

Montana

Water Supply Outlook Report

January 1st, 2019



Badger Pass SNOTEL Re-Installation 2018 – The Badger Pass SNOTEL site, which was destroyed by the Strawberry Fire in September of 2017, was re-installed by the USDA-NRCS Montana Snow Survey staff in September of 2018. The project was logistically complex, involving a helicopter and multiple sling loads to remove the destroyed equipment and to bring in all the required gear necessary to re-build the SNOTEL site. The project took two full days to complete, and the data is now available again to the public. The data from Badger Pass serves many local irrigation districts and water managers with critical snowpack data and is used in several NRCS streamflow forecasts both east and west of the Continental Divide.

Some caution should be used when looking at the data from sites that have been re-installed in burned areas. As seen in the picture above, which compares the site pre and post-burn, the canopy has been completely destroyed by fire at the site. This opens the SNOTEL site up to the wind and sun, which can dramatically change the way snow accumulates on the ground.

Snowpack percentages for individual sites are calculated by comparing the current value for Snow Water Equivalent (SWE) to a “1981-2010 Normal”, or median of 30 years of record for that day. Because the canopy has been changed so dramatically at this site what has happened in the past might not be the best comparison for what “normal” may be in the future. Please use these percentages with caution.

For more information on this site, or a list of other SNOTEL sites re-installed in burned locations, please contact the [USDA-NRCS Montana Snow Survey staff](#).

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 January 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.

Monthly Updates

Due to a lapse in appropriations, many federal agencies are not operational as of the publication date of this document. The NRCS (Natural Resources Conservation Service) [has been able to maintain operations](#) during the current lapse in appropriations, by using carryover funding, in order to ensure our customers receive the technical guidance they need for conservation planning. The USDA-NRCS Montana Snow Survey collaborates with many federal agencies to collect monthly snowpack data, and due to furloughed staff members in other federal agencies some manual snowcourses were not measured on January 1st, 2019. Below is a list of snowcourses that were not measured or used to calculate snowpack percentages.

Snowcourse	River Basin	Cooperator	Years of Jan 1 Measurements
Weasel Divide	Kootenai	USFS	39
Coyote Hill	Flathead	USFS	66
West Yellowstone	Madison	USFS	81
Discovery Basin	Upper Clark	USFS	43
Storm Lake	Upper Clark	USFS	62
Chessman Reservoir	Missouri Mainstem	USFS	82
Ten Mile Lower	Missouri Mainstem	USFS	82
Ten Mile Middle	Missouri Mainstem	USFS	82
Twenty-One Mile	Gallatin	NPS	80
Lake Camp	Upper Yellowstone	NPS	68
Norris Basin	Upper Yellowstone	NPS	62
Old Faithful	Upper Yellowstone	NPS	42

USFS - U.S. Forest Service : U.S. Dept. of Agriculture

NPS - National Parks Service : U.S. Dept. of the Interior

Snowpack – Overview

As of January 1st, winter snowpack ranges from above normal in areas favored by cold northwest flow from Canada, to below normal in regions where approaching storms and mountain range orientations have resulted in below normal snowfall. The snowpack across the state began accumulating in late October to early November west of the Divide, and at the beginning of October in many basins east of the Divide. During the first week November basins along the Continental Divide received the first major snow event of the season, adding to the early October snowpack. Many of the northern mountain ranges east and west of the Divide were largely left out until the month of December, when more favorable storm patterns began to drop snow in the mountains.

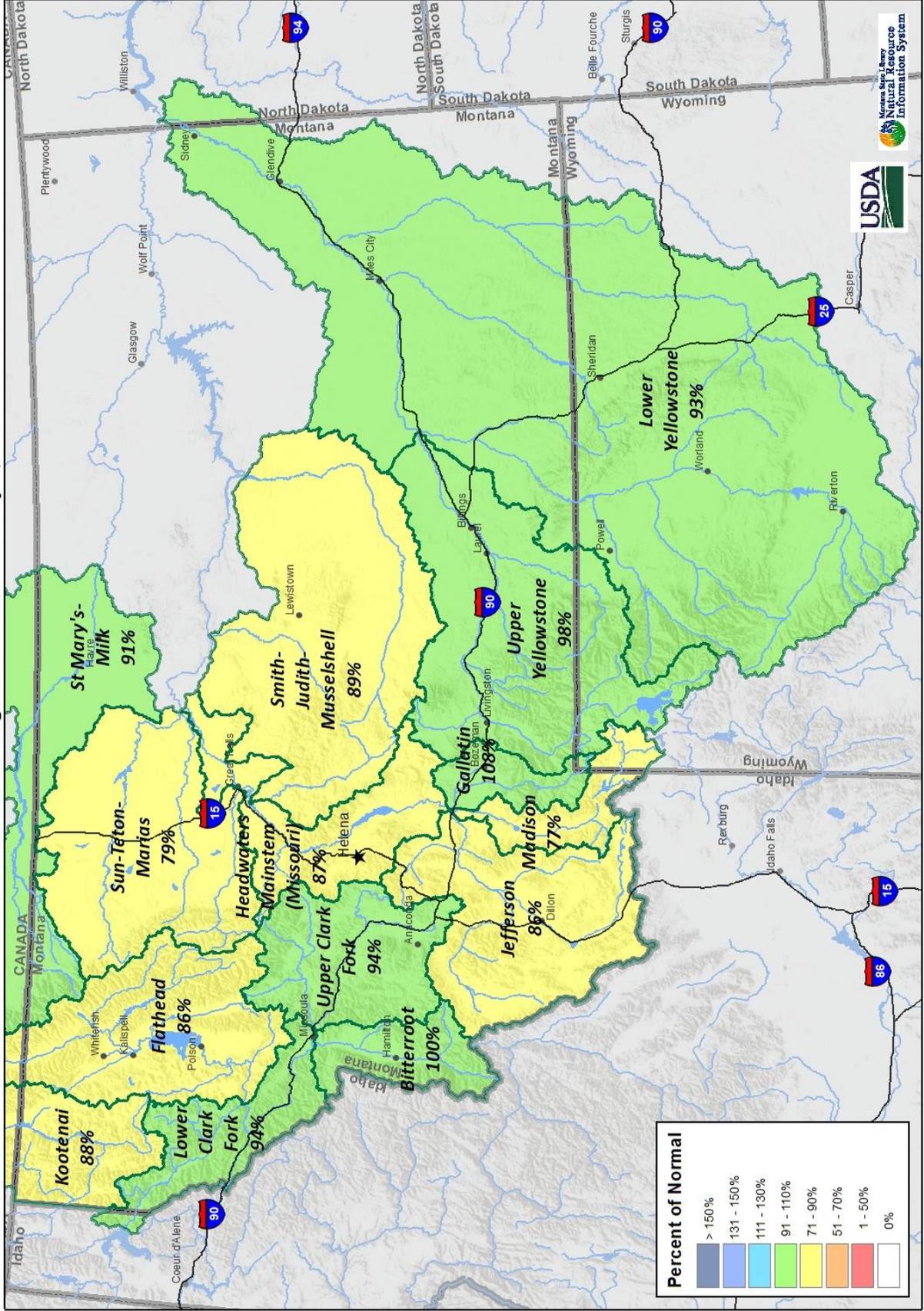
On January 1st, all but one of the river basins have a snowpack which is near or below normal for the date. Only the Gallatin River basin in southwest Montana has a snowpack which is above normal (108%) for this date. Looking at the bigger picture, how much do snowpack totals on January 1st reflect what will occur during runoff this spring and summer? West of the Divide mountain snowpack for this date is typically 40% to 50% of the seasonal peak snowpack, meaning we're not even halfway through the snow season. East of the Divide, snowpack on January 1st is typically 30% to 40% of the seasonal peak, with spring months favored to yield the bulk of the snowfall.

While there is certainly time for improvement, weather patterns tend to be persistent until there is a major change atmospherically. [Long-Range weather outlooks issued by the National Weather Service](#) aren't painting a pretty picture over the coming month, with above average temperatures forecasted, and below normal precipitation. Currently, ENSO-neutral conditions are present, but El Nino ([What is El Nino?](#)) is expected to form and continue through the Northern Hemisphere during winter 2018/2019 (~90% chance) and through spring (~60% chance). El Nino events can result in below average precipitation and above average temperatures for the pacific northwest and northern tier states, but it's important to remember that many factors (such as the Arctic Oscillation, or AO) also control the weather patterns during the winter and spring. The Montana Snow Survey will continue to provide updates throughout.

Snow Water Equivalent

1/1/2019	% Normal	% Last Year
Columbia River Basin	92	73
Kootenai in Montana	88	85
Flathead in Montana	86	72
Upper Clark Fork	94	60
Bitterroot	100	79
Lower Clark Fork	95	74
Missouri River Basin	86	68
Jefferson	86	64
Madison	77	69
Gallatin	108	79
Headwaters Mainstem	87	56
Smith-Judith-Musselshell	89	65
Sun-Teton-Marias	79	65
St. Mary-Milk	91	96
Yellowstone River Basin	94	64
Upper Yellowstone	98	61
Lower Yellowstone	93	72
West of Divide	92	73
East of Divide	88	66
Montana State-Wide	90	69

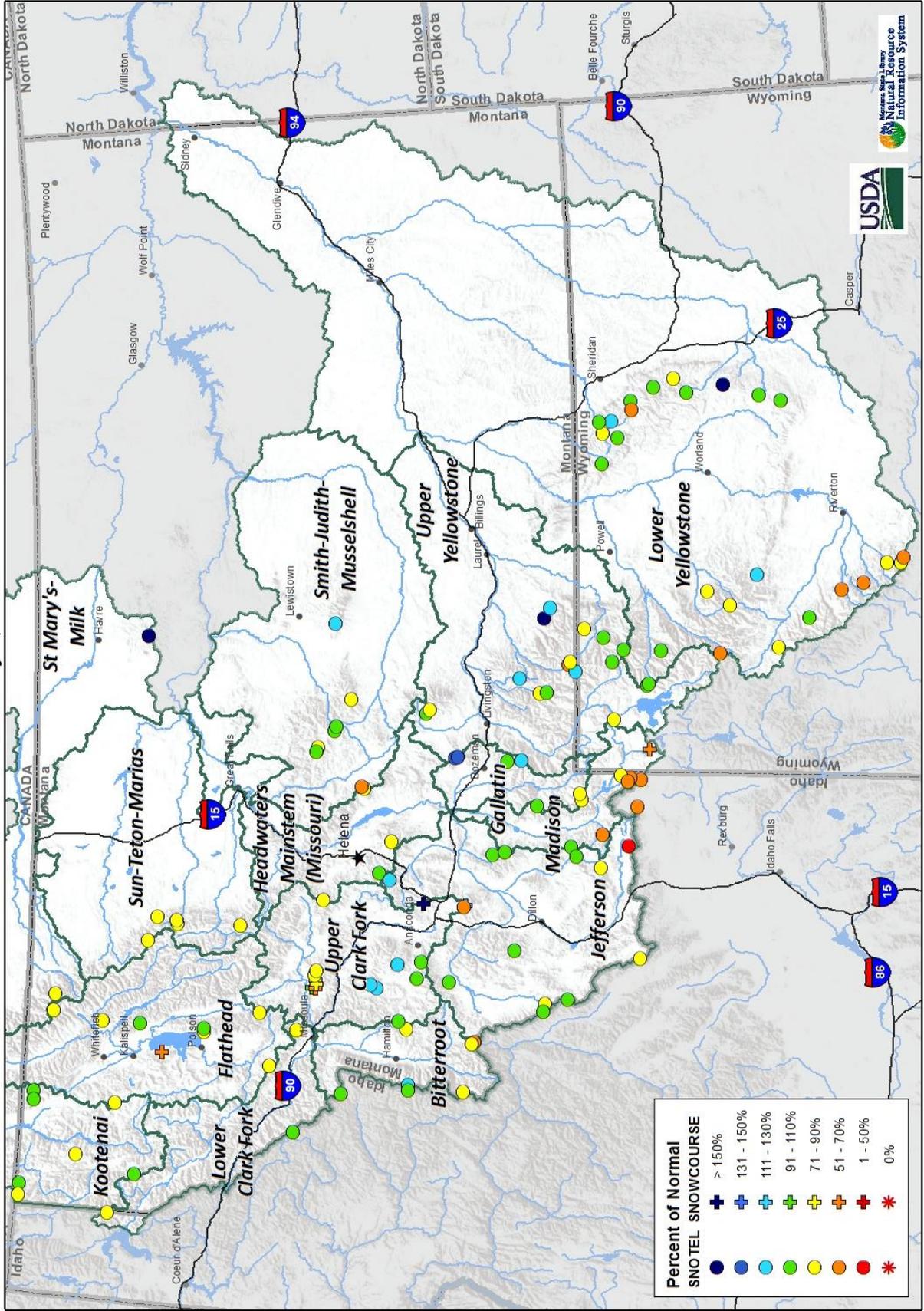
Montana Data Collection Office
 Current Snow Water Equivalent
 Basin Percentage of Normal - January 1, 2019



Note: Data includes SNOTEL and Snow course Measurements on January 1, 2019



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



Precipitation - Overview

On October 1st, 2018 the new water year began, after a very dry summer in the mountains of western Montana. Fortunately, there was a pattern shift towards the end of October which brought much needed moisture to mountain locations across the state. October mountain precipitation was near to above average in many locations, while the Kootenai River basin in northwest MT continued the drying trend. As November began, the northwest and northern river basins got some much-needed moisture, but as the month progressed the drying trend continued, and below average precipitation fell. Early November precipitation was abundant in basins that straddled the Continental Divide. These early November storms were significant enough to result in above average monthly totals, even though the latter half of the month was lackluster like in the northern basins. The high-pressure ridges in December ushered in above average temperatures and resulted in below average precipitation in all basins except the western basins along the Idaho border, and northwest basins along the Canadian border, where near to slightly below normal precipitation fell during the month.

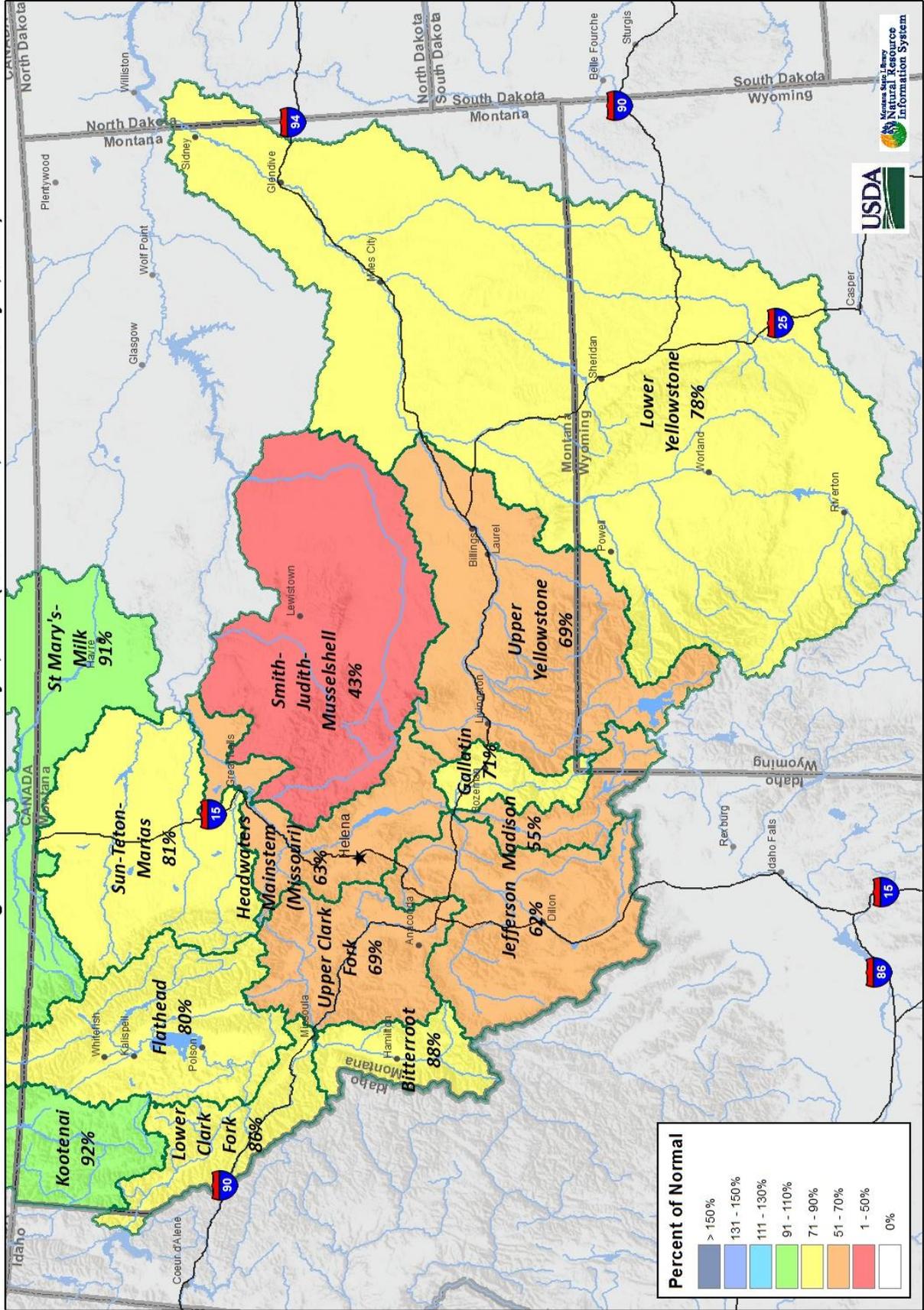
Water Year Precipitation since October for mountain locations is below normal in the Kootenai (81%), Sun-Teton-Marias (85%), and Madison River basins (82%). Abundant early November precipitation, and December precipitation has resulted in above average water-year precipitation in the Upper Yellowstone (103%), Bitterroot (104%), and Gallatin River basins (115%). All other basins in the state remain near to slightly below normal on January 1st.

Precipitation

1/1/2019	Monthly % Avg	Water Year % Avg	WY % Last Year
Columbia River Basin	83	94	79
Kootenai in Montana	92	81	76
Flathead in Montana	80	94	77
Upper Clark Fork	69	98	77
Bitterroot	88	104	93
Lower Clark Fork	86	97	83
Missouri River Basin	60	95	84
Jefferson	62	92	89
Madison	55	84	81
Gallatin	71	116	97
Headwaters Mainstem	63	95	69
Smith-Judith-Musselshell	43	94	82
Sun-Teton-Marias	81	89	66
St. Mary-Milk	91	96	76
Yellowstone River Basin	74	98	83
Upper Yellowstone	69	103	75
Lower Yellowstone	78	94	91
West of Divide	83	94	79
East of Divide	67	94	81
Montana State-Wide	75	96	81

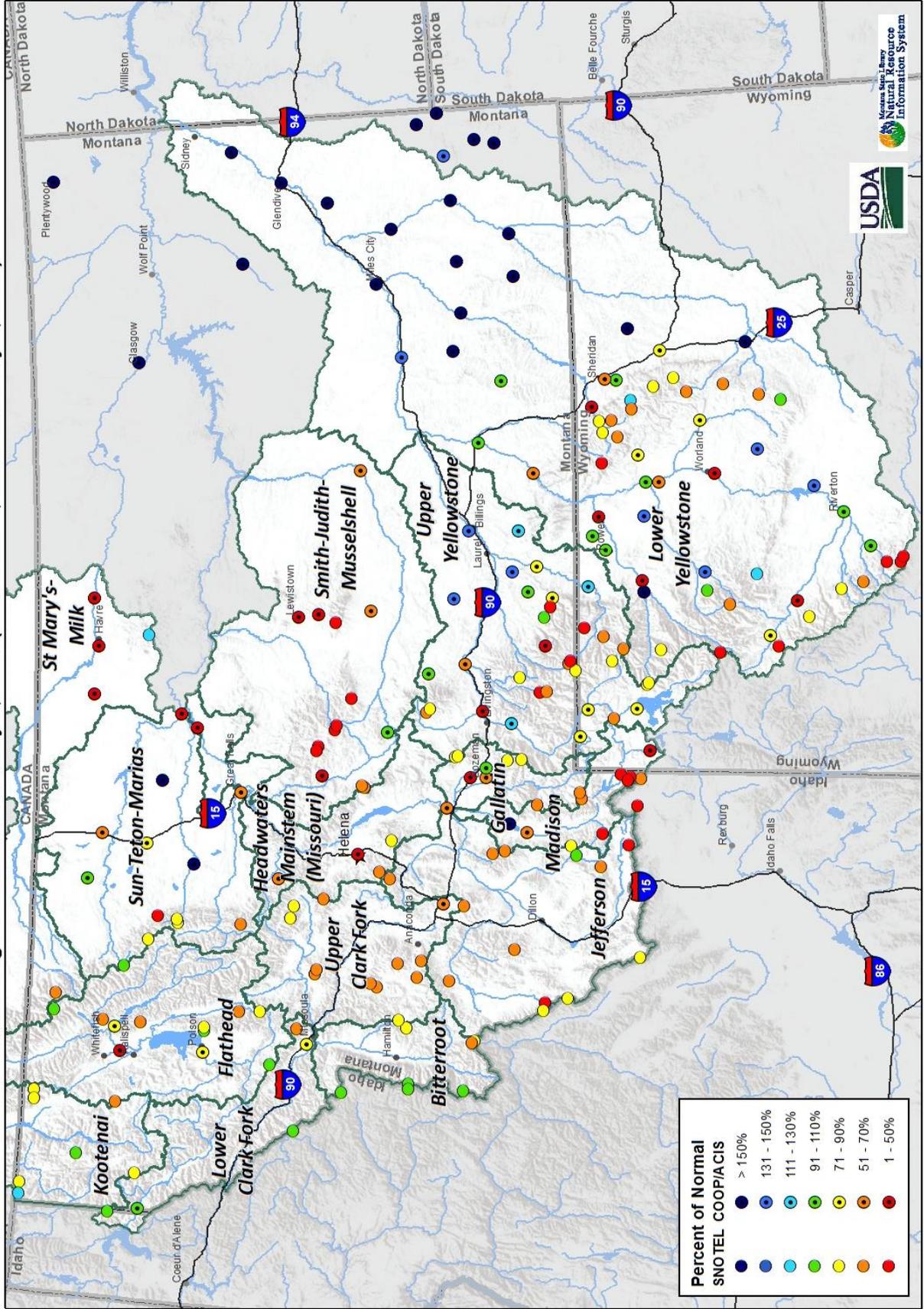
Montana Data Collection Office
 Monthly Precipitation

Basin Percentage of Normal - January 1, 2019 (December 1, 2018 - January 1, 2019)

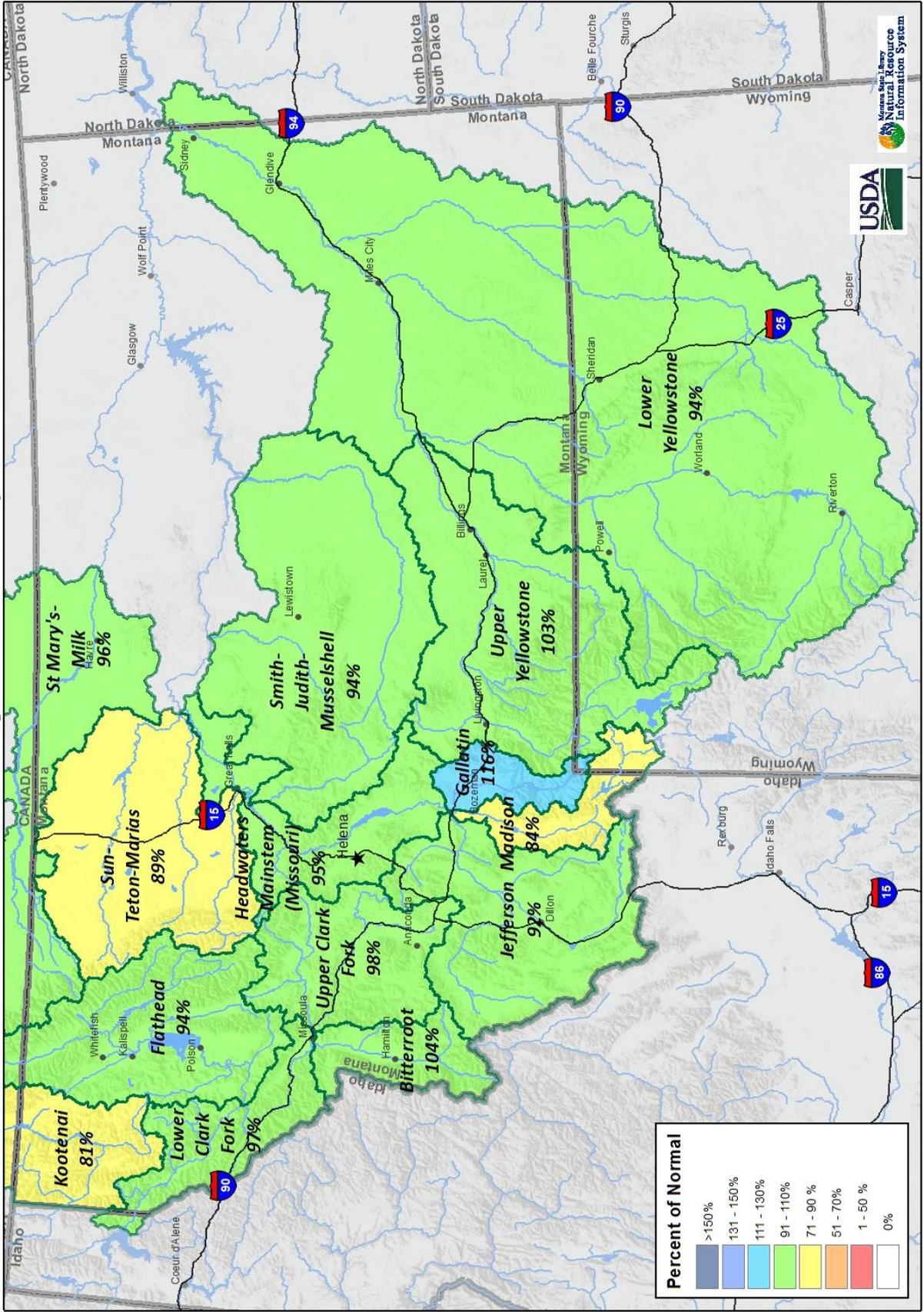


Montana Data Collection Office
 Monthly Precipitation

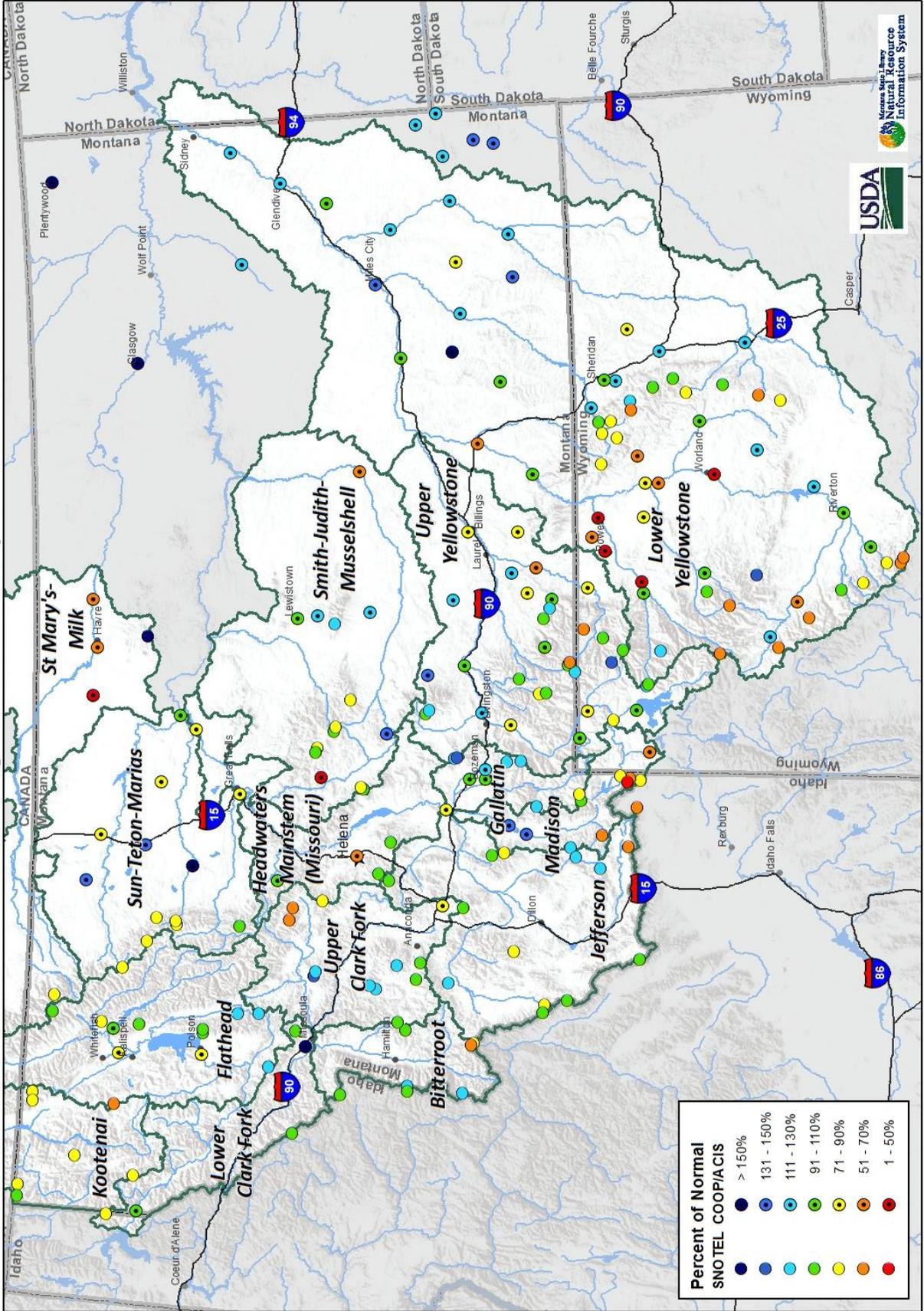
Percentage of Normal - January 1, 2019 (December 1, 2018 - January 1, 2019)



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



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



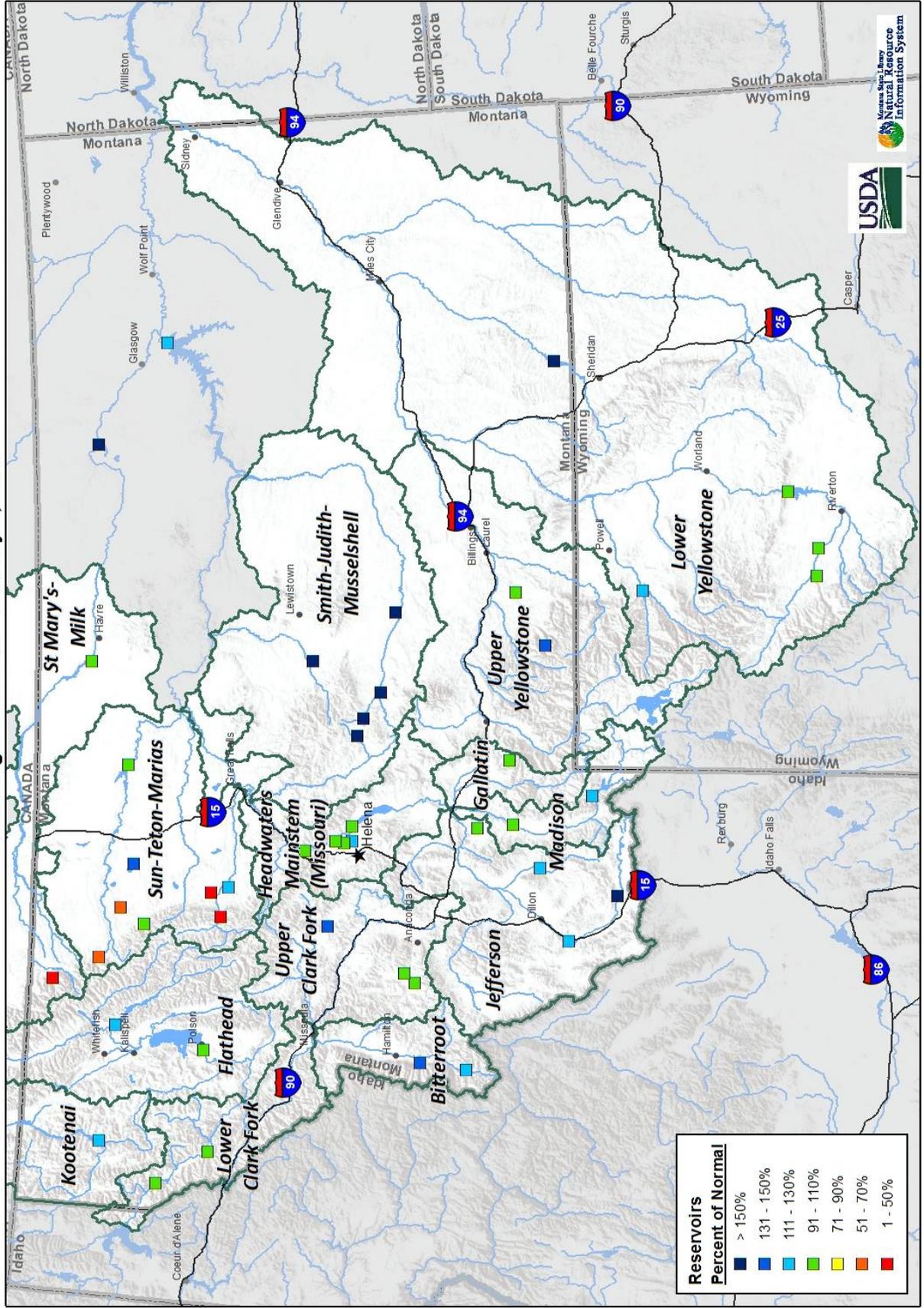
Reservoirs - Overview

As one might expect coming off a big runoff year last spring and summer, reservoir storage is near to above average at many locations across the state of Montana. Only a few locations have reservoir contents on January 1st that are below average for this date. Reservoirs along the Rocky Mountain Front are below average for January 1st. Gibson (44%), Pishkun (18%), and Lake Sherburne (48%) are well below average for this date. Pishkun Reservoir has been drained as low as possible due to work that is being performed which required the reservoir be drained down for work to be completed (new trash rack for the outlet). Carryover storage is the most impressive in the Musselshell River basin where all reservoirs are well above average for this date.

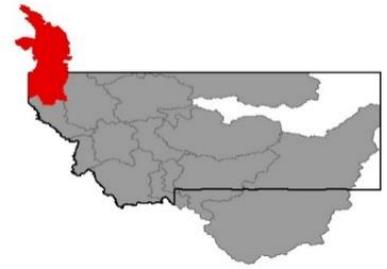
Reservoir Storage

<i>1/1/2019</i>	<i>% Average</i>	<i>% Capacity</i>	<i>% Last Year</i>
Columbia River Basin	112	74	101
Kootnenai in Montana	114	68	105
Flathead in Montana	112	79	99
Upper Clark Fork	106	71	101
Bitterroot	127	30	86
Lower Clark Fork	99	94	100
Missouri River Basin	117	80	104
Jefferson	134	58	105
Madison	113	85	97
Gallatin	105	53	124
Headwaters Mainstem	119	83	102
Smith-Judith-Musselshell	170	85	124
Sun-Teton-Marias	106	55	106
St. Mary-Milk	101	40	106
Yellowstone River Basin	103	64	95
Upper Yellowstone	116	59	84
Lower Yellowstone	103	64	95
West of Divide	112	74	101
East of Divide	116	79	103
<i>Montana State-Wide</i>	115	77	103

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



Kootenai River Basin



This year’s seasonal snowpack in the Kootenai River basin began accumulating during the first couple days of October when a storm brought snow to upper elevations and rain down low. It wasn’t until early November that the seasonal snowpack started to accumulate at lower elevation SNOTEL sites. This was the first major storm of the season and brought over a foot of snow to the upper elevations but was immediately followed by relatively dry and warm conditions through most of November and December. A Thanksgiving storm did bring some precipitation to the area. Fortunately, precipitation arrived again in mid-December and delivered significant snowfall through the end of the year. Overall, this fall has been relatively dry in the basin, which in turn has left both water year precipitation and the snowpack at below average conditions to start 2019. As of January 1st, [much of the basin has been designated under D0 and D1 drought conditions](#) by the National Drought Monitor, but this an improvement from the very dry conditions experienced through this summer. Fortunately, the basin is less than halfway into its typical snowpack accumulation period and there is time to rebound.

