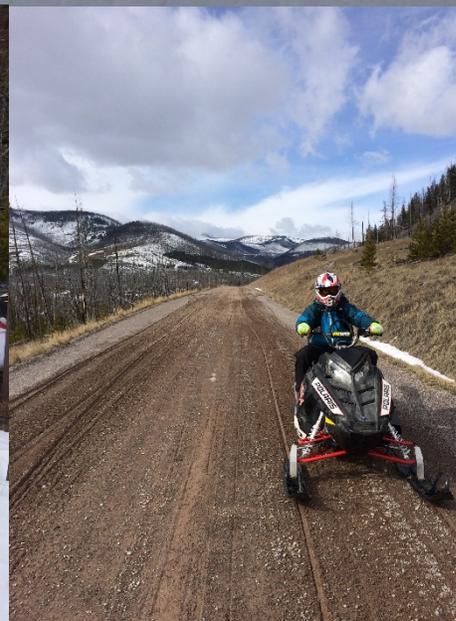


# Montana

## Water Supply Outlook Report

### March 1<sup>st</sup>, 2015



Snowpack variability by elevation is very evident in the Copper Creek drainage outside of Lincoln, MT. Higher elevations continue to have near normal to well above normal percentages, while lower elevations that experienced melt during the month from above average temperatures and rain-on-snow events have made significant declines over the month of February.

*Photos: Lucas Zukiewicz*

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## **Montana Water Supply Outlook Report as of March 1<sup>st</sup>, 2015**

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### ***How forecasts are made***

Most of the annual streamflow in the Western United States originates as snowfall that has accumulated high in the mountains during winter and early spring. As the snowpack accumulates, hydrologists estimate the runoff that will occur when it melts. Predictions are based on careful measurements of snow water equivalent at selected index points. Precipitation, temperature, soil moisture and antecedent streamflow data are combined with snowpack data to prepare runoff forecasts. Streamflow forecasts are coordinated by Natural Resources Conservation Service and National Weather Service hydrologists. This report presents a comprehensive picture of water supply conditions for areas dependent upon surface runoff. It includes selected streamflow forecasts, summarized snowpack and precipitation data, reservoir storage data, and narratives describing current conditions.

Snowpack data are obtained by using a combination of manual and automated SNOTEL measurement methods. Manual readings of snow depth and water equivalent are taken at locations called snow courses on a monthly or semi-monthly schedule during the winter. In addition, snow water equivalent, precipitation and temperature are monitored on a daily basis and transmitted via meteor burst telemetry to central data collection facilities. Both monthly and daily data are used to project snowmelt runoff.

Forecast uncertainty originates from two sources: (1) uncertainty of future hydrologic and climatic conditions, and (2) error in the forecasting procedure. To express the uncertainty in the most probable forecast, four additional forecasts are provided. The actual streamflow can be expected to exceed the most probable forecast 50% of the time. Similarly, the actual streamflow volume can be expected to exceed the 90% forecast volume 90% of the time. The same is true for the 70%, 30%, and 10% forecasts. Generally, the 90% and 70% forecasts reflect drier than normal hydrologic and climatic conditions; the 30% and 10% forecasts reflect wetter than normal conditions. As the forecast season progresses, a greater portion of the future hydrologic and climatic uncertainty will become known and the additional forecasts will move closer to the most probable forecast.

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## Overview

Ending January and beginning February the residents of Montana were looking to the skies and hoping for a return to winter, unfortunately what most received was a wet face, from rain. February started off with precipitation, just not in the solid form we are used to mid-winter. West of the Continental Divide this was a rather significant event with valleys receiving 2 inches or more of rain during the first 10 days. Mountain locations also experienced rain during this event, but it was limited to the low to mid elevations with the higher elevations receiving snowfall. East of the Divide this storm also fell in the form of rain at lower elevations, but due to the higher elevation of the ranges snow was received at many mountain locations. Across the state at elevations where there was rain on snow the snowpack was able to soak up much of the moisture without discharging snow water (melt).

Ending this cycle was a period of high pressure with dry conditions and well above average temperatures that lingered a little too long in the state. After having received rain on the snowpack at lower elevations there was some snowmelt that occurred during this time, as was evident in the well above normal streamflows in the rivers in Montana. In the Flathead River basin fields were ponding with water mid-month prompting the question: Is this the spring break-up in mid-February? Temperatures during this period were well above average adding to the snowmelt at lower elevations, but at higher elevations with deeper and more insulated snowpacks little melt occurred during this time.

Fortunately the last week of the month brought several small disturbances to the state and temperatures cooled off to more seasonal conditions. Snowfall, mostly east of the Continental Divide helped to add a little more water to the snowpack before the month ended, and cooler temperatures stopped the loss of snow water from the snowpack at lower elevations. Some areas received an impressive amount of the “sneaker” storms with upper elevations in the Northern Gallatin Range receiving up to 18” of new snow. Unfortunately these storms were not wide spread and snow totals varied greatly over short distances.

What impact did the month have overall on our regional snowpack? Basins across the state saw further declines in basin percentages of normal snowpack between February 1<sup>st</sup> and March 1<sup>st</sup>. This had a direct impact on the streamflow forecasts on March 1<sup>st</sup> for the April-July time period. West of the Divide Snowpack percentages dropped up to 16 percent during the month, and up to 10 percent east of the Divide. While it is always alarming to hear the word “decline” when it comes to the snowpack, many basins still remain near normal for March 1<sup>st</sup> due in large part to the abundance of early season snowfall.

There are certainly some basins of concern across the state where below normal snowpack has persisted or gotten worse throughout the water year. The Kootenai River basin in the northwest corner of the state and Lower Clark Fork to the south are well below normal for this time of year and saw further declines during the month. The Madison River basin has been below normal snowfall for most of this water year and unlike most basins which are near normal for water year-to-date precipitation, is below normal in this regard. Just west of the Madison River basin in the Ruby River drainage and Red Rock Valley, snowpack is well below normal, a trend that has happened 3 out of the last 4 years in this area.

Old Man Winter could easily show his face again as there are typically another 1.5 to 2 months left of potential snow accumulation for the mountains of Montana. Some basins east of the Divide are typically favored during this period regarding snowfall and precipitation, and major changes could occur in all of the basins before snowmelt begins.

## Snowpack

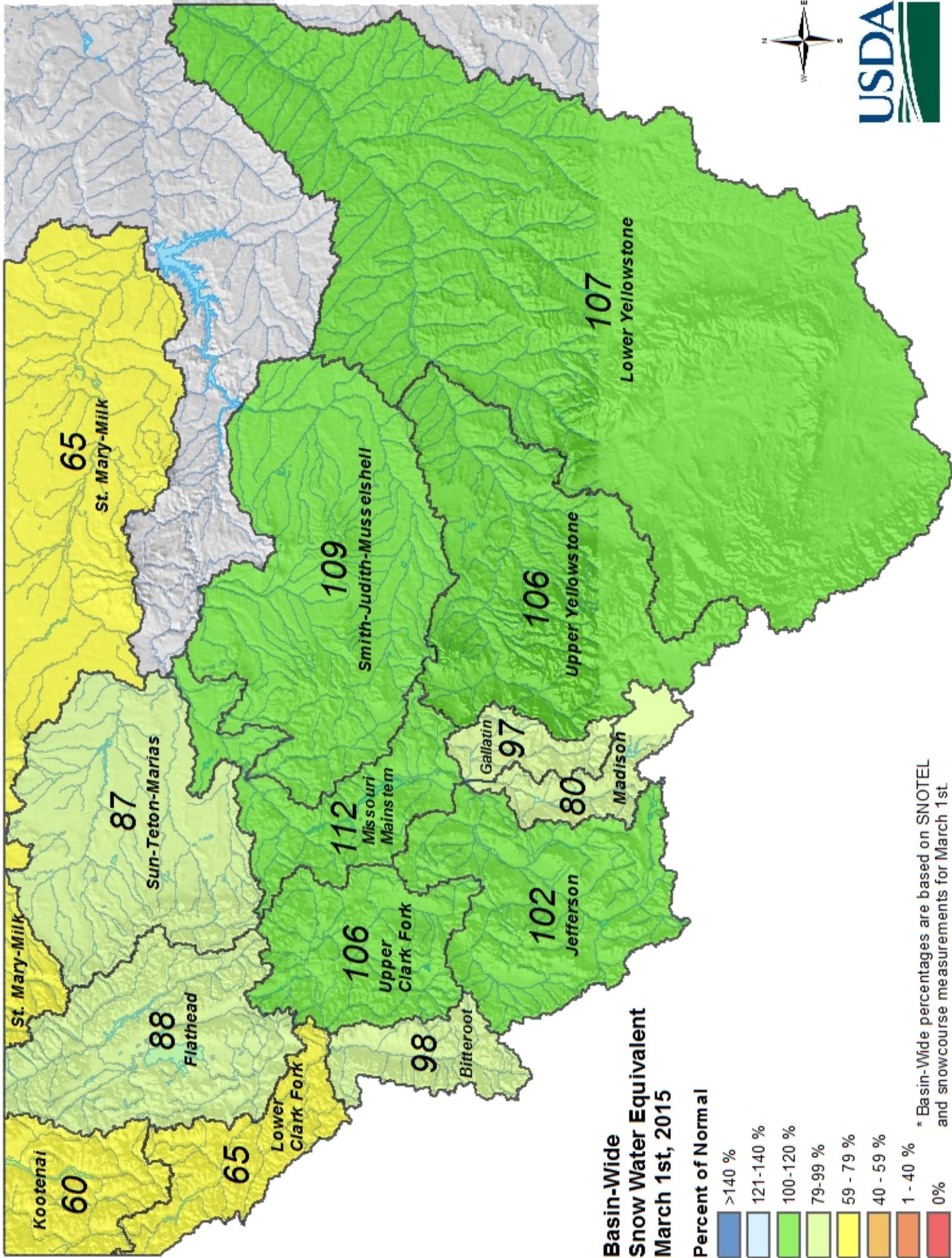
For the second straight month nearly every basin in the state of Montana saw a decrease in snowpack percentages of normal due to the lack of substantial snowfall, rain on snow events, and warmer than average temperature. State-wide there was a 9 percent decrease in snowpack from 100 percent of normal on February 1st to 91 percent of normal on March 1st.

The decreases were substantial in basins west of the Divide where losses of 9 to 16 percent were experienced between February 1<sup>st</sup> and March 1<sup>st</sup>. West of the Divide as a whole there was a 12 percent decrease in snowpack, ending the month at 86 percent of normal, and 70 percent of last year at this time. The Kootenai River basin currently has the lowest snowpack totals in the state ending the month with only 60 percent of normal. The southern neighbor the Lower Clark Fork River basin is a close second at 65 percent of normal.

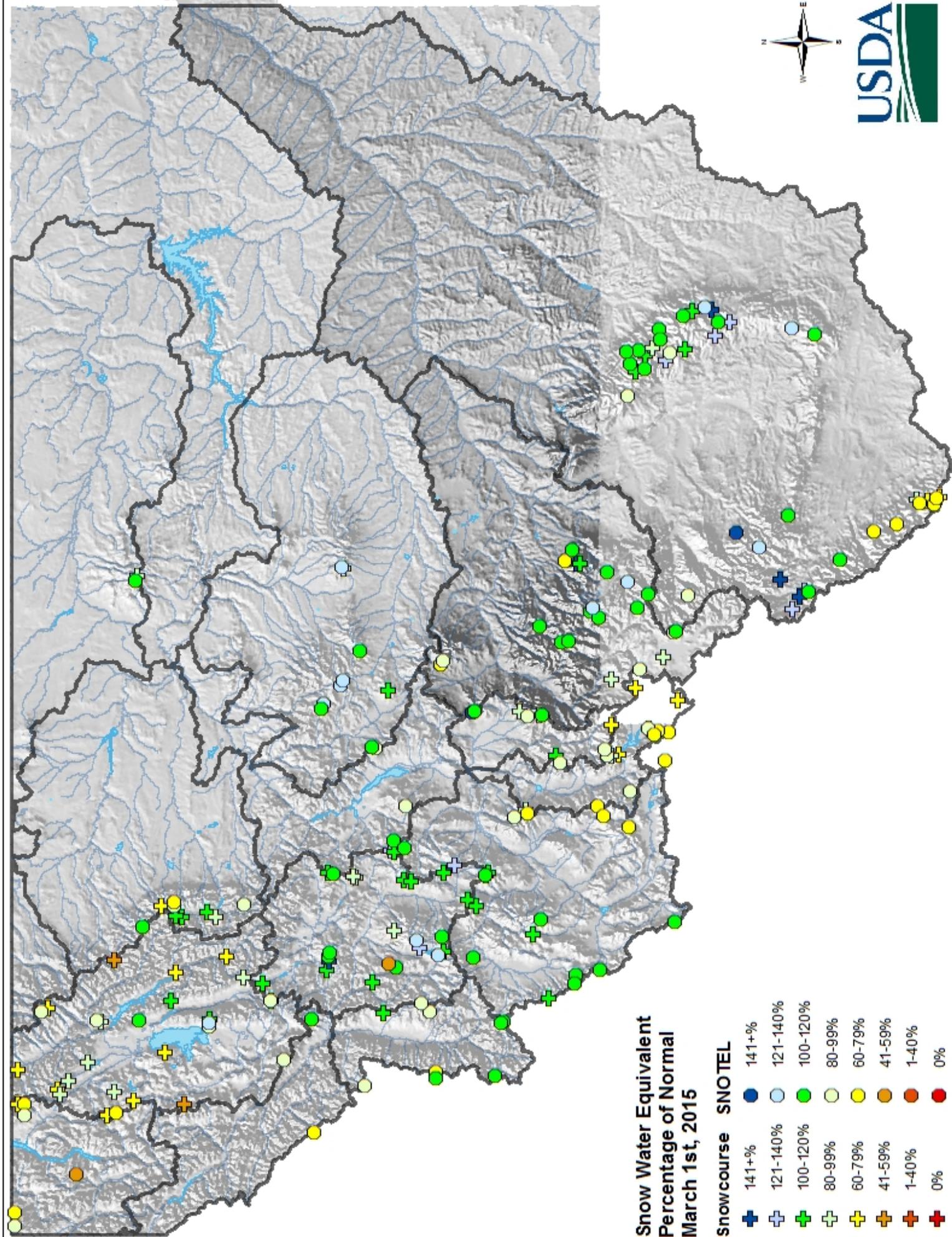
East of the Divide only one basin ended the month where it started, the St. Mary-Milk basin which remained well below normal at 77 percent on March 1<sup>st</sup>. As a whole the basins east of the Divide ended the month at 94 percent of normal, down 8 percent from February 1st, and 72 percent of last year at this time. Some basins in the headwaters of the Jefferson River basin (Red Rock and Ruby River) are experiencing record low snowpack levels at SNOTEL sites for March 1<sup>st</sup>, and a major change will be needed to improve conditions before spring runoff.

