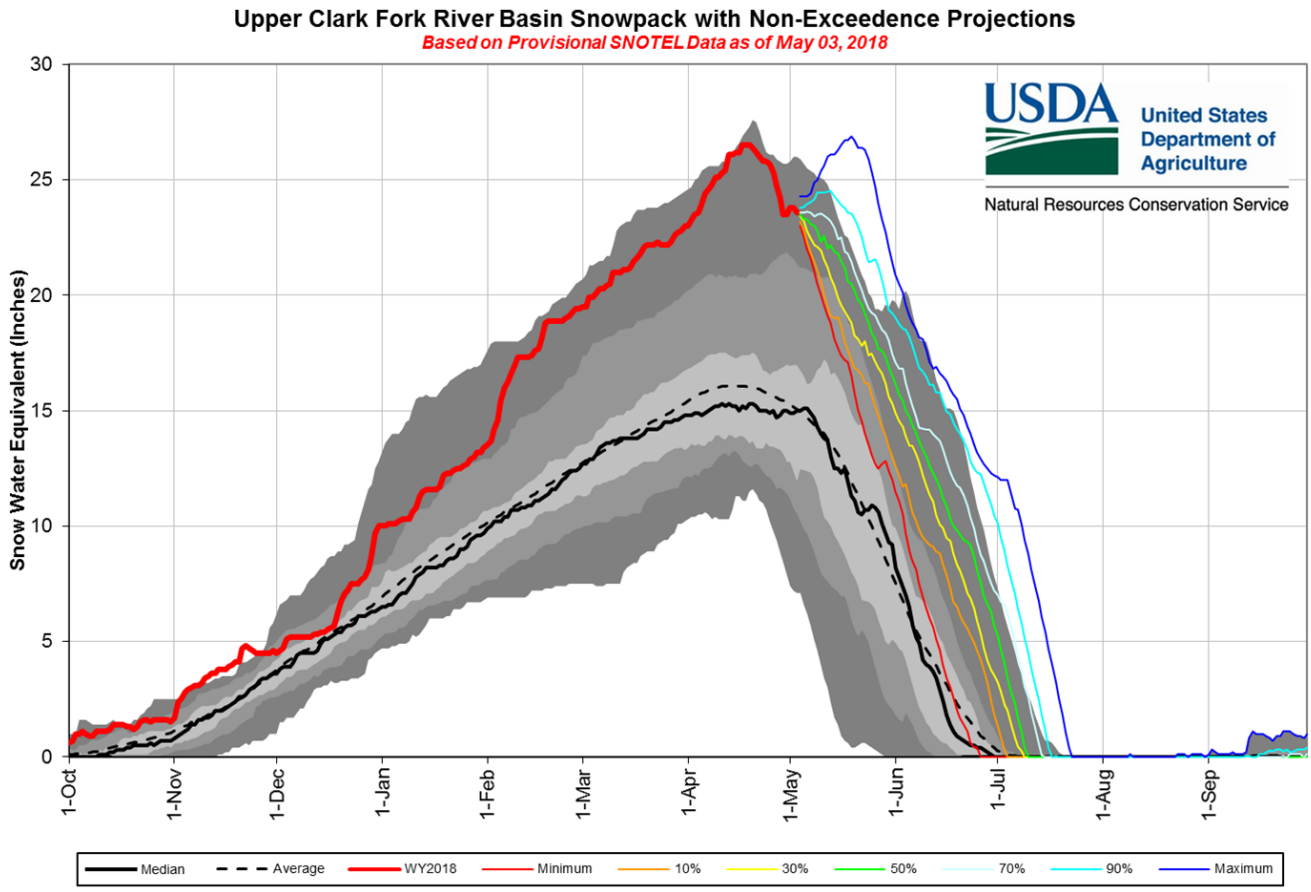
Montana
Water Supply Outlook Report
May 1st, 2018



Shown above, the Upper Clark Fork River basin nearly set a new record for basin-wide peak snow water equivalent (SWE). This graphic shows a composite of all sites within the basin, and in multiple sub-basins. Individual SNOTEL sites within the river basin did set new records for peak SWE, exceeding previous records set in the 1970s, 1997 or 2011. These sites can be found in the Flint/Upper Clark, the headwaters of the Blackfoot, and Little Blackfoot Rivers. The Clark Fork River basin by no means the only basin where snowpack approached or set new records. Snowpack in the sub-basins of the Upper Yellowstone and mountains surrounding Helena was also record-setting. With snowmelt just starting, there is a large volume of water left to enter our rivers and streams in all basins across the state. Long-duration water supply forecasts issued on May 1st for the spring and summer are well above average to near-record. Water users should consult their basin of interest in this report to get information on snowpack and water supply for their specific area.

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Montana Water Supply Outlook Report as of May 1st, 2018

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

It's official, runoff has begun across the state of Montana and the first week or two of this year's snowmelt-driven streamflows during the end of April have been pretty impressive. This winter, well-above normal snow fell throughout all the snow-producing months building a snowpack that broke records in some regions of the state. New water-year peak snow water equivalent records were set in the Upper Clark Fork River basins and the Clark's Fork of the Yellowstone River basins. The Second-highest snowpack on record can be found in the Shields River basin and the Boulder River (Yellowstone) basin. Snowpack looks to have peaked at low to mid-elevations during the first or second week of April, which is one to two weeks later than the period of record average. High elevation sites across the state are still accumulating snow water at this time or peaked during the last week of April. Only time will tell if coming storms will continue to increase the high elevation snowpack.

How anomalous was the snowfall this winter? It depends on the location. In many locations, 1972, 1975, 1997 and 2011 still have higher peak snow water equivalent at SNOTEL sites and snowcourses for the water year. These areas can be found in southwest Montana and the central mountain ranges of the state. Elsewhere, the 2018 water year will go down as one of the top 3 years for snowpack with water year peak values all in the upper 10th percentile of all years measured.

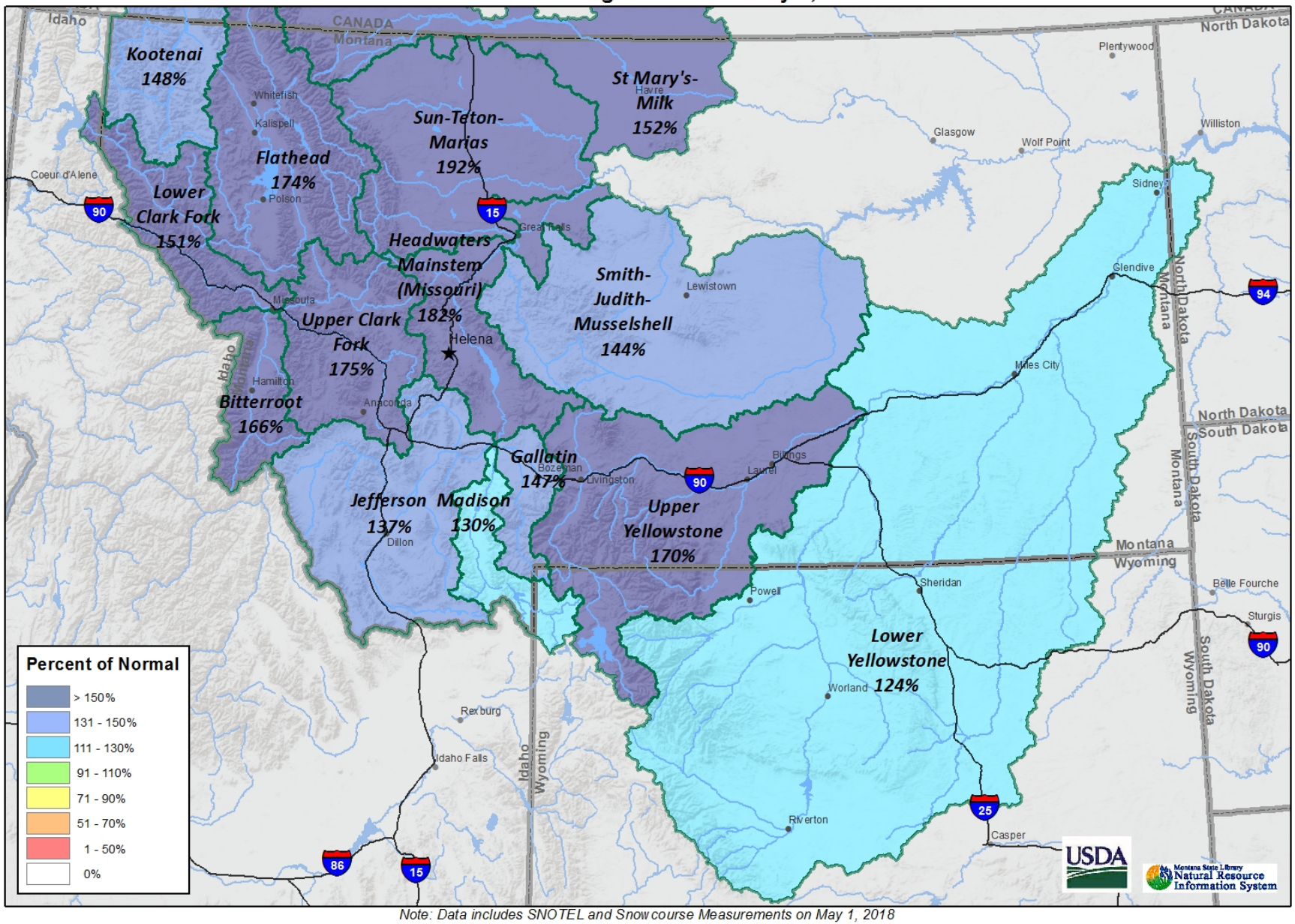
As of May 1st, most low to mid-elevation sites have transitioned to active melt during the last ten days of April. In most locations, the higher elevations are still holding snow water and not discharging at this time. The rapid increases in streamflows on many rivers and streams were due to snowmelt runoff at the end of the month due to the warm, sunny days and above freezing temperatures at mountain locations. Cooler cloudy days at the end of the month helped to slow the mountain runoff, but flows remain high on many river systems on this date. The take home point this month is this; there is still abundant snowpack remaining in the mountains for this date, and in many locations, it is primed for runoff. More information can be found in the streamflows section of this report.

Snow Water Equivalent

5/1/2018	***% Normal***	***% of Last Year***
Columbia River Basin	167	140
Kootnenai in Montana	148	122
Flathead in Montana	174	139
Upper Clark Fork	175	161
Bitterroot	166	136
Lower Clark Fork	151	122
Missouri River Basin	147	136
Jefferson	137	121
Madison	130	109
Gallatin	147	134
Headwaters Mainstem	182	202
Smith-Judith-Musselshell	144	173
Sun-Teton-Marias	192	149
St. Mary-Milk	152	123
Yellowstone River Basin	146	93
Upper Yellowstone	170	122
Lower Yellowstone	124	73

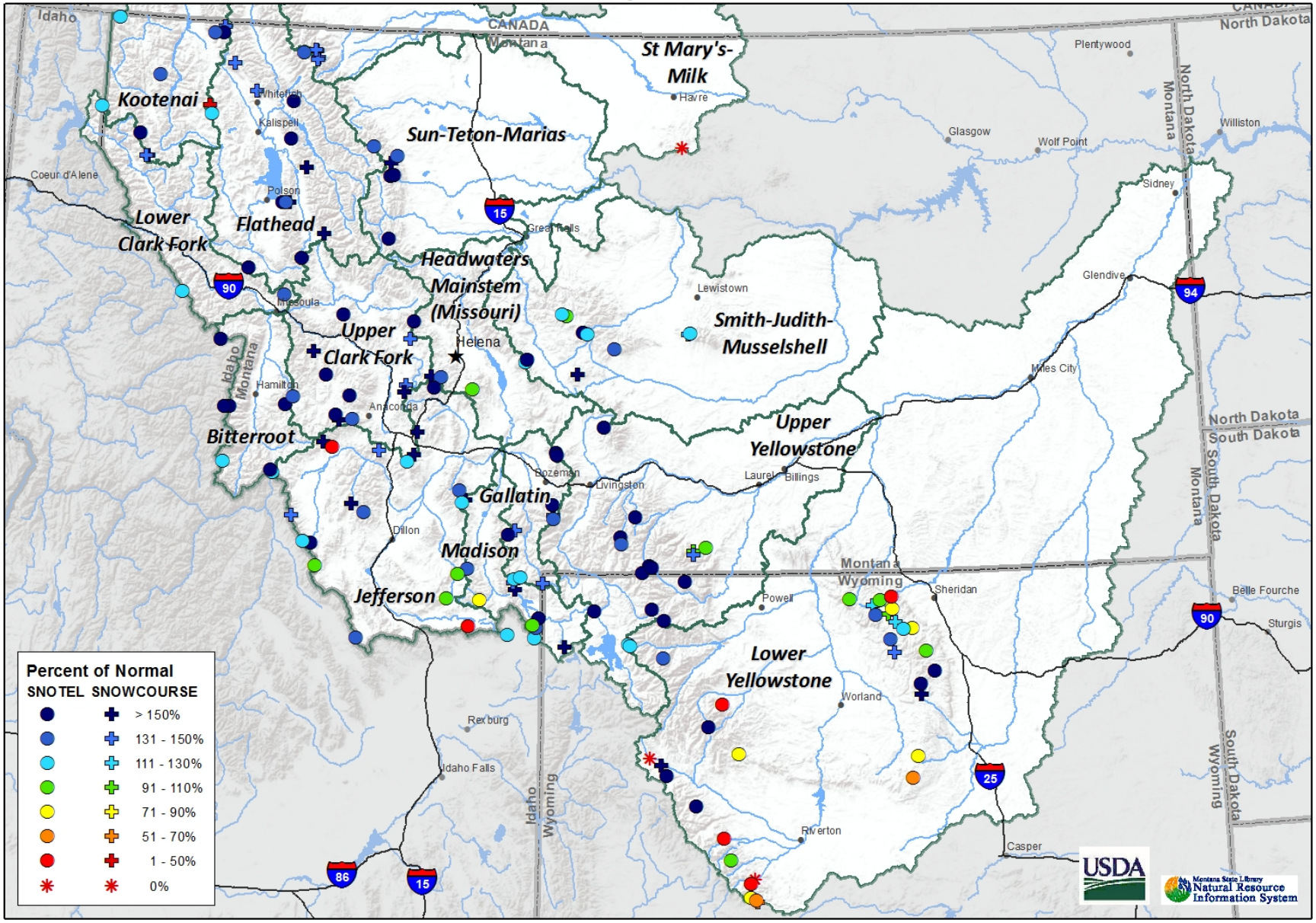
West of Divide	167	140
East of Divide	146	111
Montana State-Wide	159	135

Montana Data Collection Office
Current Snow Water Equivalent
Basin Percentage of Normal - May 1, 2018



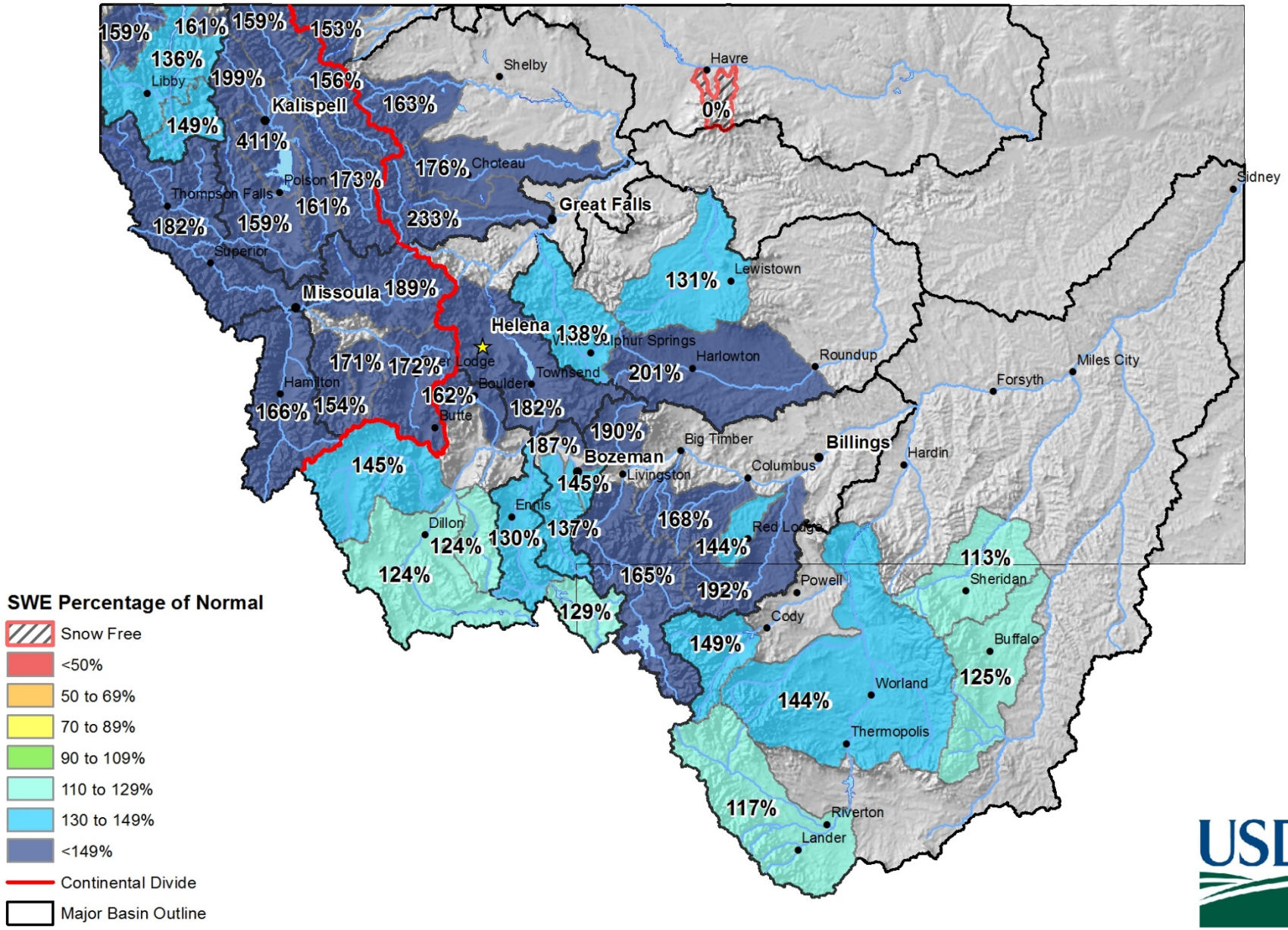
Note: Data includes SNOTEL and Snowcourse Measurements on May 1, 2018

Montana Data Collection Office
Current Snow Water Equivalent
May 1, 2018



Montana Data Collection Office

Sub-Basin Snow Water Equivalent - May 1st, 2018



Precipitation - Overview

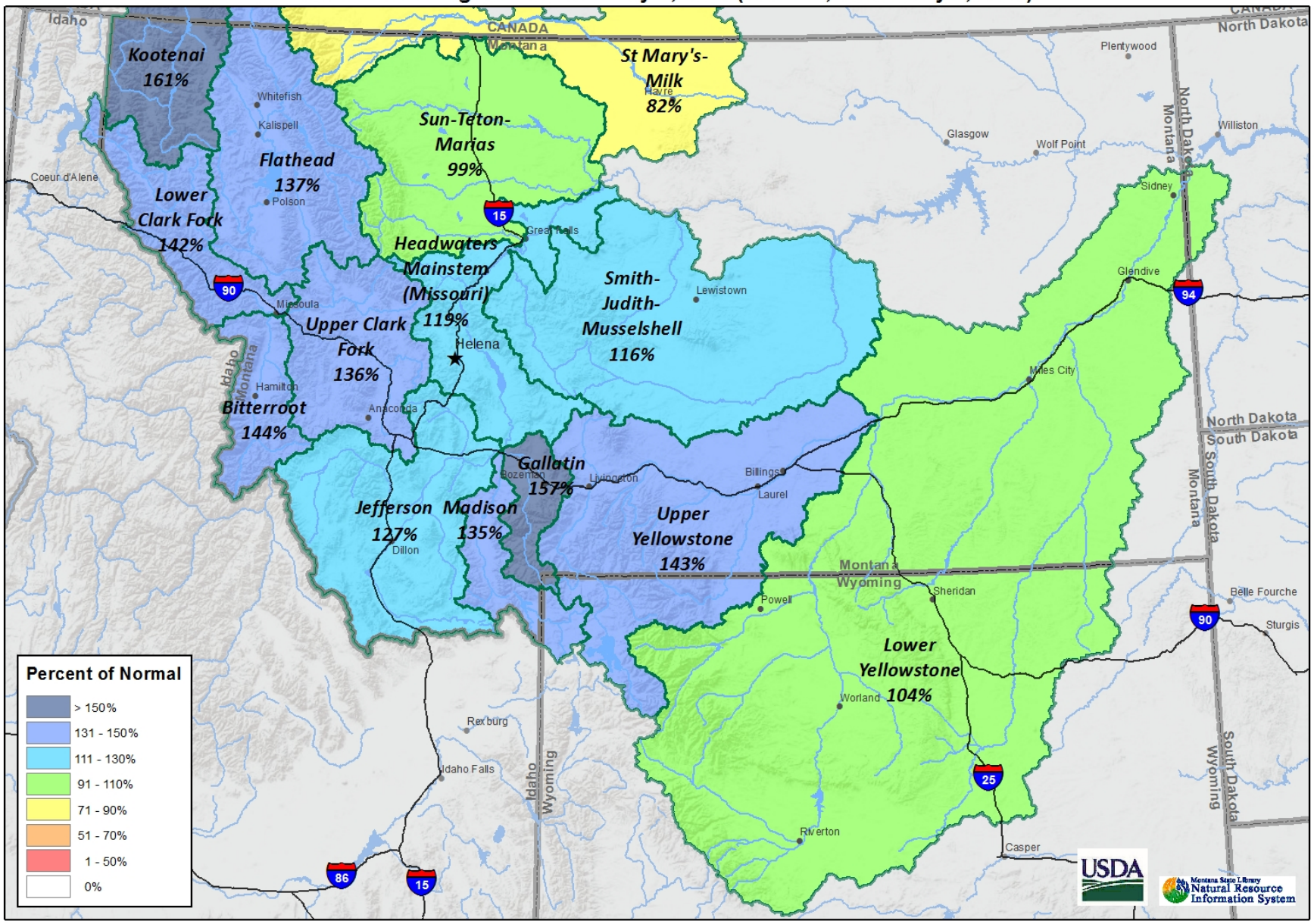
It was yet another month where precipitation has been well-above average in many mountain and valley locations in western Montana. What stands out this month is the distribution of when the precipitation fell. The first two weeks brought significant moisture and cool temperatures, which continued to build the mountain snowpack in many areas. Precipitation during this time was well above average, in many areas the bulk of the well-above-average monthly precipitation fell during the first two weeks. One SNOTEL site west of the Divide had its highest monthly total for April on record (North Fork Elk Creek), and four others had their second highest April totals on record. East of the Divide, some valley locations in the Madison River basin and Jefferson River basin experienced the highest monthly April totals on record. The Belgrade Airport COOP station reported a new record of 3.2" for the month (78 years of record), and the COOP weather station at Montana State experienced the second biggest April on record, reporting 4.4" for the month (125 years of record). The weather pattern switch during the latter half of the month brought high pressure and cloud-free skies until the end of the month. As we move into spring, the eastern mountain basins are favored with regards to precipitation with May and June typically being some of the "wettest" months of the year. On the west side of the Divide, precipitation tapers down as summer approaches. Water-year to date precipitation is above to well-above average across the state due to the abundant snowfall this year. What a year it's been for water falling from the sky in Montana. It'll be interesting to see what spring and summer yield.

Precipitation

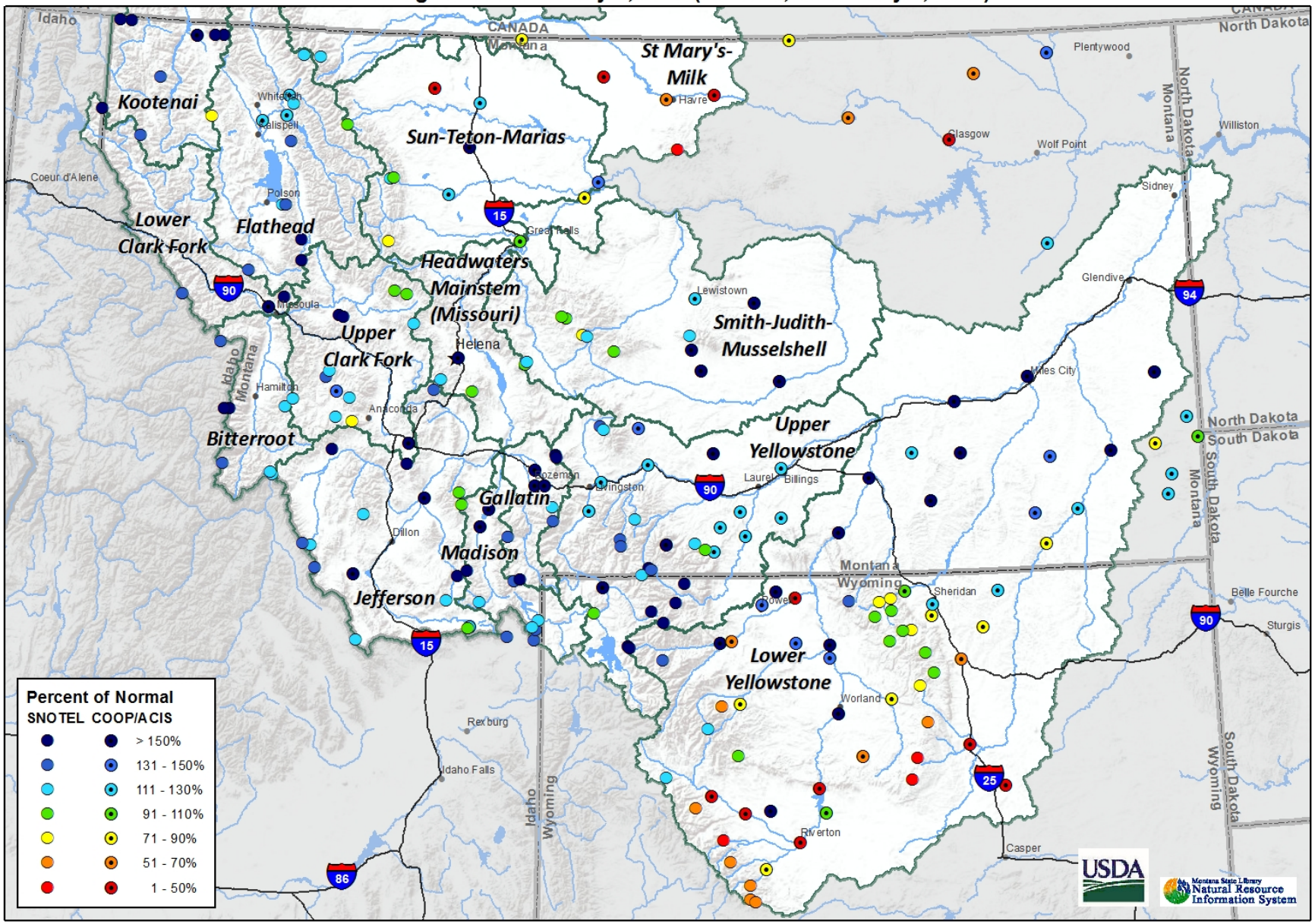
5/1/2018	***Monthly % Avg***	***Water Year % Avg***	***WY % of Last Year***
Columbia River Basin	140	125	97
Kootnenai in Montana	161	118	84
Flathead in Montana	137	130	95
Upper Clark Fork	136	132	117
Bitterroot	144	122	104
Lower Clark Fork	142	118	87
Missouri River Basin	126	120	94
Jefferson	127	113	95
Madison	135	116	84
Gallatin	157	130	98
Headwaters Mainstem	119	134	122
Smith-Judith-Musselshell	116	114	105
Sun-Teton-Marias	99	136	105
St. Mary-Milk	82	123	84
Yellowstone River Basin	117	120	78
Upper Yellowstone	143	138	96
Lower Yellowstone	104	108	67

West of Divide	140	125	97
East of Divide	121	120	88
Montana State-Wide	134	126	96

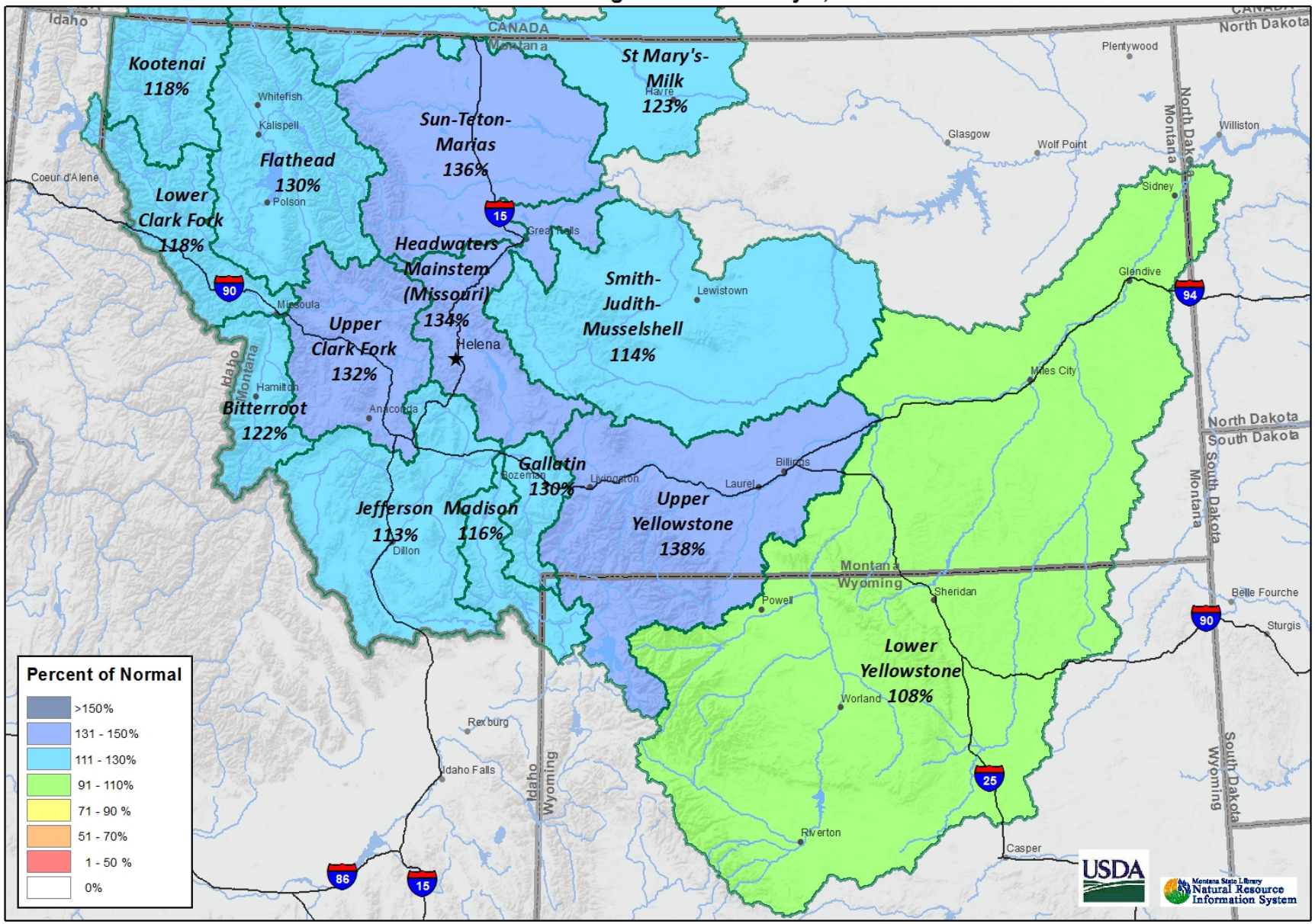
Montana Data Collection Office
Monthly Precipitation
Basin Percentage of Normal - May 1, 2018 (March 1, 2018 - May 1, 2018)



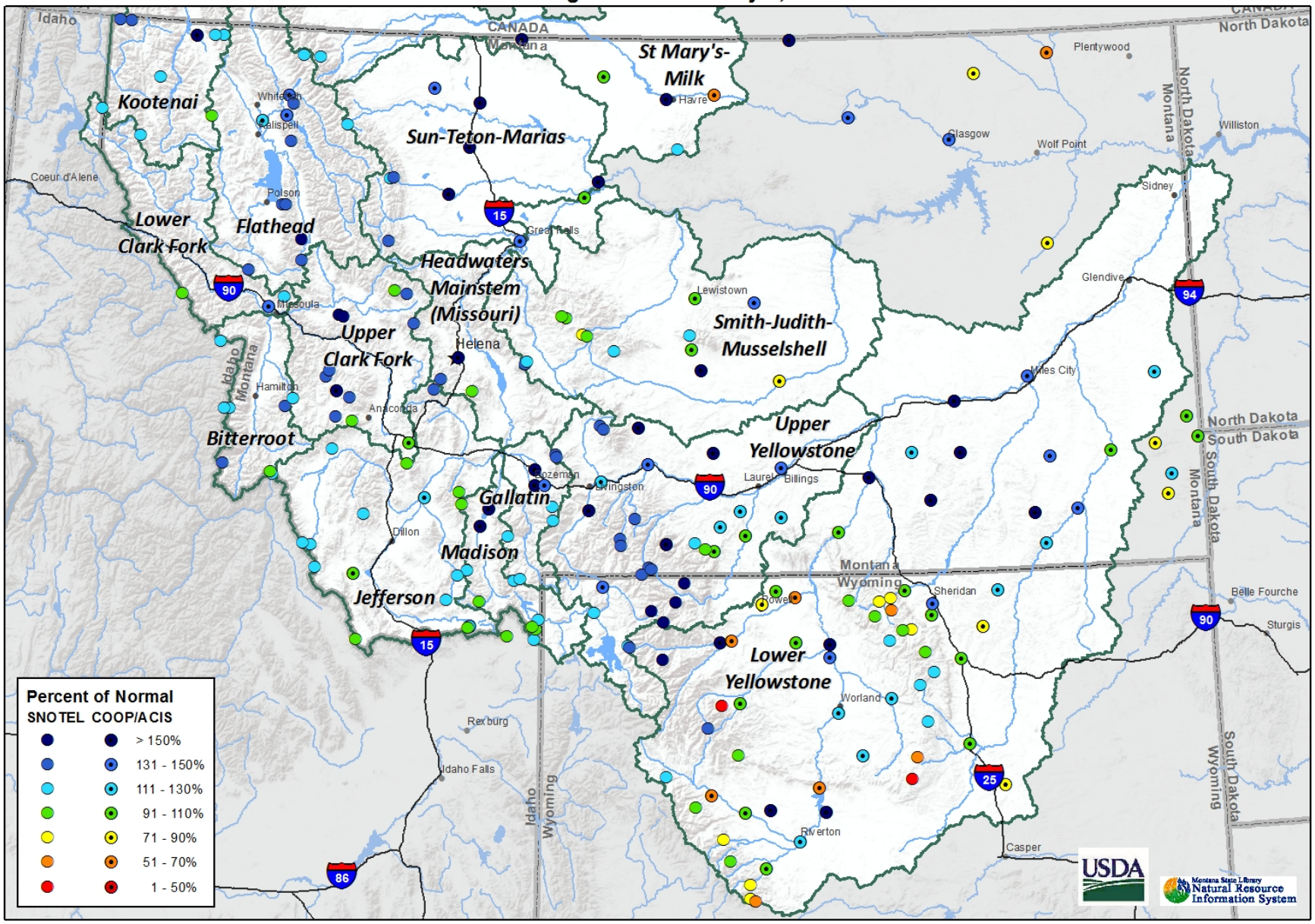
Montana Data Collection Office
Monthly Precipitation
Percentage of Normal - May 1, 2018 (March 1, 2017 - May 1, 2018)



Montana Data Collection Office
Water Year to Date Precipitation
Basin Percentage of Normal - May 1, 2018



Montana Data Collection Office
Water Year to Date Precipitation
Percentage of Normal - May 1, 2018



Reservoirs - Overview

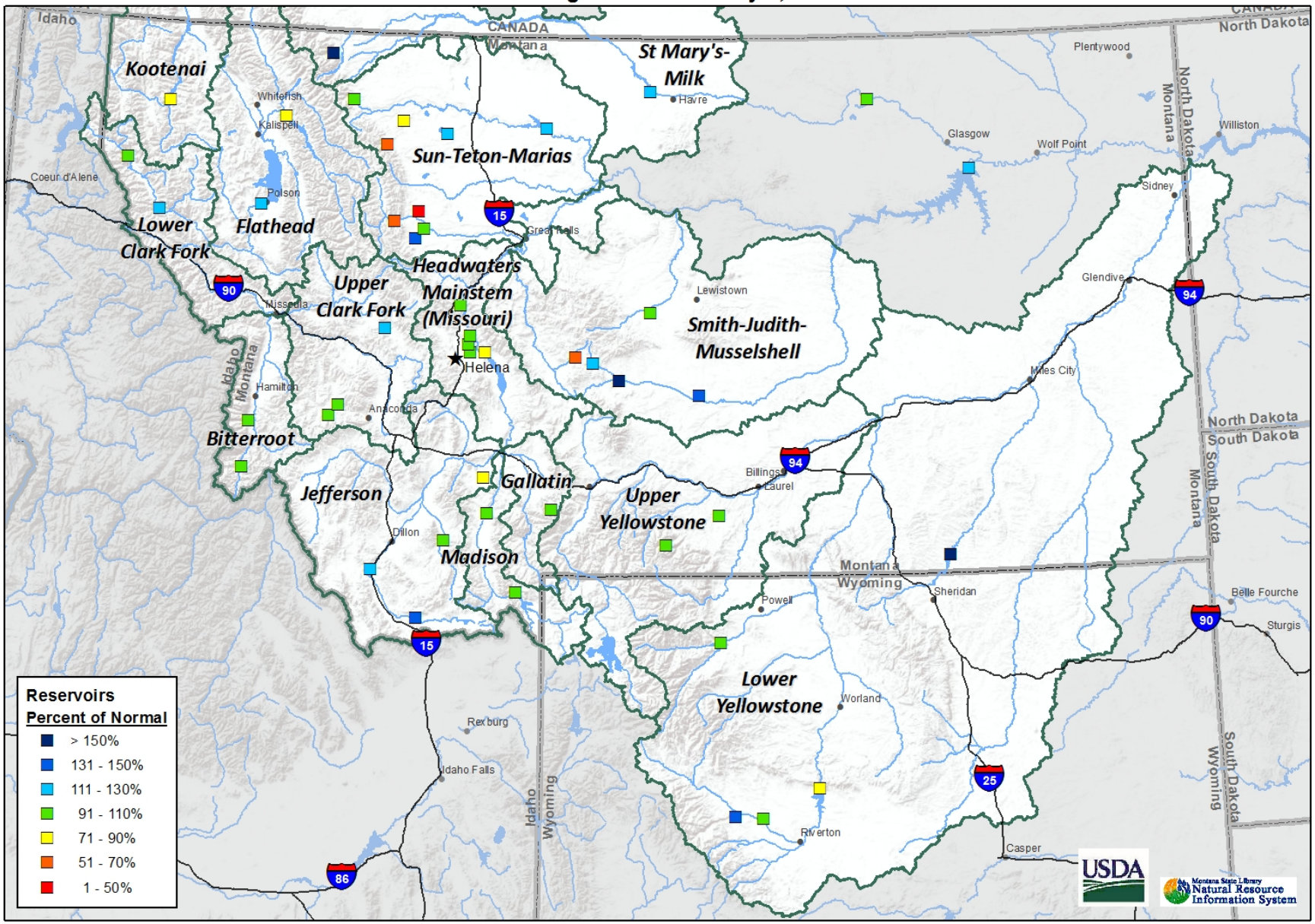
This year has presented a challenge to water managers across the state, well-above normal to record-snowpack has all but assured "adequate" water supply to fill most reservoirs in the state. The issue this year is not if they will have enough water to fill, it will be managing how much water will enter the reservoirs from snowmelt. The Bureau of Reclamation (USBOR) and Army Corps of Engineers (USACE) have been actively managing large reservoir projects across the state in anticipation of the well above normal snowmelt. Canyon Ferry Reservoir has been dropped to low levels for this time of year in anticipation of snowmelt in the Upper Missouri Headwaters and is releasing above average flows to the river. Similarly, Hungry Horse Reservoir on the west-side has been dropped nearly 70' since January in anticipation of the coming runoff. These projects provide water for power, agricultural use, flood control and recreation. This year water managers are being tested to see if they can provide a reasonable solution for all parties. Smaller reservoirs such as Gibson Reservoir which do not have the large capacity like large USBOR and USACE projects have a different problem, as once the reservoirs fill they provide little control once they fill and spill. Gibson reservoir had been dropped to close to record low levels at the end of March to early April. Snowmelt has begun to fill the reservoir at a rapid pace during the last two weeks of April, and snowpack remains well above normal for this date above the reservoir. Once the reservoir fills, water managers will have little control of the releases to the river, which could impact people and infrastructure downstream. Other small irrigator controlled projects across the state share a similar situation this year, and water managers should be aware of the substantial inflows forecasted for most reservoirs. Ultimately, the fill rate of all reservoirs will largely depend on the weather events in the future weeks and months. A word of caution should be noted should weather become anomalously hot and sunny, or large rain events are forecasted. There is a substantial snowpack this year, and snowmelt has only begun in many basins. Weather will be the dominant driver this spring and summer. Cool and cloudy would be ideal.

Reservoir Storage

5/1/2018	***% Average***	***% Capacity***	***% Last Year***
Columbia River Basin	92	50	86
Kootnenai in Montana	89	40	102
Flathead in Montana	94	56	76
Upper Clark Fork	104	83	99
Bitterroot	101	62	81
Lower Clark Fork	108	99	101
Missouri River Basin	119	82	102
Jefferson	123	76	114
Madison	100	73	93
Gallatin	107	65	101
Headwaters Mainstem	124	86	104
Smith-Judith-Musselshell	131	86	113
Sun-Teton-Marias	108	60	97
St. Mary-Milk	122	64	91
Yellowstone River Basin	96	54	97
Upper Yellowstone	105	49	90
Lower Yellowstone	96	54	97

West of Divide	92	50	86
East of Divide	118	80	102
Montana State-Wide	111	71	97

Montana Data Collection Office
Reservoir Levels
Percentage of Normal - May 1, 2018



Streamflow - Overview

It's not news anymore, the snowpack this year available runoff is substantial, and there will be some impacts to water users around the state once it gets in full swing. Throughout the winter and spring, the NRCS Montana Snow Survey has highlighted the anomalously high snowpack, even record-setting in some river basins. Snowmelt has only begun in the last two weeks due to the cool and wet weather pattern we have experienced throughout this winter. This delayed snowmelt at low elevations, building on the already above normal snowpack. The mild weather began the melt at mid and low elevations during the latter half of April with many streams and rivers rising dramatically at the end of the month. Flooding was reported along the Milk River due to melt of low elevation snowpack, and the Clark Fork River basin above Missoula was in the minor flood stage as of May 1st. If water users are to take away one point from this information it should be this; snowmelt has only just begun in many areas, and the snowpack that is remaining is well above normal for this date. There is a substantial amount of water left to come. Forecasts for the May 1st – July 31st period are above normal in the southwestern river basins but increase to well above normal for many basins west of the Divide, in the Rocky Mountain Front, and portions of the Upper Yellowstone.

The issue won't be water availability from snowmelt this year, as this winter's snowpack will provide ample runoff this spring and summer. What needs to be watched at this point is the future weather, and a close eye should be kept on day-to-day and week-to-week weather patterns. A prolonged period of high pressure with abundant sunshine, high daily temperatures, and night of above freezing temperatures could release a substantial amount of water in a short period. At this point, the best case scenario would be a cool and cloudy weather pattern in the future to allow a slow release of mountain water into the river systems. This might help to alleviate some concerns regarding flooding and help to deliver water to agricultural producers later in the summer when irrigation water demand is high.

	MAY-JUL 50 % Exceedance Forecasts		
River Basin	**Highest Point Forecast***	**Lowest Point Forecast****	**Basin Avg Forecast*****
Columbia River Basin	246%	112%	**141%**
Kootenai River Basin	137%	119%	**130%**
Flathead River Basin	157%	117%	**142%**
Upper Clark Fork	246%	142%	**168%**
Bitterroot River Basin	141%	120%	**131%**
Lower Clark Fork	148%	112%	**135%**
Missouri River Basin	197%	95%	**136%**
Jefferson	168%	95%	**129%**
Madison	119%	116%	**118%**
Gallatin	138%	130%	**133%**
Headwaters Mainstem	151%	136%	**145%**
Smith Judith Musselshell	197%	117%	**157%**
Sun Teton Marias	166%	125%	**144%**
St Mary	129%	126%	**127%**
Yellowstone River Basin	218%	81%	**133%**
Upper Yellowstone	218%	100%	**153%**
Lower Yellowstone	161%	81%	**114%**

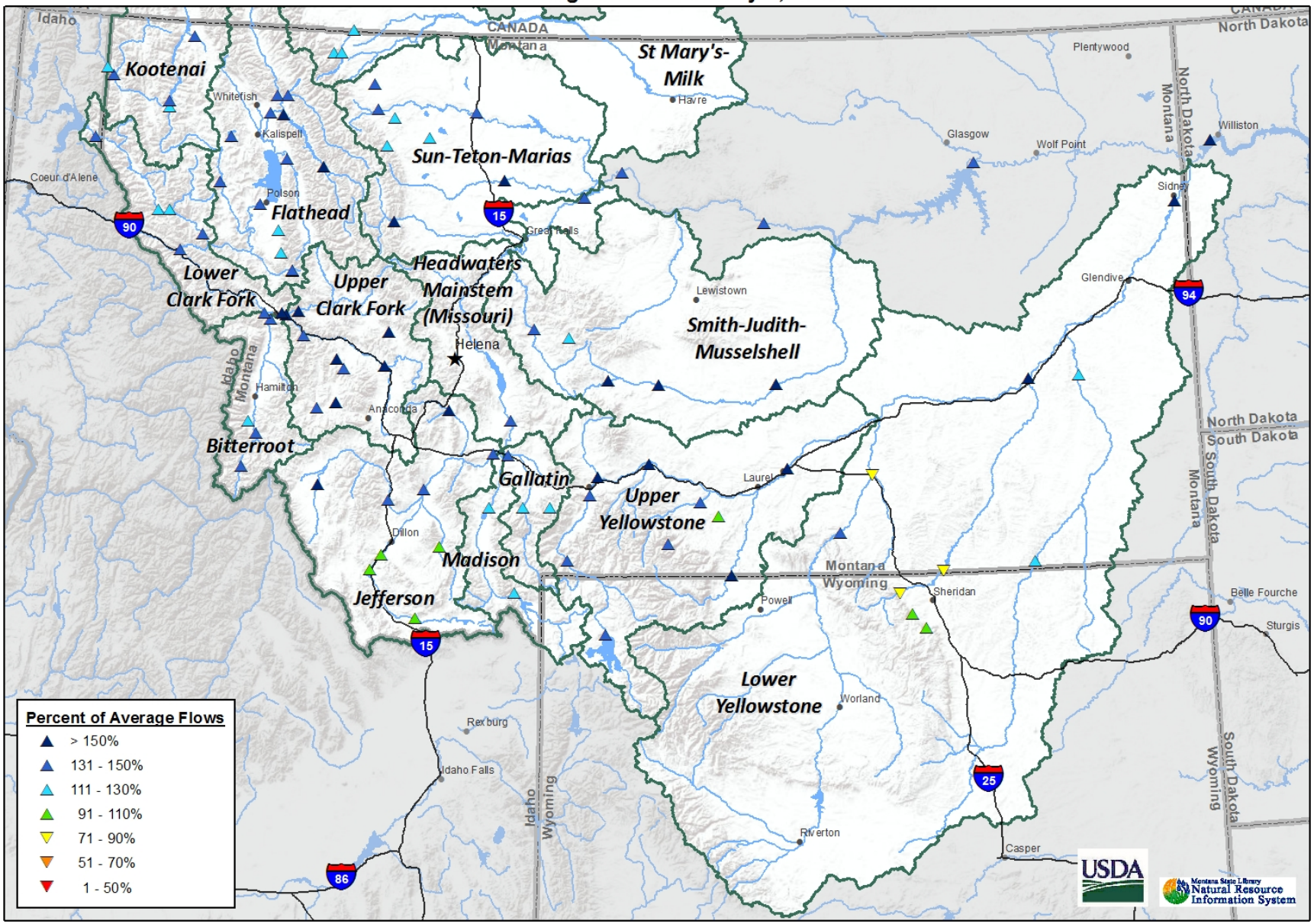
NOTE: Streamflow forecasts are issued for multiple points on rivers and streams within a major river basin and are given as a range of exceedance probabilities. Consult the individual river basin of interest to see the range of values for streams of interest.