Kootenai River Basin Data Summary

Snowpack	Percent of 1981-2010 Normal (Median)	Last Year Percentage of Normal (Median)
<i>KOOTENAY in CANADA</i>	81%	102%
<i>KOOTENAI MAINSTEM</i>	86%	97%
<i>TOBACCO</i>	93%	99%
<i>FISHER</i>	81%	124%
<i>YAAK</i>	89%	122%
<i>KOOTENAI RIVER BASIN in MONTANA</i>	88%	103%
<i>KOOTENAI ab BONNERS FERRY</i>	86%	107%
Basin-Wide Snowpack	88%	103%

Precipitation	Monthly Percentage of Average	WYTD Percentage of 1981-2010 Average*	WYTD Last Year Percentage of Average
Mountain Precipitation	92%	81%	106%
Valley Precipitation	%	%	%
Basin-Wide Precipitation	92%	81%	106%

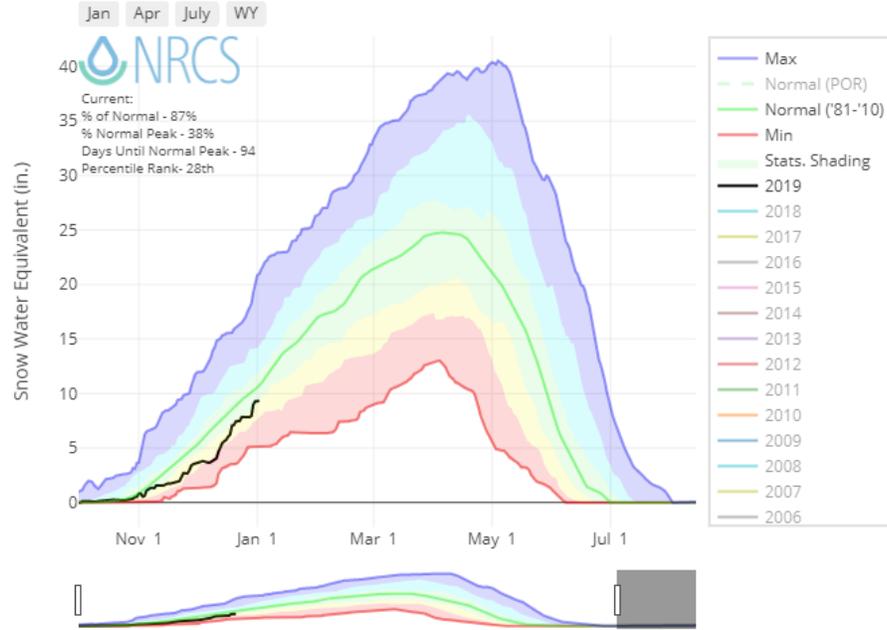
*WYTD Precipitation is October 1st- Current

Reservoir Storage	Percentage of Average	Percentage of Capacity (Total)	Last Year Percentage of Average
Basin-Wide Reservoir Storage	114%	68%	109%

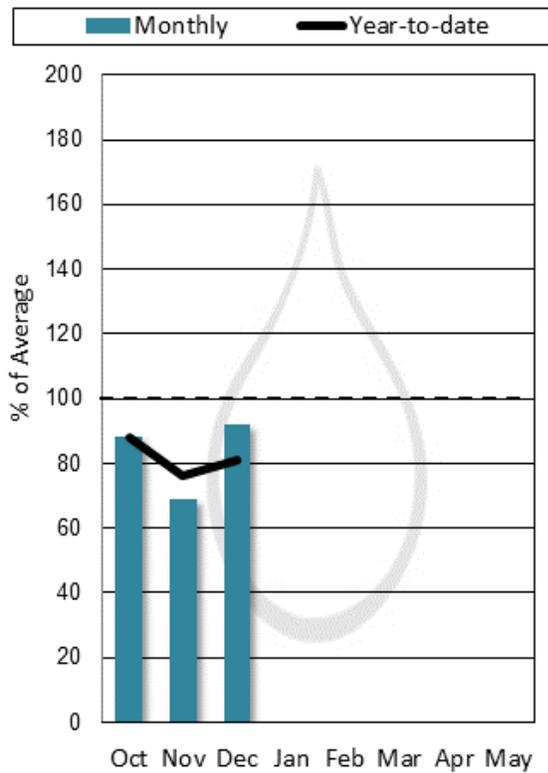
*See Reservoir Storage Table for storage in individual reservoirs

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

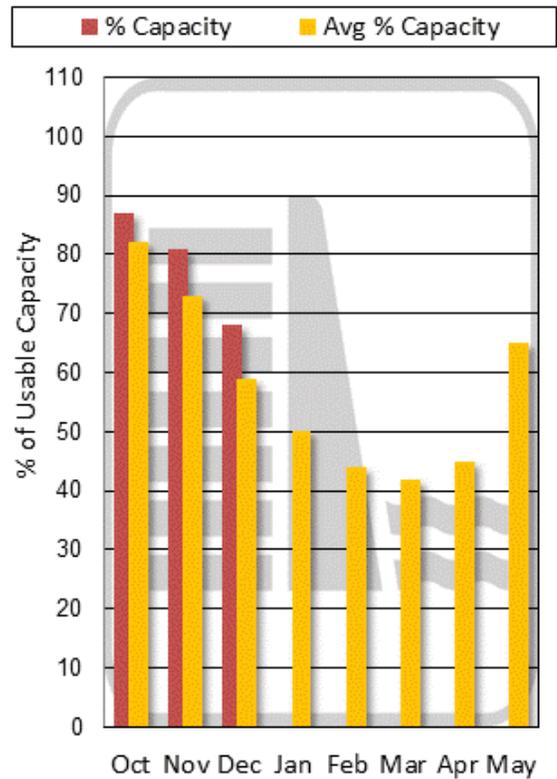
Snow Water Equivalent in KOOTENAI RIVER BASIN in MONTANA



Mountain and Valley Precipitation

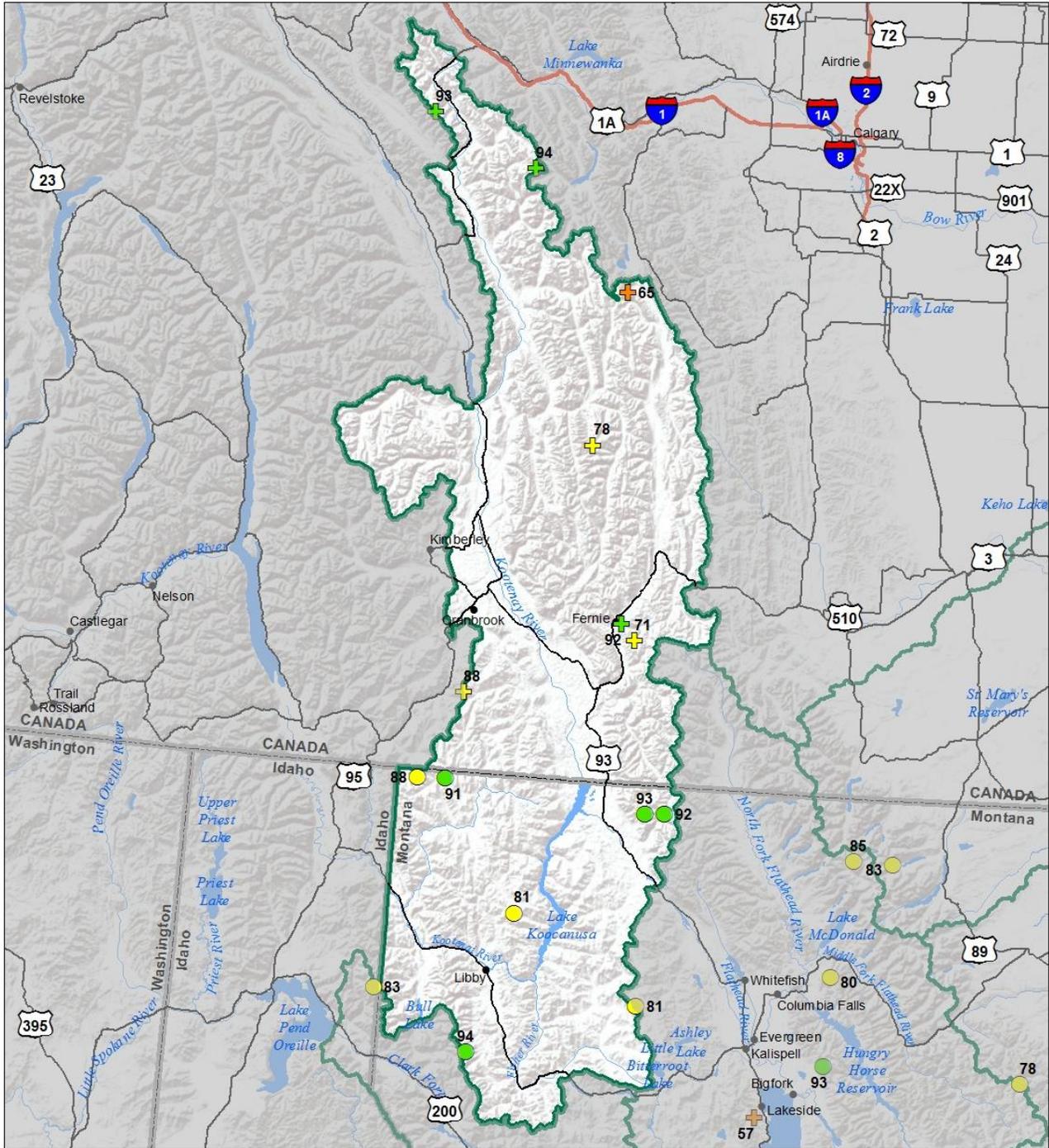


End of Month Reservoir Storage



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 January 1, 2019

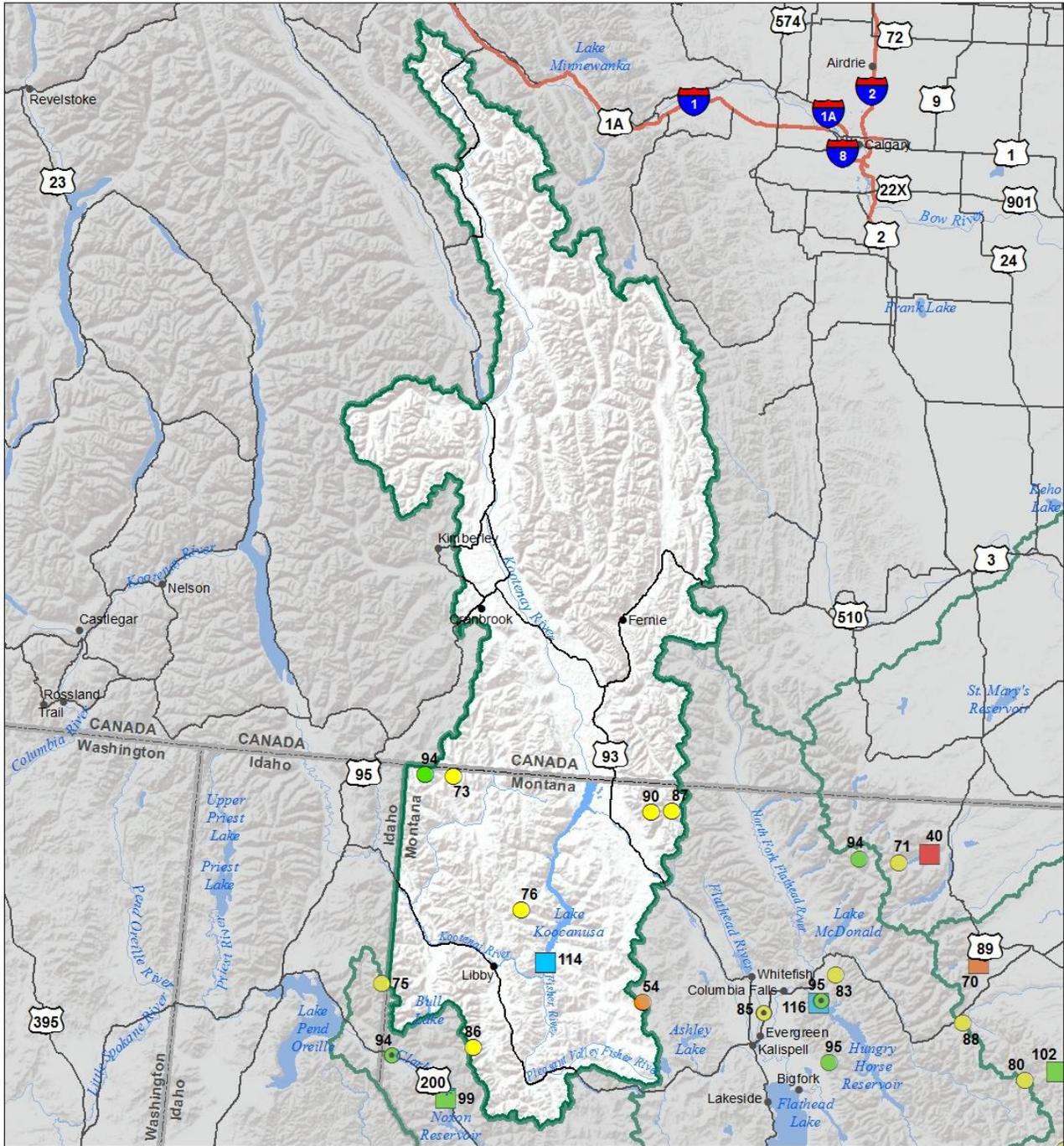


Snow Water Equivalent Percent of Normal

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%	● *	⊕ 91 - 110%	⊕ *
			● *



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

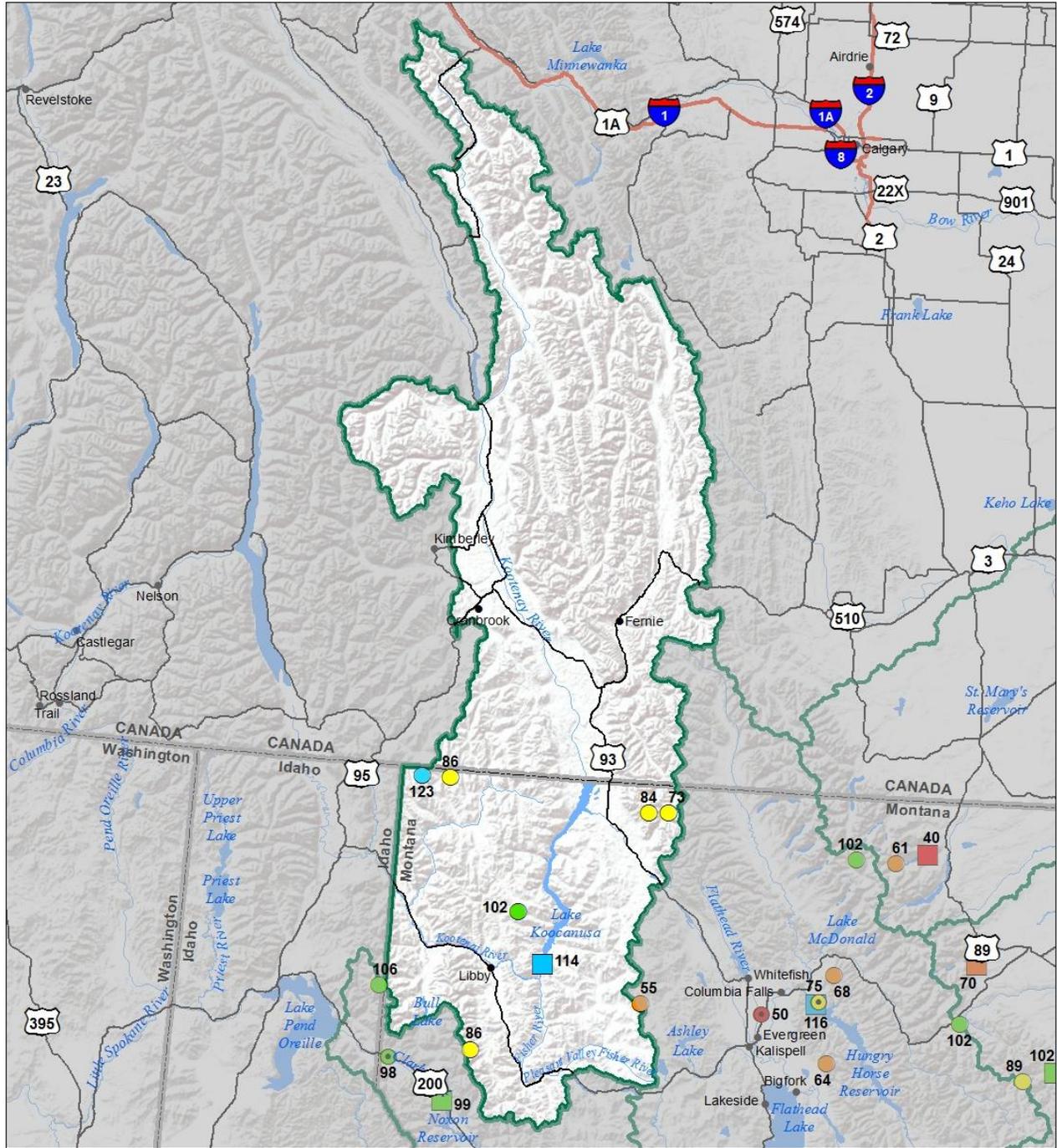


Precipitation Percent of Normal			
SNOTEL		COOP/ACIS	
● > 150%	● 71 - 90%	● > 150%	● 71 - 90%
● 131 - 150%	● 51 - 70%	● 131 - 150%	● 51 - 70%
● 111 - 130%	● 1 - 50%	● 111 - 130%	● 1 - 50%
● 91 - 110%		● 91 - 110%	

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

USDA
Western State Library
Natural Resource
Information System

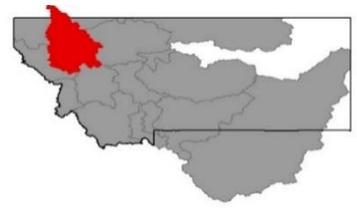
Kootenai River Basin Monthly Precipitation and Reservoir Levels Percentage of Normal January 1, 2019 (December 1, 2018 - January 1, 2019)



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

The Flathead’s seasonal snowpack started off quickly this water year with an early October storm that brought half a foot of snow to the upper elevations and several inches of rain to lower elevations. Mid-elevations near the Continental Divide received several inches of snow from this storm but much of this mid-elevation snow was gone by the end of October when a larger storm system moved into the region. This storm brought almost a foot of snow to the mountains and marked the start of the seasonal snowpack at lower elevations. Early November is typically when lower mountain elevations start to accumulate seasonal snow in this region. The rest of November and much of December lacked average precipitation and experienced above average temperatures. The mean temperature [departed 4-6 degrees Fahrenheit above normal for the month of December](#) in this region. Higher elevations across the basin did get 2 feet of snow during the 2nd half of December, however it wasn’t enough, and the basin started the new year with well below normal snowpack conditions. Water year-to-date precipitation is currently only slightly below average and several of the basin’s historically wettest months are still ahead.

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	89%	95%
MIDDLE FORK FLATHEAD	82%	103%
SOUTH FORK FLATHEAD	89%	144%
STILLWATER-WHITEFISH	81%	124%
SWAN	90%	138%
MISSION VALLEY	83%	149%
LITTLE BITTERROOT-ASHLEY	57%	109%
JOCKO	88%	126%
FLATHEAD in MONTANA	86%	120%
Basin-Wide Snowpack	86%	120%

Precipitation	Monthly Percentage of Average	WYTD Percentage of 1981-2010 Average*	WYTD Last Year Percentage of Average
Mountain Precipitation	81%	95%	122%
Valley Precipitation	50%	85%	129%
Basin-Wide Precipitation	80%	94%	122%

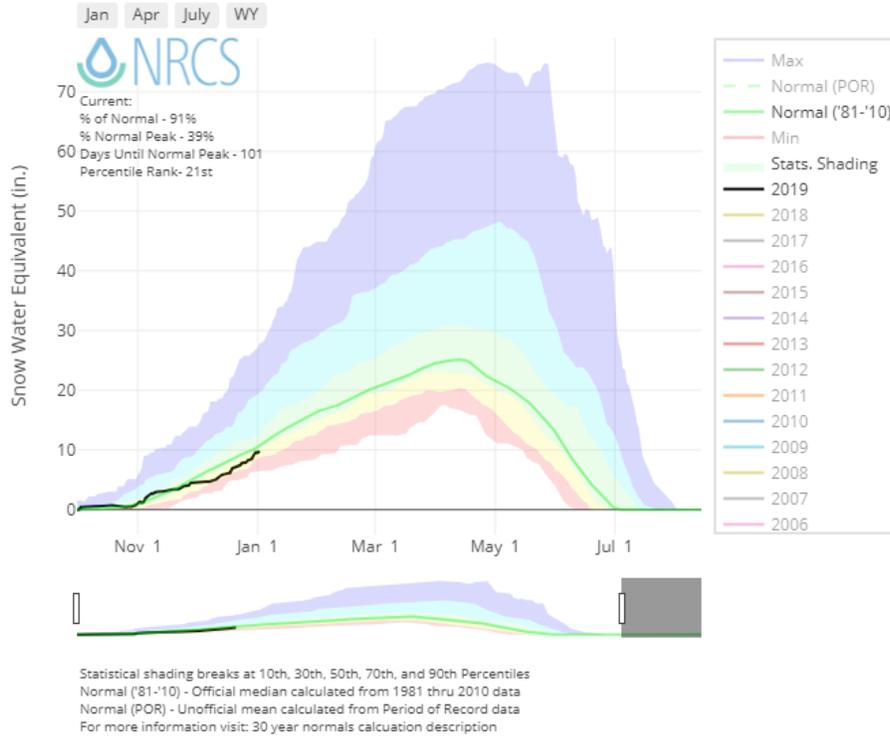
*Water Year-to-Date (WYTD) Precipitation is October 1st - Current

Reservoir Storage	Percentage of Average	Percentage of Capacity (Total)	Last Year Percentage of Average
Basin-Wide Reservoir Storage	112%	79%	113%

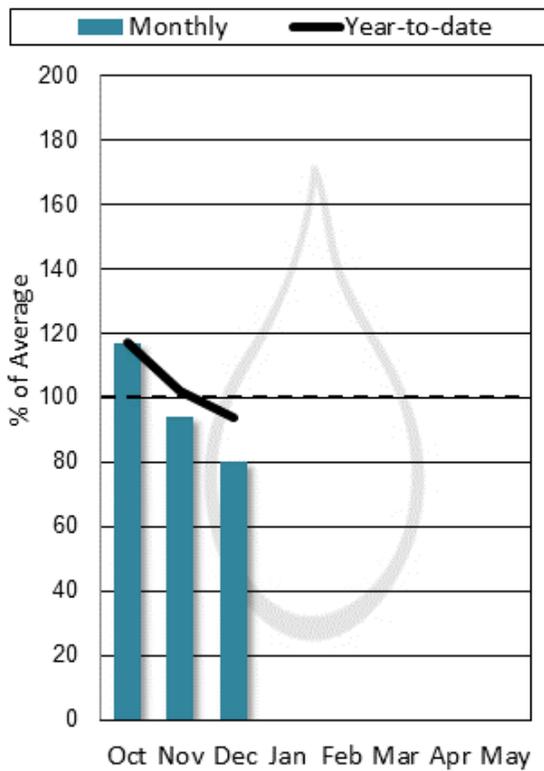
*See Reservoir Storage Table for storage in individual reservoirs

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

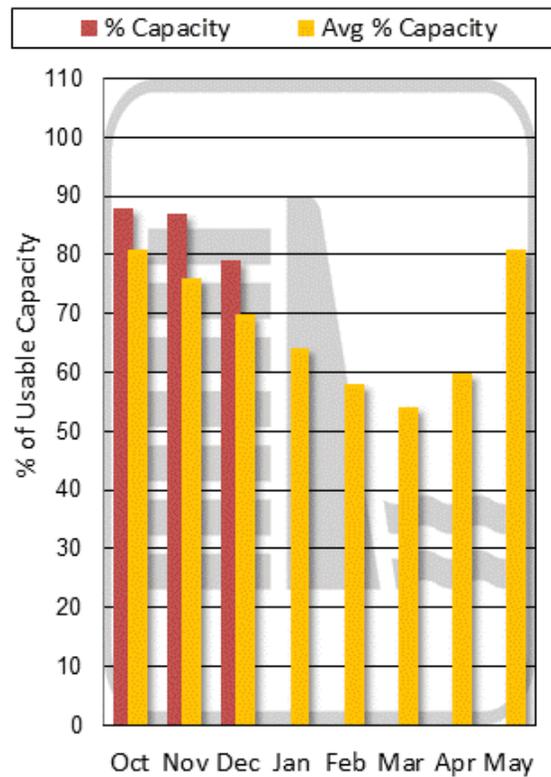
Snow Water Equivalent in FLATHEAD in MONTANA



Mountain and Valley Precipitation

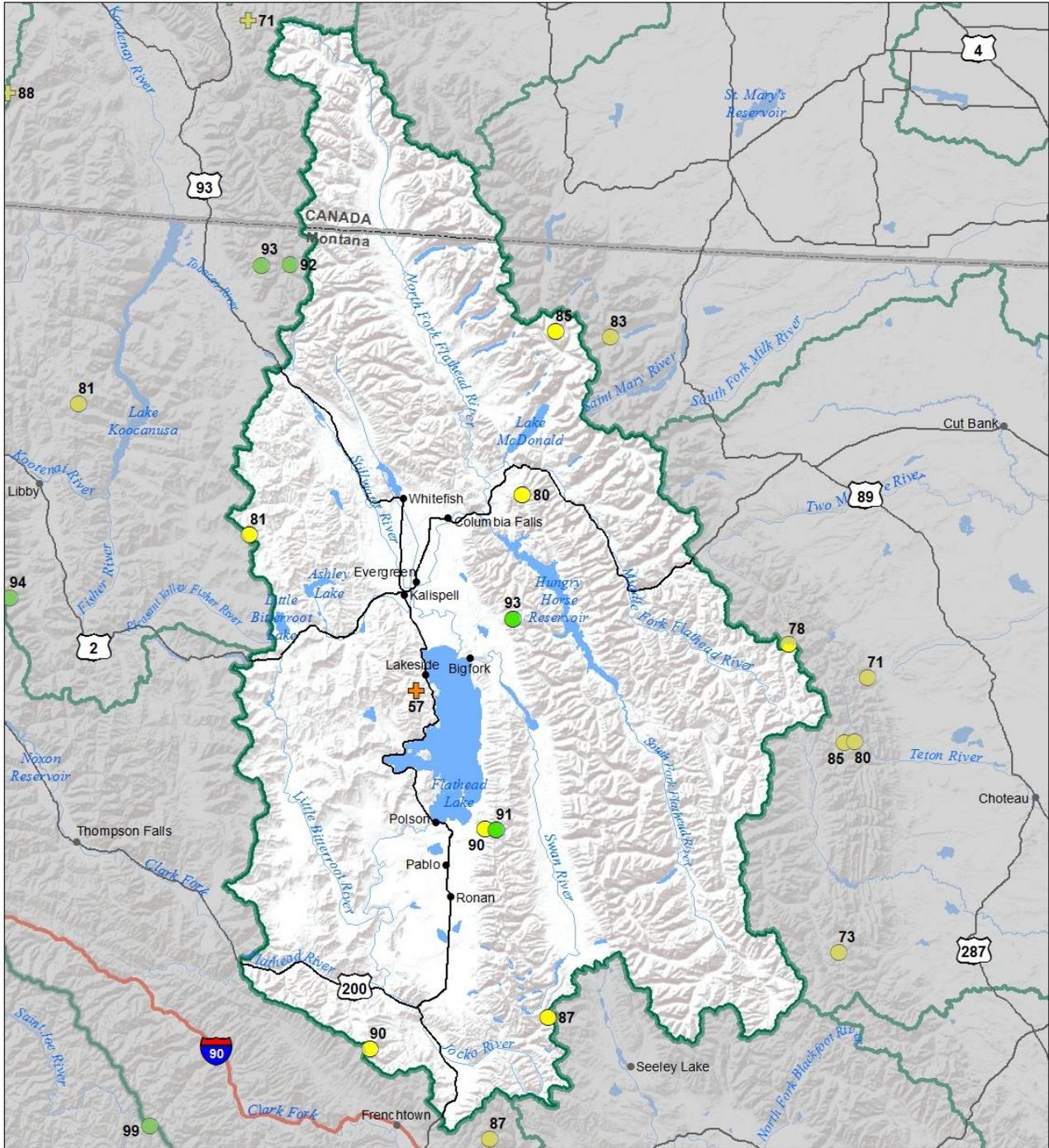


End of Month Reservoir Storage



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 January 1, 2019

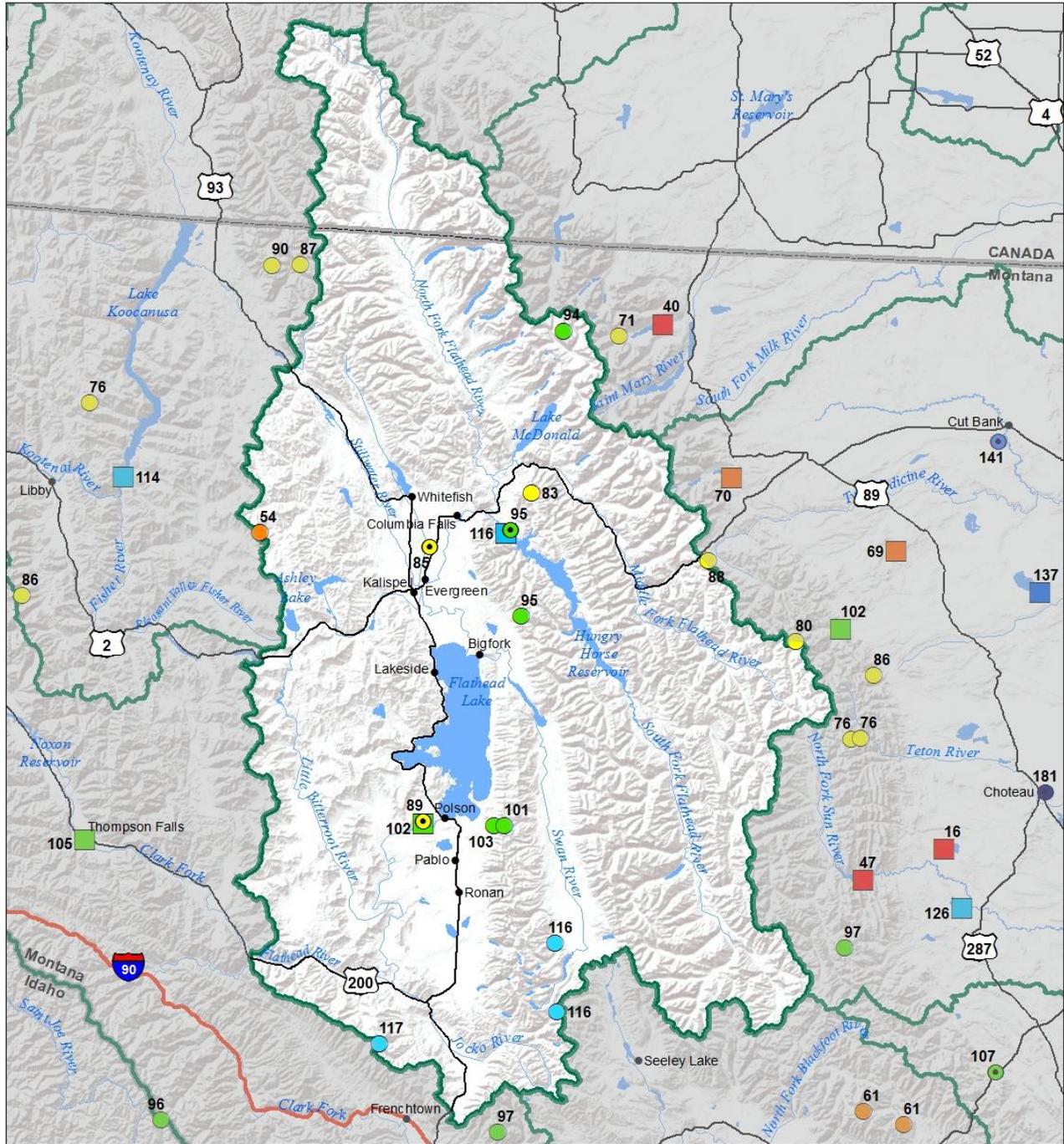


Snow Water Equivalent Percent of Normal

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%



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

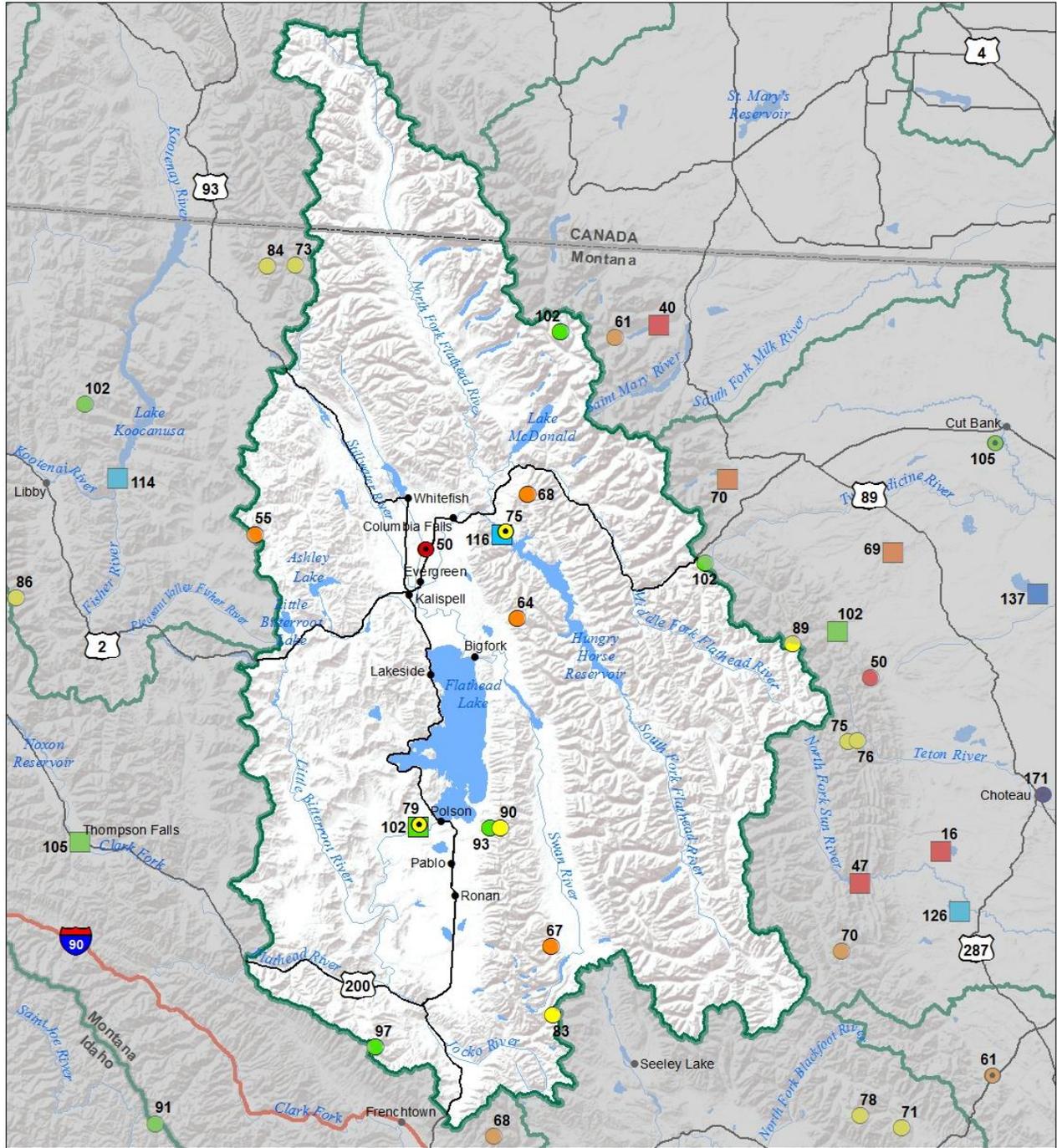


SNOTEL		COOP/ACIS	
● > 150%	● 71 - 90%	● > 150%	● 71 - 90%
● 131 - 150%	● 51 - 70%	● 131 - 150%	● 51 - 70%
● 111 - 130%	● 1 - 50%	● 111 - 130%	● 1 - 50%
● 91 - 110%		● 91 - 110%	

**Reservoirs
Percent of Normal**

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

Flathead River Basin Monthly Precipitation and Reservoir Levels Percentage of Normal January 1, 2019 (December 1, 2018 - January 1, 2019)



Precipitation Percent of Normal		COOP/ACIS	
SNOTEL			
● > 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



Last year the snowpack in the Upper Clark Fork River basin was extraordinarily deep and broke records dating back 75+ years. There was so much snow in the mountains that the Clark Fork River above Missoula saw more water pass by during the month of May than it typically does from May to September. This runoff was followed by one of [the driest July through September time periods on record](#) with regards to precipitation, however the Upper Clark Fork River is still flowing above average into the winter months. This can be attributed to both last winter and a wet start to water year 2019. Snow started trickling in at upper elevations in October this year. The first major storm arrived the first week of November and dumped ~30 inches of snow in Flint Creek Range. This allowed Discovery Ski Area to open early this year, which was on November 10th and skiers reported that the skiing was great. Precipitation continued to trickle in through November and December, with another good-sized snow storm arriving in time for Christmas. Overall, water year-to-date precipitation is near average and the snowpack is slightly below normal for basin-wide totals. Snowpack in the Rock Creek, Flint Creek and Upper Clark Fork River basins remains above normal for Jan 1st, but the northern half of the basin (Blackfoot and Little Blackfoot) has snowpack which is below normal for this date. The basin is less than halfway into its typical snow accumulation season, so it's still early to tell how much water spring runoff will deliver.

