

# Montana

## Water Supply Outlook Report

### March 1<sup>st</sup>, 2016



*Photo: Ian Bardwell – USFS Rocky Mountain Ranger District, Choteau MT*

Tricky access conditions this month lead to a creative solution by snow surveyors in the Rocky Mountain Front of Montana. Ian Bardwell (USFS Snow Surveyor) and Nate Emer (volunteer) peddled their way up the North Fork of the Teton River to measure the Freight Creek snow course in place of the traditional snowmobile ride to the wilderness boundary. The snow course measurements they made after this effort were only 50% of normal and basin-wide snowpack in the Teton River Basin is well below normal at 54% for March 1<sup>st</sup>. This area and other east facing river basins which have been overlooked regarding snowfall will be watched closely as we enter spring. Elsewhere in the state snowpack conditions are in better shape, benefitting from moisture this fall and winter.

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## Montana Water Supply Outlook Report as of March 1<sup>st</sup>, 2016

### How forecasts are made

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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

February may be the first month that “El Nino” reared his ugly face in the state of Montana. El Nino played favorites this month bringing warm and moist westerly and southwesterly flow to some basins while almost completely looking over others. In the northwest river basins there was abundant precipitation in the form of snow and rain and the snowpack is retaining this moisture with melt only occurring at the lowest of elevations. Four of the five major river basins west of the Divide saw increases in basin percentages for snowpack on March 1<sup>st</sup>. After a dry spring and summer and near record to record low snowpack on April 1<sup>st</sup> last year the change is more than welcome. River basins west of the Divide are near to slightly below normal for snowpack on March 1<sup>st</sup>.

With the exception of a few of the east facing basins that have been largely overlooked this water year, basins east of the Divide generally saw declines in basin snowpack percentages over the month. Warm and dry conditions were experienced during the first two weeks of the month before the basins received their Valentines gift of much needed moisture. Some small events trickled in during the rest of the month helping to add to the annual snowpack, but these events weren’t significant enough to maintain snowpack percentiles in most basins. There are a large range of conditions in the Missouri and Yellowstone River basins, and the individual basin reports should be consulted for specific information.

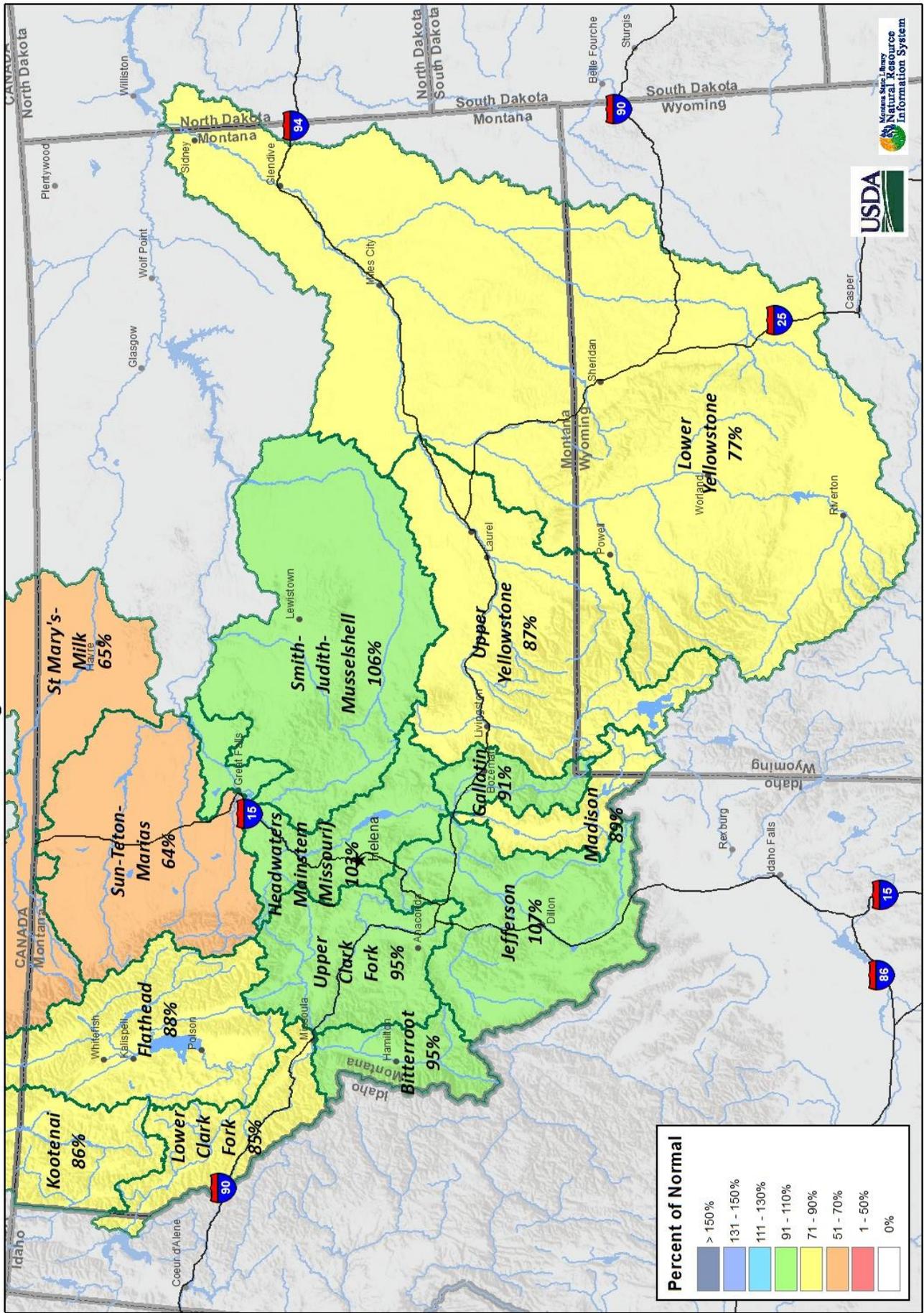
A few basins continue to be well below normal for this date and will be watched as we enter the spring when these east facing basins are historically favored in terms of precipitation. The Sun-Teton-Marias (64%), St. Mary-Milk (65%) and Lower Yellowstone (77%) River basins are well below normal for this date and will need some help this spring to recover before the bulk of snowmelt occurs. State-wide snowpack is currently 90% of normal for February 1<sup>st</sup>.

So what do snowpack percentages mean on March 1<sup>st</sup>? With the exception of the northwest river basins snowpack conditions last year were generally near to even above what we have now. This speaks to the importance of spring precipitation and snow over the next two to three months. Spring can be a game changer for water users across the state, let’s just hope we’re not playing the same game we were last spring and summer this year.

### ***Snow Water Equivalent***

<b>3/1/2016</b>	<i>% Normal</i>	<i>% Last Year</i>
<b>Columbia River Basin</b>	<b>90</b>	<b>105</b>
Kootenai in Montana	86	143
Flathead in Montana	88	101
Upper Clark Fork	95	90
Bitterroot	95	97
Lower Clark Fork	85	115
<b>Missouri River Basin</b>	<b>92</b>	<b>98</b>
Jefferson	107	103
Madison	89	109
Gallatin	91	93
Headwaters Mainstem	103	92
Smith-Judith-Musselshell	106	97
Sun-Teton-Marias	64	74
St. Mary-Milk	65	102
<b>Yellowstone River Basin</b>	<b>81</b>	<b>76</b>
Upper Yellowstone	87	82
Lower Yellowstone	77	72
<b>West of Divide</b>	<b>90</b>	<b>105</b>
<b>East of Divide</b>	<b>87</b>	<b>89</b>
<b>Montana State-Wide</b>	<b>90</b>	<b>99</b>

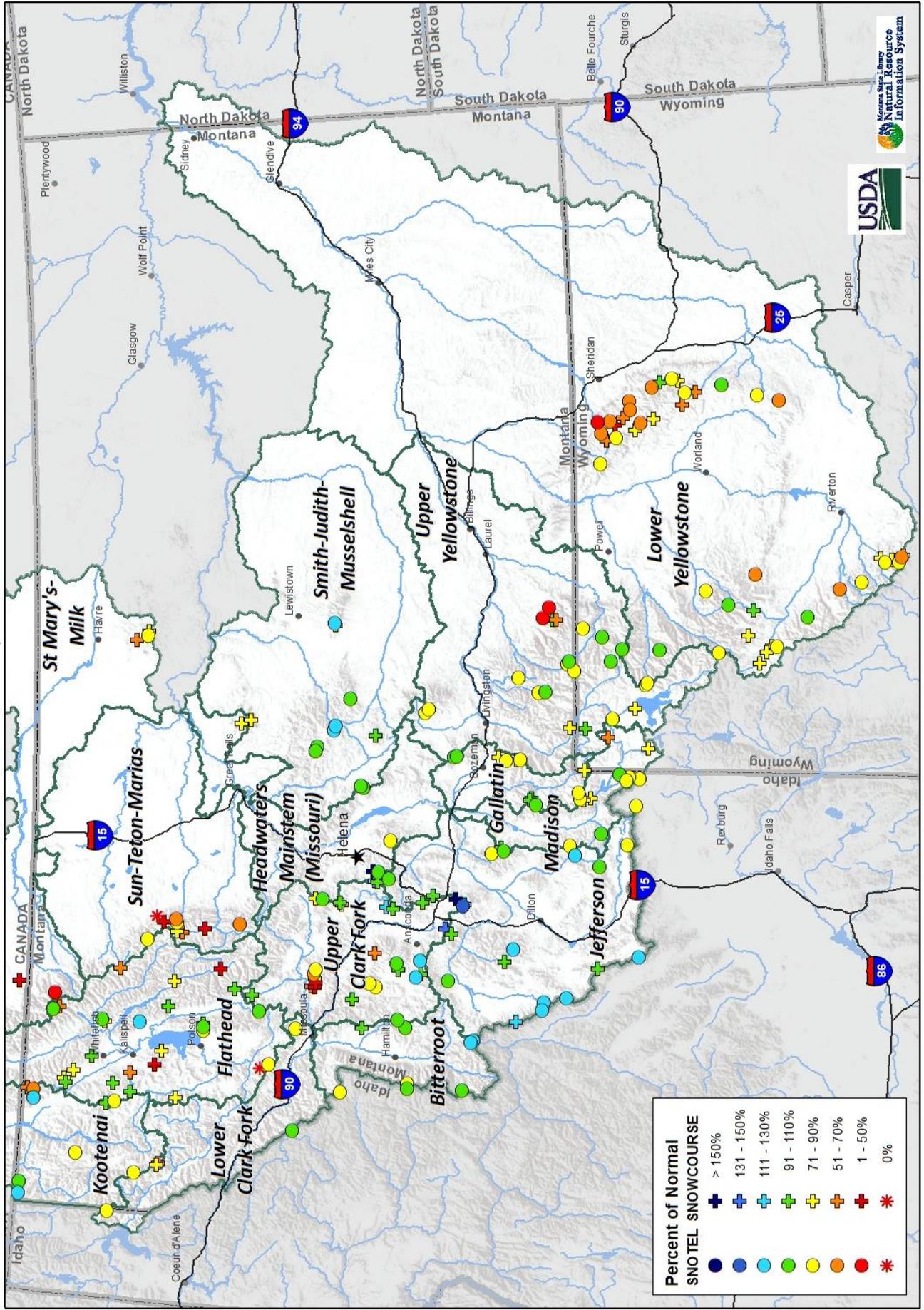
Montana Data Collection Office  
 Current Snow Water Equivalent  
 Basin Percentage of Normal - March 1, 2016



Note: Data includes SNO TEL and Snow course Measurements on March 1, 2016



Montana Data Collection Office  
 Current Snow Water Equivalent  
 March 1, 2016



## Precipitation - Overview

El Nino must have been listening to the song “The End” by the Doors this month truly believing that dropping precipitation in “the west, is the best”. Basins west of the Divide received the most precipitation during the month of February which caused water year-to-date (WYTD) precipitation percentages to climb from February 1<sup>st</sup>. In general, February was a warm month across the state so a good portion of this fell in the liquid form instead of the frozen form we prefer during the winter. Two other basins which have been overlooked this winter also received above average precipitation, the Lower Yellowstone received 102% of average precipitation during the month and St. Mary-Milk received 121%. The Madison (65%), Gallatin River (80%), Jefferson (78%) and Upper Yellowstone (74%) basins received the least combined mountain and valley precipitation during the month.

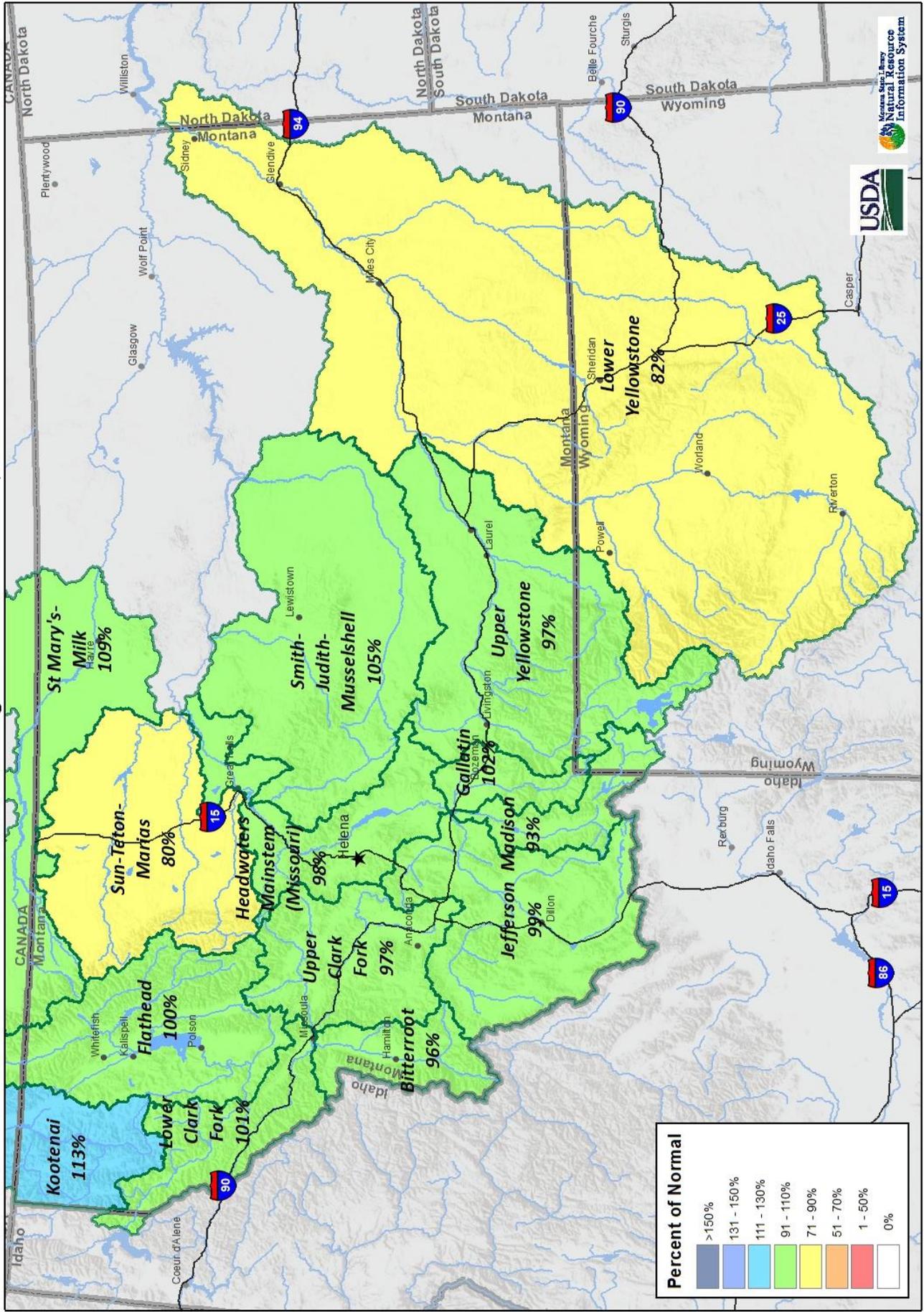
Although the precipitation received this year may be a disappointment to skiers and snowmobilers due the state (liquid) in which it fell, what has fallen has allowed most basins to stay slightly below to even above average for water year-to-date precipitation starting October 1<sup>st</sup>. Only two basins are well below average for March 1<sup>st</sup> WYTD precipitation, the Sun-Teton-Marias (80%) and Lower Yellowstone (82%). State-wide combined mountain and valley precipitation is currently 99% of average for March 1<sup>st</sup>.

In the coming three months basins east of the Divide are climatically favored to receive the bulk of their precipitation, while basins west of the Divide receive less than the early to mid-winter months. Spring plays a critical role in the runoff volumes we experience by both adding snow and providing additional over surface runoff from rain events. Last year was a major disappointment and a good reminder of how important spring is to our snowpack and water systems. Our staff will have their fingers crossed that that isn’t experienced again this year.

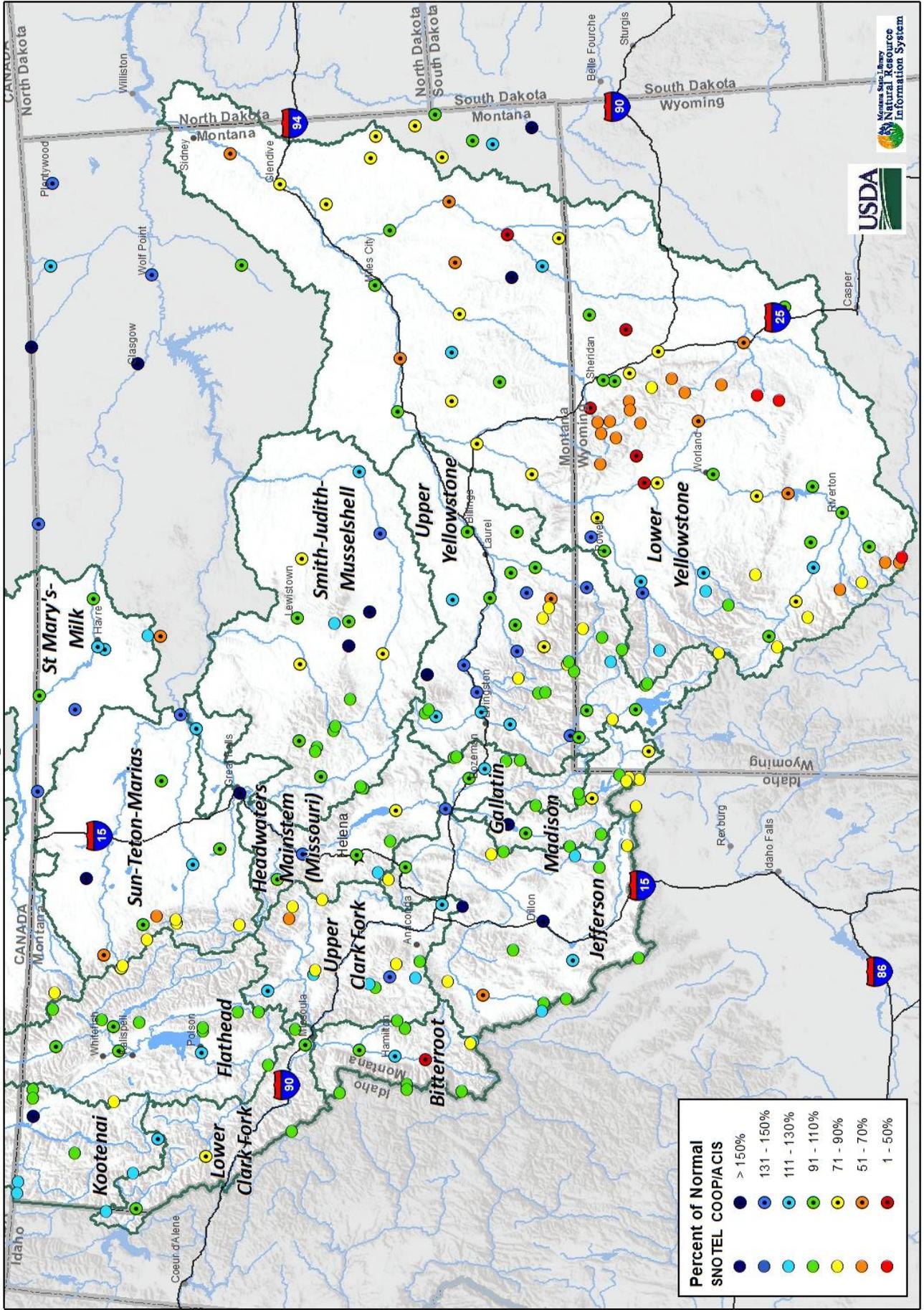
### *Precipitation*

<b>3/1/2016</b>	<i>Monthly % Avg</i>	<i>Water Year % Avg</i>	<i>WY % Last Year</i>
<b>Columbia River Basin</b>	<b>109</b>	<b>101</b>	<b>94</b>
Kootnenai in Montana	122	113	114
Flathead in Montana	118	100	90
Upper Clark Fork	95	97	88
Bitterroot	103	96	84
Lower Clark Fork	117	101	97
<b>Missouri River Basin</b>	<b>79</b>	<b>99</b>	<b>98</b>
Jefferson	78	99	104
Madison	65	93	115
Gallatin	80	102	102
Headwaters Mainstem	98	98	88
Smith-Judith-Musselshell	97	105	99
Sun-Teton-Marias	77	80	71
St. Mary-Milk	121	109	92
<b>Yellowstone River Basin</b>	<b>88</b>	<b>88</b>	<b>87</b>
Upper Yellowstone	74	97	94
Lower Yellowstone	102	82	71
<b>West of Divide</b>	<b>109</b>	<b>101</b>	<b>94</b>
<b>East of Divide</b>	<b>86</b>	<b>93</b>	<b>93</b>
<b>Montana State-Wide</b>	<b>94</b>	<b>99</b>	<b>95</b>

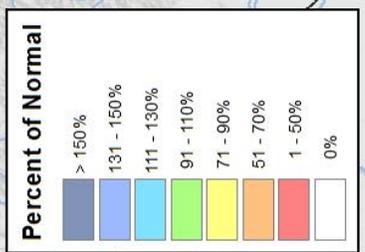
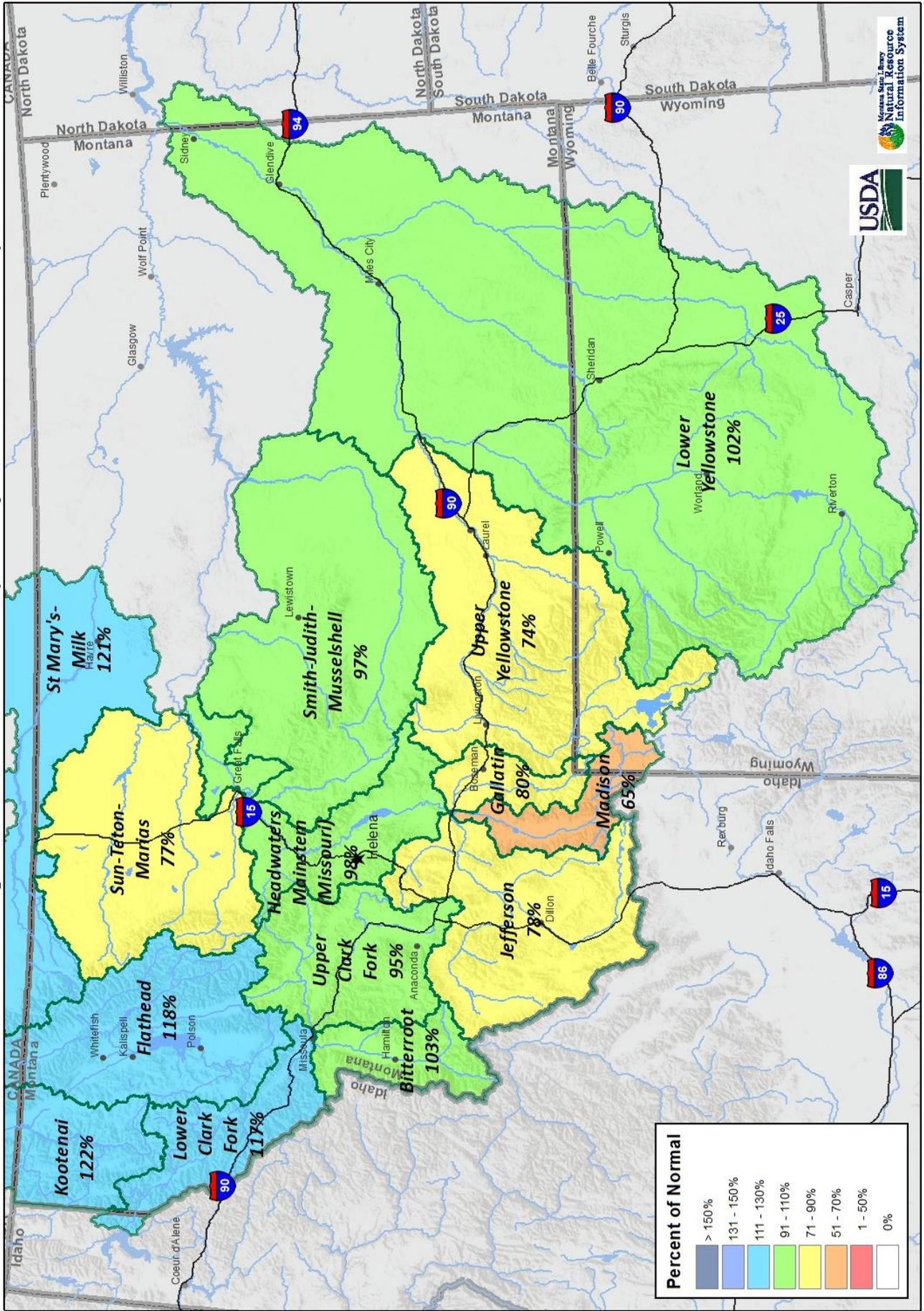
Montana Data Collection Office  
 Water Year to Date Precipitation  
 Basin Percentage of Normal - March 1, 2016



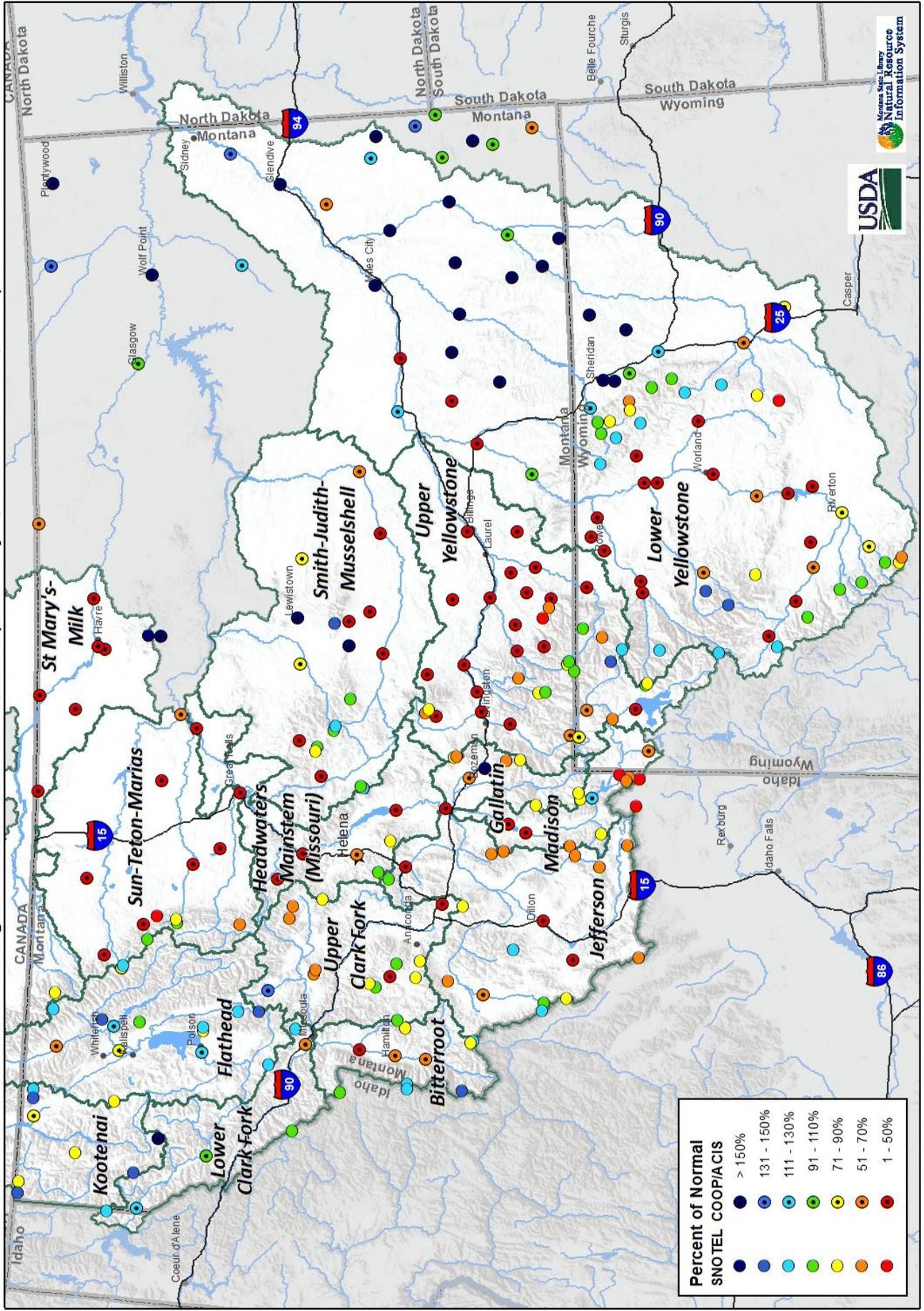
Montana Data Collection Office  
 Water Year to Date Precipitation  
 Percentage of Normal - March 1, 2016



Montana Data Collection Office  
 Monthly Precipitation  
 Basin Percentage of Normal - March 1, 2016 (February 1, 2016 - March 1, 2016)



Montana Data Collection Office  
 Monthly Precipitation  
 Percentage of Normal - March 1, 2016 (February 1, 2016 - March 1, 2016)



## Reservoirs - Overview

Similar to last month reservoir storage is mostly near to above average for the date across the treasure state. The lack of summer precipitation, low stream flows and demand for water last year in a few river basins left some reservoirs well below average entering the water year and they have continued to follow this trend through the winter.

East of the Divide there are a few reservoirs that are well below average for this date. In the Jefferson River basin Lima (70%) and Clark Canyon (81%) reservoirs are below average as of March 1<sup>st</sup>. In this basin snowpack percentages are currently above normal and water year precipitation is also above normal.

In the Sun-Teton-Marias River basin Pishkun (32%) and Gibson (63%) reservoirs are also well below average at this time, snowpack totals and precipitation feeding these reservoirs are well below average for March 1<sup>st</sup>. Wise water management and near to above average spring runoff will be needed in order to reach average conditions as water is called on this summer, and to ensure carryover is available as we enter the next water year.

### *Reservoir Storage*

<b>3/1/2016</b>	<i>% Average</i>	<i>% Capacity</i>	<i>% Last Year</i>
<b>Columbia River Basin</b>	<b>126</b>	<b>64</b>	<b>93</b>
Kootenai in Montana	149	65	97
Flathead in Montana	110	63	89
Upper Clark Fork	101	71	86
Bitterroot	111	31	57
Lower Clark Fork	103	97	101
<b>Missouri River Basin</b>	<b>114</b>	<b>76</b>	<b>97</b>
Jefferson	83	40	86
Madison	109	79	98
Gallatin	103	54	87
Headwaters Mainstem	117	79	98
Smith-Judith-Musselshell	142	74	87
Sun-Teton-Marias	99	51	87
St. Mary-Milk	133	53	74
<b>Yellowstone River Basin</b>	<b>109</b>	<b>62</b>	<b>96</b>
Upper Yellowstone	139	60	120
Lower Yellowstone	108	62	95
<b>West of Divide</b>	<b>126</b>	<b>64</b>	<b>93</b>
<b>East of Divide</b>	<b>113</b>	<b>75</b>	<b>97</b>
<b>Montana State-Wide</b>	<b>117</b>	<b>72</b>	<b>96</b>

## Streamflow - Overview

Streamflow forecasts in the state generally mimic the current snowpack totals and water year-to-date precipitation in the basins on March 1<sup>st</sup>. Basins west of the Continental Divide in the Columbia River basin have 50% exceedance forecasts for the April-July time period that are near to slightly below average at 93% for the basin-wide average. East of the Divide there is a greater variability in the forecasts, as some basins are near normal for snowpack and WYTD precipitation, while some are well below. Consult the individual basins in this WSOR to look at individual forecast points as they can vary widely within the river basin. Overall, the Missouri River Basin streamflow forecasts are 83% of average for the April-July time period, and the Yellowstone River basin forecasts are also 83% of average for that period. Streamflow prospects increased west of the Divide due to the near to above average precipitation, while forecasts east of the Divide fell due to below normal snowfall and precipitation. Streamflow forecasts in the Sun-Teton-Marias (52-77%) and Lower Yellowstone (45-75%) continue to be well below average for this date.

March streamflow forecasts are issued with the expectation that the user recognize that only 65 to 80 percent of the seasonal snowpack has accumulated at this time. Streamflow forecasts are given as a range of values that encompass the conditions that could occur given current conditions (10%, 30%, 50%, 70%, 90% exceedances). 50 percent exceedance values expect normal conditions to occur from this point until and during runoff.

For more information on streamflow forecasts and how to interpret these forecasts [click here](#).

THE FIGURES IN THE TABLE BELOW ARE AN AVERAGE OF ALL FORECASTS WITHIN THE PARTICULAR BASIN AT THE 50 PERCENT EXCEEDANCE ONLY. ALL 50 PERCENT EXCEEDANCE FORECASTS ASSUME NEAR NORMAL WEATHER THROUGH THE END OF THE FORECAST PERIOD.

**FOR FORECASTS ABOVE AND BELOW THE 50 PERCENT EXCEEDANCE, LOOK TO THE SPECIFIC BASIN REPORTS.**

### ***APR-JUL Streamflow Forecasts***

<b><i>3/1/2016</i></b>	<i>% Average</i>	<i>% Last Year</i>
<b>Columbia River Basin</b>	<b>93</b>	<b>138</b>
Kootenai in Montana	97	139
Flathead in Montana	92	141
Upper Clark Fork	92	130
Bitterroot	98	115
Lower Clark Fork	92	140
<b>Missouri River Basin</b>	<b>83</b>	<b>113</b>
Jefferson	101	191
Madison	83	121
Gallatin	89	123
Headwaters Mainstem	81	107
Smith-Judith-Musselshell	91	91
Sun-Teton-Marias	66	109
St. Mary-Milk	88	122
<b>Yellowstone River Basin</b>	<b>83</b>	<b>83</b>
Upper Yellowstone	90	103
Lower Yellowstone	78	72
<b>West of Divide</b>	<b>93</b>	<b>138</b>
<b>East of Divide</b>	<b>83</b>	<b>98</b>
<b>Montana State-Wide</b>	<b>89</b>	<b>116</b>

## Surface Water Supply Index (SWSI)

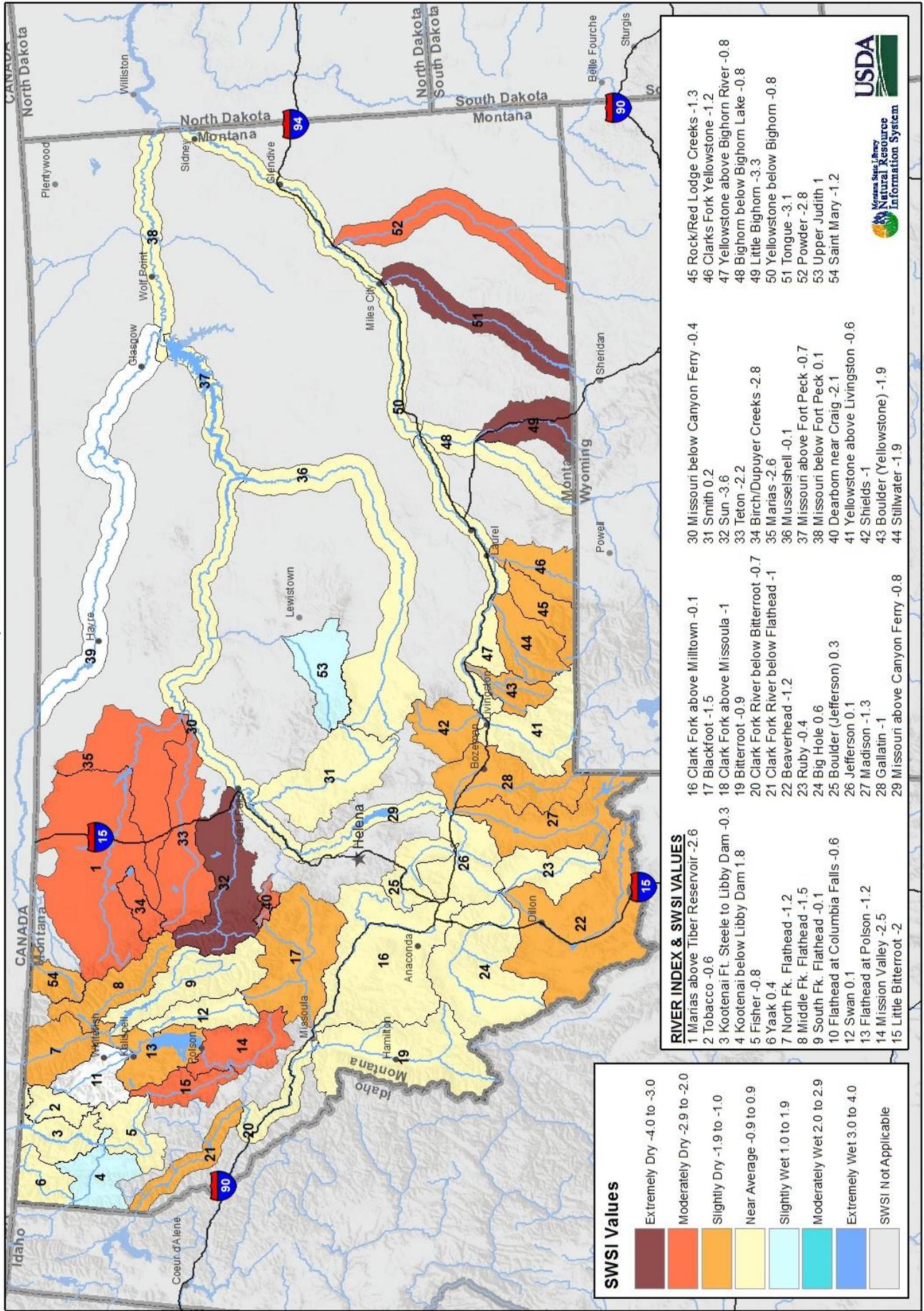
The Surface Water Supply Index (SWSI) is a measure of available surface water availability for the spring and summer months. Water users that rely on mountain precipitation can use the index to evaluate seasonal surface water supplies. The SWSI accounts for mountain snowpack, mountain precipitation, streamflow, reservoir storage, and soil moisture.

Watershed	This month's SWSI	Last Year's SWSI
Marias above Tiber Reservoir	-2.6	-0.7
Tobacco	-0.6	-1.4
Kootenai Ft. Steele to Libby Dam	-0.3	-1.4
Kootenai below Libby Dam	1.8	1.3
Fisher	-0.8	-2.4
Yaak	0.4	-2.4
North Fk. Flathead	-1.2	-1.8
Middle Fk. Flathead	-1.5	-0.7
South Fk. Flathead	-0.1	2.9
Flathead at Columbia Falls	-0.6	0.7
Swan	0.1	0.7
Flathead at Polson	-1.2	0.2
Mission Valley	-2.5	0.2
Little Bitterroot	-2.0	-0.2
Clark Fork above Milltown	-0.1	0.7
Blackfoot	-1.5	-0.2
Clark Fork above Missoula	-1.0	0.2
Bitterroot	-0.9	-0.2
Clark Fork River below Bitterroot	-0.7	0.1
Clark Fork River below Flathead	-1.0	0.1
Beaverhead	-1.2	-1.8
Ruby	-0.4	-1.8
Big Hole	0.6	0.5
Boulder (Jefferson)	0.3	0.2
Jefferson	0.1	-0.4
Madison	-1.3	-1.8
Gallatin	-1.0	-0.9
Missouri above Canyon Ferry	-0.8	-0.9
Missouri below Canyon Ferry	-0.4	-0.9
Smith	0.2	2.1
Sun	-3.6	-1.1
Teton	-2.2	0.6
Birch/Dupuyer Creeks	-2.8	-0.5
Marias	-2.6	2.0
Musselshell	-0.1	0.9
Missouri above Fort Peck	-0.7	0.5
Missouri below Fort Peck	0.1	0.4
Milk		
Dearborn near Craig	-2.1	-0.5
Yellowstone above Livingston	-0.6	0.2
Shields	-1.0	-0.7
Boulder (Yellowstone)	-1.9	0.2
Stillwater	-1.9	0.2
Rock/Red Lodge Creeks	-1.3	0.4
Clarks Fork Yellowstone	-1.2	1.6
Yellowstone above Bighorn River	-0.8	0.4
Bighorn below Bighorn Lake	-0.8	0.5
Little Bighorn	-3.3	0.0
Yellowstone below Bighorn	-0.8	0.5
Tongue	-3.1	0.5
Powder	-2.8	0.2
Upper Judith	1	3.7
Saint Mary	-1.2	-2.7

### SWSI Scale

+3.0 to +4.0	Extremely Wet
+2.0 to +2.9	Moderately Wet
+1.0 to +1.9	Slightly Wet
+0.9 to -0.9	Near Average
-1.0 to -1.9	Slightly Dry
-2.0 to -2.9	Moderately Dry
-3.0 to -4.0	Extremely Dry

# Montana Data Collection Office Surface Water Supply Index (SWSI) March 1, 2016



**SWSI Values**

Dark Red	Extremely Dry -4.0 to -3.0
Red	Moderately Dry -2.9 to -2.0
Orange	Slightly Dry -1.9 to -1.0
Yellow	Near Average -0.9 to 0.9
Light Green	Slightly Wet 1.0 to 1.9
Green	Moderately Wet 2.0 to 2.9
Dark Green	Extremely Wet 3.0 to 4.0
Grey	SWSI Not Applicable

**RIVER INDEX & SWSI VALUES**

- 1 Marias above Tiber Reservoir -2.6
- 2 Tobacco -0.6
- 3 Kootenai Ft. Steele to Libby Dam -0.3
- 4 Kootenai below Libby Dam 1.8
- 5 Fisher -0.8
- 6 Yaak 0.4
- 7 North Fk. Flathead -1.2
- 8 Middle Fk. Flathead -1.5
- 9 South Fk. Flathead -0.1
- 10 Flathead at Columbia Falls -0.6
- 12 Swan 0.1
- 13 Flathead at Polson -1.2
- 14 Mission Valley -2.5
- 15 Little Bitterroot -2
- 16 Clark Fork above Milltown -0.1
- 17 Blackfoot -1.5
- 18 Clark Fork above Missoula -1
- 19 Bitterroot -0.9
- 20 Clark Fork River below Bitterroot -0.7
- 21 Clark Fork River below Flathead -1
- 22 Beaverhead -1.2
- 23 Ruby -0.4
- 24 Big Hole 0.6
- 25 Boulder (Jefferson) 0.3
- 26 Jefferson 0.1
- 27 Madison -1.3
- 28 Gallatin -1
- 29 Missouri above Canyon Ferry -0.8
- 30 Missouri below Canyon Ferry -0.4
- 31 Smith 0.2
- 32 Sun -3.6
- 33 Teton -2.2
- 34 Birch/Dupuyer Creeks -2.8
- 35 Marias -2.6
- 36 Musselshell -0.1
- 37 Missouri above Fort Peck -0.7
- 38 Missouri below Fort Peck 0.1
- 40 Dearborn near Craig -2.1
- 41 Yellowstone above Livingston -0.6
- 42 Shields -1
- 43 Boulder (Yellowstone) -1.9
- 44 Stillwater -1.9
- 45 Rock/Red Lodge Creeks -1.3
- 46 Clarks Fork Yellowstone -1.2
- 47 Yellowstone above Bighorn River -0.8
- 48 Bighorn below Bighorn Lake -0.8
- 49 Little Bighorn -3.3
- 50 Yellowstone below Bighorn -0.8
- 51 Tongue -3.1
- 52 Powder -2.8
- 53 Upper Judith 1
- 54 Saint Mary -1.2



Note: Data used to generate this map are PROVISIONAL and SUBJECT TO CHANGE

# Kootenai River Basin



Even though it might not feel like winter at lower elevations in the Kootenai River basin, this February delivered much more snow than it did in 2015. Last year SNOTEL sites only received 45% of their normal February snow water accumulation. This year SNOTEL sites received 110% of their normal February snow water accumulation. As of March 1<sup>st</sup> snowpack percentages are higher in the northern portion of the Kootenai River basin in Montana. Baree Trail (3800 ft) near Noxon Reservoir in the Cabinet Range is the lowest elevation Snow Course in the basin and has only 63% of its normal March 1<sup>st</sup> snowpack. Poorman Creek SNOTEL (5100 ft) in the Cabinets also has below normal snowpack, but has 29 more inches of snow (12.2 inches SWE) than last year at this time. To the north, Purcell Mountain SNOTEL sites currently have above normal snowpack conditions, Hawkins Lake SNOTEL (6450 ft) is at 118% and Garver Creek SNOTEL (4250 ft) is at 109% of normal.

Starting and ending the month relatively dry, the Kootenai River basin received about 90% of its February precipitation from the 12<sup>th</sup> to the 23<sup>rd</sup> of the month. Much of this precipitation came as rain at lower elevations and mixed rain-snow high elevations. Mountain SNOTEL sites received 121% of average precipitation for the month of February, while valley weather stations received 148% of average precipitation in the Kootenai River basin.

Reservoir storage in Lake Koocanusa is currently above average at 149%.

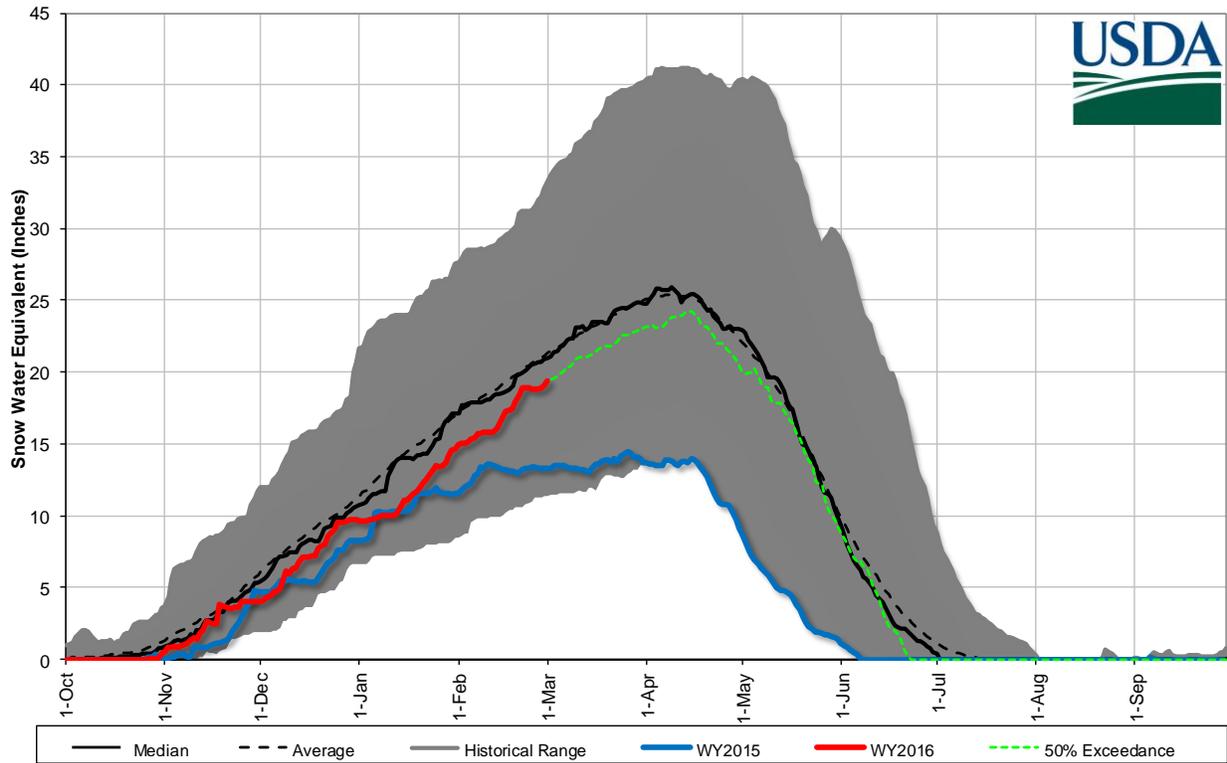
Streamflow forecasts for March 1<sup>st</sup> should be used knowing 65 to 80% of our annual snowpack has accumulated and conditions can change before runoff occurs. The 50% exceedance forecast assumes normal conditions will occur from this point and through snowmelt. Current basin-wide streamflows for the 50% exceedance are 97% of average for the April-July time period.