Basins feeding Montana rivers from the south in the Lower Yellowstone in Wyoming were the only basins to see an increase in snow water equivalent during the month..

<b>Snowpack Percentage of Normal</b>			
<b><i>River Basin</i></b>	<b>Mar 1 % of Median</b>	<b>Monthly Change</b>	<b>% of Last Year</b>
<b>Columbia</b>	<b>86</b>	<b>-12%</b>	<b>70</b>
Kootenai	60	-9%	58
Flathead	88	-9%	75
Upper Clark Fork	106	-16%	76
Bitterroot	98	-9%	65
Lower Clark Fork	65	-15%	55
<b>Missouri</b>	<b>94</b>	<b>-8%</b>	<b>72</b>
Missouri Headwaters	95	-5%	76
Jefferson	102	-5%	74
Madison	80	-3%	71
Gallatin	97	-1%	80
Missouri Mainstem	99	-7%	83
Headwaters Mainstem	112	-10%	69
Smith-Judith Musselshell	109	-3%	58
Sun-Teton-Marias	87	-4%	65
Milk	48		32
St. Mary	77	0%	70
St. Mary & Milk	65	-14%	51
<b>Yellowstone</b>	<b>107</b>	<b>+1%</b>	<b>76</b>
Upper Yellowstone	106	-5%	75
Lower Yellowstone	107	+5%	76
East of Divide	98	-5%	73
West of Divide	85	-13%	69
<b>Statewide</b>	<b>91</b>	<b>-9%</b>	<b>71</b>



\* Basin-Wide percentages are based on SNOTEL and snowcourse measurements for March 1st.



## Precipitation

Mountain and valley precipitation was near to above average for most basins in Montana during the month of February, state-wide 94 percent of the average monthly precipitation fell. Exceptions are the Upper Clark Fork (85 percent average; Bitterroot (79 percent of average); Jefferson (80 percent of average); Madison (70 percent of average).

Most basins are still near to above the water year-to-date average for March 1st. State-wide there is 105 percent of the water year-to-date average on March 1st. Only one major basin is well below normal for this time of year, the Madison River basin received only 70 percent of the average February precipitation and is 81 percent of average for March 1st. Warmer temperatures persisted across the state in February and most of the precipitation fell in the form of rain at the low to mid elevation mountain sites and all rain at the valley locations.

<b>Mar 1 Precipitation</b>		
<b><i>River Basin</i></b>	<b>February % of Average</b>	<b>Water Year % of Average</b>
<b>Columbia</b>	<b>95</b>	<b>107</b>
Kootenai	107	98
Flathead	101	111
Upper Clark Fork	85	110
Bitterroot	79	113
Lower Clark Fork	97	104
<b>Missouri</b>	<b>91</b>	<b>100</b>
Missouri Headwaters	77	91
Jefferson	80	95
Madison	70	81
Gallatin	100	100
Missouri Mainstem	103	111
Smith-Judith Musselshell	117	107
Sun-Teton-Marias	93	112
Milk	157	155
St.Mary	123	104
St. Mary & Milk	127	116
<b>Yellowstone</b>	<b>107</b>	<b>99</b>
Upper Yellowstone	99	103
Lower Yellowstone	111	94
<b>Statewide</b>	<b>95</b>	<b>105</b>

## Reservoirs

Some basins in Montana reported below normal snowpack percentages for March 1<sup>st</sup>, so it is a good thing that snow was more abundant last year than it has been so far this water year. West of the Divide reservoir storage is above average for this time of year. In basins like the Kootenai where there is well below normal snowpack above average reservoir storage will certainly help to augment flows if snowpack doesn't increase before spring runoff.

East of the Divide storage is also above average for this time of year in all basins except for the Jefferson, which is slightly below average at 97 percent on March 1<sup>st</sup>. Carry over storage in the St. Mary-Milk River basin is well above average for this time of year, and like the Kootenai is well below normal for snowpack on March 1<sup>st</sup>. This carryover will help offset losses due to lack of snowpack to a certain extent. A pattern change will be needed with a return to snowier pattern in order to see average inflow to reservoirs during snowmelt runoff.

State-wide reservoir storage is currently 122 percent of average for March 1<sup>st</sup>, and 112 percent of last year at this time.

<b>Mar 1 Reservoir Storage</b>		
<b><i>River Basin</i></b>	<b>Mar 1 % of Average</b>	<b>Mar 1 % Last Year</b>
<b>Columbia</b>	<b>135</b>	<b>100</b>
Kootenai	153	91
Flathead	124	111
Upper Clark Fork	118	117
Bitterroot	194	156
Lower Clark Fork	102	103
<b>Missouri</b>	<b>117</b>	<b>118</b>
Missouri Headwaters	106	107
Jefferson	97	121
Madison	111	101
Gallatin	100	112
Missouri Mainstem	117	118
Smith-Judith Musselshell	164	155
Sun-Teton-Marias	114	121
Milk	174	123
St. Mary	191	191
St. Mary & Milk	179	139
<b>Yellowstone</b>	<b>114</b>	<b>102</b>
Upper Yellowstone	124	113
Lower Yellowstone	114	102
<b>Statewide</b>	<b>122</b>	<b>112</b>

## Streamflow

Based on the decline in the snowpack percentages of normal during the month, streamflow forecasts have also been reduced for spring snowmelt runoff (April-September). Many major basins still have near normal forecasts for the April-July time period west of the Divide, while major basins east of the Divide in the Missouri River Basin are slightly below normal for March 1st<sup>st</sup>. Further south in the Yellowstone River basin streamflow forecasts indicate slightly above average conditions this spring.

Looking deeper into the individual basin reports/forecasts displays the variability of the snowpack and the weather conditions so far this year. The Kootenai River basin (in Montana) has well below snowpack percentages this year, but flows from Canada should help to supplement the below normal snowpack and provide only slightly below streamflow conditions on the mainstem of the Kootenai. The Yaak, Fisher and Tobacco sub-basins in the Kootenai have well below average snowpack and streamflow forecasts and will differ substantially from the mainstem of the Kootenai.

The Jefferson River basin shows the same variability trend. As a whole the Jefferson River basin indicates 90 percent of average runoff between April and July. The Big Hole and Boulder River basins are forecasted to be above average this spring while basins in the southern part of the Jefferson watershed are very dry and look to be well below average this spring.

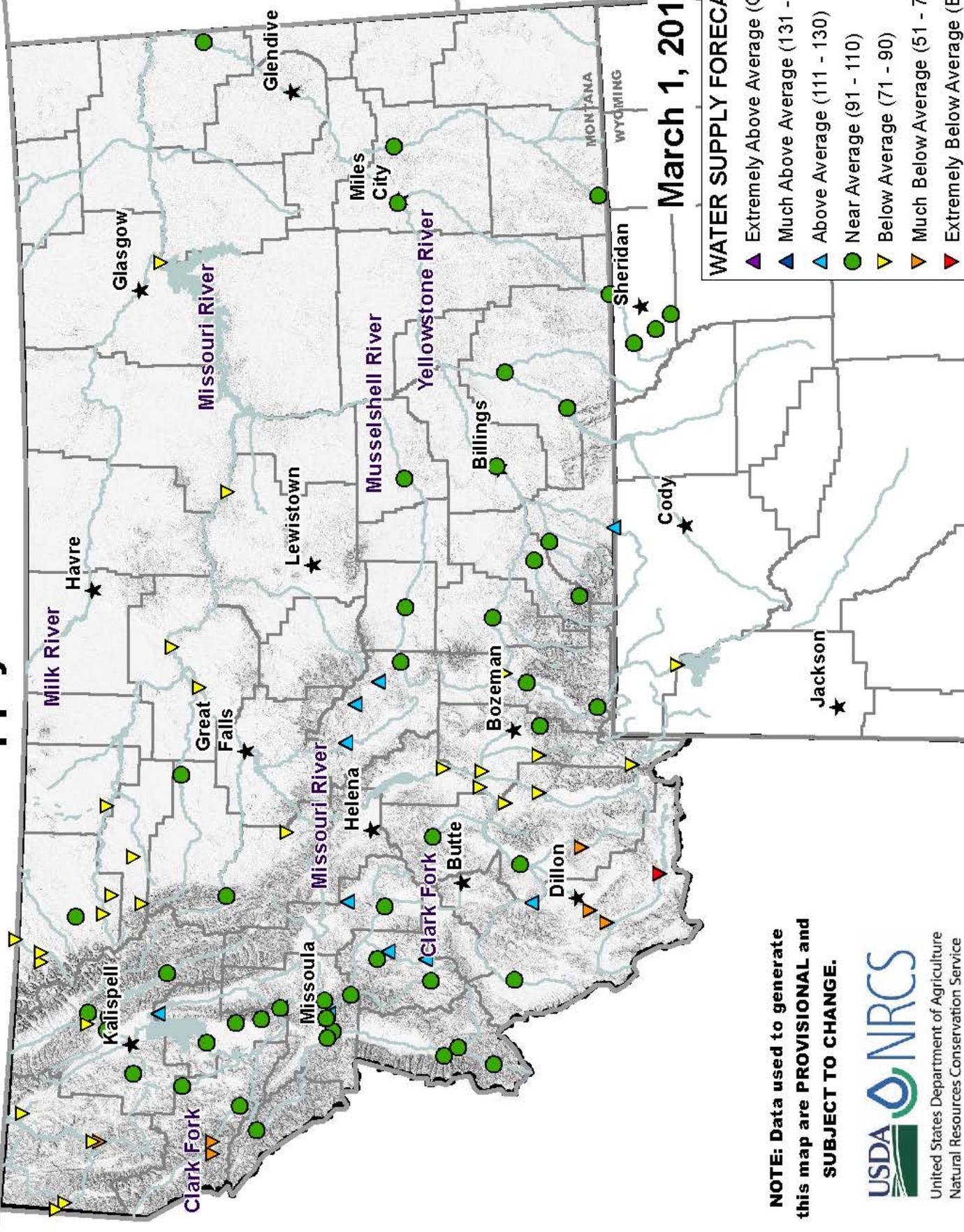
Consult the individual basin reports for a more comprehensive guide to individual basin conditions and expected streamflows this spring.

Following are streamflow forecasts for the period April 1 through July 31. **THE FIGURES IN THE TABLE BELOW ARE AN AVERAGE OF ALL FORECASTS WITHIN THE PARTICULAR BASIN AT THE 50 PERCENT EXCEEDANCE ONLY. ALL 50 PERCENT EXCEEDANCE FORECASTS ASSUME NEAR NORMAL WEATHER THROUGH THE END OF THE FORECAST PERIOD.**

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

<b>April-July Streamflow Forecast Period</b>		
<b>River Basin</b>	<b>Forecast as % of Average</b>	<b>Forecast as % Last Year's Flows</b>
<b>Columbia</b>	<b>97</b>	<b>73</b>
Kootenai	89	76
Flathead	99	72
Upper Clark Fork	107	76
Bitterroot	97	58
Lower Clark Fork	99	70
<b>Missouri</b>	<b>87</b>	<b>71</b>
Missouri Headwaters	87	79
Jefferson	90	79
Madison	76	79
Gallatin	90	79
Missouri Mainstem	87	70
Headwaters Mainstem	87	70
Smith-Judith Musselshell	109	74
Sun-Teton-Marias	90	66
St. Mary	77	55
<b>Yellowstone</b>	<b>103</b>	<b>68</b>
Upper Yellowstone	103	70
Lower Yellowstone	104	66
<b>Statewide</b>	<b>95</b>	<b>71</b>

# Water Supply Forecast for Montana



March 1, 2015

**WATER SUPPLY FORECAST**

- ▲ Extremely Above Average (Over 150)
- ▲ Much Above Average (131 - 150)
- ▲ Above Average (111 - 130)
- Near Average (91 - 110)
- ▼ Below Average (71 - 90)
- ▼ Much Below Average (51 - 70)
- ▼ Extremely Below Average (Below 51)