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	101%	176%
FLINT CREEK	112%	151%
ROCK CREEK	97%	143%
CLARK FORK ab BLACKFOOT	102%	162%
BLACKFOOT	85%	153%
Basin-Wide Snowpack	94%	156%

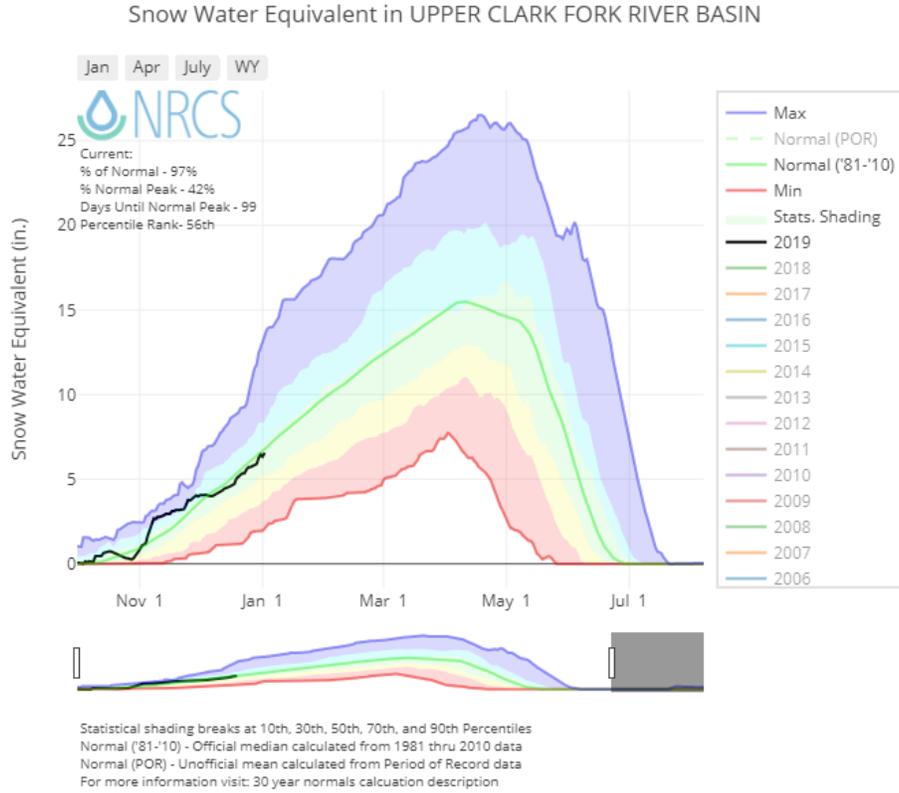
Precipitation	Monthly Percentage of Average	WYTD Percentage of 1981-2010 Average*	WYTD Last Year Percentage of Average
Mountain Precipitation	69%	98%	129%
Valley Precipitation	63%	86%	76%
Basin-Wide Precipitation	69%	98%	128%

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

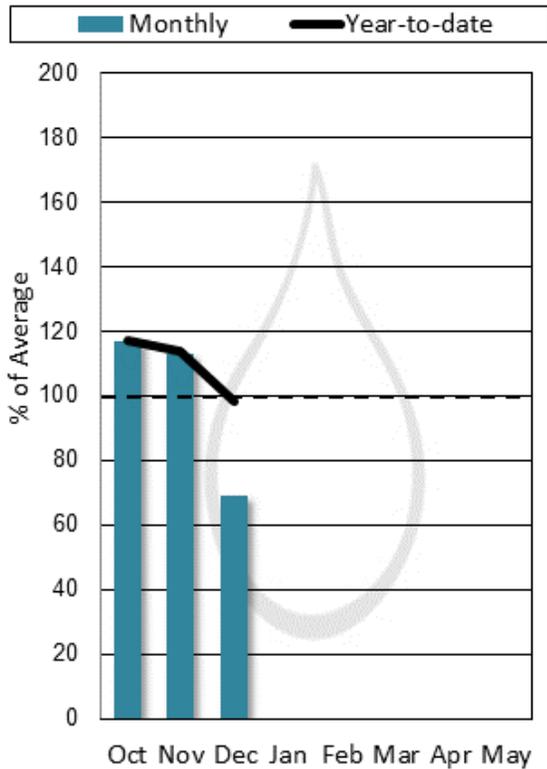
Reservoir Storage	Percentage of Average	Percentage of Capacity (Total)	Last Year Percentage of Average
Basin-Wide Storage	106%	71%	105%

*See Reservoir Storage Table for storage in individual reservoirs

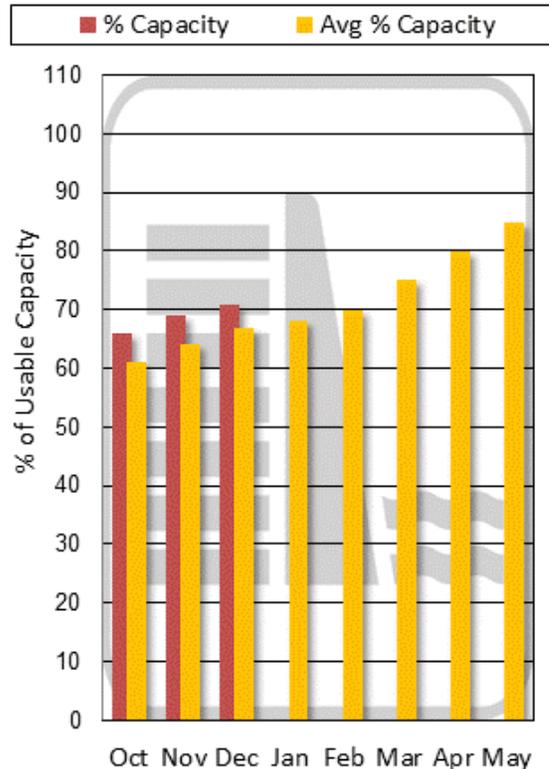
(click on chart below to navigate to [online version](#) with additional features)



Mountain and Valley Precipitation

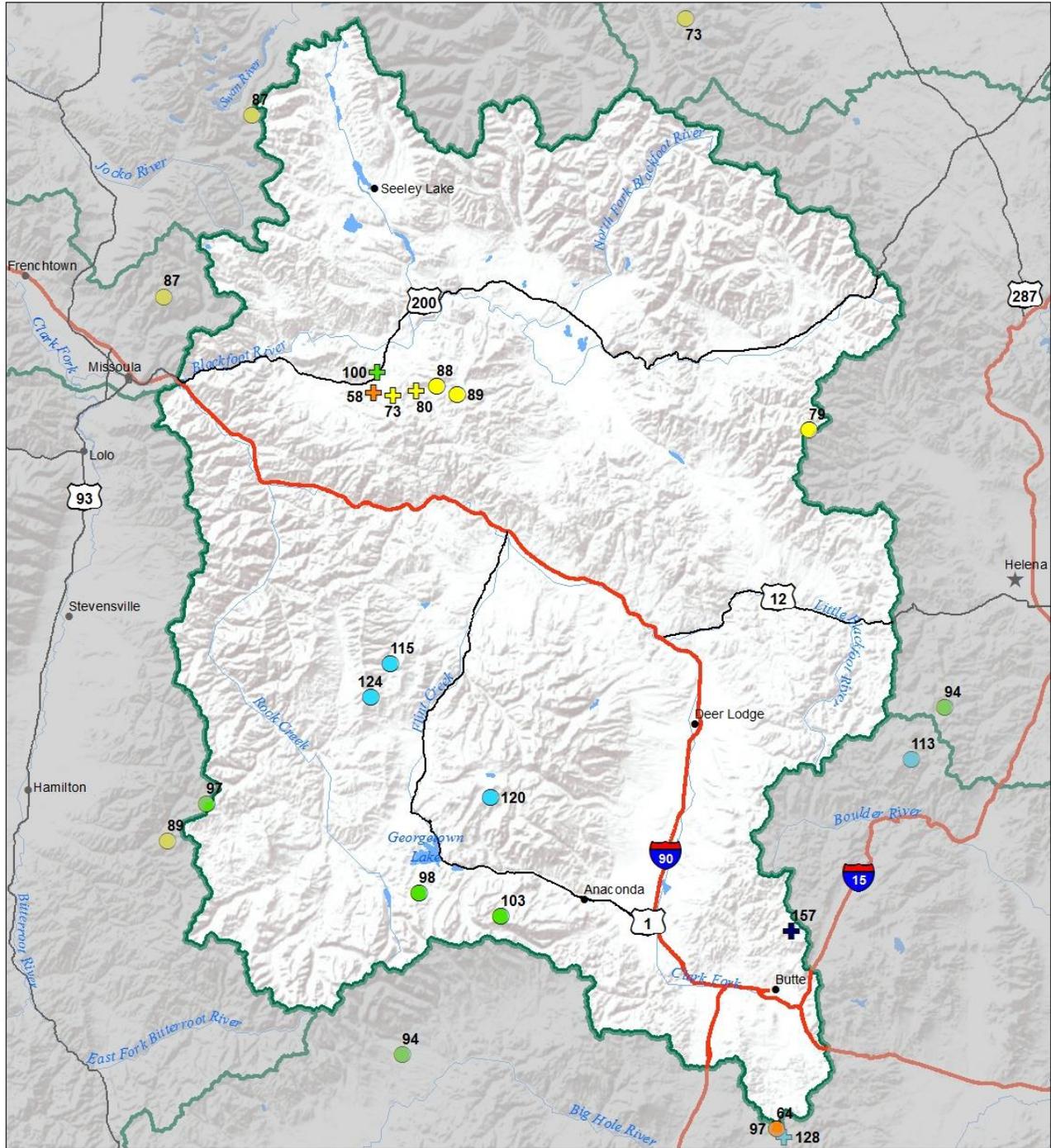


End of Month Reservoir Storage



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

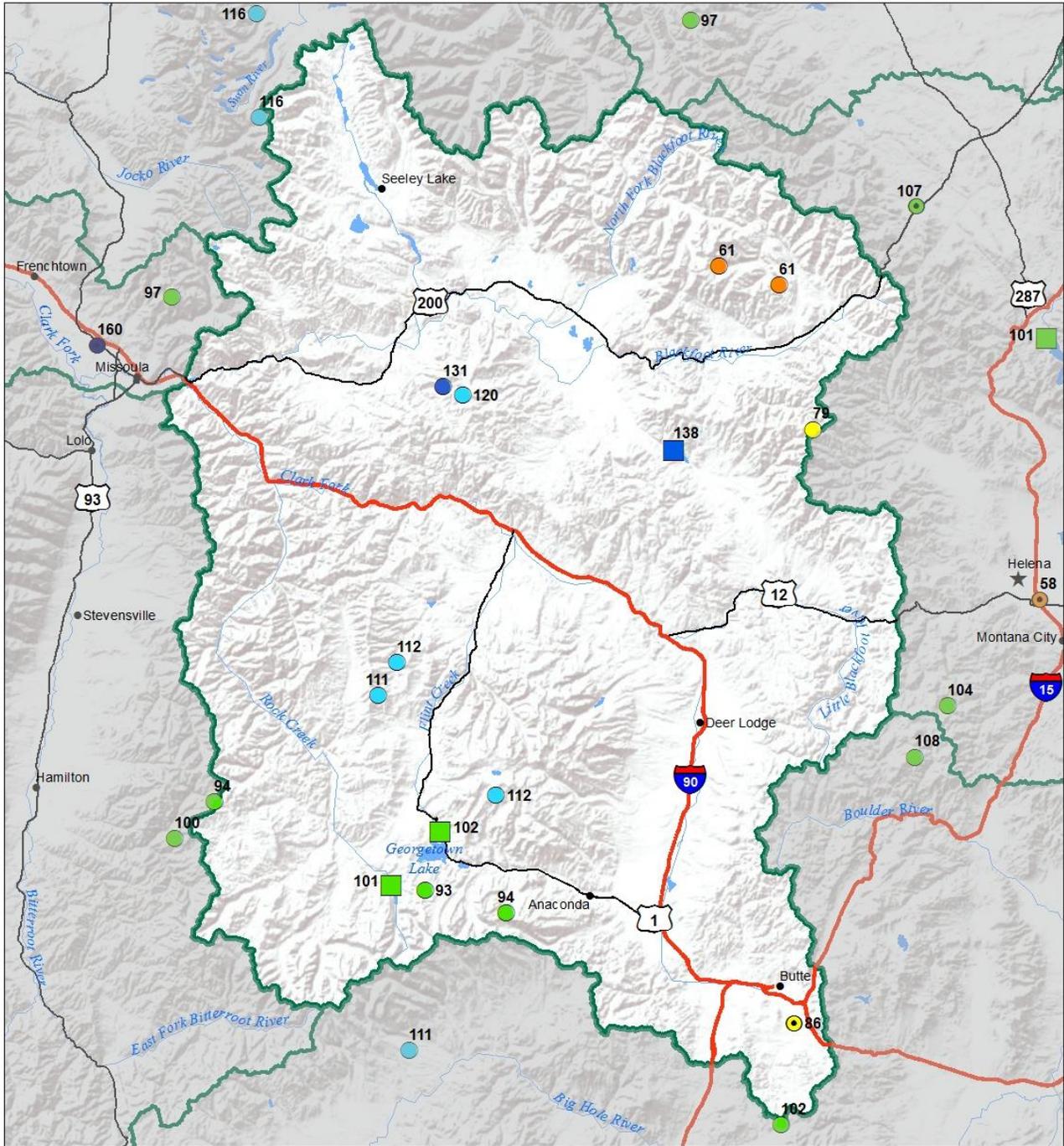
Upper Clark Fork River Basin Snow Water Equivalent Percentage of Normal January 1, 2019



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%	● *	⊕ 91 - 110%	● *
			● *

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

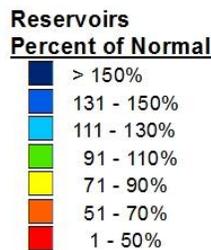
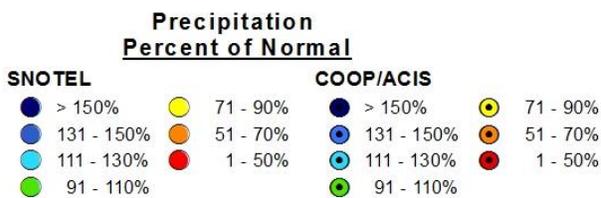
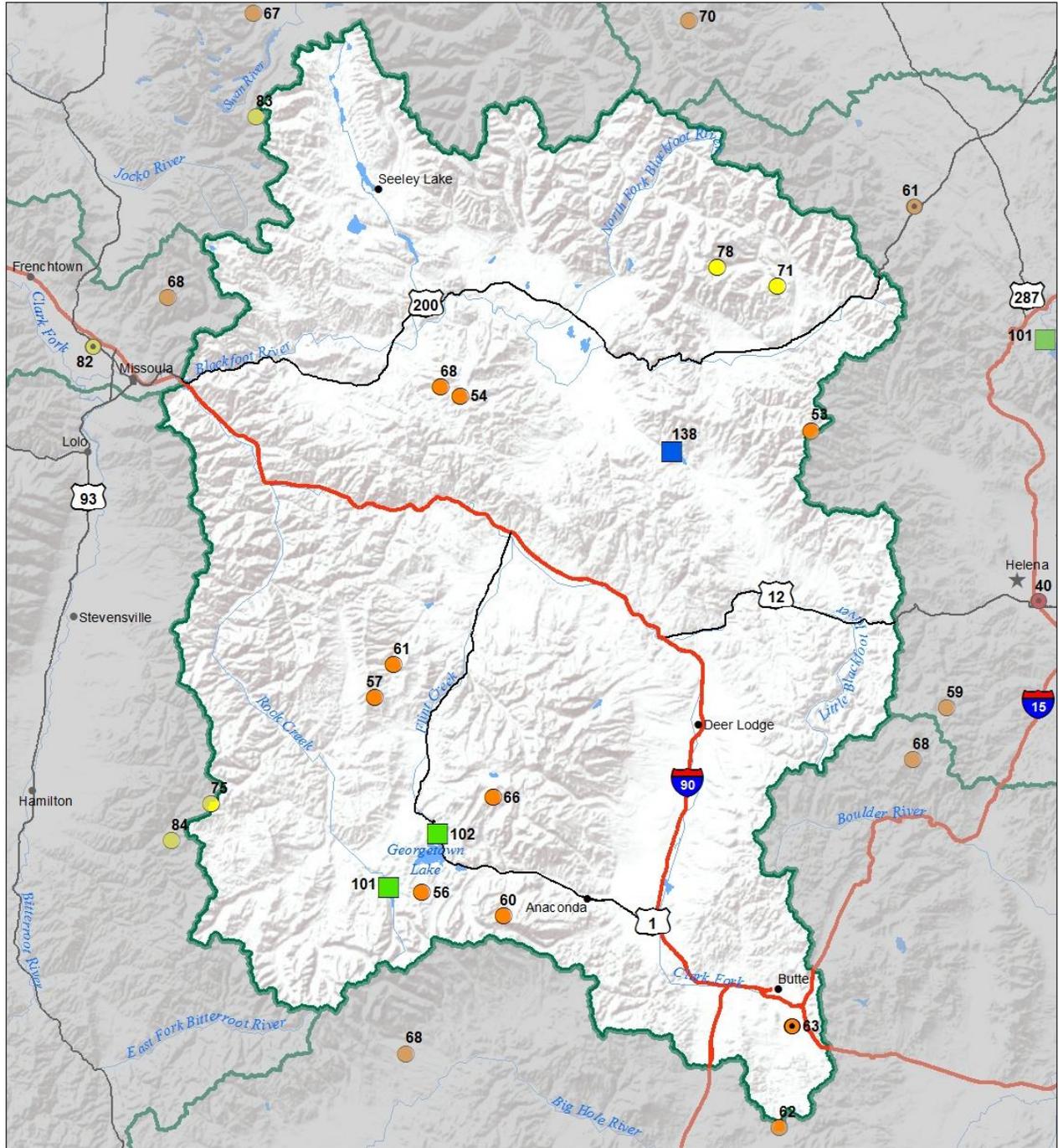


SNOTEL		COOP/ACIS	
● > 150%	● 71 - 90%	● > 150%	● 71 - 90%
● 131 - 150%	● 51 - 70%	● 131 - 150%	● 51 - 70%
● 111 - 130%	● 1 - 50%	● 111 - 130%	● 1 - 50%
● 91 - 110%		● 91 - 110%	

**Reservoirs
Percent of Normal**

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

**Upper Clark Fork River Basin
Monthly Precipitation and Reservoir Levels
Percentage of Normal
January 1, 2019 (December 1, 2018 - January 1, 2019)**



Bitterroot River Basin



The Bitterroot River Basin had a normal start to the water year. The seasonal snowpack started accumulating in early to mid-October at upper elevations. A large early November storm started off this year’s seasonal snowpack at lower elevations. There was a mid-November and early December dry spell which were separated by a relatively large storm around Thanksgiving. This storm delivered about 2 feet of snow to upper elevations on the west side of the valley, but was followed by a quick temperature increase and it rained at elevations up to at least 6400 ft. A mid-to-late December storm also brought significant snow totals to the basin. Overall, December brought below average precipitation to the basin but overall both water year precipitation and the snowpack are at normal/average conditions. The west-side of the basin has been favored so far this winter, while the headwaters near Chief Joseph Pass are lacking the most snow. It’s still too early to tell what spring runoff will entail, but the start to this water year has been optimistic in the Bitterroot River basin. Lake Como is filled to about 150% of normal for January 1st and the Bitterroot River is flowing at above normal conditions.

Bitterroot River Basin Data Summary

<i>Snowpack</i>	Percent of 1981-2010 Normal (Median)	Last Year Percentage of Normal (Median)
<i>WEST FORK BITTERROOT</i>	85%	133%
<i>EAST SIDE BITTERROOT</i>	89%	135%
<i>WEST SIDE BITTERROOT</i>	109%	123%
Basin-Wide Snowpack	100%	126%

<i>Precipitation</i>	Monthly Percentage of Average	WYTD Percentage of 1981-2010 Average*	WYTD Last Year Percentage of Average
Mountain Precipitation	88%	104%	112%
Valley Precipitation	%	%	%
Basin-Wide Precipitation	88%	104%	112%

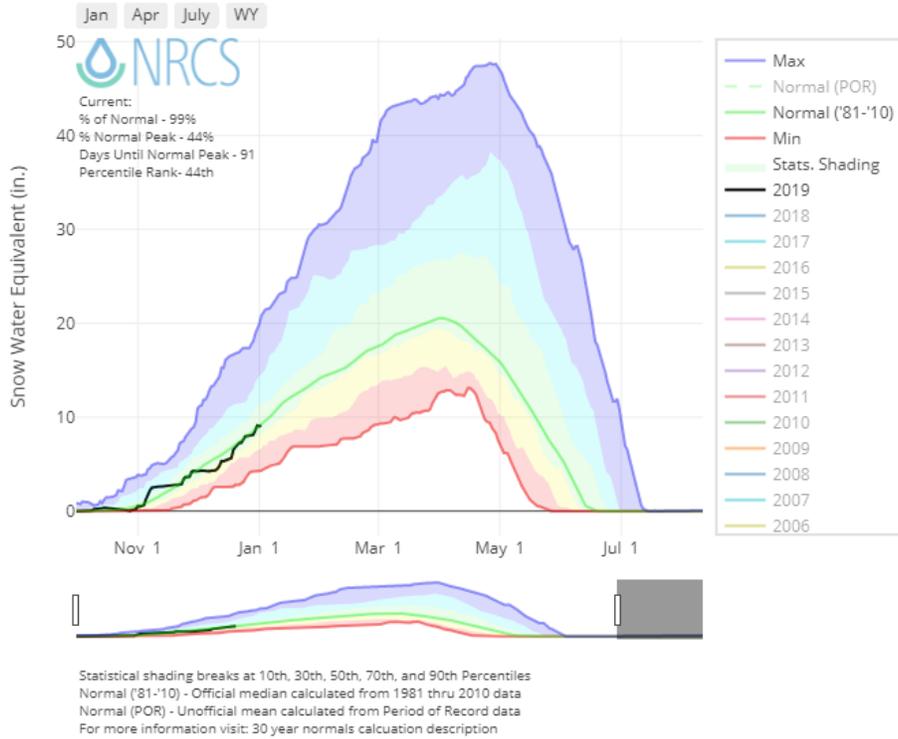
*Water Year-to-Date (WYTD) Precipitation is October 1st - Current

	Percentage of Average	Percentage of Capacity (Total)	Last Year Percentage of Average
Basin-Wide Storage	127%	30%	147%

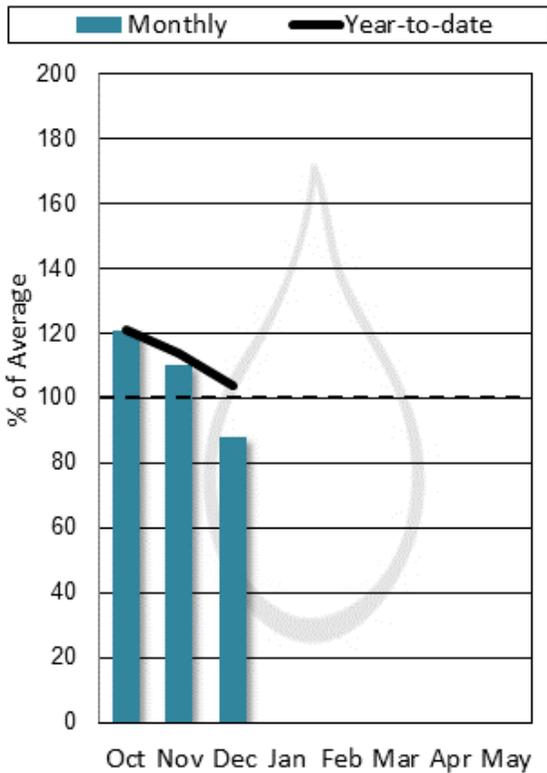
*See Reservoir Storage Table for storage in individual reservoirs

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

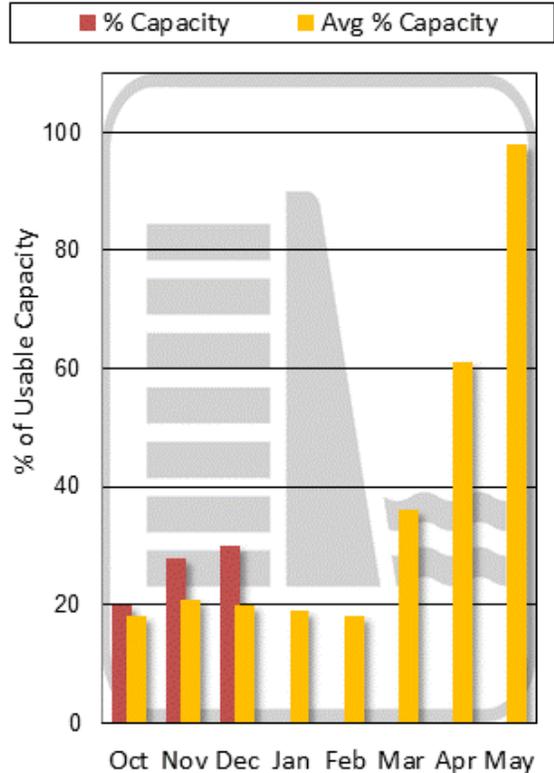
Snow Water Equivalent in BITTERROOT RIVER BASIN



Mountain and Valley
Precipitation

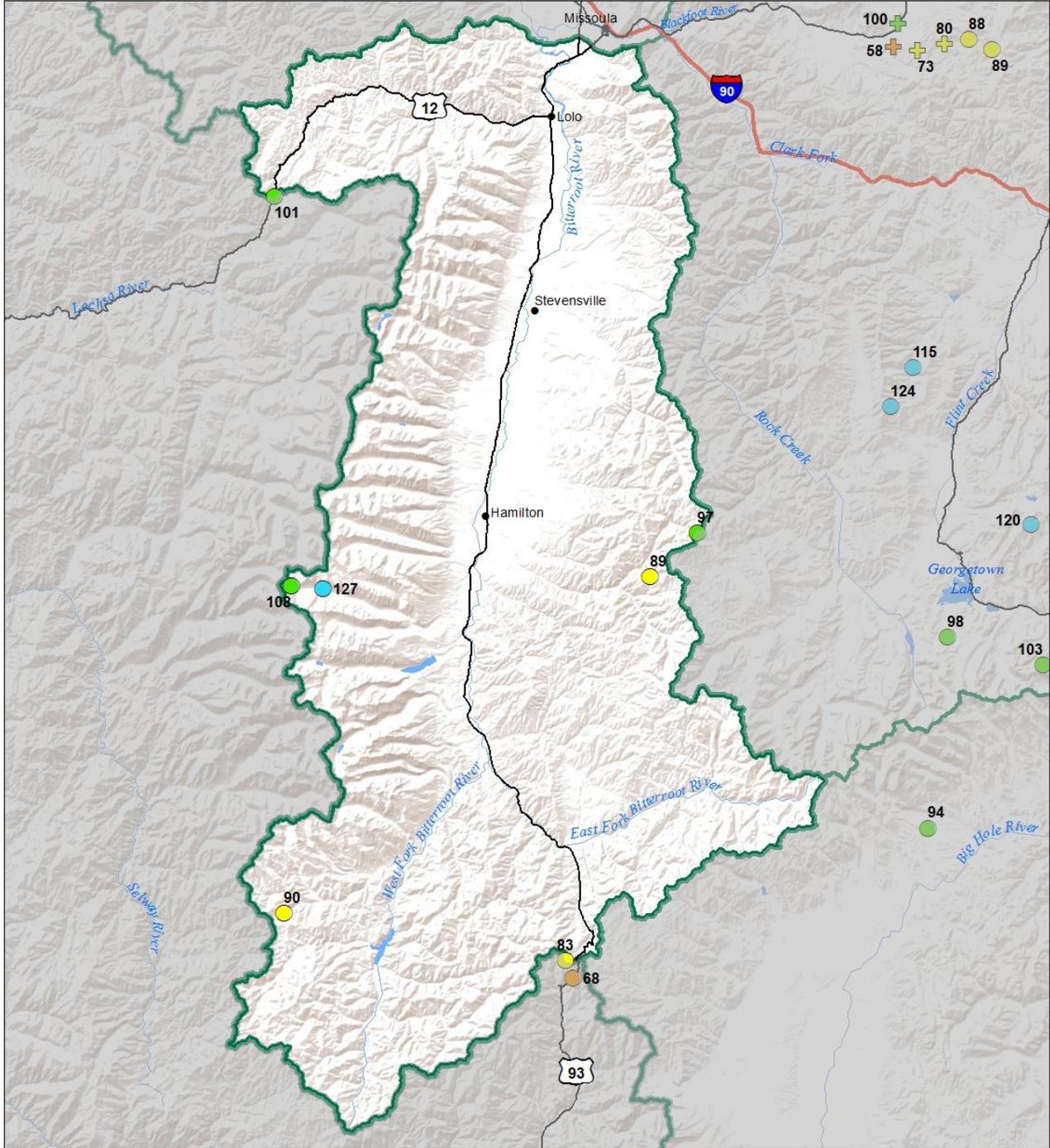


End of Month Reservoir
Storage



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 January 1, 2019



Snow Water Equivalent Percent of Normal

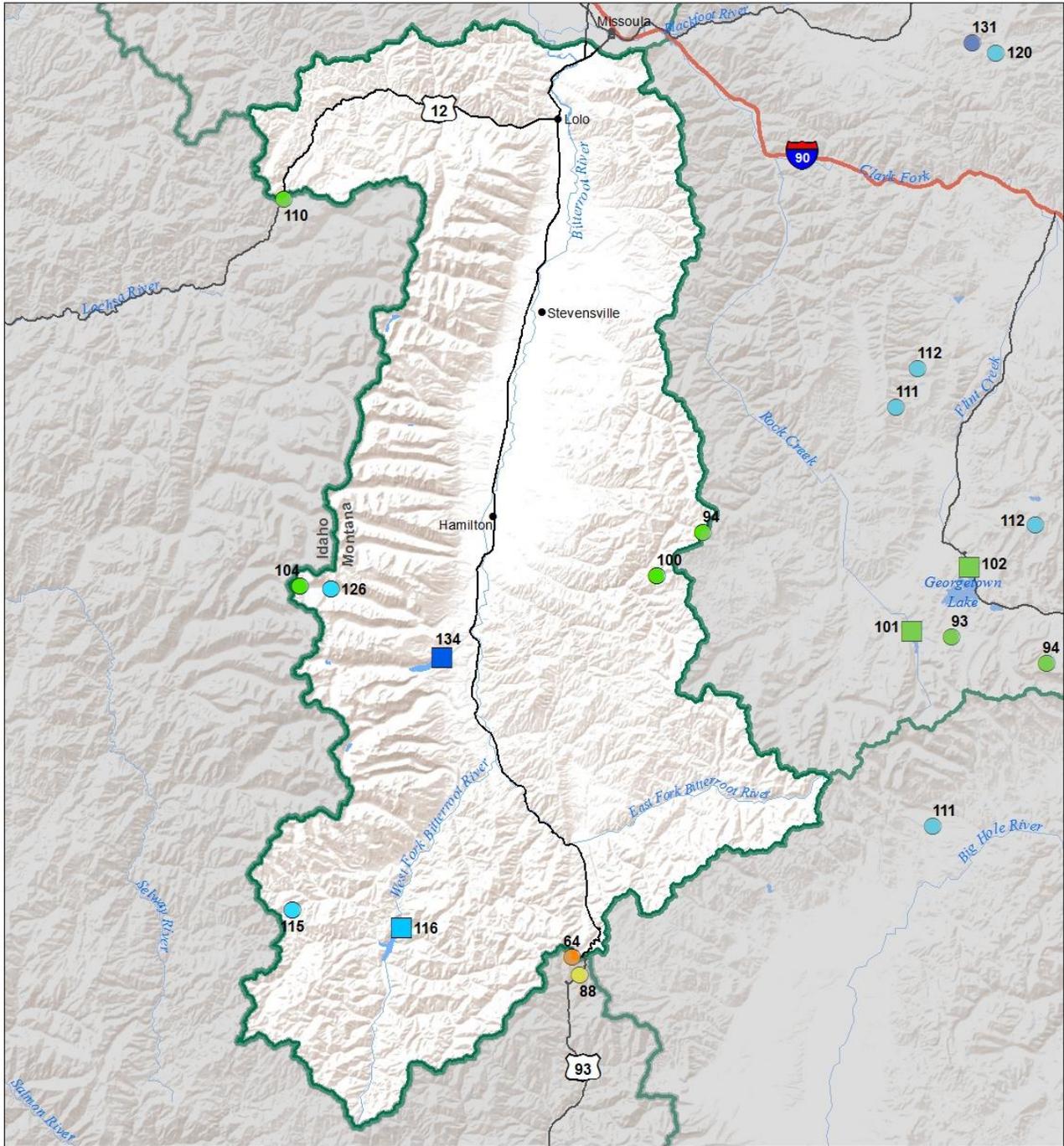
SNOTEL		Snowcourse	
● > 150%	● 71 - 90%	⊕ > 150%	⊕ 71 - 90%
● 131 - 150%	● 51 - 70%	⊕ 131 - 150%	⊕ 51 - 70%
● 111 - 130%	● 1 - 50%	⊕ 111 - 130%	⊕ 1 - 50%
● 91 - 110%	⌘ 0%	⊕ 91 - 110%	⌘ 0%



Bitterroot River Basin

Water Year to Date Precipitation and Reservoir Levels Percentage of Normal

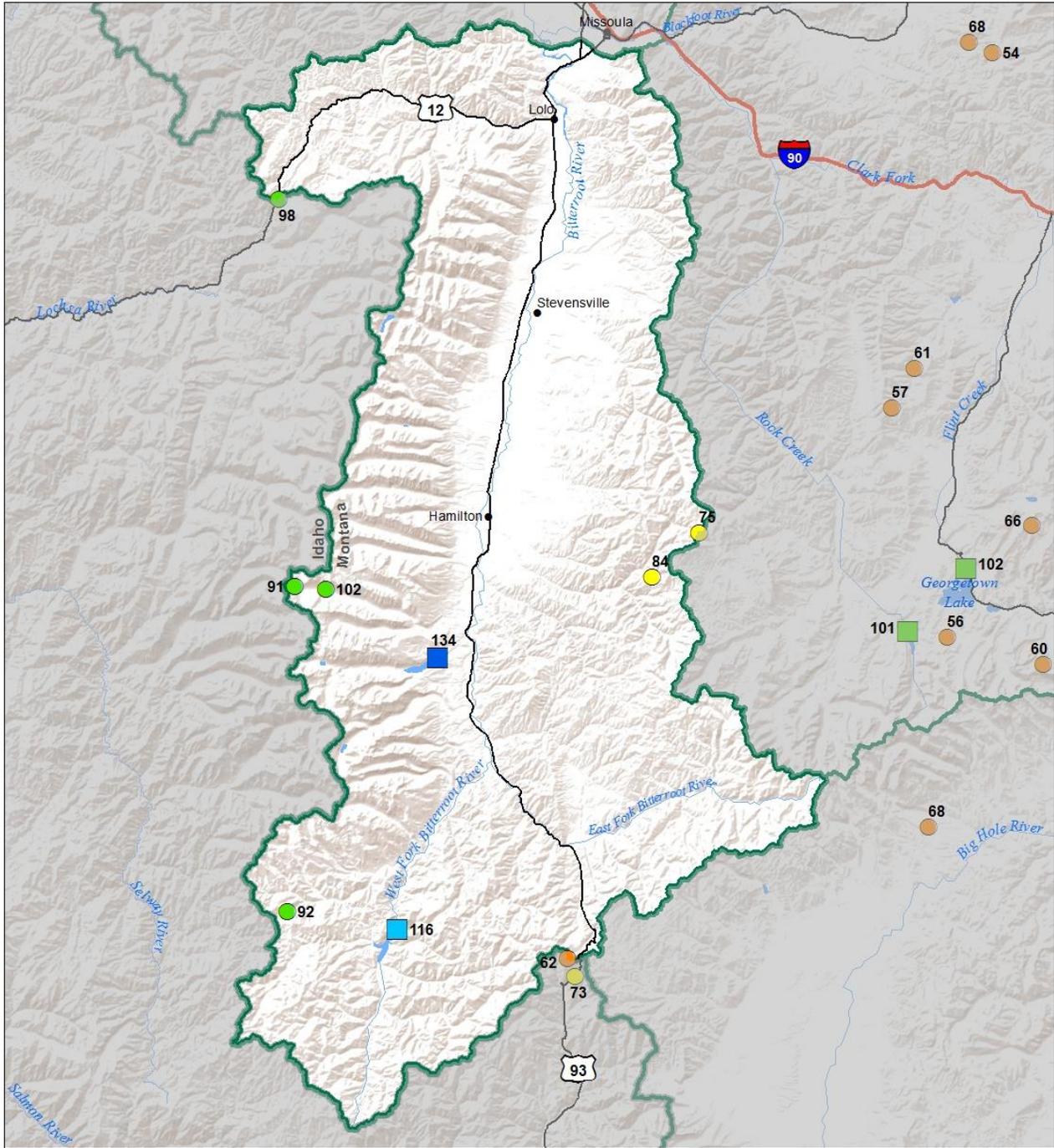
January 1, 2019



Precipitation Percent of Normal	
SNOTEL	COOP/ACIS
● > 150%	● > 150%
● 131 - 150%	● 131 - 150%
● 111 - 130%	● 111 - 130%
● 91 - 110%	● 91 - 110%
● 71 - 90%	● 71 - 90%
● 51 - 70%	● 51 - 70%
● 1 - 50%	● 1 - 50%

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

**Bitterroot River Basin
Monthly Precipitation and Reservoir Levels
Percentage of Normal
January 1, 2019 (December 1, 2018 - January 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%





Lower Clark Fork River Basin

The Lower Clark Fork River basin had a positive start this water year. October brought slightly above average precipitation. The seasonal snowpack started right on time, which is in mid-October at upper elevations and early November at low mountain elevations. An early November storm brought over a foot of snow to higher elevation SNOTEL sites like [Stuart Mountain](#) (7400 ft) and 3-4 inches to lower elevations. Following this storm, the basin had an above normal snowpack. However, mid-November through mid-December brought below average precipitation and percentages dropped slightly. Late December brought more precipitation, making holiday travels difficult, including heavy delays and closures on I-90 at Lookout Pass. This storm system brought 10 inches of snow to [Lookout SNOTEL](#) over the last week and a half of December. This winter is still young, and the basin is currently only slightly below average in terms of both water year precipitation and snowpack. Additionally, we are following a previous water year that brought well above average of moisture. Streamflow's are currently near normal in the Lower Clark Fork River basin and Noxon Reservoir is filled at its average level for January 1st.