<b>Kootenai River Basin Data Summary</b>		<b>3/1/2016</b>	
	Percent of 1981-2010 Normal (Median)	Last Year Percentage of Normal (Median)	
<b>Snowpack</b>			
Basin-Wide	86%	60%	
	Monthly Percentage of Average	WYTD Percentage of 1981-2010 Average*	Last Year Percentage of Average
<b>Precipitation</b>			
Mountain Precipitation	121%	111%	98%
Valley Precipitation	148%	136%	117%
Basin Precipitation	122%	113%	99%
	Percentage of Average	Percentage of Capacity (Total)	Last Year Percentage of Average
<b>Reservoir Storage</b>			
Basin-Wide Storage	149%	65%	153%
	50 % Exceedance Forecast Percentage of Average	50 % Exceedance Forecast % of Last Year's Flows	Last Year Percentage of Average
<b>Streamflow Forecast</b>			
Basin-Wide Apr-July	97%	139%	70%

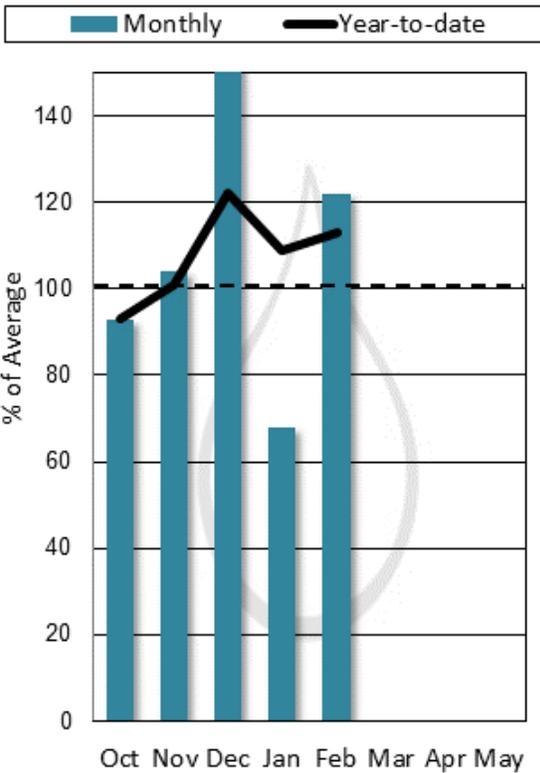
\*Water Year-to-Date (WYTD) Precipitation is October 1st - Current

\*\*Basin-wide streamflows are an average of the individual streamflow points within the basin for the 50 percent exceedance forecast. Consult the individual streamflow forecasts in the table below for the range of forecasts at an individual point.

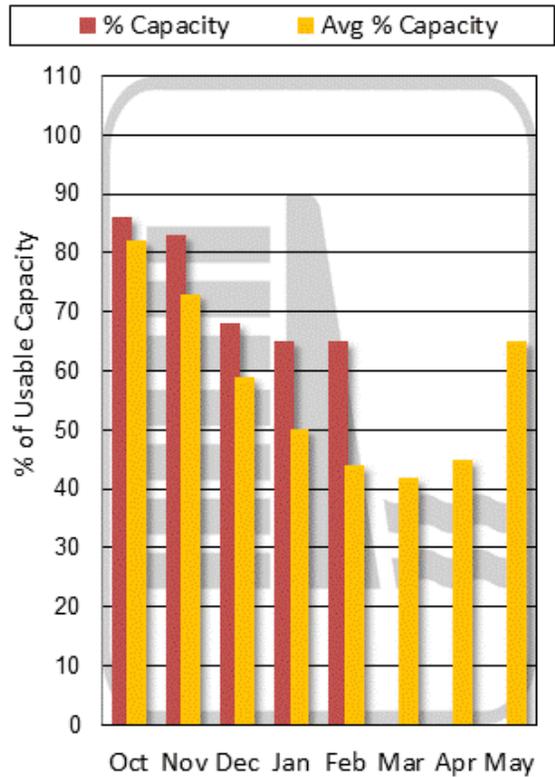
**Kootenai River Basin Snowpack with Non-Exceedence Projections**  
*Based on provisional SNOTEL daily data as of 3/1/2016*



**Mountain and Valley Precipitation**

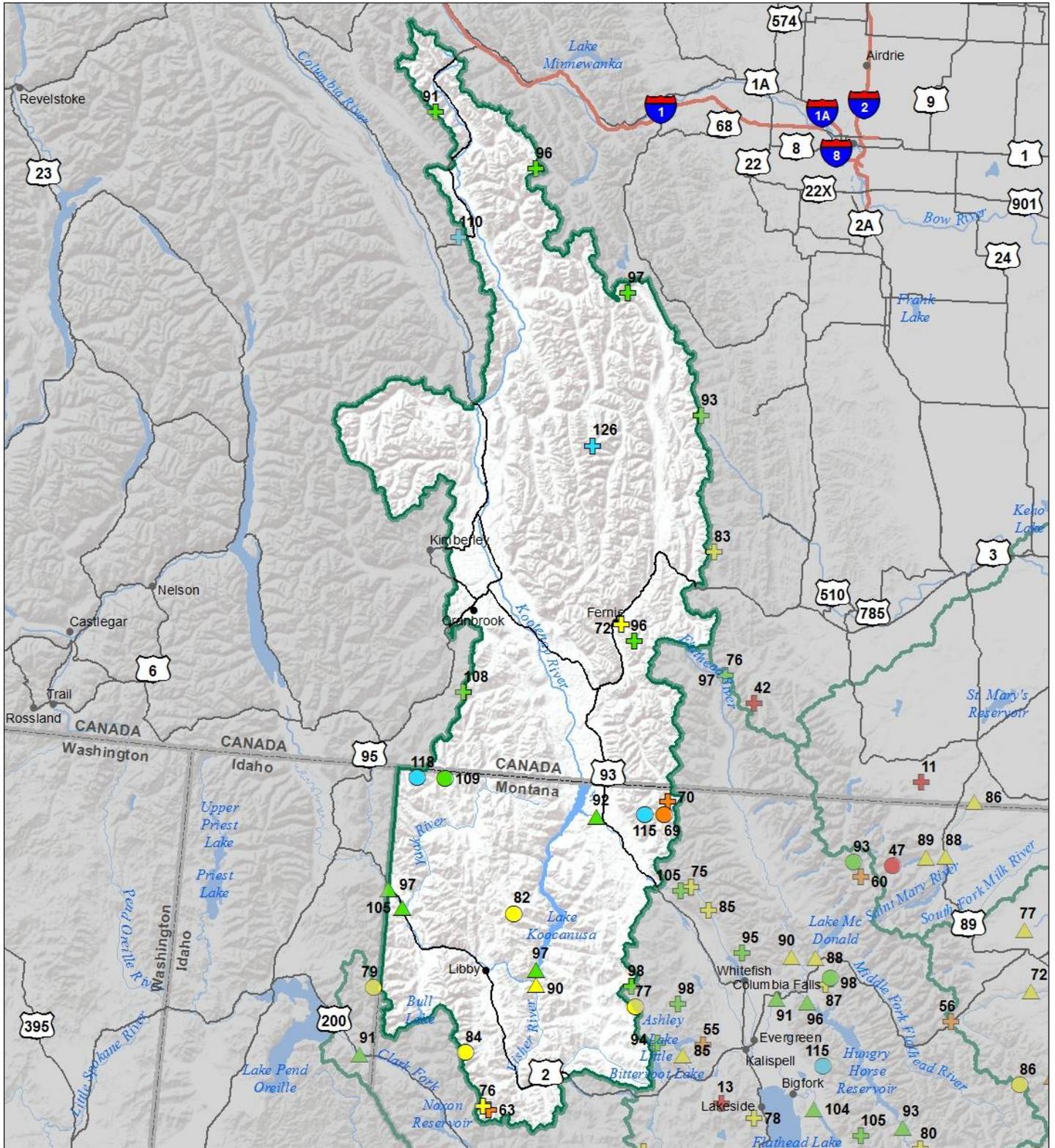


**End of Month Reservoir Storage**



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

# Kootenai River Basin Streamflow Forecast, Snow Water Equivalent Percentage of Normal March 1, 2016



### Snow Water Equivalent Percent of Normal

#### SNOTEL

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

#### Snowcourse

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

### Streamflow Forecast Percent of Average Flows

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

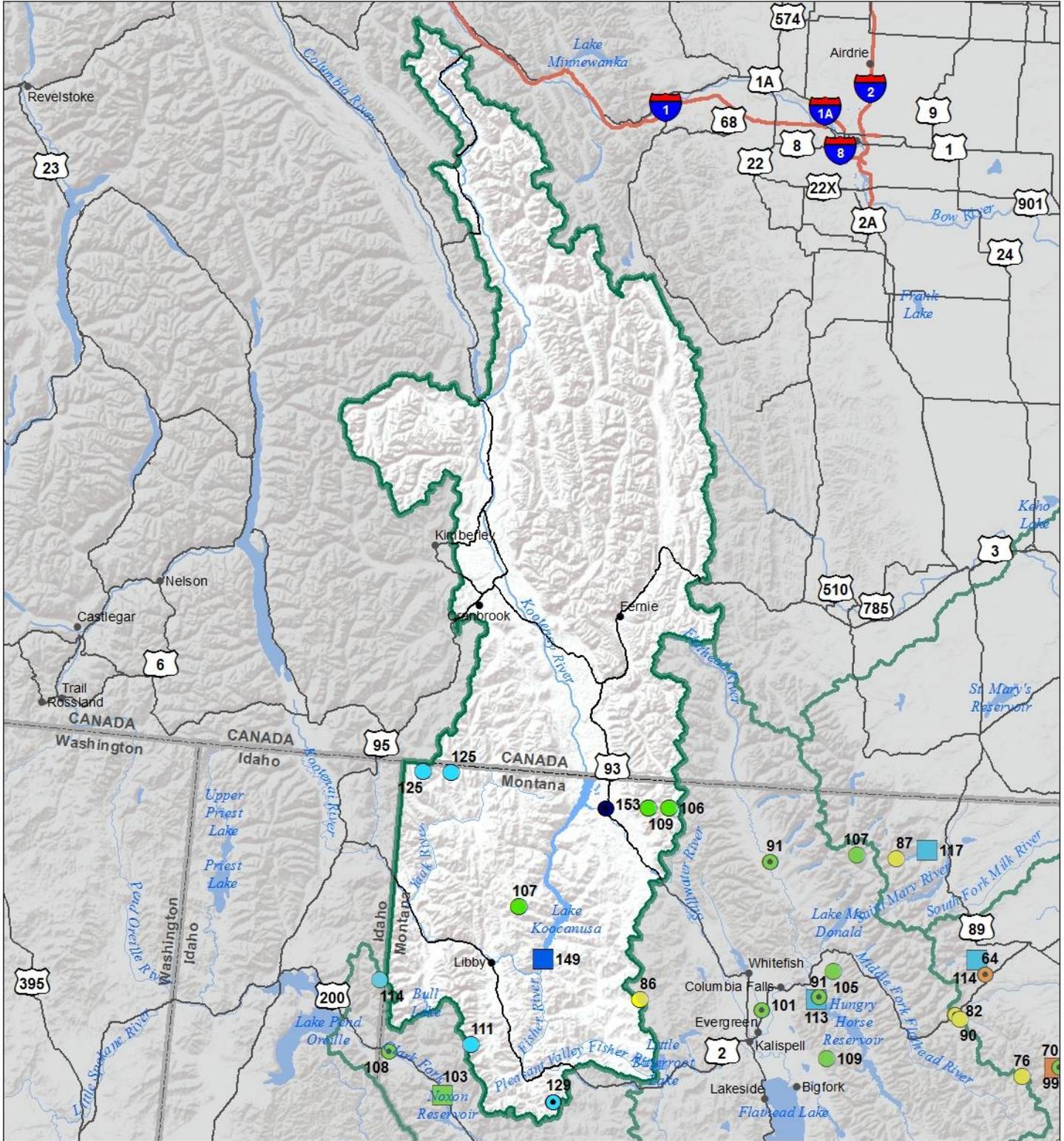


# Kootenai River Basin

## Water Year to Date Precipitation and Reservoir Levels

### Percentage of Normal

#### March 1, 2016



### Precipitation Percent of Normal

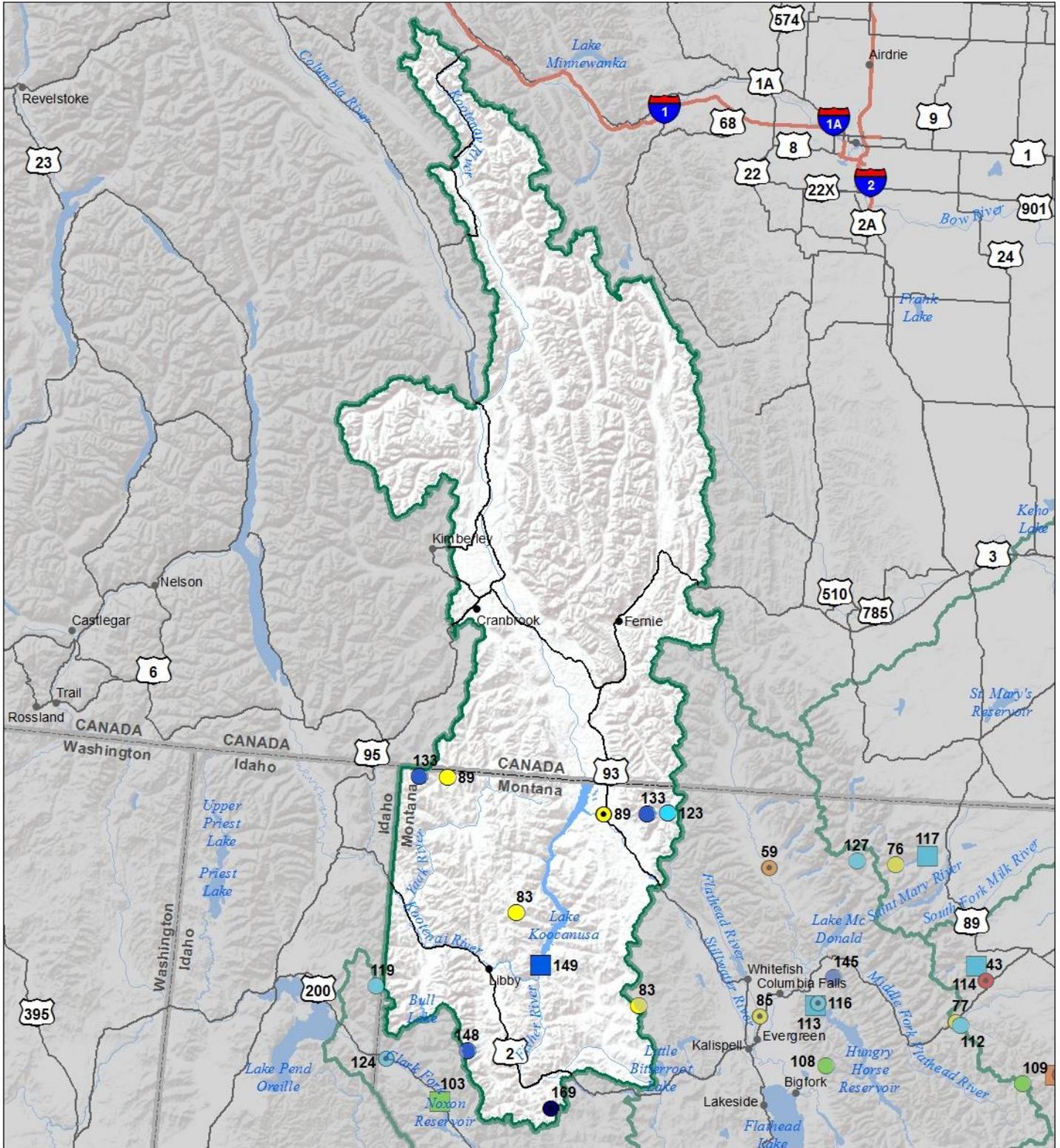
SNOTEL		COOP/ACIS	
● > 150%	● 71 - 90%	● > 150%	● 71 - 90%
● 131 - 150%	● 51 - 70%	● 131 - 150%	● 51 - 70%
● 111 - 130%	● 1 - 50%	● 111 - 130%	● 1 - 50%
● 91 - 110%		● 91 - 110%	

### Reservoirs Percent of Normal

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



# Kootenai River Basin Monthly Precipitation and Reservoir Levels Percentage of Normal March 1, 2016 (February 1, 2016 - March 1, 2016)



### 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%



## Kootenai River Basin In Montana Streamflow Forecasts - March 1, 2016

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

KOOTENAI RIVER BASIN in MONTANA	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Tobacco R nr Eureka	APR-JUL	79	100	115	91%	130	151	126
	APR-SEP	88	112	129	92%	146	170	140
Libby Reservoir Inflow <sup>1</sup>	APR-JUL	4340	4920	5180	97%	5440	6020	5340
	APR-SEP	5240	5800	6060	97%	6320	6880	6250
Fisher R nr Libby	APR-JUL	124	160	184	90%	210	245	205
	APR-SEP	135	172	197	90%	220	260	220
Yaak R nr Troy	APR-JUL	315	390	440	105%	490	565	420
	APR-SEP	330	405	460	105%	515	590	440
Kootenai R at Leonia <sup>1,2</sup>	APR-JUL	5290	6030	6370	97%	6710	7450	6600
	APR-SEP	6260	6990	7330	97%	7660	8390	7590

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

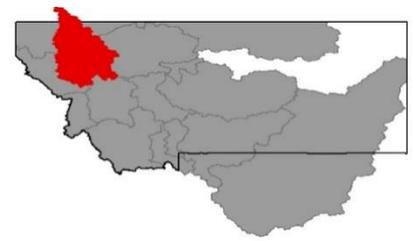
2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions

3) Median value used in place of average

Reservoir Storage End of February, 2016	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Lake Koocanusa	3714.4	3815.9	2501.0	5748.0
Basin-wide Total	3714.4	3815.9	2501.0	5748.0
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis March 1, 2016	# of Sites	% Median	Last Year % Median
KOOTENAY in CANADA	8	96	74
KOOTENAI MAINSTEM	3	81	47
TOBACCO	3	88	79
FISHER	4	77	49
YAAK	2	115	78
KOOTENAI RIVER BASIN in MONTANA	12	86	60
KOOTENAI ab BONNERS FERRY	19	91	68

# Flathead River Basin



February in the Flathead River basin began with high and dry conditions not receiving significant snow until a storm system arrived February 13<sup>th</sup>. This storm system persisted for about 8 days and favored high elevations in the southern portion of the basin. Unfortunately, it was not accompanied by cold enough temperatures to be delivered snow at all elevations. Lower elevations received mixed rain-snow and the shallowest snowpacks did not have enough cold content to keep from melting into the streams. As of March 1<sup>st</sup> the low elevation Revais Snow Course (4800 ft) near Dixon had no snow, which has happened about 6 times in its 28 years of record. Kraft Creek SNOTEL (4750 ft) in the Upper Swan River basin only received a net 0.7 inches in February, while 12 miles to the east and higher in elevation Upper Holland Lake Snow Course (6200 ft) received the highest February accumulation of snow water in the basin at 11.9 inches. The high elevation snow received in the Flathead River basin during February was enough to increase the basin wide percentage of normal by 4% from last month.

Even though the valleys are brown and significant snow was only received at higher elevations, basin-wide water year-to-date precipitation in the Flathead River basin has been near average. During the month of February mountain SNOTEL sites received 118% of average precipitation, while valley weather stations received 85% of average precipitation in the basin. Overall, basin wide year-to-date precipitation is at 99% of average

Reservoir storage across the basin is general above average, but below last year at this time.

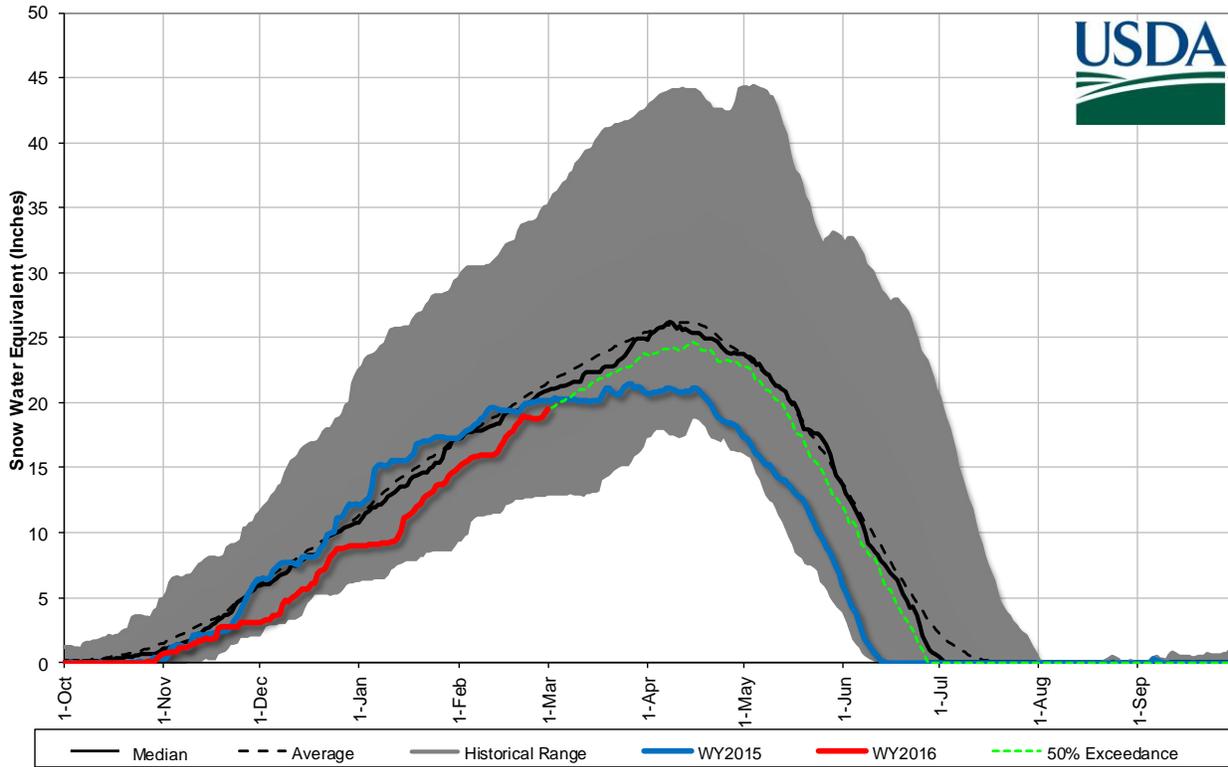
Streamflow forecasts for March 1<sup>st</sup> should be used knowing 65 to 80% of our annual snowpack has accumulated and conditions can change before runoff occurs. The 50% exceedance forecast assumes normal conditions will occur from this point and through snowmelt. Current basin-wide streamflows for the 50% exceedance are 92% of average for the April-July time period.

<b>Flathead River Basin Data Summary</b>		<b>3/1/2016</b>	
	Percent of 1981-2010 Normal (Median)	Last Year Percentage of Normal (Median)	
<b>Snowpack</b>			
Basin-Wide	87%	85%	
	Monthly Percentage of Average	WYTD Percentage of 1981-2010 Average*	Last Year Percentage of Average
<b>Precipitation</b>			
Mountain Precipitation	118%	99%	109%
Valley Precipitation	103%	111%	160%
Basin Precipitation	118%	100%	111%
	Percentage of Average	Percentage of Capacity (Total)	Last Year Percentage of Average
<b>Reservoir Storage</b>			
Basin-Wide Storage	110%	63%	124%
	50 % Exceedance Forecast Percentage of Average	50 % Exceedance Forecast % of Last Year's Flows	Last Year Percentage of Average
<b>Streamflow Forecast</b>			
Basin-Wide Apr-July	92%	141%	65%

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

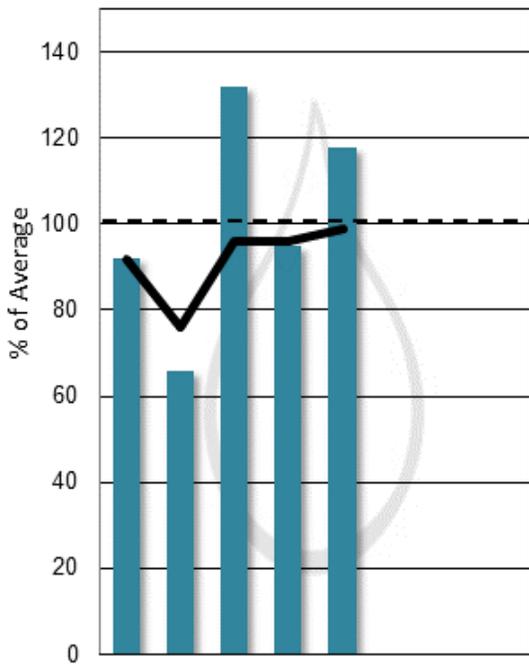
\*\*Basin-wide streamflows are an average of the individual streamflow points within the basin for the 50 percent exceedance forecast. Consult the individual streamflow forecasts in the table below for the range of forecasts at an individual point.

**Flathead River Basin Snowpack with Non-Exceedence Projections**  
*Based on provisional SNOTEL daily data as of 3/1/2016*



**Mountain and Valley Precipitation**

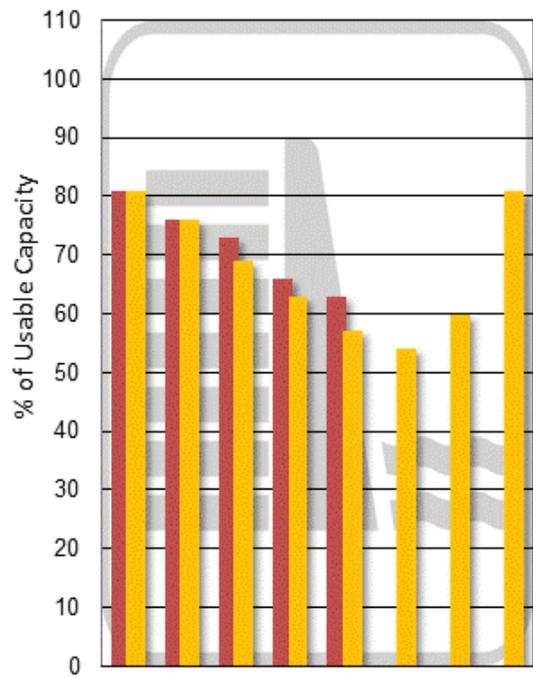
Monthly (teal bars), Year-to-date (black line)



Oct Nov Dec Jan Feb Mar Apr May

**End of Month Reservoir Storage**

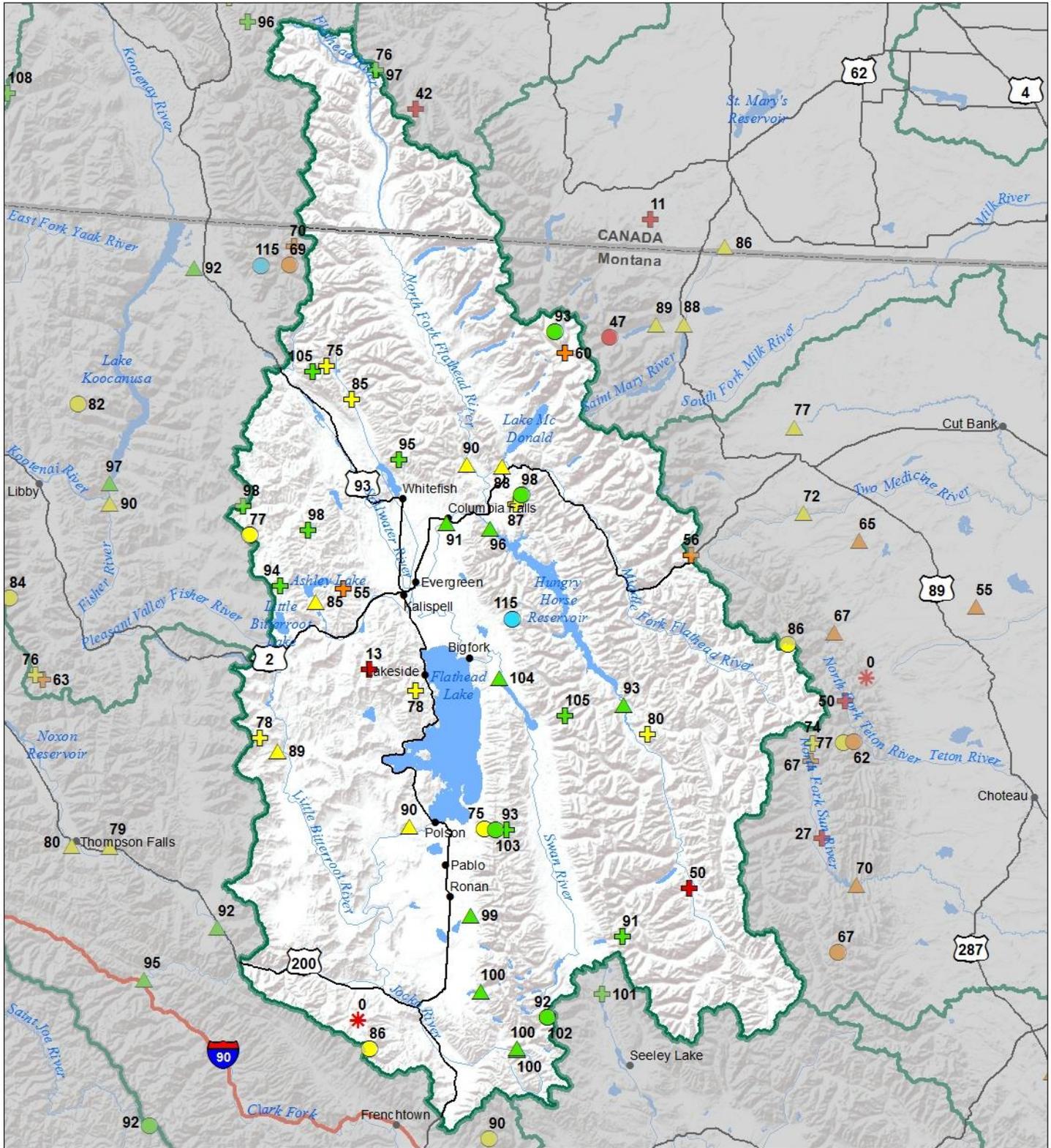
% Capacity (red bars), Avg % Capacity (yellow bars)



Oct Nov Dec Jan Feb Mar Apr May

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

# Flathead River Basin Streamflow Forecast, Snow Water Equivalent Percentage of Normal March 1, 2016



### Snow Water Equivalent Percent of Normal

#### SNOTEL

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

#### Snowcourse

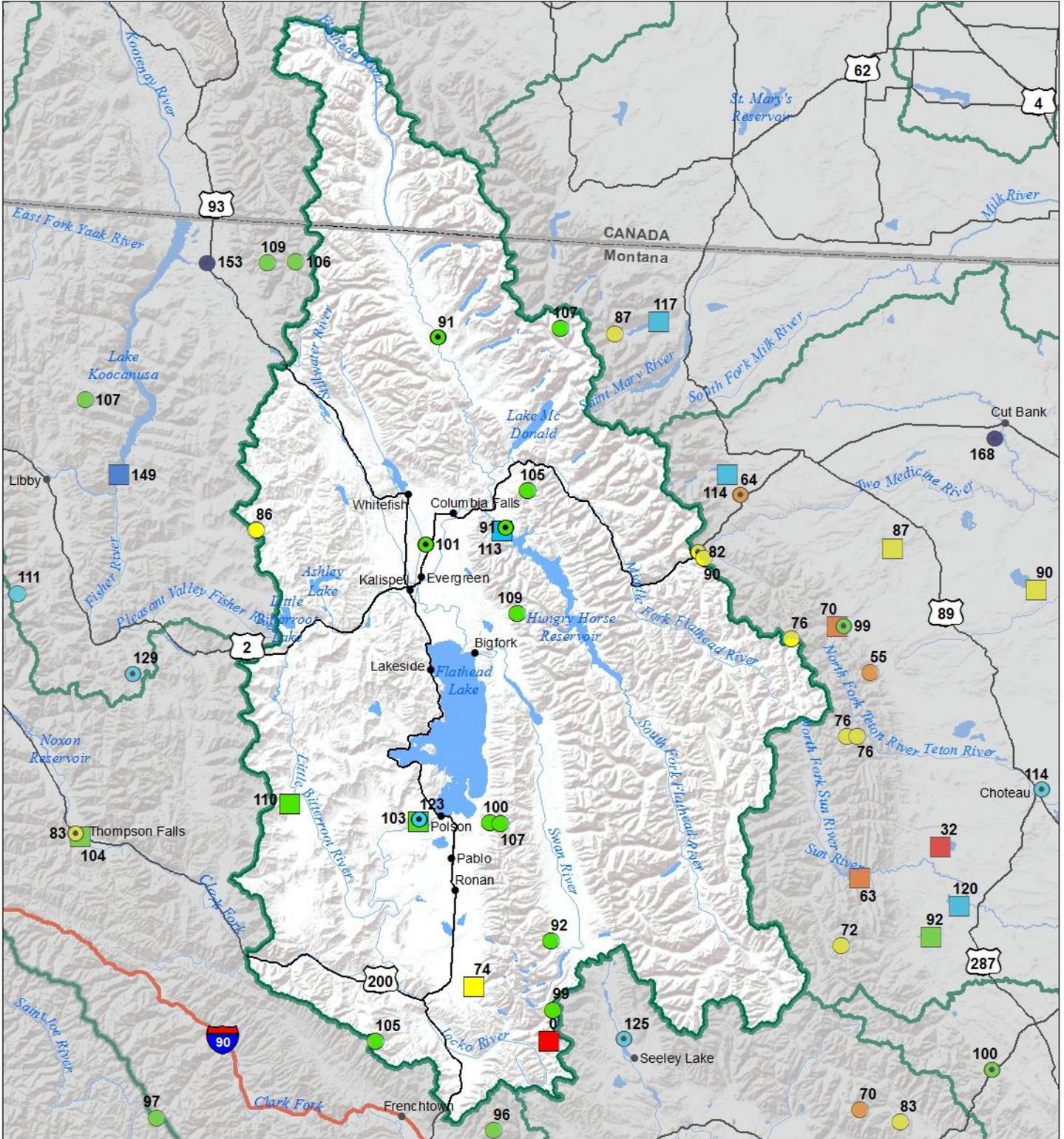
- ⊕ > 150%
- ⊕ 131 - 150%
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### Streamflow Forecast Percent of Average Flows

- ▲ > 150%
- ▲ 131 - 150%
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- ▲ 91 - 110%
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# Flathead River Basin Water Year to Date Precipitation and Reservoir Levels Percentage of Normal March 1, 2016



### Precipitation Percent of Normal

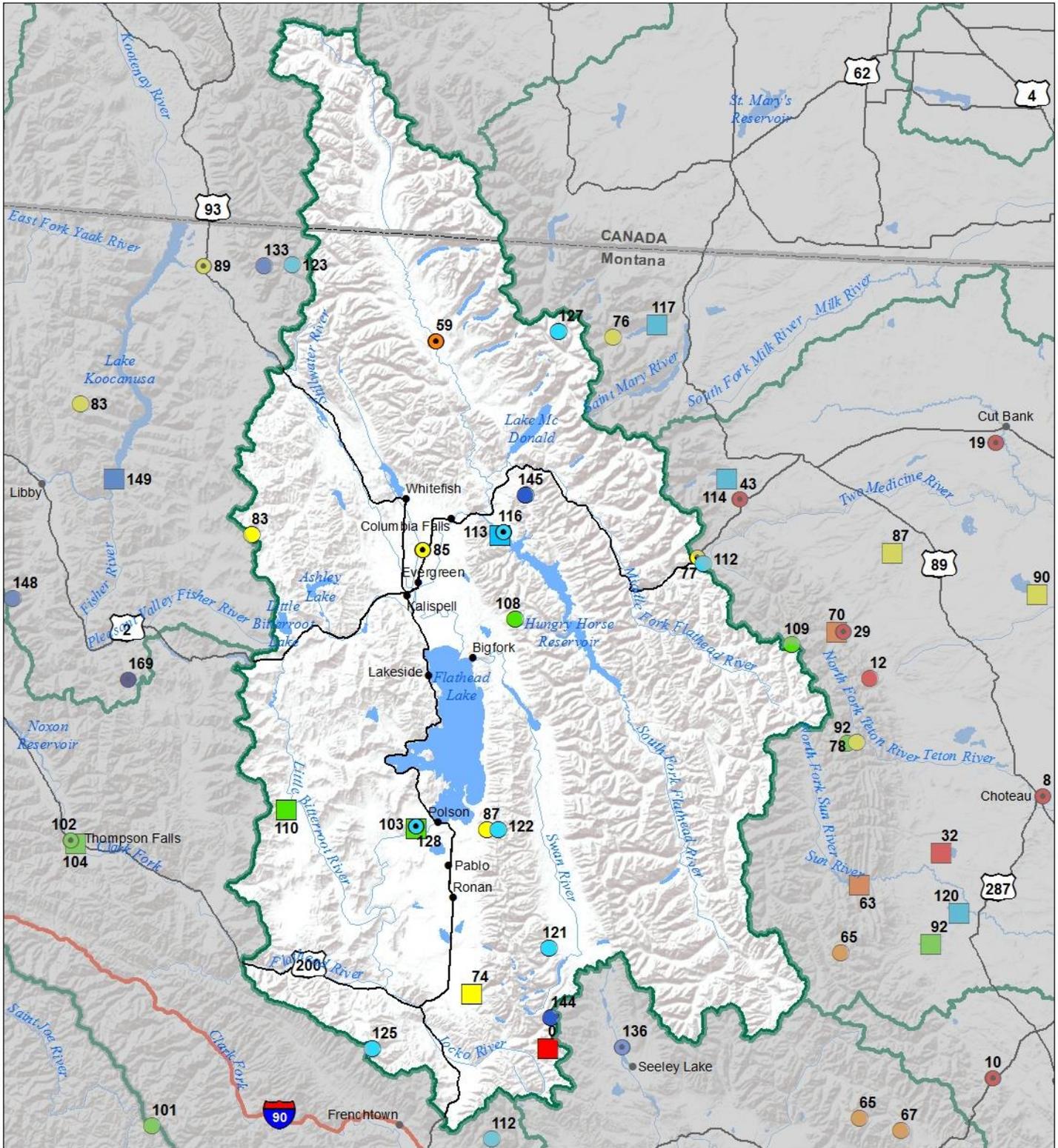
SNOTEL		COOP/ACIS	
<span style="color: blue;">●</span> > 150%	<span style="color: yellow;">●</span> 71 - 90%	<span style="color: blue;">●</span> > 150%	<span style="color: yellow;">●</span> 71 - 90%
<span style="color: darkblue;">●</span> 131 - 150%	<span style="color: orange;">●</span> 51 - 70%	<span style="color: darkblue;">●</span> 131 - 150%	<span style="color: orange;">●</span> 51 - 70%
<span style="color: cyan;">●</span> 111 - 130%	<span style="color: red;">●</span> 1 - 50%	<span style="color: cyan;">●</span> 111 - 130%	<span style="color: red;">●</span> 1 - 50%
<span style="color: green;">●</span> 91 - 110%		<span style="color: green;">●</span> 91 - 110%	

### Reservoirs Percent of Normal

<span style="color: darkblue;">■</span> > 150%
<span style="color: blue;">■</span> 131 - 150%
<span style="color: cyan;">■</span> 111 - 130%
<span style="color: green;">■</span> 91 - 110%
<span style="color: yellow;">■</span> 71 - 90%
<span style="color: orange;">■</span> 51 - 70%
<span style="color: red;">■</span> 1 - 50%



# Flathead River Basin Monthly Precipitation and Reservoir Levels Percentage of Normal March 1, 2016 (February 1, 2016 - March 1, 2016)



### 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%
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■ 71 - 90%
■ 51 - 70%
■ 1 - 50%



## Flathead River Basin Streamflow Forecasts - March 1, 2016

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

FLATHEAD RIVER BASIN	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
NF Flathead R nr Columbia Falls	APR-JUL	1180	1300	1390	90%	1480	1600	1540
	APR-SEP	1300	1440	1530	90%	1620	1760	1700
MF Flathead R nr West Glacier	APR-JUL	1070	1220	1320	88%	1420	1570	1500
	APR-SEP	1170	1320	1430	88%	1540	1690	1630
Sf Flathead R nr Hungry Horse	APR-JUL	915	1030	1100	93%	1170	1280	1180
	APR-SEP	975	1090	1170	93%	1250	1360	1260
Hungry Horse Reservoir Inflow <sup>1,2</sup>	APR-JUL	1420	1670	1780	96%	1900	2150	1860
	APR-SEP	1510	1770	1900	96%	2020	2280	1980
Flathead R at Columbia Falls <sup>2</sup>	APR-JUL	3870	4290	4580	91%	4860	5280	5020
	APR-SEP	4200	4650	4960	91%	5270	5720	5450
Ashley Ck nr Marion <sup>2</sup>	MAR	0.34	0.8	1.12	94%	1.44	1.91	1.19
	APR-JUL	3.2	4.6	5.5	85%	6.5	7.9	6.5
Swan R nr Bigfork	APR-JUL	460	510	545	105%	580	630	520
	APR-SEP	520	580	620	104%	660	720	595
Flathead Lake Inflow <sup>1,2</sup>	APR-JUL	4150	4920	5270	91%	5620	6400	5810
	APR-SEP	4430	5280	5670	90%	6060	6910	6270
Mill Ck ab Bassoo ck nr Niarada	APR-JUL	1.97	2.9	3.5	88%	4.1	5	4
	APR-SEP	2.3	3.3	3.9	89%	4.5	5.5	4.4
South Crow Ck nr Ronan	APR-JUL	7.4	9	10	99%	11	12.6	10.1
	APR-SEP	8.6	10.3	11.5	99%	12.7	14.4	11.6
Mission Ck nr St. Ignatius	APR-JUL	21	23	25	100%	27	29	25
	APR-SEP	25	28	30	100%	32	35	30
SF Jocko R nr Arlee	APR-JUL	25	30	33	100%	36	41	33
	APR-SEP	28	33	37	100%	40	46	37
NF Jocko R bl Tabor Feeder Canal	APR-JUL	26	29	31	100%	33	36	31
	APR-SEP	28	31	33	100%	35	38	33

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

3) Median value used in place of average

Reservoir Storage End of February, 2016	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Camas (4)	21.4	31.1	19.5	45.2
Lower Jocko Lake	0.0	0.0	0.0	6.4
Mission Valley (8)	23.6	27.6	32.0	100.0
Hungry Horse Lake	2498.6	2888.3	2209.0	3451.0
Flathead Lake	835.3	861.8	812.8	1791.0
Basin-wide Total	3378.9	3808.8	3073.3	5393.6
# of reservoirs	5	5	5	5

Watershed Snowpack Analysis March 1, 2016	# of Sites	% Median	Last Year % Median
NF FLATHEAD in CANADA	2	63	52
NF FLATHEAD in MONTANA	8	83	78
MIDDLE FORK FLATHEAD	5	86	89
SOUTH FORK FLATHEAD	6	98	97
STILLWATER-WHITEFISH	9	89	81
SWAN	6	100	105
MISSION VALLEY	4	92	106
LITTLE BITTERROOT-ASHLEY	5	71	54
JOCKO	4	88	100
FLATHEAD in MONTANA	33	88	87
FLATHEAD RIVER BASIN	35	87	85

# Upper Clark Fork River Basin



February could be called “Steady Eddy” for this basin. A consistent stream of storm pulses passed through the basin during the entire month. Like the rest of Montana, warm temperatures persisted resulting in some snowmelt in the valley areas and at low elevation sites. Sites in the northern most areas of the basin received well above average moisture whereas sites in the headwaters area received below average moisture for the month.

The snowpack is variable throughout the basin depending on aspect and elevation. Sites in the lower end of the basin in the Lubrecht Experimental Forest have well below normal snowfall while sites in the headwaters area near Butte continue to be well above average on March 1. The continued storm pulses that went through the basin during the month helped to increase or maintain existing snowpack. Although some of the storms were more of the rain/snow variety than straight snow. Basin-wide the snowpack is 95% of normal for March 1<sup>st</sup>.

February mountain precipitation fell mainly in the form of snow or rain/snow at most of the sites throughout the basin. Low elevation sites saw more rain due the very warm temperatures. Sites in the headwaters area near Butte saw well below average precipitation. Areas in the central portion of the basin saw near to above average precipitation. Sites in the northwest area received well above average precipitation. Valley stations recorded well below average February precipitation. Basin-wide the month ended up at 95% of average for water year-to-date precipitation.

Reservoir storage is above average in the basin at most locations, and close to last year at this time.

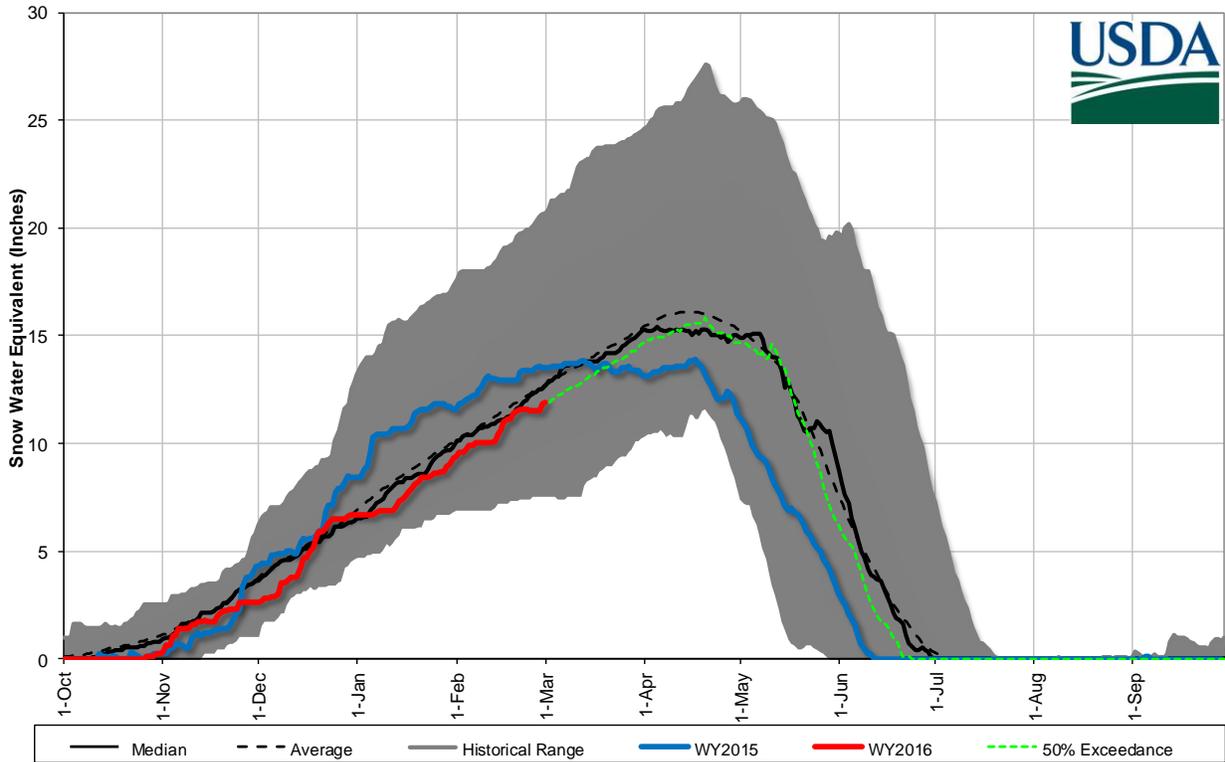
Streamflow forecasts for March 1st should be used knowing 65 to 80% of our annual snowpack has accumulated and conditions can change before runoff occurs. The 50% exceedance forecast assumes normal conditions will occur from this point and through snowmelt. Current basin-wide streamflows for the 50% exceedance are 92% of average for the April-July time period.

