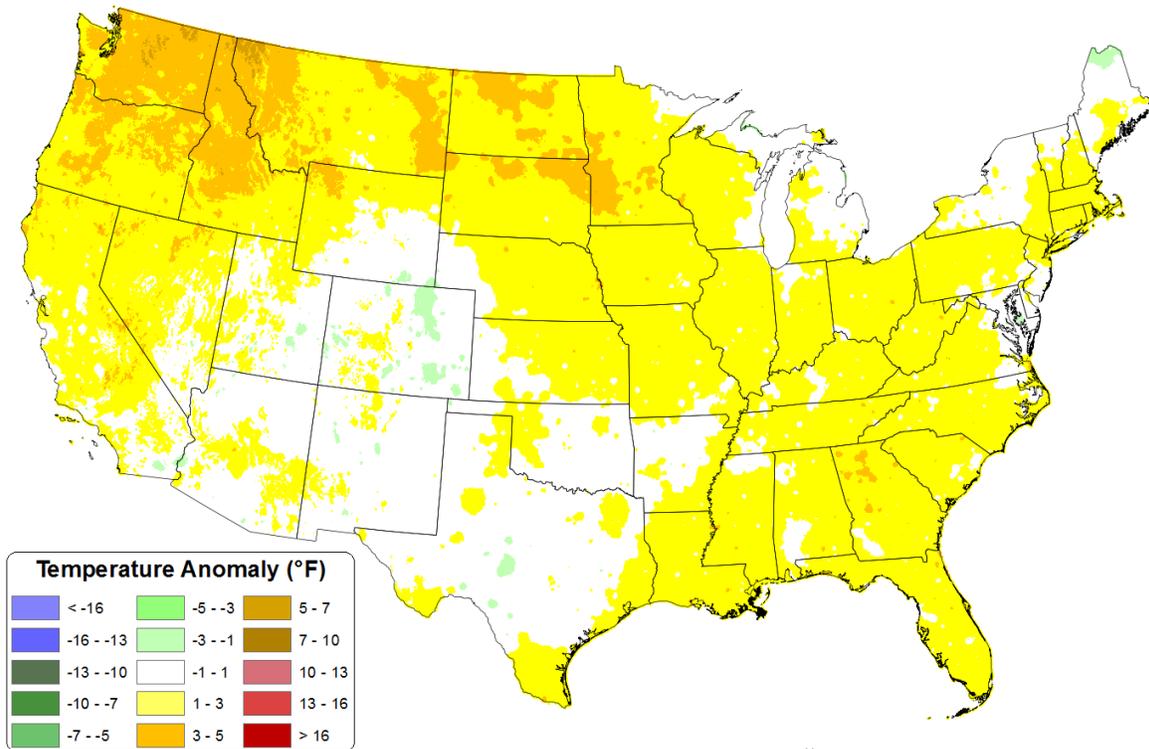


# Montana

## Water Supply Outlook Report

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

Daily Mean Temperature Anomaly: March 2016 - May 2016  
 Period ending 7 AM EST 31 May 2016  
 Base period: 1981-2010  
 (Map created 02 Jun 2016)



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The snowpack in the state felt the effects of the waves of persistent high pressure this spring with sunny and well above average temperatures causing early onset of snowmelt across the state. Snowpack peaked at the beginning of April in most basins and has been melting since, causing early rises in rivers and streams. This early movement of the mountain snow water has resulted in reservoir storage that is near or above average for June 1<sup>st</sup> in all river basins, but with the snowpack now running out there will be less water available in the coming weeks to refill the reservoirs as demand increases. June is the last of the “wet” months before more typical summer weather patterns occur and will play an important role in the seasonal volumes experienced in the rivers and streams this summer and fall.

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## Montana Water Supply Outlook Report as of June 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

Campers for the Memorial Day weekend probably weren't too surprised to find their traditional camping spots snow free over the holiday weekend, sunny and warm weather over the last few months has caused the bulk of the snow water to exit the mountains. As of June 1<sup>st</sup> 73 SNOTEL sites (of 131 total) were snow free, compared to 93 sites which had melted out last year at this time. Melt out dates this year have been 1 to 3 weeks earlier than average, but later than last year at this time.

Snow melt slowed this month in many basins, except the Kootenai where snowmelt persisted through the month due to above average temperatures and rain on snow events. Most other basins were given a reprieve from the common weather pattern this winter and springs which caused earlier than average peak snowpack and early melt. The cooler weather decreased snowmelt rates in many basins helping to prolong the upper elevation snowpack further into spring and summer.

May brought the highest melt rates west of the Divide and river basins currently have 11 to 43% of this year's peak snow water remaining to enter the river systems. The Bitterroot River basin has the least snowpack remaining with 11%, and Flathead River basin is the highest at 43%. This snow water is at the higher elevations and will continue to enter the rivers over the coming weeks. Other basins west of the Divide generally have 30% of this year's peak snow water remaining.

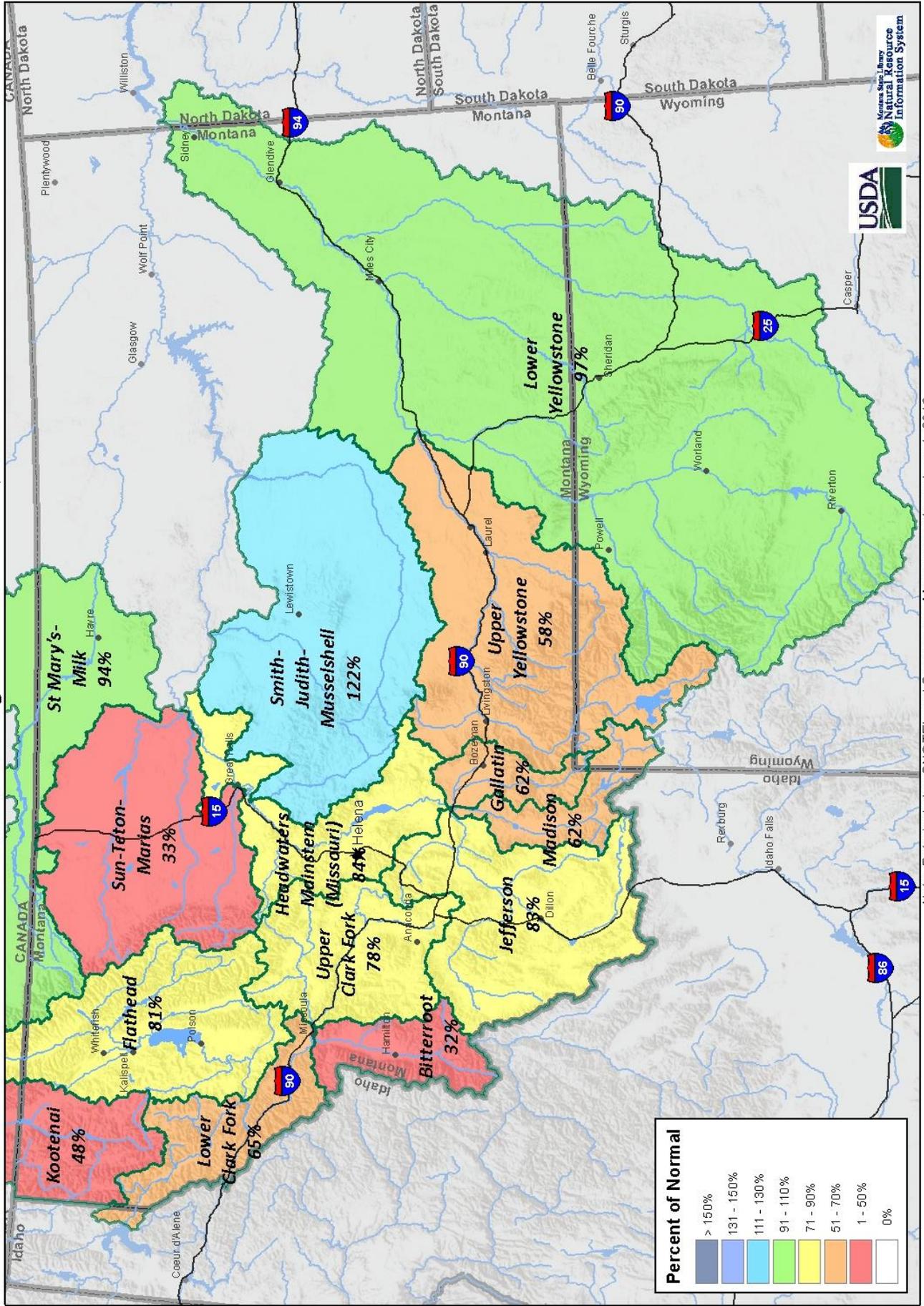
East of the Divide there is generally more snow this time of year in the higher elevation basins. Most basins east of the Divide have 23 to 30% of the snowpack remaining to melt. The Sun-Teton-Marias River basin has the least snow water remaining, with only 15% of this year's snowpack remaining on June 1<sup>st</sup>. The lack of snow and water year precipitation has been a cause of concern in this basin and will likely result in well below average streamflows this summer without substantial summer precipitation. Just north in the St. Mary's river basin the high elevation snowpack in Glacier National park has 63% of this year's peak snowpack left to enter the river systems. This is not uncommon for this region where snowpack at higher elevations generally persists well into summer.

For the state as whole there is 27% of this year's peak snowpack remaining to enter the river systems of the state, the average for this date is 40%. Water year peak snowpack, and snow melt, occurred early in all basins in Montana. The bulk of the snow water has entered the groundwater and river systems at this time, and longer days with more solar energy and warmer temperatures will cause the remaining snowpack to melt in the coming weeks at all but the highest of elevations.

### *Snow Water Equivalent*

<b>6/1/2016</b>	<i>% Normal</i>	<i>% Last Year</i>
<b>Columbia River Basin</b>	<b>70</b>	<b>189</b>
Kootenai in Montana	48	343
Flathead in Montana	81	188
Upper Clark Fork	78	181
Bitterroot	32	457
Lower Clark Fork	65	133
<b>Missouri River Basin</b>	<b>72</b>	<b>180</b>
Jefferson	83	154
Madison	62	200
Gallatin	62	172
Headwaters Mainstem	84	400
Smith-Judith-Musselshell	122	254
Sun-Teton-Marias	33	194
St. Mary-Milk	94	159
<b>Yellowstone River Basin</b>	<b>77</b>	<b>112</b>
Upper Yellowstone	58	105
Lower Yellowstone	97	124
<b>West of Divide</b>	<b>70</b>	<b>189</b>
<b>East of Divide</b>	<b>76</b>	<b>136</b>
<b>Montana State-Wide</b>	<b>68</b>	<b>158</b>

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

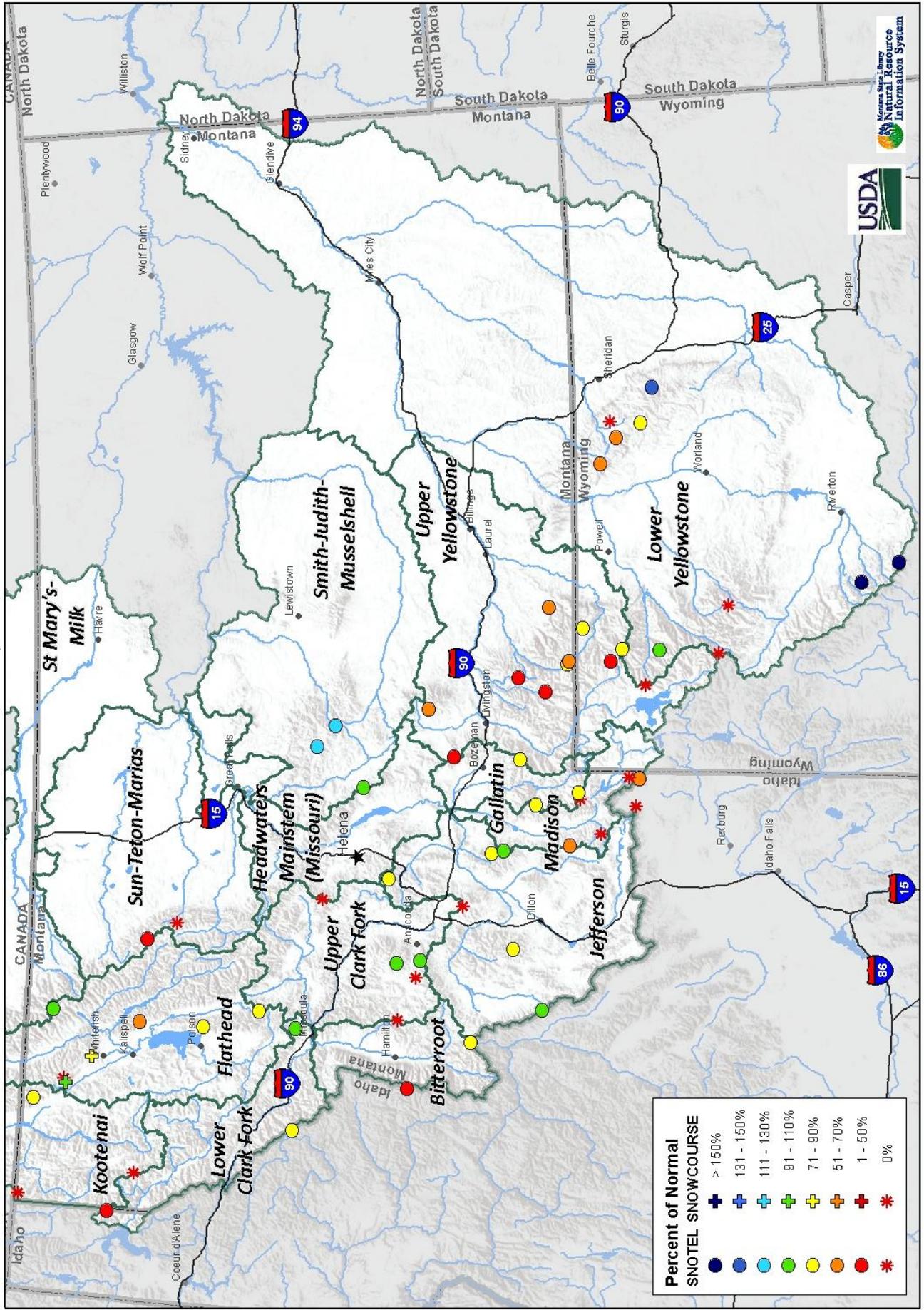


Note: Data includes SNOTEL and Snowcourse Measurements on June 1, 2016





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



## Precipitation - Overview

After a disappointing April, mountain SNOTEL precipitation for the month of May was above average in the northern basins and near to slightly below average in the southern basins. Storms favored the Kootenai River basin which received 156% of average mountain precipitation this month, though the surrounding basins were also above average. The Sun-Teton-Marias River basin which has been exceptionally dry this winter and spring finally received slightly above average mountain precipitation for the month of May.

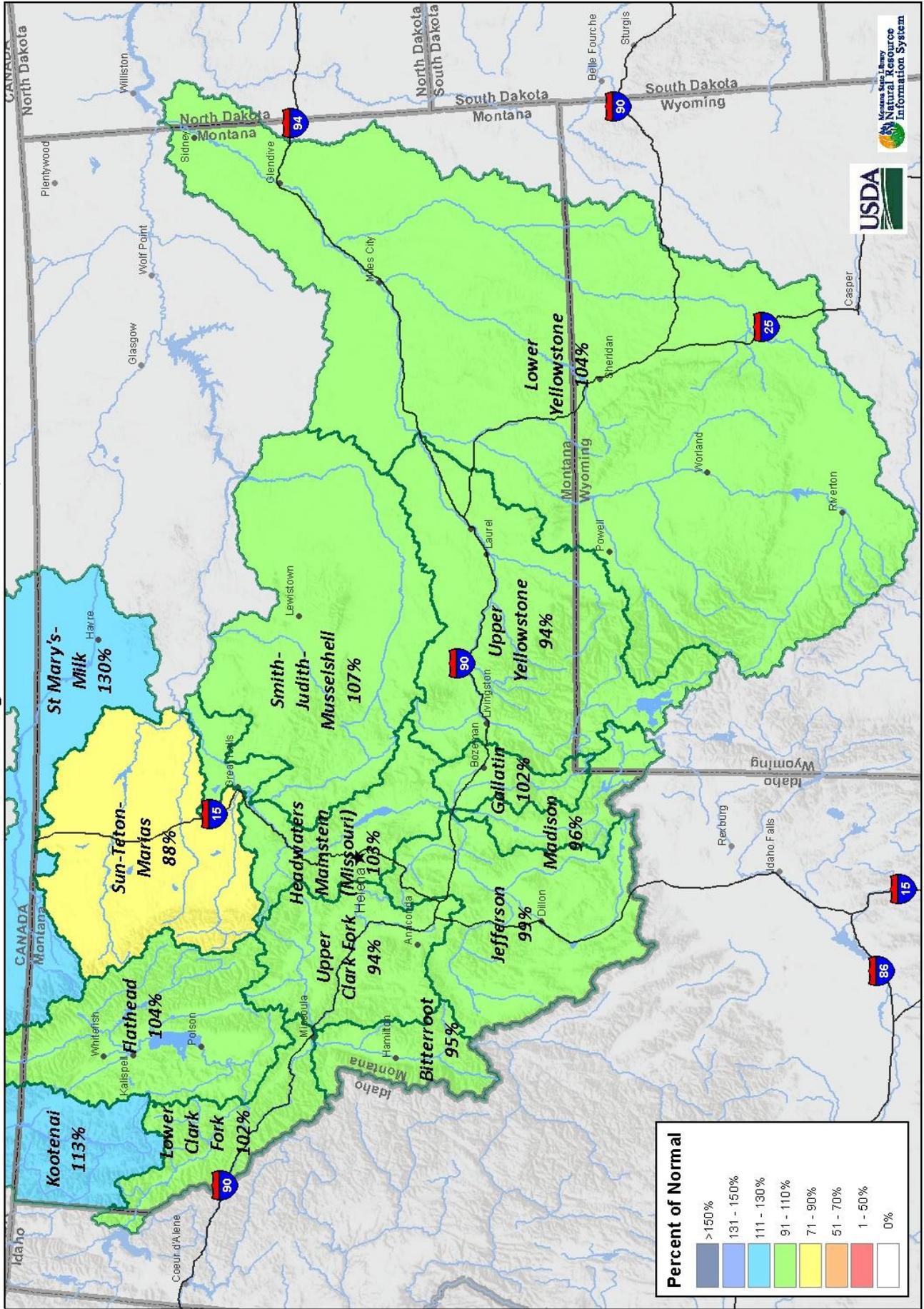
Water year-to-date mountain precipitation (starting Oct 1<sup>st</sup>) continues to be near to slightly above average in most Montana river basins, except the Sun-Teton-Marias which is still below average. Fall precipitation and winter snowfall makes up the bulk of the water year totals at this time, and the impact of spring and summer precipitation has less impact on this number on June 1<sup>st</sup>. Currently the Sun-Teton-Marias River basin is the lowest state-wide in terms of water year precipitation at 87% of average for June 1<sup>st</sup>, and the Kootenai River basin is the highest at 113% of average for this date.

June is typically one of the last “wet” months in the region before the more typical summer weather pattern begins, resulting in less widespread precipitation events. Southern basins east of the Divide should hope for a return of more seasonal patterns this June to help make up for below average May precipitation in order to keep soil moisture up as we enter the generally dry summer months.

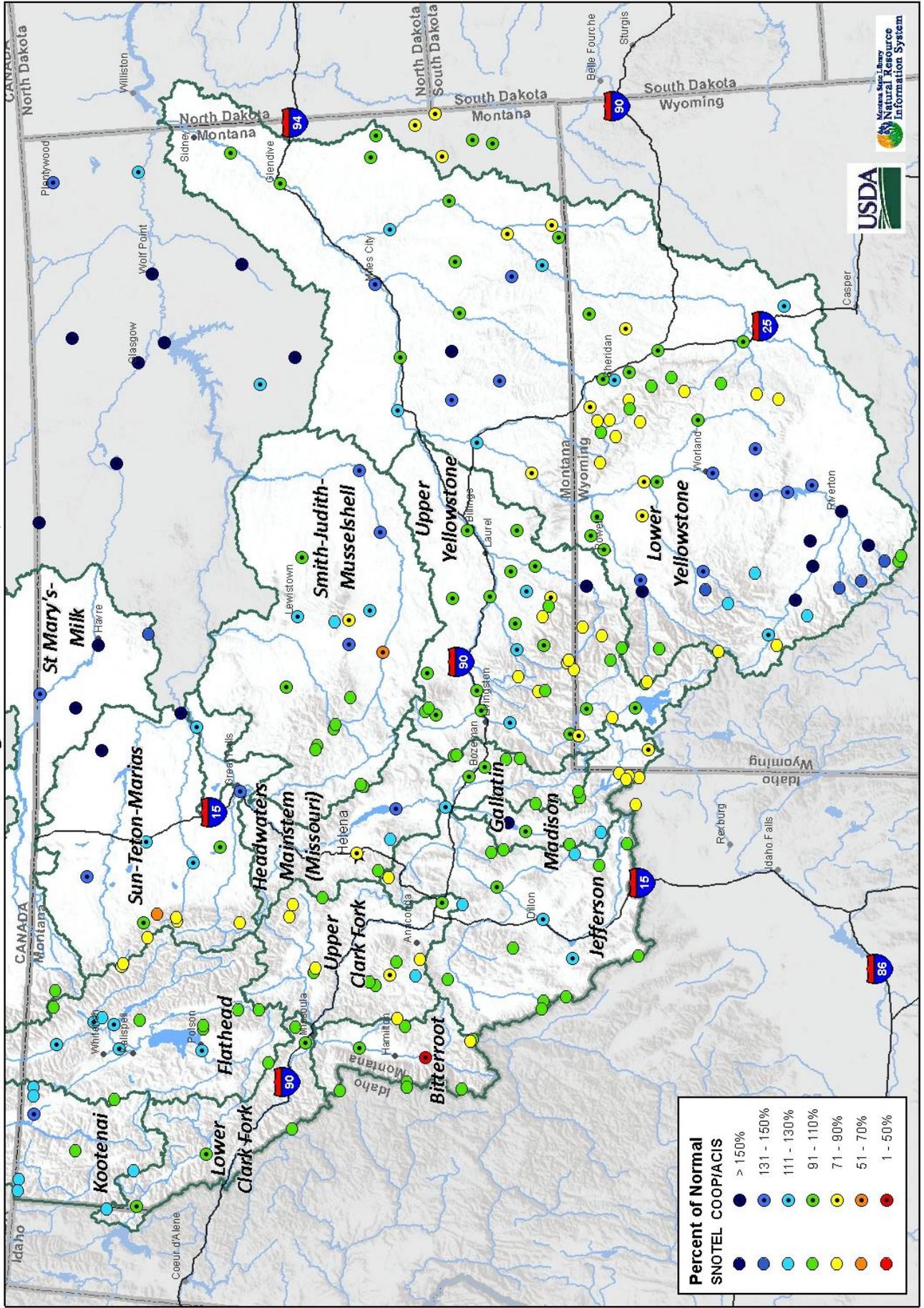
### *Precipitation*

<b>6/1/2016</b>	<i>Monthly % Avg</i>	<i>Water Year % Avg</i>	<i>WY % Last Year</i>
<b>Columbia River Basin</b>	<b>111</b>	<b>101</b>	<b>107</b>
Kootenai in Montana	156	113	122
Flathead in Montana	133	104	109
Upper Clark Fork	90	94	104
Bitterroot	82	95	97
Lower Clark Fork	105	102	107
<b>Missouri River Basin</b>	<b>112</b>	<b>103</b>	<b>112</b>
Jefferson	93	99	113
Madison	91	96	117
Gallatin	89	102	111
Headwaters Mainstem	117	103	106
Smith-Judith-Musselshell	128	107	113
Sun-Teton-Marias	111	87	89
St. Mary-Milk	170	128	129
<b>Yellowstone River Basin</b>	<b>91</b>	<b>100</b>	<b>100</b>
Upper Yellowstone	83	94	99
Lower Yellowstone	93	104	102
<b>West of Divide</b>	<b>111</b>	<b>101</b>	<b>107</b>
<b>East of Divide</b>	<b>101</b>	<b>100</b>	<b>108</b>
<b>Montana State-Wide</b>	<b>105</b>	<b>102</b>	<b>110</b>

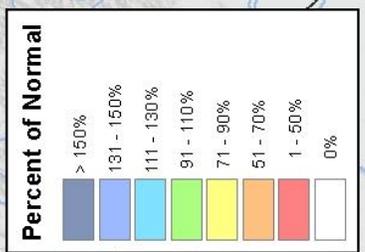
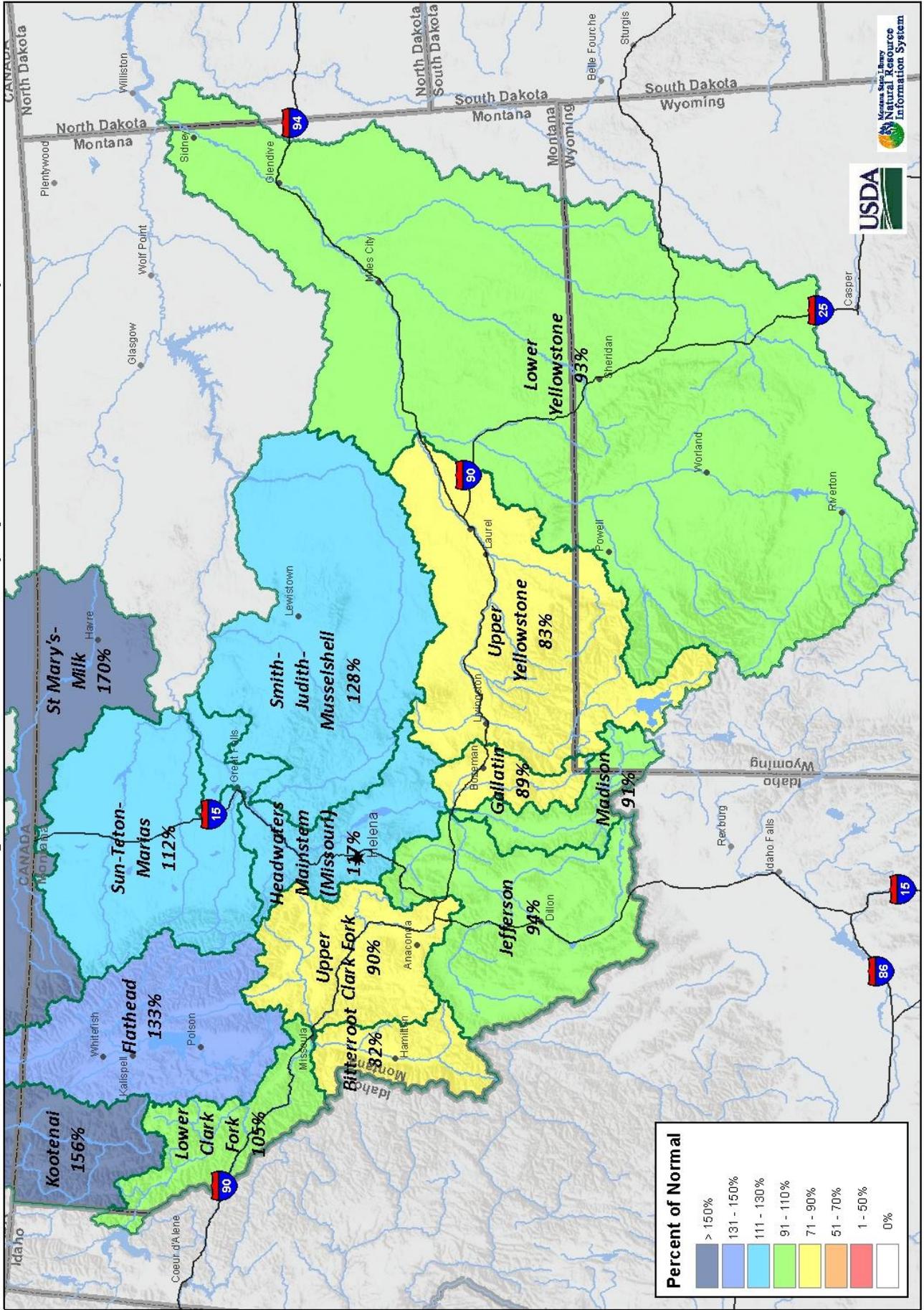
Montana Data Collection Office  
 Water Year to Date Precipitation  
 Basin Percentage of Normal - June 1, 2016



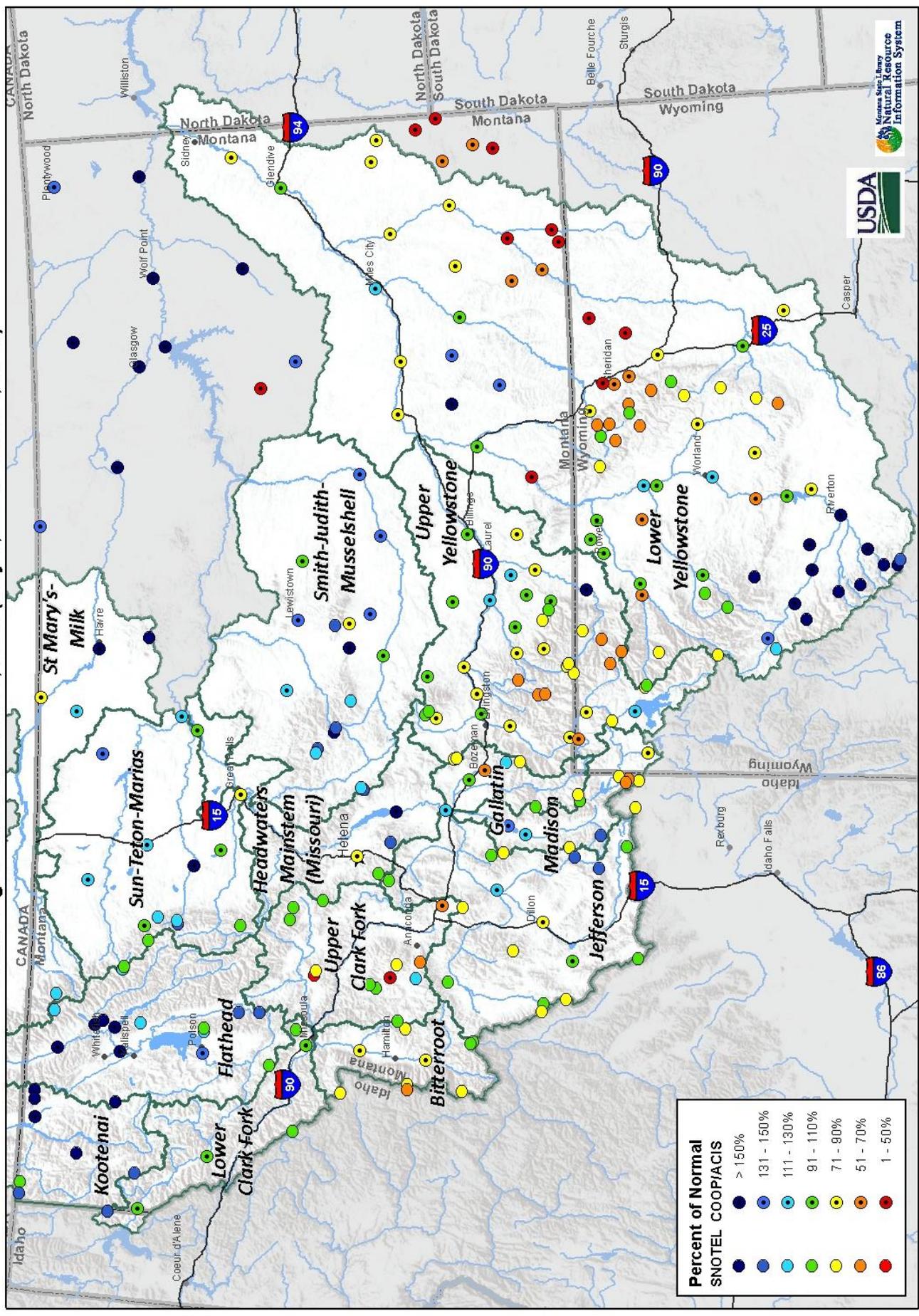
Montana Data Collection Office  
 Water Year to Date Precipitation  
 Percentage of Normal - June 1, 2016



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



Montana Data Collection Office  
 Monthly Precipitation  
 Percentage of Normal - June 1, 2016 - June 1, 2016 (May 1, 2016 - June 1, 2016)



## Reservoirs - Overview

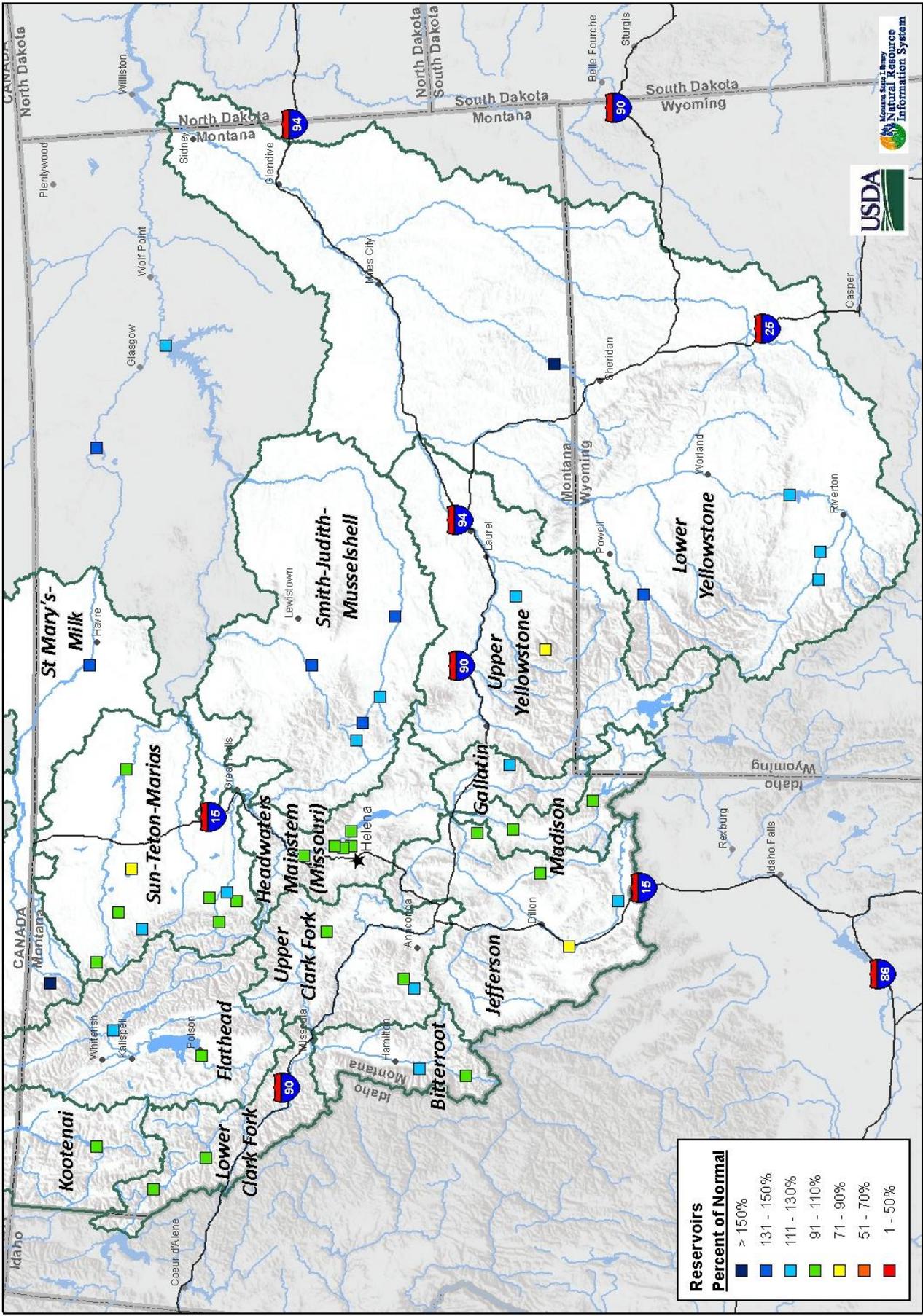
Reservoir storage has been near to above average in most basins throughout the winter, and continues to be in good standing in most locations. It should be noted that while reservoirs are above average for this date, most are not at capacity. The early spring runoff has been captured in most reservoirs, boosting the percentages of average for June 1<sup>st</sup>. Only a few reservoirs in the state are below average for this date. This information can be found in the individual basin summaries, and should be consulted by water users.

The early spring runoff may come into play for water managers later this water year if summer is dry with regards to precipitation. As water is used this irrigation season the reservoir levels will drop, and early snowmelt means there would be less water to slowly refill the reservoirs if there is high demand.

### *Reservoir Storage*

<b>6/1/2016</b>	<i>% Average</i>	<i>% Capacity</i>	<i>% Last Year</i>
<b>Columbia River Basin</b>	<b>111</b>	<b>82</b>	<b>99</b>
Kootnenai in Montana	109	71	93
Flathead in Montana	112	92	104
Upper Clark Fork	108	93	108
Bitterroot	108	106	97
Lower Clark Fork	101	98	101
<b>Missouri River Basin</b>	<b>113</b>	<b>81</b>	<b>99</b>
Jefferson	101	63	109
Madison	105	93	95
Gallatin	118	100	89
Headwaters Mainstem	115	81	100
Smith-Judith-Musselshell	132	93	89
Sun-Teton-Marias	100	63	90
St. Mary-Milk	143	79	112
<b>Yellowstone River Basin</b>	<b>103</b>	<b>65</b>	<b>90</b>
Upper Yellowstone	112	68	101
Lower Yellowstone	103	65	90
<b>West of Divide</b>	<b>111</b>	<b>82</b>	<b>99</b>
<b>East of Divide</b>	<b>113</b>	<b>80</b>	<b>99</b>
<b>Montana State-Wide</b>	<b>112</b>	<b>80</b>	<b>99</b>

Montana Data Collection Office  
 Reservoir Levels  
 Percentage of Normal - June 1, 2016



## Streamflow - Overview

Rivers and streams were running near to above average during the first three weeks of the month from mountain snowmelt and some precipitation events that fell in the river basins. During the last week of the month streamflows have made a sharp decline west of the Divide and along the Rocky Mountain Front as the mountain snowpack runs out. Other basins east of the Divide continue to experience near average flows with more snowpack remaining to sustain the rivers and streams.

Early movement of snow water from the mountains this year will impact water users later in the summer irrigation and recreation season. Long duration forecasts issued for June 1<sup>st</sup> reflect the general lack of snowpack on June 1<sup>st</sup> and are below average in almost all basins.

Summer precipitation will be important this year since so much snow water has moved ahead of schedule. Weather patterns in the summer tend to be less widespread, and more convective (thunderstorms) in nature, meaning that some parts of a basins can receive heavy rainfall while other regions are left high and dry. The mountain snowpack reservoir is almost empty in many basins, and water users will be reliant on reservoir storage summer precipitation to sustain the flows in rivers and streams.

Streamflow forecasts assume normal conditions from this point forward, the weather we have experienced this water year is far from normal temperature wise. Early snowmelt runoff will persist if temperatures continue to be above average. Summer precipitation will be key for water users across the state.

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

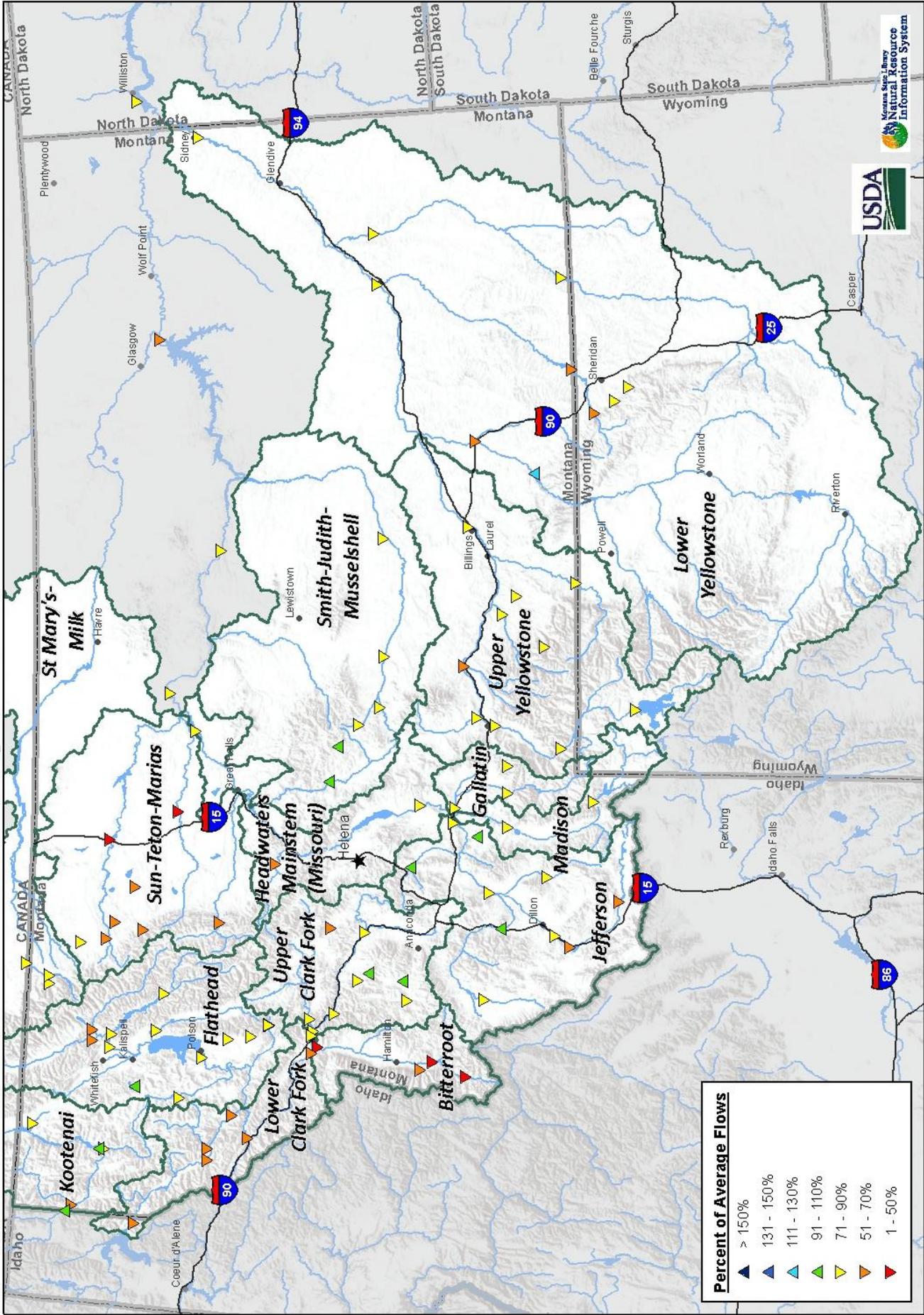
**FOR FORECASTS ABOVE AND BELOW THE 50 PERCENT EXCEEDANCE, LOOK TO THE SPECIFIC BASIN REPORTS.**

### ***JUN-JUL Streamflow Forecasts***

<b>6/1/2016</b>	<i>% Average</i>	<i>% Last Year</i>
<b>Columbia River Basin</b>	<b>70</b>	<b>143</b>
Kootenai in Montana	71	151
Flathead in Montana	70	141
Upper Clark Fork	79	154
Bitterroot	50	96
Lower Clark Fork	68	139
<b>Missouri River Basin</b>	<b>73</b>	<b>116</b>
Jefferson	84	323
Madison	76	128
Gallatin	78	134
Headwaters Mainstem	73	106
Smith-Judith-Musselshell	86	105
Sun-Teton-Marias	54	122
St. Mary-Milk	82	122
<b>Yellowstone River Basin</b>	<b>83</b>	<b>90</b>
Upper Yellowstone	76	103
Lower Yellowstone	88	84
<b>West of Divide</b>	<b>70</b>	<b>143</b>
<b>East of Divide</b>	<b>78</b>	<b>101</b>
<b>Montana State-Wide</b>	<b>74</b>	<b>117</b>

Forecasted values above are basin-wide averages for the 50% exceedance level. For individual forecast points, or forecasts at the 10%,30%,70%,90% levels consult the Water Supply Outlook Report

Montana Data Collection Office  
 Streamflow Forecast  
 Percentage of Normal - June 1, 2016



## Surface Water Supply Index (SWSI)

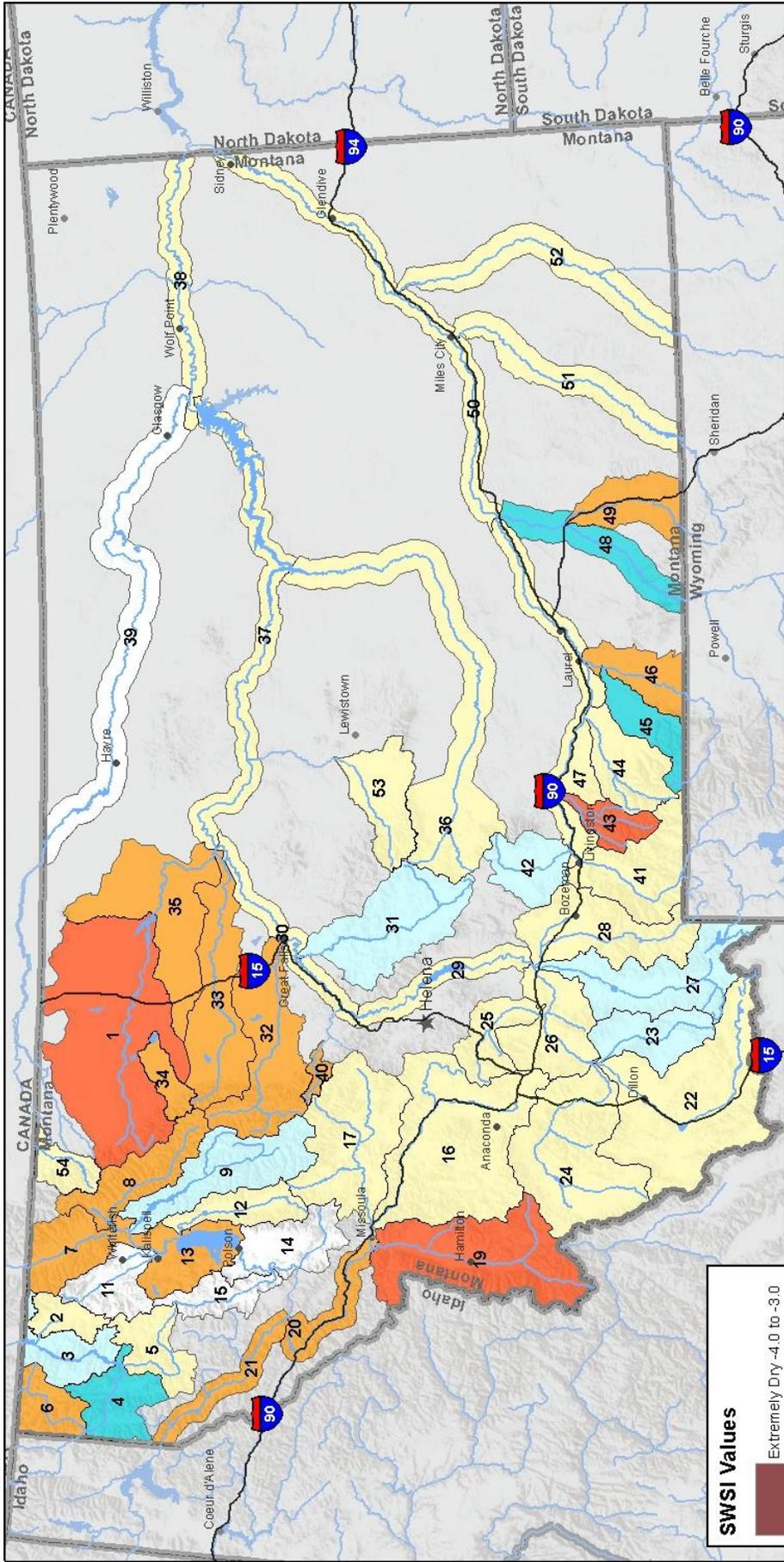
The Surface Water Supply Index (SWSI) is a measure of available surface water availability for the spring and summer months. Water users that rely on mountain precipitation can use the index to evaluate seasonal surface water supplies. The SWSI accounts for mountain snowpack, mountain precipitation,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

Watershed	This month's SWSI	Last Year's SWSI
Marias above Tiber Reservoir	-2.2	-2.7
Tobacco	0.1	-3.1
Kootenai Ft. Steele to Libby Dam	1.3	-1.1
Kootenai below Libby Dam	2.7	0.4
Fisher	0.6	-2.2
Yaak	-1.0	-2.5
North Fk. Flathead	-1.0	-3.3
Middle Fk. Flathead	-1.5	-2.9
South Fk. Flathead	1.7	-1.6
Flathead at Columbia Falls	-0.3	-2.4
Swan	0.6	-2.7
Flathead at Polson	-1.2	-2.9
Mission Valley		-3.4
Little Bitterroot		2.0
Clark Fork above Milltown	0.4	-3.3
Blackfoot	-0.8	-3.3
Clark Fork above Missoula	-0.4	-3.4
Bitterroot	-2.8	-2.0
Clark Fork River below Bitterroot	-1.1	-3.0
Clark Fork River below Flathead	-1.1	-2.9
Beaverhead	0.3	-3.1
Ruby	1.7	-3.1
Big Hole	0.1	-1.6
Boulder (Jefferson)	0.6	-1.3
Jefferson	0.5	-1.8
Madison	1.5	-3.1
Gallatin	-0.1	-2.9
Missouri above Canyon Ferry	0.1	-2.5
Missouri below Canyon Ferry	0.4	-2.0
Smith	1.4	-1.7
Sun	-1.3	-2.5
Teton	-1.6	-1.5
Birch/Dupuyer Creeks	-1.9	-1.1
Marias	-1.0	-0.2
Musselshell	0.3	0.0
Missouri above Fort Peck	0.6	-0.5
Missouri below Fort Peck	0.4	-0.5
Milk		
Dearborn near Craig	-1.4	-3.1
Yellowstone above Livingston	-0.1	-2.7
Shields	1.0	-2.4
Boulder (Yellowstone)	-2.6	-2.5
Stillwater	-0.8	-2.2
Rock/Red Lodge Creeks	2.2	0.2
Clarks Fork Yellowstone	-1.3	-1.8
Yellowstone above Bighorn River	-0.3	-2.1
Bighorn below Bighorn Lake	2.1	1.3
Little Bighorn	-1.5	-0.7
Yellowstone below Bighorn	0.7	-0.6
Tongue	-0.6	1.5
Powder	-0.1	1.3
Upper Judith	-0.1	0.3
Saint Mary	0.6	-3.3

### 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) June 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

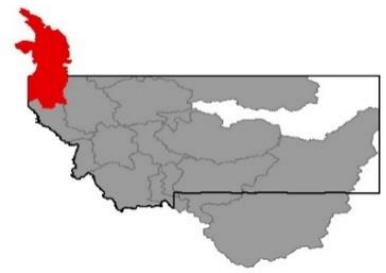
**RIVER INDEX & SWSI VALUES**

- 1 Marias above Tiber Reservoir -2.2
- 2 Tobacco 0.1
- 3 Kootenai Ft. Steele to Libby Dam 1.3
- 4 Kootenai below Libby Dam 2.7
- 5 Fisher 0.6
- 6 Yaak -1
- 7 North Fk. Flathead -1
- 8 Middle Fk. Flathead -1.5
- 9 South Fk. Flathead 1.7
- 10 Flathead at Columbia Falls -0.3
- 12 Swan 0.6
- 13 Flathead at Polson -1.2
- 14 Mission Valley
- 15 Little Bitterroot
- 16 Clark Fork above Milltown 0.4
- 17 Blackfoot -0.8
- 18 Clark Fork above Missoula -0.4
- 19 Bitterroot -2.8
- 20 Clark Fork River below Bitterroot -1.1
- 21 Clark Fork River below Flathead -1.1
- 22 Beaverhead 0.3
- 23 Ruby 1.7
- 24 Big Hole 0.1
- 25 Boulder (Jefferson) 0.6
- 26 Jefferson 0.5
- 27 Madison 1.5
- 28 Gallatin -0.1
- 29 Missouri above Canyon Ferry 0.1
- 30 Missouri below Canyon Ferry 0.4
- 31 Smith 1.4
- 32 Sun -1.3
- 33 Teton -1.6
- 34 Birch/Dupuyer Creeks -1.9
- 35 Marias -1
- 36 Musselshell 0.3
- 37 Missouri above Fort Peck 0.6
- 38 Missouri below Fort Peck 0.4
- 40 Dearborn near Craig -1.4
- 41 Yellowstone above Livingston -0.1
- 42 Shields 1
- 43 Boulder (Yellowstone) -2.6
- 44 Stillwater -0.8
- 45 Rock/Red Lodge Creeks 2.2
- 46 Clarks Fork Yellowstone -1.3
- 47 Yellowstone above Bighorn River -0.3
- 48 Bighorn below Bighorn Lake 2.1
- 49 Little Bighorn -1.5
- 50 Yellowstone below Bighorn 0.7
- 51 Tongue -0.8
- 52 Powder -0.1
- 53 Upper Judith -0.1
- 54 Saint Mary 0.6



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

# Kootenai River Basin



April and May brought well above average snowmelt in the Kootenai River basin. As of June 1<sup>st</sup> Stahl Peak (6030 ft) and Bear Mountain (5400 ft) are the only 2 SNOTEL sites in the basin with snow. A mid-May storm did bring significant snow to the upper elevations, which helped the basin rebound before reaching a record low snowpack. Stahl Peak received the brunt of this storm, getting 24 inches of high density snow the night of May 22<sup>nd</sup>. The short term weather forecast for the Kootenai River basin is calling for above freezing nighttime temperatures and warm sunny days. The remaining SNOTEL sites in the basin will likely be melted out by mid-June, about 3 weeks early.

