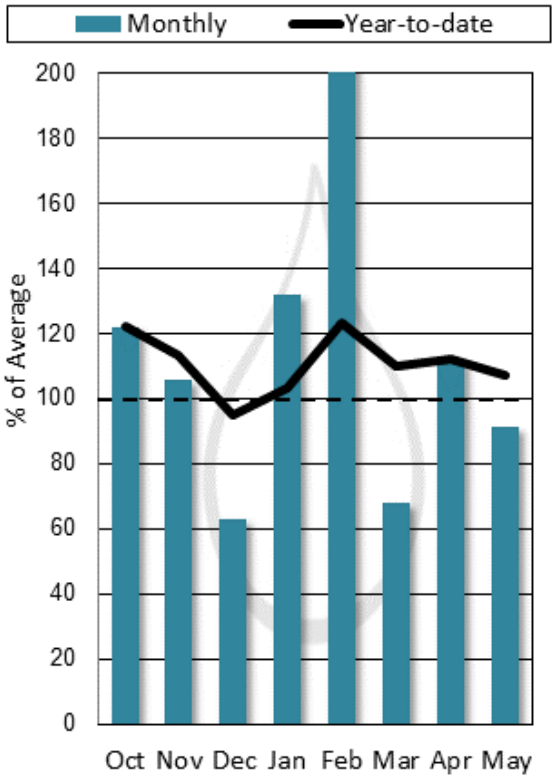
Reservoir Storage	**Percentage of Average**	**Percentage of Capacity (Total)**	**Last Year Percentage of Average**
Basin-Wide Storage	**125%**	**90%**	**127%**

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

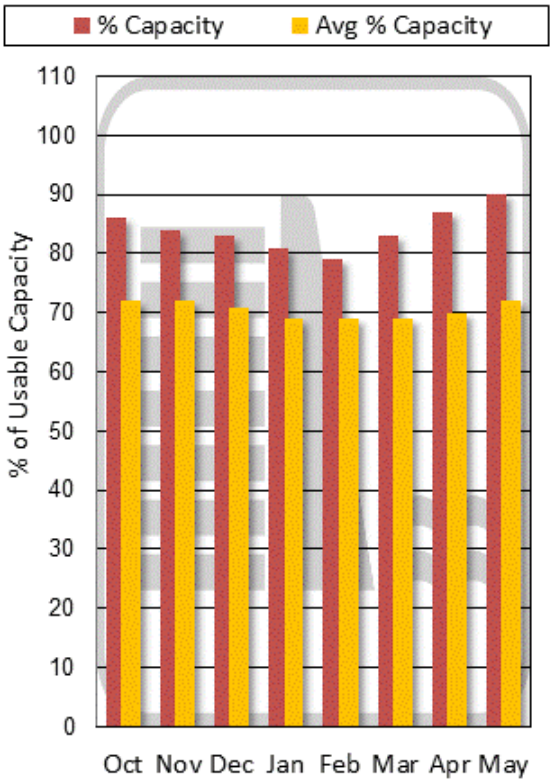
(click on chart below to navigate to online version with additional features)



Mountain and Valley Precipitation

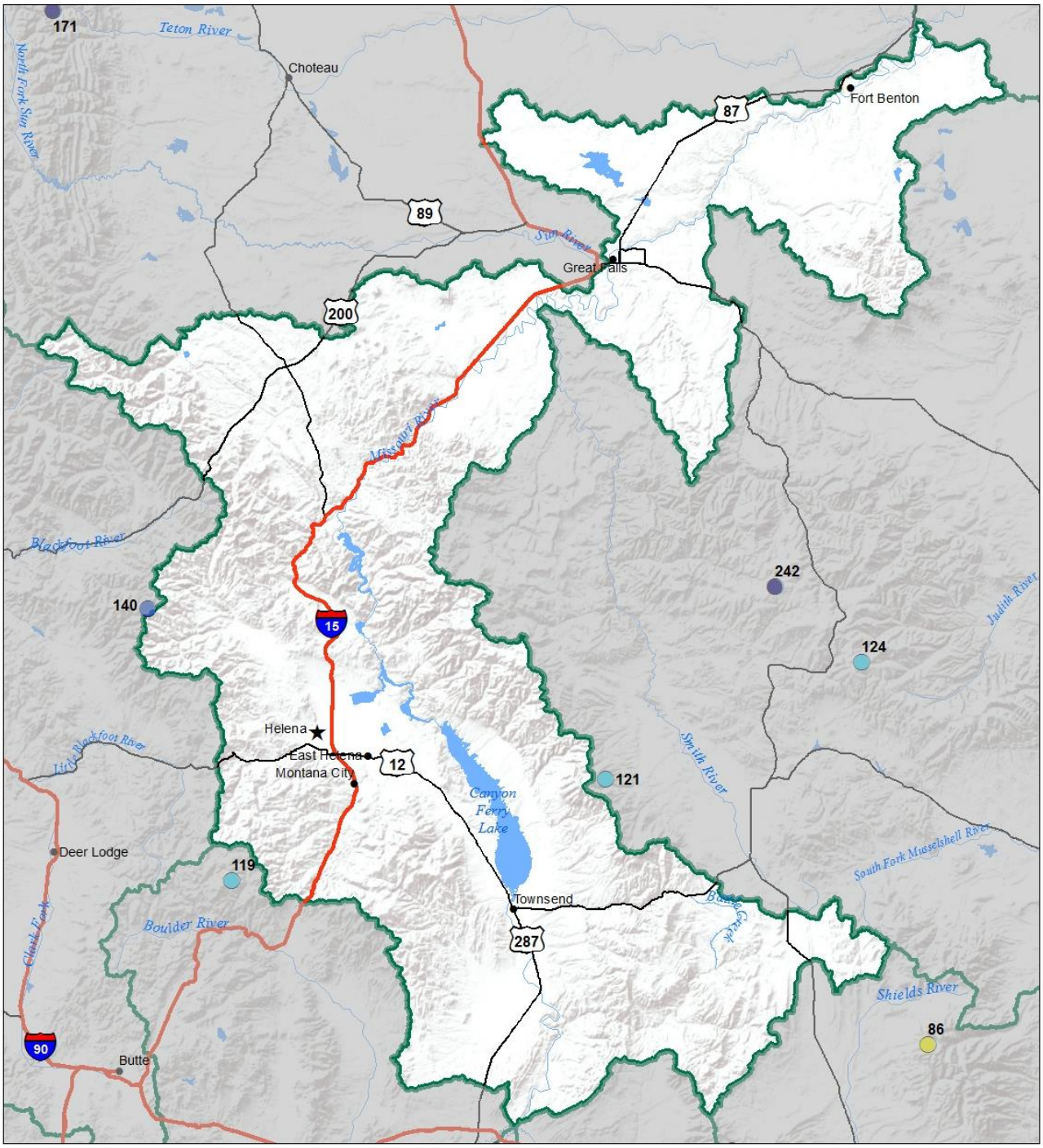


End of Month Reservoir Storage



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

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



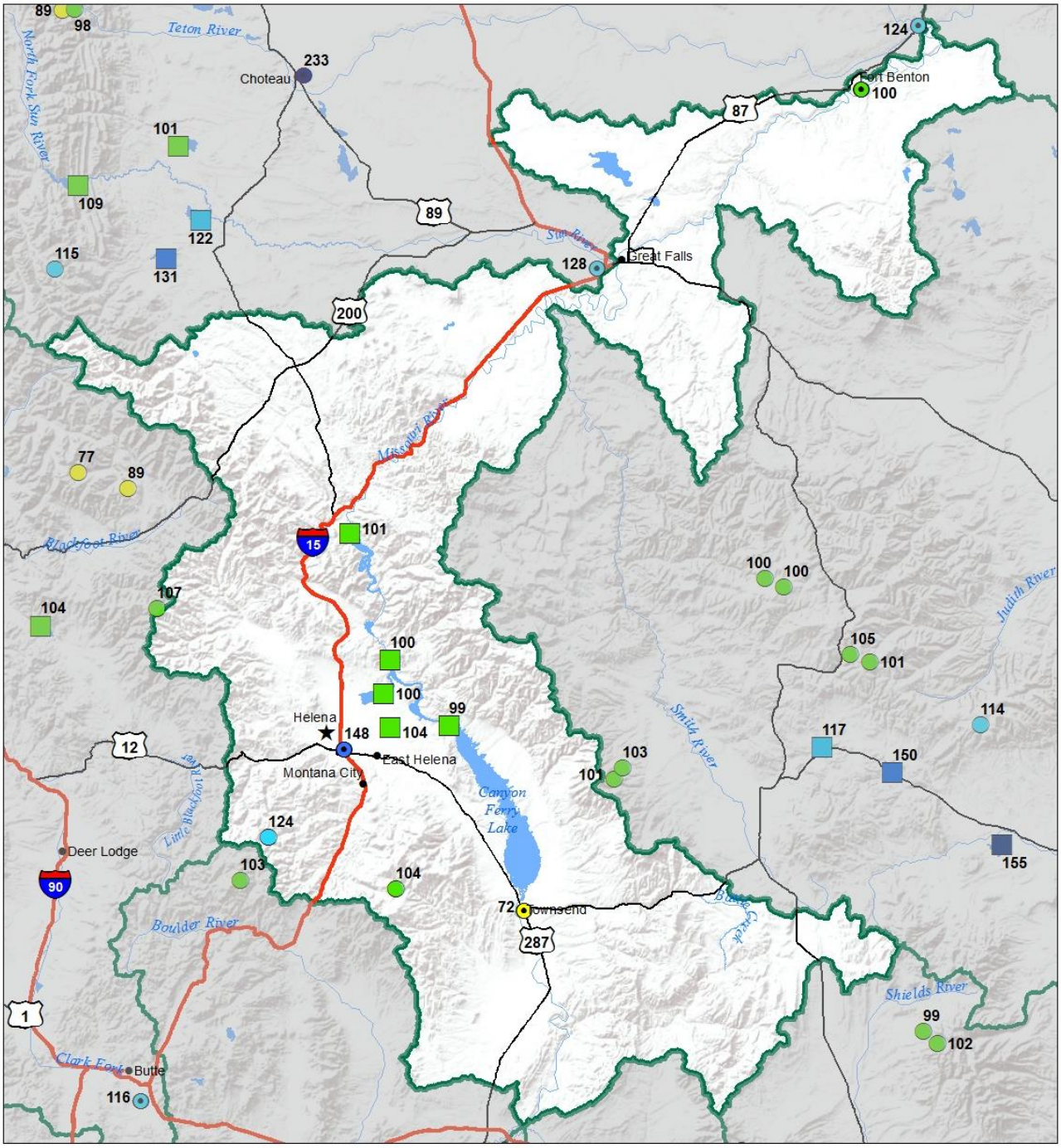
Snow Water Equivalent
Percent of Normal

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%		

USDA

Montana State Library Natural Resource Information System

Headwaters Mainstem (Missouri) River Basin
Water Year to Date Precipitation and Reservoir Levels
Percentage of Normal
June 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%	

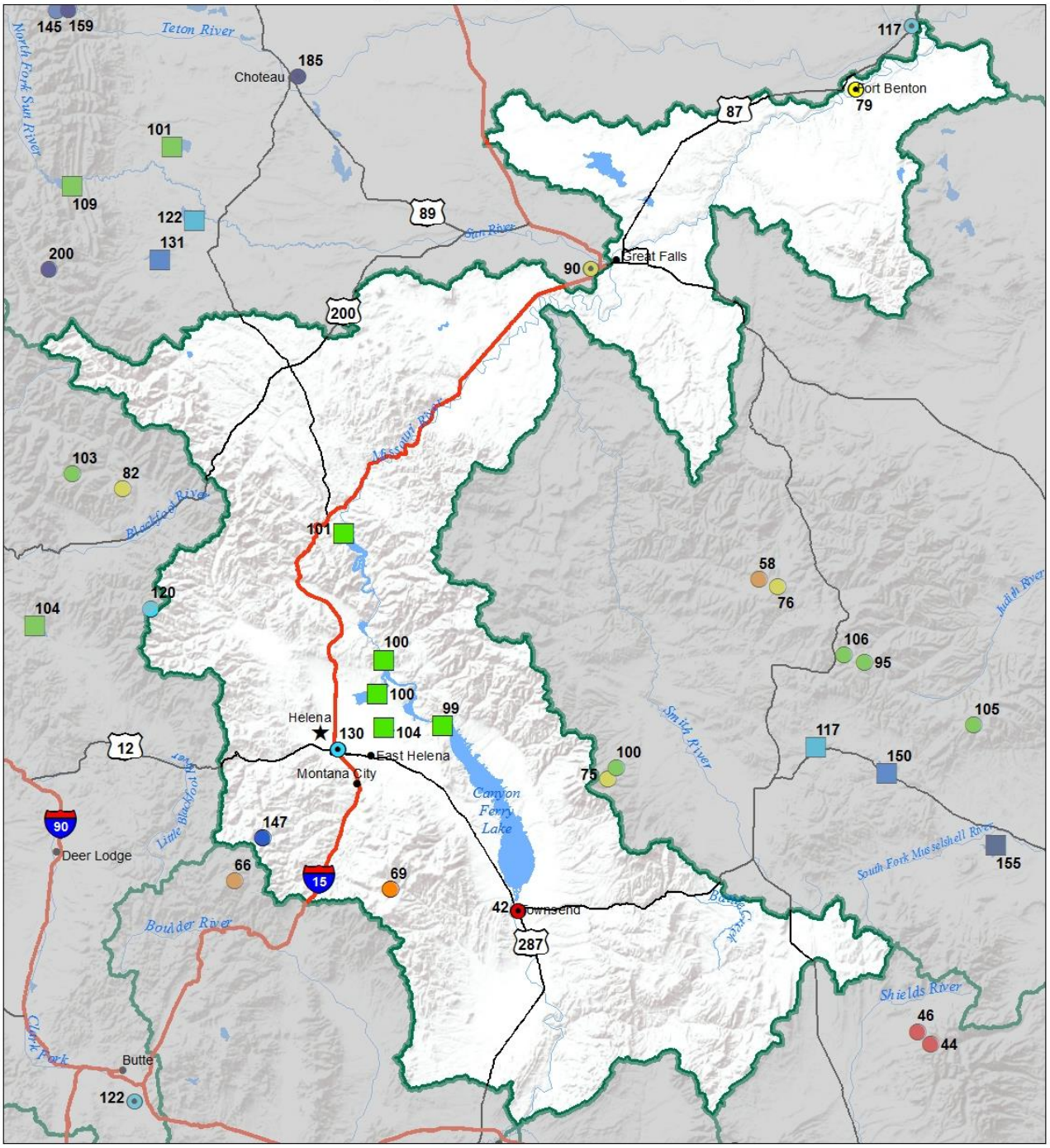
Reservoirs
Percent of Normal

- > 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
June 1, 2019 (May 1, 2019 - June 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%	