*Highest point forecast is the highest 50% forecast of all forecast points within the basin

**Lowest point forecast is the lowest 50% forecast of all forecast points within the basin

***Basin Average Forecast is an average of all 50% forecasts within the basin

Montana Data Collection Office
Streamflow Forecast
Percentage of Normal - May 1, 2018



Kootenai River Basin

Following a snowy winter, there has been no lack of precipitation so far this spring in the Kootenai River basin. Even though April had its share of warm sunny days, it also ranked among the basin's wettest months on record. Eureka Ranger Station recorded its 2nd most April precipitation in 57 years. Several SNOTEL sites recorded their 2nd highest precipitation also. Warm weather and rain initiated snowmelt in the basin during April. All Kootenai SNOTEL sites appeared to have already peaked and have begun releasing water. Rivers including the Fisher, Yaak, and Kootenai are all currently flowing at well above normal levels. With the significant amount of snow that is still in the mountains, there will be abundant water traveling through the Kootenai River basin this year. The snowpack includes low mountain elevation locations like at Garver Creek and Grave Creek SNOTEL sites that have their 2nd highest snowpack in over 40 years. As usual, weather patterns over the next couple months will dictate the timing of which this snowpack influences the Kootenai and its tributaries.

Kootenai River Basin Data Summary

Snowpack	**Percent of 1981-2010 Normal (Median)**	**Last Year Percentage of Normal (Median)**
KOOTENAY in CANADA	137%	131%
KOOTENAI MAINSTEM	136%	110%
TOBACCO	161%	138%
FISHER	149%	109%
YAAK	159%	149%
KOOTENAI RIVER BASIN in MONTANA	148%	121%
KOOTENAI ab BONNERS FERRY	151%	128%
Basin-Wide Snowpack	**148%**	**121%**

Precipitation	**Monthly Percentage of Average**	**WYTD Percentage of 1981-2010 Average***	**WYTD Last Year Percentage of Average**
Mountain Precipitation	159%	118%	140%
Valley Precipitation	235%	151%	194%
Basin-Wide Precipitation	**161%**	**118%**	**141%**

**WYTD Precipitation is October 1st- Current*

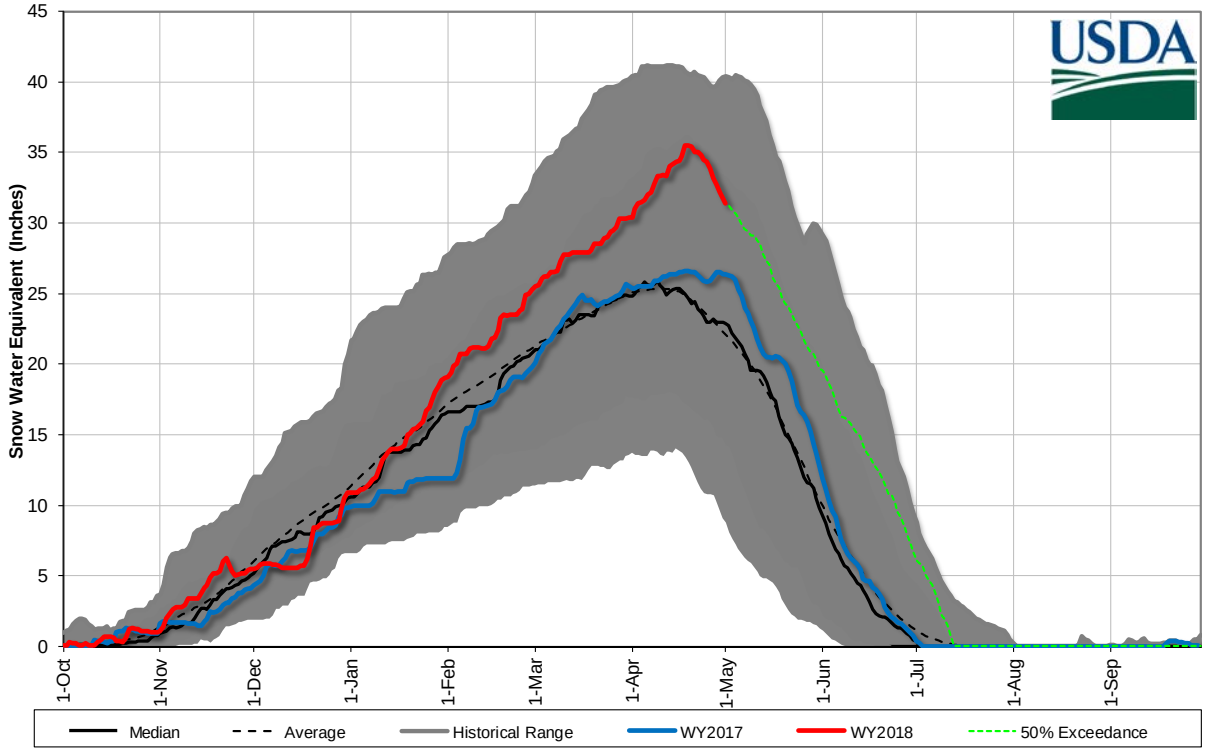
Reservoir Storage	**Percentage of Average**	**Percentage of Capacity (Total)**	**Last Year Percentage of Average**
Basin-Wide Reservoir Storage	**89%**	**40%**	**87%**

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

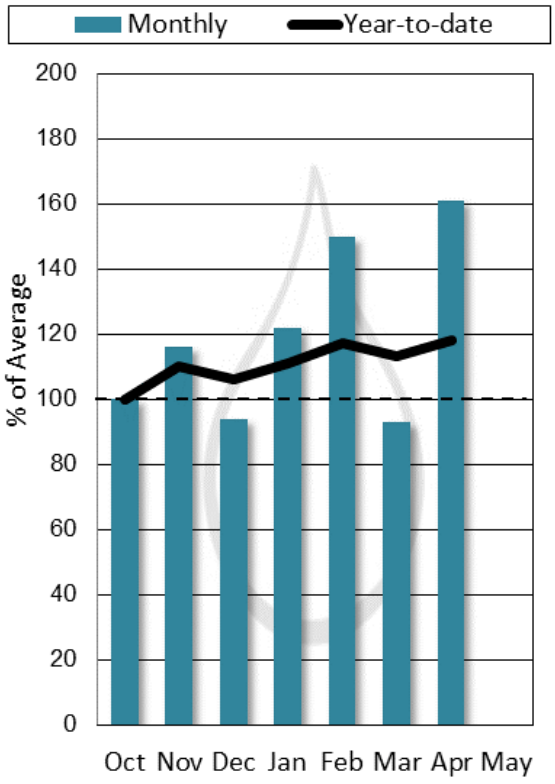
End of Month Storage	**Current (KAF)**	**Last Year (KAF)**	**Average (KAF)**	**Capacity (KAF)**	**% Average**	**% Capacity**
Lake Koocanusa	2320.7	2275.9	2614.0	5748.0	**89%**	**40%**

Kootenai River Basin Snowpack with Non-Exceedence Projections

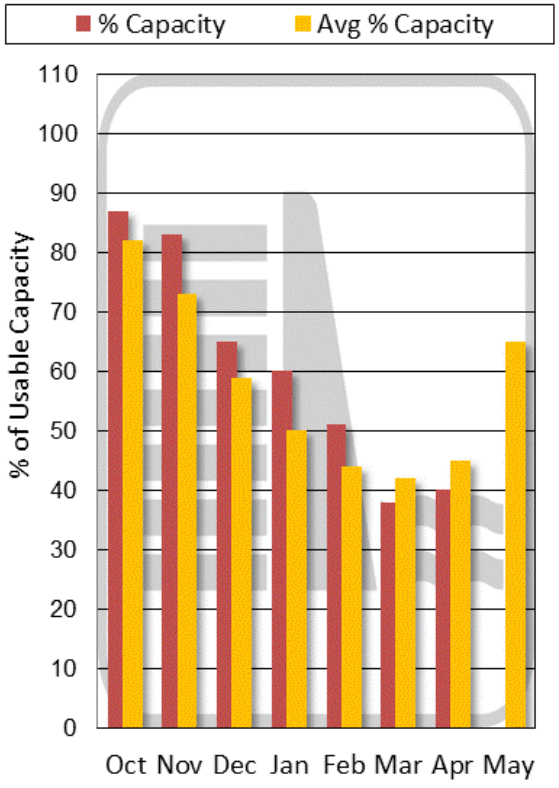
Based on provisional SNOTEL daily data as of 5/1/2018



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.

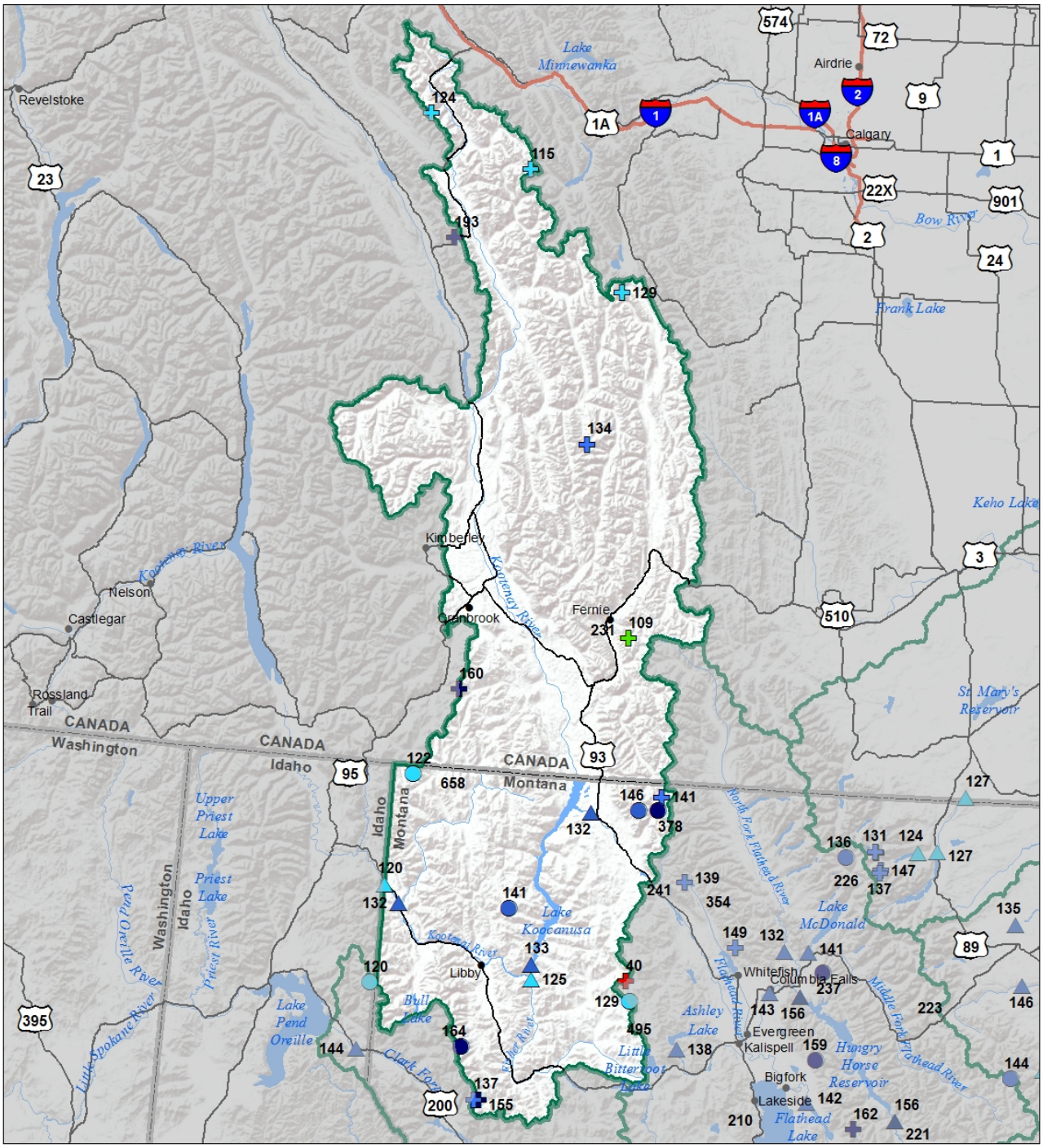
Kootenai River Basin

Forecast Point	Forecast Period	Chance Actual Volume Will Exceed Forecasted Volume						
		90% (KAF)	70% (KAF)	50% (KAF)	*% Avg*	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Tobacco R nr Eureka	MAY-JUL	109	125	136	*135%*	147	162	101
	MAY-SEP	120	138	151	*132%*	163	182	114
Libby Reservoir Inflow[1]	MAY-JUL	5710	6310	6580	*137%*	6850	7450	4820
	MAY-SEP	6690	7330	7620	*133%*	7900	8540	5733
Fisher R nr Libby	MAY-JUL	133	157	172	*126%*	188	210	136
	MAY-SEP	146	170	187	*125%*	205	230	150
Yaak R nr Troy	MAY-JUL	330	380	410	*132%*	445	495	310
	MAY-SEP	345	400	435	*132%*	470	525	330
Kootenai R at Leonia[1,2]	MAY-JUL	5460	6380	6800	*119%*	7220	8140	5730
	MAY-SEP	6810	7670	8060	*120%*	8460	9320	6730

1) 90% and 10% exceedance probabilities are actually 95% and 5%

2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions

Kootenai River Basin
Streamflow Forecast, Snow Water Equivalent
Percentage of Normal
May 1, 2018

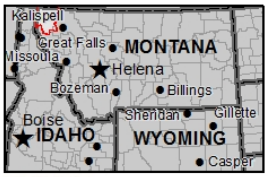


Snow Water Equivalent
Percent of Normal

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

Streamflow Forecast
Percent of Average Flows

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



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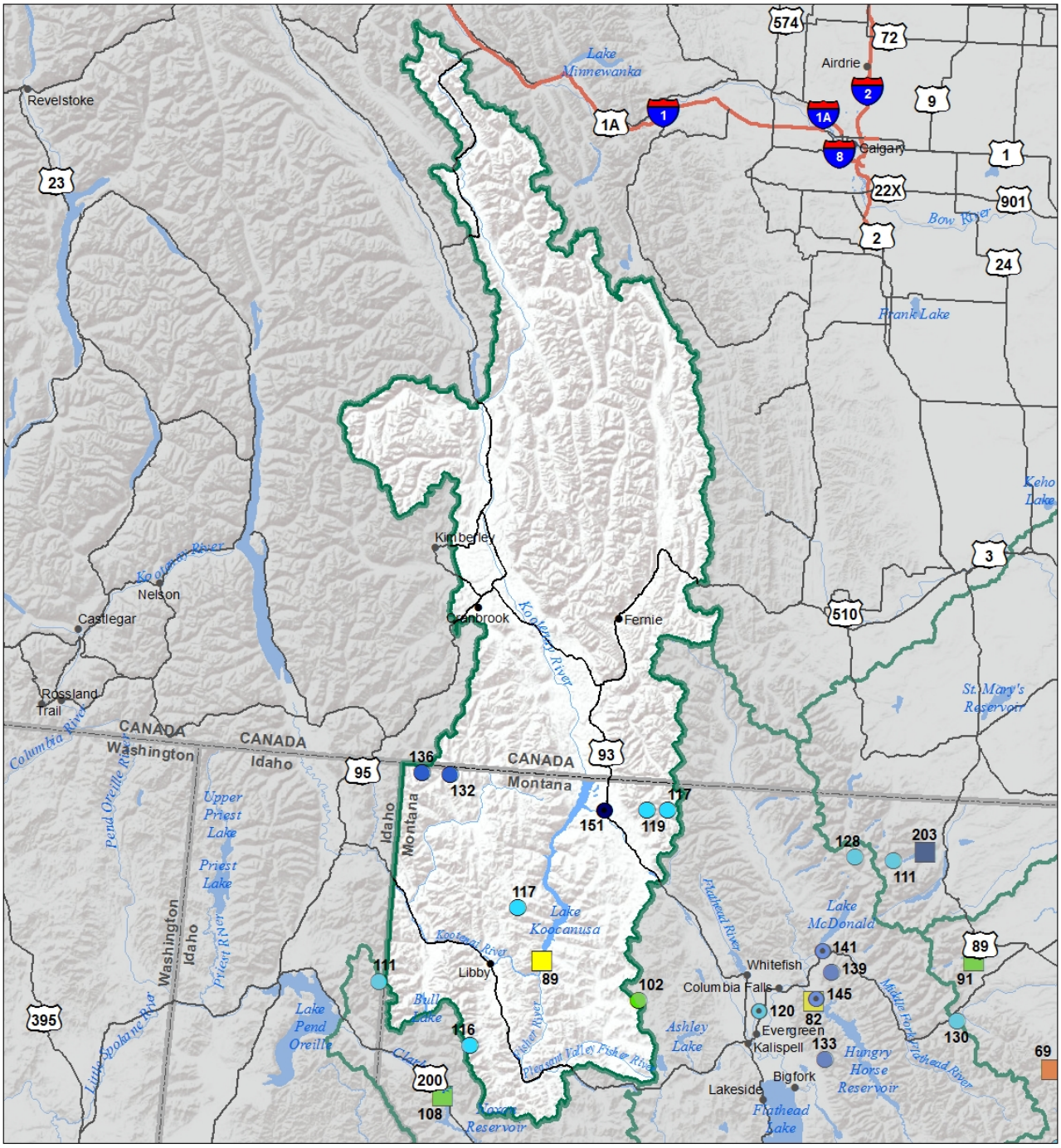
Montana State Library Natural Resource Information System

Kootenai River Basin
Water Year to Date Precipitation and Reservoir Levels
Percentage of Normal
May 1, 2018

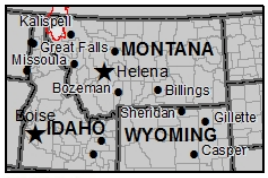


Precipitation
Percent of Normal

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%



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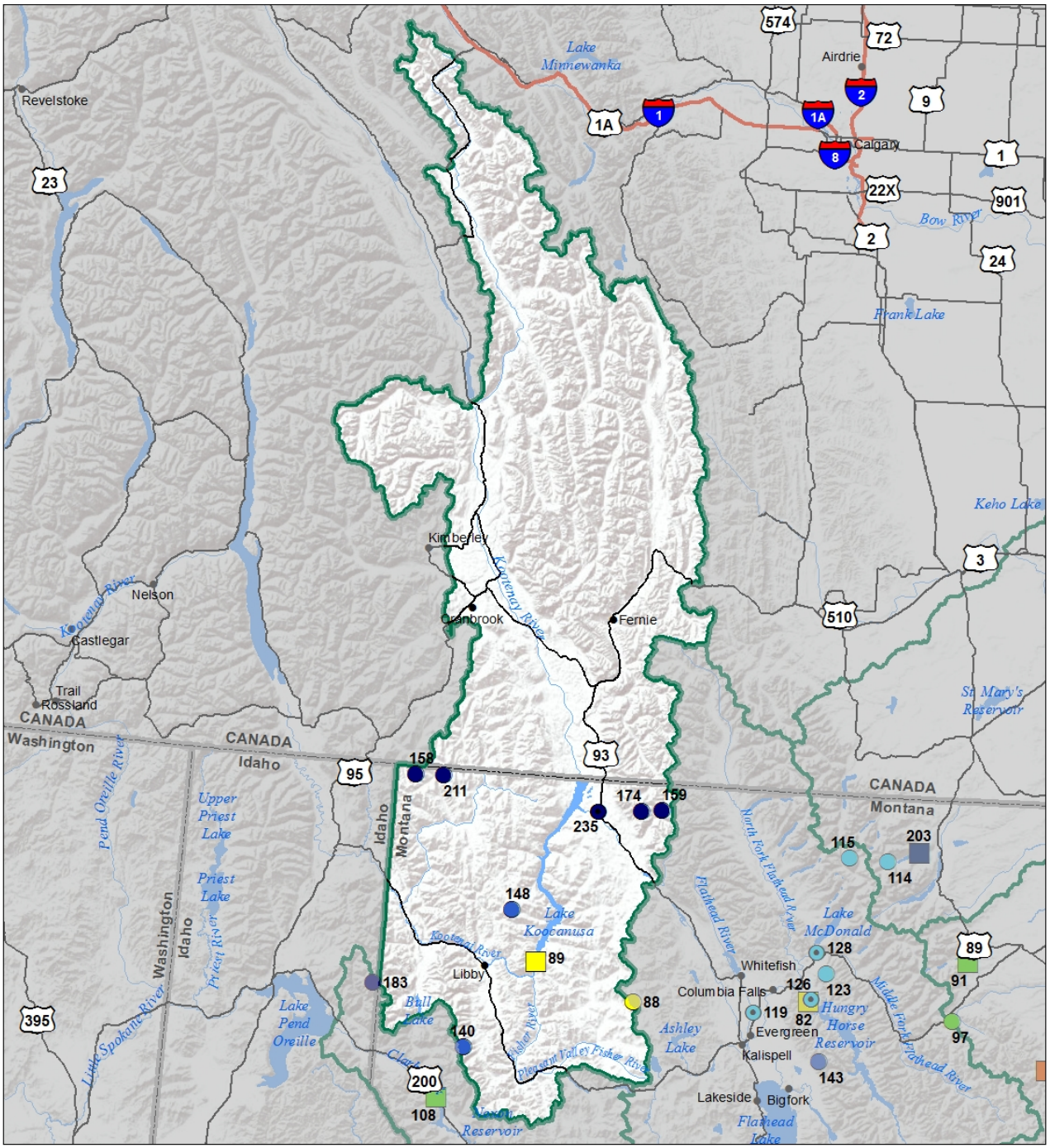
Montana State Library Natural Resource Information System

Kootenai River Basin
Monthly Precipitation and Reservoir Levels
Percentage of Normal
May 1, 2018 (April 1, 2018 - May 1, 2018)

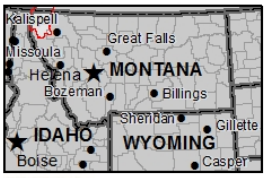


Precipitation
Percent of Normal

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%



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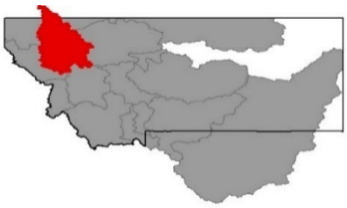


Flathead River Basin

It should be obvious at this point that this will be a big water year in the Flathead River basin. To put it into perspective there hasn't been a single month since October 1st with below average precipitation. The first 18 days of April brought most of last month's precipitation. This precipitation came as rain at lower elevations, which drove some of the shallower snowpack to the melt phase. The warm sunny days that followed during the 2nd half of the month drove the snowpack into melt at all SNOTEL sites except the high elevation Noisy Basin SNOTEL site. This snowmelt brought water levels up significantly across the basin. The Flathead at West Glacier reached over 13,000 cfs last weekend which is nearly triple its's median daily value for this time of the year. The basin's rivers have receded slightly since last weekend, but there is still a substantial snowpack in the mountains. Stryker Basin Snow Course has its highest snow water content for May 1st in 42 years. In the Swan Range, Noisy Basin, Trinkus Lake, and Upper Holland Lake all have their 2nd deepest snowpack on record. It is safe to say there will be no lack of water in the Flathead River this year. The timing of this water will largely depend on what the weather brings over the next couple months.

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	159%	126%
MIDDLE FORK FLATHEAD	156%	133%
SOUTH FORK FLATHEAD	173%	118%
STILLWATER-WHITEFISH	199%	117%
SWAN	161%	118%
MISSION VALLEY	158%	133%
LITTLE BITTERROOT-ASHLEY	411%	243%
JOCKO	159%	125%
FLATHEAD in MONTANA	174%	125%
Basin-Wide Snowpack	***174%***	***125%***

Precipitation	**Monthly Percentage of Average**	**WYTD Percentage of 1981-2010 Average***	**WYTD Last Year Percentage of Average**
Mountain Precipitation	137%	130%	136%
Valley Precipitation	119%	120%	186%
Basin-Wide Precipitation	**137%**	**130%**	**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 Reservoir Storage	94%	56%	124%

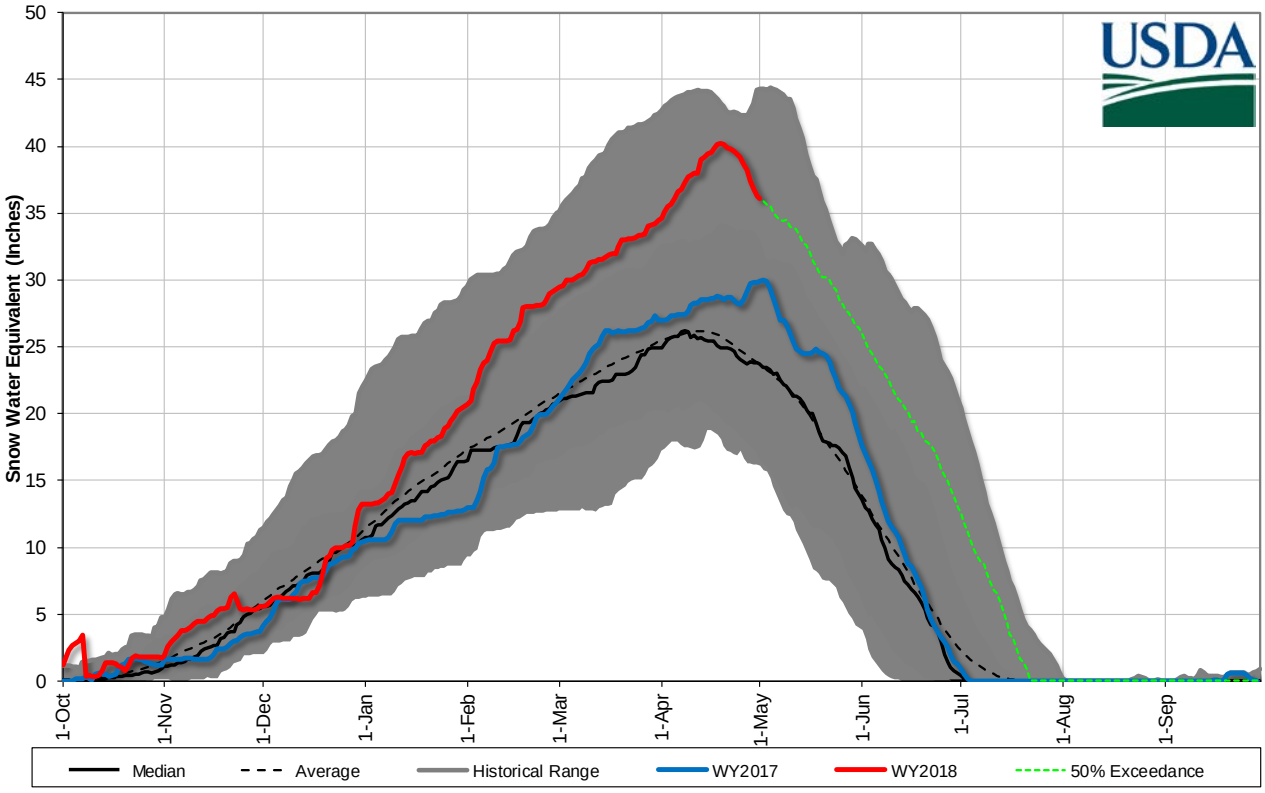
**See Reservoir Storage Table for storage in individual reservoirs*

End of Month Storage

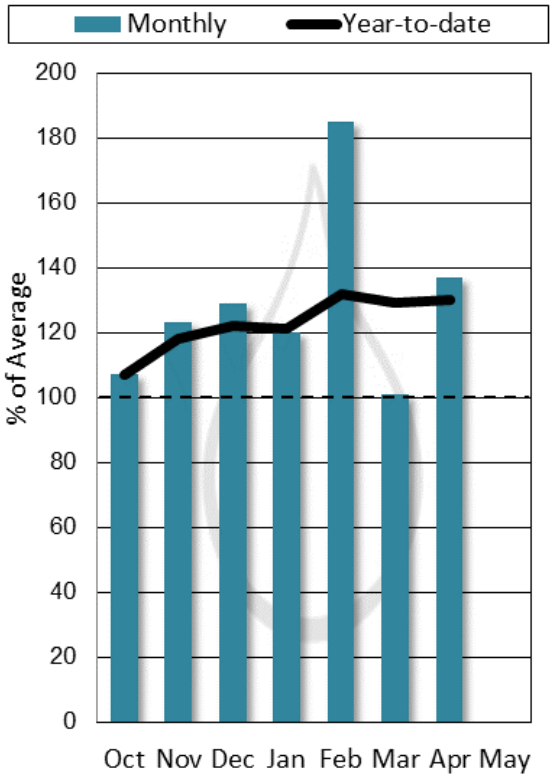
	Current (KAF)	**Last Year (KAF)**	**Average (KAF)**	**Capacity (KAF)**	**% Average**	**% Capacity**
Camas (4)		38.1	26.9	45.2		
Lower Jocko Lake		1.3	0.8	6.4		
Mission Valley (8)		44.3	40.1	100.0		
Hungry Horse Lake	1798.8	2739.1	2188.0	3451.0	**82%**	**52%**
Flathead Lake	1158.7	1186.6	971.5	1791.0	**119%**	**65%**

Flathead River Basin Snowpack with Non-Exceedence Projections

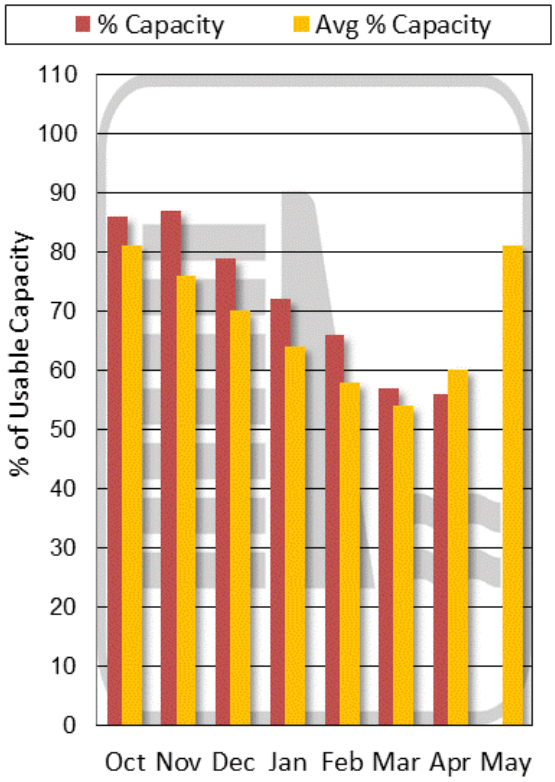
Based on provisional SNOTEL daily data as of 5/1/2018



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.

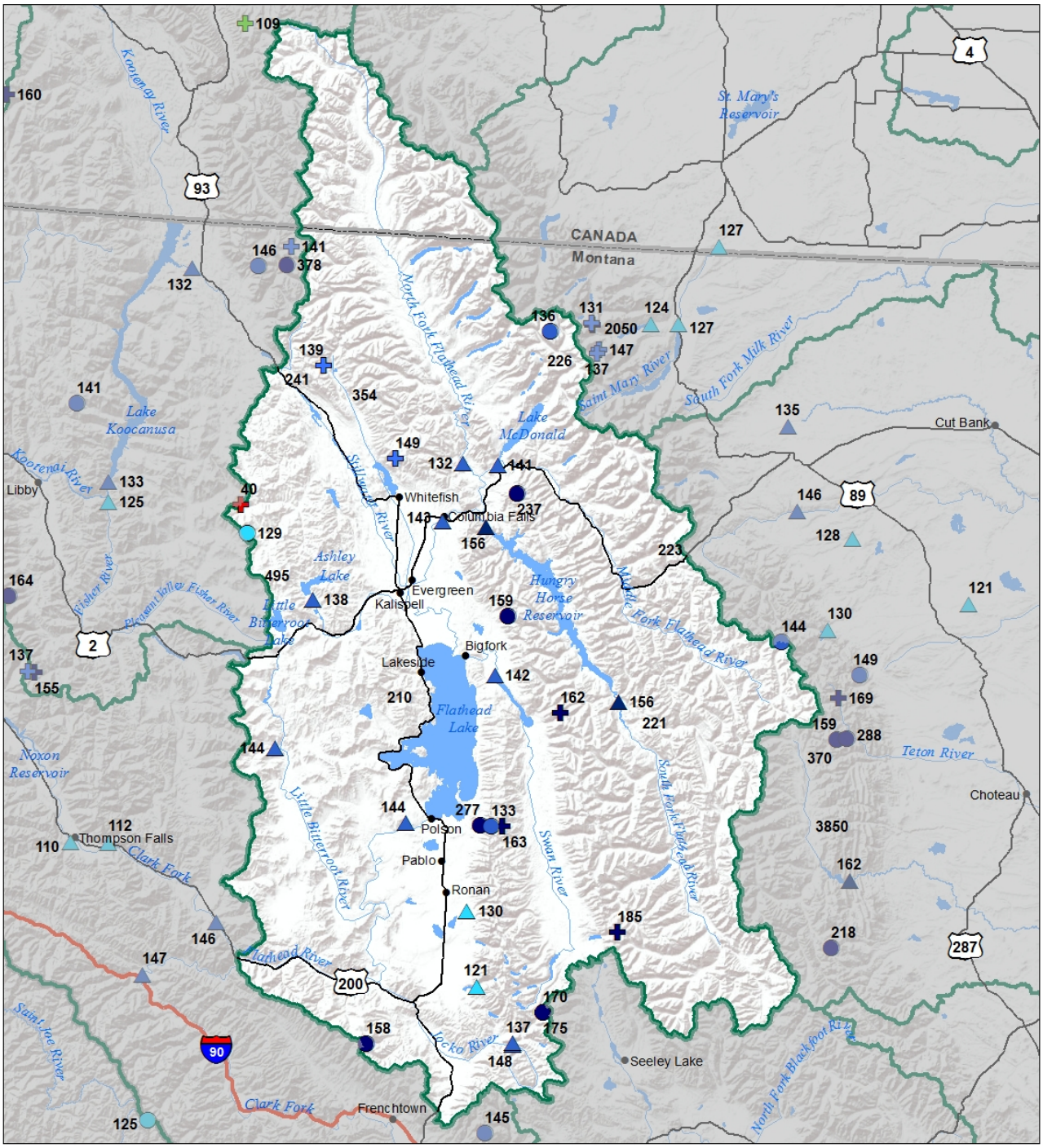
Flathead River Basin

Forecast Point	Forecast Period	Chance Actual Volume Will Exceed Forecasted Volume						30yr Avg (KAF)
		90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	
NF Flathead R nr Columbia Falls	MAY-JUL	1560	1670	1750	*133%*	1830	1940	1320
	MAY-SEP	1730	1860	1950	*132%*	2030	2160	1480
MF Flathead R nr West Glacier	MAY-JUL	1610	1740	1830	*141%*	1920	2060	1300
	MAY-SEP	1770	1910	2010	*141%*	2100	2250	1430
Sf Flathead R nr Hungry Horse	MAY-JUL	1470	1560	1620	*156%*	1680	1770	1040
	MAY-SEP	1570	1660	1730	*156%*	1790	1880	1110
Hungry Horse Reservoir Inflow[1,2]	MAY-JUL	2180	2380	2480	*157%*	2570	2780	1580
	MAY-SEP	2310	2540	2640	*156%*	2750	2970	1690
Flathead R at Columbia Falls[2]	MAY-JUL	5580	5930	6160	*144%*	6400	6740	4290
	MAY-SEP	6080	6470	6730	*143%*	6990	7380	4720
Ashley Ck nr Marion[2]	MAY	2.5	3.2	*3.6*	*138%*	4	4.6	2.6
	MAY-JUL	3.9	4.8	5.4	*138%*	6.1	7	3.9
Swan R nr Bigfork	MAY-JUL	555	600	625	*144%*	655	695	435
	MAY-SEP	645	695	725	*142%*	760	805	510
Flathead Lake Inflow[1,2]	MAY-JUL	6200	6830	7110	*144%*	7400	8020	4940
	MAY-SEP	6730	7440	7770	*144%*	8090	8810	5400
Mill Ck ab Bassoo ck nr Niarada	MAY-JUL	2.9	3.7	4.2	*145%*	4.8	5.6	2.9
	MAY-SEP	3.3	4.1	4.6	*144%*	5.2	6	3.2
South Crow Ck nr Ronan	MAY-JUL	10.1	11.3	12.1	*132%*	12.9	14	9.2
	MAY-SEP	11.6	13	13.8	*130%*	14.7	16.1	10.6
Mission Ck nr St. Ignatius	MAY-JUL	25	27	28	*117%*	30	32	24
	MAY-SEP	30	33	35	*121%*	36	39	29
SF Jocko R nr Arlee	MAY-JUL	39	42	44	*152%*	47	50	29
	MAY-SEP	44	47	49	*148%*	52	55	33
NF Jocko R bl Tabor Feeder Canal	MAY-JUL	36	38	39	*139%*	40	42	28
	MAY-SEP	37	40	41	*137%*	42	45	30

1) 90% and 10% exceedance probabilities are actually 95% and 5%

2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions

Flathead River Basin
Streamflow Forecast, Snow Water Equivalent
Percentage of Normal
May 1, 2018



Snow Water Equivalent
Percent of Normal

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

Streamflow Forecast
Percent of Average Flows

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

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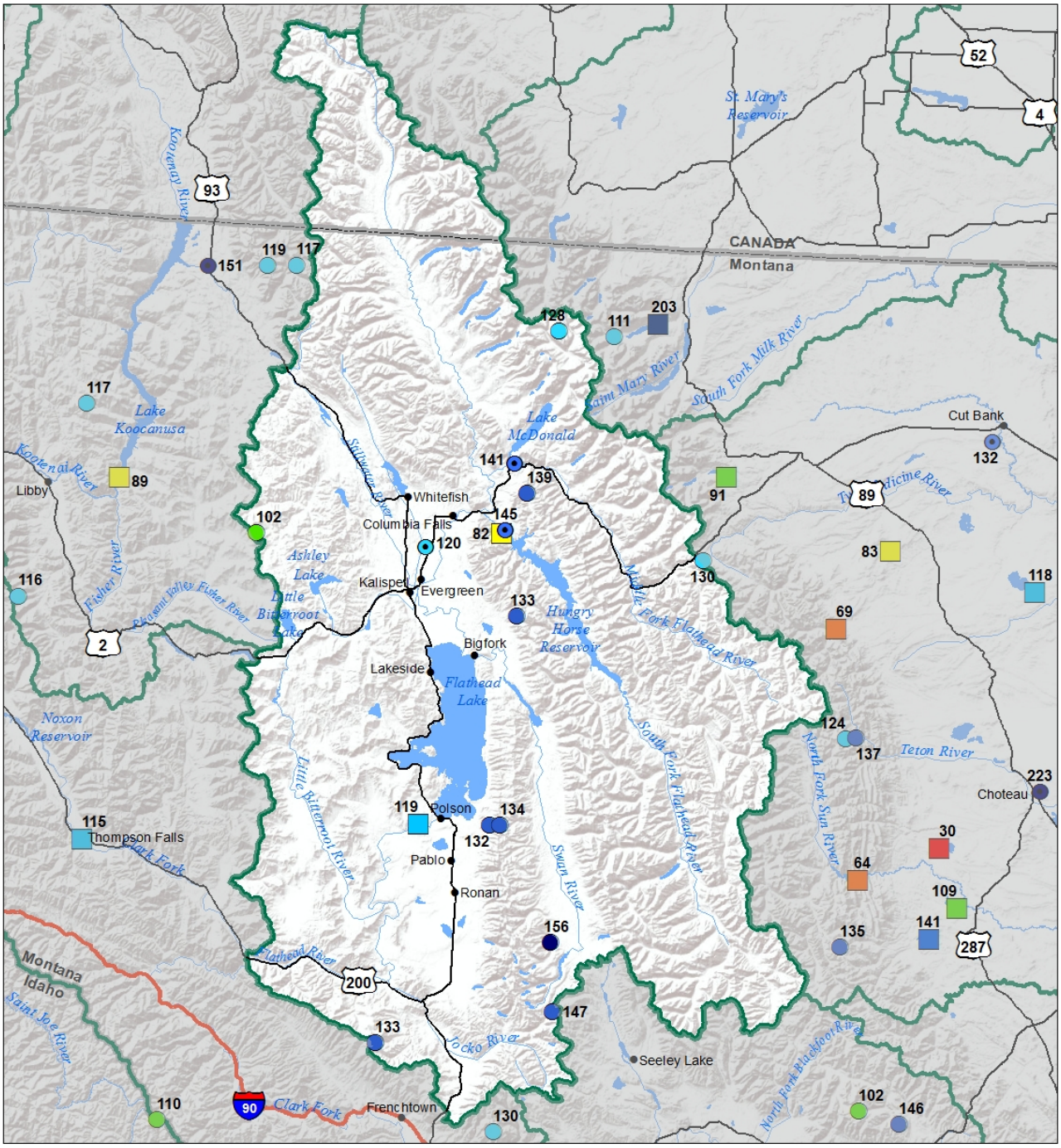
Flathead River Basin
Water Year to Date Precipitation and Reservoir Levels
Percentage of Normal
May 1, 2018



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%

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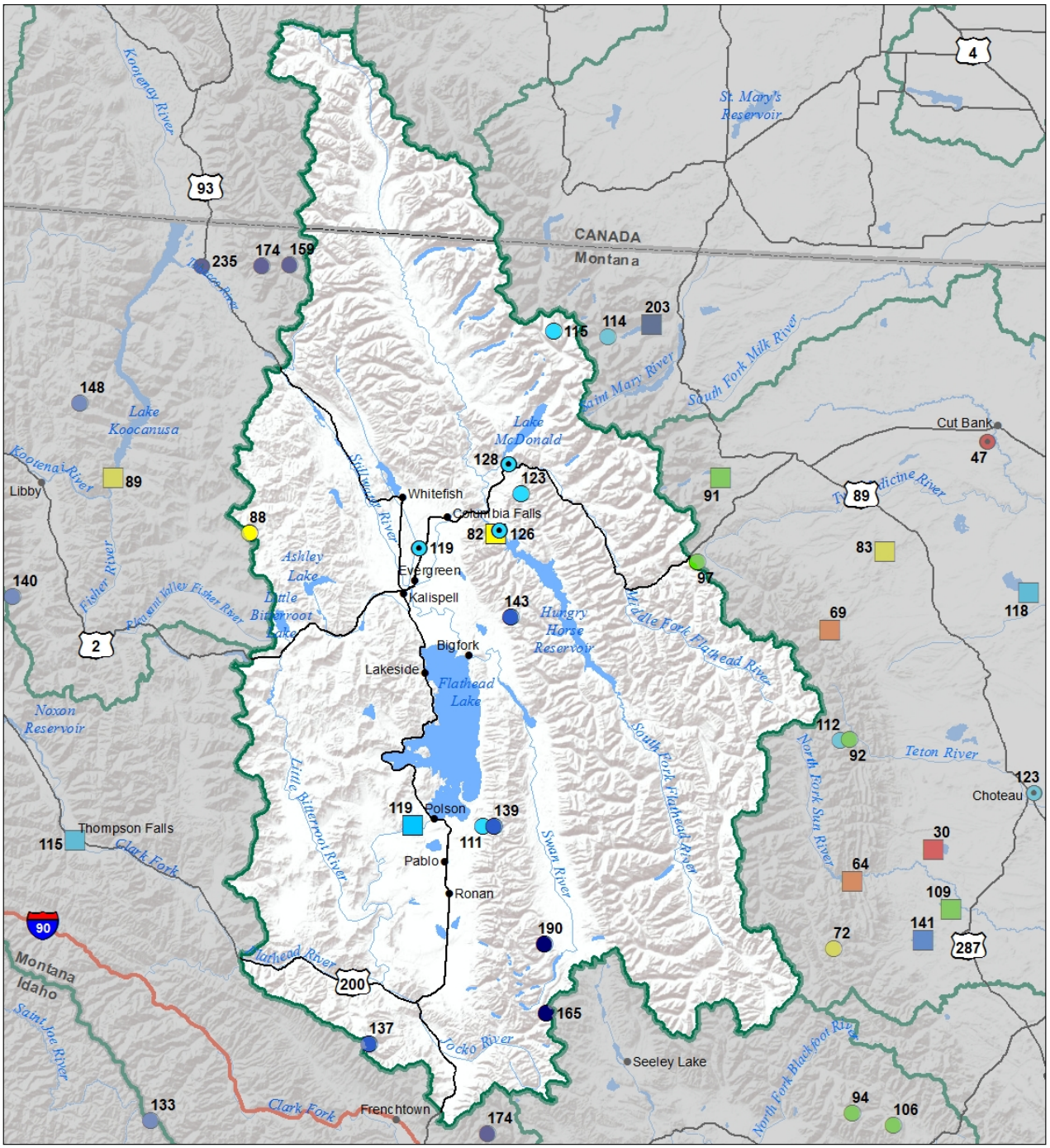
Flathead River Basin
Monthly Precipitation and Reservoir Levels
Percentage of Normal
May 1, 2018 (April 1, 2018 - May 1, 2018)

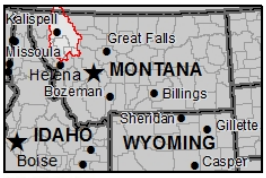


Precipitation
Percent of Normal

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%



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Upper Clark Fork River Basin

This will most certainly go down as one of the biggest snow years in the Upper Clark Fork River basin when looking at basin-wide snowpack. While the latter half of April was warm and dry, the first two weeks brought abundant precipitation to the basin. Most SNOTEL sites had already reported above normal April monthly totals by mid-month. This only continued to build on the well above normal snowpack in the basin and kept snowpack totals at very high to record levels for May 1st. Snow Water Equivalent (SWE) peaked across the basin at low elevations in the first two weeks of the month, and at higher elevations during the last 10 days of the month. Two SNOTEL sites in the basin set new records for peak SWE this year, Nevada Ridge SNOTEL in the Blackfoot River basin and Warm Springs SNOTEL in the Flint/Upper Clark River basin. Two other sites in the headwaters of the basin were the second highest on record, lagging only behind 1975 for peak SWE. Even though melt has begun, many sites remain record high (3 sites) or second highest on record (3 sites) for May 1st, and all measurement locations remain well-above normal for snowpack on this date. Putting statistics aside, what does this mean for water users in the basin? Snowmelt has already caused significant increases in rivers and streams across the region, in some places flooding is already being reported at the time of this publication. The amount of snow remaining in the mountains will continue to feed the rivers and streams and it is yet to be determined when peak flows will occur and how high they will be. There is potential for very high flows this year due to the snowpack. May 1st NRCS forecasts for the May 1st – July 31st period are above average for all streams in the basin, meaning the total volume of water this year will be very high, but the day-to-day and week-by-week flows will depend on future weather. A close eye should be kept on the weather patterns, with two major patterns that could increase flows substantially over a short period of time. 1) Prolonged periods of sunny weather with above average daily temperatures, and above freezing temperatures at night. 2) Rain-on-snow, or prolonged rain events. Water users are highly encouraged to monitor National Weather Service forecasts for their locations and keep an eye on the sky over the next two 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	179%	96%
FLINT CREEK	171%	121%
ROCK CREEK	154%	116%
CLARK FORK ab BLACKFOOT	172%	105%
BLACKFOOT	189%	120%
Basin-Wide	**175%**	**109%**

Precipitation	**Monthly Percentage of Average**	**WYTD Percentage of 1981-2010 Average***	**WYTD Last Year Percentage of Average**
Mountain Precipitation	135%	131%	112%
Valley Precipitation	143%	159%	141%
Basin-Wide Precipitation	**136%**	**132%**	**113%**

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

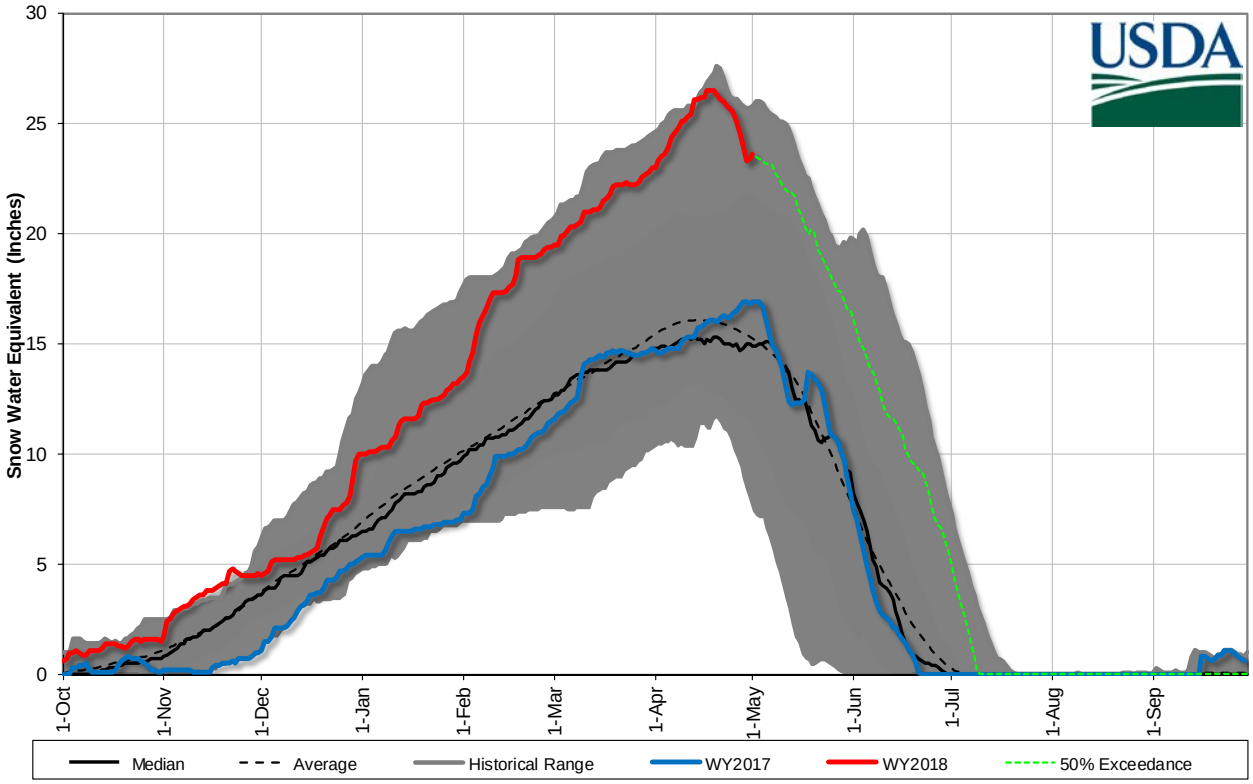
Reservoir Storage	**Percentage of Average**	**Percentage of Capacity (Total)**	**Last Year Percentage of Average**
Basin-Wide Storage	**104%**	**83%**	**105%**

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

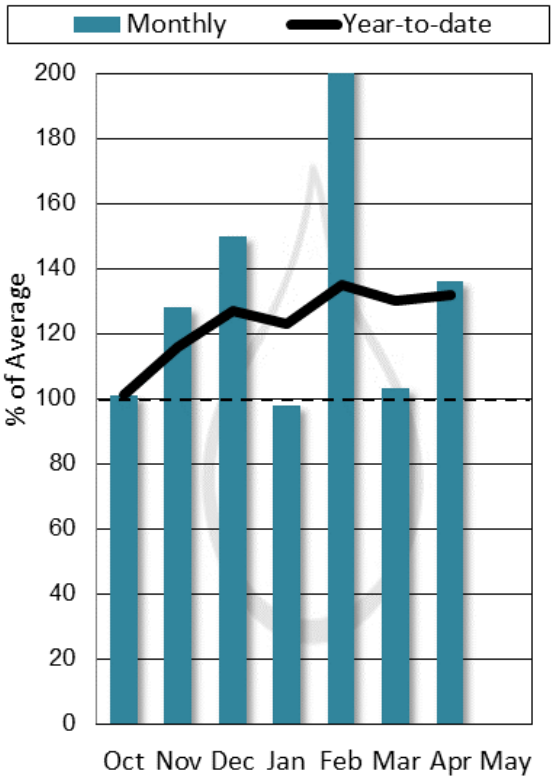
End of Month Storage	**Current (KAF)**	**Last Year (KAF)**	**Average (KAF)**	**Capacity (KAF)**	**% Average**	**% Capacity**
East Fork Rock Creek Res	9.8	9.7	9.2	15.6	**107%**	**63%**
Georgetown Lake	27.4	28.8	28.2	31.0	**97%**	**88%**
Lower Willow Creek Reservoir			4.1	4.9		
Nevada Creek Res	11.9	11.3	9.9	12.6	**120%**	**94%**

Upper Clark Fork River Basin Snowpack with Non-Exceedence Projections

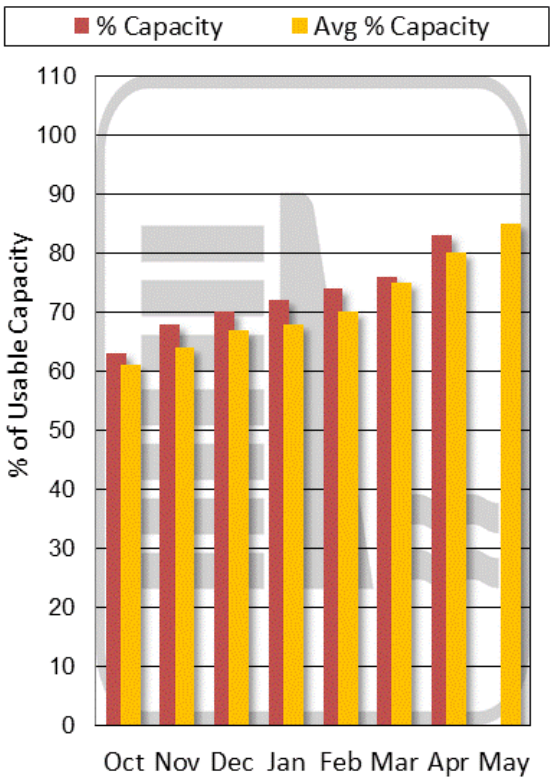
Based on provisional SNOTEL daily data as of 5/1/2018



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.