The snow line of the large mid-May storm was at about 4500-5500 ft. Grave Creek SNOTEL (4300 ft) received some snow that was quickly melted by rain. Grave Creek SNOTEL received over 5 inches of rain from May 22<sup>nd</sup> to 24<sup>th</sup>. Currently water-year-to date precipitation in the basin is at 113% of average. Mountain SNOTEL sites received 156% of average precipitation for the month of May, while valley weather stations received 166% of average precipitation in the Kootenai River basin.

Reservoir storage in Lake Koocanusa is currently above average at 109%.

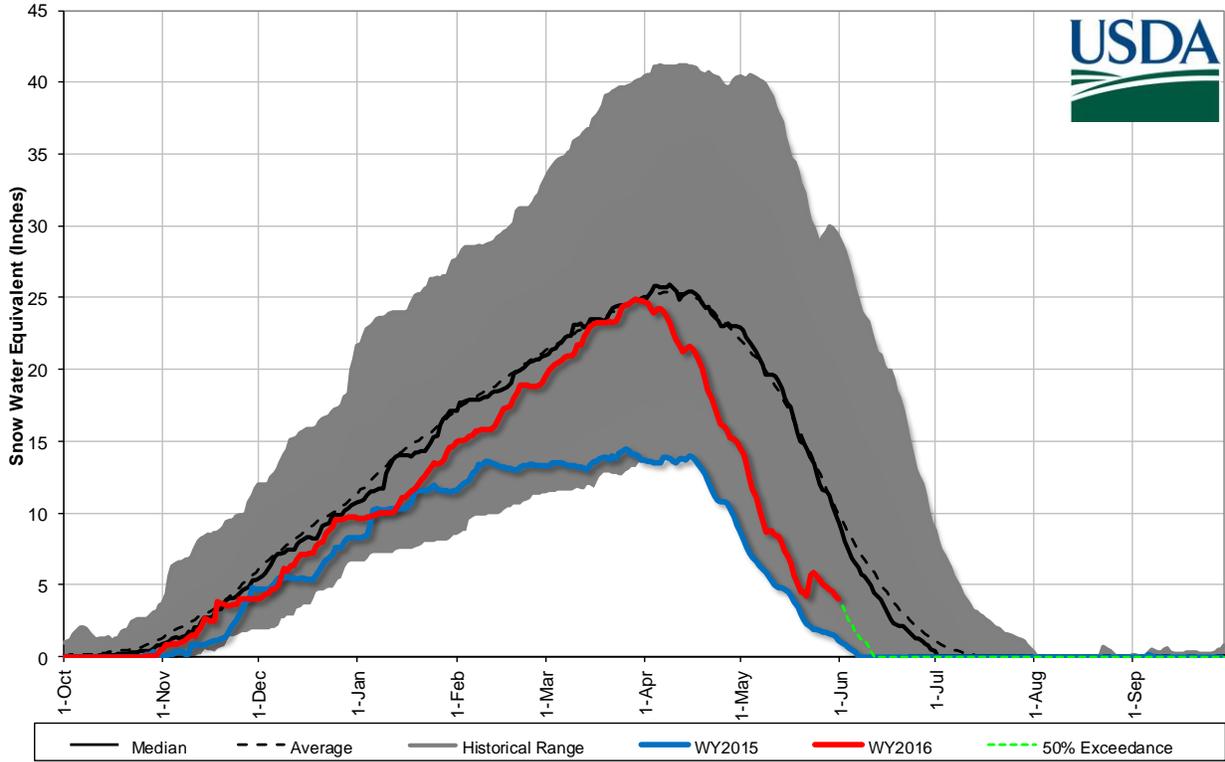
Above average April temperatures drove a significant portion of available snow water out of the mountain early this year. Most rivers within the basin experienced their snowmelt driven peaks during the last week of April. The Yaak River's snowmelt peak occurred on April 24<sup>th</sup>, which was about 24 days before the average peak date. The large increase in flows that occurred on streams within the Kootenai in late May was primarily rain driven. Current basin-wide streamflows for the 50% exceedance are 71% of average for the June-July time period.

<b>Kootenai River Basin Data Summary</b>		<b>6/1/2016</b>	
	Percent of 1981-2010 Normal (Median)	Last Year Percentage of Normal (Median)	
<b>Snowpack</b>			
Basin-Wide	48%	14%	
	Monthly Percentage of Average	WYTD Percentage of 1981-2010 Average*	Last Year Percentage of Average
<b>Precipitation</b>			
Mountain Precipitation	156%	113%	92%
Valley Precipitation	166%	138%	108%
Basin Precipitation	156%	113%	93%
	Percentage of Average	Percentage of Capacity (Total)	Last Year Percentage of Average
<b>Reservoir Storage</b>			
Basin-Wide Storage	109%	71%	117%
	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 June -July	71%	151%	47%

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

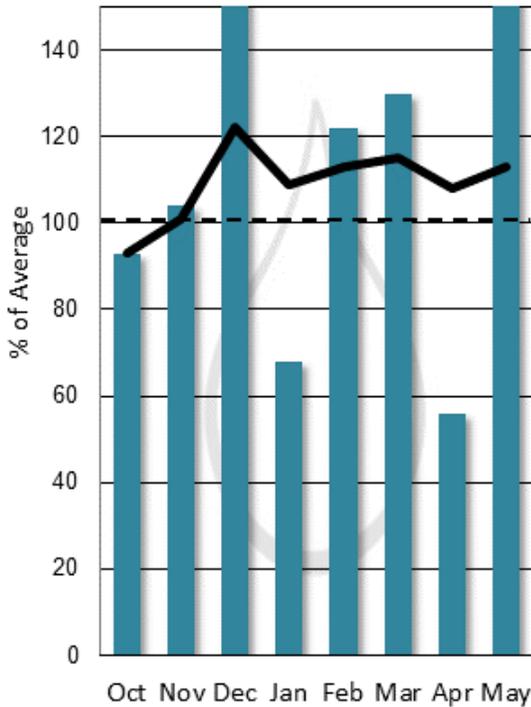
\*\*Basin-wide streamflows are an average of the individual streamflow points within the basin for the 50 percent exceedance forecast. Consult the individual streamflow forecasts in the table below for the range of forecasts at an individual point.

**Kootenai River Basin Snowpack with Non-Exceedence Projections**  
*Based on provisional SNOTEL daily data as of 6/1/2016*



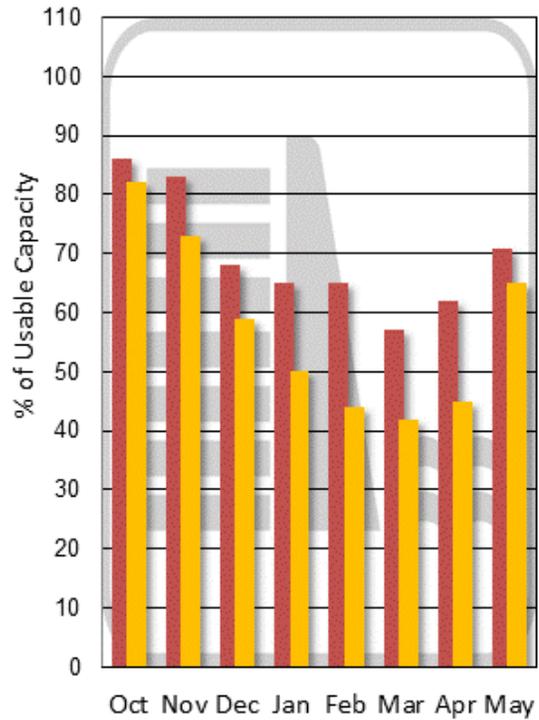
**Mountain and Valley  
Precipitation**

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



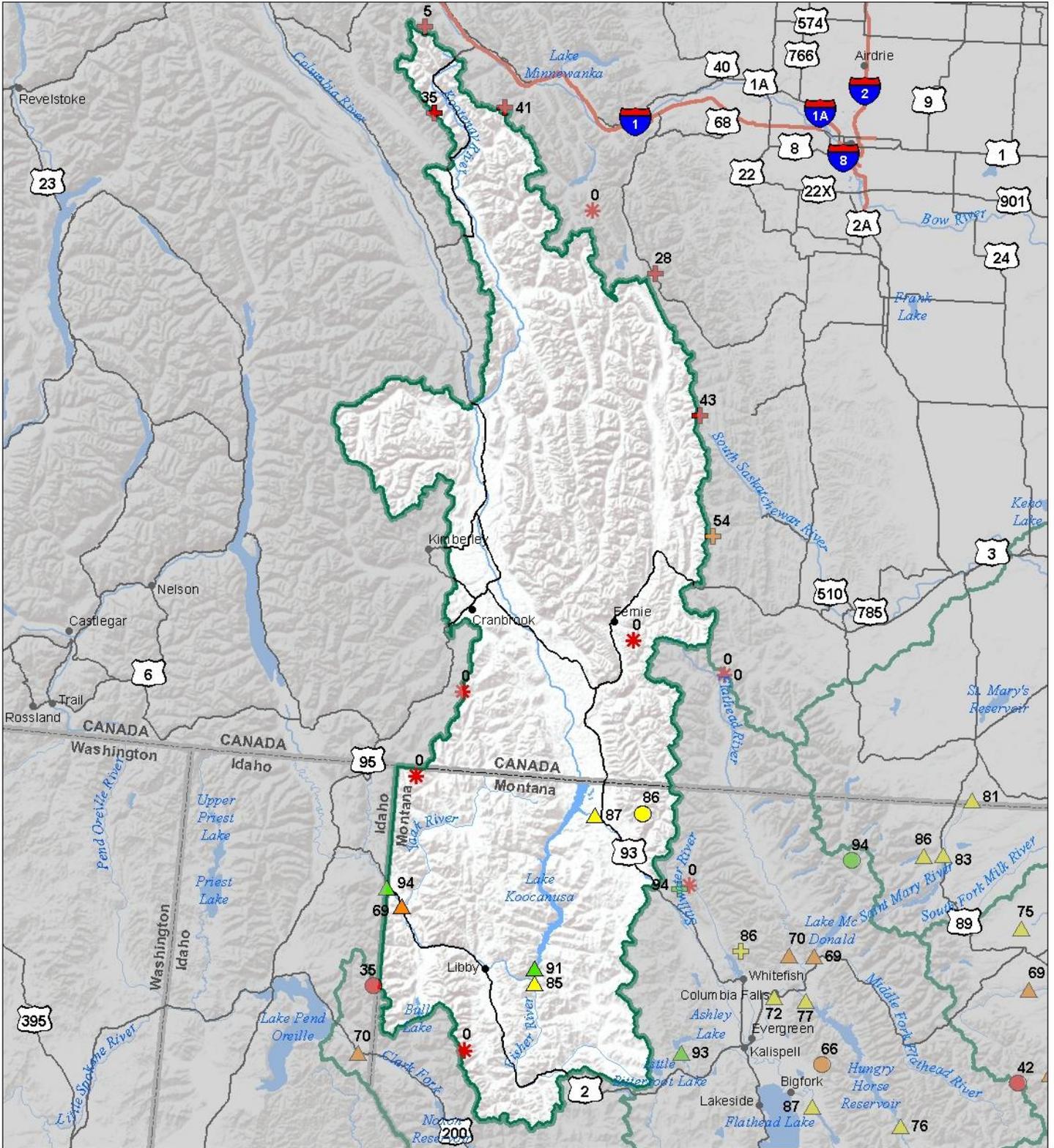
**End of Month Reservoir  
Storage**

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



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

# Kootenai River Basin Streamflow Forecast, Snow Water Equivalent Percentage of Normal June 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%

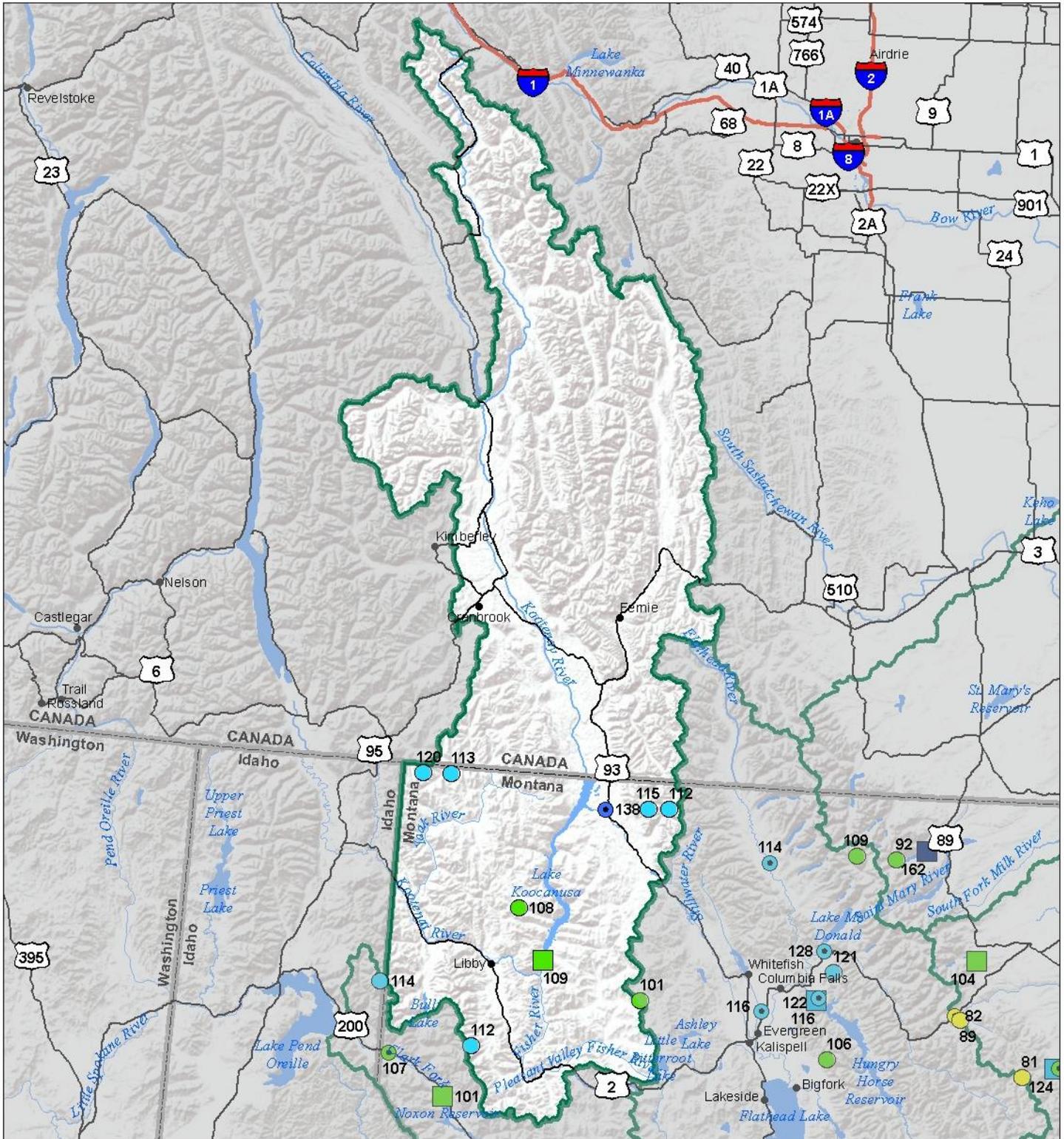


# Kootenai River Basin

## Water Year to Date Precipitation and Reservoir Levels

### Percentage of Normal

June 1, 2016



### Precipitation Percent of Normal

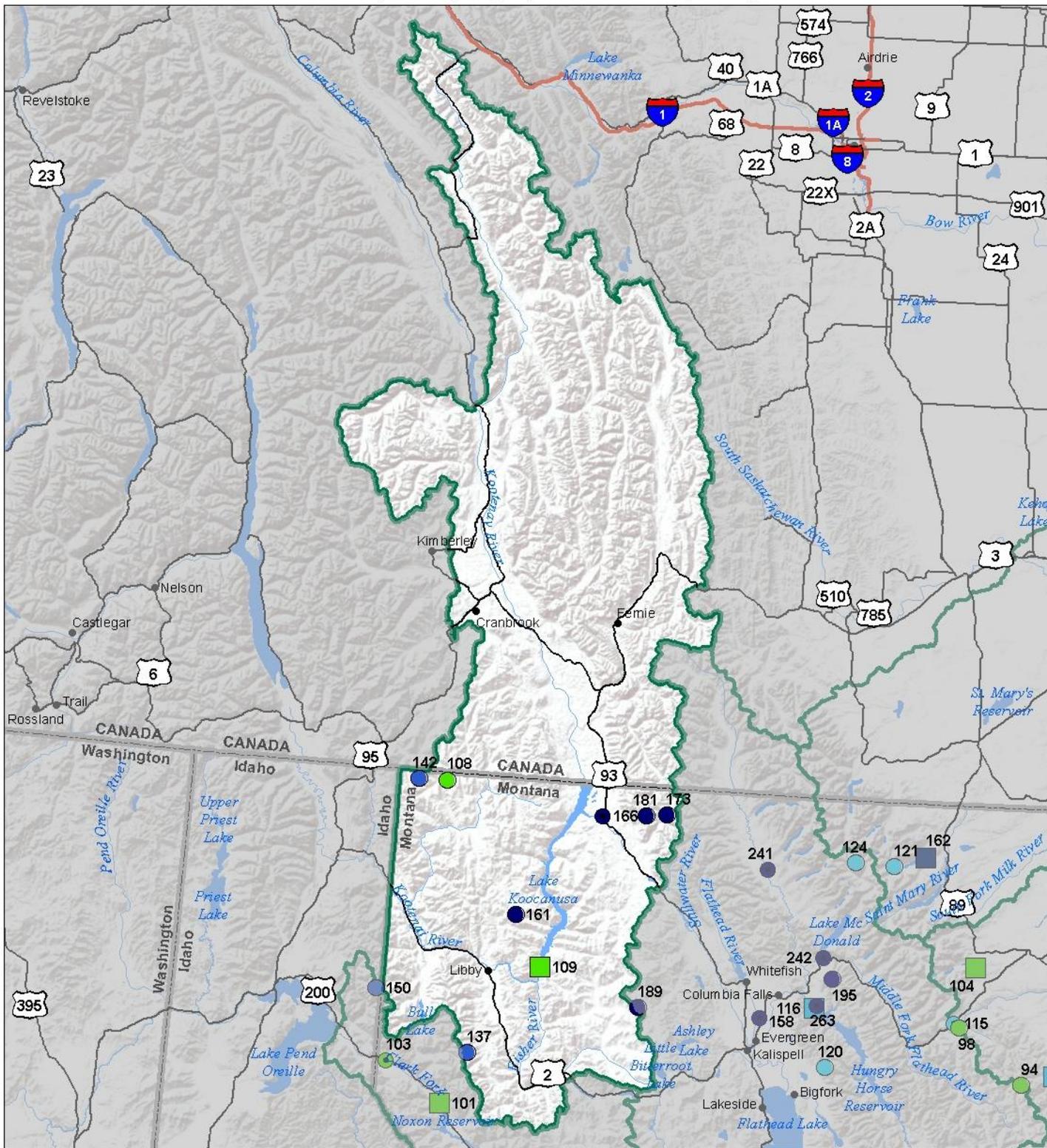
SNOTEL		COOP/ACIS	
● > 150%	● 71 - 90%	● > 150%	● 71 - 90%
● 131 - 150%	● 51 - 70%	● 131 - 150%	● 51 - 70%
● 111 - 130%	● 1 - 50%	● 111 - 130%	● 1 - 50%
● 91 - 110%		● 91 - 110%	

### 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 June 1, 2016 (May 1, 2016 - June 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%



## Kootenai River Basin In Montana Streamflow Forecasts - June 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	JUN-JUL	33	44	51	88%	58	69	58
	JUN-SEP	40	53	62	87%	71	84	71
Libby Reservoir Inflow <sup>1</sup>	JUN-JUL	2340	2780	2980	92%	3180	3620	3240
	JUN-SEP	2980	3530	3780	91%	4030	4580	4150
Fisher R nr Libby	JUN-JUL	32	44	52	85%	60	72	61
	JUN-SEP	41	55	64	85%	73	87	75
Yaak R nr Troy	JUN-JUL	41	67	85	65%	103	129	130
	JUN-SEP	55	83	103	69%	123	151	150
Kootenai R at Leonia <sup>1,2</sup>	JUN-JUL	2560	3160	3420	94%	3690	4290	3640
	JUN-SEP	3330	4060	4380	94%	4710	5430	4640

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

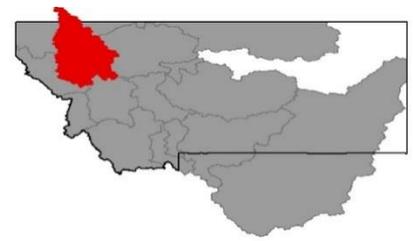
2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions

3) Median value used in place of average

Reservoir Storage End of May, 2016	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Lake Koocanusa	4082.0	4362.7	3736.0	5748.0
Basin-wide Total	4082.0	4362.7	3736.0	5748.0
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis June 1, 2016	# of Sites	% Median	Last Year % Median
KOOTENAY in CANADA	6	34	43
KOOTENAI MAINSTEM	3	34	0
TOBACCO	2	86	35
FISHER	1		
YAAK	2	0	0
KOOTENAI RIVER BASIN in MONTANA	8	48	14
KOOTENAI ab BONNERS FERRY	13	42	36

# Flathead River Basin



With summer like weather conditions arriving early this year in the Flathead River basin the snowpack was approaching record low conditions in early May. By mid-May the snowpack was fairing worse than last year. On May 22<sup>nd</sup> a large storm arrived which helped the basin's upper elevation snowpack recover slightly. During this event Flattop SNOTEL (6300 ft) received 4.0 inches of snow water (20 inches depth). Daytime mountain temperatures for the Flathead River basin are forecasted to be near 60 degrees over the next week. Expect to see all SNOTEL sites in the basin to be melted out by mid-June if warm weather persists.

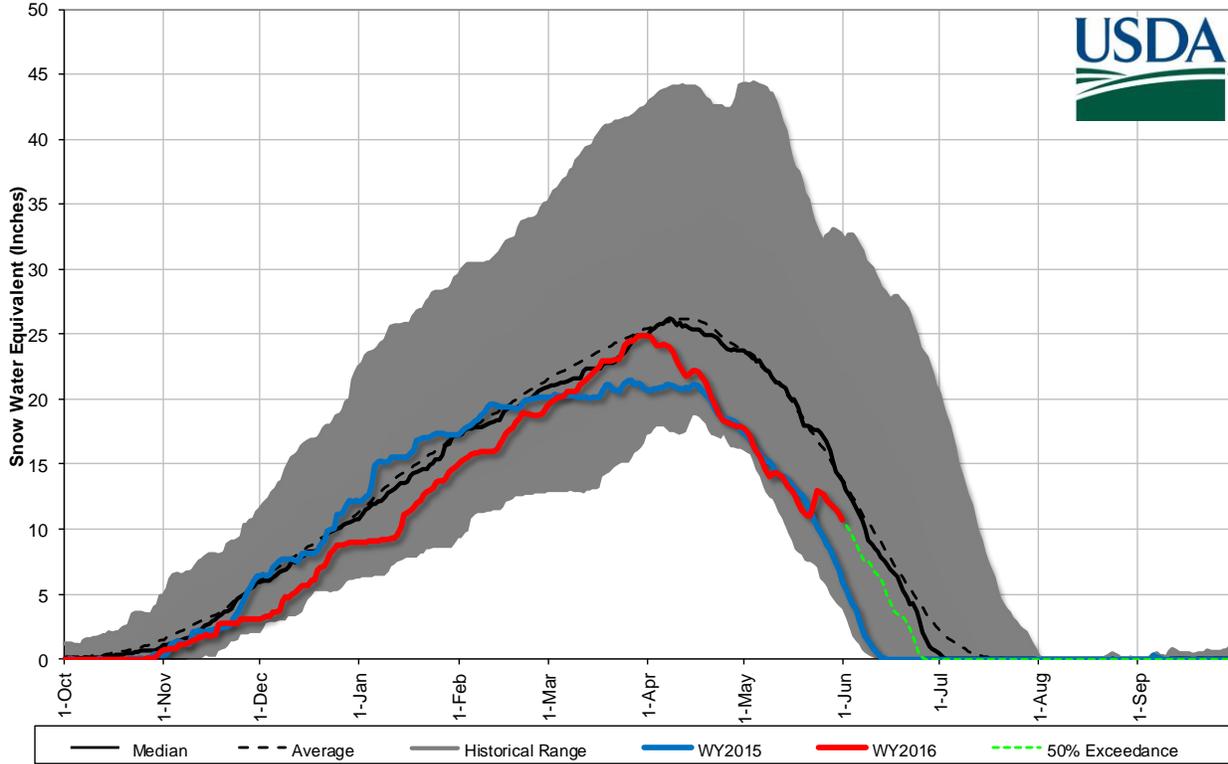
The large May storm came in the form of rain at mid-to-low elevations. Many Glacier SNOTEL (4900 ft) received a much needed 3 inches of rain during the peak of this storm. Currently water-year-to date precipitation in the basin is at 104% of average. Mountain SNOTEL sites received 133% of average precipitation for the month of May, while valley weather stations received 144% of average precipitation in the Flathead River basin.

Reservoir capacities in the Flathead River basin are currently above average at 112%.

Most streams within the Flathead River basins experienced their true snowmelt driven peak in mid-April due to above average temperatures. However the early May precipitation event did cause rain influenced snowmelt peaks which were near if not higher than the April peaks. High water in late May was primarily rain driven. The Flathead River at is currently flowing at 70 percent of average and is in recession. Current basin-wide streamflows for the 50% exceedance are 70% of average for the June-July time period.

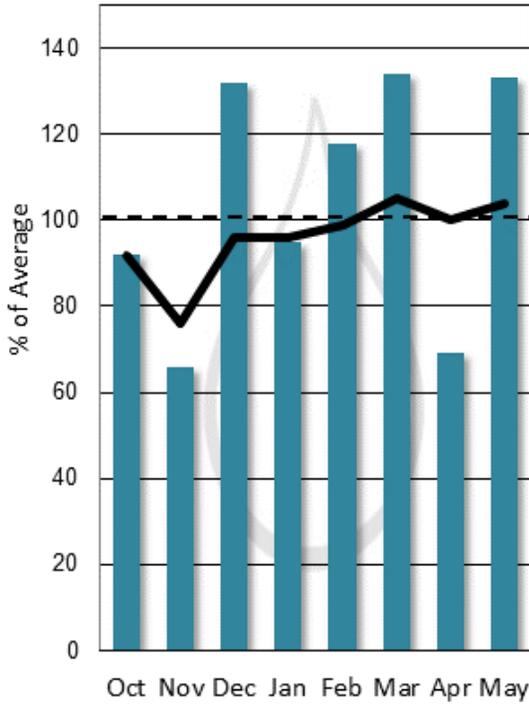
<b>Flathead River Basin Data Summary</b>		<b>6/1/2016</b>	
	Percent of 1981-2010 Normal (Median)	Last Year Percentage of Normal (Median)	
<b>Snowpack</b>			
Basin-Wide	78%	42%	
	Monthly Percentage of Average	WYTD Percentage of 1981-2010 Average*	Last Year Percentage of Average
<b>Precipitation</b>			
Mountain Precipitation	133%	103%	95%
Valley Precipitation	144%	122%	112%
Basin Precipitation	133%	104%	95%
	Percentage of Average	Percentage of Capacity (Total)	Last Year Percentage of Average
<b>Reservoir Storage</b>			
Basin-Wide Storage	112%	92%	108%
	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 June -July	70%	141%	50%
*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 6/1/2016*



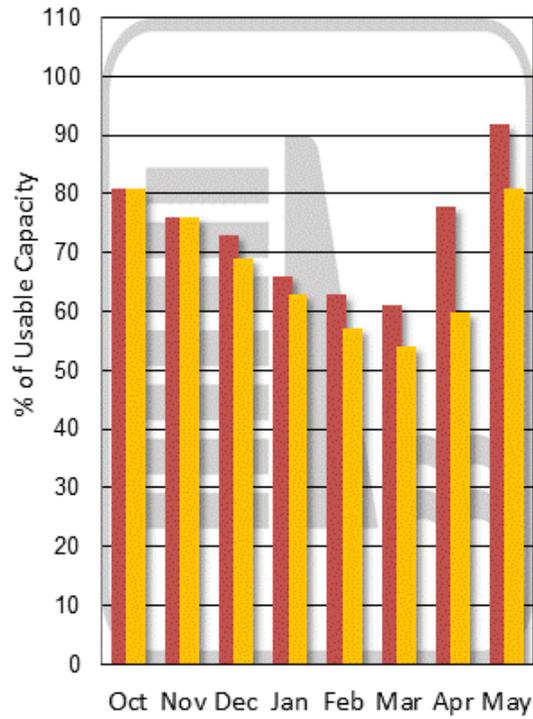
**Mountain and Valley Precipitation**

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



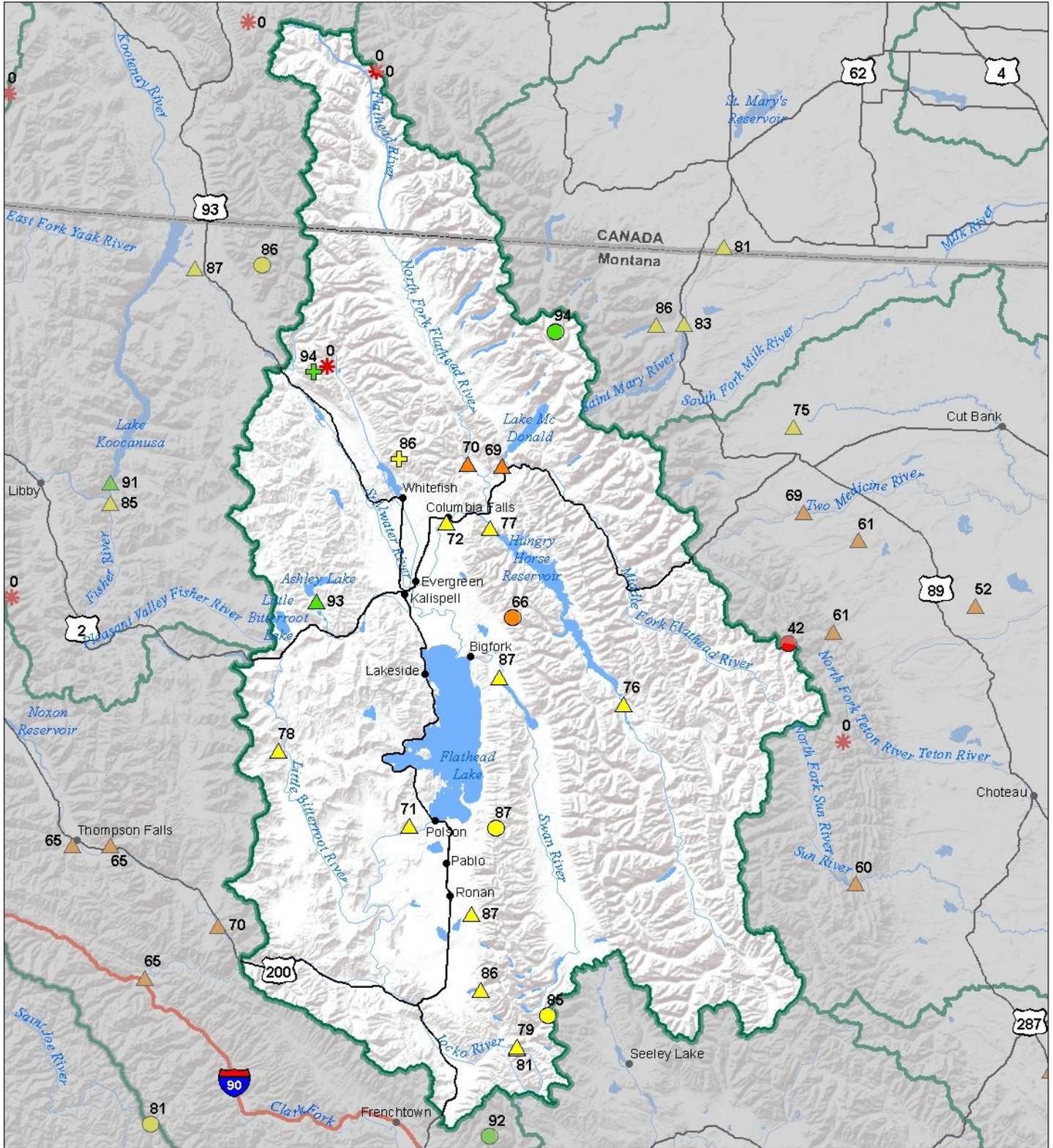
**End of Month Reservoir Storage**

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



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

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



### Snow Water Equivalent Percent of Normal

#### SNOTEL

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

#### Snowcourse

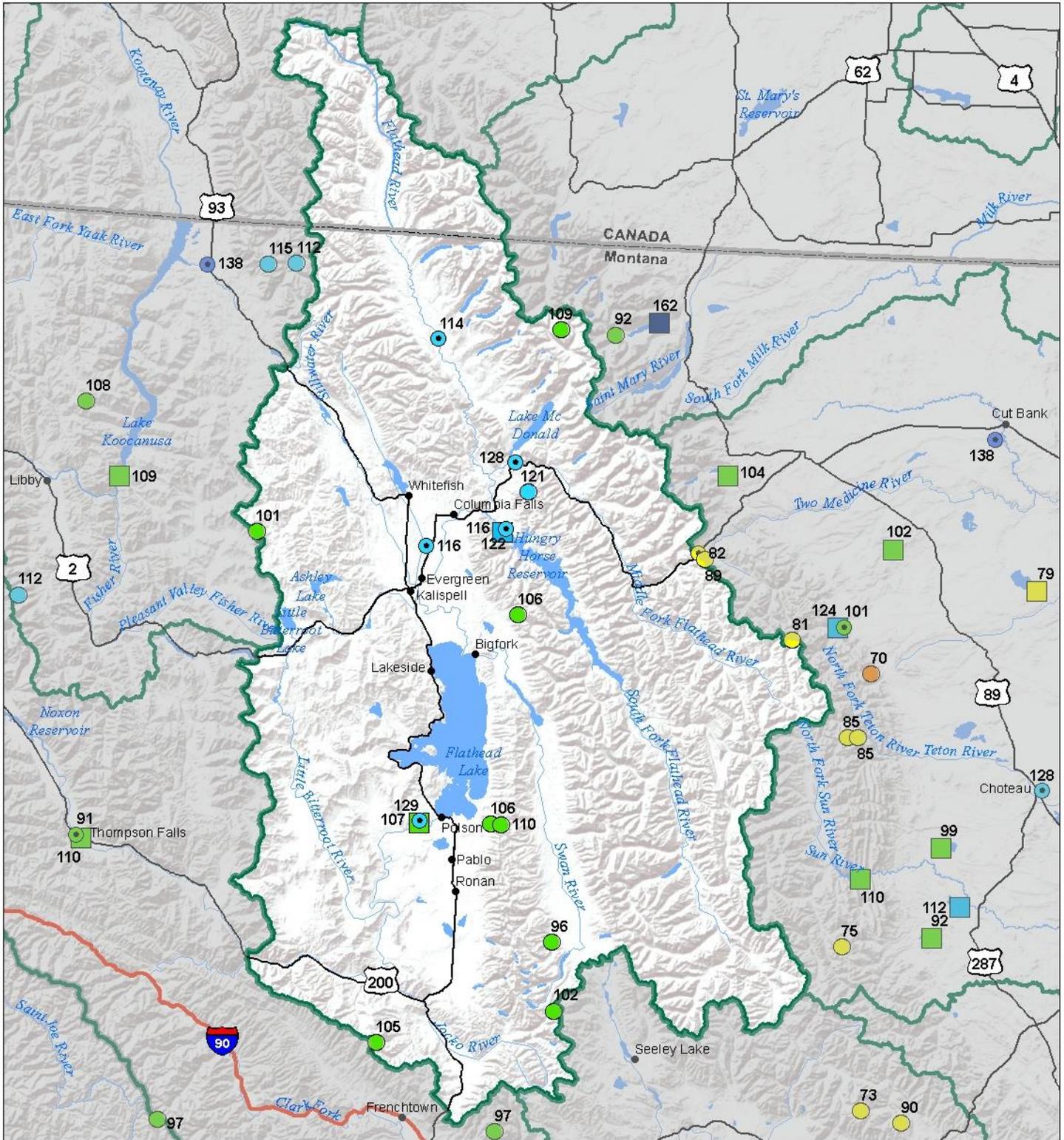
- ✚ > 150%
- ✚ 131 - 150%
- ✚ 111 - 130%
- ✚ 91 - 110%
- ✚ 71 - 90%
- ✚ 51 - 70%
- ✚ 1 - 50%
- ✚ 0%

### Streamflow Forecast Percent of Average Flows

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



# Flathead River Basin Water Year to Date Precipitation and Reservoir Levels Percentage of Normal June 1, 2016



### Precipitation Percent of Normal

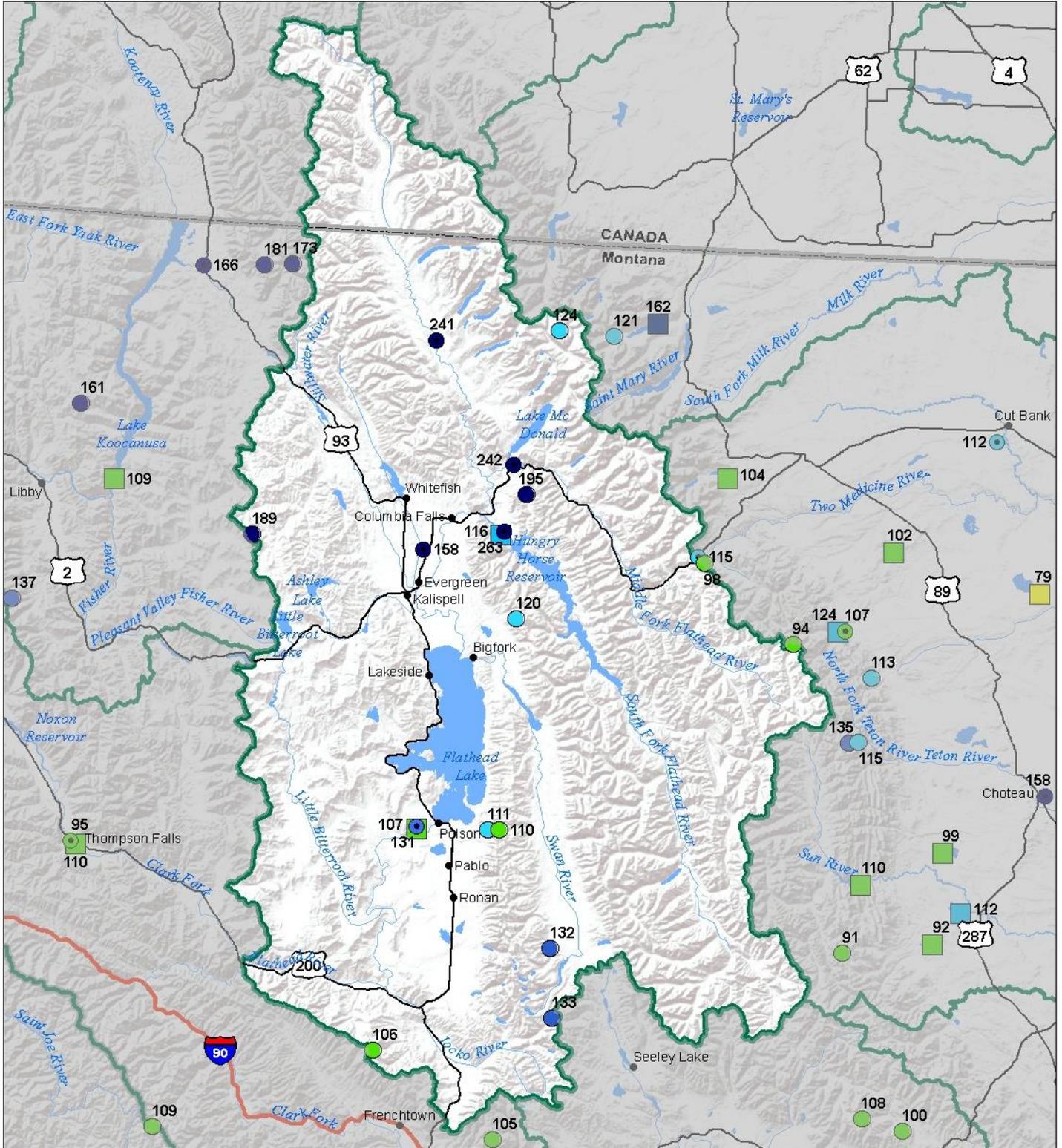
SNOTEL		COOP/ACIS	
<span style="color: blue;">●</span> > 150%	<span style="color: yellow;">●</span> 71 - 90%	<span style="color: blue;">●</span> > 150%	<span style="color: yellow;">●</span> 71 - 90%
<span style="color: lightblue;">●</span> 131 - 150%	<span style="color: orange;">●</span> 51 - 70%	<span 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%



# Flathead River Basin Monthly Precipitation and Reservoir Levels Percentage of Normal June 1, 2016 (May 1, 2016 - June 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%



**Flathead River Basin  
Streamflow Forecasts - June 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	JUN-JUL	340	445	520	67%	595	700	775
	JUN-SEP	450	570	655	70%	740	860	935
MF Flathead R nr West Glacier	JUN-JUL	300	415	495	66%	575	690	755
	JUN-SEP	400	525	610	69%	695	820	890
Sf Flathead R nr Hungry Horse	JUN-JUL	300	370	420	74%	470	540	565
	JUN-SEP	350	425	480	76%	535	610	635
Hungry Horse Reservoir Inflow <sup>1,2</sup>	JUN-JUL	400	575	655	76%	735	910	860
	JUN-SEP	480	670	755	77%	840	1030	980
Flathead R at Columbia Falls <sup>2</sup>	JUN-JUL	1150	1480	1700	69%	1920	2250	2460
	JUN-SEP	1460	1820	2070	72%	2320	2680	2890
Ashley Ck nr Marion <sup>2</sup>	MAY-JUL	1.48	2.4	3	77%	3.6	4.5	3.9
	JUN-SEP	0.17	0.27	0.55	93%	1.31	2.4	0.59
Swan R nr Bigfork	JUN-JUL	197	225	245	88%	265	295	280
	JUN-SEP	250	285	310	87%	335	370	355
Flathead Lake Inflow <sup>1,2</sup>	JUN-JUL	1170	1720	1970	69%	2220	2770	2860
	JUN-SEP	1440	2070	2360	71%	2650	3280	3320
Mill Ck ab Bassoo ck nr Niarada	JUN-JUL	0.46	0.78	1	80%	1.22	1.54	1.25
	JUN-SEP	0.64	0.99	1.23	78%	1.47	1.82	1.58
South Crow Ck nr Ronan	JUN-JUL	4	5	5.7	88%	6.4	7.4	6.5
	JUN-SEP	4.9	6.1	6.9	87%	7.7	8.9	7.9
Mission Ck nr St. Ignatius	JUN-JUL	12.8	14.5	15.6	88%	16.7	18.4	17.7
	JUN-SEP	15.2	17.5	19	86%	21	23	22
SF Jocko R nr Arlee	JUN-JUL	10.2	12.5	14	82%	15.5	17.8	17.1
	JUN-SEP	12.8	15.4	17.1	81%	18.8	21	21
NF Jocko R bl Tabor Feeder Canal	JUN-JUL	9	10.8	12	78%	13.2	15	15.4
	JUN-SEP	10.1	12.2	13.6	79%	15	17.1	17.3

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 May, 2016	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Camas (4)		40.6	28.6	45.2
Lower Jocko Lake		2.8	3.7	6.4
Mission Valley (8)		46.0	63.0	100.0
Hungry Horse Lake	3160.2	3048.6	2733.0	3451.0
Flathead Lake	1641.4	1584.4	1538.0	1791.0
Basin-wide Total	4801.6	4633.0	4271.0	5242.0
# of reservoirs	2	2	2	2

Watershed Snowpack Analysis June 1, 2016	# of Sites	% Median	Last Year % Median
NF FLATHEAD in CANADA	1	0	0
NF FLATHEAD in MONTANA	6	89	45
MIDDLE FORK FLATHEAD	3	76	45
SOUTH FORK FLATHEAD	2	66	42
STILLWATER-WHITEFISH	5	90	44
SWAN	3	79	45
MISSION VALLEY	2	87	65
LITTLE BITTERROOT-ASHLEY	0		
JOCKO	3	88	42
FLATHEAD in MONTANA	16	81	43
FLATHEAD RIVER BASIN	17	78	42

# Upper Clark Fork River Basin



The snowpack in the Upper Clark Fork River basin trended relatively close to normal until about April of this year. After peaking early and experiencing above average temperatures in April the snowpack melted quickly. Several mid-elevation SNOTEL sites were melted out by mid-April. By the end of the first week in May the basin wide snowpack was fairing worse than last year at that time. Fortunately a late May storm delivered significant snow water at high elevations within the basin. North Fork Jocko SNOTEL (6330 ft), near the headwaters of the Clearwater River, received over 2.0 inches of snow water overnight on May 24<sup>th</sup>.