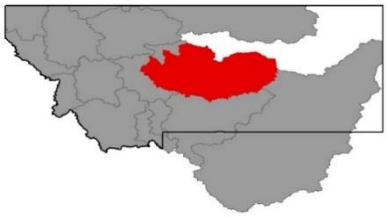
Reservoirs
Percent of Normal

- > 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



Not that bragging about June 1st means a lot in the greater scheme of things, but snowpack in the Smith-Judith-Musselshell is the best, percentage-wise, in the state on this date. The significance of a high number for this date is that there's more water than normal remaining to enter the rivers, which is excellent news. Snowpack remains at the high elevations in the Little Belt and Big Belt mountains, with low and mid elevations melting out during the early weeks of May. Snowmelt began in earnest at all elevations in early May, but cooler weather mid-month helped to slow the melt at high elevation monitoring sites. SNOTEL sites in the east side of the Little Belts received near to slightly above average precipitation during the month, benefitting from upslope flow from the passing low-pressure systems, while other sites in the west side of the Little Belts and in Big Belt Range experienced below average precipitation. Seasonal snowmelt-driven peak flows on many rivers likely occurred on May 18th after the prolonged warm spell, but future peak flows could occur should a rain event coincide with the remaining melt from the high elevations. The great news is that excellent carryover storage and abundant snowpack this year has reservoirs full, or nearing full, on June 1st. Water users look to have adequate water supply this summer, barring an anomalously warm and dry summer.

Smith Judith Musselshell River Basin Data Summary

Snowpack	**Percent of 1981-2010 Normal (Median)**	**Last Year Percentage of Normal (Median)**
SMITH	134%	62%
HIGHWOOD	%	%
JUDITH	166%	76%
MUSSELSHELL	%	%
Basin-Wide Snowpack	**157%**	**62%**

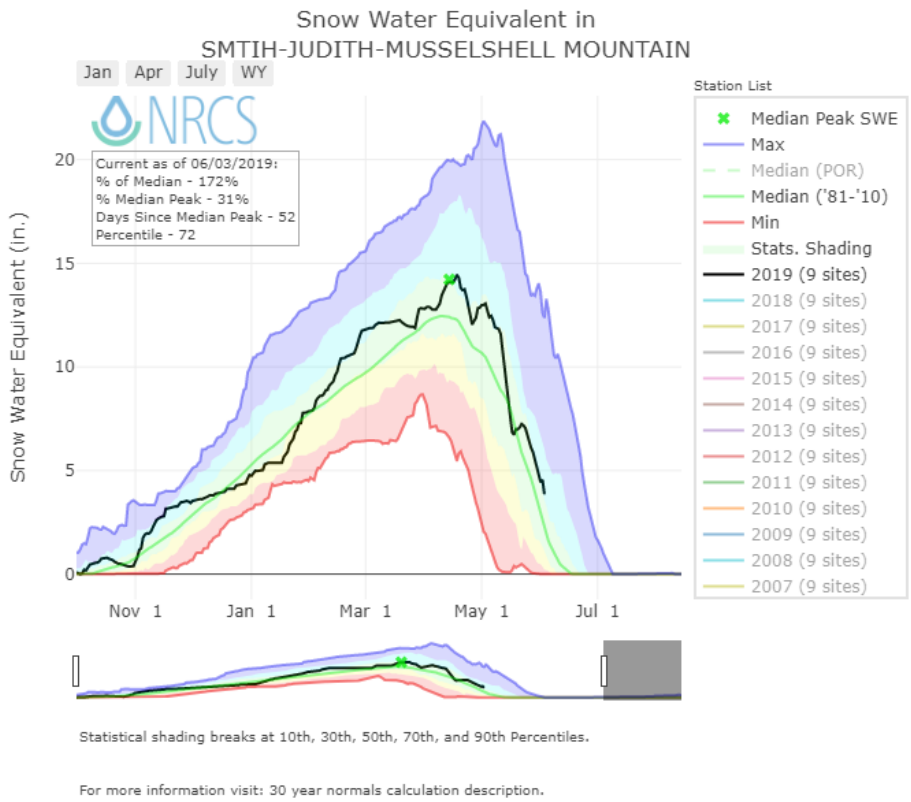
Precipitation	**Monthly Percentage of Average**	**WYTD Percentage of 1981-2010 Average***	**WYTD Last Year Percentage of Average**
Mountain Precipitation	82%	102%	116%
Valley Precipitation	141%	128%	156%
Basin-Wide Precipitation	**93%**	**105%**	**121%**

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

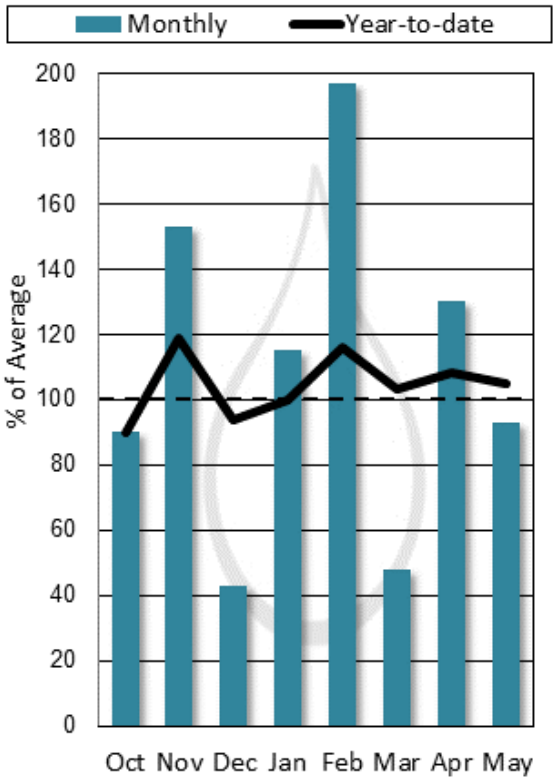
Reservoir Storage	**Percentage of Average**	**Percentage of Capacity (Total)**	**Last Year Percentage of Average**
Basin-Wide Storage	**149%**	**104%**	**148%**

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

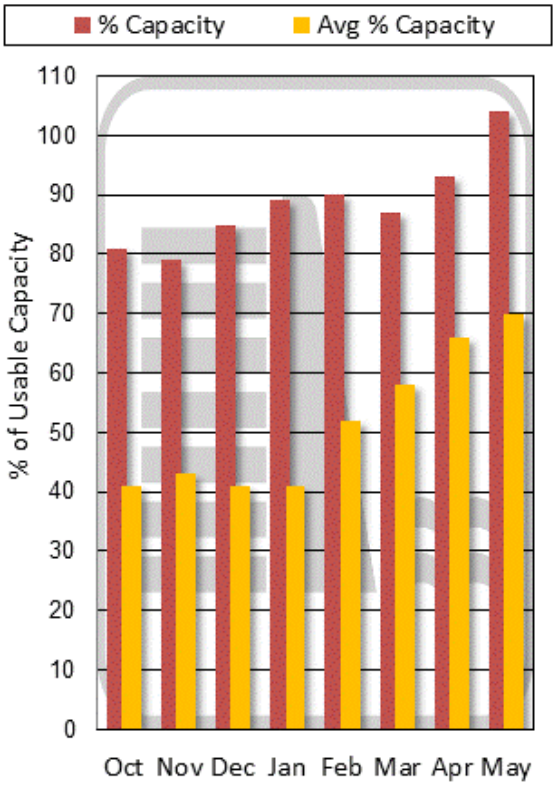
(click on chart below to navigate to online version with additional features)



Mountain and Valley Precipitation

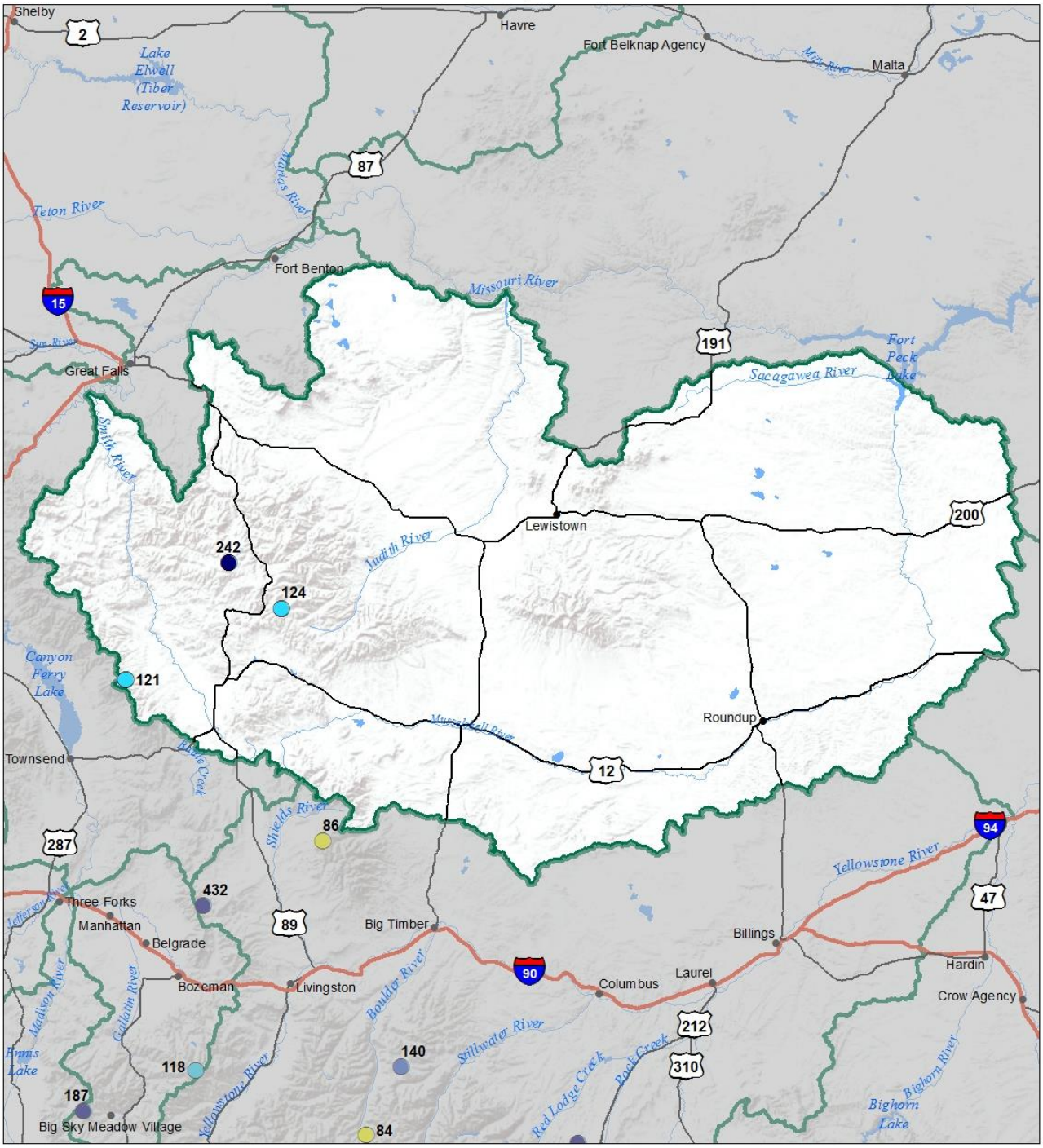


End of Month Reservoir Storage



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

Smith-Judith-Musselshell River Basin
Snow Water Equivalent
Percentage of Normal
June 1, 2019