**NOTE: Data used to generate this map are PROVISIONAL and SUBJECT TO CHANGE.**



# 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	-0.7	-1.2
Tobacco	-1.4	-0.8
Kootenai Ft. Steele to Libby Dam	-1.4	-1.0
Kootenai below Libby Dam	1.3	2.3
Fisher	-2.4	0.2
Yaak	-2.4	-0.6
North Fk. Flathead	-1.8	-1.2
Middle Fk. Flathead	-0.7	0.3
South Fk. Flathead	2.9	3.1
Flathead at Columbia Falls	0.7	0.8
Swan	0.7	2.3
Flathead at Polson	0.2	0.3
Mission Valley	0.2	-2.2
Little Bitterroot	-0.2	0.1
Clark Fork above Milltown	0.7	2.6
Blackfoot	-0.2	2.4
Clark Fork above Missoula	0.2	2.8
Bitterroot	-0.2	2.4
Clark Fork River below Bitterroot	0.1	2.8
Clark Fork River below Flathead	0.1	1.2
Beaverhead	-1.8	-2.1
Ruby	-1.8	-0.7
Big Hole	0.5	1.5
Boulder (Jefferson)	0.2	1.8
Jefferson	-0.4	1.9
Madison	-1.8	0.0
Gallatin	-0.9	0.7
Missouri above Canyon Ferry	-0.9	0.6
Missouri below Canyon Ferry	-0.9	0.5
Smith	2.1	2.9
Sun	-1.1	0.4
Teton	0.6	1.1
Birch/Dupuyer Creeks	-0.5	-2.1
Marias	2.0	0.6
Musselshell	0.9	2.3
Missouri above Fort Peck	0.5	0.7
Missouri below Fort Peck	0.4	-0.9
Milk		
Dearborn near Craig	-0.5	0.1
Yellowstone above Livingston	0.2	1.1
Shields	-0.7	2.4
Boulder (Yellowstone)	0.2	2.2
Stillwater	0.2	0.6
Rock/Red Lodge Creeks	0.7	1.4
Clarks Fork Yellowstone	1.6	2.3
Yellowstone above Bighorn River	0.4	1.1
Bighorn below Bighorn Lake	0.5	3.2
Little Bighorn	0.0	1.5
Yellowstone below Bighorn	0.5	2.0
Tongue	0.5	2.5
Powder	0.2	2.4
Upper Judith	3.7	3.4
Saint Mary	-2.7	0.1

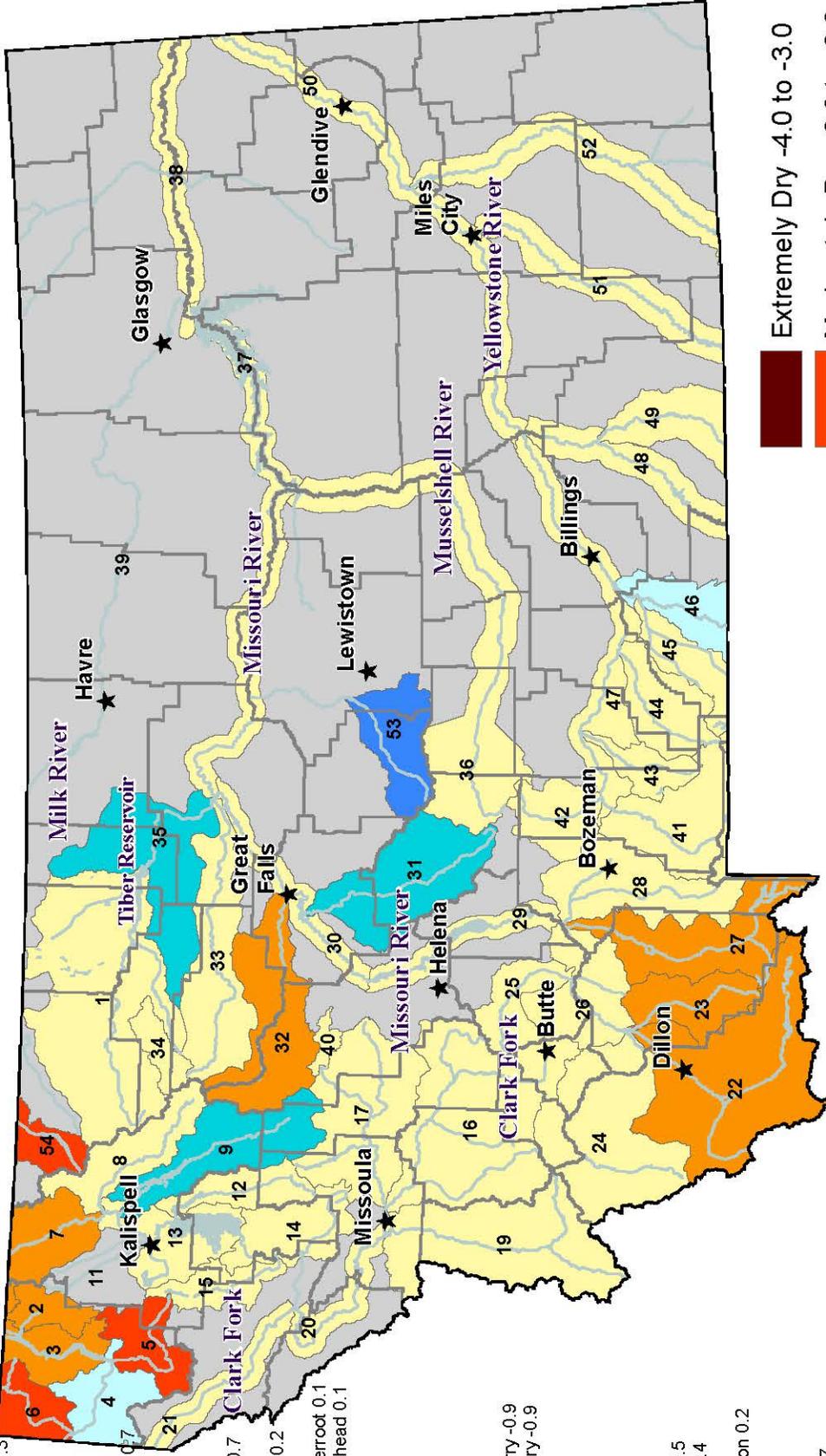
## SWSI Scale

+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

# Surface Water Supply Index (SWSI) Values

## RIVER INDEX & SWSI VALUES

- 1 Marias above Tiber Reservoir -0.7
- 2 Tobacco -1.4
- 3 Kootenai Ft. Steele to Libby Dam -1.4
- 4 Kootenai below Libby Dam 1.3
- 5 Fisher -2.4
- 6 Yaak -2.4
- 7 North Fk. Flathead -1.8
- 8 Middle Fk. Flathead -0.7
- 9 South Fk. Flathead 2.9
- 10 Flathead at Columbia Falls 0.7
- 11 Kalispell 8
- 12 Swan 0.7
- 13 Flathead at Polson 0.2
- 14 Mission Valley 0.2
- 15 Little Bitterroot -0.2
- 16 Clark Fork above Milltown 0.7
- 17 Blackfoot -0.2
- 18 Clark Fork above Missoula 0.2
- 19 Bitterroot -0.2
- 20 Clark Fork River below Bitterroot 0.1
- 21 Clark Fork River below Flathead 0.1
- 22 Beaverhead -1.8
- 23 Ruby -1.8
- 24 Big Hole 0.5
- 25 Boulder (Jefferson) 0.2
- 26 Jefferson -0.4
- 27 Madison -1.8
- 28 Gallatin -0.9
- 29 Missouri above Canyon Ferry -0.9
- 30 Missouri below Canyon Ferry -0.9
- 31 Smith 2.1
- 32 Sun -1.1
- 33 Teton 0.6
- 34 Birch/Dupuyer Creeks -0.5
- 35 Marias 2
- 36 Musselshell 0.9
- 37 Missouri above Fort Peck 0.5
- 38 Missouri below Fort Peck 0.4
- 40 Dearborn near Craig -0.5
- 41 Yellowstone above Livingston 0.2
- 42 Shields -0.7
- 43 Boulder (Yellowstone) 0.2
- 44 Stillwater 0.2
- 45 Rock/Red Lodge Creeks 0.7
- 46 Clark Fork Yellowstone 1.6
- 47 Yellowstone above Bighorn River 0.4
- 48 Bighorn below Bighorn Lake 0.5
- 49 Little Bighorn 0
- 50 Yellowstone below Bighorn 0.5
- 51 Tongue 0.5
- 52 Powder 0.2
- 53 Upper Judith 3.7
- 54 Saint Mary -2.7

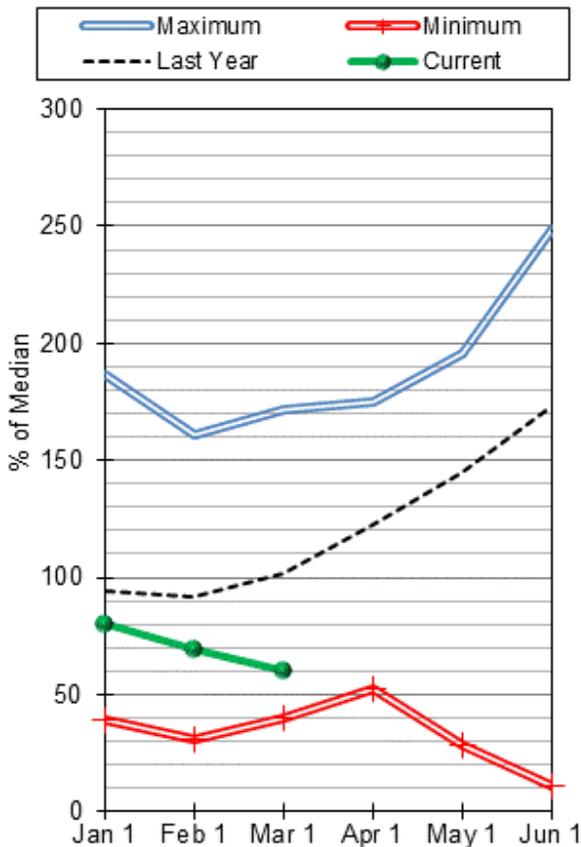


**March 1, 2015**

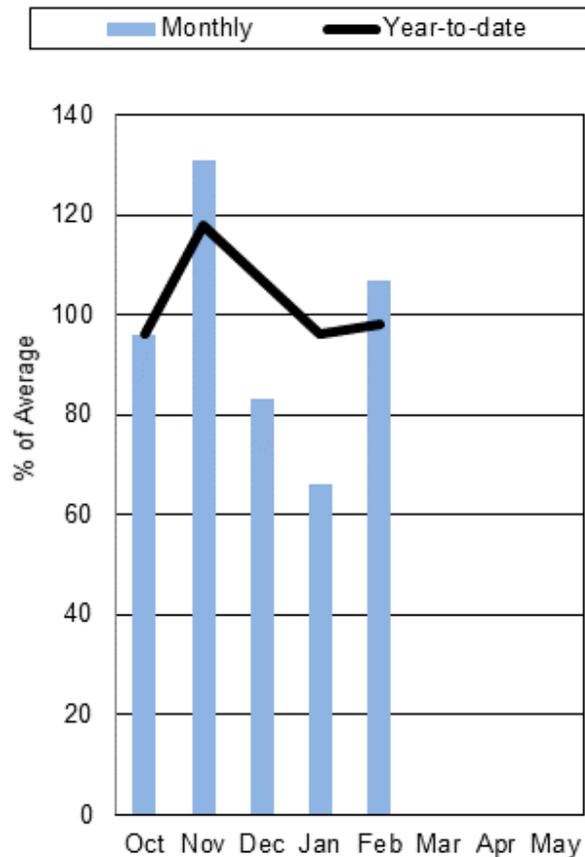
**NOTE: Data used to generate this map are PROVISIONAL and SUBJECT TO CHANGE.**

# Kootenai River Basin in Montana

## Mountain Snowpack



## Precipitation



Webster’s definition of winter “The coldest season of the year (December, January and February)” .....not so much in the Kootenai River Basin for this year. The warm temperatures experienced the end of January carried over into the first half of February. The month started off with a really nice storm which unfortunately was mostly rain especially at the mid to low elevations. Major rivers and streams in the basin responded to this rain event. For the rest of the month, temperatures cooled off a bit and the basin received a series of small storms with little to no accumulation of snow.

This year’s permanent snowpacks in the Kootenai River Basin got off to a slow start and subsequent storms have not been generous to this area in Montana or Canada above Lake Koocanusa. For the Kootenai River Basin in Canada the March 1<sup>st</sup> snowpack was only 86 percent of normal. In Montana the snowpacks are well below normal with 47 percent of normal in the Kootenai Mainstem below Lake Koocanusa, the Fisher River Basin with 49 percent of normal, the Tobacco River basin with 79 percent of normal and the Yaak River Basin with 78 percent of normal. Overall the Kootenai River Basin snowpack is 60 percent of normal and is only 58 percent of last year. Remember 2014 was well above normal snowpack.

February mountain precipitation in the basin ranged from 61 percent of average in the Fisher (based on Hand Creek SNOTEL only) to 131 percent of average in the Yaak. Valley precipitation was at 107 percent of average. Overall the February precipitation for the Kootenai River Basin in Montana was 107 percent of average and 73 percent of last year. The Kootenai River basin in Montana came in at 98 percent of average for March 1<sup>st</sup>. Last year at this time the water year-to-date precipitation was 82 percent of average.

Reservoir storage in Lake Koocanusa is 153 percent of average and 91 percent of last year at this time.

Based on average precipitation for the rest of the year, the April-July streamflow forecast for the Kootenai River is 89 percent of average and 76 percent of last year.