Arriving as snow at upper elevations the late May storm brought rain to lower elevations. Warm Springs SNOTEL (7800 ft) received over 2 inches of rain from May 19<sup>th</sup> to the 25<sup>th</sup>. Currently water-year-to date precipitation in the basin is at 94% of average. Mountain SNOTEL sites received 95% of average precipitation for the month of May, while valley weather stations received 37% of average precipitation in the Upper Clark River basin.

Reservoir storage is above average in the basin for this date, and at or approaching capacity at many reservoirs in the basin.

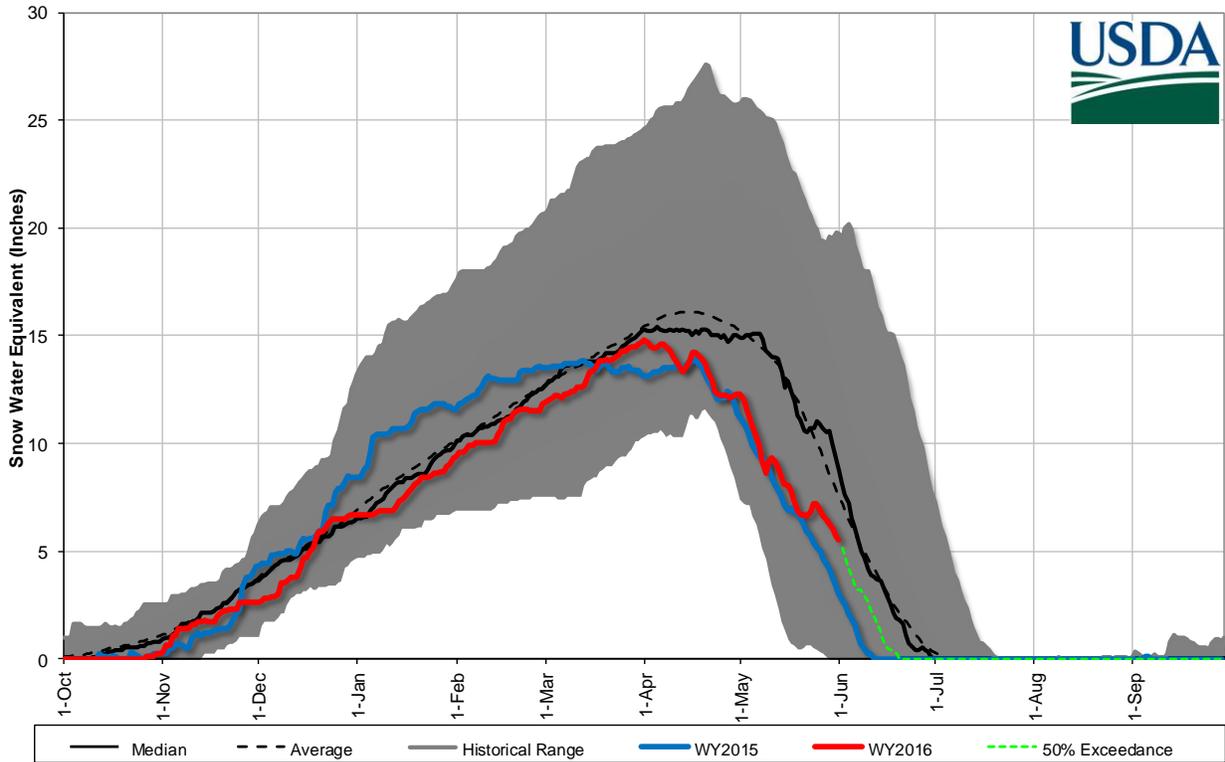
Most streams in the Upper Clark Fork River basin experienced a snowmelt driven peak during the last week of April. Streams had a second snowmelt driven peak during second week of May that was in general lower than the earlier peak in April. The Clark Fork River above Missoula had a second and larger peak on May 10<sup>th</sup> which was snowmelt driven and rain influenced. The high water near the end of May was primarily rain driven. Current basin-wide streamflows for the 50% exceedance are 79% of average for the June-July time period.

<b>Upper Clark Fork River Basin Data Summary</b>		<b>6/1/2016</b>	
	Percent of 1981-2010 Normal (Median)	Last Year Percentage of Normal (Median)	
<b>Snowpack</b>			
Basin-Wide	78%	43%	
	Monthly Percentage of Average	WYTD Percentage of 1981-2010 Average*	Last Year Percentage of Average
<b>Precipitation</b>			
Mountain Precipitation	95%	95%	89%
Valley Precipitation	37%	83%	91%
Basin Precipitation	90%	94%	90%
	Percentage of Average	Percentage of Capacity (Total)	Last Year Percentage of Average
<b>Reservoir Storage</b>			
Basin-Wide Storage	108%	93%	100%
	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 June -July	79%	154%	51%

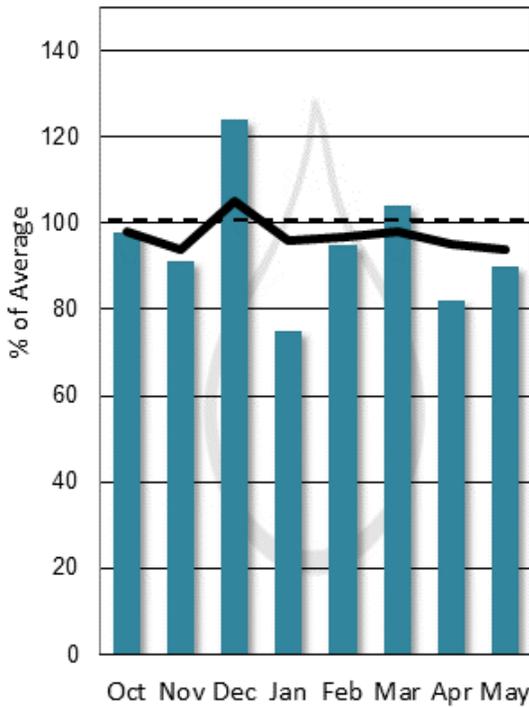
\*Water Year-to-Date (WYTD) Precipitation is October 1st - Current

\*\*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.

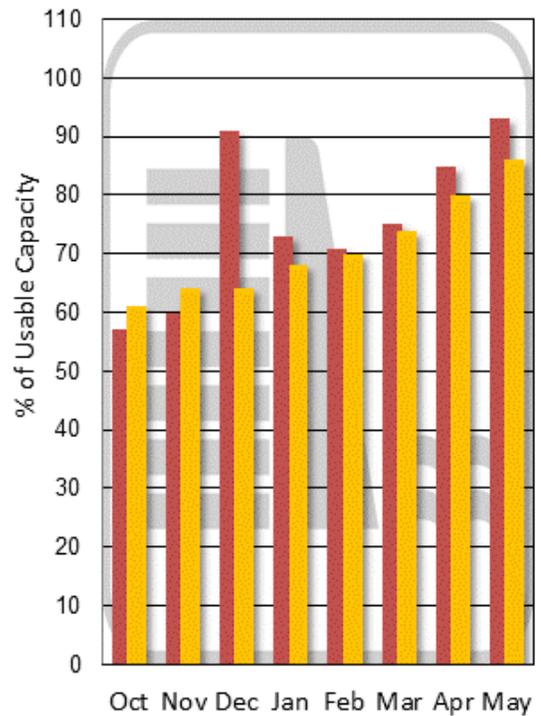
**Upper Clark Fork River Basin Snowpack with Non-Exceedence Projections**  
*Based on provisional SNOTEL daily data as of 6/1/2016*



**Mountain and Valley Precipitation**

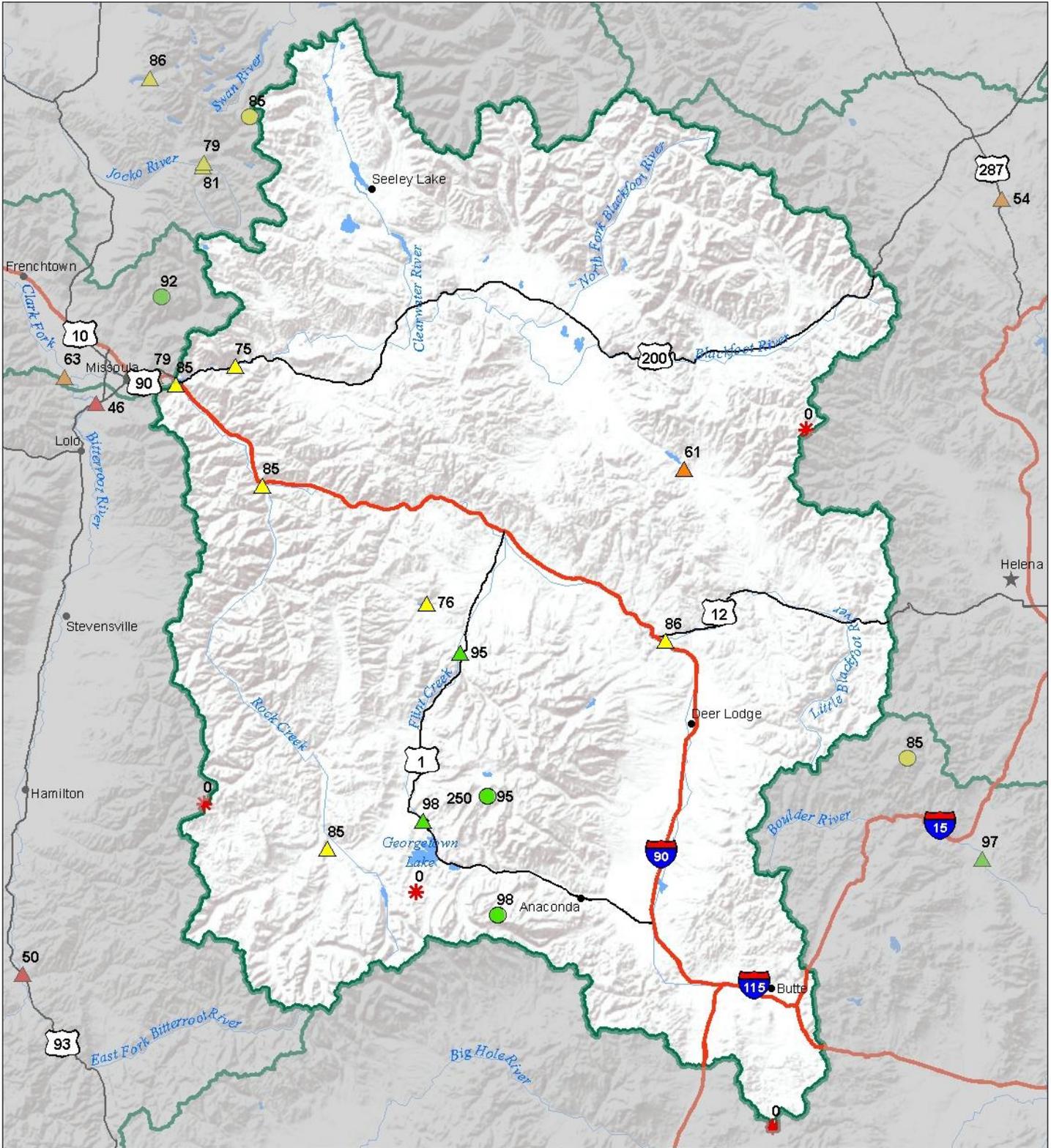


**End of Month Reservoir Storage**



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

# Upper Clark Fork River Basin Streamflow Forecast, Snow Water Equivalent Percentage of Normal June 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

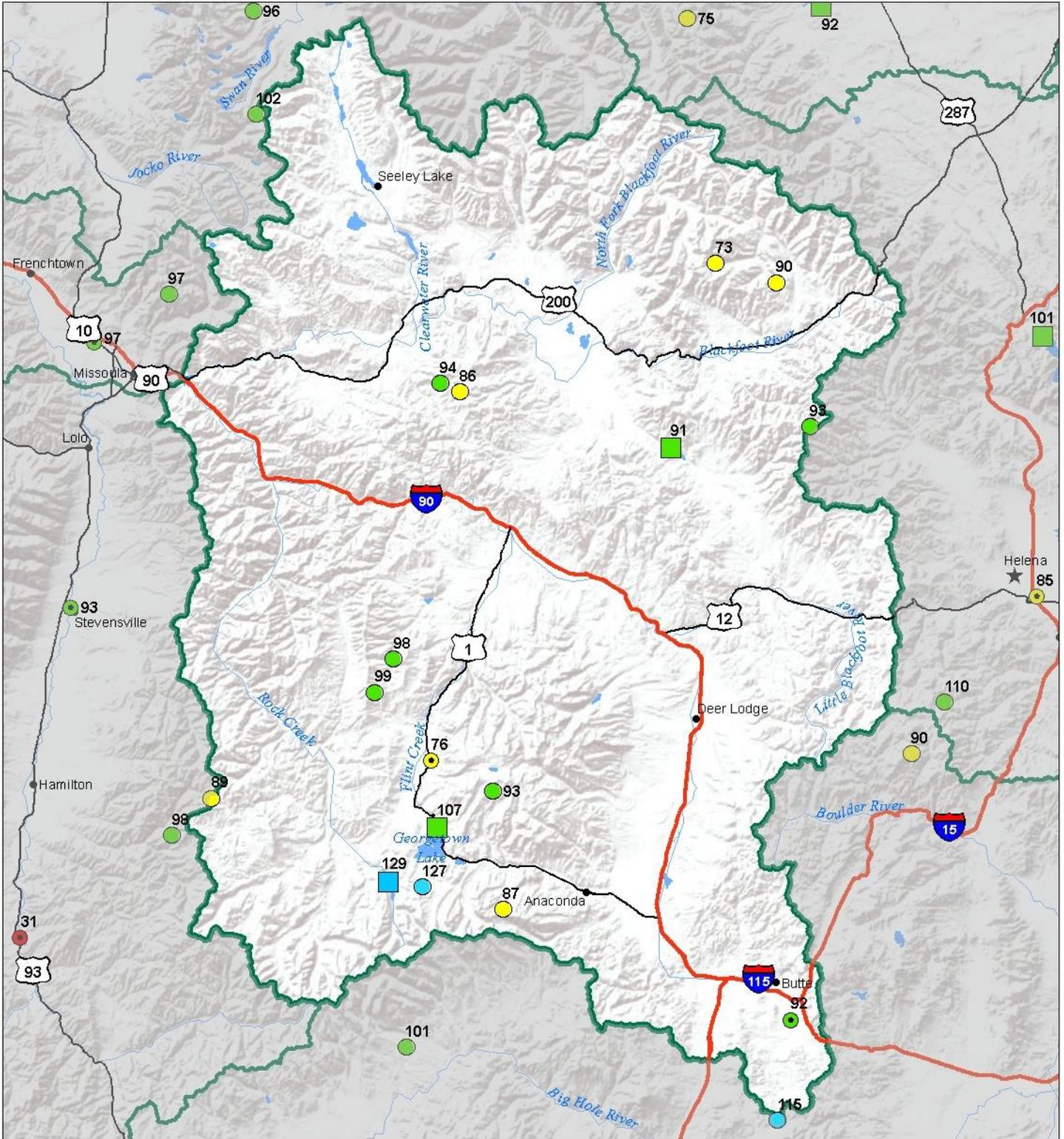
- ▲ > 150%
- ▲ 131 - 150%
- ▲ 111 - 130%
- ▲ 91 - 110%
- ▲ 71 - 90%
- ▲ 51 - 70%
- ▲ 1 - 50%



# Upper Clark Fork River Basin

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

### June 1, 2016



#### Precipitation Percent of Normal

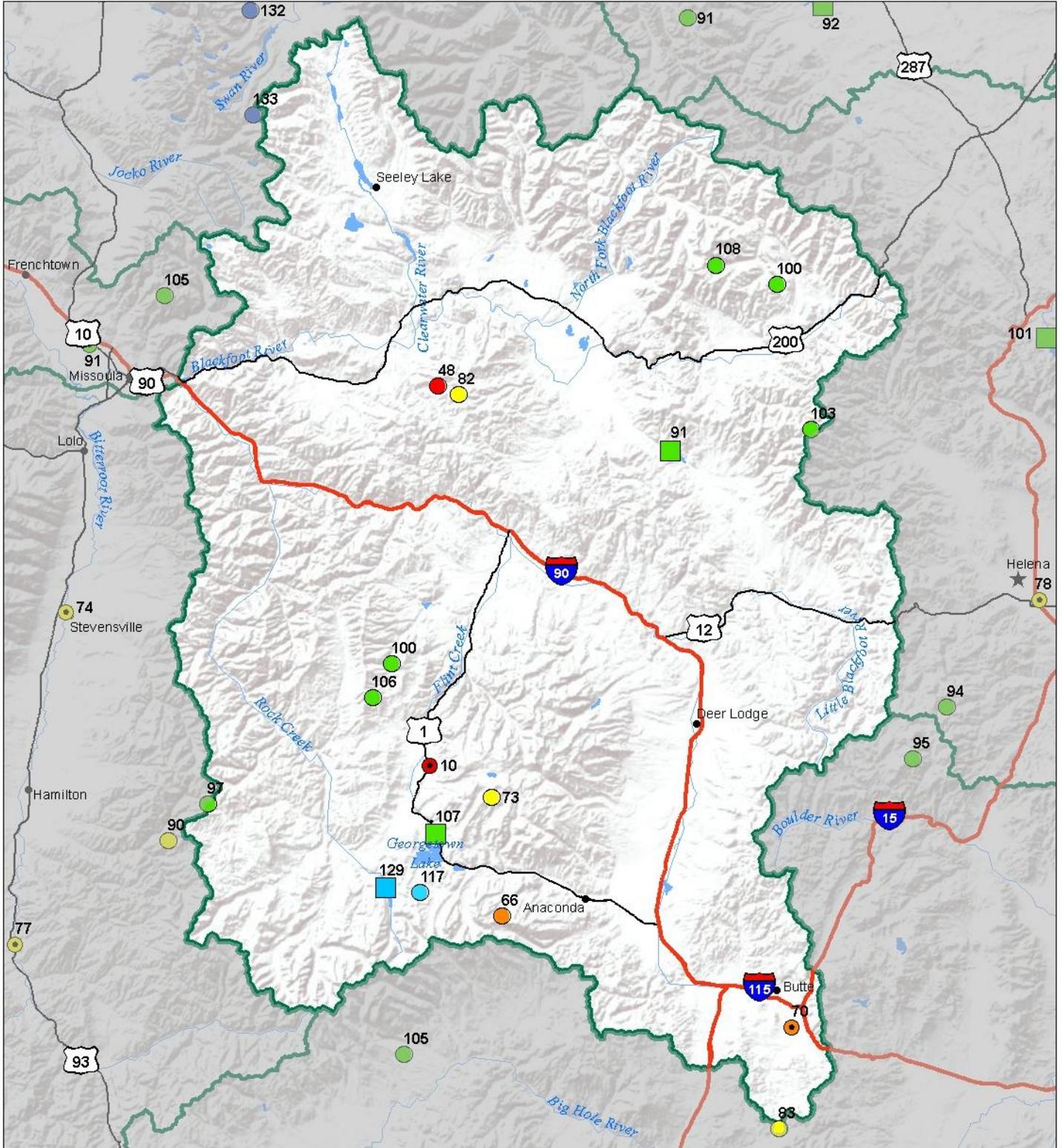
SNOTEL		COOP/ACIS	
<span style="color: blue;">●</span> > 150%	<span style="color: yellow;">●</span> 71 - 90%	<span style="color: blue;">●</span> > 150%	<span style="color: yellow;">●</span> 71 - 90%
<span style="color: darkblue;">●</span> 131 - 150%	<span style="color: orange;">●</span> 51 - 70%	<span 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%



# Upper Clark Fork River Basin Monthly Precipitation and Reservoir Levels Percentage of Normal June 1, 2016 (May 1, 2016 - June 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 - June 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	JUN-JUL	10.8	19.3	25	86%	31	39	29
	JUN-SEP	14.5	24	31	86%	38	48	36
Flint Ck nr Southern Cross	JUN-JUL	2.7	4.9	6.4	94%	7.9	10.1	6.8
	JUN-SEP	3.8	6.8	8.8	98%	10.8	13.8	9
Flint Ck bl Boulder Ck	JUN-JUL	15.3	23	29	94%	35	43	31
	JUN-SEP	24	35	42	95%	49	60	44
Lower Willow Ck Reservoir Inflow <sup>2</sup>	JUN-JUL	0.26	1.65	2.6	72%	3.5	4.9	3.6
	JUN-SEP	0.81	2.4	3.4	76%	4.5	6	4.5
MF Rock Ck nr Philipsburg	JUN-JUL	16.1	24	29	85%	34	41	34
	JUN-SEP	21	30	35	85%	41	49	41
Rock Ck nr Clinton	JUN-JUL	60	90	110	84%	131	161	131
	JUN-SEP	81	115	139	85%	162	197	164
Clark Fork R ab Milltown	JUN-JUL	105	179	230	85%	280	350	270
	JUN-SEP	154	240	300	85%	360	450	355
Nevada Ck nr Helmville	JUN-JUL	0.87	2.3	3.2	55%	4.2	5.6	5.8
	JUN-SEP	1.66	3.3	4.4	61%	5.5	7.1	7.2
Blackfoot R nr Bonner	JUN-JUL	163	205	235	72%	265	310	325
	JUN-SEP	225	270	305	75%	335	385	405
Clark Fork R ab Missoula	JUN-JUL	290	390	460	77%	530	630	595
	JUN-SEP	405	525	605	79%	685	805	765

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 May, 2016	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
East Fork Rock Creek Res	13.6	10.8	10.6	15.6
Georgetown Lake	31.2	29.9	29.1	31.0
Lower Willow Creek Reservoir		4.4	4.7	4.9
Nevada Creek Res	10.0	9.9	10.9	12.6
Basin-wide Total	54.8	50.6	50.6	59.2
# of reservoirs	3	3	3	3

Watershed Snowpack Analysis June 1, 2016	# of Sites	% Median	Last Year % Median
CLARK FORK ab FLINT CREEK	5	87	56
FLINT CREEK	4	33	0
ROCK CREEK	2	0	0
CLARK FORK ab BLACKFOOT	10	70	44
BLACKFOOT	5	83	39
UPPER CLARK FORK RIVER BASIN	14	78	43

# Bitterroot River Basin



All but the highest elevations are already melted out this year in the Bitterroot River basin. At the basin’s headwaters, Saddle Mountain SNOTEL (7940 ft) holds the most snow at 22 inches (10.4 SWE). Since mid-April the basin’s snowpack has been trending with similar conditions to last year. Fortunately 2 significant storms hit the upper elevations in May helping the keep the snowpack from reaching even worse conditions. With the weather forecasted to be in the 70’s and sunny at Saddle Mountain SNOTEL this weekend, don’t expect the snow to be around much longer.

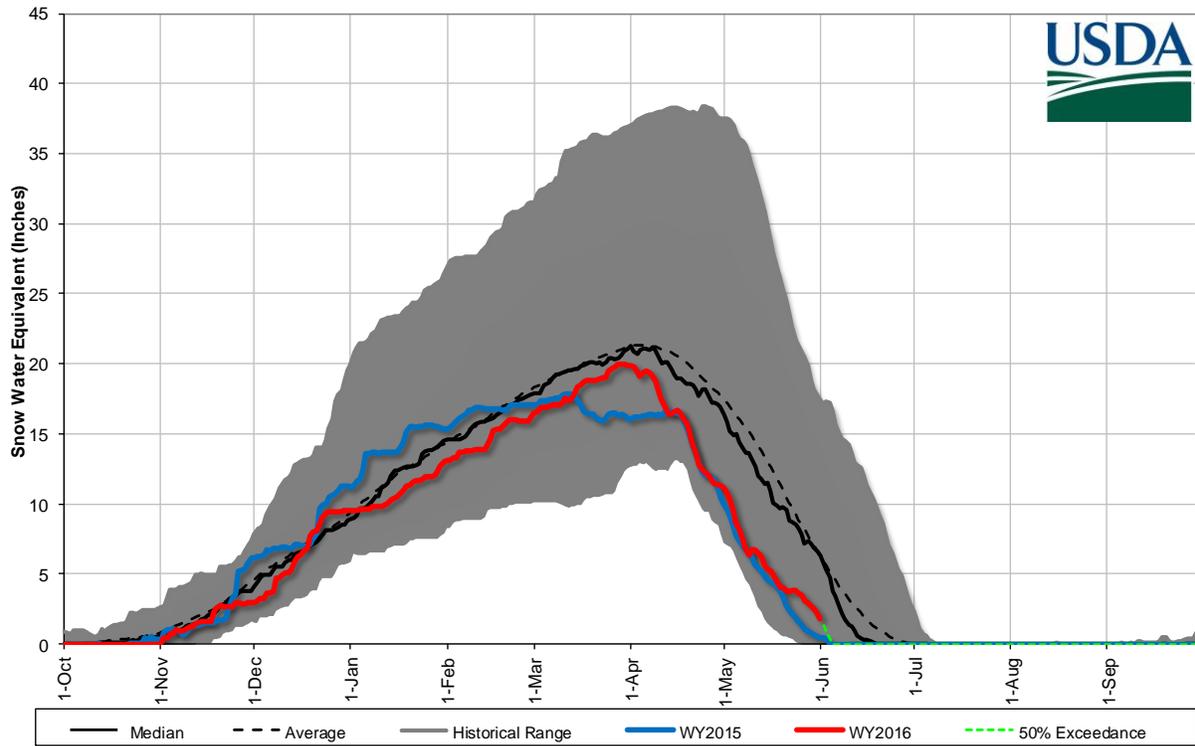
On May 9<sup>th</sup> an isolated storm hit Saddle Mountain SNOTEL delivering 1.7 inches of precipitation. Its neighbor 40 miles to the north, Twin Lakes SNOTEL (6400 ft), only received 0.2 inches precipitation. On May 19<sup>th</sup> the second May storm arrived and delivered about 2.0 inches of precipitation to Twin Lakes SNOTEL. Currently water-year-to date precipitation in the basin is at 95% of average. Mountain SNOTEL sites received 83% of average precipitation for the month of May, while valley weather stations received 74% of average precipitation in the Bitterroot River basin.

Reservoir storage is currently above average in the basin, and at or near capacity in both reservoirs

Despite a large portion of available snow water melting in mid-April, the Bitterroot River experienced its snowmelt driven peak on May 9<sup>th</sup>, which was likely influenced by rain. The Bitterroot River typically reaches its snowmelt driven peak on June 5<sup>th</sup>. Upcoming warm temperatures in the region will likely drive another snowmelt influenced peak before the hydrograph continues its recession. Current basin-wide streamflows for the 50% exceedance are 50% of average for the June-July time period.

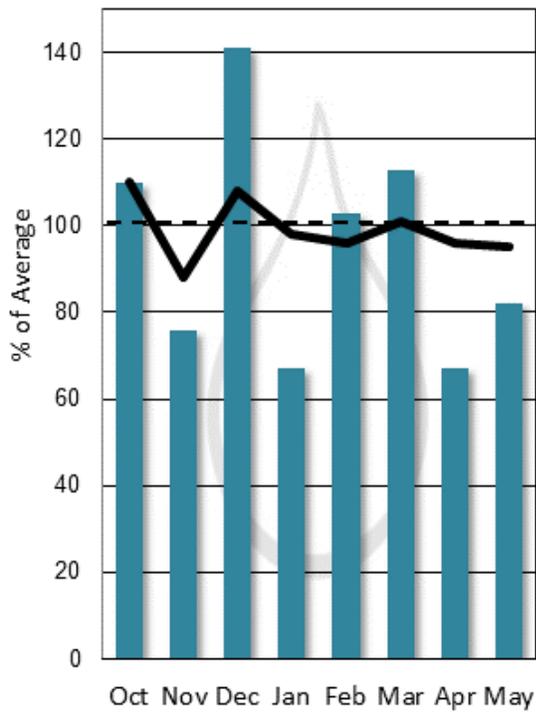
<b>Bitterroot River Basin Data Summary</b>		<b>6/1/2016</b>	
	Percent of 1981-2010 Normal (Median)	Last Year Percentage of Normal (Median)	
<b>Snowpack</b>			
Basin-Wide	32%	7%	
	Monthly Percentage of Average	WYTD Percentage of 1981-2010 Average*	Last Year Percentage of Average
<b>Precipitation</b>			
Mountain Precipitation	83%	95%	97%
Valley Precipitation	74%	93%	122%
Basin Precipitation	82%	95%	98%
	Percentage of Average	Percentage of Capacity (Total)	Last Year Percentage of Average
<b>Reservoir Storage</b>			
Basin-Wide Storage	108%	106%	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 June -July	50%	96%	50%
*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-Exceedance Projections**  
*Based on provisional SNOTEL daily data as of 6/1/2016*



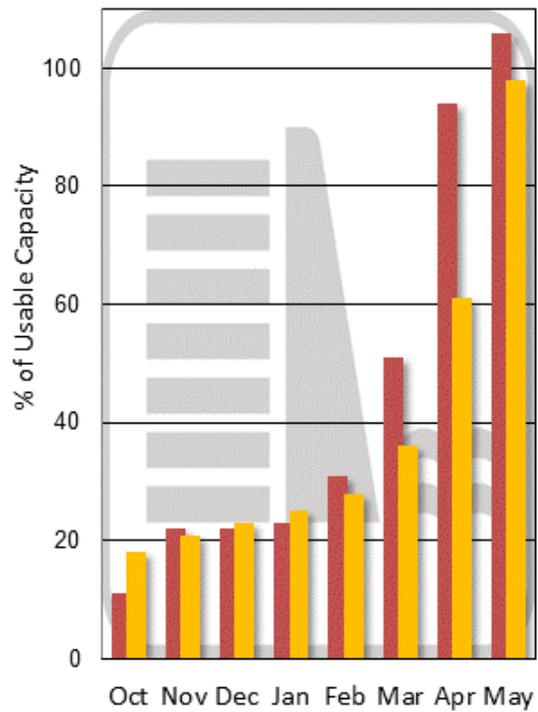
**Mountain and Valley  
Precipitation**

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



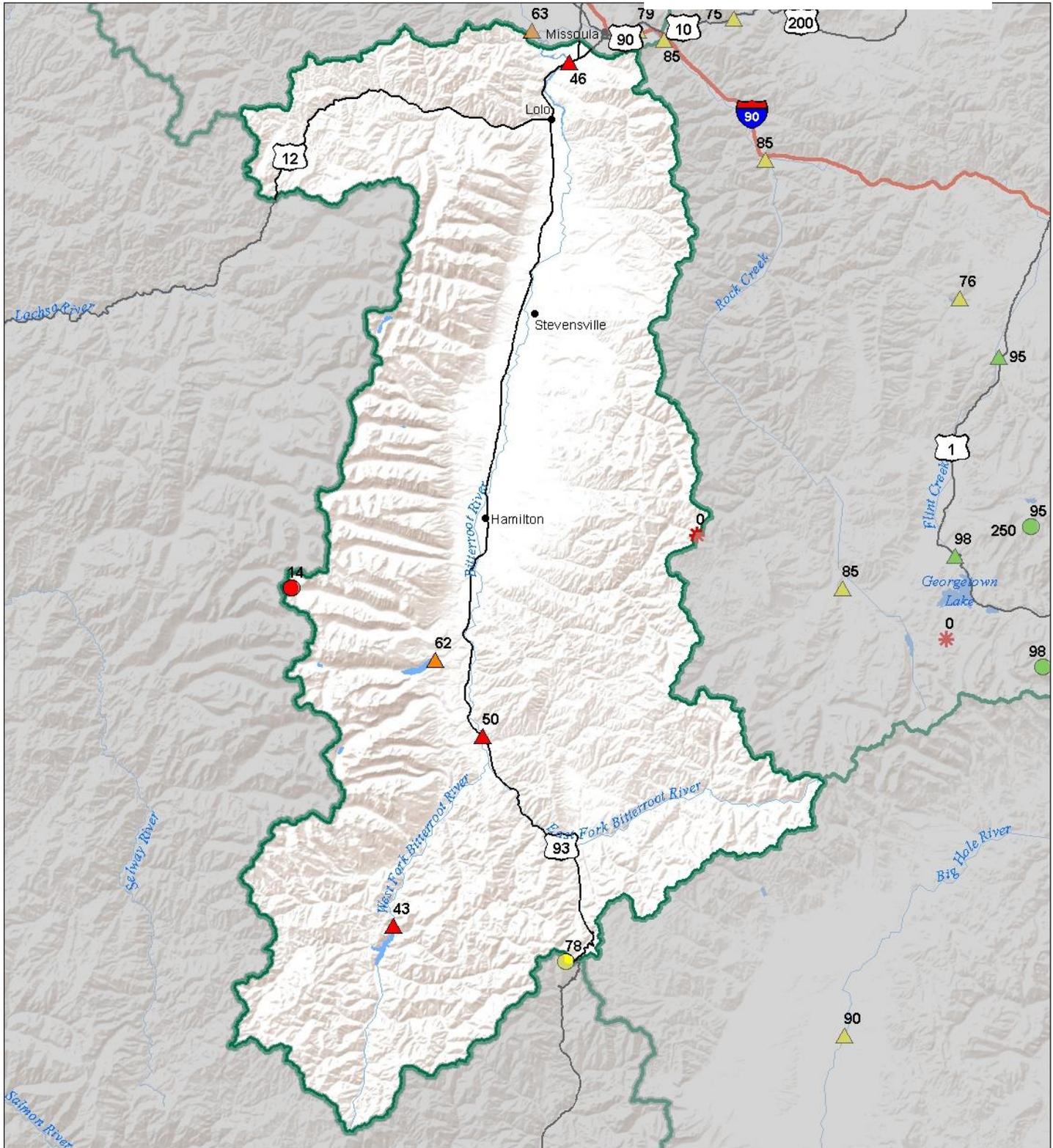
**End of Month Reservoir  
Storage**

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



# Bitterroot River Basin Streamflow Forecast, Snow Water Equivalent Percentage of Normal June 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

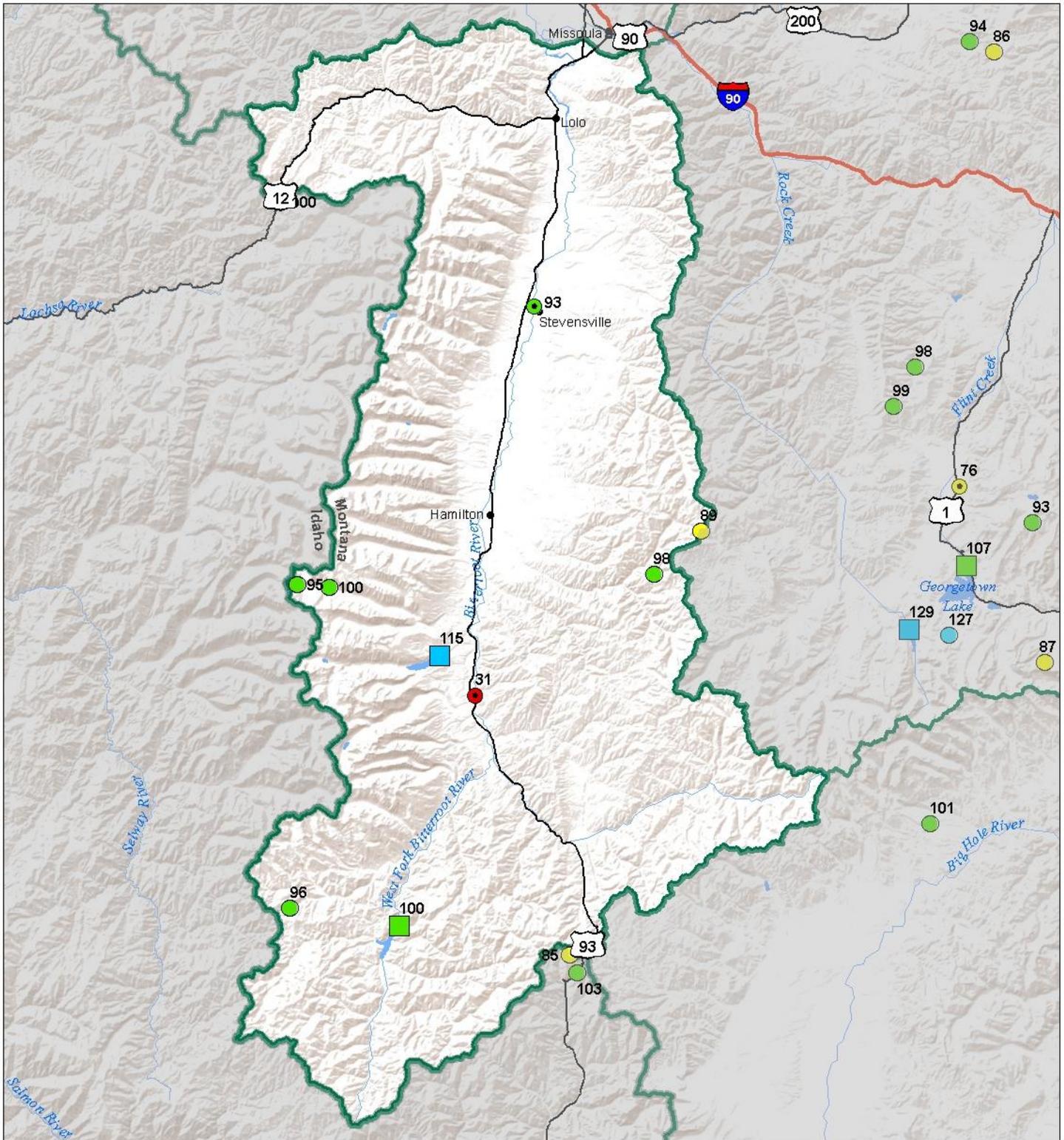
- ⊕ > 150%
- ⊕ 131 - 150%
- ⊕ 111 - 130%
- ⊕ 91 - 110%
- ⊕ 71 - 90%
- ⊕ 51 - 70%
- ⊕ 1 - 50%
- ⊕ \*

### 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 June 1, 2016



### Precipitation Percent of Normal

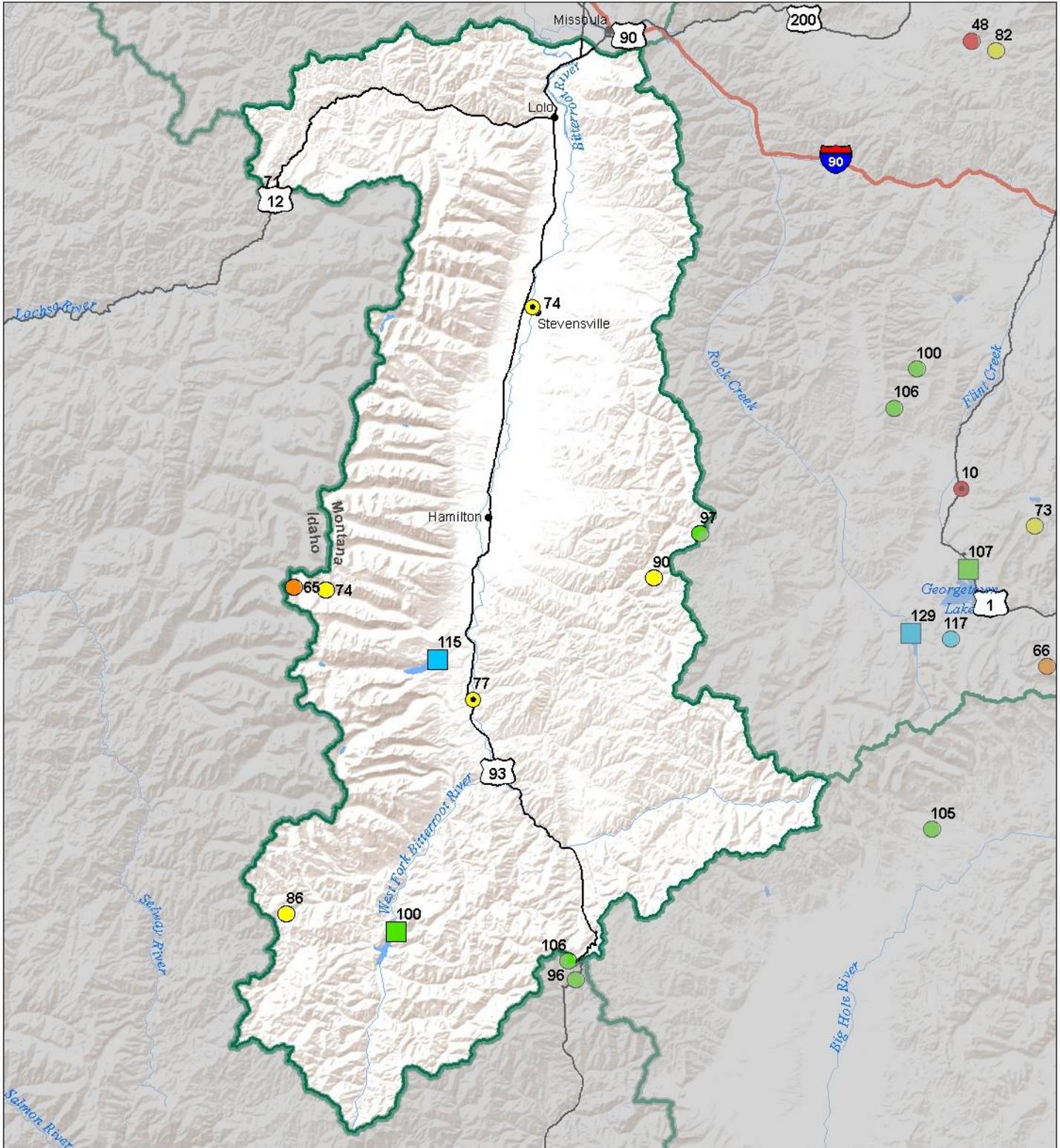
SNOTEL		COOP/ACIS	
● > 150%	● 71 - 90%	● > 150%	● 71 - 90%
● 131 - 150%	● 51 - 70%	● 131 - 150%	● 51 - 70%
● 111 - 130%	● 1 - 50%	● 111 - 130%	● 1 - 50%
● 91 - 110%		● 91 - 110%	

### Reservoirs Percent of Normal

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



# Bitterroot River Basin Monthly Precipitation and Reservoir Levels Percentage of Normal June 1, 2016 (May 1, 2016 - June 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%



## Bitterroot River Basin Streamflow Forecasts - June 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>	JUN-JUL	3.7	12	17.6	31%	23	32	56
	JUN-SEP	9	21	29	43%	37	49	67
Bitterroot R Nr Darby	JUN-JUL	60	81	96	46%	110	132	210
	JUN-SEP	90	118	136	50%	154	182	270
Como Reservoir Inflow <sup>2</sup>	JUN-JUL	10.6	18.6	24	63%	29	37	38
	JUN-SEP	12	20	26	62%	32	40	42
Bitterroot R nr Missoula	JUN-JUL	184	260	315	53%	370	445	600
	JUN-SEP	178	265	325	46%	385	470	705

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 May, 2016	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Painted Rocks Lake	32.4	33.3	32.3	31.7
Lake Como	38.3	39.1	33.2	34.9
Basin-wide Total	70.7	72.5	65.5	66.6
# of reservoirs	2	2	2	2

Watershed Snowpack Analysis June 1, 2016	# of Sites	% Median	Last Year % Median
WEST FORK BITTERROOT	2	78	22
EAST SIDE BITTERROOT	3	46	13
WEST SIDE BITTERROOT	3	14	0
BITTERROOT RIVER BASIN	7	32	7



## Lower Clark Fork River Basin

After having a relatively close to normal snowpack peak this year, the conditions in the Lower Clark Fork River basin took a turn for the worse after the first week in April. By May 21<sup>st</sup> the basin-wide snowpack was similar to last year at that time. Poorman Creek SNOTEL (5100 ft) normally has about 30 inches of snow (depth) on the pillow on May 21<sup>st</sup>, this year it was the day the pillow melted out. With warm sunny weather forecasted for the region, the basin's 2 SNOTEL sites with remaining snow (Hoodoo Basin and Stuart Mountain) will likely melt out a couple weeks earlier than normal this year.