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%	94%
Basin-Wide	94%	116%

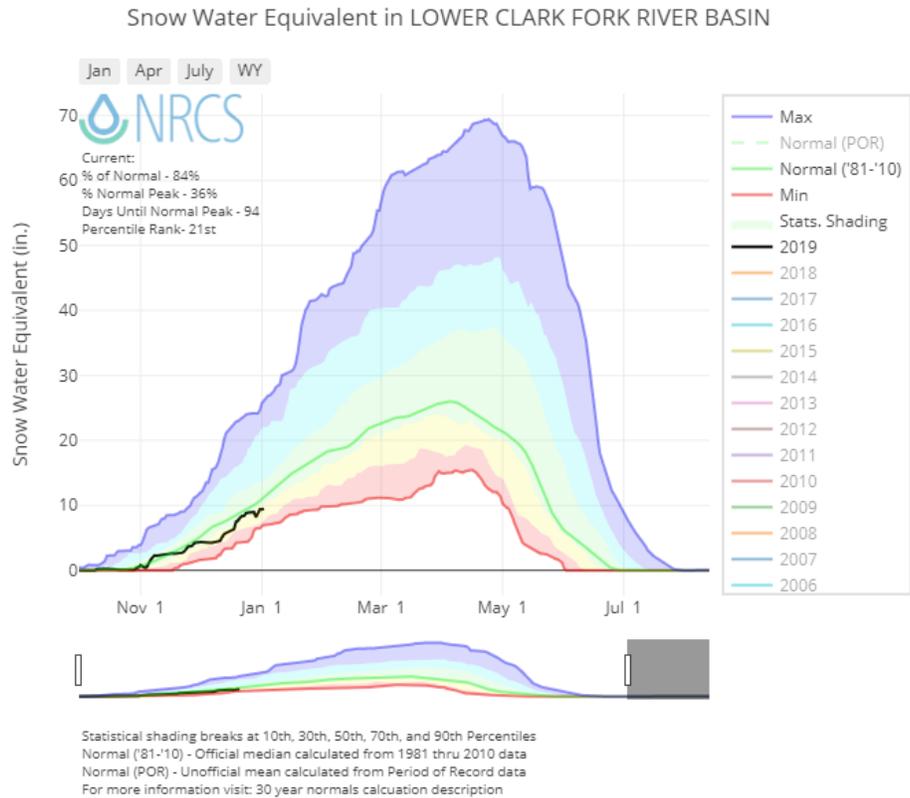
Precipitation	Monthly Percentage of Average	WYTD Percentage of 1981-2010 Average*	WYTD Last Year Percentage of Average
Mountain Precipitation	86%	96%	117%
Valley Precipitation	82%	160%	130%
Basin-Wide Precipitation	86%	97%	117%

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

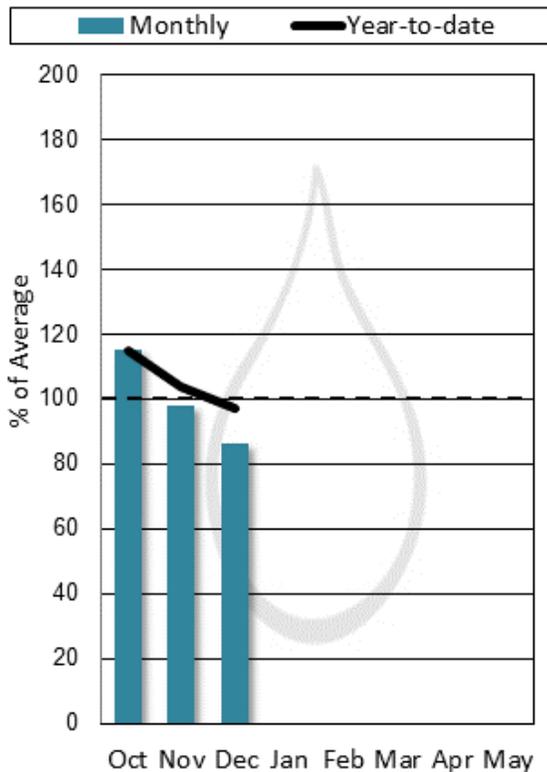
Reservoir Storage	Percentage of Average	Percentage of Capacity (Total)	Last Year Percentage of Average
Basin-Wide Storage	99%	94%	99%

*See Reservoir Storage Table for storage in individual reservoirs

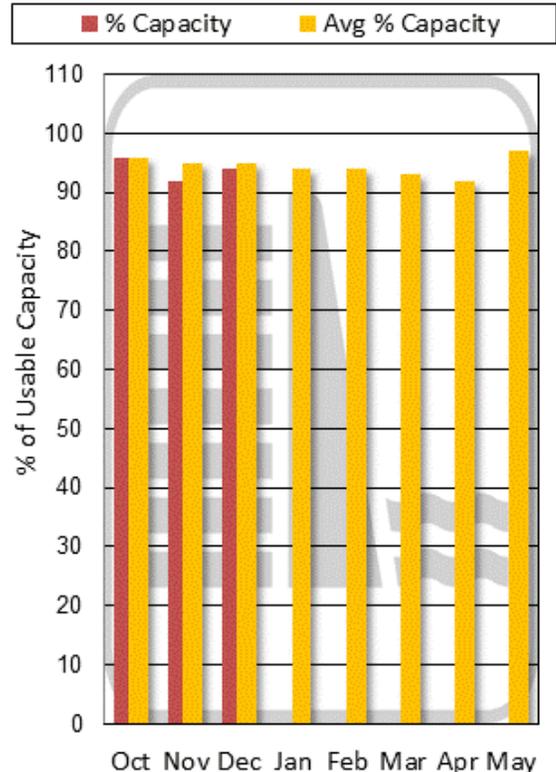
(click on chart below to navigate to [online version](#) with additional features)



Mountain and Valley Precipitation

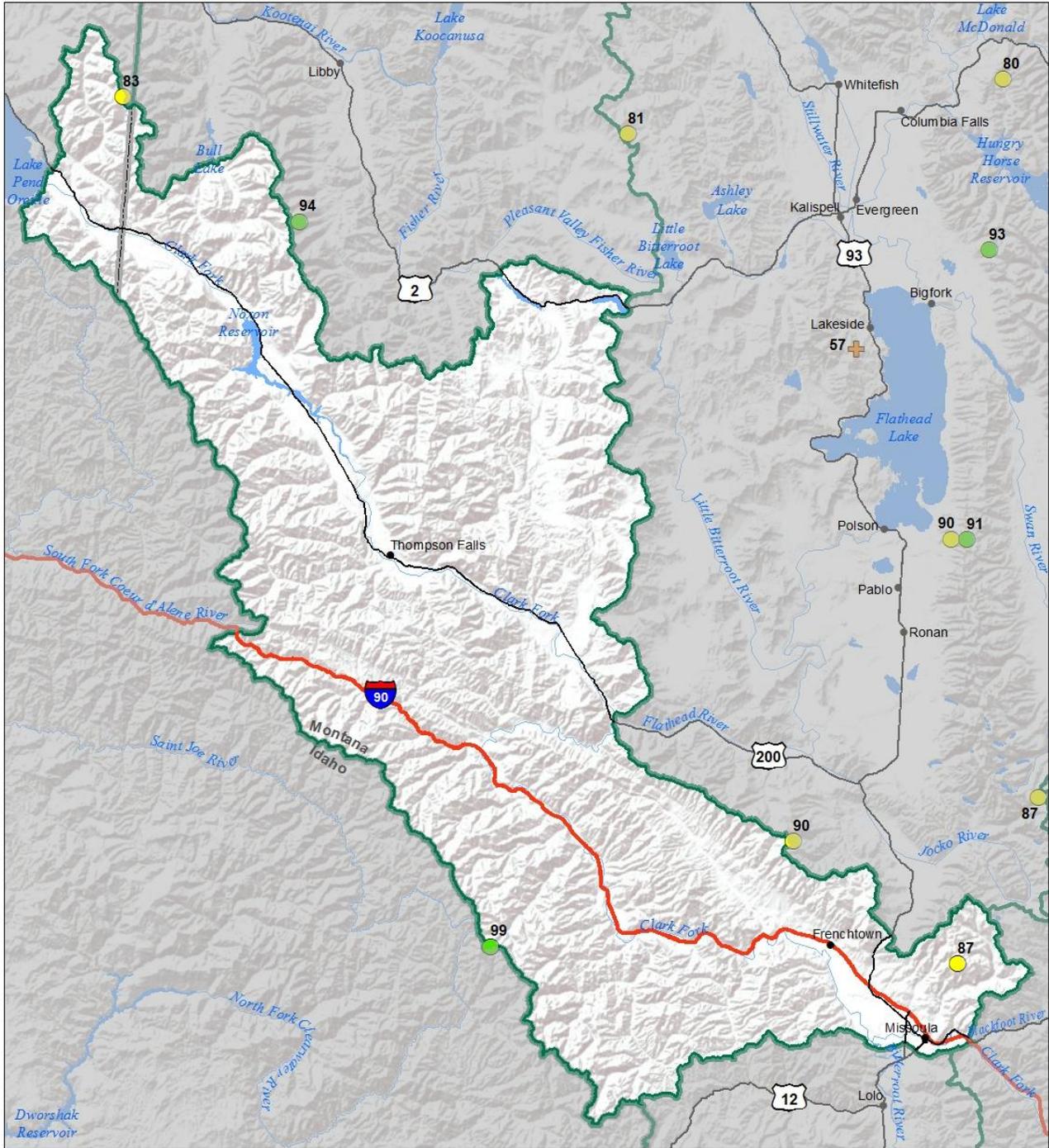


End of Month Reservoir Storage



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

Lower Clark Fork River Basin Snow Water Equivalent Percentage of Normal January 1, 2019

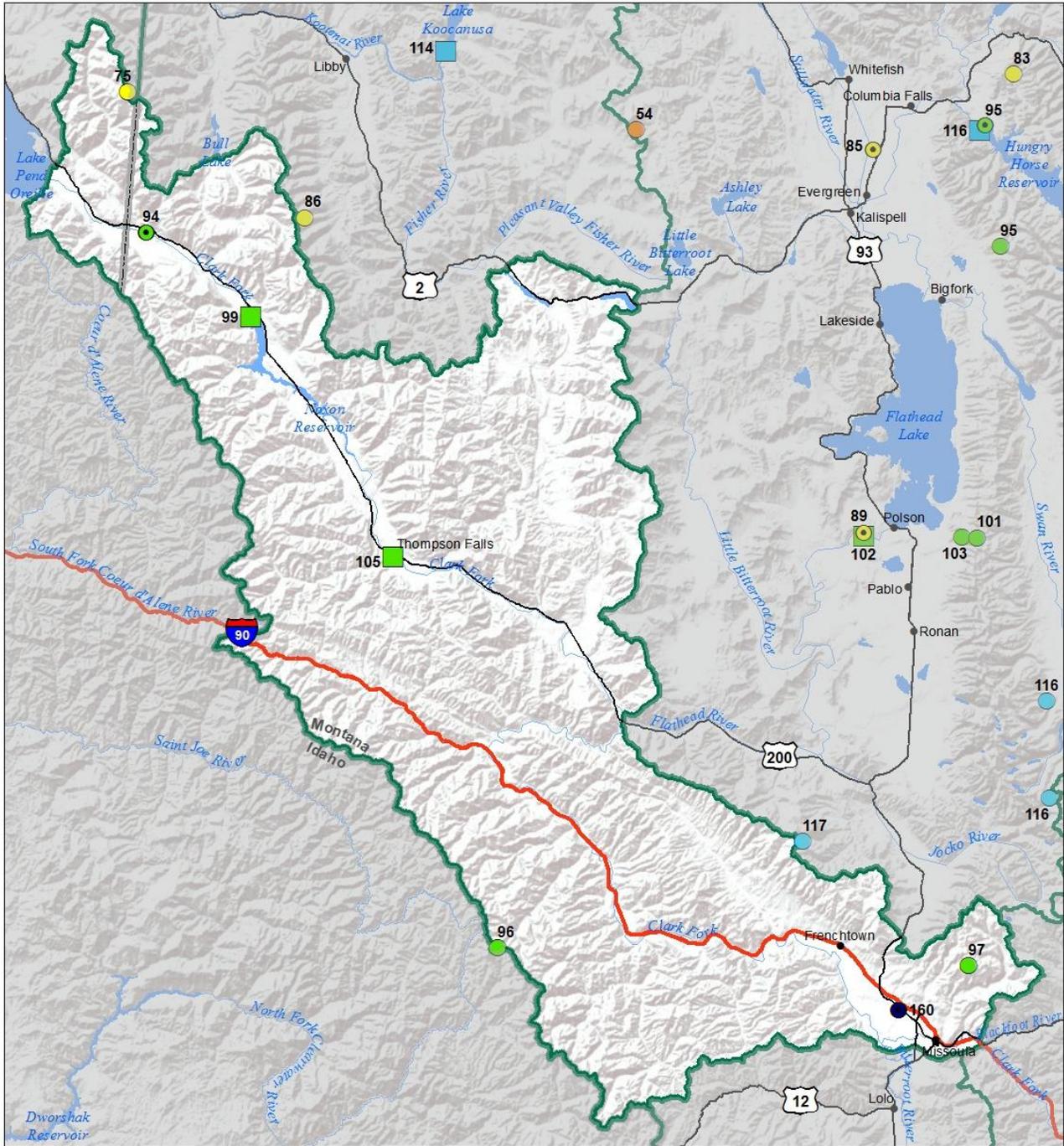


Snow Water Equivalent Percent of Normal

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%	● *	⊕ 91 - 110%	⊕ *



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

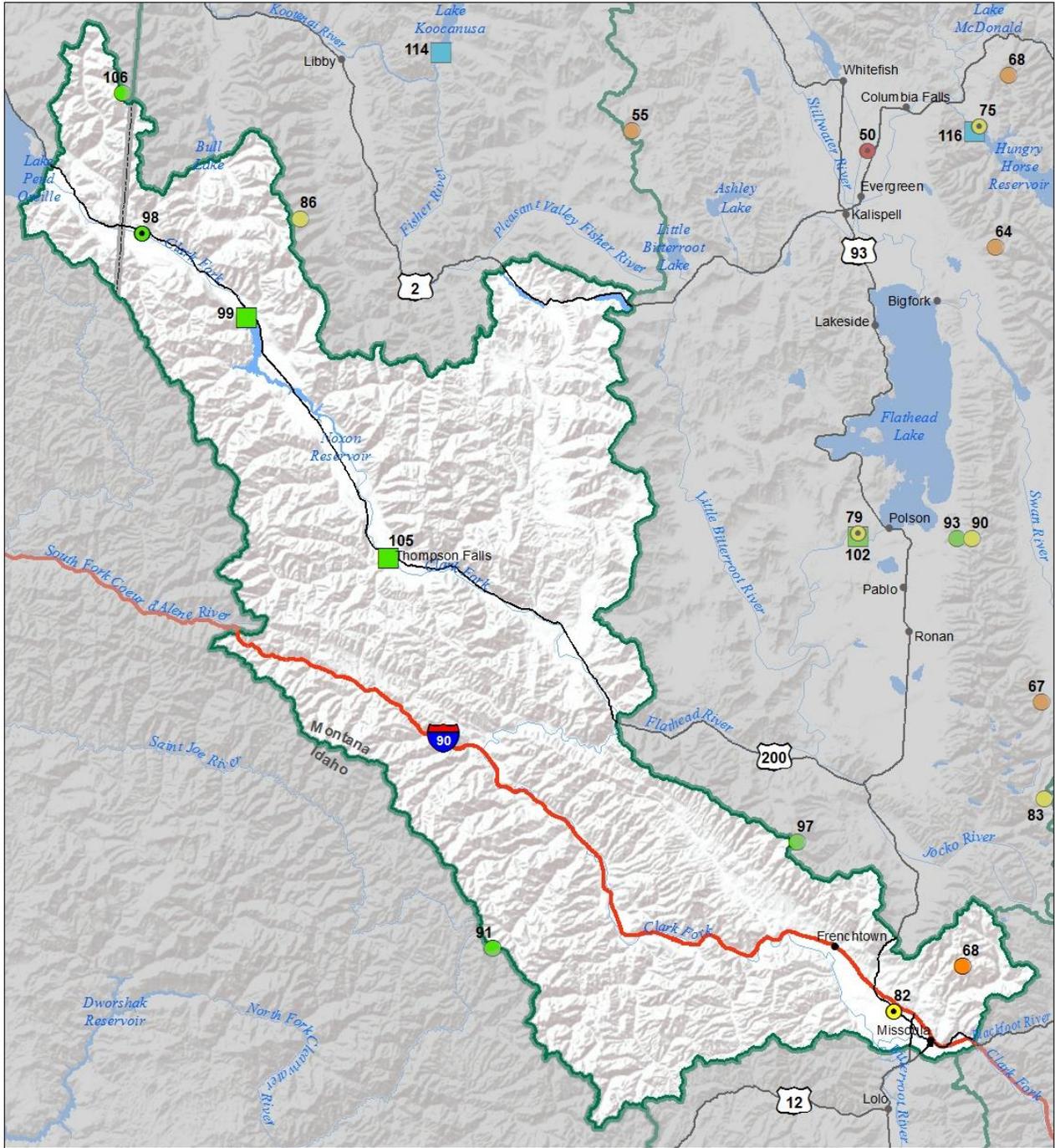


SNOTEL		COOP/ACIS	
● > 150%	● 71 - 90%	● > 150%	● 71 - 90%
● 131 - 150%	● 51 - 70%	● 131 - 150%	● 51 - 70%
● 111 - 130%	● 1 - 50%	● 111 - 130%	● 1 - 50%
● 91 - 110%		● 91 - 110%	

**Reservoirs
Percent of Normal**

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

**Lower Clark Fork River Basin
Monthly Precipitation and Reservoir Levels
Percentage of Normal
January 1, 2019 (December 1, 2018 - January 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



The Jefferson River basin is off to a slower start than last winter with 86% of normal snowpack currently accumulated in the basin. Last year at this time, basin-wide snowpack accumulated consistently in November and December (134% of normal snowpack) and continued strong throughout the winter but melted off quickly in May with above average temperatures statewide. Currently, the Big Hole holds the best snowpack in the region at 91% of normal while the Red Rock is only at 70% of normal. Most of the sites in region did not sustain snowpack until mid-October with the Tobacco Roots holding the deepest snow. Reservoir storage is currently 137% of average as reservoir managers have carried over last years above average snowpack, which could pay dividends this year. [NOAA's three month outlook forecast](#) suggests above average temperatures and average precipitation over SW Montana with a moderate El Nino winter probable. It's still early, and with several more months of winter precipitation to come, conditions could change rapidly.

Jefferson River Basin Data Summary

Snowpack	Percent of 1981-2010 Normal (Median)	Last Year Percentage of Normal (Median)
BEAVERHEAD	78%	117%
RUBY	97%	133%
BIGHOLE	86%	148%
BOULDER	94%	174%
Basin-Wide Snowpack	86%	134%

Precipitation	Monthly Percentage of Average	WYTD Year Percentage of 1981-2010 Average*	WYTD Last Year Percentage of Average
Mountain Precipitation	62%	92%	103%
Valley Precipitation	%	%	%
Basin-Wide Precipitation	62%	92%	103%

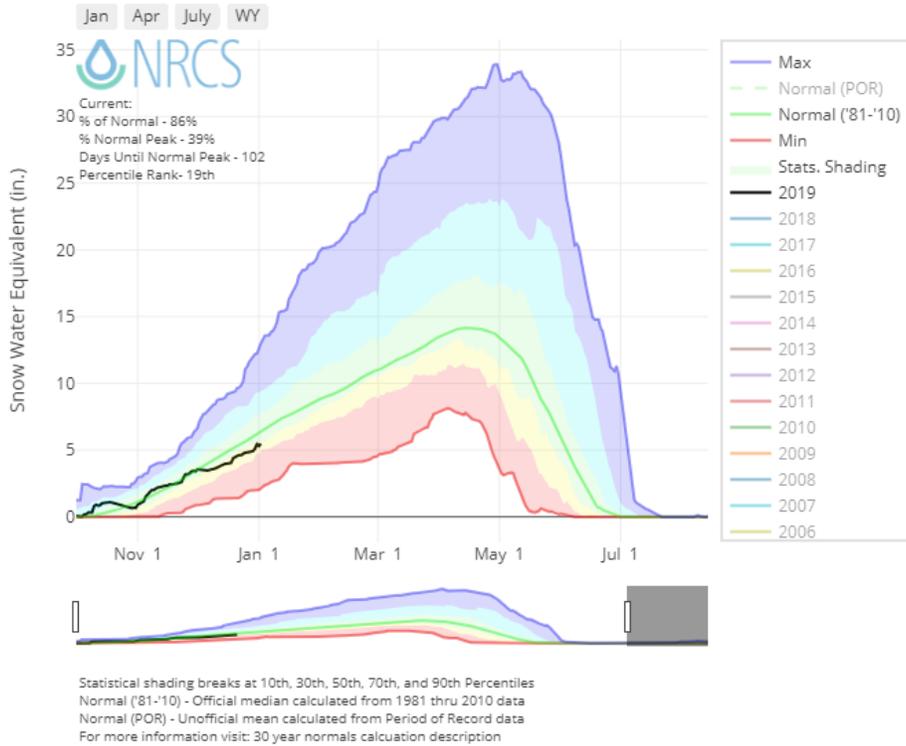
*Water Year-to-Date (WYTD) Precipitation is October 1st - Current

Reservoir Storage	Percentage of Average	Percentage of Capacity (Total)	Last Year Percentage of Average
Basin-Wide Storage	134%	58%	128%

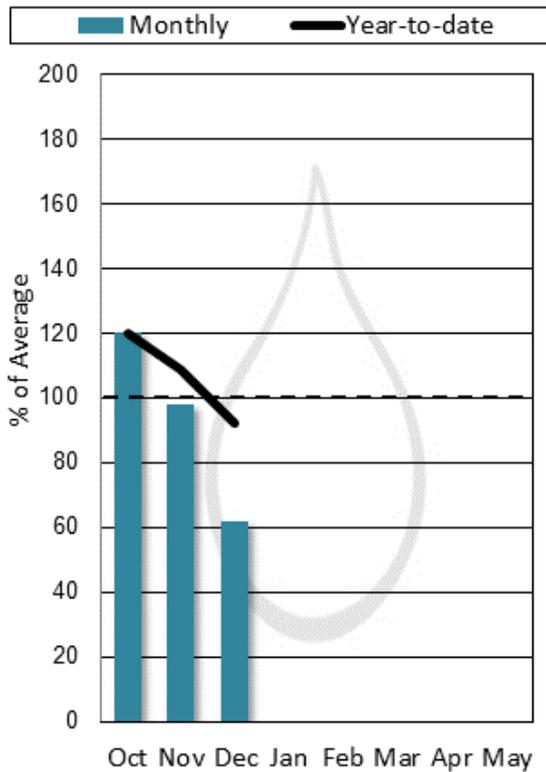
*See Reservoir Storage Table for storage in individual reservoirs

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

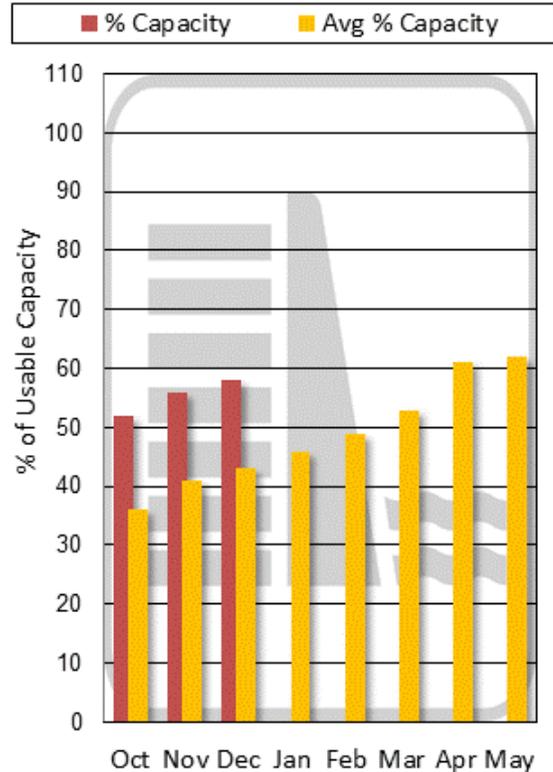
Snow Water Equivalent in JEFFERSON RIVER BASIN



Mountain and Valley Precipitation

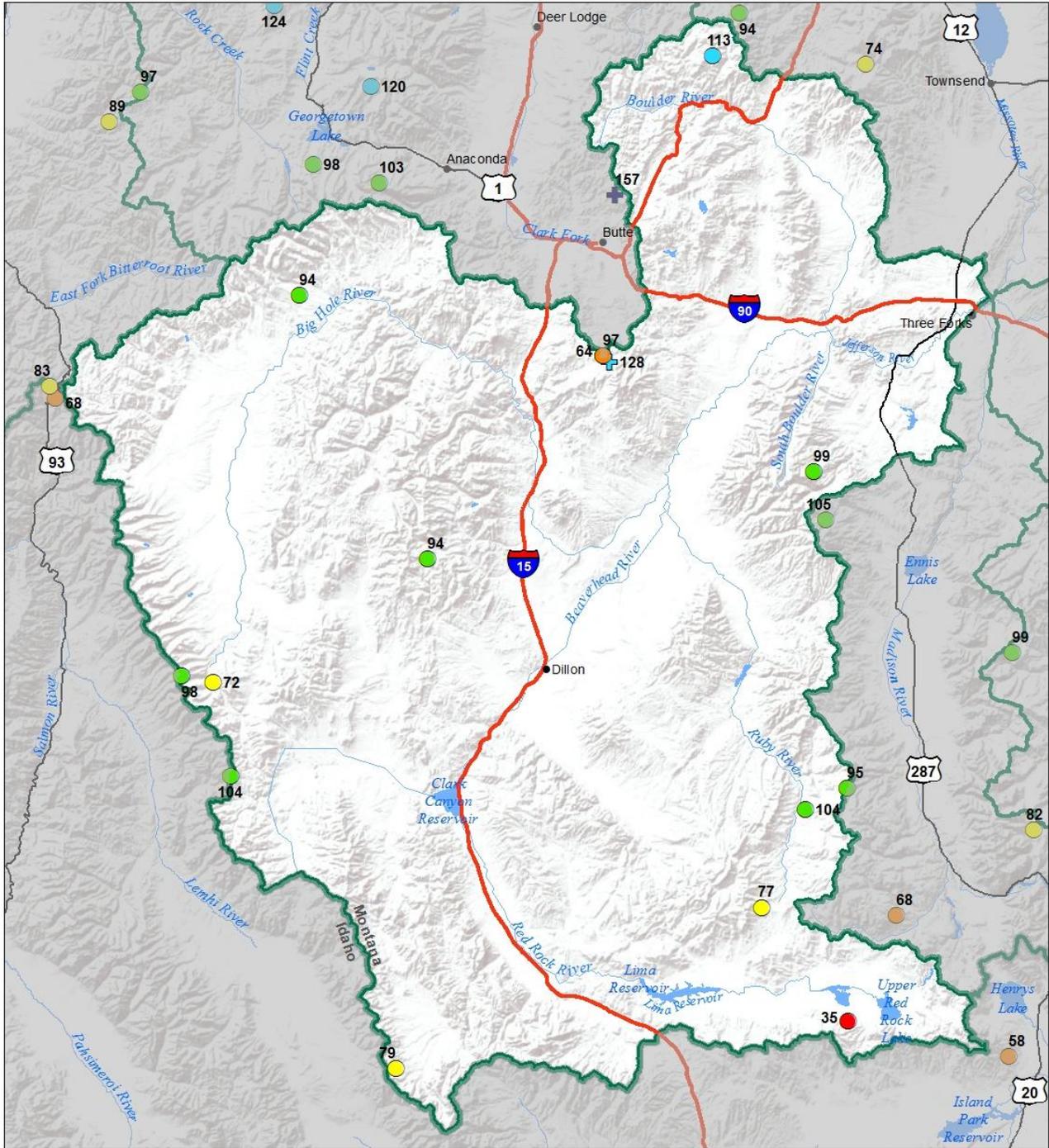


End of Month Reservoir Storage



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

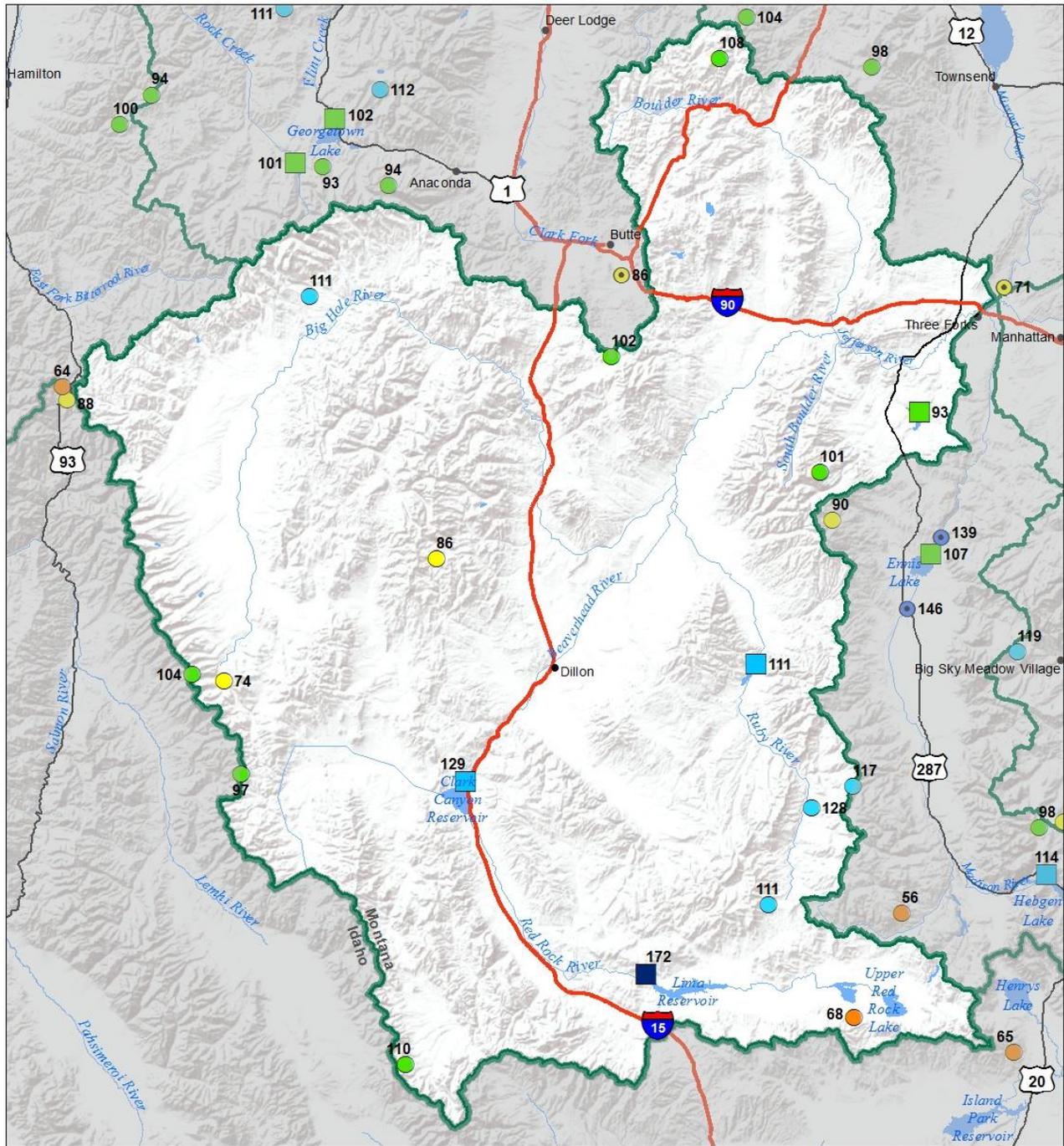
Jefferson River Basin Snow Water Equivalent Percentage of Normal January 1, 2019



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%

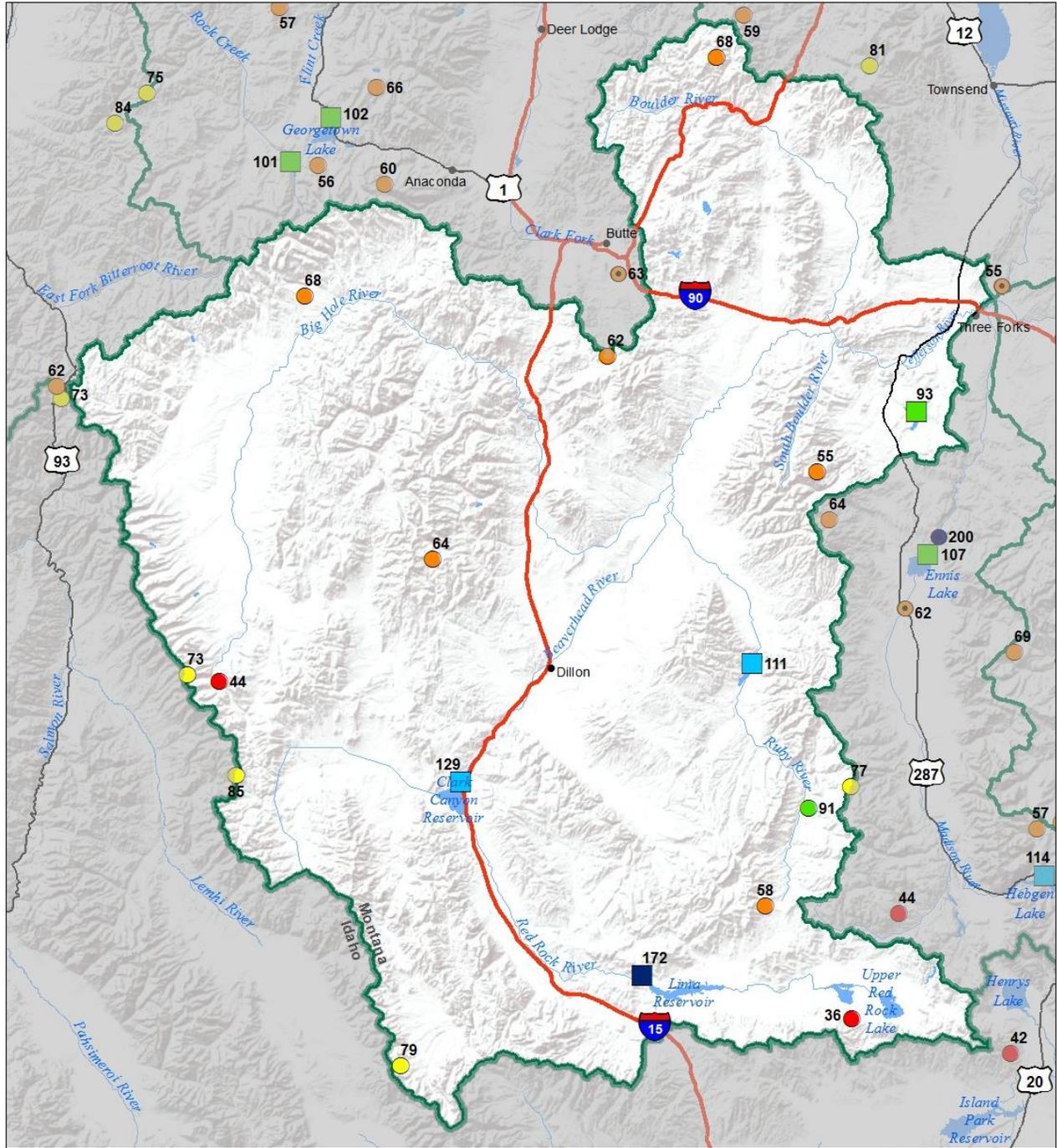
Jefferson River Basin Water Year to Date Precipitation and Reservoir Levels Percentage of Normal January 1, 2019



Precipitation Percent of Normal	
SNOTEL	COOP/ACIS
● > 150%	● > 150%
● 131 - 150%	● 131 - 150%
● 111 - 130%	● 111 - 130%
● 91 - 110%	● 91 - 110%
● 71 - 90%	● 71 - 90%
● 51 - 70%	● 51 - 70%
● 1 - 50%	● 1 - 50%

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

**Jefferson River Basin
Monthly Precipitation and Reservoir Levels
Percentage of Normal
January 1, 2019 (December 1, 2018 - January 1, 2019)**



**Precipitation
Percent of Normal**

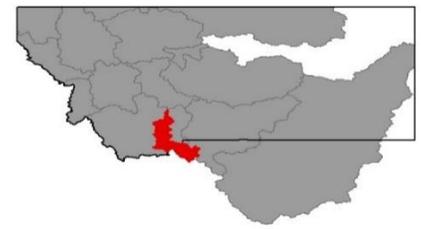
SNOTEL		COOP/ACIS	
● > 150%	● 71 - 90%	● > 150%	● 71 - 90%
● 131 - 150%	● 51 - 70%	● 131 - 150%	● 51 - 70%
● 111 - 130%	● 1 - 50%	● 111 - 130%	● 1 - 50%
● 91 - 110%		● 91 - 110%	

**Reservoirs
Percent of Normal**

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



Madison River Basin



Snowpack in the Madison got off to an early start during the first week of October in the Gravellys and southern Tobacco Roots, which left us scrambling to finish up our summer maintenance on the Clover Meadow SNOTEL site. Clover narrowly escaped being burned to the ground during the [Monument Fire](#) that consumed 6,600 acres to the east of the site. Following this first wave of snow, the region dried up through the end of October, which gave way to three large systems during November and December. These storms stacked up over three feet of settled snow depth in the southern Tobacco Root, Gravelly and Southern Madison Ranges; storms that weren't nearly as effective above Hebgen Lake. These sites are reporting 62% of normal snowpack, much to the dismay of West Yellowstone snowmobilers. In total, the Madison River drainage has received 77% of normal snowpack as of January 1st, in large part due to the snowpack that rests in the Gravellys and southern Madison Range. With a long winter remaining, the story of our upcoming runoff season has yet to unfold.