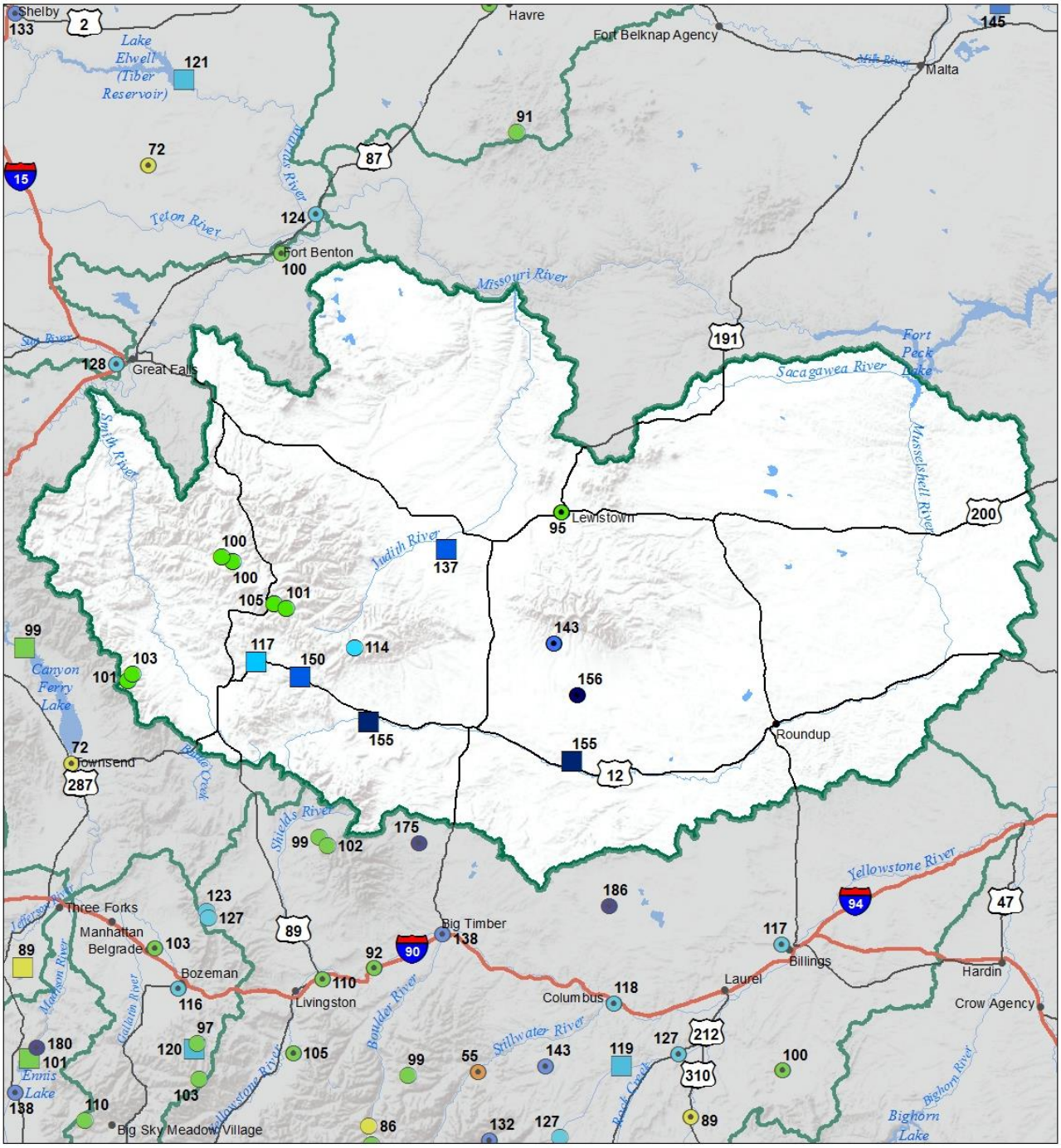


Snow Water Equivalent
Percent of Normal

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%

USDA
Montana State Library Natural Resource Information System

Smith-Judith-Musselshell River Basin
Water Year to Date Precipitation and Reservoir Levels
Percentage of Normal
June 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%	

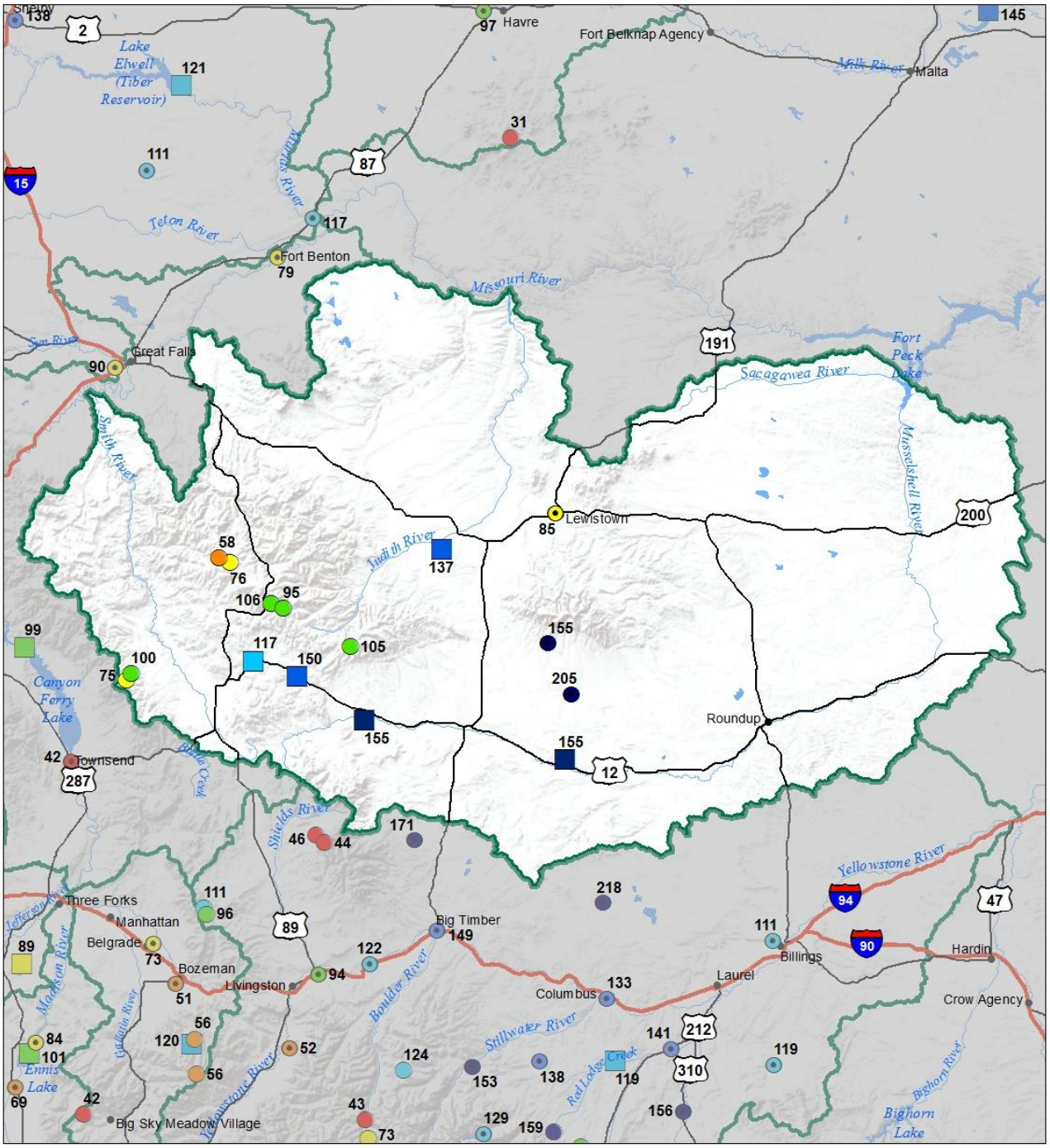
Reservoirs
Percent of Normal

- > 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
June 1, 2019 (May 1, 2019 - June 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%	

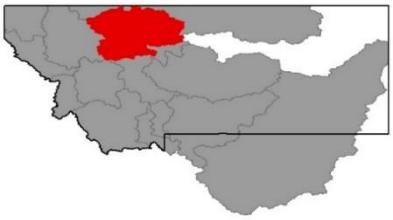
Reservoirs
Percent of Normal

- > 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



Talking about snow in the Rocky Mountain Front seems like a moot point after what happened during the latter half of May, but we'll summarize what's left on June 1st. Snowpack remains at two high elevation SNOTEL sites in the basin, but melt has been occurring throughout the month. During the latter half of the month, a low-pressure system ushered in copious amounts of moisture into the east Rocky Mountain Front. SNOTEL sites reported 4.5 to 9.5" of precipitation between May 15th and May 28th. This caused rapid rises in local rivers and streams, and widespread flooding in the area. This is the second year in a row that a late spring event inundated the town of Augusta with water, with Elk Creek overflowing its banks. As you might expect, reservoirs are full to capacity at this time. Streamflow forecasts in the basin indicate near to slightly below average volumes for the June 1st – September 30th period, but the weather patterns (summer precipitation and temperatures) are always a major player in how streamflows shape up in the later summer months.

Sun-Teton-Marias River Basin Data Summary

Snowpack	**Percent of 1981-2010 Normal (Median)**	**Last Year Percentage of Normal (Median)**
SUN	171%	189%
TETON	171%	189%
MARIAS	59%	55%
Basin-Wide Snowpack	**82%**	**83%**

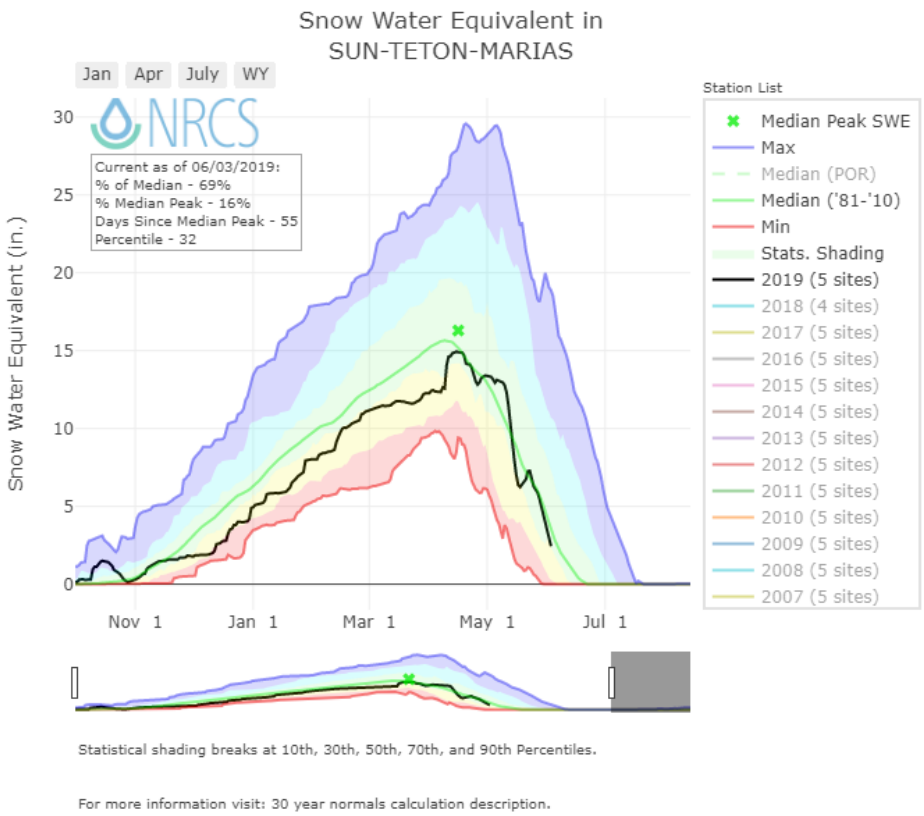
Precipitation	**Monthly Percentage of Average**	**WYTD Percentage of 1981-2010 Average***	**WYTD Last Year Percentage of Average**
Mountain Precipitation	180%	101%	122%
Valley Precipitation	146%	192%	187%
Basin-Wide Precipitation	**174%**	**107%**	**127%**

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

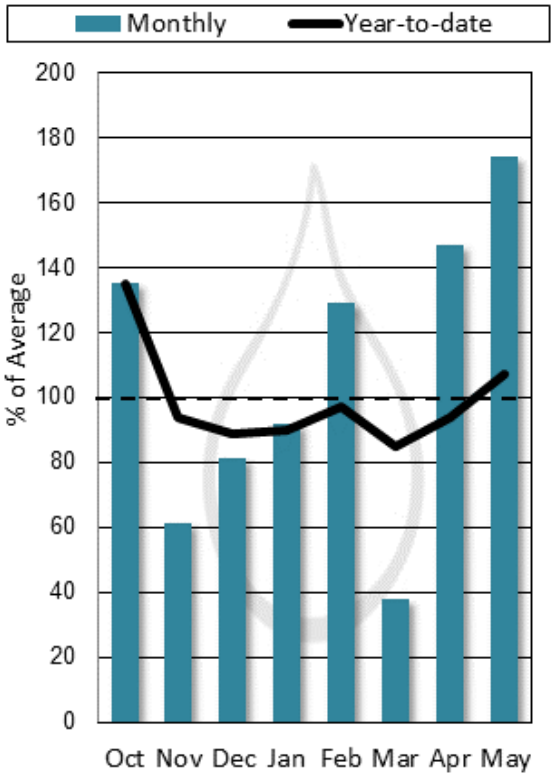
Reservoir Storage	**Percentage of Average**	**Percentage of Capacity (Total)**	**Last Year Percentage of Average**
Basin-Wide Storage	**119%**	**75%**	**112%**

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

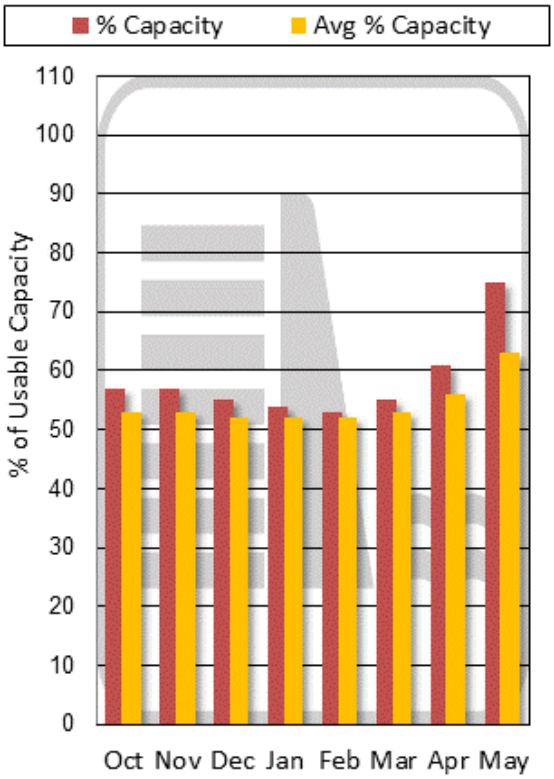
(click on chart below to navigate to online version with additional features)