A late May storm did bring significant rain to the Lower Clark Fork River basin. The brunt of the storm was in the northern portion of the basin and the snow line was high. Hoodoo Basin SNOTEL (6050 ft) received about 0.6 in of mixed precipitation during that storm, while Poorman Creek SNOTEL received about 5.5 inches of rain during that storm. Currently water-year-to date precipitation in the basin is at 102% of average. Mountain SNOTEL sites received 107% of average precipitation for the month of May, while valley weather stations received 97% of average precipitation in the Lower Clark River basin.

Reservoir storage in Noxon Rapids Reservoir is currently above average at 101%.

Above average temperatures in April drove a significant portion of available snow water out of the Lower Clark Fork Mountains early this year. The St. Regis and Thompson Rivers experienced their snowmelt driven peak during last week of April, about a month early. The Clark Fork at St. Regis had its snowmelt driven peak several weeks later on May 10<sup>th</sup>, about a month early and 80 percent of the average peak. Current basin-wide streamflows for the 50% exceedance are 68% of average for the June-July time period.

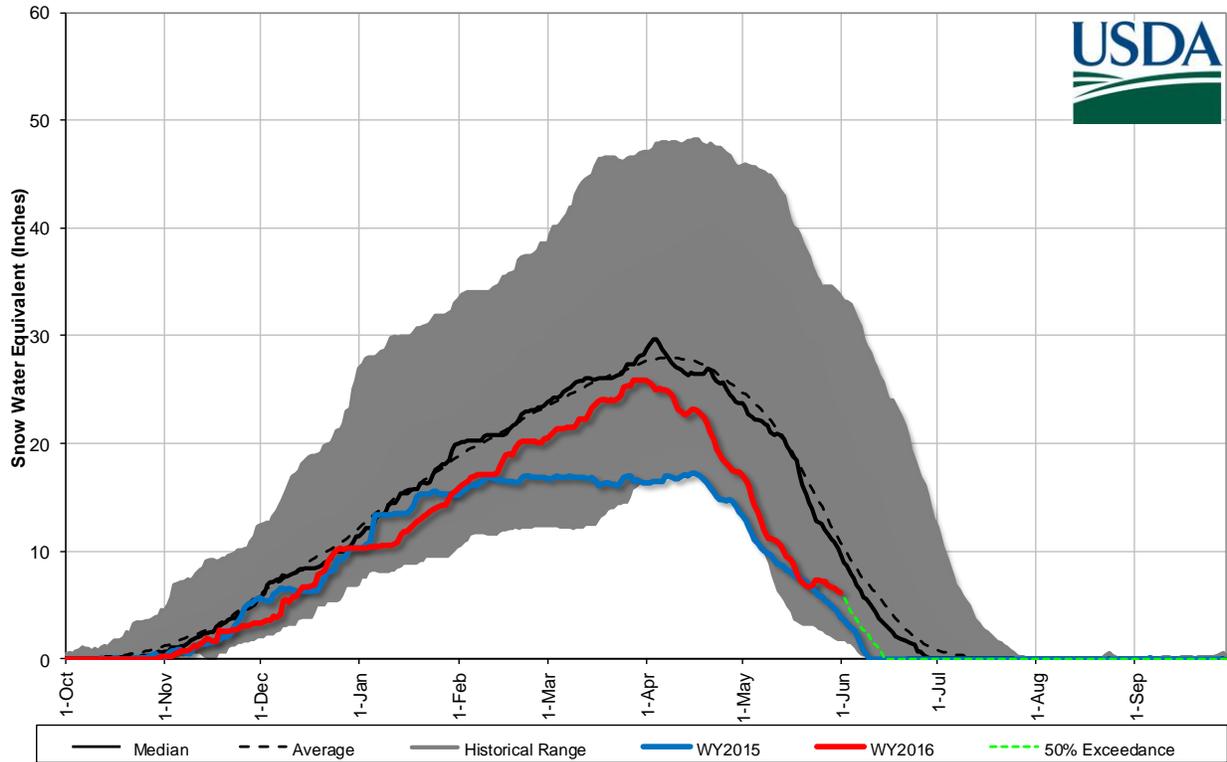
<b>Lower Clark Fork River Basin Data Summary</b>		<b>6/1/2016</b>	
	Percent of 1981-2010 Normal (Median)	Last Year Percentage of Normal (Median)	
<b>Snowpack</b>			
Basin-Wide	84%	53%	
	Monthly Percentage of Average	WYTD Percentage of 1981-2010 Average*	Last Year Percentage of Average
<b>Precipitation</b>			
Mountain Precipitation	107%	102%	94%
Valley Precipitation	97%	100%	99%
Basin Precipitation	105%	102%	95%
	Percentage of Average	Percentage of Capacity (Total)	Last Year Percentage of Average
<b>Reservoir Storage</b>			
Basin-Wide Storage	101%	98%	100%
	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 June -July	68%	139%	29%

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

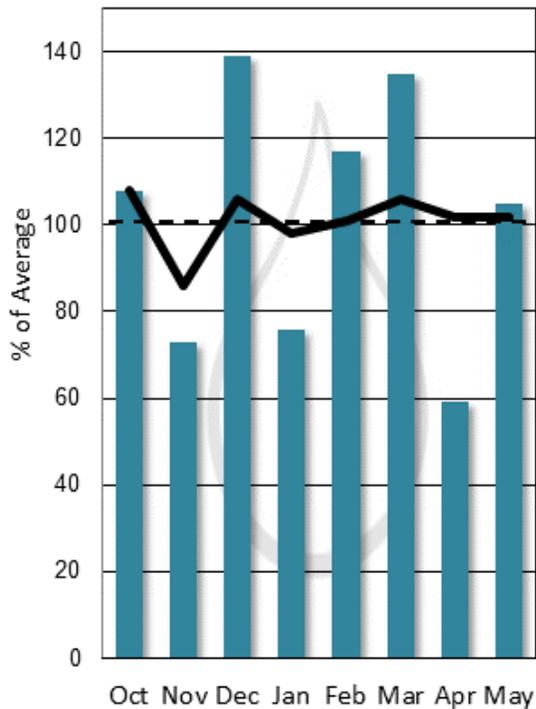
\*\*Basin-wide streamflows are an average of the individual streamflow points within the basin for the 50 percent exceedance forecast. Consult the individual streamflow forecasts in the table below for the range of forecasts at an individual point.

**Lower Clark Fork River Basin Snowpack with Non-Exceedence Projections**

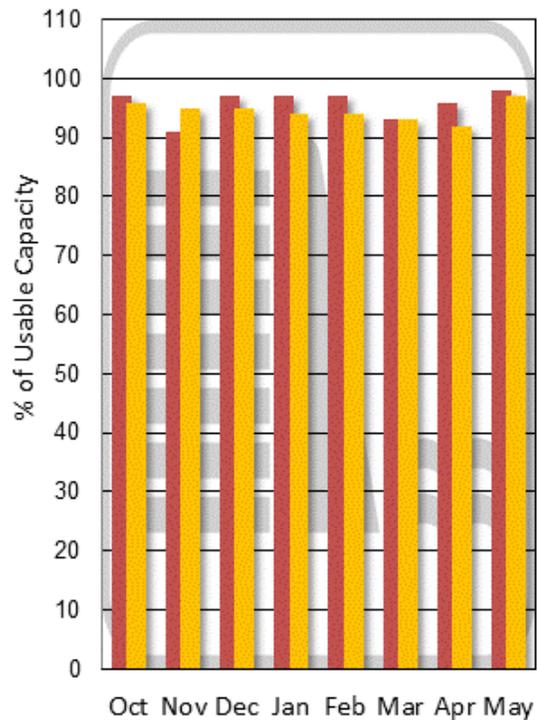
*Based on provisional SNOTEL daily data as of 6/1/2016*



**Mountain and Valley Precipitation**

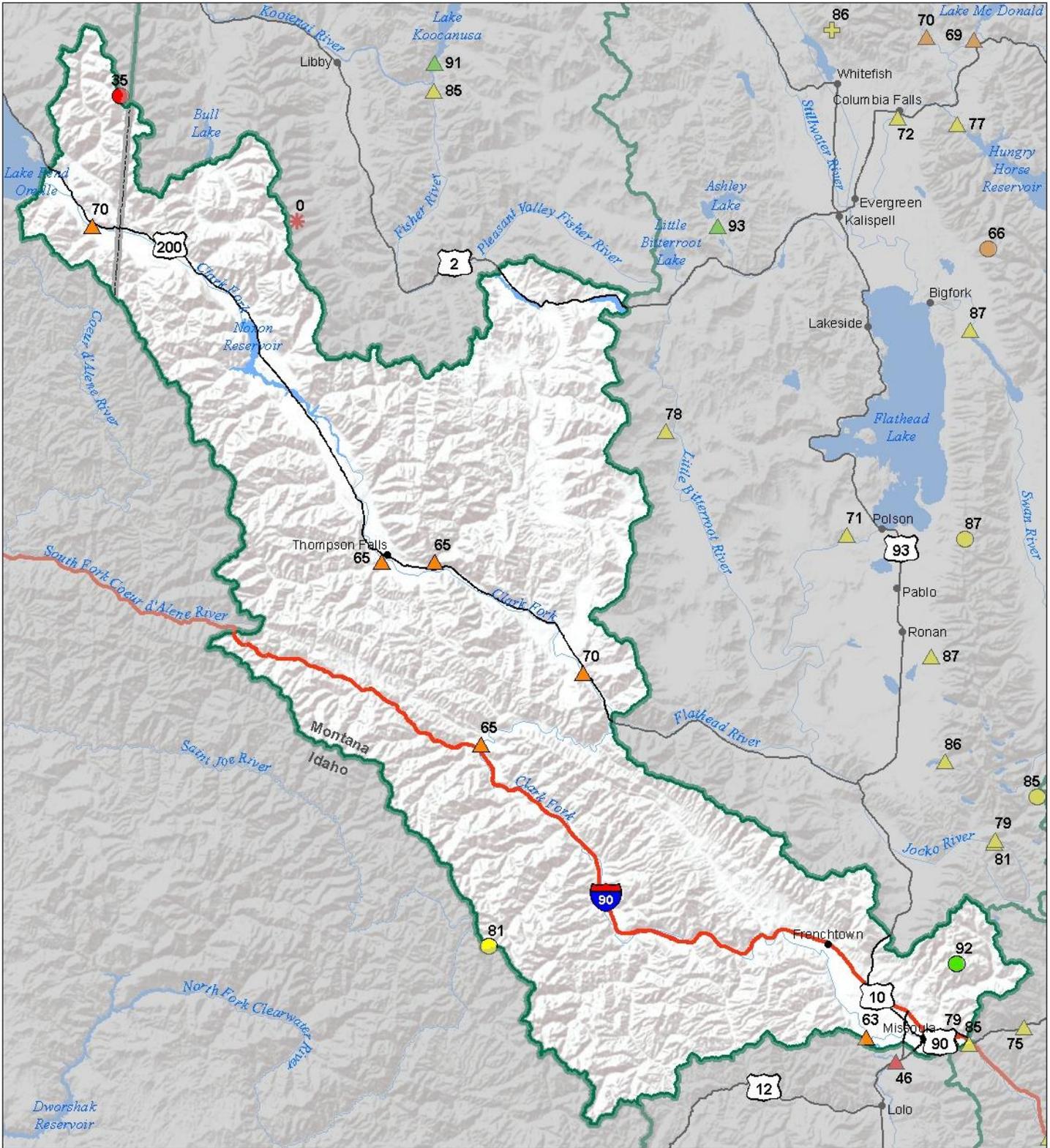


**End of Month Reservoir Storage**



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

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



### Snow Water Equivalent Percent of Normal

#### SN OTEL

- > 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%

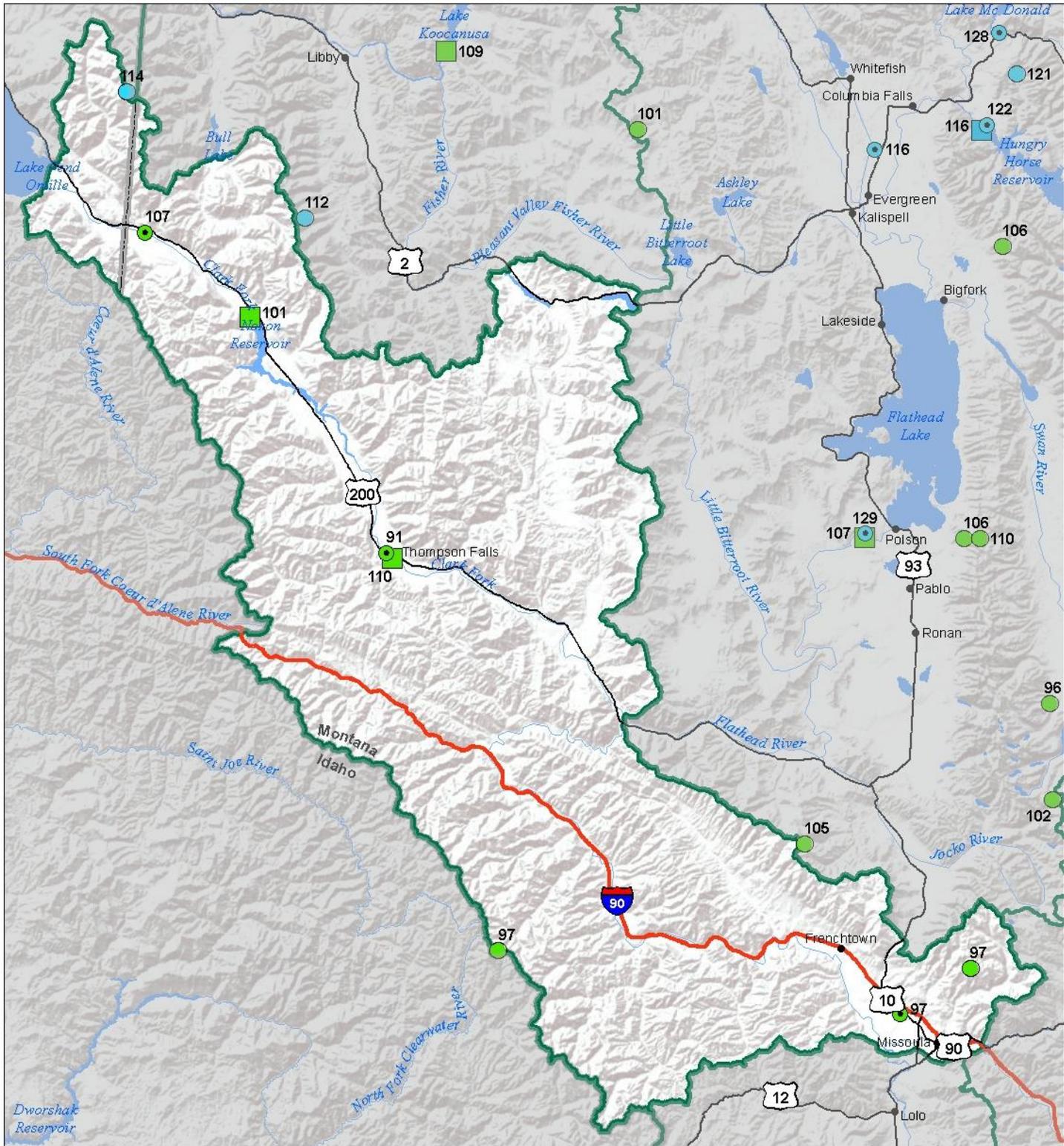


# Lower Clark Fork River Basin

## Water Year to Date Precipitation and Reservoir Levels

### Percentage of Normal

June 1, 2016

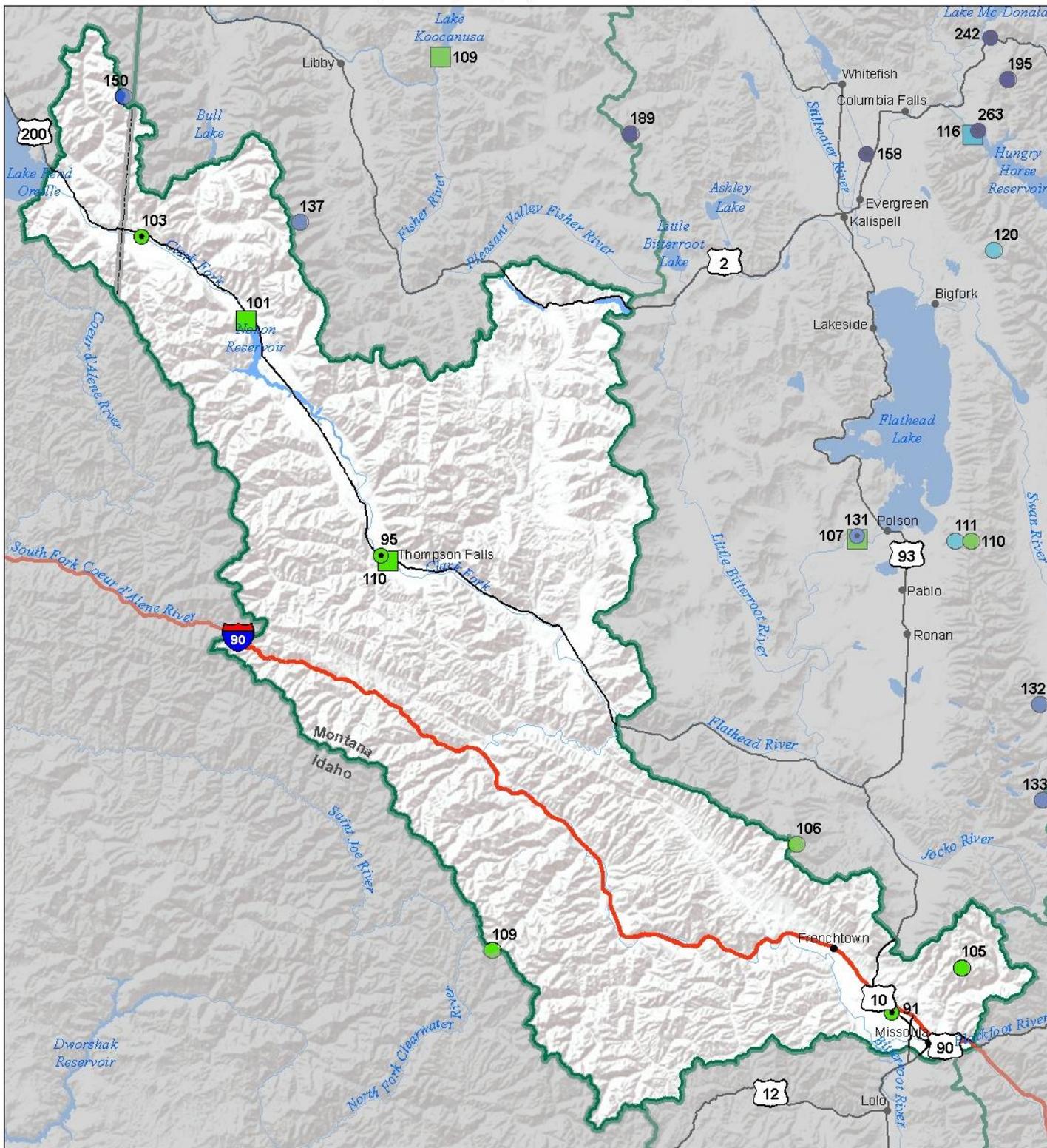


Precipitation Percent of Normal	
SNOTEL	COOP/ACIS
Dark Blue: > 150%	Dark Blue: > 150%
Blue: 131 - 150%	Blue: 131 - 150%
Cyan: 111 - 130%	Cyan: 111 - 130%
Light Green: 91 - 110%	Light Green: 91 - 110%
Yellow: 71 - 90%	Yellow: 71 - 90%
Orange: 51 - 70%	Orange: 51 - 70%
Red: 1 - 50%	Red: 1 - 50%

Reservoirs Percent of Normal
Dark Blue: > 150%
Blue: 131 - 150%
Cyan: 111 - 130%
Light Green: 91 - 110%
Yellow: 71 - 90%
Orange: 51 - 70%
Red: 1 - 50%

USDA  
Montana State University  
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Information System

# Lower Clark Fork River Basin Monthly Precipitation and Reservoir Levels Percentage of Normal June 1, 2016 (May 1, 2016 - June 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%



## Lower Clark Fork River Basin Streamflow Forecasts - June 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	JUN-JUL	510	665	775	65%	885	1040	1200
	JUN-SEP	625	805	930	63%	1050	1240	1470
Clark Fork R. at St. Regis <sup>1</sup>	JUN-JUL	570	870	1010	66%	1150	1450	1530
	JUN-SEP	720	1060	1220	65%	1380	1720	1880
Clark Fork R. nr Plains <sup>1,2</sup>	JUN-JUL	2110	2800	3120	69%	3440	4130	4540
	JUN-SEP	2550	3380	3760	70%	4140	4970	5410
Thompson nr Thompson Falls	JUN-JUL	26	37	44	63%	51	62	70
	JUN-SEP	38	51	60	65%	69	82	93
Prospect Ck at Thompson Falls	JUN-JUL	14.9	18.8	21	60%	24	28	35
	JUN-SEP	21	25	28	65%	31	35	43
Clark Fork R. at Whitehorse Rapids <sup>1,2</sup>	JUN-JUL	2400	3150	3490	69%	3830	4580	5070
	JUN-SEP	2950	3850	4250	70%	4650	5550	6090

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 May, 2016	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Noxon Rapids Reservoir	327.9	324.4	324.2	335.0
Basin-wide Total	327.9	324.4	324.2	335.0
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis June 1, 2016	# of Sites	% Median	Last Year % Median
LOWER CLARK FORK RIVER BASIN	7	84	53

# Jefferson River Basin



Cooler and more seasonal weather helped to prolong the snowpack during the second half of May, leaving the mountain snowpack in the Jefferson basin only slightly below normal for the Jefferson River basin as a whole. Melt occurred through the month and snowmelt rates were close to average across the sub-basins. The majority of the low and mid-elevation SNOTEL sites have melted out as of June 1<sup>st</sup> leaving only high elevation locations with measurable snowpack that is 65 to 100% of normal. The lower elevation Beaverhead and Ruby ranges have moved the bulk of the snow into the river systems by this time while the higher elevation Beaverhead and Tobacco Root ranges have high elevation snowpack remaining. In relation to this year's peak snow water there is 32% of the snowpack left to enter the hydrologic systems and the bulk of the water has moved. Currently basin-wide snowpack is 82% of normal for June 1<sup>st</sup>, and xxx% of last year at this time.

Precipitation in the basin was near average for the month of May in the Beaverhead (92%) and Ruby (102%) basins, and below average in the Big Hole (87%) and Boulder River (89%) basins. Valley precipitation was near to slightly above average basin-wide. The sub-basins continue to be in good standing for water year-to-date precipitation. Currently, water year-to-date precipitation for the greater Jefferson River basin is 99% of average for June 1<sup>st</sup>.

Reservoir storage in the basin is slightly below average (88%) at Clark Canyon Reservoir and above average for June 1<sup>st</sup> at Lima and Ruby Reservoirs.

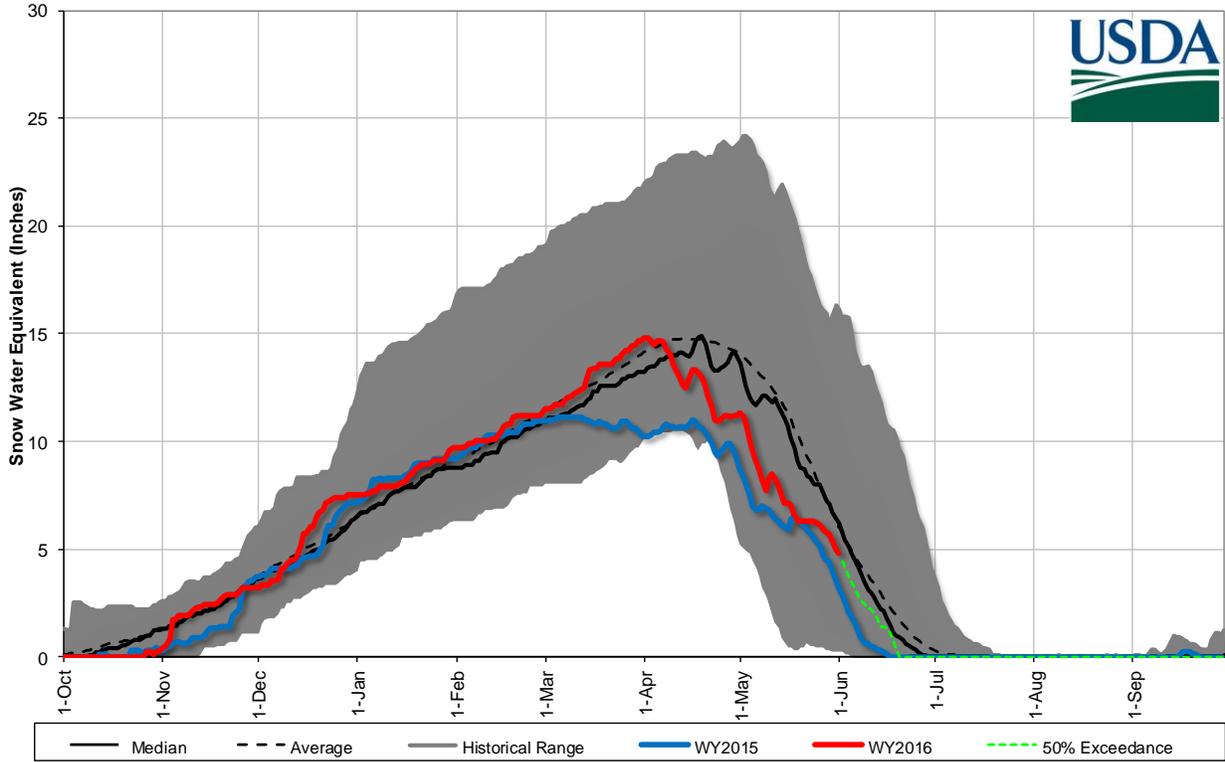
Abnormally dry and warm weather caused streamflows across the basin to increase at the beginning of April were above average until the end of May. The early movement of water has resulted in decreased forecasts for the June-July and June-September time period. Basin-wide streamflow forecasts vary greatly across the basin, so consult the table at the end of this section for individual forecast points. Current basin-wide streamflow forecasts for the 50% exceedance are 84% of average for the June-July time period.

<b>Jefferson River Basin Data Summary</b>		<b>6/1/2016</b>	
	Percent of 1981-2010 Normal (Median)	Last Year Percentage of Normal (Median)	
<b>Snowpack</b>			
Basin-Wide	83%	54%	
	Monthly Percentage of Average	WYTD Percentage of 1981-2010 Average*	Last Year Percentage of Average
<b>Precipitation</b>			
Mountain Precipitation	93%	98%	88%
Valley Precipitation	101%	116%	109%
Basin Precipitation	94%	99%	88%
	Percentage of Average	Percentage of Capacity (Total)	Last Year Percentage of Average
<b>Reservoir Storage</b>			
Basin-Wide Storage	101%	63%	93%
	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 June -July	84%	323%	26%

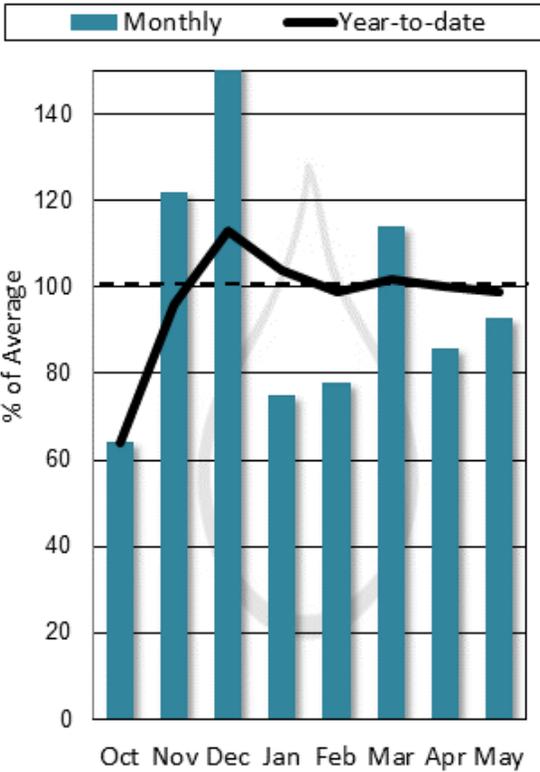
\*Water Year-to-Date (WYTD) Precipitation is October 1st - Current

\*\*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.

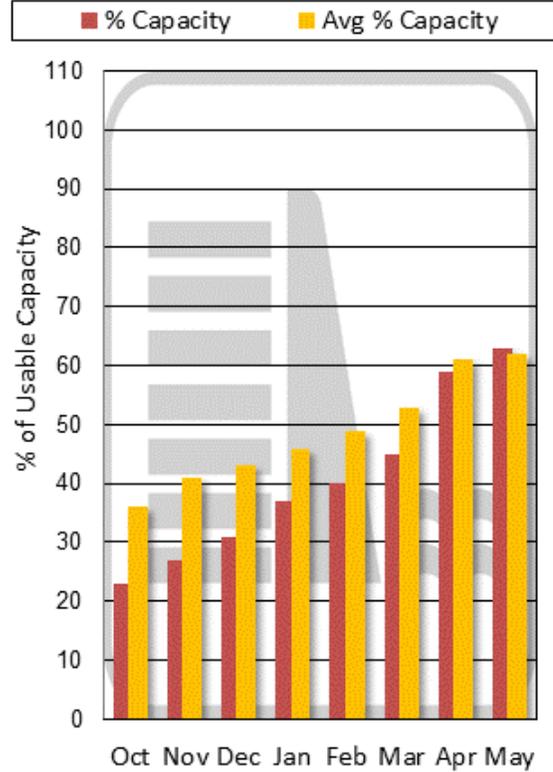
**Jefferson River Basin Snowpack with Non-Exceedence Projections**  
*Based on provisional SNOTEL daily data as of 6/1/2016*



**Mountain and Valley  
Precipitation**

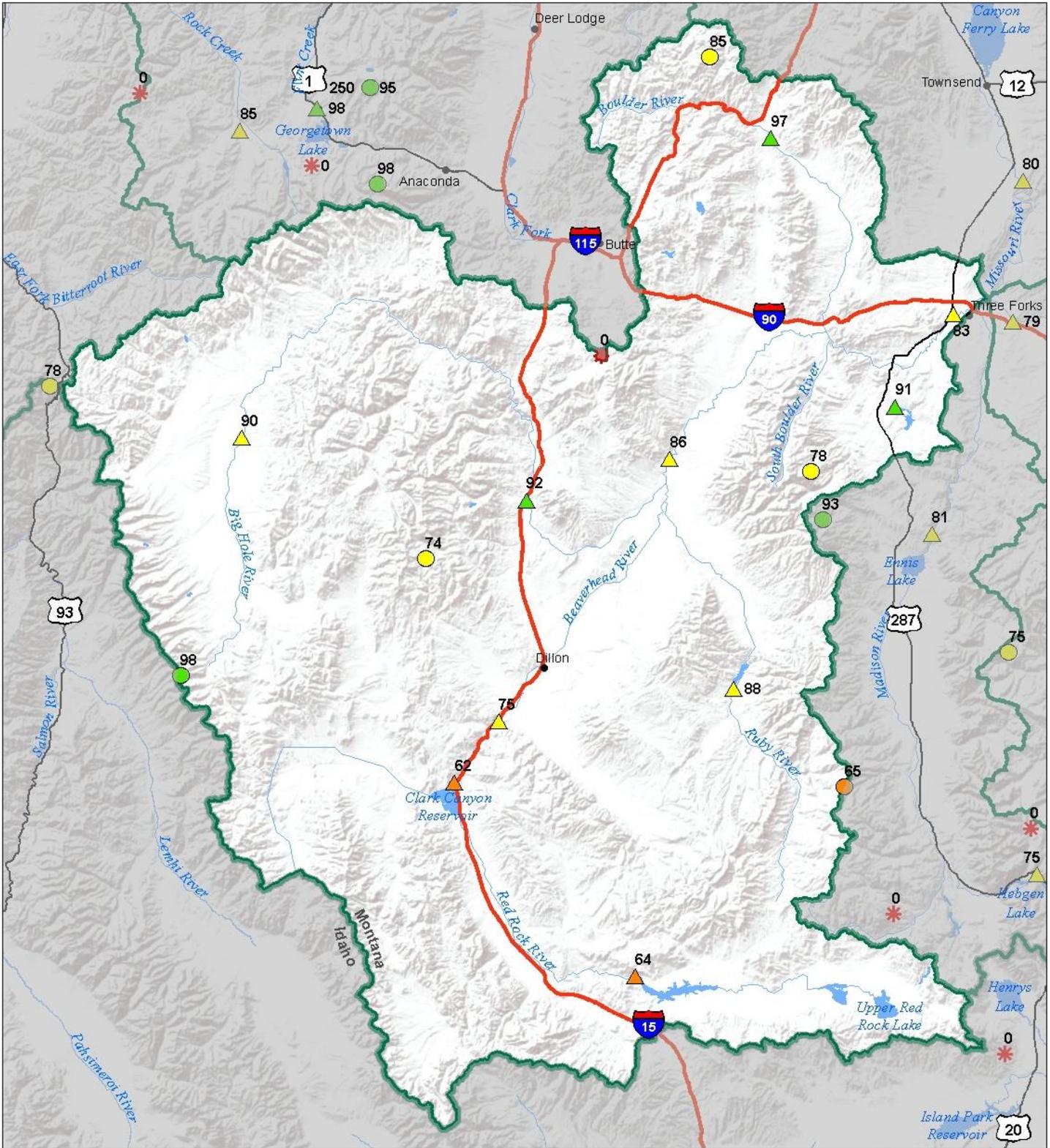


**End of Month Reservoir  
Storage**



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 June 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

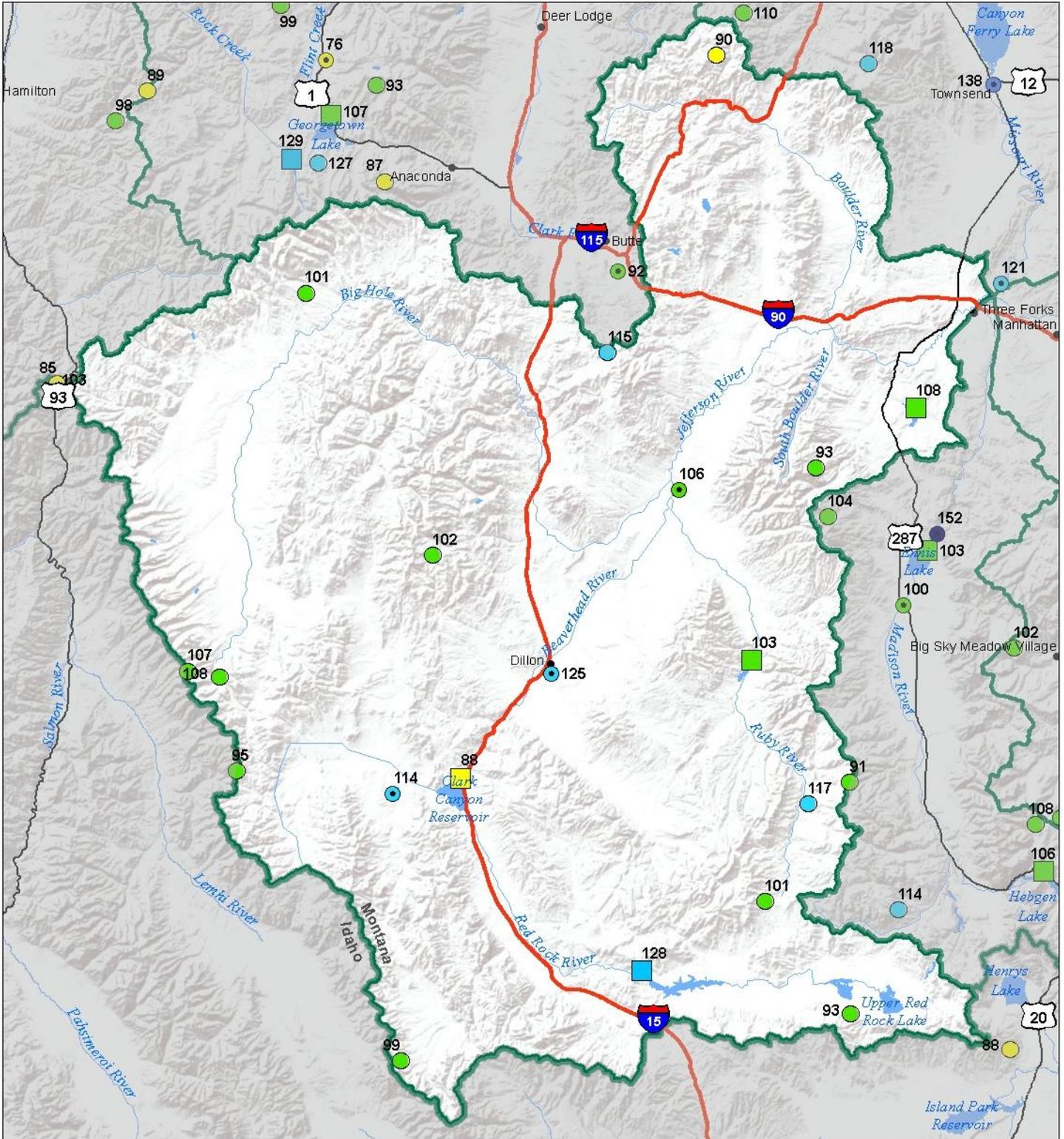
- ▲ > 150%
- ▲ 131 - 150%
- ▲ 111 - 130%
- ▲ 91 - 110%
- ▲ 71 - 90%
- ▲ 51 - 70%
- ▲ 1 - 50%



# Jefferson River Basin

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

### June 1, 2016



#### Precipitation Percent of Normal

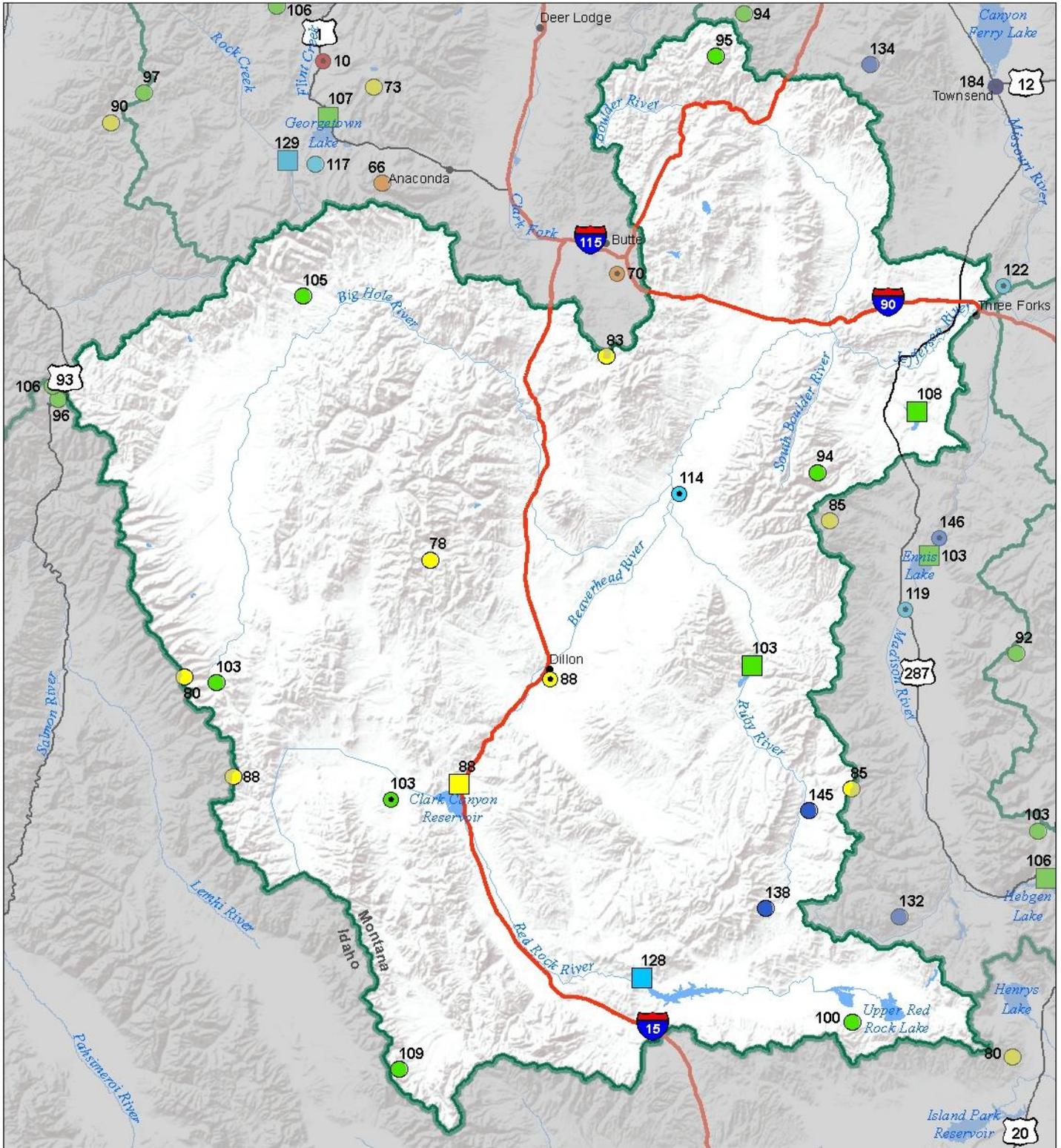
SNOTEL		COOP/ACIS	
<span style="color: blue;">●</span> > 150%	<span style="color: yellow;">●</span> 71 - 90%	<span style="color: blue;">●</span> > 150%	<span style="color: yellow;">●</span> 71 - 90%
<span style="color: lightblue;">●</span> 131 - 150%	<span style="color: orange;">●</span> 51 - 70%	<span 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%



# Jefferson River Basin Monthly Precipitation and Reservoir Levels Percentage of Normal June 1, 2016 (May 1, 2016 - June 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 - June 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>	JUN-JUL	6.3	14.5	20	65%	26	34	31
	JUN-SEP	7.4	17.9	25	64%	32	43	39
Clark Canyon Inflow <sup>2</sup>	JUN-JUL	-23	3.1	21	60%	39	65	35
	JUN-SEP	-16.4	13.6	34	62%	54	84	55
Beaverhead R at Barretts <sup>2</sup>	JUN-JUL	-13	10.5	36	73%	62	100	49
	JUN-SEP	-9	22	56	75%	89	138	75
Ruby R Reservoir Inflow <sup>2</sup>	JUN-JUL	20	29	35	85%	41	50	41
	JUN-SEP	31	42	49	88%	56	67	56
Big Hole R at Wisdom	JUN-JUL	3.3	26	41	89%	56	79	46
	JUN-SEP	3.3	29	47	90%	65	91	52
Big Hole R nr Melrose	JUN-JUL	138	205	250	93%	295	360	270
	JUN-SEP	154	235	290	92%	345	425	315
Jefferson R nr Twin Bridges <sup>2</sup>	JUN-JUL	85	191	265	83%	335	440	320
	JUN-SEP	81	215	305	86%	395	530	355
Boulder R nr Boulder	JUN-JUL	19.5	26	31	97%	36	42	32
	JUN-SEP	21	30	36	97%	42	51	37
Willow Ck Reservoir Inflow <sup>2</sup>	JUN-JUL	4.3	7.4	9.5	91%	11.6	14.7	10.4
	JUN-SEP	4.3	8.5	11.4	91%	14.3	18.5	12.5
Jefferson R nr Three Forks <sup>2</sup>	JUN-JUL	96	210	290	82%	365	480	355
	JUN-SEP	109	250	345	83%	440	575	415

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

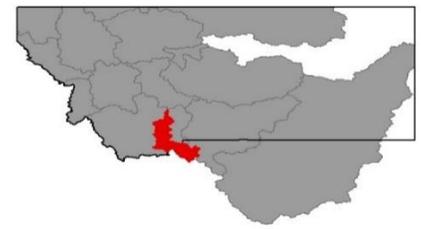
2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions

3) Median value used in place of average

Reservoir Storage End of May, 2016	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Lima Reservoir	78.5	63.7	61.4	84.0
Clark Canyon Res	120.7	117.6	137.1	255.6
Ruby River Reservoir	38.4	37.6	37.1	38.8
Basin-wide Total	237.5	218.9	235.6	378.4
# of reservoirs	3	3	3	3

Watershed Snowpack Analysis June 1, 2016	# of Sites	% Median	Last Year % Median
BEAVERHEAD	8	82	59
RUBY	5	80	63
BIGHOLE	8	90	55
BOULDER	3	83	39
JEFFERSON RIVER BASIN	19	83	54

# Madison River Basin



Snowpack in the upper reaches of the Madison River basin has been below normal throughout this winter, and the impact of the below normal snowpack is now being seen in the river flows above Hebgen Lake. The cooler and wet weather during the latter half of the month has helped to prolong the remaining snowpack at higher elevations, but it still remains well below average for this date. Below Hebgen the seasonal snowpack was better this year, and continues to be in better standing on June 1<sup>st</sup>. Typically at this time there is 50% of the peak snow water left to enter the river systems, but with regards to this year's peak there is only 32% remaining. The early melt this year has led to increases in reservoir storage for the time being, but the lack of snow later in the season means inflows to these reservoirs and natural flows in the streams will be below average later this summer. Precipitation will play an important role in streamflows this summer.

Precipitation was below average across the basin at mountain and valley locations. April totals for valley locations were 93% of average, while mountain totals at SNOTEL sites were 87% of average. Precipitation favored the lower Madison over the month with SNOTEL sites below Hebgen receiving 94% of average precipitation for May, while sites above Hebgen received 74% of average precipitation. Water year-to-date mountain precipitation is below average above Hebgen Lake reporting 85% of average for June 1<sup>st</sup>, but above last year at this time when it was 70%. Below Hebgen Lake water year mountain precipitation is in good standing for this date and is currently 102% of average. Overall basin-wide precipitation for the water year is currently 97% for June 1<sup>st</sup>, well above last year at this time.