Madison River Basin Data Summary

Snowpack	Percent of 1981-2010 Normal (Median)	Last Year Percentage of Normal (Median)
MADISON abv HEBGEN LAKE	62%	98%
MADISON blw HEBGEN LAKE	89%	124%
Basin-Wide Snowpack	77%	112%

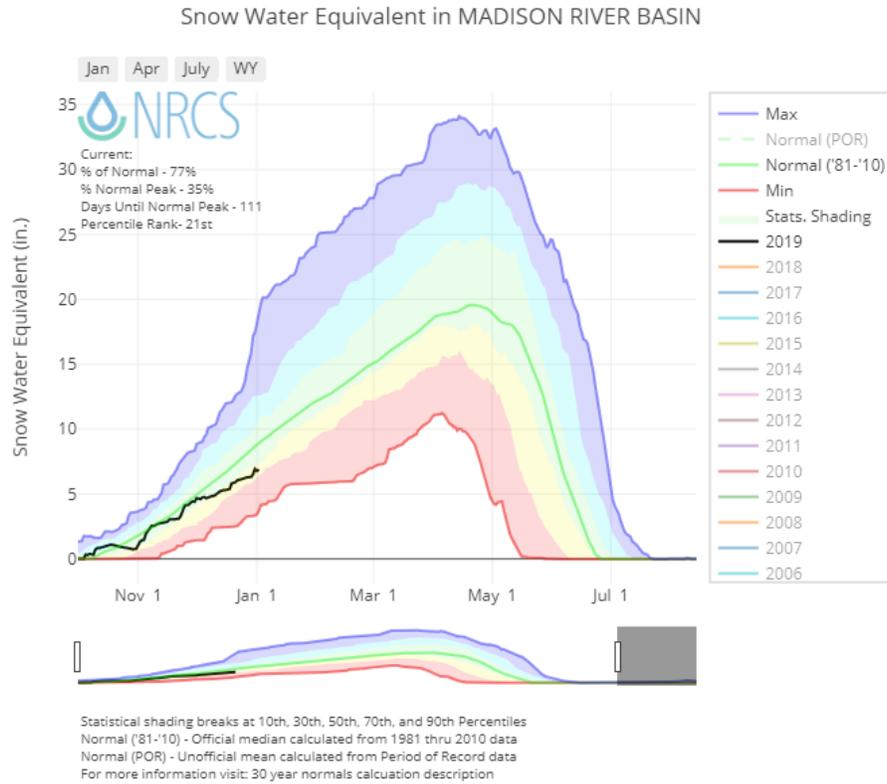
Precipitation	Monthly Percentage of Average	WYTD Percentage of 1981-2010 Average*	WYTD Last Year Percentage of Average
Mountain Precipitation	55%	83%	99%
Valley Precipitation	60%	97%	150%
Basin-Wide Precipitation	55%	84%	104%

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

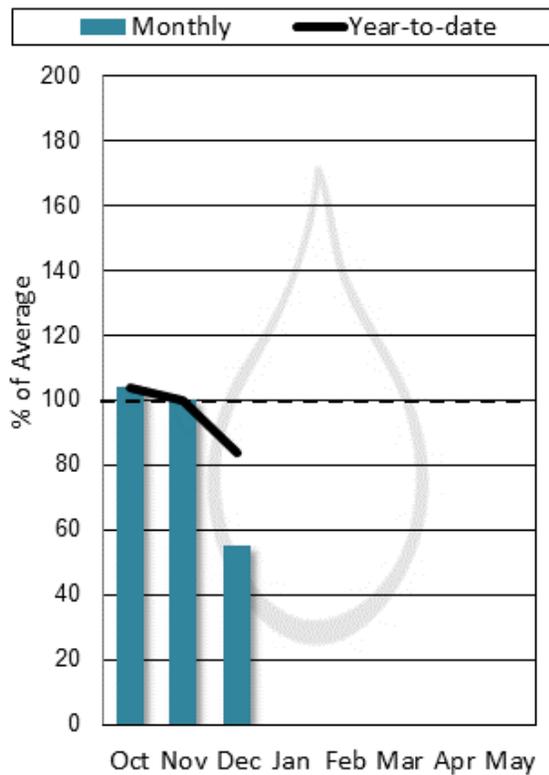
Reservoir Storage	Percentage of Average	Percentage of Capacity (Total)	Last Year Percentage of Average
Basin-Wide Storage	113%	85%	116%

*See Reservoir Storage Table for storage in individual reservoirs

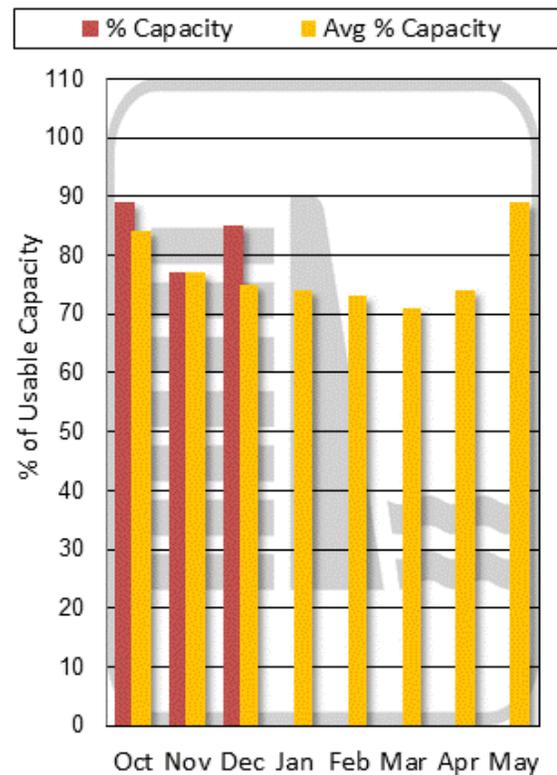
(click on chart below to navigate to [online version](#) with additional features)



Mountain and Valley Precipitation

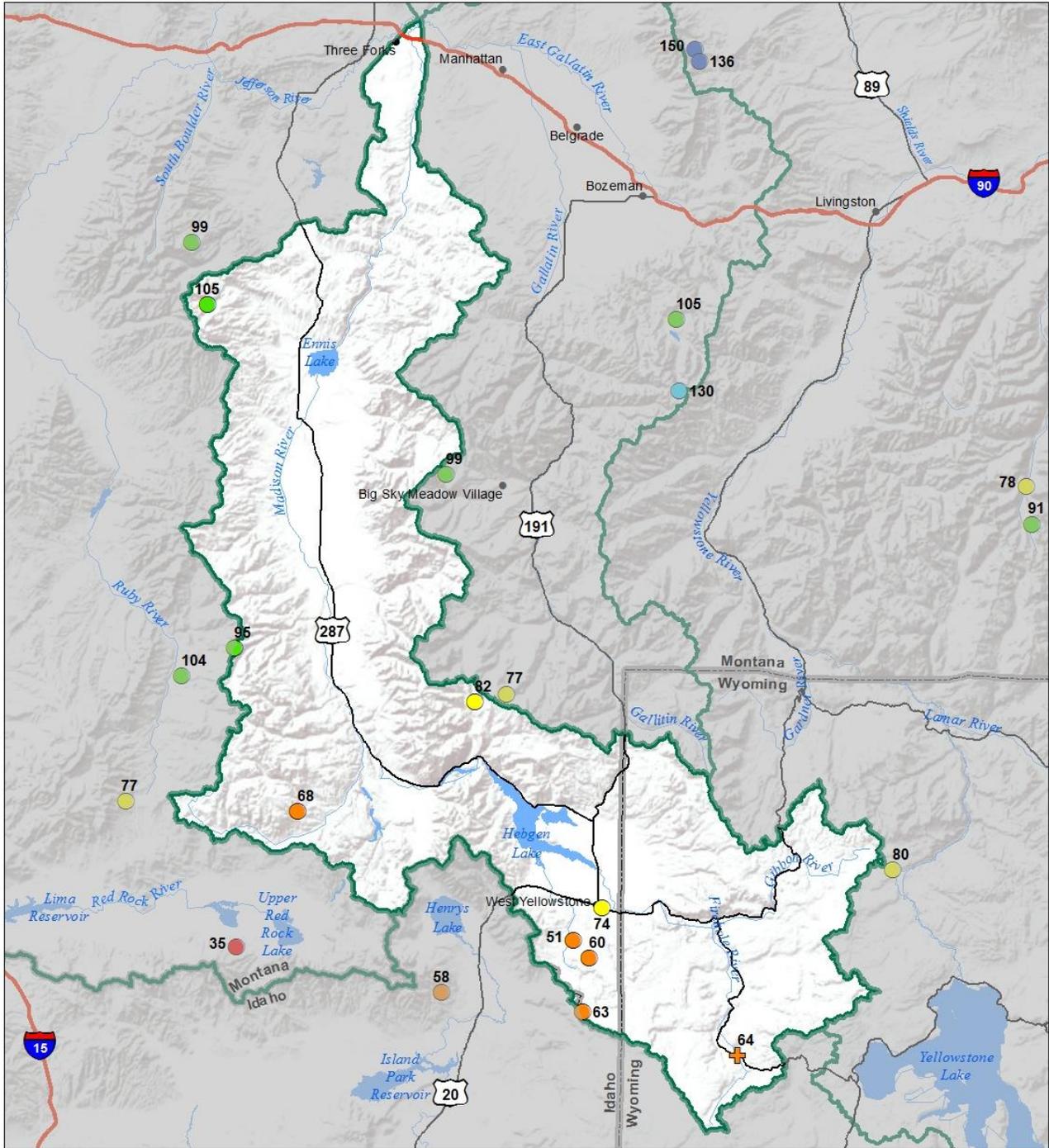


End of Month Reservoir Storage



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

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

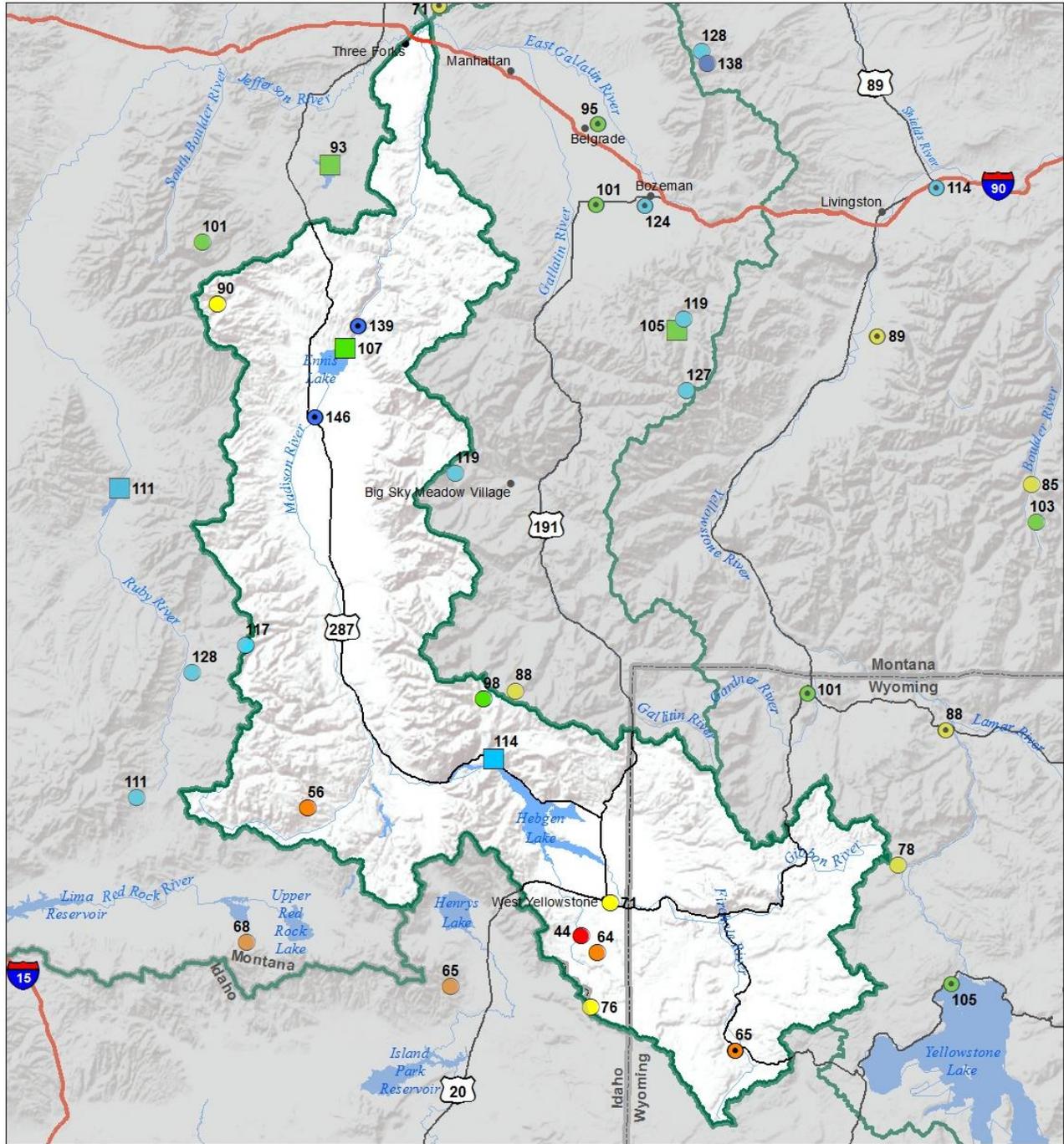


Snow Water Equivalent Percent of Normal

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%



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

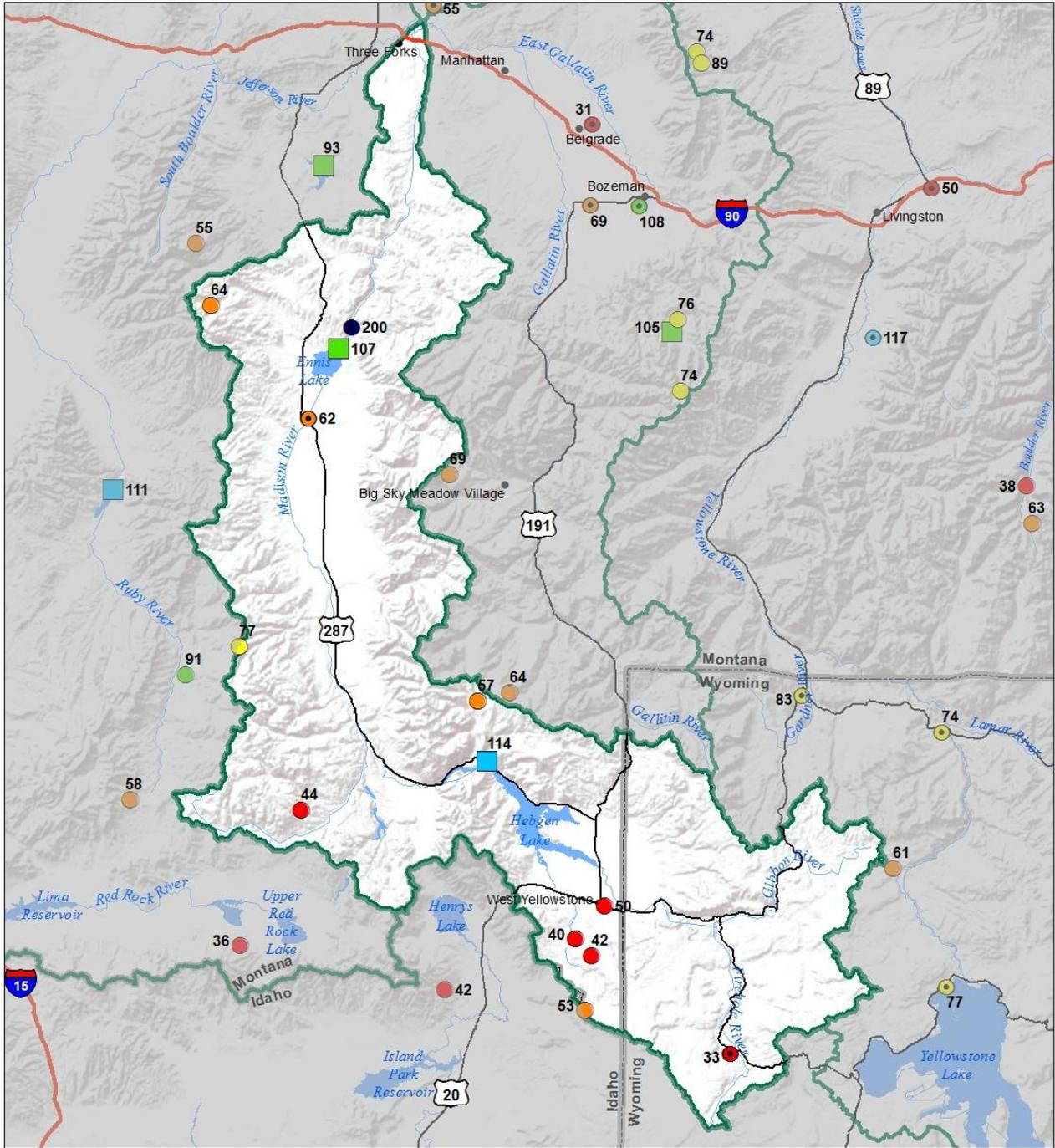


Precipitation Percent of Normal			
SNOTEL		COOP/ACIS	
● > 150%	● 71 - 90%	● > 150%	● 71 - 90%
● 131 - 150%	● 51 - 70%	● 131 - 150%	● 51 - 70%
● 111 - 130%	● 1 - 50%	● 111 - 130%	● 1 - 50%
● 91 - 110%		● 91 - 110%	

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

USDA
National Resource Information System

**Madison River Basin
Monthly Precipitation and Reservoir Levels
Percentage of Normal
January 1, 2019 (December 1, 2018 - January 1, 2019)**



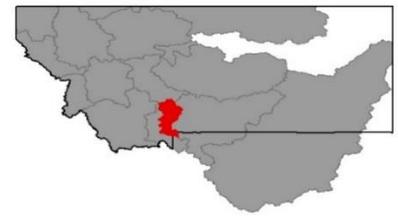
Precipitation Percent of Normal		COOP/ACIS	
SNOTEL		COOP/ACIS	
● > 150%	● 71 - 90%	● > 150%	● 71 - 90%
● 131 - 150%	● 51 - 70%	● 131 - 150%	● 51 - 70%
● 111 - 130%	● 1 - 50%	● 111 - 130%	● 1 - 50%
● 91 - 110%		● 91 - 110%	

**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



The Gallatin River drainage currently leads the state in snowpack at 108% of normal, thanks largely to a late October – early November system that blanketed the area. [Shower Falls SNOTEL](#) in Hyalite received over 30” of snow depth and up to 4.3” of snow water equivalent during this period. The Gallatin and Bridger ranges following this system have slowly but steadily accumulated snow with consistent storms keeping the drainage slightly above normal snowpack. The upper Gallatin isn’t doing as well, at 85% of normal snowpack, while valley precipitation was just 31% of normal for December. Last winter hammered the region with storms, almost setting records at many sites with snowpack nearing 150% of normal in May. This bumper snowpack allowed reservoir managers to carry over storage from last winter, which is money in the bank with a normal snowpack in the mountains above them. For users that aren’t downstream of these reservoirs, 30-40% of our annual average snowpack is already stored in the mountains with several months of winter left, and snow in the forecast. The next four months will paint the picture of springtime runoff and water supply for irrigators and river runners, but there is still a lot of skiing to be had until we have a better picture!

Gallatin River Basin Data Summary

<i>Snowpack</i>	Percent of 1981-2010 Normal (Median)	Last Year Percentage of Normal (Median)
UPPER GALLATIN	85%	124%
HYALITE	122%	155%
BRIDGER	144%	143%
Basin-Wide Snowpack	108%	136%

<i>Precipitation</i>	Monthly Percentage of Average	WYTD Percentage of 1981-2010 Average*	WYTD Last Year Percentage of Average
Mountain Precipitation	71%	116%	120%
Valley Precipitation	31%	95%	124%
Basin-Wide Precipitation	71%	116%	120%

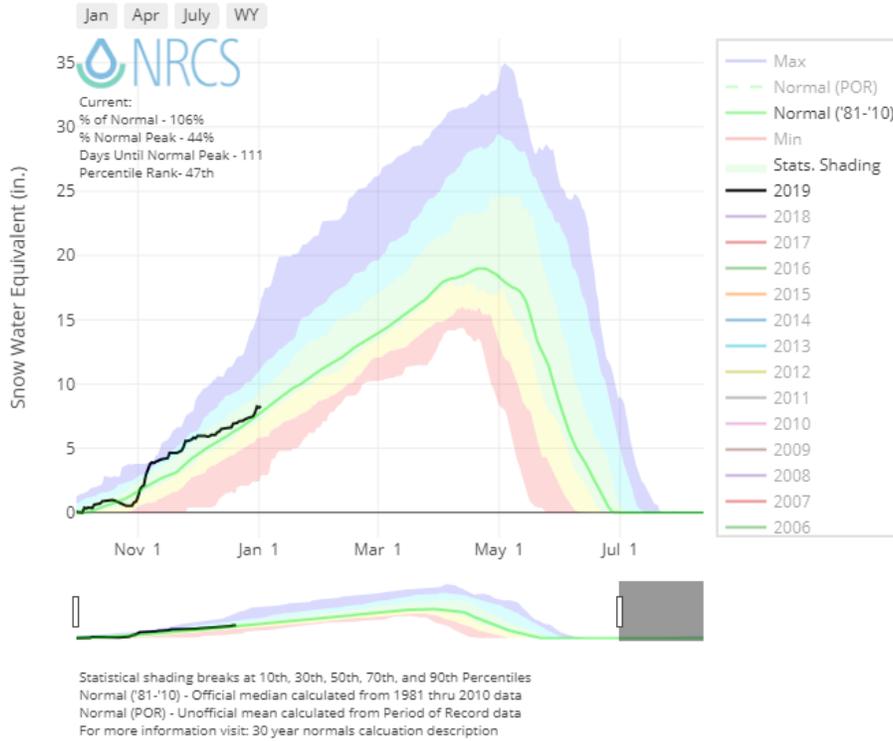
*Water Year-to-Date (WYTD) Precipitation is October 1st - Current

<i>Reservoir Storage</i>	Percentage of Average	Percentage of Capacity (Total)	Last Year Percentage of Average
Basin-Wide Storage	105%	53%	104%

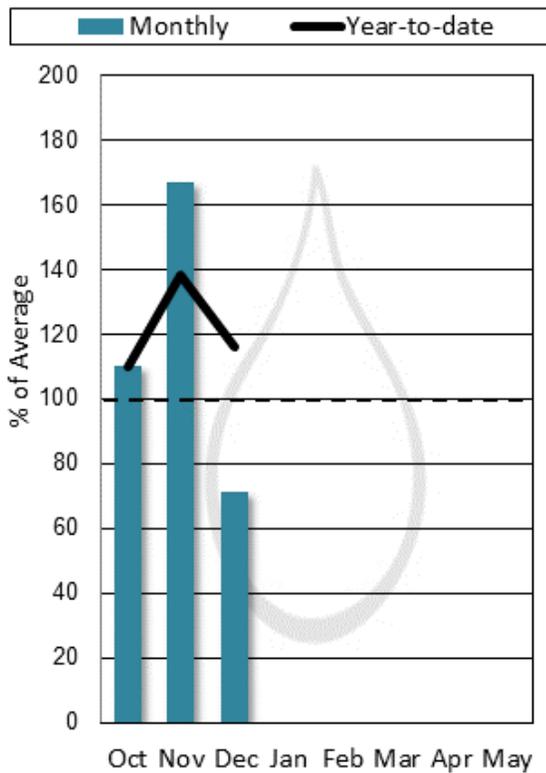
*See Reservoir Storage Table for storage in individual reservoirs

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

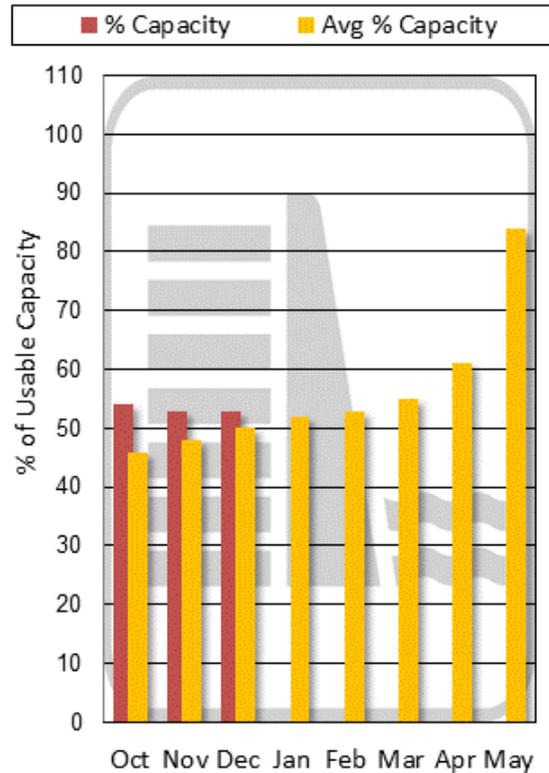
Snow Water Equivalent in GALLATIN RIVER BASIN



Mountain and Valley Precipitation

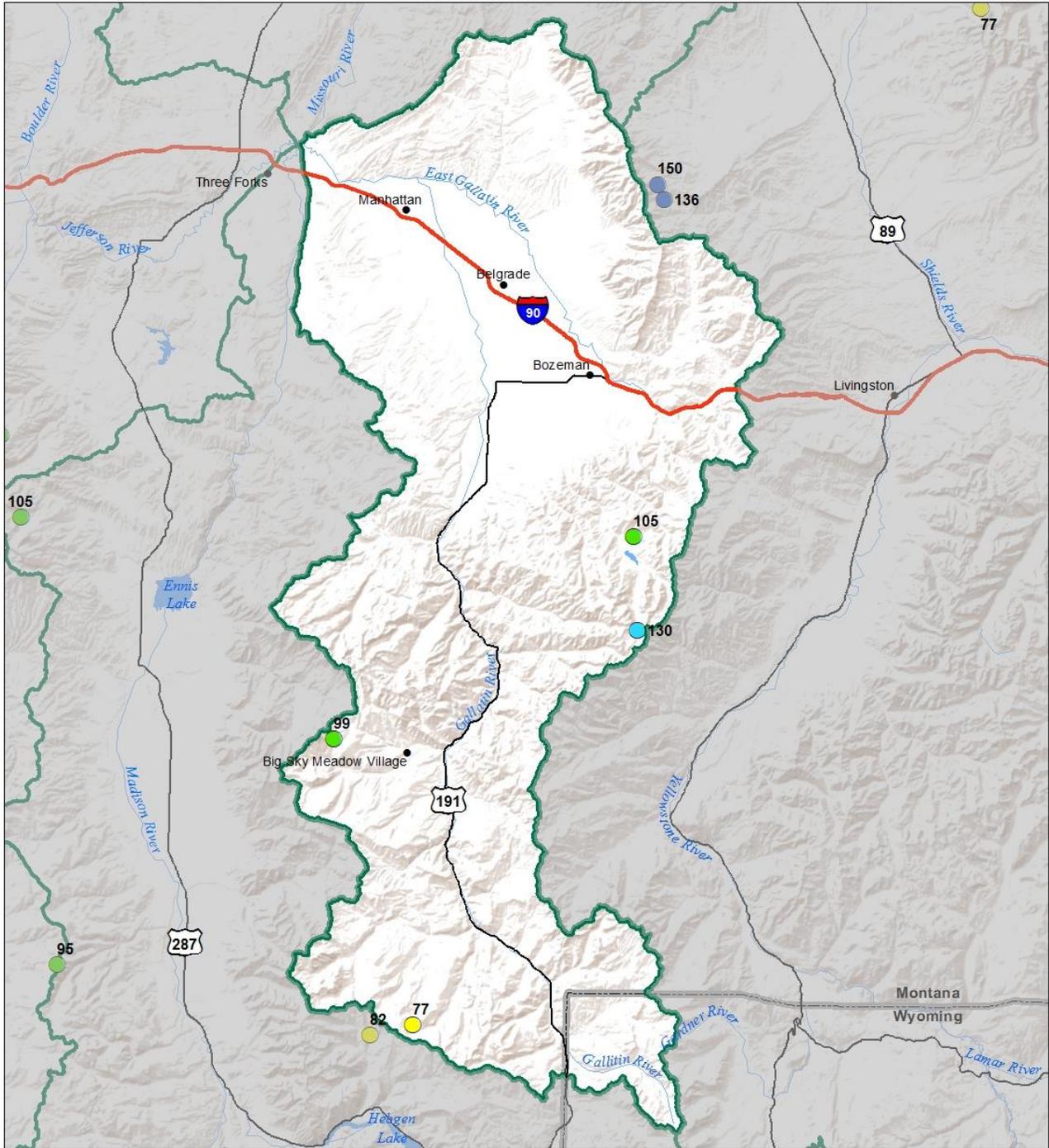


End of Month Reservoir Storage



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 January 1, 2019

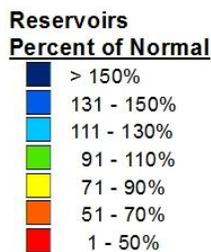
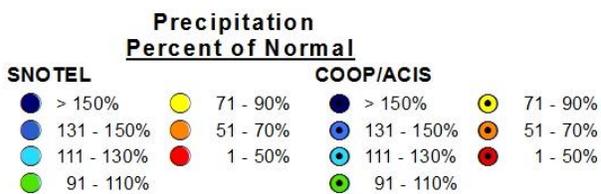
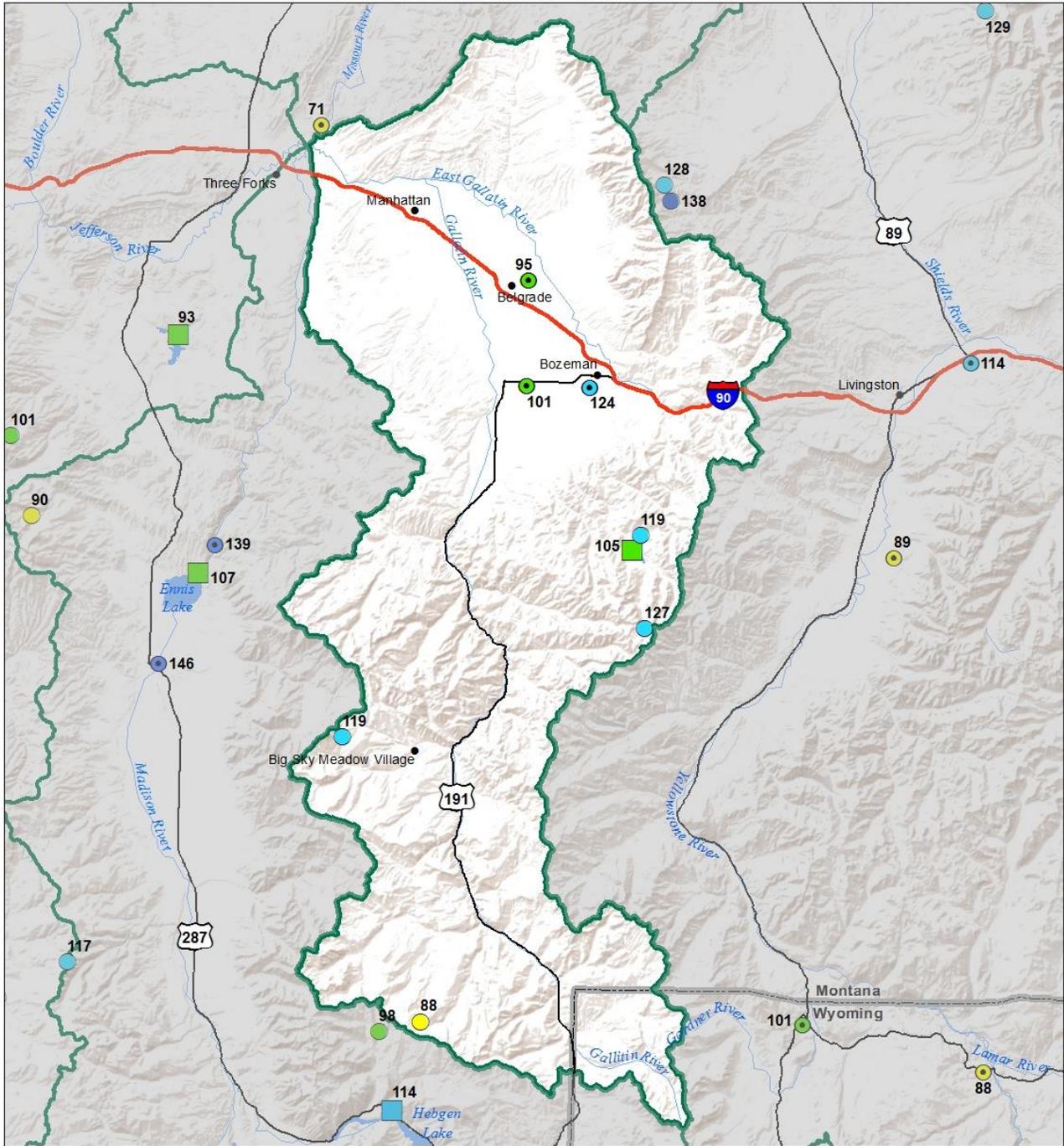


Snow Water Equivalent Percent of Normal

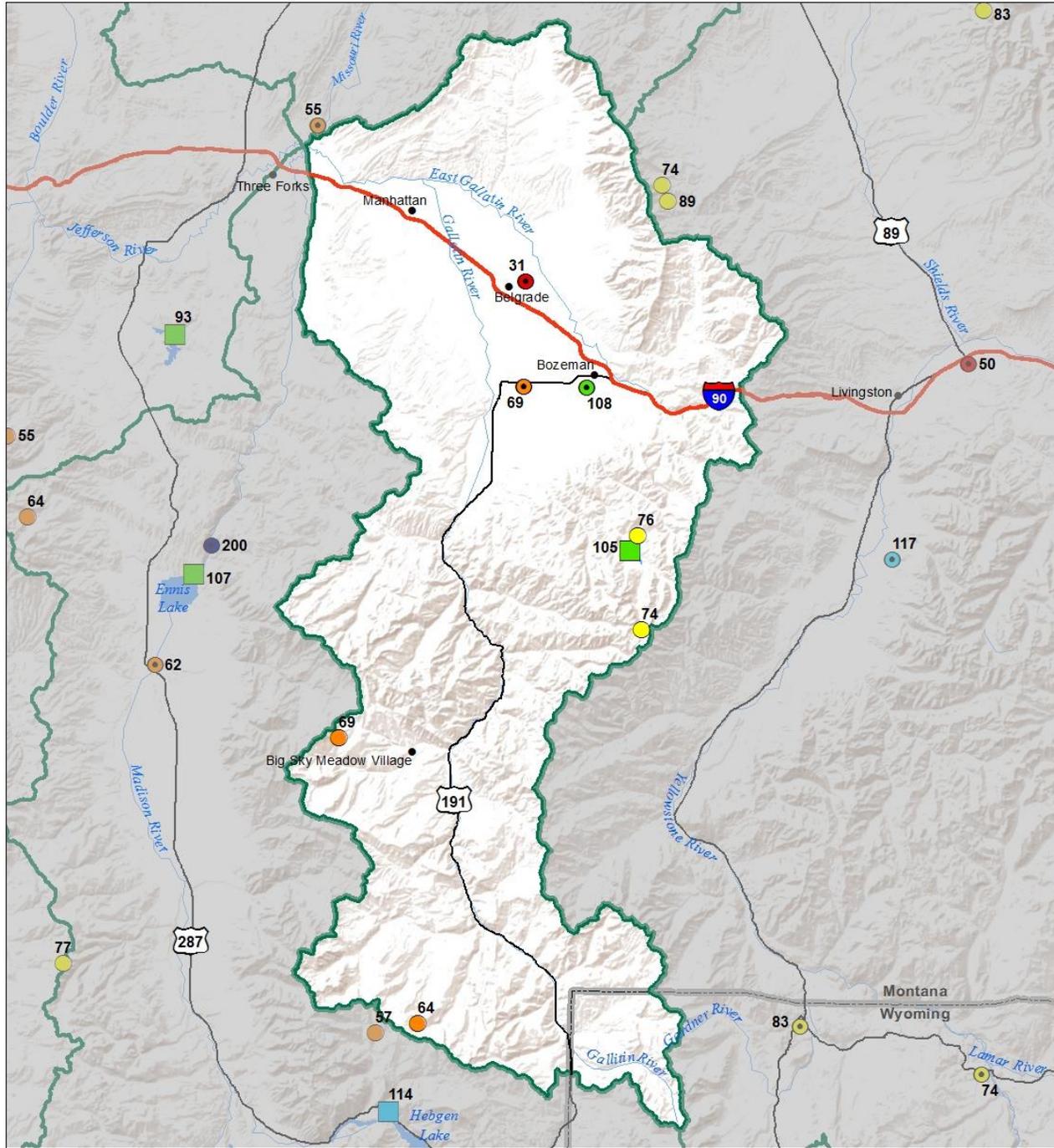
SNOTEL		Snowcourse	
● > 150%	● 71 - 90%	⊕ > 150%	⊕ 71 - 90%
● 131 - 150%	● 51 - 70%	⊕ 131 - 150%	⊕ 51 - 70%
● 111 - 130%	● 1 - 50%	⊕ 111 - 130%	⊕ 1 - 50%
● 91 - 110%	✱ 0%	⊕ 91 - 110%	✱ 0%



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



Gallatin River Basin Monthly Precipitation and Reservoir Levels Percentage of Normal January 1, 2019 (December 1, 2018 - January 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%





Headwaters Mainstem (Missouri) River Basin

The headwaters of the Missouri Mainstem is coming off a record breaking year with Nevada Ridge SNOTEL reaching 28.7" of snow water equivalent last season, a snowpack not topped in the 24 years of record. Many other sites in the drainage were near record breaking, so it's no surprise that reservoir storage has jumped up this year to 101% of average, while last year during this time carry over storage was only 93%. This year, snowpack in the Elkhorn and Big Belt Mountains started to build in the second week of November thru the beginning of December, which was followed by a lull for the first half December. Sites have received consistent snow in the last couple weeks, bumping up totals to 88% of normal snowpack in the basin. Both valley and mountain precipitation numbers are down from average, but [with 70% of average precipitation](#) on a typical year yet to reach the mountains, conditions can change quickly. With snow in the forecast for coming weeks, we will just have to wait and see what 'precipitates'. Tune in next month for an update.