Mountain and Valley Precipitation

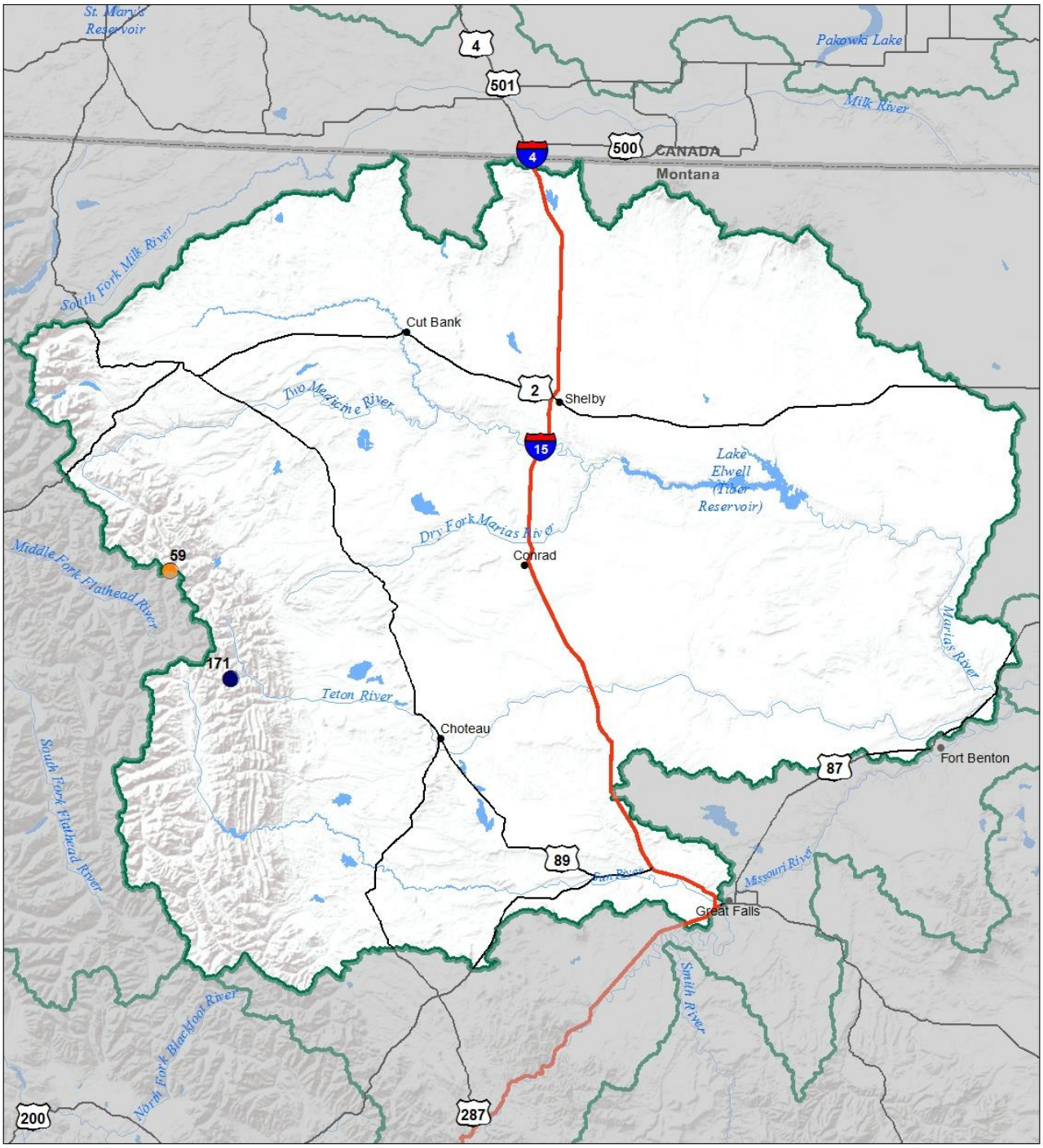


End of Month Reservoir Storage



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

Sun-Teton-Marias River Basin
Snow Water Equivalent
Percentage of Normal
June 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%

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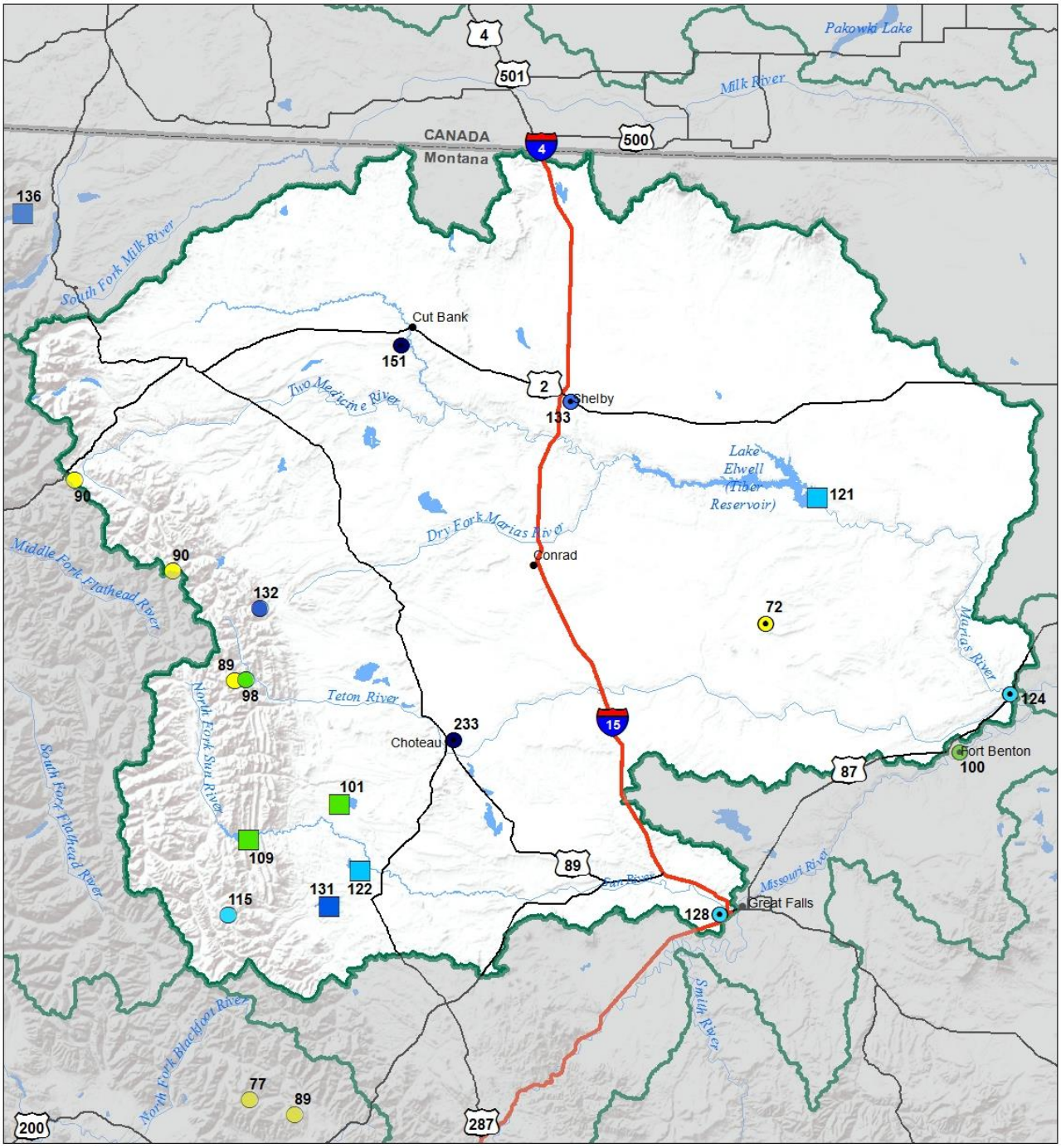
Sun-Teton-Marias River Basin
Water Year to Date Precipitation and Reservoir Levels
Percentage of Normal
June 1, 2019



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%

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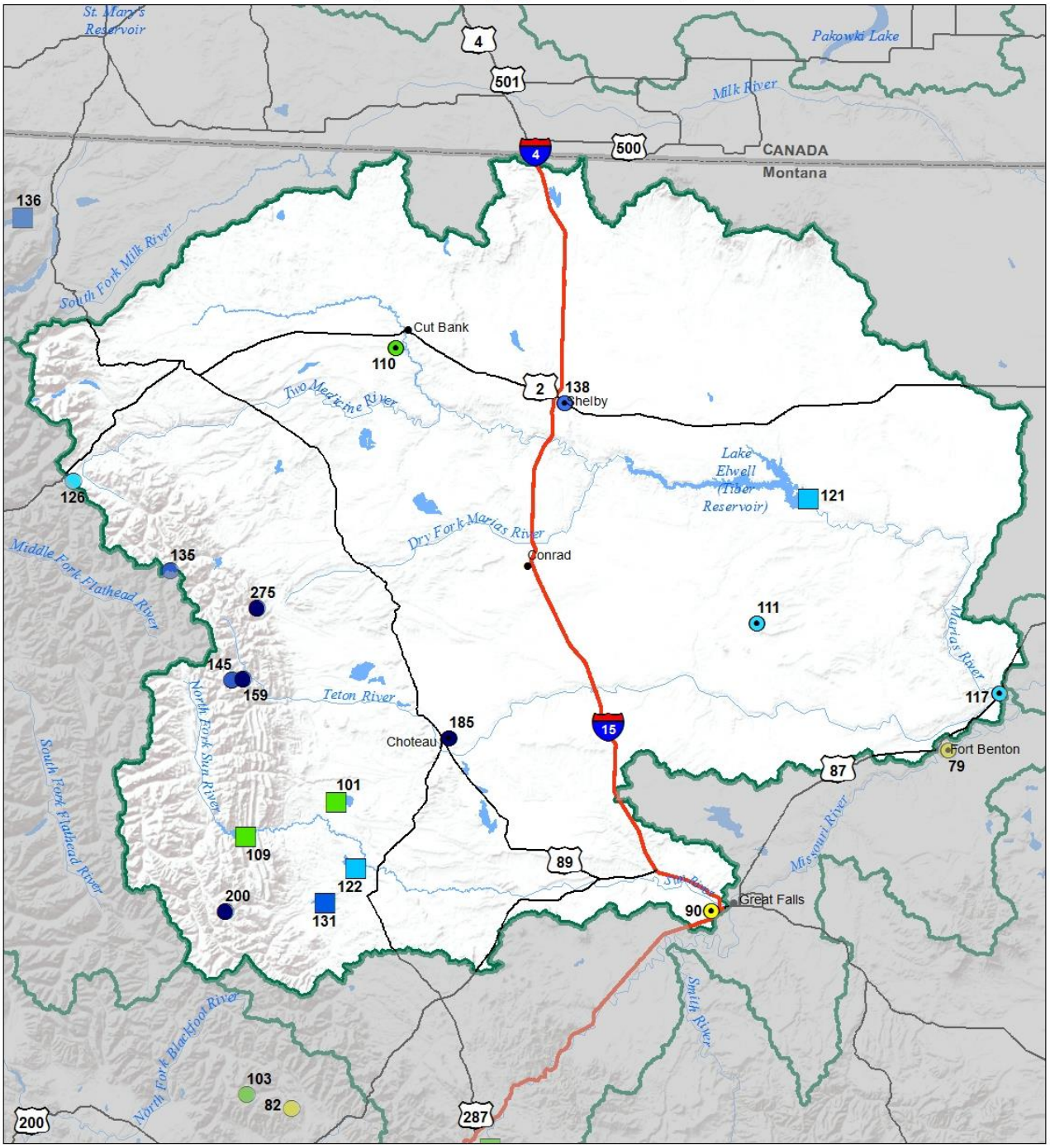
Sun-Teton-Marias River Basin
Monthly Precipitation and Reservoir Levels
Percentage of Normal
June 1, 2019 (May 1, 2019 - June 1, 2019)



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%

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St. Mary-Milk River Basin

High elevation snowpack in the St. Mary River basin peaked below normal this year and is melting earlier than normal. Melt occurred throughout the month at the Flattop Mountain SNOTEL site, located in Glacier National Park, but a brief return to cooler weather mid-month helped to delay what looked to be very early and rapid snowmelt. At this time, about 50% of the high elevation snowpack remains to enter the river systems over the coming month, and warm temperatures at the end of May and beginning of June have accelerated the snowmelt. Water Year precipitation is below normal at both high and low elevations in the region, with Flattop Mountain experiencing further declines after only 43% of average precipitation fell during May. Water supply is anticipated to be below average this summer due to the below average water year precipitation, and below normal peak snowpack.