<b>Upper Clark Fork River Basin Data Summary</b>		<b>3/1/2016</b>	
<b>Snowpack</b>	Percent of 1981-2010 Normal (Median)	Last Year Percentage of Normal (Median)	
Basin-Wide	95%	106%	
<b>Precipitation</b>	Monthly Percentage of Average	WYTD Percentage of 1981-2010 Average*	Last Year Percentage of Average
Mountain Precipitation	95%	95%	109%
Valley Precipitation	93%	125%	127%
Basin Precipitation	95%	97%	110%
<b>Reservoir Storage</b>	Percentage of Average	Percentage of Capacity (Total)	Last Year Percentage of Average
Basin-Wide Storage	101%	71%	118%
<b>Streamflow Forecast</b>	50 % Exceedance Forecast Percentage of Average	50 % Exceedance Forecast % of Last Year's Flows	Last Year Percentage of Average
Basin-Wide Apr-July	92%	130%	71%

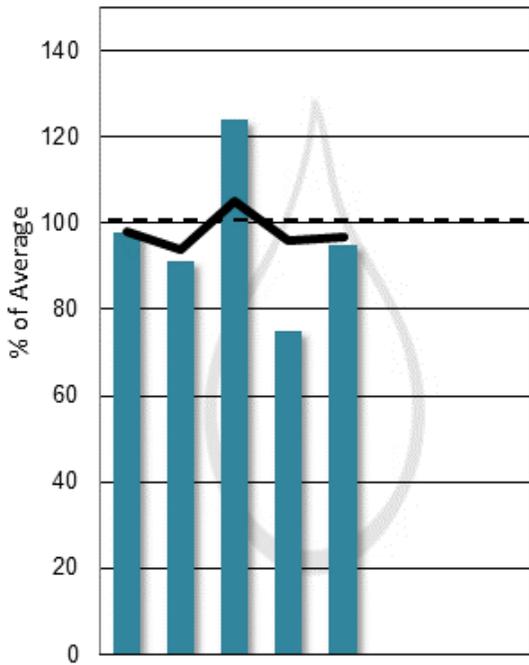
\*Water Year-to-Date (WYTD) Precipitation is October 1st - Current

\*\*Basin-wide streamflows are an average of the individual streamflow points within the basin for the 50 percent exceedance forecast. Consult the individual streamflow forecasts in the table below for the range of forecasts at an individual point.

**Upper Clark Fork River Basin Snowpack with Non-Exceedence Projections**  
*Based on provisional SNOTEL daily data as of 3/1/2016*

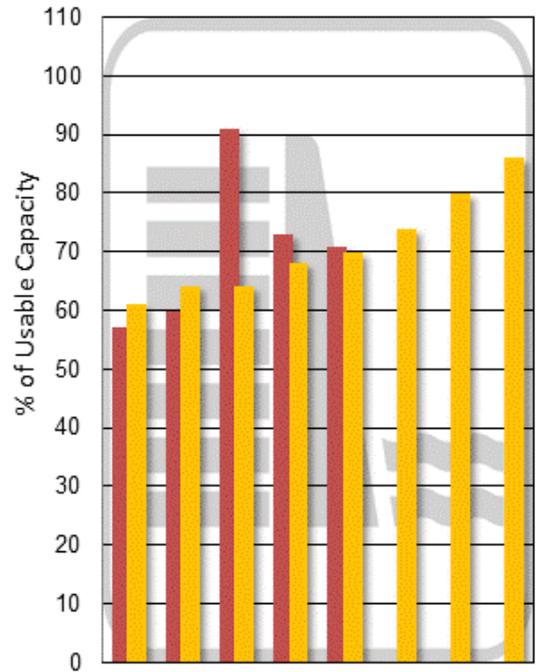


**Mountain and Valley  
Precipitation**



Oct Nov Dec Jan Feb Mar Apr May

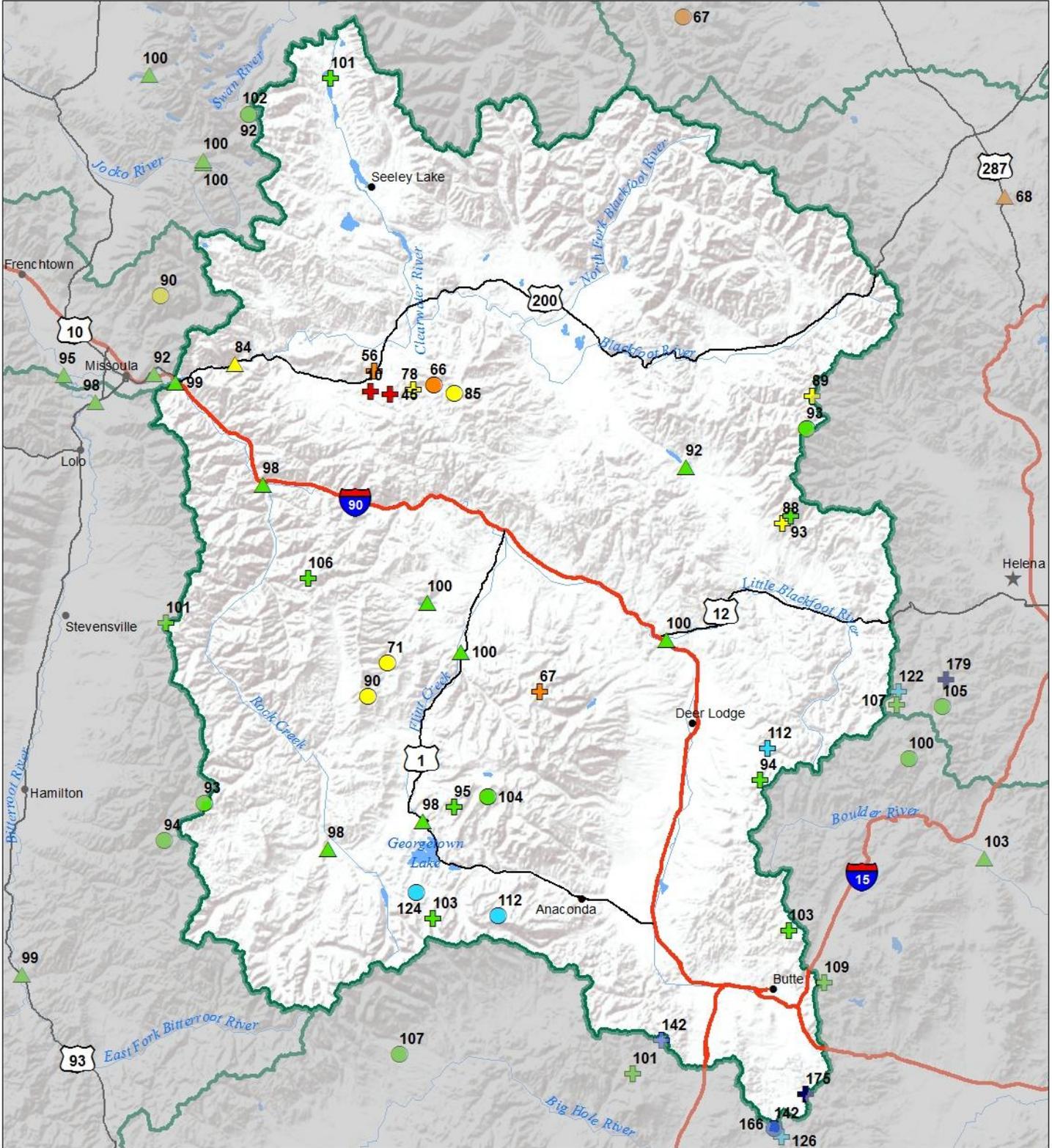
**End of Month Reservoir  
Storage**



Oct Nov Dec Jan Feb Mar Apr May

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

# Upper Clark Fork River Basin Streamflow Forecast, Snow Water Equivalent Percentage of Normal March 1, 2016



### Snow Water Equivalent Percent of Normal

#### SNOTEL

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

#### Snowcourse

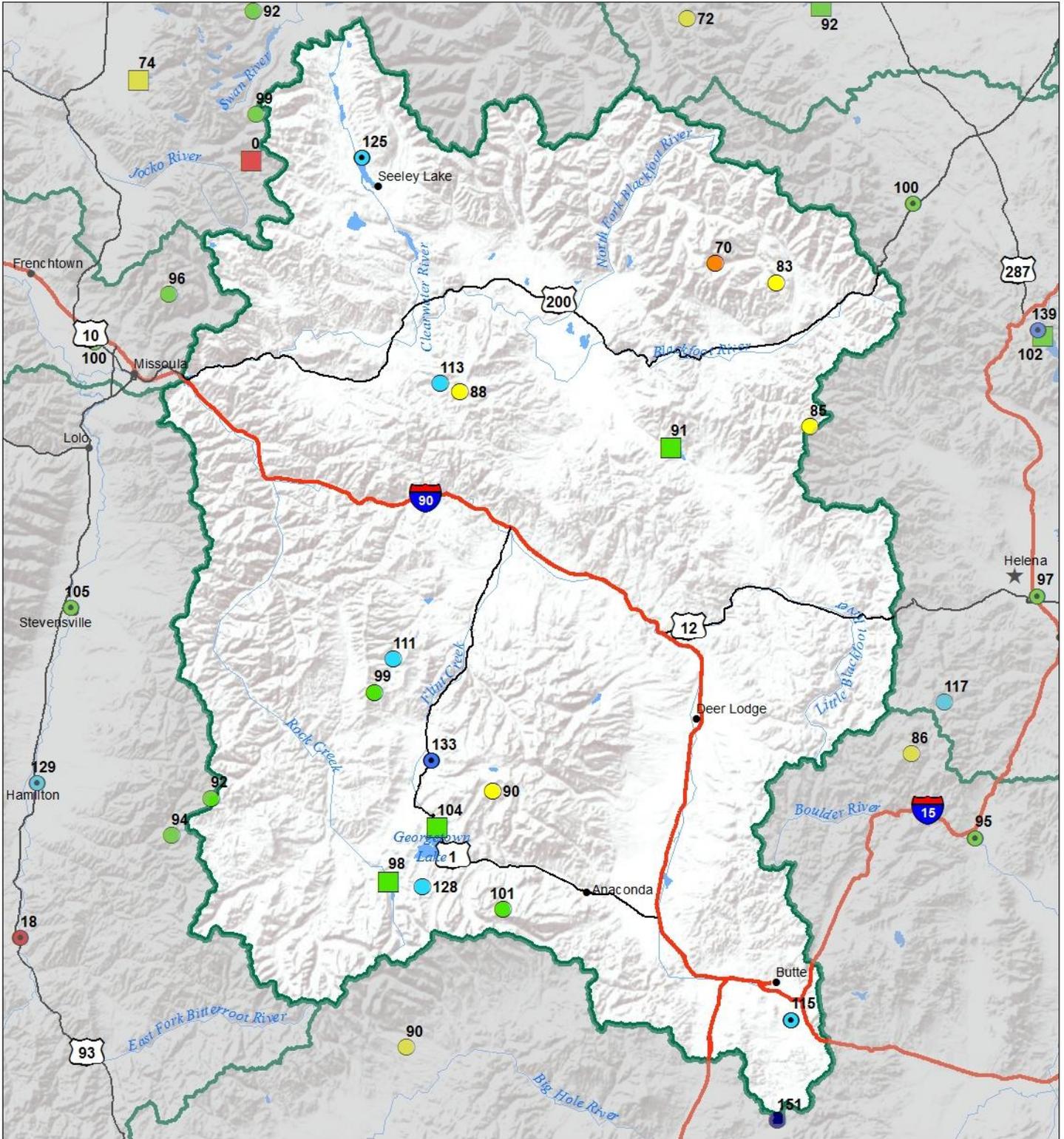
- + > 150%
- + 131 - 150%
- + 111 - 130%
- + 91 - 110%
- + 71 - 90%
- + 51 - 70%
- + 1 - 50%
- \* 0%

### Streamflow Forecast Percent of Average Flows

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



# Upper Clark Fork River Basin Water Year to Date Precipitation and Reservoir Levels Percentage of Normal March 1, 2016



### Precipitation Percent of Normal

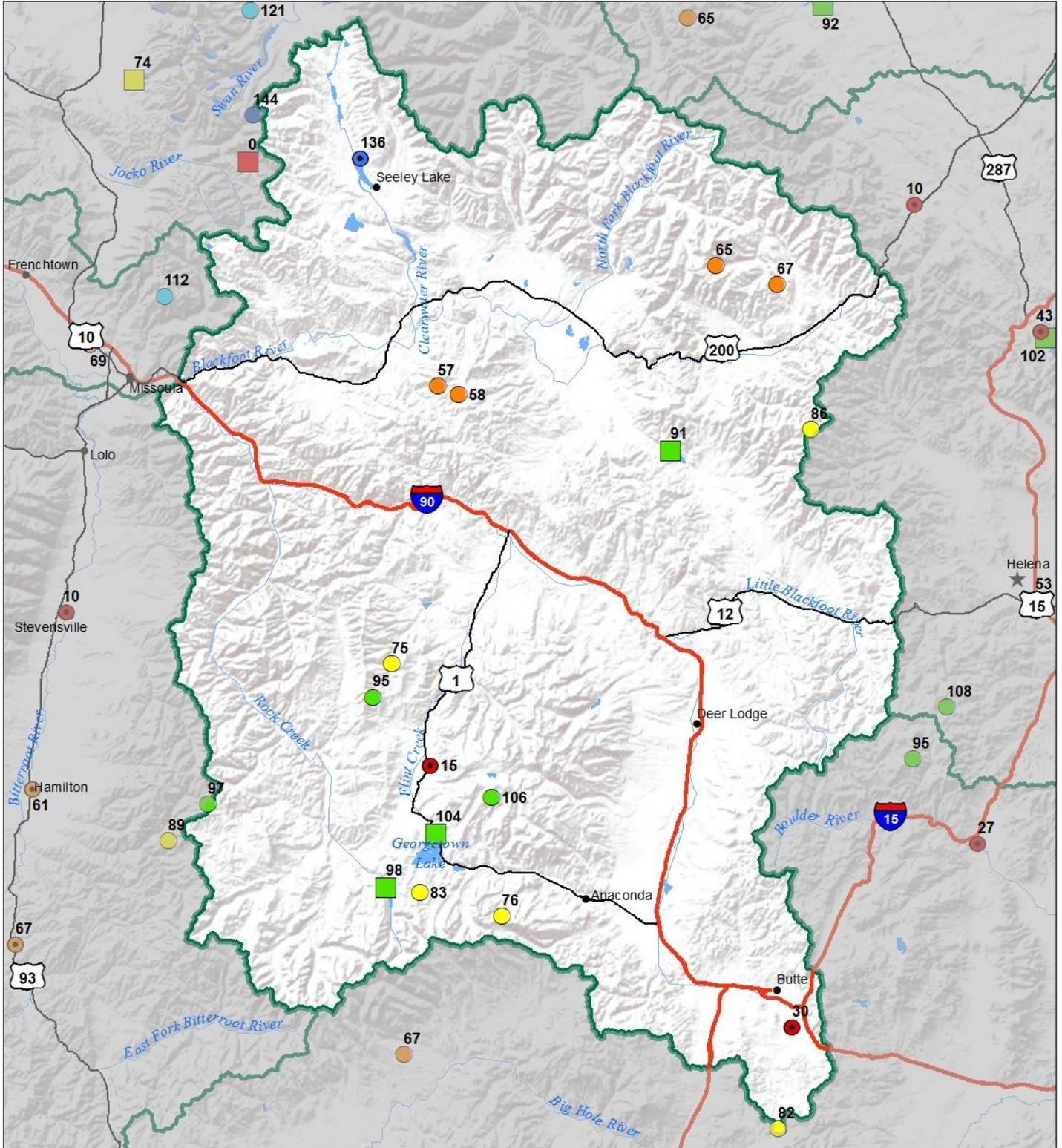
SNOTEL		COOP/ACIS	
● > 150%	● 71 - 90%	● > 150%	● 71 - 90%
● 131 - 150%	● 51 - 70%	● 131 - 150%	● 51 - 70%
● 111 - 130%	● 1 - 50%	● 111 - 130%	● 1 - 50%
● 91 - 110%		● 91 - 110%	

### Reservoirs Percent of Normal

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



**Upper Clark Fork River Basin  
Monthly Precipitation and Reservoir Levels  
Percentage of Normal  
March 1, 2016 (February 1, 2016 - March 1, 2016)**



**Precipitation  
Percent of Normal**

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

**Reservoirs  
Percent of Normal**

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



## Upper Clark Fork River Basin Streamflow Forecasts - March 1, 2016

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

UPPER CLARK FORK RIVER BASIN	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Little Blackfoot nr Garrison	APR-JUL	38	57	70	100%	83	102	70
	APR-SEP	42	63	77	100%	91	111	77
Flint Ck nr Southern Cross	APR-JUL	5.7	9.5	12	97%	14.5	18.3	12.4
	APR-SEP	6.4	11.1	14.3	98%	17.5	22	14.6
Flint Ck bl Boulder Ck	APR-JUL	27	42	52	100%	62	77	52
	APR-SEP	36	54	66	100%	78	96	66
Lower Willow Ck Reservoir Inflow <sup>2</sup>	APR-MAY	3	5.5	7.1	97%	8.7	11.1	7.3
	APR-JUL	4.2	8	10.6	100%	13.2	17.1	10.6
MF Rock Ck nr Philipsburg	APR-JUL	41	50	57	98%	64	73	58
	APR-SEP	46	57	64	98%	71	82	65
Rock Ck nr Clinton	APR-JUL	157	210	245	98%	280	335	250
	APR-SEP	178	235	275	98%	315	370	280
Clark Fork R ab Milltown	APR-JUL	275	425	525	99%	630	780	530
	APR-SEP	330	495	610	99%	725	890	615
Nevada Ck nr Helmville	APR-MAY	2.2	5.5	7.7	92%	9.9	13.1	8.4
	APR-JUL	3.7	9.3	13	92%	16.8	22	14.2
Blackfoot R nr Bonner	APR-JUL	410	525	605	84%	680	800	720
	APR-SEP	465	590	675	84%	760	885	800
Clark Fork R ab Missoula	APR-JUL	695	960	1140	91%	1320	1590	1250
	APR-SEP	810	1100	1300	92%	1490	1780	1420

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

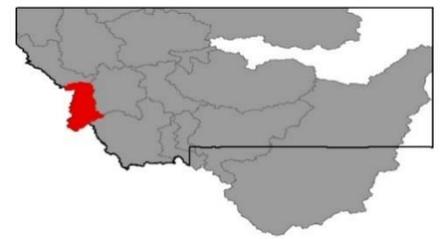
2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions

3) Median value used in place of average

Reservoir Storage End of February, 2016	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
East Fork Rock Creek Res	8.1	10.6	8.3	15.6
Georgetown Lake	28.7	28.7	27.6	31.0
Lower Willow Creek Reservoir		4.3	2.2	4.9
Nevada Creek Res	5.1	9.6	5.6	12.6
Basin-wide Total	42.0	48.9	41.5	59.2
# of reservoirs	3	3	3	3

Watershed Snowpack Analysis March 1, 2016	# of Sites	% Median	Last Year % Median
CLARK FORK ab FLINT CREEK	14	101	108
FLINT CREEK	5	99	115
ROCK CREEK	5	103	109
CLARK FORK ab BLACKFOOT	22	100	108
BLACKFOOT	13	86	103
UPPER CLARK FORK RIVER BASIN	33	95	106

# Bitterroot River Basin



The storm system that arrived in Montana around February 13<sup>th</sup> arrived just in time for the Bitterroot River basin, as the snowpack at several of the basin’s SNOTEL sites was melting due to above normal temperatures. On February 9<sup>th</sup> the temperature at Twelvemile Creek SNOTEL (5600 ft) reached 60 degrees. During the 2<sup>nd</sup> week of the month Twelvemile Creek SNOTEL saw about a 10 inch reduction in snow depth. Post-melt, SNOTEL sites received significant accumulations from the mid-month storm cycles. Saddle Mountain SNOTEL (7940 ft) is the highest measurement location in the basin and received 13 inches during the first wave of the mid-month storms, which made for some great skiing at Lost trail Powder Mountain. As of March 1<sup>st</sup> snowpack percentages are slightly favored on the east side of the basin at 101% of normal, while the west side of the Bitterroot Basin is only at 90%. Overall, the basin-wide snowpack is currently 95% of normal for March 1<sup>st</sup>.

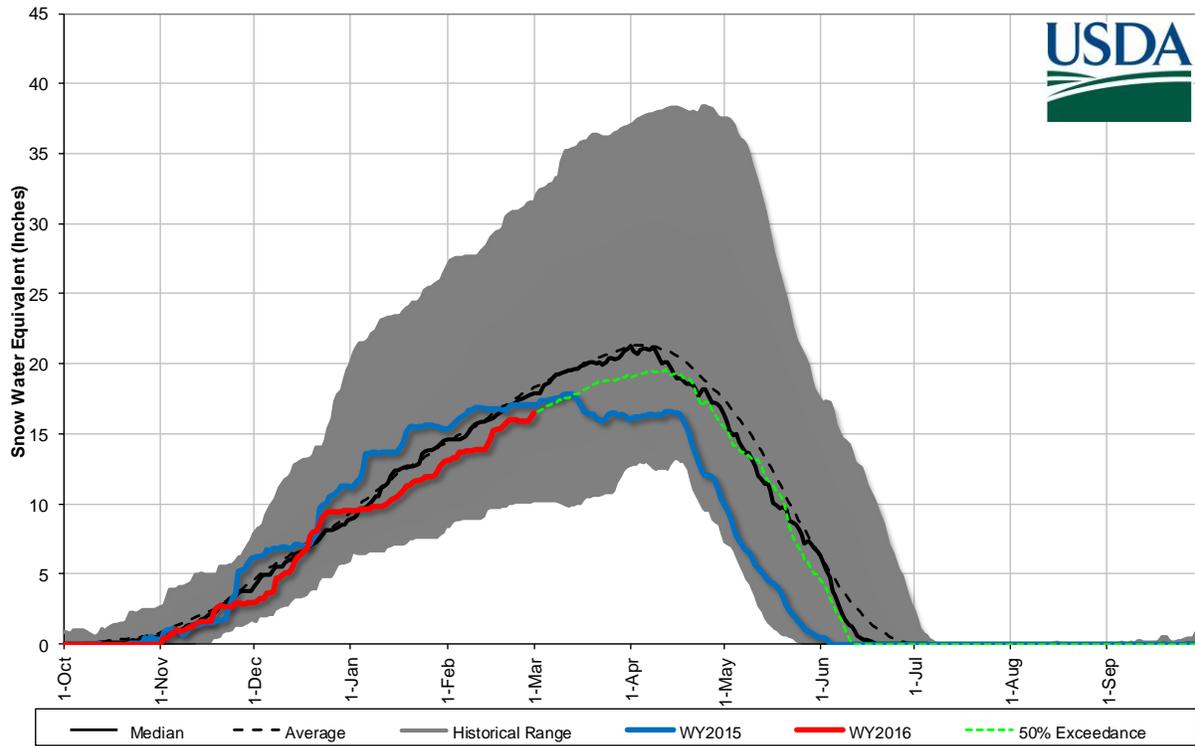
February does not typically delivery as much mountain precipitation as January in the Bitterroot River basin. This year it did. With about 1 inch more precipitation in January than in February the basin percentages rebounded from the small hit it took last month. Mountain SNOTEL sites received 108% of average precipitation for the month of February. Basin-wide, water year-to-date precipitation is at 99% of normal.

Reservoir storage is currently above average in Painted Rocks Lake at 154% and below average in Lake Como at 93%.

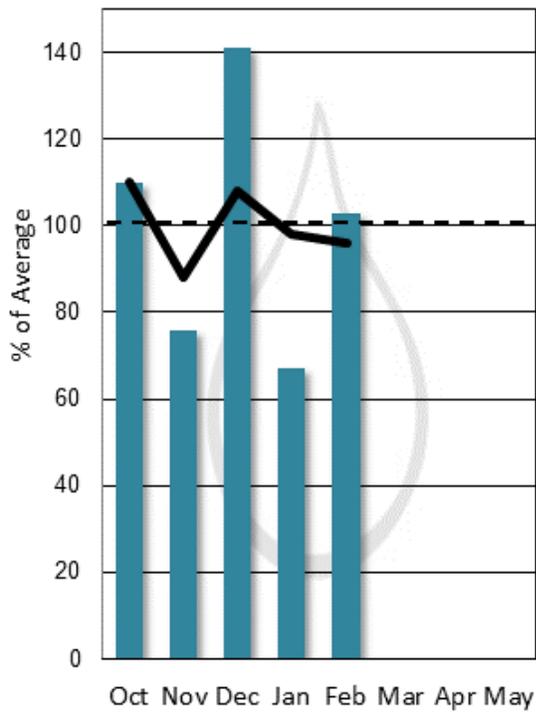
Streamflow forecasts for March 1<sup>st</sup> should be used knowing 65% to 80% of our annual snowpack has accumulated and conditions can change before runoff occurs. The 50% exceedance forecast assumes normal conditions will occur from this point and through snowmelt. Current basin-wide streamflows for the 50% exceedance are 98% of average for the April-July time period.

<b>Bitterroot River Basin Data Summary</b>		<b>3/1/2016</b>	
	Percent of 1981-2010 Normal (Median)	Last Year Percentage of Normal (Median)	
<b>Snowpack</b>			
Basin-Wide	95%	98%	
	Monthly Percentage of Average	WYTD Percentage of 1981-2010 Average*	Last Year Percentage of Average
<b>Precipitation</b>			
Mountain Precipitation	108%	98%	110%
Valley Precipitation	47%	79%	153%
Basin Precipitation	103%	96%	114%
	Percentage of Average	Percentage of Capacity (Total)	Last Year Percentage of Average
<b>Reservoir Storage</b>			
Basin-Wide Storage	111%	31%	194%
	50 % Exceedance Forecast Percentage of Average	50 % Exceedance Forecast % of Last Year's Flows	Last Year Percentage of Average
<b>Streamflow Forecast</b>			
Basin-Wide Apr-July	98%	115%	79%
*Water Year-to-Date (WYTD) Precipitation is October 1st - Current			
**Basin-wide streamflows are an average of the individual streamflow points within the basin for the 50 percent exceedance forecast. Consult the individual streamflow forecasts in the table below for the range of forecasts at an individual point.			

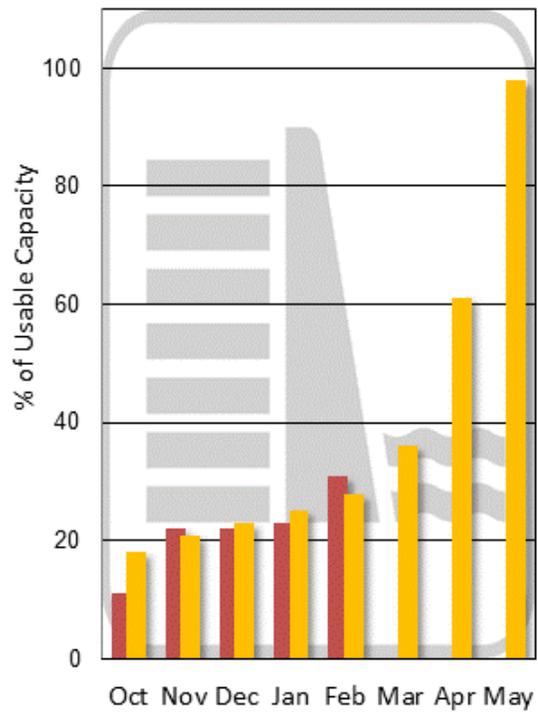
**Bitterroot River Basin Snowpack with Non-Exceedence Projections**  
*Based on provisional SNOTEL daily data as of 3/1/2016*



**Mountain and Valley  
Precipitation**

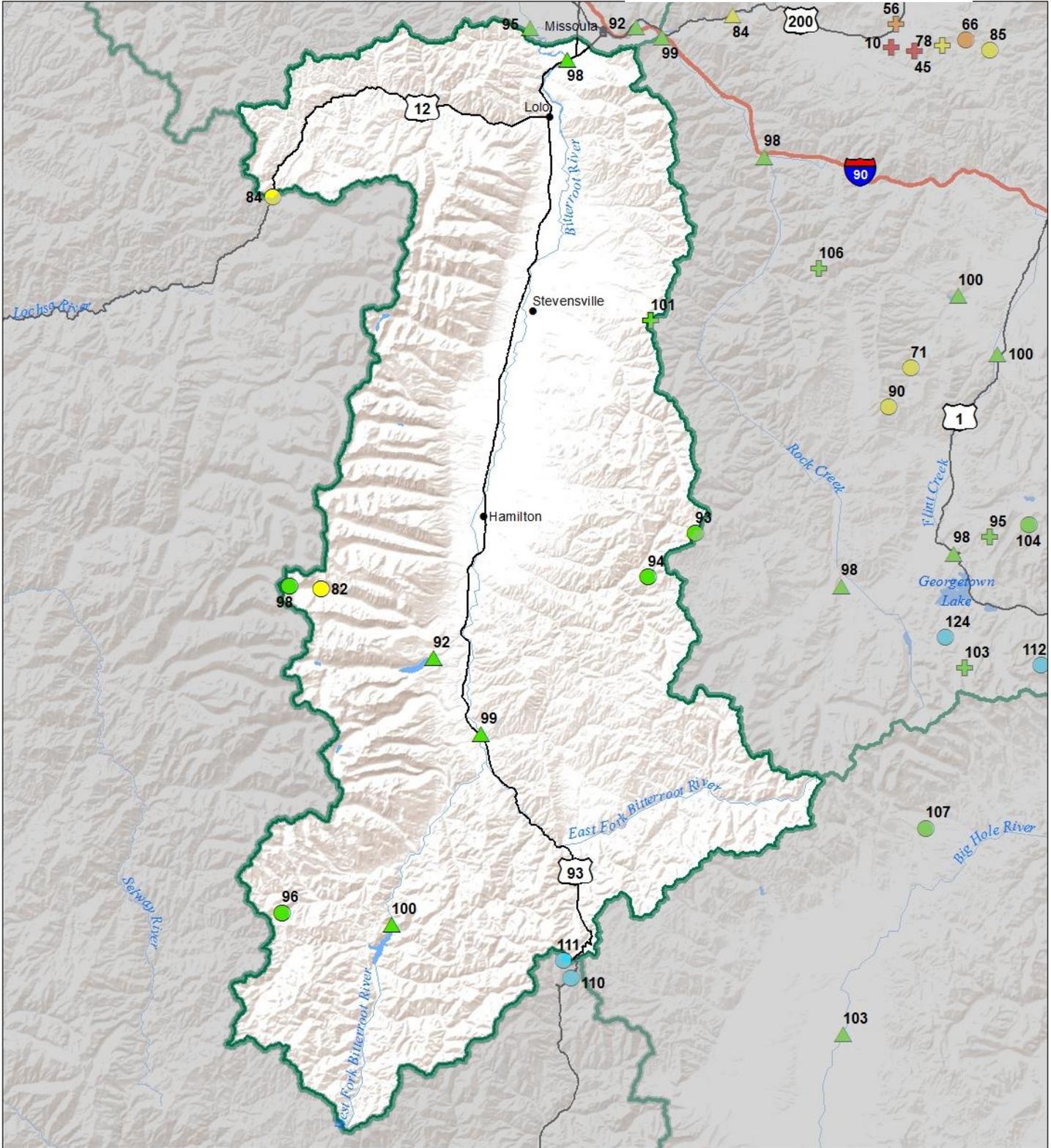


**End of Month Reservoir  
Storage**



# Bitterroot River Basin Streamflow Forecast, Snow Water Equivalent Percentage of Norm March 1, 2016

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



### Snow Water Equivalent Percent of Normal

#### SNOTEL

- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%

- 71 - 90%
- 51 - 70%
- 1 - 50%
- \*

#### Snowcourse

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

### Streamflow Forecast Percent of Average Flows

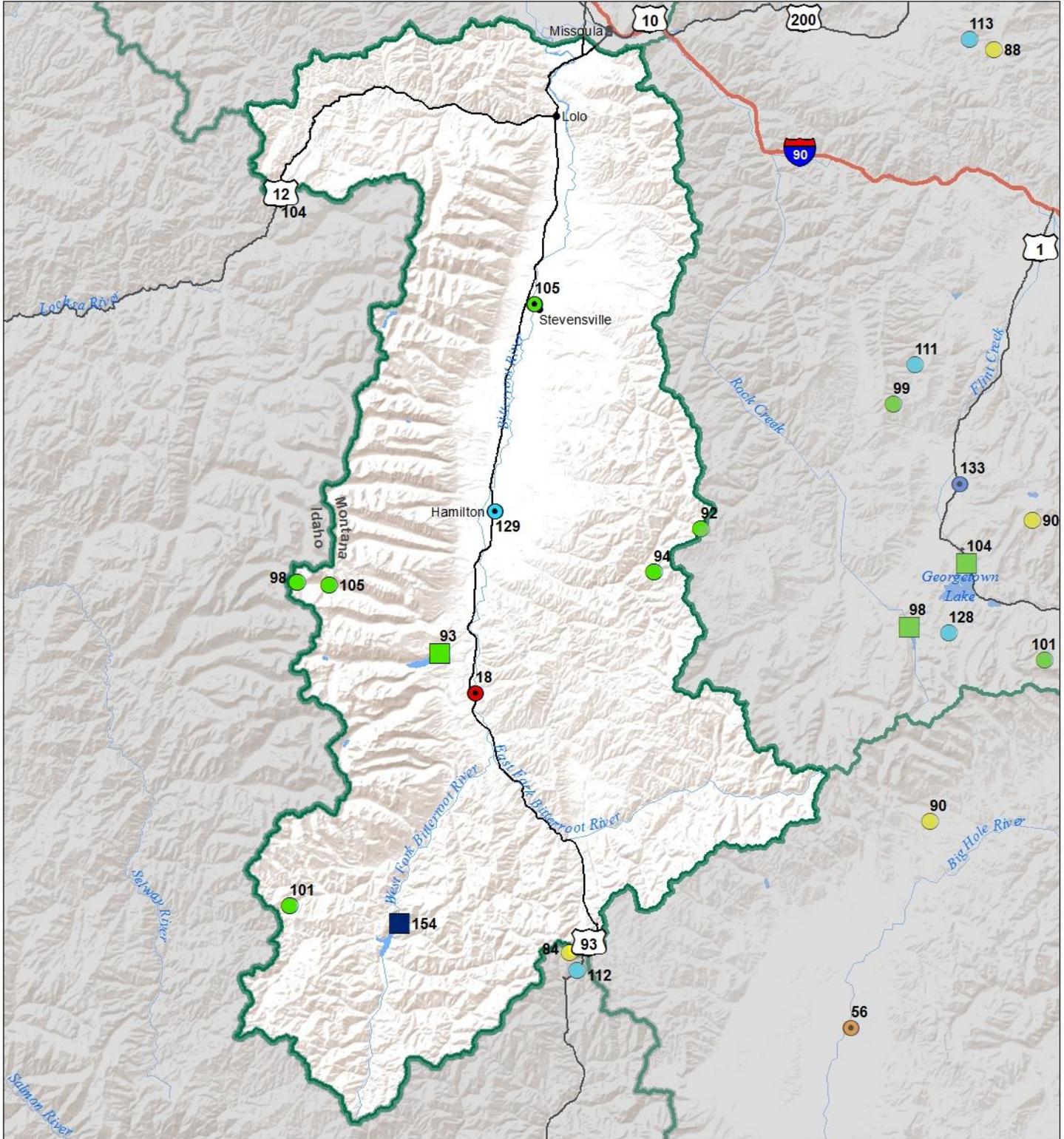
- ▲ > 150%
- ▲ 131 - 150%
- ▲ 111 - 130%
- ▲ 91 - 110%
- ▲ 71 - 90%
- ▲ 51 - 70%
- ▲ 1 - 50%



# Bitterroot River Basin

## Water Year to Date Precipitation and Reservoir Levels Percentage of Normal

### March 1, 2016

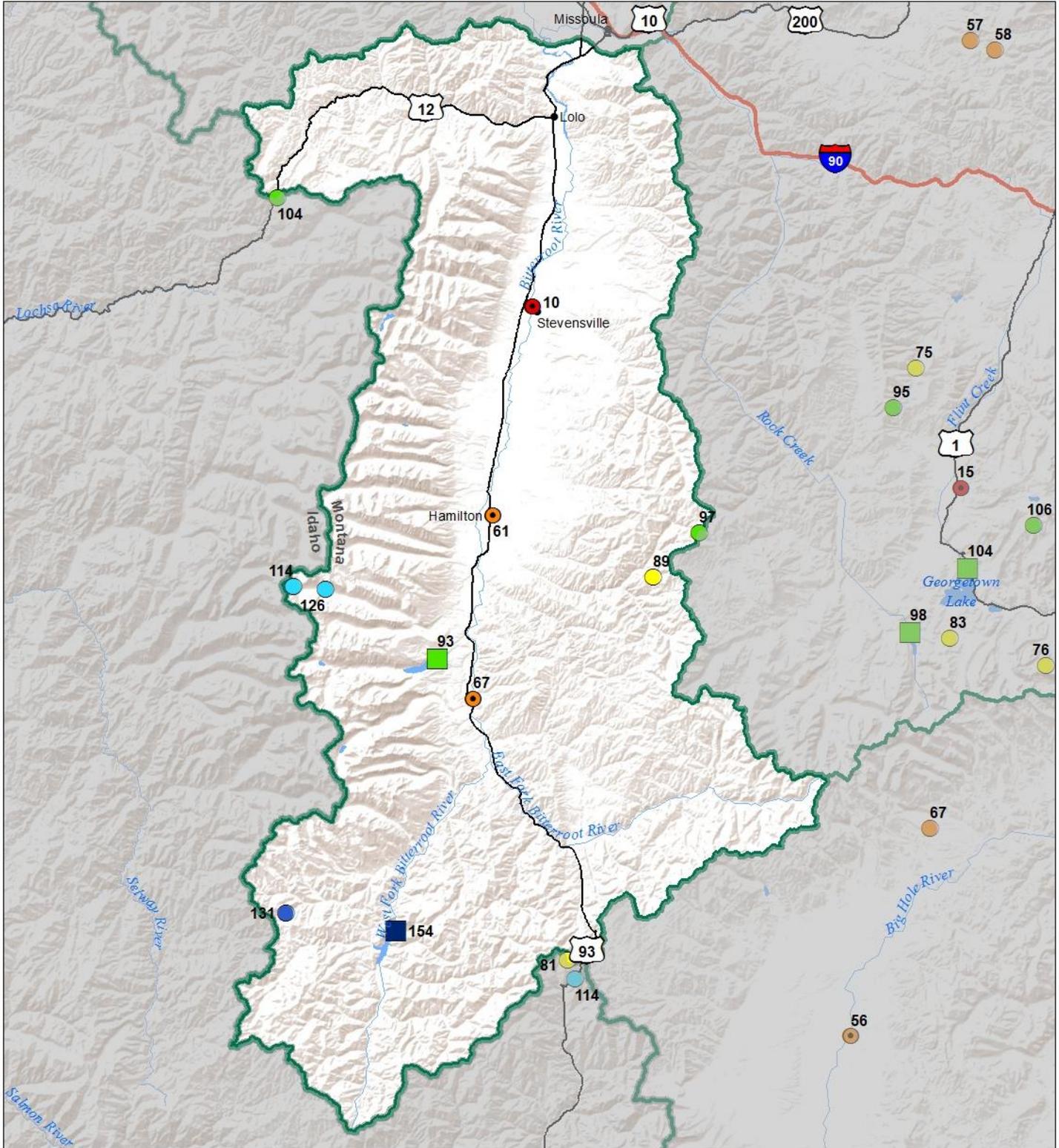


Precipitation Percent of Normal	
SNOTEL	COOP/ACIS
● > 150%	● > 150%
● 131 - 150%	● 131 - 150%
● 111 - 130%	● 111 - 130%
● 91 - 110%	● 91 - 110%
● 71 - 90%	● 71 - 90%
● 51 - 70%	● 51 - 70%
● 1 - 50%	● 1 - 50%

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



# Bitterroot River Basin Monthly Precipitation and Reservoir Levels Percentage of Normal March 1, 2016 (February 1, 2016 - March 1, 2016)



### Precipitation Percent of Normal

SNOTEL		COOP/ACIS	
<span style="color: blue;">●</span> > 150%	<span style="color: yellow;">●</span> 71 - 90%	<span style="color: blue;">●</span> > 150%	<span style="color: yellow;">●</span> 71 - 90%
<span style="color: lightblue;">●</span> 131 - 150%	<span style="color: orange;">●</span> 51 - 70%	<span style="color: lightblue;">●</span> 131 - 150%	<span style="color: orange;">●</span> 51 - 70%
<span style="color: cyan;">●</span> 111 - 130%	<span style="color: red;">●</span> 1 - 50%	<span style="color: cyan;">●</span> 111 - 130%	<span style="color: red;">●</span> 1 - 50%
<span style="color: green;">●</span> 91 - 110%		<span style="color: green;">●</span> 91 - 110%	

### Reservoirs Percent of Normal

<span style="color: darkblue;">■</span> > 150%
<span style="color: blue;">■</span> 131 - 150%
<span style="color: lightblue;">■</span> 111 - 130%
<span style="color: green;">■</span> 91 - 110%
<span style="color: yellow;">■</span> 71 - 90%
<span style="color: orange;">■</span> 51 - 70%
<span style="color: red;">■</span> 1 - 50%



## Bitterroot River Basin Streamflow Forecasts - March 1, 2016

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

BITTERROOT RIVER BASIN	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
WF Bitterroot R Nr Conner <sup>2</sup>	APR-JUL	80	108	127	99%	146	174	128
	APR-SEP	86	118	139	100%	160	192	139
Bitterroot R Nr Darby	APR-JUL	265	350	405	99%	460	545	410
	APR-SEP	330	410	465	99%	520	600	470
Como Reservoir Inflow <sup>2</sup>	APR-JUL	58	65	70	92%	75	83	76
	APR-SEP	60	68	73	92%	78	86	79
Bitterroot R nr Missoula	APR-JUL	835	1010	1120	97%	1240	1410	1150
	APR-SEP	910	1100	1220	98%	1350	1530	1250

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

3) Median value used in place of average

Reservoir Storage End of February, 2016	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Painted Rocks Lake	8.8	13.5	5.7	31.7
Lake Como	12.0	22.6	12.9	34.9
Basin-wide Total	20.7	36.1	18.6	66.6
# of reservoirs	2	2	2	2

Watershed Snowpack Analysis March 1, 2016	# of Sites	% Median	Last Year % Median
WEST FORK BITTERROOT	2	105	113
EAST SIDE BITTERROOT	4	101	106
WEST SIDE BITTERROOT	3	90	91
BITTERROOT RIVER BASIN	8	95	98

# Lower Clark Fork River Basin



The Lower Clark Fork River basin has received near normal snowfall increments since recovering from an extended dry spell in early January. The largest snow accumulations of 2016 for the basin occurred during the mid-February storm cycle that blanketed the region. Poorman Creek SNOTEL (5100 ft) received 12 inches of snow in a 24-hr dump on February 14<sup>th</sup>. Hoodoo basin currently has the deepest snowpack in the basin at 86 inches of depth and 29.6 inches of snow water content. The basin’s shallow low elevation mountain snowpack was not as favored during these mid-February storms in which warm air temperatures caused rain and loss of snow water content. Entering February having an 83% of normal snowpack the basin saw a slightly increase to 84% of normal for March 1<sup>st</sup>.

February and March are typically the two driest winter months in the Lower Clark Fork River basin. Fortunately precipitation in basin was above average this February after having a below average January. Similar to January, precipitation in the basin came as mixed rain and snow. Mountain SNOTEL sites received 118% of average precipitation for the month of January, while valley weather stations received 110% of average precipitation in the Bitterroot River basin. Water year-to-date precipitation is still hanging right at normal, 101% for March 1<sup>st</sup>.

Reservoir storage in Noxon Rapids Reservoir is currently above average at 103%.

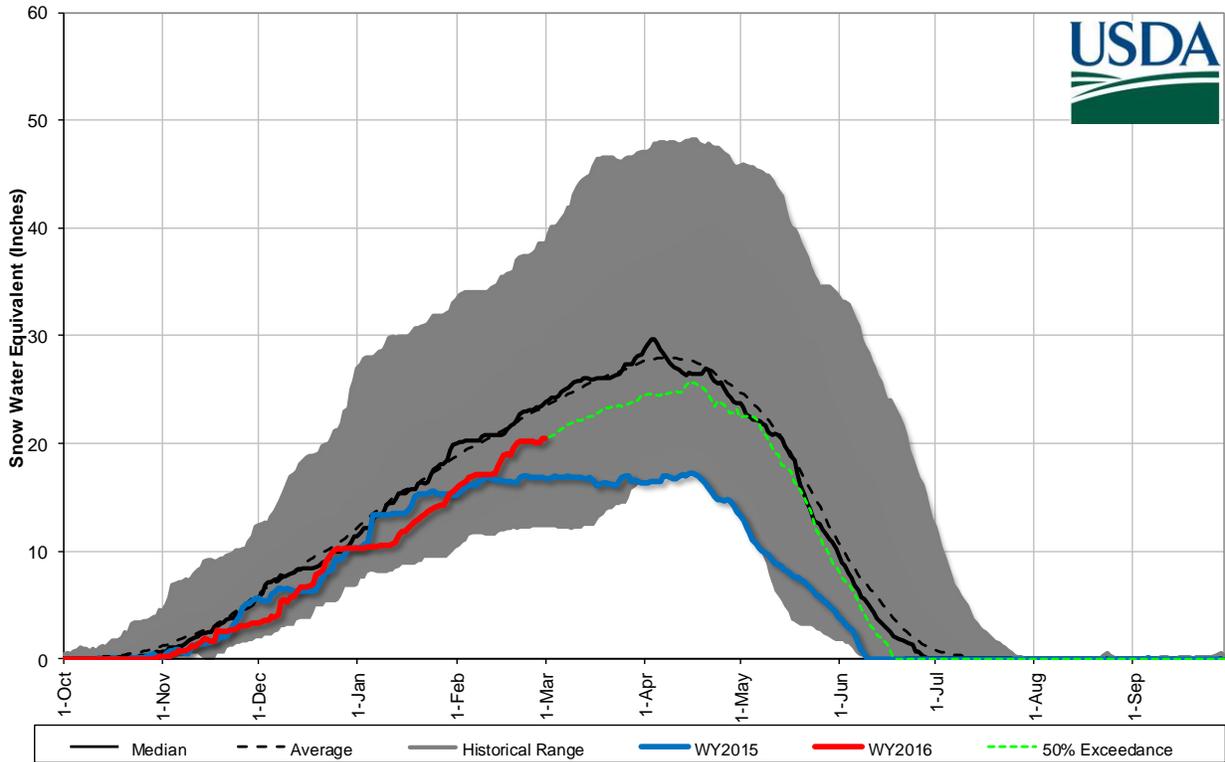
Streamflow forecasts for March 1<sup>st</sup> should be used knowing 65 to 80% of our annual snowpack has accumulated and conditions can change before runoff occurs. The 50% exceedance forecast assumes normal conditions will occur from this point and through snowmelt. Current basin-wide streamflows for the 50% exceedance are 92% of average for the April-July time period.