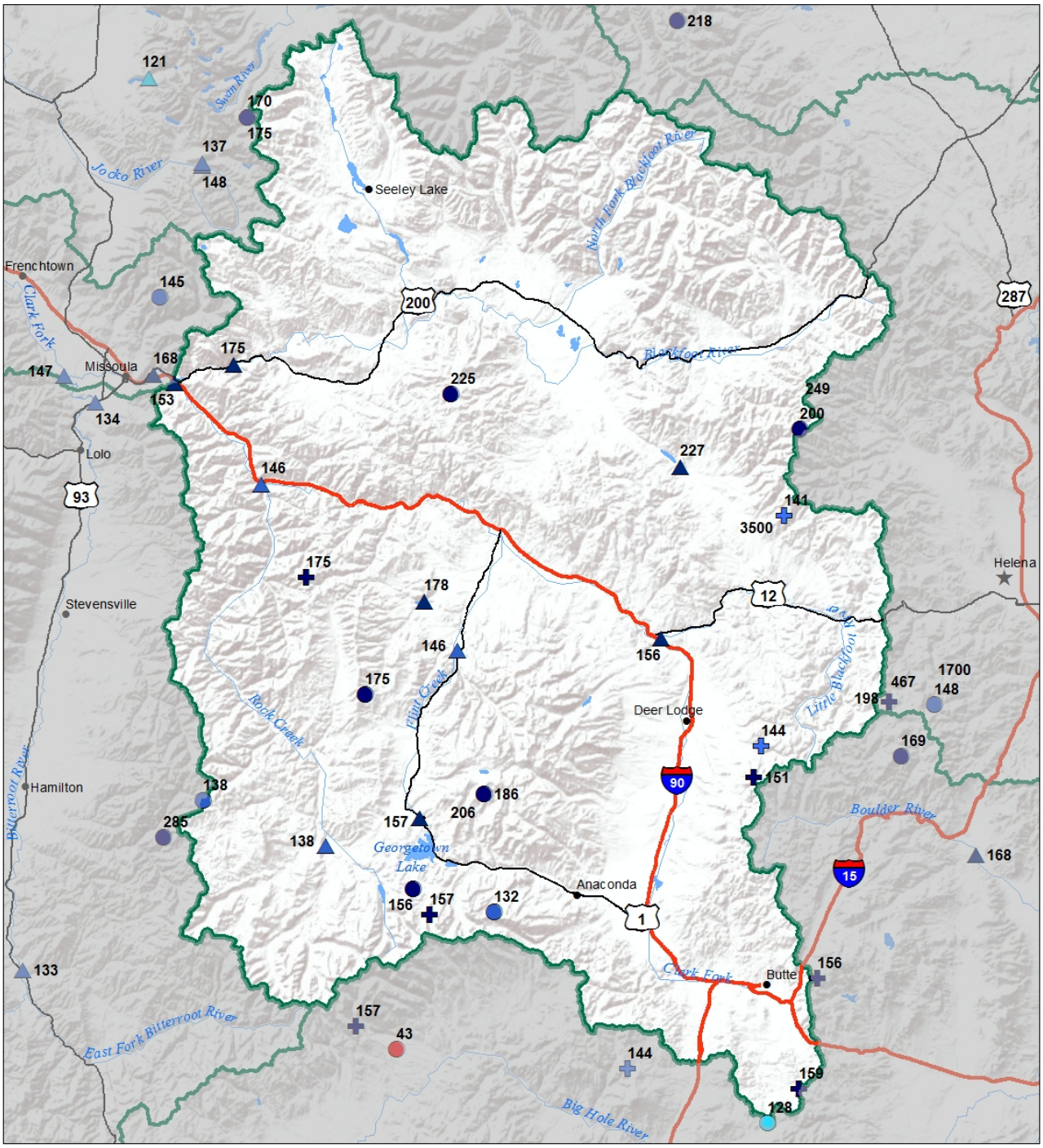
Upper Clark Fork River Basin

Forecast Point	Forecast Period	Chance Actual Volume Will Exceed Forecasted Volume						
		90% (KAF)	70% (KAF)	50% (KAF)	*% Avg*	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Little Blackfoot nr Garrison	MAY-JUL	64	79	89	*159%*	99	114	56
	MAY-SEP	70	87	98	*156%*	109	126	63
Flint Ck nr Southern Cross	MAY-JUL	11.1	14.3	16.5	*157%*	18.7	22	10.5
	MAY-SEP	13.6	17.6	20	*157%*	23	27	12.7
Flint Ck bl Boulder Ck	MAY-JUL	48	60	68	*151%*	76	88	45
	MAY-SEP	62	76	86	*146%*	96	110	59
Lower Willow Ck Reservoir Inflow[2]	MAY	5.6	7.4	8.5	*170%*	9.7	11.5	5
	MAY-JUL	10.8	13.3	15.1	*178%*	16.8	19.4	8.5
MF Rock Ck nr Philipsburg	MAY-JUL	57	68	75	*142%*	82	93	53
	MAY-SEP	64	76	83	*138%*	91	103	60
Rock Ck nr Clinton	*MAY-JUL*	240	290	325	*148%*	360	410	220
	MAY-SEP	275	330	365	*146%*	400	455	250
Clark Fork R ab Milltown	MAY-JUL	465	605	695	*156%*	790	925	445
	MAY-SEP	560	710	810	*153%*	915	1060	530
Nevada Ck nr Helmville	MAY	9.1	11.3	12.8	*246%*	14.4	16.6	5.2
	MAY-JUL	17.9	22	25	*227%*	28	32	11
Blackfoot R nr Bonner	MAY-JUL	925	1010	1060	*180%*	1120	1200	590
	MAY-SEP	1030	1120	1180	*175%*	1240	1330	675
Clark Fork R ab Missoula	MAY-JUL	1420	1630	1770	*172%*	1910	2120	1030
	MAY-SEP	1630	1850	2010	*168%*	2160	2390	1200

1) 90% and 10% exceedance probabilities are actually 95% and 5%

2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions

Upper Clark Fork River Basin
Streamflow Forecast, Snow Water Equivalent
Percentage of Normal
May 1, 2018



Snow Water Equivalent
Percent of Normal

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

Streamflow Forecast
Percent of Average Flows

- > 150%
- 131 - 150%
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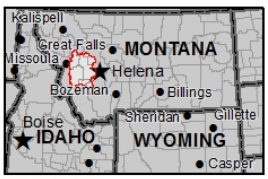
- 1 - 50%



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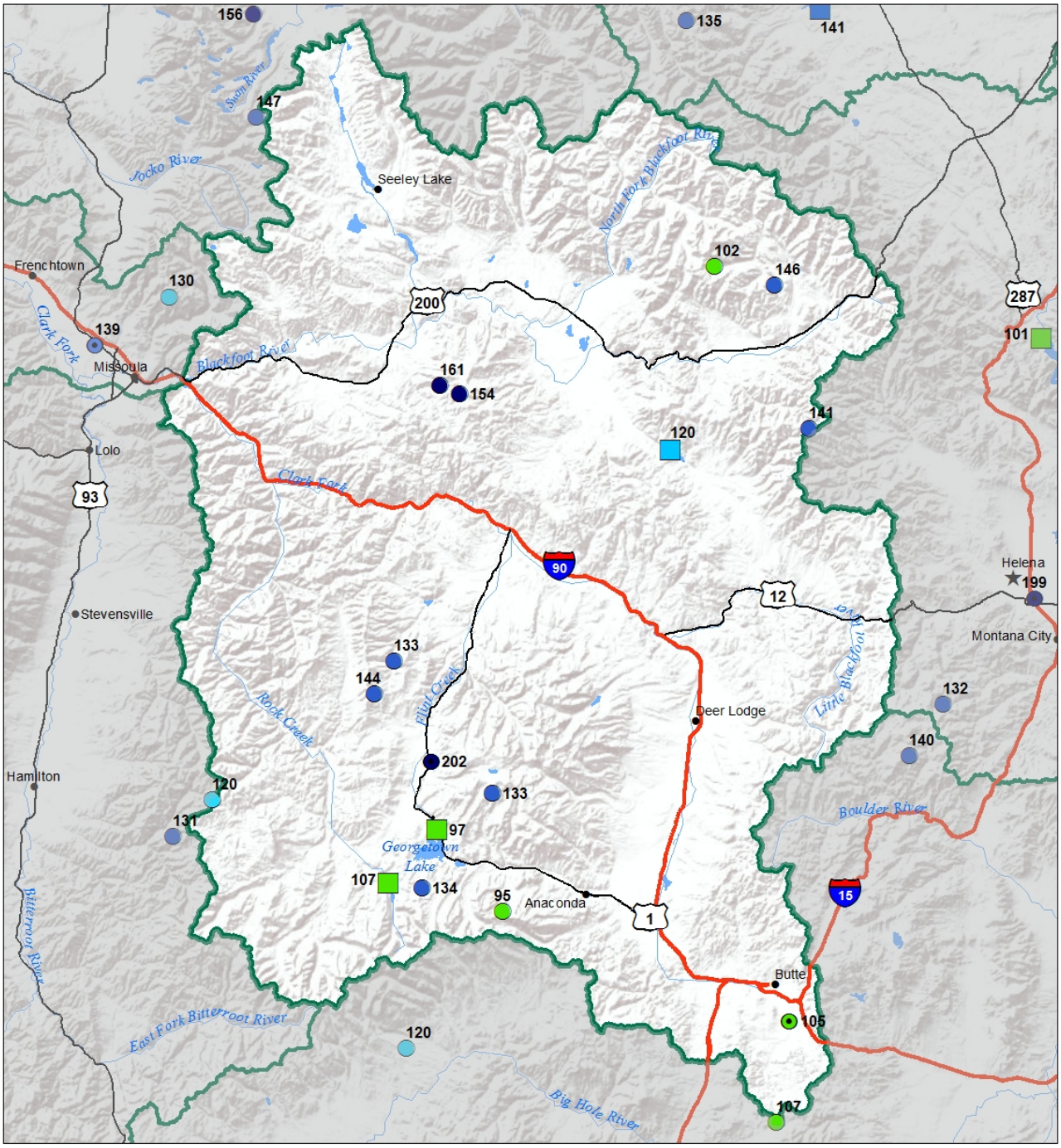
Upper Clark Fork River Basin
Water Year to Date Precipitation and Reservoir Levels
Percentage of Normal
May 1, 2018



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%

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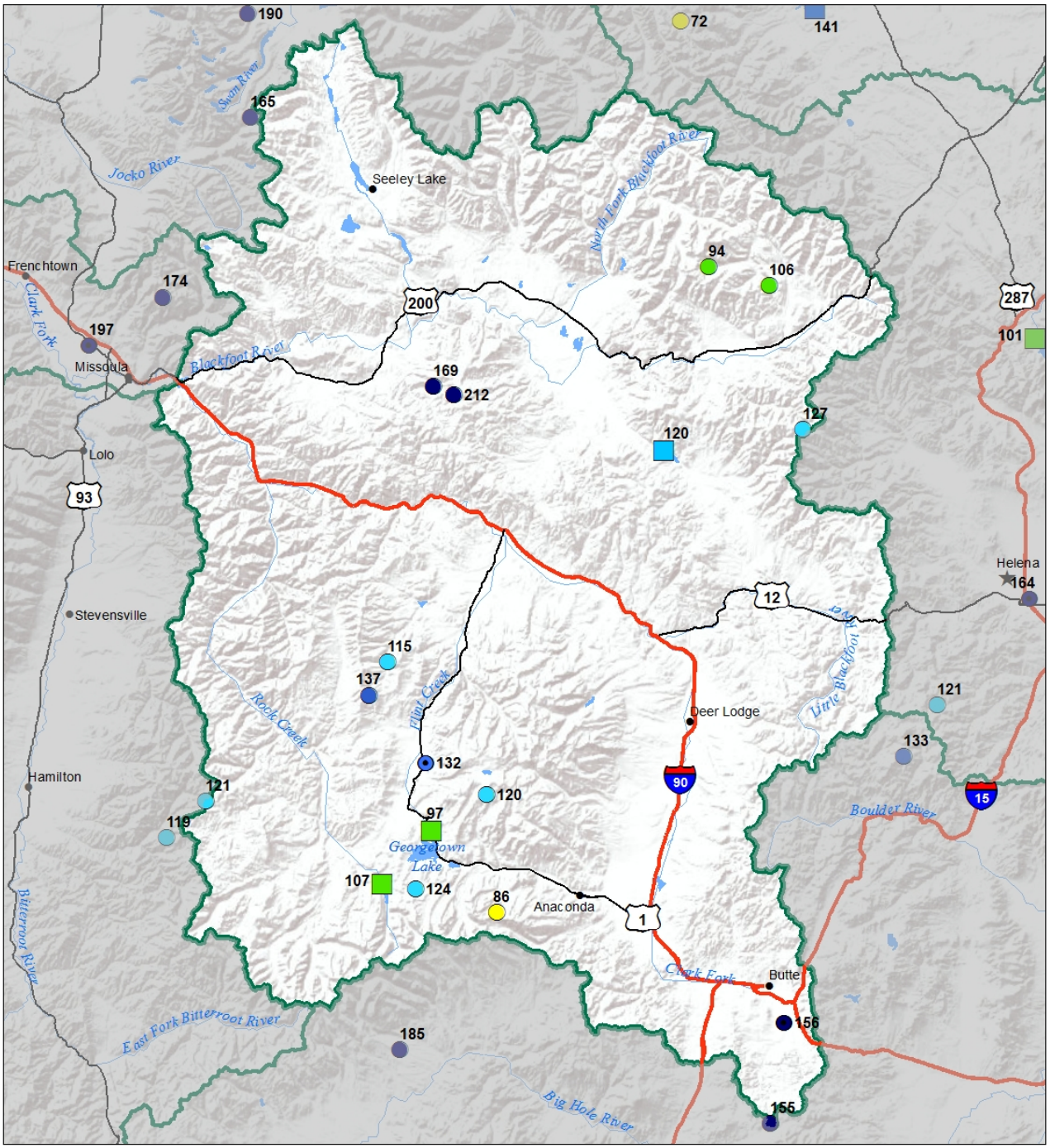
Upper Clark Fork River Basin
Monthly Precipitation and Reservoir Levels
Percentage of Normal
May 1, 2018 (April 1, 2018 - May 1, 2018)



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%
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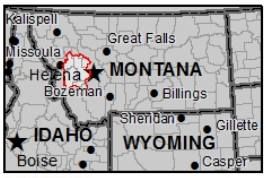
- 1 - 50%



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Bitterroot River Basin

After a big winter, it appears the season has finally transitioned to spring in the Bitterroot River basin. April continued the trend of 2018 and brought well above average precipitation to the basin. The majority of this precipitation occurred during the first half of the month and arrived as mixed snow and rain. The latter half of the month was dominated by abundant sunshine and above average temperatures. The snowpack quickly ripened and began to melt at low to mid-elevations, which caused significant increases in river levels across the basin. The Bitterroot River was trending at near normal flows for most of April until the initial wave of snowmelt caused the river to rise substantially. On April 30th the Bitterroot near Missoula hit 10,000 cfs which is nearly triple its normal conditions for this time of the year. The river has since receded, but there is still plenty of snow left in the mountains. All SNOTEL sites within the basin still have well above normal snowpack remaining to enter the rivers. The high elevation Twin Lakes SNOTEL still has 55.8 inches of snow water, is 169% of normal and has only just begun to melt at the end of April. Overall the Bitterroot River basin has a well above normal snowpack for May 1st which will provide a significant amount of water to downstream water users over the upcoming months. The timing of the runoff will largely depend on the weather over the next couple months.

Bitterroot River Basin Data Summary

Snowpack	**Percent of 1981-2010 Normal (Median)**	**Last Year Percentage of Normal (Median)**
WEST FORK BITTERROOT	148%	118%
EAST SIDE BITTERROOT	157%	119%
WEST SIDE BITTERROOT	182%	127%
Basin-Wide	**166%**	**122%**

Precipitation	**Monthly Percentage of Average**	**WYTD Percentage of 1981-2010 Average***	**WYTD Last Year Percentage of Average**
Mountain Precipitation	144%	122%	117%
Valley Precipitation	%	%	%
Basin-Wide Precipitation	**144%**	**122%**	**117%**

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

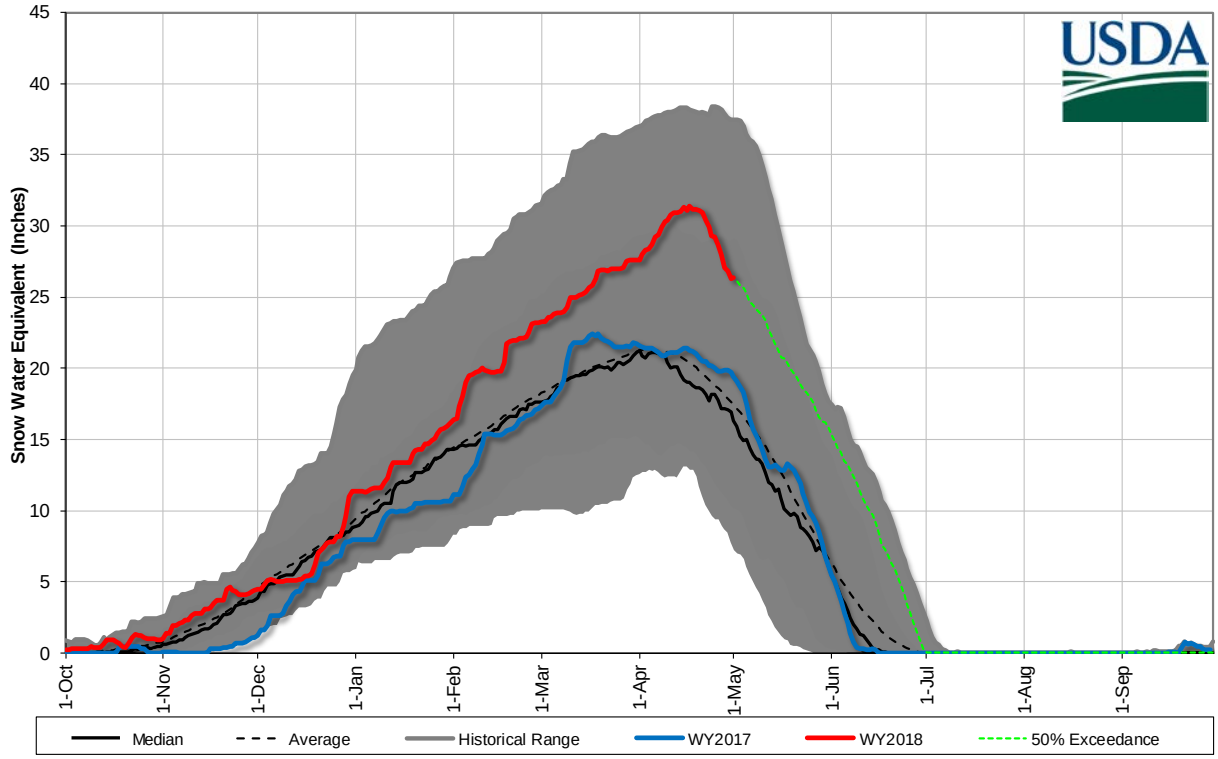
	Percentage of Average	**Percentage of Capacity (Total)**	**Last Year Percentage of Average**
Basin-Wide Storage	**101%**	**62%**	**124%**

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

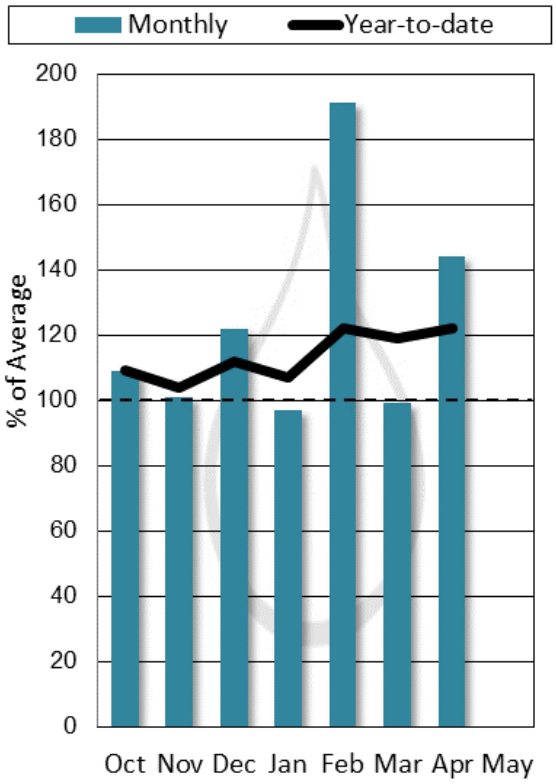
End of Month Storage	**Current (KAF)**	**Last Year (KAF)**	**Average (KAF)**	**Capacity (KAF)**	**% Average**	**% Capacity**
Painted Rocks Lake	18.8	23.6	18.7	31.7	**101%**	**59%**
Lake Como	22.5	26.8	22.1	34.9	**102%**	**64%**

Bitterroot River Basin Snowpack with Non-Exceedence Projections

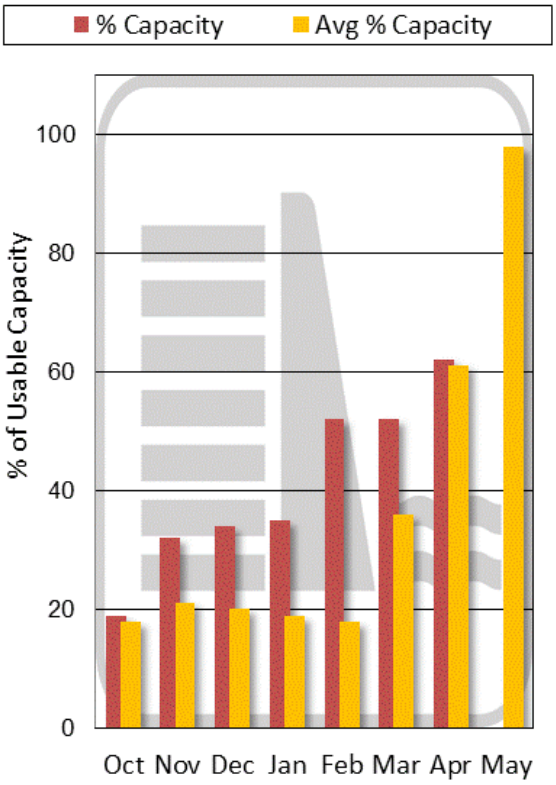
Based on provisional SNOTEL daily data as of 5/1/2018



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.

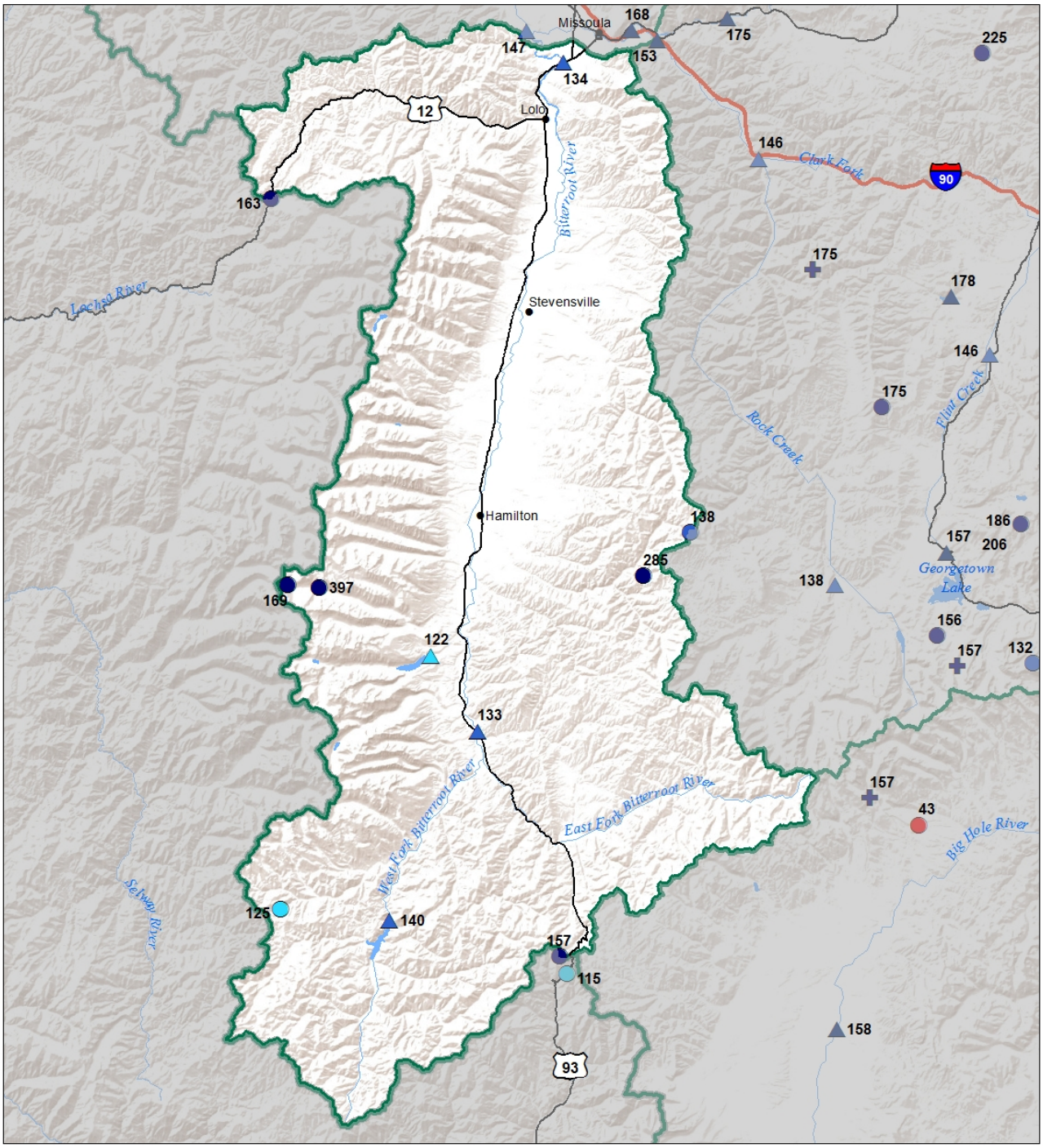
Bittterroot River Basin

Forecast Point	Forecast Period	Chance Actual Volume Will Exceed Forecasted Volume						
		90% (KAF)	**70% (KAF)**	**50% (KAF)**	***% Avg***	**30% (KAF)**	**10% (KAF)**	**30yr Avg (KAF)**
WF Bitterroot R Nr Conner[2]	MAY-JUL	119	140	154	*141%*	168	189	109
	MAY-SEP	126	151	168	*140%*	184	210	120
Bitterroot R Nr Darby	MAY-JUL	385	445	485	*129%*	525	590	375
	MAY-SEP	440	500	545	*133%*	585	650	410
Como Reservoir Inflow2	MAY-JUL	67	75	79	*120%*	84	92	66
	MAY-SEP	71	79	84	*122%*	89	96	69
Bitterroot R nr Missoula	MAY-JUL	1120	1250	1330	*134%*	1420	1550	990
	MAY-SEP	1220	1360	1460	*134%*	1550	1690	1090

1) 90% and 10% exceedance probabilities are actually 95% and 5%

2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions

Bitterroot River Basin
Streamflow Forecast, Snow Water Equivalent
Percentage of Normal
May 1, 2018



Snow Water Equivalent
Percent of Normal

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

Streamflow Forecast
Percent of Average Flows

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

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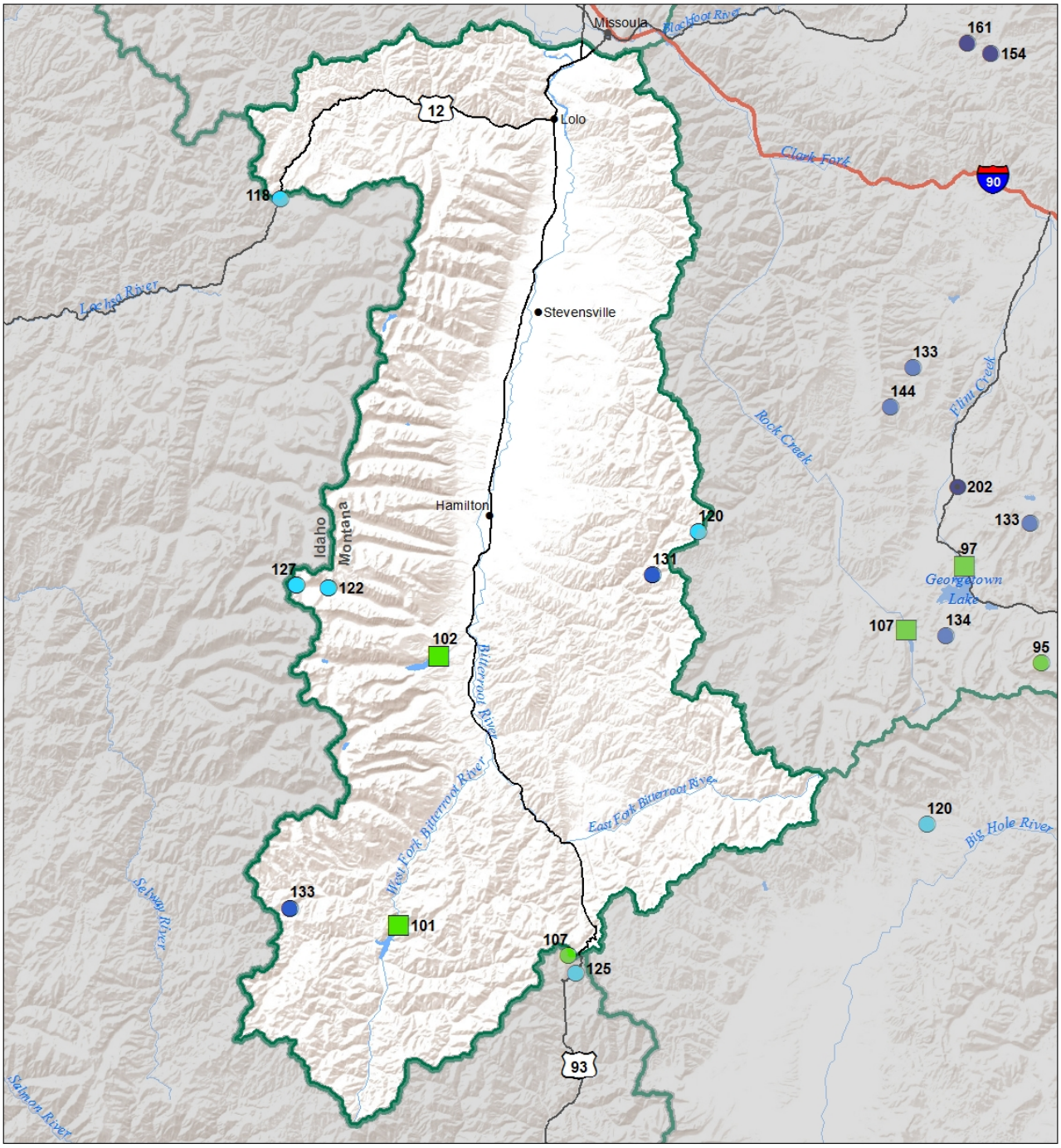
Bitterroot River Basin
Water Year to Date Precipitation and Reservoir Levels
Percentage of Normal
May 1, 2018



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%

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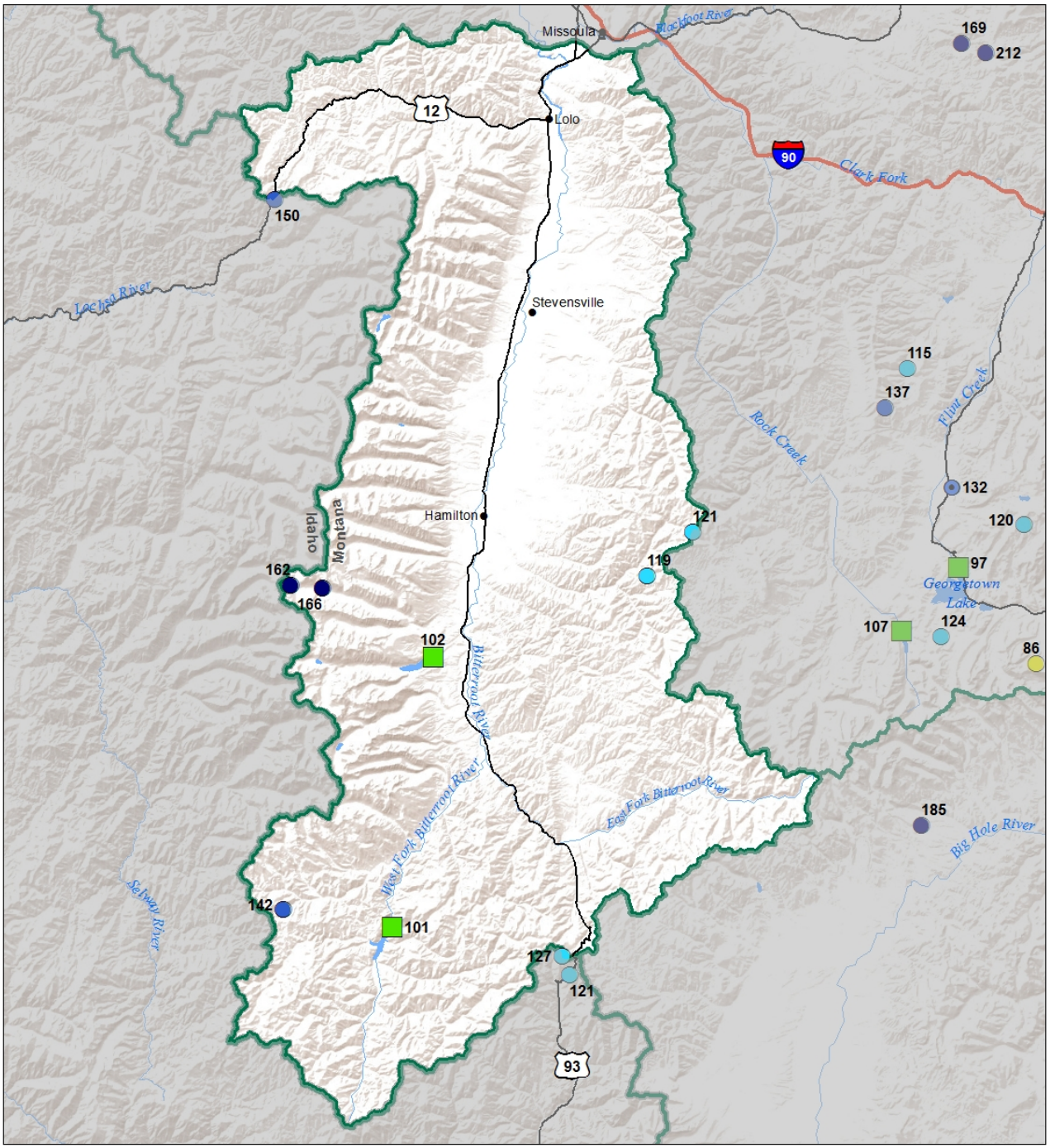
Bitterroot River Basin
Monthly Precipitation and Reservoir Levels
Percentage of Normal
May 1, 2018 (April 1, 2018 - May 1, 2018)

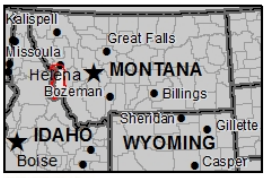


Precipitation
Percent of Normal

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%



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Lower Clark Fork River Basin

On the tail-end of a snowy winter, April brought well above average precipitation to the Lower Clark Fork River basin. Most of the precipitation occurred during the first half of the month. Several SNOTEL sites saw snow accumulation during this period, including Stuart Mountain SNOTEL which recorded its second highest April precipitation on record. Sunshine and warm temperatures graced the region during the second half of the month. Snowpack isn't record setting but snowpack percentages are well above normal. It's worth noting that many locations in the Upper Clark Fork currently have record-high snowpack conditions. The snowpack in the entire Clark Fork drainage has either started melting or is ripening and getting ready to melt. Significant melting of the lower elevation snowpack in April brought river levels in the Lower Cark Fork basin to near record conditions for this early in the season. Currently, the Clark Fork near St Regis is flowing at about 35,000 cfs, which is more than 2.5 times its normal May 1st flow. The melting of the higher elevation snowpack will provide a very substantial amount of water to the basin over the remainder of this season. The weather over the next couple months will dictate the timing of this snowmelt. It is highly recommended to keep an eye on the National Weather Service's local river forecasts over the next couple months.