St. Mary-Milk River Basin Data Summary

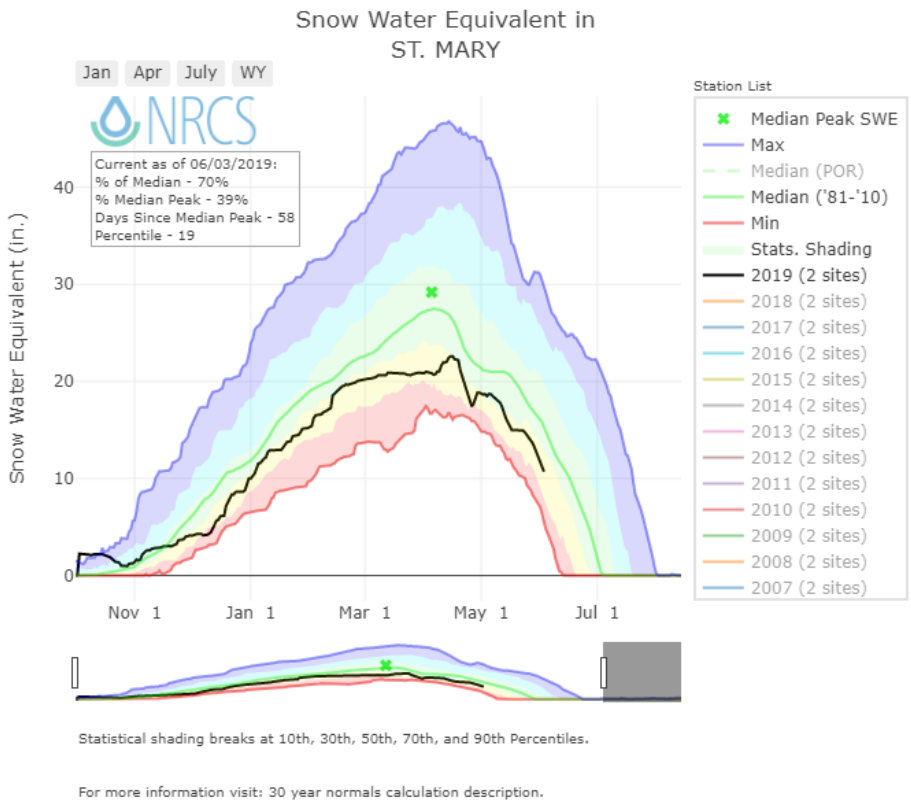
Snowpack	**Percent of 1981-2010 Normal (Median)**	**Last Year Percentage of Normal (Median)**
ST. MARY	73%	102%
BEARPAW MOUNTAINS	%	%
MILK RIVER BASIN	%	%
Basin-Wide	**73%**	**102%**

Precipitation	**Monthly Percentage of Average**	**WYTD Percentage of 1981-2010 Average***	**WYTD Last Year Percentage of Average**
Mountain Precipitation (St. Mary)	70%	81%	111%
Mountain Precipitation (Bearpaw Mtns)	31%	91%	102%
Valley Precipitation	79%	115%	136%
Basin-Wide Precipitation	**62%**	**85%**	**112%**

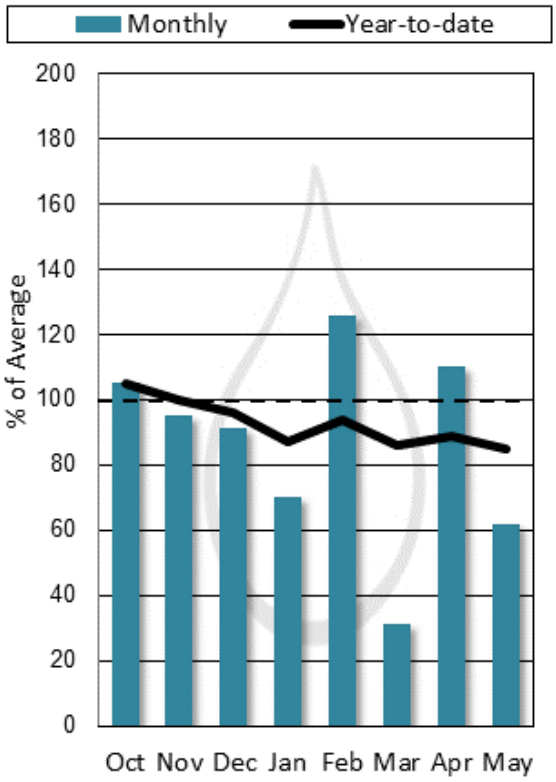
*Water Year-to-Date (WYTD) Precipitation is October 1st - Current

Reservoir Storage	**Percentage of Average**	**Percentage of Capacity (Total)**	**Last Year Percentage of Average**
Basin-Wide Storage	**133%**	**74%**	**138%**

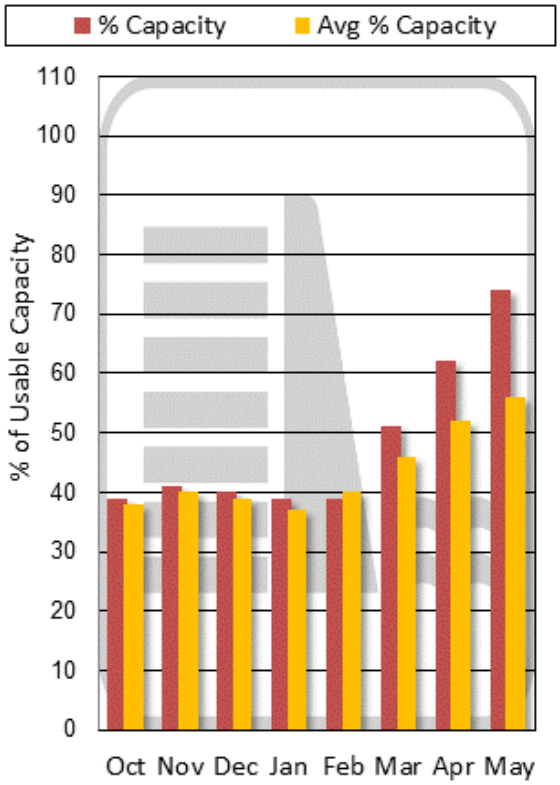
(click on chart below to navigate to online version with additional features)



Mountain and Valley Precipitation

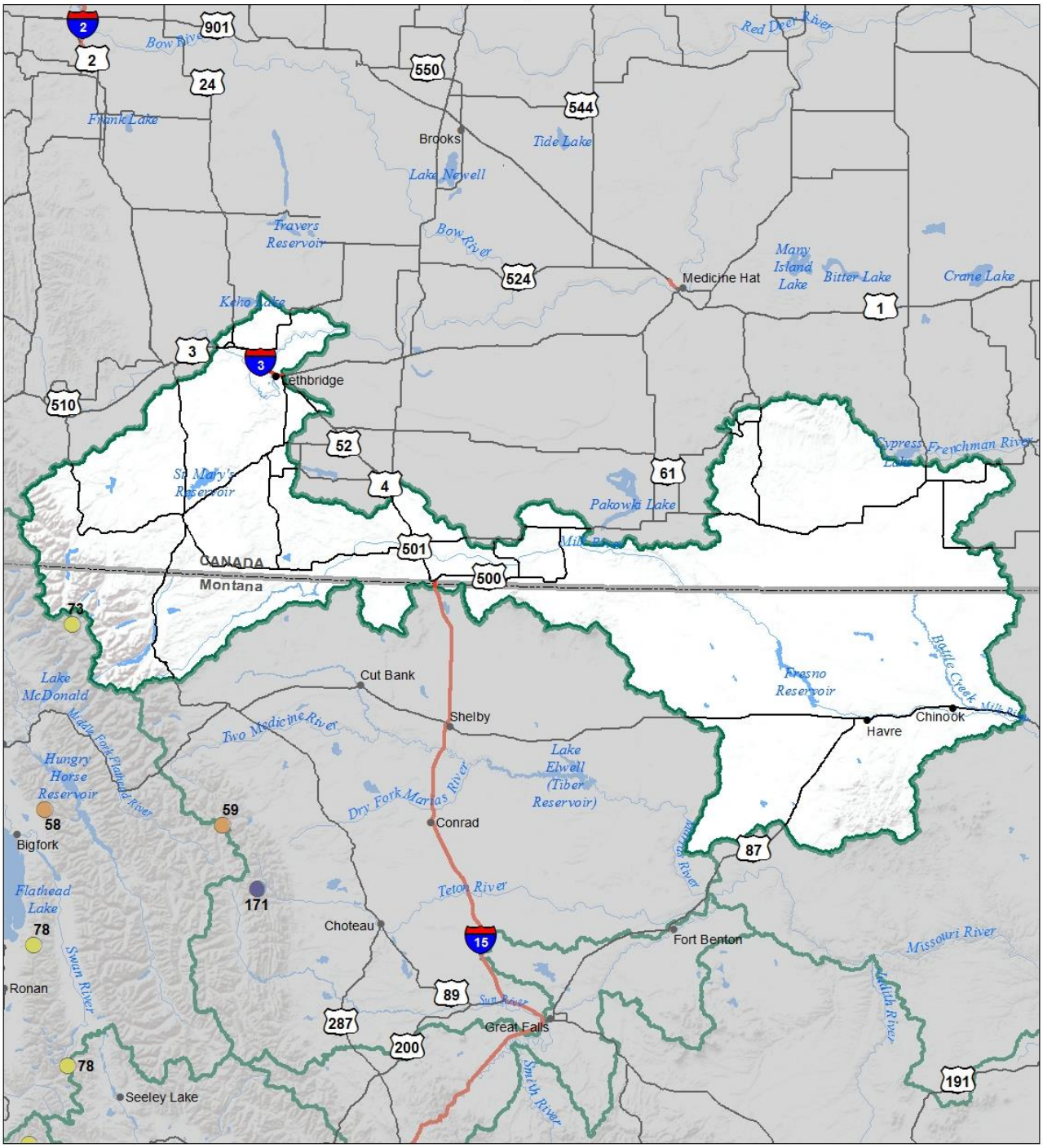


End of Month Reservoir Storage



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

St Mary's-Milk River Basin
Snow Water Equivalent
Percentage of Normal
June 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%

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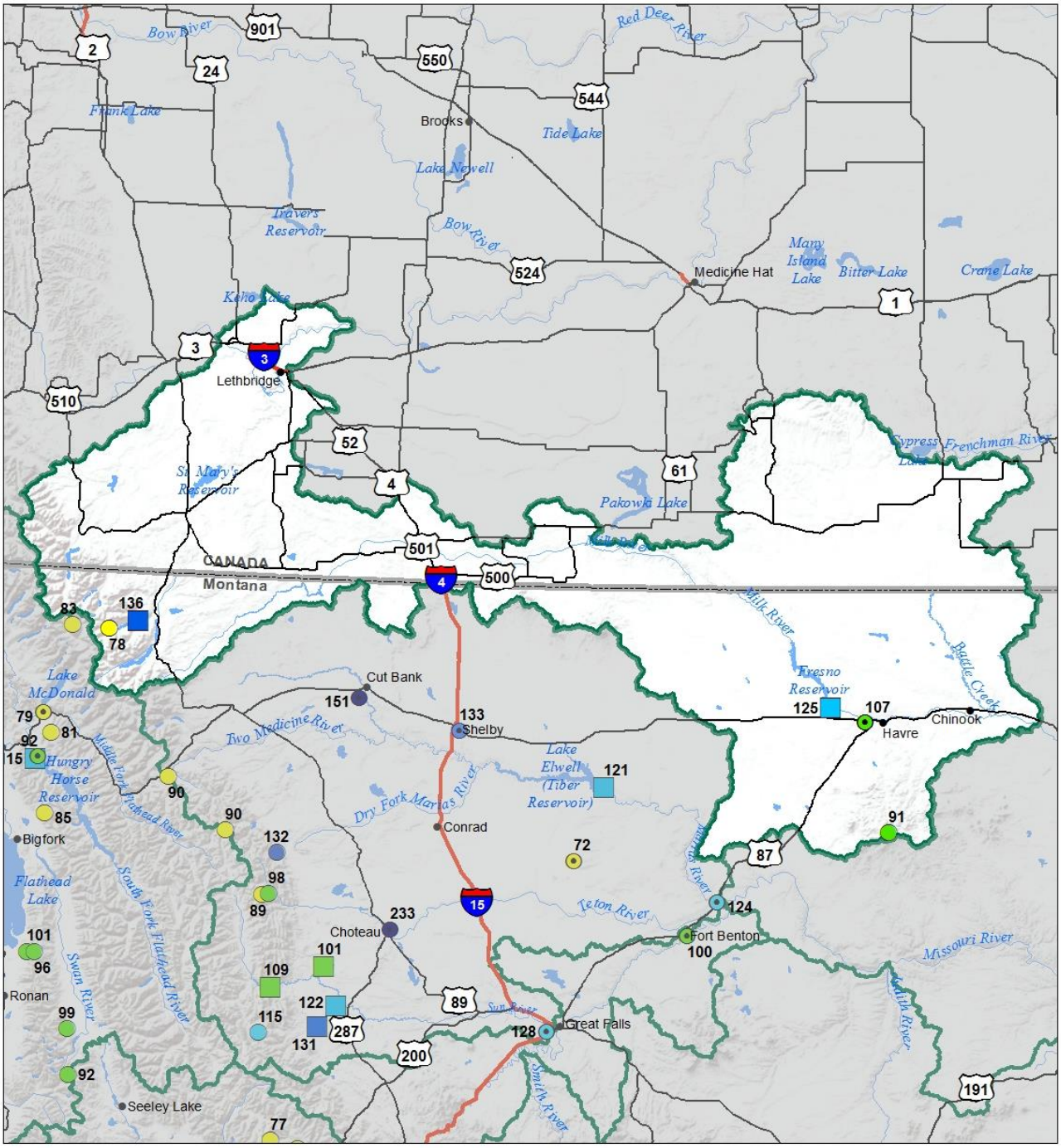
St Mary's-Milk River Basin
Water Year to Date Precipitation and Reservoir Levels
Percentage of Normal
June 1, 2019