<b>Lower Clark Fork River Basin Data Summary</b>		<b>3/1/2016</b>	
	Percent of 1981-2010 Normal (Median)	Last Year Percentage of Normal (Median)	
<b>Snowpack</b>			
Basin-Wide	84%	65%	
	Monthly Percentage of Average	WYTD Percentage of 1981-2010 Average*	Last Year Percentage of Average
<b>Precipitation</b>			
Mountain Precipitation	118%	101%	103%
Valley Precipitation	110%	98%	112%
Basin Precipitation	117%	101%	104%
	Percentage of Average	Percentage of Capacity (Total)	Last Year Percentage of Average
<b>Reservoir Storage</b>			
Basin-Wide Storage	103%	97%	102%
	50 % Exceedance Forecast Percentage of Average	50 % Exceedance Forecast % of Last Year's Flows	Last Year Percentage of Average
<b>Streamflow Forecast</b>			
Basin-Wide Apr-July	92%	140%	39%

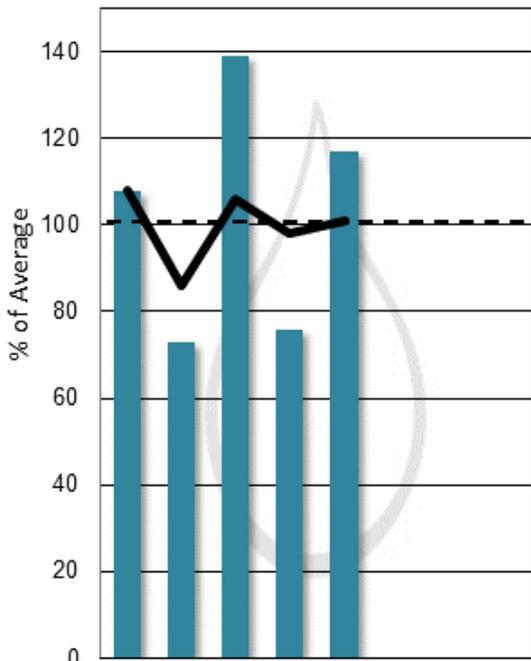
\*Water Year-to-Date (WYTD) Precipitation is October 1st - Current

\*\*Basin-wide streamflows are an average of the individual streamflow points within the basin for the 50 percent exceedance forecast. Consult the individual streamflow forecasts in the table below for the range of forecasts at an individual point.

**Lower Clark Fork River Basin Snowpack with Non-Exceedence Projections**  
*Based on provisional SNOTEL daily data as of 3/1/2016*

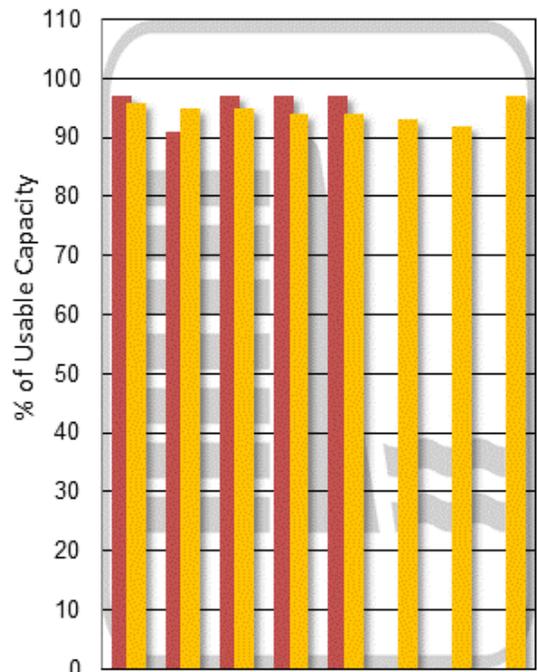


**Mountain and Valley  
Precipitation**



Oct Nov Dec Jan Feb Mar Apr May

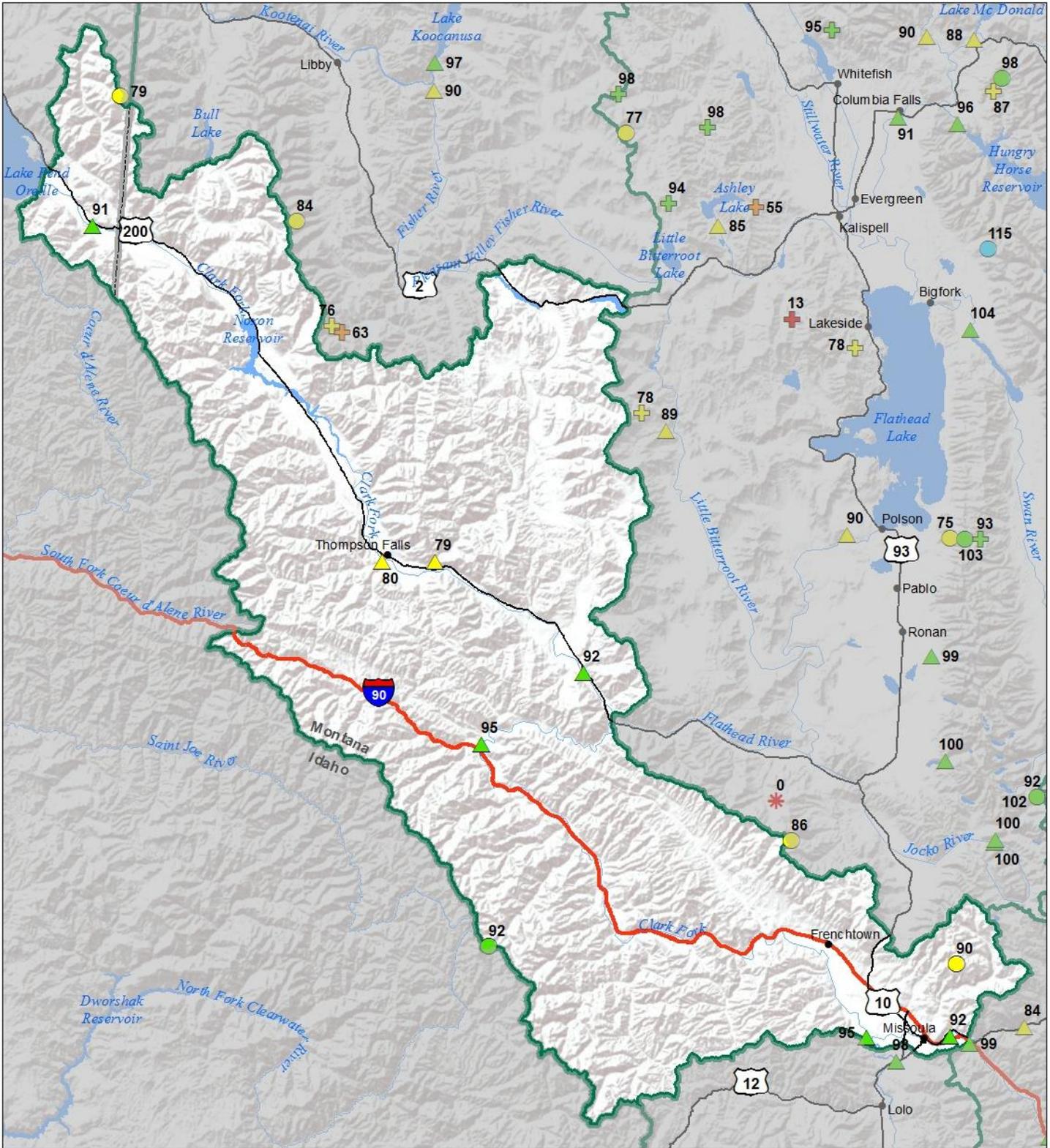
**End of Month Reservoir  
Storage**



Oct Nov Dec Jan Feb Mar Apr May

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

# Lower Clark Fork River Basin Streamflow Forecast, Snow Water Equivalent Percentage of Normal March 1, 2016



### Snow Water Equivalent Percent of Normal

#### SNOTEL

- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%

- 71 - 90%
- 51 - 70%
- 1 - 50%
- \*

#### Snowcourse

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

### Streamflow Forecast Percent of Average Flows

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

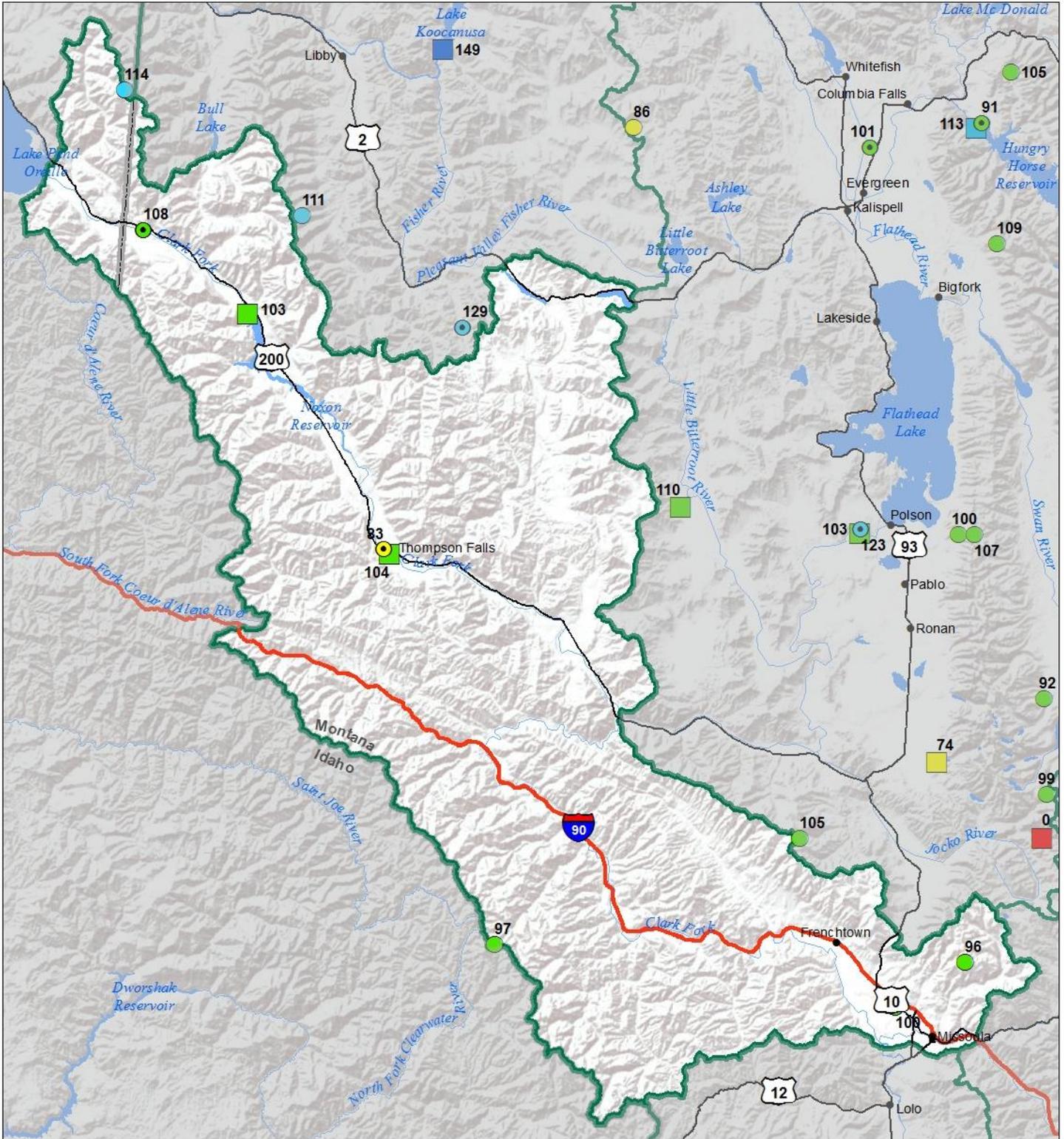


# Lower Clark Fork River Basin

## Water Year to Date Precipitation and Reservoir Levels

### Percentage of Normal

#### March 1, 2016



### Precipitation Percent of Normal

SNOTEL		COOP/ACIS	
<span style="color: blue;">●</span> > 150%	<span style="color: yellow;">●</span> 71 - 90%	<span style="color: blue;">●</span> > 150%	<span style="color: yellow;">●</span> 71 - 90%
<span style="color: lightblue;">●</span> 131 - 150%	<span style="color: orange;">●</span> 51 - 70%	<span style="color: lightblue;">●</span> 131 - 150%	<span style="color: orange;">●</span> 51 - 70%
<span style="color: cyan;">●</span> 111 - 130%	<span style="color: red;">●</span> 1 - 50%	<span style="color: cyan;">●</span> 111 - 130%	<span style="color: red;">●</span> 1 - 50%
<span style="color: green;">●</span> 91 - 110%		<span style="color: green;">●</span> 91 - 110%	

### Reservoirs Percent of Normal

<span style="color: darkblue;">■</span> > 150%
<span style="color: blue;">■</span> 131 - 150%
<span style="color: lightblue;">■</span> 111 - 130%
<span style="color: green;">■</span> 91 - 110%
<span style="color: yellow;">■</span> 71 - 90%
<span style="color: orange;">■</span> 51 - 70%
<span style="color: red;">■</span> 1 - 50%

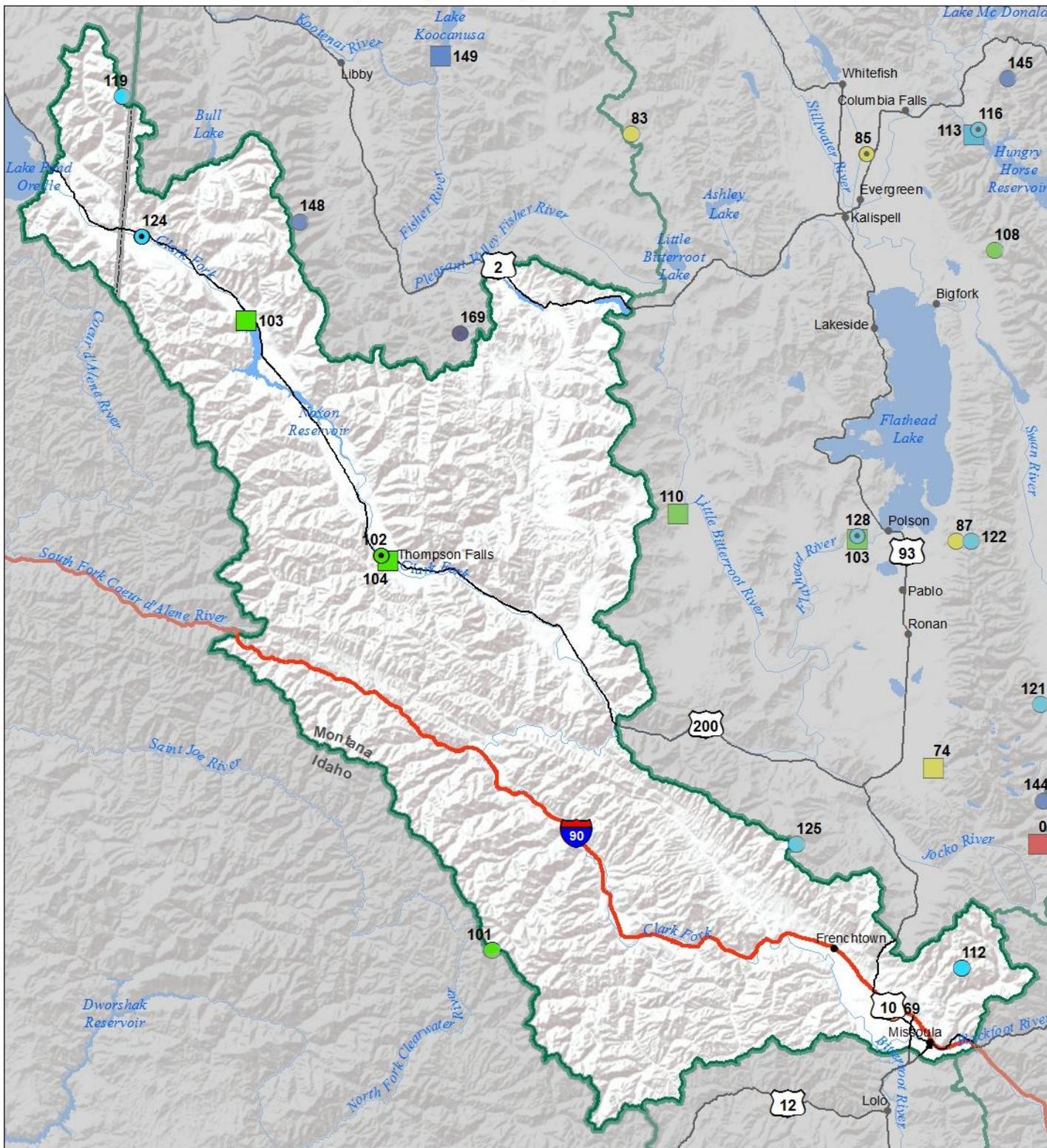


# Lower Clark Fork River Basin

## Monthly Precipitation and Reservoir Levels

### Percentage of Normal

March 1, 2016 (February 1, 2016 - March 1, 2016)



### 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%
- 1 - 50%



## Lower Clark Fork River Basin Streamflow Forecasts - March 1, 2016

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

LOWER CLARK FORK RIVER BASIN	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Clark Fork R. bl Missoula	APR-JUL	1580	1990	2270	95%	2550	2960	2400
	APR-SEP	1780	2230	2530	95%	2830	3280	2670
Clark Fork R. at St. Regis <sup>1</sup>	APR-JUL	1950	2670	3000	95%	3330	4060	3160
	APR-SEP	2210	2990	3350	95%	3700	4480	3510
Clark Fork R. nr Plains <sup>1,2</sup>	APR-JUL	6300	7810	8500	92%	9190	10700	9200
	APR-SEP	6880	8550	9310	92%	10100	11700	10100
Thompson nr Thompson Falls	APR-JUL	79	116	141	78%	166	205	181
	APR-SEP	94	134	161	79%	188	230	205
Prospect Ck at Thompson Falls	APR-JUL	54	71	82	80%	93	110	102
	APR-SEP	60	76	88	80%	100	116	110
Clark Fork R. at Whitehorse Rapids <sup>1,2</sup>	APR-JUL	7180	8840	9600	91%	10400	12000	10500
	APR-SEP	7890	9720	10500	91%	11400	13200	11500

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

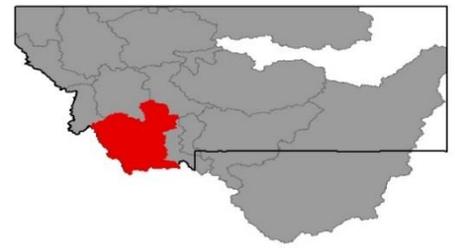
2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions

3) Median value used in place of average

Reservoir Storage End of February, 2016	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Noxon Rapids Reservoir	323.3	319.7	313.9	335.0
Basin-wide Total	323.3	319.7	313.9	335.0
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis March 1, 2016	# of Sites	% Median	Last Year % Median
LOWER CLARK FORK RIVER BASIN	11	84	65

# Jefferson River Basin



February started off dry and warm in the Jefferson River basin with a strong high pressure ridge feeding in warm and dry air from the southwest. Just in time for Valentine’s Day, a moist storm brought snowfall back to the basin and this pattern favored the western half of the river basin through the end of the month. Monthly snowfall ranged from above normal in the Big Hole river basin to below normal in all other basins. Snowpack in the Boulder River basin is currently the highest for March 1<sup>st</sup> due to early season snowfall at 114% of normal, followed closely by the Big Hole River basin which is currently 112% of normal. Snowpack percentiles in the Beaverhead River basin are 105% of normal for the date with the lowest snowpack being in the headwaters of the basin above Red Rocks Lake. The Ruby River basin is slightly below normal at this time at 92% of normal for March 1<sup>st</sup>. The abundant early season snowfall has allowed the river basin as a whole to stay above normal for the date, but has it declined for the second straight month to 107% of normal. Even with the decline it is still the highest in the state at this time, and ahead of last year in terms of March 1<sup>st</sup> snowpack percentiles.

Precipitation for the month emulates the trend in snowfall for the month with all basins receiving below normal precipitation for February. The highest percentages were at the higher elevation SNOTEL sites in western and northern sub-basins, while the southern and eastern basins were well below normal. Valley precipitation during the month was well below average at 31% for the month. Combined mountain and valley water year-to-date precipitation has benefitted from the fall and winter precipitation and is still near normal at 99% for March 1<sup>st</sup>.

Reservoir storage in the basin is below average for this date at both Clark Canyon (81%) and Lima Reservoirs (70%). Ruby reservoir is well above average for March 1<sup>st</sup> at 126%. Continued snowfall, spring precipitation and wise water management will be needed in reservoirs that are below average to reach normal levels for summer use.

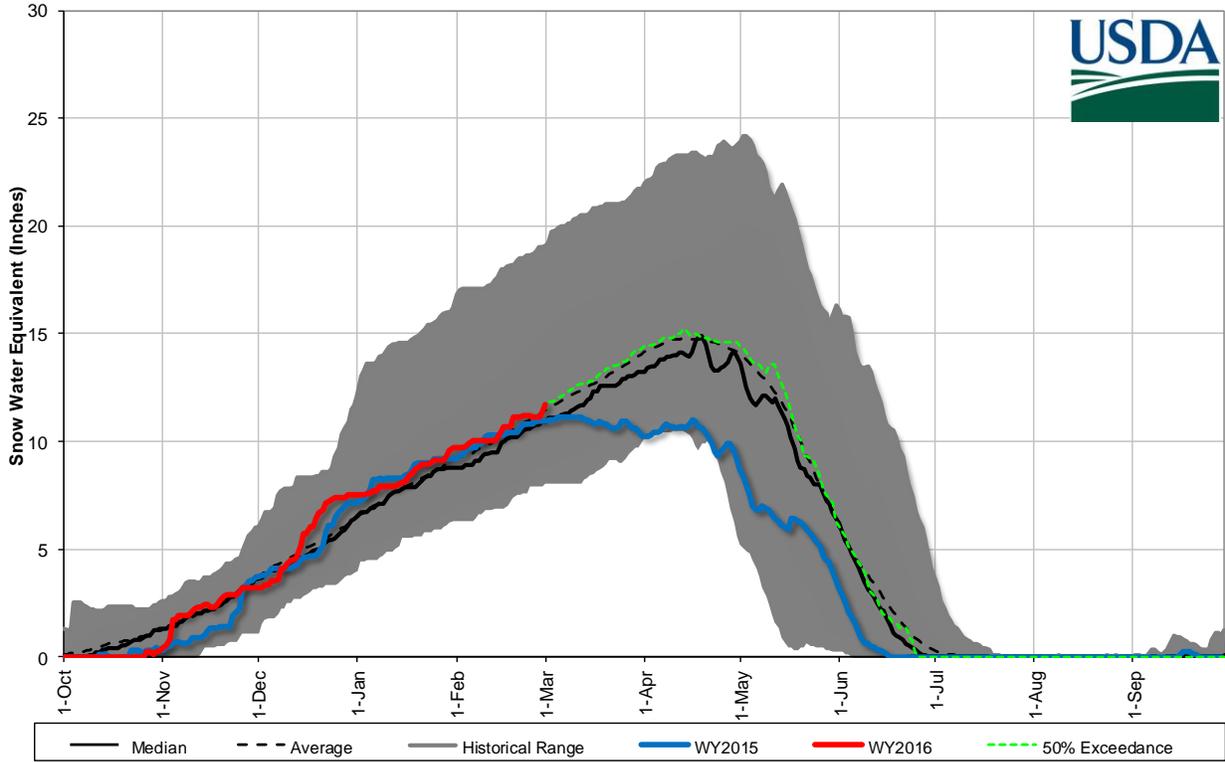
Streamflow forecasts for March 1st should be used knowing 65 to 80% of our annual snowpack has accumulated and conditions can change before runoff occurs. The 50% exceedance forecast assumes normal conditions will occur from this point and through snowmelt. Current basin-wide streamflows for the 50% exceedance are 101% of average for the April-July time period.

<b>Jefferson River Basin Data Summary</b>		<b>3/1/2016</b>	
	Percent of 1981-2010 Normal (Median)	Last Year Percentage of Normal (Median)	
<b>Snowpack</b>			
Basin-Wide	107%	104%	
	Monthly Percentage of Average	WYTD Percentage of 1981-2010 Average*	Last Year Percentage of Average
<b>Precipitation</b>			
Mountain Precipitation	80%	99%	95%
Valley Precipitation	30%	105%	98%
Basin Precipitation	78%	99%	95%
	Percentage of Average	Percentage of Capacity (Total)	Last Year Percentage of Average
<b>Reservoir Storage</b>			
Basin-Wide Storage	83%	40%	97%
	50 % Exceedance Forecast Percentage of Average	50 % Exceedance Forecast % of Last Year's Flows	Last Year Percentage of Average
<b>Streamflow Forecast</b>			
Basin-Wide Apr-July	101%	191%	53%

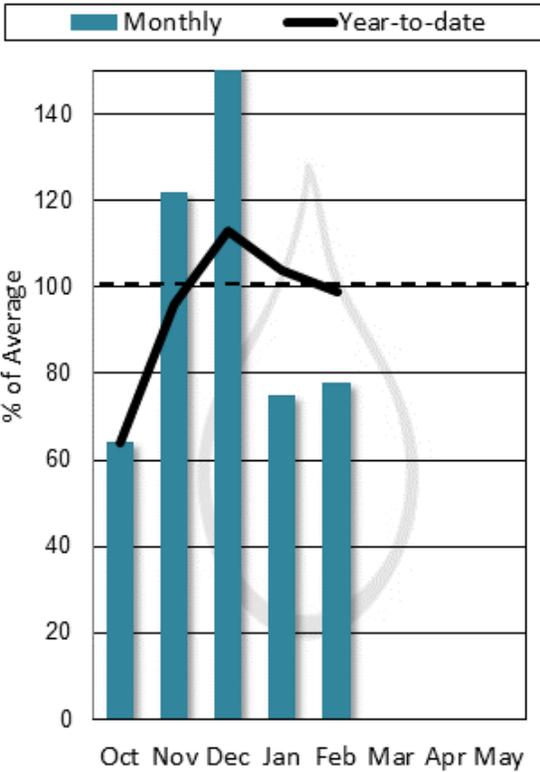
\*Water Year-to-Date (WYTD) Precipitation is October 1st - Current

\*\*Basin-wide streamflows are an average of the individual streamflow points within the basin for the 50 percent exceedance forecast. Consult the individual streamflow forecasts in the table below for the range of forecasts at an individual point.

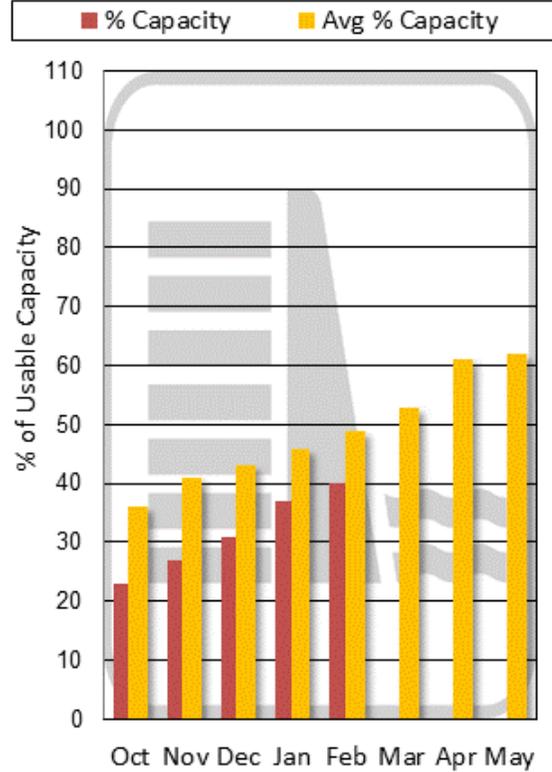
**Jefferson River Basin Snowpack with Non-Exceedence Projections**  
*Based on provisional SNOTEL daily data as of 3/1/2016*



**Mountain and Valley  
Precipitation**

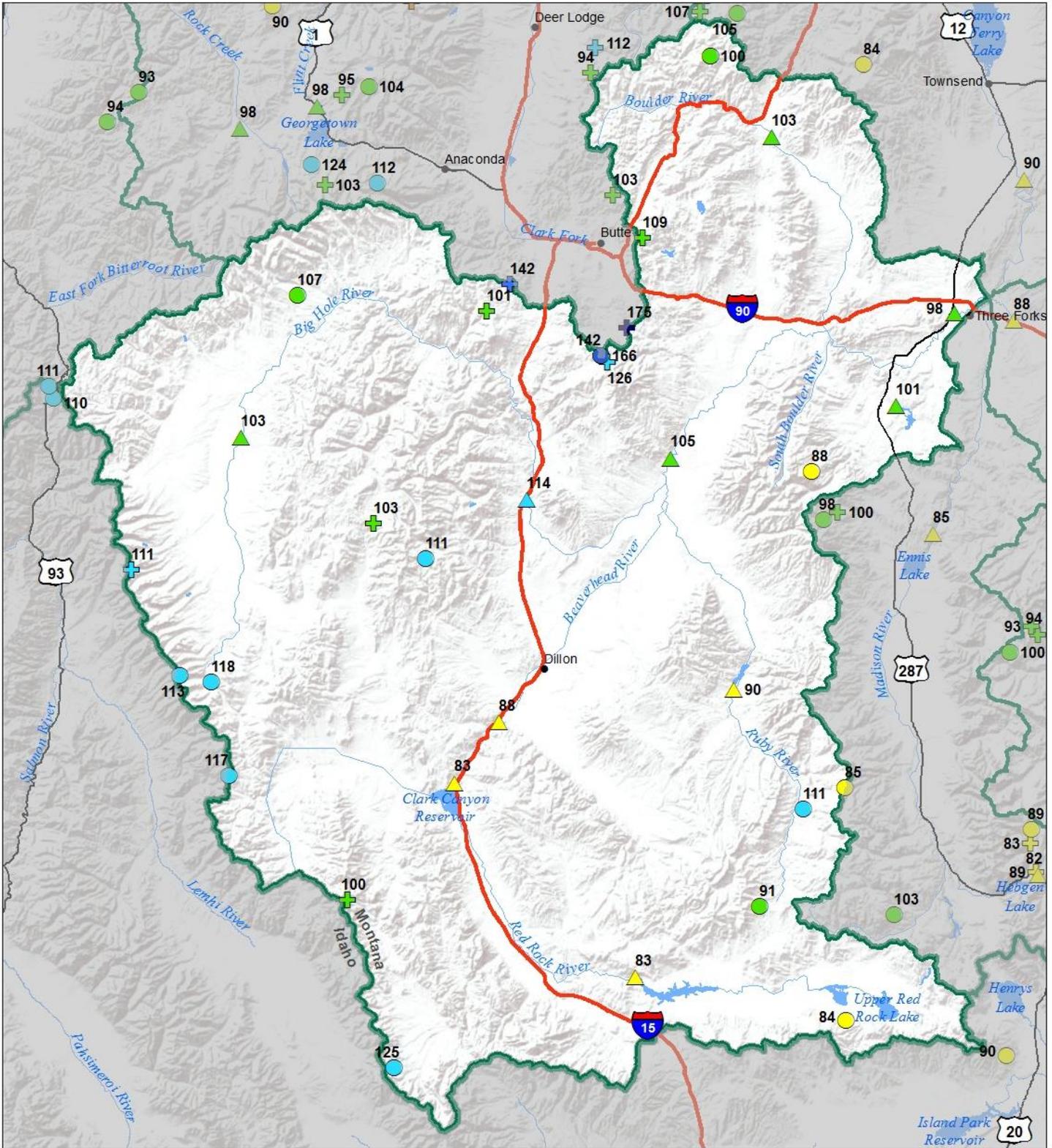


**End of Month Reservoir  
Storage**



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

# Jefferson River Basin Streamflow Forecast, Snow Water Equivalent Percentage of Normal March 1, 2016



### Snow Water Equivalent Percent of Normal

#### SNOTEL

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

#### Snowcourse

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

### Streamflow Forecast Percent of Average Flows

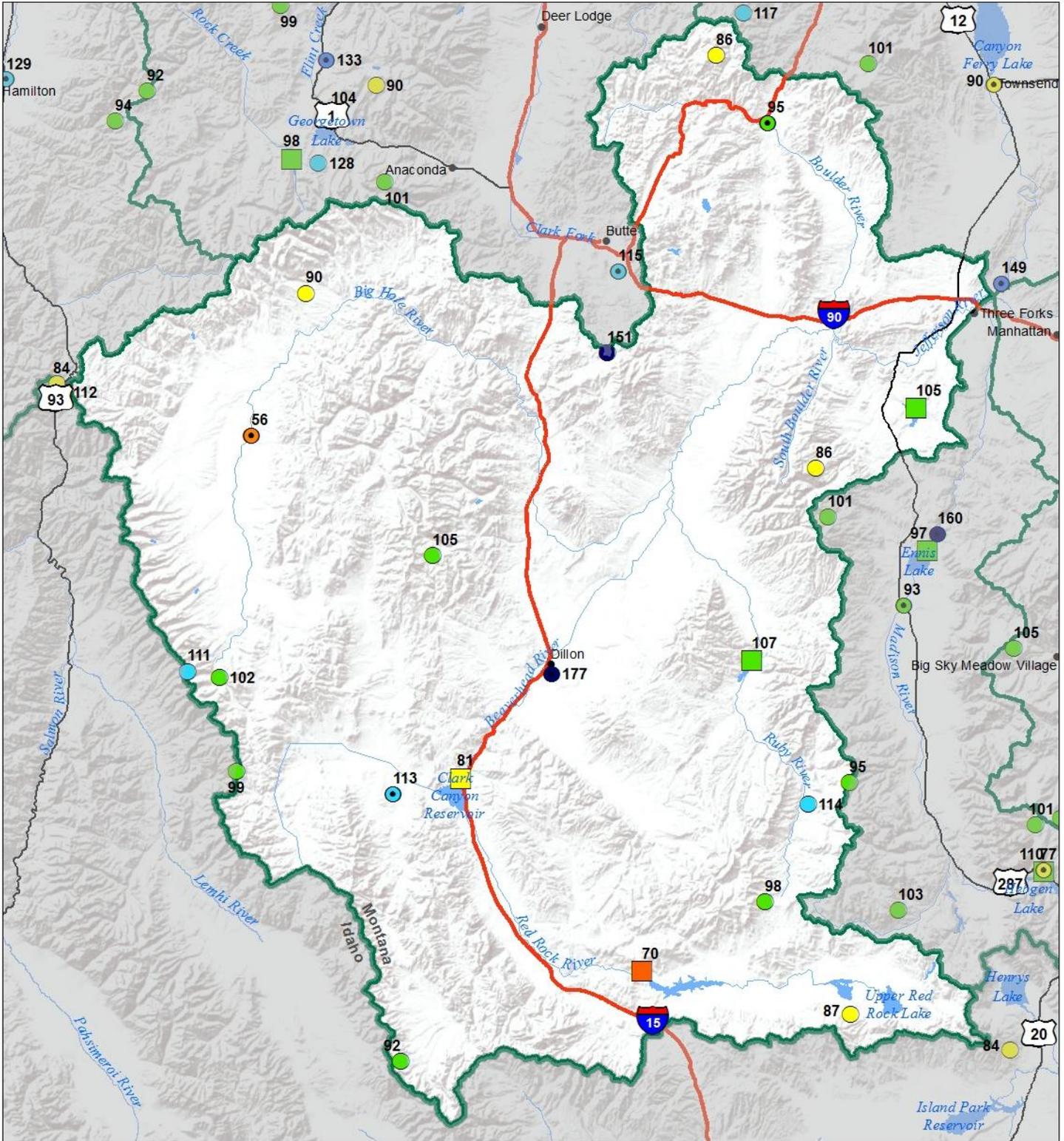
- ▲ > 150%
- ▲ 131 - 150%
- ▲ 111 - 130%
- ▲ 91 - 110%
- ▲ 71 - 90%
- ▲ 51 - 70%
- ▲ 1 - 50%



# Jefferson River Basin

## Water Year to Date Precipitation and Reservoir Levels Percentage of Normal

### March 1, 2016

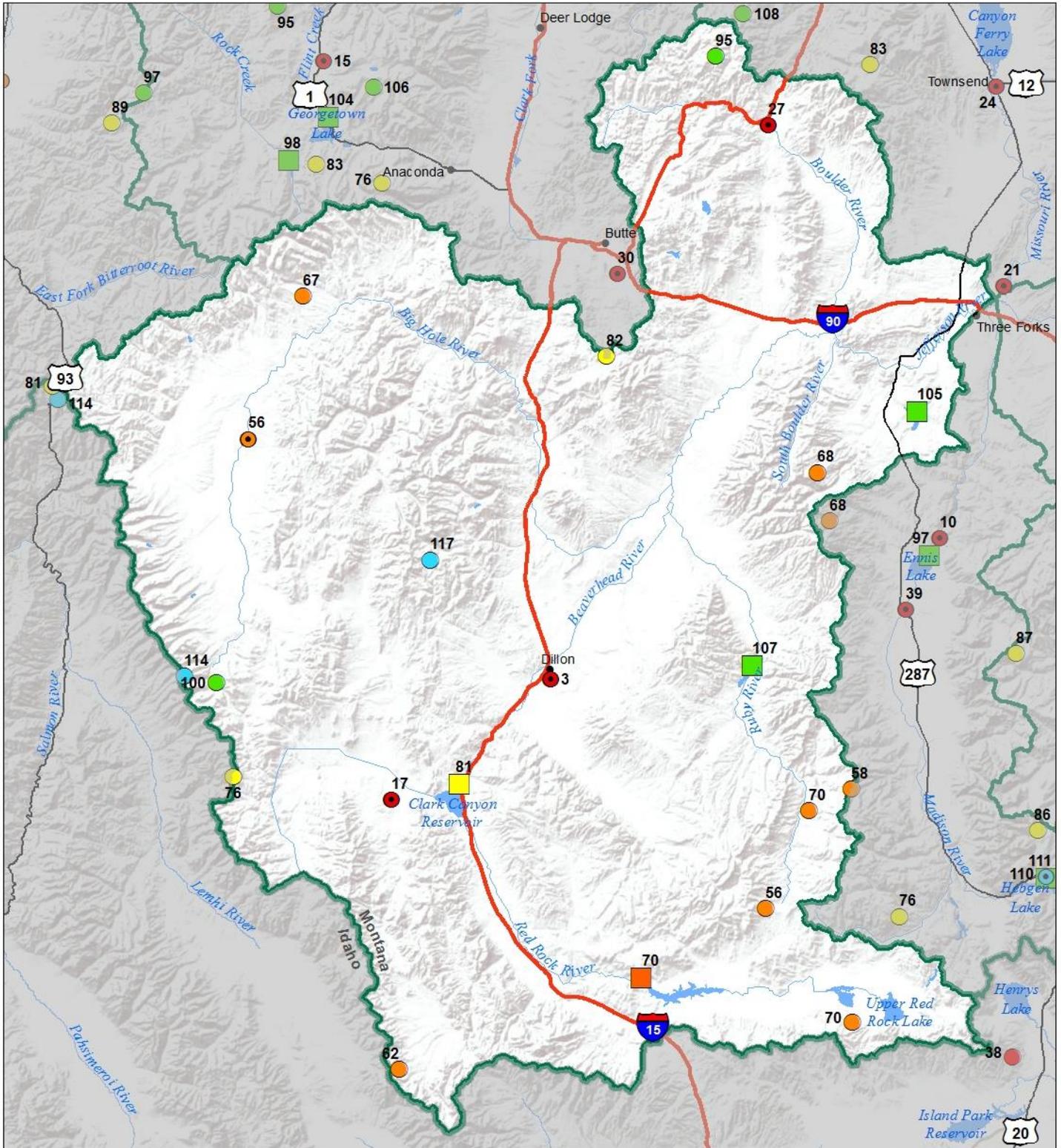


Precipitation Percent of Normal	
SNOTEL	COOP/ACIS
● > 150%	● > 150%
● 131 - 150%	● 131 - 150%
● 111 - 130%	● 111 - 130%
● 91 - 110%	● 91 - 110%
● 71 - 90%	● 71 - 90%
● 51 - 70%	● 51 - 70%
● 1 - 50%	● 1 - 50%

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



# Jefferson River Basin Monthly Precipitation and Reservoir Levels Percentage of Normal March 1, 2016 (February 1, 2016 - March 1, 2016)



### 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%



## Jefferson River Basin Streamflow Forecasts - March 1, 2016

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

JEFFERSON RIVER BASIN	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Lima Reservoir Inflow <sup>2</sup>	APR-JUL	34	54	68	83%	82	102	82
	APR-SEP	33	58	74	83%	90	115	89
Clark Canyon Inflow <sup>2</sup>	APR-JUL	21	48	82	81%	116	167	101
	APR-SEP	7.2	62	100	83%	138	193	120
Beaverhead R at Barretts <sup>2</sup>	APR-JUL	25	64	114	88%	164	235	129
	APR-SEP	36	80	138	88%	196	280	156
Ruby R Reservoir Inflow <sup>2</sup>	APR-JUL	39	56	68	88%	80	97	77
	APR-SEP	49	69	82	90%	95	115	91
Big Hole R at Wisdom	APR-JUL	31	75	105	103%	135	179	102
	APR-SEP	30	78	111	103%	144	192	108
Big Hole R nr Melrose	APR-JUL	390	510	595	116%	680	800	515
	APR-SEP	415	550	640	114%	730	865	560
Jefferson R nr Twin Bridges <sup>2</sup>	APR-JUL	330	555	705	102%	855	1080	690
	APR-SEP	345	595	765	105%	935	1190	730
Boulder R nr Boulder	APR-JUL	43	60	71	103%	82	99	69
	APR-SEP	46	64	76	103%	88	106	74
Willow Ck Reservoir Inflow <sup>2</sup>	APR-JUL	6.7	12.8	17	101%	21	27	16.8
	APR-SEP	8.7	15.1	19.5	101%	24	30	19.3
Jefferson R nr Three Forks <sup>2</sup>	APR-JUL	295	550	720	97%	890	1150	740
	APR-SEP	310	590	780	98%	970	1250	800

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

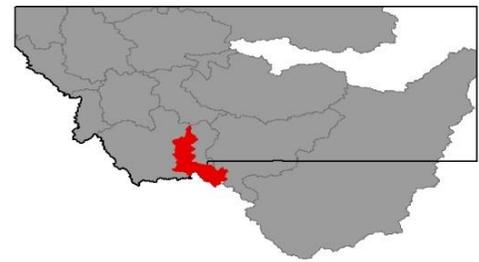
2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions

3) Median value used in place of average

Reservoir Storage End of February, 2016	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Lima Reservoir	21.8	37.4	31.1	84.0
Clark Canyon Res	102.4	108.4	126.4	255.6
Ruby River Reservoir	29.1	34.2	27.2	38.8
Basin-wide Total	153.3	180.0	184.7	378.4
# of reservoirs	3	3	3	3

Watershed Snowpack Analysis March 1, 2016	# of Sites	% Median	Last Year % Median
BEAVERHEAD	11	106	96
RUBY	5	92	84
BIGHOLE	15	112	113
BOULDER	7	114	120
JEFFERSON RIVER BASIN	31	107	104

# Madison River Basin



Just when things seemed to be turning around for the Madison River basin a second straight month of below normal snowfall has caused basin snowpack percentages to drop for March 1<sup>st</sup>. Like the rest of the basins in southwest Montana the first two weeks of the month were warm and dry before a moist storm system brought snowfall to the high country. Unfortunately this pattern didn't continue and warm and dry conditions ended the month. Snowfall for the month of February was well below normal above Hebgen Lake ranging from 40% to 57%, but was slightly better below Hebgen where 65% to 93% of normal snowfall occurred. Currently the snowpack above Hebgen Lake is 85% of normal for March 1<sup>st</sup>, while the snowpack below Hebgen is 92% of normal. Overall, the basin-wide snowpack for the Madison River basin is below normal at 89% for March 1<sup>st</sup>. Spring is coming and that normally means increased precipitation for the region so now is the time to do your snow and rain dances!

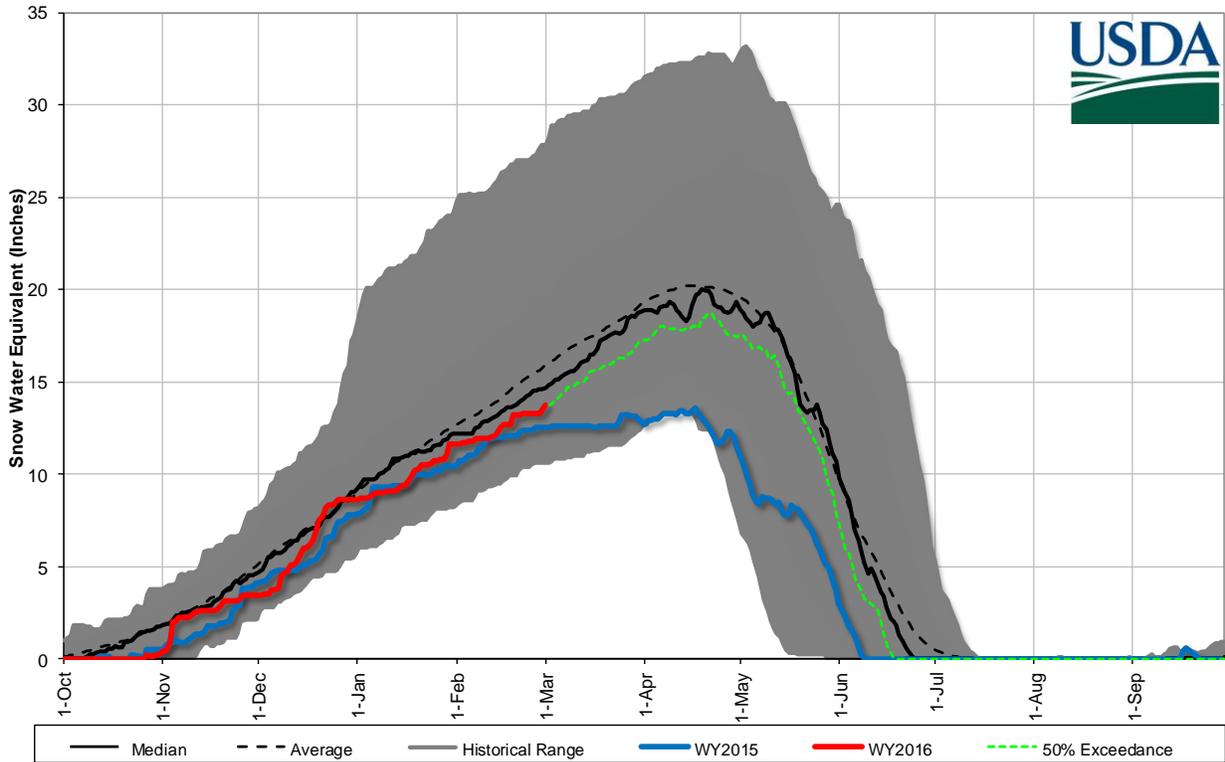
Precipitation was also below average at mountain and valley locations for the month of February. Basin-wide valley weather stations were well below average for the month at 47%, while higher elevation SNOTEL sites fared slightly better at 66% of average, overall. Like snowfall SNOTEL sites above Hebgen saw the least precipitation (53%) while sites below Hebgen were slightly better (77%). Water year-to-date precipitation starting October 1<sup>st</sup> has benefitted from the precipitation earlier in the year and remains average at valley locations (100%), while mountain SNOTEL sites are slightly below average (92%). Combined mountain and valley water year-to-date precipitation for the basin is currently 93% of average for March 1<sup>st</sup>.

Reservoir storage in the basin is near to above average for the date. On March 1<sup>st</sup> Hebgen Lake was reported at 110% of average and Ennis Lake reported 97% of average.

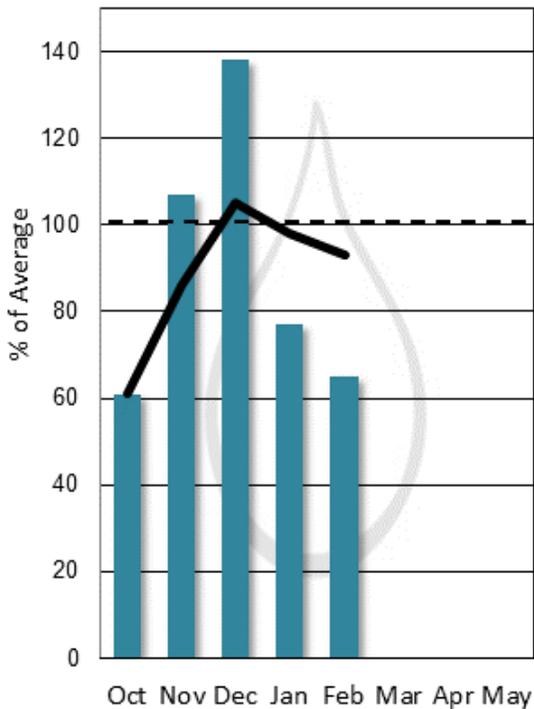
Streamflow forecasts for March 1<sup>st</sup> should be used knowing 65 to 80% of our annual snowpack has accumulated and conditions can change before runoff occurs. The 50% exceedance forecast assumes normal conditions will occur from this point and through snowmelt. Current basin-wide streamflows for the 50% exceedance are 83% of average for the April-July time period.