Reservoir storage in the basin is above average at 105% on June 1<sup>st</sup>.

Streamflows were near to above average in the Upper Madison until the second week of May. Since then below normal snowpack and early snowmelt in the Upper Madison has resulted in streamflows which are well below average on June 1<sup>st</sup>. The early movement of water has resulted in decreased forecasts for the June-July and June-September time period. Basin-wide streamflow forecasts vary greatly across the basin, so consult the table at the end of this section for individual forecast points. Current basin-wide streamflow forecasts for the 50% exceedance are 76% of average for the June-July time period.

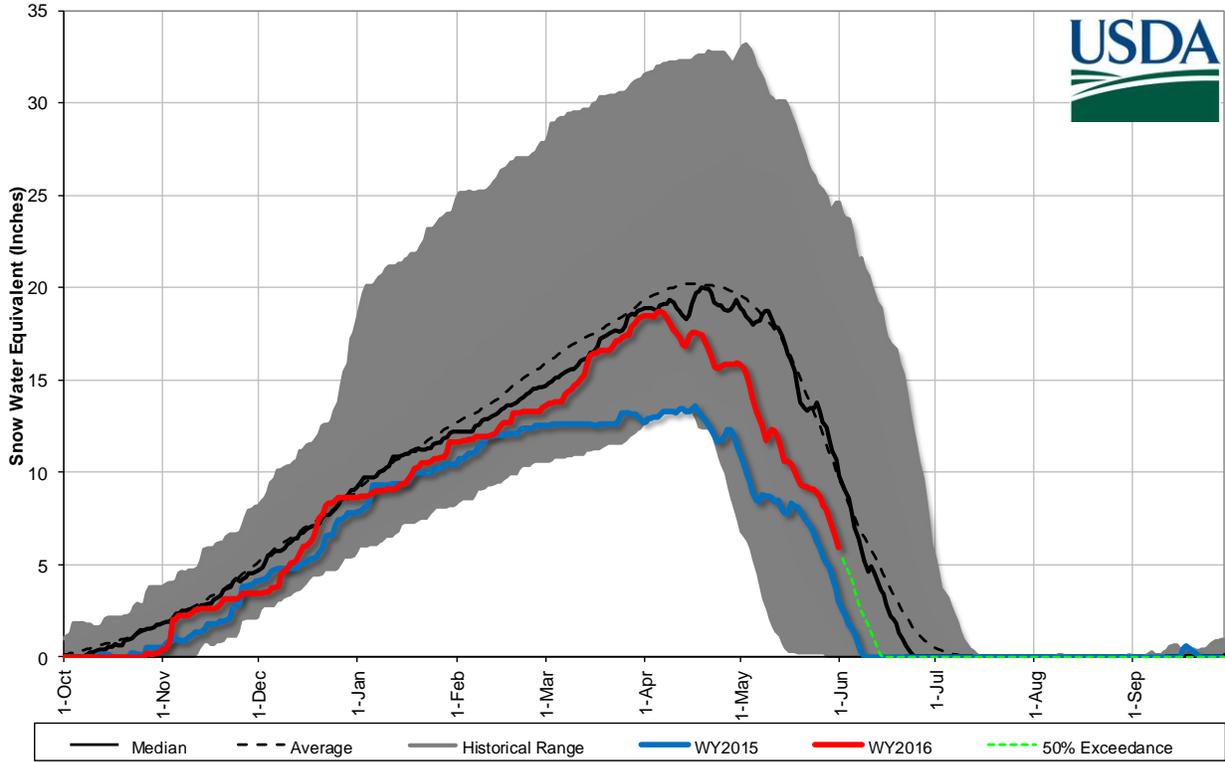
<b>Madison River Basin Data Summary</b>		<b>6/1/2016</b>	
	Percent of 1981-2010 Normal (Median)	Last Year Percentage of Normal (Median)	
<b>Snowpack</b>			
Basin-Wide	62%	31%	
	Monthly Percentage of Average	WYTD Percentage of 1981-2010 Average *	Last Year Percentage of Average
<b>Precipitation</b>			
Mountain Precipitation	87%	95%	79%
Valley Precipitation	113%	103%	101%
Basin Precipitation	91%	96%	82%
	Percentage of Average	Percentage of Capacity (Total)	Last Year Percentage of Average
<b>Reservoir Storage</b>			
Basin-Wide Storage	105%	93%	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 June -July	76%	128%	60%

\*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.

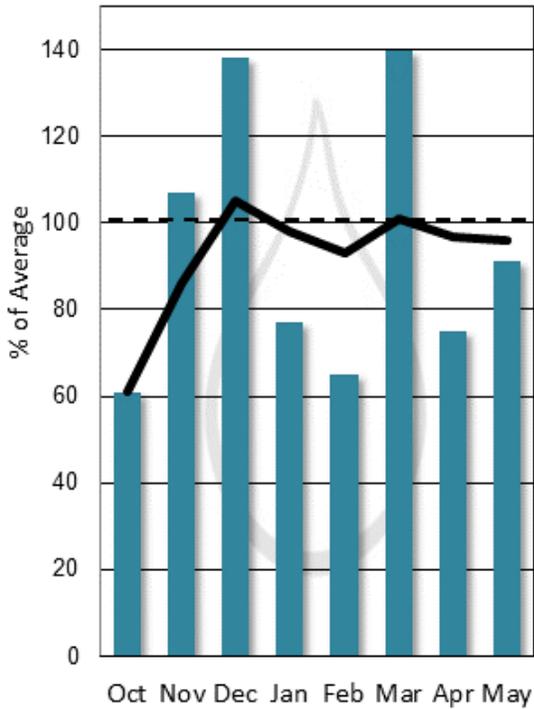
**Madison River Basin Snowpack with Non-Exceedence Projections**

*Based on provisional SNOTEL daily data as of 6/1/2016*



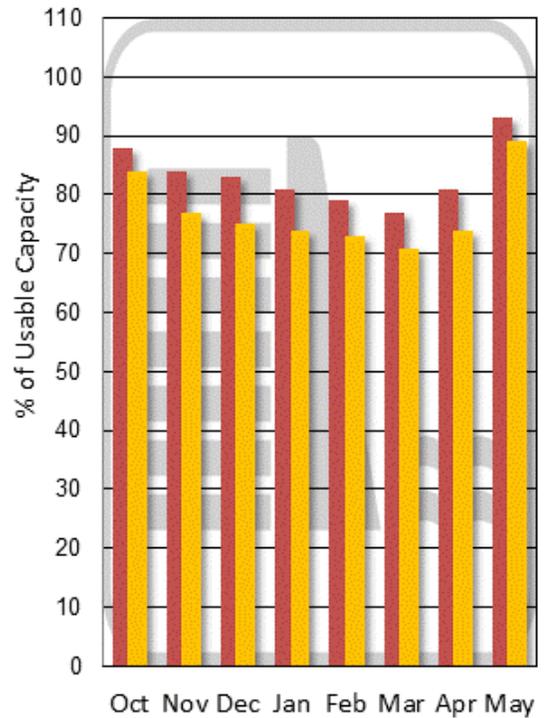
**Mountain and Valley Precipitation**

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



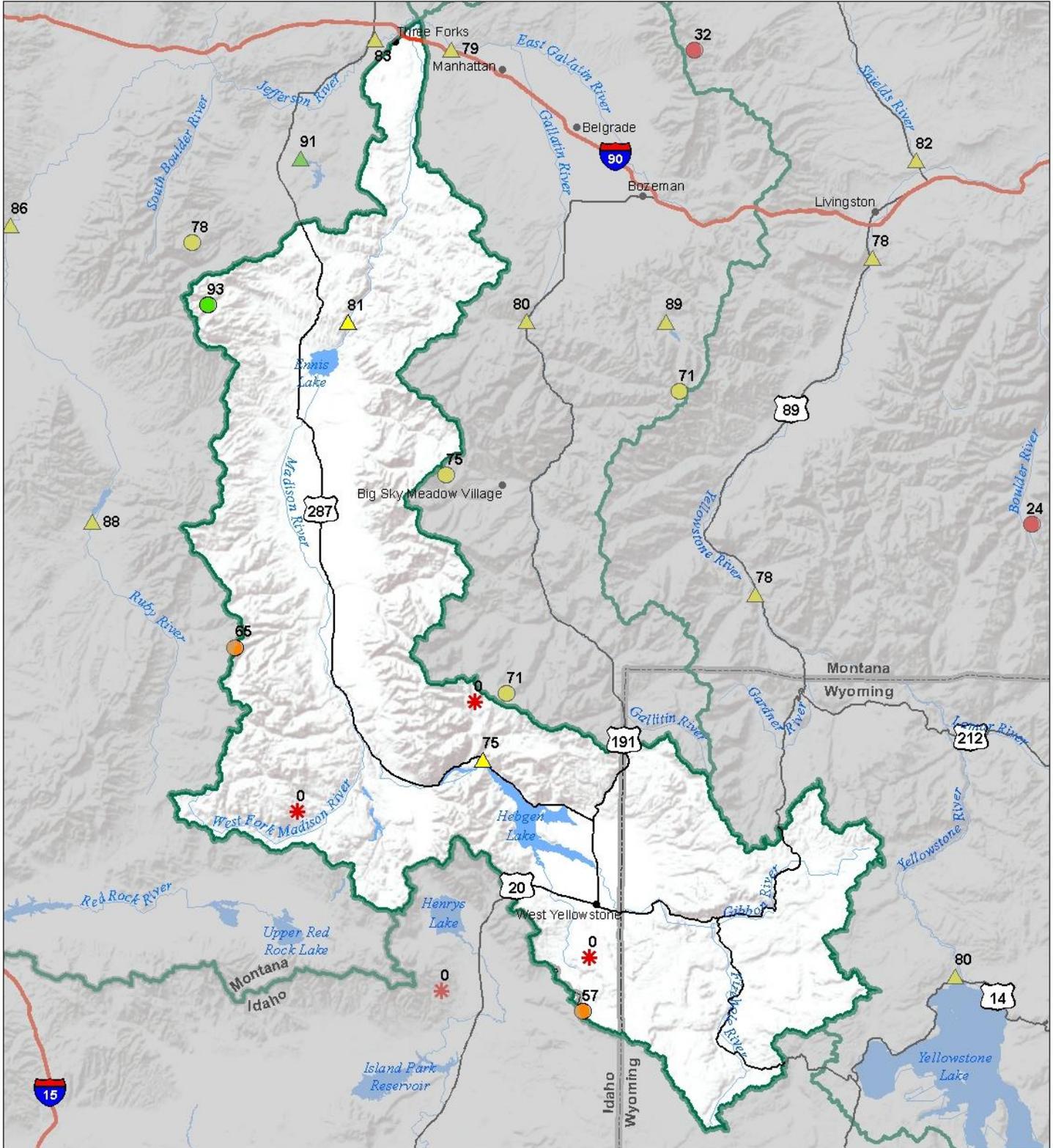
**End of Month Reservoir Storage**

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



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

# Madison River Basin Streamflow Forecast, Snow Water Equivalent Percentage of Normal June 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

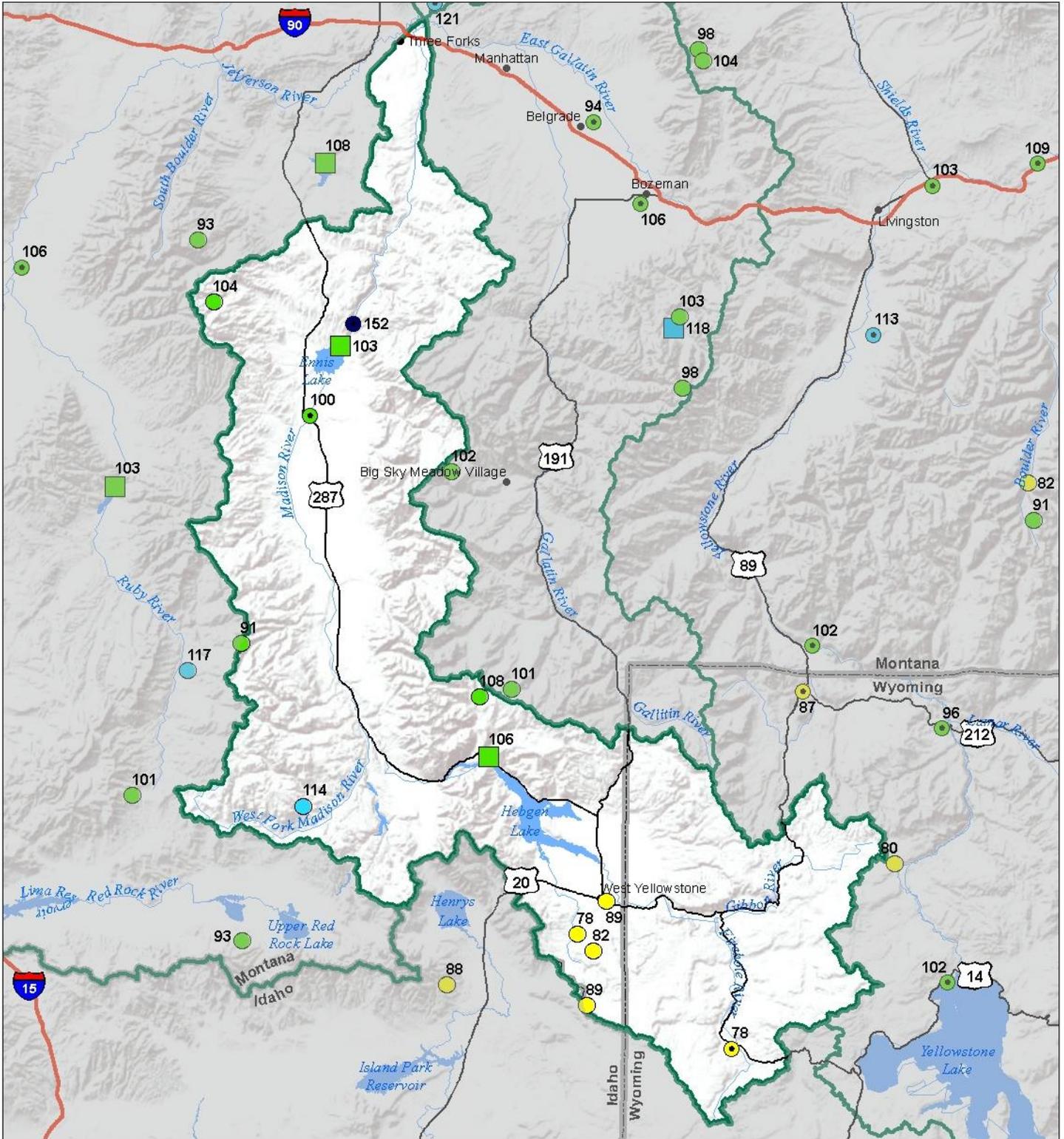
- ▲ > 150%
- ▲ 131 - 150%
- ▲ 111 - 130%
- ▲ 91 - 110%
- ▲ 71 - 90%
- ▲ 51 - 70%
- ▲ 1 - 50%



# Madison River Basin

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

### June 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

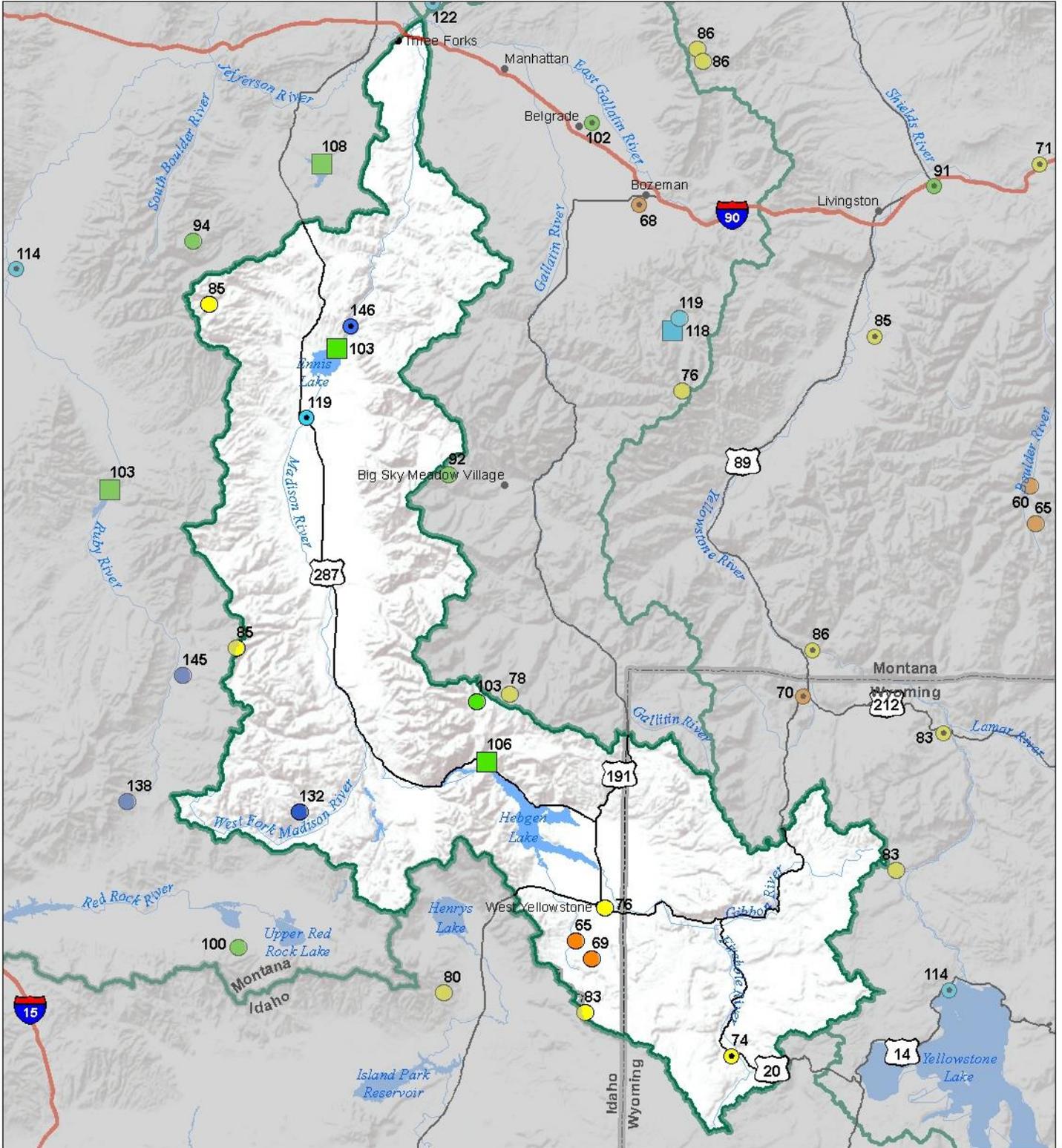
<span style="color: darkblue;">■</span> > 150%
<span style="color: blue;">■</span> 131 - 150%
<span style="color: lightblue;">■</span> 111 - 130%
<span style="color: green;">■</span> 91 - 110%
<span style="color: yellow;">■</span> 71 - 90%
<span style="color: orange;">■</span> 51 - 70%
<span style="color: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



# Madison River Basin

## Monthly Precipitation and Reservoir Levels Percentage of Normal

### June 1, 2016 (May 1, 2016 - June 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%



## Madison River Basin Streamflow Forecasts - June 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>	JUN-JUL	83	109	126	71%	143	169	178
	JUN-SEP	158	189	210	75%	230	260	280
Ennis Reservoir Inflow <sup>2</sup>	JUN-JUL	193	235	260	79%	285	325	330
	JUN-SEP	310	360	395	81%	430	480	485

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 May, 2016	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Ennis Lake	36.6	36.9	35.6	41.0
Hebgen Lake	355.4	377.4	336.2	378.8
Basin-wide Total	392.0	414.4	371.8	419.8
# of reservoirs	2	2	2	2

Watershed Snowpack Analysis June 1, 2016	# of Sites	% Median	Last Year % Median
MADISON abv HEBGEN LAKE	4	46	3
MADISON blw HEBGEN LAKE	7	68	42
MADISON RIVER BASIN	11	62	31

## Gallatin River Basin



May brought a return to more seasonal weather in the Gallatin River basin, and although this did help to slow snowmelt, a substantial portion of the snowpack had moved into the river systems before the weather could intervene and slow melt. Active melt during the months of April and May has resulted in snowpack totals that are below normal for June 1<sup>st</sup>, but above last year at this time. Currently SNOTEL sites above 8000' have measureable snowpack at this time which ranges from 70 to 75% of average. At this time 28% of the peak snowpack during April remains to enter the river systems, which is well below the long term average of 43%. Early melt caused the Gallatin River to run above average from April until late May, but since the last week of May it has been below average. The bulk of the snow water has entered the hydrologic system and summer precipitation will dictate what levels the rivers and streams flow at later this summer.

Precipitation was below average at both mountain and valley locations for the month of April. Valley locations reported 83% of average precipitation and mountain SNOTEL sites received 91% of average precipitation. March helped to boost the water year-to-date totals, so even though April and May precipitation was below average water year-to-date (October 1<sup>st</sup>-current) totals are above average. Basin-wide water year precipitation is currently 102% of average for June 1<sup>st</sup>.

Reservoir storage is above average, and Middle Creek (Hyalite) Reservoir is at capacity on June 1<sup>st</sup>.

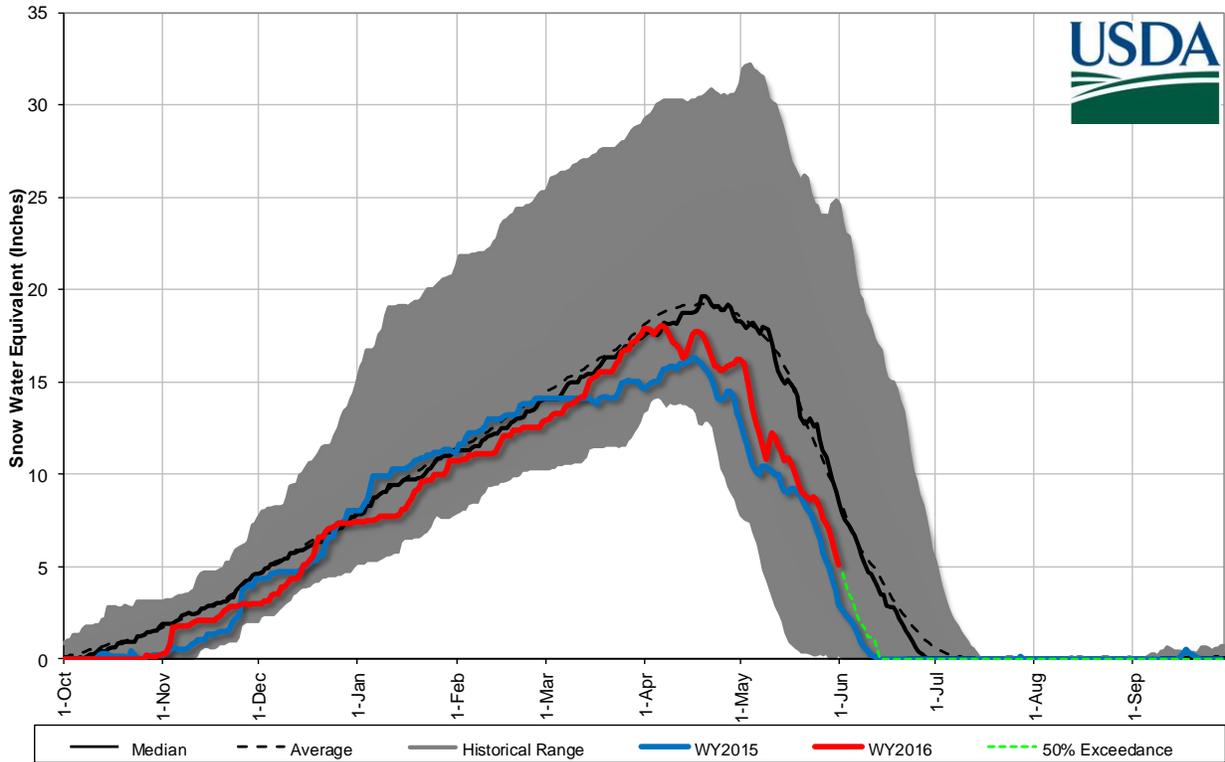
Streamflows were near to above average in the Gallatin Basin until the third week of May. Both the East Gallatin and Gallatin Rivers have since started trending downward, and will likely see increased recession with the early movement of snowpack. The early movement of water has resulted in decreased forecasts for the June-July and June-September time period. Current basin-wide streamflow forecasts for the 50% exceedance are 78% of average for the June-July time period.

<b>Gallatin River Basin Data Summary</b>		<b>6/1/2016</b>	
	Percent of 1981-2010 Normal (Median)	Last Year Percentage of Normal (Median)	
<b>Snowpack</b>			
Basin-Wide	62%	36%	
	Monthly Percentage of Average	WYTD Percentage of 1981-2010 Average *	Last Year Percentage of Average
<b>Precipitation</b>			
Mountain Precipitation	90%	102%	93%
Valley Precipitation	83%	101%	89%
Basin Precipitation	89%	102%	92%
	Percentage of Average	Percentage of Capacity (Total)	Last Year Percentage of Average
<b>Reservoir Storage</b>			
Basin-Wide Storage	118%	100%	118%
	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 June -July	78%	134%	57%

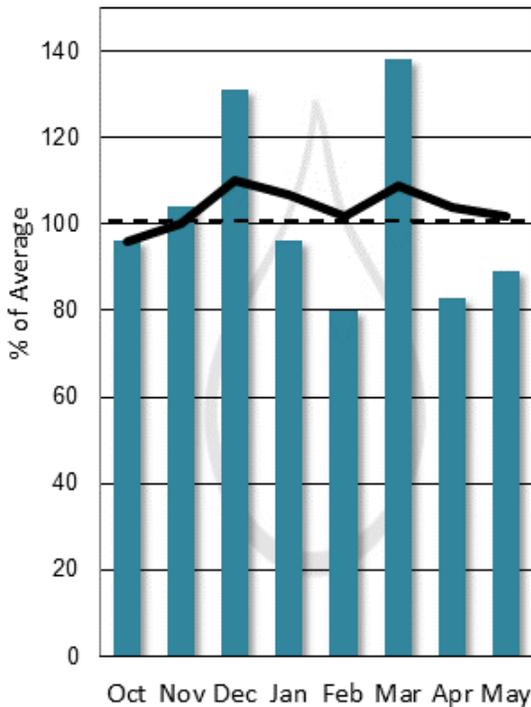
\*Water Year-to-Date (WYTD) Precipitation is October 1st - Current

\*\*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.

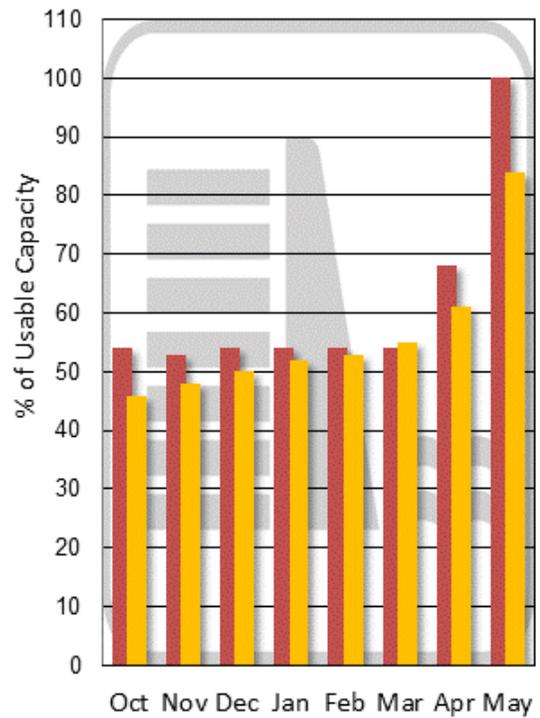
**Gallatin River Basin Snowpack with Non-Exceedence Projections**  
*Based on provisional SNOTEL daily data as of 6/1/2016*



**Mountain and Valley Precipitation**

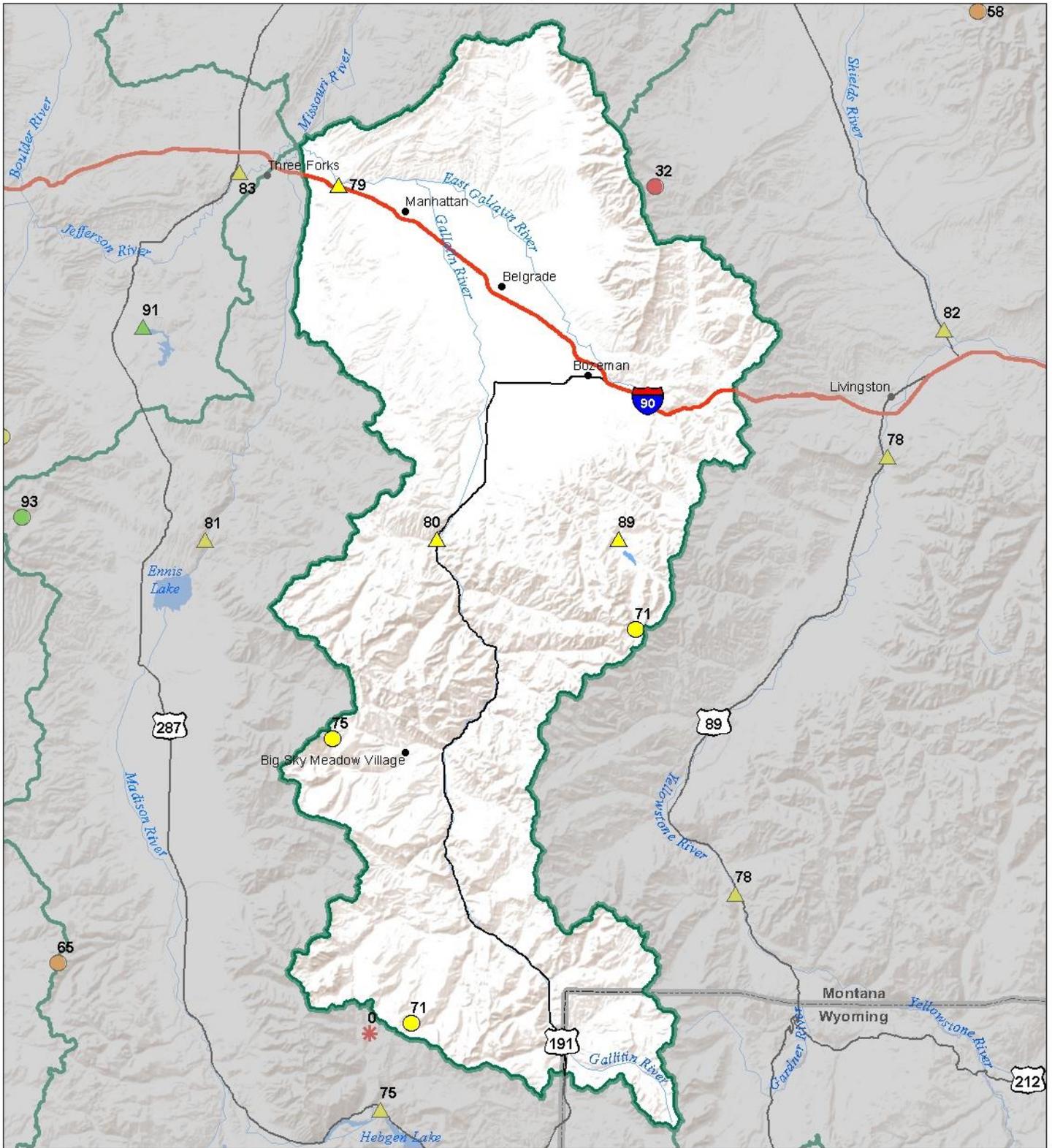


**End of Month Reservoir Storage**



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

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



### Snow Water Equivalent Percent of Normal

#### SN OTEL

- > 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%

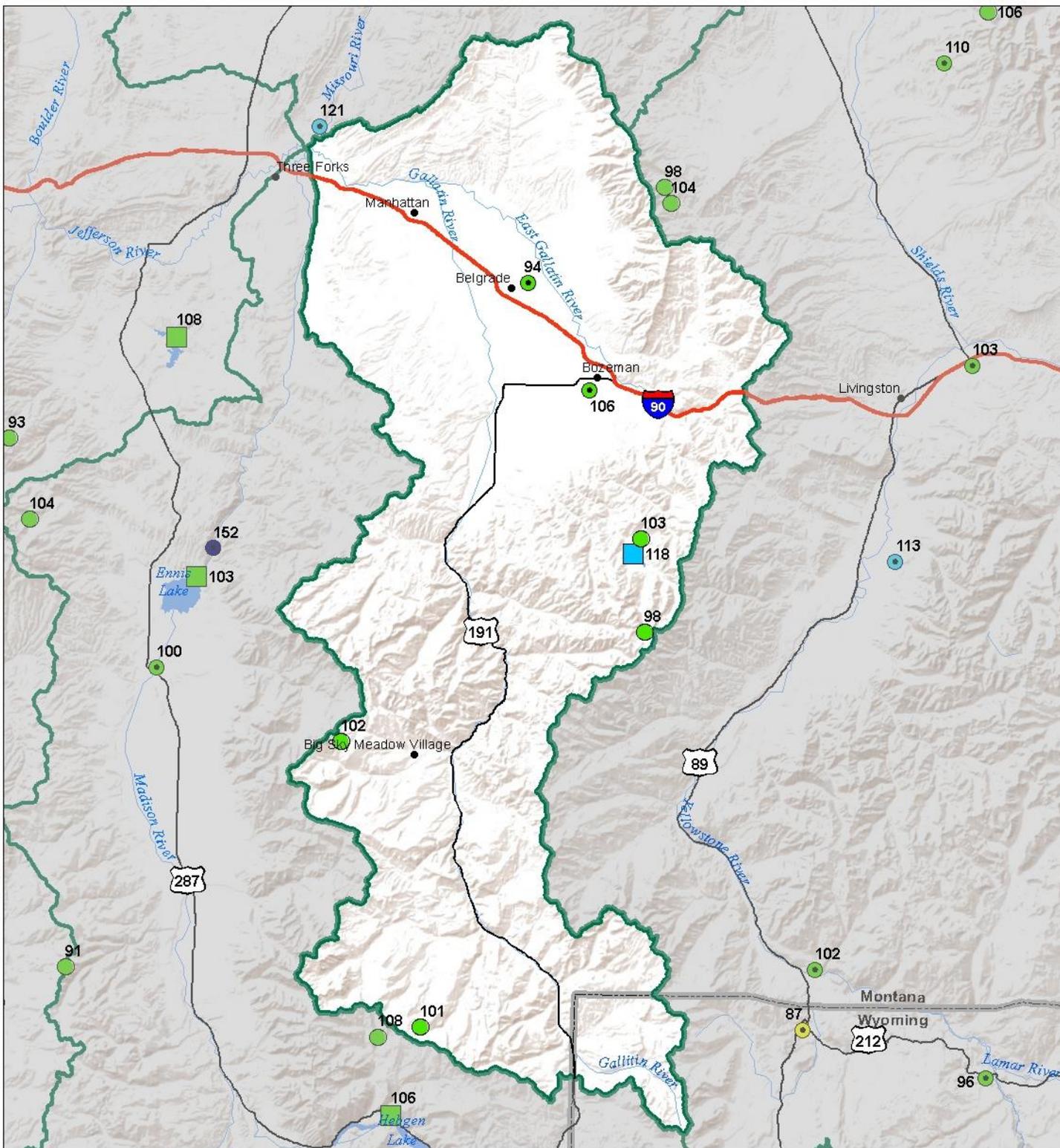


# Gallatin River Basin

## Water Year to Date Precipitation and Reservoir Levels

### Percentage of Normal

June 1, 2016

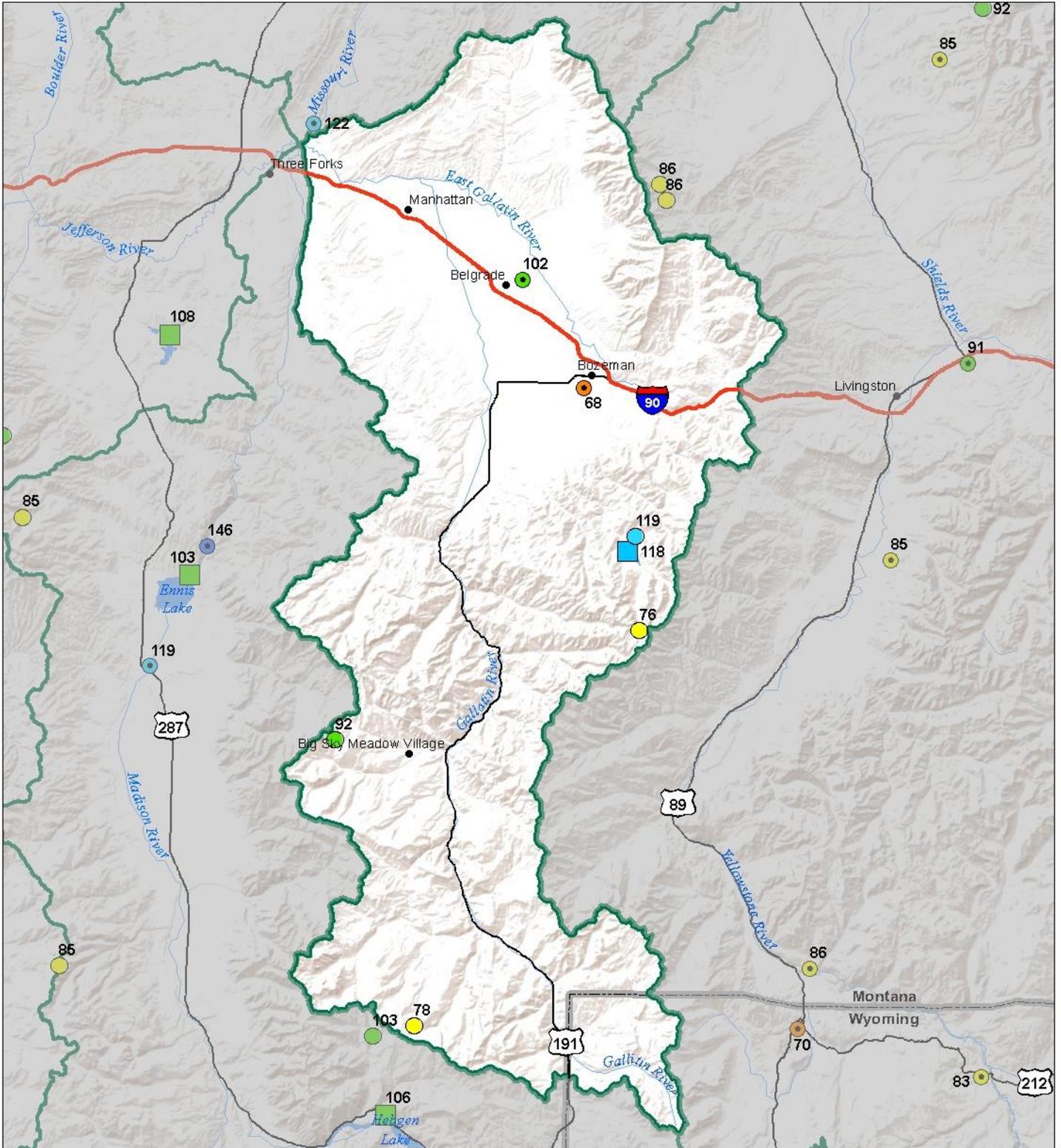


Precipitation Percent of Normal		COOP/ACIS	
SNOTEL			
● > 150%	● 71 - 90%	● > 150%	● 71 - 90%
● 131 - 150%	● 51 - 70%	● 131 - 150%	● 51 - 70%
● 111 - 130%	● 1 - 50%	● 111 - 130%	● 1 - 50%
● 91 - 110%		● 91 - 110%	

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

USDA  
Montana State Library  
Natural Resource Information System

# Gallatin River Basin Monthly Precipitation and Reservoir Levels Percentage of Normal June 1, 2016 (May 1, 2016 - June 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%



## Gallatin River Basin Streamflow Forecasts - June 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	JUN-JUL	142	177	200	78%	225	260	255
	JUN-SEP	184	225	255	80%	285	325	320
Hyalite Reservoir Inflow <sup>2</sup>	JUN-JUL	8.7	10.2	11.2	87%	12.2	13.7	12.9
	JUN-SEP	10.7	12.6	13.9	89%	15.1	17	15.7
Gallatin R at Logan	JUN-JUL	102	155	191	78%	225	280	245
	JUN-SEP	131	200	245	79%	295	365	310

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

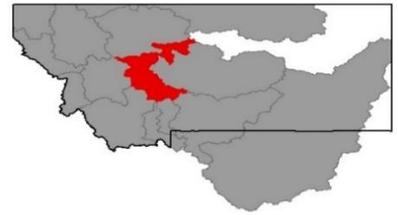
2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions

3) Median value used in place of average

Reservoir Storage End of May, 2016	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Middle Creek Res	10.2	10.1	8.6	10.2
Basin-wide Total	10.2	10.1	8.6	10.2
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis June 1, 2016	# of Sites	% Median	Last Year % Median
UPPER GALLATIN	3	60	24
HYALITE	2	71	68
BRIDGER	2	32	0
GALLATIN RIVER BASIN	7	62	36

# Headwaters Mainstem (Missouri) River Basin



As of June 1, any remaining snow can be found at the highest elevations within the basin or in some cases in shaded or heavily timbered areas. Only two SNOTEL sites have measurable snowpack: Boulder Mountain in the Big Belt Mountains at 98 percent of normal and Rocker Peak in the Boulder Mountains north of Boulder, MT., at 84 percent of normal. Two major event storms brought needed precipitation in the form of rain and snow especially in the Big Belt Mountains. Unfortunately the snow melted as fast as it fell especially at the lower to mid elevations.

The May flowers along with all the other plant life are “dancing” for joy over the amount of rain received in May. May mountain precipitation in the Big Belt and Elk Horn Mountains was well above average. Other areas within the basin received slightly below to near average May mountain precipitation. The basin as a whole was 117% of average for the month of May. Mountain locations received 114% of average for the month, valley locations reported 129% of average precipitation for May. Overall, the basin continues to be slightly above average for water year precipitation at 103% on June 1<sup>st</sup>.

Smaller streams and creeks reached their snowmelt peak either the end of April or the first of part of May. A few may have had an earlier peak which was heavily rain influenced.

Reservoir storages for June 1 are 114 percent of average. All reservoirs in the Helena area are near to above average for this date due to the early snowmelt runoff.

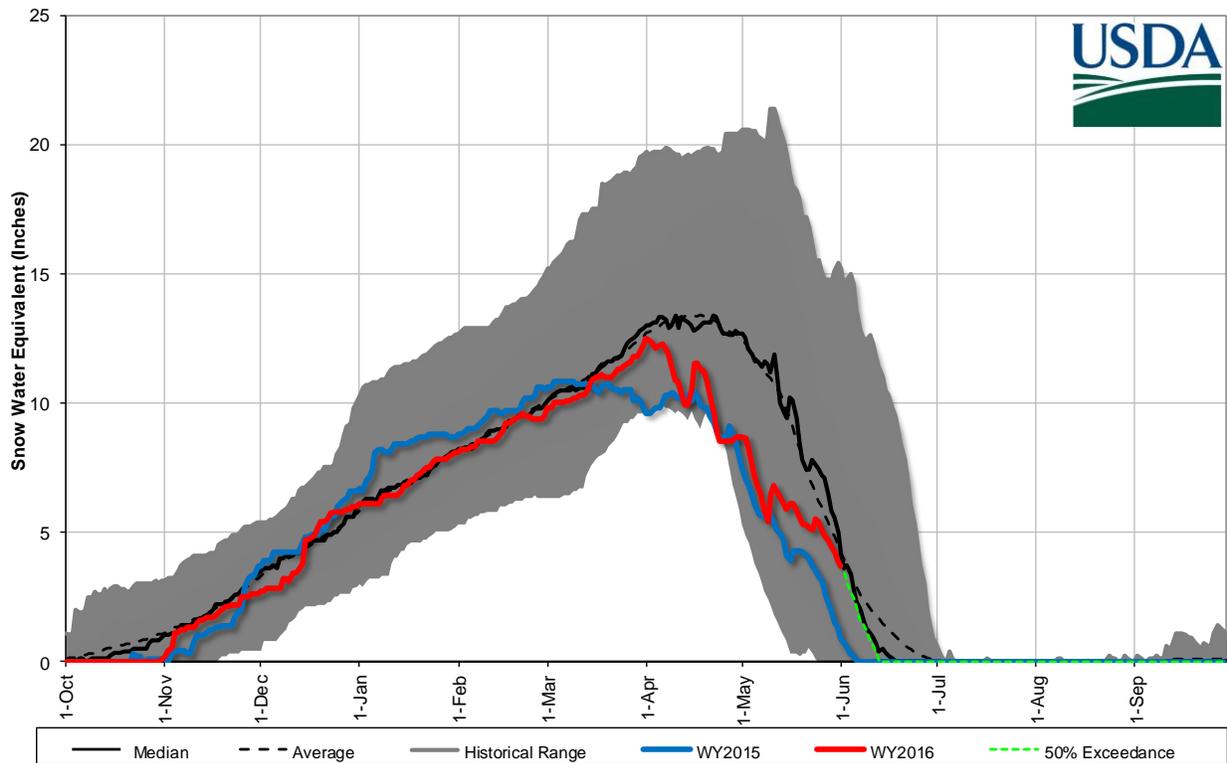
Warm and sunny conditions caused snowmelt ahead of schedule which caused the Missouri River to rise substantially in April and May. Smaller streams around Helena have shown similar response. The early movement of water has resulted in lower June-July streamflow forecasts in the basin for June 1<sup>st</sup>. Current basin-wide streamflows for the 50% exceedance are 73% of average for the June-July time period.

<b>Missouri Mainstem River Basin Data Summary</b>		<b>6/1/2016</b>	
	Percent of 1981-2010 Normal (Median)	Last Year Percentage of Normal (Median)	
<b>Snowpack</b>			
Basin-Wide	84%	21%	
	Monthly Percentage of Average	WYTD Percentage of 1981-2010 Average*	Last Year Percentage of Average
<b>Precipitation</b>			
Mountain Precipitation	114%	103%	96%
Valley Precipitation	129%	109%	103%
Basin Precipitation	117%	103%	97%
	Percentage of Average	Percentage of Capacity (Total)	Last Year Percentage of Average
<b>Reservoir Storage</b>			
Basin-Wide Storage	114%	82%	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 June -July	73%	106%	58%

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

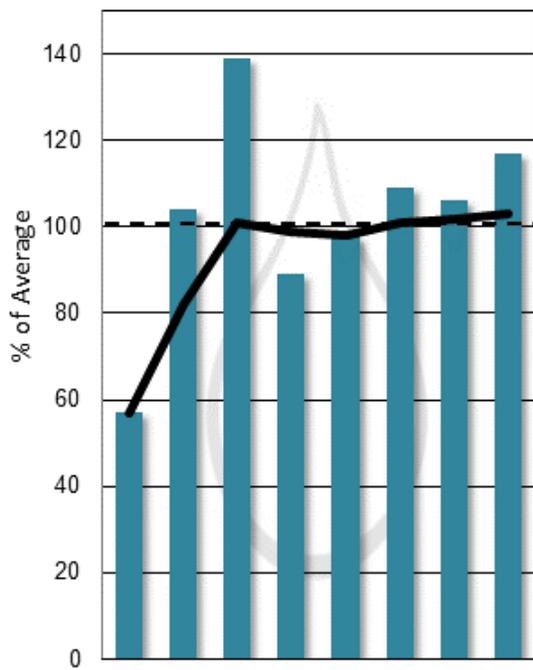
\*\*Basin-wide streamflows are an average of the individual streamflow points within the basin for the 50 percent exceedance forecast. Consult the individual streamflow forecasts in the table below for the range of forecasts at an individual point.