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	151%	124%
Basin-Wide	**151%**	**124%**

Precipitation	**Monthly Percentage of Average**	**WYTD Percentage of 1981-2010 Average***	**WYTD Last Year Percentage of Average**
Mountain Precipitation	139%	117%	134%
Valley Precipitation	197%	139%	169%
Basin-Wide Precipitation	**142%**	**118%**	**135%**

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

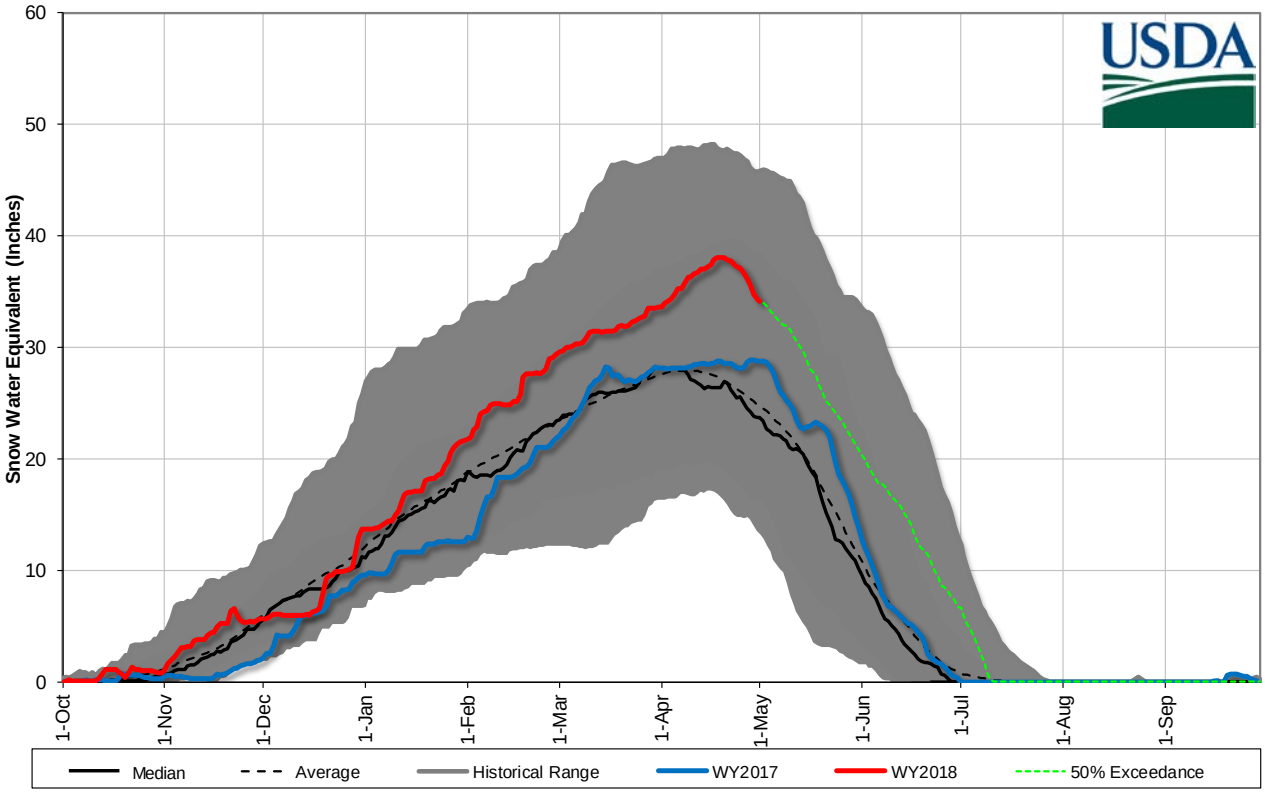
Reservoir Storage	**Percentage of Average**	**Percentage of Capacity (Total)**	**Last Year Percentage of Average**
Basin-Wide Storage	**108%**	**99%**	**107%**

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

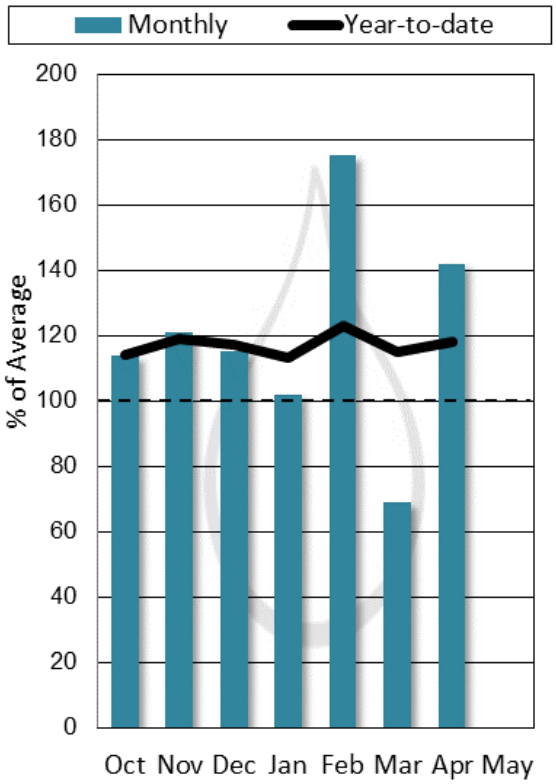
End of Month Storage	**Current (KAF)**	**Last Year (KAF)**	**Average (KAF)**	**Capacity (KAF)**	**% Average**	**% Capacity**
Noxon Rapids Reservoir	332.6	329.6	307.4	335	**108%**	**99%**

Lower Clark Fork River Basin Snowpack with Non-Exceedence Projections

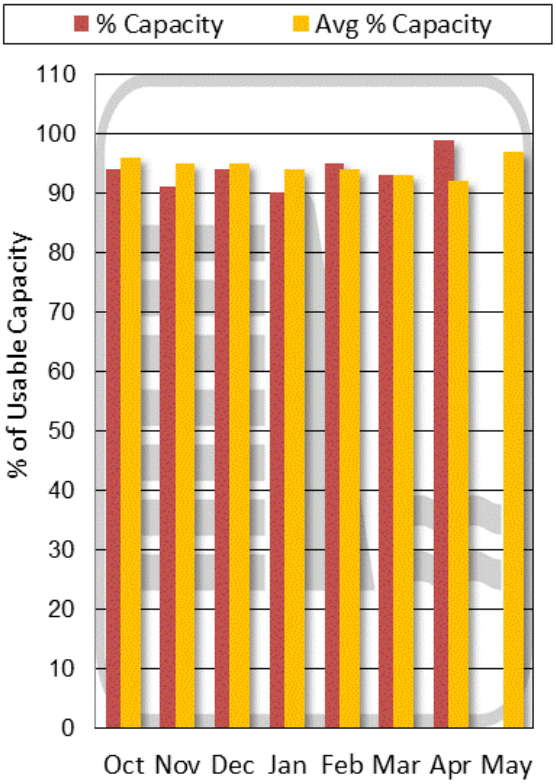
Based on provisional SNOTEL daily data as of 5/1/2018



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

Forecast Point	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
		Chance Actual Volume Will Exceed Forecasted Volume						
Clark Fork R bl Missoula	MAY-JUL	2470	2790	3010	*148%*	3230	3550	2030
	MAY-SEP	2790	3140	3380	*147%*	3620	3970	2300
Clark Fork R at St. Regis[1]	MAY-JUL	3060	3650	3920	*148%*	4180	4770	2640
	MAY-SEP	3460	4100	4390	*147%*	4680	5320	2990
Clark Fork R nr Plains[1,2]	MAY-JUL	9670	10800	11400	*147%*	11900	13100	7780
	MAY-SEP	10600	12000	12600	*146%*	13200	14500	8650
Thompson nr Tompson Falls	MAY-JUL	108	136	155	*112%*	175	205	138
	MAY-SEP	129	160	181	*112%*	200	230	161
Prospect Ck at Thompson Falls	MAY-JUL	65	77	85	*112%*	93	104	76
	MAY-SEP	72	84	92	*110%*	101	113	84
Clark Fork R at Whitehorse Rapids[1,2]	MAY-JUL	10900	12200	12700	*145%*	13300	14600	8740
	MAY-SEP	12000	13500	14100	*144%*	14800	16200	9760

1) 90% and 10% exceedance probabilities are actually 95% and 5%

2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions

Lower Clark Fork River Basin
Streamflow Forecast, Snow Water Equivalent
Percentage of Normal
May 1, 2018

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%
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Streamflow Forecast
Percent of Average Flows

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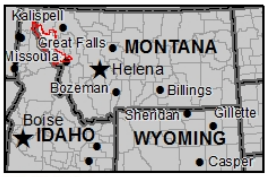

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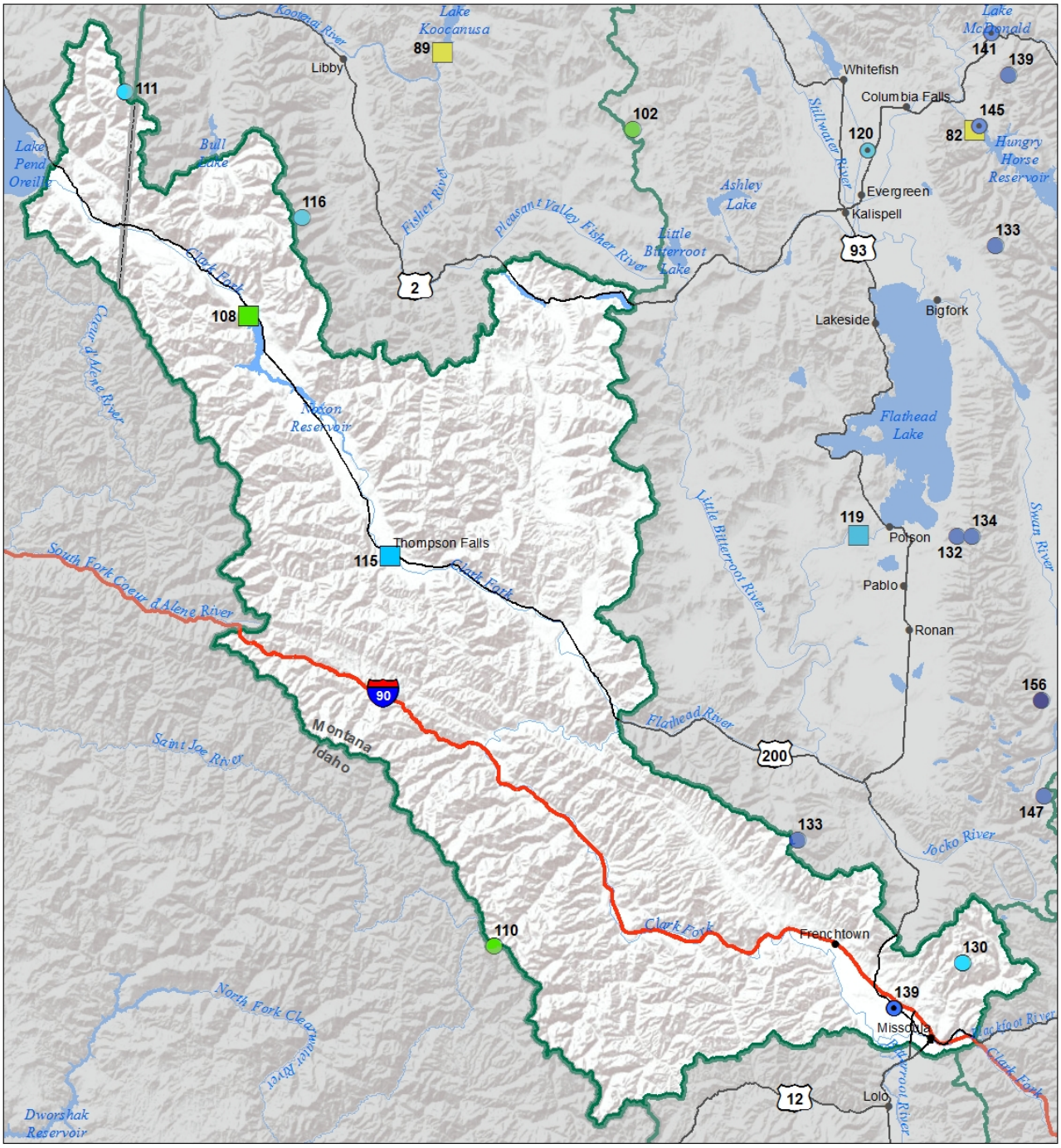
Lower Clark Fork River Basin
Water Year to Date Precipitation and Reservoir Levels
Percentage of Normal
May 1, 2018



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

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- 131 - 150%
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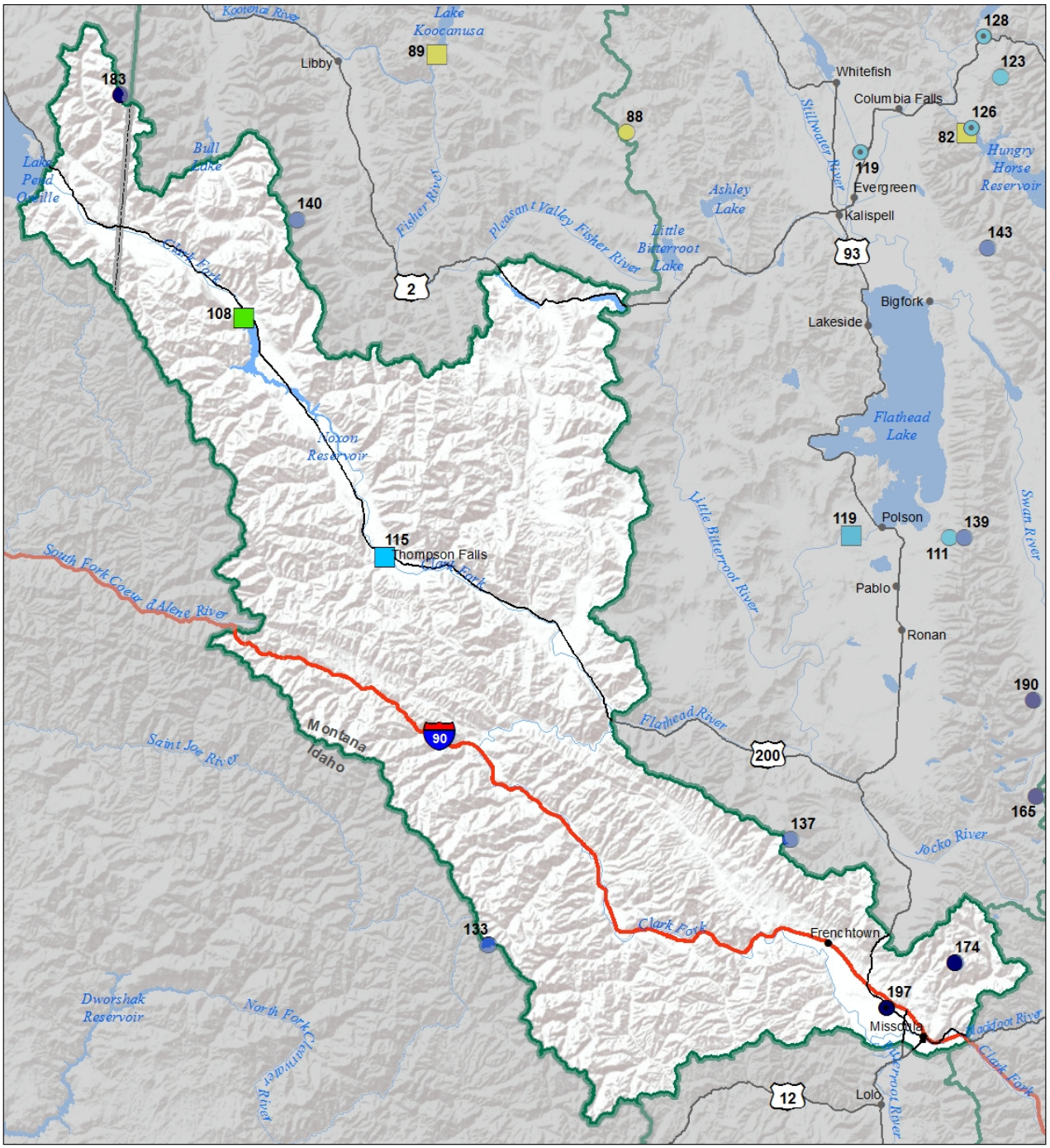
Montana State Library Natural Resource Information System

Lower Clark Fork River Basin
Monthly Precipitation and Reservoir Levels
Percentage of Normal
May 1, 2018 (April 1, 2018 - May 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

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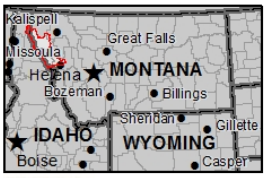

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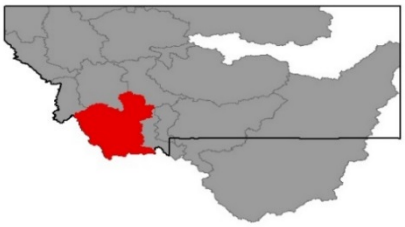
Jefferson River Basin



Snowmelt has officially begun in the Jefferson River basin at low and mid-elevations after April delivered yet another above average month with regards to precipitation. The first half of April was a wet one; most sites had reported average to above-average April monthly totals by April 18th, 2018. The latter half of the month was dominated by high pressure, abundant sunshine, and well-above average temperatures. Low and mid-elevations began discharging snow water into the rivers and streams mid-month, with flows ramping up substantially as the month ended. Clark Canyon reservoir has already filled by May 1st, and outflows from the reservoir are matching inflows at this time. This is great news for irrigators who divert from the Beaverhead River for agriculture. Big picture wise, snowmelt is only getting started in the river basin. While low-elevations began to feed streams in mid-April, higher elevation snow monitoring sites in the basin began to melt towards the end of the month. Snowpack for this date ranges from near to above normal in the Beaverhead River basin, to well above normal in the Big Hole and Boulder River basins. The abundant snowfall this winter, and remaining snowpack for this date should provide adequate streamflows for the May 1st – July 31st period. Forecasts within the basin vary depending on the sub-basin and range from near normal on the Red Rock River to well above normal for the Big Hole and Boulder River basins. Individual streamflow forecasts can be found in the streamflow table later in this section. There is still a substantial amount of water left to enter the rivers and streams, but the timing of when that will occur will be completely weather dependent. A long, slow release of mountain water is always preferred but isn't always delivered. Water users in the basin should monitor day-to-day and week-to-week weather patterns as they will dictate flows on a short-term basis. Long periods of above normal temperatures or rain-on-snow events could release snow water more quickly than normal. Keep an eye on the sky and weather forecasts this month.

Jefferson River Basin Data Summary

Snowpack	**Percent of 1981-2010 Normal (Median)**	**Last Year Percentage of Normal (Median)**
BEAVERHEAD	124%	119%
RUBY	124%	110%
BIGHOLE	145%	120%
BOULDER	162%	91%
Basin-Wide	**137%**	**113%**

Precipitation	**Monthly Percentage of Average**	**WYTD Percentage of 1981-2010 Average***	**WYTD Last Year Percentage of Average**
Mountain Precipitation	126%	114%	118%
Valley Precipitation	170%	110%	165%
Basin-Wide Precipitation	**127%**	**113%**	**119%**

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

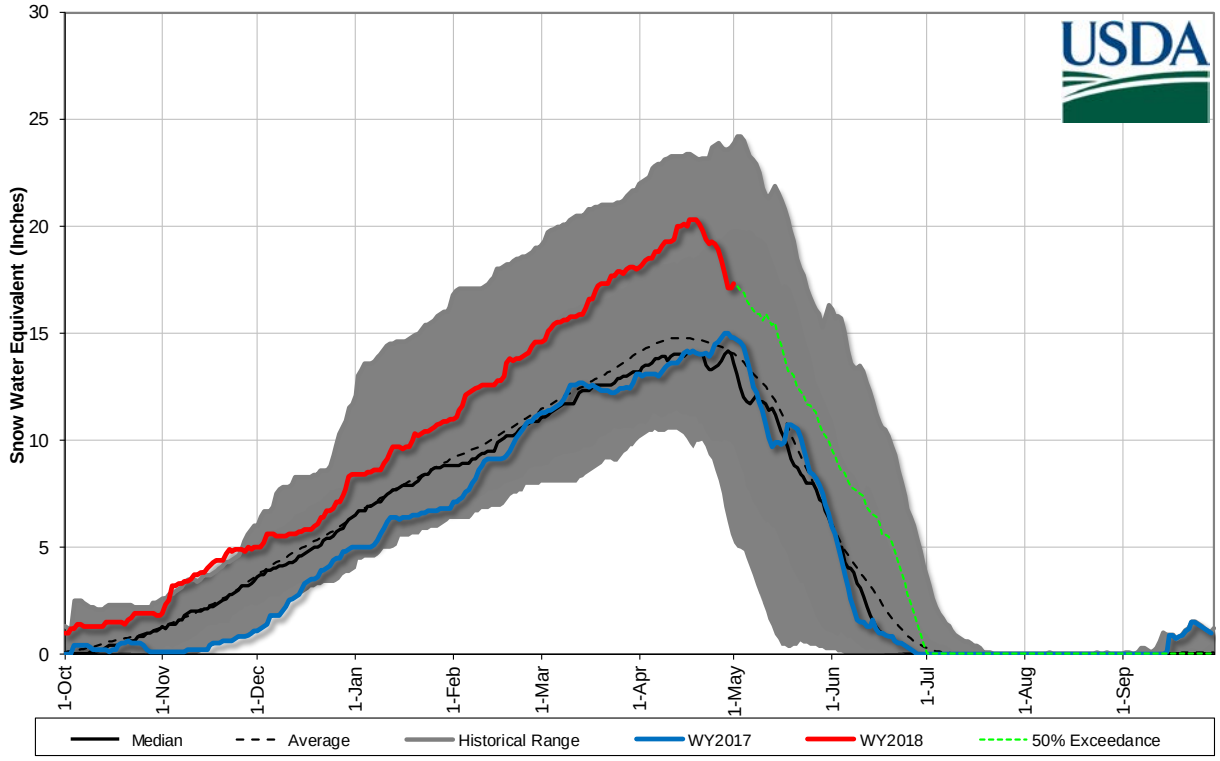
Reservoir Storage	**Percentage of Average**	**Percentage of Capacity (Total)**	**Last Year Percentage of Average**
Basin-Wide Storage	**123%**	**76%**	**108%**

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

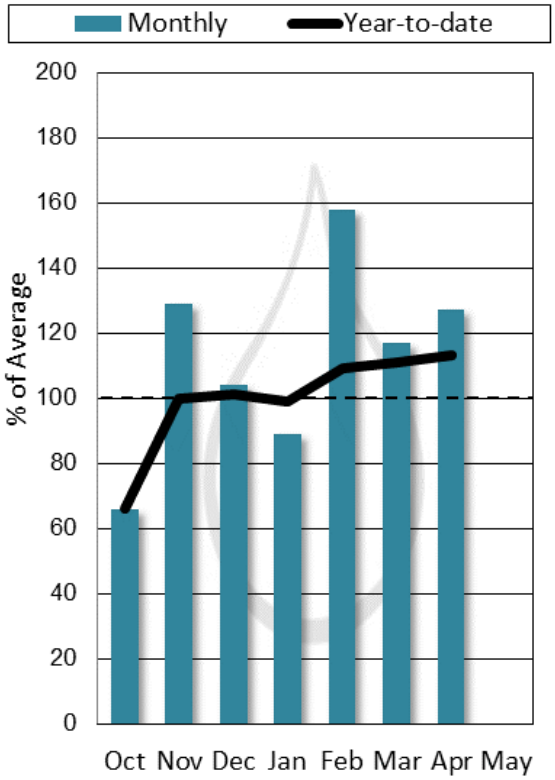
End of Month Storage	**Current (KAF)**	**Last Year (KAF)**	**Average (KAF)**	**Capacity (KAF)**	**% Average**	**% Capacity**
Lima Reservoir	72.4	75.1	54.4	84.0	**133%**	**86%**
Clark Canyon Res	175.2	137.8	141.6	255.6	**124%**	**69%**
Ruby River Reservoir	38.2	38.0	36.7	38.8	**104%**	**98%**

Jefferson River Basin Snowpack with Non-Exceedence Projections

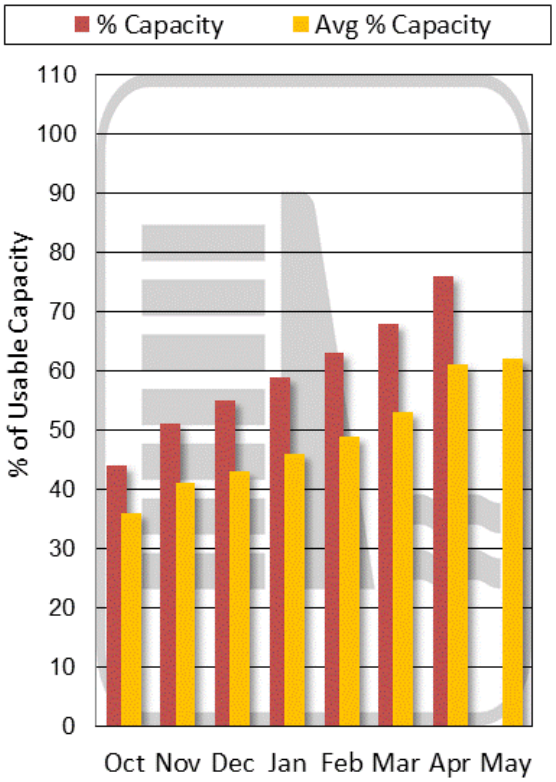
Based on provisional SNOTEL daily data as of 5/1/2018



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.

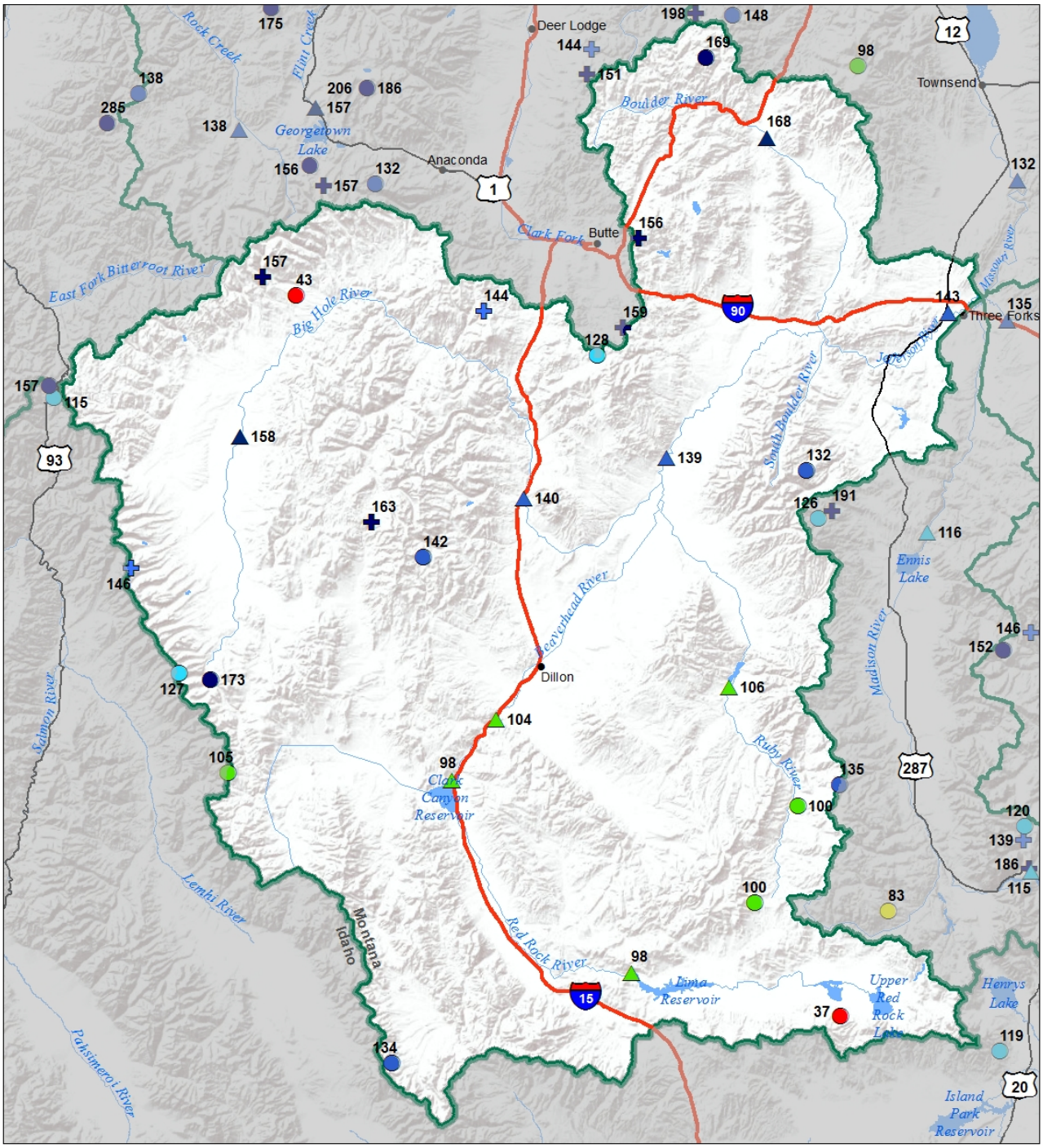
Jefferson River Basin

Forecast Point	Forecast Period	Chance Actual Volume Will Exceed Forecasted Volume						
		90% (KAF)	70% (KAF)	50% (KAF)	*% Avg*	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Lima Reservoir Inflow[2]	MAY-JUL	26	40	49	*98%*	59	73	50
	MAY-SEP	30	45	55	*98%*	66	81	56
Clark Canyon Inflow[2]	MAY-JUL	16.1	43	61	*95%*	79	106	64
	MAY-SEP	26	59	81	*98%*	103	136	83
Beaverhead R at Barretts[2]	MAY-JUL	38	68	89	*105%*	110	140	85
	MAY-SEP	56	91	115	*104%*	139	174	111
Ruby R Reservoir Inflow[2]	MAY-JUL	50	63	72	*107%*	80	93	67
	MAY-SEP	62	77	87	*106%*	97	111	82
Big Hole R at Wisdom	MAY-JUL	63	96	118	*157%*	140	173	75
	MAY-SEP	67	102	126	*158%*	150	185	80
Big Hole R nr Melrose	MAY-JUL	480	565	620	*141%*	675	760	440
	MAY-SEP	515	610	670	*140%*	730	825	480
Jefferson R nr Twin Bridges[2]	MAY-JUL	445	605	715	*139%*	825	985	515
	MAY-SEP	475	650	770	*139%*	890	1060	555
Boulder R nr Boulder	MAY-JUL	73	90	101	*168%*	113	130	60
	MAY-SEP	78	97	109	*168%*	122	141	65
Willow Ck Reservoir Inflow[2]	MAY-JUL	9.9	15.4	19.1	*133%*	23	28	14.4
Jefferson R nr Three Forks[2]	MAY-JUL	575	740	850	*148%*	960	1120	575
	MAY-SEP	585	775	905	*143%*	1030	1220	635

1) 90% and 10% exceedance probabilities are actually 95% and 5%

2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions

Jefferson River Basin
Streamflow Forecast, Snow Water Equivalent
Percentage of Normal
May 1, 2018



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%
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Streamflow Forecast
Percent of Average Flows

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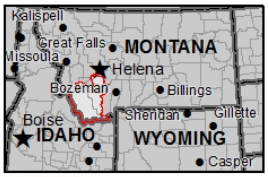

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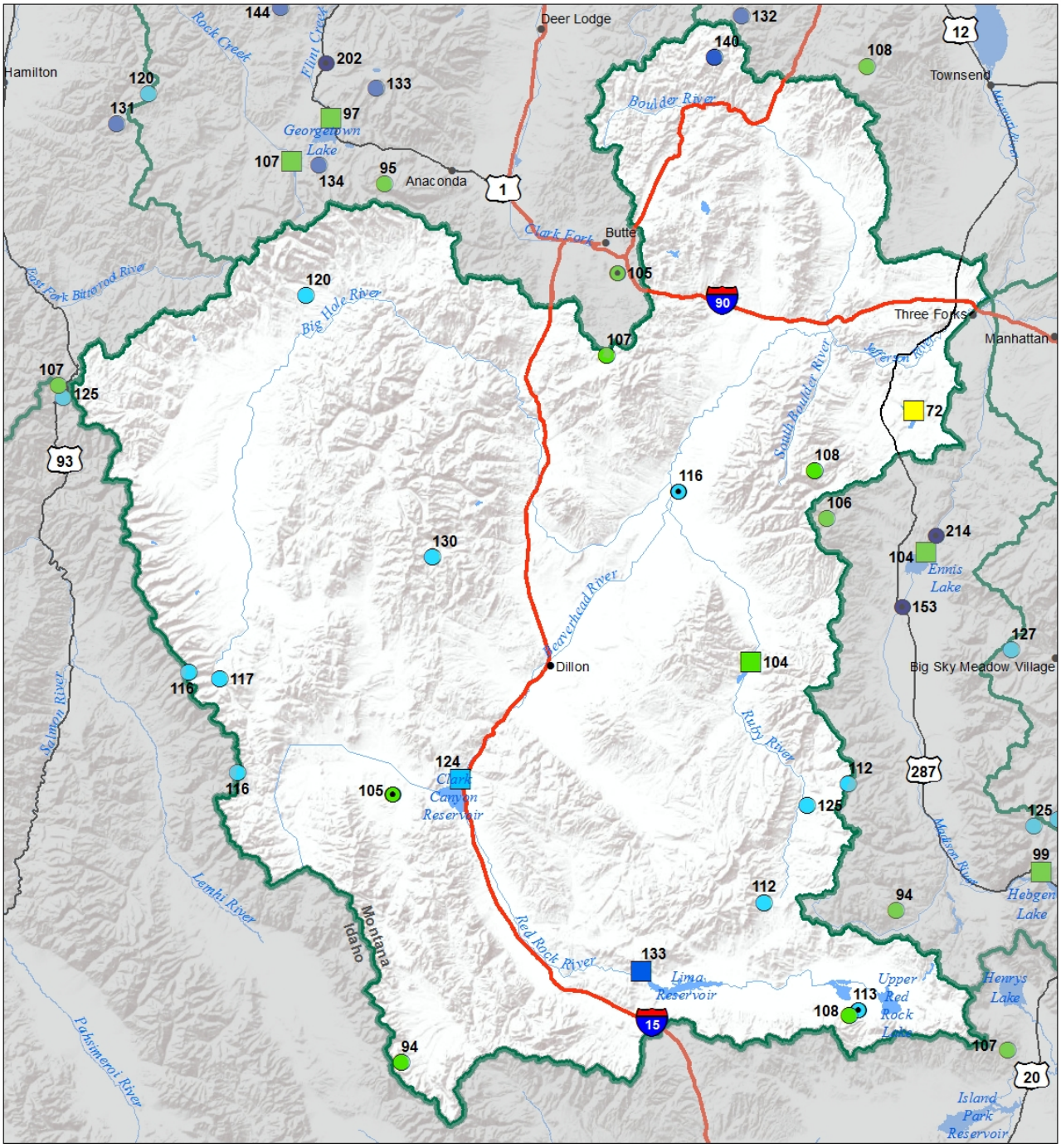
Jefferson River Basin
Water Year to Date Precipitation and Reservoir Levels
Percentage of Normal
May 1, 2018



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%
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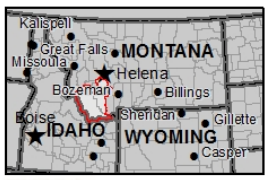
- 1 - 50%



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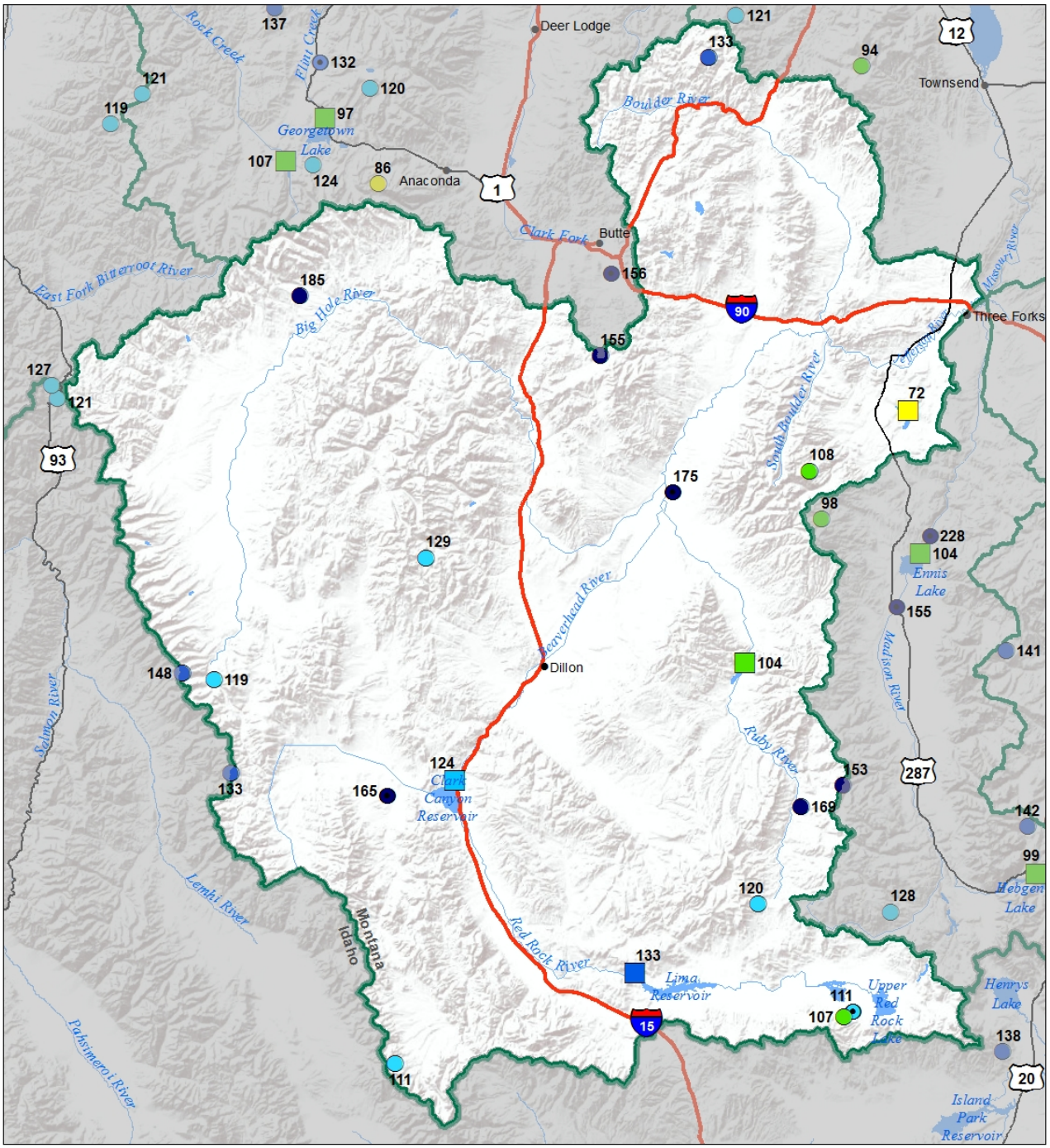
Montana State Library Natural Resource Information System

Jefferson River Basin
Monthly Precipitation and Reservoir Levels
Percentage of Normal
May 1, 2018 (April 1, 2018 - May 1, 2018)

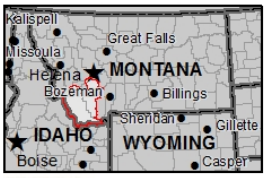


Precipitation
Percent of Normal

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%



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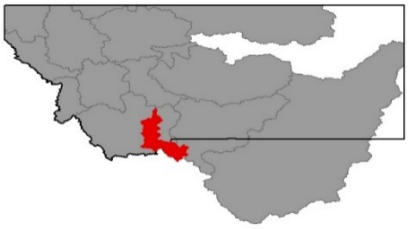
Madison River Basin



After months of above normal snowfall and precipitation this winter, April again delivered "wetter" than normal conditions. Mountain snowfall and valley precipitation occurred through the middle of the month before giving way to high pressure and above average temperatures. The amazing part of April was how much precipitation was delivered during the first 18 days. Most mountain SNOTEL sites received the "normal" amount of precipitation for the entire month during that period. The valleys were no different. The monthly total for the Pump House COOP station at the outflow of Ennis Lake was 228% of average for the month at 4.2", which tied a record set in 1940. Snowfall has been abundant in the basin and streamflow forecast for the May 1st – July 31st period reflect the well-above normal snowpack for this date. Snowpack will provide ample inflow to Hebgen Lake and Ennis Reservoir this summer, great news for irrigators and recreational users in the basin. Like every spring in MT, the timing of runoff will be dependent on the future weather patterns. Reservoir storage insulates this basin to some extent from the spring variability some other regions face with regards to the timing of streamflows, but filling and spilling reservoirs is never ideal. Let's hope for a slow release of the mountain snowpack and long duration inflows to the reservoir and river system.

Madison River Basin Data Summary

Snowpack	**Percent of 1981-2010 Normal (Median)**	**Last Year Percentage of Normal (Median)**
MADISON abv HEBGEN LAKE	129%	125%
MADISON blw HEBGEN LAKE	130%	116%
Basin-Wide	**130%**	**119%**

Precipitation	**Monthly Percentage of Average**	**WYTD Percentage of 1981-2010 Average***	**WYTD Last Year Percentage of Average**
Mountain Precipitation	131%	113%	137%
Valley Precipitation	196%	187%	168%
Basin-Wide Precipitation	**135%**	**116%**	**138%**

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

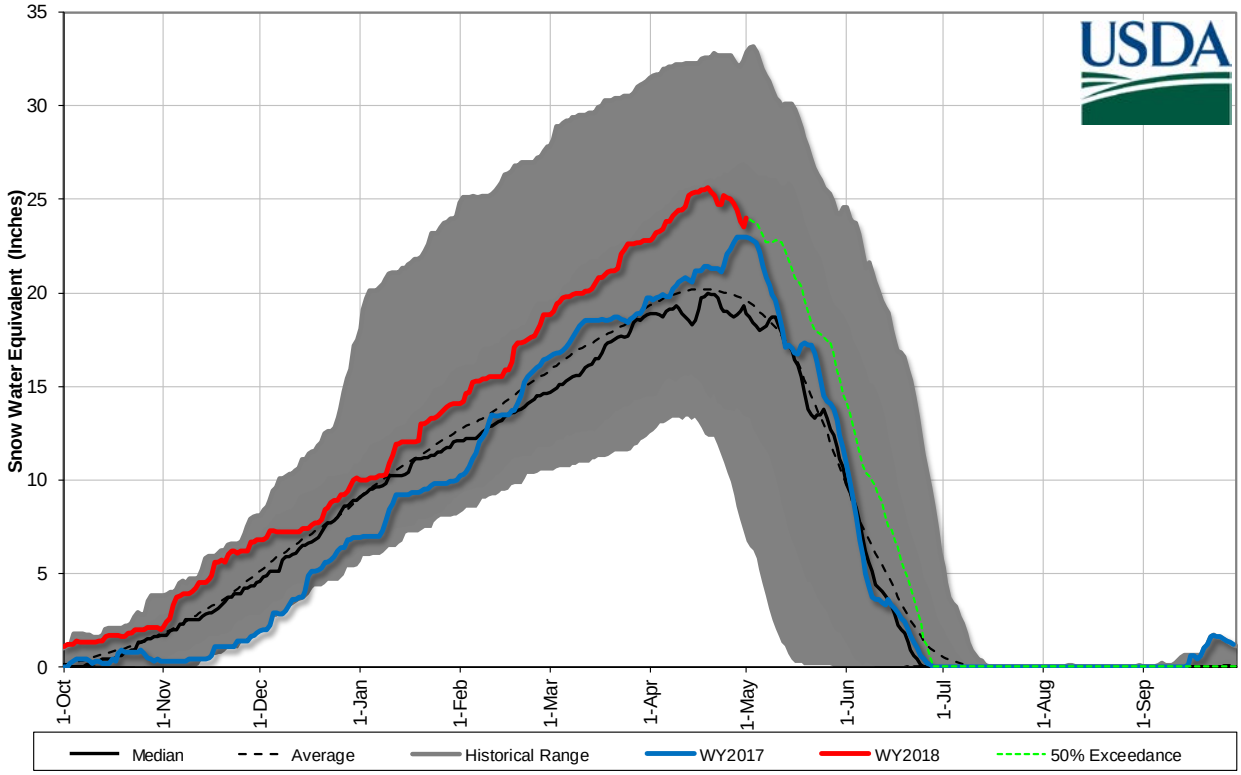
Reservoir Storage	**Percentage of Average**	**Percentage of Capacity (Total)**	**Last Year Percentage of Average**
Basin-Wide Storage	**100%**	**73%**	**108%**

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

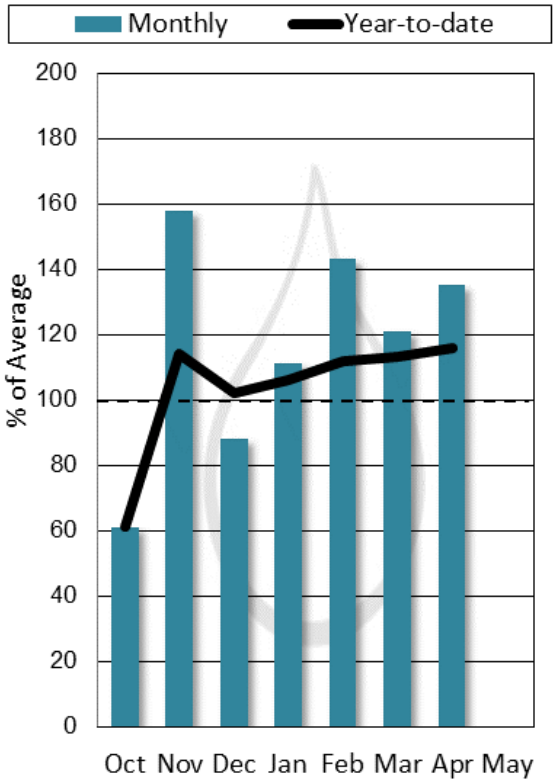
End of Month Storage	**Current (KAF)**	**Last Year (KAF)**	**Average (KAF)**	**Capacity (KAF)**	**% Average**	**% Capacity**
Ennis Lake	33.6	35.1	32.4	41.0	**104%**	**82%**
Hebgen Lake	274.3	298.2	276.7	378.8	**99%**	**72%**

Madison River Basin Snowpack with Non-Exceedence Projections

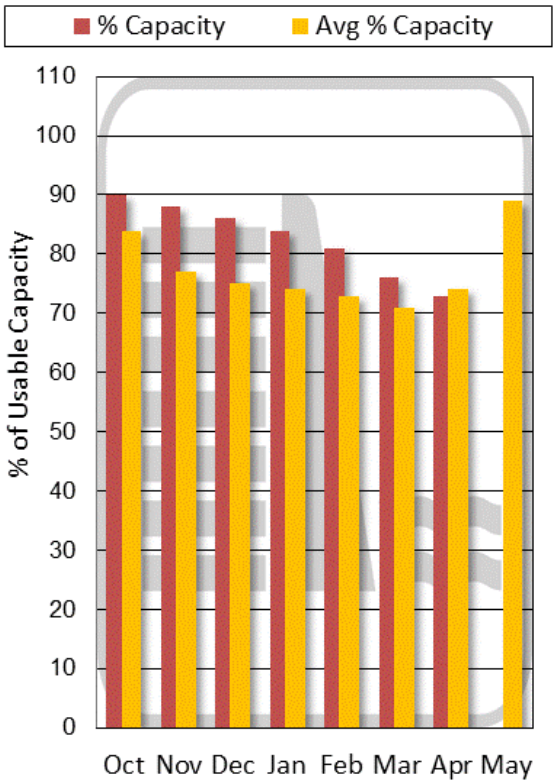
Based on provisional SNOTEL daily data as of 5/1/2018



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.