<b>Madison River Basin Data Summary</b>		<b>3/1/2016</b>	
	Percent of 1981-2010 Normal (Median)	Last Year Percentage of Normal (Median)	
<b>Snowpack</b>			
Basin-Wide	89%	82%	
	Monthly Percentage of Average	WYTD Percentage of 1981-2010 Average*	Last Year Percentage of Average
<b>Precipitation</b>			
Mountain Precipitation	66%	92%	81%
Valley Precipitation	47%	100%	88%
Basin Precipitation	65%	93%	81%
	Percentage of Average	Percentage of Capacity (Total)	Last Year Percentage of Average
<b>Reservoir Storage</b>			
Basin-Wide Storage	109%	79%	111%
	50 % Exceedance Forecast Percentage of Average	50 % Exceedance Forecast % of Last Year's Flows	Last Year Percentage of Average
<b>Streamflow Forecast</b>			
Basin-Wide Apr-July	83%	121%	69%
*Water Year-to-Date (WYTD) Precipitation is October 1st - Current			
**Basin-wide streamflows are an average of the individual streamflow points within the basin for the 50 percent exceedance forecast. Consult the individual streamflow forecasts in the table below for the range of forecasts at an individual point.			

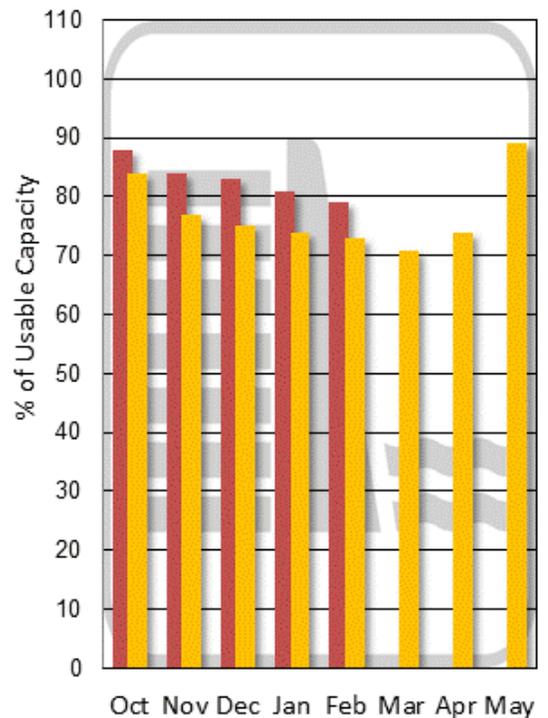
**Madison River Basin Snowpack with Non-Exceedence Projections**  
*Based on provisional SNOTEL daily data as of 3/1/2016*



**Mountain and Valley Precipitation**

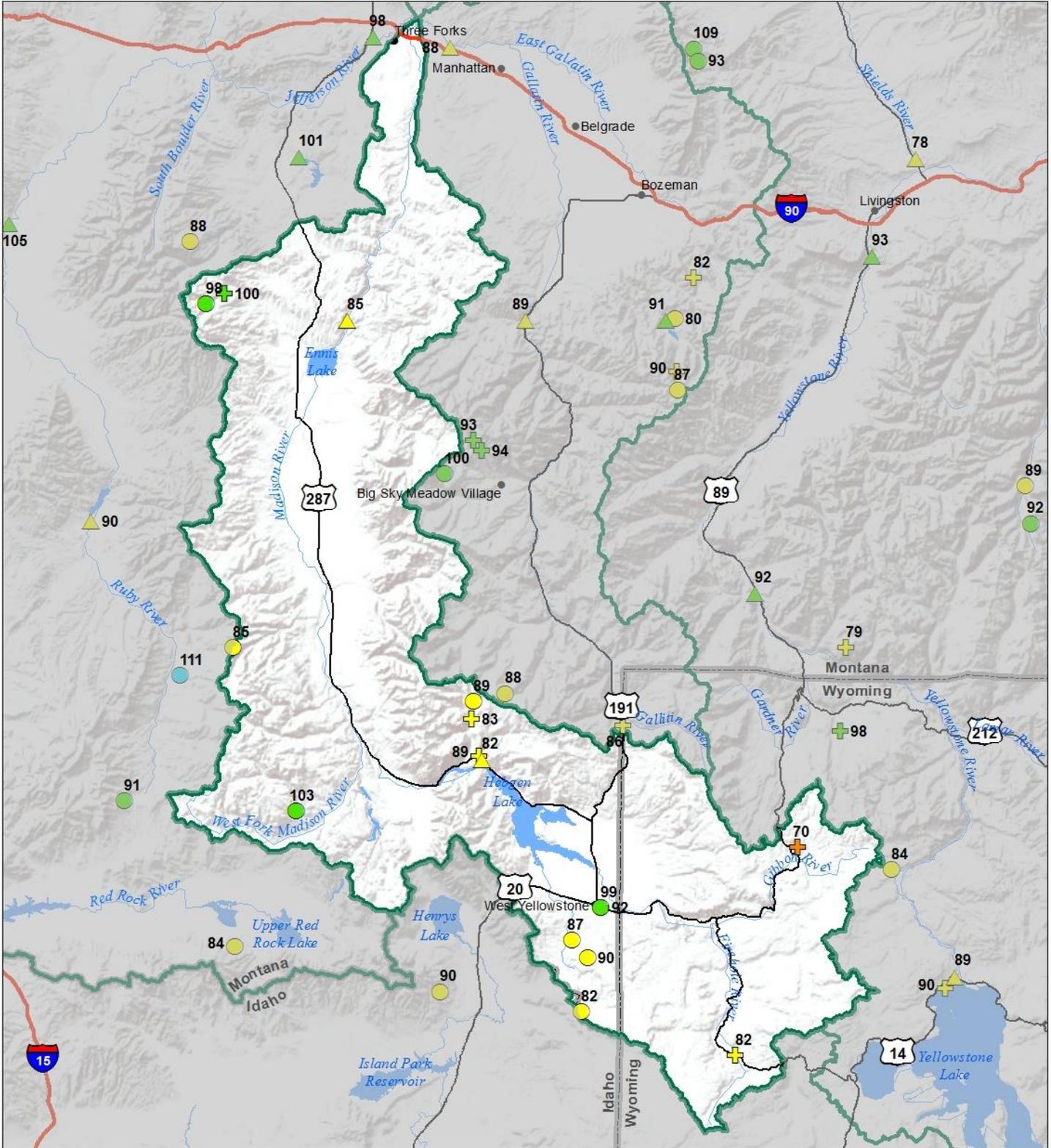


**End of Month Reservoir Storage**



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

# Madison River Basin Streamflow Forecast, Snow Water Equivalent Percentage of Normal March 1, 2016



### Snow Water Equivalent Percent of Normal

#### SNOTEL

- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%

- 71 - 90%
- 51 - 70%
- 1 - 50%
- \*

#### Snowcourse

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

### Streamflow Forecast Percent of Average Flows

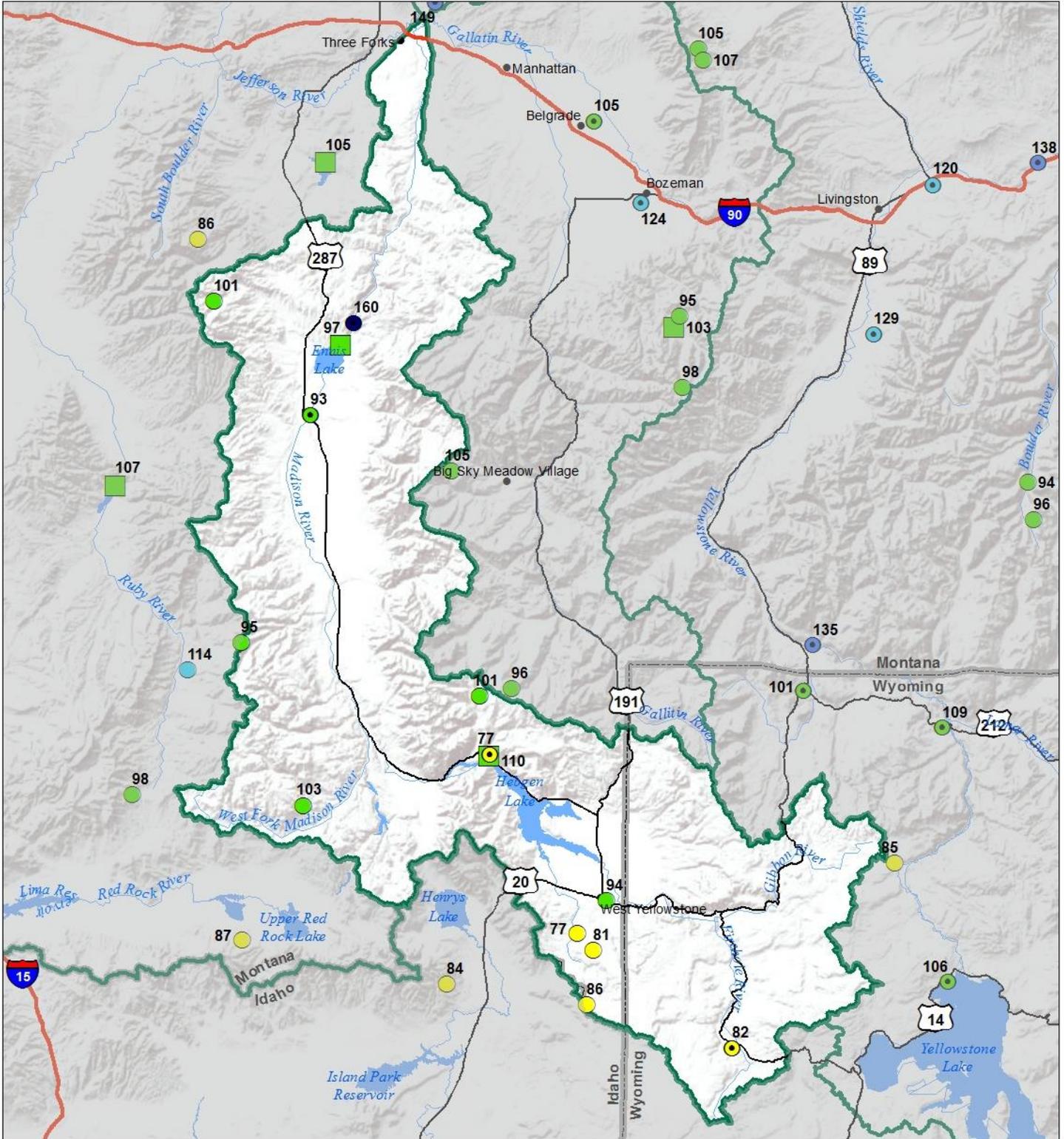
- ▲ > 150%
- ▲ 131 - 150%
- ▲ 111 - 130%
- ▲ 91 - 110%
- ▲ 71 - 90%
- ▲ 51 - 70%
- ▲ 1 - 50%



# Madison River Basin

## Water Year to Date Precipitation and Reservoir Levels Percentage of Normal

### March 1, 2016



#### Precipitation Percent of Normal

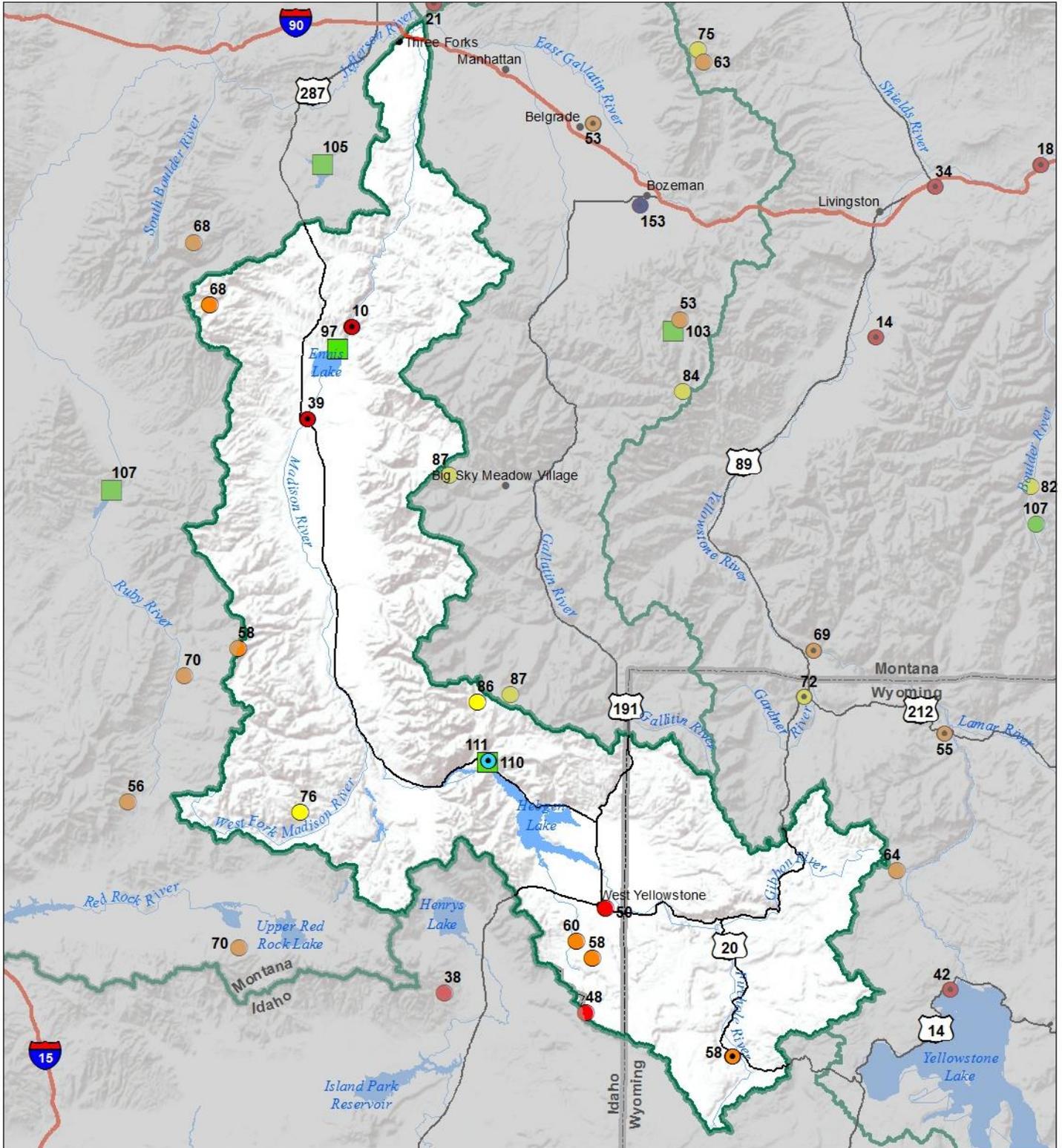
SNOTEL		COOP/ACIS	
<span style="color: blue;">●</span> > 150%	<span style="color: yellow;">●</span> 71 - 90%	<span style="color: blue;">●</span> > 150%	<span style="color: yellow;">●</span> 71 - 90%
<span style="color: lightblue;">●</span> 131 - 150%	<span style="color: orange;">●</span> 51 - 70%	<span style="color: lightblue;">●</span> 131 - 150%	<span style="color: orange;">●</span> 51 - 70%
<span style="color: cyan;">●</span> 111 - 130%	<span style="color: red;">●</span> 1 - 50%	<span style="color: cyan;">●</span> 111 - 130%	<span style="color: red;">●</span> 1 - 50%
<span style="color: green;">●</span> 91 - 110%		<span style="color: green;">●</span> 91 - 110%	

#### Reservoirs Percent of Normal

<span style="color: darkblue;">■</span> > 150%
<span style="color: blue;">■</span> 131 - 150%
<span style="color: lightblue;">■</span> 111 - 130%
<span style="color: green;">■</span> 91 - 110%
<span style="color: yellow;">■</span> 71 - 90%
<span style="color: orange;">■</span> 51 - 70%
<span style="color: red;">■</span> 1 - 50%



# Madison River Basin Monthly Precipitation and Reservoir Levels Percentage of Normal March 1, 2016 (February 1, 2016 - March 1, 2016)



### Precipitation Percent of Normal

SNOTEL		COOP/ACIS	
Dark Blue	> 150%	Dark Blue	> 150%
Blue	131 - 150%	Blue	131 - 150%
Cyan	111 - 130%	Cyan	111 - 130%
Green	91 - 110%	Green	91 - 110%
Yellow	71 - 90%	Yellow	71 - 90%
Orange	51 - 70%	Orange	51 - 70%
Red	1 - 50%	Red	1 - 50%

### Reservoirs Percent of Normal

Dark Blue	> 150%
Blue	131 - 150%
Cyan	111 - 130%
Green	91 - 110%
Yellow	71 - 90%
Orange	51 - 70%
Red	1 - 50%



## Madison River Basin Streamflow Forecasts - March 1, 2016

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

MADISON RIVER BASIN	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Hebgen Reservoir Inflow <sup>2</sup>	APR-JUL	235	275	305	82%	330	370	370
	APR-SEP	310	355	385	82%	420	465	470
Ennis Reservoir Inflow <sup>2</sup>	APR-JUL	385	470	525	84%	580	665	625
	APR-SEP	495	595	660	85%	725	825	775

- 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
- 3) Median value used in place of average

Reservoir Storage End of February, 2016	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Ennis Lake	28.9	28.2	29.8	41.0
Hebgen Lake	302.3	310.3	274.6	378.8
Basin-wide Total	331.1	338.5	304.4	419.8
# of reservoirs	2	2	2	2

Watershed Snowpack Analysis March 1, 2016	# of Sites	% Median	Last Year % Median
MADISON abv HEBGEN LAKE	6	85	76
MADISON blw HEBGEN LAKE	10	92	86
MADISON RIVER BASIN	16	89	82

# Gallatin River Basin



The windblown and sun baked bulletproof ice on the south face of Lone Mountain, and sign in the tram line stating “slide for life, know how to self-arrest”, speak volumes to the weather and skiing conditions we have experienced during the month of February in the Gallatin River basin. The first two weeks of the month were dominated by a high pressure ridge which ushered in warm dry air from the south, before a mid-month storm dropped snowfall in the mountains of the basin. Warm and dry weather returned with strong winds before a small storm dropped some snow during the last week of February. Overall, February was lackluster in terms of snowfall in the basin with most SNOTEL and snowcourses reporting below normal snowfall for the month. Currently the Bridger Range snowpack is 102% of normal for March 1<sup>st</sup>, the Upper Gallatin snowpack is slightly below normal at 91%, and the Hyalite snowpack is below normal reporting 84% for March 1<sup>st</sup>. The good news is we still spring to help us to recover in those basins that are below normal. April-June the Gallatin River basin is climatically favored with regards to precipitation, let’s just hope we return to more average temperatures when the precipitation finally comes.

The lack of storms during the month left monthly precipitation below average for both mountain and valley locations. Valley precipitation sites in the Gallatin valley reported 117% of average precipitation for the month while mountain SNOTEL stations reported 78% of average. Due to precipitation early in the water year totals for March 1<sup>st</sup> are near to above average, and above last year at this time. Water year-to-date (October 1<sup>st</sup>-current) valley precipitation is currently 117% of average, mountain SNOTEL sites are 101% of average for March 1<sup>st</sup>. Entering our typically “wet” season things are off to a decent start.

Reservoir storage is slightly above average in Middle Creek Reservoir (Hyalite) for this time of year and was reported at 103%.

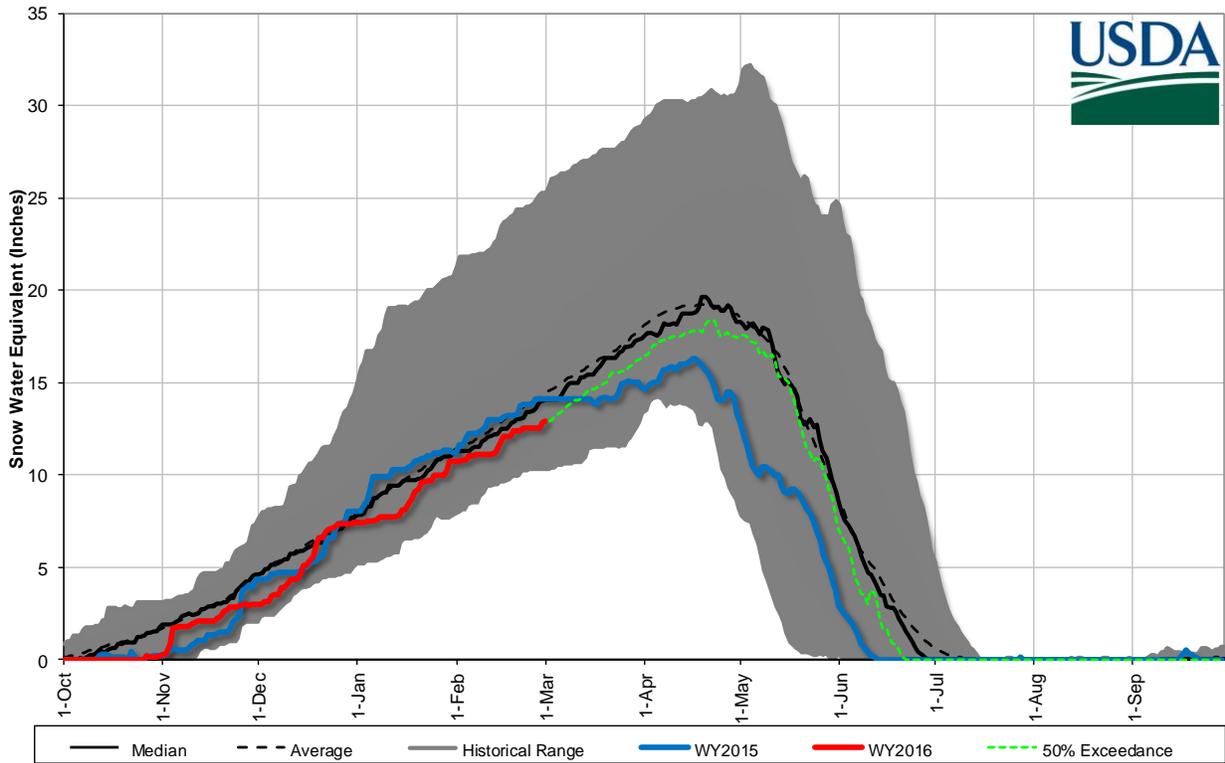
Streamflow forecasts for March 1st should be used knowing 65 to 80% of our annual snowpack has accumulated and conditions can change before runoff occurs. The 50% exceedance forecast assumes normal conditions will occur from this point and through snowmelt. Current basin-wide streamflows for the 50% exceedance are 89% of average for the April-July time period.

<b>Gallatin River Basin Data Summary</b>		<b>3/1/2016</b>	
<b>Snowpack</b>	Percent of 1981-2010 Normal (Median)	Last Year Percentage of Normal (Median)	
Basin-Wide	91%	98%	
<b>Precipitation</b>	Monthly Percentage of Average	WYTD Percentage of 1981-2010 Average*	Last Year Percentage of Average
Mountain Precipitation	78%	101%	101%
Valley Precipitation	117%	117%	79%
Basin Precipitation	80%	102%	100%
<b>Reservoir Storage</b>	Percentage of Average	Percentage of Capacity (Total)	Last Year Percentage of Average
Basin-Wide Storage	103%	54%	100%
<b>Streamflow Forecast</b>	50 % Exceedance Forecast Percentage of Average	50 % Exceedance Forecast % of Last Year's Flows	Last Year Percentage of Average
Basin-Wide Apr-July	89%	123%	71%

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

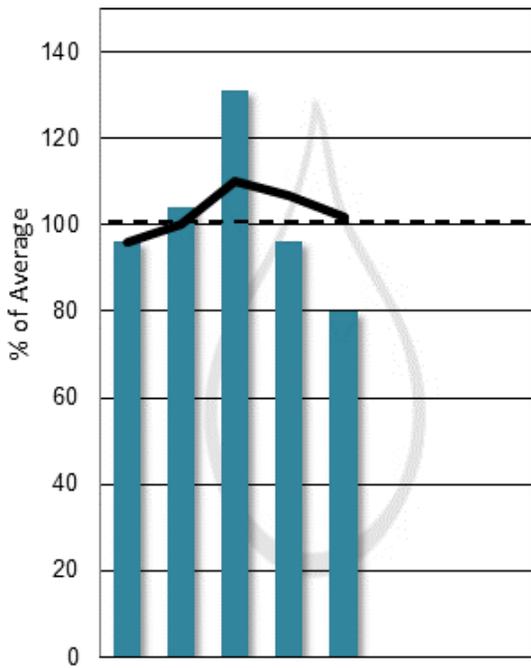
\*\*Basin-wide streamflows are an average of the individual streamflow points within the basin for the 50 percent exceedance forecast. Consult the individual streamflow forecasts in the table below for the range of forecasts at an individual point.

**Gallatin River Basin Snowpack with Non-Exceedence Projections**  
*Based on provisional SNOTEL daily data as of 3/1/2016*



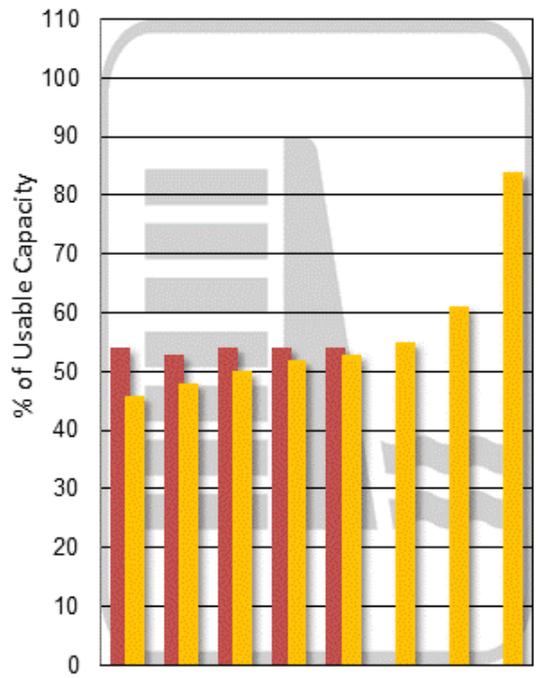
**Mountain and Valley Precipitation**

Monthly Year-to-date



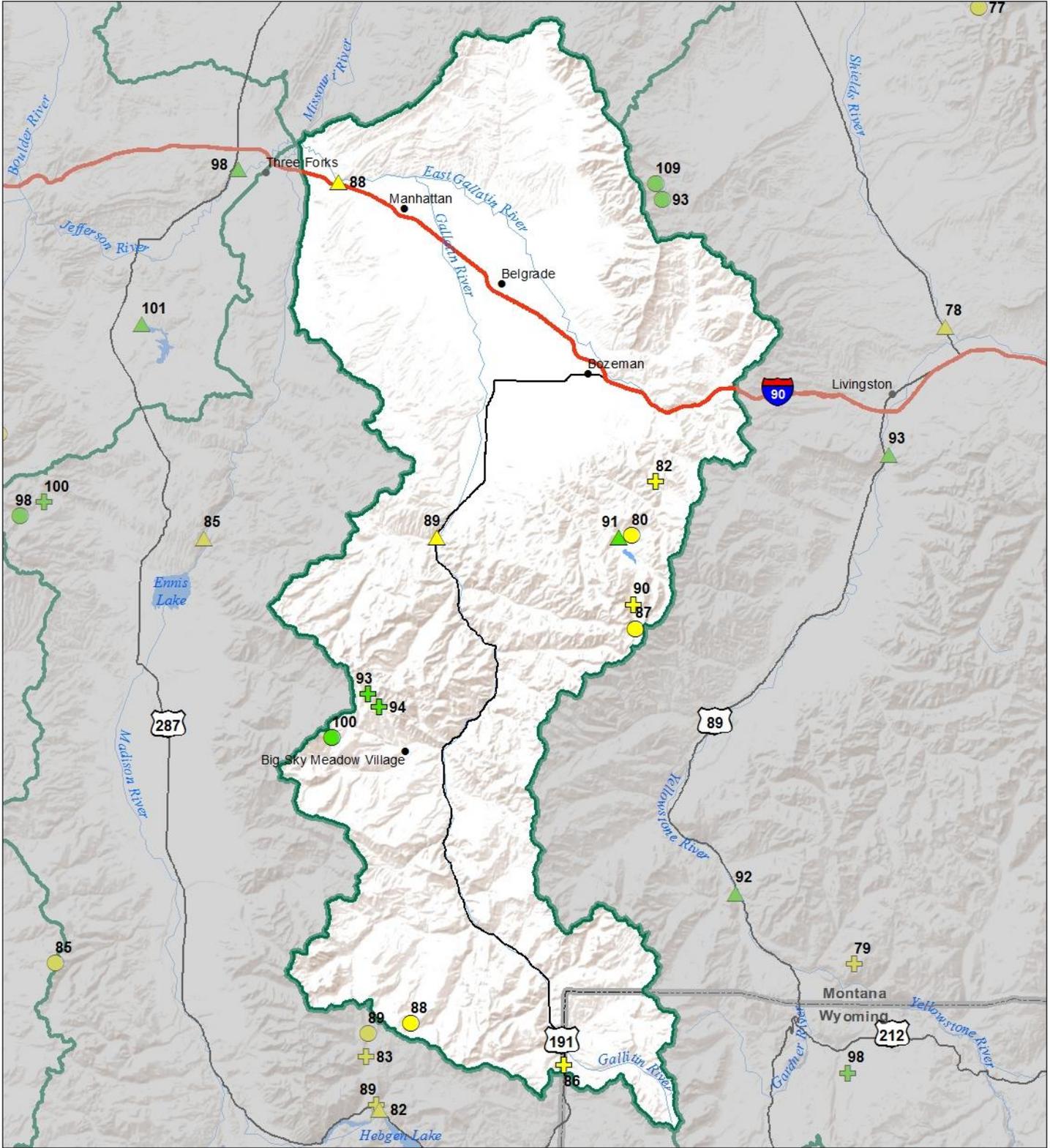
**End of Month Reservoir Storage**

% Capacity Avg % Capacity



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

# Gallatin River Basin Streamflow Forecast, Snow Water Equivalent Percentage of Normal March 1, 2016



### Snow Water Equivalent Percent of Normal

#### SNOTEL

- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%

- 71 - 90%
- 51 - 70%
- 1 - 50%
- \* 0%

#### Snowcourse

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

### Streamflow Forecast Percent of Average Flows

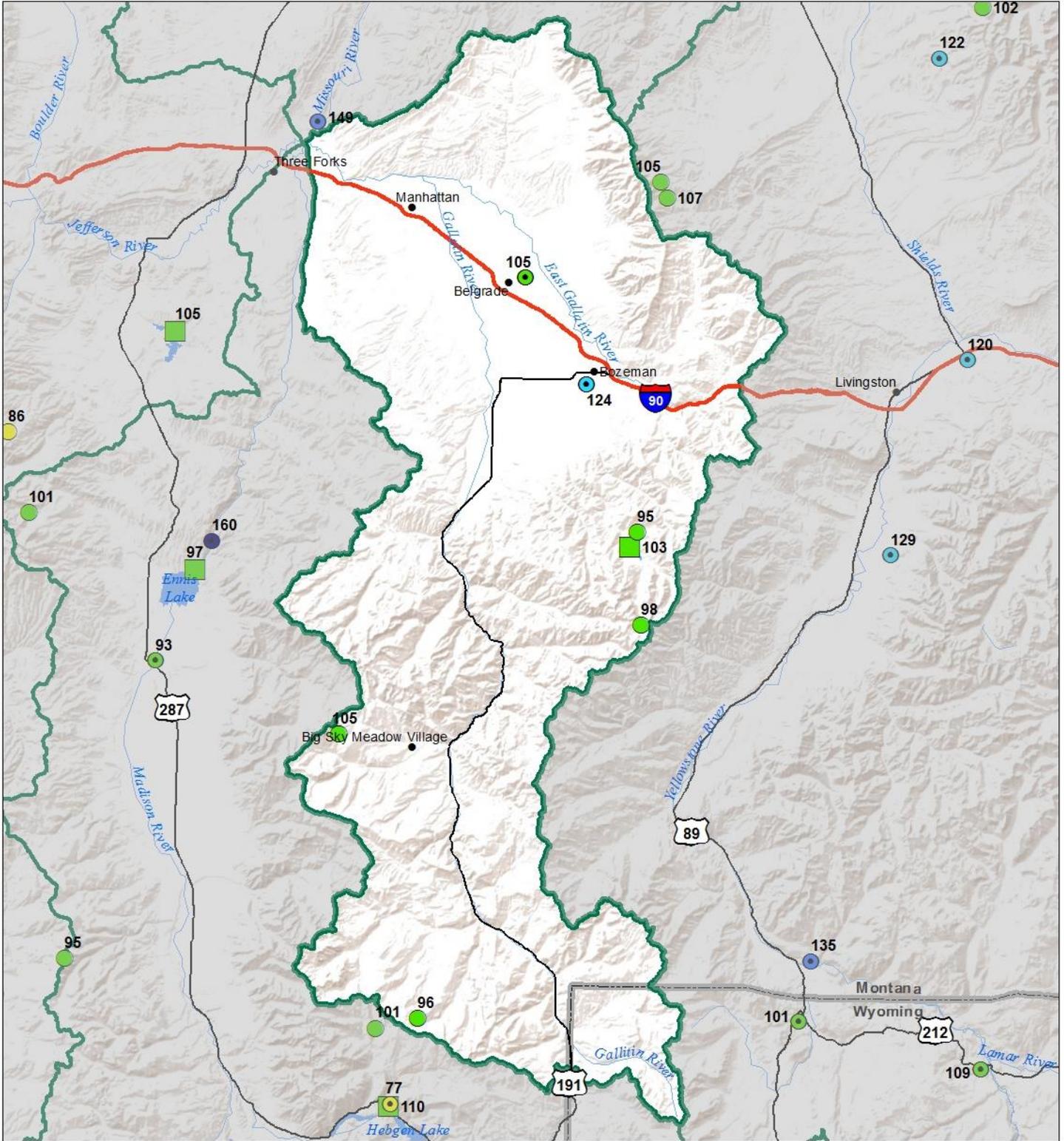
- ▲ > 150%
- ▲ 131 - 150%
- ▲ 111 - 130%
- ▲ 91 - 110%
- ▲ 71 - 90%
- ▲ 51 - 70%
- ▲ 1 - 50%



# Gallatin River Basin

## Water Year to Date Precipitation and Reservoir Levels Percentage of Normal

### March 1, 2016



#### Precipitation Percent of Normal

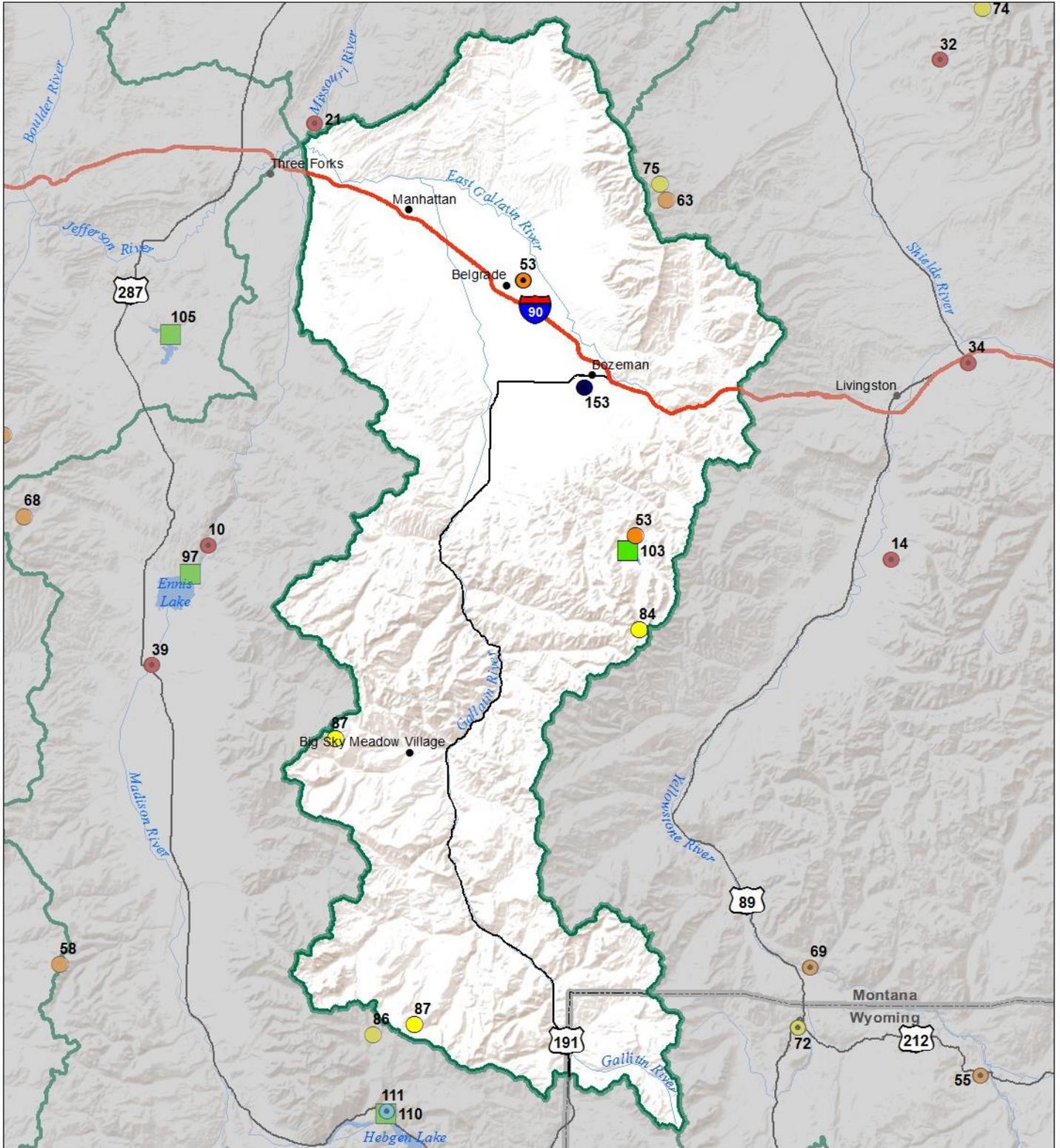
SNOTEL		COOP/ACIS	
<span style="color: blue;">●</span> > 150%	<span style="color: yellow;">●</span> 71 - 90%	<span style="color: blue;">●</span> > 150%	<span style="color: yellow;">●</span> 71 - 90%
<span style="color: lightblue;">●</span> 131 - 150%	<span style="color: orange;">●</span> 51 - 70%	<span style="color: lightblue;">●</span> 131 - 150%	<span style="color: orange;">●</span> 51 - 70%
<span style="color: cyan;">●</span> 111 - 130%	<span style="color: red;">●</span> 1 - 50%	<span style="color: cyan;">●</span> 111 - 130%	<span style="color: red;">●</span> 1 - 50%
<span style="color: green;">●</span> 91 - 110%		<span style="color: green;">●</span> 91 - 110%	

#### Reservoirs Percent of Normal

<span style="color: darkblue;">■</span> > 150%
<span style="color: blue;">■</span> 131 - 150%
<span style="color: lightblue;">■</span> 111 - 130%
<span style="color: green;">■</span> 91 - 110%
<span style="color: yellow;">■</span> 71 - 90%
<span style="color: orange;">■</span> 51 - 70%
<span style="color: red;">■</span> 1 - 50%



# Gallatin River Basin Monthly Precipitation and Reservoir Levels Percentage of Normal March 1, 2016 (February 1, 2016 - March 1, 2016)



### 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%



## Gallatin River Basin Streamflow Forecasts - March 1, 2016

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

GALLATIN RIVER BASIN	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Gallatin R nr Gateway	APR-JUL	260	320	360	90%	400	460	400
	APR-SEP	305	375	420	89%	465	535	470
Hyalite Reservoir Inflow <sup>2</sup>	APR-JUL	14.5	16.7	18.2	91%	19.7	22	20
	APR-SEP	17.4	19.7	21	91%	23	25	23
Gallatin R at Logan	APR-JUL	215	315	385	88%	455	555	440
	APR-SEP	250	365	445	88%	525	640	505

- 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
- 3) Median value used in place of average

Reservoir Storage End of February, 2016	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Middle Creek Res	5.6	5.4	5.4	10.2
Basin-wide Total	5.6	5.4	5.4	10.2
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis March 1, 2016	# of Sites	% Median	Last Year % Median
UPPER GALLATIN	5	91	88
HYALITE	4	85	95
BRIDGER	2	102	128
GALLATIN RIVER BASIN	11	91	98

# Headwaters Mainstem (Missouri) River Basin



The Missouri Mainstem Basin received near normal accumulations of both precipitation and snow water during the month of February. Coming into the month, on February 1<sup>st</sup>, total snow water equivalence (SWE) in the mountains averaged 112% of normal and combined mountain and valley precipitation was at 98%. Precipitation continued though the month at near normal rates delivering 98% of average. For the 2016 water year, On March 1<sup>st</sup>, the basin had an accumulated total of 103% of normal SWE and 98% of average water year-to-date precipitation. Compared to March 1<sup>st</sup> of water year 2015, SWE and total precipitation were down from 112% and 111%, respectively.

All reservoirs in the basin remained at near or above normal levels. With a combined current average of 115%, reservoir levels notched up two points from February 1<sup>st</sup> but fell a few points from this time last year.

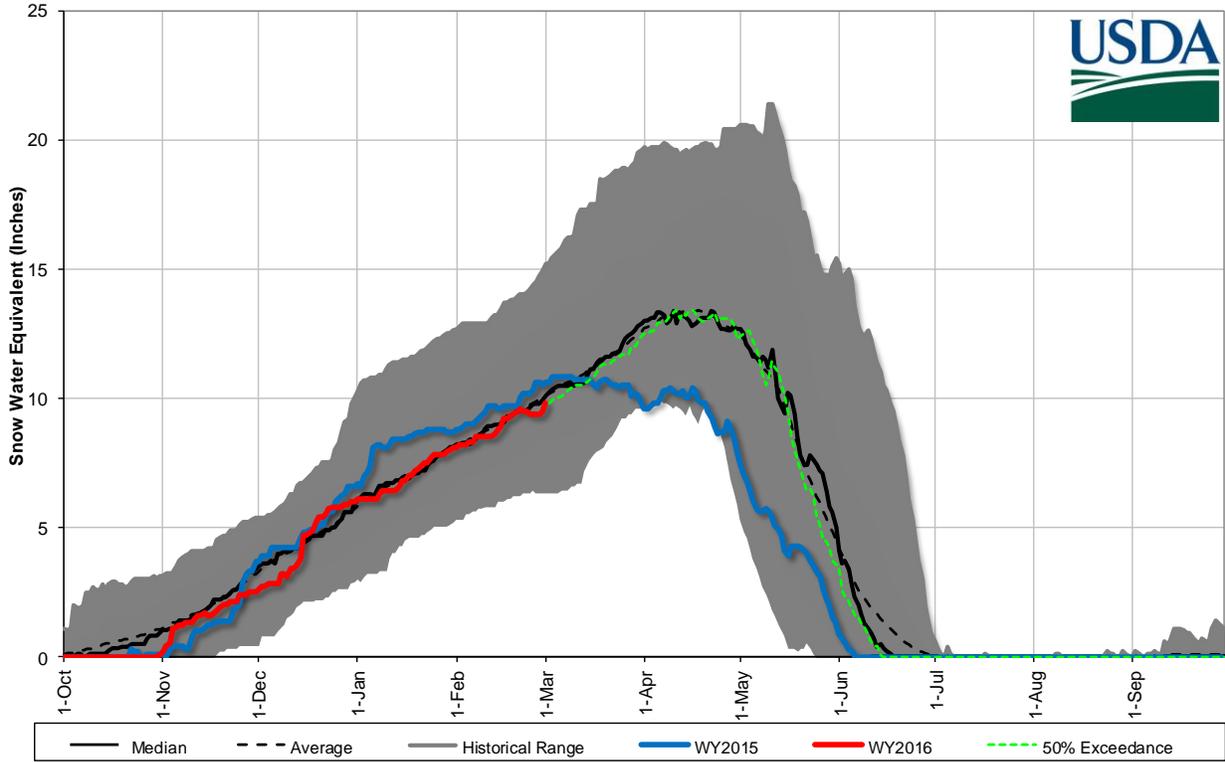
Streamflow forecasts for March 1<sup>st</sup> should be used knowing 65 to 80% of our annual snowpack has accumulated and conditions can change before runoff occurs. The 50% exceedance forecast assumes normal conditions will occur from this point and through snowmelt. Current basin-wide streamflows for the 50% exceedance are 81% of average for the April-July time period.

<b>Missouri Mainstem River Basin Data Summary</b>		<b>3/1/2016</b>	
<b>Snowpack</b>			
	Percent of 1981-2010 Normal (Median)	Last Year Percentage of Normal (Median)	
Basin-Wide	103%	112%	
<b>Precipitation</b>			
	Monthly Percentage of Average	WYTD Percentage of 1981-2010 Average*	Last Year Percentage of Average
Mountain Precipitation	98%	98%	111%
Valley Precipitation	98%	98%	111%
Basin Precipitation	98%	98%	111%
<b>Reservoir Storage</b>			
	Percentage of Average	Percentage of Capacity (Total)	Last Year Percentage of Average
Basin-Wide Storage	115%	79%	117%
<b>Streamflow Forecast</b>			
	50 % Exceedance Forecast Percentage of Average	50 % Exceedance Forecast % of Last Year's Flows	Last Year Percentage of Average
Basin-Wide Apr-July	81%	107%	76%

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

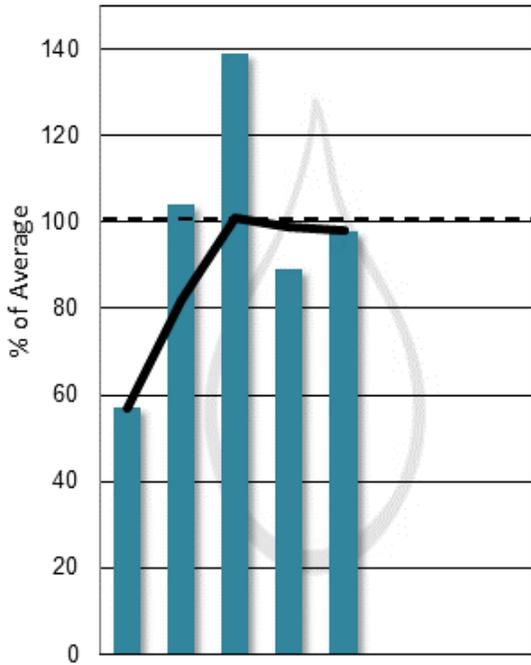
\*\*Basin-wide streamflows are an average of the individual streamflow points within the basin for the 50 percent exceedance forecast. Consult the individual streamflow forecasts in the table below for the range of forecasts at an individual point.