## Kootenai River Basin In Montana Streamflow Forecasts - March 1st, 2015

Forecast Exceedance Probabilities for Risk Assessment Chance that actual volume will exceed forecast
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KOOTENAI RIVER BASIN in MONTANA	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Tobacco R nr Eureka	APR-JUL	67	89	104	83%	118	140	126
	APR-SEP	74	98	115	82%	131	156	140
Libby Reservoir Inflow <sup>1</sup>	APR-JUL	3970	4550	4810	90%	5070	5650	5340
	APR-SEP	4800	5360	5620	90%	5880	6440	6250
Fisher R nr Libby	APR-JUL	77	114	138	67%	163	199	205
	APR-SEP	87	124	149	68%	174	210	220
Yaak R nr Troy	APR-JUL	186	260	310	74%	365	440	420
	APR-SEP	199	275	330	75%	380	460	440
Kootenai R at Leonia <sup>1,2</sup>	APR-JUL	4800	5540	5880	89%	6220	6970	6600
	APR-SEP	5690	6420	6750	89%	7090	7820	7590

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

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

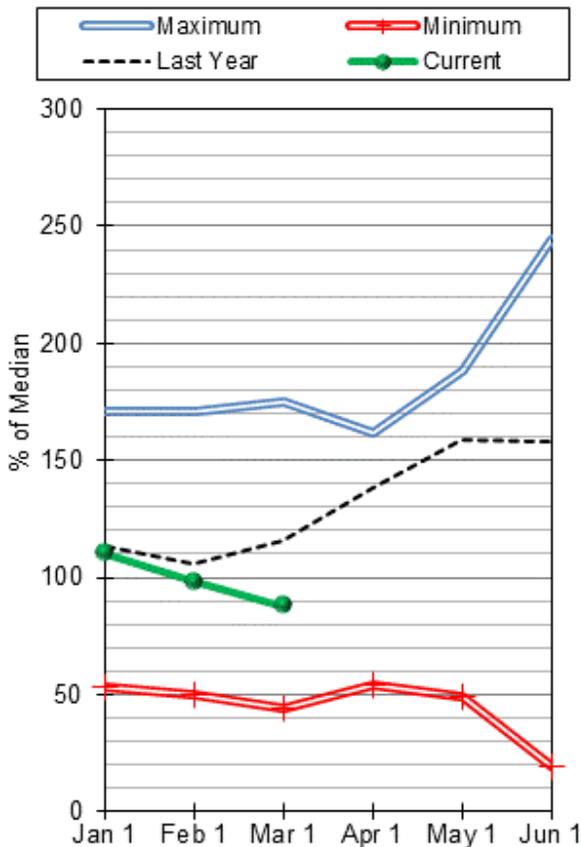
3) Median value used in place of average

Reservoir Storage End of February, 2015	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Lake Koocanusa	3815.9	4197.0	2501.0	5748.0
Basin-wide Total	3815.9	4197.0	2501.0	5748.0
# of reservoirs	1	1	1	1

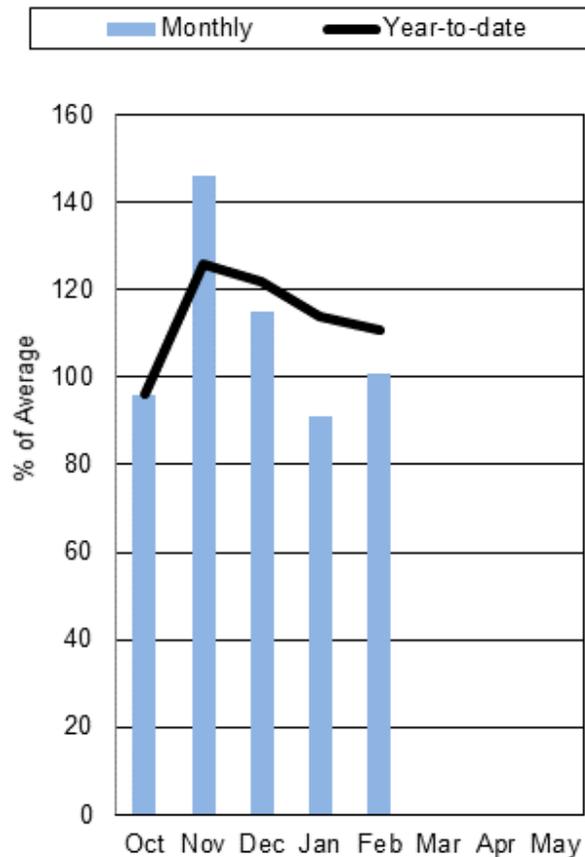
Watershed Snowpack Analysis March 1st, 2015	# of Sites	% Median	Last Year % Median
KOOTENAY in CANADA	17	86%	101%
KOOTENAI MAINSTEM	3	47%	92%
TOBACCO	3	79%	100%
FISHER	4	49%	133%
YAAK	2	78%	102%
KOOTENAI RIVER BASIN in MONTANA	12	60%	104%
KOOTENAI ab BONNERS FERRY	28	76%	105%

# Flathead River Basin

## Mountain Snowpack



## Precipitation



Like the Kootenai, the Flathead River basin did not follow along with Webster’s definition of winter! Since both basins are “connected”, the storm that hit the Kootenai during the first part of February also hit the Flathead. This storm brought snow to the higher elevations and rain to the lower elevations. Lower elevation SNOTEL sites within the basin showed melt during the first half of February. Streams and creeks responded to this low elevation melting during this time. As we moved to the end of February, the temperatures cooled down and a series of storms stopped this melt pattern and snow has started accumulating again.

Snowpacks are quite variable throughout the major Flathead River basin ranging from 68 percent of normal in the Little Bitterroot-Ashley River Basins to 107 percent of normal in the Mission Valley. The major forks of the Flathead River are well below average in the North Fork to near average in the Middle and South Fork Basins. Basin-wide snowpack is 111 percent of the water year to date average for March 1st<sup>st</sup>. Last year at this time it was 97 percent of average.

February mountain precipitation was a little below to near average in the Basin. Low elevation SNOTEL sites received more rain in February than snow. Many Glacier in Glacier National Peak received 5.6 inches of precipitation in February for 147 percent of average. Valley stations within the Flathead Basin also received good rain increments and are above to well above average for the month.

Basin-wide reservoir storage is 124 percent of average and 111 percent of last year.

Based on average precipitation for the rest of the year, the basin-wide April-July streamflow forecast is 99 percent of average and 72 percent of last year.

## Flathead River Basin Streamflow Forecasts - March 1st, 2015

FLATHEAD RIVER BASIN	Forecast Period	Forecast Exceedance Probabilities for Risk Assessment Chance that actual volume will exceed forecast						30yr Avg (KAF)
		90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	
NF Flathead R nr Columbia Falls	APR-JUL	1130	1260	1350	88%	1430	1560	1540
	APR-SEP	1260	1400	1490	88%	1590	1730	1700
MF Flathead R nr West Glacier	APR-JUL	1180	1330	1430	95%	1530	1680	1500
	APR-SEP	1290	1450	1560	96%	1660	1820	1630
Sf Flathead R nr Hungry Horse	APR-JUL	1100	1210	1280	108%	1360	1470	1180
	APR-SEP	1170	1280	1360	108%	1440	1560	1260
Hungry Horse Reservoir Inflow <sup>1,2</sup>	APR-JUL	1680	1940	2050	110%	2160	2410	1860
	APR-SEP	1790	2050	2170	110%	2300	2560	1980
Flathead R at Columbia Falls <sup>2</sup>	APR-JUL	4200	4620	4910	98%	5190	5610	5020
	APR-SEP	4560	5010	5320	98%	5630	6080	5450
Ashley Ck nr Marion <sup>2</sup>	MAR	0.32	0.79	1.1	92%	1.42	1.89	1.19
	APR-JUL	3.5	4.9	5.9	91%	6.8	8.2	6.5
Swan R nr Bigfork	APR-JUL	495	550	585	113%	620	670	520
	APR-SEP	565	625	665	112%	705	760	595
Flathead Lake Inflow <sup>1,2</sup>	APR-JUL	4540	5310	5670	98%	6020	6790	5810
	APR-SEP	4860	5720	6100	97%	6490	7340	6270
Mill Ck ab Bassoo ck nr Niarada	APR-JUL	2.8	3.7	4.4	110%	5	5.9	4
	APR-SEP	3.1	4.1	4.7	107%	5.3	6.3	4.4
South Crow Ck nr Ronan	APR-JUL	8	9.6	10.6	105%	11.6	13.2	10.1
	APR-SEP	9.2	10.9	12.1	104%	13.2	14.9	11.6
Mission Ck nr St. Ignatius	APR-JUL	22	24	26	104%	27	30	25
	APR-SEP	26	29	31	103%	33	36	30
SF Jocko R nr Arlee	APR-JUL	28	33	37	112%	40	45	33
	APR-SEP	32	37	41	111%	44	50	37
NF Jocko R bl Tabor Feeder Canal	APR-JUL	29	32	34	110%	35	38	31
	APR-SEP	31	34	35	106%	37	40	33

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

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

3) Median value used in place of average

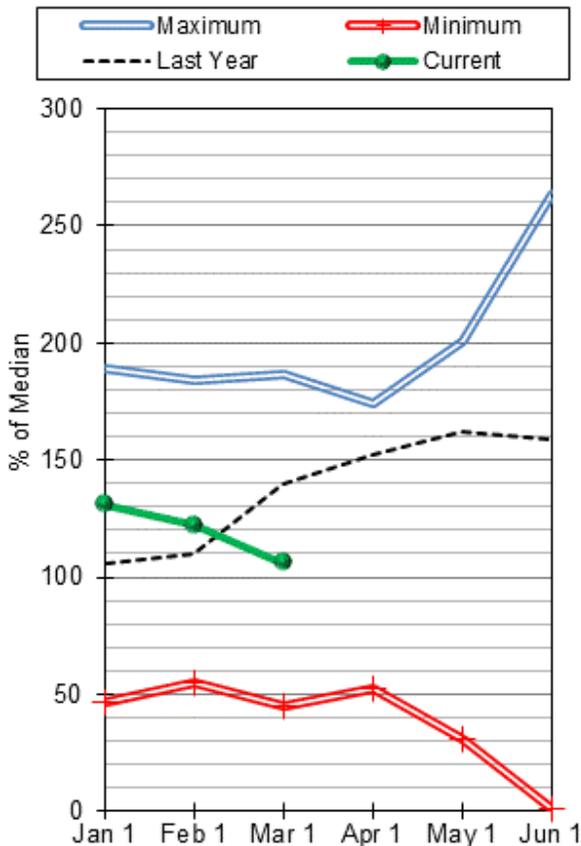
Reservoir Storage End of February, 2015	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Camas (4)	31.1	21.6	19.5	45.2
Lower Jocko Lake	0.0	0.0	0.0	6.4
Mission Valley (8)	27.6	22.5	32.0	100.0
Hungry Horse Lake	2888.3	2726.0	2209.0	3451.0
Flathead Lake	861.8	668.2	812.8	1791.0
Basin-wide Total	3808.8	3438.3	3073.3	5393.6
# of reservoirs	5	5	5	5

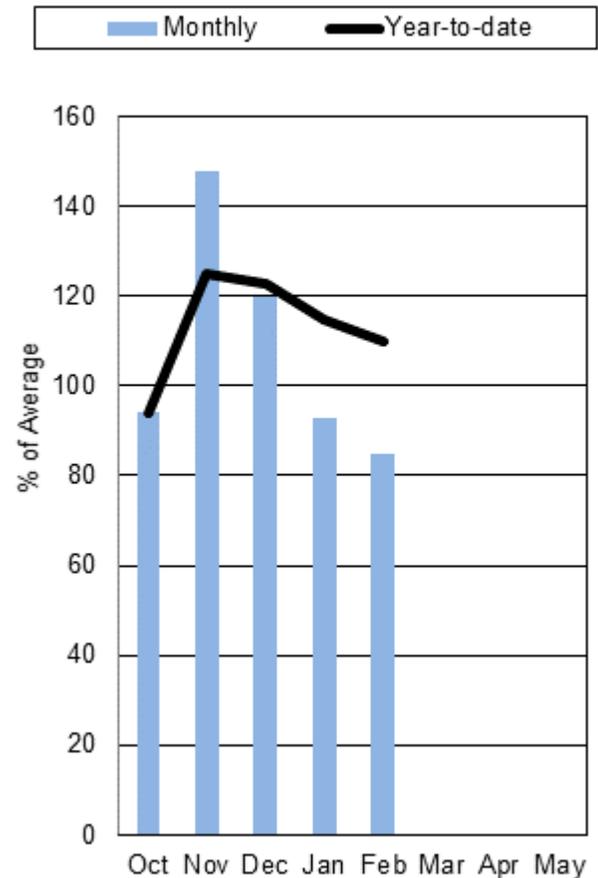
Watershed Snowpack Analysis March 1st, 2015	# of Sites	% Median	Last Year % Median
NF FLATHEAD in CANADA	4	61%	106%
NF FLATHEAD in MONTANA	9	77%	107%
MIDDLE FORK FLATHEAD	4	90%	118%
SOUTH FORK FLATHEAD	6	96%	113%
STILLWATER-WHITEFISH	9	81%	126%
SWAN	5	105%	112%
MISSION VALLEY	3	107%	119%
LITTLE BITTERROOT-ASHLEY	3	64%	122%
JOCKO	3	101%	120%
FLATHEAD in MONTANA	29	88%	117%
FLATHEAD RIVER BASIN	33	85%	116%

# Upper Clark Fork River Basin

## Mountain Snowpack



## Precipitation



Compared to most basins west of the Continental Divide the Upper Clark Fork River basin is in pretty good shape snowpack wise. It is currently the only basin above normal for March 1<sup>st</sup>, though snowpack percentages did drop 16 percent since February 1<sup>st</sup>. The month started with substantial precipitation in the basin with valleys and lower elevations in the mountains receiving rain, and higher elevations receiving a rain/snow mix depending on the location. After this event, warm and dry conditions prevailed under high pressure with some low elevations experiencing melt. After a small storm brought scattered snowfall in the basin during the 3<sup>rd</sup> week, cooler conditions returned to end the month.

While most mid to high elevation measurement locations are near to well above normal in the basin, some low elevation sites are well below normal. Combination SNOTEL near Phillipsburg is currently 54 percent of normal, and two snow courses in the Lubrecht Experimental Forest are 29 and 41 percent of normal. These lower elevation sites received rain on snow during the month and felt the effect of the warmer than average weather, dropping their percentages since February 1<sup>st</sup>. As a whole the basin currently 106 percent of normal for March 1<sup>st</sup>, and 76 percent of last year at this time.

Valley weather stations received 104 percent of monthly average precipitation for February, while mountain SNOTEL sites received 84 percent. Currently on February 1<sup>st</sup>, the Upper Clark Fork River Basin is 110 percent of water year-to-date average. Last year at this time the water year-to-date precipitation was 107 percent of average.