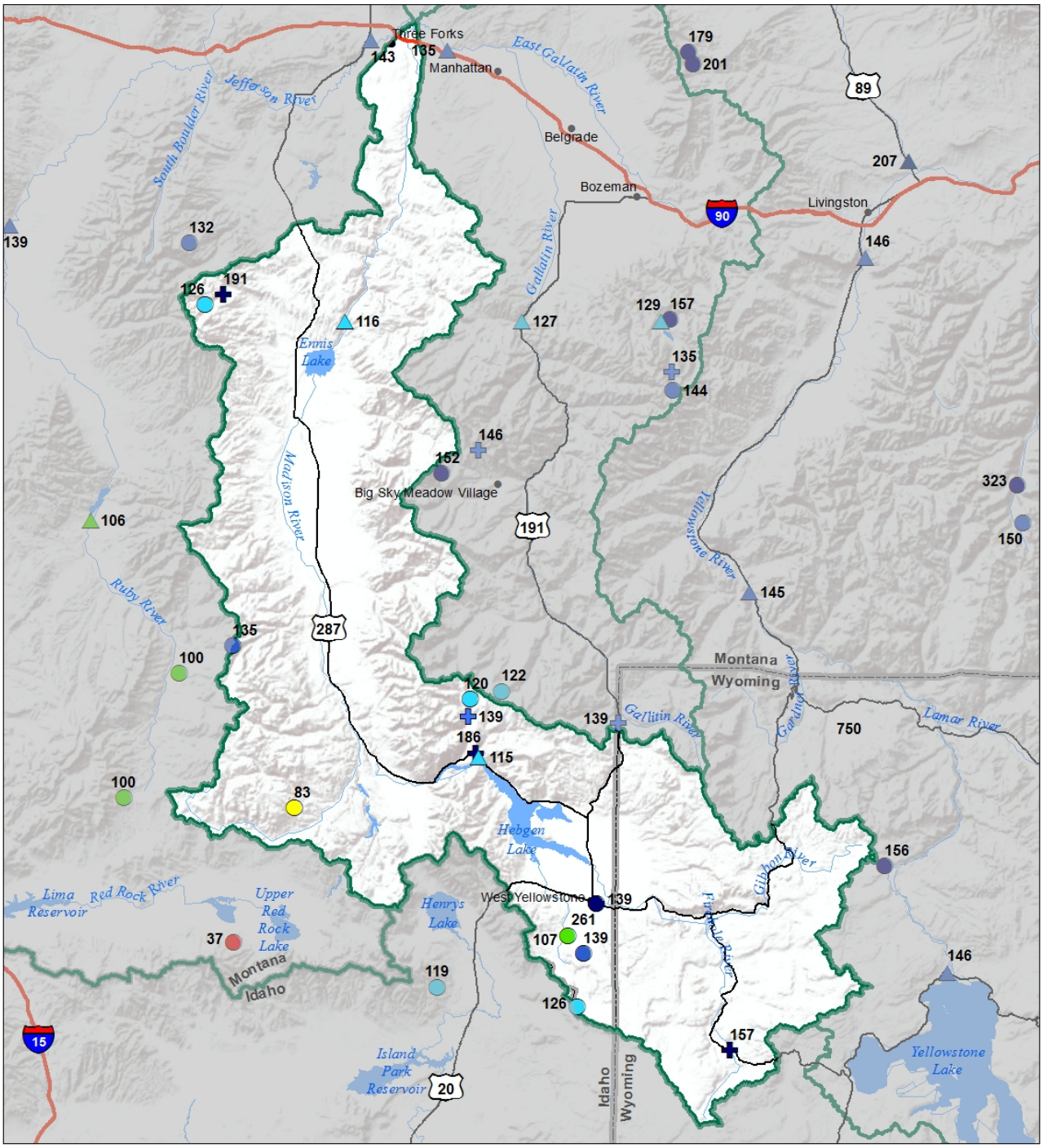
Madison River Basin

Forecast Point	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
		Chance Actual Volume Will Exceed Forecasted Volume						
Hebgen Reservoir Inflow[2]	MAY-JUL	290	330	355	*116%*	380	420	305
	MAY-SEP	380	430	465	*115%*	500	550	405
Ennis Reservoir Inflow[2]	MAY-JUL	520	585	630	*119%*	675	740	530
	MAY-SEP	650	735	790	*116%*	845	930	680

1) 90% and 10% exceedance probabilities are actually 95% and 5%

2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions

Madison River Basin
Streamflow Forecast, Snow Water Equivalent
Percentage of Normal
May 1, 2018



Snow Water Equivalent
Percent of Normal

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

Streamflow Forecast
Percent of Average Flows

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

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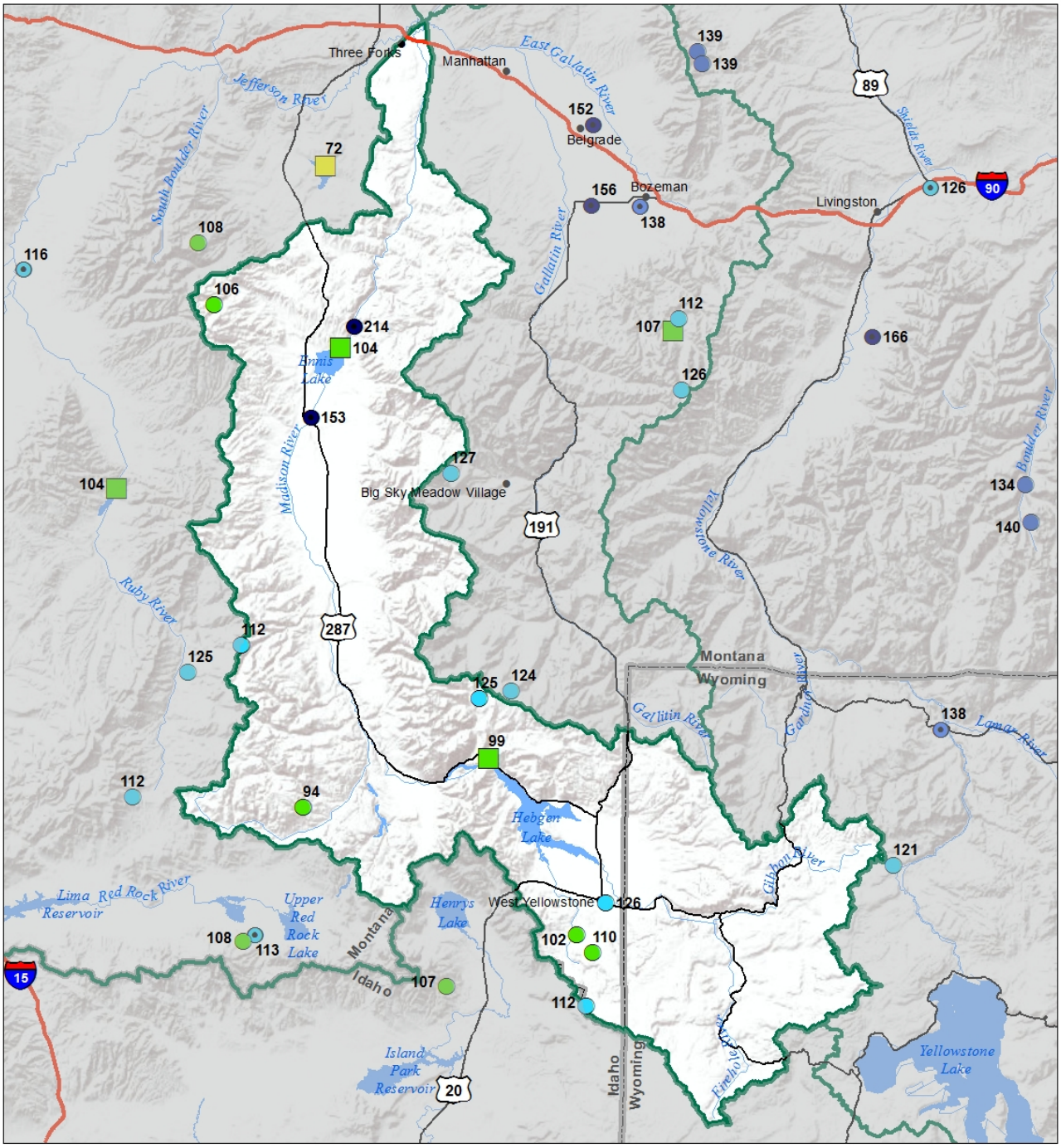
Madison River Basin
Water Year to Date Precipitation and Reservoir Levels
Percentage of Normal
May 1, 2018



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%

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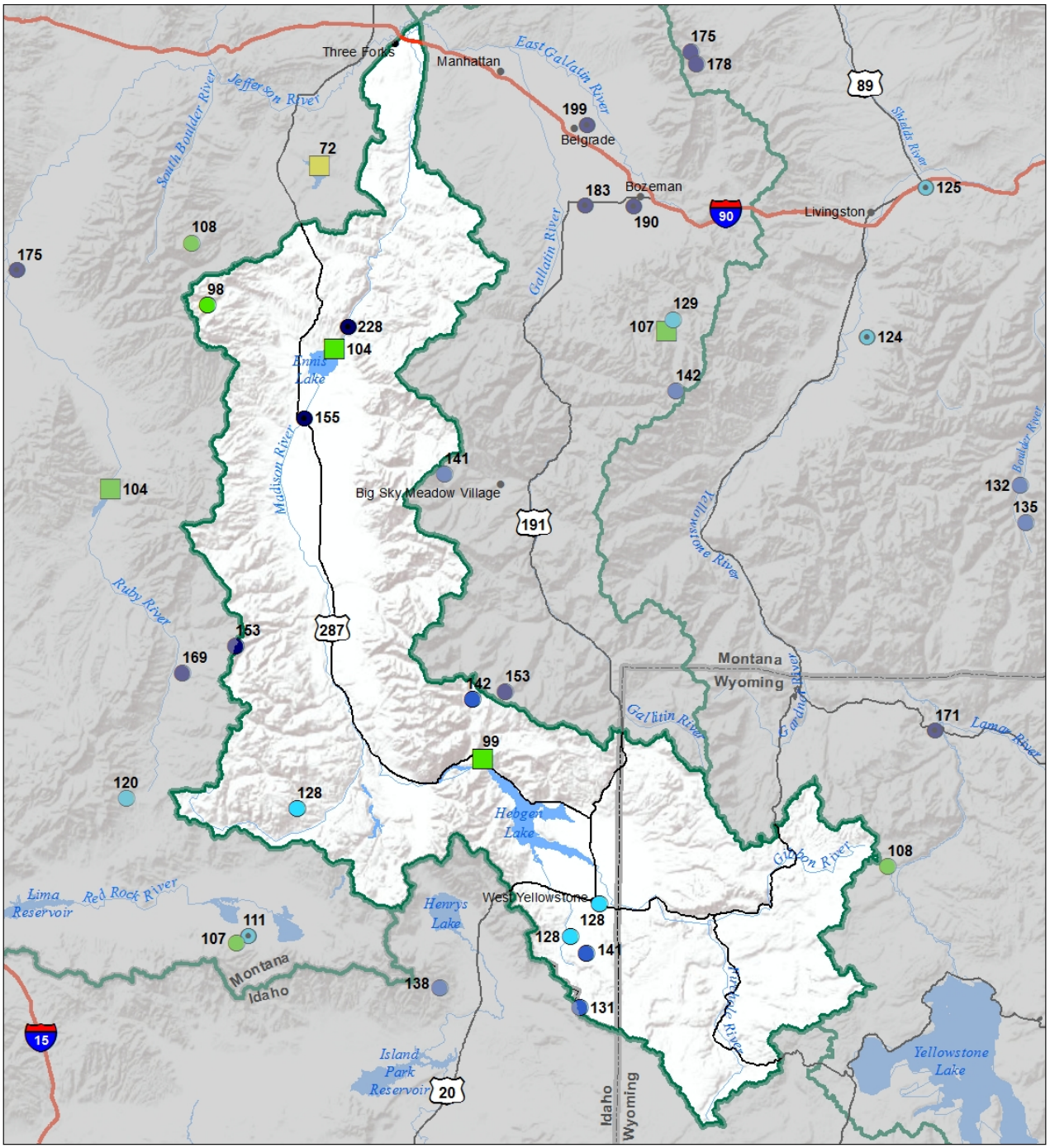
Madison River Basin
Monthly Precipitation and Reservoir Levels
Percentage of Normal
May 1, 2018 (April 1, 2018 - May 1, 2018)



Precipitation
Percent of Normal

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

Reservoirs
Percent of Normal

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

USDA

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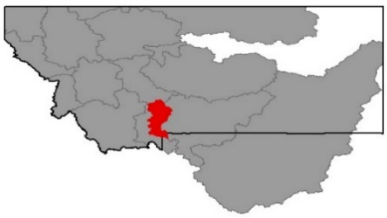


Gallatin River Basin

Will it ever quit? After months of seemingly endless snowfall this winter, the Gallatin Valley just experienced some of the highest April monthly precipitation totals on record. Both the Experimental Farm COOP near Four Corners (52 years or record) and the Belgrade Airport COOP (78 years) station recorded their highest April monthly precipitation totals. The Montana State University COOP station reported the second highest April total in 125 years of record. Not to be out done, both SNOTEL sites in the Bridger Range also reported the second highest April precipitation totals in the last 25 years. Other SNOTEL sites in the basins that feed the mainstem of the Gallatin also reported well above average precipitation for the month, ranging from 131% to 154% of average. What was anomalous this month is that most of the precipitation that occurred happened during the first 18 days of the month. High pressure with well-above-average temperatures during the latter half of the month began the snowmelt at low and mid-elevation SNOTEL sites in the basin, and the rivers and streams in the basin began to rise from snowmelt around the 20th of April. Although low and mid-elevations have begun to move at this point, most high elevation SNOTEL locations have experienced little melt. This isn't necessarily anomalous for the high elevation sites, as they typically peak in early May. It has been a big winter, and the remaining snowpack in the Upper Gallatin, Hyalite area, and the Bridger Range remains well above normal for this date. There is a substantial amount of snow water left in the mountains to enter the rivers and soils are saturated in many locations due to abundant snowfall this winter and above average April precipitation. NRCS Long-duration streamflow forecasts for the May 1st – July 31st period reflect the current snowpack totals and are well-above average across the basin. This is great news for water users in the region, but it comes with a caveat. Spring weather will largely dictate the timing and magnitude of flows in the local rivers and streams. While official National Weather Service (NWS-NOAA) flood forecasts indicate a low-likelihood of flooding on the larger rivers, there is still potential for small streams and some rivers to swell if anomalous weather occurs. A close eye should be kept on the weather. Prolonged periods with abundant sunshine and above average temperatures, or a rain-on-snow event, could quickly increase snowmelt contributions on a day-to-day basis.

Gallatin River Basin Data Summary

Snowpack	**Percent of 1981-2010 Normal (Median)**	**Last Year Percentage of Normal (Median)**
UPPER GALLATIN	137%	115%
HYALITE	145%	99%
BRIDGER	187%	108%
Basin-Wide	**147%**	**110%**

Precipitation	**Monthly Percentage of Average**	**WYTD Percentage of 1981-2010 Average***	**WYTD Last Year Percentage of Average**
Mountain Precipitation	153%	129%	132%
Valley Precipitation	194%	143%	132%
Basin-Wide Precipitation	**157%**	**130%**	**132%**

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

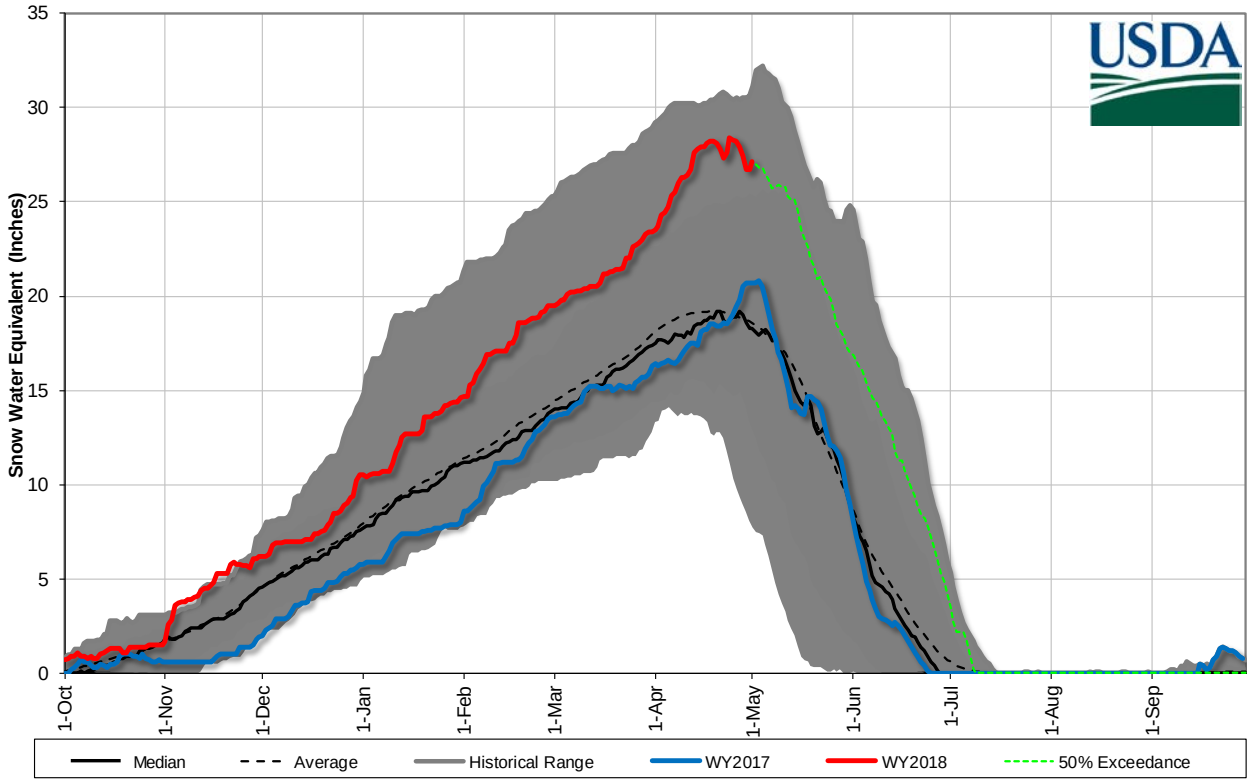
Reservoir Storage	**Percentage of Average**	**Percentage of Capacity (Total)**	**Last Year Percentage of Average**
Basin-Wide Storage	**107%**	**65%**	**106%**

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

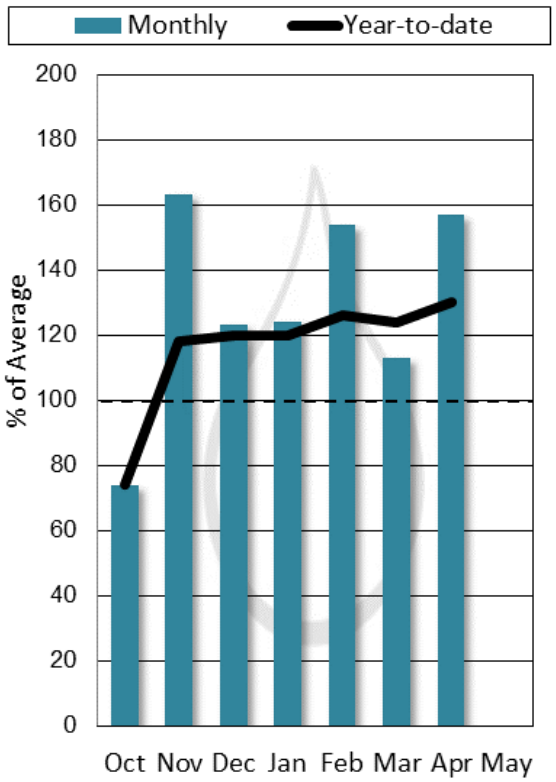
End of Month Storage	**Current (KAF)**	**Last Year (KAF)**	**Average (KAF)**	**Capacity (KAF)**	**% Average**	**% Capacity**
Middle Creek Res	6.7	6.6	6.2	10.2	**107%**	**65%**

Gallatin River Basin Snowpack with Non-Exceedence Projections

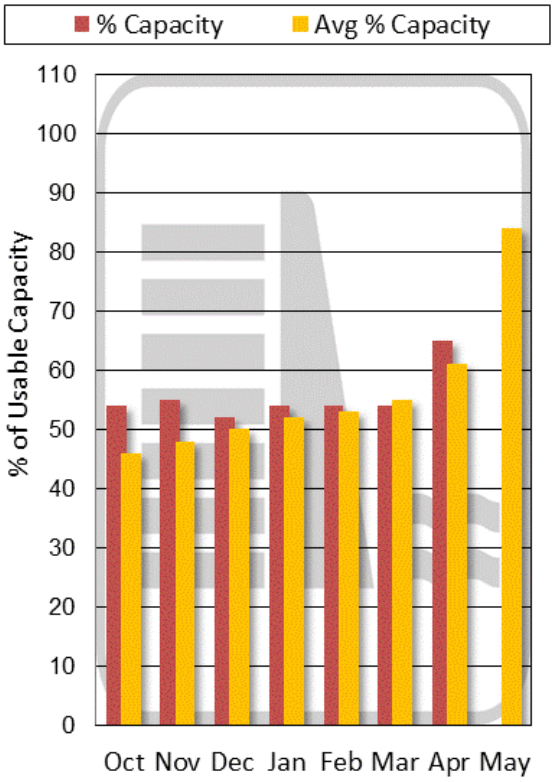
Based on provisional SNOTEL daily data as of 5/1/2018



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.

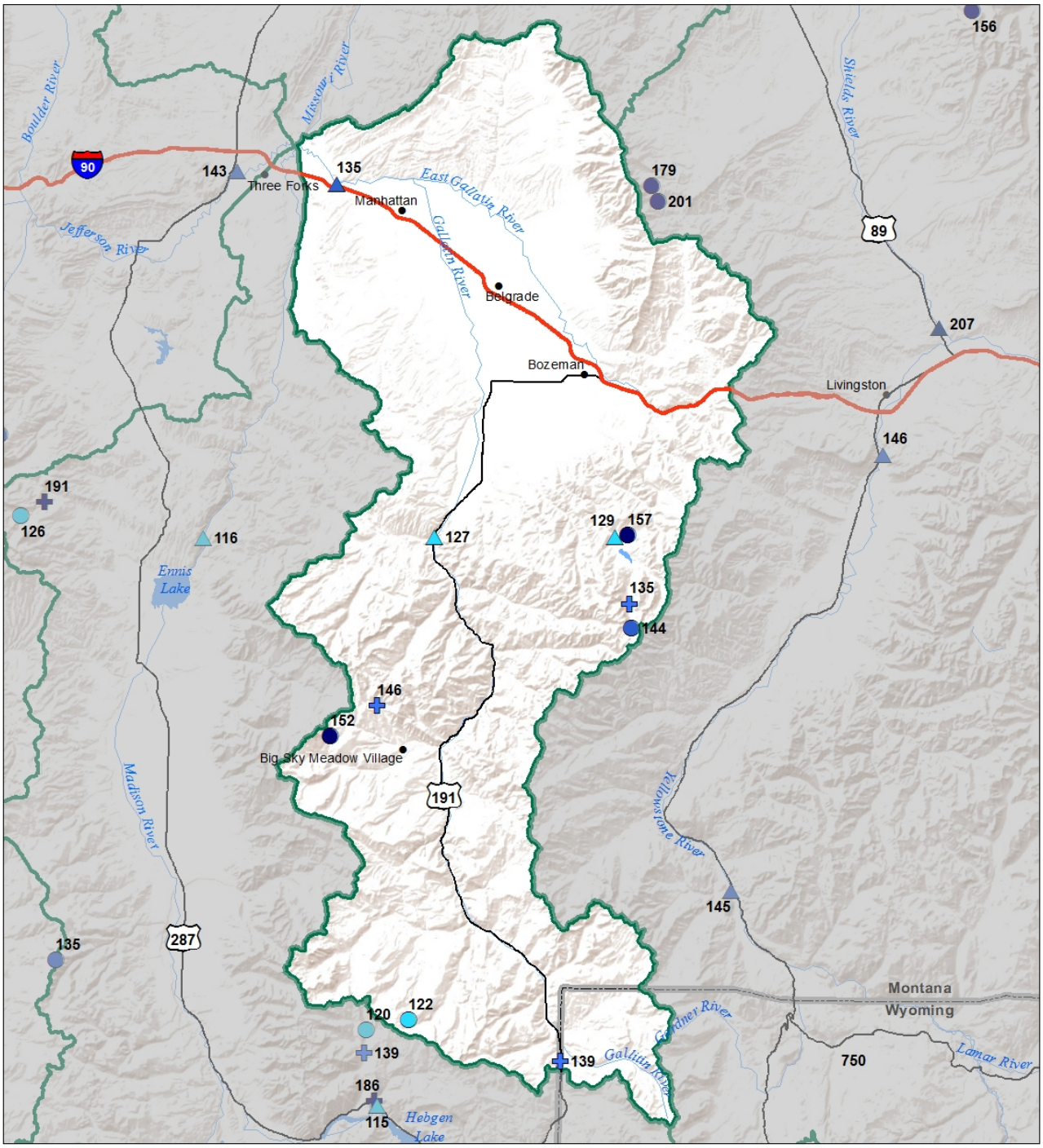
Gallatin River Basin

GALLATIN RIVER BASIN	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
		Chance Actual Volume Will Exceed Forecasted Volume						
Gallatin R nr Gateway	MAY-JUL	415	455	480	*130%*	505	545	370
	MAY-SEP	485	530	560	*127%*	590	635	440
Hyalite Reservoir Inflow[2]	MAY-JUL	21	22	24	*130%*	25	27	18.5
	MAY-SEP	24	26	27	*129%*	29	31	21
Gallatin R at Logan	MAY-JUL	400	475	525	*138%*	575	650	380
	MAY-SEP	455	540	600	*135%*	660	750	445

1) 90% and 10% exceedance probabilities are actually 95% and 5%

2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions

Gallatin River Basin
Streamflow Forecast, Snow Water Equivalent
Percentage of Normal
May 1, 2018



Snow Water Equivalent
Percent of Normal

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

Streamflow Forecast
Percent of Average Flows

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

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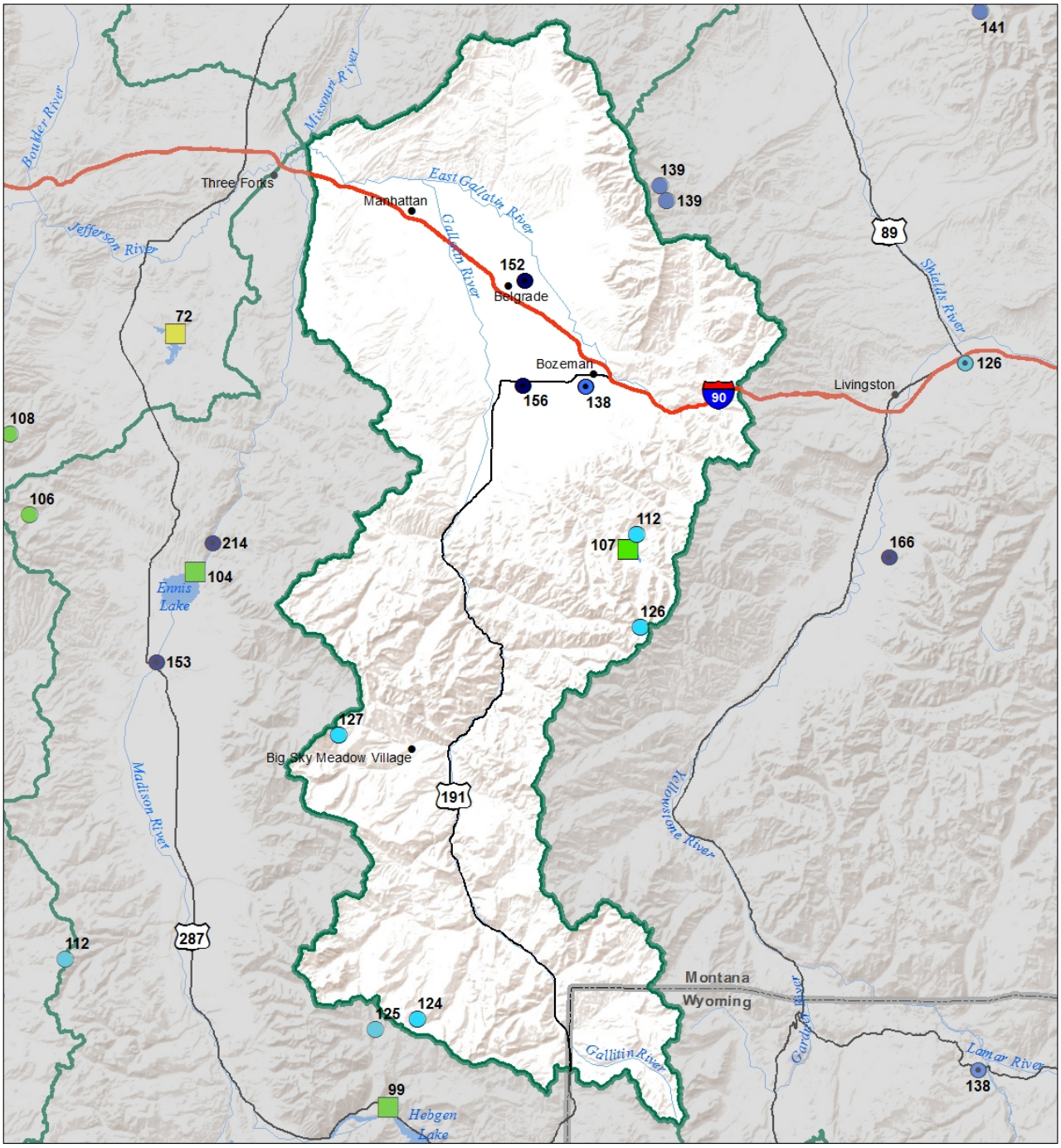
Gallatin River Basin
Water Year to Date Precipitation and Reservoir Levels
Percentage of Normal
May 1, 2018



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%

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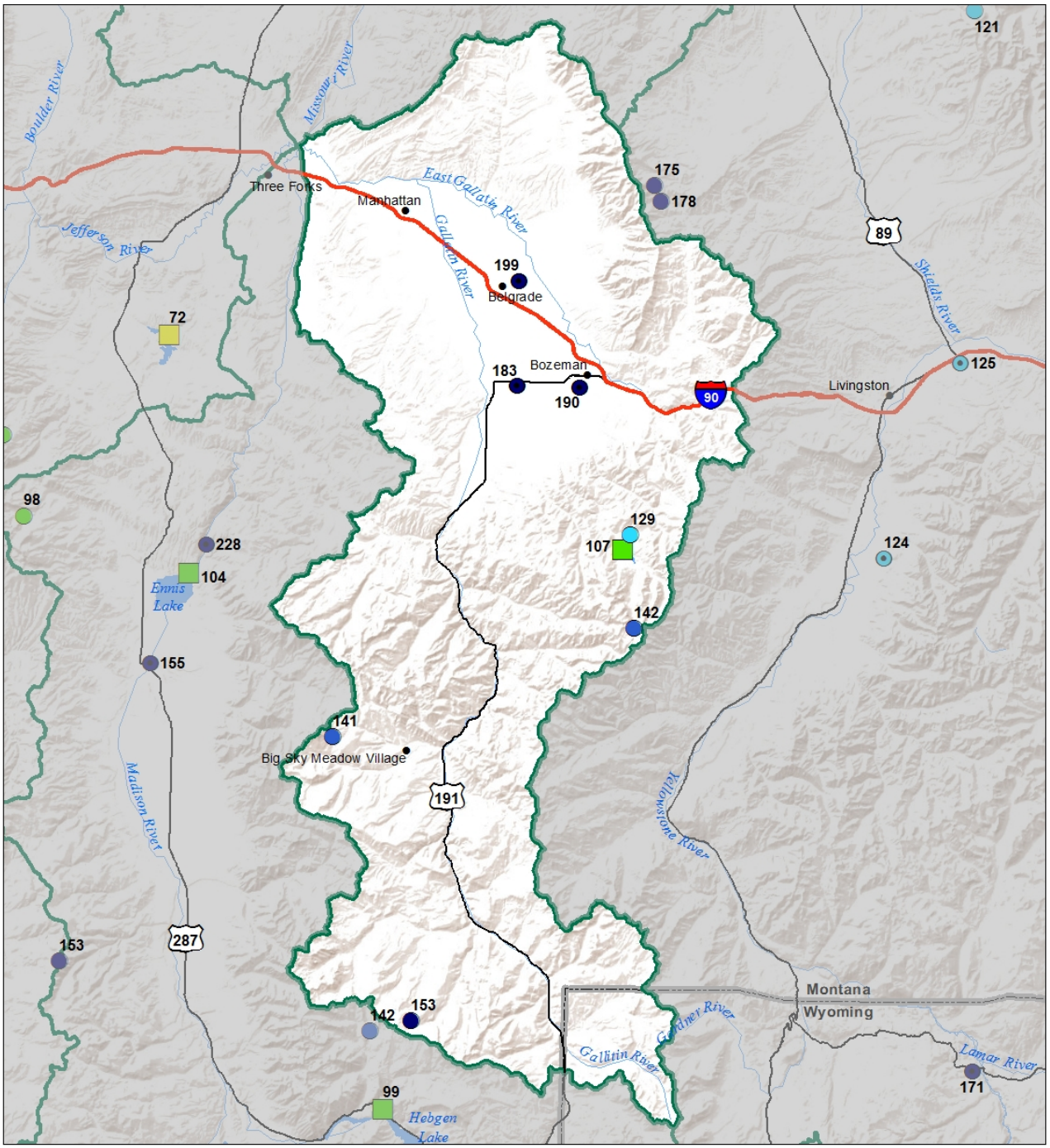
Gallatin River Basin
Monthly Precipitation and Reservoir Levels
Percentage of Normal
May 1, 2018 (April 1, 2018 - May 1, 2018)



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%
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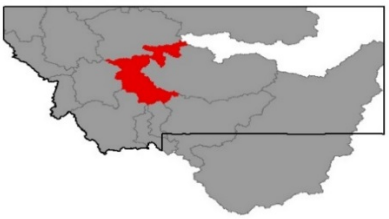
USDA

Montana State Library Natural Resource Information System



Headwaters Mainstem (Missouri) River Basin

On May 1st snowpack in the Missouri Mainstem River basin has typically peaked, and the water-year peak snow water equivalent (SWE) at mountain snowpack monitoring sites is known. This year, a new record peak SWE was set at the Nevada Ridge SNOTEL site northwest of Helena. Rocker Peak SNOTEL, Frohner Meadow SNOTEL, and Ten Mile Lower Snowcourse were second highest on record (behind 1975), and the Boulder Mountain SNOTEL site was the third highest on record. The first half of April continued the wet pattern this winter, dropping near to above normal precipitation in the mountains and valleys. Low-elevation SNOTEL sites began the seasonal melt on April 17th, when high-pressure with abundant sunshine and above average temperatures transitioned the snowpack to isothermal (ready to melt). High elevation SNOTEL sites in the basin (above 8000') have only started the transition to melt at the end of the month or continued to gain SWE ending the month. The take-home point is this; we had record-setting snowfall in the mountains of the region this winter and spring, and the bulk of the water contained in the snowpack remains to enter the system. Streamflow forecasts for the May 1st – July 31st period reflect the well-above normal snowpack for this date and are well-above average on all streams in the basin. River and streams have begun to rise due to the low and mid-elevation snowmelt and will continue to do so over the coming weeks. A close eye should be kept on the future weather, as long periods of abundant sunshine with above-average temperatures, or a rain-on-snow event, has the potential to release a substantial amount of snow water in systems in a short period of time. In many areas, flooding is actively occurring as of the publication date of this report (Ten Mile Creek, Prickly Pear Creek) and this will likely continue until snowpack decreases over the coming weeks. Additional anomalous weather would only exacerbate what is already occurring.

Headwaters Missouri Mainstem River Basin Data Summary

Snowpack	**Percent of 1981-2010 Normal (Median)**	**Last Year Percentage of Normal (Median)**
HEADWATERS MAINSTEM	182%	90%
SMITH-JUDITH-MUSSELSHELL	144%	83%
SUN-TETON-MARIAS	192%	129%
MAINSTEM ab FT PECK RES	171%	98%
MILK RIVER BASIN	0%	0%
Basin-Wide	**171%**	**98%**

Precipitation	**Monthly Percentage of Average**	**WYTD Percentage of 1981-2010 Average***	**WYTD Last Year Percentage of Average**
Mountain Precipitation	116%	131%	109%
Valley Precipitation	164%	199%	143%
Basin-Wide Precipitation	**119%**	**134%**	**110%**

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

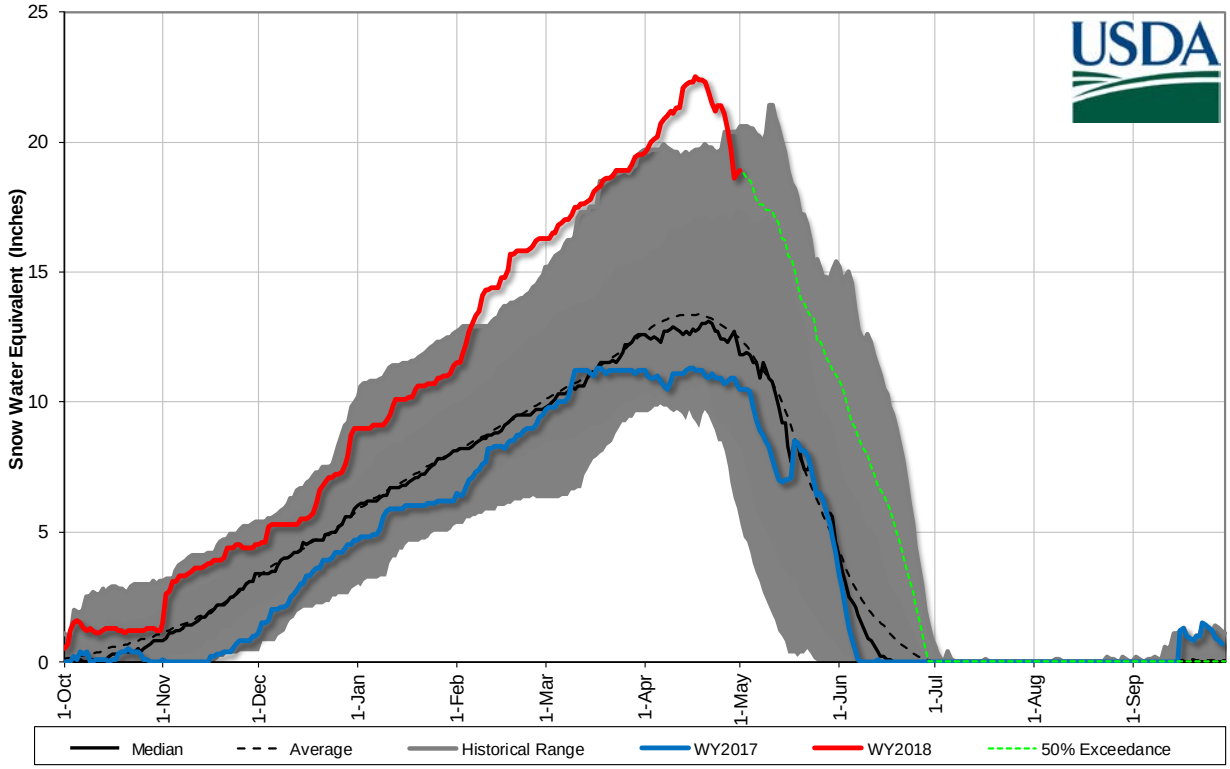
Reservoir Storage	**Percentage of Average**	**Percentage of Capacity (Total)**	**Last Year Percentage of Average**
Basin-Wide Storage	**120%**	**84%**	**118%**

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

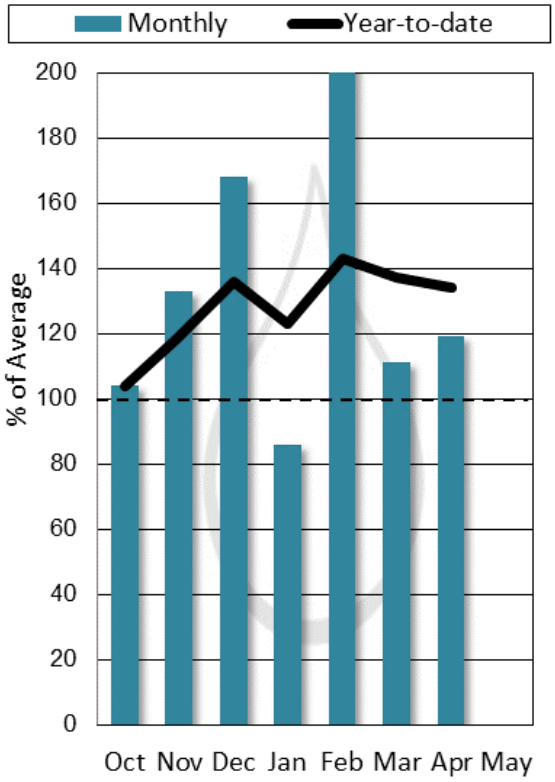
End of Month Storage	**Current (KAF)**	**Last Year (KAF)**	**Average (KAF)**	**Capacity (KAF)**	**% Average**	**% Capacity**
Canyon Ferry Lake	1326.9	1566.4	1480.0	2043.0	**90%**	**65%**
Helena Valley Reservoir	8.8	8.9	8.2	9.2	**107%**	**96%**
Lake Helena	11.0	11.0	10.8	12.7	**102%**	**87%**
Hauser Lake & Lake Helena	74.3	74.1	74.2	74.6	**100%**	**100%**
Holter Lake	81.2	81.2	80.6	81.9	**101%**	**99%**
Fort Peck Lake	16291.4	15694.2	13138.0	18910.0	**124%**	**86%**

Missouri River Basin below Toston above Smith River Inflow Snowpack with Non-Exceedence Projections

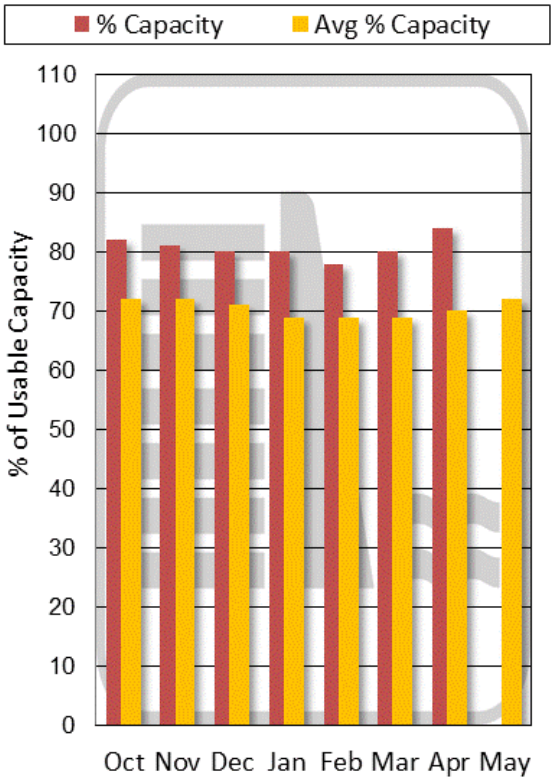
Based on provisional SNOTEL daily data as of 5/1/2018



Mountain and Valley Precipitation



End of Month Reservoir Storage



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

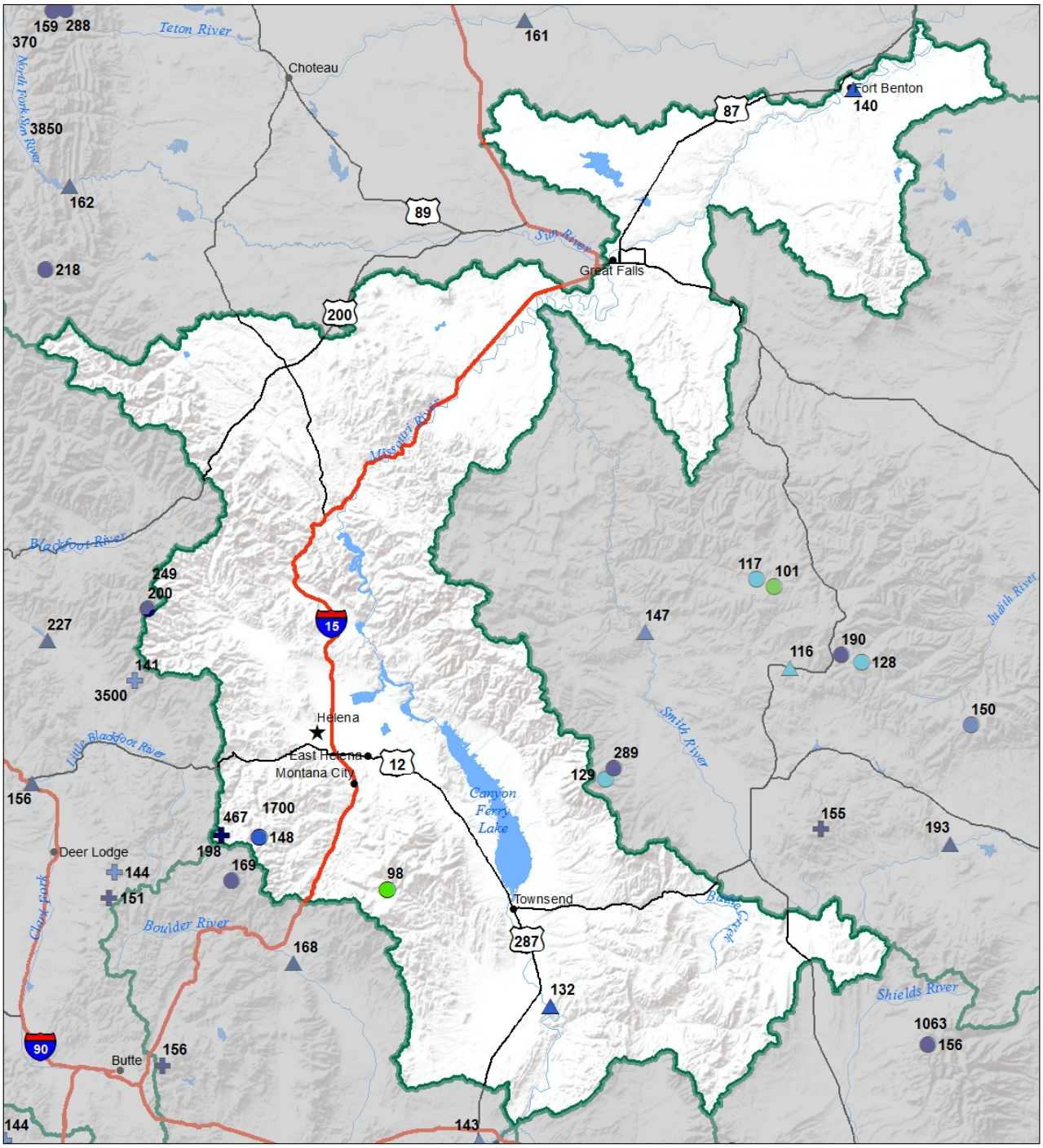
Missouri Mainstem Basin

Forecast Point	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
		Chance Actual Volume Will Exceed Forecasted Volume						
Missouri R at Toston[2]	MAY-JUL	1580	1840	2020	*136%*	2200	2470	1480
	MAY-SEP	1770	2100	2330	*132%*	2550	2890	1760
Dearborn R nr Craig								
Missouri R at Fort Benton[2]	MAY-JUL	2450	2880	3170	*145%*	3460	3890	2190
	MAY-SEP	2870	3400	3760	*140%*	4120	4650	2680
Missouri R nr Virgelle[2]	MAY-JUL	2860	3330	3640	*145%*	3950	4420	2510
	MAY-SEP	3270	3850	4240	*140%*	4640	5210	3030
Missouri R nr Landusky[2]	MAY-JUL	3080	3580	3930	*148%*	4270	4780	2650
	MAY-SEP	3520	4140	4570	*143%*	4990	5620	3200
Missouri R bl Fort Peck Dam[2]	MAY-JUL	3110	3690	4080	*151%*	4470	5050	2700
	MAY-SEP	3360	4110	4630	*147%*	5140	5900	3160
Lake Sakakawea Inflow[2]								

1) 90% and 10% exceedance probabilities are actually 95% and 5%

2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions

Headwaters Mainstem (Missouri) River Basin
Streamflow Forecast, Snow Water Equivalent
Percentage of Normal
May 1, 2018



Snow Water Equivalent
Percent of Normal

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

Streamflow Forecast
Percent of Average Flows

- > 150%
- 131 - 150%
- 111 - 130%
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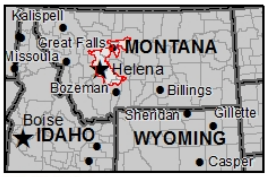

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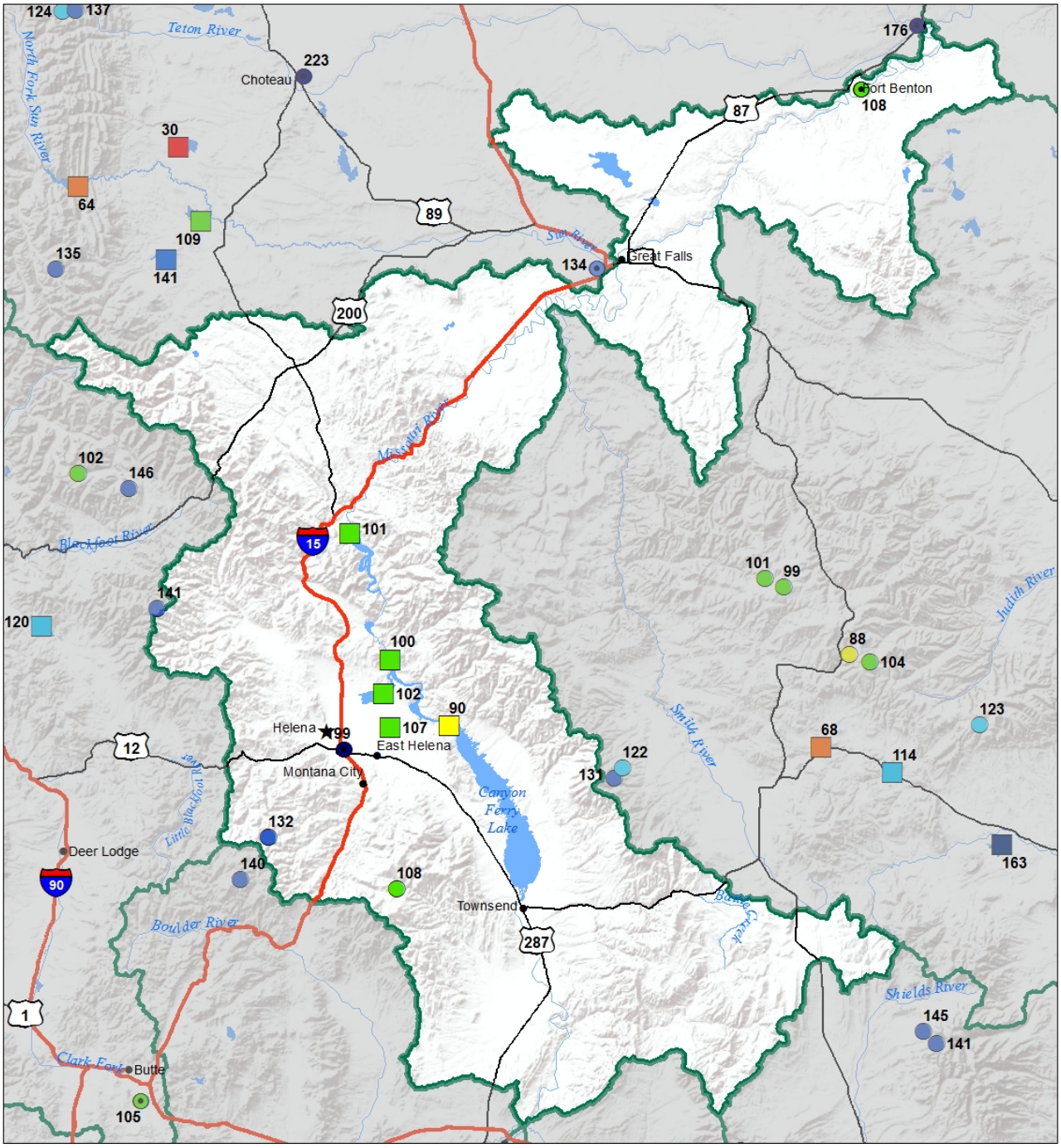
Montana State Library Natural Resource Information System

Headwaters Mainstem (Missouri) River Basin
Water Year to Date Precipitation and Reservoir Levels
Percentage of Normal
May 1, 2018



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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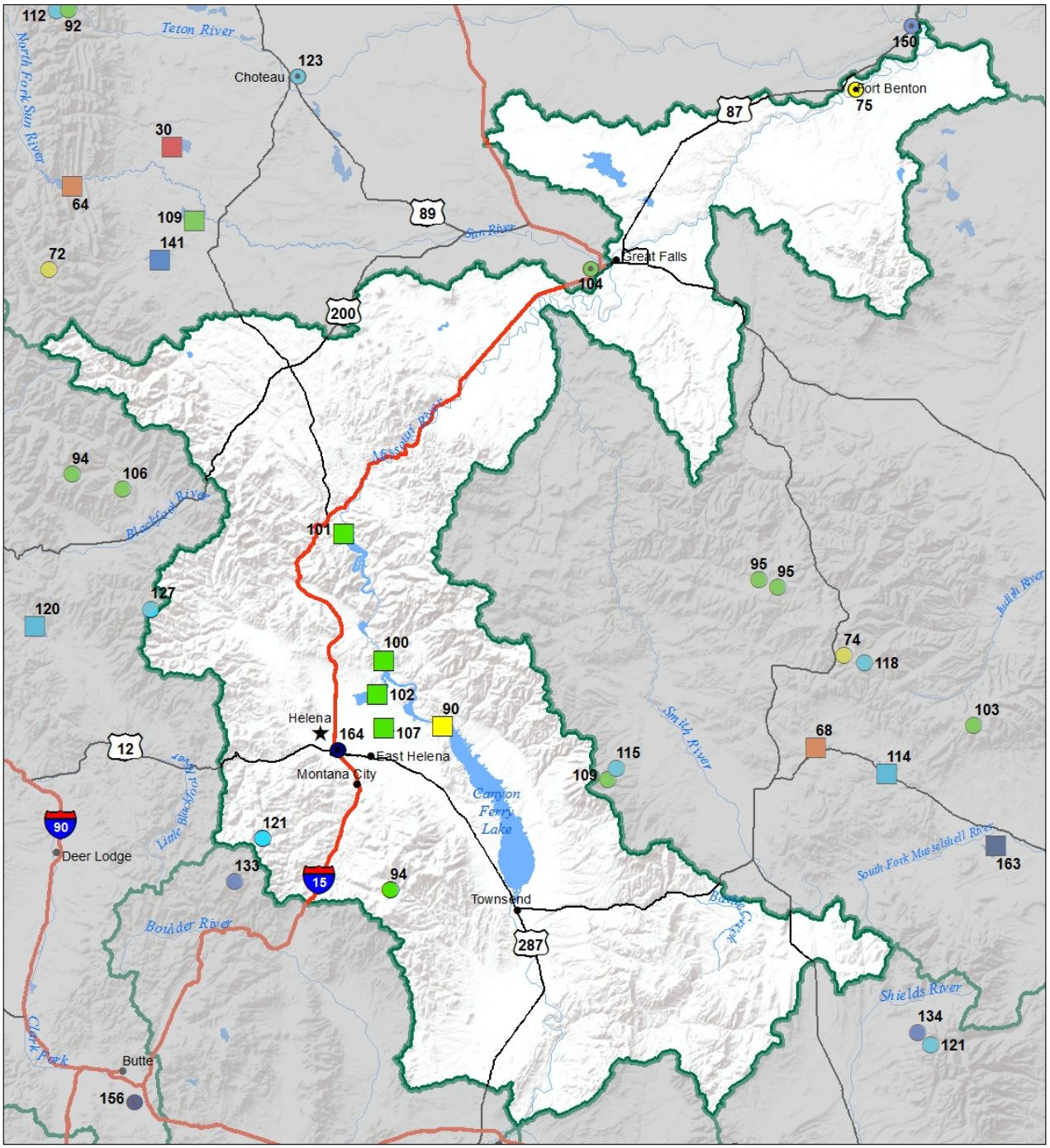
Headwaters Mainstem (Missouri) River Basin
Monthly Precipitation and Reservoir Levels
Percentage of Normal
May 1, 2018 (April 1, 2018 - May 1, 2018)



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%
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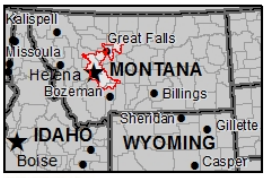

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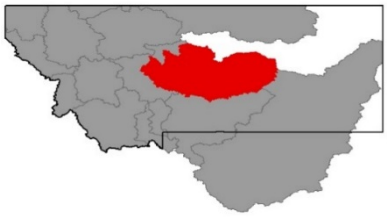
Smith-Judith-Musselshell River Basin



The early part of April in the Smith-Judith-Musselshell River basin brought continued precipitation to the mountains and valleys, but only last through about the middle of the month. The Big Belts, the Castle Mountains, and Big Snowies received above normal precipitation for the month, while most SNOTEL sites in the Little Belts reported near to below average precipitation. Snowfall this winter has built a well-above normal snowpack for runoff this year, and on May 1st all sites are normal to well-above normal (101% to 290%). After mid-month, the sunny days with above average temperatures caused the snowpack at low and mid-elevation to transition to melt, while high elevation monitoring sites continued to accumulate snow. Streamflows began to rise in response to the snowmelt and have continued to climb through the end of the month. Long-duration streamflow forecasts for the May 1st – July 31st period are above average to well-above average and can be found in the streamflow table in this section. There is a substantial snowpack remaining to melt this spring, and high flows are anticipated on many of the rivers in the region. Lower elevations still have 70% to 80% of this year's peak snowpack remaining to enter the rivers, and high elevations have 90% to 95% still remaining to melt. The coming weather in May will dictate the timing of peak runoff and the volumes experienced in the rivers on a day-to-day basis. Long periods of sunny weather with above normal temperatures, or a rain-on-snow event, could cause substantial increases inflows in a short time from the remaining snowpack. A slow release of mountain snowpack is always ideal but not always delivered. A close eye should be kept on the weather by water managers and water users in the basin this spring and summer.