**Missouri Headwaters Mainstem River Basin (below Toston, above the Smith) Snowpack with Non-Exceedence**  
*Based on provisional SNOTEL daily data as of 3/1/2016*



**Mountain and Valley  
Precipitation**

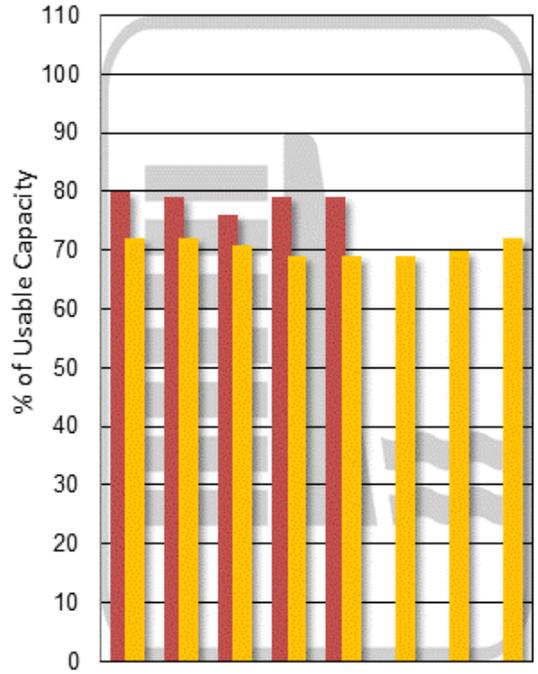
Monthly (teal bar), Year-to-date (black line)



Oct Nov Dec Jan Feb Mar Apr May

**End of Month Reservoir  
Storage**

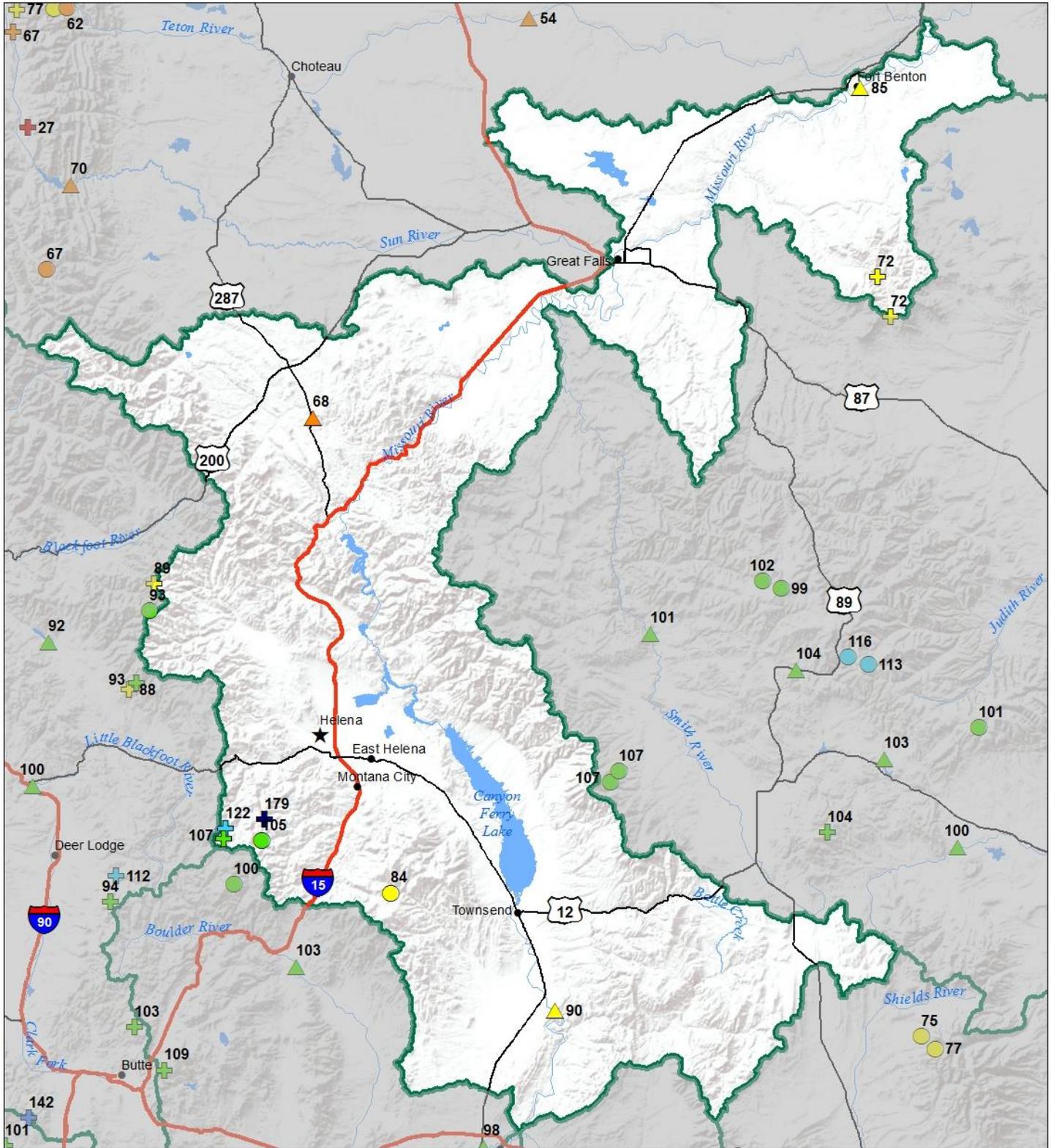
% Capacity (red bar), Avg % Capacity (yellow bar)



Oct Nov Dec Jan Feb Mar Apr May

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

# Headwaters Mainstem (Missouri) River Basin Streamflow Forecast, Snow Water Equivalent Percentage of Normal March 1, 2016



### Snow Water Equivalent Percent of Normal

#### SNOTEL

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

#### Snowcourse

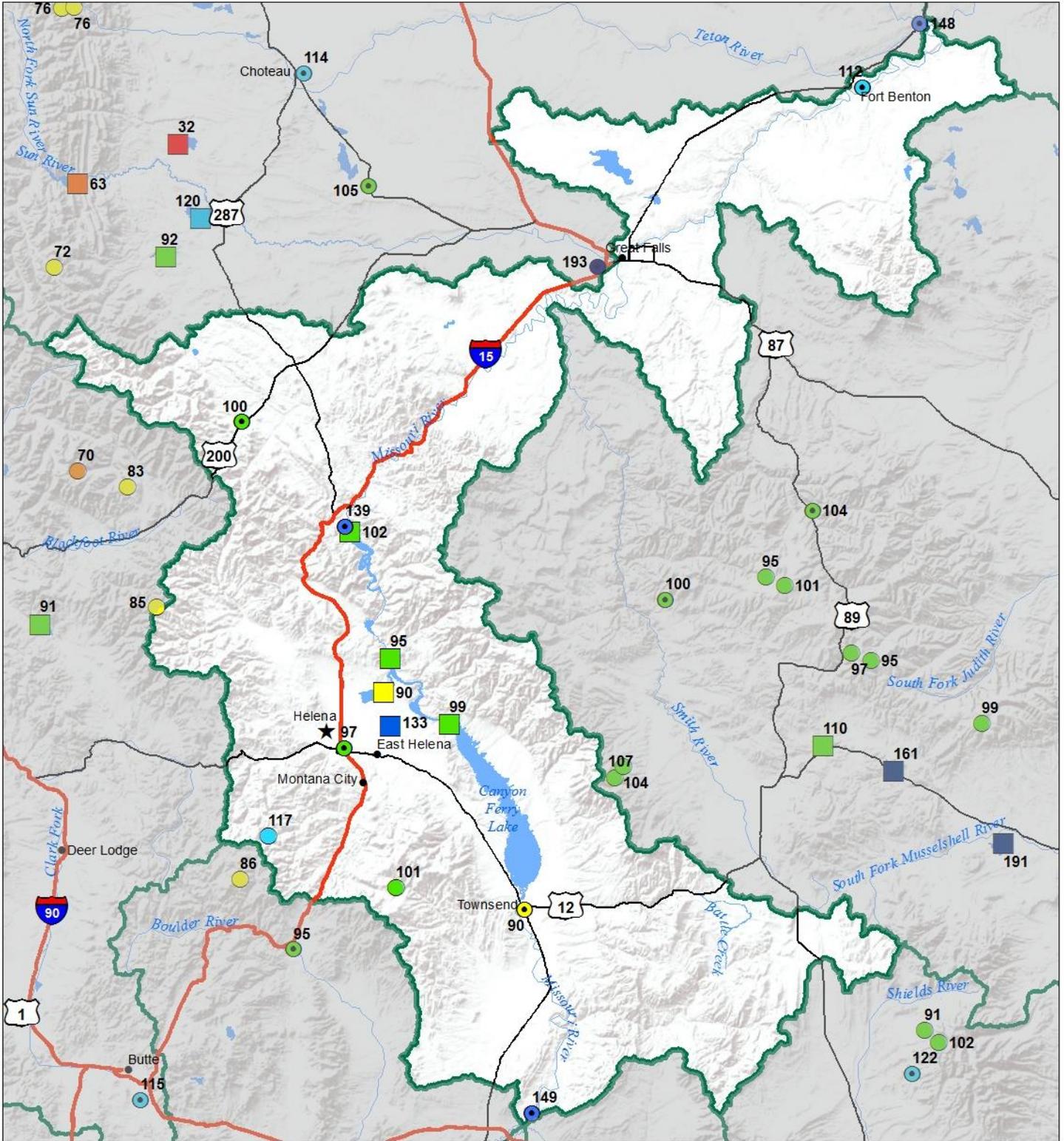
- ⊕ > 150%
- ⊕ 131 - 150%
- ⊕ 111 - 130%
- ⊕ 91 - 110%
- ⊕ 71 - 90%
- ⊕ 51 - 70%
- ⊕ 1 - 50%
- ⊕ \*

### Streamflow Forecast Percent of Average Flows

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



# Headwaters Mainstem (Missouri) River Basin Water Year to Date Precipitation and Reservoir Levels Percentage of Normal March 1, 2016



### Precipitation Percent of Normal

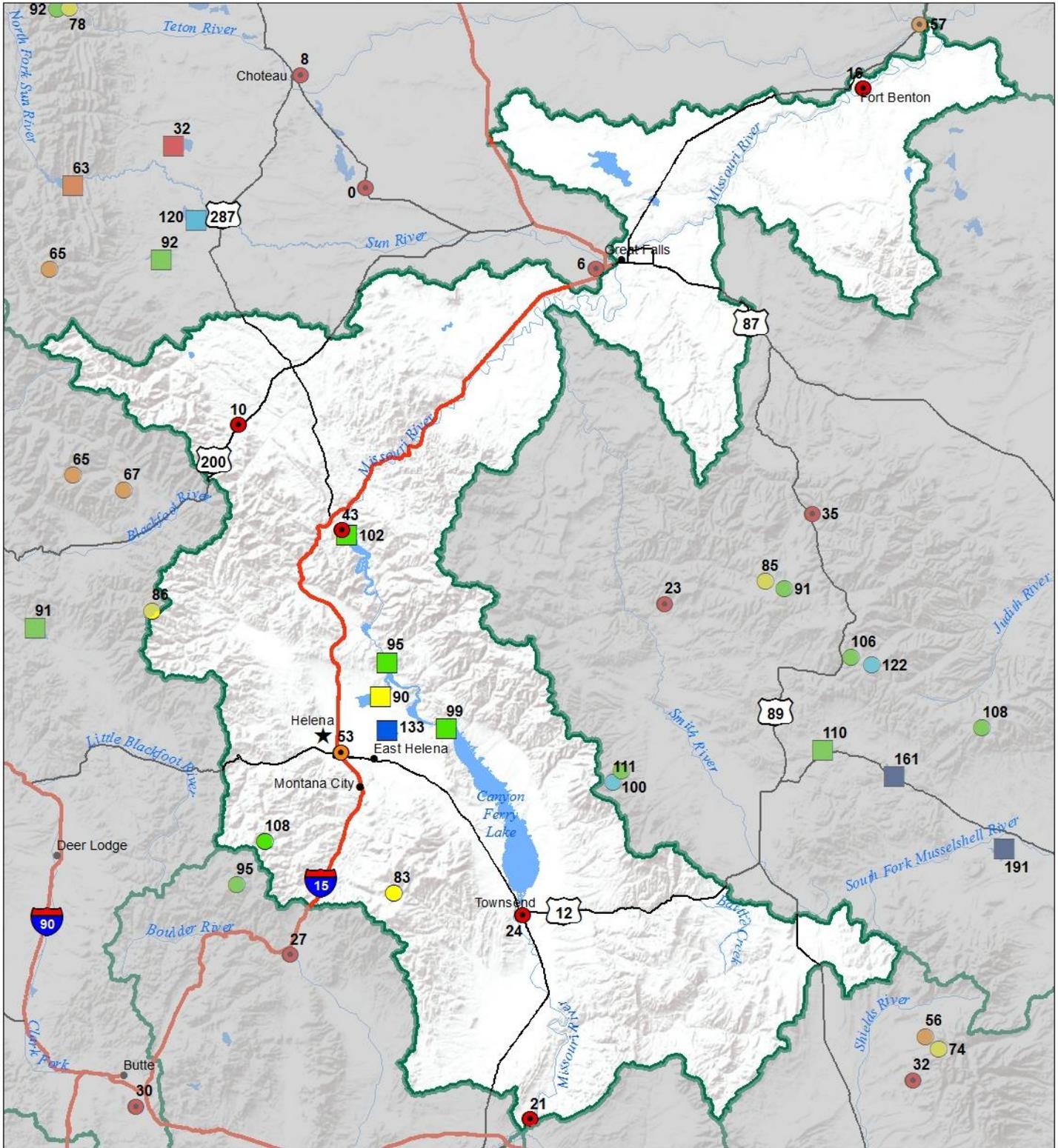
SNOTEL		COOP/ACIS	
● > 150%	● 71 - 90%	● > 150%	● 71 - 90%
● 131 - 150%	● 51 - 70%	● 131 - 150%	● 51 - 70%
● 111 - 130%	● 1 - 50%	● 111 - 130%	● 1 - 50%
● 91 - 110%		● 91 - 110%	

### Reservoirs Percent of Normal

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



# Headwaters Mainstem (Missouri) River Basin Monthly Precipitation and Reservoir Levels Percentage of Normal March 1, 2016 (February 1, 2016 - March 1, 2016)



### Precipitation Percent of Normal

SNOTEL		COOP/ACIS	
<span style="color: blue;">●</span> > 150%	<span style="color: yellow;">●</span> 71 - 90%	<span style="color: blue;">●</span> > 150%	<span style="color: yellow;">●</span> 71 - 90%
<span style="color: blue;">●</span> 131 - 150%	<span style="color: orange;">●</span> 51 - 70%	<span style="color: blue;">●</span> 131 - 150%	<span style="color: orange;">●</span> 51 - 70%
<span style="color: cyan;">●</span> 111 - 130%	<span style="color: red;">●</span> 1 - 50%	<span style="color: cyan;">●</span> 111 - 130%	<span style="color: red;">●</span> 1 - 50%
<span style="color: green;">●</span> 91 - 110%		<span style="color: green;">●</span> 91 - 110%	

### Reservoirs Percent of Normal

<span style="color: darkblue;">■</span> > 150%
<span style="color: blue;">■</span> 131 - 150%
<span style="color: cyan;">■</span> 111 - 130%
<span style="color: green;">■</span> 91 - 110%
<span style="color: yellow;">■</span> 71 - 90%
<span style="color: orange;">■</span> 51 - 70%
<span style="color: red;">■</span> 1 - 50%



## Missouri Mainstem Basin Streamflow Forecasts - March 1, 2016

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

MISSOURI MAINSTEM BASIN	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Missouri R at Toston <sup>2</sup>	APR-JUL	915	1330	1610	90%	1890	2300	1790
	APR-SEP	1050	1530	1860	90%	2190	2670	2070
Dearborn R nr Craig	APR-JUL	12.7	41	61	69%	81	109	89
	APR-SEP	13.9	44	65	68%	86	116	95
Missouri R at Fort Benton <sup>2</sup>	APR-JUL	1180	1790	2200	84%	2610	3220	2610
	APR-SEP	1420	2150	2640	85%	3130	3860	3110
Missouri R nr Virgelle <sup>2</sup>	APR-JUL	1250	1950	2430	81%	2910	3610	3000
	APR-SEP	1480	2310	2880	82%	3450	4280	3520
Missouri R nr Landusky <sup>2</sup>	APR-JUL	1330	2060	2550	81%	3040	3770	3160
	APR-SEP	1580	2450	3040	82%	3630	4500	3720
Missouri R bl Fort Peck Dam <sup>2</sup>	APR-JUL	1210	2010	2550	79%	3090	3890	3240
	APR-SEP	1230	2230	2910	79%	3590	4590	3700
Lake Sakakawea Inflow <sup>2</sup>	APR-JUL	3530	5370	6620	80%	7870	9710	8310
	APR-SEP	3550	5840	7390	79%	8940	11200	9400

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

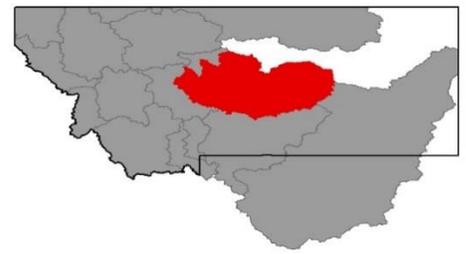
2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions

3) Median value used in place of average

Reservoir Storage End of February, 2016	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Canyon Ferry Lake	1473.8	1531.2	1482.0	2043.0
Helena Valley Reservoir	5.8	5.1	4.4	9.2
Lake Helena	9.8	9.9	10.9	12.7
Hauser Lake & Lake Helena	69.9	70.3	73.7	74.6
Holter Lake	80.9	81.2	79.5	81.9
Fort Peck Lake	15006.3	15251.6	12838.0	18910.0
Basin-wide Total	16646.5	16949.4	14488.5	21131.4
# of reservoirs	6	6	6	6

Watershed Snowpack Analysis March 1, 2016	# of Sites	% Median	Last Year % Median
HEADWATERS MAINSTEM	9	103	112
SMITH-JUDITH-MUSSELSHELL	11	106	109
SUN-TETON-MARIAS	10	64	87
MAINSTEM ab FT PECK RES	31	88	100
MILK RIVER BASIN	9	48	48
MISSOURI MAINSTEM BASIN	40	84	95

# Smith-Judith-Musselshell River Basin



February in the Smith-Judith-Musselshell basin was relatively average. The month began with a slightly above average snowpack with about eight inches of snow water equivalent (SWE) in the mountains. Snow trickled in, holding levels at near normal, until a large storm in the middle of the month impacted the area. This storm added nearly an inch of SWE to higher elevation snowpacks and lifted total accumulation to 109% of average. Mild weather filled out the remainder of the month with an additional quarter inch of SWE accumulating. On March 1<sup>st</sup> the average SWE across the Smith-Judith-Musselshell basin was 10.4 inches or about 106% of normal. SWE conditions are slightly below those recorded on March 1<sup>st</sup> of last year.

In terms of total precipitation, February brought 102% of average, resulting in a water year total of 106%. Considering sub-basins, both the Smith and Judith basins received above normal amounts for the month, 103% and 122% respectively, and remained above normal for the water year. The Musselshell, however, was low (79%) for the month and at near normal (95%) for the water year. Compared to last year, the Smith and Judith River basins remained below 2015 levels and the Musselshell remained above.

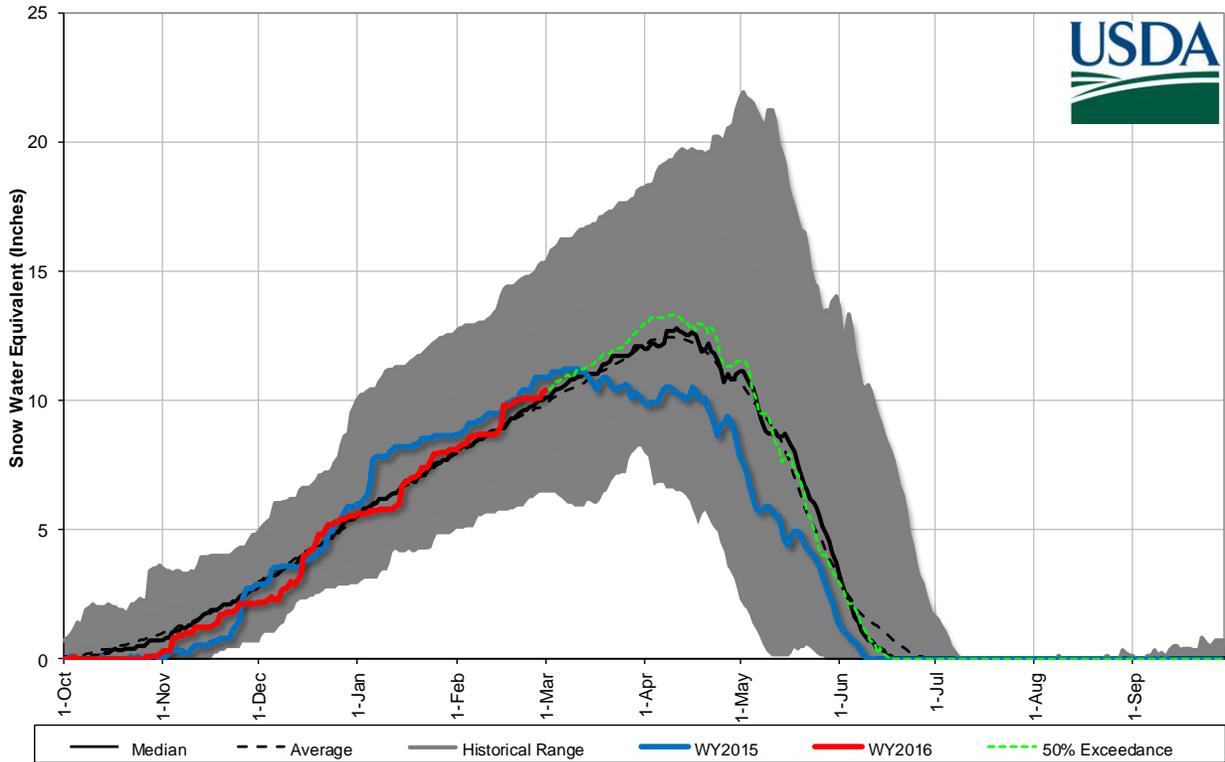
Reservoir storage is well above average in the basin and is currently 142% of average for March 1<sup>st</sup>.

Streamflow forecasts for March 1<sup>st</sup> should be used knowing 65 to 80% of our annual snowpack has accumulated and conditions can change before runoff occurs. The 50% exceedance forecast assumes normal conditions will occur from this point and through snowmelt. Current basin-wide streamflows for the 50% exceedance are 91% of average for the April-July time period.

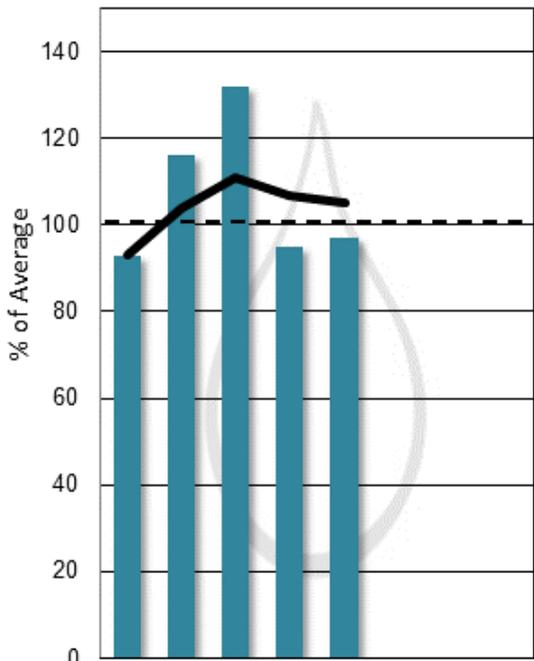
<b>Smith-Judith-Musselshell River Basin Data Summary</b>		<b>3/1/2016</b>	
	Percent of 1981-2010 Normal (Median)	Last Year Percentage of Normal (Median)	
<b>Snowpack</b>			
Basin-Wide	106%	109%	
	Monthly Percentage of Average	WYTD Percentage of 1981-2010 Average*	Last Year Percentage of Average
<b>Precipitation</b>			
Mountain Precipitation	104%	102%	111%
Valley Precipitation	67%	114%	87%
Basin Precipitation	97%	105%	106%
	Percentage of Average	Percentage of Usable Capacity	Last Year Percentage of Average
<b>Reservoir Storage</b>			
Basin-Wide Storage	142%	74%	164%
	50 % Exceedance Forecast Percentage of Average	50 % Exceedance Forecast % of Last Year's Flows	Last Year Percentage of Average
<b>Streamflow Forecast</b>			
Basin-Wide Apr-July	91%	91%	98%
*Water Year-to-Date (WYTD) Precipitation is October 1st - Current			
**Basin-wide streamflows are an average of the individual streamflow points within the basin for the 50 percent exceedance forecast. Consult the individual streamflow forecasts in the table below for the range of forecasts at an individual point.			

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

*Based on provisional SNOTEL daily data as of 3/1/2016*

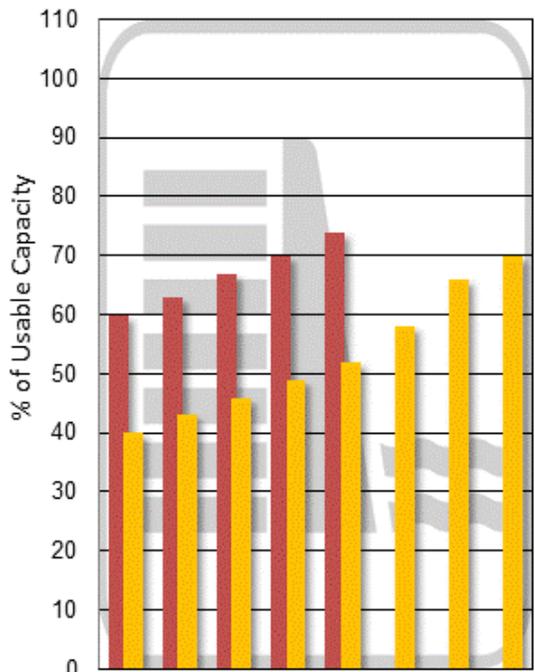


**Mountain and Valley Precipitation**



Oct Nov Dec Jan Feb Mar Apr May

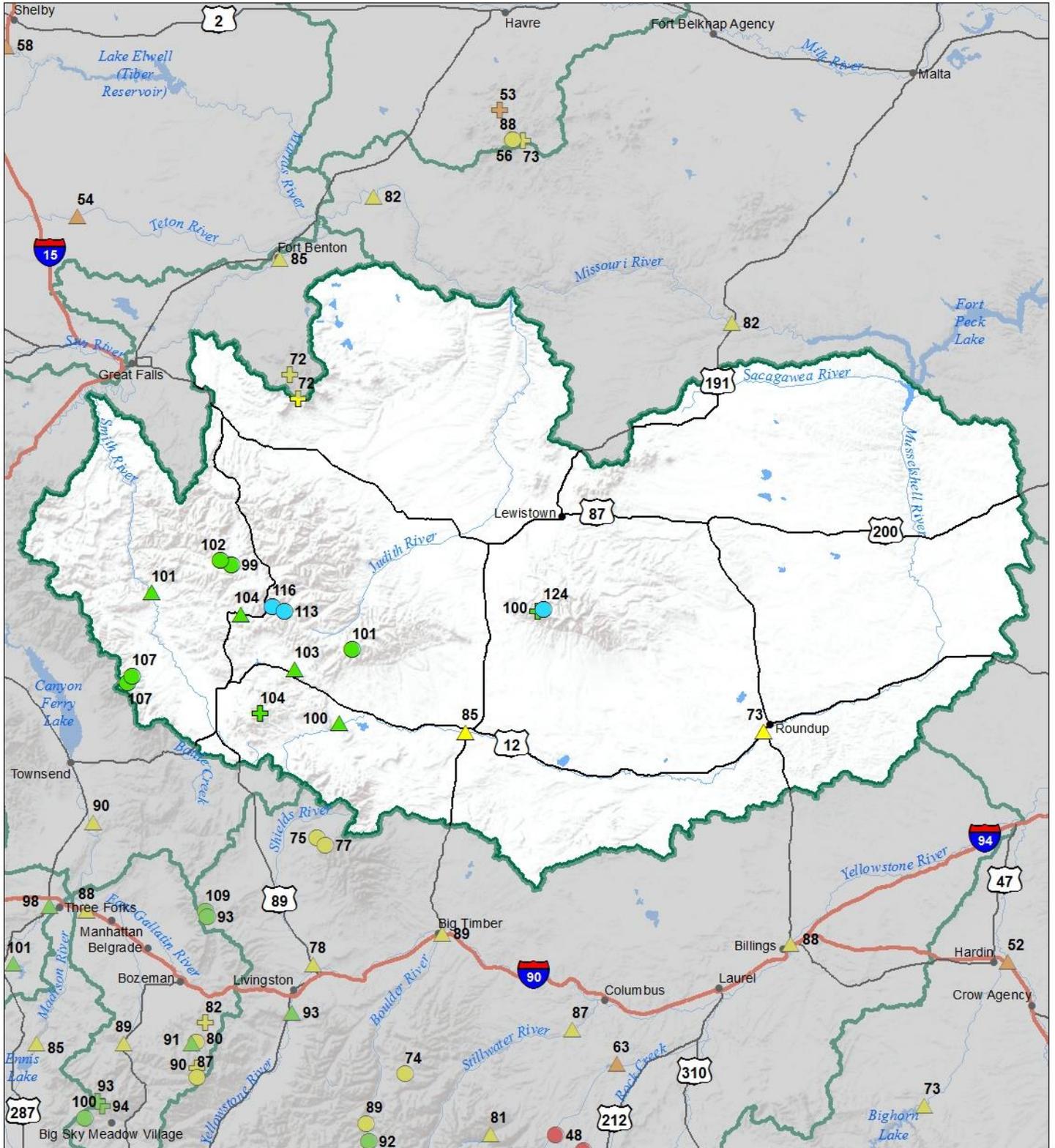
**End of Month Reservoir Storage**



Oct Nov Dec Jan Feb Mar Apr May

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

# Smith-Judith-Musselshell River Basin Streamflow Forecast, Snow Water Equivalent Percentage of Normal March 1, 2016



### Snow Water Equivalent Percent of Normal

#### SNOTEL

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

#### Snowcourse

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

### Streamflow Forecast Percent of Average Flows

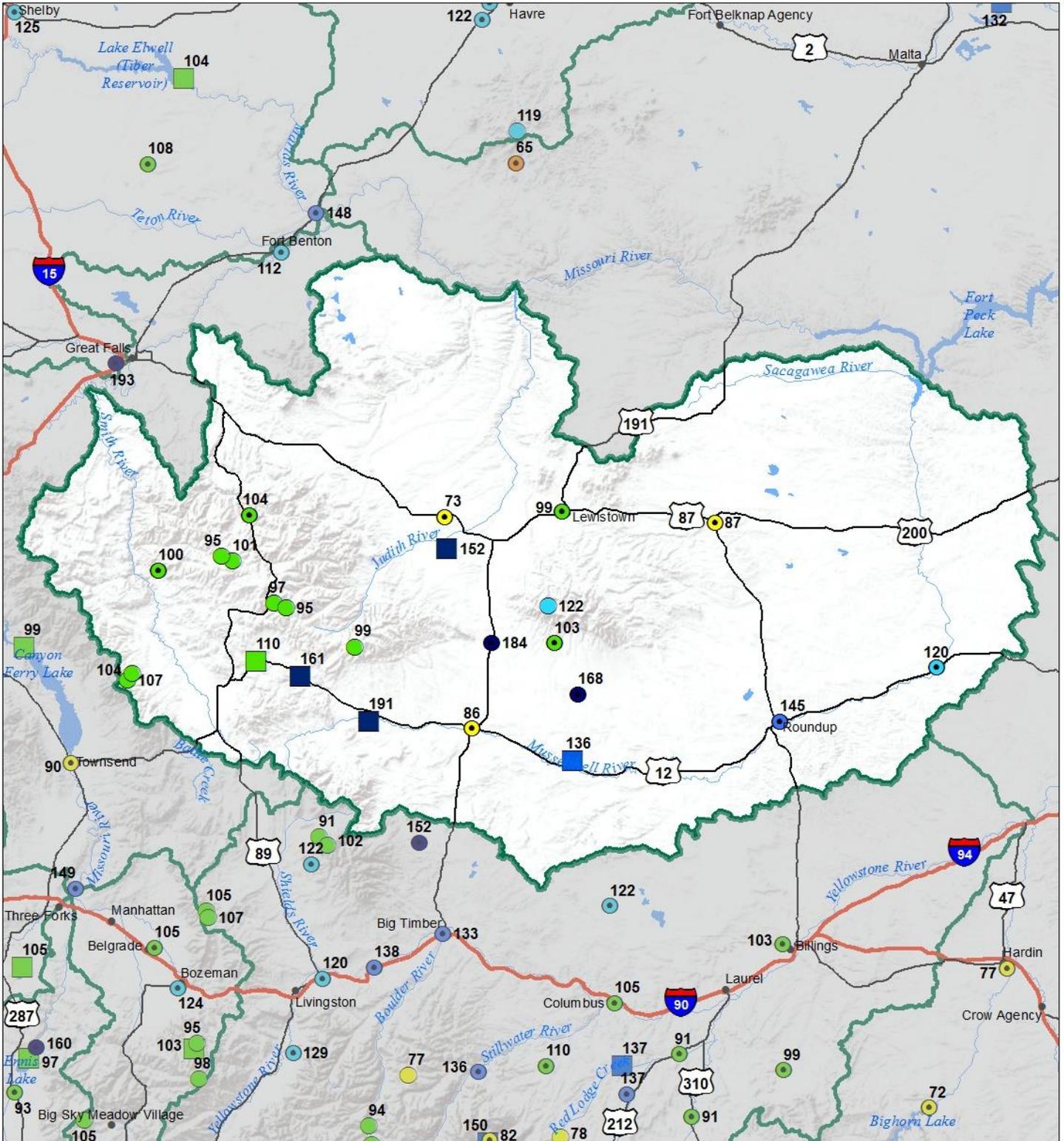
- ▲ > 150%
- ▲ 131 - 150%
- ▲ 111 - 130%
- ▲ 91 - 110%
- ▲ 71 - 90%
- ▲ 51 - 70%
- ▲ 1 - 50%



# Smith-Judith-Musselshell River Basin

## Water Year to Date Precipitation and Reservoir Levels Percentage of Normal

### March 1, 2016



#### Precipitation Percent of Normal

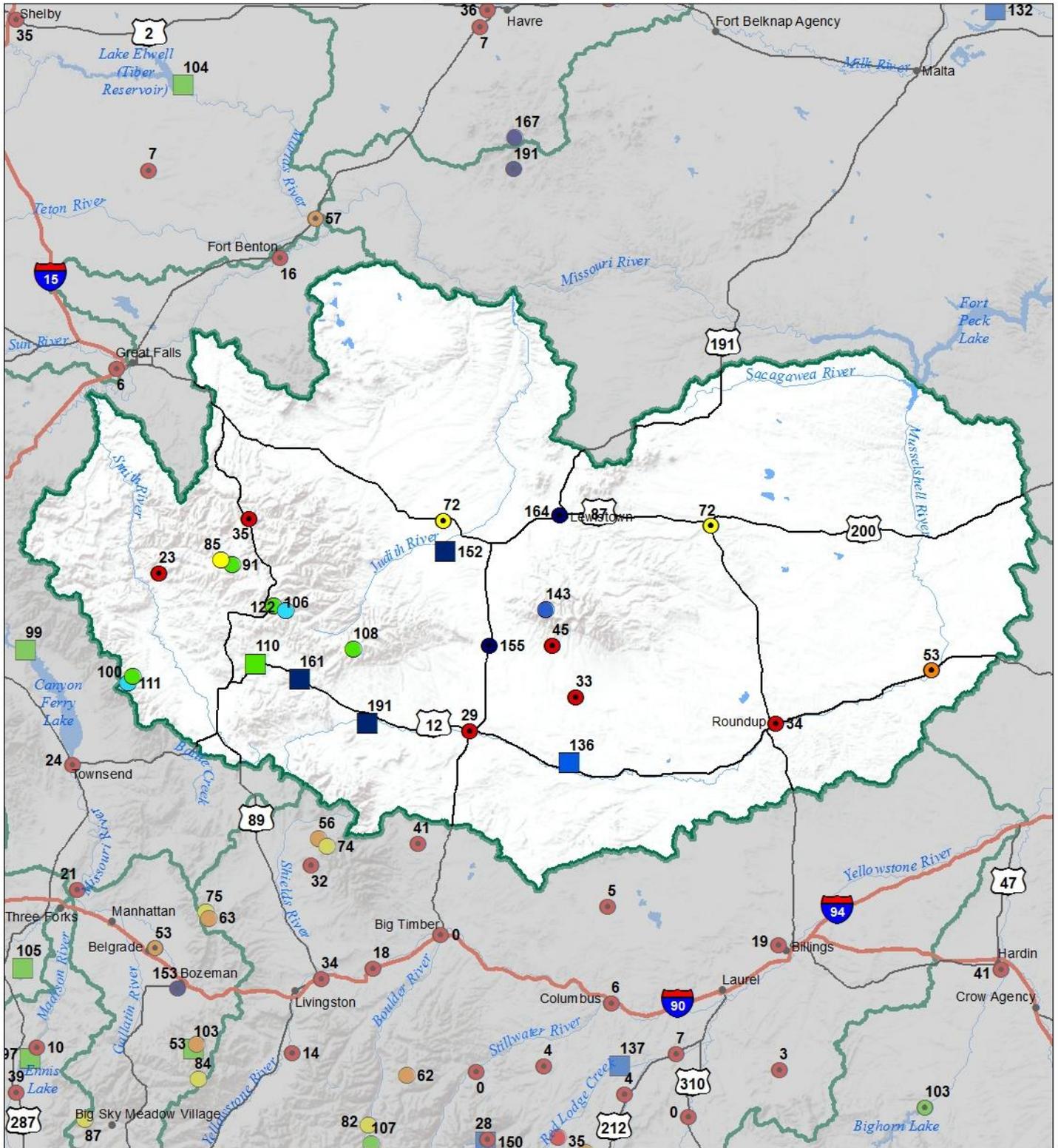
SNOTEL		COOP/ACIS	
<span style="color: blue;">●</span> > 150%	<span style="color: yellow;">●</span> 71 - 90%	<span style="color: blue;">●</span> > 150%	<span style="color: yellow;">●</span> 71 - 90%
<span style="color: lightblue;">●</span> 131 - 150%	<span style="color: orange;">●</span> 51 - 70%	<span style="color: lightblue;">●</span> 131 - 150%	<span style="color: orange;">●</span> 51 - 70%
<span style="color: cyan;">●</span> 111 - 130%	<span style="color: red;">●</span> 1 - 50%	<span style="color: cyan;">●</span> 111 - 130%	<span style="color: red;">●</span> 1 - 50%
<span style="color: green;">●</span> 91 - 110%		<span style="color: green;">●</span> 91 - 110%	

#### Reservoirs Percent of Normal

<span style="color: darkblue;">■</span> > 150%
<span style="color: blue;">■</span> 131 - 150%
<span style="color: lightblue;">■</span> 111 - 130%
<span style="color: green;">■</span> 91 - 110%
<span style="color: yellow;">■</span> 71 - 90%
<span style="color: orange;">■</span> 51 - 70%
<span style="color: red;">■</span> 1 - 50%



# Smith-Judith-Musselshell River Basin Monthly Precipitation and Reservoir Levels Percentage of Normal March 1, 2016 (February 1, 2016 - March 1, 2016)



### 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%



## Smith-Judith-Musselshell Streamflow Forecasts - March 1, 2016

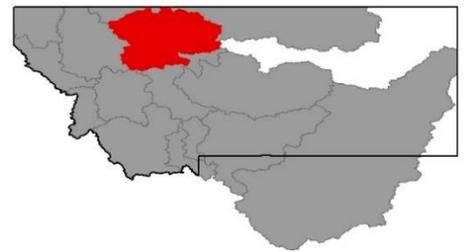
Forecast Exceedance Probabilities for Risk Assessment  
Chance that actual volume will exceed forecast

<b>SMITH-JUDITH-MUSSEL SHELL</b>	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Sheep Ck nr White Sulphur Springs	APR-JUL	10.4	13.8	16.1	104%	18.4	22	15.5
	APR-SEP	12.5	16.5	19.2	104%	22	26	18.4
Smith R bl Eagle CK <sup>2</sup>	APR-JUL	51	85	107	101%	130	163	106
	APR-SEP	51	90	117	101%	144	183	116
NF Musselshell R nr Delpine	APR-JUL	1.44	2.6	3.4	100%	4.3	5.4	3.4
	APR-SEP	1.82	3.2	4.1	103%	5	6.3	4
SF Musselshell R ab Martinsdale	APR-JUL	9	24	35	100%	45	61	35
	APR-SEP	10.3	27	38	100%	49	65	38
Musselshell R at Harlowton <sup>2</sup>	APR-JUL	-1.9	24	48	84%	72	106	57
	APR-SEP	-1.2	25	50	85%	75	112	59
Musselshell R nr Roundup <sup>2</sup>	APR-JUL	-23	3	48	72%	93	159	67
	APR-SEP	-26	3.4	48	73%	93	159	66

- 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
- 3) Median value used in place of average

<b>Reservoir Storage End of February, 2016</b>	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Smith River Res	6.4	9.0	5.8	10.6
Ackley Lake	3.9	3.9	2.6	7.0
Bair Res	5.1	6.2	3.2	7.0
Martinsdale Res	14.9	17.9	7.8	23.1
Deadman's Basin Res	58.9	65.9	43.4	72.2
<b>Basin-wide Total</b>	<b>89.3</b>	<b>102.9</b>	<b>62.8</b>	<b>119.9</b>
# of reservoirs	5	5	5	5

<b>Watershed Snowpack Analysis March 1, 2016</b>	# of Sites	% Median	Last Year % Median
SMITH	7	107	114
HIGHWOOD	2	72	39
JUDITH	5	110	114
MUSSEL SHELL	3	96	97
SMITH-JUDITH-MUSSEL SHELL	11	106	109



## Sun-Teton-Marias River Basin

This winter has not been kind so far to the Sun-Teton-Marias River basins, the storms patterns that typically drop snow in the basin have not occurred this winter and there has been well below average snowfall during most of the winter. February monthly snow totals were better than they have been in the past few months but favored higher elevations in the basin. Low elevation snowcourses and SNOTEL sites are well below average in the basin for March 1<sup>st</sup> ranging from 27% to 62% of normal. The low elevation (5750') Dupuyer Creek SNOTEL site is snow free as of March 1<sup>st</sup>, experiencing melt from the above average temperatures during the month of February. This is the earliest melt-out date since automated daily records began at the site in 1984. Currently, the snowpack in the Sun River basin is 68% of normal for March 1<sup>st</sup>, the Teton River basin is 54% of normal, and the Marias River basin is 61% of normal at this time. Overall, the Sun-Teton-Marias River basin as a whole is well below average at 64% of normal for March 1<sup>st</sup>. Water users in the region should hope that normal or above average precipitation is received this spring to help the basin to recover from low snow totals early in the year. Spring is climatically favored to bring wetter conditions to the area and this will be needed after dry conditions last summer and low snowpack totals so far this water year.

Precipitation was well below average at valley locations during the month of February, but it should be noted that February is not typically a big month in the river basins. Valley weather stations reported <50% of average precipitation through the month. Mountain SNOTEL site fared better receiving 89% of average precipitation for February. Until this past month valley precipitation has been near to above average, keeping the water year-to-date precipitation at 89% of average for March 1<sup>st</sup>. Mountain precipitation has been below average through this water year and remains below average at 77% on March 1<sup>st</sup>. The combined mountain and valley precipitation for the Sun-Teton-Marias River basin is currently 80% of average on March 1<sup>st</sup>.

Reservoir storage ranges from below average at Pishkun (32%) and Gipson (63%) Reservoirs to near or above average at larger reservoirs in the eastern part of the basin. Overall, basin-wide storage is 99% of average for March 1<sup>st</sup>.

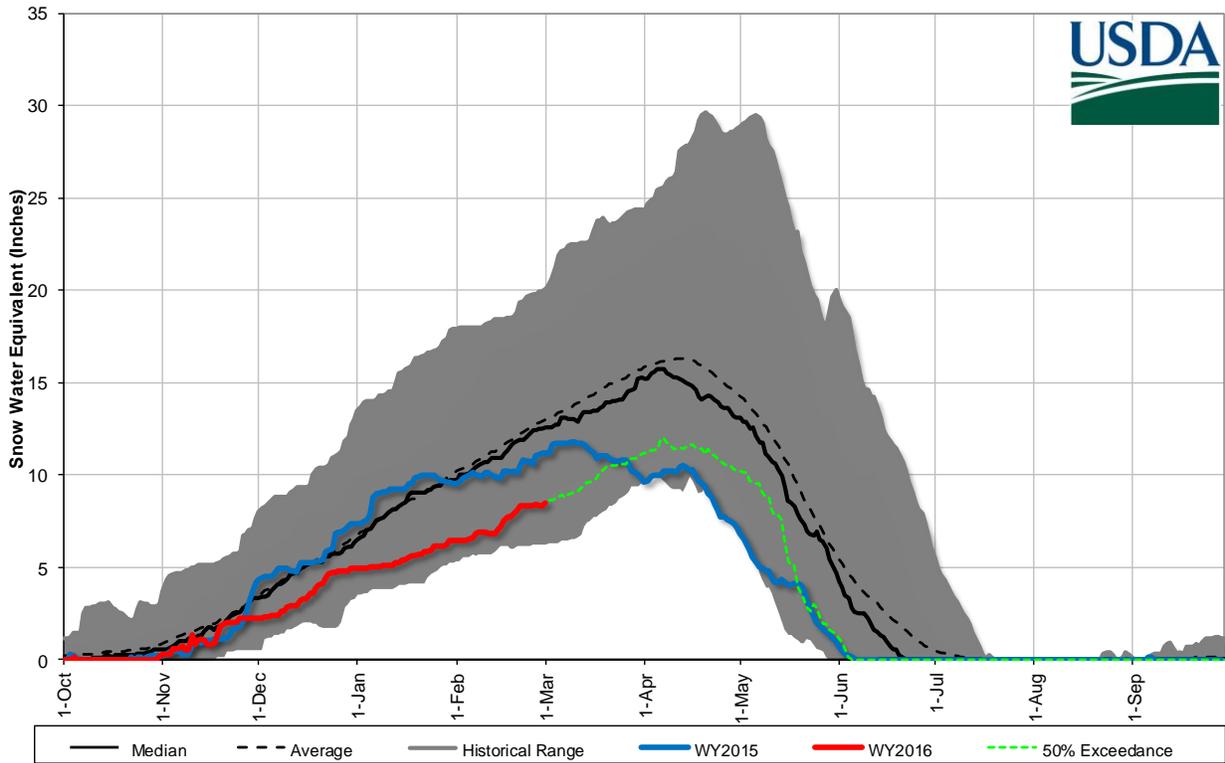
Streamflow forecasts for March 1st should be used knowing 65 to 80% of our annual snowpack has accumulated and conditions can change before runoff occurs. The 50% exceedance forecast assumes normal conditions will occur from this point and through snowmelt. Current basin-wide streamflows for the 50% exceedance are 66% of average for the April-July time period.

<b>Sun-Teton-Marias River Basin Data Summary</b>		<b>3/1/2016</b>	
	Percent of 1981-2010 Normal (Median)	Last Year Percentage of Normal (Median)	
<b>Snowpack</b>			
Basin-Wide	64%	87%	
	Monthly Percentage of Average	WYTD Percentage of 1981-2010 Average*	Last Year Percentage of Average
<b>Precipitation</b>			
Mountain Precipitation	89%	77%	110%
Valley Precipitation	50%	89%	119%
Basin Precipitation	77%	80%	113%
	Percentage of Average	Percentage of Usable Capacity	Last Year Percentage of Average
<b>Reservoir Storage</b>			
Basin-Wide Storage	99%	51%	114%
	50 % Exceedance Forecast Percentage of Average	50 % Exceedance Forecast % of Last Year's Flows	Last Year Percentage of Average
<b>Streamflow Forecast</b>			
Basin-Wide Apr-July	66%	109%	57%

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

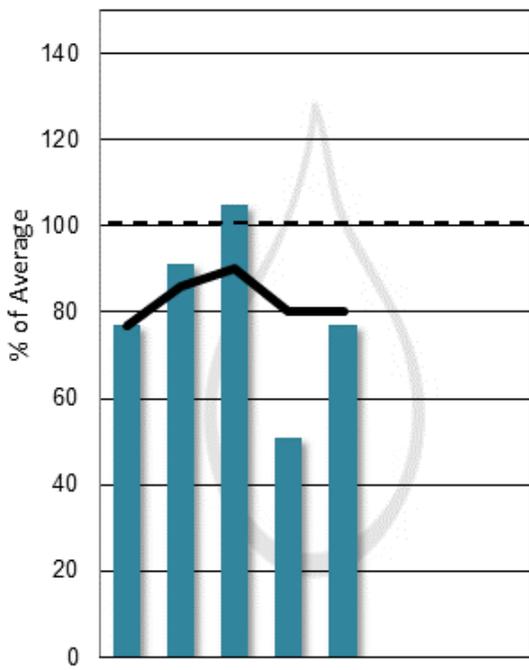
\*\*Basin-wide streamflows are an average of the individual streamflow points within the basin for the 50 percent exceedance forecast. Consult the individual streamflow forecasts in the table below for the range of forecasts at an individual point.