Basin-wide reservoir storage is currently 118 percent of average and 117 percent of last year at this time.

The basin-wide average April-July streamflow forecast for the Upper Clark Fork River is currently at 107 percent of average and 76 percent of last year.

## Upper Clark Fork River Basin Streamflow Forecasts - March 1st, 2015

Forecast Exceedance Probabilities for Risk Assessment Chance that actual volume will exceed forecast
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UPPER CLARK FORK RIVER BASIN	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Little Blackfoot nr Garrison	APR-JUL	45	64	77	110%	89	109	70
	APR-SEP	49	70	84	109%	98	118	77
Flint Ck nr Southern Cross	APR-JUL	8.3	12	14.5	117%	17.1	21	12.4
	APR-SEP	9.3	14	17.2	118%	20	25	14.6
Flint Ck bl Boulder Ck	APR-JUL	36	50	60	115%	70	85	52
	APR-SEP	46	64	76	115%	88	105	66
Lower Willow Ck Reservoir Inflow <sup>2</sup>	APR-MAY	3.8	6.2	7.8	107%	9.5	11.9	7.3
	APR-JUL	5.3	9.1	11.7	110%	14.3	18.2	10.6
MF Rock Ck nr Philipsburg	APR-JUL	47	57	63	109%	70	79	58
	APR-SEP	52	63	70	108%	78	88	65
Rock Ck nr Clinton	APR-JUL	187	240	275	110%	310	365	250
	APR-SEP	215	270	310	111%	350	405	280
Clark Fork R ab Milltown	APR-JUL	340	490	595	112%	700	850	530
	APR-SEP	410	575	690	112%	800	970	615
Nevada Ck nr Helmville	APR-MAY	4.4	7.6	9.8	117%	12	15.3	8.4
	APR-JUL	7	12.5	16.3	115%	20	26	14.2
Blackfoot R nr Bonner	APR-JUL	530	645	725	101%	805	920	720
	APR-SEP	595	720	805	101%	890	1020	800
Clark Fork R ab Missoula	APR-JUL	885	1150	1330	106%	1520	1780	1250
	APR-SEP	1020	1310	1510	106%	1700	1990	1420

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

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

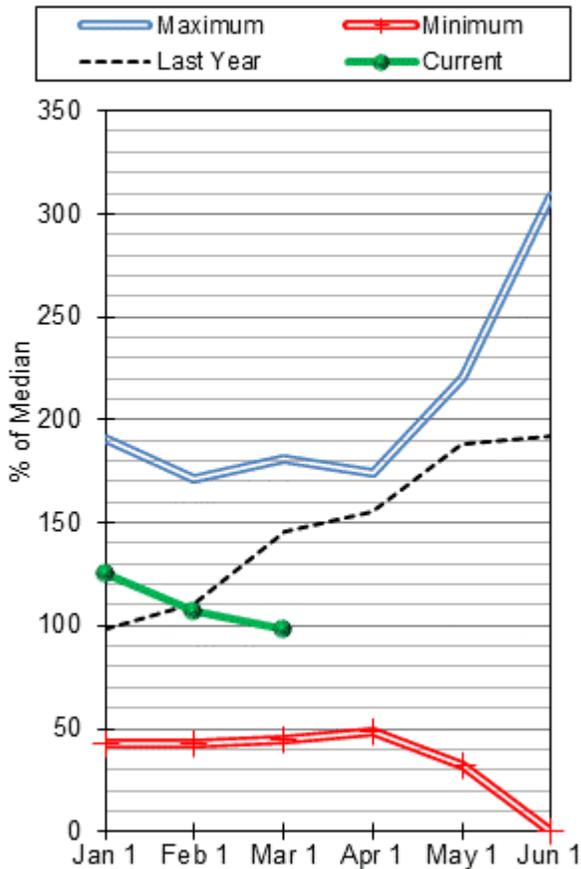
3) Median value used in place of average

Reservoir Storage End of February, 2015	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
East Fork Rock Creek Res	10.6	9.3	8.3	15.6
Georgetown Lake	28.7	28.4	27.6	31.0
Lower Willow Creek Reservoir		2.1	2.2	4.9
Nevada Creek Res	9.6	4.1	5.6	12.6
Basin-wide Total	48.9	41.8	41.5	59.2
# of reservoirs	3	3	3	3

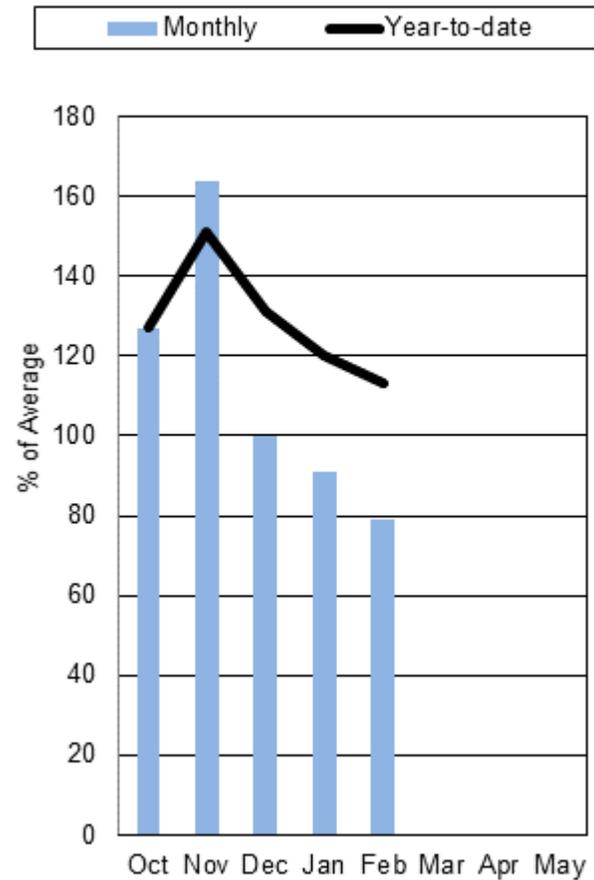
Watershed Snowpack Analysis March 1st, 2015	# of Sites	% Median	Last Year % Median
CLARK FORK ab FLINT CREEK	12	108%	142%
FLINT CREEK	5	115%	148%
ROCK CREEK	4	110%	138%
CLARK FORK ab BLACKFOOT	19	108%	143%
BLACKFOOT	12	102%	137%
UPPER CLARK FORK RIVER BASIN	29	106%	140%

# Bitterroot River Basin

## Mountain Snowpack



## Precipitation



The Bitterroot River Basin ended February with below normal snowpack for the first time since late November. The first week of the month brought snowfall to the higher elevations and rain to the Bitterroot valley, but mostly dry conditions prevailed after the second week of the month. SNOTEL sites in the basin reported only 56 percent of the normal February snowfall. The biggest changes experienced during the month were at the lowest mountain and valley elevations where the snowpack experienced melt with above average temperatures and bright sunny days. Higher elevations in the basin did not see much loss of snow water equivalent during this time and are generally above normal for March 1<sup>st</sup>. The lack of snowfall and loss snowpack at low elevations due to melt brought the basin below normal mid-month, and the basins has continued the decline through March 1<sup>st</sup>. Currently the Bitterroot River basin is 95 percent of normal for March 1<sup>st</sup>, and 65 percent of last year at this time.

Valley weather stations received 125 percent of monthly average precipitation for February, while mountain SNOTEL sites received 76 percent. Currently on March 1<sup>st</sup>, the Bitterroot River Basin is 113 percent of the water year-to-date average, down 7 percent from last month. Last year at this time the water year-to-date precipitation was 114 percent of average.

Painted Rocks Lake reservoir is currently at 237 percent of average and Lake Como reservoir is currently 175 percent of average. Basin-wide reservoir storage is at 194 percent of average and 156 percent of last year at this time.

The basin-wide average April-July streamflow forecast for the Bitterroot River is currently at 97 percent of average and 58 percent of last year.

## Bitterroot River Basin Streamflow Forecasts - March 1st, 2015

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

BITTERROOT RIVER BASIN	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
WF Bitterroot R Nr Conner <sup>2</sup>	APR-JUL	74	102	121	95%	140	168	128
	APR-SEP	78	110	131	94%	152	184	139
Bitterroot R Nr Darby	APR-JUL	250	330	390	95%	445	525	410
	APR-SEP	310	390	445	95%	500	580	470
Como Reservoir Inflow <sup>2</sup>	APR-JUL	62	70	75	99%	80	87	76
	APR-SEP	66	73	78	99%	83	91	79
Bitterroot R nr Missoula	APR-JUL	835	1010	1120	97%	1240	1410	1150
	APR-SEP	900	1090	1210	97%	1340	1520	1250

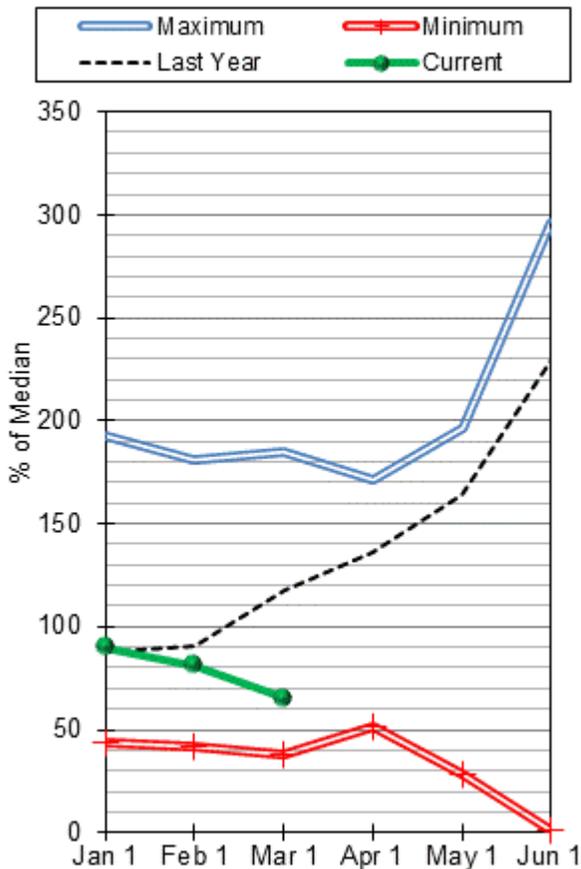
- 1) 90% and 10% exceedance probabilities are actually 95% and 5%
- 2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions
- 3) Median value used in place of average

Reservoir Storage End of February, 2015	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Painted Rocks Lake	13.5	10.4	5.7	31.7
Lake Como	22.6	12.6	12.9	34.9
Basin-wide Total	36.1	23.0	18.6	66.6
# of reservoirs	2	2	2	2

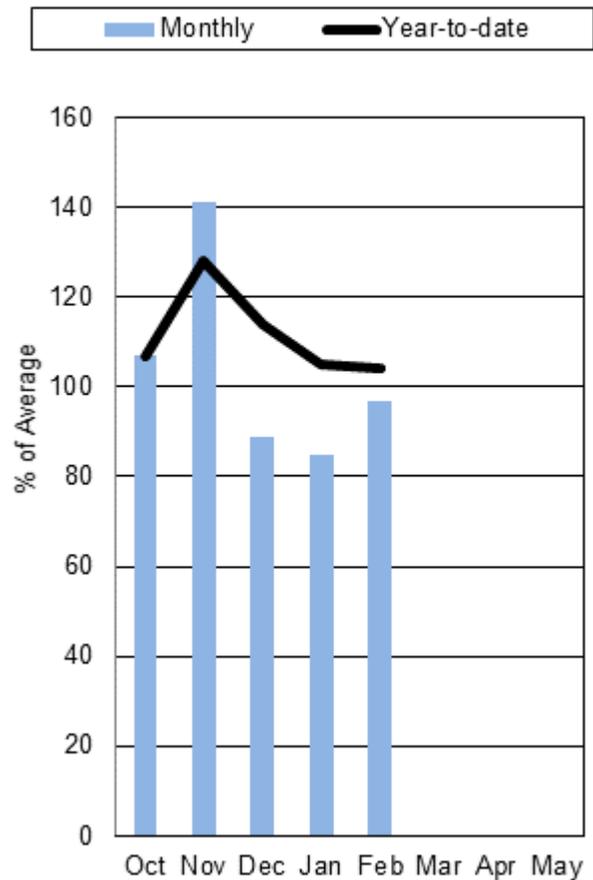
Watershed Snowpack Analysis March 1st, 2015	# of Sites	% Median	Last Year % Median
WEST FORK BITTERROOT	2	113%	158%
EAST SIDE BITTERROOT	3	106%	147%
WEST SIDE BITTERROOT	3	91%	143%
BITTERROOT RIVER BASIN	7	98%	146%

# Lower Clark Fork River Basin

## Mountain Snowpack



## Precipitation



Like the other major basins in the area, winter has skipped out or never really has shown up in the Lower Clark Fork River Basin. A storm early in February brought pretty good snow to the higher elevations especially along the Idaho-Montana border. These increases were short lived as high pressure came back into the area along with above average temperatures. Snowpacks showed slight decreases during this time and didn't start accumulating again until the end of the month. This pattern did not help the already well below normal snowpacks of the basin. Overall Basin snowpack is 65 percent of normal and 55 percent of last year. This is a 15 percent decrease from February 1<sup>st</sup>.

Thanks to the warm temperatures that persisted throughout much of February, mountain precipitation was near to a little above average at most of the SNOTEL sites in the basin. SNOTEL sites along the Montana-Idaho border only received 81 to 87 percent of average precipitation. Basin-wide February mountain precipitation was 98 percent of average. Currently the basin is 104 percent of the water year to date average for March 1<sup>st</sup>. Last year at this time it was 91 percent of average.