Smith Judith Musselshell River Basin Data Summary

Snowpack	**Percent of 1981-2010 Normal (Median)**	**Last Year Percentage of Normal (Median)**
SMITH	138%	86%
HIGHWOOD	%	%
JUDITH	131%	76%
MUSSELSHELL	201%	96%
Basin-Wide	**144%**	**83%**

Precipitation	**Monthly Percentage of Average**	**WYTD Percentage of 1981-2010 Average***	**WYTD Last Year Percentage of Average**
Mountain Precipitation	109%	114%	105%
Valley Precipitation	162%	116%	142%
Basin-Wide Precipitation	**116%**	**114%**	**109%**

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

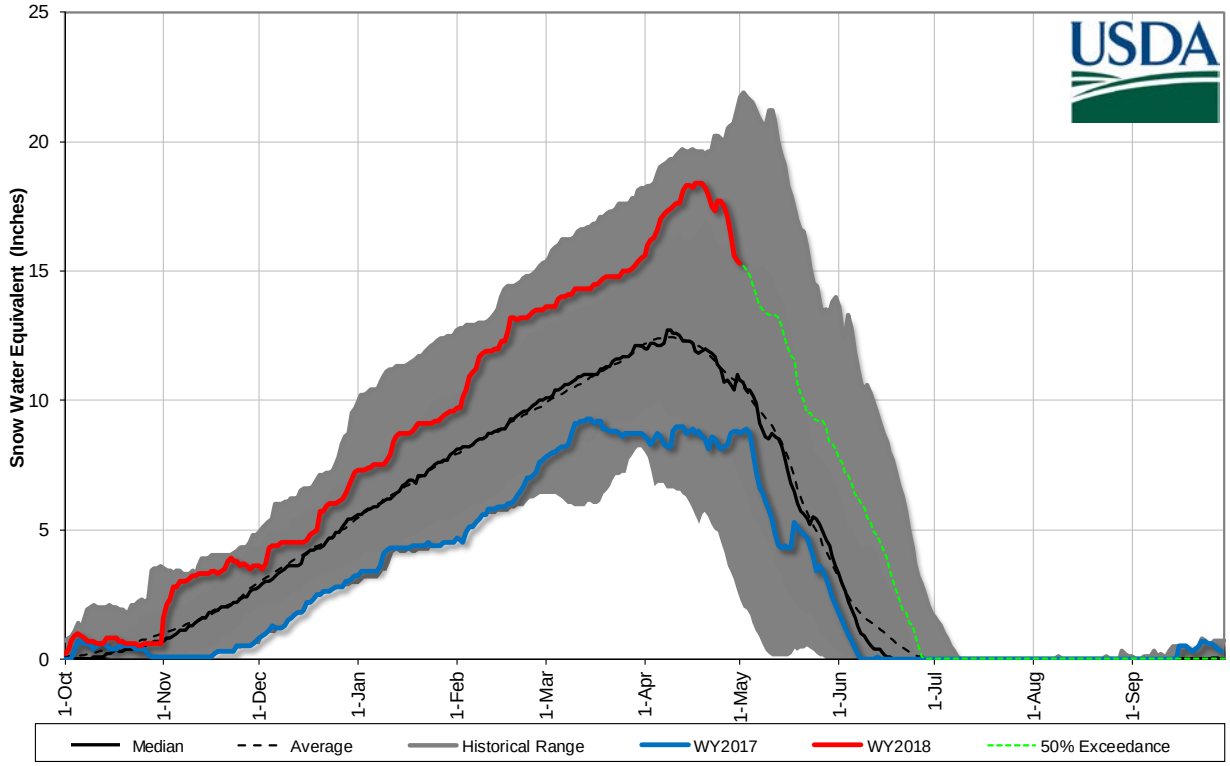
Reservoir Storage	**Percentage of Average**	**Percentage of Capacity (Total)**	**Last Year Percentage of Average**
Basin-Wide Storage	**131%**	**86%**	**116%**

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

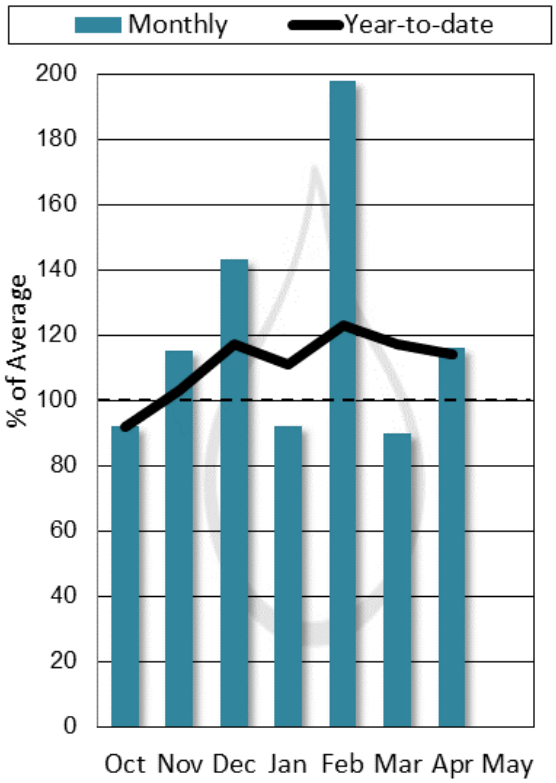
End of Month Storage	**Current (KAF)**	**Last Year (KAF)**	**Average (KAF)**	**Capacity (KAF)**	**% Average**	**% Capacity**
Smith River Res	5.6	7.1	8.3	10.6	**68%**	**53%**
Ackley Lake	3.3	3.6	3.3	7.0	**101%**	**48%**
Bair Res	5.1	4.8	4.5	7.0	**114%**	**73%**
Martinsdale Res	19.2	15.1	11.8	23.1	**163%**	**83%**
Deadman's Basin Res	70.2	60.6	51.0	72.2	**138%**	**97%**

Smith-Judith-Musselshell River Basin Snowpack with Non-Exceedence Projections

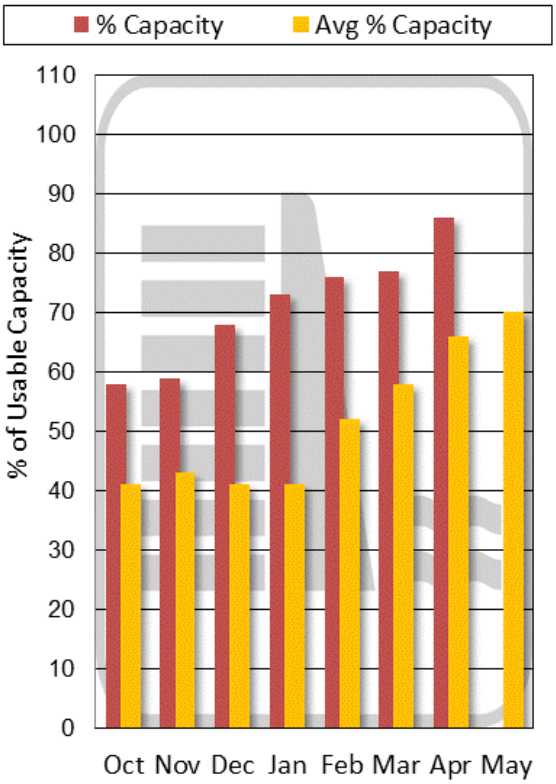
Based on provisional SNOTEL daily data as of 5/1/2018



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.

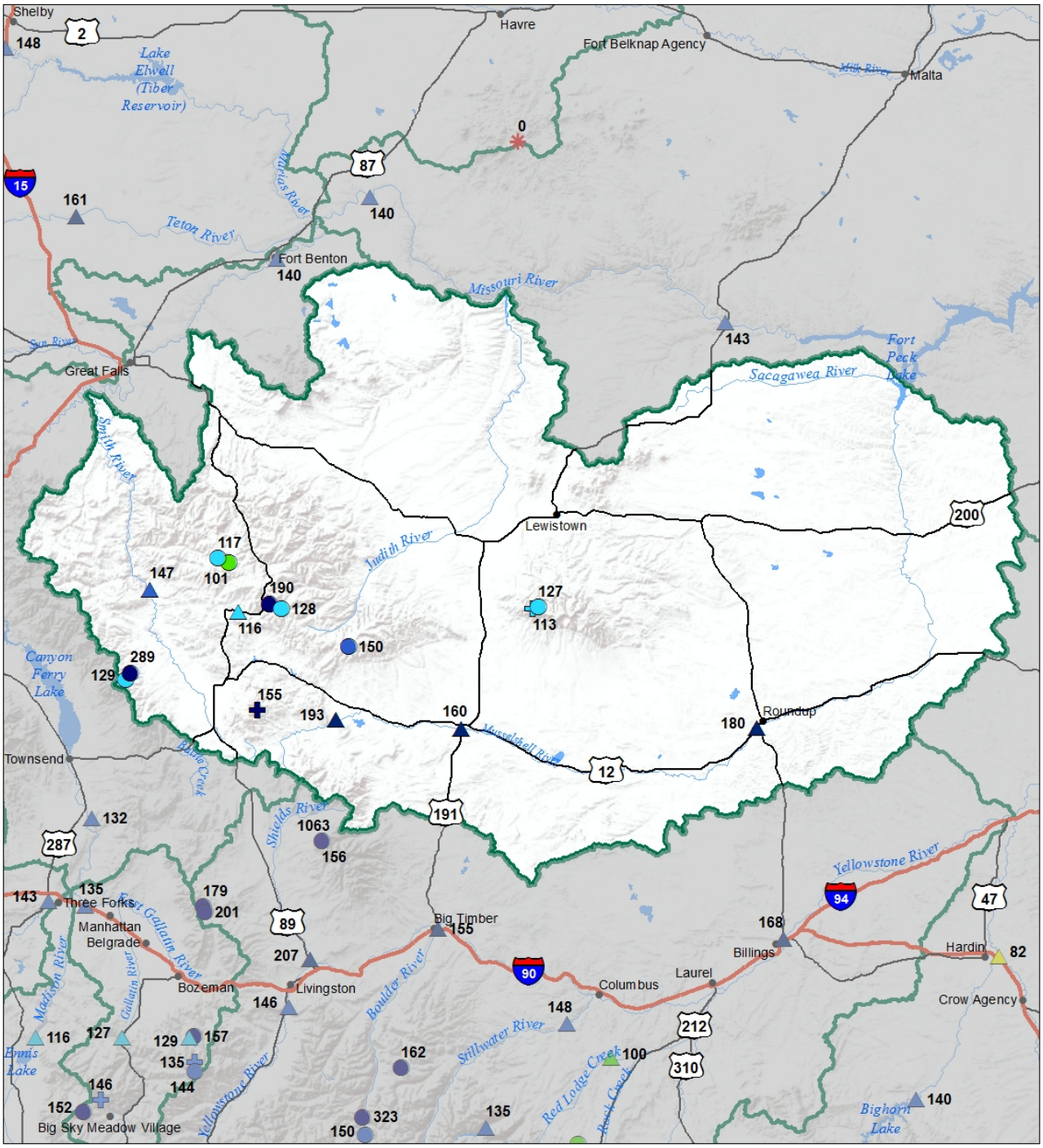
Smith-Judith-Musselshell

Forecast Point	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
		Chance Actual Volume Will Exceed Forecasted Volume						
Sheep Ck nr White Sulphur Springs	MAY-JUL	10.7	13.7	15.7	*117%*	17.7	21	13.4
	MAY-SEP	12.7	16.3	18.8	*116%*	21	25	16.2
Smith R bl Eagle Ck[2]	MAY-JUL	87	114	133	*149%*	152	179	89
	MAY-SEP	90	123	146	*147%*	169	200	99
NF Musselshell R nr Delpine								
SF Musselshell R ab Martinsdale	MAY-JUL	41	60	73	*197%*	86	104	37
	MAY-SEP	44	64	77	*193%*	90	110	40
Musselshell R at Harlowton[2]	MAY-JUL	47	66	78	*163%*	90	109	48
	MAY-SEP	45	66	80	*160%*	94	115	50
Musselshell R nr Roundup[2]	MAY-JUL	41	75	97	*180%*	120	153	54
	MAY-SEP	37	72	97	*180%*	120	154	54

1) 90% and 10% exceedance probabilities are actually 95% and 5%

2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions

Smith-Judith-Musselshell River Basin
Streamflow Forecast, Snow Water Equivalent
Percentage of Normal
May 1, 2018



Snow Water Equivalent
Percent of Normal

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

Streamflow Forecast
Percent of Average Flows

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

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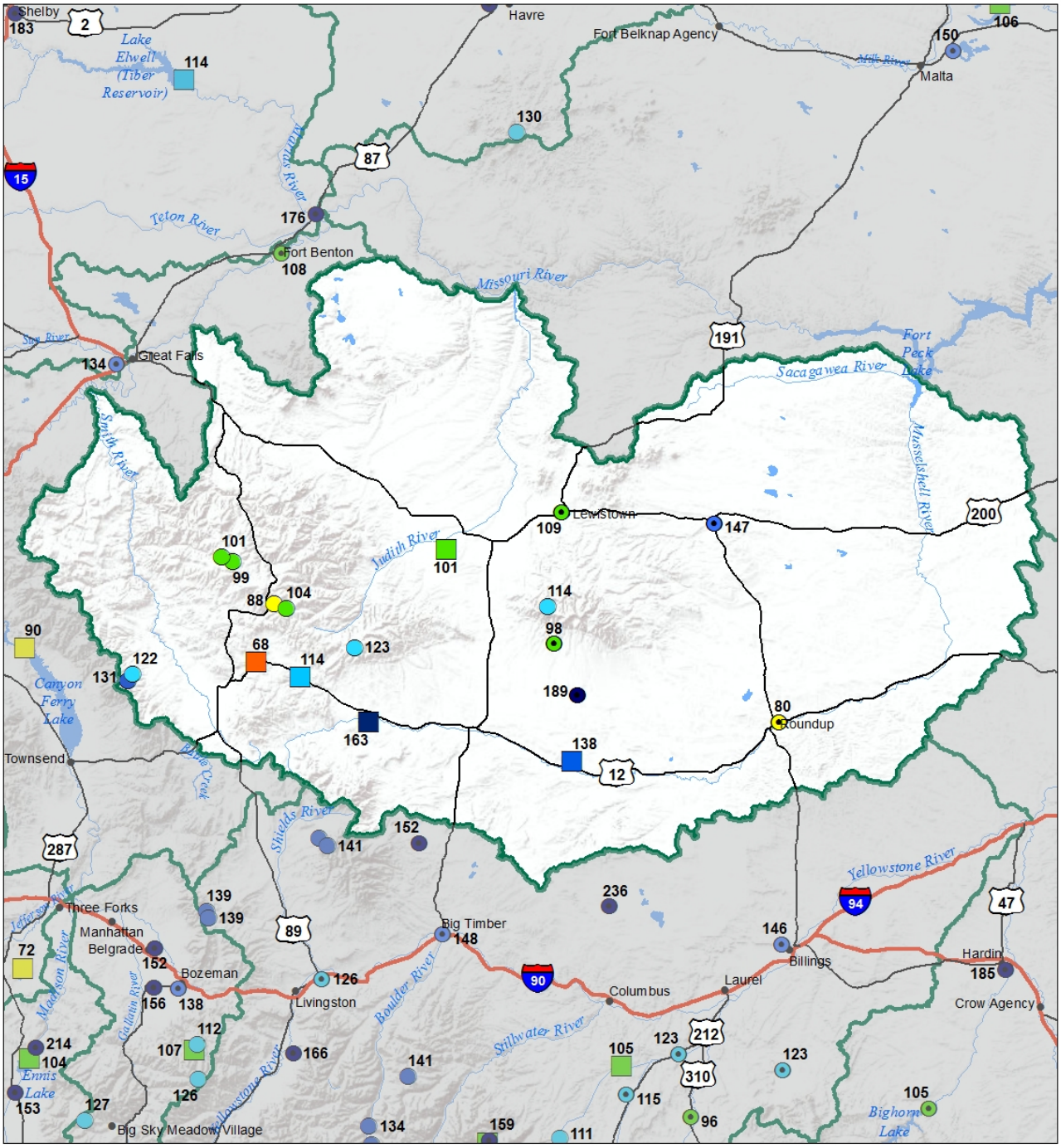
Smith-Judith-Musselshell River Basin
Water Year to Date Precipitation and Reservoir Levels
Percentage of Normal
May 1, 2018



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%
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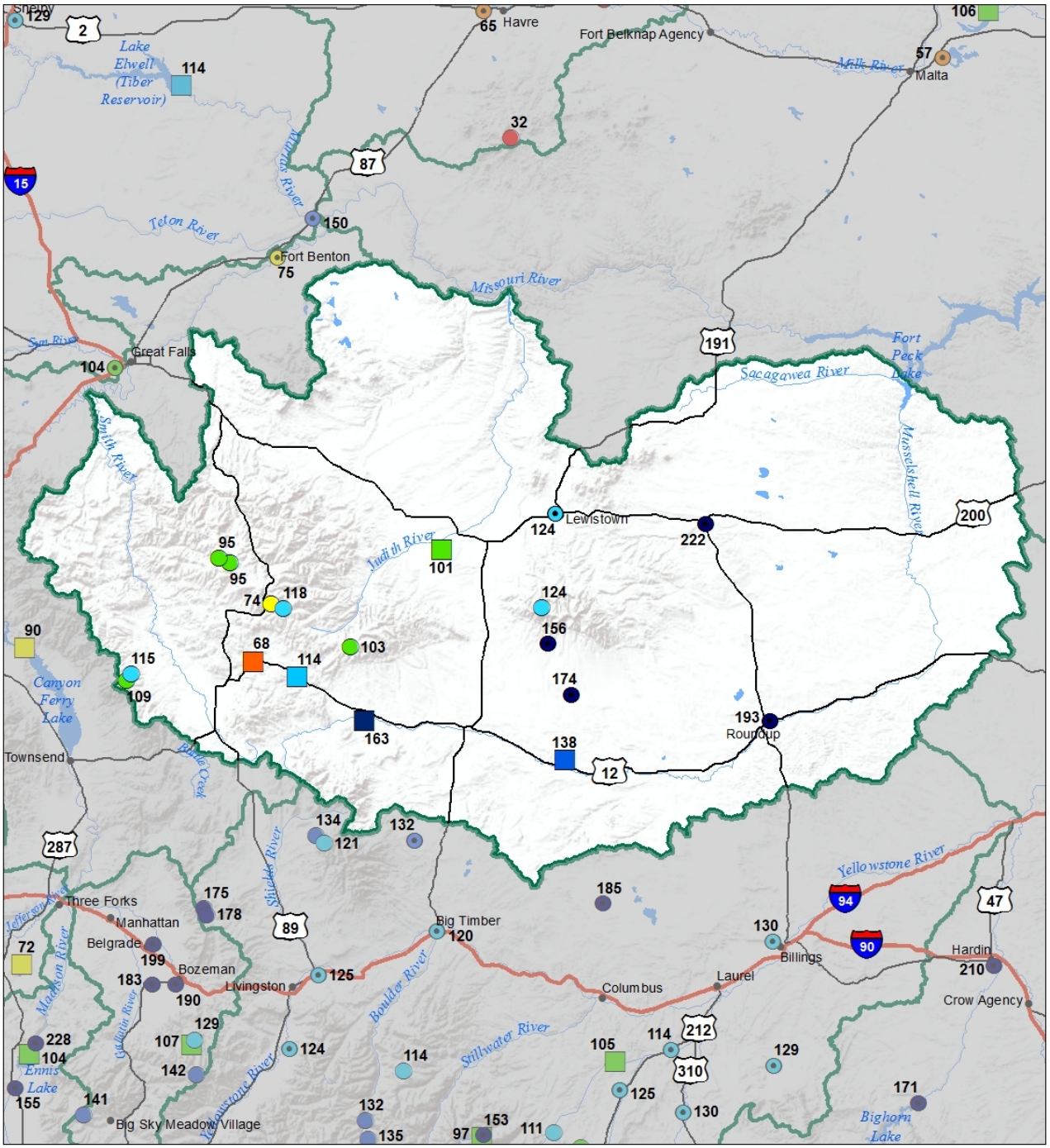
Smith-Judith-Musselshell River Basin
Monthly Precipitation and Reservoir Levels
Percentage of Normal
May 1, 2018 (April 1, 2018 - May 1, 2018)



Precipitation
Percent of Normal

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

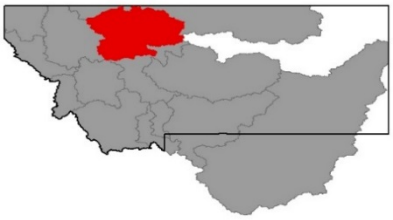
Reservoirs
Percent of Normal

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

USDA

Montana State Library Natural Resource Information System

Sun-Teton-Marias River Basin



Snowfall this year has been abundant in the Front Range, perhaps too abundant. All the cities and towns in the area have been reeling from the unrelenting snowfall so far this year, with many setting new record seasonal snowfall totals. The impacts have been wide-spread. It has impacted livestock producers while calving, cut off entire communities during large storm events, and caused wide-spread flooding from the melting of low elevation valley snowpack in mid-April. And this is just in the valleys. Snowfall wasn't quite as abundant during April as the previous months this winter and spring and was near to slightly to below normal, which was probably a good thing. Some snowpack monitoring sites set new records this year for peak snow water equivalent (SWE), Wood Creek SNOTEL west of August broke a record that was previously set in 1997 when it peaked on April 18th, and the other SNOTEL sites in the basin(s) peaked in the 85th-90th percentile. Snow surveys conducted in the Sun River basin this month measured snowpack that was 218% to 370% of normal for this date, and the Cabin Creek Snowcourse was the second highest on record for May 1st (54 years of measurements). The higher elevation Wrong Creek Snowcourse was the third highest on record. A substantial amount of snow remains in the mountains for May 1st, 75% to 90% of the snowpack is left to melt this spring and summer. A close eye is being kept on Gibson Reservoir this spring and summer, as projected inflows due to the amount of snowpack available to melt will surely fill the reservoir. The big questions are the rate at which the reservoir is going to fill (inflows), if/how long it will spill, and what the impacts are going to be downstream. Water managers have dropped the reservoir to near historic low levels in anticipation of higher than average inflows, and the future weather will dictate the impacts this spring and summer. Streamflow forecasts for the May 1st – July 31st period are well above average across the basin, so the total volume of water isn't a concern this year. It's how fast it will come out; slow and low would be ideal.

Sun-Teton-Marias River Basin Data Summary

Snowpack	**Percent of 1981-2010 Normal (Median)**	**Last Year Percentage of Normal (Median)**
SUN	233%	131%
TETON	176%	128%
MARIAS	163%	121%
Basin-Wide	**192%**	**129%**

Precipitation	**Monthly Percentage of Average**	**WYTD Percentage of 1981-2010 Average***	**WYTD Last Year Percentage of Average**
Mountain Precipitation	95%	130%	124%
Valley Precipitation	118%	193%	192%
Basin-Wide Precipitation	**99%**	**136%**	**130%**

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

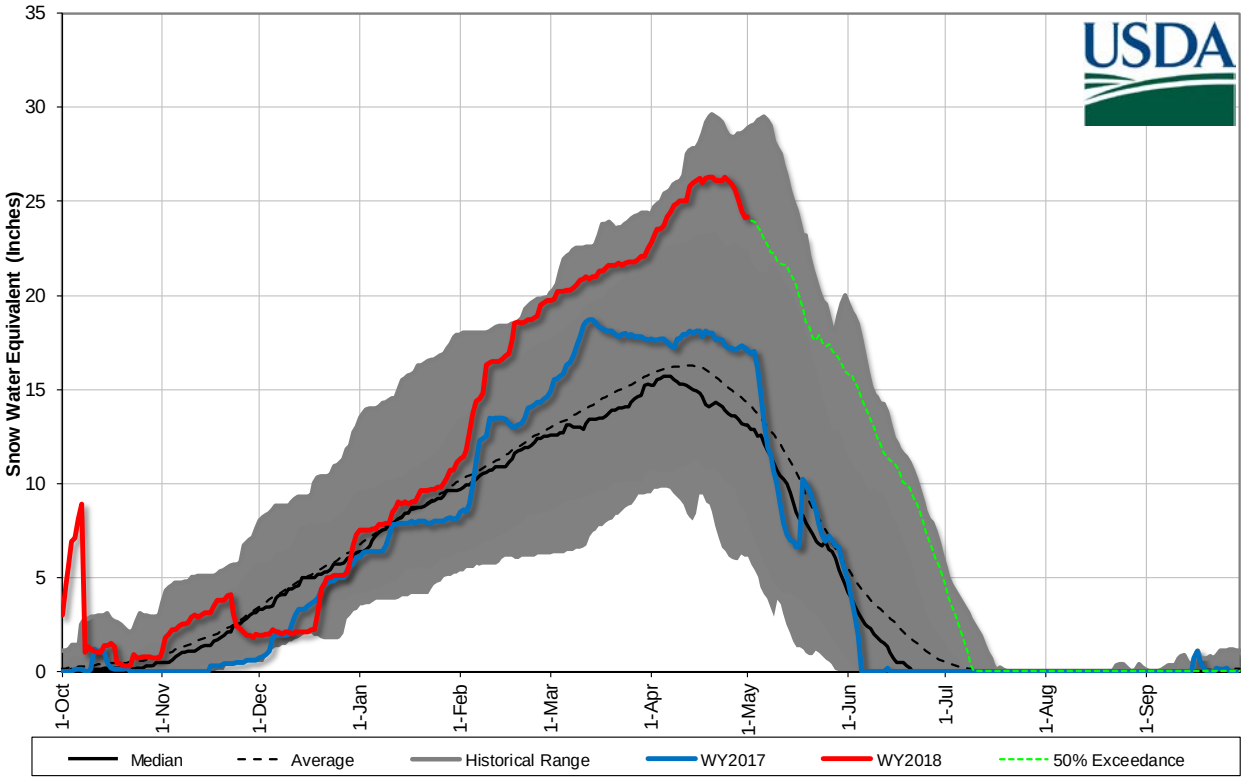
Reservoir Storage	**Percentage of Average**	**Percentage of Capacity (Total)**	**Last Year Percentage of Average**
Basin-Wide Storage	**108%**	**60%**	**111%**

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

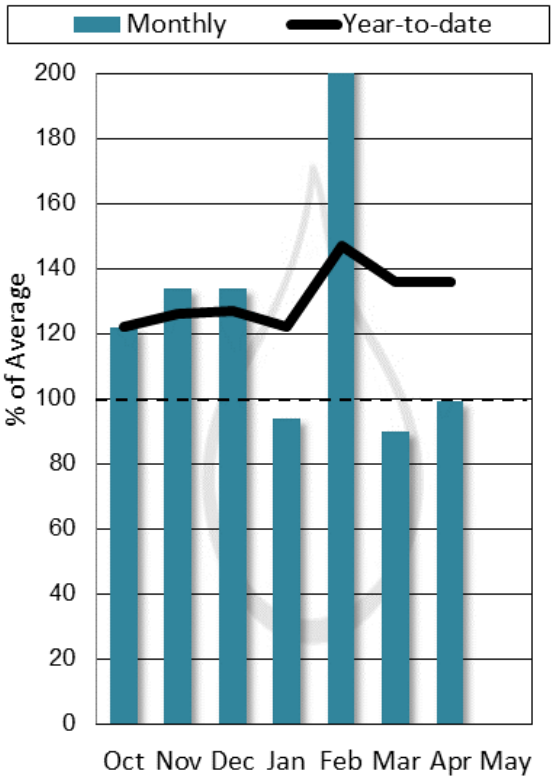
End of Month Storage	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)	% Average	% Capacity
Gibson Res	39.8	46.0	62.6	99.1	**64%**	**40%**
Pishkun Res	7.0	12.6	23.3	32.0	**30%**	**22%**
Willow Creek Res - Augusta	27.9	29.4	25.6	32.2	**109%**	**87%**
Lower Two Medicine Lake	9.6	9.6	10.5	11.9	**91%**	**80%**
Four Horns Lake	8.8	11.8	10.5	19.2	**83%**	**46%**
Swift Res	12.6	10.7	18.1	30.0	**69%**	**42%**
Lake Frances	78.6	67.9	66.6	112.0	**118%**	**70%**
Lake Elwell (Tiber)	820.0	842.2	716.2	1347.0	**114%**	**61%**
Nilan Reservoir	11.0	10.4	7.8	11.0	**141%**	**100%**

Sun-Teton-Marias River Basin Snowpack with Non-Exceedence Projections

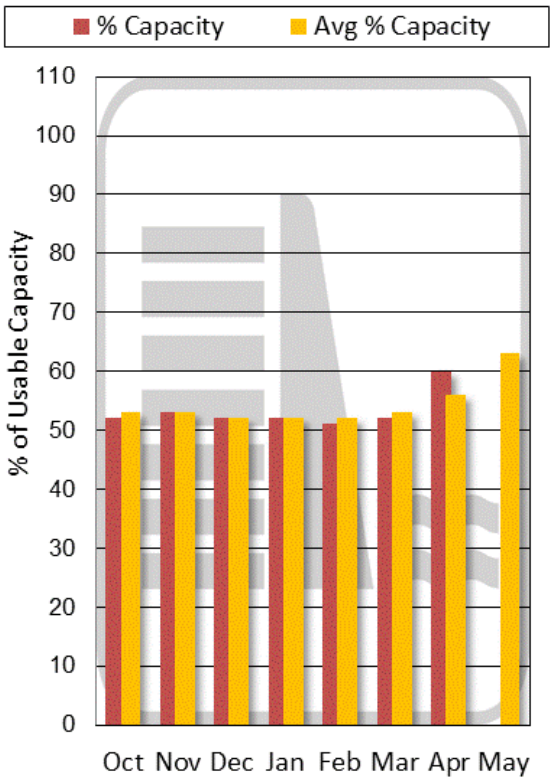
Based on provisional SNOTEL daily data as of 5/1/2018



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.

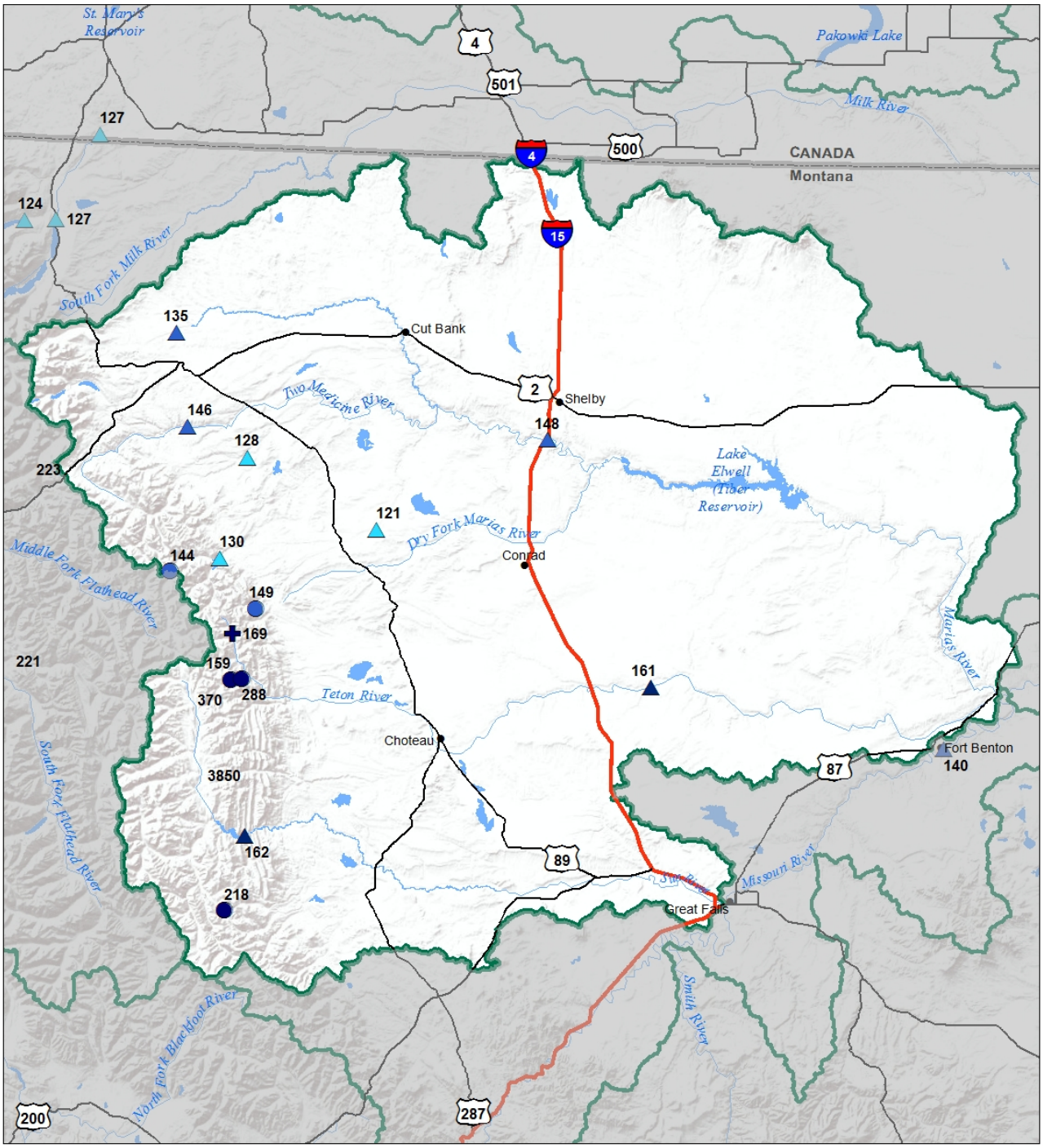
Sun-Teton-Marias Basins

Forecast Point	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
		Chance Actual Volume Will Exceed Forecasted Volume						
Gibson Reservoir Inflow	MAY-JUL	520	560	585	*165%*	615	655	355
	MAY-SEP	565	610	640	*162%*	670	715	395
Two Medicine R nr Browning[2]	MAY-JUL	188	210	225	*147%*	240	265	153
	MAY-SEP	199	225	240	*146%*	255	280	164
Badger Ck nr Browning	MAY-JUL	80	93	102	*132%*	111	124	77
	MAY-SEP	92	108	118	*128%*	128	144	92
Swift Reservoir Inflow[2]	MAY-JUL	49	59	66	*135%*	73	83	49
	MAY-SEP	58	70	78	*130%*	86	98	60
Dupuyer Ck nr Valier	MAY-JUL	6.6	9.5	11.4	*125%*	13.3	16.2	9.1
	MAY-SEP	7.5	10.7	12.9	*121%*	15.1	18.3	10.7
Cut Bank Ck nr Browning	MAY-JUL	67	78	85	*137%*	92	103	62
	MAY-SEP	73	84	92	*135%*	100	111	68
Marias R nr Shelby[2]	MAY-JUL	330	400	445	*148%*	490	560	300
	MAY-SEP	340	415	465	*148%*	515	590	315
Teton R nr Dutton	MAY-JUL	21	43	58	*166%*	73	95	35
	MAY-SEP	26	50	66	*161%*	82	106	41

1) 90% and 10% exceedance probabilities are actually 95% and 5%

2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions

Sun-Teton-Marias River Basin
Streamflow Forecast, Snow Water Equivalent
Percentage of Normal
May 1, 2018



Snow Water Equivalent
Percent of Normal

SNOTEL				Snowcourse			
> 150%	71 - 90%			> 150%	71 - 90%		
131 - 150%	51 - 70%			131 - 150%	51 - 70%		
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Streamflow Forecast
Percent of Average Flows

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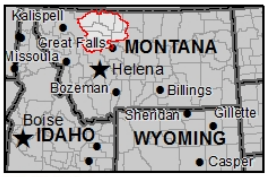

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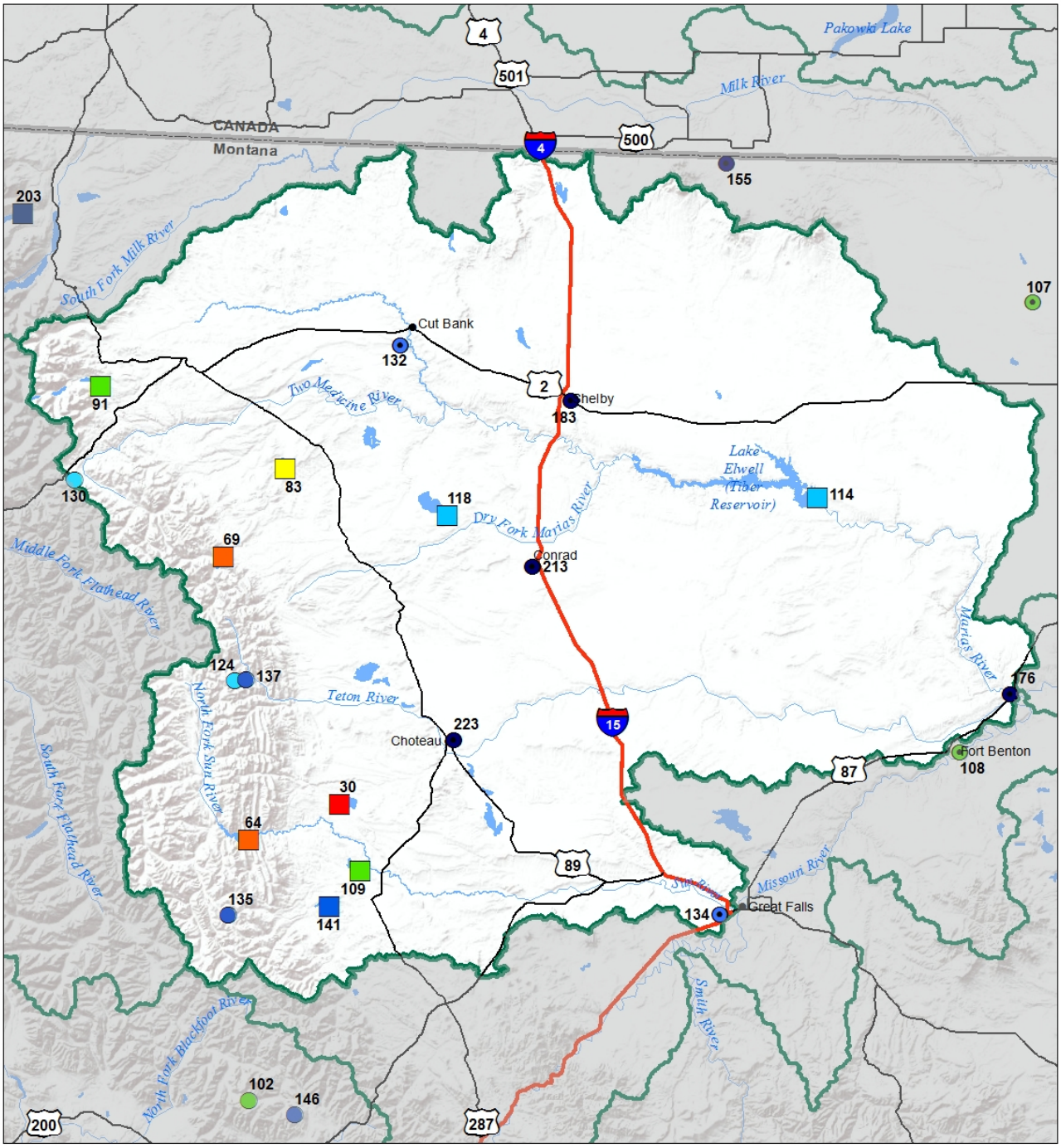
Sun-Teton-Marias River Basin
Water Year to Date Precipitation and Reservoir Levels
Percentage of Normal
May 1, 2018



Precipitation
Percent of Normal

SNOTEL		COOP/ACIS	
> 150%	71 - 90%	> 150%	71 - 90%
131 - 150%	51 - 70%	131 - 150%	51 - 70%
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Reservoirs
Percent of Normal

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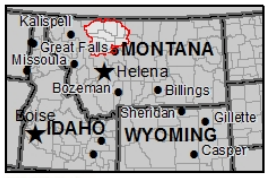

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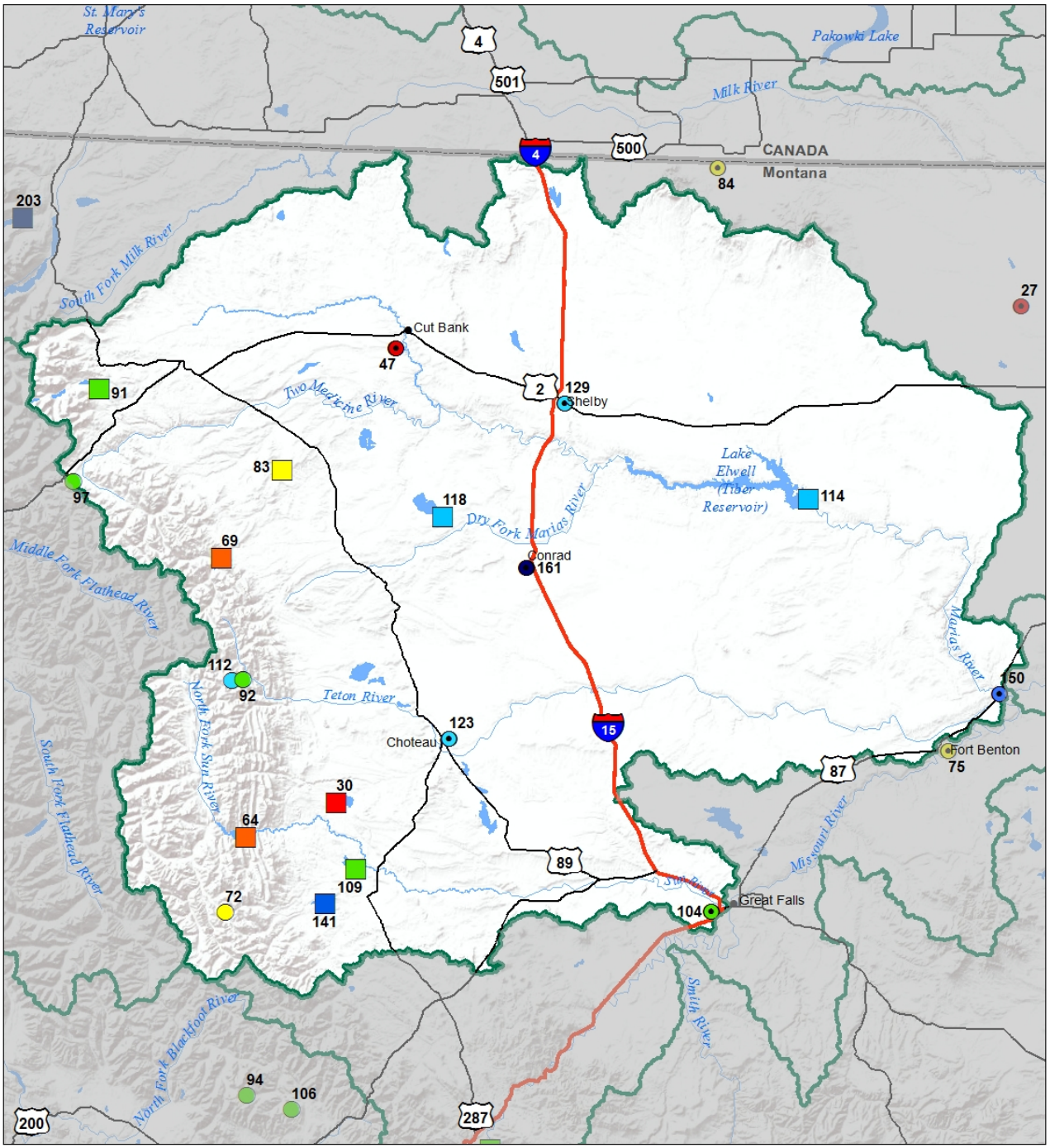
Montana State Library Natural Resource Information System

Sun-Teton-Marias River Basin
Monthly Precipitation and Reservoir Levels
Percentage of Normal
May 1, 2018 (April 1, 2018 - May 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

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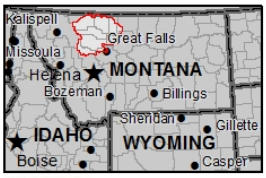

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Montana State Library Natural Resource Information System

St. Mary-Milk River Basin

From Glacier National Park (GNP) east across the Hi-Line, there was a substantial amount of snowfall this winter. In the St. Mary River basin, mountain snowfall has been above normal throughout the winter, with April again yielding above average precipitation at mountain locations in GNP. Snowpack for today's date is well above normal at both low and high elevations. Snowmelt began at the low to mid-elevations on the 19th of April, and about 60% of this year's peak remains to enter the system. The higher elevations have only started to transition to melt and could continue to increase if future storms roll through the basin. Streamflow forecasts in the St. Mary's basin are well above average for the May 1st – July 31st period, a direct result of the well above normal snowpack. Although the Montana Snow Survey technically only operates one SNOTEL sites in the Milk River basin (Bearpaw Mtns), we do collect snowpack from Canada cooperators to assess conditions in the Milk. This year, abundant plains snowpack in both Montana and Canada has caused significant flooding issues on the Milk River. The warmer than average temperatures experienced since mid-April caused the melting of this above normal valley/plains snow cover which caused flooding in some cities located near the Milk along the Hi-Line. It should be noted that this was a completely prairie snowmelt-driven event, as precipitation totals for April along the Hi-Line were well below average in many locations.