**Sun-Teton-Marias River Basin Snowpack with Non-Exceedence Projections**  
*Based on provisional SNOTEL daily data as of 3/1/2016*



**Mountain and Valley Precipitation**

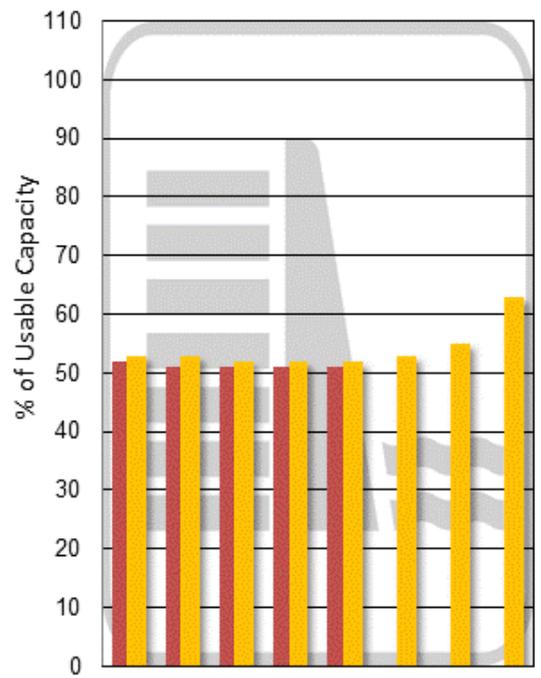
Monthly Year-to-date



Oct Nov Dec Jan Feb Mar Apr May

**End of Month Reservoir Storage**

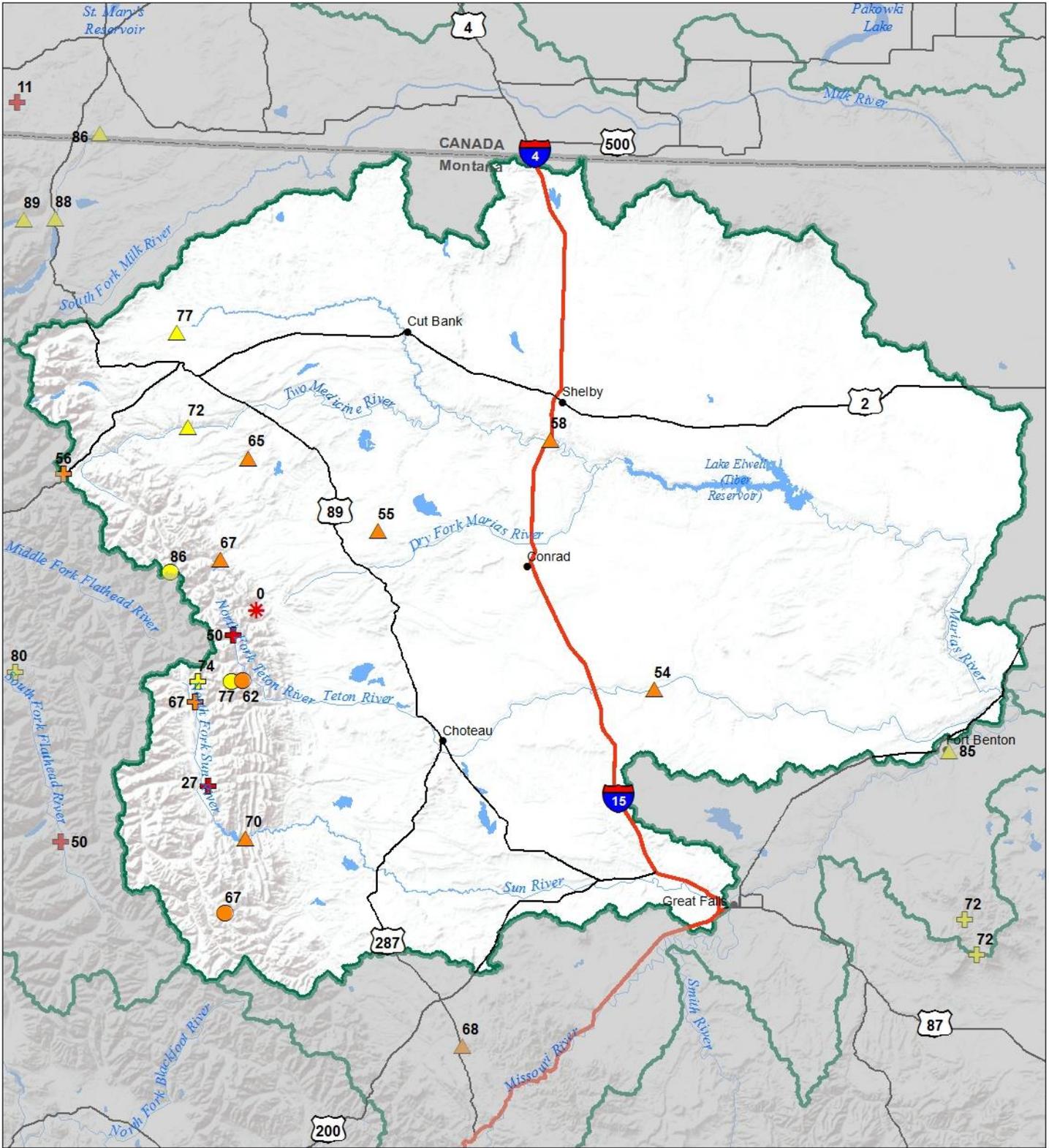
% Capacity Avg % Capacity



Oct Nov Dec Jan Feb Mar Apr May

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

# Sun-Teton-Marias River Basin Streamflow Forecast, Snow Water Equivalent Percentage of Normal March 1, 2016



### Snow Water Equivalent Percent of Normal

#### SNOTEL

- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%

- 71 - 90%
- 51 - 70%
- 1 - 50%
- \*

#### Snowcourse

- ⊕ > 150%
- ⊕ 131 - 150%
- ⊕ 111 - 130%
- ⊕ 91 - 110%
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- ⊕ 51 - 70%
- ⊕ 1 - 50%
- ⊕ \*

### Streamflow Forecast Percent of Average Flows

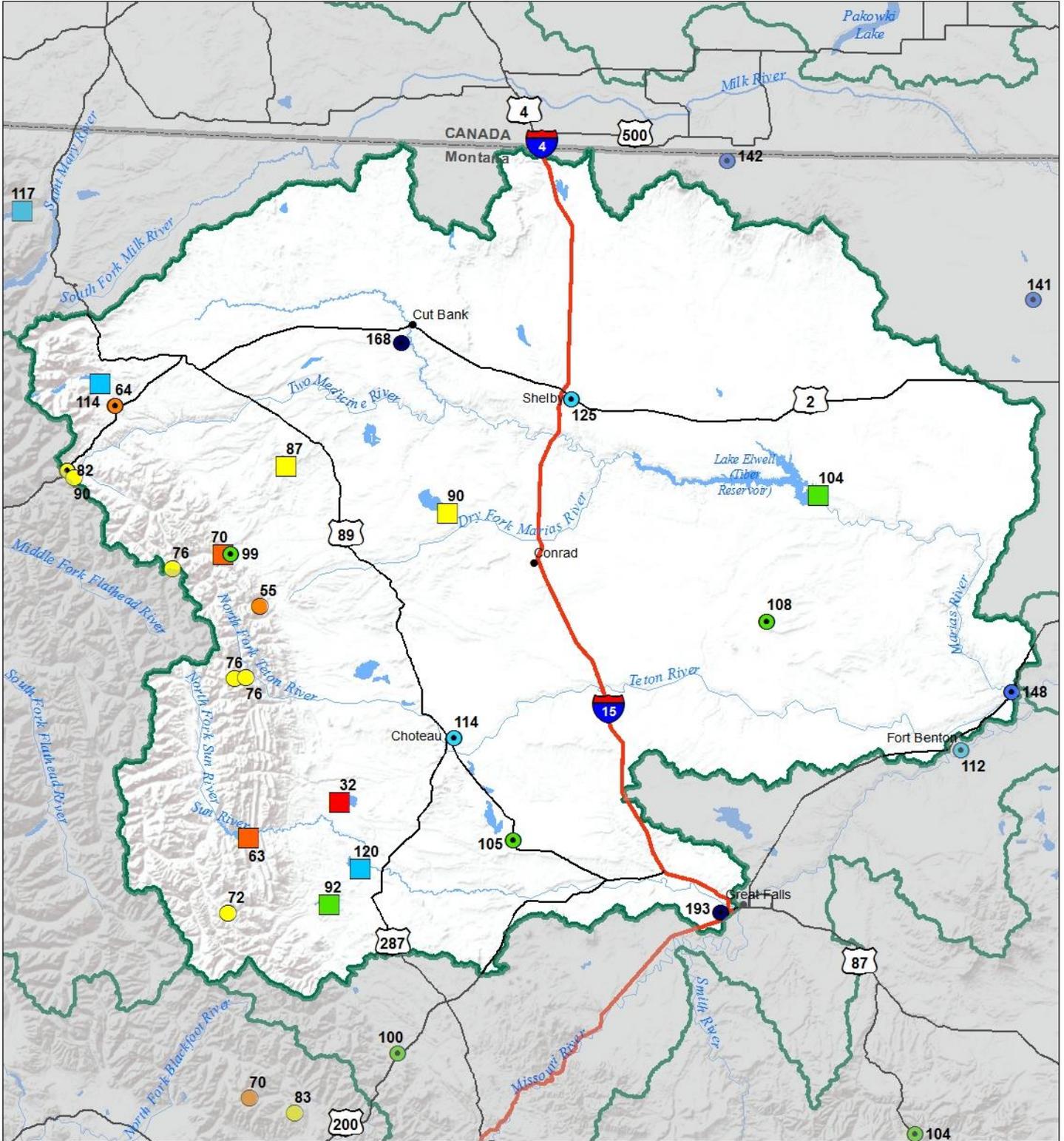
- ▲ > 150%
- ▲ 131 - 150%
- ▲ 111 - 130%
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- ▲ 71 - 90%
- ▲ 51 - 70%
- ▲ 1 - 50%



# Sun-Teton-Marias River Basin

## Water Year to Date Precipitation and Reservoir Levels Percentage of Normal

### March 1, 2016



#### Precipitation Percent of Normal

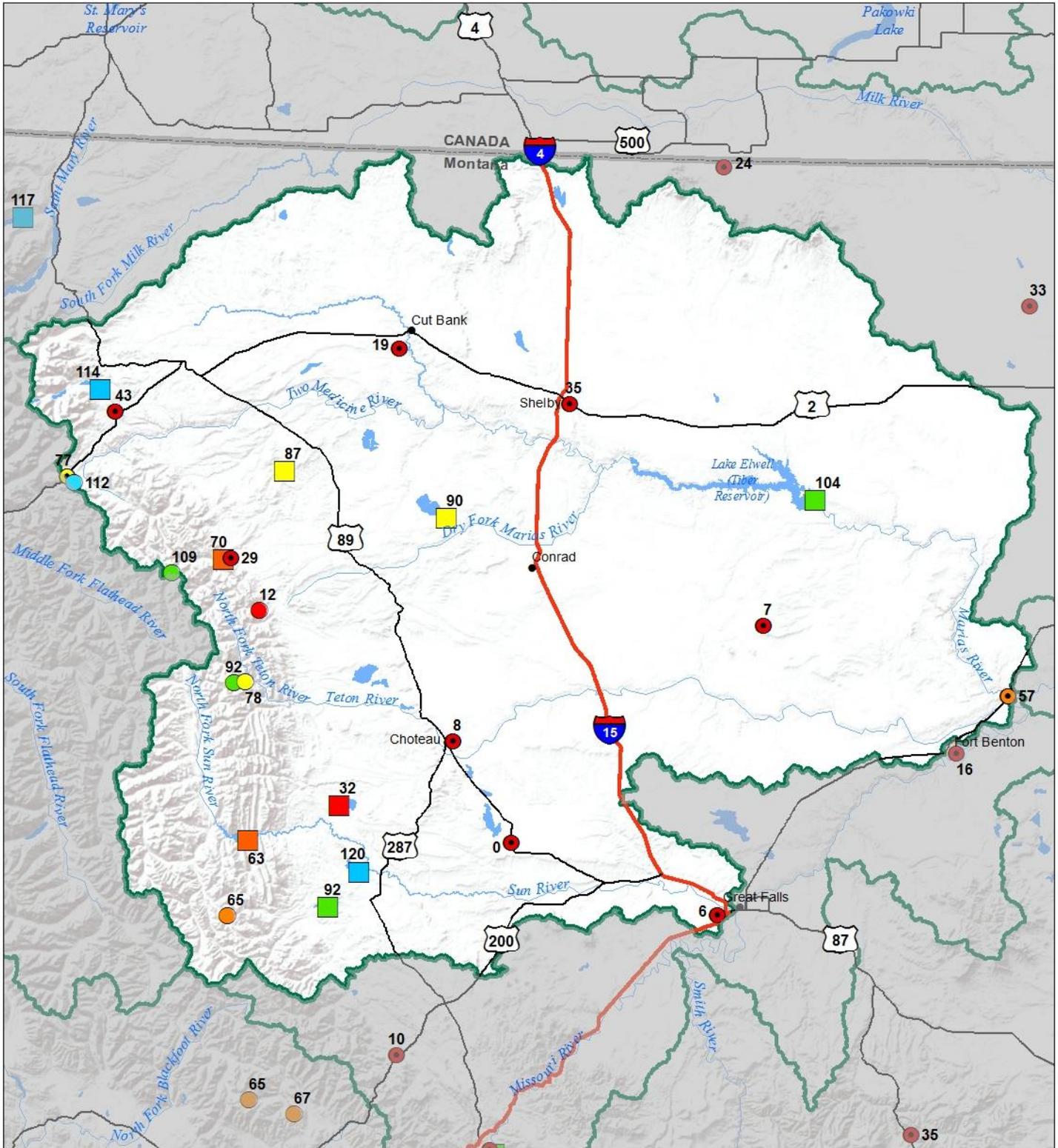
SNOTEL		COOP/ACIS	
● > 150%	● 71 - 90%	● > 150%	● 71 - 90%
● 131 - 150%	● 51 - 70%	● 131 - 150%	● 51 - 70%
● 111 - 130%	● 1 - 50%	● 111 - 130%	● 1 - 50%
● 91 - 110%		● 91 - 110%	

#### Reservoirs Percent of Normal

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



**Sun-Teton-Marias River Basin**  
**Monthly Precipitation and Reservoir Levels**  
**Percentage of Normal**  
**March 1, 2016 (February 1, 2016 - March 1, 2016)**



**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%



## Sun-Teton-Marias Streamflow Forecasts - March 1, 2016

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

SUN-TETON-MARIAS	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Gibson Reservoir Inflow	APR-JUL	171	235	275	70%	315	380	395
	APR-SEP	199	265	310	70%	355	420	440
Two Medicine R nr Browning <sup>2</sup>	APR-JUL	88	114	131	72%	148	174	183
	APR-SEP	95	122	140	72%	158	185	194
Badger Ck nr Browning	APR-JUL	30	45	56	64%	67	82	88
	APR-SEP	38	55	67	65%	79	96	103
Swift Reservoir Inflow <sup>2</sup>	APR-JUL	16.8	29	37	65%	45	57	57
	APR-SEP	23	36	45	67%	54	67	67
Dupuyer Ck nr Valier	APR-JUL	0.1	1.11	6	54%	10.9	18.1	11.1
	APR-SEP	0.4	1.59	7	55%	12.4	20	12.7
Cut Bank Ck nr Browning	APR-JUL	29	43	53	77%	63	77	69
	APR-SEP	32	48	58	77%	68	84	75
Marias R nr Shelby <sup>2</sup>	APR-JUL	27	133	205	59%	280	385	345
	APR-SEP	16.3	131	210	58%	285	400	360
Teton R nr Dutton	APR-JUL	4.5	11.8	22	52%	41	69	42
	APR-SEP	5.6	13	26	54%	47	77	48

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

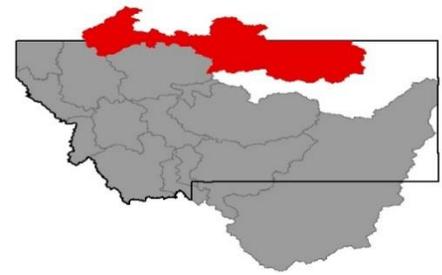
2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions

3) Median value used in place of average

Reservoir Storage End of February, 2016	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Gibson Res	27.0	24.6	43.1	99.1
Pishkun Res	5.6	19.4	17.2	32.0
Willow Creek Res - Augusta	27.9	29.7	23.3	32.2
Lower Two Medicine Lake	9.6	8.9	8.4	11.9
Four Horns Lake	8.8	9.9	10.1	19.2
Swift Res	11.6	21.3	16.5	30.0
Lake Frances	52.0	70.7	57.5	112.0
Lake Elwell (Tiber)	719.1	803.1	693.8	1347.0
Nilan Reservoir	6.3	8.5	6.9	11.0
Basin-wide Total	867.8	996.2	876.8	1694.4
# of reservoirs	9	9	9	9

Watershed Snowpack Analysis March 1, 2016	# of Sites	% Median	Last Year % Median
SUN	5	68	99
TETON	4	54	77
MARIAS	4	61	79
SUN-TETON-MARIAS	10	64	87

# St. Mary-Milk River Basin



It's not much to brag about, but the St. Mary-Milk River basin has already exceeded the peak snowpack experienced last year. That might not offer much comfort considering how poor the snowpack was in the basin last year. Snowfall was well below normal at the low-elevation snowcourses and SNOTEL sites in the basin this month. The high elevation Flattop Mountain SNOTEL sites in Glacier National Park did see an increase in snow water equivalent, but this fell as both rain and snow during the month. Low elevation SNOTEL and snowcourses are well below normal for this date and will be reliant on spring precipitation in the form of snow and rain to recover. Currently the St. Mary River basin is 77% of normal for March 1<sup>st</sup>, the Cypress Hills in Canada are well below normal at 30%, and the Bear Paw Mountains are below normal at 73% for this date. Overall, the combined St. Mary-Milk River basin is currently 67% of normal for March 1<sup>st</sup>. Spring can be a game changer in the basin, historically it favors the basin in terms of precipitation but there is always the chance that things could dry out. Last year is an excellent example of this. Water users should be prepared for either outcome and look to the skies this spring for some much needed precipitation.

Precipitation might not have fallen in the solid form as snow much at SNOTEL sites and valley locations, but overall monthly precipitation was above normal at mountain locations (126%) and slightly below normal (88%) at valley locations. Rain fell in place of snow at lower elevation during the storm that occurred mid-month, but helped to keep the water year precipitation from a sharp decline. Significant precipitation early in the year has kept the water year totals near to above average. Water year-to-date precipitation (October 1<sup>st</sup> – current) remains near average (103%) at mountain SNOTEL locations, and well above average at valley locations (141%). Overall, the combined mountain and valley basin-wide water year-to-date precipitation is currently 109% of average for March 1<sup>st</sup>.

Reservoir storage is well above average for this date in the basin. Basin-wide reservoir storage is currently 133% of average for March 1<sup>st</sup>.

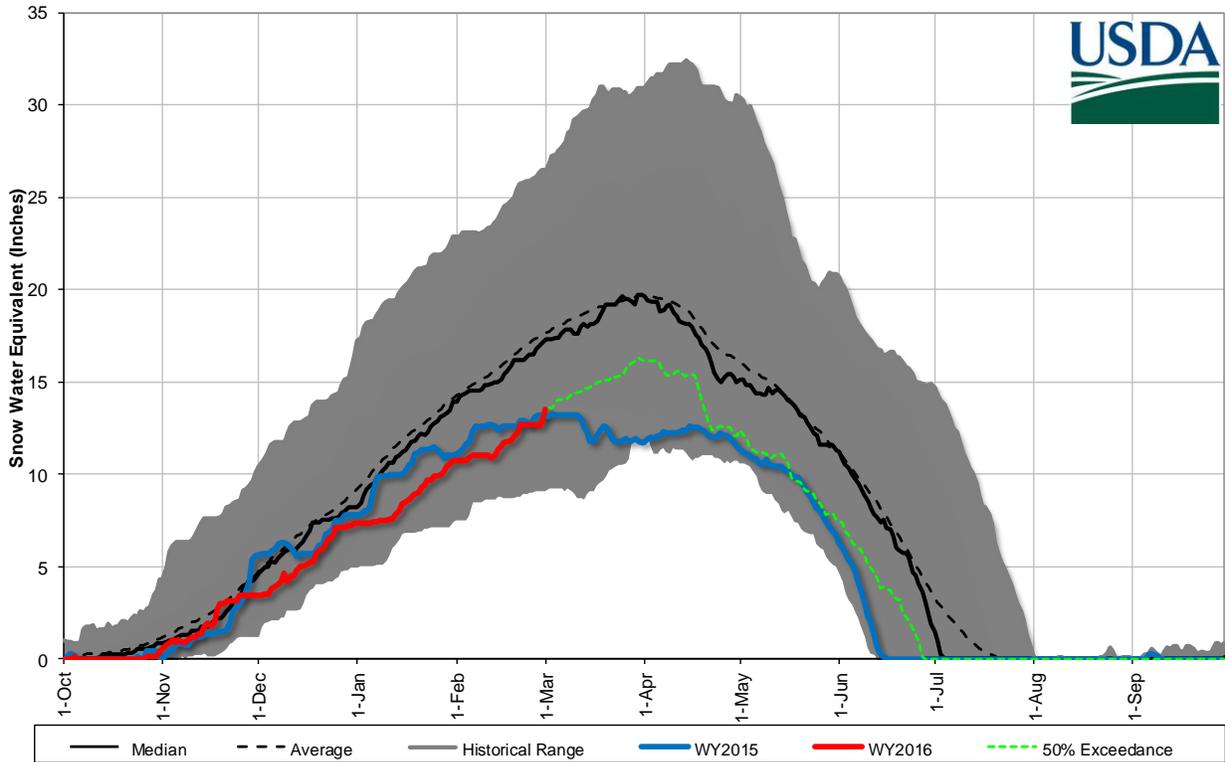
Streamflow forecasts for March 1st should be used knowing 65 to 80% of our annual snowpack has accumulated and conditions can change before runoff occurs. The 50% exceedance forecast assumes normal conditions will occur from this point and through snowmelt. Current basin-wide streamflows for the 50% exceedance are 88% of average for the April-July time period.

<b>St. Mary-Milk River Basin Data Summary</b>		<b>3/1/2016</b>	
	Percent of 1981-2010 Normal (Median)	Last Year Percentage of Normal (Median)	
<b>Snowpack</b>			
Basin-Wide	65%	64%	
	Monthly Percentage of Average	WYTD Percentage of 1981-2010 Average*	Last Year Percentage of Average
<b>Precipitation</b>			
Mountain Precipitation	126%	103%	119%
Valley Precipitation	88%	141%	116%
Basin Precipitation	121%	109%	119%
	Percentage of Average	Percentage of Capacity (Total)	Last Year Percentage of Average
<b>Reservoir Storage</b>			
Basin-Wide Storage	133%	53%	179%
	50 % Exceedance Forecast Percentage of Average	50 % Exceedance Forecast % of Last Year's Flows	Last Year Percentage of Average
<b>Streamflow Forecast</b>			
Basin-Wide Apr-July	88%	122%	72%

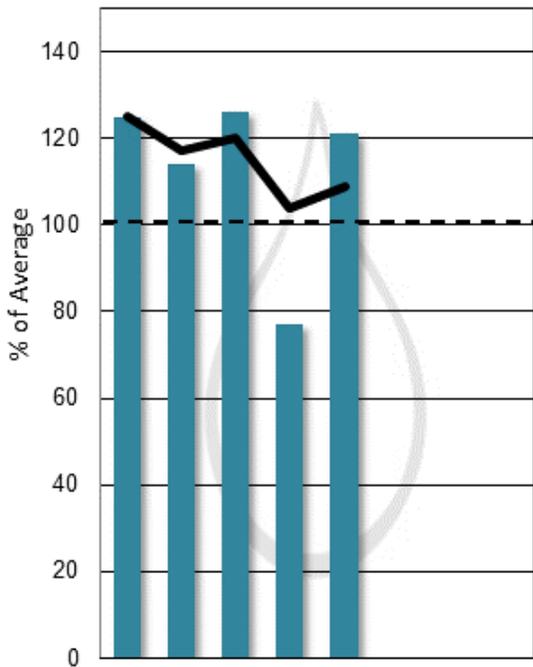
\*Water Year-to-Date (WYTD) Precipitation is October 1st - Current

\*\*Basin-wide streamflows are an average of the individual streamflow points within the basin for the 50 percent exceedance forecast. Consult the individual streamflow forecasts in the table below for the range of forecasts at an individual point.

**St. Mary-Milk River Basin Snowpack with Non-Exceedance Projections**  
*Based on provisional SNOTEL daily data as of 3/1/2016*

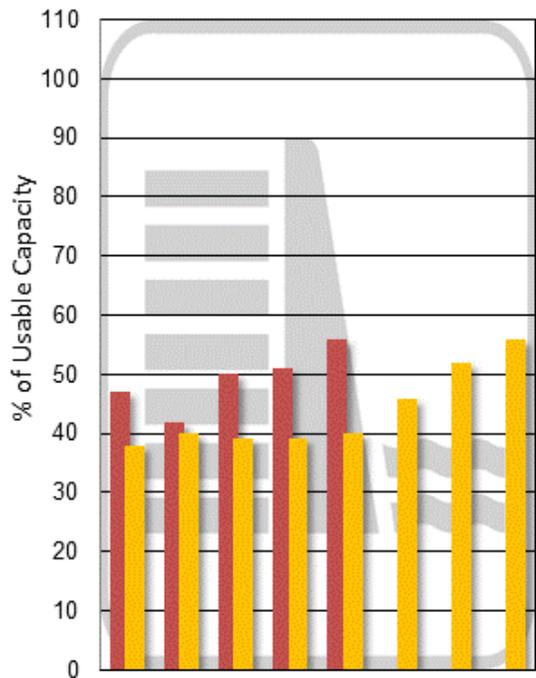


**Mountain and Valley Precipitation**



Oct Nov Dec Jan Feb Mar Apr May

**End of Month Reservoir Storage**



Oct Nov Dec Jan Feb Mar Apr May

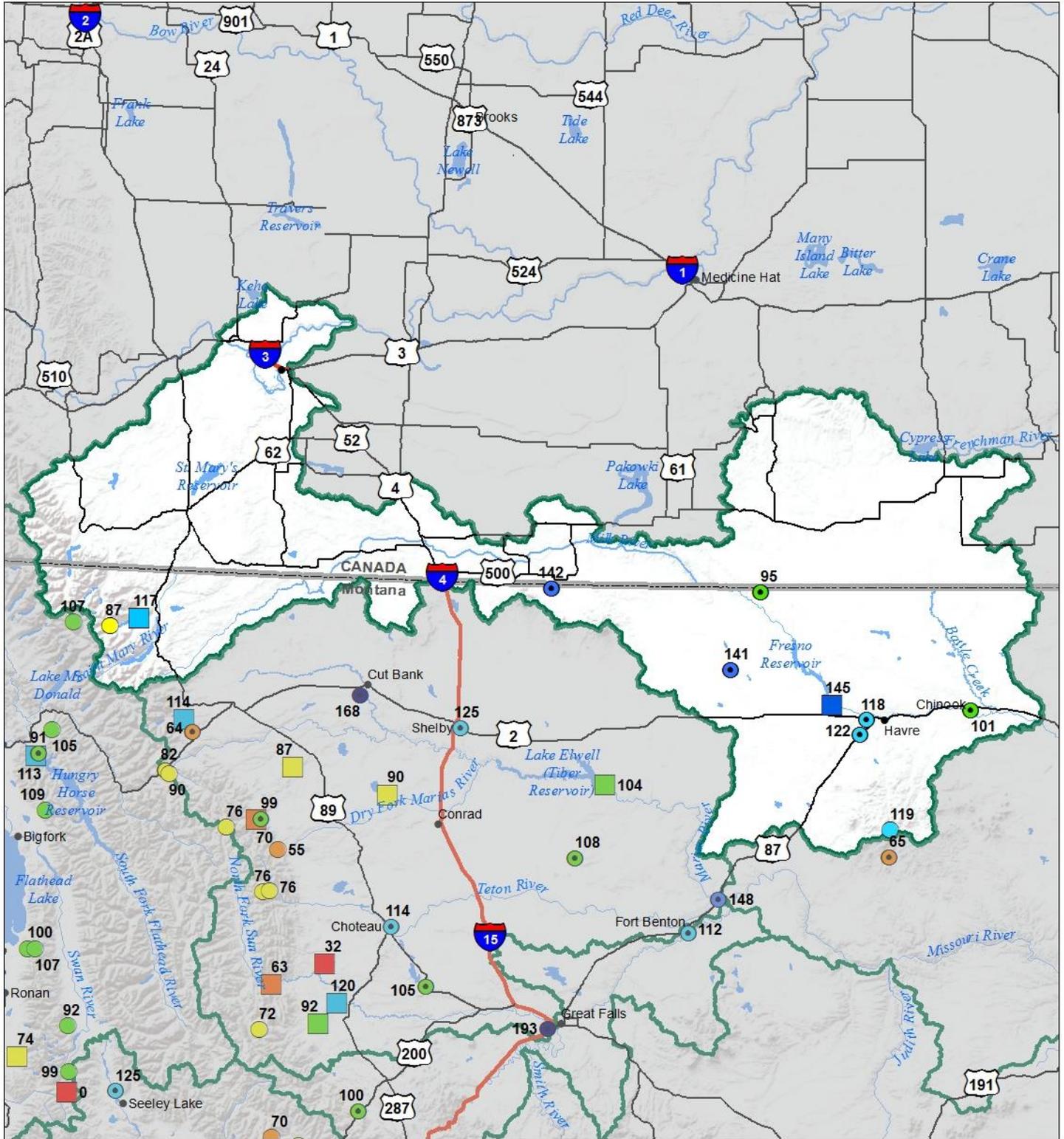
Storage above is averaged for all reservoirs in the basin. For individual reservoirs see table below.



# St Mary's-Milk River Basin

## Water Year to Date Precipitation and Reservoir Levels Percentage of Normal

### March 1, 2016



#### Precipitation Percent of Normal

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

#### Reservoirs Percent of Normal

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





## St. Mary & Milk Basins Streamflow Forecasts - March 1, 2016

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

ST. MARY & MILK BASINS	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Lake Sherburne Inflow	APR-JUL	71	80	86	89%	92	101	97
	APR-SEP	83	93	100	89%	107	117	112
St. Mary R nr Babb <sup>2</sup>	APR-JUL	260	300	325	88%	350	390	370
	APR-SEP	300	345	375	88%	405	445	425
St. Mary R at Intl Boundary <sup>2</sup>	APR-JUL	280	340	380	87%	420	480	435
	APR-SEP	330	395	435	86%	475	540	505
Milk R at Western Crossing of Intl Bndry, AB	MAR-SEP	6.8	13.6	25	76%	36	53	32.77
Milk R at Eastern Crossing of Intl Bndry								

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

3) Median value used in place of average

Reservoir Storage End of February, 2016	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Lake Sherburne	36.0	58.6	30.7	64.3
Fresno Res	61.7	82.3	42.6	127.0
Nelson Res	40.1	44.7	30.4	66.8
Basin-wide Total	137.8	185.5	103.7	258.1
# of reservoirs	3	3	3	3

Watershed Snowpack Analysis March 1, 2016	# of Sites	% Median	Last Year % Median
ST. MARY	4	73	72
BEARPAW MOUNTAINS	3	73	79
CYPRESS HILLS, CANADA	6	30	27
MILK RIVER BASIN	9	48	48
ST. MARY & MILK BASINS	13	65	64

# Upper Yellowstone River Basin



It was another interesting water month in the Upper Yellowstone River Basin. Both mountain and valley precipitation were below average. In terms of snow water equivalence (SWE), of the five sub-basins comprising the Upper Yellowstone, all were within 15% of normal except for the Red Lodge-Rock Creek area which spoiled the class average by coming in at a meager 54%. As a whole, the mountains received 82% of their normal precipitation resulting in a slight drop in cumulative SWE from 87% recorded on February 1<sup>st</sup>. However, 2016 levels are significantly down from this time last year when the region had accumulated 106% of normal snowpack.

While overall mountain precipitation was not particularly dismal, valley conditions in February were a different story. For the month, the valleys of the Upper Yellowstone Basin received just 14% of their normal. Fortunately, the strong storms of November and December kept valley water year totals strong at 114%.

On March 1<sup>st</sup>, with mountain and valley zones combined, the Upper Yellowstone Basin had received 75% of normal precipitation for the month of February and 96% of normal for the 2016 water year, both down slightly from last year's March 1<sup>st</sup> measurements.

Both the Mystic Lake and Cooney Reservoirs remained significantly above average at 150% and 137%, respectively, and a combined average of 139%. At this time last year the combined reservoir storage averaged 116%.

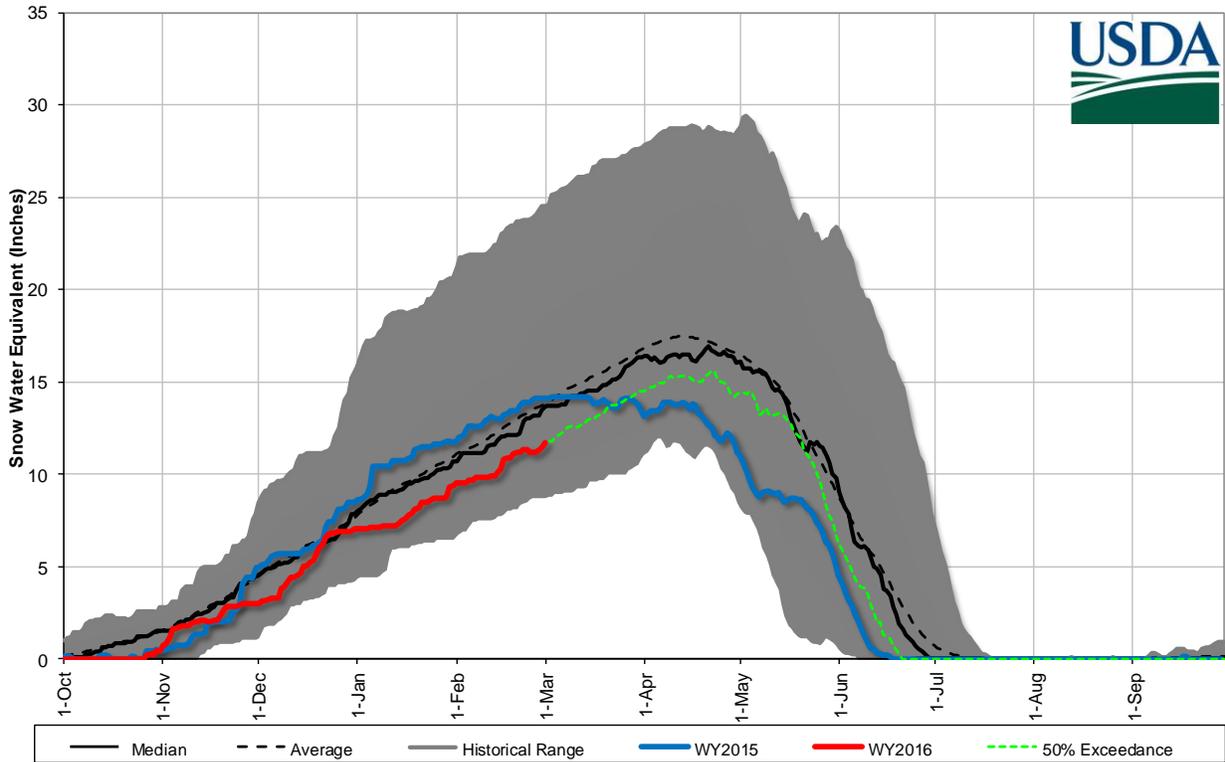
Streamflow forecasts for March 1<sup>st</sup> should be used knowing 65 to 80% of our annual snowpack has accumulated and conditions can change before runoff occurs. The 50% exceedance forecast assumes normal conditions will occur from this point and through snowmelt. Current basin-wide streamflows for the 50% exceedance are 90% of average for the April-July time period.

<b>Upper Yellowstone River Basin Data Summary</b>		<b>3/1/2016</b>	
	Percent of 1981-2010 Normal (Median)	Last Year Percentage of Normal (Median)	
<b>Snowpack</b>			
Basin-Wide	87%	106%	
	Monthly Percentage of Average	WYTD Percentage of 1981-2010 Average *	Last Year Percentage of Average
<b>Precipitation</b>			
Mountain Precipitation	82%	94%	103%
Valley Precipitation	14%	114%	101%
Basin Precipitation	74%	97%	103%
	Percentage of Average	Percentage of Capacity (Total)	Last Year Percentage of Average
<b>Reservoir Storage</b>			
Basin-Wide Storage	139%	60%	116%
	50 % Exceedance Forecast Percentage of Average	50 % Exceedance Forecast % of Last Year's Flows	Last Year Percentage of Average
<b>Streamflow Forecast</b>			
Basin-Wide Apr-July	90%	103%	87%

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

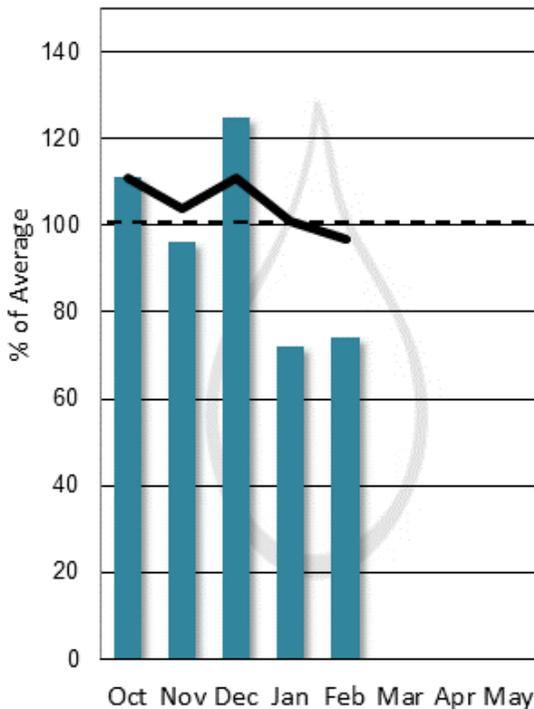
\*\*Basin-wide streamflows are an average of the individual streamflow points within the basin for the 50 percent exceedance forecast. Consult the individual streamflow forecasts in the table below for the range of forecasts at an individual point.

**Upper Yellowstone River Basin Snowpack with Non-Exceedance Projections**  
*Based on provisional SNOTEL daily data as of 3/1/2016*



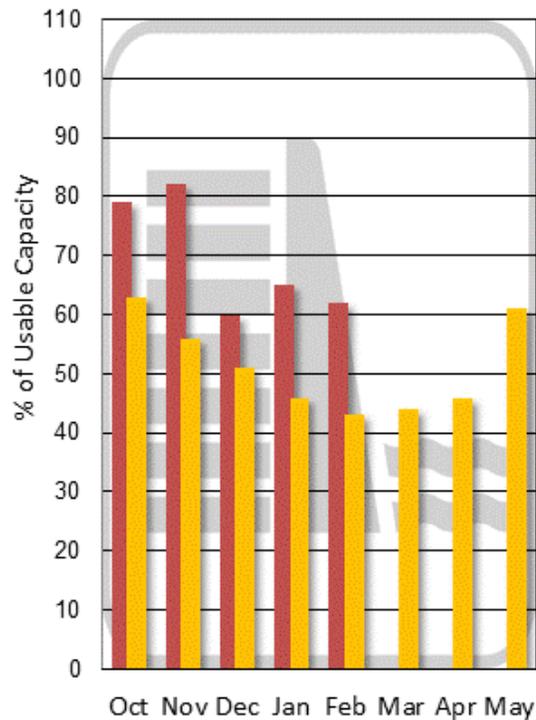
**Mountain and Valley Precipitation**

Monthly (teal bar), Year-to-date (black line)



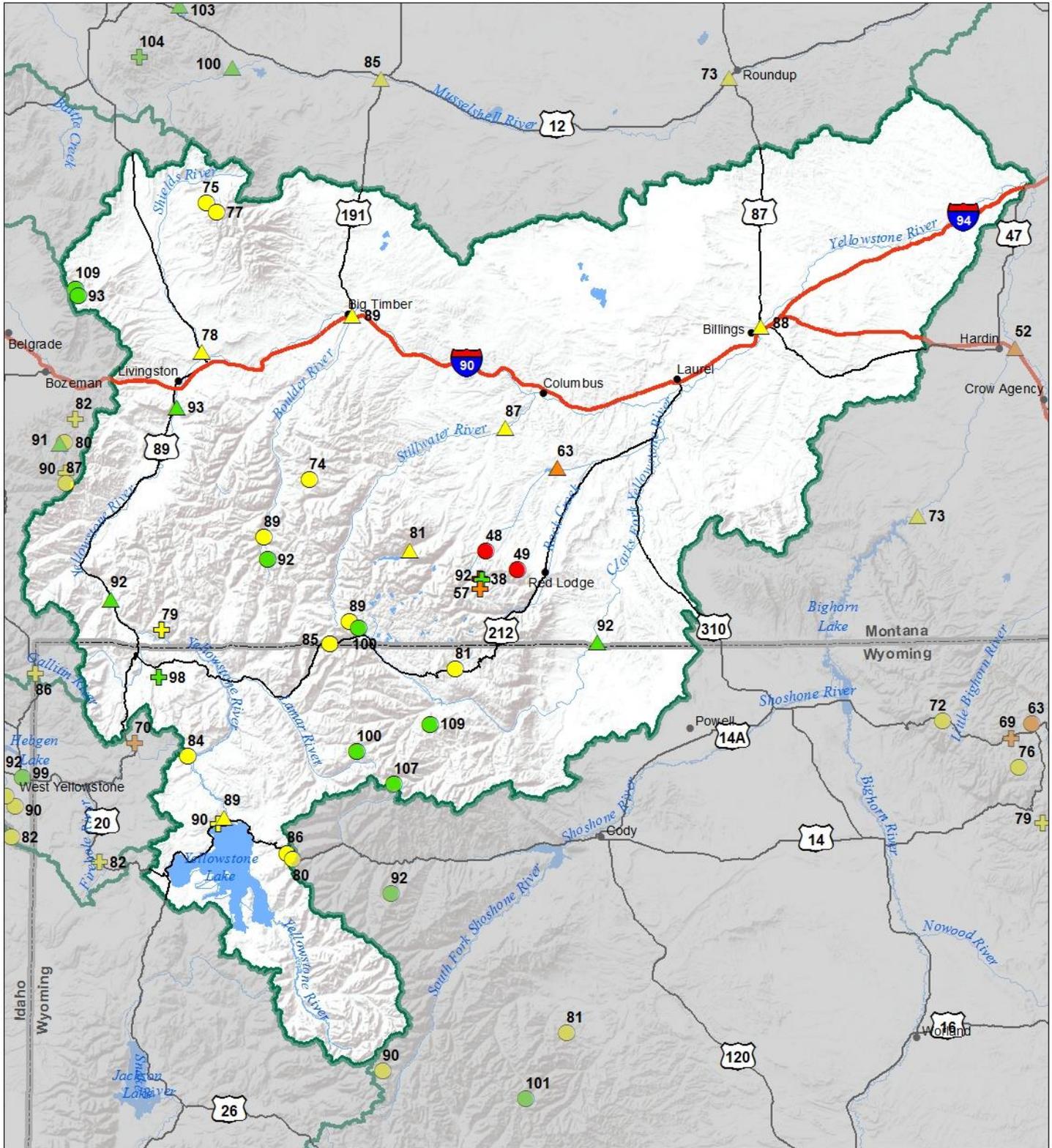
**End of Month Reservoir Storage**

% Capacity (red bar), Avg % Capacity (yellow bar)