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%

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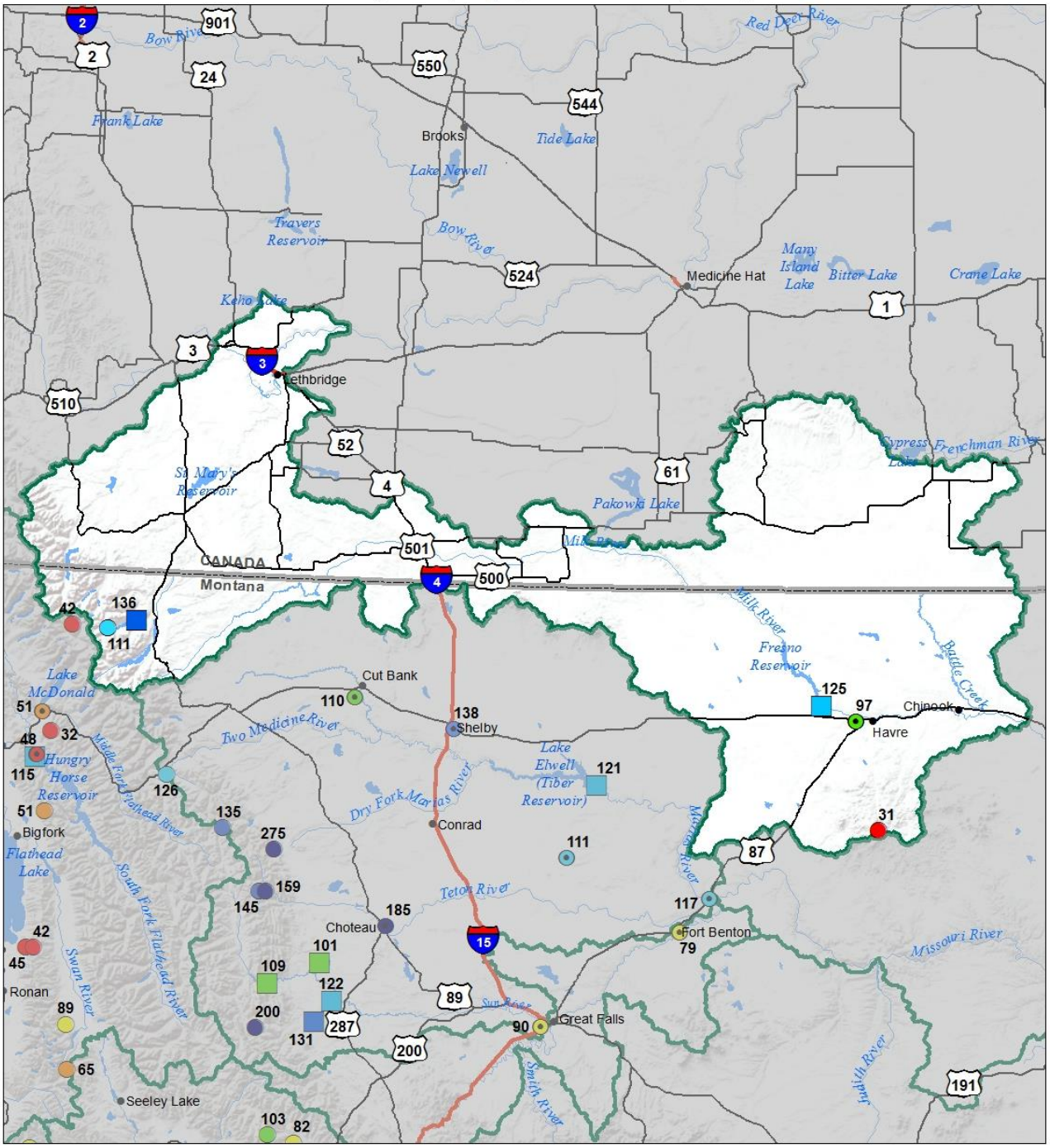
St Mary's-Milk River Basin
Monthly Precipitation and Reservoir Levels
Percentage of Normal
June 1, 2019 (May 1, 2019 - June 1, 2019)



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%

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Upper Yellowstone River Basin

The Upper Yellowstone has had its ebbs and flows like many other drainages around southern Montana this winter, but its finishing up spring with a bang in the Clark's Fork and Rock Creek, as both received above average precipitation in May. High elevation snowpack also peaked in the first week of May across the region, while low to mid elevations where predominantly snow free by the 10th. This high elevation snowpack still sits at 133% of normal basin wide, which spells a favorable run-off season as overnight lows continue to remain above freezing, even at the upper reaches of the basin. The Yellowstone River has already seen it's low elevation snow water pulse, and as this high elevation snowpack begins to enter the streams and tributaries, it should reach another crest soon. Even with above average snowpack melting out of the mountains, we still need average precipitation in coming months to help to sustain flows throughout the summer.

Upper Yellowstone River Basin Data Summary

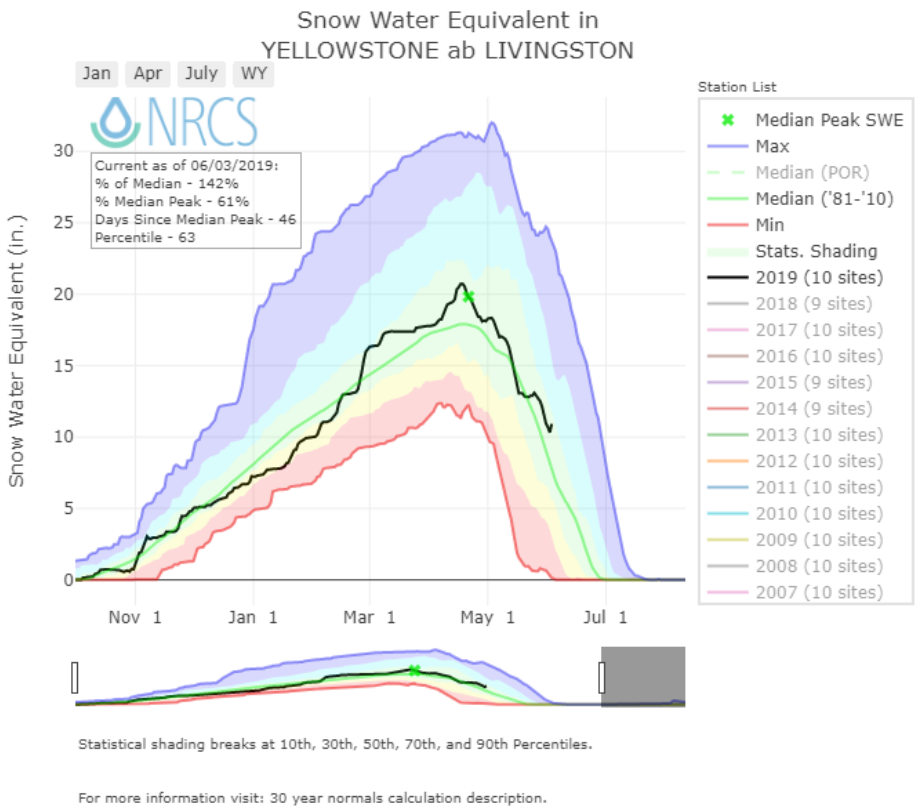
Snowpack	**Percent of 1981-2010 Normal (Median)**	**Last Year Percentage of Normal (Median)**
YELLOWSTONE ab LIVINGSTON	129%	127%
SHIELDS	174%	30%
BOULDER-STILLWATER	110%	99%
RED LODGE-ROCK CREEK	211%	7%
CLARK'S FORK	136%	155%
Basin-Wide Snowpack	**133%**	**117%**

Precipitation	**Monthly Percentage of Average**	**WYTD Percentage of 1981-2010 Average***	**WYTD Last Year Percentage of Average**
Mountain Precipitation	91%	108%	129%
Valley Precipitation	135%	129%	157%
Basin-Wide Precipitation	**102%**	**111%**	**134%**

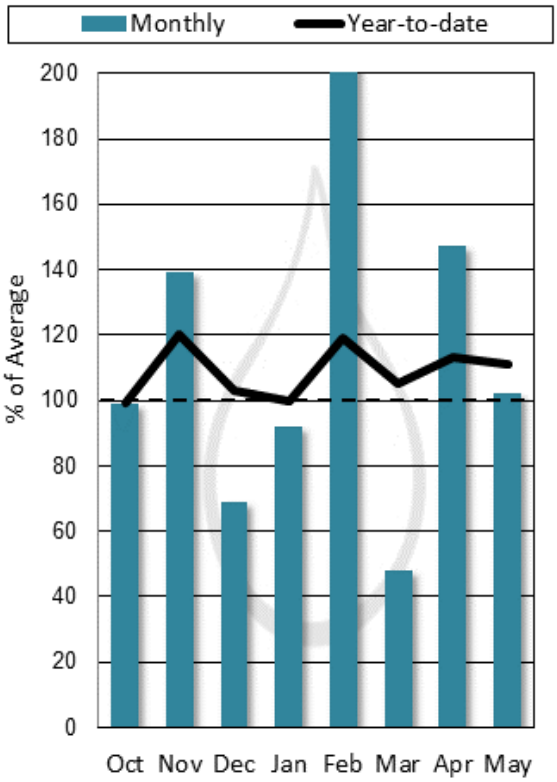
*Water Year-to-Date (WYTD) Precipitation is October 1st - Current

Reservoir Storage	**Percentage of Average**	**Percentage of Capacity (Total)**	**Last Year Percentage of Average**
Basin-Wide Storage	**119%**	**103%**	**119%**

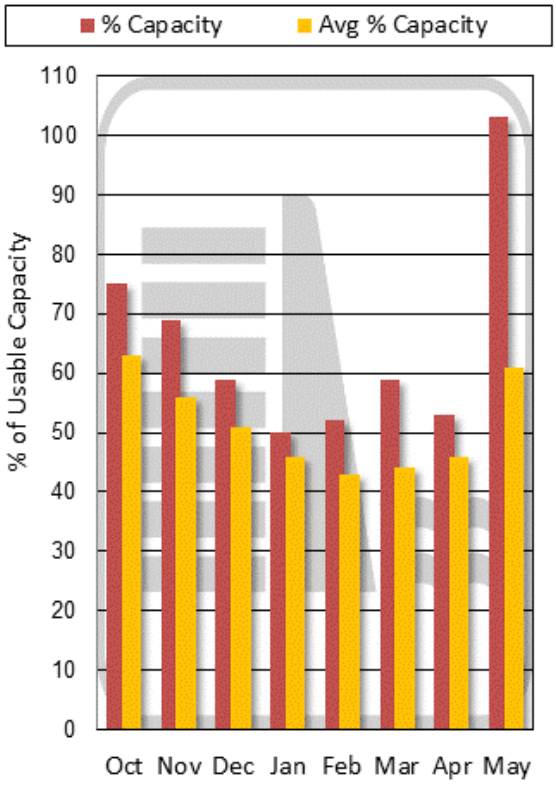
(click on chart below to navigate to online version with additional features)



Mountain and Valley Precipitation

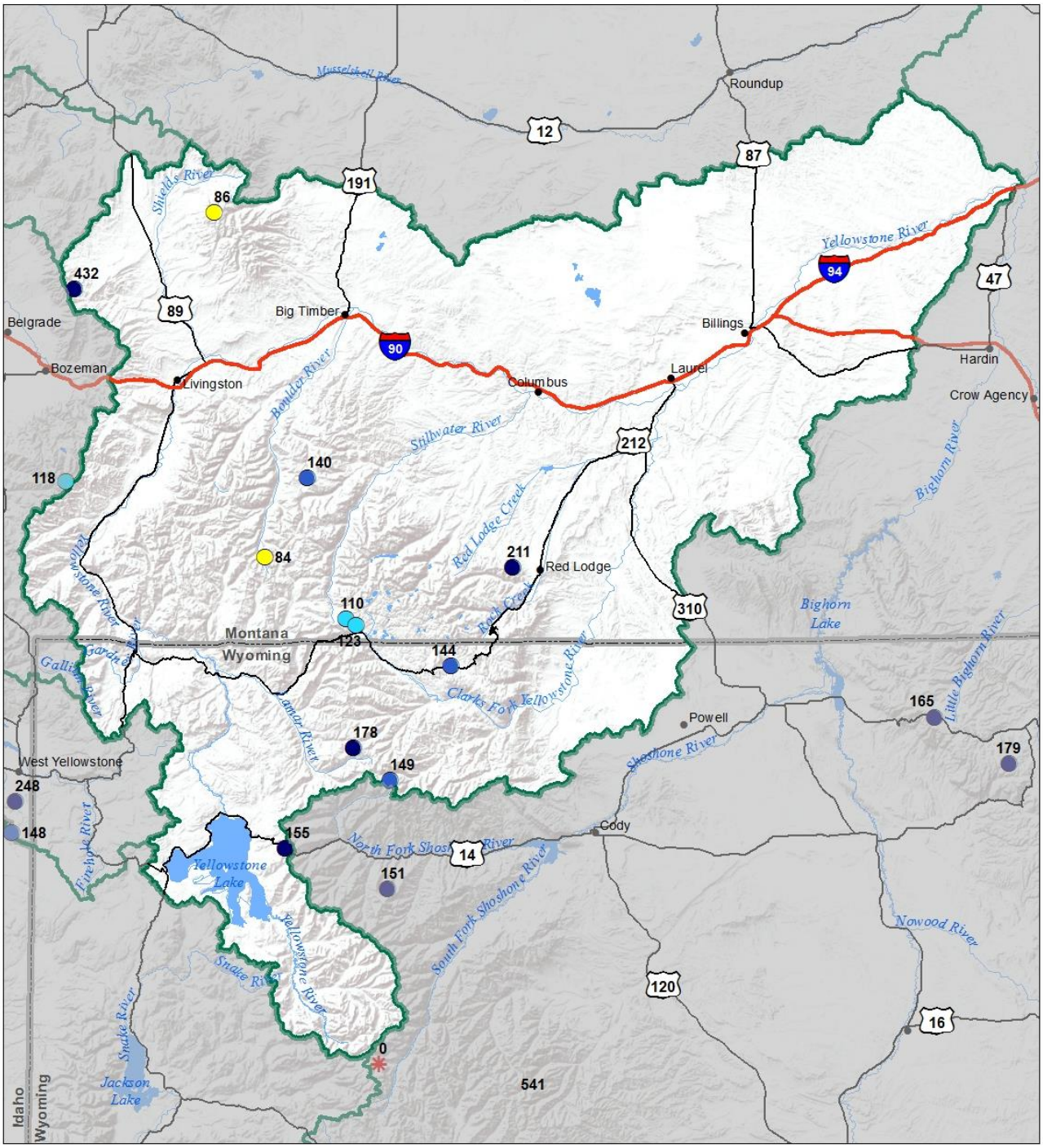


End of Month Reservoir Storage



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

Upper Yellowstone River Basin
Snow Water Equivalent
Percentage of Normal
June 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%	