Valley precipitation for February was more variable ranging from 54 percent of average at Superior to 141 percent of average at the Missoula Airport. For the month basin-wide valley precipitation was 91 percent of average and 47 percent of last year. The combined (mountain and valley stations) February precipitation was 97 percent of average and 50 percent of last year. Currently on March 1<sup>st</sup>, the Lower Clark Fork River Basin is 104 percent of the water year-to-date average. Last year at this time the water year-to-date precipitation was 91 percent of average.

Reservoir storage at the end of February in Noxon Reservoir is 102 percent of average and 103 percent of last year.

Based on average precipitation for the rest of the year, the basin-wide April-July streamflow forecast for the Lower Clark Fork River is 99 percent of average and 70 percent of last year.

## Lower Clark Fork River Basin Streamflow Forecasts - March 1st, 2015

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

LOWER CLARK FORK RIVER BASIN	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Clark Fork R bl Missoula	APR-JUL	1730	2140	2420	101%	2700	3110	2400
	APR-SEP	1940	2380	2680	100%	2990	3430	2670
Clark Fork R at St. Regis <sup>1</sup>	APR-JUL	2140	2870	3200	101%	3530	4260	3160
	APR-SEP	2410	3190	3540	101%	3900	4680	3510
Clark Fork R nr Plains <sup>1,2</sup>	APR-JUL	6920	8440	9130	99%	9820	11300	9200
	APR-SEP	7540	9200	9960	99%	10700	12400	10100
Thompson nr Thompson Falls	APR-JUL	46	83	108	60%	133	170	181
	APR-SEP	58	98	125	61%	152	192	205
Prospect Ck at Thompson Falls	APR-JUL	33	50	61	60%	73	89	102
	APR-SEP	38	55	66	60%	78	95	110
Clark Fork R at Whitehorse Rapids <sup>1,2</sup>	APR-JUL	7900	9560	10300	98%	11100	12700	10500
	APR-SEP	8620	10500	11300	98%	12100	13900	11500

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

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

3) Median value used in place of average

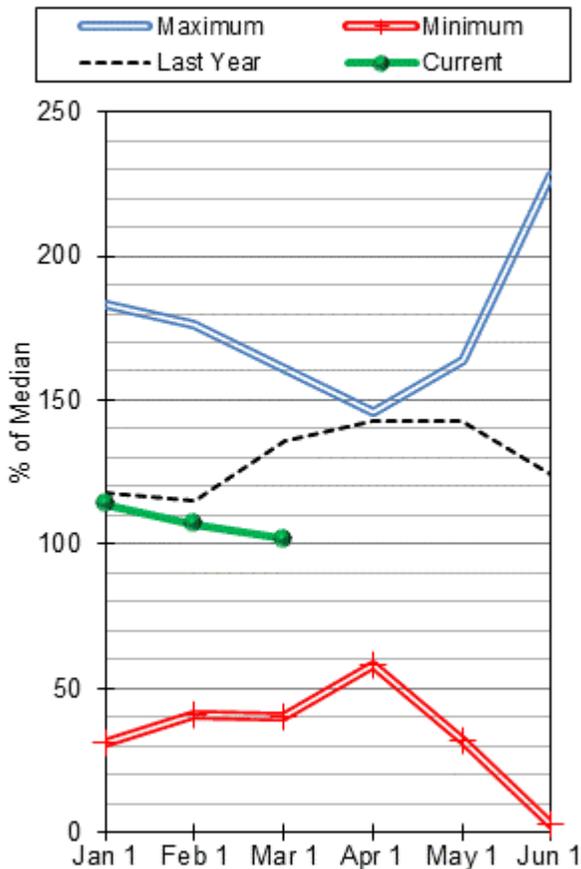
<b>Reservoir Storage End of February, 2015</b>	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Noxon Rapids Reservoir	319.7	311.8	313.9	335.0
Basin-wide Total	319.7	311.8	313.9	335.0
# of reservoirs	1	1	1	1

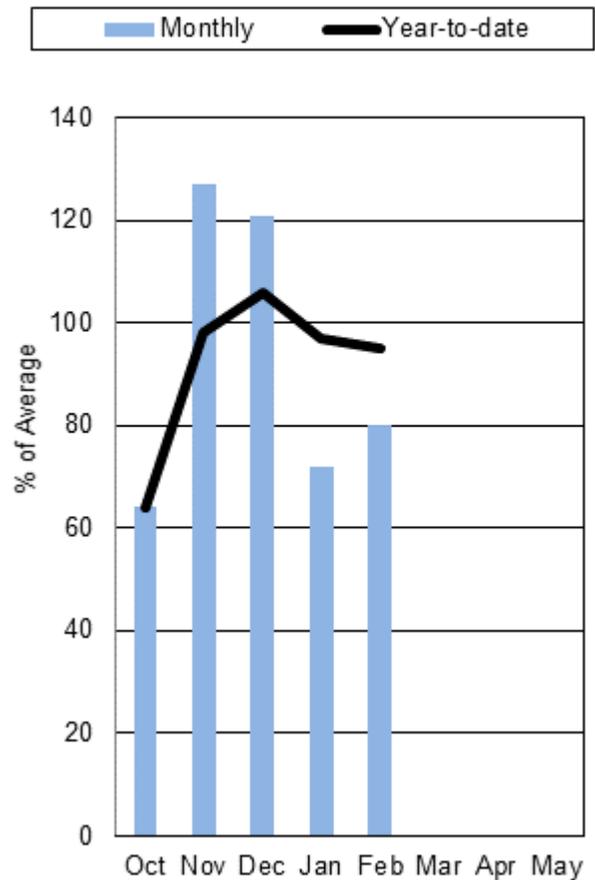
<b>Watershed Snowpack Analysis March 1st, 2015</b>	# of Sites	% Median	Last Year % Median
LOWER CLARK FORK RIVER BASIN	10	65%	118%

# Jefferson River Basin

## Mountain Snowpack



## Precipitation



Like our weather this year, conditions are variable across the greater Jefferson River basin. The western and northern end of the basin received snowfall at the beginning and end of the month, and continue to be above normal for March 1<sup>st</sup>. The Boulder River sub-basin is currently well above normal at 121 percent as is the Big Hole River basin which is currently 114 percent. The Beaverhead River basin as a whole is near normal at 96 percent, with sites along the western part of the basin reporting near to above normal for March 1<sup>st</sup>.

It is a completely different story in the southeastern end of the basin where record low snow water equivalent (SWE) values for the date were recorded at SNOTEL sites on March 1<sup>st</sup>. Currently the Lakeview Ridge SNOTEL site is reporting 49 percent of normal SWE for March 1<sup>st</sup>. The southeastern part of the basin in the Ruby and Red Rock drainages are both the lowest in 35 years for the combined basin-wide SWE values from SNOTEL sites. Snowfall accumulation before spring runoff will be carefully monitored in these basins, which have seen below normal conditions for 3 of the last 4 years.

As a whole, the Jefferson River basin is doing well snowpack wise, currently 102 percent of normal for March 1<sup>st</sup>, and 74 percent of last year at this time.

Valley weather stations received 79 percent of monthly average precipitation for February, while mountain SNOTEL sites received 80 percent. Currently on March 1<sup>st</sup>, the Jefferson River Basin is 95 percent of the water year-to-date average. Last year at this time the water year-to-date precipitation was 110 percent of average.

Clark Canyon Reservoir is currently at 86 percent of average, Lima Reservoir is 120 percent of average, and Ruby Reservoir is currently at 126 percent of average. Basin-wide reservoir storage is at 97 percent of average and 121 percent of last year of last year at this time.

The basin-wide average April-July streamflow forecast for the Jefferson River is currently at 90 percent of average and 79 percent of last year.

# Jefferson River Basin Streamflow Forecasts - March 1st, 2015

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

JEFFERSON RIVER BASIN	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Lima Reservoir Inflow <sup>2</sup>	APR-JUL	8.6	29	41	50%	57	77	82
	APR-SEP	2.4	27	43	48%	59	84	89
Clark Canyon Inflow <sup>2</sup>	APR-JUL	-15	19.7	54	53%	88	139	101
	APR-SEP	-4	29	67	56%	105	160	120
Beaverhead R at Barretts <sup>2</sup>	APR-JUL	17.9	32	82	64%	117	191	129
	APR-SEP	28	41	102	65%	145	230	156
Ruby R Reservoir Inflow <sup>2</sup>	APR-JUL	17.7	35	46	60%	58	75	77
	APR-SEP	25	44	57	63%	71	90	91
Big Hole R at Wisdom	APR-JUL	38	82	112	110%	142	186	102
	APR-SEP	38	86	119	110%	152	200	108
Big Hole R nr Melrose	APR-JUL	385	505	590	115%	675	795	515
	APR-SEP	410	545	635	113%	725	860	560
Jefferson R nr Twin Bridges <sup>2</sup>	APR-JUL	250	475	640	93%	780	1000	690
	APR-SEP	255	505	690	95%	845	1100	730
Boulder R nr Boulder	APR-JUL	48	65	76	110%	87	104	69
	APR-SEP	52	70	82	111%	94	112	74
Willow Ck Reservoir Inflow <sup>2</sup>	APR-JUL	1.89	8	12.2	73%	16.4	23	16.8
	APR-SEP	4.3	10.7	15.1	78%	19.4	26	19.3
Jefferson R nr Three Forks <sup>2</sup>	APR-JUL	182	435	615	83%	780	1030	740
	APR-SEP	183	465	665	83%	845	1120	800

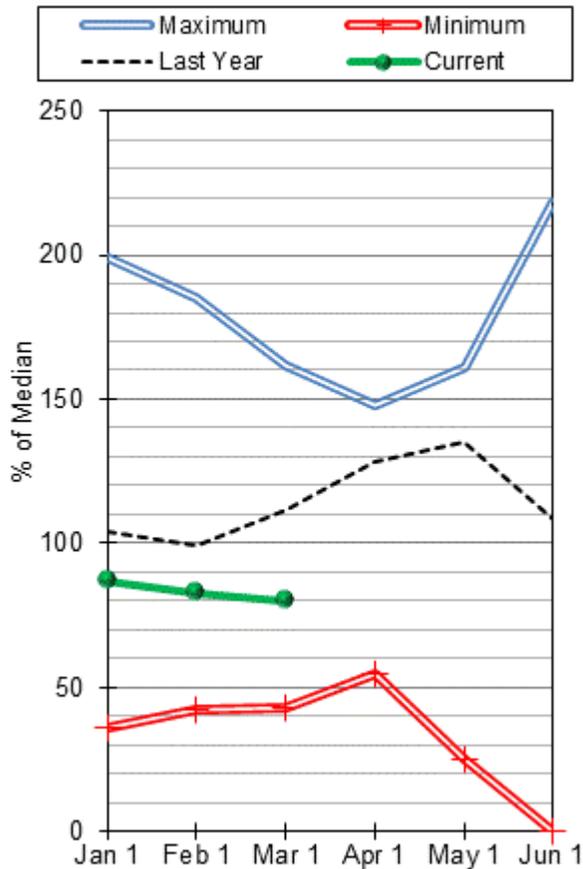
- 1) 90% and 10% exceedance probabilities are actually 95% and 5%
- 2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions
- 3) Median value used in place of average

Reservoir Storage End of February, 2015	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Lima Reservoir	37.4	23.8	31.1	84.0
Clark Canyon Res	108.4	92.3	126.4	255.6
Ruby River Reservoir	34.2	32.3	27.2	38.8
Basin-wide Total	180.0	148.4	184.7	378.4
# of reservoirs	3	3	3	3

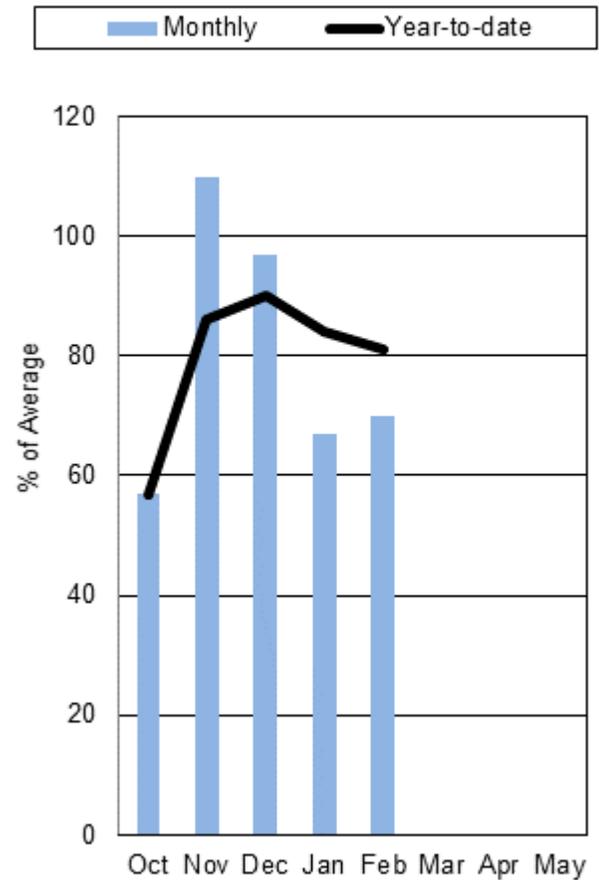
Watershed Snowpack Analysis March 1st, 2015	# of Sites	% Median	Last Year % Median
BEAVERHEAD	9	96%	122%
RUBY	5	76%	125%
BIGHOLE	13	114%	150%
BOULDER	6	121%	163%
JEFFERSON RIVER BASIN	27	102%	138%

# Madison River Basin

## Mountain Snowpack



## Precipitation



The Madison River Basin currently has the lowest percentage of normal snowpack of all of the major river basins in southwest Montana. February was characterized by periods of cool and unsettled weather, followed by warm and dry conditions during high pressure periods. Unfortunately the storm track during the cool and unsettled periods was generally from a northwest to northerly direction which does not favor the majority of this basin and only 68 percent of normal snow water equivalent was recorded basin-wide. The southern part of the basin, above Hebgen Lake received their only significant snowfall during the first week of February and currently is 76 percent of normal snowpack.