Headwaters Missouri Mainstem River Basin Data Summary

Snowpack	Percent of 1981-2010 Normal (Median)	Last Year Percentage of Normal (Median)
HEADWATERS MAINSTEM	87%	156%
SMITH-JUDITH-MUSSELSHELL	89%	137%
SUN-TETON-MARIAS	79%	121%
MAINSTEM ab FT PECK RES	86%	137%
MILK RIVER BASIN	170%	135%
Basin-Wide Snowpack	88%	137%

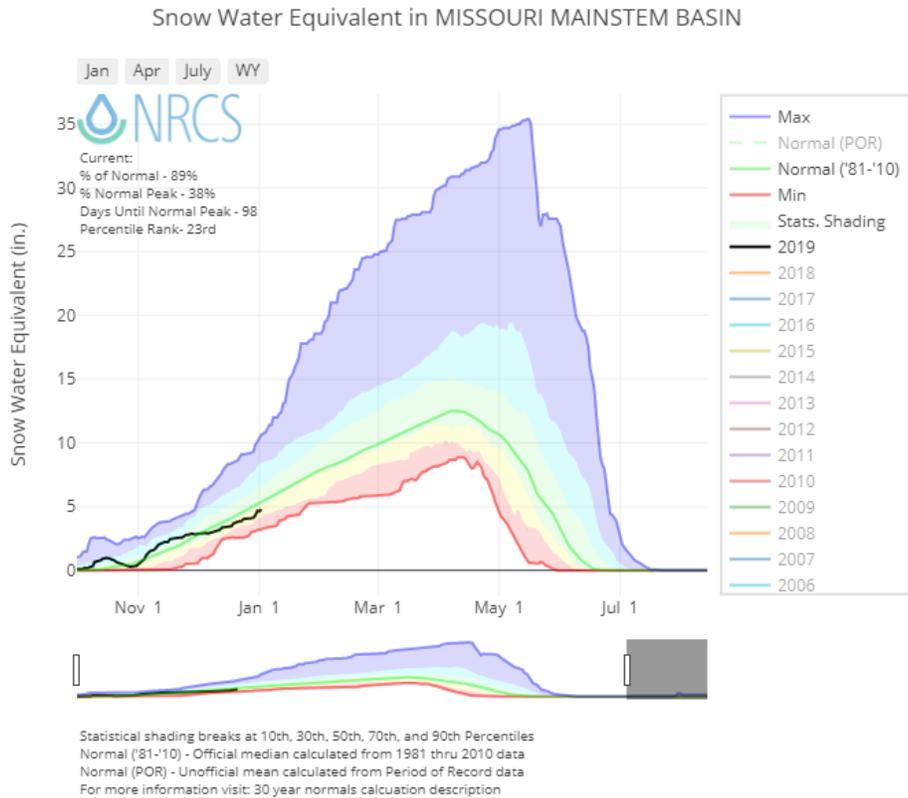
Precipitation	Monthly Percentage of Average	WYTD Percentage of 1981-2010 Average*	WYTD Last Year Percentage of Average
Mountain Precipitation	64%	96%	134%
Valley Precipitation	40%	58%	212%
Basin-Wide Precipitation	63%	95%	138%

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

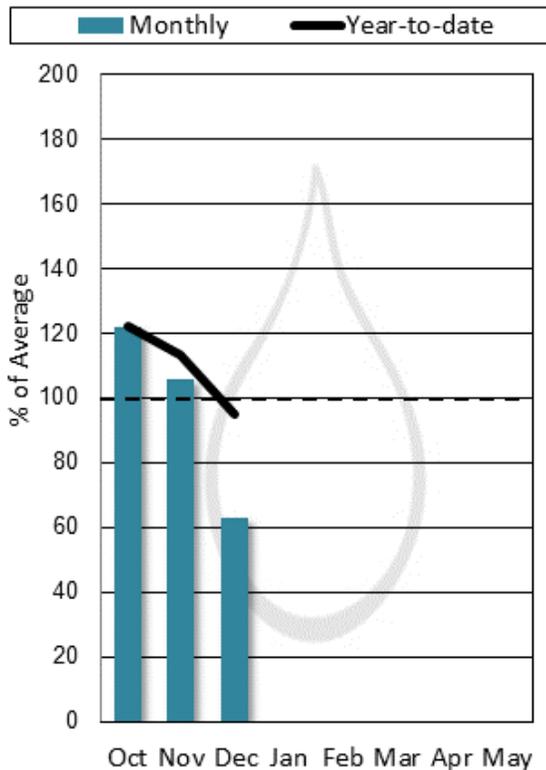
Reservoir Storage	Percentage of Average	Percentage of Capacity (Total)	Last Year Percentage of Average
Basin-Wide Storage	117%	83%	114%

*See Reservoir Storage Table for storage in individual reservoirs

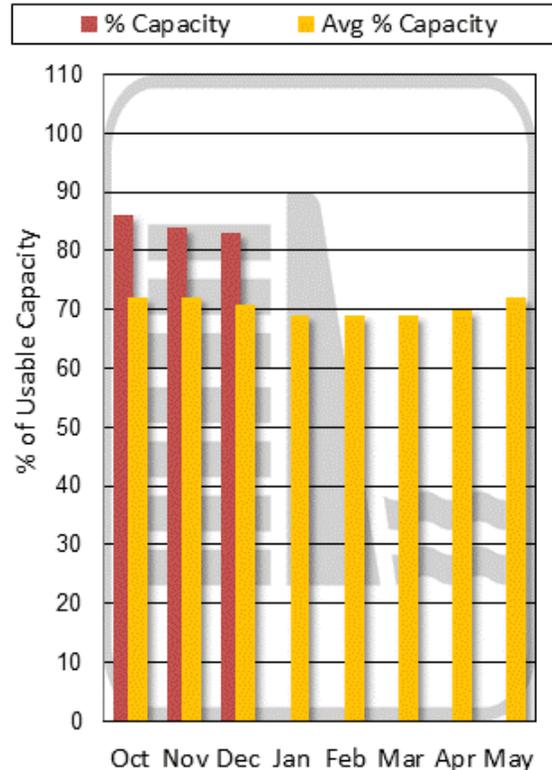
(click on chart below to navigate to [online version](#) with additional features)



Mountain and Valley Precipitation

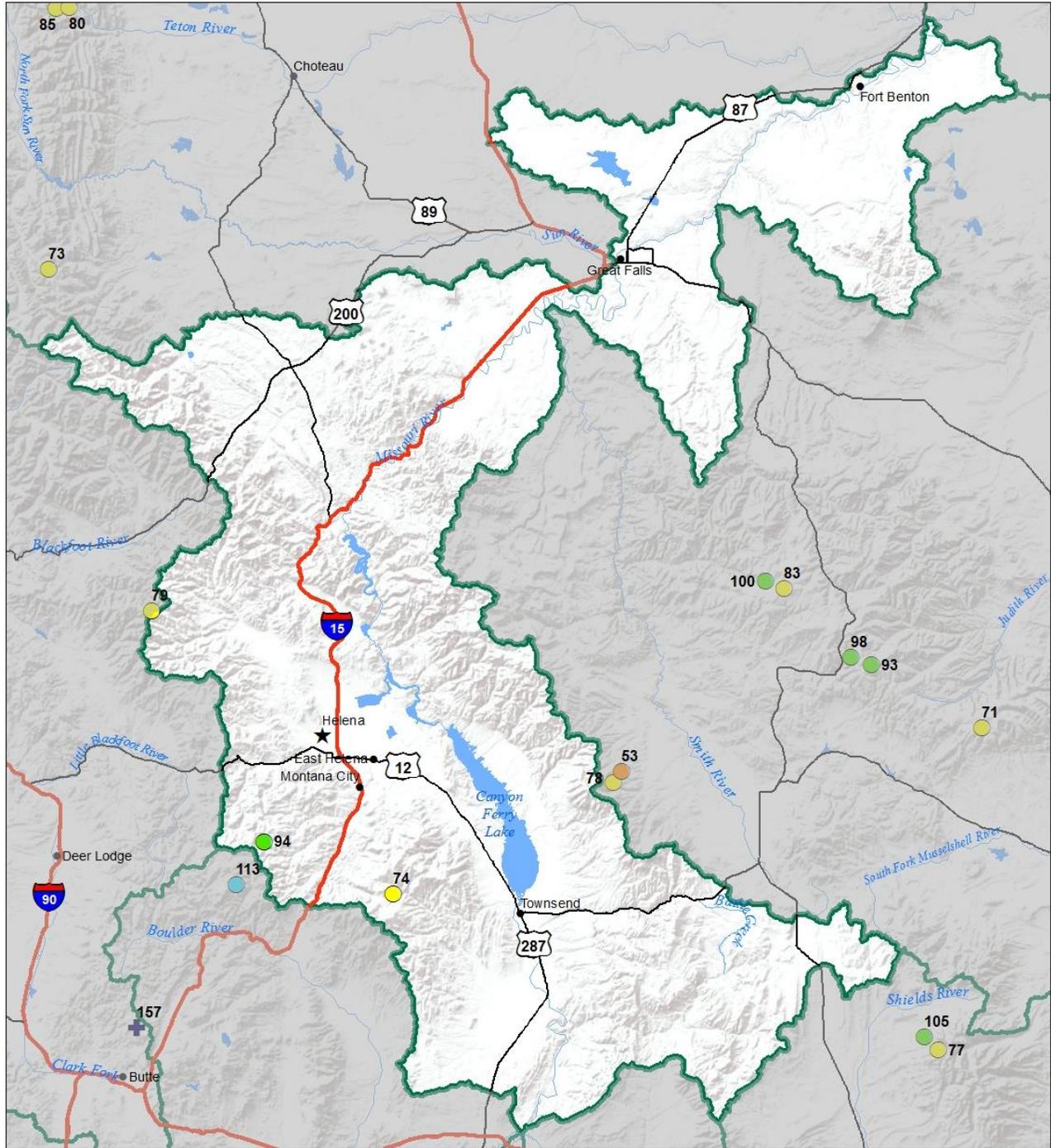


End of Month Reservoir Storage



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 January 1, 2019

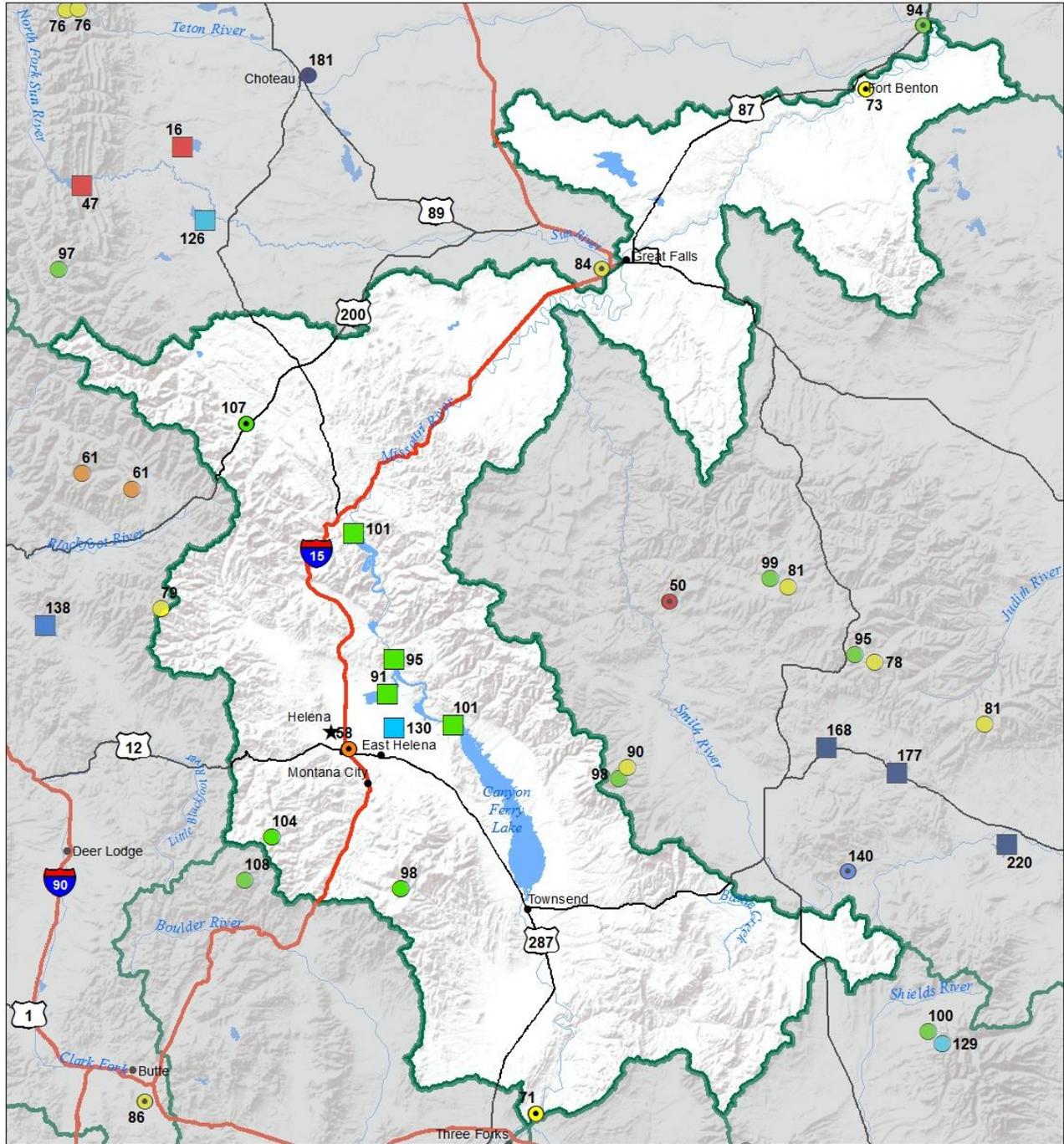


Snow Water Equivalent Percent of Normal

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%



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

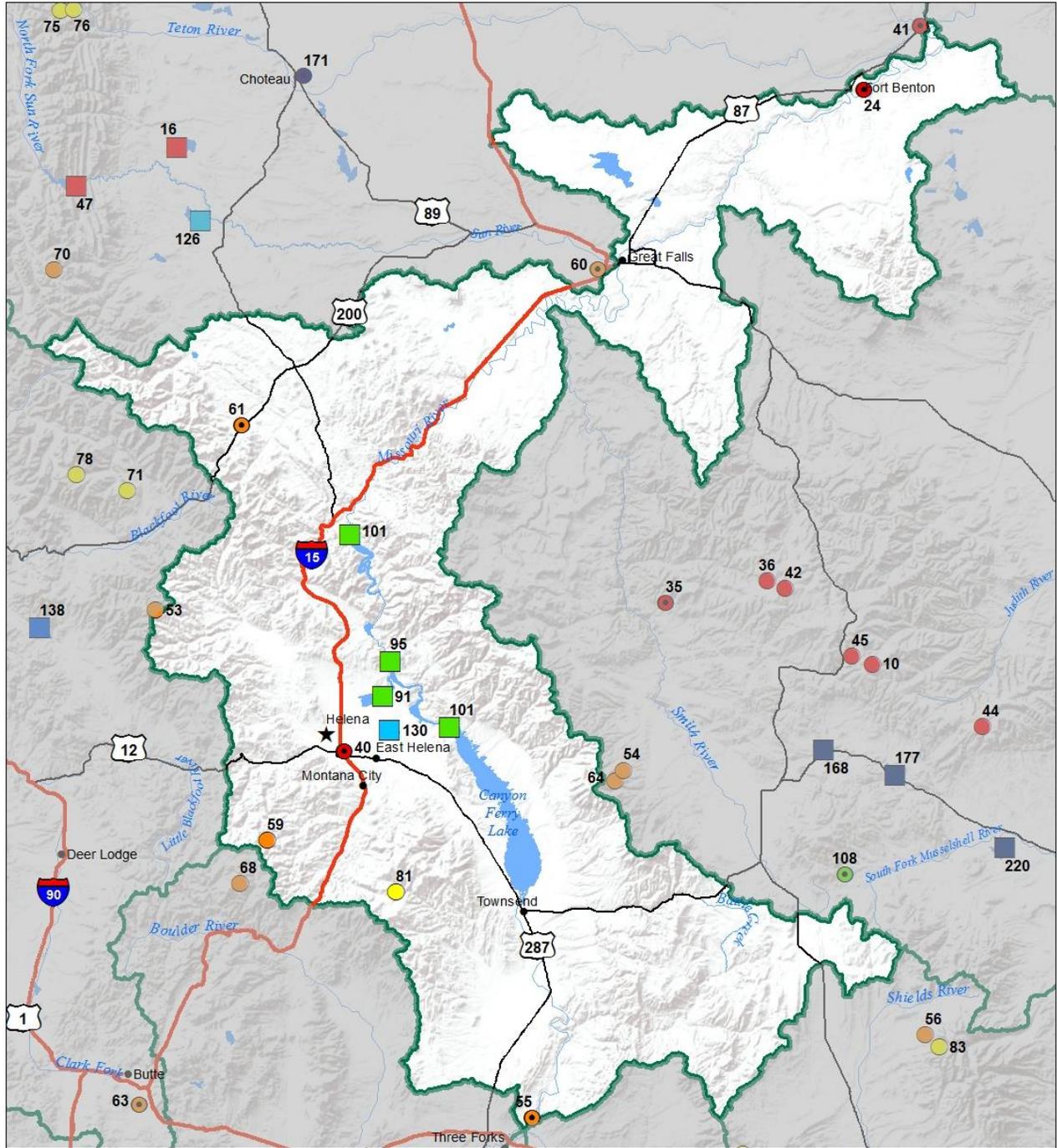


Precipitation Percent of Normal	
SNOTEL	COOP/ACIS
● > 150%	● > 150%
● 131 - 150%	● 131 - 150%
● 111 - 130%	● 111 - 130%
● 91 - 110%	● 91 - 110%
● 71 - 90%	● 71 - 90%
● 51 - 70%	● 51 - 70%
● 1 - 50%	● 1 - 50%

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

USDA
National Resource Information System

Headwaters Mainstem (Missouri) River Basin Monthly Precipitation and Reservoir Levels Percentage of Normal January 1, 2019 (December 1, 2018 - January 1, 2019)

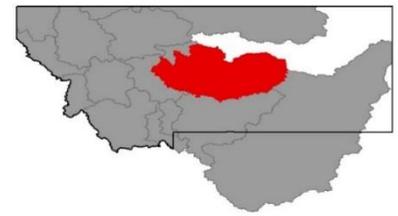


Precipitation Percent of Normal		COOP/ACIS	
SNOTEL			
● > 150%	● 71 - 90%	● > 150%	● 71 - 90%
● 131 - 150%	● 51 - 70%	● 131 - 150%	● 51 - 70%
● 111 - 130%	● 1 - 50%	● 111 - 130%	● 1 - 50%
● 91 - 110%		● 91 - 110%	

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



The snowpack looked like it was off to another good start this water year in the mountains feeding the rivers in the region, and all elevations began to accumulate snowpack during the second week of October. The above average temperatures caused the low elevation sites in the basin to melt during the latter half of the month, while the higher elevations retained their snowpack. Early November snowfall began the basin-wide snowpack at all elevations in the basin, with cold northwest flow favoring this regions with regards to snowfall. A mostly lackluster December (with regards to snowfall), dropped snowpack percentages, resulting [in snow totals for January 1st](#) that are above average in the Big Snowy Range (135%), below near to below normal in the Little Belts (71% to 100%), and well below normal in the Big Belts (53% to 78%). Water-year precipitation in the river basin generally mimics the snowpack percentages at this point, except in the Big Belt mountains where snowpack is below normal for this date, but water year precipitation remains near to slightly below normal. Typically, the basin receives the bulk of its moisture during the spring and early summer, so all is not lost. Reservoir contents in the basin stand well above average for this date, due to abundant carryover from last year's above average runoff.

Smith Judith Musselshell River Basin Data Summary

Snowpack	Percent of 1981-2010 Normal (Median)	Last Year Percentage of Normal (Median)
SMITH	84%	130%
HIGHWOOD	%	%
JUDITH	98%	132%
MUSSELSHELL	83%	184%
Basin-Wide Snowpack	89%	137%

Precipitation	Monthly Percentage of Average	WYTD Percentage of 1981-2010 Average*	WYTD Last Year Percentage of Average
Mountain Precipitation	43%	94%	115%
Valley Precipitation	49%	104%	112%
Basin-Wide Precipitation	43%	94%	115%

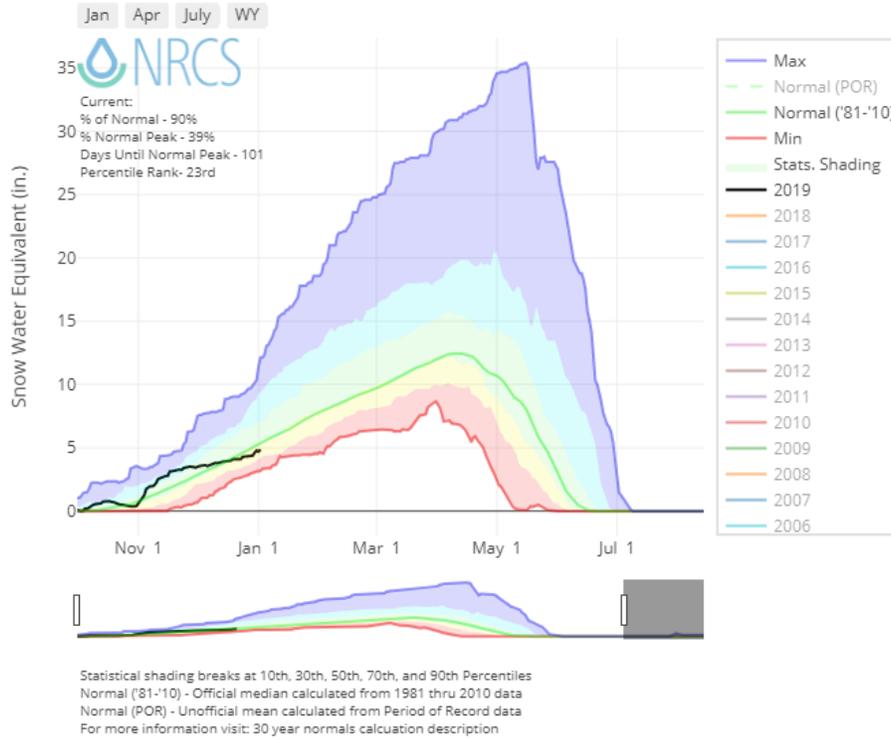
*Water Year-to-Date (WYTD) Precipitation is October 1st - Current

Reservoir Storage	Percentage of Average	Percentage of Capacity (Total)	Last Year Percentage of Average
Basin-Wide Storage	170%	85%	137%

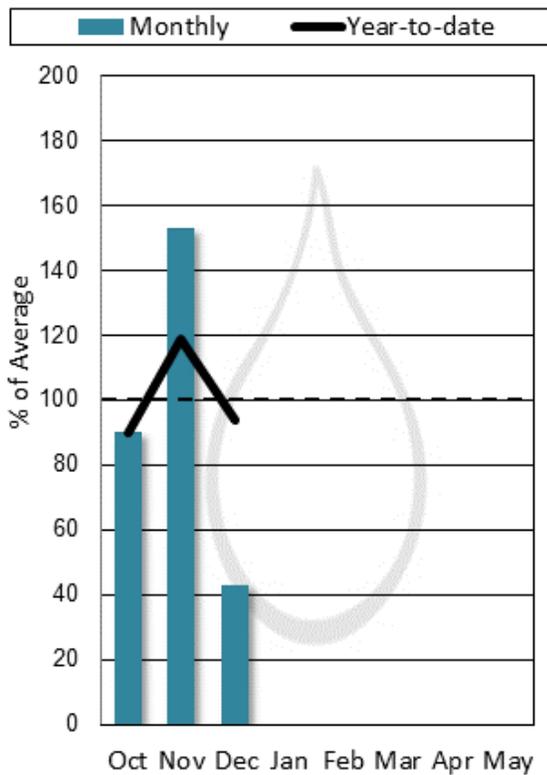
*See Reservoir Storage Table for storage in individual reservoirs

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

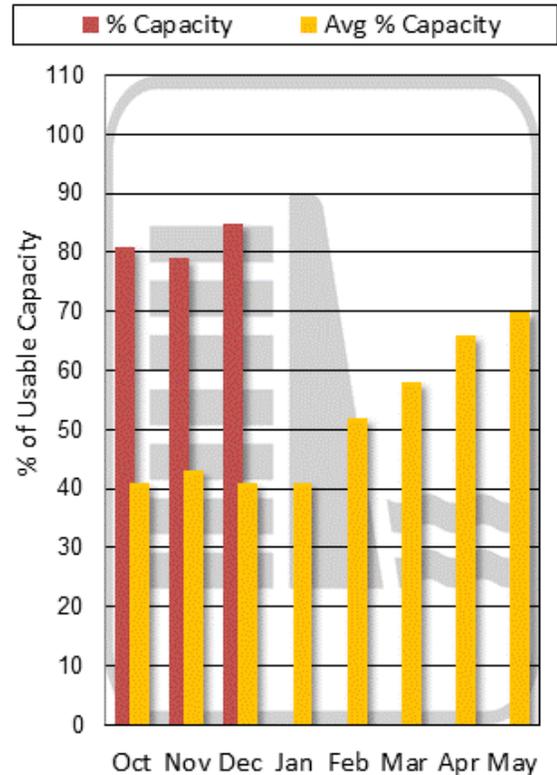
Snow Water Equivalent in SMITH-JUDITH-MUSSELSHELL



Mountain and Valley Precipitation

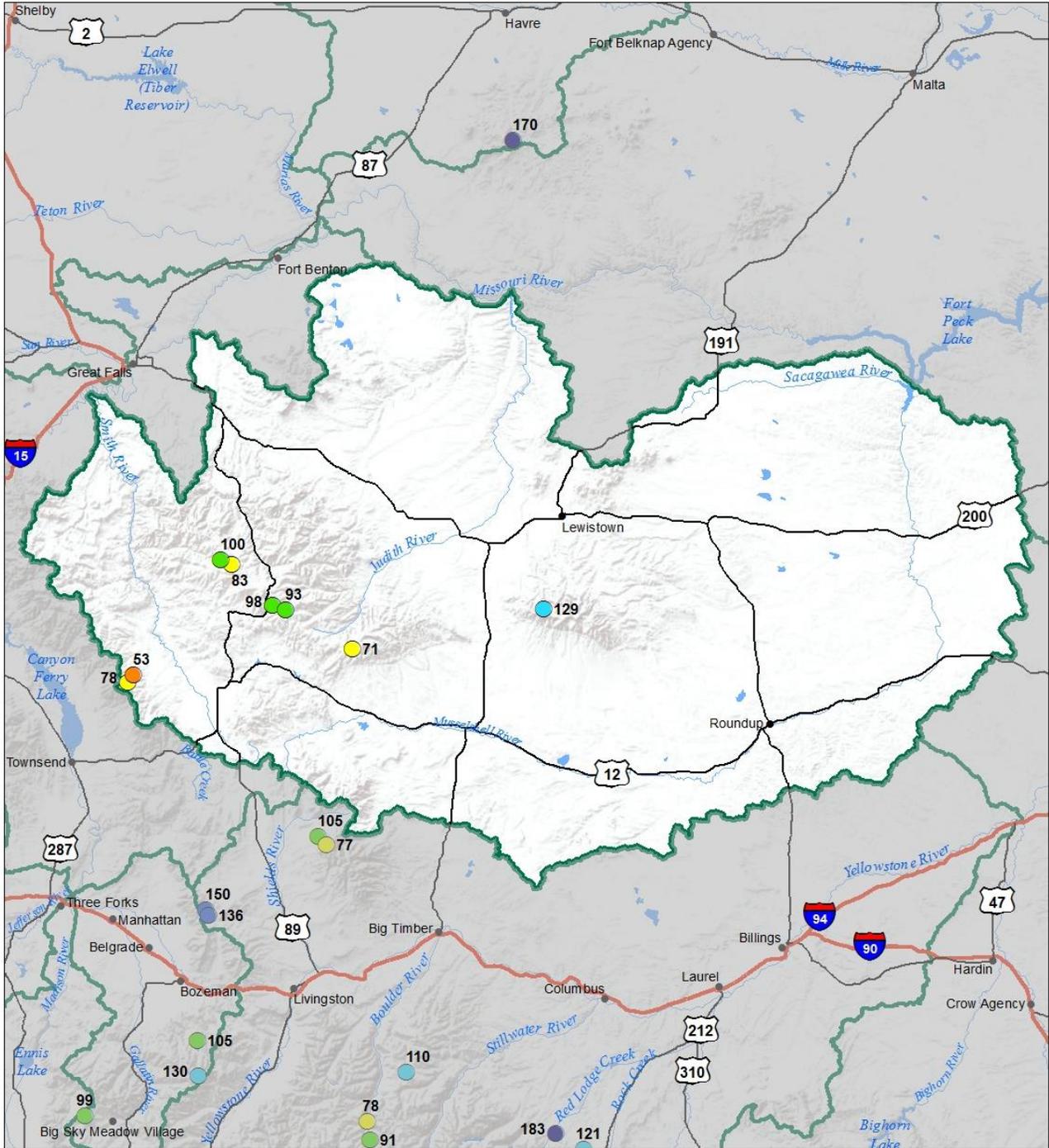


End of Month Reservoir Storage



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 January 1, 2019



Snow Water Equivalent Percent of Normal

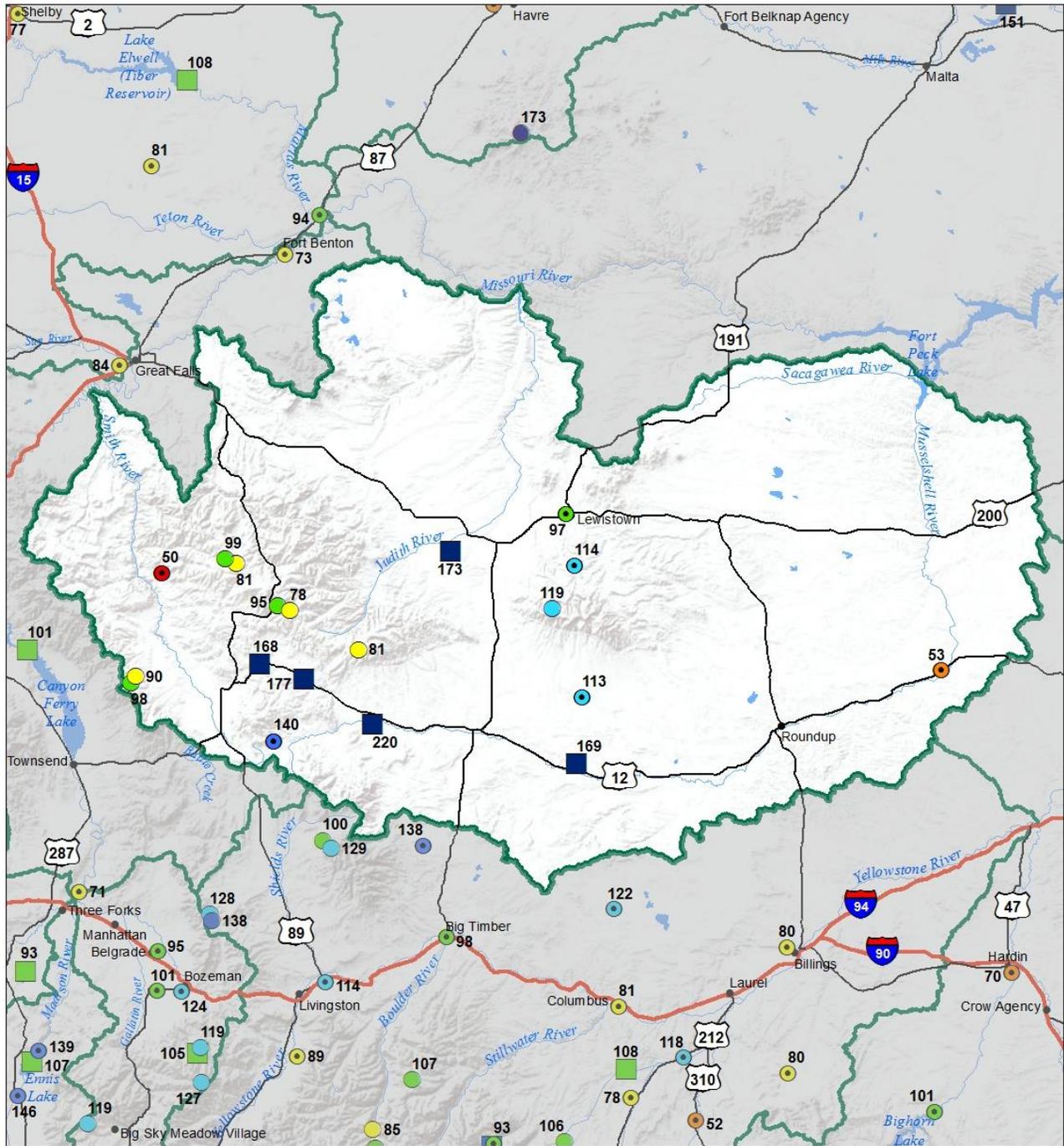
SNOTEL		Snowcourse	
● > 150%	● 71 - 90%	⊕ > 150%	⊕ 71 - 90%
● 131 - 150%	● 51 - 70%	⊕ 131 - 150%	⊕ 51 - 70%
● 111 - 130%	● 1 - 50%	⊕ 111 - 130%	⊕ 1 - 50%
● 91 - 110%	● *	⊕ 91 - 110%	⊕ *

Smith-Judith-Musselshell River Basin

Water Year to Date Precipitation and Reservoir Levels

Percentage of Normal

January 1, 2019



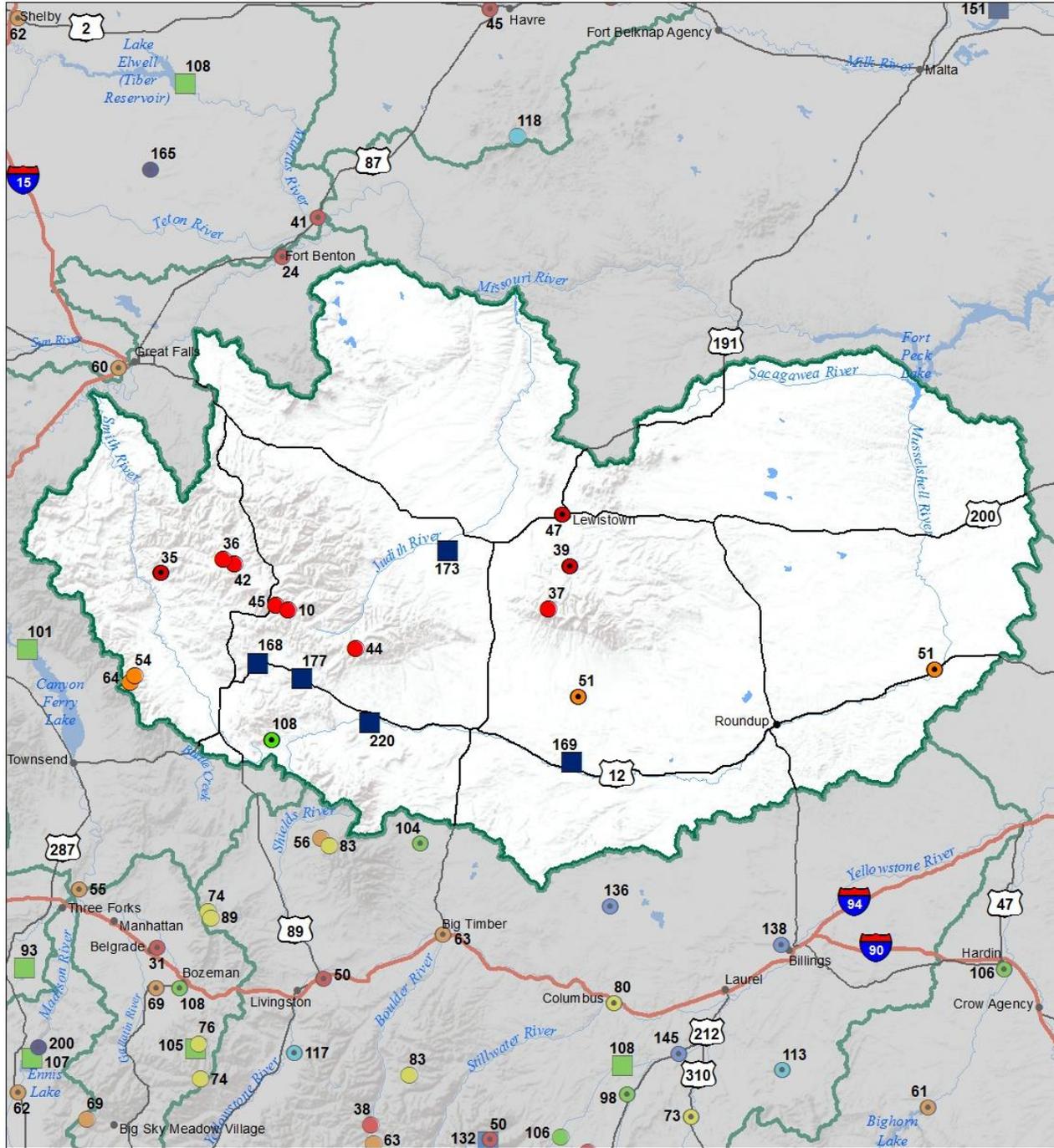
SNOTEL		COOP/ACIS	
● > 150%	● 71 - 90%	● > 150%	● 71 - 90%
● 131 - 150%	● 51 - 70%	● 131 - 150%	● 51 - 70%
● 111 - 130%	● 1 - 50%	● 111 - 130%	● 1 - 50%
● 91 - 110%		● 91 - 110%	

Reservoirs
Percent of Normal

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

USDA
National Digital Library
Natural Resource
Information System

**Smith-Judith-Musselshell River Basin
Monthly Precipitation and Reservoir Levels
Percentage of Normal
January 1, 2019 (December 1, 2018 - January 1, 2019)**

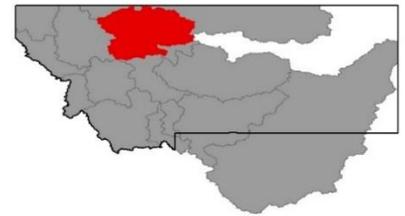


Precipitation Percent of Normal			
SNOTEL		COOP/ACIS	
● > 150%	● 71 - 90%	● > 150%	● 71 - 90%
● 131 - 150%	● 51 - 70%	● 131 - 150%	● 51 - 70%
● 111 - 130%	● 1 - 50%	● 111 - 130%	● 1 - 50%
● 91 - 110%		● 91 - 110%	

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



Sun-Teton-Marias River Basin



After the [Strawberry Fire](#) burned the [Badger Pass SNOTEL](#) site in September of 2017, the Montana Snow Survey staff is happy to announce that it has been re-installed and is once again operational as of October 1st, 2018.