St. Mary-Milk River Basin Data Summary

Snowpack	**Percent of 1981-2010 Normal (Median)**	**Last Year Percentage of Normal (Median)**
ST. MARY	153%	125%
BEARPAW MOUNTAINS	0%	0%
CYPRESS HILLS, CANADA	%	%
MILK RIVER BASIN	0%	0%
Basin-Wide	**152%**	**124%**

Precipitation	**Monthly Percentage of Average**	**WYTD Percentage of 1981-2010 Average***	**WYTD Last Year Percentage of Average**
Mountain Precipitation (St. Mary)	114%	121%	135%
Mountain Precipitation (Bearpaw Mtns)	32%	130%	139%
Valley Precipitation	53%	128%	189%
Basin-Wide Precipitation	**82%**	**123%**	**146%**

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

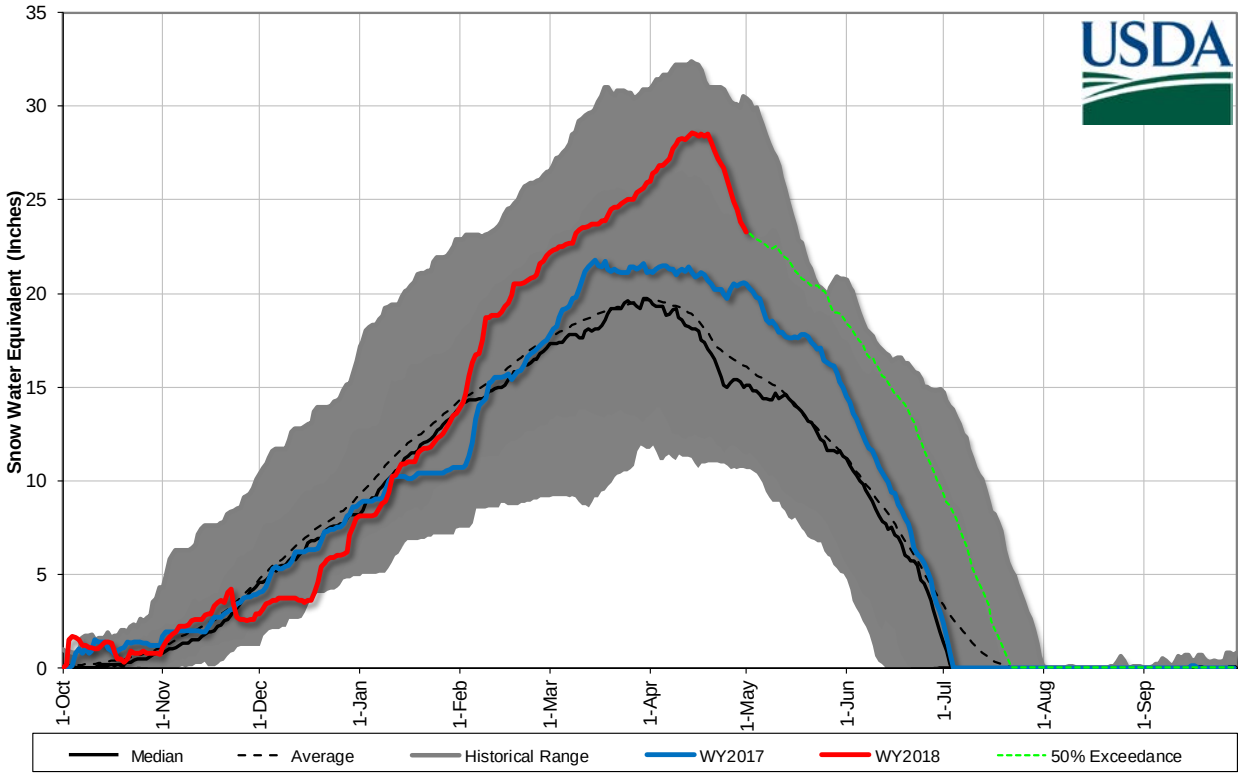
Reservoir Storage	**Percentage of Average**	**Percentage of Capacity (Total)**	**Last Year Percentage of Average**
Basin-Wide Storage	**122%**	**64%**	**134%**

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

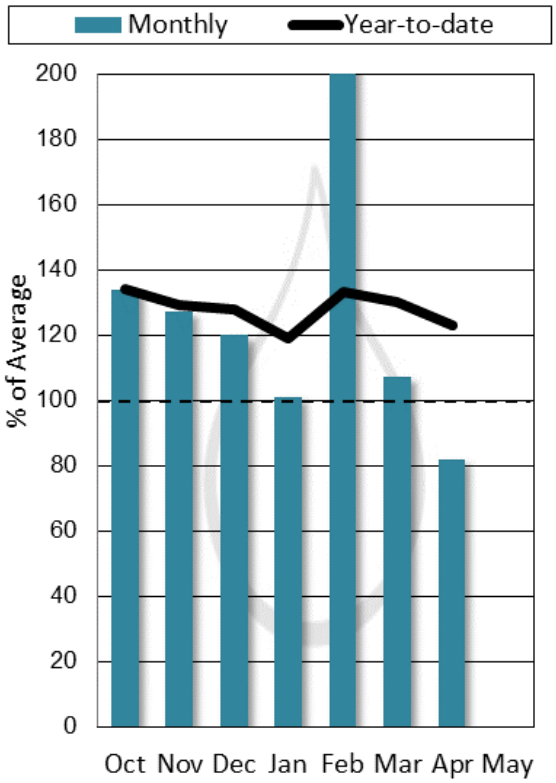
End of Month Storage	**Current (KAF)**	**Last Year (KAF)**	**Average (KAF)**	**Capacity (KAF)**	**% Average**	**% Capacity**
Lake Sherburne	36.5	46.7	18.0	64.3	**203%**	**57%**
Fresno Res	83.4	87.7	74.9	127.0	**111%**	**66%**
Nelson Res	44.8	46.3	42.4	66.8	**106%**	**67%**

Saint Mary-Milk River Basin Snowpack with Non-Exceedence Projections

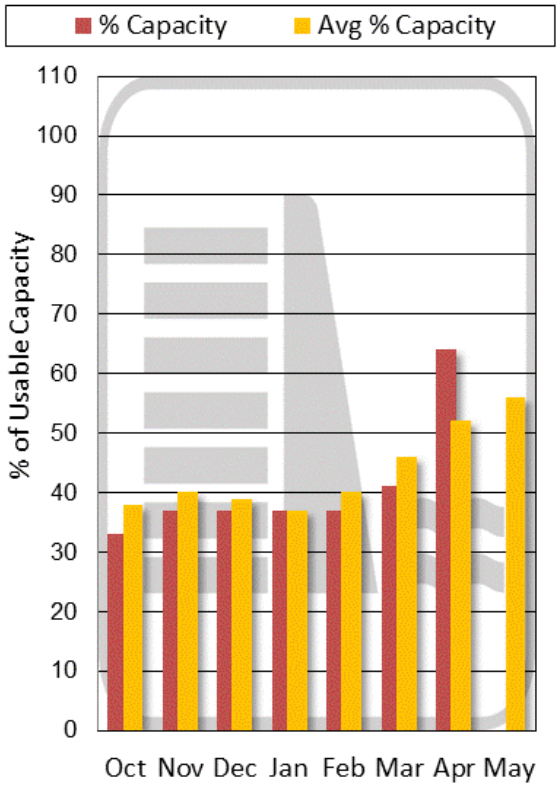
Based on provisional SNOTEL daily data as of 5/1/2018



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.

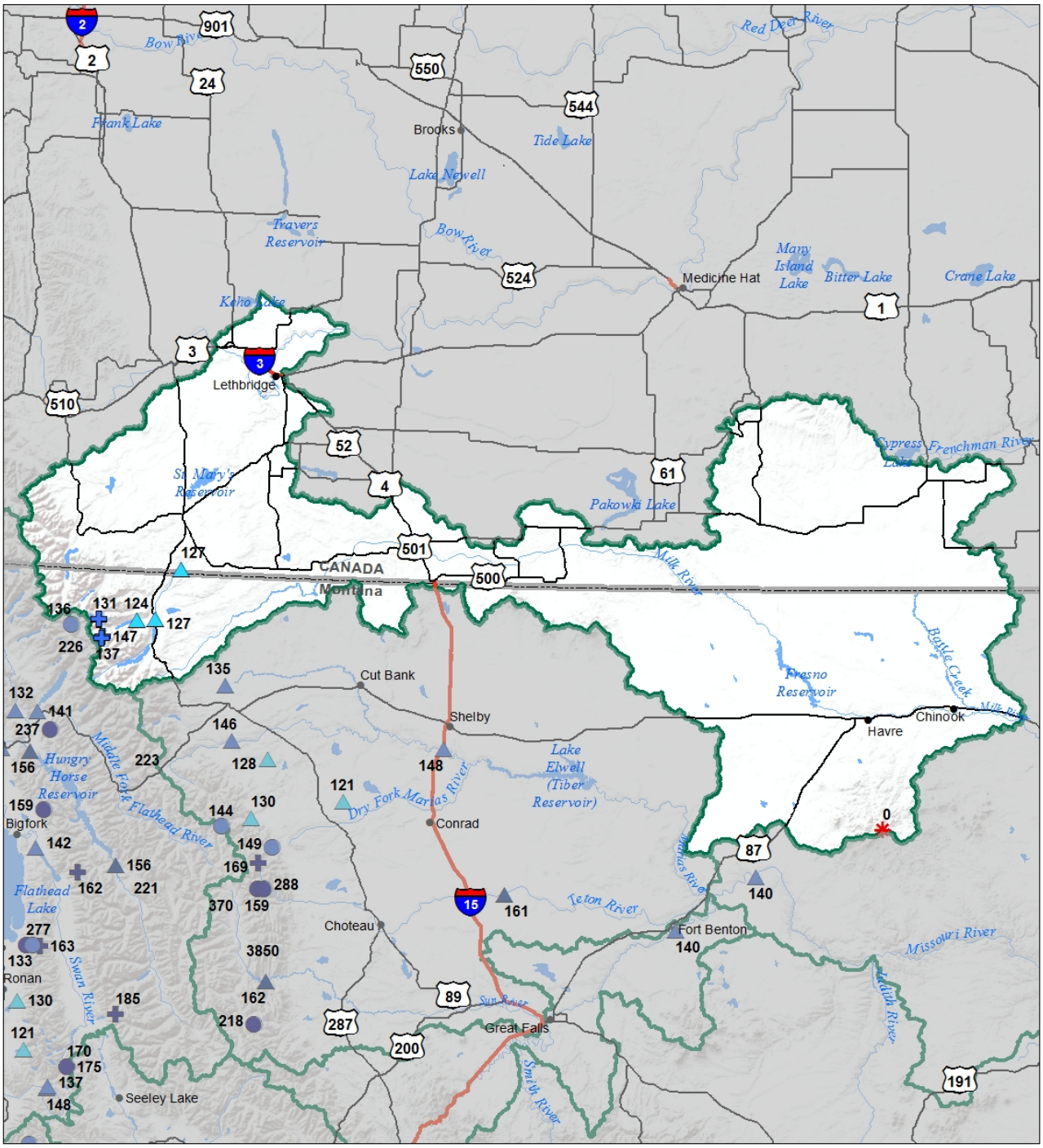
St. Mary River Basin

ST. MARY & MILK BASINS	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
		Chance Actual Volume Will Exceed Forecasted Volume						
Lake Sherburne Inflow	MAY-JUL	92	102	109	*127%*	116	126	86
	MAY-SEP	106	118	125	*124%*	133	144	101
Two Medicine R nr Browning[2]	MAY-JUL	365	405	430	*126%*	460	500	340
	MAY-SEP	420	465	500	*127%*	530	575	395
Badger Ck nr Browning	MAY-JUL	420	480	515	*129%*	555	610	400
	MAY-SEP	490	550	595	*127%*	635	695	470

1) 90% and 10% exceedance probabilities are actually 95% and 5%

2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions

St Mary's-Milk River Basin
Streamflow Forecast, Snow Water Equivalent
Percentage of Normal
May 1, 2018

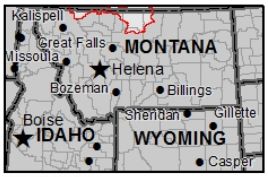


Snow Water Equivalent
Percent of Normal

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

Streamflow Forecast
Percent of Average Flows

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



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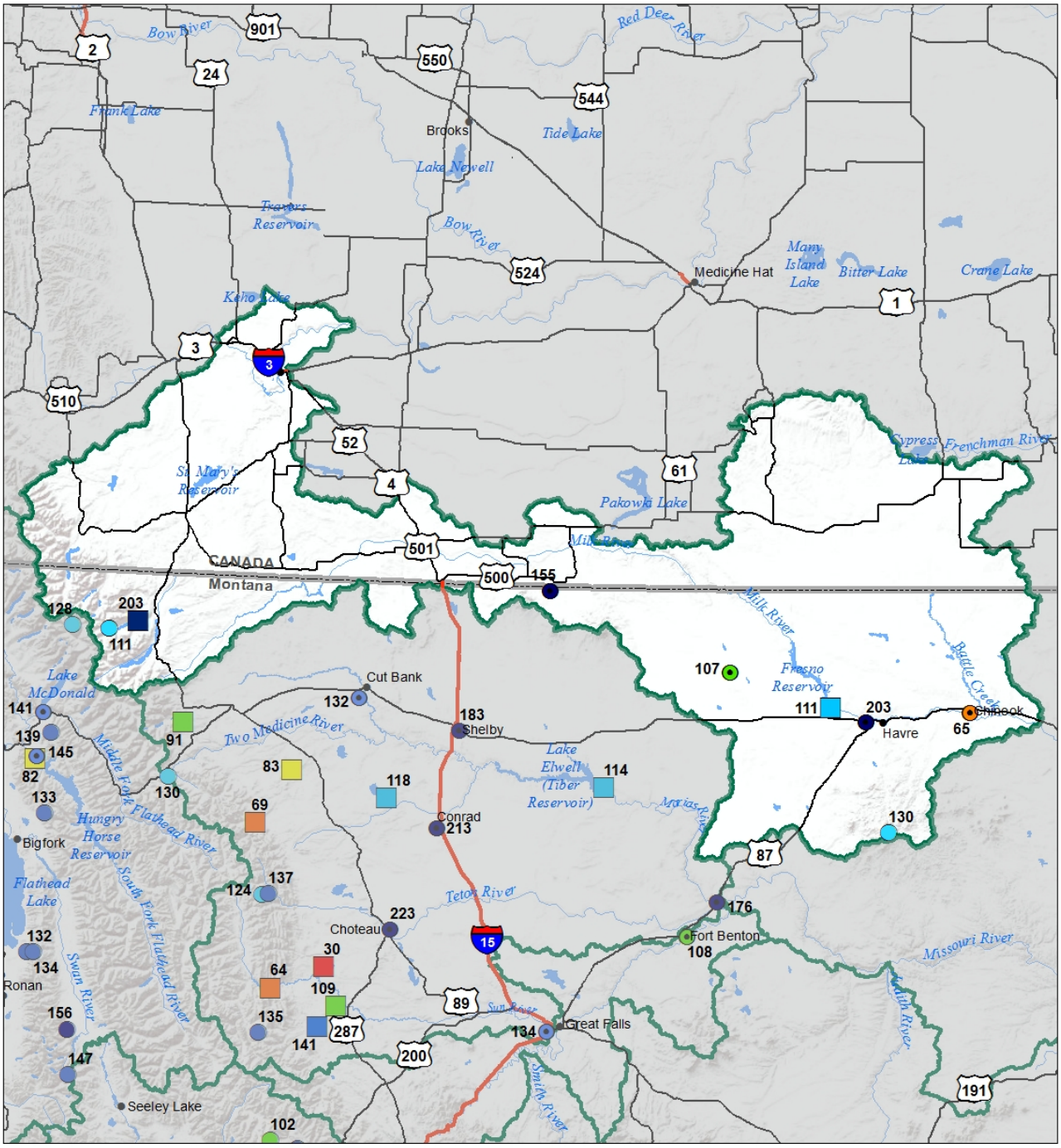
St Mary's-Milk River Basin
Water Year to Date Precipitation and Reservoir Levels
Percentage of Normal
May 1, 2018

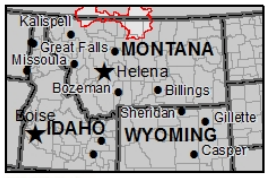


Precipitation
Percent of Normal

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%



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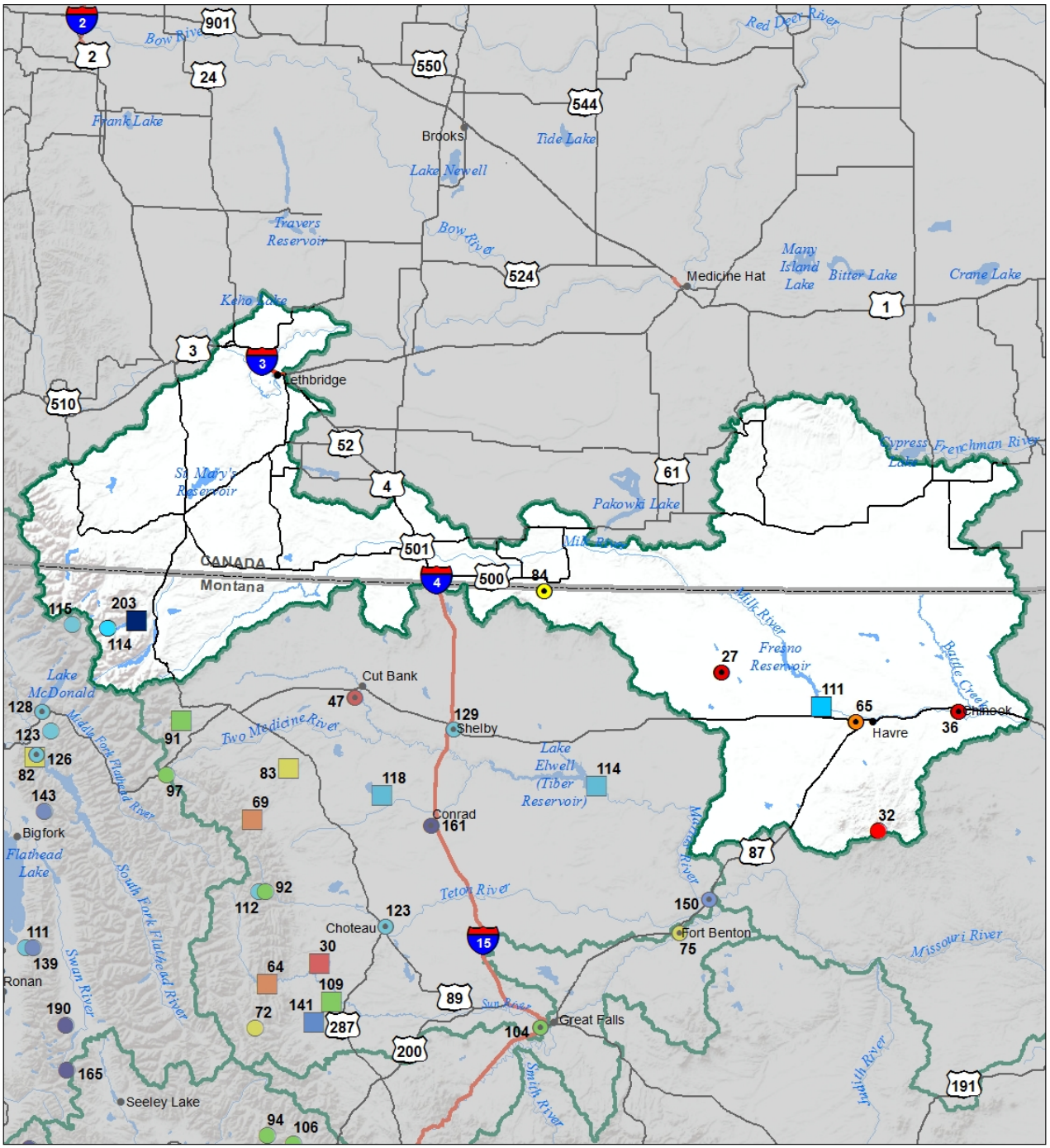
St Mary's-Milk River Basin
Monthly Precipitation and Reservoir Levels
Percentage of Normal
May 1, 2018 (April 1, 2018 - May 1, 2018)



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%
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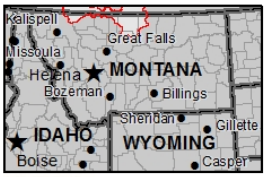

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Upper Yellowstone River Basin

Get ready for big water. It's not really news anymore, snowfall in many of the sub-basins of the Upper Yellowstone River basin has been record-setting. April didn't break the trend in the basin; most mountain SNOTEL sites received monthly precipitation that was ranked in the top 15th percentile, which only built on a well above normal snowpack on April 1st. Snowpack totals remain well-above normal as of May 1st. So how many records were set for water-year peak snow water equivalent (SWE)? Three SNOTEL sites in the Clark's Fork River basin have set new records for the most amount of water contained in the snow, one other site in the basin reported the second highest. Both SNOTEL sites in the Boulder River basin were second highest on record for peak SWE, and three SNOTEL sites in the Shields River basin were second highest on record. Snowpack in the other sub-basins, while not record-setting this year, peaked well above normal and in the top 10 years on record. At some point, it had to stop snowing, and the latter half of April was when it happened. Low elevations and some mid-elevations began transitioning to melt during the last week of the month, causing rises in some rivers and streams. The higher elevation snow monitoring sites have either just started to transition, or continue to accumulate snow. Due to the high-elevation nature of the basins, this isn't anomalous, but it is a bit daunting considering the volume of water contained in the snowpack. There is a lot of water remaining in the snowpack yet to enter the river systems, but the timing of peak runoff and daily volumes will be completely weather dependent. Long-duration NRCS streamflow forecasts issued on May 1st indicate well above average flows on almost all rivers for the May 1st – July 31st period. In some cases, the total volume of water that passes through a gage could exceed previous records (Clark's Fork @ Belfry). The Yellowstone and most of its tributaries are free-flowing rivers, meaning there are no man-made structures to store water for irrigation or provide flood relief. The weather over the next two months is going to be critical in managing the release of the water stored in the snowpack. Slow and low is always preferred but isn't always delivered. A close eye will be kept on the future weather this spring, with two main things to look out for. 1-Prolonged periods of sunny days with above average temperatures, and above freezing nighttime temperatures. 2-Rain-on-snow events, or prolonged rain events. It could all work out for the best and deliver water for a long time this summer with no major impacts, but it would be wise to remember that the potential is there for very high flows.

Upper Yellowstone River Basin Data Summary

Snowpack	**Percent of 1981-2010 Normal (Median)**	**Last Year Percentage of Normal (Median)**
YELLOWSTONE ab LIVINGSTON	165%	146%
SHIELDS	190%	112%
BOULDER-STILLWATER	168%	112%
RED LODGE-ROCK CREEK	144%	120%
CLARK'S FORK	192%	166%
Basin-Wide	**170%**	**139%**

Precipitation	**Monthly Percentage of Average**	**WYTD Percentage of 1981-2010 Average***	**WYTD Last Year Percentage of Average**
Mountain Precipitation	145%	138%	143%
Valley Precipitation	129%	144%	151%
Basin-Wide Precipitation	**143%**	**138%**	**144%**

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

Reservoir Storage	**Percentage of Average**	**Percentage of Capacity (Total)**	**Last Year Percentage of Average**
Basin-Wide Storage	**105%**	**49%**	**117%**

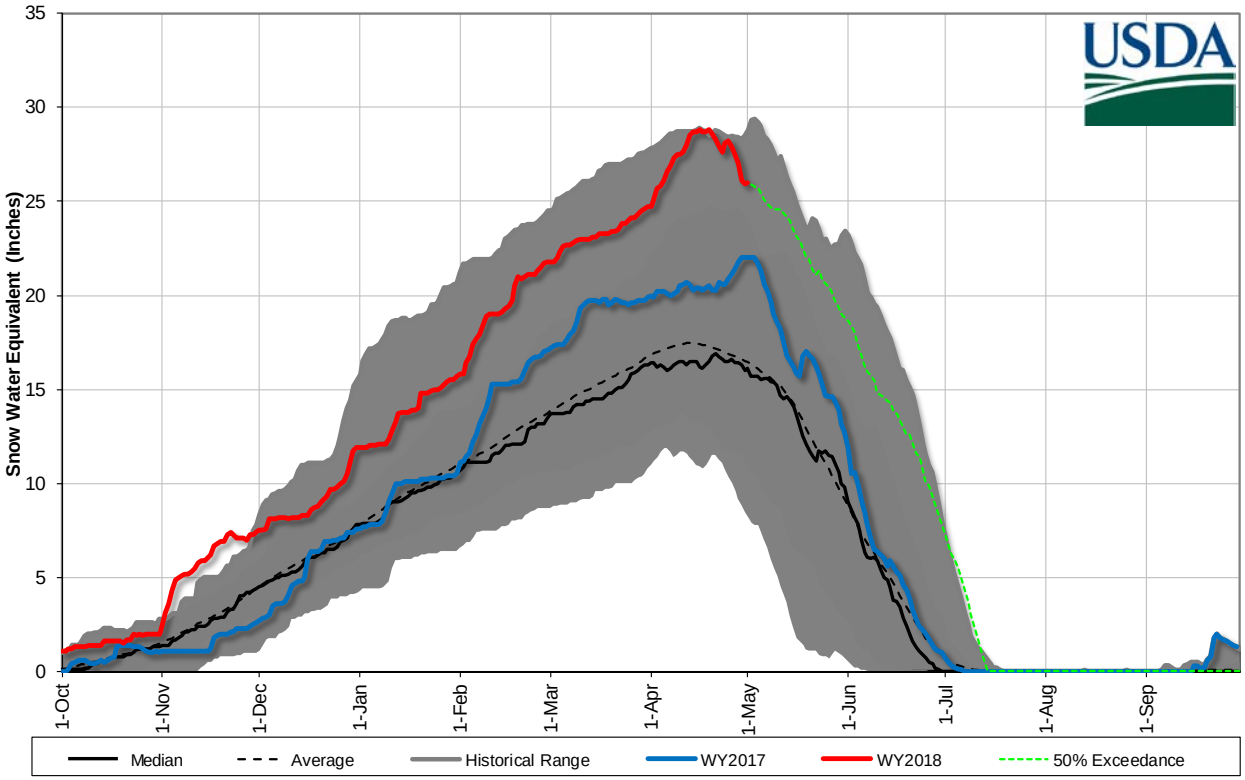
**See Reservoir Storage Table for storage in individual reservoirs*

End of Month Storage

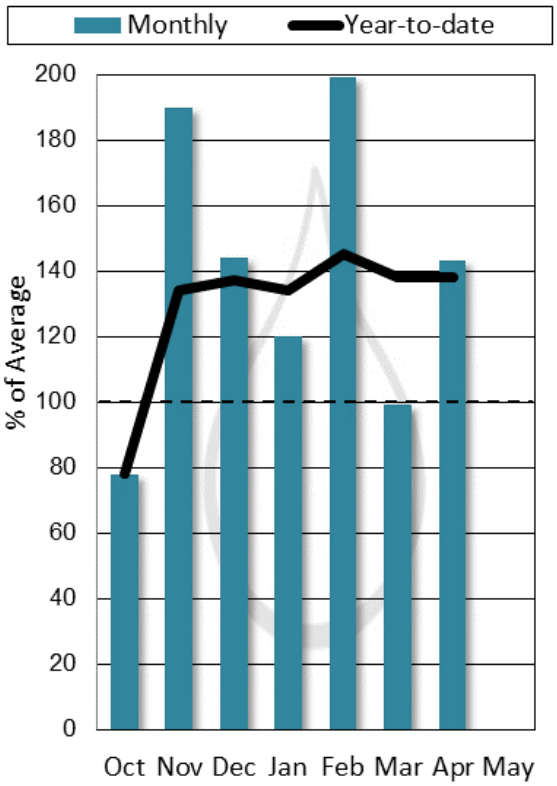
	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)	% Average	% Capacity
Mystic Lake	0.6	0.2	0.6	21.0	**97%**	**3%**
Cooney Res	22.9	26.0	21.9	27.4	**105%**	**84%**

Upper Yellowstone River Basin Snowpack with Non-Exceedence Projections

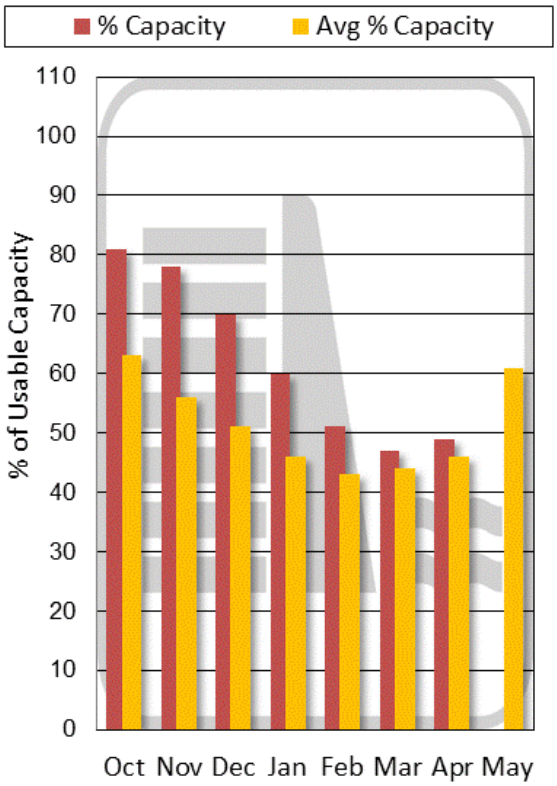
Based on provisional SNOTEL daily data as of 5/1/2018



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.

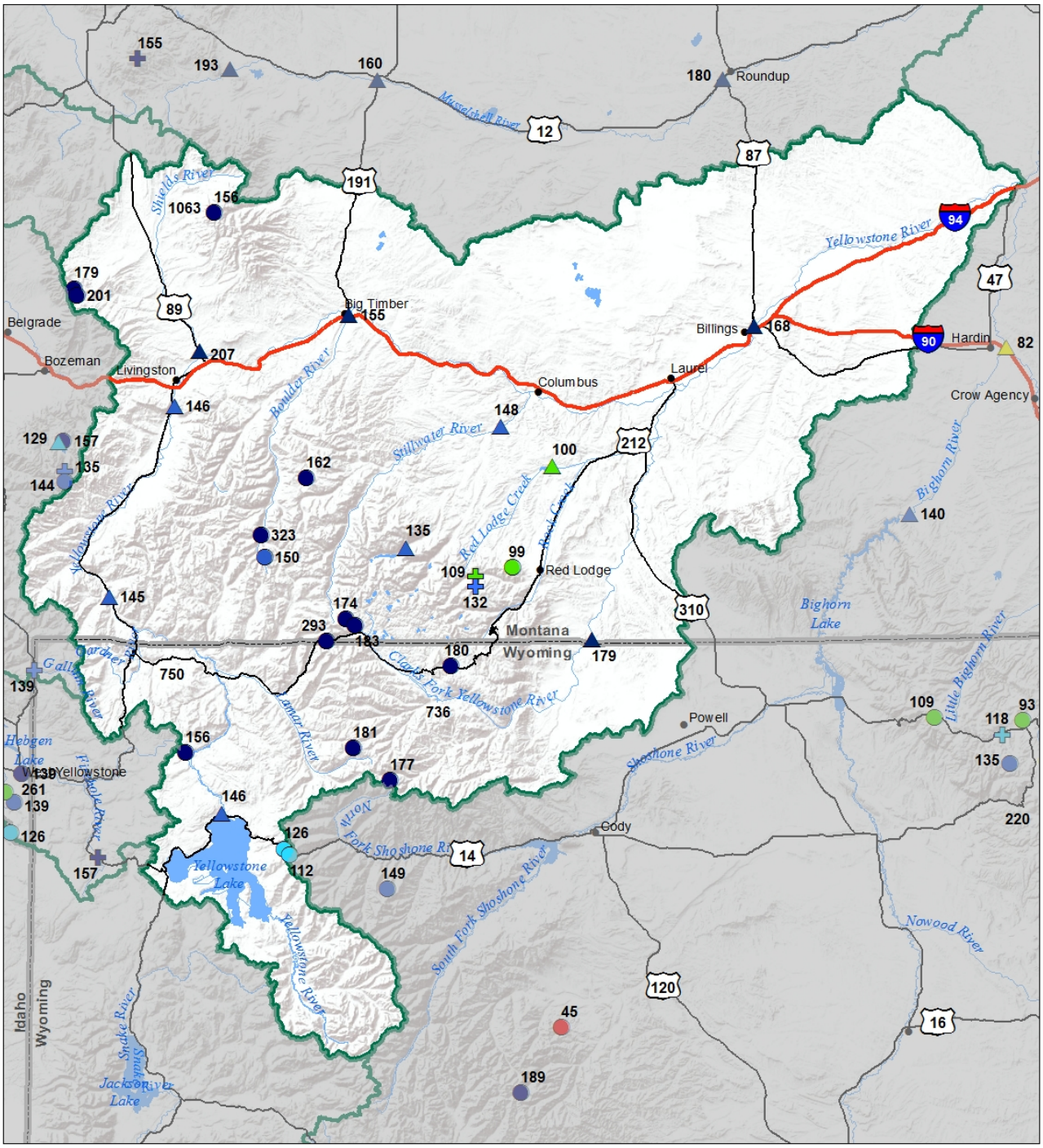
Upper Yellowstone River Basin

Forecast Point	Forecast Period	Chance Actual Volume Will Exceed Forecasted Volume						30yr Avg (KAF)
		90% (KAF)	70% (KAF)	50% (KAF)	*% Avg*	30% (KAF)	10% (KAF)	
Yellowstone R at Yellowstone Lake Outlet	MAY-JUL	685	745	790	*145%*	830	895	545
	MAY-SEP	940	1020	1070	*146%*	1120	1200	735
Yellowstone R at Corwin Springs	MAY-JUL	1890	2040	2140	*145%*	2240	2390	1480
	MAY-SEP	2270	2440	2560	*145%*	2680	2850	1770
Yellowstone R at Livingston	MAY-JUL	2140	2320	2450	*147%*	2580	2760	1670
	MAY-SEP	2560	2780	2930	*146%*	3070	3290	2010
Shields R nr Livingston	MAY-JUL	182	215	235	*218%*	255	290	108
	MAY-SEP	196	230	255	*207%*	275	310	123
Boulder R at Big Timber	MAY-JUL	355	390	415	*154%*	440	475	270
	MAY-SEP	380	425	450	*155%*	475	515	290
Mystic Lake Inflow[2]	MAY-JUL	68	72	75	*132%*	78	82	57
	MAY-SEP	88	93	97	*135%*	101	106	72
Stillwater R nr Absarokee[2]	MAY-JUL	530	585	620	*148%*	660	715	420
	MAY-SEP	625	690	735	*148%*	775	840	495
Clarks Fk Yellowstone R nr Belfry	MAY-JUL	770	815	850	*177%*	885	930	480
	MAY-SEP	845	900	940	*179%*	975	1030	525
Cooney Reservoir Inflow	MAY-JUL	16.3	26	33	*100%*	40	50	33
	MAY-SEP	25	36	43	*100%*	50	61	43
Yellowstone R at Billings	MAY-JUL	4400	4790	5050	*168%*	5320	5710	3000
	MAY-SEP	5050	5530	5860	*168%*	6190	6670	3490

1) 90% and 10% exceedance probabilities are actually 95% and 5%

2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions

Upper Yellowstone River Basin
Streamflow Forecast, Snow Water Equivalent
Percentage of Normal
May 1, 2018



Snow Water Equivalent
Percent of Normal

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

Streamflow Forecast
Percent of Average Flows

- > 150%
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- 111 - 130%
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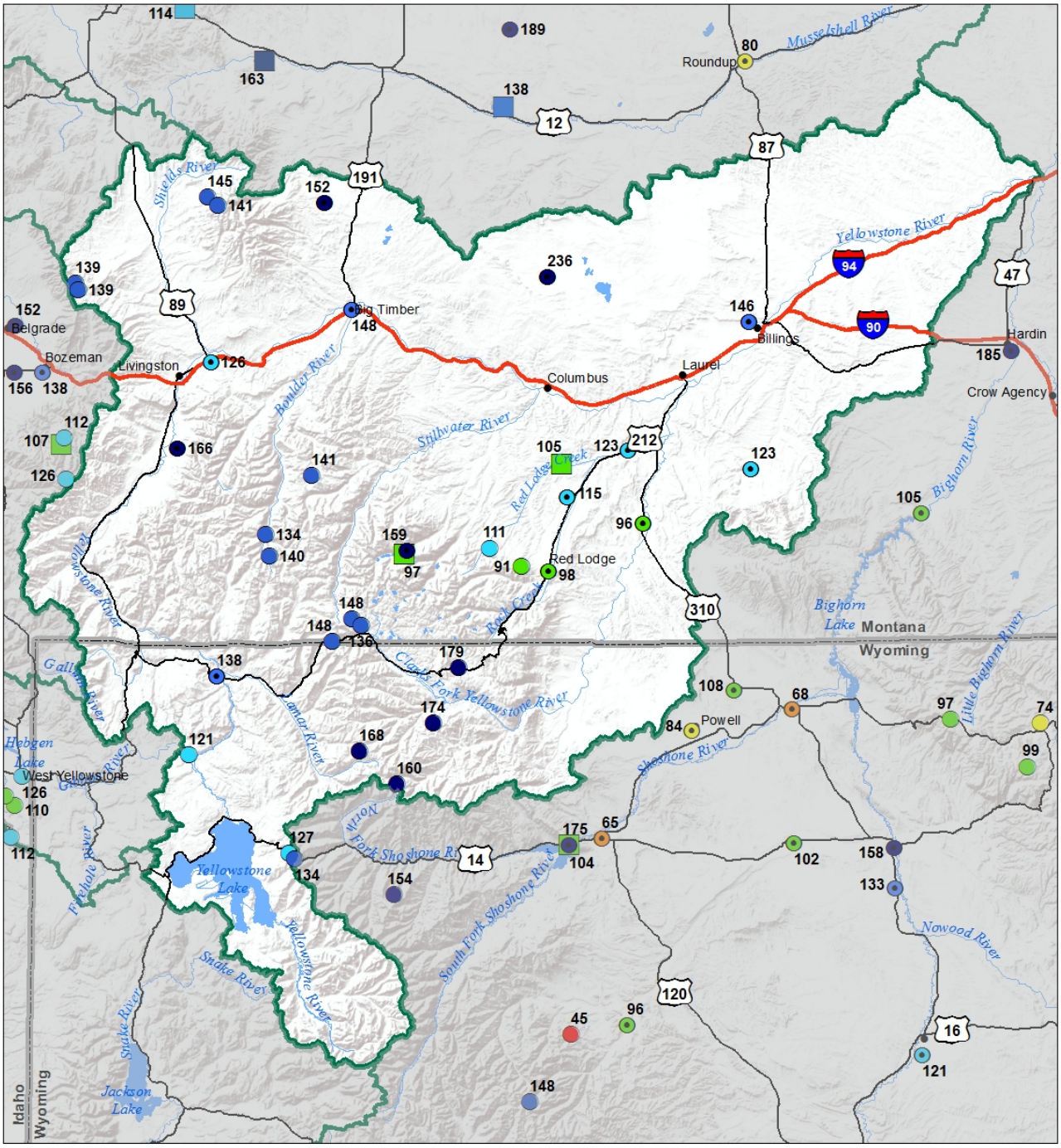
Upper Yellowstone River Basin
Water Year to Date Precipitation and Reservoir Levels
Percentage of Normal
May 1, 2018

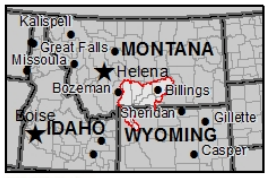


Precipitation
Percent of Normal

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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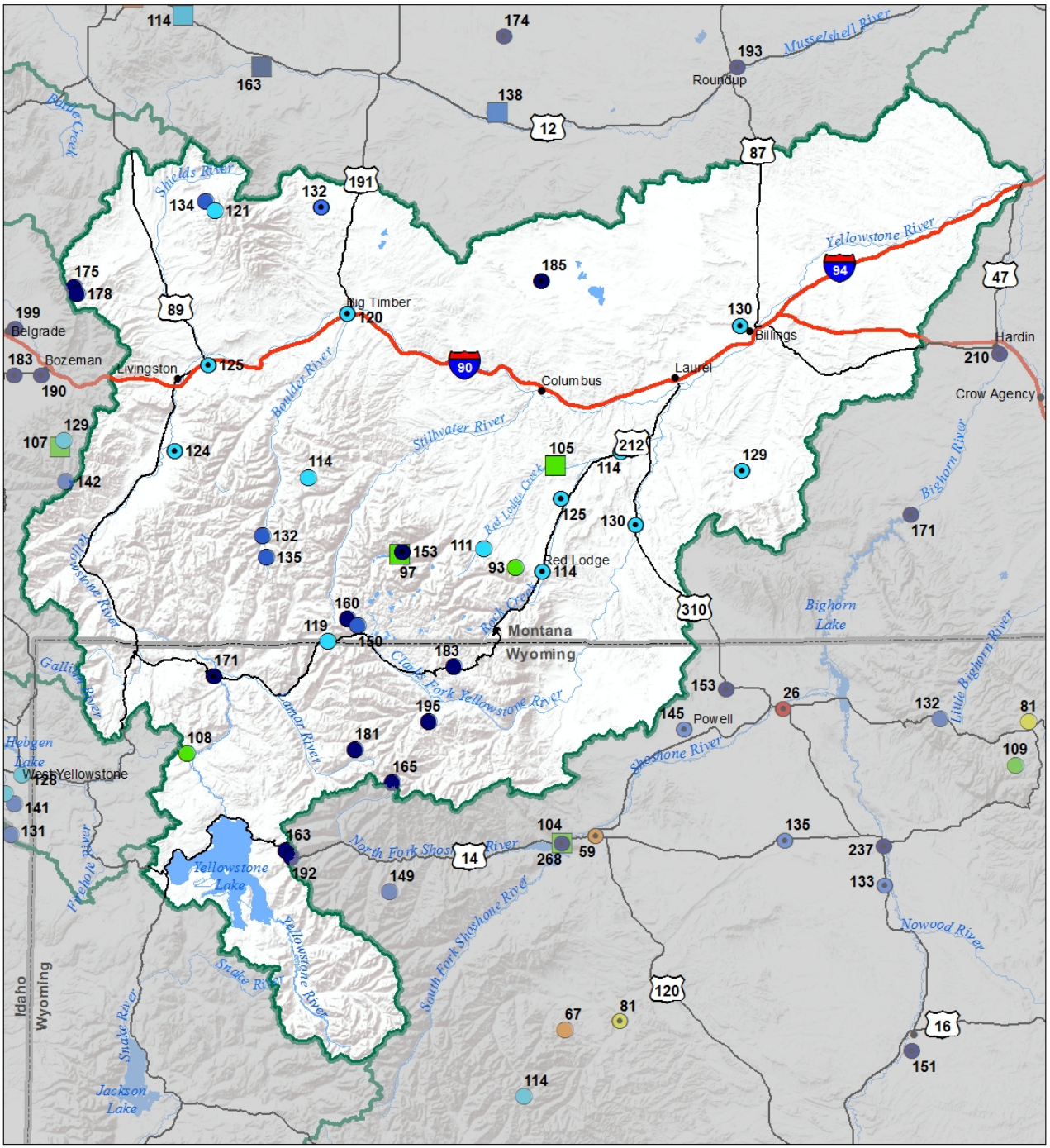
Montana State Library Natural Resource Information System

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

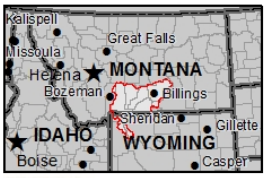


Precipitation
Percent of Normal

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%



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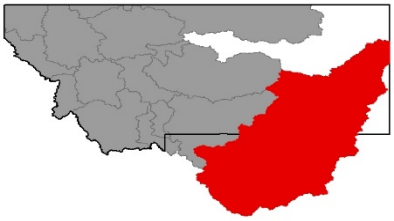
Montana State Library Natural Resource Information System



Lower Yellowstone River Basin

After receiving near average precipitation in April, water year-to-date precipitation continues to be near average in the Lower Yellowstone River basin. Most of the April precipitation was received during the first half of the month. As the residents of the region likely enjoyed the sun's warmth during the second half of the month, its energy also initiated snowmelt, particularly at lower elevations. Many of the low elevation snow survey sites saw over a 50% reduction in their snowpack water content during this melt. All sites within the Black Hills region have melted out except Cole Canyon, which will melt out very soon. Mid-to-high elevation sites in the Big Horn and Wind Rivers still have over 75% of their peak snowpack left. Overall, the snowpack is above normal in the Lower Yellowstone River basin. There is still over 40 inches of snow water remaining in locations like Togwotee Pass SNOTEL at the headwaters of the Wind River. Shell Creek SNOTEL in the Big Horns currently has its 2nd highest snow water content reading in 39 years. Water users located downstream of the Upper Yellowstone basin be aware of its record-breaking snowpack that is likely to bring above average river levels to the region. Streamflows of the Lower Yellowstone River tributaries are forecasted to be above average this year except for the Little Big Horn River and Tongue River near Dayton. With that said, keep an eye on the weather over the next couple months as May and June are typically two of the wettest months for the region.