Below Hebgen Lake the northern mountains made some gains as the northerly flow helped to boost the snowpack to 83 percent of normal. As a whole the snowpack of the Madison River Basin is currently 80 percent of normal with a net loss of 3 percent over the month of February. This is 71 percent of the snowpack at this time last year.

Valley weather stations received 61 percent of the average precipitation for February while mountain stations received 70 percent of average. Overall the Madison River Basin has experienced 81 percent of average precipitation water year-to-date. Last year at this time the basin was 101 percent of average.

Hebgen Lake is currently 112 percent of average and 101 percent of last year at this time.

The basin-wide average April-July streamflow forecast for the Madison River is currently at 76 percent of average and 79 of last year.

## Madison River Basin Streamflow Forecasts - March 1st, 2015

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

MADISON RIVER BASIN	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Hebgen Reservoir Inflow <sup>2</sup>								
	APR-JUL	230	270	295	80%	320	360	370
	APR-SEP	295	345	375	80%	405	455	470
Ennis Reservoir Inflow <sup>2</sup>								
	APR-JUL	325	410	465	74%	520	605	625
	APR-SEP	420	515	580	75%	650	745	775

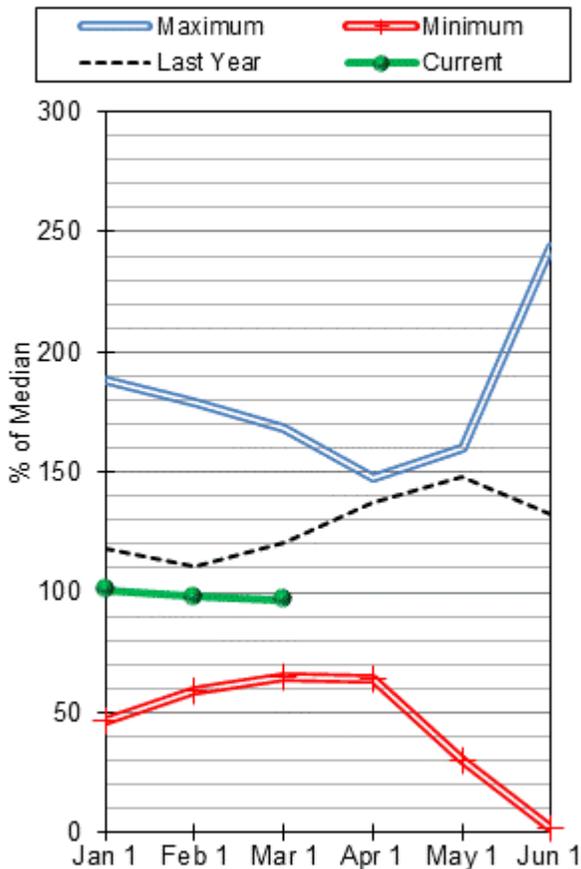
- 1) 90% and 10% exceedance probabilities are actually 95% and 5%
- 2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions
- 3) Median value used in place of average

Reservoir Storage End of February, 2015	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Ennis Lake	28.2	28.2	29.8	41.0
Hebgen Lake	310.3	305.5	274.6	377.5
Basin-wide Total	338.5	333.7	304.4	418.5
# of reservoirs	2	2	2	2

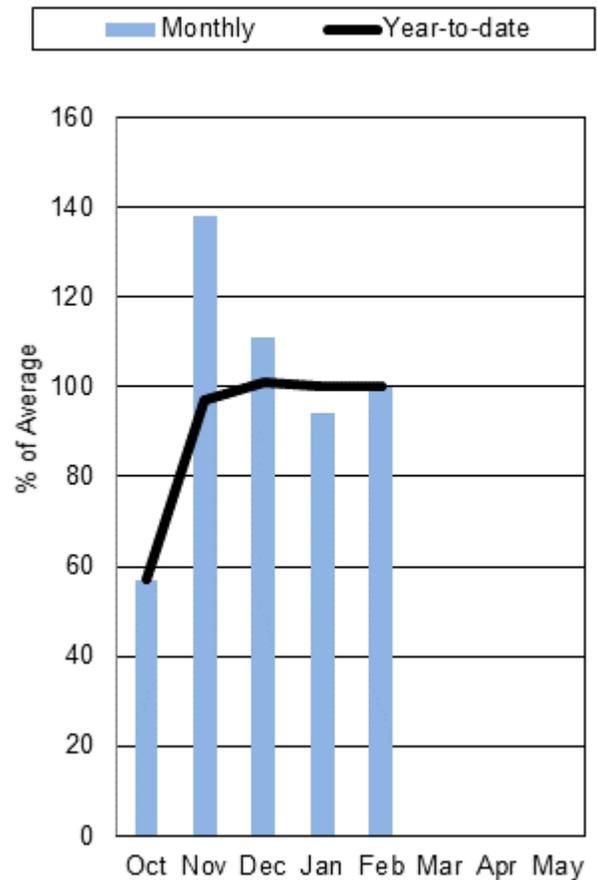
Watershed Snowpack Analysis March 1st, 2015	# of Sites	% Median	Last Year % Median
MADISON abv HEBGEN LAKE	6	76%	102%
MADISON blw HEBGEN LAKE	10	83%	118%
MADISON RIVER BASIN	16	80%	112%

# Gallatin River Basin

## Mountain Snowpack



## Precipitation



The month of February was characterized by periods of cool unsettled conditions interspersed with warm spells of high pressure. The cool and unsettled periods occurred the first and third weeks of the month and brought significant snow to mountain locations and a mix of rain and snow to lower elevations. Each precipitation event was followed by a period of strong high pressure which brought warmer than average daytime high temperatures. The last week of the month brought a cool and dry northerly flow with no significant precipitation.

Overall the Gallatin River Basin experienced normal snow accumulation for the month of February which helped to maintain near normal snowpack values. A more detailed look at the basin reveals that snowpack gains were made at high elevations in the northern half of the basin this month while lower elevations along with the southern half of the basin did not fare as well. Despite this divergent distribution the overall snowpack is currently at 97 percent of normal basin wide, a net loss of only 1 percent since February 1<sup>st</sup>. This value represents a range from 88 percent of normal snowpack in the Upper Gallatin to 128 percent of normal in the Bridger Range. The snowpack in Hyalite falls right in the middle at 95 percent of normal. Basin-wide the Gallatin River basin is currently 97 percent of normal for March 1<sup>st</sup>, and 80 percent of last year at this time.

In the same vein, precipitation for the month favored mountain locations which experienced 103 percent of average precipitation while valley locations only received 58 percent of their average precipitation for the month of February. As of March 1<sup>st</sup> the Gallatin River Basin has experienced 100 percent of average precipitation since Oct 1. As a comparison, on this date last year, the year to date precipitation was 112 percent of average.

Middle Creek Reservoir is currently 100 percent of average and 112 percent of last year at this time.

The basin-wide average April-July streamflow forecast for the Gallatin River is currently at 90 percent of average and 79 of last year.

## Gallatin River Basin Streamflow Forecasts - March 1st, 2015

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

GALLATIN RIVER BASIN	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Gallatin R nr Gateway	APR-JUL	255	315	355	89%	395	455	400
	APR-SEP	300	370	415	88%	460	530	470
Hyalite Reservoir Inflow <sup>2</sup>	APR-JUL	17	19.3	21	105%	22	25	20
	APR-SEP	19.8	22	24	104%	25	28	23
Gallatin R at Logan	APR-JUL	225	325	395	90%	465	565	440
	APR-SEP	255	375	455	90%	535	650	505

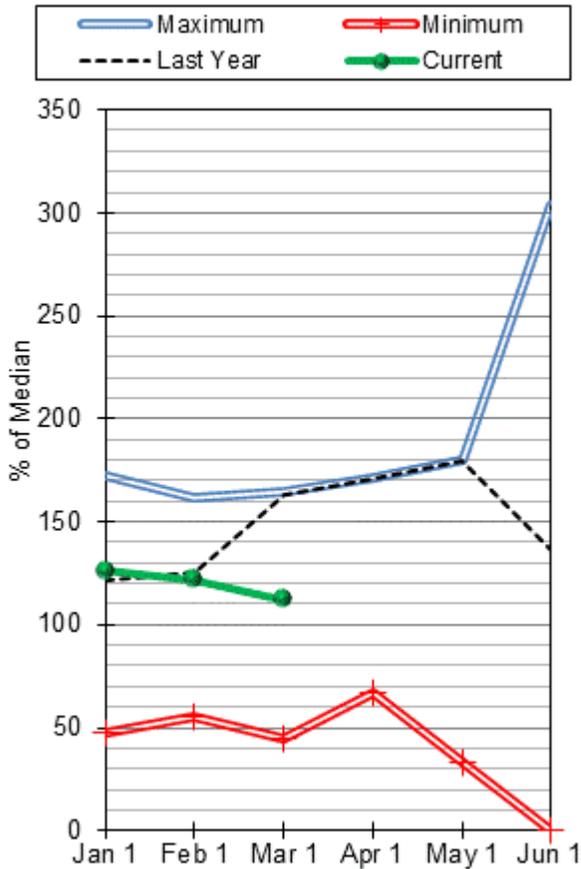
- 1) 90% and 10% exceedance probabilities are actually 95% and 5%
- 2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions
- 3) Median value used in place of average

Reservoir Storage End of February, 2015	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Middle Creek Res	5.4	4.8	5.4	10.2
Basin-wide Total	5.4	4.8	5.4	10.2
# of reservoirs	1	1	1	1

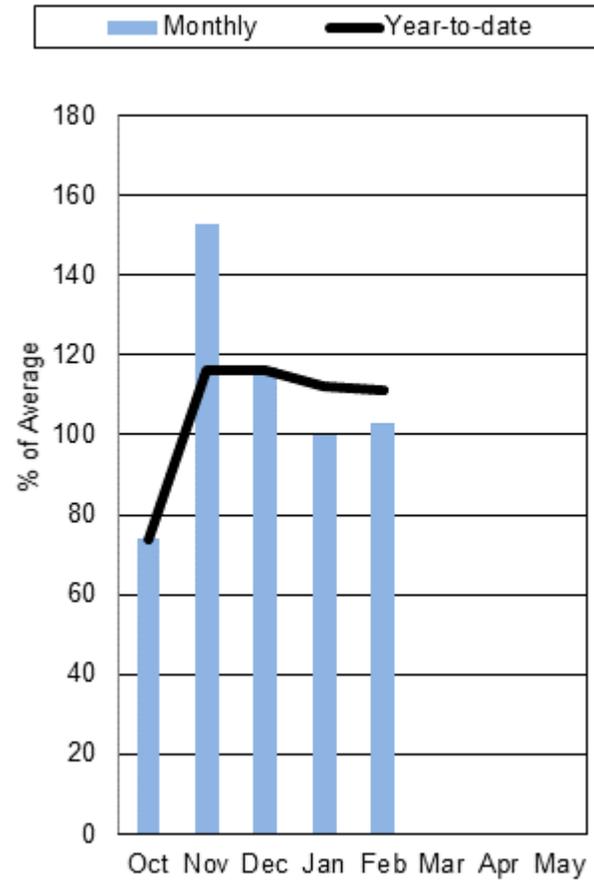
Watershed Snowpack Analysis March 1st, 2015	# of Sites	% Median	Last Year % Median
UPPER GALLATIN	5	88%	111%
HYALITE	4	95%	122%
BRIDGER	2	128%	148%
GALLATIN RIVER BASIN	11	97%	121%

# Missouri Headwaters Mainstem River Basin

## Mountain Snowpack



## Precipitation



Snowpack in the area around Helena is currently the highest in the state in terms of percentage of normal for March 1st<sup>st</sup>. Early snowfall in the year built a strong foundation, one that has been able to withstand the warm temperatures and rain that fell during the month of February. Snow fell at the beginning of the month at higher elevations in the basin, but mostly as rain at low elevations in the mountains and valleys. Mostly dry and above average temperatures prevailed until the end of the month when cooler temperatures and scattered snowfall increased basins percentages.

Currently SNOTEL sites and snow courses are 112 to 179 percent of normal for March 1st<sup>st</sup>, only two SNOTEL sites in the central/southern end of the basin are slightly below normal. Overall the combined Missouri Headwaters Mainstem River basin is still doing well for March 1st<sup>st</sup> with basin-wide snow water equivalent at 112 percent of normal, down 10 percent from February 1<sup>st</sup>, and 69 percent of last year at this time.

Valley weather stations received 127 percent of monthly average precipitation for January, while mountain SNOTEL sites received 106 percent. Currently on March 1st<sup>st</sup>, the Missouri Mainstem River Basin is 110 percent of the water year-to-date average. Last year at this time the water year-to-date precipitation was 114 percent of average.

Fort Peck Lake is currently at 119 percent of average, Canyon Ferry is currently 103 percent of average, and Lake Helena is currently at 91 percent of average. Basin-wide reservoir storage is at 114 percent of average and 116 percent of last year at this time.

The basin-wide average April-July streamflow forecast for the Missouri Mainstem River is currently at 87 percent of average and 70 percent of last year.