Although this site is now operational, it is reporting snowpack data that mimics the other sites across the Rocky Mountain Front. Snowpack for January 1st is below normal for this date after a prolonged dry spell that lasted from mid-November to mid-December. Snowpack percentages range from 71% to 85% of normal for this date. October snowfall looked to start the seasonal snowpack in the region, but warm weather towards the end of the month melted low and mid elevation snow. The prolonged dry spell lasted until the second week of December when snow started to fall, but this was not enough to make up for the deficits from a month without snow. Precipitation totals for the water-year mimic the snowpack totals in all areas except [Wood Creek SNOTEL](#), which has below normal snowpack but near normal precipitation. The rain event in late October in this region melted the snowpack and added to the precipitation totals. Seasonal snowcover at this site has been intermittent but looks to have begun for the season in early December. Reservoir storage in the basin is well below average in some locations for Jan 1st, due to above average fall releases from [Gibson Reservoir](#) (48%) and construction on Pishkun Reservoir (17%). Reservoirs further south in the Sun River basin have storage which is above average for this date.

Sun-Teton-Marias River Basin Data Summary

Snowpack	Percent of 1981-2010 Normal (Median)	Last Year Percentage of Normal (Median)
SUN	81%	127%
TETON	81%	119%
MARIAS	77%	116%
Basin-Wide Snowpack	79%	121%

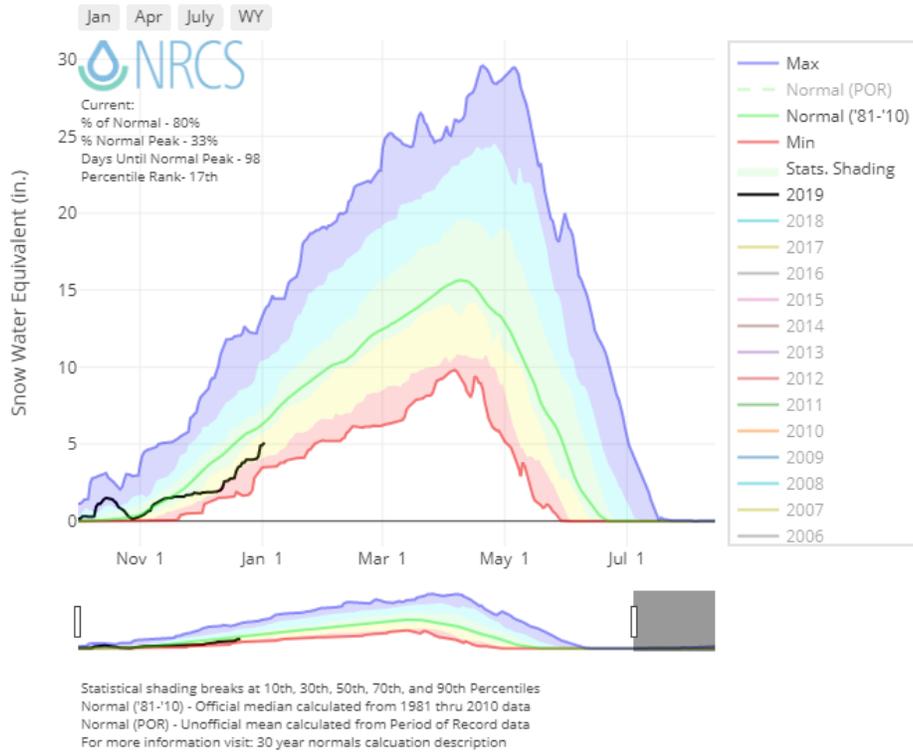
Precipitation	Monthly Percentage of Average	WYTD Percentage of 1981-2010 Average*	WYTD Last Year Percentage of Average
Mountain Precipitation	80%	84%	127%
Valley Precipitation	116%	154%	231%
Basin-Wide Precipitation	81%	89%	134%

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

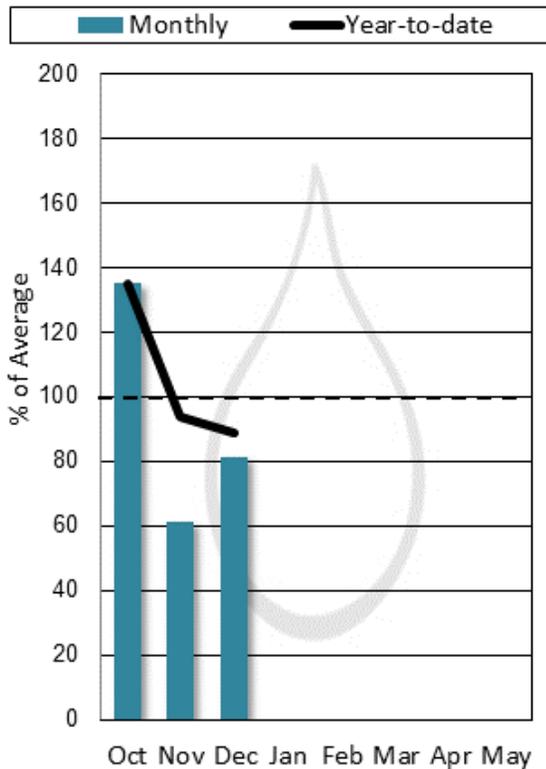
Reservoir Storage	Percentage of Average	Percentage of Capacity (Total)	Last Year Percentage of Average
Basin-Wide Storage	106%	55%	100%

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

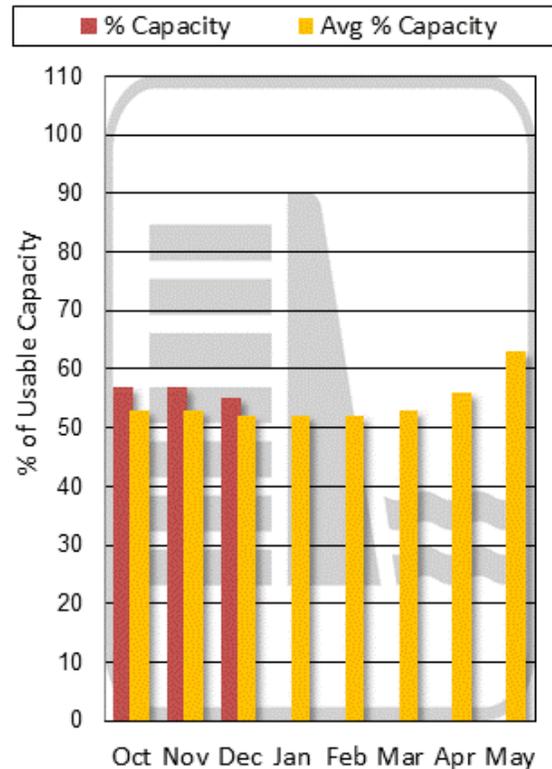
Snow Water Equivalent in SUN-TETON-MARIAS



Mountain and Valley Precipitation

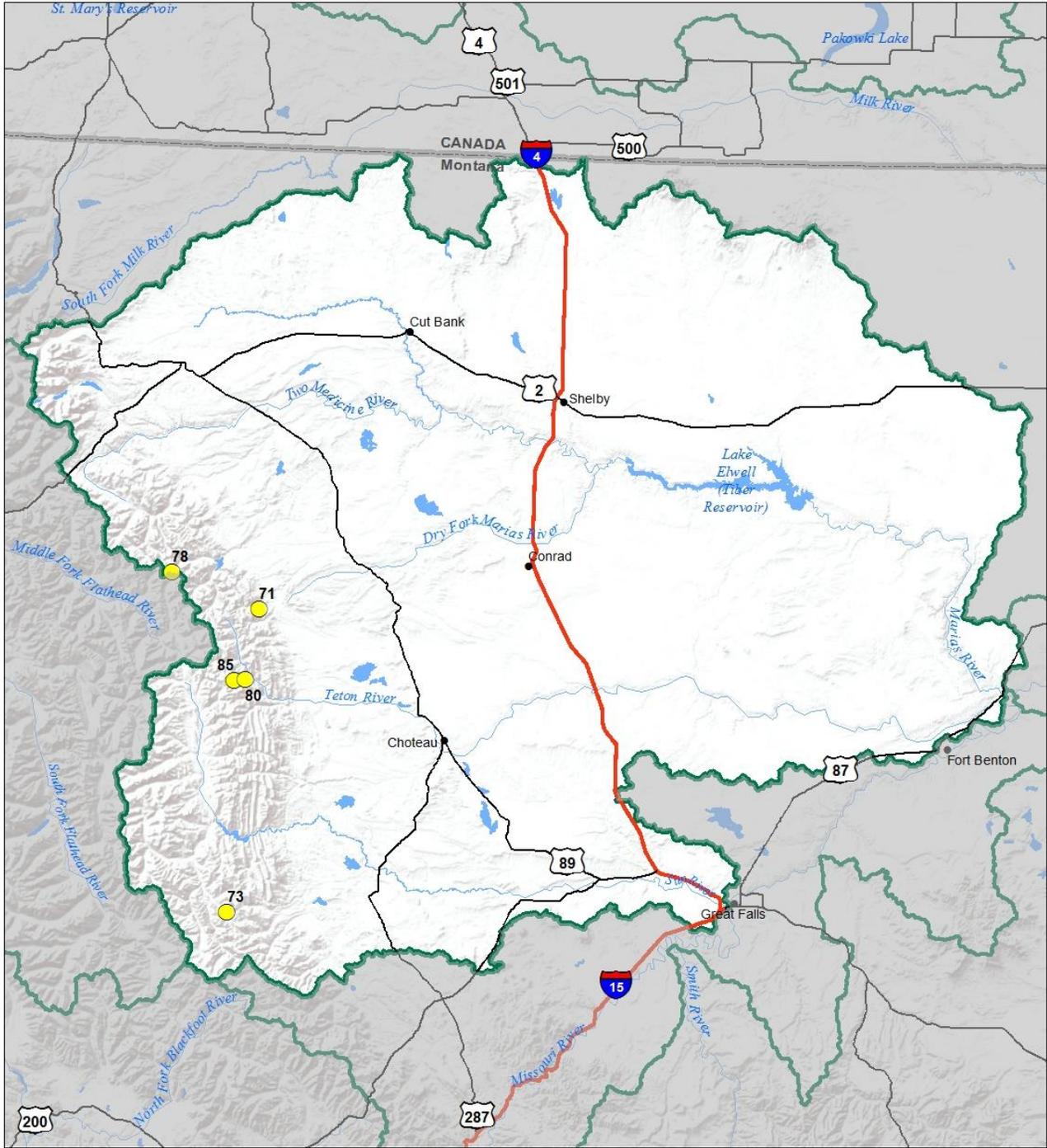


End of Month Reservoir Storage



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
January 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%	● *	⊕ 91 - 110%	⊕ *

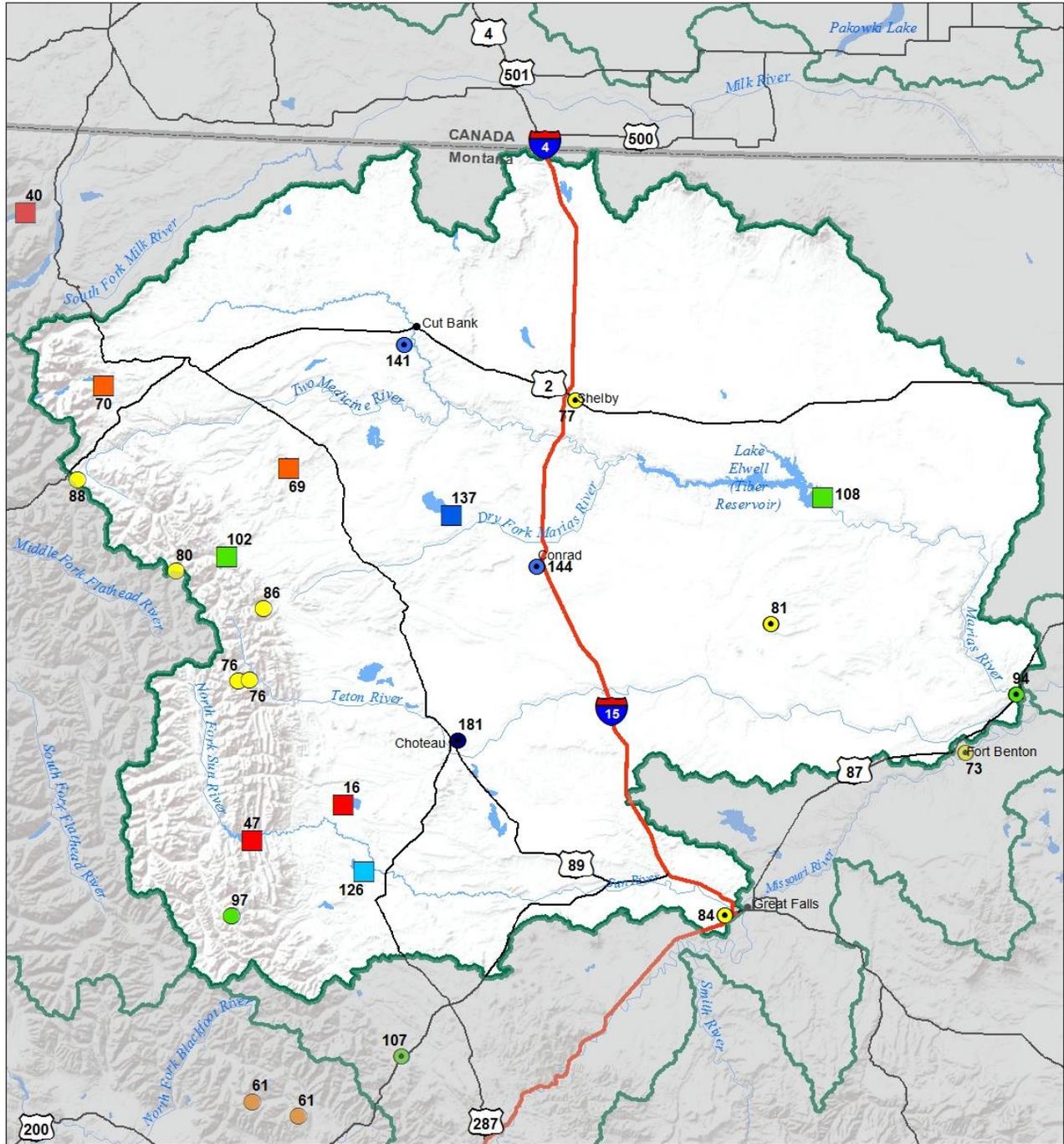


Sun-Teton-Marias River Basin

Water Year to Date Precipitation and Reservoir Levels

Percentage of Normal

January 1, 2019

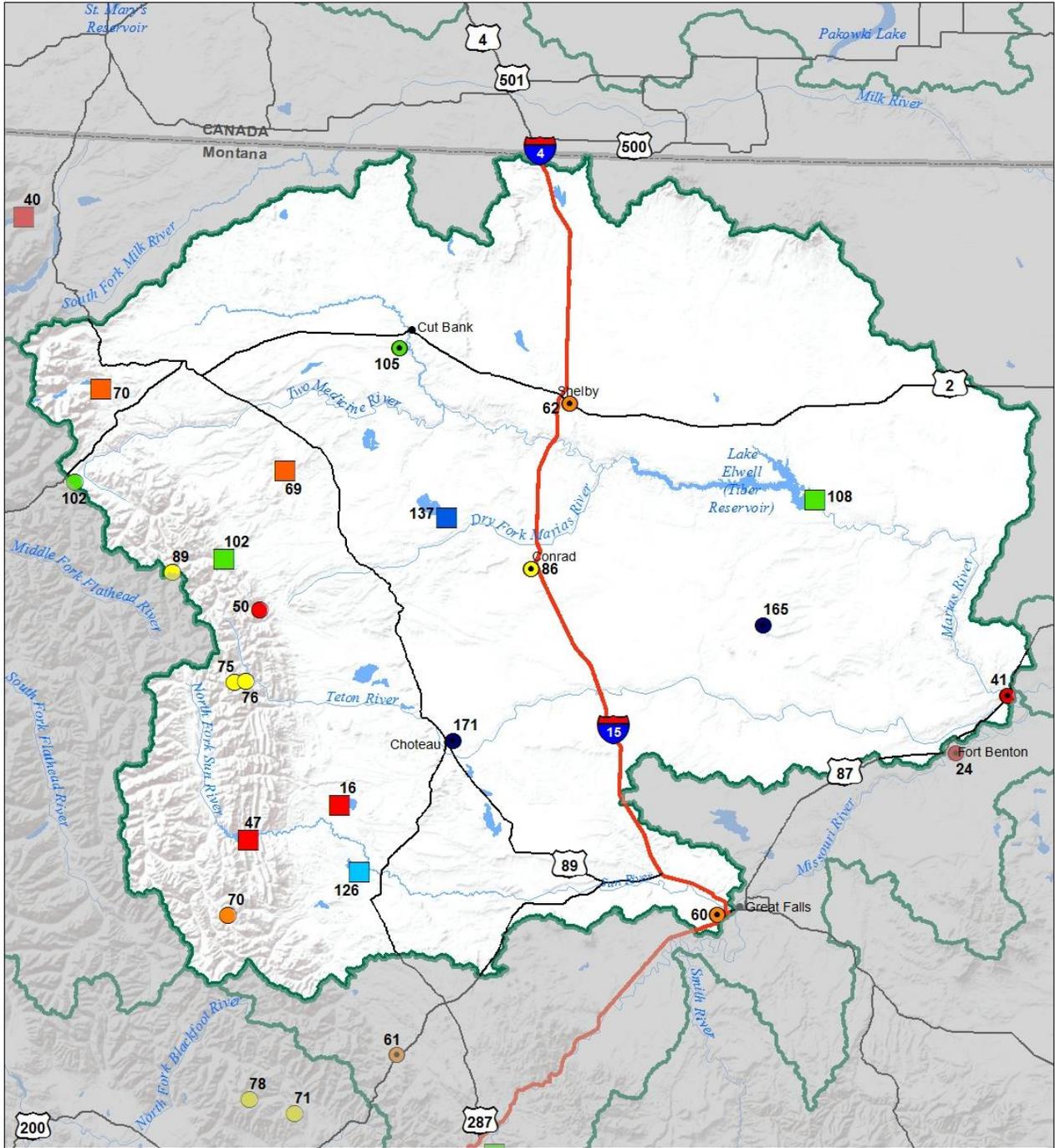


SNOTEL		COOP/ACIS	
● > 150%	● 71 - 90%	● > 150%	● 71 - 90%
● 131 - 150%	● 51 - 70%	● 131 - 150%	● 51 - 70%
● 111 - 130%	● 1 - 50%	● 111 - 130%	● 1 - 50%
● 91 - 110%		● 91 - 110%	

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

USDA
National Resource Information System

**Sun-Teton-Marias River Basin
 Monthly Precipitation and Reservoir Levels
 Percentage of Normal
 January 1, 2019 (December 1, 2018 - January 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%

St. Mary-Milk River Basin



The SNOTEL sites in the Upper St. Mary River basin are reporting snowpack that is below normal for this date, with the low elevation Many Glacier SNOTEL site reporting 83% of normal, and high elevation Flattop Mountain SNOTEL sites reporting 85% of normal. Late October snowfall began the seasonal snowpack at all elevations in the basin, before a prolonged dry spell until early December caused snowpack percentages to decline. Snowfall since mid-December has helped the snowpack to recover, but not make up for the deficits from the lack of precipitation.

Further east, the Bearpaw Mountains have a snowpack which is above normal for this date, due to the significant precipitation experienced during the first week of November. Just under 5" of precipitation fell during that week, as a mix of rain and snow in the mountains. Snow Water Equivalent (SWE) values haven't gained much since then but increased slightly at the end of December. Above average water-year precipitation in the Bearpaw Mountains isn't reflective of the entire region, the Havre WFO is reporting only 69% of average precipitation for the water year, and Chinook is reporting 59%.

St. Mary-Milk River Basin Data Summary

Snowpack

	Percent of 1981-2010 Normal (Median)	Last Year Percentage of Normal (Median)
ST. MARY	84%	91%
BEARPAW MOUNTAINS	170%	135%
CYPRESS HILLS, CANADA	%	%
MILK RIVER BASIN	170%	135%
Basin-Wide	91%	95%

Precipitation

	Monthly Percentage of Average	WYTD Percentage of 1981-2010 Average*	WYTD Last Year Percentage of Average
Mountain Precipitation (St. Mary)	87%	84%	112%
Mountain Precipitation (Bearpaw Mtns)	118%	173%	200%
Valley Precipitation	110%	121%	180%
Basin-Wide Precipitation	91%	96%	126%

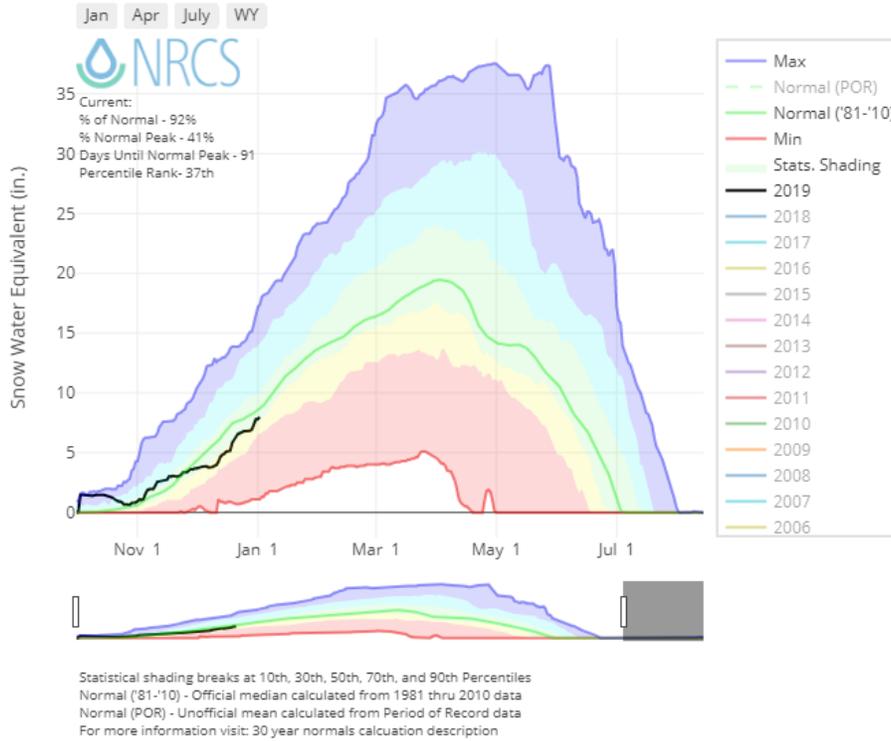
*Water Year-to-Date (WYTD) Precipitation is October 1st - Current

Reservoir Storage

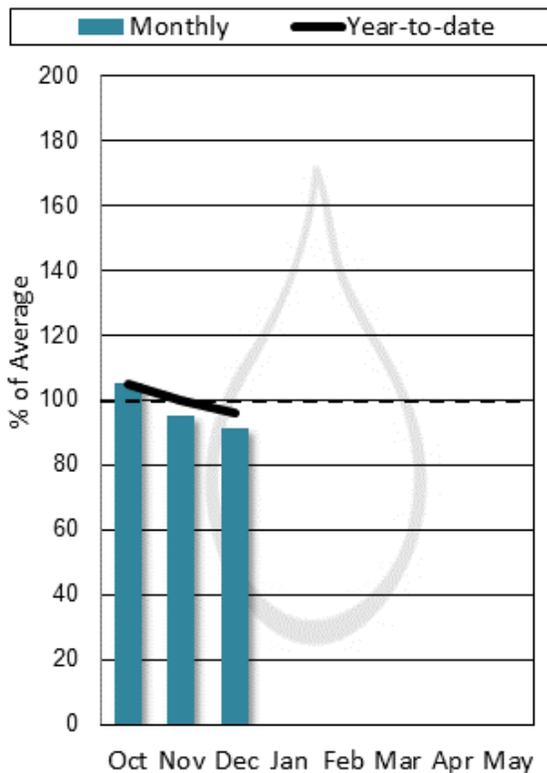
	Percentage of Average	Percentage of Capacity (Total)	Last Year Percentage of Average
Basin-Wide Storage	101%	40%	95%

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

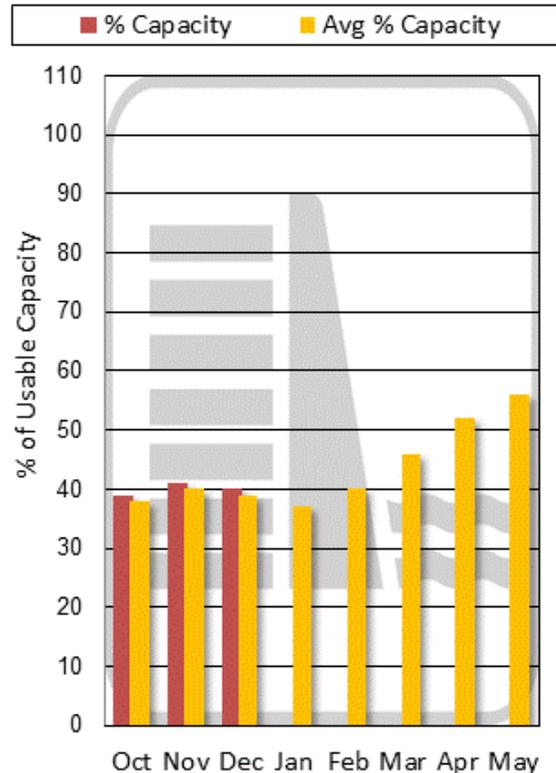
Snow Water Equivalent in ST. MARY & MILK BASINS



Mountain and Valley Precipitation

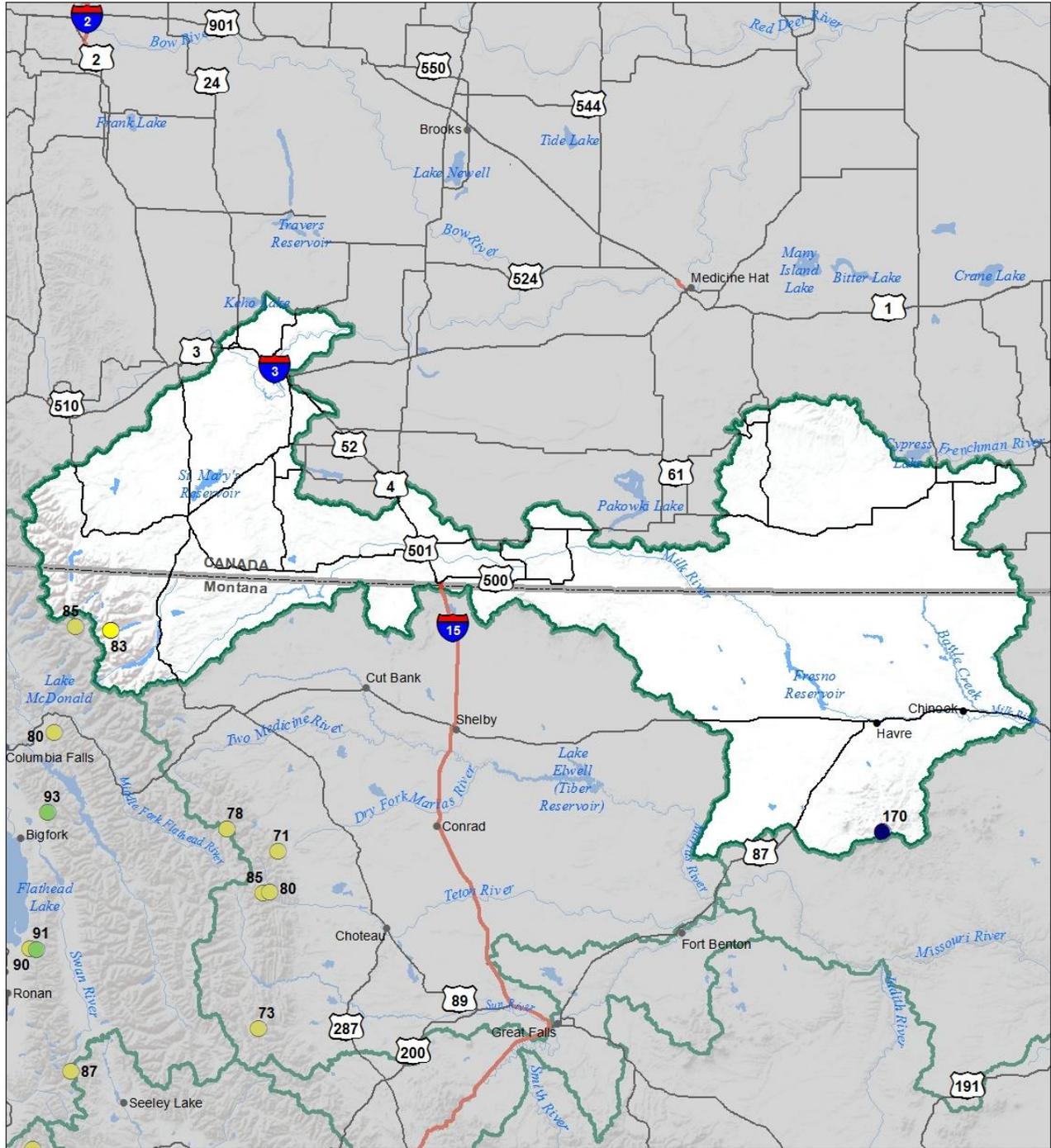


End of Month Reservoir Storage



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 January 1, 2019

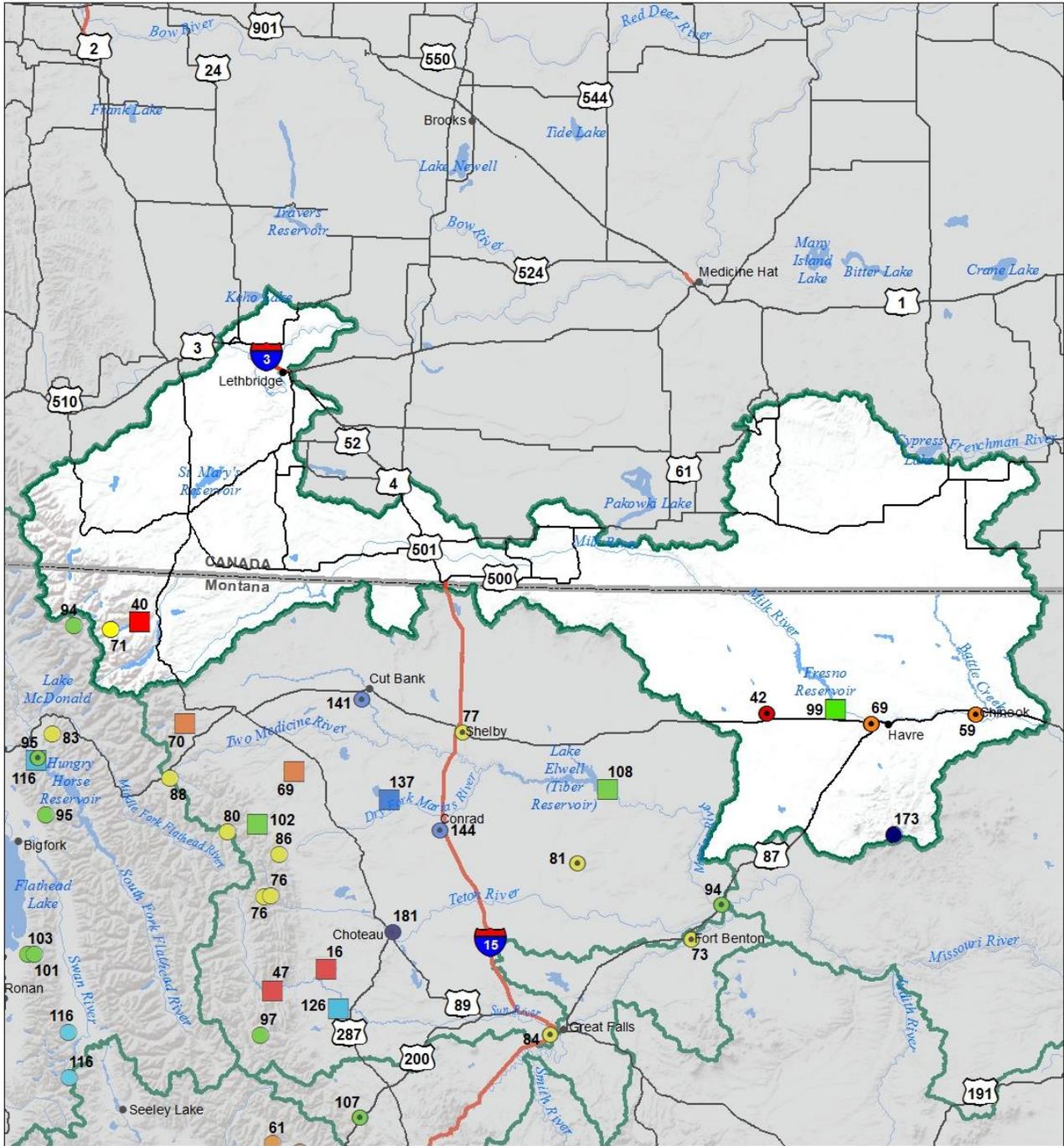


Snow Water Equivalent Percent of Normal

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%	● *	⊕ 91 - 110%	⊕ *
			● *



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

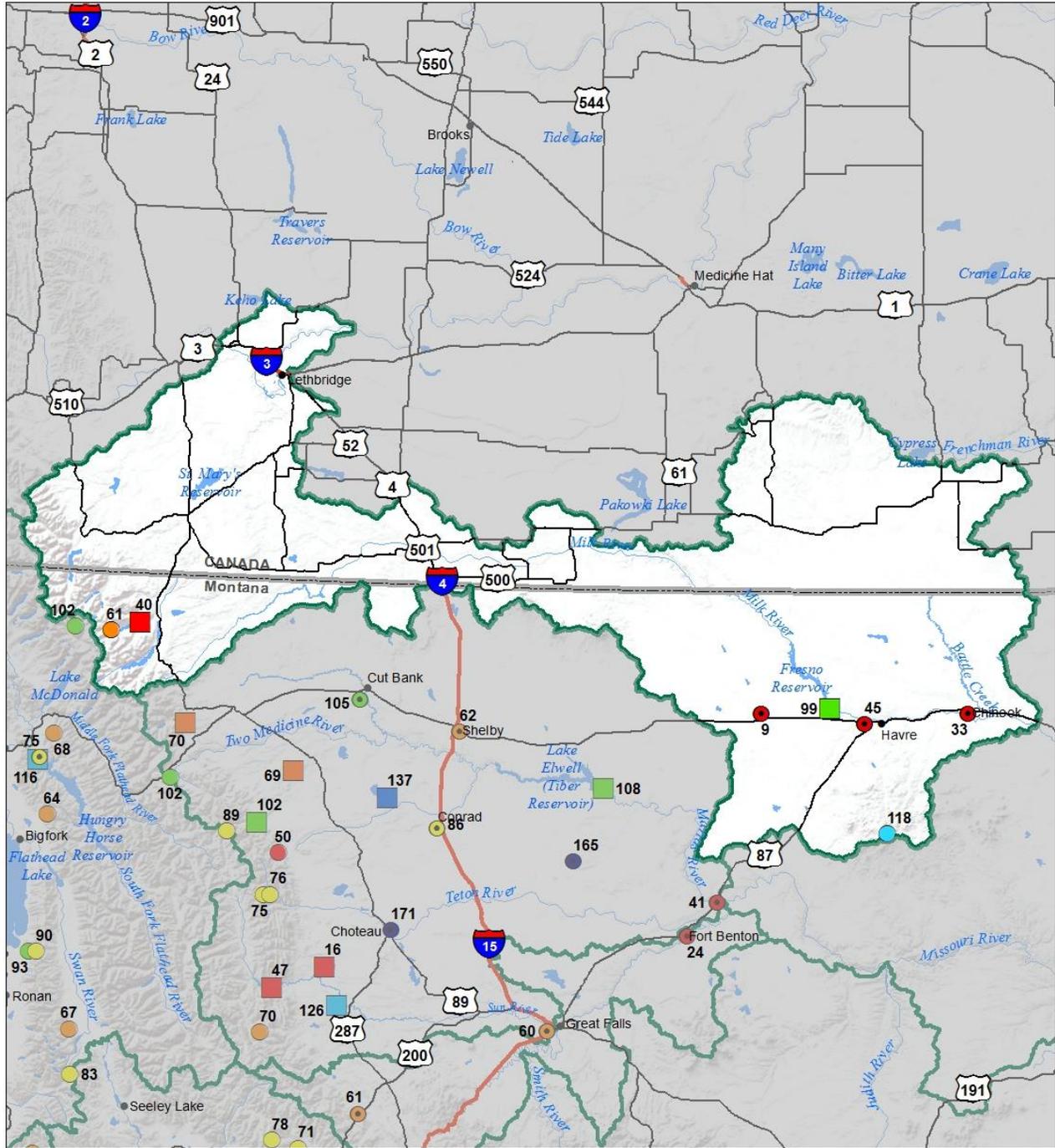


Precipitation Percent of Normal	
SNOTEL	COOP/ACIS
● > 150%	● > 150%
● 131 - 150%	● 131 - 150%
● 111 - 130%	● 111 - 130%
● 91 - 110%	● 91 - 110%
● 71 - 90%	● 71 - 90%
● 51 - 70%	● 51 - 70%
● 1 - 50%	● 1 - 50%

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

USDA
Natural Resource Information System

**St Mary's-Milk River Basin
Monthly Precipitation and Reservoir Levels
Percentage of Normal
January 1, 2019 (December 1, 2018 - January 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%





Upper Yellowstone River Basin

Hit or miss. That's the best way to describe the snowpack totals on January 1st in the Upper Yellowstone River basin. Some areas like the Shields (119%) and Red Lodge/Rock Creek (135%) areas have a snowpack that is well above normal for this date, while other regions in Yellowstone National Park and surrounding areas have snowpack that is below, to well below normal. The skiing and snowmobiling mecca of Cooke City is having one of its slowest starts in the last ten years with regards to snowpack at the higher elevations. The [Fisher Creek SNOTEL](#) site is currently reporting on 69% of normal Snow Water Equivalent (SWE), and the mid-elevation White Mill SNOTEL is reporting 80%.