Lower Yellowstone River Basin Data Summary

Snowpack	**Percent of 1981-2010 Normal (Median)**	**Last Year Percentage of Normal (Median)**
WIND RIVER BASIN	117%	224%
SHOSHONE RIVER BASIN	149%	147%
BIGHORN RIVER BASIN	144%	149%
LITTLE BIGHORN BASIN	103%	114%
TONGUE RIVER BASIN	113%	136%
POWDER RIVER BASIN	125%	157%
Basin-Wide	**124%**	**170%**

Precipitation	**Monthly Percentage of Average**	**WYTD Percentage of 1981-2010 Average***	**WYTD Last Year Percentage of Average**
Mountain Precipitation	96%	103%	152%
Valley Precipitation	119%	118%	179%
Basin-Wide Precipitation	**104%**	**108%**	**161%**

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

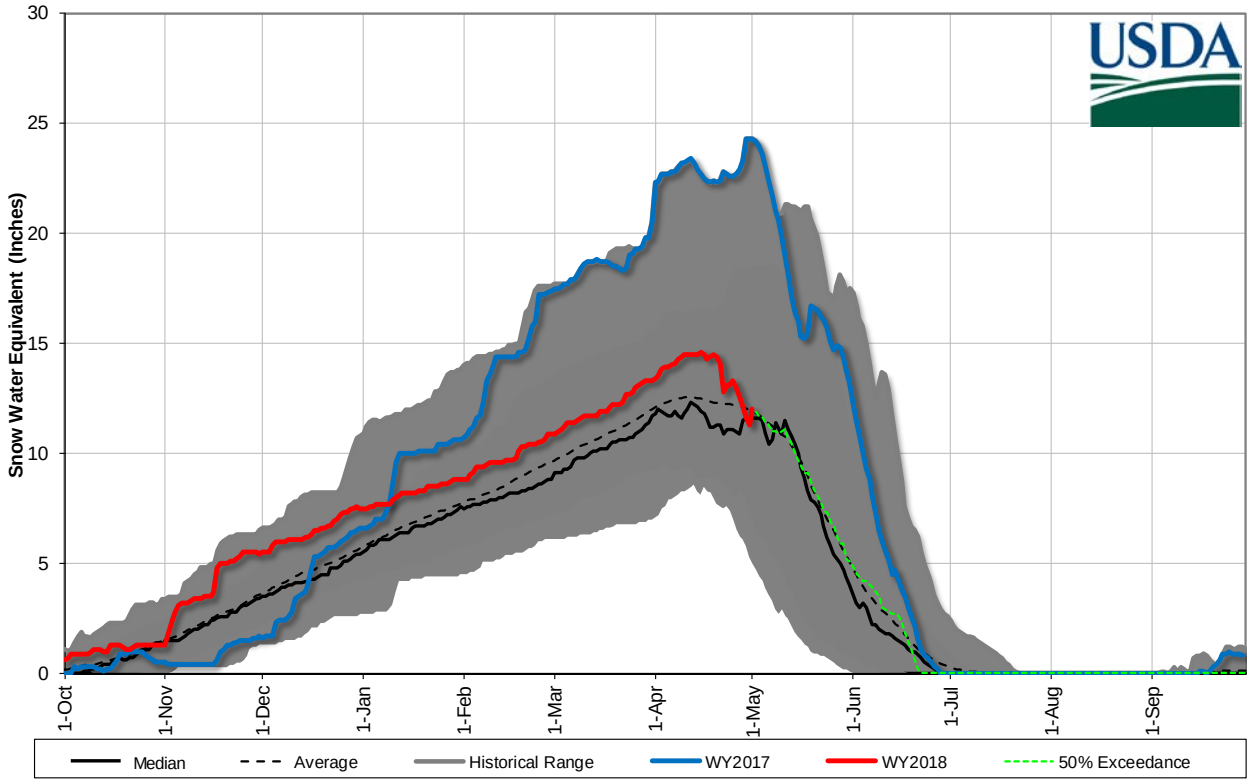
Reservoir Storage	**Percentage of Average**	**Percentage of Capacity (Total)**	**Last Year Percentage of Average**
Basin-Wide Storage	**96%**	**54%**	**99%**

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

End of Month Storage	**Current (KAF)**	**Last Year (KAF)**	**Average (KAF)**	**Capacity (KAF)**	**% Average**	**% Capacity**
Bighorn Lake	712.4	729.8	773.6	1356.0	**92%**	**53%**
Tongue River Res	62.2	67.2	34.7	79.1	**179%**	**79%**

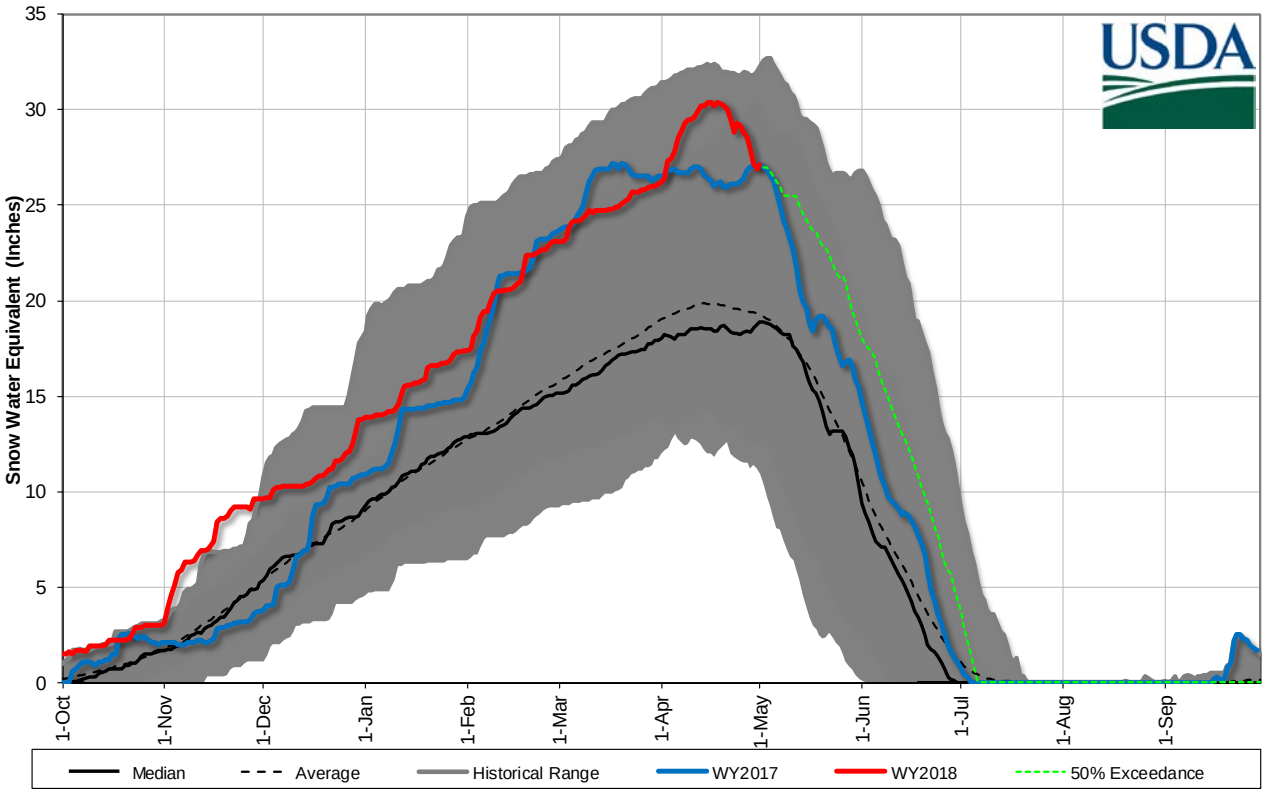
Wind River Basin Snowpack with Non-Exceedence Projections

Based on provisional SNOTEL daily data as of 5/1/2018



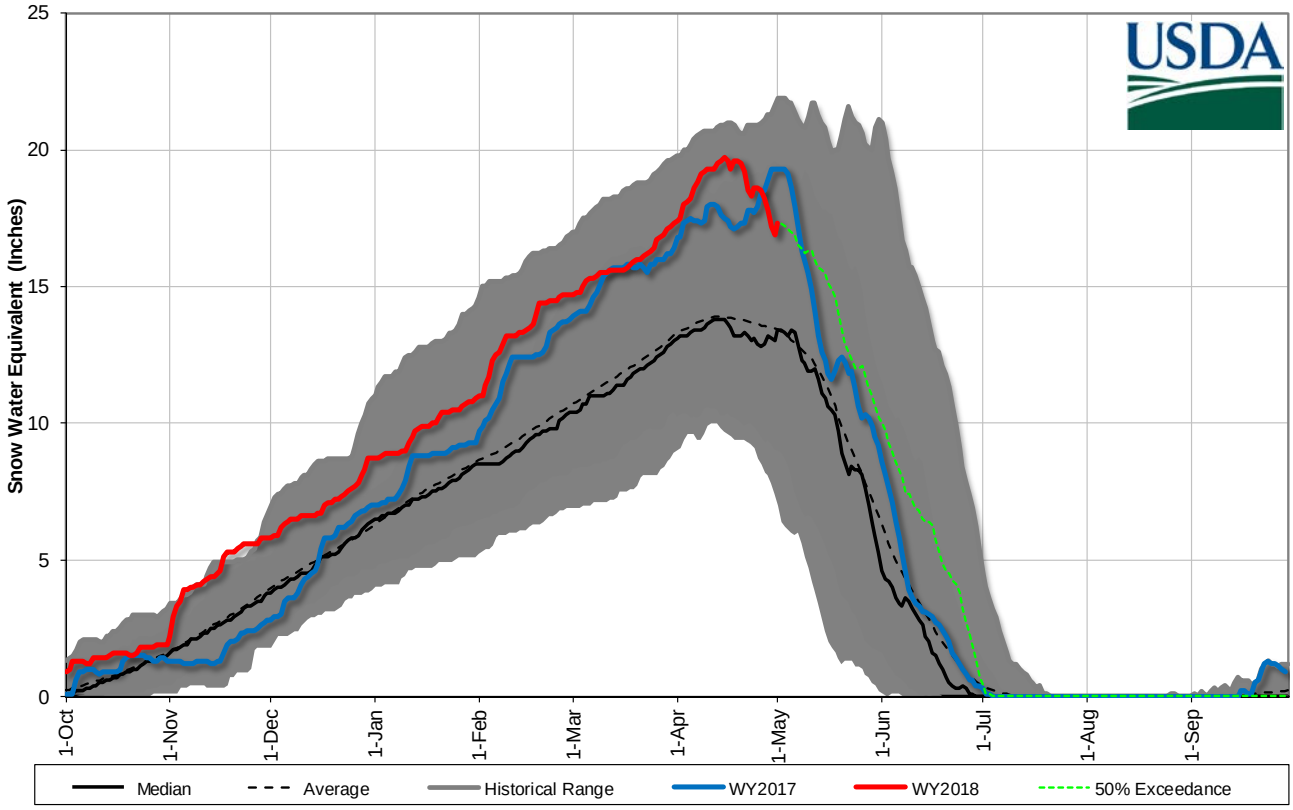
Shoshone River Basin Snowpack with Non-Exceedence Projections

Based on provisional SNOTEL daily data as of 5/1/2018



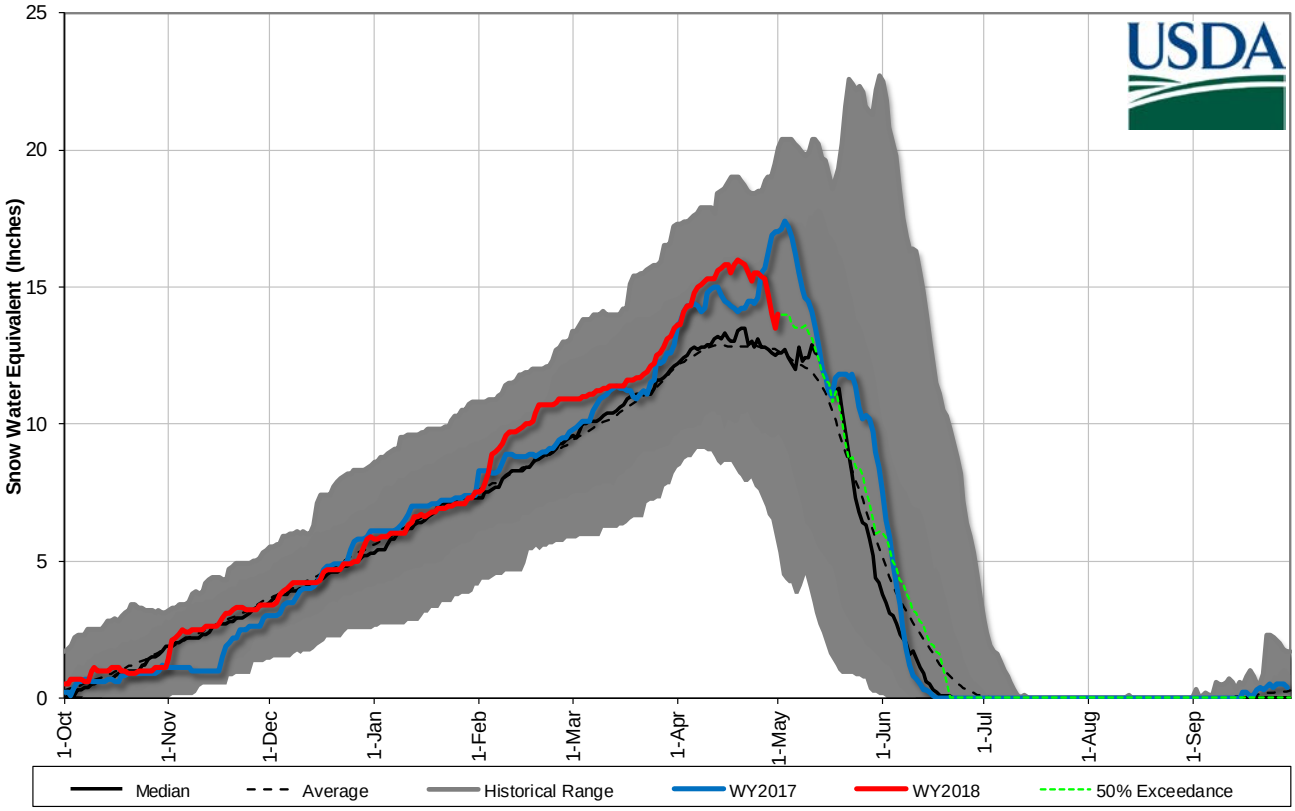
Bighorn River Basin Snowpack with Non-Exceedence Projections

Based on provisional SNOTEL daily data as of 5/1/2018



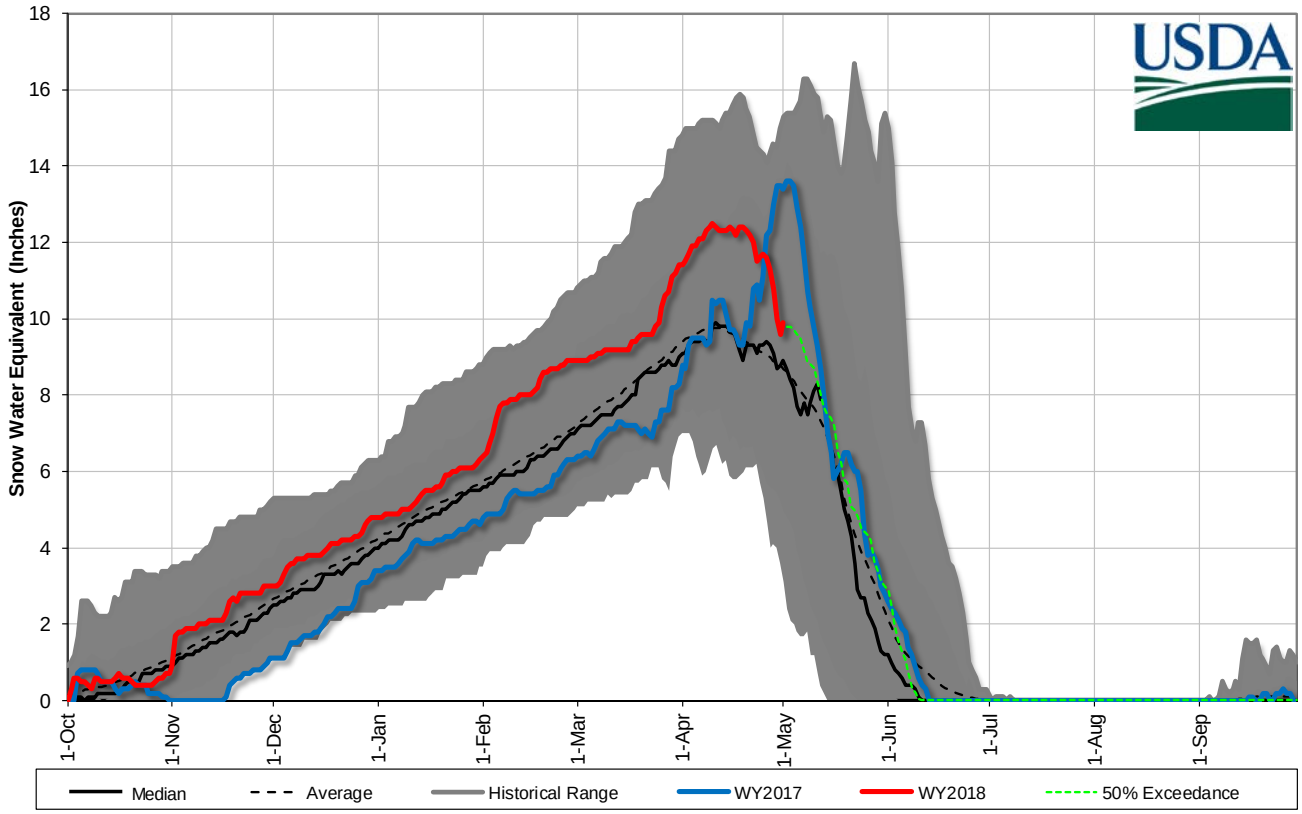
Tongue River Basin Snowpack with Non-Exceedence Projections

Based on provisional SNOTEL daily data as of 5/1/2018

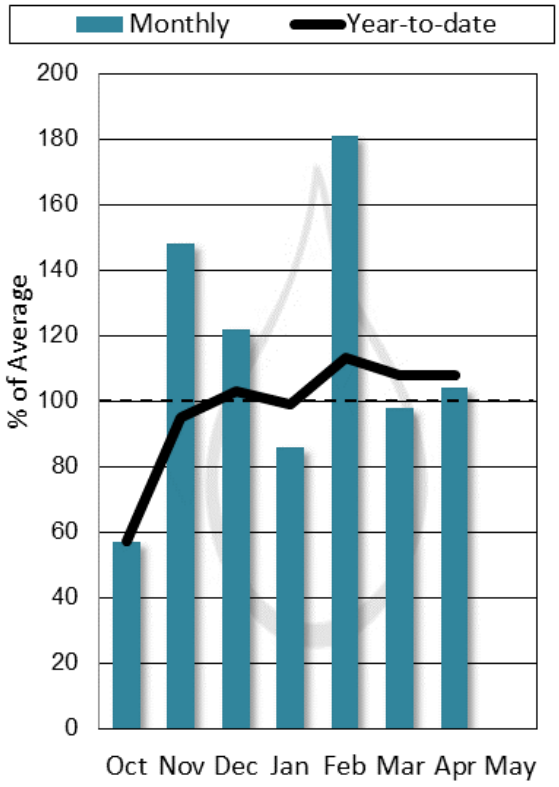


Powder River Basin Snowpack with Non-Exceedence Projections

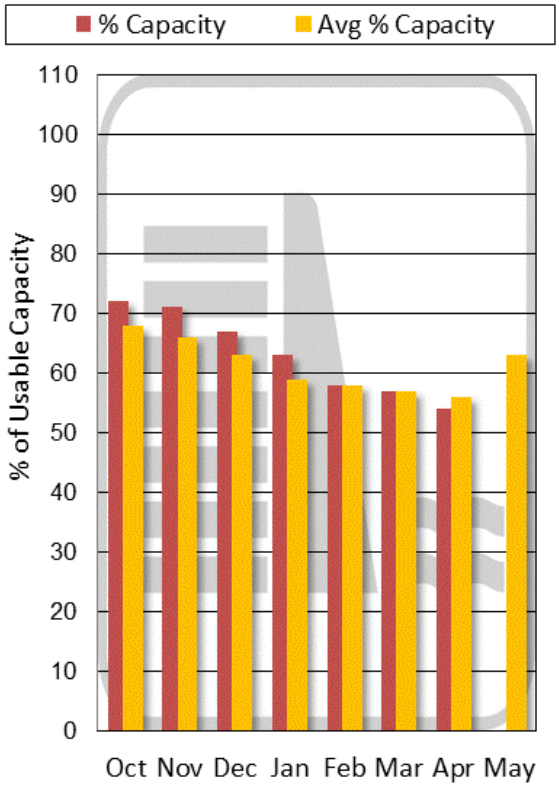
Based on provisional SNOTEL daily data as of 5/1/2018



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.

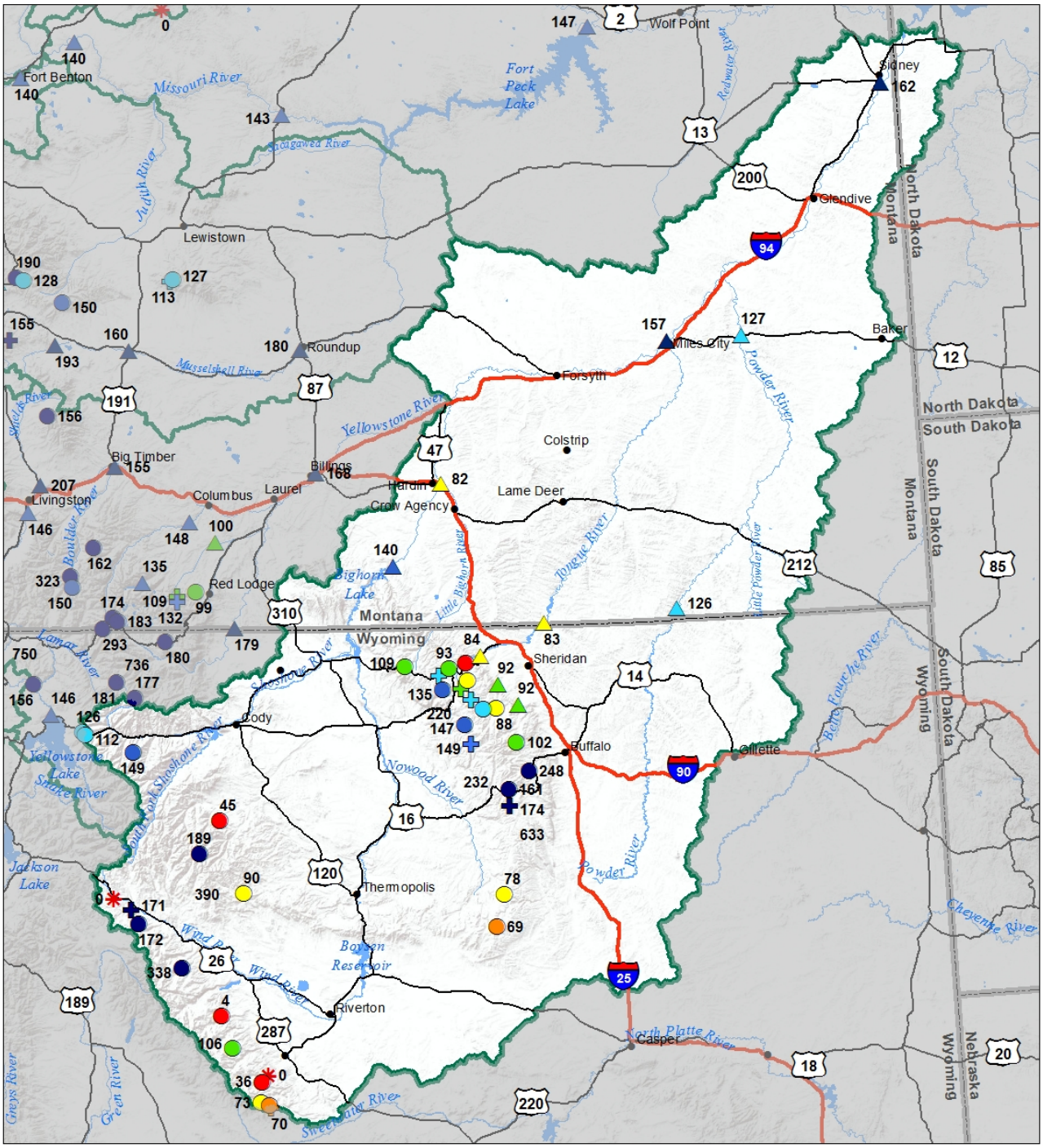
Lower Yellowstone River Basin

Forecast Point	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
		Chance Actual Volume Will Exceed Forecasted Volume						
Bighorn R nr St. Xavier[2]	MAY-JUL	1300	1570	1760	*140%*	1940	2210	1260
	MAY-SEP	1380	1670	1870	*140%*	2070	2370	1340
Little Bighorn R nr Hardin	MAY-JUL	26	52	69	*81%*	86	112	85
	MAY-SEP	31	60	80	*82%*	100	129	97
Tongue R nr Dayton[2]	MAY-JUL	40	55	65	*81%*	75	90	80
	MAY-SEP	49	65	77	*84%*	88	104	92
Big Goose Ck nr Sheridan	MAY-JUL	23	33	40	*91%*	46	56	44
	MAY-SEP	31	41	48	*92%*	55	65	52
Little Goose Ck nr Bighorn	MAY-JUL	16	22	26	*90%*	30	36	29
	MAY-SEP	23	29	34	*92%*	38	45	37
Tongue River Reservoir Inflow[2]	MAY-JUL	53	105	141	*81%*	177	230	175
	MAY-SEP	70	126	164	*83%*	200	260	198
Yellowstone R at Miles City[2]	MAY-JUL	5650	6360	6840	*157%*	7320	8030	4370
	MAY-SEP	6440	7290	7880	*157%*	8460	9310	5030
Powder R at Moorehead	MAY-JUL	70	143	193	*128%*	245	315	151
	MAY-SEP	89	163	215	*126%*	265	335	170
Powder R nr Locate	MAY-JUL	72	155	210	*128%*	270	350	164
	MAY-SEP	91	177	235	*127%*	295	380	185
Yellowstone R nr Sidney[2]	MAY-JUL	5680	6500	7050	*161%*	7600	8420	4380
	MAY-SEP	6410	7400	8070	*162%*	8730	9720	4980

1) 90% and 10% exceedance probabilities are actually 95% and 5%

2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions

Lower Yellowstone River Basin
Streamflow Forecast, Snow Water Equivalent
Percentage of Normal
May 1, 2018



Snow Water Equivalent
Percent of Normal

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

Streamflow Forecast
Percent of Average Flows

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

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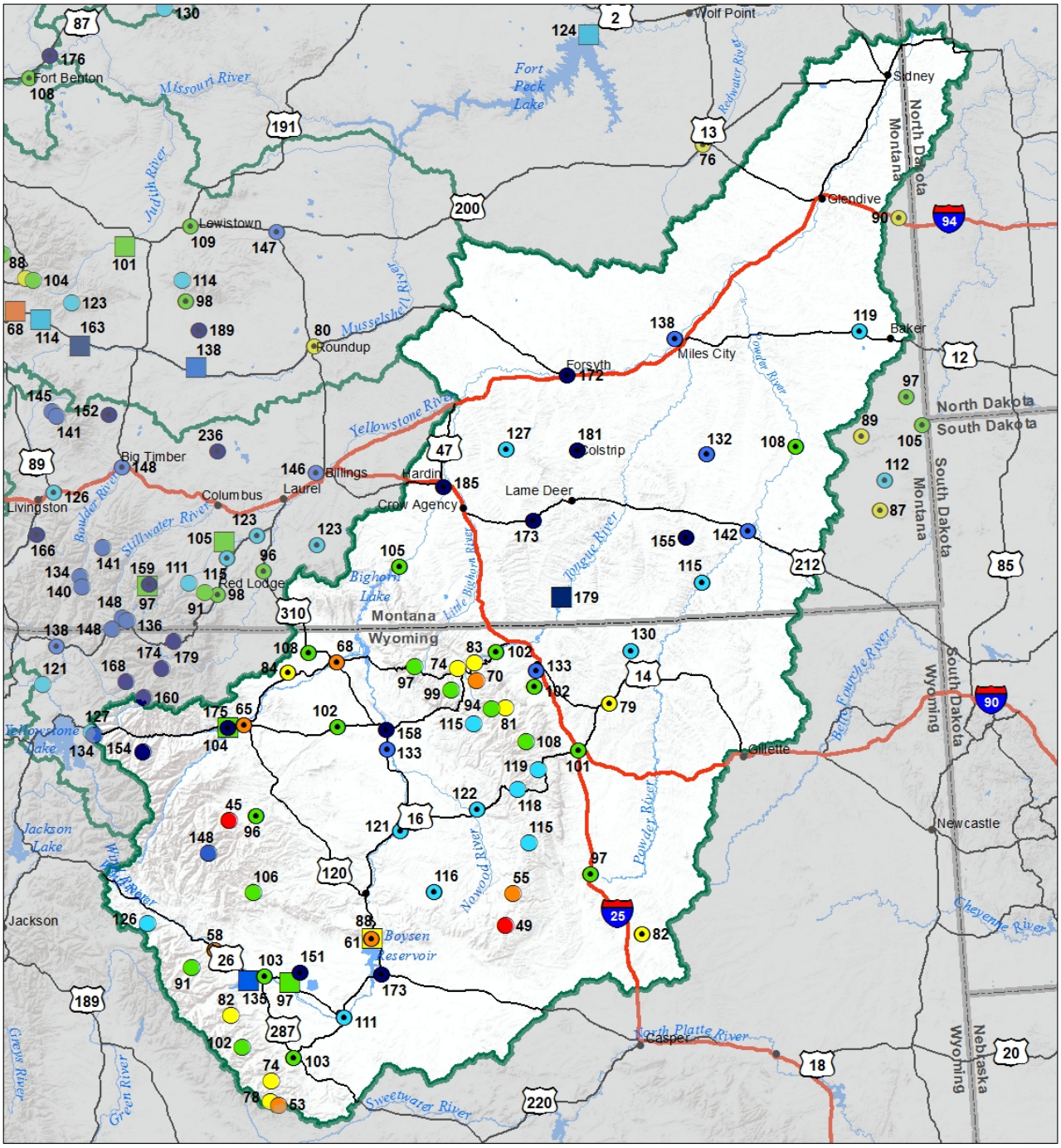
Lower Yellowstone River Basin
Water Year to Date Precipitation and Reservoir Levels
Percentage of Normal
May 1, 2018

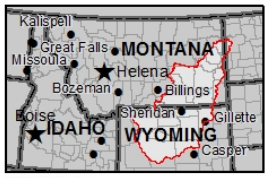


Precipitation
Percent of Normal

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%



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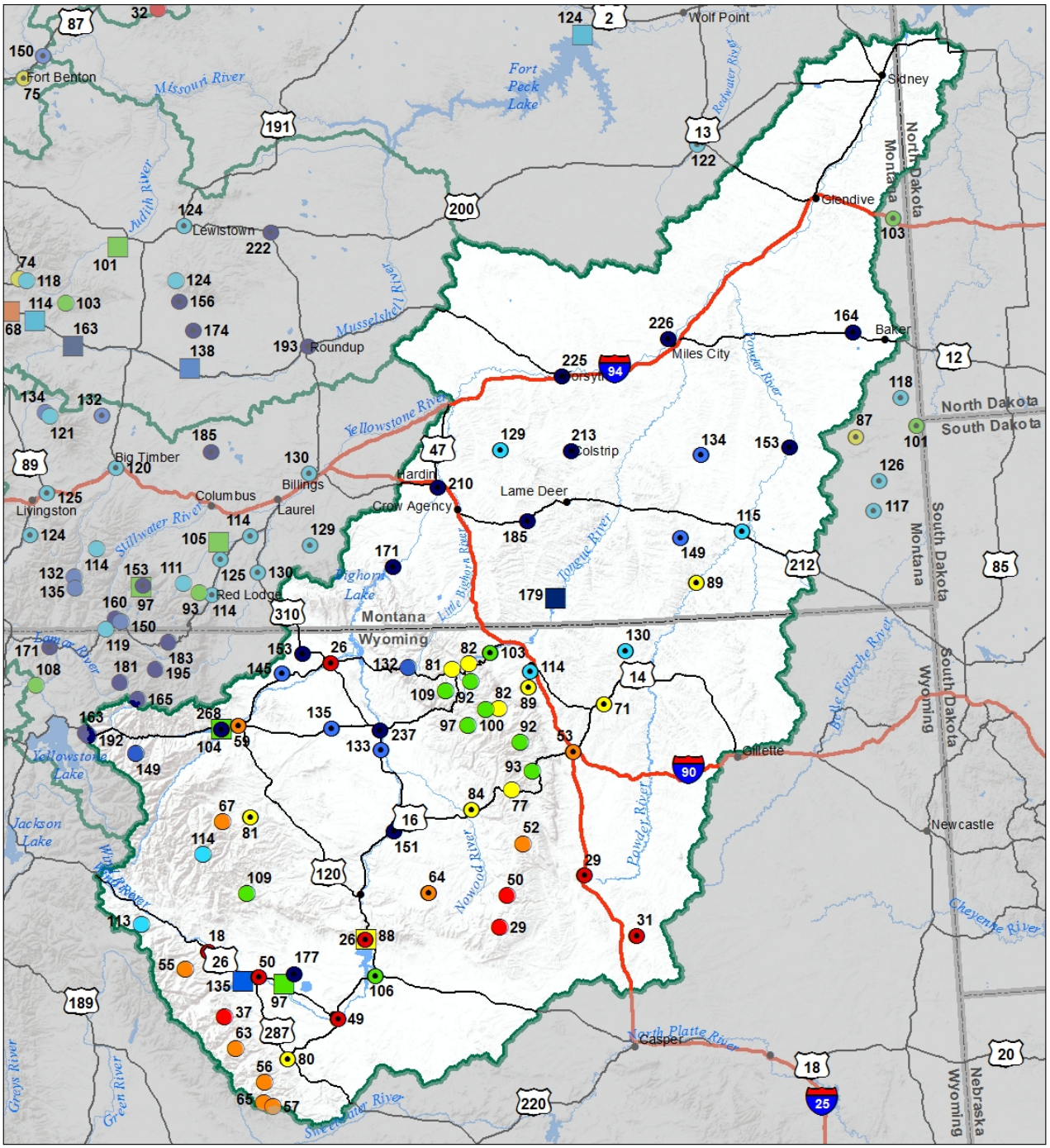
Montana State Library Natural Resource Information System

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

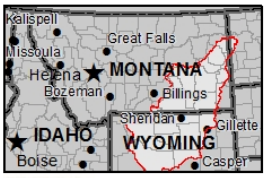


Precipitation
Percent of Normal

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%



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Montana State Library Natural Resource Information System

Data Summary (SNOTEL and Snowcourse)

Montana Snow Sites	Network	Elevation (ft)	Depth (in)	SWE (in)	Median (in)	% Median	Last Year SWE (in)	Last Year % Median
Albro Lake	SNOTEL	8300	64	24.9	18.9	132	25.9	137
Ambrose	SC	6480			9.6			
Arch Falls	SC	7350	40	14.4	10.7	135	9.2	86
Ashley Divide	SC	4820	14	4.6	0		0	
Badger Pass	SNOTEL	6900	87	42.2	29.4	144	39.7	135
Banfield Mountain	SNOTEL	5600	45	18.5	13.1	141	16.1	123
Baree Creek	SC	5500	103	47.8	34.8	137	34.8	100
Baree Midway	SC	4600	81	35.1	22.7	155	26.4	116
Baree Trail	SC	3800	11	4.8	0		2.2	
Barker Lakes	SNOTEL	8250	64	21.5	16.3	132	15.9	98
Basin Creek	SNOTEL	7180	46	11.5	9	128	7.3	81
Bassoo Peak	SC	5150	20	7.8	0		5.3	
Beagle Springs	SNOTEL	8850	35	11.7	8.7	134	13.8	159
Bear Basin	SC	8150			17.2		19	110
Bear Mountain	SNOTEL	5400	140	64.6	53.7	120	53.3	99
Beartooth Lake	SNOTEL	9360	103	41.1	22.8	180	36.1	158
Beaver Creek	SNOTEL	7850	65	21.9	18.2	120	20.3	112
Big Snowy	SC	7150	72	23.3	20.6	113	15.4	75
Bisson Creek	SNOTEL	4920	30	11.9	4.3	277	6.5	151
Black Bear	SNOTEL	8170	112	47	37.4	126	51.4	137
Black Mountain	SC	7750	68	24	15.9	151	15.2	96
Black Pine	SNOTEL	7210	39	14.9	8.5	175	10.7	126
Blacktail	SC	5650	37	14.7	7	210	9.8	140
Blacktail Mtn	SNOTEL	5650	24	10.3			9.5	
Bloody Dick	SNOTEL	7600	40	14.7	8.5	173	16.3	192
Bots Sots	SC	7750	14	4.9	4.5	109	0.1	2
Boulder Mountain	SNOTEL	7950	72	27	20.9	129	20.1	96
Box Canyon	SNOTEL	6670	21	9.7	3	323	0	0
Boxelder Creek	SC	5100	0	0	1.6	0	0	0
Brackett Creek	SNOTEL	7320	78	36	20.1	179	24.5	122
Bristow Creek	SC	3900						
Brush Creek Timber	SC	5000	1	0.4	1	40	0	0
Bull Mountain	SC	6600	19	5.6	0		0	
Burnt Mtn	SNOTEL	5880	8	3.1	0		0.4	
Cabin Creek	SC	5200	21	7.7	0.2	3850	0	0
Calvert Creek	SNOTEL	6430	1	0.3	0.7	43	0	0
Camp Senia	SC	7890	48	15.3	5.4	283	13.5	250
Canyon	SNOTEL	7870	42	16.2	10.4	156	18.7	180
Carrot Basin	SNOTEL	9000	98	34.8	28.6	122	35.7	125
Chessman Reservoir	SC	6200	17	6.8	0.4	1700	0	0
Chicago Ridge	SC	5800					36.6	

Chicken Creek	SC	4060	42	17	4.8	354	8.5	177
Clover Meadow	SNOTEL	8600	69	23.5	17.4	135	17.5	101
Cole Creek	SNOTEL	7850	53	16.5	16.6	99	17.1	103
Combination	SNOTEL	5600	0	0	0		0	
Copper Bottom	SNOTEL	5200	0	0			0	
Copper Camp	SNOTEL	6950	77	42.1			39	
Copper Mountain	SC	7700	40	15	9.6	156	14	146
Cottonwood Creek	SC	6400	31	11.2	7.8	144	0	0
Coyote Hill	SC	4200	23	10	0		0	
Crevice Mountain	SC	8400						
Crystal Lake	SNOTEL	6050	38	14.4	11.3	127	7.4	65
Dad Creek Lake	SC	8800			15.6			
Daisy Peak	SNOTEL	7600	43	15.3	10.2	150	9.8	96
Daly Creek	SNOTEL	5780	26	9.4	3.3	285	4.4	133
Darkhorse Lake	SNOTEL	8600	100	38.3	30.1	127	36	120
Deadman Creek	SNOTEL	6450	26	9.9	5.2	190	0	0
Desert Mountain	SC	5600	49	20.6				
Discovery Basin	SC	7050		18.1	8.8	206	11.2	127
Divide	SNOTEL	7800	34	11.1	11.1	100	10	90
Dix Hill	SC	6400	16	7	0.2	3500	0	0
Dupuyer Creek	SNOTEL	5750		10	6.7	149	7.9	118
Eagle Creek	SC	7000						
East Boulder Mine	SNOTEL	6335	3	1.5			0.9	
El Dorado Mine	SC	7800						
Elk Horn Springs	SC	7800	33	10.9	6.7	163	8.6	128
Elk Peak	SNOTEL	7600	82	35			22	
Elk Peak	SC	8000	63	23.6	15.2	155	15.2	100
Emery Creek	SNOTEL	4350	34	13.5	5.7	237	9.2	161
Fatty Creek	SC	5500	82	34.1	20.9	163	26	124
Fish Creek	SC	8000			11			
Fisher Creek	SNOTEL	9100	131	56.8	32.7	174	47.6	146
Flattop Mtn.	SNOTEL	6300	123	57.5	42.2	136	56.6	134
Fleecer Ridge	SC	7500	41	11.5	8	144	11	138
Foolhen	SC	8280		22.7	15.4	147	18	117
Forest Lake	SC	6400						
Four Mile	SC	6900	25	8.8	4.6	191	6.8	148
Freight Creek	SC	6000	41	15.2	9	169	8.7	97
Frohner Meadow	SNOTEL	6480	22	9.5	6.4	148	0	0
Garver Creek	SNOTEL	4250	31	12.5	1.9	658	7	368
Gibbons Pass	SC	7100						
Goat Mountain	SC	7000			5.4			
Government Saddle	SC	5270					32.2	
Grave Creek	SNOTEL	4300	48	18.9	5	378	9.3	186
Griffin Creek Divide	SC	5150	25	9.9	2	495	6.8	340
Hand Creek	SNOTEL	5035	20	7.1	5.5	129	6.1	111
Hawkins Lake	SNOTEL	6450	82	31.6	25.9	122	34.3	132
Haymaker	SC	8050						

Hebgen Dam	SC	6550		6.9	3.7	186	0	0
Hell Roaring Divide	SC	5770	92	39.6	26.6	149	30.1	113
Herrig Junction	SC	4850	73	29.1	20.9	139	22.6	108
Highwood Divide	SC	5650						
Highwood Station	SC	4600			0			
Holbrook	SC	4530	13	5.9	0			
Hoodoo Basin	SNOTEL	6050	115	49.6	39.8	125	46.2	116
Humboldt Gulch	SNOTEL	4250	27	7.4	1.4	529	4	286
Jakes Canyon	SC	9040						
Johnson Park	SC	6450	12	5.2	0		0	
Kishenehn	SC	3890						
Kraft Creek	SNOTEL	4750	33	13.4			0	
Lake Camp	SC	7780			6.6		9.8	148
Lakeview Canyon	SC	6930	26	8.2	8.5	96	6.6	78
Lakeview Ridge	SNOTEL	7400	13	2.9	7.9	37	2.3	29
Lemhi Ridge	SNOTEL	8100	32	10.5	10	105	11.2	112
Lick Creek	SNOTEL	6860	40	13.7	8.7	157	8.8	101
Little Park	SC	7400	47	18.4	12.6	146	11.4	90
Logan Creek	SC	4300	1	0.4	0		0	
Lolo Pass	SNOTEL	5240	60	28.1	17.2	163	23	134
Lone Mountain	SNOTEL	8880	67	28.1	18.5	152	22.2	120
Lookout	SNOTEL	5140	60	25.4	22.7	112	22.5	99
Lower Twin	SNOTEL	7900	66	23.2	18.4	126	23.4	127
Lubrecht Flume	SNOTEL	4680	0	0	0		0	
Lubrecht Forest No 3	SC	5450	5	1.9	0		0	
Lubrecht Forest No 4	SC	4650	0	0	0		0	
Lubrecht Forest No 6	SC	4040	0	0	0		0	
Lubrecht Hydroplot	SC	4200	0	0	0		0	
Lupine Creek	SC	7380	25	9	1.2	750	0	0
Madison Plateau	SNOTEL	7750	74	29.6	21.3	139	29.8	140
Many Glacier	SNOTEL	4900	28	12.3	0.6	2050	4.8	800
Marias Pass	SC	5250	58	23.2	10.4	223	10.9	105
Mineral Creek	SC	4000	31	14.7	6.5	226	0	0
Monument Peak	SNOTEL	8850	82	31.6	21	150	26.2	125
Moss Peak	SNOTEL	6780	123	51.3	38.7	133	51.7	134
Moulton Reservoir	SC	6850			1.5			
Mount Allen No 7	SC	5700	104	48	35	137	40	114
Mount Lockhart	SNOTEL	6400	62	26.8	16.9	159	21.6	128
Mudd Lake	SC	7650	63	25.5	16.2	157		
Mule Creek	SNOTEL	8300	68	22.9	16.1	142	19.9	124
N Fk Elk Creek	SNOTEL	6250	44	16.9	7.5	225	8.9	119
Nevada Ridge	SNOTEL	7020	60	24.6	12.3	200	17	138
New World	SC	6900					10.5	
Nez Perce Camp	SNOTEL	5650	32	12.1	9.7	125	10.5	108
Noisy Basin	SNOTEL	6040	141	70.1	44	159	54.9	125
Norris Basin	SC	7550			5.4			
North Fork Jocko	SNOTEL	6330	134	64.9	38.2	170	40.3	105

Northeast Entrance	SNOTEL	7350	19	8.8	3	293	2.9	97
Onion Park	SNOTEL	7410	39	13.7	13.5	101	11	81
Ophir Park	SC	7150	47	19.5	13.8	141	12.9	93
Parker Peak	SNOTEL	9400	89	38.5	21.3	181	42.6	200
Peterson Meadows	SNOTEL	7200	49	16.7	10.7	156	13.4	125
Pickfoot Creek	SNOTEL	6650	28	10.7	3.7	289	4.8	130
Pike Creek	SNOTEL	5930	20	8.3			5.7	
Pipestone Pass	SC	7200	19	5.4	3.4	159	2.6	76
Placer Basin	SNOTEL	8830	71	28.5	17.6	162	20.4	116
Poorman Creek	SNOTEL	5100	99	46.2	28.2	164	34.8	123
Porcupine	SNOTEL	6500	22	8.5	0.8	1063	0.1	13
Potomageton Park	SC	7150	24	9.9	7.1	139	7.7	108
Revais	SC	4800	0	0	0		0	
Rock Creek Mdws	SC	3400					9.2	
Rocker Peak	SNOTEL	8000	73	25.2	14.9	169	14.8	99
Rocky Boy	SNOTEL	4700	0	0	0		0	
Roland Summit	SC	5120						
S Fork Shields	SNOTEL	8100	71	27.7	17.8	156	22.1	124
Sacajawea	SNOTEL	6550	48	20.7	10.3	201	8.4	82
Saddle Mtn.	SNOTEL	7940	82	35.4	22.5	157	27.5	122
Short Creek	SNOTEL	7000	16	3.8	3.8	100	0	0
Shower Falls	SNOTEL	8100	93	34.5	23.9	144	25	105
Skalkaho Summit	SNOTEL	7250	70	30.4	22.1	138	25.3	114
Sleeping Woman	SNOTEL	6150	43	17.4	11	158	17.3	157
Slide Rock Mountain	SC	7100	49	22.8	13	175	15	115
Spotted Bear Mountain	SC	7000	37	17	7.7	221	9	117
Spur Park	SNOTEL	8100	76	28.6	22.4	128	20.7	92
Stahl Peak	SNOTEL	6030	116	51.6	35.4	146	50.3	142
Stemple Pass	SC	6600	50	17.2	6.9	249	9.8	142
Storm Lake	SC	7780	60	22.6	14.4	157	16	111
Stringer Creek	SNOTEL	6550	27	9.5	8.1	117	4.8	59
Stryker Basin	SC	6180	95	73	30.3	241	32.2	106
Stuart Mountain	SNOTEL	7400	108	42.7	29.4	145	40.8	139
Taylor Road	SC	4080	0	0	0		0	
Ten Mile Lower	SC	6600	31	12.6	2.7	467	1.8	67
Ten Mile Middle	SC	6800	51	18.6	9.4	198	9.4	100
Tepee Creek	SNOTEL	8000	32	11.1	13.4	83	13.6	101
Timberline Creek	SC	8850	53	18.2	13.8	132	17.2	125
Tizer Basin	SNOTEL	6880	22	8	8.2	98	0.7	9
Trinkus Lake	SC	6100	134	62.7	38.8	162	44.6	115
Truman Creek	SC	4060	0	0	0		0	
Twelvemile Creek	SNOTEL	5600	34	13.5	3.4	397	6.6	194
Twenty-One Mile	SC	7150	42	15.7	11.3	139	14.8	131
Twin Lakes	SNOTEL	6400	113	55.8	33	169	38.5	117
Upper Holland Lake	SC	6200	126	56.2	30.4	185	31.7	104
Waldron	SNOTEL	5600	34	13.8	4.8	288	9.8	204
Warm Springs	SNOTEL	7800	97	39.7	21.4	186	24.9	116

Weasel Divide	SC	5450	100	40.7	28.8	141	36.1	125
West Yellowstone	SNOTEL	6700	10	4.7	1.8	261	0	0
Whiskey Creek	SNOTEL	6800	43	15.6	14.6	107	12.8	88
White Elephant	SNOTEL	7710	72	28.5	24	119	31.9	133
White Mill	SNOTEL	8700	102	43.5	23.8	183	40.4	170
Wolverine	SNOTEL	7650	38	18.4	2.5	736	5.9	236
Wood Creek	SNOTEL	5960	38	14.8	6.8	218	7	103
Wrong Creek	SC	5700	43	17.4	4.7	370	8.8	187
Wrong Ridge	SC	6800			13		16.9	130
Younts Peak	SNOTEL	8350			15.5		23.5	152

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Montana Water Supply Outlook Report

Natural Resources Conservation Service