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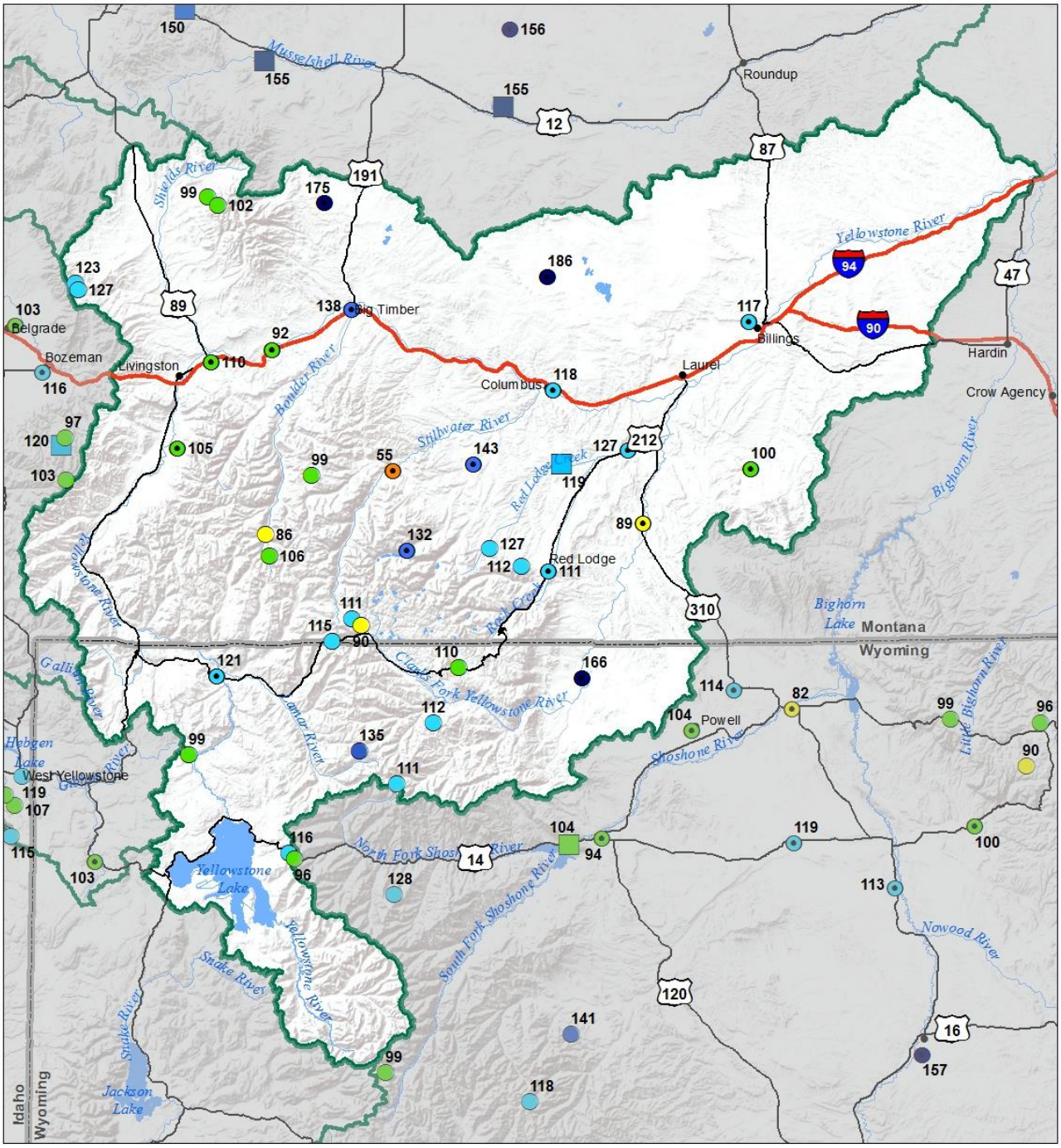
Upper Yellowstone River Basin
Water Year to Date Precipitation and Reservoir Levels
Percentage of Normal
June 1, 2019



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%

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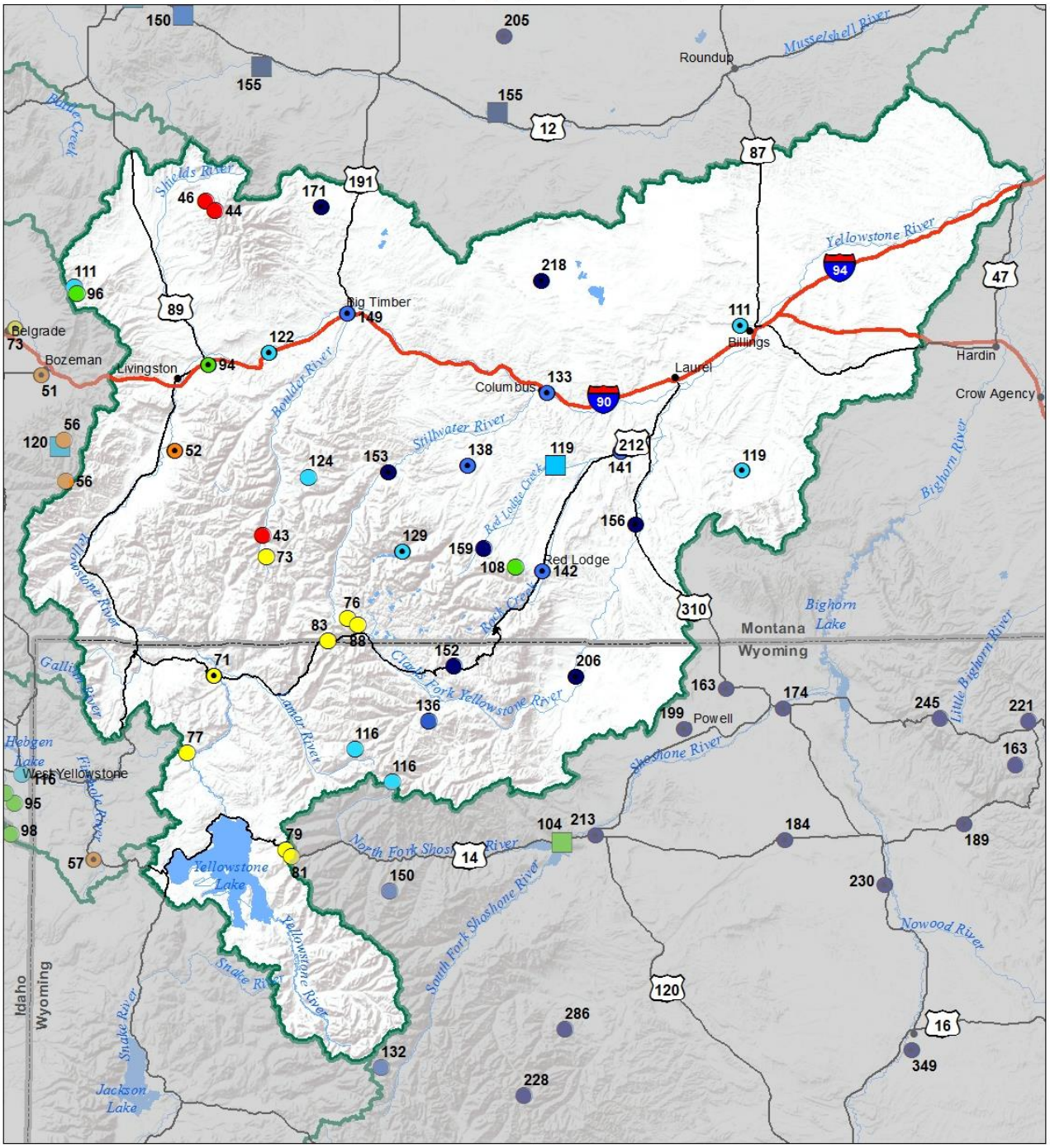
Montana State Library Natural Resource Information System

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



Precipitation
Percent of Normal

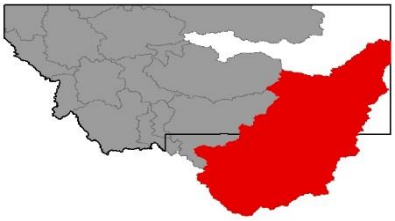
SNOTEL		COOP/ACIS	
> 150%	71 - 90%	> 150%	71 - 90%
131 - 150%	51 - 70%	131 - 150%	51 - 70%
111 - 130%	1 - 50%	111 - 130%	1 - 50%
91 - 110%		91 - 110%	

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

Just when it seemed like winter was over, it came roaring back into the sub-basins that make up the Lower Yellowstone River basin. Snowpack accumulated in the mountains during the first two weeks of the month, before warmer weather began the melt at most elevations. Shortly after the snowpack seemed like it was on the way, out a slow-moving low-pressure system delivered incredible amounts of mountain snow and valley precipitation for late May. In general, SNOTEL sites in the Wind River Range and the Absaroka Range received 2.3” to 8.7” of snow water equivalent during this storm cycle and up to 27” of snow. Further east in the Bighorn Range, the storm fell as a mix of rain in the valleys and at low elevations in the mountains, and snowfall at mid and high elevation sites. Up to 4.7” of snow water equivalent was added to the snowpack at high elevations, and up to 7.1” of precipitation fell elsewhere. Monthly precipitation for May was amazing, ranging from 142% to 375% of average, and helped almost all areas to recover from the deficits experienced so far this winter and spring with regards to water-year precipitation (October 1st – current). It doesn’t matter when you get it, as long as you get it.

As you might expect, all this water did cause its share of problems. Some rivers and creeks broke free of their banks in north-central during the end of the month in response to the heavy rainfall at lower elevations. On the bright side, the increases in snowpack in the mountains should help to fill reservoirs across the region and ensure adequate water supply for the coming summer.

Lower Yellowstone River Basin Data Summary

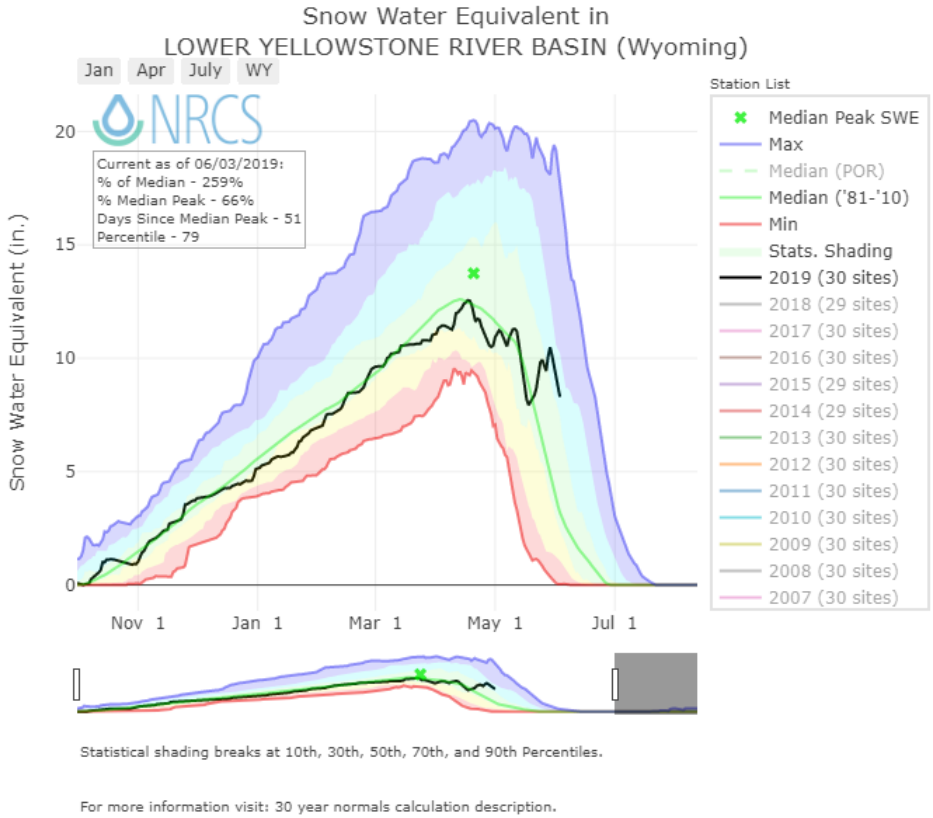
Snowpack	**Percent of 1981-2010 Normal (Median)**	**Last Year Percentage of Normal (Median)**
WIND RIVER BASIN	301%	88%
SHOSHONE RIVER BASIN	151%	121%
BIGHORN RIVER BASIN	181%	88%
LITTLE BIGHORN BASIN	202%	40%
TONGUE RIVER BASIN	368%	40%
POWDER RIVER BASIN	449%	10%
Basin-Wide Snowpack	**254%**	**84%**

Precipitation	**Monthly Percentage of Average**	**WYTD Percentage of 1981-2010 Average***	**WYTD Last Year Percentage of Average**
Mountain Precipitation	187%	105%	107%
Valley Precipitation	192%	132%	126%
Basin-Wide Precipitation	**189%**	**113%**	**113%**

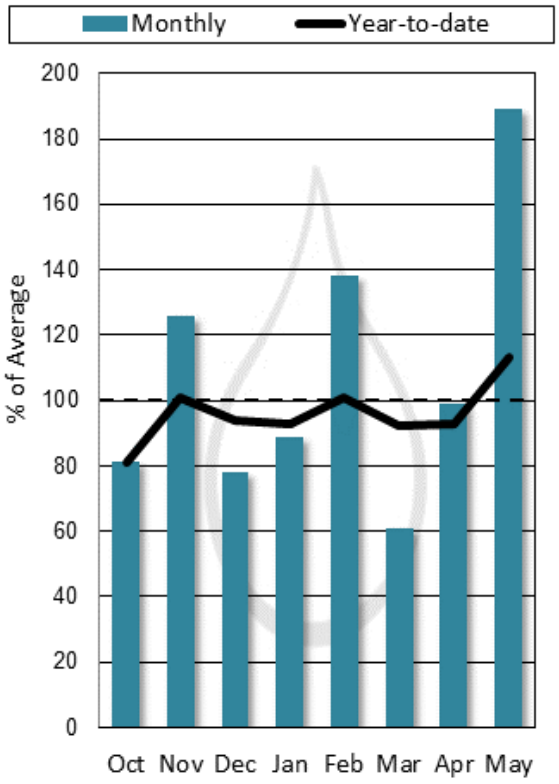
*Water Year-to-Date (WYTD) Precipitation is October 1st - Current