Across the basin, early November storms built the foundation of the snowpack, and snow has done little more than trickle in over the following weeks. In some areas, the above to well above normal snowpack [can be attributed to this week alone \(Shields\)](#). It is still very early in the snow season in the Upper Yellowstone, and January is too early to tell what runoff might look like when we get to the spring months. For now, a pattern change would be welcomed in the southern headwaters of the Upper Yellowstone.

Upper Yellowstone River Basin Data Summary

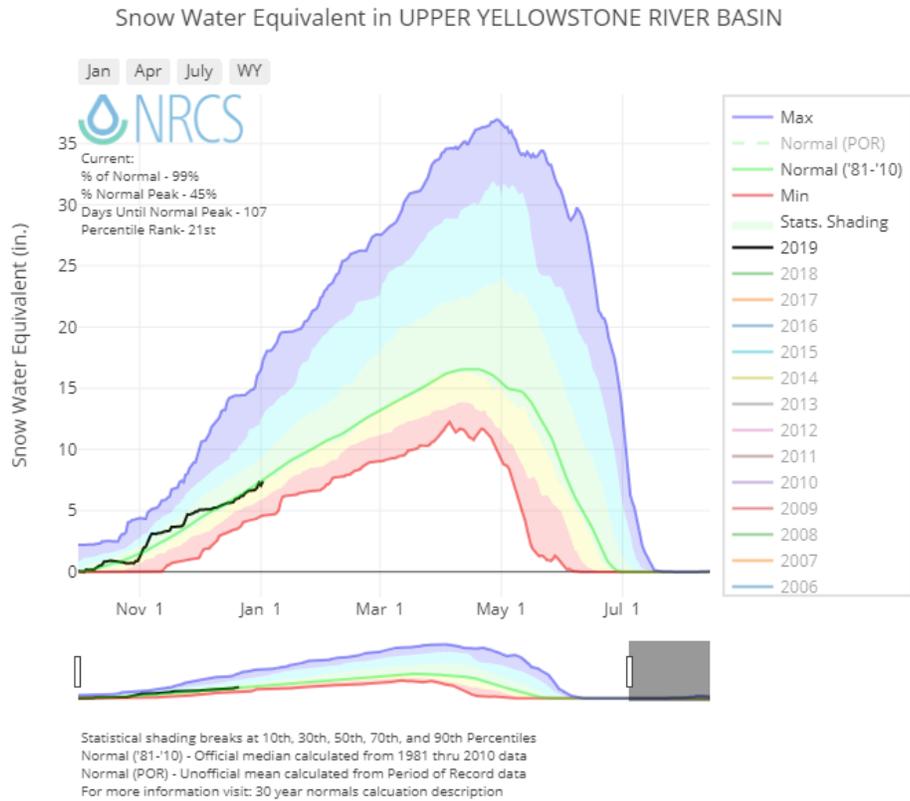
Snowpack	Percent of 1981-2010 Normal (Median)	Last Year Percentage of Normal (Median)
<i>YELLOWSTONE ab LIVINGSTON</i>	92%	158%
<i>SHIELDS</i>	119%	150%
<i>BOULDER-STILLWATER</i>	96%	168%
<i>RED LODGE-ROCK CREEK</i>	135%	132%
<i>CLARK'S FORK</i>	86%	178%
Basin-Wide Snowpack	98%	161%

Precipitation	Monthly Percentage of Average	WYTD Percentage of 1981-2010 Average*	WYTD Last Year Percentage of Average
Mountain Precipitation	67%	103%	135%
Valley Precipitation	98%	103%	158%
Basin-Wide Precipitation	69%	103%	137%

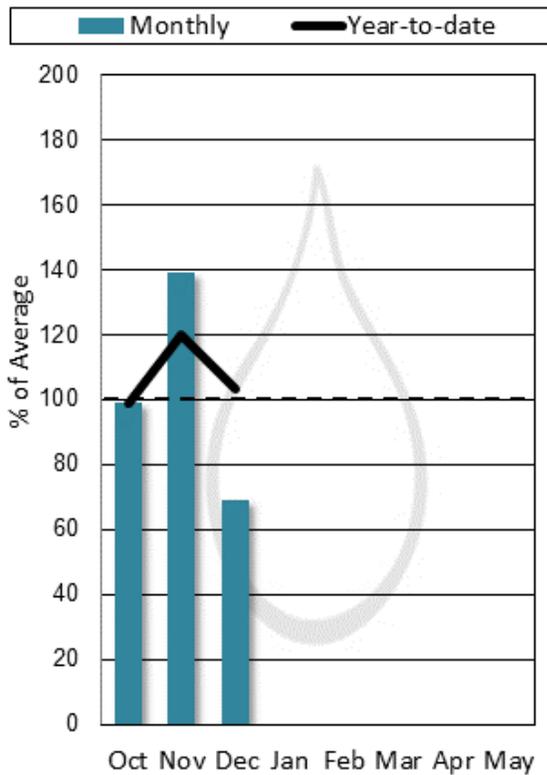
*Water Year-to-Date (WYTD) Precipitation is October 1st - Current

Reservoir Storage	Percentage of Average	Percentage of Capacity (Total)	Last Year Percentage of Average
Basin-Wide Storage	116%	59%	138%

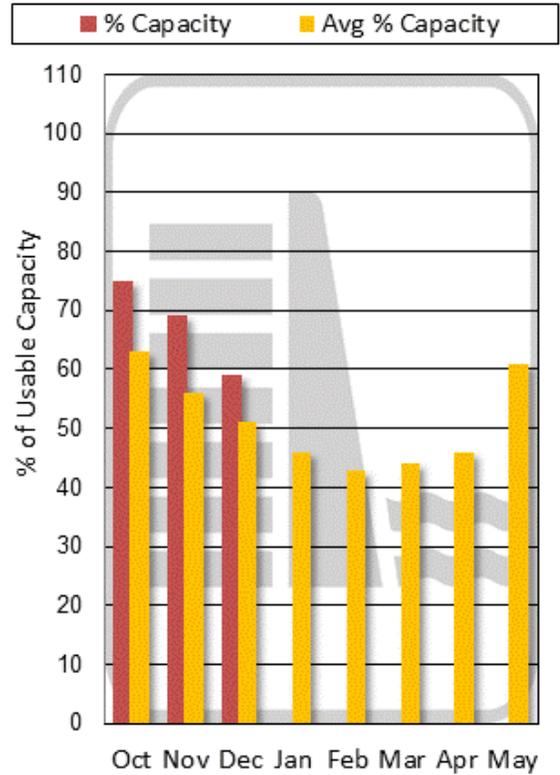
(click on chart below to navigate to [online version](#) with additional features)



Mountain and Valley Precipitation

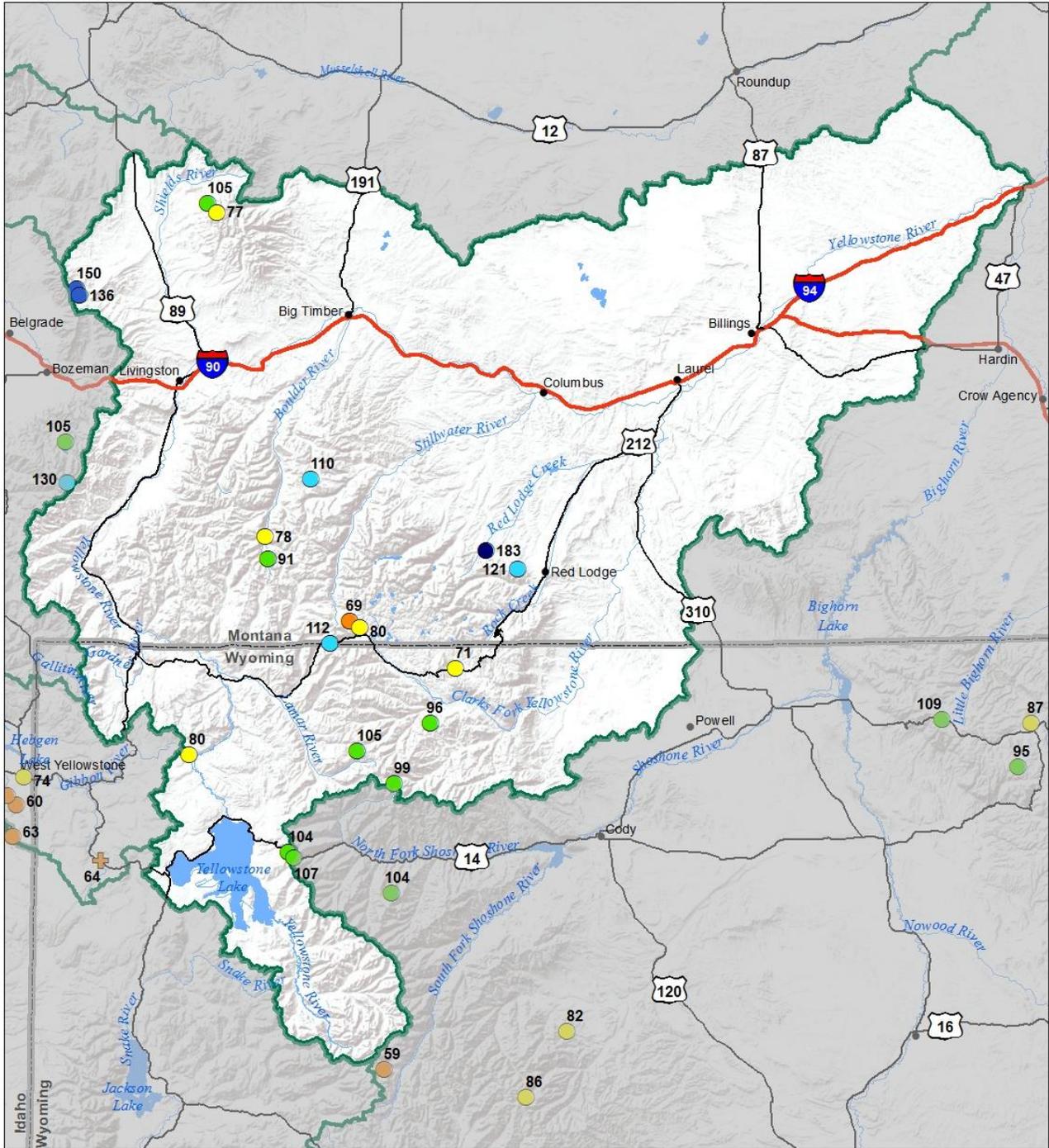


End of Month Reservoir Storage



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

Upper Yellowstone River Basin Snow Water Equivalent Percentage of Normal January 1, 2019

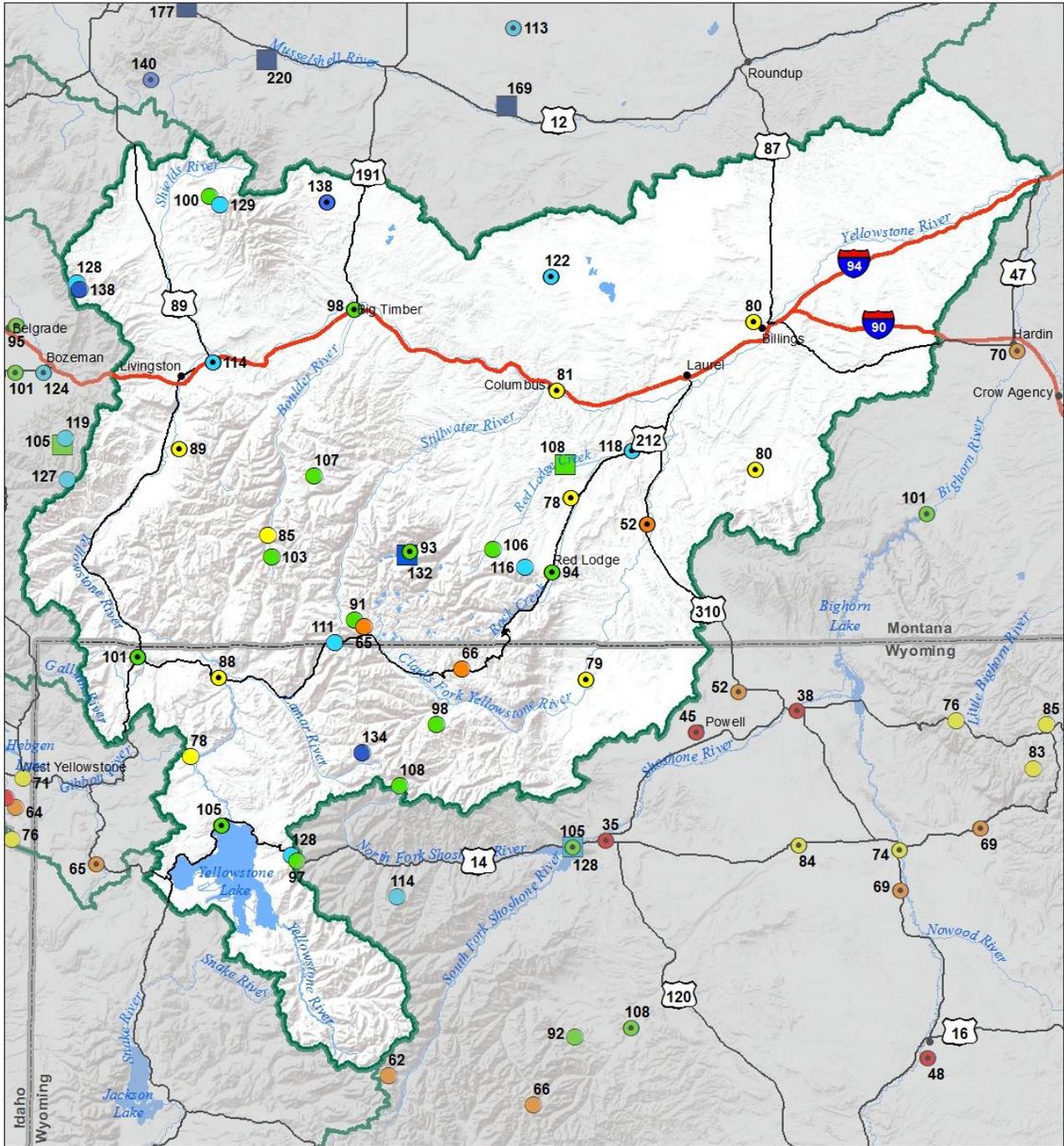


Snow Water Equivalent Percent of Normal

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%



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

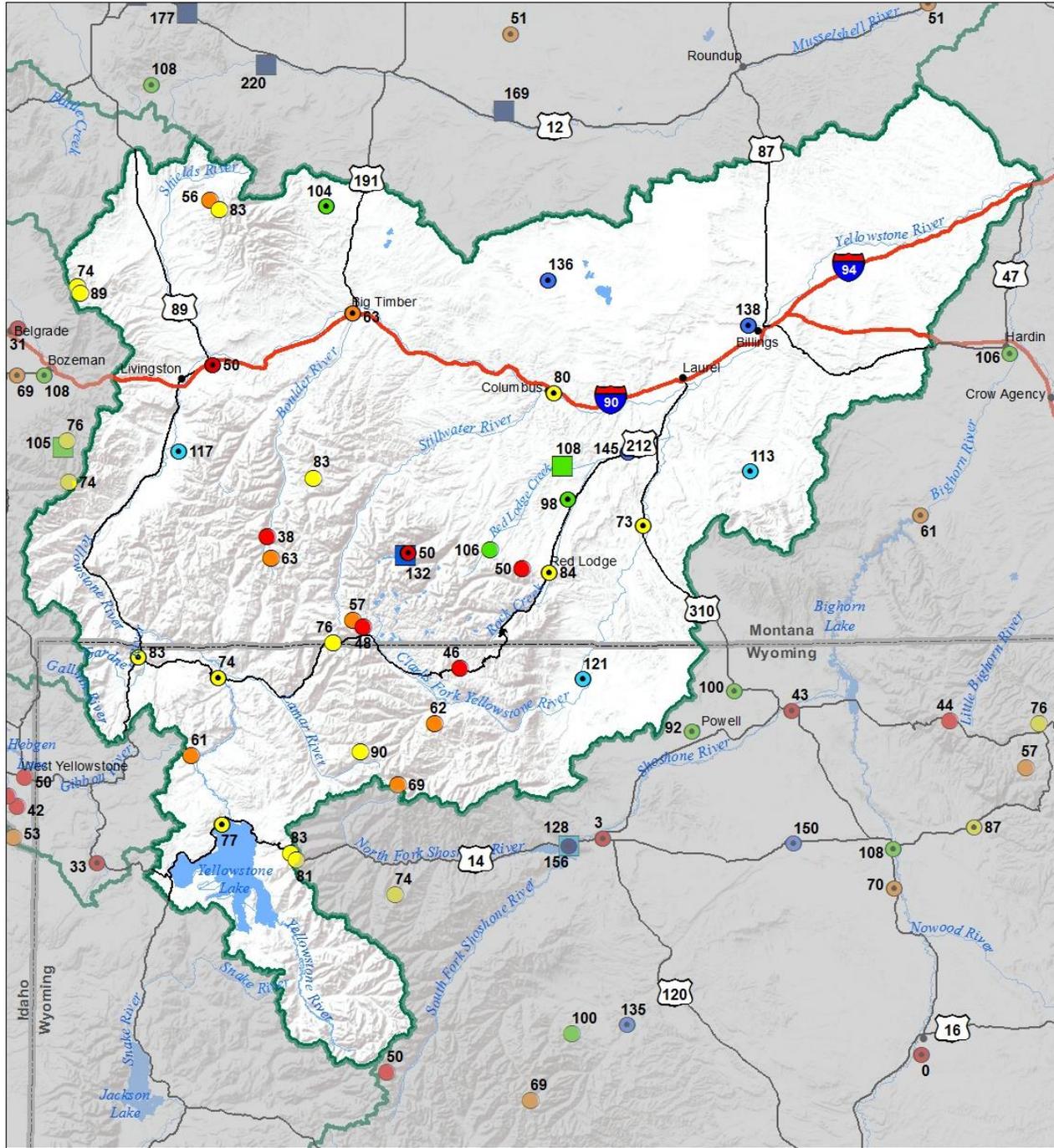


SNOTEL		COOP/ACIS	
● > 150%	● 71 - 90%	● > 150%	● 71 - 90%
● 131 - 150%	● 51 - 70%	● 131 - 150%	● 51 - 70%
● 111 - 130%	● 1 - 50%	● 111 - 130%	● 1 - 50%
● 91 - 110%		● 91 - 110%	

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

USDA
Natural Resource Information System

**Upper Yellowstone River Basin
Monthly Precipitation and Reservoir Levels
Percentage of Normal
January 1, 2019 (December 1, 2018 - January 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%





Lower Yellowstone River Basin

The water-year started out slow in many mountain locations with October precipitation being below average in all locations except for a few mountain SNOTEL sites in the Shoshone River basin. Fortunately, November brought substantial change across northern Wyoming when most mountain locations began to build their seasonal snowpack for the year, with above average precipitation in almost all areas aside from sites on the east side of the Wind River range. Unfortunately, a major pattern shift occurred in mid-November weather wise, which resulted in below average precipitation across the entire region, aside from the Owl Creek Range and some isolated valley locations. Snowpack across northern Wyoming on January 1st ranges from near normal in the Shoshone (103%), Bighorn (104%) and Little Bighorn Basins (103%), to below normal in the Tongue (89%) and Wind River basins (81%). Reservoir storage for this date is above average in all the Lower Yellowstone Reservoirs that feed Montana rivers due to excellent carryover storage from the [well above average runoff last spring and summer](#) in the Wind, Bighorn and Shoshone River basins.

Lower Yellowstone River Basin Data Summary

Snowpack	Percent of 1981-2010 Normal (Median)	Last Year Percentage of Normal (Median)
WIND RIVER BASIN	80%	142%
SHOSHONE RIVER BASIN	103%	158%
BIGHORN RIVER BASIN	104%	143%
LITTLE BIGHORN BASIN	102%	105%
TONGUE RIVER BASIN	89%	93%
POWDER RIVER BASIN	106%	116%
Basin-Wide Snowpack	93%	130%

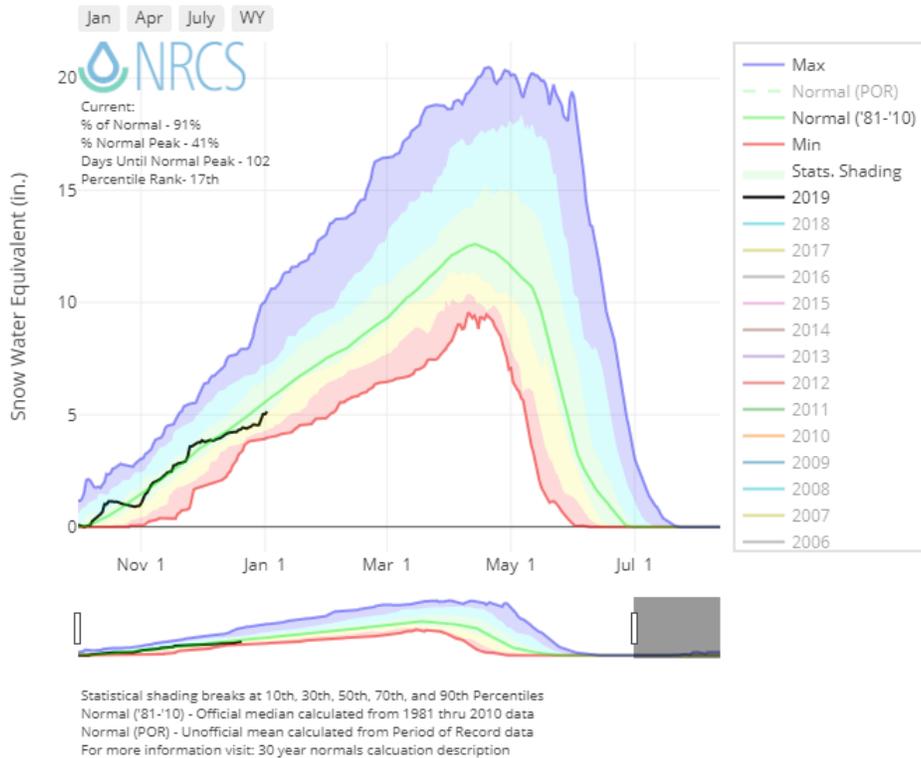
Precipitation	Monthly Percentage of Average	WYTD Percentage of 1981-2010 Average*	WYTD Last Year Percentage of Average
Mountain Precipitation	63%	89%	105%
Valley Precipitation	123%	106%	100%
Basin-Wide Precipitation	78%	94%	103%

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

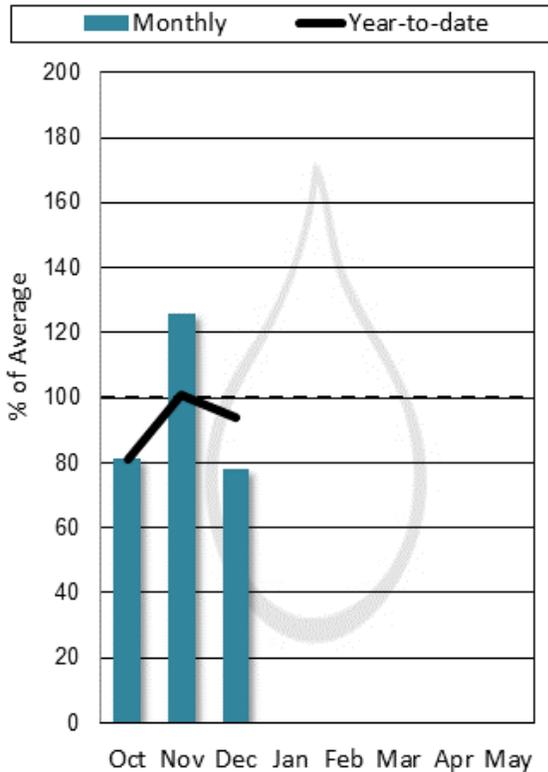
Reservoir Storage	Percentage of Average	Percentage of Capacity (Total)	Last Year Percentage of Average
Basin-Wide Storage	103%	64%	108%

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

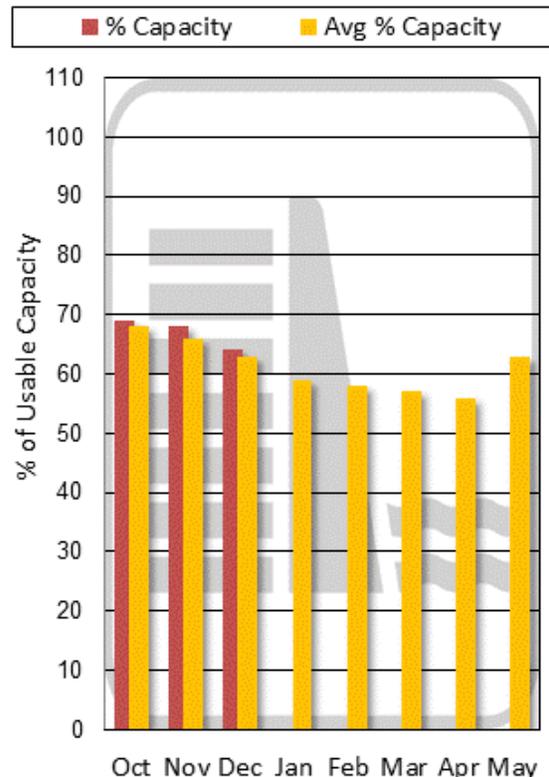
Snow Water Equivalent in LOWER YELLOWSTONE RIVER BASIN (Wyoming)



Mountain and Valley Precipitation

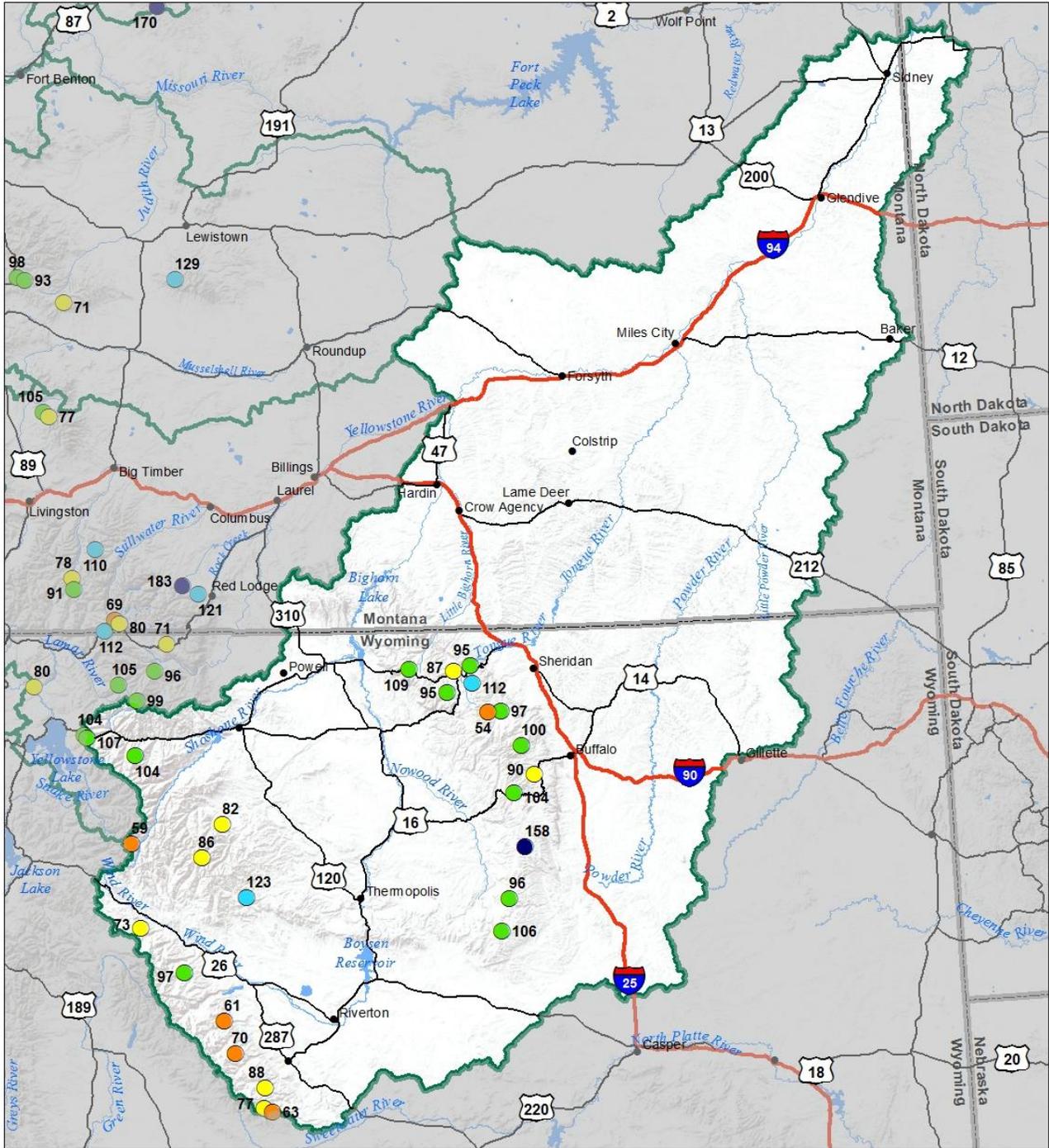


End of Month Reservoir Storage



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 January 1, 2019

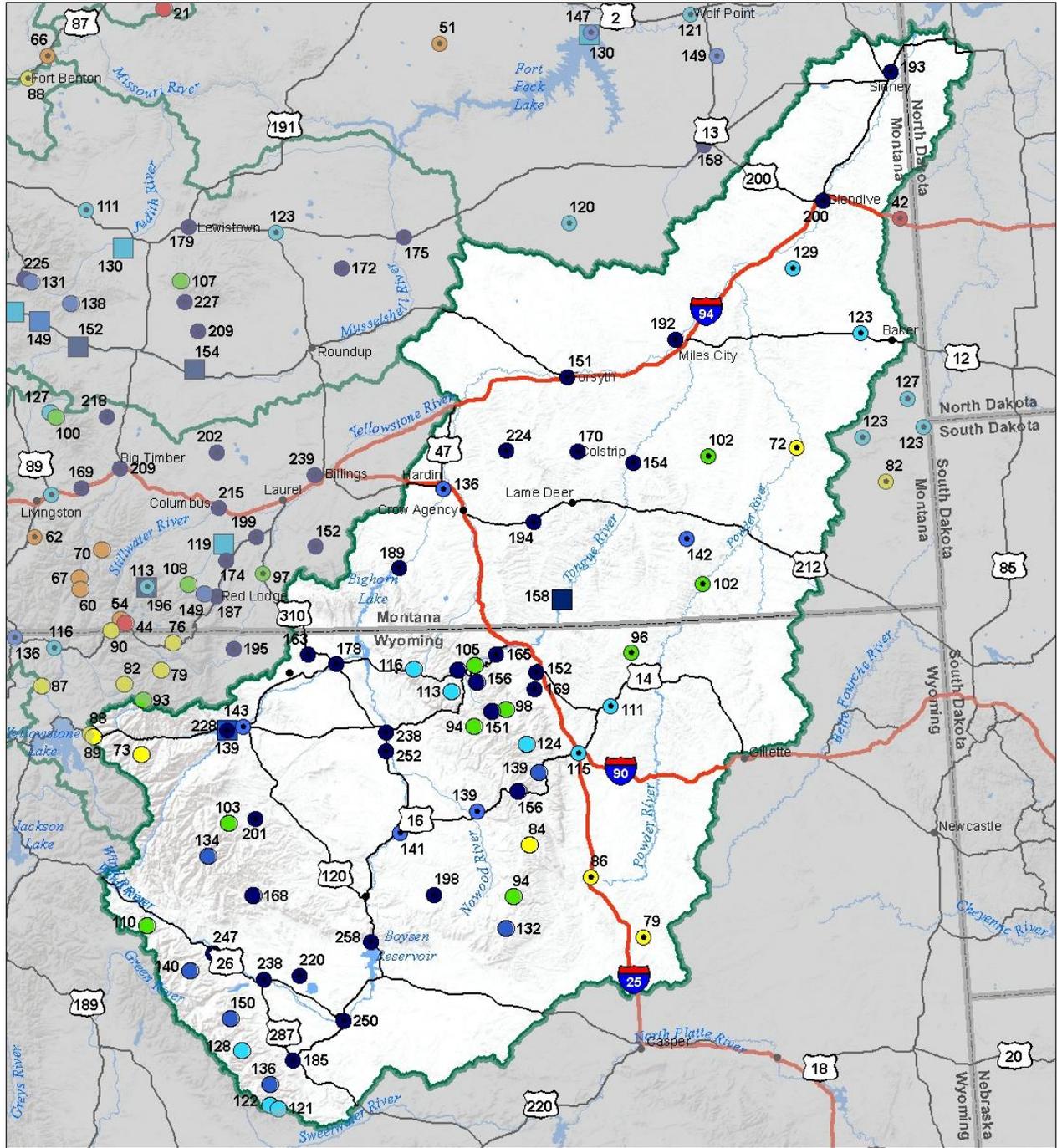


Snow Water Equivalent Percent of Normal

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%	● *	⊕ 91 - 110%	⊕ *
			● *



**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%



Issued by:

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

Released by:

Tom Watson
State Conservationist (Acting)
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