**Missouri Headwaters Mainstem River Basin (below Toston, above the Smith) Snowpack with Non-Exceedence**  
*Based on provisional SNOTEL daily data as of 6/1/2016*



**Mountain and Valley Precipitation**

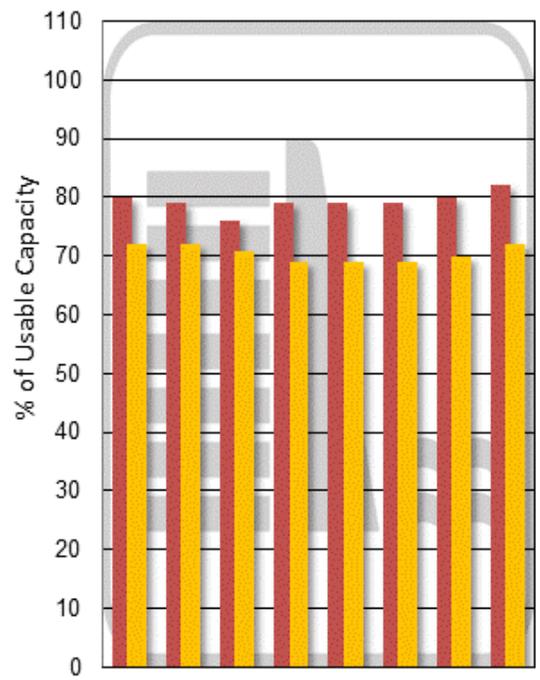
Monthly (teal bar), Year-to-date (black line)



Oct Nov Dec Jan Feb Mar Apr May

**End of Month Reservoir Storage**

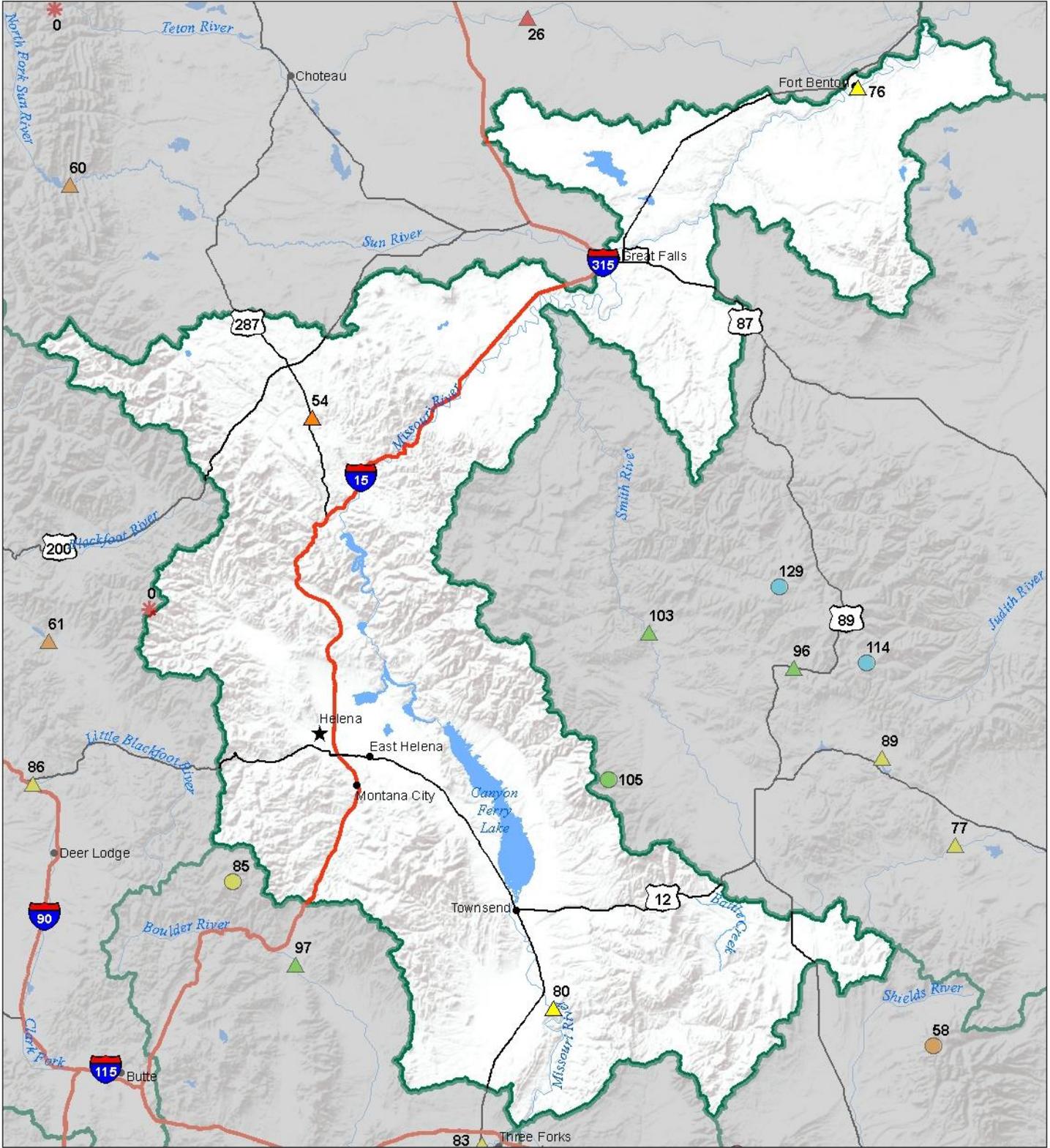
% Capacity (red bar), Avg % Capacity (yellow bar)



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 June 1, 2016



### Snow Water Equivalent Percent of Normal

#### SNOTEL

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

#### Snowcourse

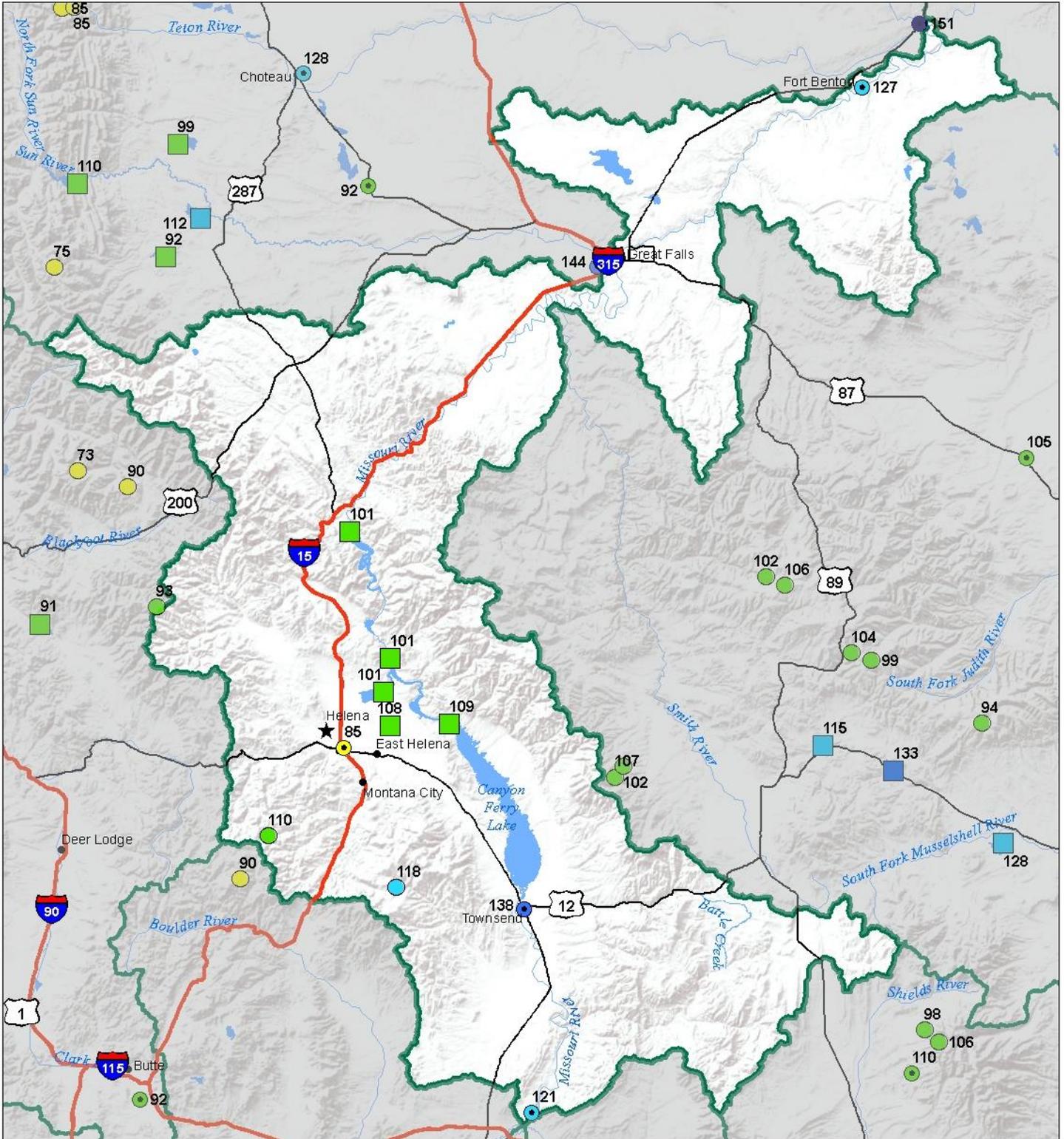
- ⊕ > 150%
- ⊕ 131 - 150%
- ⊕ 111 - 130%
- ⊕ 91 - 110%
- ⊕ 71 - 90%
- ⊕ 51 - 70%
- ⊕ 1 - 50%
- ⊕ 0%

### Streamflow Forecast Percent of Average Flows

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



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



### Precipitation Percent of Normal

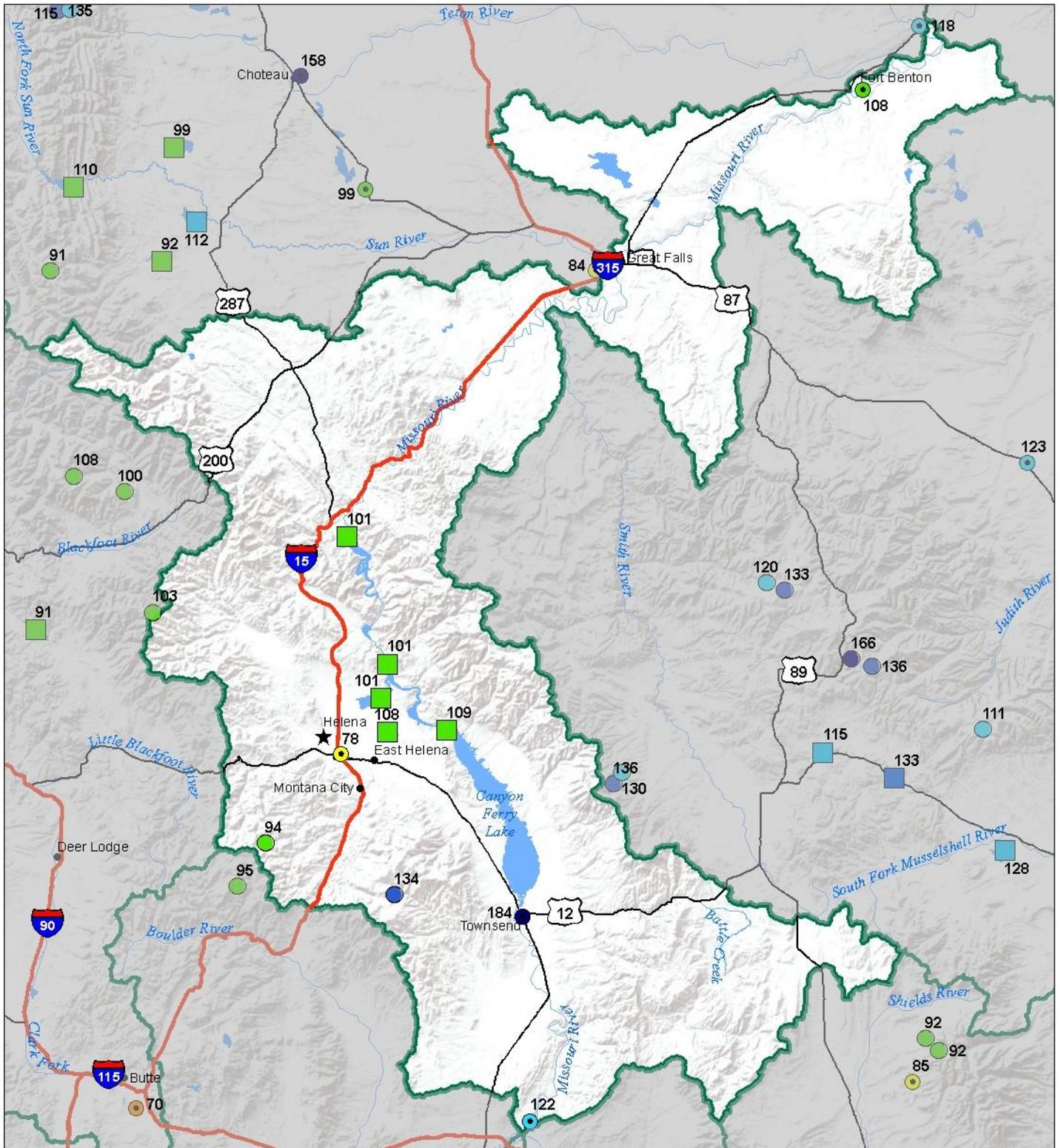
SNOTEL		COOP/ACIS	
<span style="color: blue;">●</span> > 150%	<span style="color: yellow;">●</span> 71 - 90%	<span style="color: blue;">●</span> > 150%	<span style="color: yellow;">●</span> 71 - 90%
<span style="color: lightblue;">●</span> 131 - 150%	<span style="color: orange;">●</span> 51 - 70%	<span 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%



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



## Missouri Mainstem Basin Streamflow Forecasts - June 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>	JUN-JUL	360	575	725	77%	875	1090	940
	JUN-SEP	465	765	970	80%	1180	1480	1220
Dearborn R nr Craig	JUN-JUL	1	9.5	19.2	48%	29	43	40
	JUN-SEP	1	13.5	25	54%	35	52	46
Missouri R at Fort Benton <sup>2</sup>	JUN-JUL	415	770	1010	72%	1250	1610	1410
	JUN-SEP	655	1120	1440	76%	1760	2220	1900
Missouri R nr Virgelle <sup>2</sup>	JUN-JUL	470	850	1110	69%	1360	1740	1600
	JUN-SEP	725	1210	1550	73%	1880	2370	2120
Missouri R nr Landusky <sup>2</sup>	JUN-JUL	540	920	1170	68%	1430	1810	1710
	JUN-SEP	810	1310	1650	73%	1990	2490	2260
Missouri R bl Fort Peck Dam <sup>2</sup>	JUN-JUL	320	795	1110	65%	1440	1910	1710
	JUN-SEP	315	1000	1460	67%	1930	2610	2170
Lake Sakakawea Inflow <sup>2</sup>	JUN-JUL	2000	3150	3930	78%	4710	5860	5060
	JUN-SEP	1950	3650	4800	78%	5950	7650	6150

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

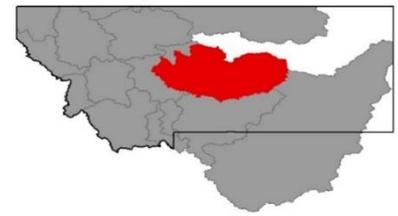
2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions

3) Median value used in place of average

Reservoir Storage End of May, 2016	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Canyon Ferry Lake	1790.2	1739.4	1639.0	2043.0
Helena Valley Reservoir	8.5	8.7	7.9	9.2
Lake Helena	11.0	10.9	10.9	12.7
Hauser Lake & Lake Helena	74.3	74.0	73.8	74.6
Holter Lake	80.9	81.0	80.4	81.9
Fort Peck Lake	15400.1	15428.1	13383.0	18910.0
Basin-wide Total	17365.0	17342.1	15195.0	21131.4
# of reservoirs	6	6	6	6

Watershed Snowpack Analysis June 1, 2016	# of Sites	% Median	Last Year % Median
HEADWATERS MAINSTEM	5	84	21
SMITH-JUDITH-MUSSELSHELL	9	122	48
SUN-TETON-MARIAS	5	33	17
MAINSTEM ab FT PECK RES	18	79	33
MILK RIVER BASIN	3		
MISSOURI MAINSTEM BASIN	21	79	33

# Smith-Judith-Musselshell River Basin



During the early part of May, the snowpack at all elevations throughout the basins was headed for early melt out. However, a whopper of a spring storm blew into Central Montana, May 9 – 11. Our Crystal Lake SNOTEL site received 5.1 inches snow water equivalent (SWE) with 31 inches of snow depth. Lewistown also was hammered with major drifting south of town towards the mountains and the May flowers were buried in snow! Areas in the northern part of Smith River Basin also picked up outstanding increments (over 2 inches of SWE and 23 inches of snow depth) from this storm. All this was awesome but very short lived. Warm temperatures returned to the region mid-month and the snow melted quickly at the lower elevations but stuck around at the higher elevations.

As of June 1, snowpack percentages are quiet varied throughout these basins. A lot of the sites with measurable snow are typically snow free this time of year. Snowpack for the basins is 122 percent of normal which is based on a handful of sites.

Both mountain and valley stations in all three major basins received well above average precipitation for the month of May. The majority of rain fell in the storm of May 9-11. However storms continued to rumble through the region for the rest of the May with another good storm hitting around May 22. May mountain precipitation percentages ranged from 103 percent of average in the Musselshell River Basin to 137 percent of the average in the Judith and Smith River Basins. Overall the basin is 107% of average for water year precipitation beginning October 1<sup>st</sup>.

Reservoir storage is above average for June 1<sup>st</sup> at all reservoirs in the basin.

The streams and rivers in the region responded appropriately to the large rain increments and snowmelt during the month. However, all behaved and no major flooding occurred. Harlowton and Roundup were spared this year! Snowmelt peaks probably occurred either the end of April or the first part of May before the storm hit on the May 9. Current basin-wide streamflows for the 50% exceedance are 86% of average for the June-July time period.

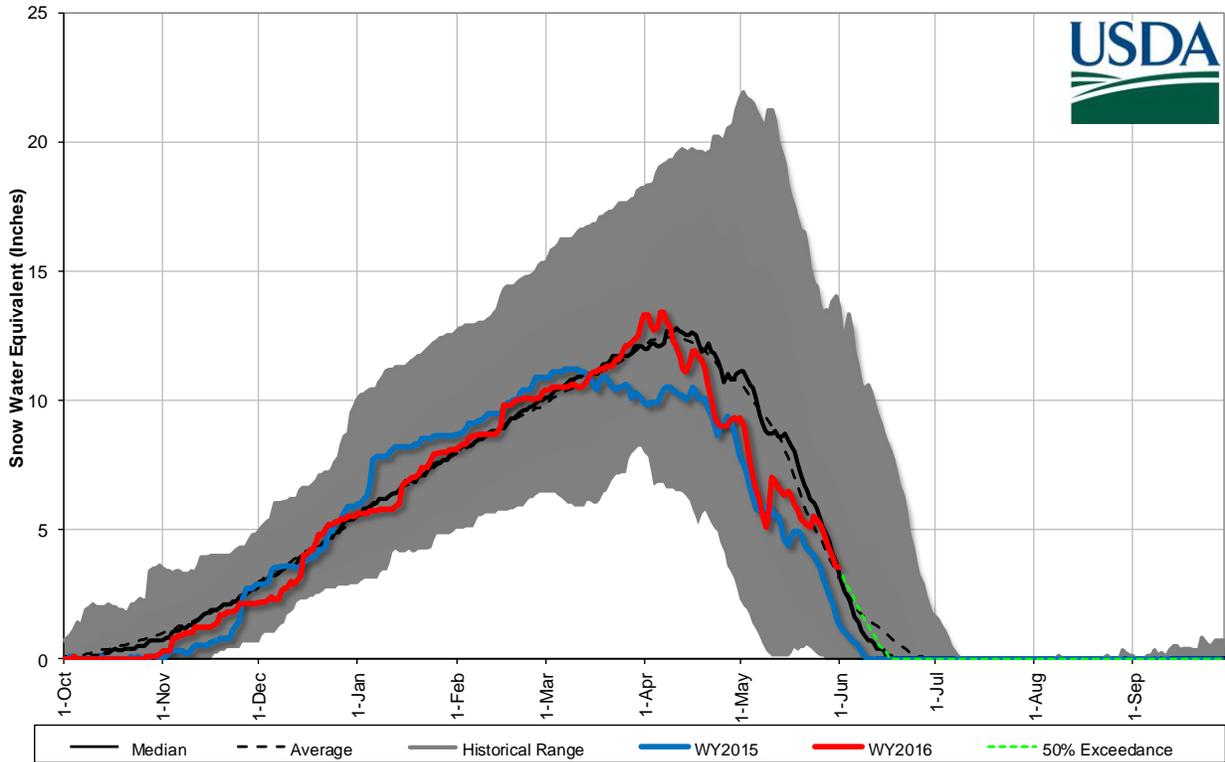
<b>Smith-Judith-Musselshell River Basin Data Summary</b>		<b>6/1/2016</b>	
	Percent of 1981-2010 Normal (Median)	Last Year Percentage of Normal (Median)	
<b>Snowpack</b>			
Basin-Wide	122%	48%	
	Monthly Percentage of Average	WYTD Percentage of 1981-2010 Average*	Last Year Percentage of Average
<b>Precipitation</b>			
Mountain Precipitation	129%	105%	96%
Valley Precipitation	125%	112%	94%
Basin Precipitation	128%	107%	95%
	Percentage of Average	Percentage of Usable Capacity	Last Year Percentage of Average
<b>Reservoir Storage</b>			
Basin-Wide Storage	132%	93%	148%
	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 June -July	86%	105%	80%

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

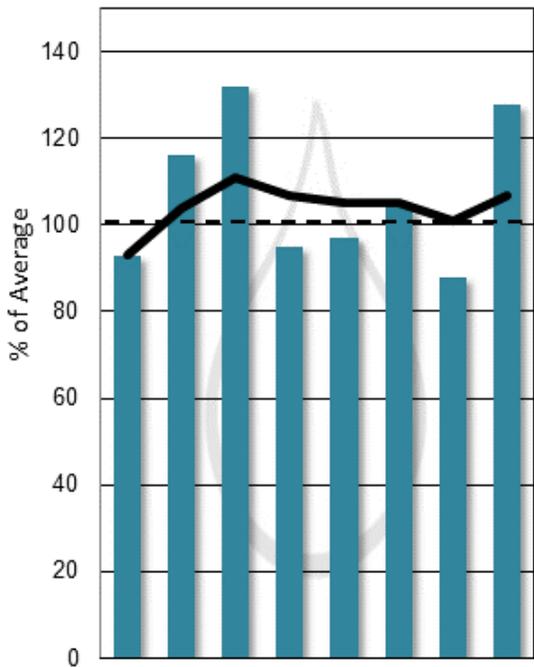
\*\*Basin-wide streamflows are an average of the individual streamflow points within the basin for the 50 percent exceedance forecast. Consult the individual streamflow forecasts in the table below for the range of forecasts at an individual point.

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

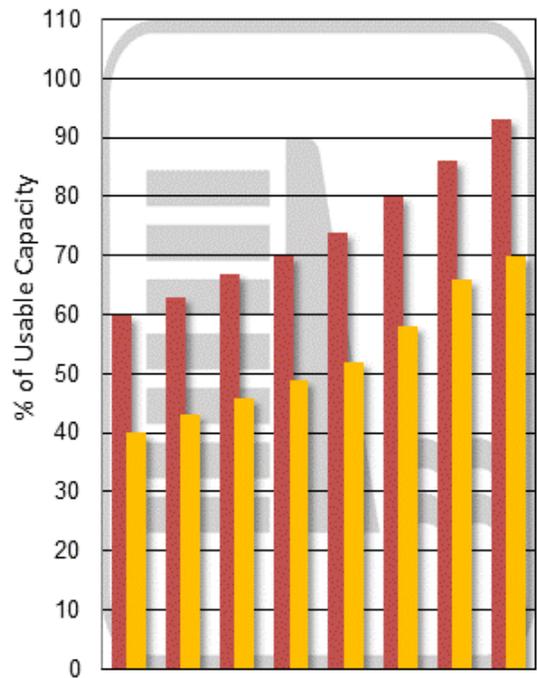
*Based on provisional SNOTEL daily data as of 6/1/2016*



**Mountain and Valley Precipitation**

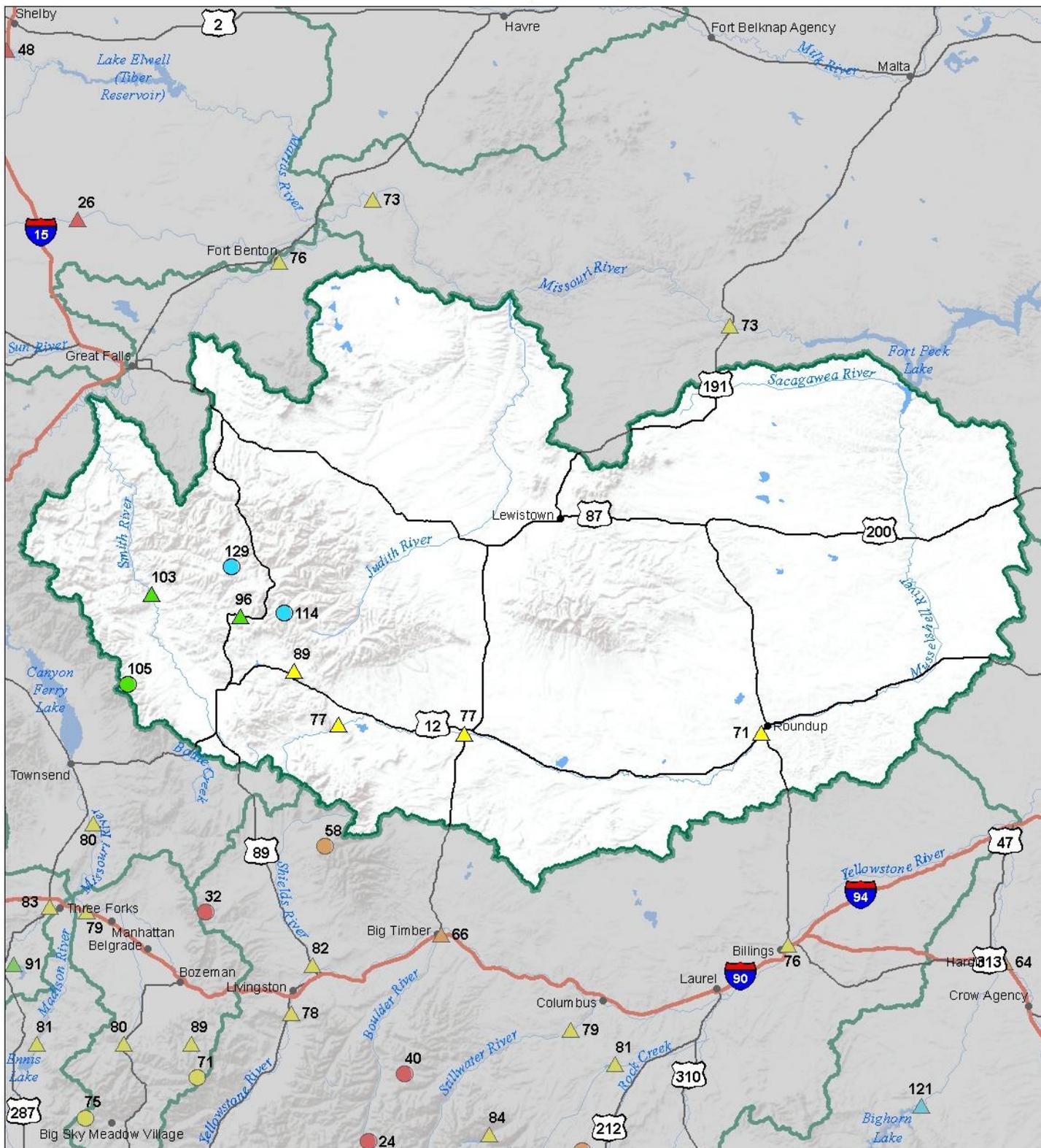


**End of Month Reservoir Storage**



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

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



### Snow Water Equivalent Percent of Normal

#### SN OTEL

- > 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%

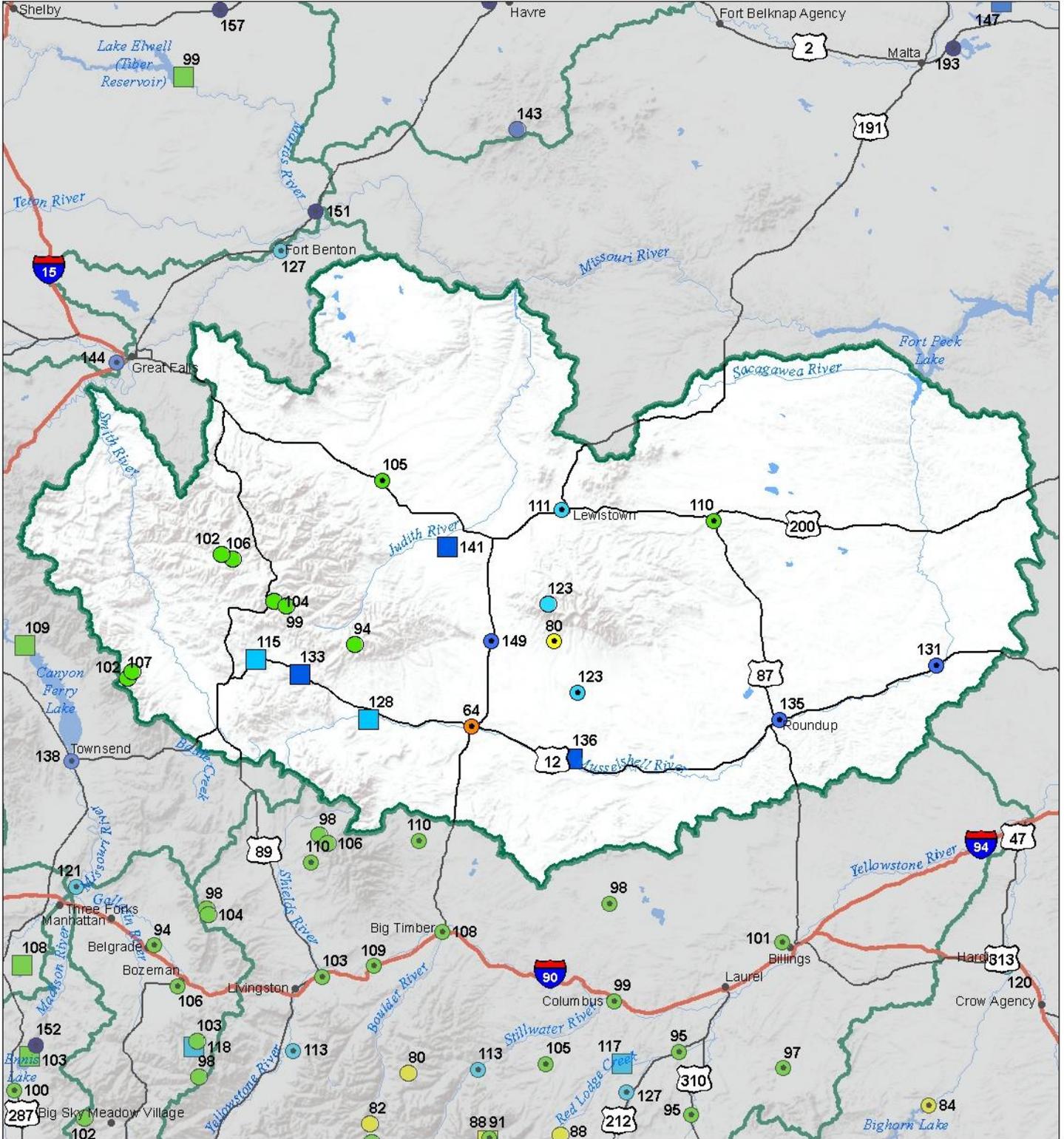


# Smith-Judith-Musselshell River Basin

## Water Year to Date Precipitation and Reservoir Levels

### Percentage of Normal

#### June 1, 2016



### Precipitation Percent of Normal

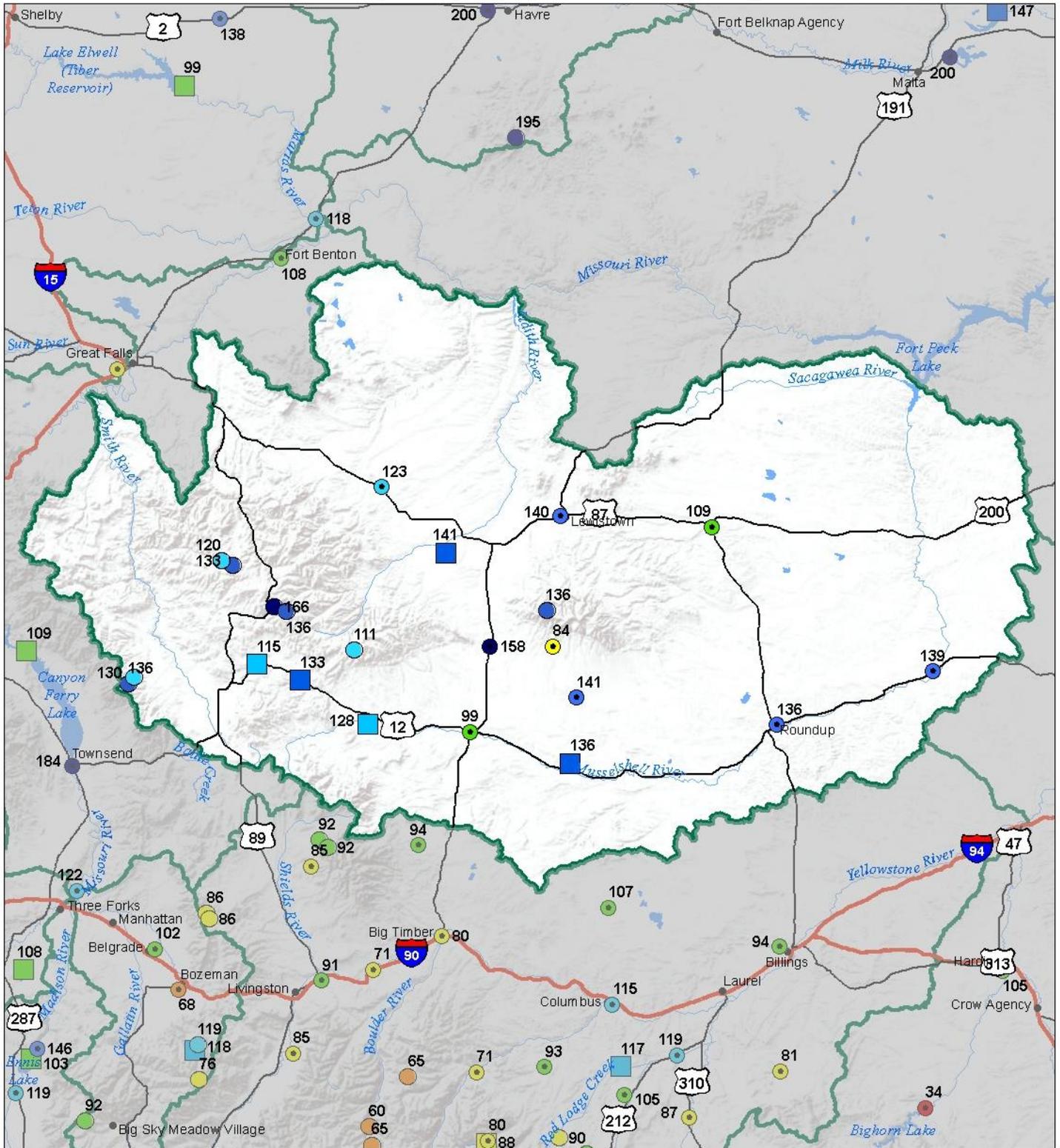
SNOTEL		COOP/ACIS	
<span style="color: blue;">●</span> > 150%	<span style="color: yellow;">●</span> 71 - 90%	<span style="color: blue;">●</span> > 150%	<span style="color: yellow;">●</span> 71 - 90%
<span style="color: lightblue;">●</span> 131 - 150%	<span style="color: orange;">●</span> 51 - 70%	<span 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 June 1, 2016 (May 1, 2016 - June 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 - June 1, 2016

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

SMITH-JUDITH-MUSSEL SHELL	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Sheep Ck nr White Sulphur Springs								
	JUN-JUL	4.1	6.3	7.8	96%	9.3	11.5	8.1
	JUN-SEP	5.5	8.5	10.5	96%	12.5	15.5	10.9
Smith R bl Eagle CK <sup>2</sup>								
	JUN-JUL	21	41	55	102%	69	89	54
	JUN-SEP	21	48	67	103%	85	112	65
NF Musselshell R nr Delpine								
	JUN-JUL	0.1	0.65	1.8	90%	2.9	4.6	2
	JUN-SEP	0.1	1.53	2.5	89%	3.5	4.9	2.8
SF Musselshell R ab Martinsdale								
	JUN-JUL	1	7.8	15.4	77%	23	34	20
	JUN-SEP	1	9.6	17.7	77%	26	38	23
Musselshell R at Harlowton <sup>2</sup>								
	JUN-JUL	-9	3.2	21	75%	39	65	28
	JUN-SEP	-7	5.1	23	77%	41	67	30
Musselshell R nr Roundup <sup>2</sup>								
	JUN-JUL	-18.7	6.5	24	71%	41	66	34
	JUN-SEP	-18.4	6.8	24	71%	41	66	34

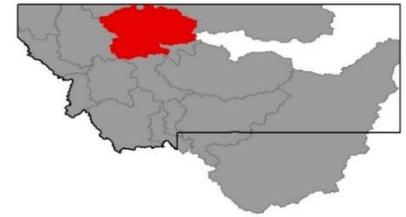
1) 90% and 10% exceedance probabilities are actually 95% and 5%

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 May, 2016	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Smith River Res	11.4	11.6	9.9	10.6
Ackley Lake	6.5	6.6	4.6	7.0
Bair Res	6.5	7.5	4.9	7.0
Martinsdale Res	19.5	23.2	15.2	23.1
Deadman's Basin Res	67.0	75.3	49.2	72.2
Basin-wide Total	110.9	124.1	83.8	119.9
# of reservoirs	5	5	5	5

Watershed Snowpack Analysis June 1, 2016	# of Sites	% Median	Last Year % Median
SMITH	6	113	44
HIGHWOOD	0		
JUDITH	4	132	85
MUSSEL SHELL	2		
SMITH-JUDITH-MUSSEL SHELL	9	122	48



## Sun-Teton-Marias River Basin

Only one snow measurement site in the Sun-Teton-Marias River basin currently has measurable snow on June 1<sup>st</sup>, the high elevation Badger Pass SNOTEL site which is 39% of normal for this date. Snowpack has been near record low this year in the basin, and is virtually non-existent at this time except for the highest elevation in the basin. This year's peak snow water was near record low at SNOTEL sites and below last year at this time. At this time only 11% of this year's peak snow water remains at SNOTEL elevations and will be gone in the coming weeks. The snow component to runoff is nearly done for this water year and summer precipitation will be critical in the basin to sustain river flows and provide water to users.

If there is a silver lining to the water story in the basin it is that May brought above average precipitation to both mountain and valley locations. As has been the case for much of this year valley locations were favored over the mountains, which should help keep soil moisture levels up for agricultural producers as we enter summer. Mountain precipitation for the month of May was 107% of average, and at valley locations was 119% of average. Water year-to-date totals in the basin are near average (104%) at valley locations, and well below average at mountain SNOTEL sites (82%). It is important for water users to realize that both snow totals and precipitation totals for June 1<sup>st</sup> are below last year at this time, when after June 1<sup>st</sup> the basin received very little in the way of precipitation from June through October.

Reservoir storage is 100% of average on June 1<sup>st</sup>.

From April 1<sup>st</sup> until the second week of May, substantial snowmelt in the basin resulted in streamflows that are above average, but since then have trended downward sharply. On June 1<sup>st</sup> the North Fork of the Sun River currently flowing at the lowest level for this day in the last 34 years. Many of the other streams have shown a similar trend and are well below average this time. The early movement of water has resulted in decreased forecasts for the June-July and June-September time period. Current basin-wide streamflow forecasts for the 50% exceedance are extremely below average at 54% of average for the June-July time period.

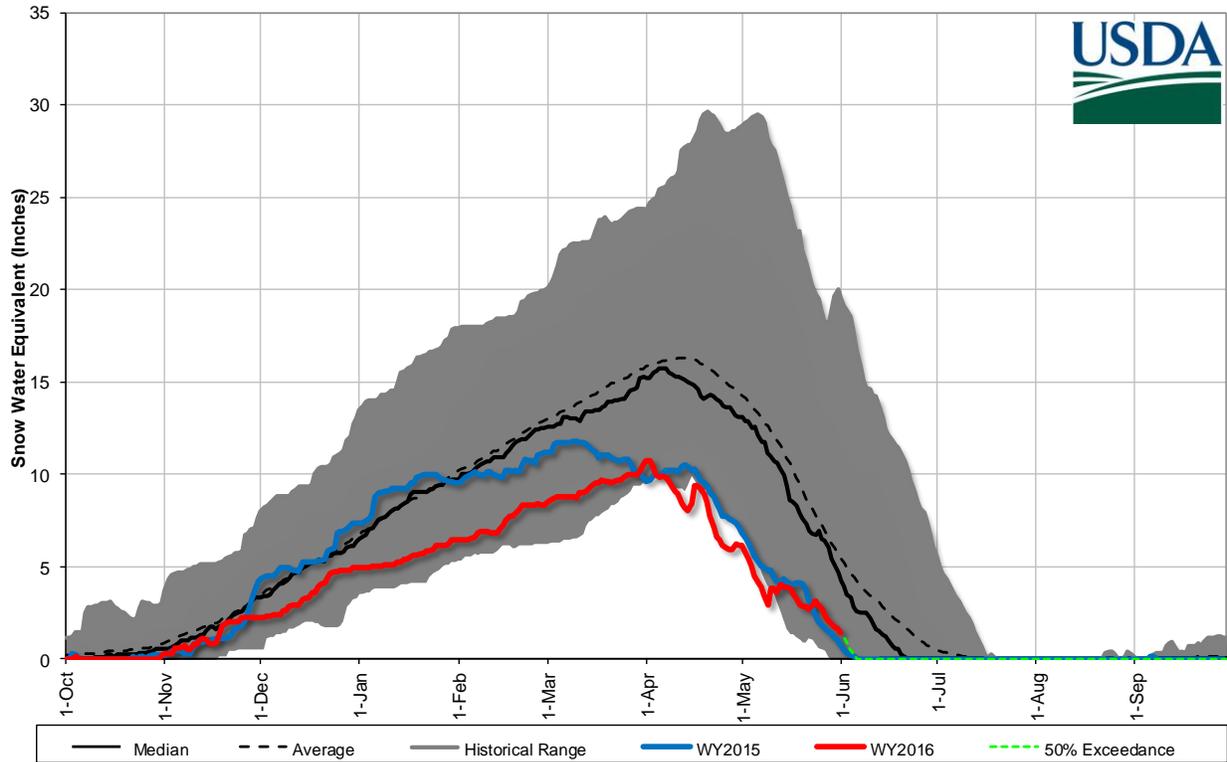
<b>Sun-Teton-Marias River Basin Data Summary</b>		<b>6/1/2016</b>	
	Percent of 1981-2010 Normal (Median)	Last Year Percentage of Normal (Median)	
<b>Snowpack</b>			
Basin-Wide	33%	17%	
	Monthly Percentage of Average	WYTD Percentage of 1981-2010 Average*	Last Year Percentage of Average
<b>Precipitation</b>			
Mountain Precipitation	107%	82%	97%
Valley Precipitation	119%	104%	101%
Basin Precipitation	112%	88%	98%
	Percentage of Average	Percentage of Usable Capacity	Last Year Percentage of Average
<b>Reservoir Storage</b>			
Basin-Wide Storage	100%	63%	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 June -July	54%	122%	40%

\*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.