Reservoir Storage	**Percentage of Average**	**Percentage of Capacity (Total)**	**Last Year Percentage of Average**
Basin-Wide Storage	**108%**	**68%**	**113%**

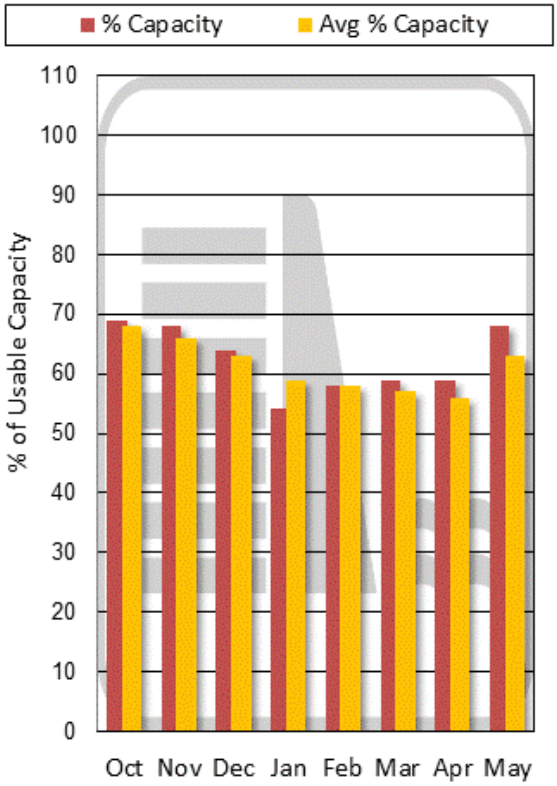
(click on chart below to navigate to online version with additional features)



Mountain and Valley Precipitation

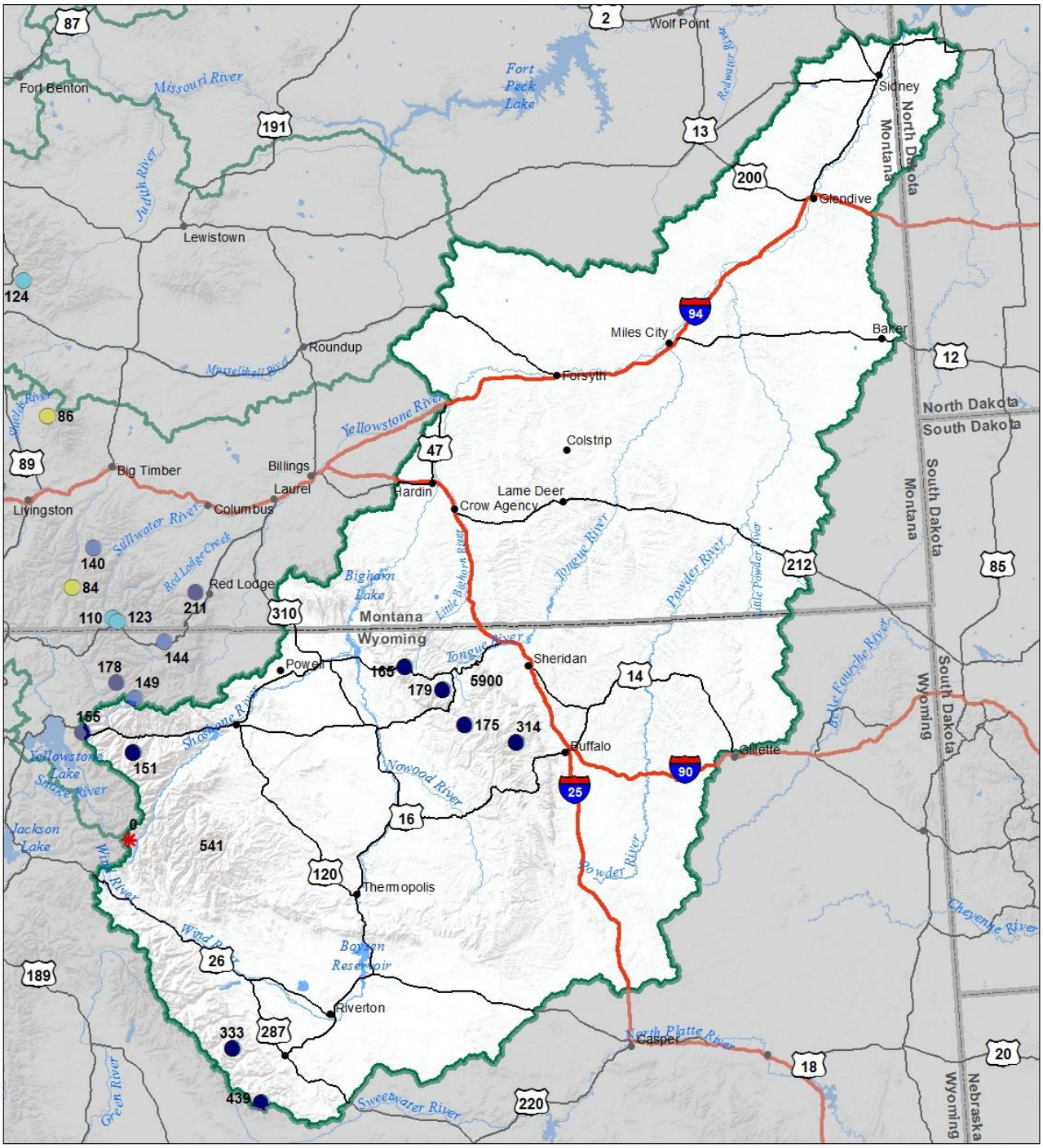


End of Month Reservoir Storage



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

Lower Yellowstone River Basin
Snow Water Equivalent
Percentage of Normal
June 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%	

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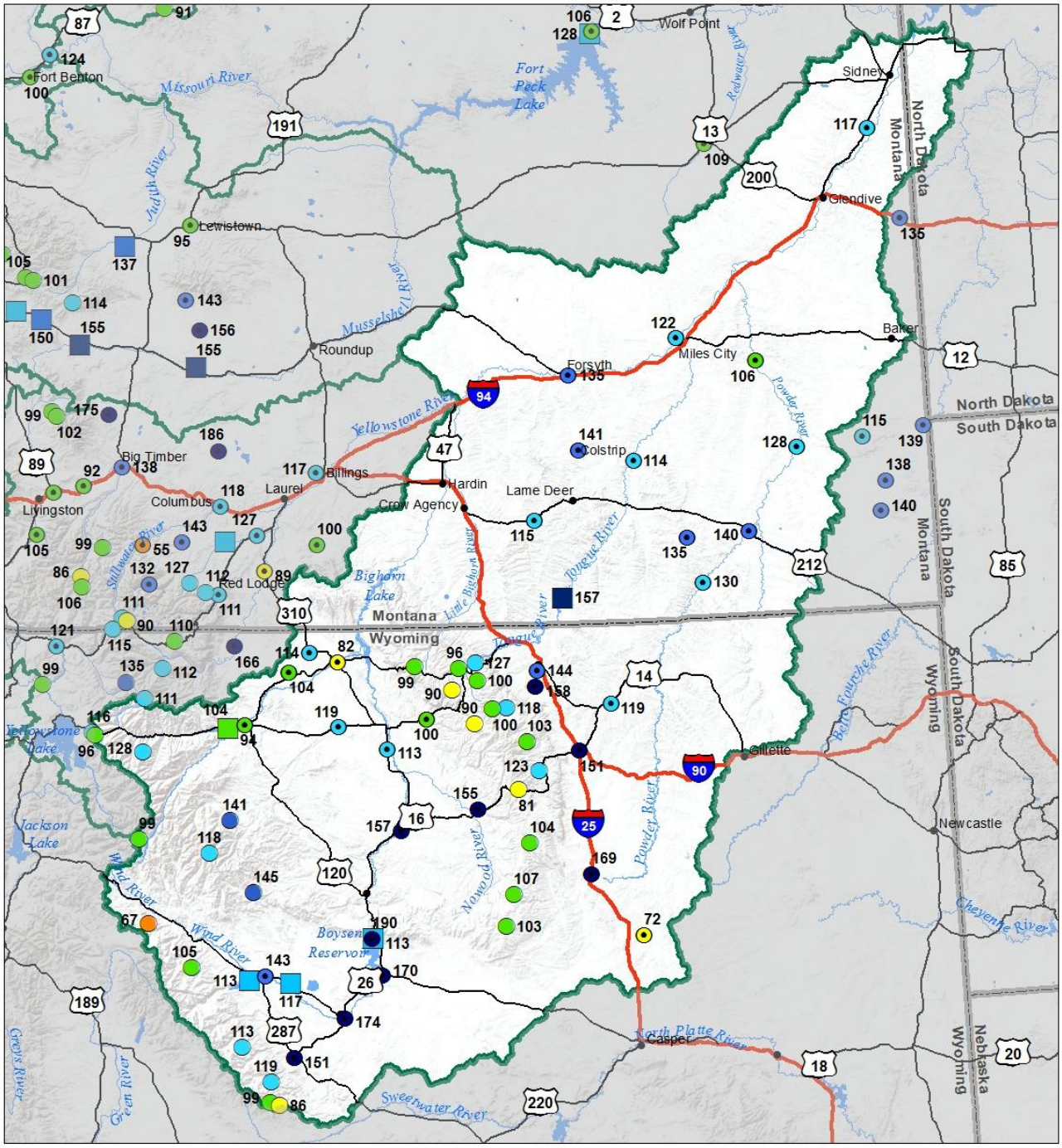
Montana State Library Natural Resource Information System

Lower Yellowstone River Basin
Water Year to Date Precipitation and Reservoir Levels
Percentage of Normal
June 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%	

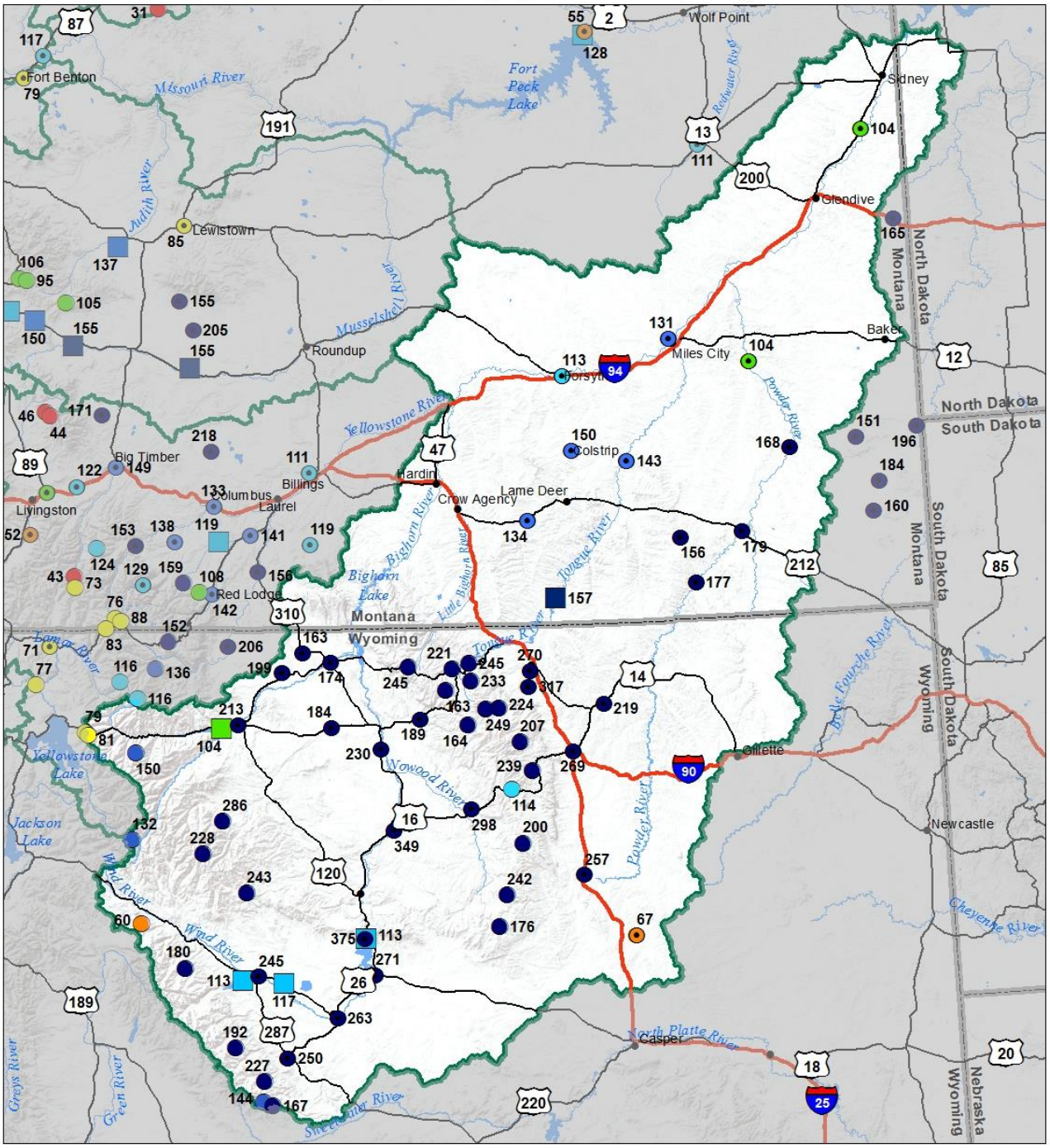
Reservoirs
Percent of Normal

- > 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, 2019 (May 1, 2019 - June 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%
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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