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

# Upper Yellowstone River Basin Streamflow Forecast, Snow Water Equivalent Percentage of Normal March 1, 2016



### Snow Water Equivalent Percent of Normal

#### SNOTEL

- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%

- 71 - 90%
- 51 - 70%
- 1 - 50%
- \*

#### Snowcourse

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

### Streamflow Forecast Percent of Average Flows

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

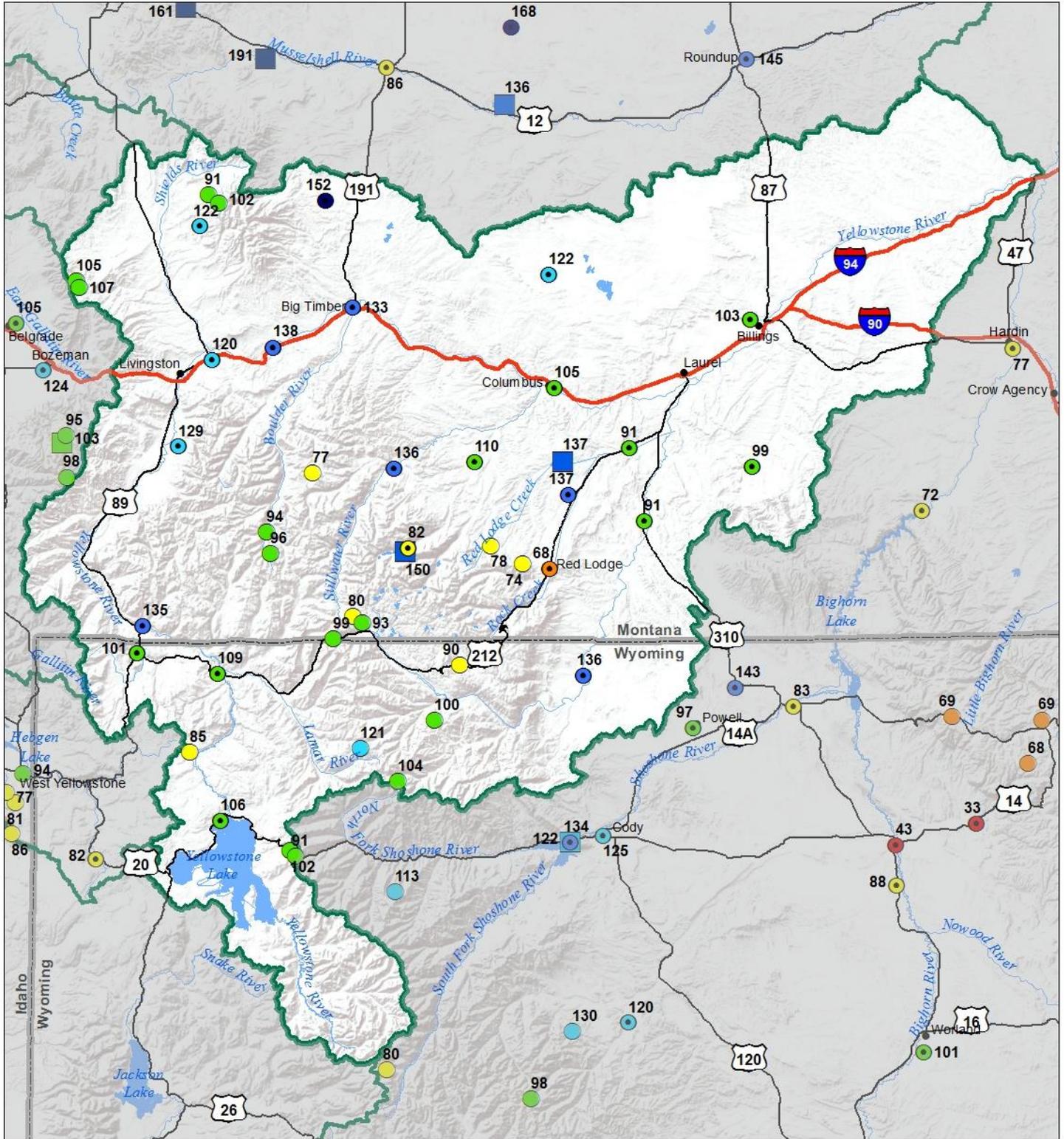


# Upper Yellowstone River Basin

## Water Year to Date Precipitation and Reservoir Levels

### Percentage of Normal

#### March 1, 2016



### Precipitation Percent of Normal

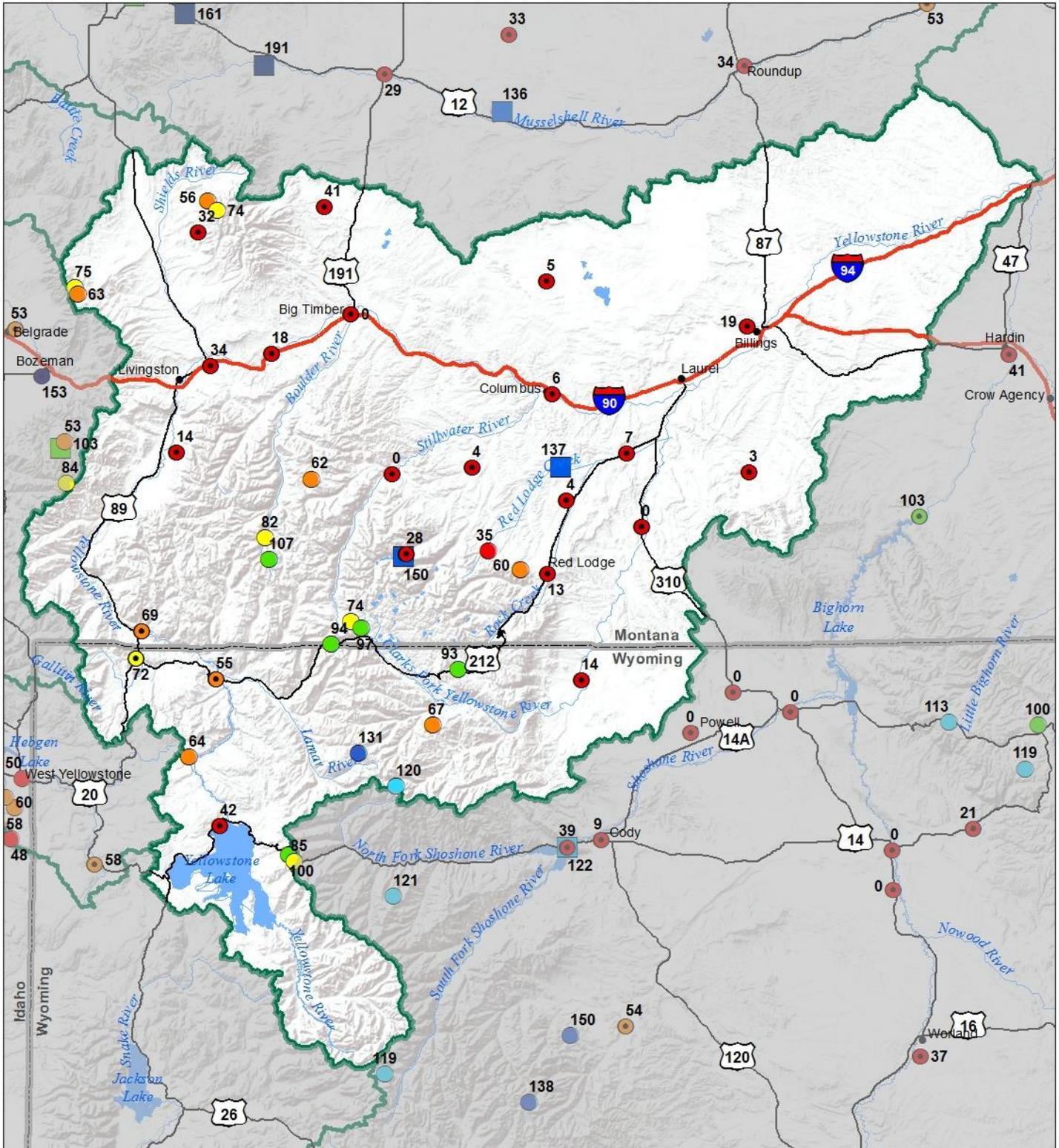
SNOTEL		COOP/ACIS	
<span style="color: blue;">■</span> > 150%	<span style="color: yellow;">■</span> 71 - 90%	<span style="color: blue;">■</span> > 150%	<span style="color: yellow;">■</span> 71 - 90%
<span style="color: lightblue;">■</span> 131 - 150%	<span style="color: orange;">■</span> 51 - 70%	<span style="color: lightblue;">■</span> 131 - 150%	<span style="color: orange;">■</span> 51 - 70%
<span style="color: cyan;">■</span> 111 - 130%	<span style="color: red;">■</span> 1 - 50%	<span style="color: cyan;">■</span> 111 - 130%	<span style="color: red;">■</span> 1 - 50%
<span style="color: green;">■</span> 91 - 110%		<span style="color: green;">■</span> 91 - 110%	

### Reservoirs Percent of Normal

<span style="color: darkblue;">■</span> > 150%
<span style="color: blue;">■</span> 131 - 150%
<span style="color: lightblue;">■</span> 111 - 130%
<span style="color: green;">■</span> 91 - 110%
<span style="color: yellow;">■</span> 71 - 90%
<span style="color: orange;">■</span> 51 - 70%
<span style="color: red;">■</span> 1 - 50%



# Upper Yellowstone River Basin Monthly Precipitation and Reservoir Levels Percentage of Normal March 1, 2016 (February 1, 2016 - March 1, 2016)



### Precipitation Percent of Normal

#### SNOTEL

- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%

#### COOP/ACIS

- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%

### Reservoirs Percent of Normal

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



## Upper Yellowstone River Basin Streamflow Forecasts - March 1, 2016

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

UPPER YELLOWSTONE RIVER BASIN	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Yellowstone R at Yellowstone Lake Outlet	APR-SEP	530	620	680	88%	740	830	770
	APR-JUL	395	465	510	89%	555	625	575
Yellowstone R at Corwin Springs	APR-SEP	1330	1550	1700	90%	1860	2080	1880
	APR-JUL	1150	1340	1460	92%	1580	1770	1590
Yellowstone R at Livingston	APR-SEP	1480	1760	1940	91%	2130	2410	2140
	APR-JUL	1280	1510	1670	93%	1820	2050	1800
Shields R nr Livingston	APR-SEP	25	76	110	77%	144	195	143
	APR-JUL	25	70	101	78%	132	177	129
Boulder R at Big Timber	APR-SEP	180	230	265	88%	300	350	300
	APR-JUL	176	220	250	89%	280	325	280
Mystic Lake Inflow <sup>2</sup>	APR-SEP	50	57	62	84%	67	74	74
	APR-JUL	39	44	48	81%	52	57	59
Stillwater R nr Absarokee <sup>2</sup>	APR-SEP	320	395	445	86%	495	570	520
	APR-JUL	280	340	385	87%	430	490	445
Clarks Fk Yellowstone R nr Belfry	APR-SEP	400	465	510	93%	555	620	550
	APR-JUL	370	430	470	92%	510	570	510
Cooney Reservoir Inflow	APR-SEP	8.6	23	32	67%	41	55	48
	APR-JUL	2.6	15.4	24	63%	33	45	38
Yellowstone R at Billings	APR-SEP	2110	2770	3220	86%	3670	4330	3730
	APR-JUL	1910	2470	2850	88%	3230	3790	3230

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

3) Median value used in place of average

Reservoir Storage End of February, 2016	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Mystic Lake	4.5	3.9	3.0	21.0
Cooney Res	24.4	20.3	17.9	27.4
Basin-wide Total	29.0	24.2	20.9	48.4
# of reservoirs	2	2	2	2

Watershed Snowpack Analysis March 1, 2016	# of Sites	% Median	Last Year % Median
YELLOWSTONE ab LIMNGSTON	13	88	98
SHIELDS	4	92	109
BOULDER-STILLWATER	3	85	110
RED LODGE-ROCK CREEK	5	54	129
CLARK'S FORK	7	96	114
UPPER YELLOWSTONE RIVER BASIN	29	87	106

# Lower Yellowstone River Basin



Thankfully there was a bit of a turnaround this month, near normal snowfall fell at many locations across the Lower Yellowstone River basin. February started with a storm system that favored high elevations in the Shoshone River basin, but this storm did yield snowfall in the eastern basins, though not to the same extent. Mid-month another front dropped the major storm of the month across the basin and helped the some basins to crawl out of record low snowpack conditions, however snowpack is still well below normal for the date. Snowpack is best in the western half of the basin, the Shoshone River basin is currently 93% of normal for March 1<sup>st</sup>, and the Wind River basin is below normal at 82% for this time. As you move east in the basin conditions generally decline. The greater Bighorn River basin is propped up by the upstream contributions which are above normal, and is 82% of normal for this date. The Powder and Tongue River basins are still well below normal, but made some improvement during the month. Two SNOTEL sites (Burgess Junction and Dome Lake) are still reporting the lowest snow water equivalent in the last 35 years, and 4 other SNOTEL sites are reporting second lowest snow totals. It should be noted that February is not typically a big snow month for the eastern ranges in the basin and we are entering the months when things can change quickly. Let's hope it does, or water users should plan on below normal snow contributions to flows this spring and summer.

In February and near to above average precipitation fell in most of the sub-basins of the Lower Yellowstone. Monthly precipitation was near to slightly above average in all basins except the Powder River basin where slightly below average precipitation fell (93%). Water year-to-date precipitation is below average in all sub-basins except the Shoshone which is currently 103% of average for March 1<sup>st</sup>. Overall, basin-wide water year-to-date precipitation is below normal at 82% of average for March 1<sup>st</sup>. As water users in the basin know, spring plays a large role in the region in terms of precipitation and can turn things around quickly, as it did last year. Considering the low snowpack and below average precipitation for this date it would be a welcome change.

On a positive note, reservoir storage in the basin remains in good condition with totals hovering just above normal for this time of year; this may help alleviate water shortages this spring and summer.

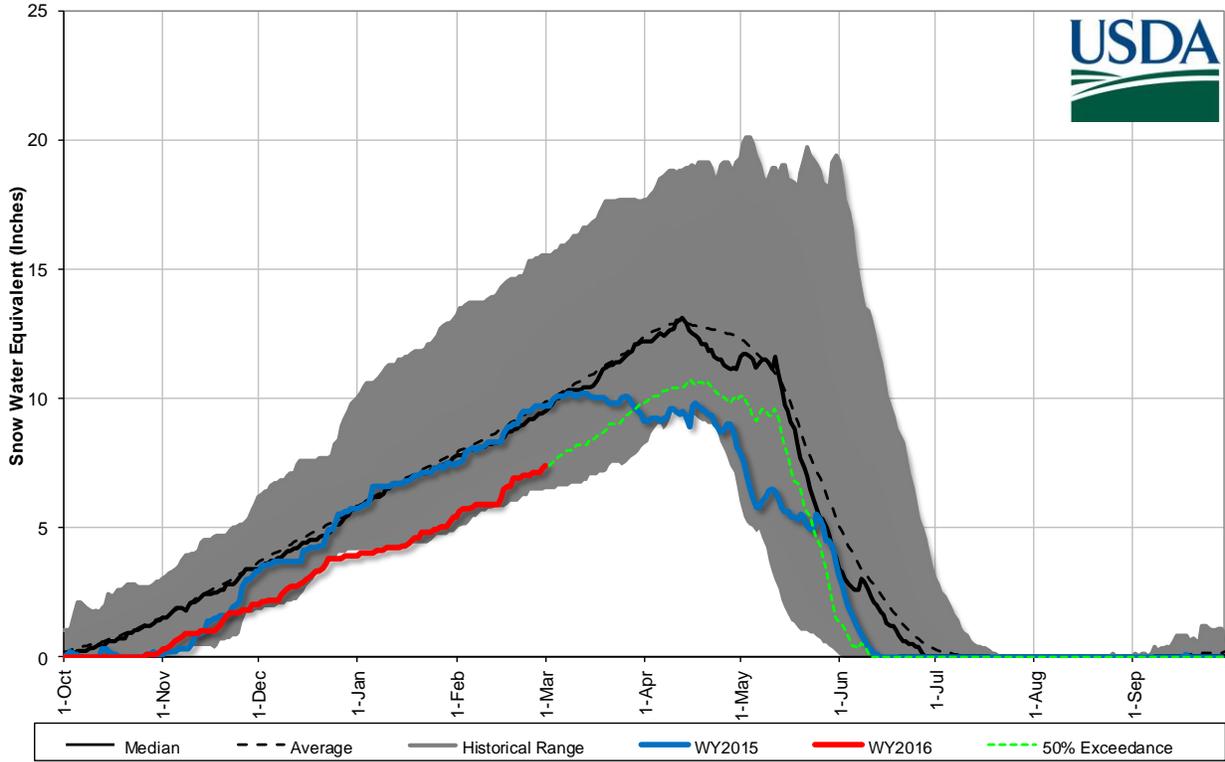
Streamflow forecasts for March 1st should be used knowing 65 to 80% of our annual snowpack has accumulated and conditions can change before runoff occurs. The 50% exceedance forecast assumes normal conditions will occur from this point and through snowmelt. Current basin-wide streamflows for the 50% exceedance are 78% of average for the April-July time period.

<b>Lower Yellowstone River Basin Data Summary</b>		<b>3/1/2016</b>	
	Percent of 1981-2010 Normal (Median)	Last Year Percentage of Normal (Median)	
<b>Snowpack</b>			
Basin-Wide	77%	107%	
	Monthly Percentage of Average	WYTD Percentage of 1981-2010 Average*	Last Year Percentage of Average
<b>Precipitation</b>			
Mountain Precipitation	102%	77%	96%
Valley Precipitation	103%	90%	104%
Basin Precipitation	102%	82%	99%
	Percentage of Average	Percentage of Capacity (Total)	Last Year Percentage of Average
<b>Reservoir Storage</b>			
Basin-Wide Storage	108%	62%	114%
	50 % Exceedance Forecast Percentage of Average	50 % Exceedance Forecast % of Last Year's Flows	Last Year Percentage of Average
<b>Streamflow Forecast</b>			
Basin-Wide Apr-July	78%	72%	108%

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

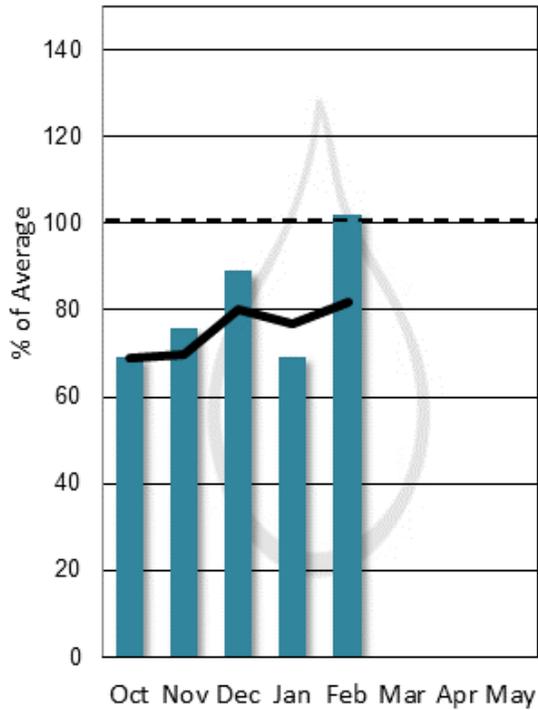
\*\*Basin-wide streamflows are an average of the individual streamflow points within the basin for the 50 percent exceedance forecast. Consult the individual streamflow forecasts in the table below for the range of forecasts at an individual point.

**Lower Yellowstone River Basin Snowpack with Non-Exceedance Projections**  
*Based on provisional SNOTEL daily data as of 3/1/2016*



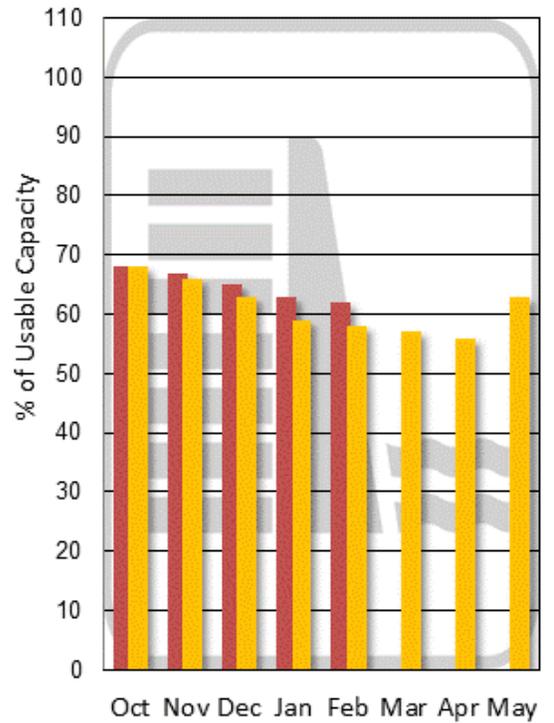
**Mountain and Valley Precipitation**

Monthly (teal bars) Year-to-date (black line)



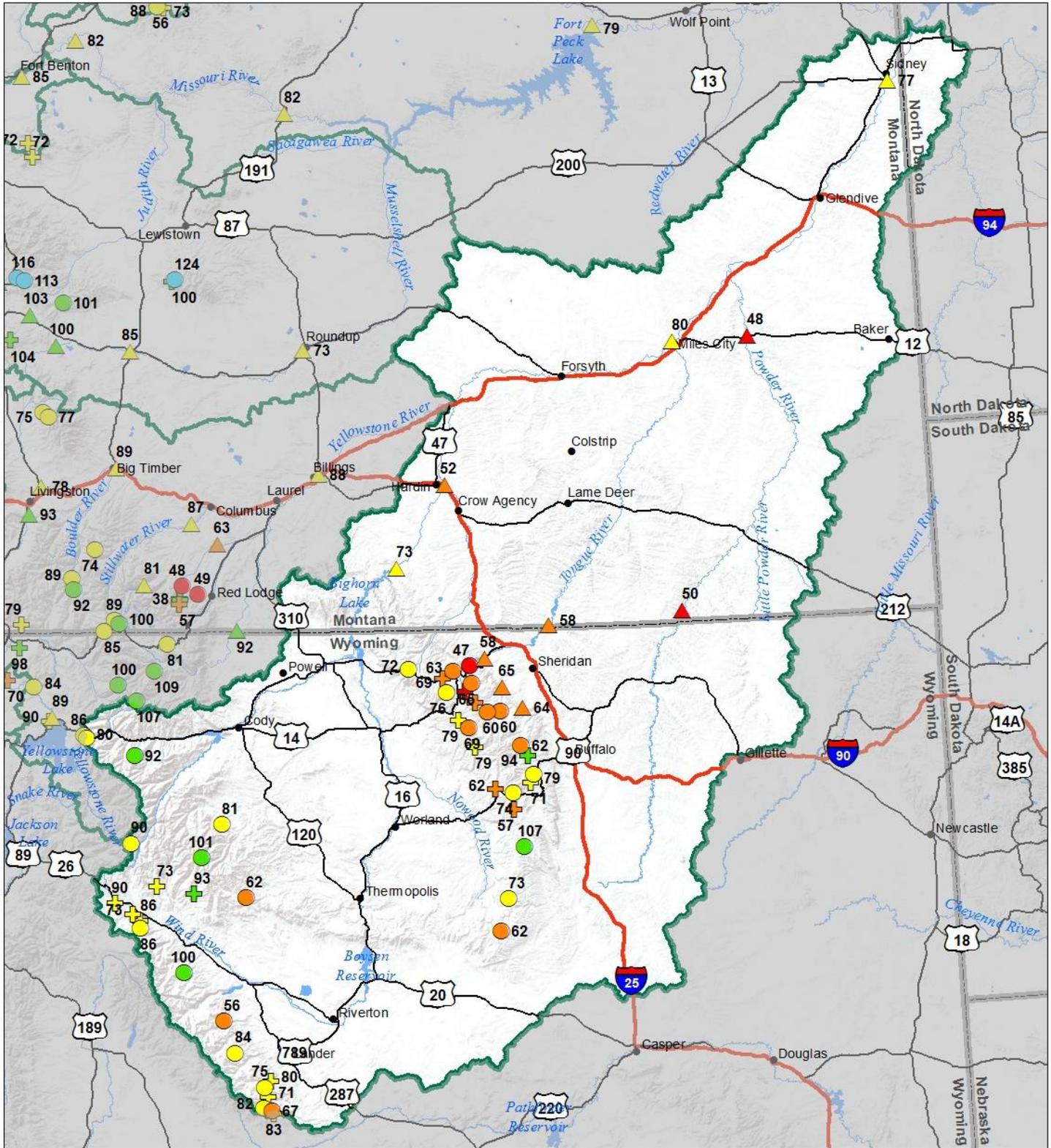
**End of Month Reservoir Storage**

% Capacity (red bars) Avg % Capacity (yellow bars)



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

# Lower Yellowstone River Basin Streamflow Forecast, Snow Water Equivalent Percentage of Normal March 1, 2016



### Snow Water Equivalent Percent of Normal

#### SNOTEL

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

#### Snowcourse

- ⊕ > 150%
- ⊕ 131 - 150%
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- ⊕ 1 - 50%
- ⊕ \*

### Streamflow Forecast Percent of Average Flows

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

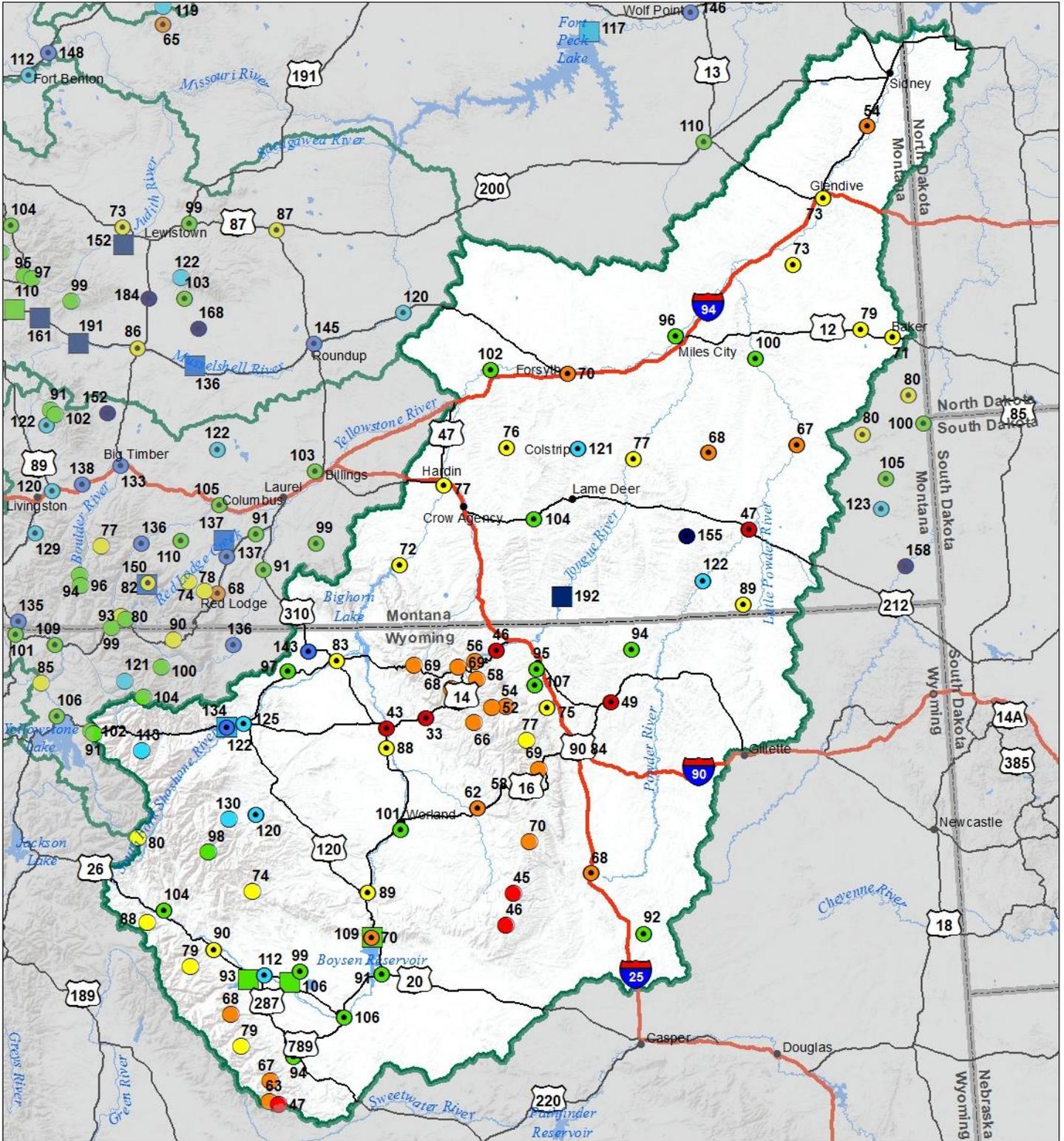


# Lower Yellowstone River Basin

## Water Year to Date Precipitation and Reservoir Levels

### Percentage of Normal

#### March 1, 2016



### Precipitation Percent of Normal

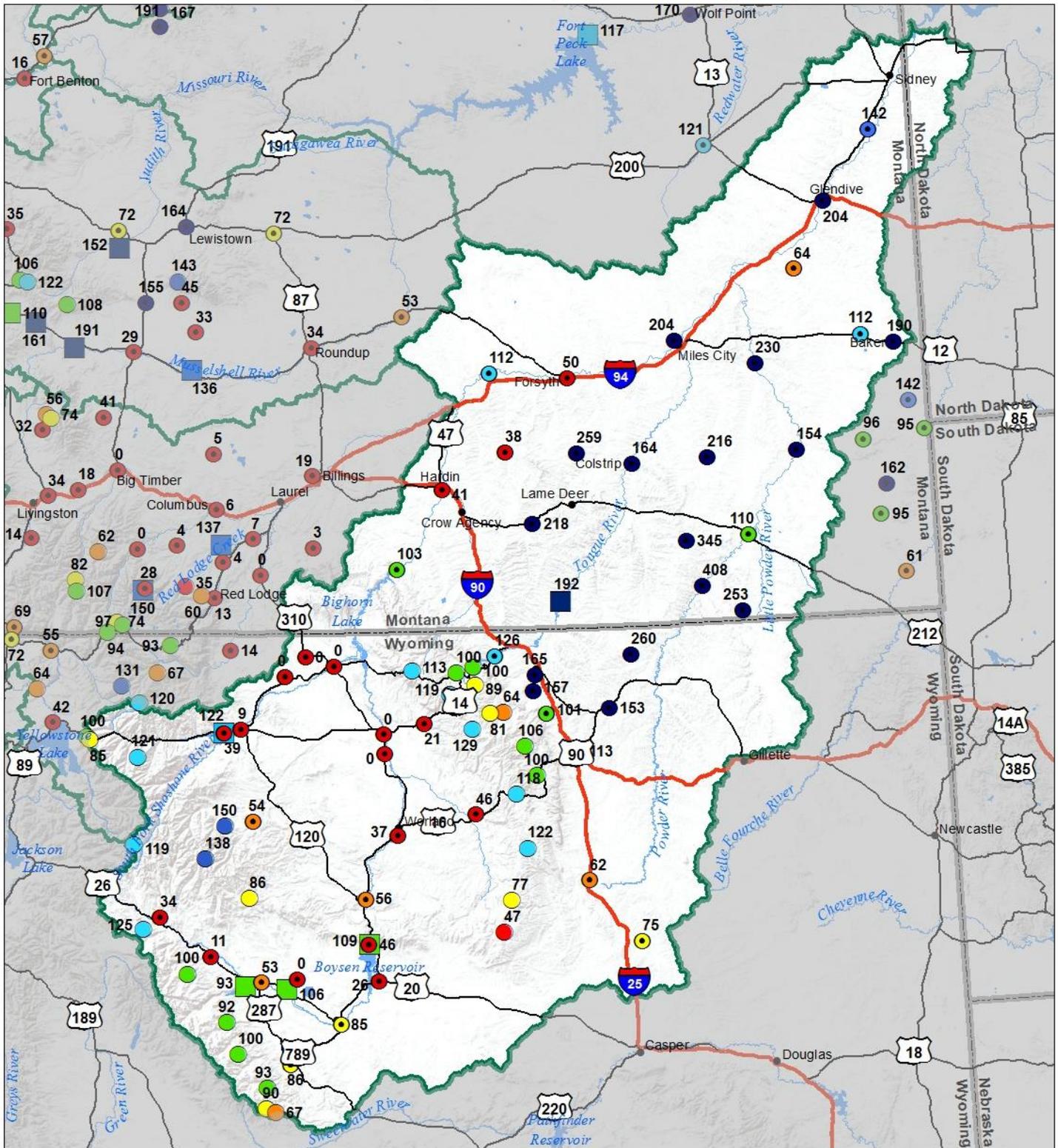
SNOTEL		COOP/ACIS	
● > 150%	● 71 - 90%	● > 150%	● 71 - 90%
● 131 - 150%	● 51 - 70%	● 131 - 150%	● 51 - 70%
● 111 - 130%	● 1 - 50%	● 111 - 130%	● 1 - 50%
● 91 - 110%		● 91 - 110%	

### Reservoirs Percent of Normal

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



# Lower Yellowstone River Basin Monthly Precipitation and Reservoir Levels Percentage of Normal March 1, 2016 (February 1, 2016 - March 1, 2016)



### Precipitation Percent of Normal

#### SNOTEL

- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%

#### 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%



**Lower Yellowstone River Basin (Wyoming)  
Streamflow Forecasts - March 1, 2016**

Forecast Exceedance Probabilities for Risk Assessment Chance that actual volume will exceed forecast
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<b>LOWER YELLOWSTONE RIVER BASIN (Wyoming)</b>	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Bighorn R nr St. Xavier <sup>2</sup>	APR-JUL	410	785	1040	75%	1300	1680	1380
	APR-SEP	345	770	1060	73%	1340	1770	1460
Little Bighorn R nr Hardin	APR-JUL	3	31	50	51%	69	97	98
	APR-SEP	5.8	37	58	52%	79	110	111
Tongue R nr Dayton <sup>2</sup>	APR-JUL	16.9	35	48	56%	61	79	86
	APR-SEP	23	43	57	58%	71	91	98
Big Goose Ck nr Sheridan	APR-JUL	7.5	19.1	27	59%	35	46	46
	APR-SEP	15.1	27	35	65%	43	55	54
Little Goose Ck nr Bighorn	APR-JUL	7	14.1	19	61%	24	31	31
	APR-SEP	11.9	19.7	25	64%	30	38	39
Tongue River Reservoir Inflow <sup>2</sup>	APR-JUL	0.4	66	110	57%	154	220	193
	APR-SEP	9.3	78	125	58%	172	240	215
Yellowstone R at Miles City <sup>2</sup>	APR-JUL	2310	3270	3920	82%	4570	5530	4780
	APR-SEP	2460	3600	4370	80%	5140	6280	5450
Powder R at Moorehead	APR-JUL	1	35	82	46%	128	196	177
	APR-SEP	1	51	98	50%	146	215	196
Powder R nr Locate	APR-JUL	1	36	90	45%	145	225	199
	APR-SEP	1	47	105	48%	164	250	220
Yellowstone R nr Sidney <sup>2</sup>	APR-JUL	1980	3080	3820	79%	4560	5660	4830
	APR-SEP	1980	3280	4170	77%	5060	6360	5430

- 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
- 3) Median value used in place of average

<b>Reservoir Storage End of February, 2016</b>	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Bighorn Lake	836.5	887.7	797.1	1356.0
Tongue River Res	54.3	52.1	28.2	79.1
Basin-wide Total	890.8	939.8	825.3	1435.1
# of reservoirs	2	2	2	2

<b>Watershed Snowpack Analysis March 1, 2016</b>	# of Sites	% Median	Last Year % Median
WIND RIVER (Wyoming)	18	82	101
SHOSHONE RIVER (Wyoming)	4	93	103
BIGHORN RIVER (Wyoming)	18	82	111
LITTLE BIGHORN (Wyoming)	3	69	104
TONGUE RIVER (Wyoming)	9	63	104
POWDER RIVER (Wyoming)	9	72	126
LOWER YELLOWSTONE RIVER BASIN (Wyoming)	46	77	107

## Data Summary (SNOTEL and Snowcourse)

Station Name	Network	Elevation (ft)	Depth (in)	SWE (in)	Median (in)	% Median	Last Year SWE (in)	Last Year % Median
Albro Lake	SNOTEL	8300	42	12.2	13.8	88	12.5	91
Ambrose	SC	6480		9.3	9.2	101	9.7	105
Arch Falls	SC	7350	27	7.0	7.8	90	6.6	85
Ashley Divide	SC	4820	11	2.9	5.3	55	1.6	30
Badger Pass	SNOTEL	6900	60	20.3	23.7	86	25.7	108
Banfield Mountain	SNOTEL	5600	38	11.7	14.3	82	8.6	60
Baree Creek	SC	5500						
Baree Midway	SC	4600	52	18.0	23.6	76	11.4	48
Baree Trail	SC	3800	16	4.9	7.8	63	1.3	17
Barker Lakes	SNOTEL	8250	42	11.5	10.3	112	10.9	106
Basin Creek	SNOTEL	7180	29	7.8	5.5	142	6.4	116
Bassoo Peak	SC	5150	17	5.9	7.6	78	4.0	53
Beagle Springs	SNOTEL	8850	34	7.9	6.3	125	6.2	98
Bear Basin	SC	8150	46	13.7	14.7	93		
Bear Mountain	SNOTEL	5400	98	38.4	48.4	79	21.4	44
Beartooth Lake	SNOTEL	9360	54	13.5	16.7	81	18.0	108
Beaver Creek	SNOTEL	7850	46	12.4	14.0	89	12.4	89
Big Snowy	SC	7150	46	13.8	13.8	100	12.2	88
Bisson Creek	SNOTEL	4920	17	6.3	8.4	75	7.9	94
Black Bear	SNOTEL	8170	76	24.2	29.6	82	23.7	80
Black Mountain	SC	7750	35	10.3	11.0	94	11.4	104
Black Pine	SNOTEL	7210	27	7.4	8.2	90	9.8	120
Blacktail	SC	5650	28	8.6	11.0	78	8.6	78
Blacktail Mtn	SNOTEL	5650	26	9.4			7.5	
Bloody Dick	SNOTEL	7600	41	11.0	9.3	118	10.2	110
Bots Sots	SC	7750	9	2.0	5.3	38	8.3	157
Boulder Mountain	SNOTEL	7950	56	16.5	15.4	107	14.4	94
Box Canyon	SNOTEL	6670	25	6.6	7.4	89	8.7	118
Boxelder Creek	SC	5100	16	4.1	5.6	73	4.8	86
Brackett Creek	SNOTEL	7320	49	15.7	14.4	109	20.4	142
Bristow Creek	SC	3900						
Brush Creek Timber	SC	5000	18	6.2	6.3	98	4.1	65
Bull Mountain	SC	6600	23	6.8	4.8	142	5.2	108
Burnt Mtn	SNOTEL	5880	4	1.9	4.0	48	3.0	75
Cabin Creek	SC	5200	5	1.3	4.9	27	5.6	114
Calvert Creek	SNOTEL	6430	27	7.3	6.8	107	7.5	110
Camp Senia	SC	7890	19	3.5	3.8	92	8.4	221
Canyon	SNOTEL	7870	36	8.8	10.5	84	9.6	91
Carrot Basin	SNOTEL	9000	64	18.0	20.4	88	17.1	84
Chessman Reservoir	SC	6200	15	5.0	2.8	179	5.0	179
Chicago Ridge	SC	5800	81	28.0			21.0	
Chicken Creek	SC	4060	35	10.9	12.8	85	12.0	94
Clover Meadow	SNOTEL	8600	41	10.5	12.4	85	9.2	74
Cole Creek	SNOTEL	7850	22	4.9	9.9	49	11.3	114
Combination	SNOTEL	5600	9	2.9	4.1	71	2.2	54
Copper Bottom	SNOTEL	5200	5	1.8			3.5	
Copper Camp	SNOTEL	6950	62	22.2			30.6	
Copper Mountain	SC	7700	32	8.7	8.0	109	9.7	121
Cottonwood Creek	SC	6400	21	5.8	5.2	112	5.2	100
Coyote Hill	SC	4200	18	7.9	7.8	101	8.9	114
Crevice Mountain	SC	8400	31	6.8	8.6	79	3.6	42

Station Name	Network	Elevation (ft)	Depth (in)	SWE (in)	Median (in)	% Median	Last Year SWE (in)	Last Year % Median
Crystal Lake	SNOTEL	6050	39	11.3	9.1	124	11.4	125
Dad Creek Lake	SC	8800	35	9.8	9.8	100		
Daisy Peak	SNOTEL	7600	30	7.3	7.2	101	7.9	110
Daly Creek	SNOTEL	5780	26	7.9	8.4	94	8.0	95
Darkhorse Lake	SNOTEL	8600	77	25.0	22.2	113	26.4	119
Deadman Creek	SNOTEL	6450	32	9.3	8.0	116	10.7	134
Desert Mountain	SC	5600	32	9.4	10.8	87	8.9	82
Discovery Basin	SC	7050	25	7.0	7.4	95	9.9	134
Divide	SNOTEL	7800	32	7.4	8.1	91	5.7	70
Dix Hill	SC	6400	25	7.2	8.2	88	7.0	85
Dupuyer Creek	SNOTEL	5750	0	0.0	7.1	0	2.9	41
Eagle Creek	SC	7000	34	10.3			15.0	
East Boulder Mine	SNOTEL	6335	8	2.5			0.7	
El Dorado Mine	SC	7800	28	8.7	12.9	67	10.6	82
Elk Horn Springs	SC	7800	29	7.0	6.8	103	8.0	118
Elk Peak	SNOTEL	7600	53	18.7			16.5	
Elk Peak	SC	8000	36	10.8	10.4	104	11.0	106
Emery Creek	SNOTEL	4350	34	12.2	12.5	98	11.7	94
Fatty Creek	SC	5500	52	16.2	17.4	93	18.0	103
Fish Creek	SC	8000	35	8.8	7.0	126	8.0	114
Fisher Creek	SNOTEL	9100	73	23.0	25.8	89	26.7	103
Flattop Mtn.	SNOTEL	6300	98	31.5	33.8	93	30.4	90
Fleecer Ridge	SC	7500	28	7.8	7.7	101	8.6	112
Foolhen	SC	8280	40	11.8	11.0	107	11.0	100
Forest Lake	SC	6400	28	9.4			11.9	
Four Mile	SC	6900	21	6.0	6.0	100	5.2	87
Freight Creek	SC	6000	20	5.2	10.4	50	7.6	73
Frohner Meadow	SNOTEL	6480	26	6.2	5.9	105	6.9	117
Garver Creek	SNOTEL	4250	24	8.7	8.0	109	5.3	66
Gibbons Pass	SC	7100	56	19.6				
Goat Mountain	SC	7000			7.6		6.6	87
Government Saddle	SC	5270	70	23.8			16.4	
Grave Creek	SNOTEL	4300	30	9.3	13.5	69	10.6	79
Griffin Creek Divide	SC	5150	21	7.6	8.1	94	5.4	67
Hand Creek	SNOTEL	5035	24	7.3	9.5	77	6.4	67
Hawkins Lake	SNOTEL	6450	76	22.8	19.3	118	15.9	82
Haymaker	SC	8050						
Hebgen Dam	SC	6550	29	8.2	9.2	89	7.2	78
Hell Roaring Divide	SC	5770	65	22.6	23.9	95	19.8	83
Herrig Junction	SC	4850	51	16.0	21.2	75	17.0	80
Highwood Divide	SC	5650	16	4.3	6.0	72	2.0	33
Highwood Station	SC	4600	9	2.6	3.6	72	1.7	47
Holbrook	SC	4530	11	3.8	7.6	50	4.9	64
Hoodoo Basin	SNOTEL	6050	86	29.6	32.3	92	24.2	75
Humboldt Gulch	SNOTEL	4250		8.3	9.8	85	5.8	59
Jakes Canyon	SC	9040	40	11.3	9.6	118	9.1	95
Johnson Park	SC	6450			4.6			
Kishenehn	SC	3890			7.2		5.2	72
Kraft Creek	SNOTEL	4750	21	7.6			7.3	
Lake Camp	SC	7780	30	7.0	7.8	90	7.2	92
Lakeview Canyon	SC	6930			7.2			
Lakeview Ridge	SNOTEL	7400	27	7.1	8.5	84	4.2	49
Lemhi Ridge	SNOTEL	8100	36	9.5	8.1	117	8.7	107

Station Name	Network	Elevation (ft)	Depth (in)	SWE (in)	Median (in)	% Median	Last Year SWE (in)	Last Year % Median
Lick Creek	SNOTEL	6860	26	6.6	8.2	80	7.6	93
Little Park	SC	7400	38	10.7	11.4	94	12.0	105
Logan Creek	SC	4300	16	5.4	5.5	98	4.8	87
Lolo Pass	SNOTEL	5240		19.2	22.9	84	18.5	81
Lone Mountain	SNOTEL	8880	45	13.2	13.2	100	11.3	86
Lookout	SNOTEL	5140	49	17.5	24.5	71	9.7	40
Lower Twin	SNOTEL	7900	45	12.7	13.0	98	12.6	97
Lubrecht Flume	SNOTEL	4680	8	3.1	4.7	66	5.2	111
Lubrecht Forest No 3	SC	5450	6	2.0	4.4	45	1.8	41
Lubrecht Forest No 4	SC	4650	1	0.2	2.1	10	0.6	29
Lubrecht Forest No 6	SC	4040	6	1.5	2.7	56	3.0	111
Lubrecht Hydroplot	SC	4200	9	3.2	4.1	78	6.3	154
Lupine Creek	SC	7380	24	6.3	6.4	98	5.6	88
Madison Plateau	SNOTEL	7750	56	16.1	17.8	90	13.7	77
Many Glacier	SNOTEL	4900	17	5.4	11.5	47	4.2	37
Marias Pass	SC	5250	23	7.4	13.1	56	6.9	53
Mineral Creek	SC	4000	20	8.4	13.9	60	9.0	65
Monument Peak	SNOTEL	8850	52	14.0	15.2	92	16.8	111
Moss Peak	SNOTEL	6780	85	28.9	28.1	103	34.3	122
Moulton Reservoir	SC	6850	26	6.2	6.0	103	7.0	117
Mount Allen No 7	SC	5700						
Mount Lockhart	SNOTEL	6400	39	11.7	15.2	77	14.9	98
Mudd Lake	SC	7650			15.1			
Mule Creek	SNOTEL	8300	46	12.4	11.2	111	12.8	114
N Fk Elk Creek	SNOTEL	6250	27	7.6	8.9	85	10.0	112
Nevada Ridge	SNOTEL	7020	37	10.1	10.9	93	12.7	117
New World	SC	6900	30	8.2	10.0	82	9.1	91
Nez Perce Camp	SNOTEL	5650	24	10.4	10.8	96	11.4	106
Noisy Basin	SNOTEL	6040	95	36.2	31.5	115	34.8	110
Norris Basin	SC	7550	25	5.6	8.0	70	6.2	78
North Fork Jocko	SNOTEL	6330	87	30.8	33.5	92	32.5	97
Northeast Entrance	SNOTEL	7350	28	7.0	8.2	85	9.4	115
Onion Park	SNOTEL	7410	36	10.0	10.1	99	12.7	126
Ophir Park	SC	7150	33	10.4	11.2	93	10.3	92
Parker Peak	SNOTEL	9400	60	16.0	16.0	100	19.0	119
Peterson Meadows	SNOTEL	7200	34	8.8	7.1	124	8.7	123
Pickfoot Creek	SNOTEL	6650	33	9.0	8.4	107	8.9	106
Pike Creek	SNOTEL	5930	12	3.9			2.5	
Pipestone Pass	SC	7200	20	5.6	3.2	175	5.3	166
Placer Basin	SNOTEL	8830	42	9.5	12.8	74	13.4	105
Poorman Creek	SNOTEL	5100	70	26.0	30.9	84	13.8	45
Porcupine	SNOTEL	6500	13	3.9	5.2	75	3.2	62
Potomageton Park	SC	7150	34	9.5	11.4	83	10.5	92
Revais	SC	4800	0	0.0	1.8	0	0.8	44
Rock Creek Mdws	SC	3400	26	9.2			8.0	
Rocker Peak	SNOTEL	8000	39	10.1	10.1	100	11.9	118
Rocky Boy	SNOTEL	4700	14	3.5	4.0	88	4.6	115
Roland Summit	SC	5120	66	25.7	27.0	95	16.4	61
S Fork Shields	SNOTEL	8100	31	9.1	11.8	77	10.6	90
Sacajawea	SNOTEL	6550	34	11.1	11.9	93	13.2	111
Saddle Mtn.	SNOTEL	7940	65	21.0	19.0	111	22.3	117
Short Creek	SNOTEL	7000	18	4.9	4.4	111	3.3	75
Shower Falls	SNOTEL	8100	52	13.6	15.6	87	16.4	105

Station Name	Network	Elevation (ft)	Depth (in)	SWE (in)	Median (in)	% Median	Last Year SWE (in)	Last Year % Median
Skalkaho Summit	SNOTEL	7250	53	16.2	17.5	93	17.2	98
Sleeping Woman	SNOTEL	6150	34	10.5	12.2	86	11.5	94
Slide Rock Mountain	SC	7100	37	10.7	10.1	106	11.6	115
Spotted Bear Mountain	SC	7000	25	8.6	10.7	80	7.5	70
Spur Park	SNOTEL	8100	60	17.5	15.5	113	18.9	122
Stahl Peak	SNOTEL	6030	92	31.5	27.5	115	24.1	88
Stemple Pass	SC	6600	25	6.2	7.0	89	8.2	117
Storm Lake	SC	7780	37	9.8	9.5	103	11.0	116
Stringer Creek	SNOTEL	6550	34	8.8	8.6	102	10.2	119
Stryker Basin	SC	6180	79	26.3	25.0	105	23.6	94
Stuart Mountain	SNOTEL	7400	71	23.4	25.9	90	28.5	110
Taylor Road	SC	4080	6	1.6	3.0	53	0.5	17
Ten Mile Lower	SC	6600	25	6.6	5.4	122	6.7	124
Ten Mile Middle	SC	6800	31	8.0	7.5	107	8.4	112
Tepee Creek	SNOTEL	8000	41	10.9	10.6	103	8.6	81
Timberline Creek	SC	8850	25	5.2	9.2	57	10.5	114
Tizer Basin	SNOTEL	6880	23	6.1	7.3	84	6.9	95
Trinkus Lake	SC	6100	91	33.9	32.4	105	34.2	106
Truman Creek	SC	4060	2	0.5	4.0	13	0.0	0
Twelvemile Creek	SNOTEL	5600	33	11.3	13.8	82	10.9	79
Twenty-One Mile	SC	7150	42	10.7	12.4	86	9.8	79
Twin Lakes	SNOTEL	6400	76	29.5	30.2	98	31.3	104
Upper Holland Lake	SC	6200	71	23.6	26.0	91	23.4	90
Waldron	SNOTEL	5600	19	5.5	8.9	62	6.5	73
Warm Springs	SNOTEL	7800	54	15.4	14.8	104	19.6	132
Weasel Divide	SC	5450	64	18.3	26.2	70	18.1	69
West Yellowstone	SNOTEL	6700	34	8.9	9.0	99	7.3	81
Whiskey Creek	SNOTEL	6800	41	10.4	12.0	87	9.1	76
White Elephant	SNOTEL	7710	57	18.4	20.4	90	14.9	73
White Mill	SNOTEL	8700	56	18.3	18.3	100	22.2	121
Wolverine	SNOTEL	7650	33	9.3	8.5	109	10.9	128
Wood Creek	SNOTEL	5960	16	5.0	7.5	67	6.1	81
Wrong Creek	SC	5700	19	5.9	8.8	67	8.8	100
Wrong Ridge	SC	6800		9.2	12.4	74	12.7	102
Younts Peak	SNOTEL	8350	39	10.5	11.7	90		

*Issued by:*

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**Montana**  
**Water Supply Outlook**  
**Report**  
**Natural Resources Conservation Service**