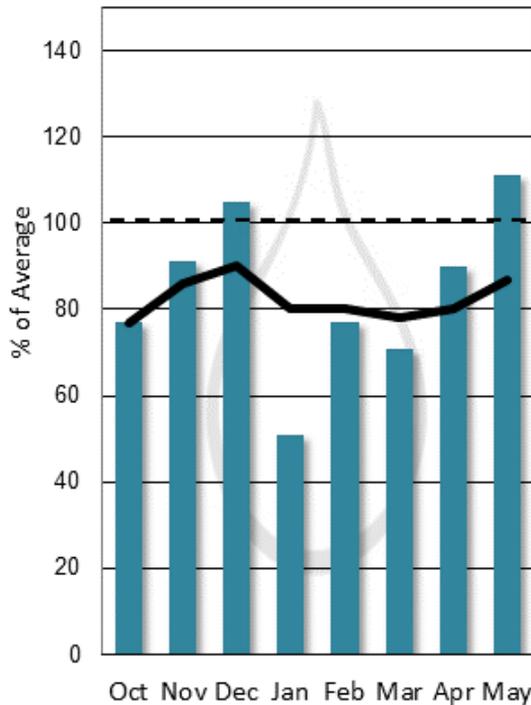
### Sun-Teton-Marias River Basin Snowpack with Non-Exceedence Projections

Based on provisional SNOTEL daily data as of 6/1/2016



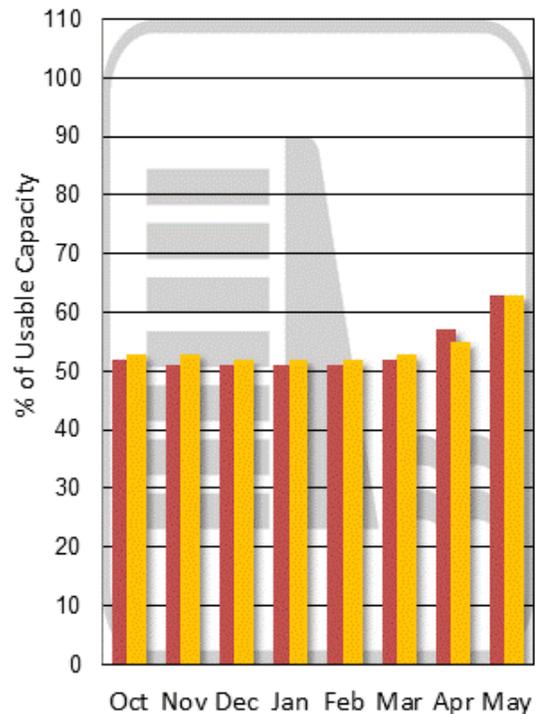
#### Mountain and Valley Precipitation

Monthly    Year-to-date



#### End of Month Reservoir Storage

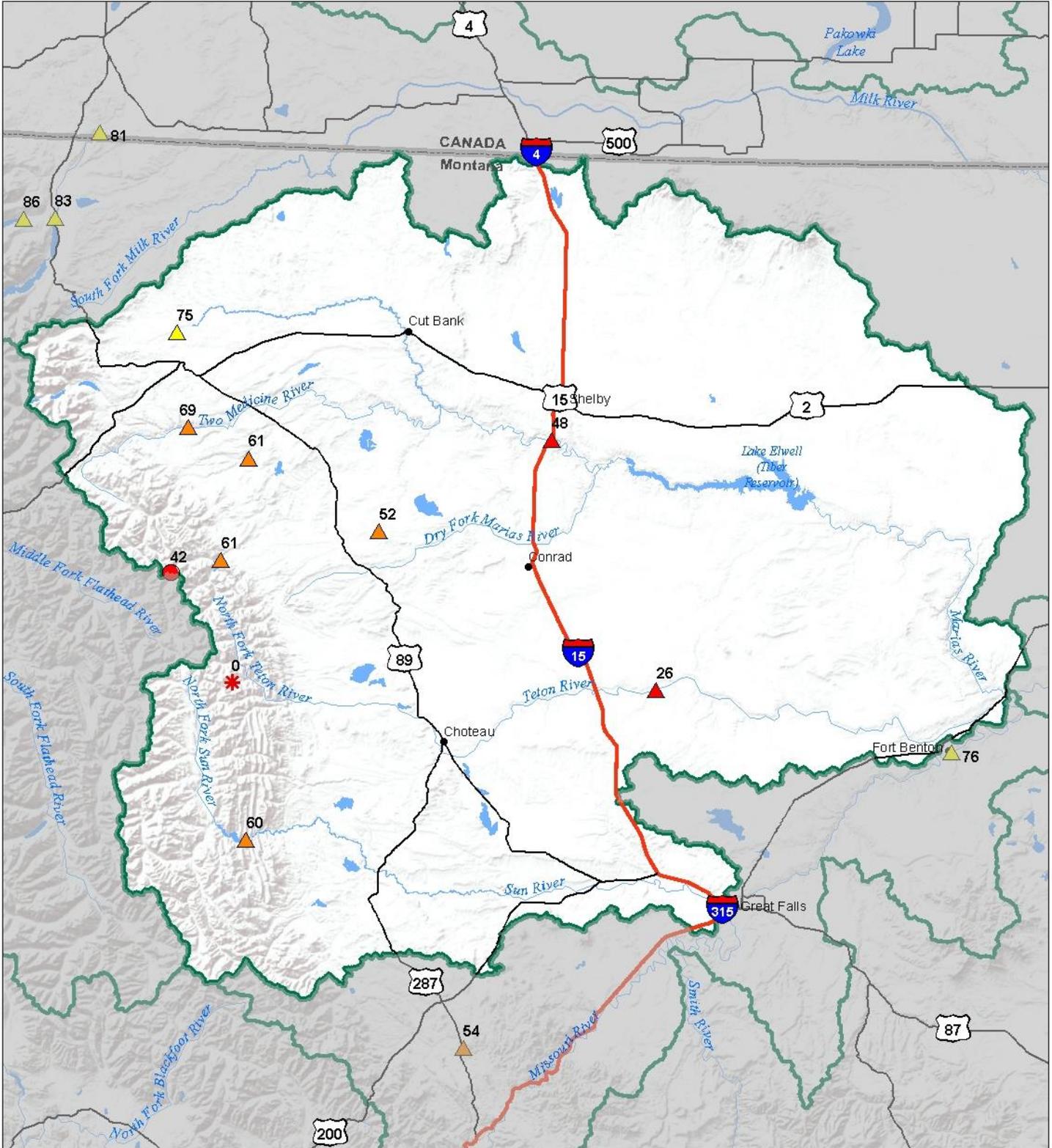
% Capacity    Avg % Capacity



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

# Sun-Teton-Marias River Basin

## Streamflow Forecast, Snow Water Equivalent Percentage of Normal June 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%

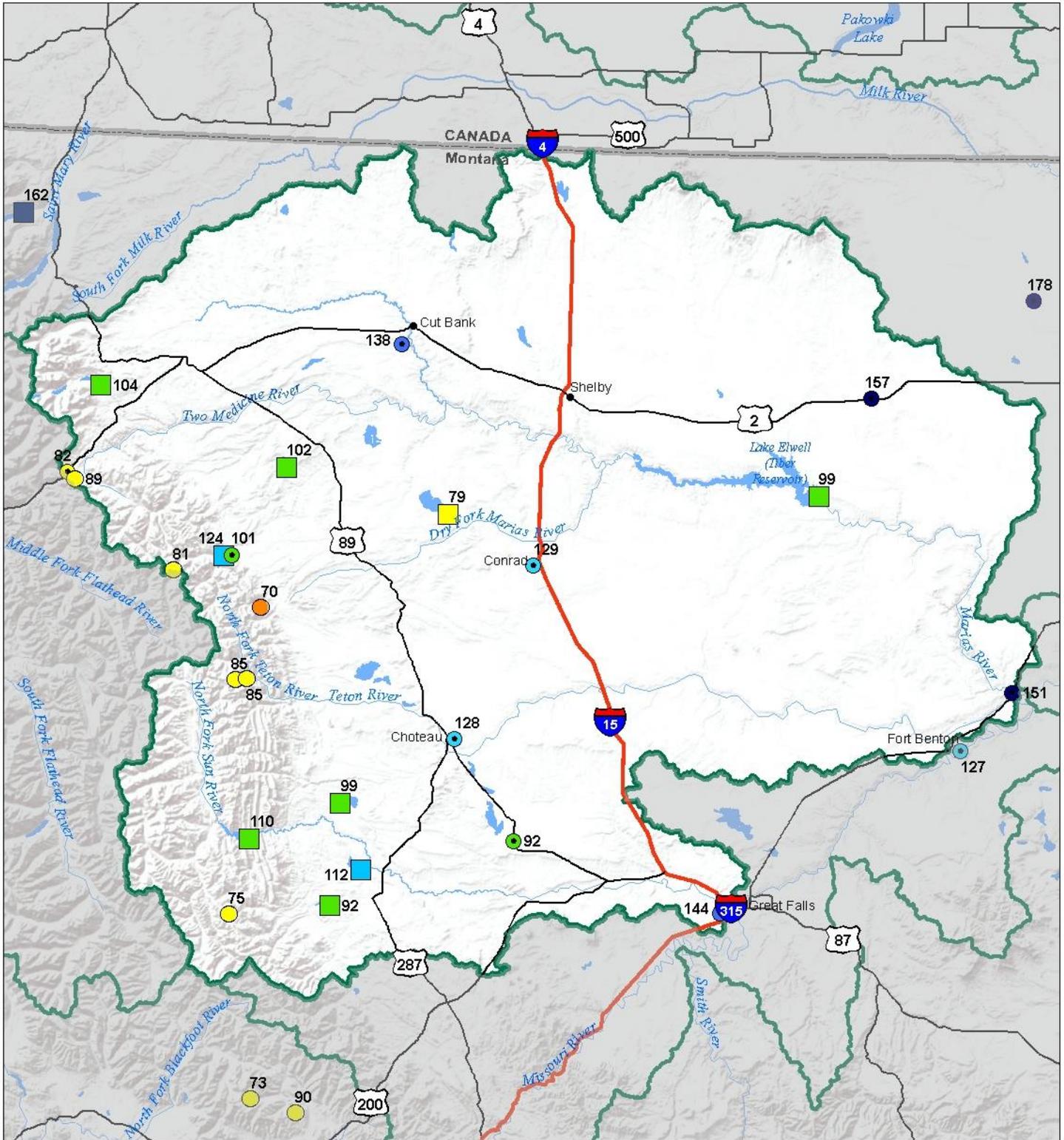


# Sun-Teton-Marias River Basin

## Water Year to Date Precipitation and Reservoir Levels

### Percentage of Normal

June 1, 2016



### Precipitation Percent of Normal

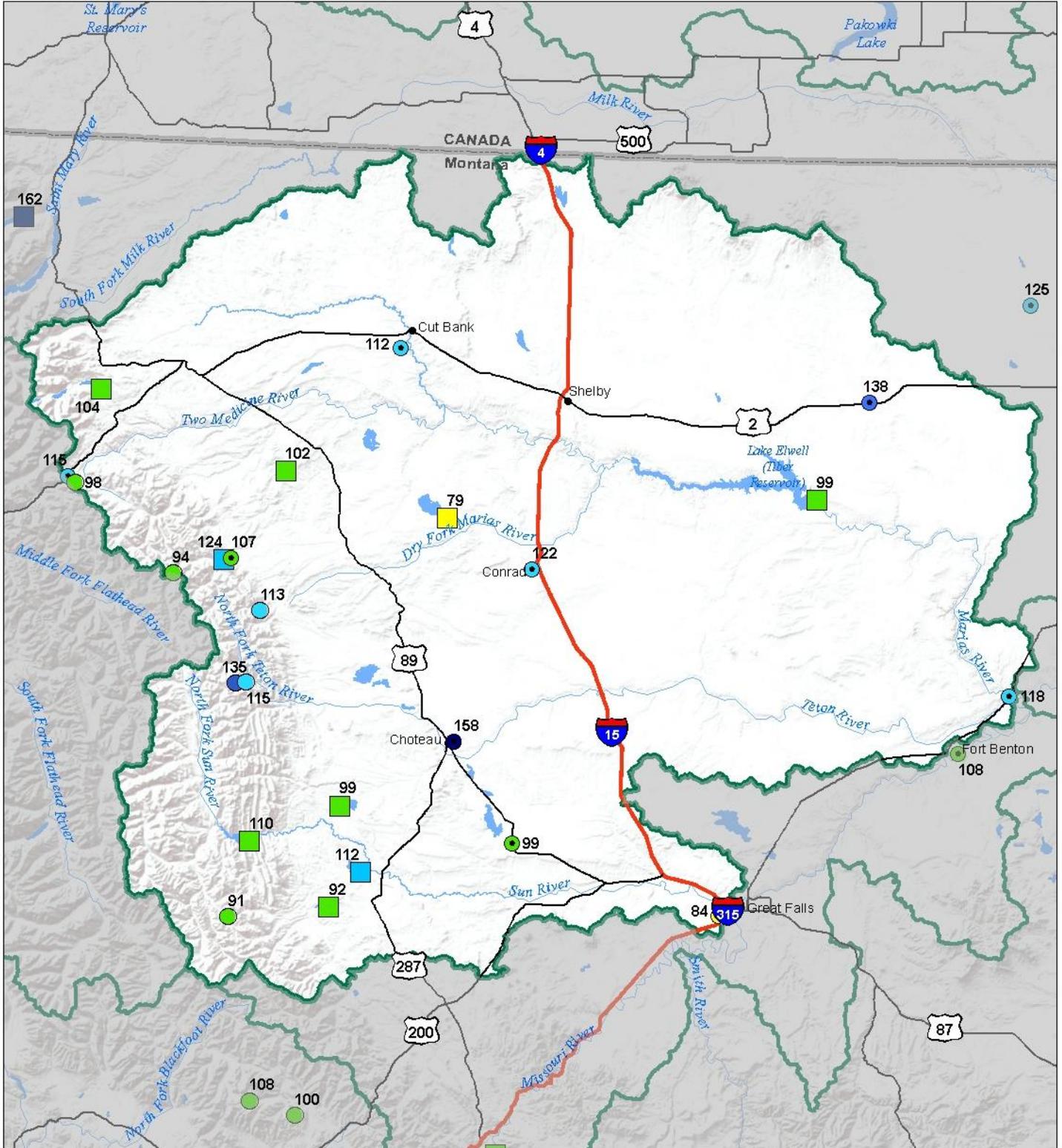
SNOTEL		COOP/ACIS	
● > 150%	● 71 - 90%	● > 150%	● 71 - 90%
● 131 - 150%	● 51 - 70%	● 131 - 150%	● 51 - 70%
● 111 - 130%	● 1 - 50%	● 111 - 130%	● 1 - 50%
● 91 - 110%		● 91 - 110%	

### 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  
 June 1, 2016 (May 1, 2016 - June 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 Streamflow Forecasts - June 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	JUN-JUL	61	93	115	55%	137	169	210
	JUN-SEP	92	127	150	60%	173	210	250
Two Medicine R nr Browning <sup>2</sup>	JUN-JUL	32	46	55	67%	64	78	82
	JUN-SEP	39	54	65	69%	76	91	94
Badger Ck nr Browning	JUN-JUL	8.2	18.2	25	54%	32	42	46
	JUN-SEP	17.1	29	37	61%	45	57	61
Swift Reservoir Inflow <sup>2</sup>	JUN-JUL	6.3	12.4	16.5	55%	21	27	30
	JUN-SEP	12	19.7	25	61%	30	38	41
Dupuyer Ck nr Valier	JUN-JUL	0.5	1	2.5	46%	5.6	10	5.4
	JUN-SEP	0.5	1.44	3.6	52%	7.2	12.6	6.9
Cut Bank Ck nr Browning	JUN-JUL	15.8	24	29	76%	34	42	38
	JUN-SEP	18.5	27	33	75%	39	47	44
Marias R nr Shelby <sup>2</sup>	JUN-JUL	-15	21	65	45%	109	175	143
	JUN-SEP	-15	25	76	48%	127	200	158
Teton R nr Dutton	JUN-JUL	0.4	1.52	3.8	16%	16.4	35	24
	JUN-SEP	0.5	3	7.6	26%	23	45	29

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 May, 2016	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Gibson Res	98.6	98.5	89.8	99.1
Pishkun Res	29.5	30.4	29.8	32.0
Willow Creek Res - Augusta	31.8	31.5	28.3	32.2
Lower Two Medicine Lake	12.5	12.5	12.0	11.9
Four Horns Lake	11.8	12.5	11.6	19.2
Swift Res	28.6	24.8	23.1	30.0
Lake Frances	58.1	83.9	73.9	112.0
Lake Elwell (Tiber)	789.7	881.6	796.1	1347.0
Nilan Reservoir	7.8	11.0	8.5	11.0
Basin-wide Total	1068.5	1186.5	1073.1	1694.4
# of reservoirs	9	9	9	9

Watershed Snowpack Analysis June 1, 2016	# of Sites	% Median	Last Year % Median
SUN	2	0	0
TETON	3	0	0
MARIAS	2	42	21
SUN-TETON-MARIAS	5	33	17

# St. Mary-Milk River Basin



Snowpack in the St. Mary River basin exists only at the high elevation Flattop Mountain SNOTEL site which is near normal for this date. Low elevation snowpack melted during the month of April and mid-elevation snowpack followed suit. High elevation snow plays a critical role in the flows in the St. Mary's basin and generally lasts well into summer. Cooler and more seasonal weather has allowed the high elevation snowpack to slow its melt, but a return to the warm and dry weather experienced so far this year would accelerate the melt of the high elevation snowpack. Measurement locations in the Milk River basin are all snow free at this time.

Precipitation was above average across the basin for the month of May. Mountain precipitation in the St. Mary's River basin was 123% of average for the month, and mountain precipitation in the Bearpaw Mountains was 195% of average. During the month the Rocky Boy SNOTEL sites received over 8" of precipitation. Precipitation has favored the plains in the eastern half of the Milk River basin all water year, valley/plains water year-to-date precipitation is well above average at 181% for June 1<sup>st</sup>. Mountain water year-to-date precipitation is also above average for this date in the St. Mary's at 109% of average. Soil moisture in the basin reflects the abundant precipitation for the water year and is above average at measurement locations.

Basin-wide reservoir storage is currently 143% of average for May 1<sup>st</sup>.

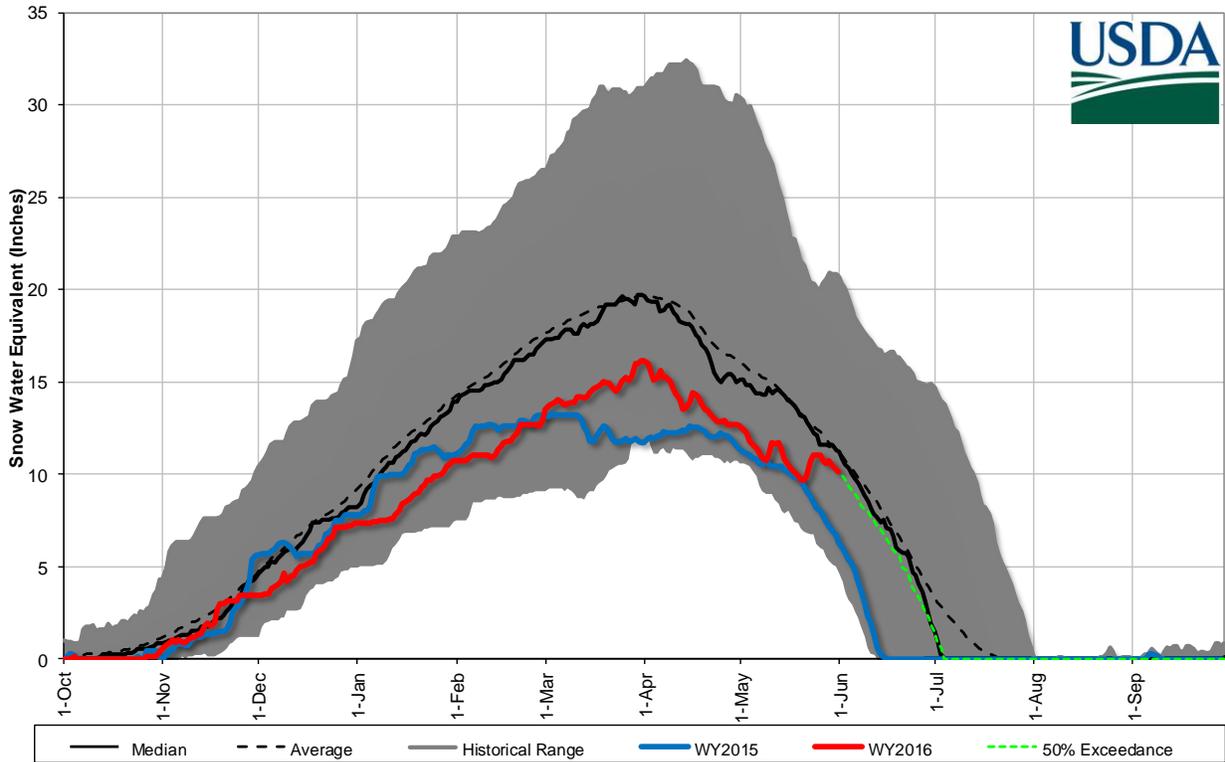
Streamflows in the basin made major increases at the beginning of April due to snowmelt and were above average from April 1<sup>st</sup> through the third week of May. Since then streamflows have started to recede to near or slightly below average levels. The early movement of snow water is reflected in the lower forecasts for the June-July and June-September time periods. Current basin-wide streamflow forecasts for the 50% exceedance are 82% of average for the June-July time period.

<b>St. Mary-Milk River Basin Data Summary</b>		<b>6/1/2016</b>	
	Percent of 1981-2010 Normal (Median)	Last Year Percentage of Normal (Median)	
<b>Snowpack</b>			
Basin-Wide	94%	59%	
	Monthly Percentage of Average	WYTD Percentage of 1981-2010 Average*	Last Year Percentage of Average
<b>Precipitation</b>			
Mountain Precipitation	171%	117%	101%
Valley Precipitation	168%	181%	86%
Basin Precipitation	170%	130%	98%
	Percentage of Average	Percentage of Capacity (Total)	Last Year Percentage of Average
<b>Reservoir Storage</b>			
Basin-Wide Storage	143%	79%	128%
	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 June -July	82%	122%	67%

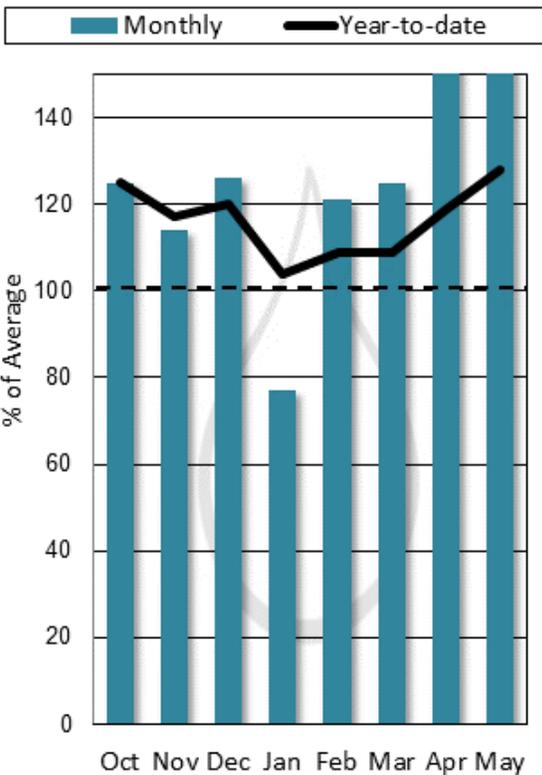
\*Water Year-to-Date (WYTD) Precipitation is October 1st - Current

\*\*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.

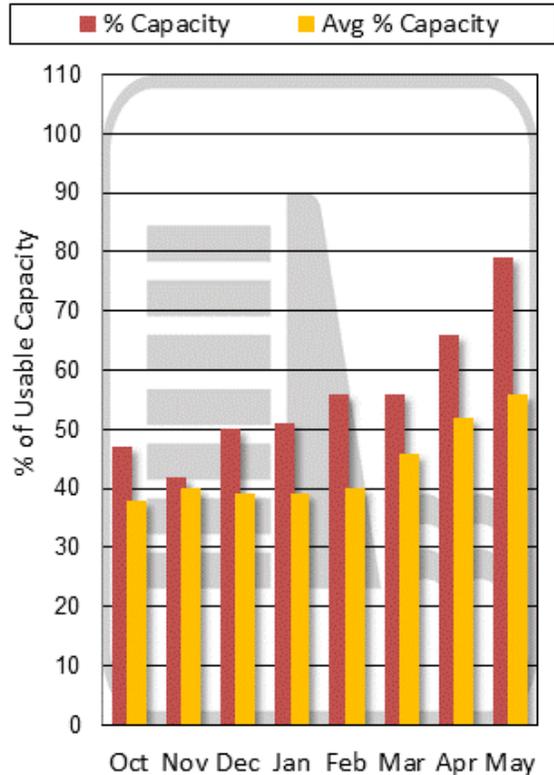
**St. Mary-Milk River Basin Snowpack with Non-Exceedance Projections**  
*Based on provisional SNOTEL daily data as of 6/1/2016*



**Mountain and Valley  
Precipitation**

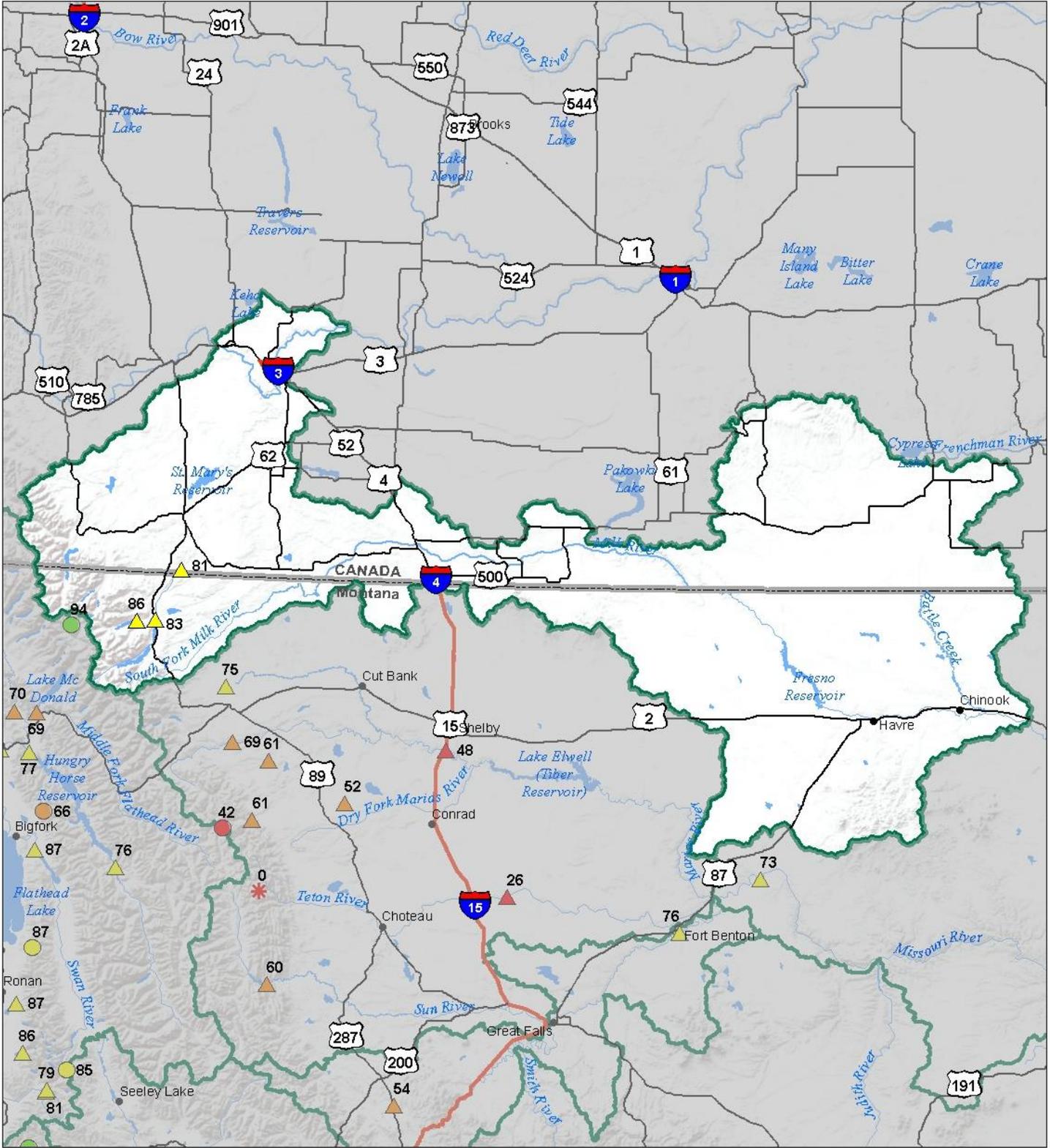


**End of Month Reservoir  
Storage**



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

# St Mary's-Milk River Basin Streamflow Forecast, Snow Water Equivalent Percentage of Normal June 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

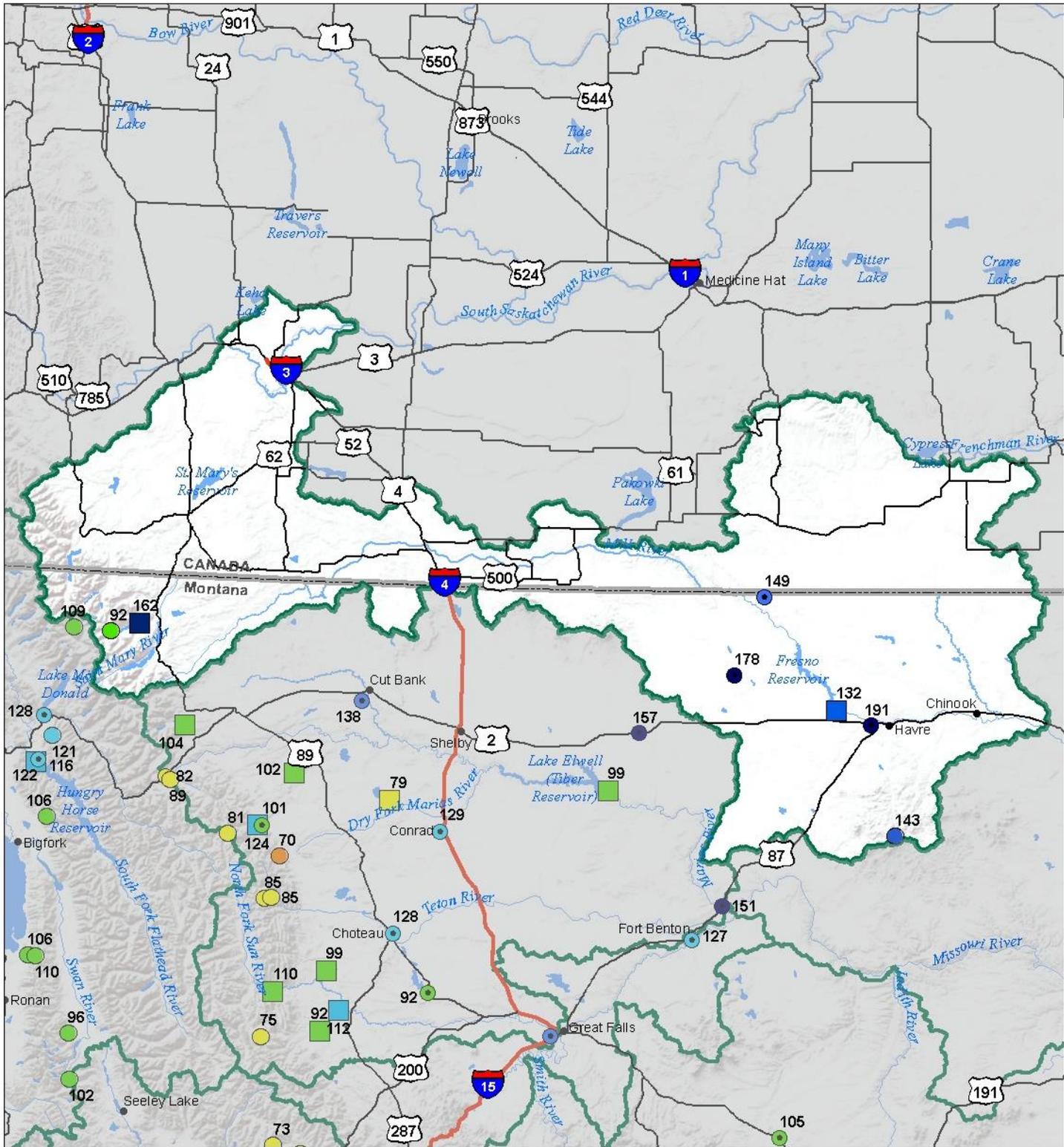
- ▲ > 150%
- ▲ 131 - 150%
- ▲ 111 - 130%
- ▲ 91 - 110%
- ▲ 71 - 90%
- ▲ 51 - 70%
- ▲ 1 - 50%



# St Mary's-Milk River Basin

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

### June 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%

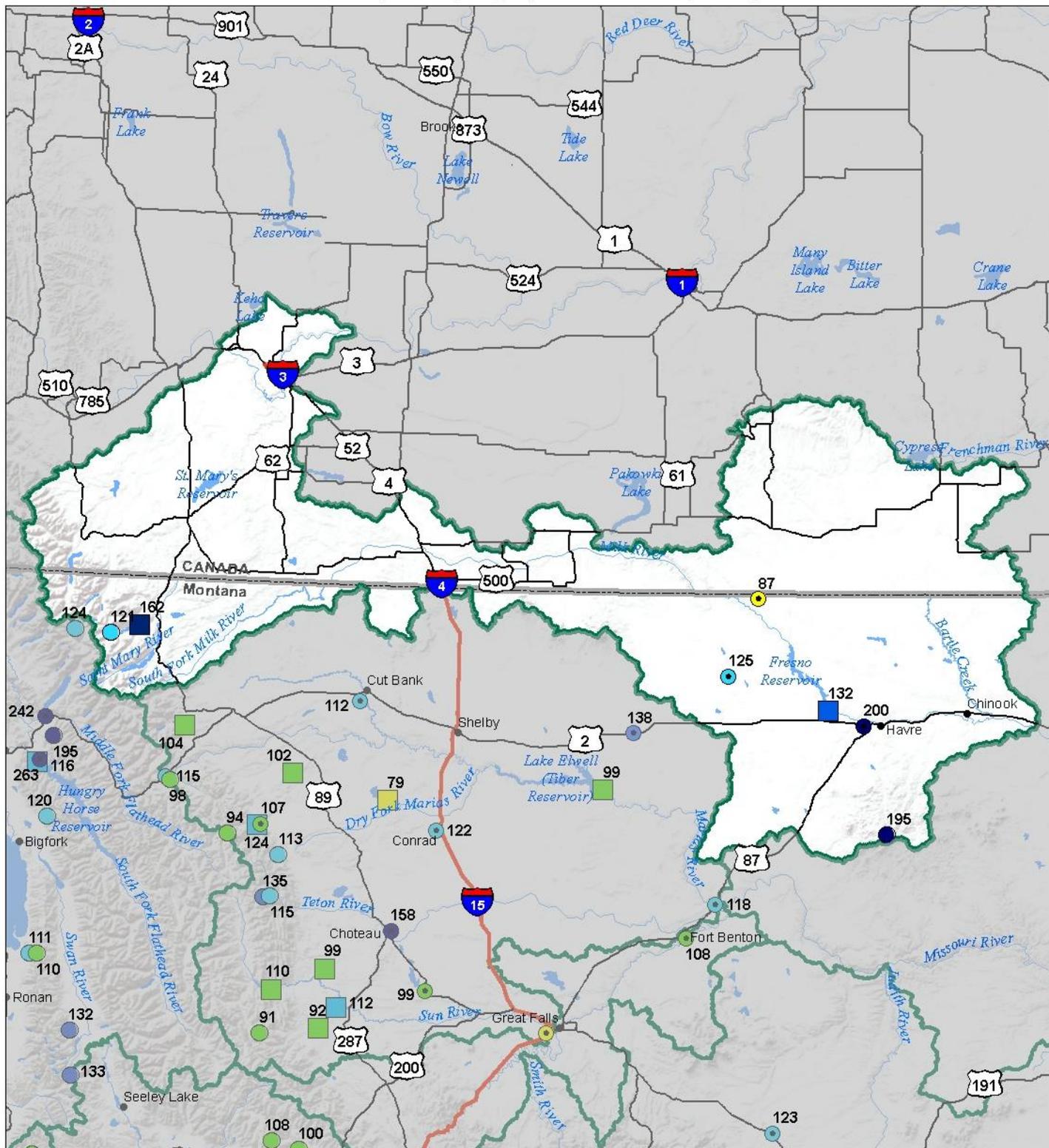


# St Mary's-Milk River Basin

## Monthly Precipitation and Reservoir Levels

### Percentage of Normal

June 1, 2016 (May 1, 2016 - June 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%



## St. Mary & Milk Basins Streamflow Forecasts - June 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								
	JUN-JUL	34	42	47	84%	52	60	56
	JUN-SEP	46	55	61	86%	67	76	71
St. Mary R nr Babb <sup>2</sup>								
	JUN-JUL	144	175	195	83%	215	245	235
	JUN-SEP	188	225	245	83%	270	305	295
St. Mary R at Intl Boundary <sup>2</sup>								
	JUN-JUL	149	191	220	80%	245	290	275
	JUN-SEP	200	250	280	81%	310	355	345
Milk R at Western Crossing of Intl Bndry, AB								
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 May, 2016	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Lake Sherburne	51.4	50.2	31.8	64.3
Fresno Res	95.2	76.8	71.9	127.0
Nelson Res	58.6	56.5	40.0	66.8
Basin-wide Total	205.2	183.5	143.7	258.1
# of reservoirs	3	3	3	3

Watershed Snowpack Analysis June 1, 2016	# of Sites	% Median	Last Year % Median
ST. MARY	2	94	59
BEARPAW MOUNTAINS	3		
CYPRESS HILLS, CANADA	0		
MILK RIVER BASIN	3		
ST. MARY & MILK BASINS	5	94	59

# Upper Yellowstone River Basin



After peaking slightly early and below average this year, the snowpack in the Upper Yellowstone River basin is currently on a very similar track to last year. The basin would likely be in much worse condition than last year had the cool wet weather not arrived in May. During the second week of May Shower Falls SNOTEL (8100 ft), near the headwaters of Eightmile Creek, received 23 inches of snow (2.5 inches SWE). The high elevation SNOTEL sites above Cooke City currently hold the most snow in the basin and are at about 75% to 77% of normal. Most mid-to low elevation SNOTEL sites in the basin are melted out and with the 60 to 70 degree mountain temperatures forecasted for this weekend, the remainder will likely be melted out by the end of next week.

May is typically the wettest month of the year in the Upper Yellowstone River basin. Despite having significant precipitation early and late in the month, precipitation at SNOTEL sites was below average. Currently water-year-to date precipitation in the basin is at 94% of average. Mountain SNOTEL sites received 79% of average precipitation for the month of May, while valley weather stations received 92% of average precipitation in the Upper Yellowstone River basin.

Reservoir storage is slightly below average at Mystic Lake Reservoir for June 1<sup>st</sup>, and above average at Cooney Reservoir which is currently at capacity.

Above average temperatures in April drove significant, but not too far above average flow in April. May precipitation drove streamflow up and after experiencing a rain influenced snowmelt peak near the end of May the Yellowstone at Livingston has only receded slightly. Current basin-wide streamflows for the 50% exceedance are 82% of average for the June-July time period.

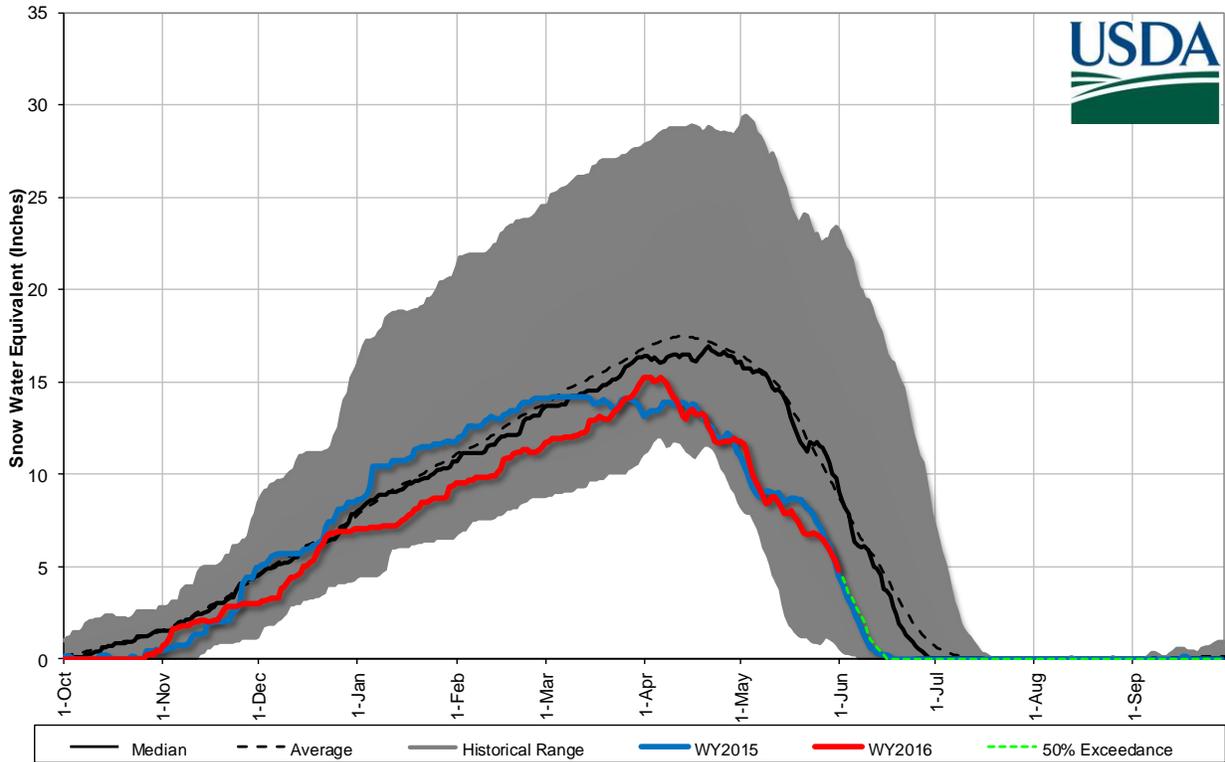
<b>Upper Yellowstone River Basin Data Summary</b>		<b>6/1/2016</b>	
	Percent of 1981-2010 Normal (Median)	Last Year Percentage of Normal (Median)	
<b>Snowpack</b>			
Basin-Wide	58%	55%	
	Monthly Percentage of Average	WYTD Percentage of 1981-2010 Average*	Last Year Percentage of Average
<b>Precipitation</b>			
Mountain Precipitation	79%	91%	93%
Valley Precipitation	92%	104%	105%
Basin Precipitation	83%	94%	95%
	Percentage of Average	Percentage of Capacity (Total)	Last Year Percentage of Average
<b>Reservoir Storage</b>			
Basin-Wide Storage	112%	68%	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	82%	98%	84%

\*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.

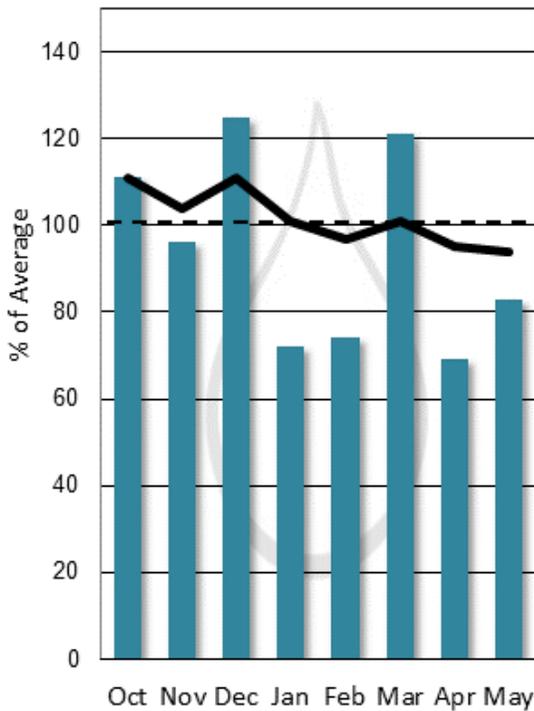
**Upper Yellowstone River Basin Snowpack with Non-Exceedance Projections**

*Based on provisional SNOTEL daily data as of 6/1/2016*



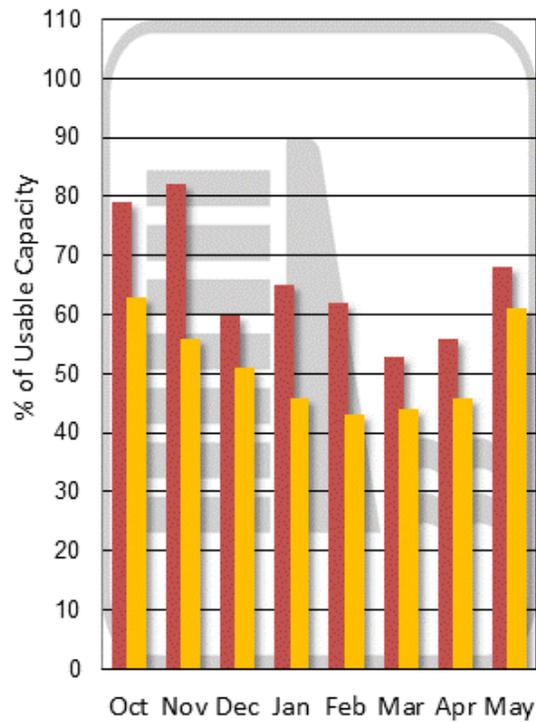
**Mountain and Valley Precipitation**

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



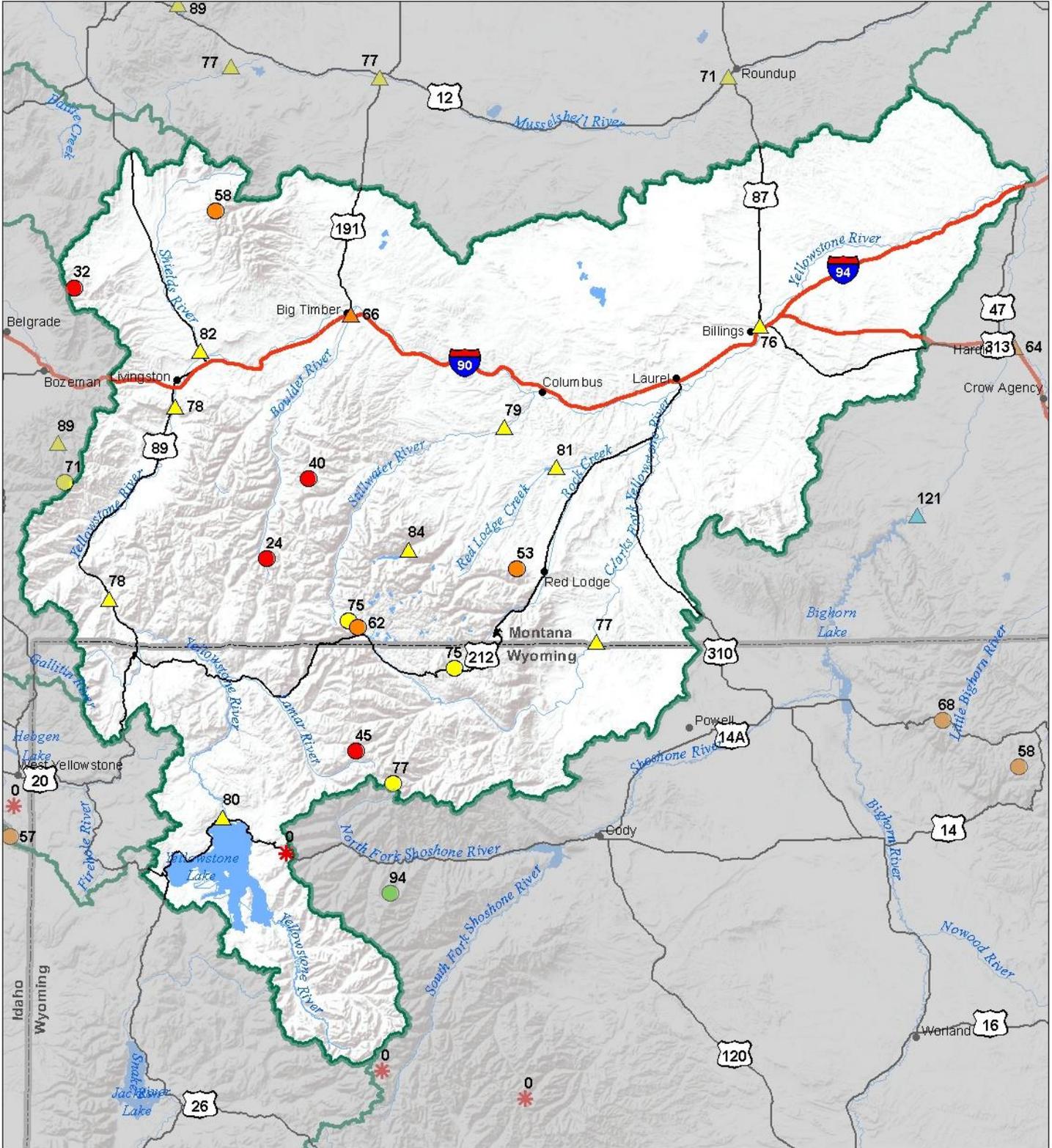
**End of Month Reservoir Storage**

% 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 June 1, 2016



### Snow Water Equivalent Percent of Normal

SNOTEL

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

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

Snowcourse

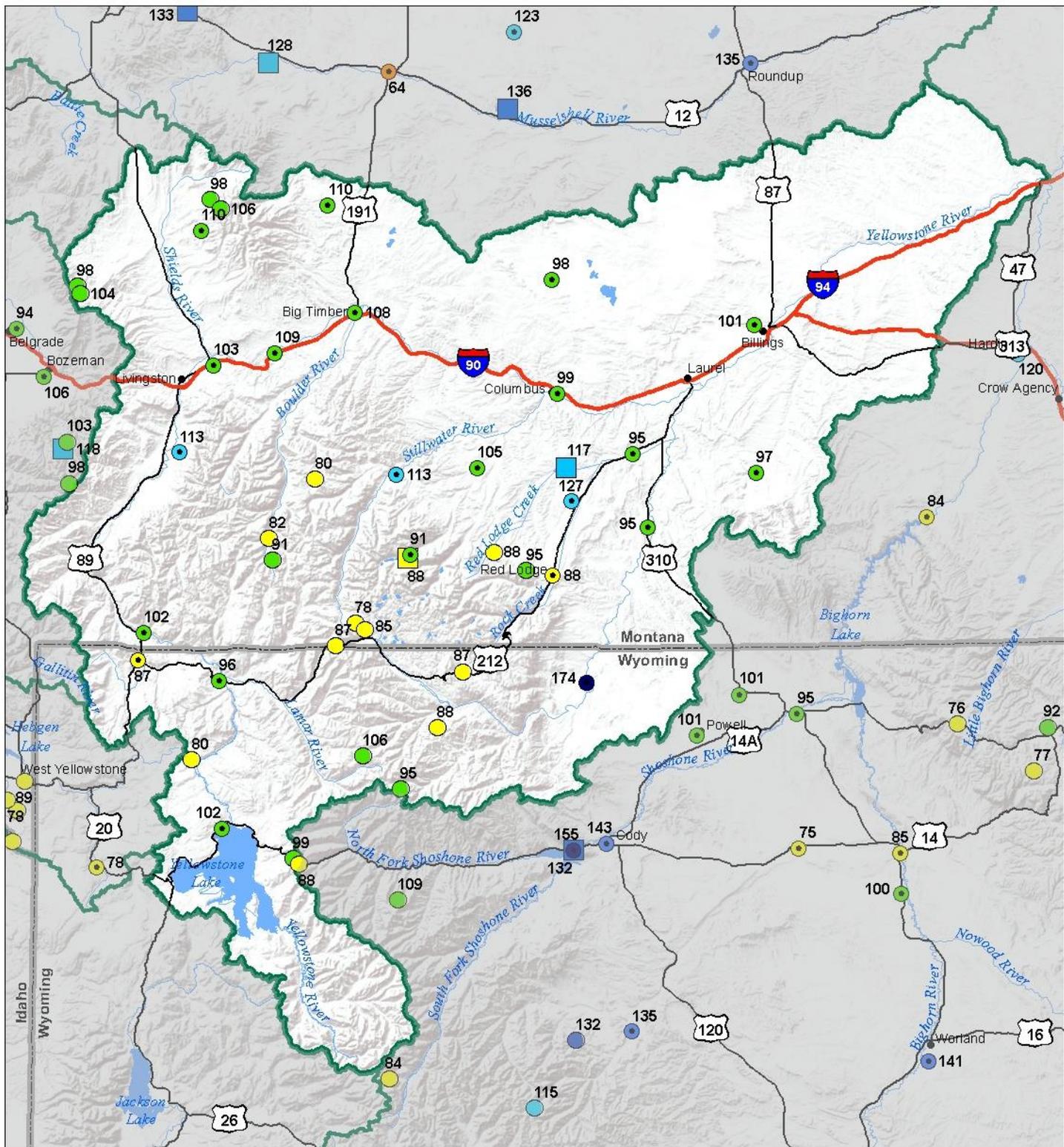
- ⊕ > 150%
- ⊕ 131 - 150%
- ⊕ 111 - 130%
- ⊕ 91 - 110%
- ⊕ 71 - 90%
- ⊕ 51 - 70%
- ⊕ 1 - 50%
- \* 0%

### Streamflow Forecast Percent of Average Flows

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



# Upper Yellowstone River Basin Water Year to Date Precipitation and Reservoir Levels Percentage of Normal June 1, 2016



### Precipitation Percent of Normal

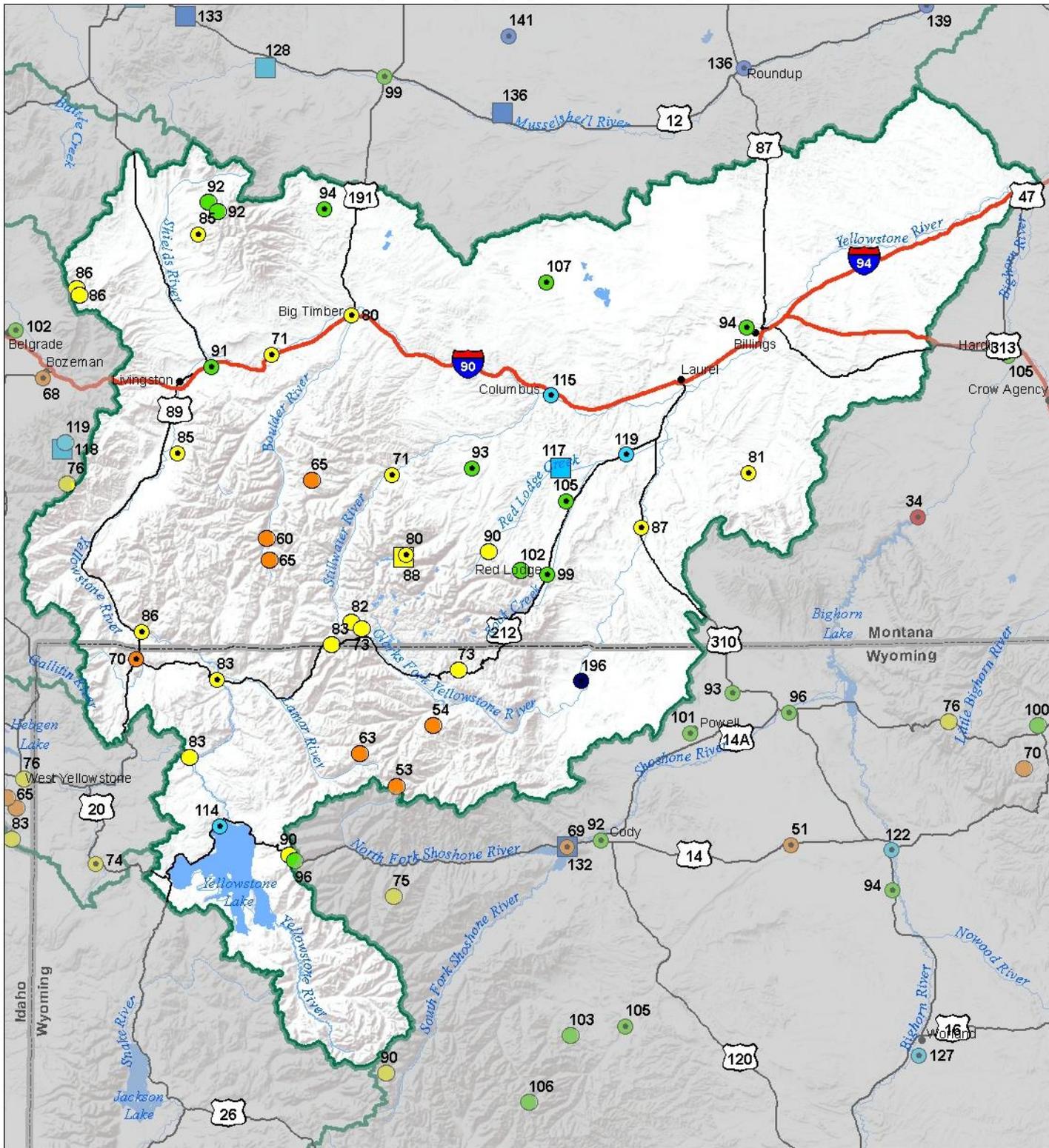
SNOTEL		COOP/ACIS	
<span style="color: blue;">●</span> > 150%	<span style="color: yellow;">●</span> 71 - 90%	<span style="color: blue;">●</span> > 150%	<span style="color: yellow;">●</span> 71 - 90%
<span style="color: lightblue;">●</span> 131 - 150%	<span style="color: orange;">●</span> 51 - 70%	<span 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 June 1, 2016 (May 1, 2016 - June 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%



## Upper Yellowstone River Basin Streamflow Forecasts - June 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	JUN-JUL	300	345	375	81%	405	450	465
	JUN-SEP	415	480	525	80%	570	635	655
Yellowstone R at Corwin Springs	JUN-JUL	600	720	805	77%	890	1010	1040
	JUN-SEP	765	930	1040	78%	1150	1310	1330
Yellowstone R at Livingston	JUN-JUL	670	820	920	78%	1020	1170	1180
	JUN-SEP	865	1060	1190	78%	1320	1520	1520
Shields R nr Livingston	JUN-JUL	1	31	52	84%	72	103	62
	JUN-SEP	1.09	37	62	82%	86	122	76
Boulder R at Big Timber	JUN-JUL	89	116	135	68%	153	180	200
	JUN-SEP	91	125	148	66%	171	205	225
Mystic Lake Inflow <sup>2</sup>	JUN-JUL	32	37	40	85%	43	48	47
	JUN-SEP	42	49	53	84%	57	64	63
Stillwater R nr Absarokee <sup>2</sup>	JUN-JUL	188	225	250	77%	280	315	325
	JUN-SEP	225	280	315	79%	350	405	400
Clarks Fk Yellowstone R nr Belfry	JUN-JUL	205	245	270	77%	295	335	350
	JUN-SEP	220	270	305	77%	340	390	395
Cooney Reservoir Inflow	JUN-JUL	5.8	12.3	16.8	76%	21	28	22
	JUN-SEP	11.8	19.6	25	81%	30	38	31
Yellowstone R at Billings	JUN-JUL	1050	1390	1630	75%	1860	2200	2170
	JUN-SEP	1240	1700	2020	76%	2330	2790	2660

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 May, 2016	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Mystic Lake	5.1	4.2	5.8	21.0
Cooney Res	27.8	28.5	23.7	27.4
Basin-wide Total	32.9	32.7	29.5	48.4
# of reservoirs	2	2	2	2

Watershed Snowpack Analysis June 1, 2016	# of Sites	% Median	Last Year % Median
YELLOWSTONE ab LIVINGSTON	9	60	55
SHIELDS	4	51	0
BOULDER-STILLWATER	3	31	48
RED LODGE-ROCK CREEK	2	53	130
CLARK'S FORK	7	69	58
UPPER YELLOWSTONE RIVER BASIN	21	58	55

# Lower Yellowstone River Basin



Following the seasonal snowpack peak on May 1<sup>st</sup> in the Lower Yellowstone River basin, rapid melt ensued leaving SNOTEL sites below 9000 feet completely melted out by May 30<sup>th</sup>. As of June 1<sup>st</sup>, many sites at higher elevations were still holding onto some snow and the basin wide snowpack percentage was 97% of normal. In the Powder and Tongue River basins, only 4 SNOTEL sites reported snow on June 1; the Tongue was at 69% of normal with 3 sites reporting data and the Powder was at 135% of normal with only Cloud Peak SNOTEL reporting any measurable snow. June 1 snowpack percentages varied greatly in the Wind River, Shoshone, & Big Horn basins with percentages ranging from 70% of normal in the Bighorn basin to 131% of normal in the Wind River basin. The Wind River basin continued to accumulate snow after its snowpack peaked at the beginning of April which helped delay melt and preserve snow at the higher elevations.

Precipitation in the mountains of the Lower Yellowstone River basin was right at normal for the month of May while the valley stations recorded totals at 89%. The Wind River basin was the only sub-basin that received above average precipitation for the month (150%) and as a result is the only sub-basin with above average year-to-date precipitation. Precipitation in the other basins ranged from 76% in the Powder to 83% in the Big Horn. For the entire basin, year-to-date precipitation in the mountains and valleys is now at 104% of average.

Reservoir storage in the basin remains in good condition with totals remaining above normal for this time of year and at 65% of capacity.

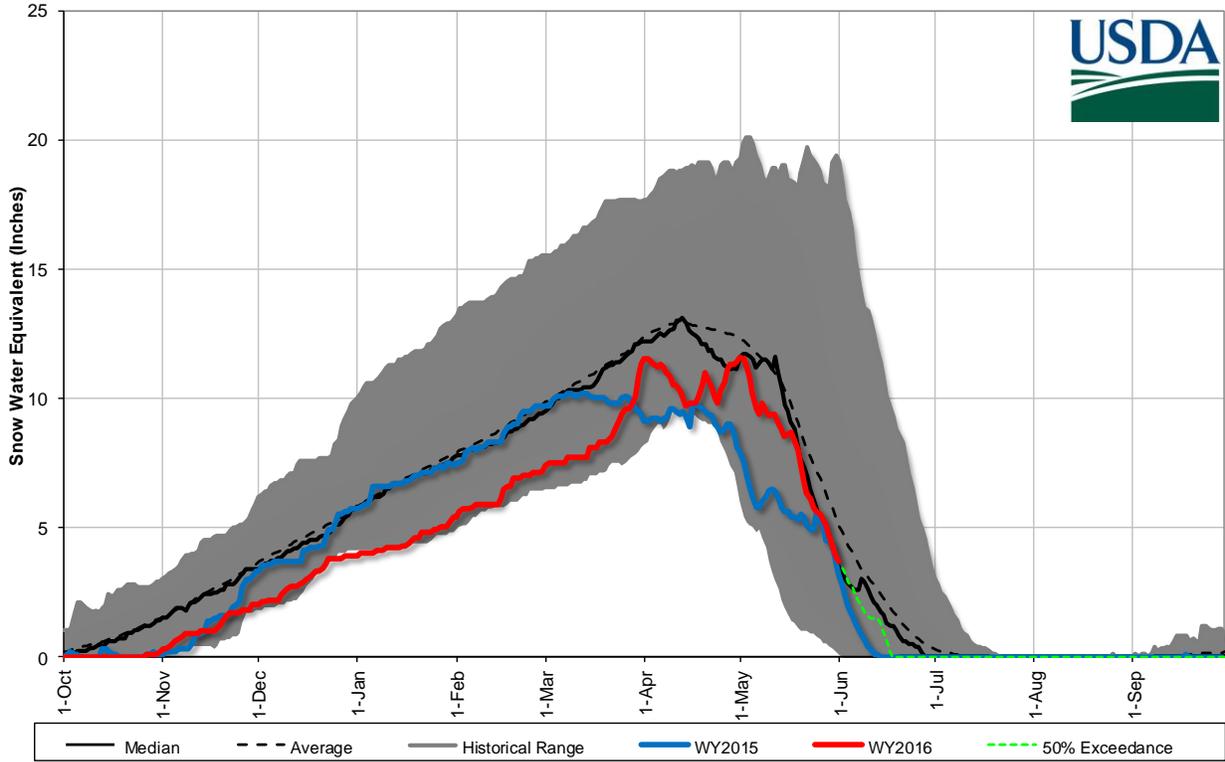
Rivers on the eastern side of the basin have reached their seasonal snow melt peaks and current forecasts for the remainder of the runoff season are below normal. Rivers on the western side are nearing their seasonal snow melt peaks but current forecasts call for near to above normal runoff for the next couple of months. Current basin-wide forecasts at the 50% exceedance are 88% of average for the June-July time period.

<b>Lower Yellowstone River Basin Data Summary</b>		<b>6/1/2016</b>	
	Percent of 1981-2010 Normal (Median)	Last Year Percentage of Normal (Median)	
<b>Snowpack</b>			
Basin-Wide	97%	78%	
	Monthly Percentage of Average	WYTD Percentage of 1981-2010 Average *	Last Year Percentage of Average
<b>Precipitation</b>			
Mountain Precipitation	98%	97%	97%
Valley Precipitation	89%	114%	110%
Basin Precipitation	93%	104%	103%
	Percentage of Average	Percentage of Capacity (Total)	Last Year Percentage of Average
<b>Reservoir Storage</b>			
Basin-Wide Storage	103%	65%	115%
	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 June -July	88%	84%	105%

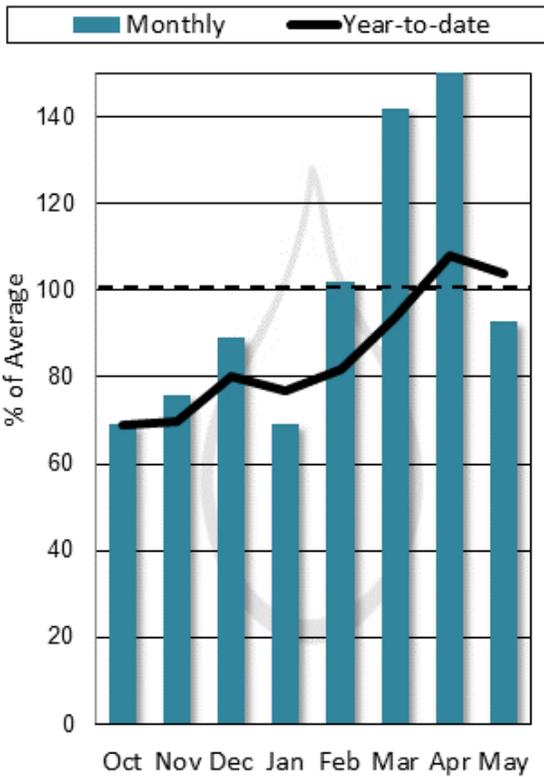
\*Water Year-to-Date (WYTD) Precipitation is October 1st - Current

\*\*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.

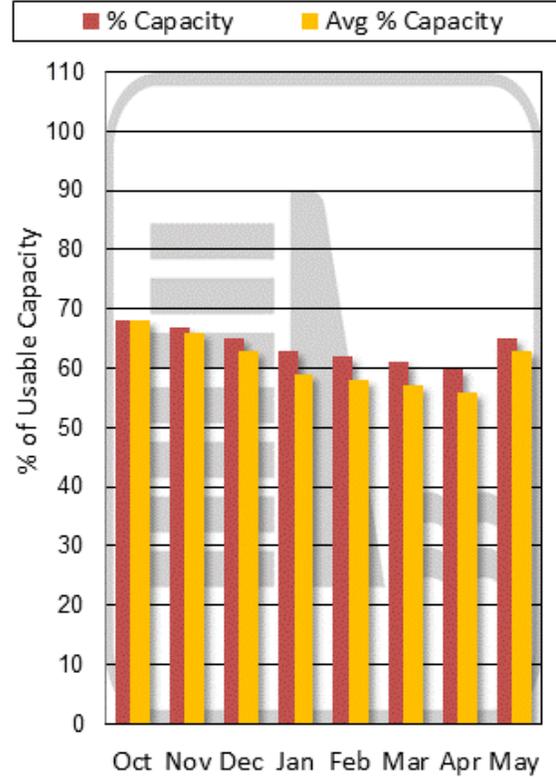
**Lower Yellowstone River Basin Snowpack with Non-Exceedance Projections**  
*Based on provisional SNOTEL daily data as of 6/1/2016*



**Mountain and Valley Precipitation**

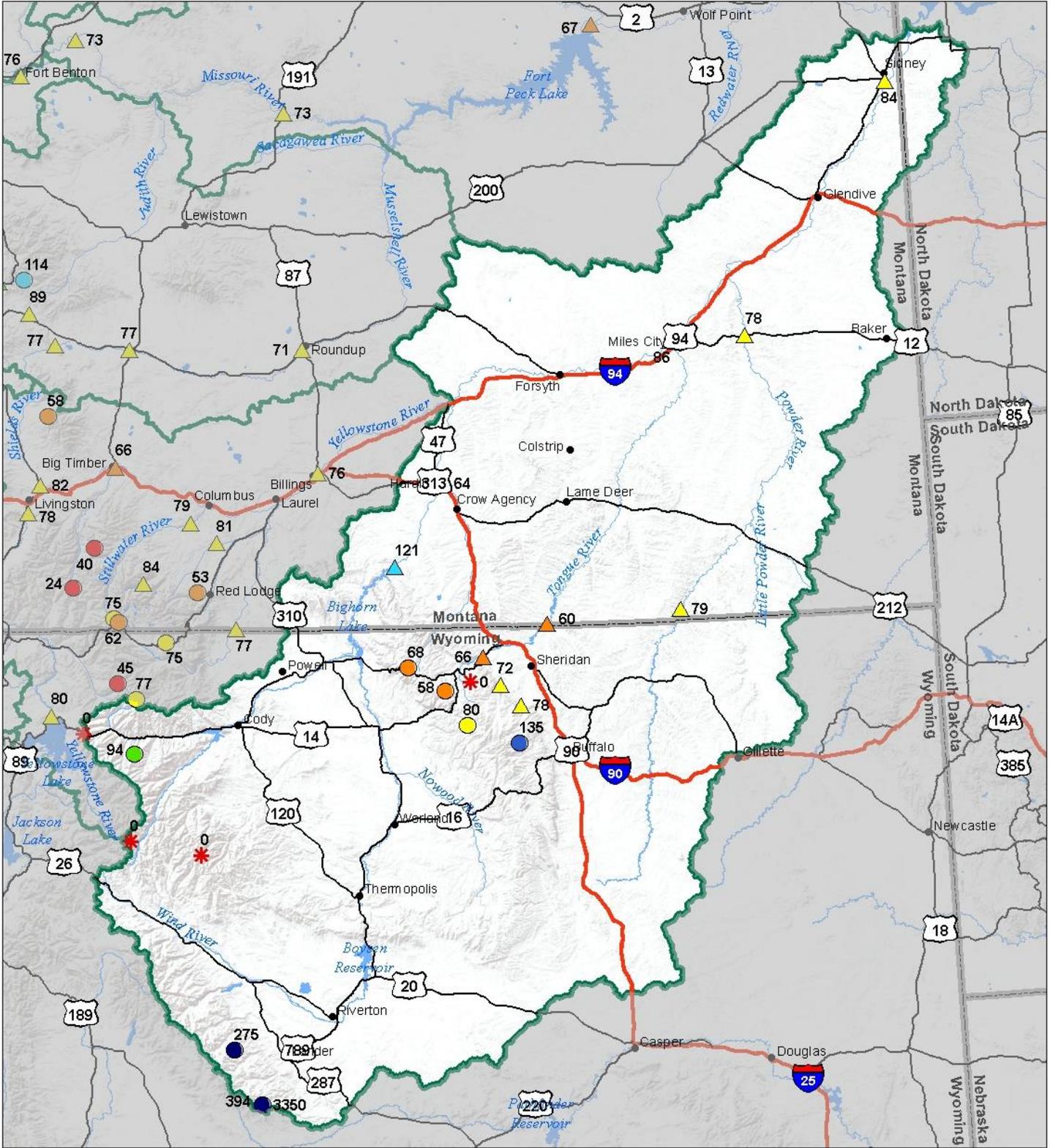


**End of Month Reservoir Storage**



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

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



### Snow Water Equivalent Percent of Normal

#### SN OTEL

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

#### Snowcourse

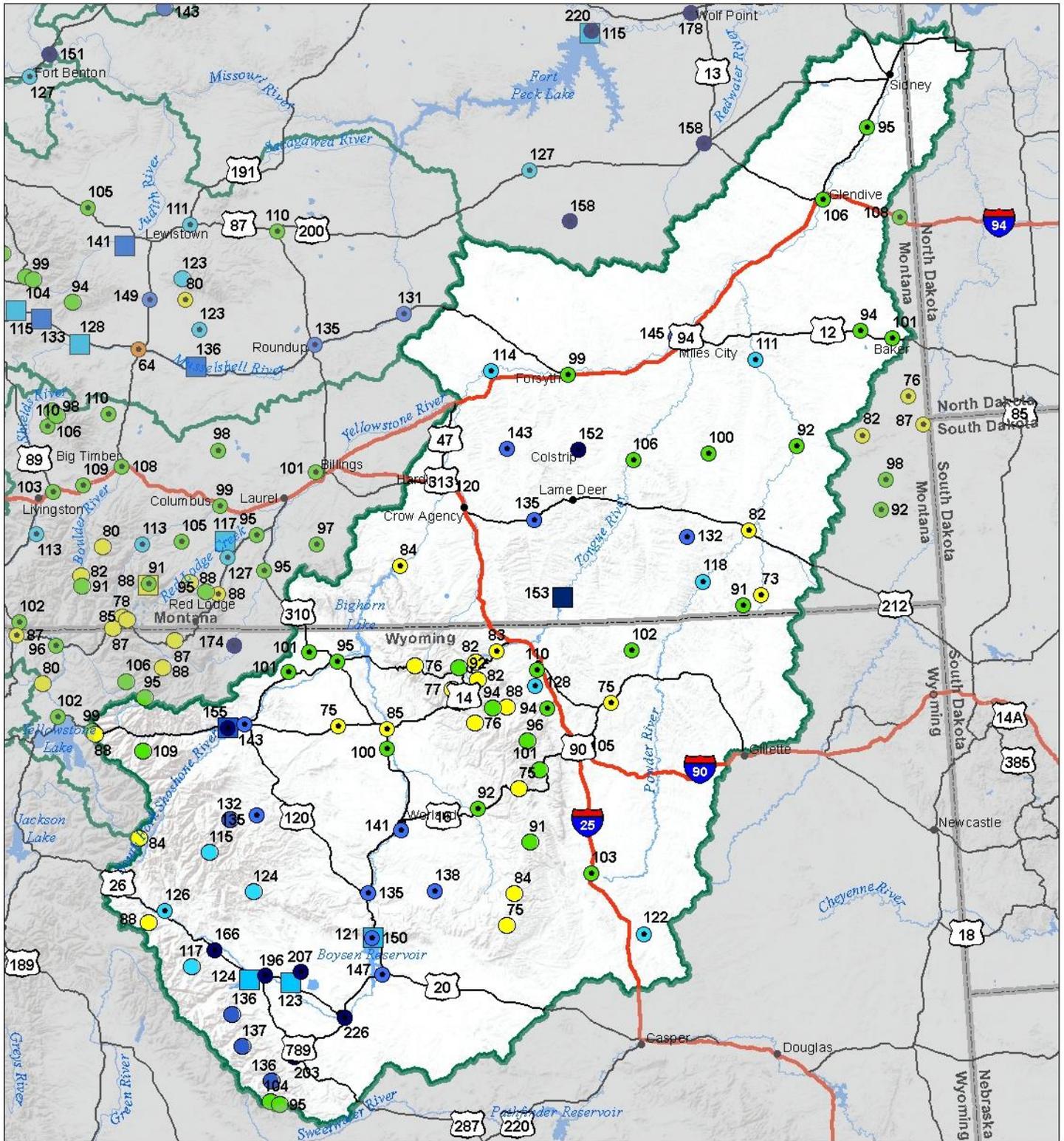
- ⊕ > 150%
- ⊕ 131 - 150%
- ⊕ 111 - 130%
- ⊕ 91 - 110%
- ⊕ 71 - 90%
- ⊕ 51 - 70%
- ⊕ 1 - 50%
- ⊕ \*

### Streamflow Forecast Percent of Average Flows

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



# Lower Yellowstone River Basin Water Year to Date Precipitation and Reservoir Levels Percentage of Normal June 1, 2016



### Precipitation Percent of Normal

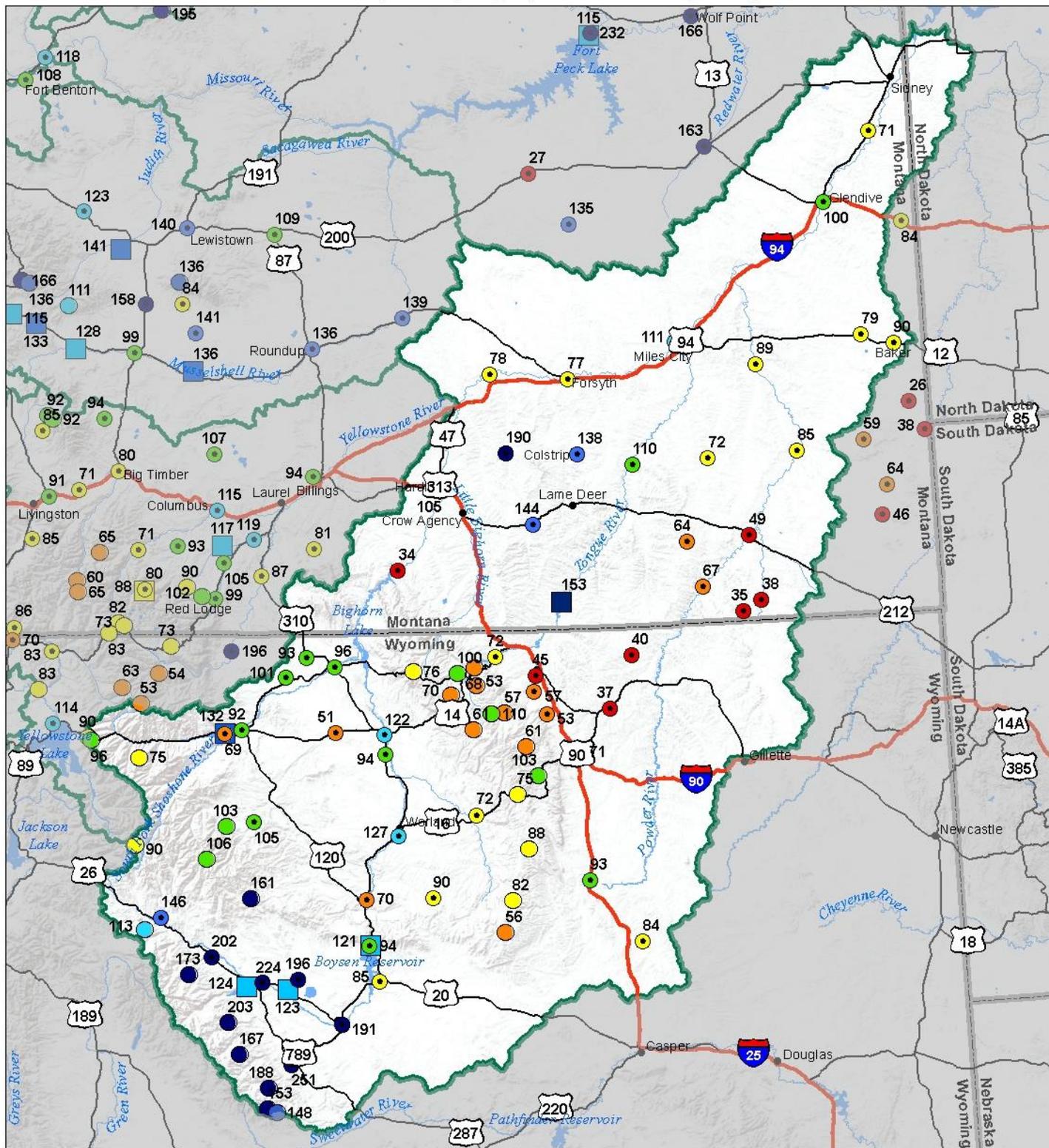
SNOTEL		COOP/ACIS	
<span style="color: blue;">●</span> > 150%	<span style="color: yellow;">●</span> 71 - 90%	<span style="color: blue;">●</span> > 150%	<span style="color: yellow;">●</span> 71 - 90%
<span style="color: darkblue;">●</span> 131 - 150%	<span style="color: orange;">●</span> 51 - 70%	<span 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%



# Lower Yellowstone River Basin Monthly Precipitation and Reservoir Levels Percentage of Normal June 1, 2016 (May 1, 2016 - June 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%



## Lower Yellowstone River Basin (Wyoming) Streamflow Forecasts - June 1, 2016

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

LOWER YELLOWSTONE RIVER BASIN (Wyoming)	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Bighorn R nr St. Xavier <sup>2</sup>	JUN-JUL	785	970	1090	118%	1220	1400	920
	JUN-SEP	815	1050	1220	121%	1380	1620	1010
Little Bighorn R nr Hardin	JUN-JUL	3.3	20	32	60%	44	61	53
	JUN-SEP	8	28	42	64%	56	76	66
Tongue R nr Dayton <sup>2</sup>	JUN-JUL	14	24	30	61%	36	46	49
	JUN-SEP	22	33	41	66%	49	60	62
Big Goose Ck nr Sheridan	JUN-JUL	11.5	16.9	21	68%	24	30	31
	JUN-SEP	18.5	24	28	72%	32	38	39
Little Goose Ck nr Bighorn	JUN-JUL	9.2	12	13.9	73%	15.8	18.5	19.1
	JUN-SEP	14.7	18.5	21	78%	24	28	27
Tongue River Reservoir Inflow <sup>2</sup>	JUN-JUL	18	45	63	57%	81	107	110
	JUN-SEP	25	59	81	60%	104	137	134
Yellowstone R at Miles City <sup>2</sup>	JUN-JUL	1870	2400	2750	86%	3110	3630	3200
	JUN-SEP	2080	2820	3320	86%	3830	4570	3870
Powder R at Moorehead	JUN-JUL	12.2	45	67	73%	89	121	92
	JUN-SEP	21	60	87	79%	114	153	110
Powder R nr Locate	JUN-JUL	2.3	45	74	73%	103	146	101
	JUN-SEP	4.3	58	95	78%	132	186	122
Yellowstone R nr Sidney <sup>2</sup>	JUN-JUL	1720	2340	2760	85%	3180	3790	3240
	JUN-SEP	1780	2650	3240	84%	3830	4700	3840

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 May, 2016	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Bighorn Lake	847.5	950.2	848.0	1356.0
Tongue River Res	80.7	83.4	52.6	79.1
Basin-wide Total	928.2	1033.6	900.6	1435.1
# of reservoirs	2	2	2	2

Watershed Snowpack Analysis June 1, 2016	# of Sites	% Median	Last Year % Median
WIND RIVER (Wyoming)	11	131	92
SHOSHONE RIVER (Wyoming)	4	73	48
BIGHORN RIVER (Wyoming)	14	70	54
LITTLE BIGHORN (Wyoming)	2	68	61
TONGUE RIVER (Wyoming)	7	68	84
POWDER RIVER (Wyoming)	6	135	231
LOWER YELLOWSTONE RIVER BASIN (Wyoming)	31	97	78

## Data Summary (SNOTEL and Snowcourse)

Site Name	Network	Elevation (ft)	Depth (in)	SWE (in)	Median (in)	% Median	Last Year SWE (in)	Last Year % Median
Albro Lake	SNOTEL	8300	21	9.5	12.2	78	9.0	74
Ambrose	SC	6480						
Arch Falls	SC	7350						
Ashley Divide	SC	4820						
Badger Pass	SNOTEL	6900	12	7.2	17.2	42	3.6	21
Banfield Mountain	SNOTEL	5600	0	0.0	0.0		0.0	
Baree Creek	SC	5500						
Baree Midway	SC	4600						
Baree Trail	SC	3800						
Barker Lakes	SNOTEL	8250	29	10.8	11.0	98	6.7	61
Basin Creek	SNOTEL	7180	0	0.0	0.3	0	0.0	0
Bassoo Peak	SC	5150						
Beagle Springs	SNOTEL	8850	0	0.0	0.0		0.0	
Bear Basin	SC	8150						
Bear Mountain	SNOTEL	5400	17	9.4	26.7	35	0.0	0
Beartooth Lake	SNOTEL	9360	36	12.9	17.1	75	15.5	91
Beaver Creek	SNOTEL	7850	0	0.0	6.4	0	0.0	0
Big Snowy	SC	7150						
Bisson Creek	SNOTEL	4920	0	0.0	0.0		0.0	
Black Bear	SNOTEL	8170	29	14.0	24.5	57	1.0	4
Black Mountain	SC	7750						
Black Pine	SNOTEL	7210	0	0.0	0.0		0.0	
Blacktail	SC	5650						
Blacktail Mtn	SNOTEL	5650	0	0.0	0.0		0.0	
Bloody Dick	SNOTEL	7600	0	0.0	0.0		0.0	
Bots Sots	SC	7750						
Boulder Mountain	SNOTEL	7950	29	9.6	9.1	105	0.4	4
Box Canyon	SNOTEL	6670	0	0.0	0.0		0.0	
Boxelder Creek	SC	5100	0	0.0	0.0		0.0	
Brackett Creek	SNOTEL	7320	2	1.0	3.1	32	0.0	0
Bristow Creek	SC	3900						
Brush Creek Timber	SC	5000						
Bull Mountain	SC	6600						
Burnt Mtn	SNOTEL	5880	0	0.0	0.0		0.0	
Cabin Creek	SC	5200						
Calvert Creek	SNOTEL	6430	0	0.0	0.0		0.0	
Camp Senia	SC	7890						
Canyon	SNOTEL	7870	0	0.0	0.0		0.0	
Carrot Basin	SNOTEL	9000	35	16.0	22.6	71	8.9	39
Chessman Reservoir	SC	6200						
Chicago Ridge	SC	5800						
Chicken Creek	SC	4060	0	0.0	0.0		0.0	
Clover Meadow	SNOTEL	8600	19	6.8	10.4	65	5.1	49
Cole Creek	SNOTEL	7850	16	4.9	9.2	53	12.0	130
Combination	SNOTEL	5600	0	0.0	0.0		0.0	
Copper Bottom	SNOTEL	5200	0	0.0			0.0	
Copper Camp	SNOTEL	6950	0	0.0			0.0	
Copper Mountain	SC	7700						
Cottonwood Creek	SC	6400						
Coyote Hill	SC	4200						

Site Name	Network	Elevation (ft)	Depth (in)	SWE (in)	Median (in)	% Median	Last Year SWE (in)	Last Year % Median
Crevice Mountain	SC	8400						
Crystal Lake	SNOTEL	6050	6	2.5	0.0		0.0	
Dad Creek Lake	SC	8800						
Daisy Peak	SNOTEL	7600	0	0.0	0.0		0.9	
Daly Creek	SNOTEL	5780	0	0.0	0.0		0.0	
Darkhorse Lake	SNOTEL	8600	57	25.6	26.0	98	20.1	77
Deadman Creek	SNOTEL	6450	0	0.0	0.0		0.0	
Desert Mountain	SC	5600						
Discovery Basin	SC	7050	2	0.5	0.2	250	0.0	0
Divide	SNOTEL	7800	0	0.0	0.0		0.0	
Dix Hill	SC	6400						
Dupuyer Creek	SNOTEL	5750	0	0.0	0.0		0.0	
Eagle Creek	SC	7000						
East Boulder Mine	SNOTEL	6335	0	0.0			0.0	
El Dorado Mine	SC	7800						
Elk Horn Springs	SC	7800						
Elk Peak	SNOTEL	7600	13	5.5			0.0	
Elk Peak	SC	8000						
Emery Creek	SNOTEL	4350	0	0.0	0.0		0.0	
Fatty Creek	SC	5500						
Fish Creek	SC	8000						
Fisher Creek	SNOTEL	9100	45	21.1	28.1	75	19.9	71
Flattop Mtn.	SNOTEL	6300	66	30.3	32.3	94	18.9	59
Fleecer Ridge	SC	7500						
Foolhen	SC	8280						
Forest Lake	SC	6400						
Four Mile	SC	6900						
Freight Creek	SC	6000						
Frohner Meadow	SNOTEL	6480	0	0.0	0.0		0.0	
Garver Creek	SNOTEL	4250	0	0.0	0.0		0.0	
Gibbons Pass	SC	7100						
Goat Mountain	SC	7000						
Government Saddle	SC	5270						
Grave Creek	SNOTEL	4300	0	0.0	0.0		0.0	
Griffin Creek Divide	SC	5150						
Hand Creek	SNOTEL	5035	0	0.0	0.0		0.0	
Hawkins Lake	SNOTEL	6450	0	0.0	12.2	0	0.0	0
Haymaker	SC	8050						
Hebgen Dam	SC	6550						
Hell Roaring Divide	SC	5770	20	9.7	11.3	86	3.2	28
Herrig Junction	SC	4850	0	0.0	0.3	0	0.0	0
Highwood Divide	SC	5650						
Highwood Station	SC	4600						
Holbrook	SC	4530						
Hoodoo Basin	SNOTEL	6050	40	19.0	23.5	81	10.8	46
Humboldt Gulch	SNOTEL	4250	0	0.0	0.0		0.0	
Jakes Canyon	SC	9040						
Johnson Park	SC	6450						
Kishenehn	SC	3890						
Kraft Creek	SNOTEL	4750	0	0.0			0.0	
Lake Camp	SC	7780						
Lakeview Canyon	SC	6930						
Lakeview Ridge	SNOTEL	7400	0	0.0	0.0		0.0	

Site Name	Network	Elevation (ft)	Depth (in)	SWE (in)	Median (in)	% Median	Last Year SWE (in)	Last Year % Median
Lemhi Ridge	SNOTEL	8100	0	0.0	0.0		0.0	
Lick Creek	SNOTEL	6860	0	0.0	0.0		0.0	
Little Park	SC	7400						
Logan Creek	SC	4300						
Lolo Pass	SNOTEL	5240	0	0.0	0.0		0.0	
Lone Mountain	SNOTEL	8880	15	6.3	8.4	75	0.0	0
Lookout	SNOTEL	5140	0	0.0	0.0		0.0	
Lower Twin	SNOTEL	7900	34	12.6	13.5	93	8.8	65
Lubrecht Flume	SNOTEL	4680	0	0.0	0.0		0.0	
Lubrecht Forest No 3	SC	5450						
Lubrecht Forest No 4	SC	4650						
Lubrecht Forest No 6	SC	4040						
Lubrecht Hydroplot	SC	4200						
Lupine Creek	SC	7380						
Madison Plateau	SNOTEL	7750	0	0.0	6.2	0	0.0	0
Many Glacier	SNOTEL	4900	0	0.0	0.0		0.0	
Marias Pass	SC	5250						
Mineral Creek	SC	4000						
Monument Peak	SNOTEL	8850	9	3.6	15.3	24	5.1	33
Moss Peak	SNOTEL	6780	51	24.6	28.4	87	18.5	65
Moulton Reservoir	SC	6850						
Mount Allen No 7	SC	5700						
Mount Lockhart	SNOTEL	6400	0	0.0	4.5	0	0.0	0
Mudd Lake	SC	7650						
Mule Creek	SNOTEL	8300	20	7.0	9.4	74	3.5	37
N Fk Elk Creek	SNOTEL	6250	0	0.0	0.0		0.0	
Nevada Ridge	SNOTEL	7020	0	0.0	2.5	0	0.0	0
New World	SC	6900						
Nez Perce Camp	SNOTEL	5650	0	0.0	0.0		0.0	
Noisy Basin	SNOTEL	6040	37	18.8	28.5	66	12.0	42
Norris Basin	SC	7550						
North Fork Jocko	SNOTEL	6330	33	18.0	21.2	85	4.4	21
Northeast Entrance	SNOTEL	7350	0	0.0	0.0		0.0	
Onion Park	SNOTEL	7410	8	3.1	2.4	129	0.0	0
Ophir Park	SC	7150			3.2			
Parker Peak	SNOTEL	9400	18	6.2	13.8	45	1.6	12
Peterson Meadows	SNOTEL	7200	0	0.0	1.3	0	0.0	0
Pickfoot Creek	SNOTEL	6650	0	0.0	0.0		0.0	
Pike Creek	SNOTEL	5930	0	0.0	0.0		0.0	
Pipestone Pass	SC	7200						
Placer Basin	SNOTEL	8830	14	5.3	13.1	40	8.4	64
Poorman Creek	SNOTEL	5100	0	0.0	0.8	0	0.0	0
Porcupine	SNOTEL	6500	0	0.0	0.0		0.0	
Potomageton Park	SC	7150						
Revais	SC	4800			0.0			
Rock Creek Mdws	SC	3400						
Rocker Peak	SNOTEL	8000	24	9.0	10.6	85	4.2	40
Rocky Boy	SNOTEL	4700	0	0.0	0.0		0.0	
Roland Summit	SC	5120						
S Fork Shields	SNOTEL	8100	13	5.2	9.0	58	0.0	0
Sacajawea	SNOTEL	6550	0	0.0	0.0		0.0	
Saddle Mtn.	SNOTEL	7940	22	10.4	13.3	78	2.9	22

Site Name	Network	Elevation (ft)	Depth (in)	SWE (in)	Median (in)	% Median	Last Year SWE (in)	Last Year % Median
Short Creek	SNOTEL	7000	0	0.0	0.0		0.0	
Shower Falls	SNOTEL	8100	31	12.1	17.0	71	11.6	68
Skalkaho Summit	SNOTEL	7250	0	0.0	9.5	0	0.0	0
Sleeping Woman	SNOTEL	6150	0	0.0	0.0		0.0	
Slide Rock Mountain	SC	7100						
Spotted Bear Mountain	SC	7000						
Spur Park	SNOTEL	8100	40	15.9	13.9	114	10.9	78
Stahl Peak	SNOTEL	6030	47	22.3	25.8	86	9.0	35
Stemple Pass	SC	6600						
Storm Lake	SC	7780						
Stringer Creek	SNOTEL	6550	0	0.0	0.0		0.0	
Stryker Basin	SC	6180	39	18.9	20.1	94	10.8	54
Stuart Mountain	SNOTEL	7400	38	17.3	18.8	92	12.2	65
Taylor Road	SC	4080	0	0.0	0.0		0.0	
Ten Mile Lower	SC	6600						
Ten Mile Middle	SC	6800						
Tepee Creek	SNOTEL	8000	0	0.0	1.8	0	0.0	0
Timberline Creek	SC	8850						
Tizer Basin	SNOTEL	6880	0	0.0	0.0		0.0	
Trinkus Lake	SC	6100						
Truman Creek	SC	4060						
Twelvemile Creek	SNOTEL	5600	0	0.0	0.0		0.0	
Twenty-One Mile	SC	7150						
Twin Lakes	SNOTEL	6400	6	2.3	16.5	14	0.0	0
Upper Holland Lake	SC	6200						
Waldron	SNOTEL	5600	0	0.0	0.0		0.0	
Warm Springs	SNOTEL	7800	44	16.2	17.0	95	12.1	71
Weasel Divide	SC	5450						
West Yellowstone	SNOTEL	6700	0	0.0	0.0		0.0	
Whiskey Creek	SNOTEL	6800	0	0.0	0.0		0.0	
White Elephant	SNOTEL	7710	0	0.0	4.4	0	0.0	0
White Mill	SNOTEL	8700	23	10.4	16.9	62	12.0	71
Wolverine	SNOTEL	7650	0	0.0	0.0		0.0	
Wood Creek	SNOTEL	5960	0	0.0	0.0		0.0	
Wrong Creek	SC	5700						
Wrong Ridge	SC	6800						
Younts Peak	SNOTEL	8350	0	0.0	3.2	0		

*Issued by:*

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