## Missouri Mainstem Basin Streamflow Forecasts - March 1st, 2015

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

MISSOURI MAINSTEM BASIN	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Missouri R at Toston <sup>2</sup>	APR-JUL	780	1190	1480	83%	1760	2170	1790
	APR-SEP	880	1360	1690	82%	2020	2510	2070
Dearborn R nr Craig	APR-JUL	32	61	80	90%	100	128	89
	APR-SEP	35	65	86	91%	107	137	95
Missouri R at Fort Benton <sup>2</sup>	APR-JUL	1120	1730	2150	82%	2550	3160	2610
	APR-SEP	1330	2050	2550	82%	3040	3760	3110
Missouri R nr Virgelle <sup>2</sup>	APR-JUL	1300	2000	2490	83%	2960	3660	3000
	APR-SEP	1490	2330	2890	82%	3460	4300	3520
Missouri R nr Landusky <sup>2</sup>	APR-JUL	1390	2110	2620	83%	3100	3830	3160
	APR-SEP	1590	2460	3050	82%	3640	4510	3720
Missouri R bl Fort Peck Dam <sup>2</sup>	APR-JUL	1280	2080	2630	81%	3160	3960	3240
	APR-SEP	1240	2240	2920	79%	3600	4600	3700
Lake Sakakawea Inflow <sup>2</sup>	APR-JUL	4720	6560	7820	94%	9060	10900	8310
	APR-SEP	4890	7170	8730	93%	10300	12600	9400

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

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

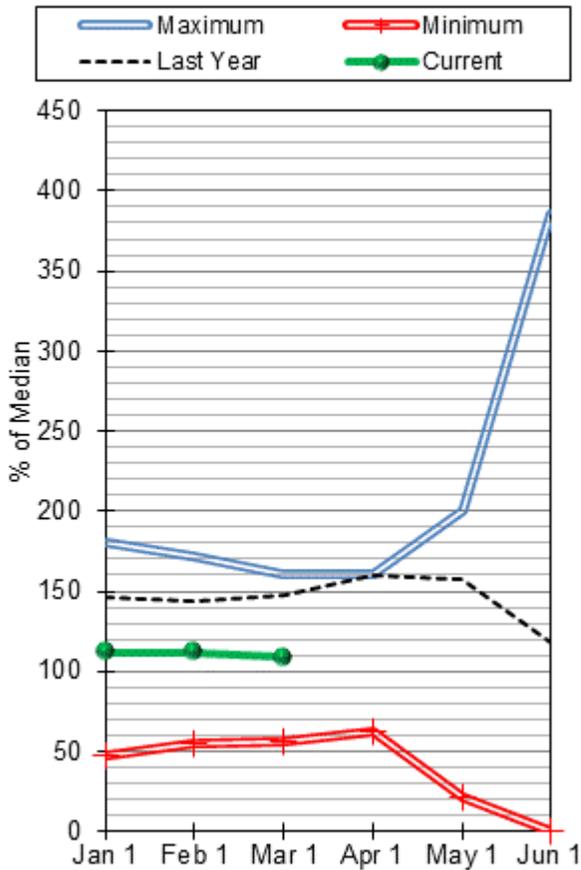
3) Median value used in place of average

Reservoir Storage End of February, 2015	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Canyon Ferry Lake	1531.2	1453.0	1482.0	2043.0
Helena Valley Reservoir	5.1	6.0	4.4	9.2
Lake Helena	9.9	9.7	10.9	12.7
Hauser Lake & Lake Helena	70.3	69.6	73.7	74.6
Holter Lake	81.2	80.6	79.5	81.9
Fort Peck Lake	15251.6	12735.6	12838.0	18910.0
<b>Basin-wide Total</b>	<b>16949.4</b>	<b>14354.5</b>	<b>14488.5</b>	<b>21131.4</b>
# of reservoirs	6	6	6	6

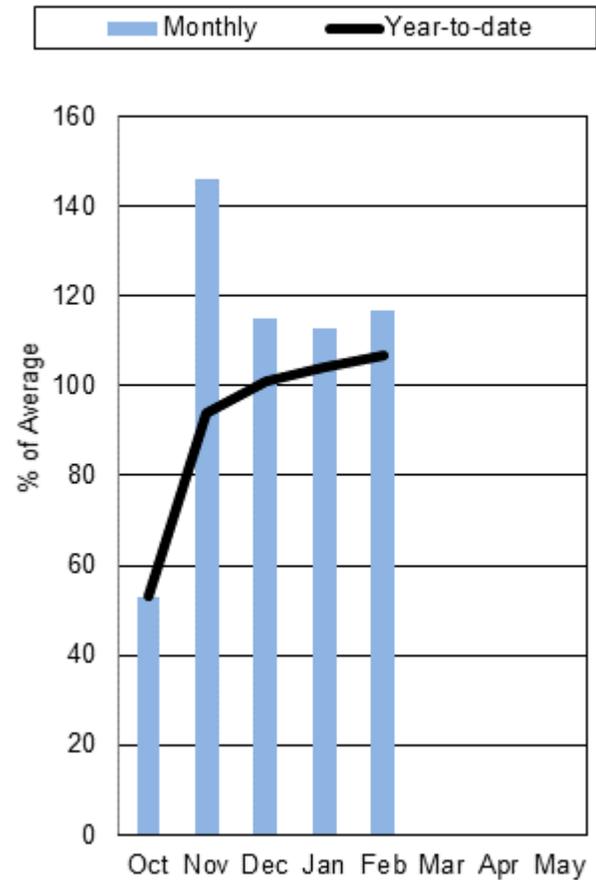
Watershed Snowpack Analysis March 1st, 2015	# of Sites	% Median	Last Year % Median
HEADWATERS MAINSTEM	9	112%	163%
SMITH-JUDITH-MUSSELSHELL	11	109%	147%
SUN-TETON-MARIAS	11	87%	133%
MAINSTEM ab FT PECK RES	32	99%	145%
MILK RIVER BASIN	9	48%	151%
MISSOURI MAINSTEM BASIN	41	95%	146%

# Smith-Judith-Musselshell River Basins

## Mountain Snowpack



## Precipitation



The basin-wide snowpack in Smith-Judith-Musselshell River Basin started the month of February at 112 percent of normal. The majority of the basin only received minor loss of water within the snowpack over the month of February. The Highwood Mountains fared the worst in the region. Highwood Station Snow Course (Elevation 4600 ft.) lost 0.8 inches of snow water equivalent in February. The Highwood Mountains saw a 26 percent net loss to 39 percent of normal snowpack conditions by March 1st<sup>st</sup>, the largest reduction in the Smith-Judith-Musselshell Basin. Currently the basin is above average at 109 percent of normal snowpack, while last year at this time the basin was 147 percent of normal.

Valley weather stations received 73 percent of monthly average precipitation for February, while mountain SNOTEL sites received 122 percent. Currently on March 1st<sup>st</sup>, the Smith-Judith-Musselshell River Basin is 107 percent of the water year-to-date average. Last year at this time the basin was 127 percent of average.

Basin-wide reservoir storage is currently at 164 percent of average, and 155 percent of last year at this time.

The basin-wide average April-July streamflow forecast for the Smith-Judith-Musselshell Rivers is currently at 109 percent of average and 74 percent of last year.

## Smith-Judith-Musselshell Streamflow Forecasts - March 1st, 2015

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

SMITH-JUDITH-MUSSELSHELL	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Sheep Ck nr White Sulphur Springs								
	APR-JUL	13	16.4	18.7	121%	21	24	15.5
	APR-SEP	15.2	19.2	22	120%	25	29	18.4
Smith R bl Eagle Ck <sup>2</sup>								
	APR-JUL	69	103	125	118%	148	181	106
	APR-SEP	76	115	142	122%	168	210	116
NF Musselshell R nr Delpine								
	APR-JUL	2	3.2	4	118%	4.8	6	3.4
	APR-SEP	2.5	3.8	4.7	118%	5.6	7	4
SF Musselshell R ab Martinsdale								
	APR-JUL	7.2	23	33	94%	43	59	35
	APR-SEP	8.5	25	36	95%	47	64	38
Musselshell R at Harlowton <sup>2</sup>								
	APR-JUL	1.47	36	60	105%	83	118	57
	APR-SEP	1.5	37	62	105%	87	124	59
Musselshell R nr Roundup <sup>2</sup>								
	APR-JUL	-23	24	69	103%	114	180	67
	APR-SEP	-25	24	69	105%	113	179	66

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

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

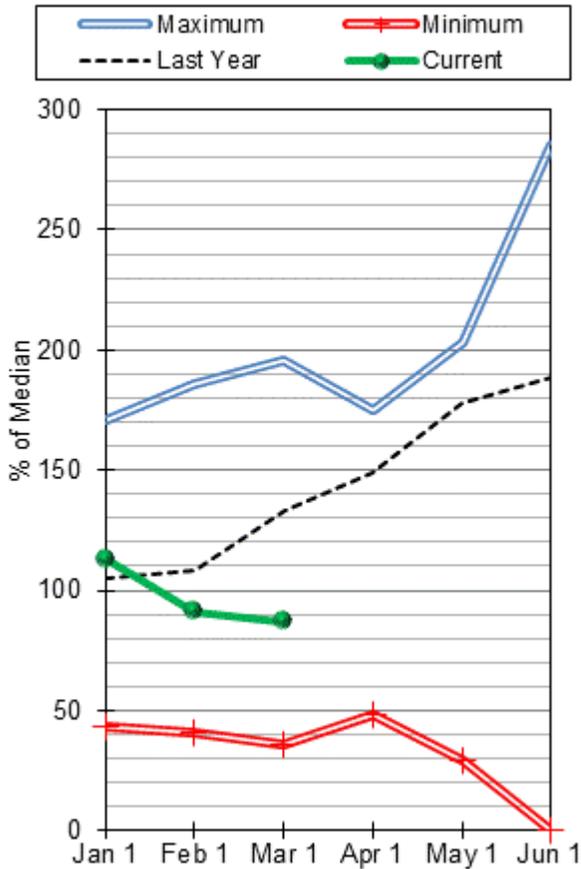
3) Median value used in place of average

Reservoir Storage End of February, 2015	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Smith River Res	9.0	6.7	5.8	10.6
Ackley Lake	3.9	3.6	2.6	7.0
Bair Res	6.2	3.2	3.2	7.0
Martinsdale Res	17.9	5.5	7.8	23.1
Deadman's Basin Res	65.9	47.4	43.4	72.2
Basin-wide Total	102.9	66.5	62.8	119.9
# of reservoirs	5	5	5	5

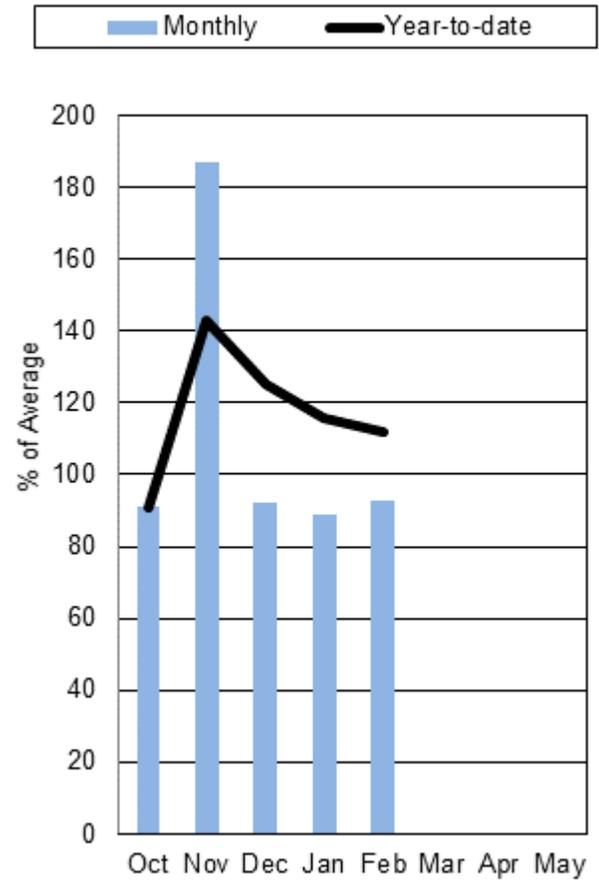
Watershed Snowpack Analysis March 1st, 2015	# of Sites	% Median	Last Year % Median
SMITH	7	113%	149%
HIGHWOOD	2	39%	128%
JUDITH	5	114%	145%
MUSSELSHELL	3	97%	168%
SMITH-JUDITH-MUSSELSHELL	11	109%	147%

# Sun-Teton-Marias River Basins

## Mountain Snowpack



## Precipitation



The basin-wide snowpack in the Sun-Teton-Marias River Basin started the month of February at 91 percent of normal. The snow water equivalent among the basin’s SNOTEL sites increased 1.7 inches over the month of February, approximately 60 percent of the normal February value. The Teton River Basin saw the largest decrease in percentage of normal (12 percent). The southern region of the Sun-Teton-Marias basin is fairing slightly better than the northern, with the Sun at 97 percent and the Marias at 79 percent. Overall the Sun-Teton-Marias River Basin snowpack is below average at 87 percent of normal, while last year at this time the basin was 133 percent of normal.

Valley weather stations received 99 percent of monthly average precipitation for February, while mountain SNOTEL sites received 92 percent. Currently on March 1st<sup>st</sup>, the Sun-Teton-Marias River Basin is 112 percent of the water year-to-date average. Last year at this time the basin was 116 percent of average.

Basin-wide reservoir storage is currently at 114 percent of average, and 121 percent of last year at this time.

The basin-wide average April-July streamflow forecast for the Sun-Teton-Marias Rivers is currently at 90 percent of average and 66 percent of last year.

## Sun-Teton-Marias Streamflow Forecasts - March 1st, 2015

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

SUN-TETON-MARIAS	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Gibson Reservoir Inflow	APR-JUL	255	315	360	91%	400	460	395
	APR-SEP	285	350	395	90%	445	510	440
Two Medicine R nr Browning <sup>2</sup>	APR-JUL	122	148	165	90%	182	210	183
	APR-SEP	130	157	175	90%	193	220	194
Badger Ck nr Browning	APR-JUL	52	67	78	89%	89	104	88
	APR-SEP	62	79	91	88%	103	120	103
Swift Reservoir Inflow <sup>2</sup>	APR-JUL	27	39	47	82%	55	67	57
	APR-SEP	34	47	56	84%	65	78	67
Dupuyer Ck nr Valier	APR-JUL	1.5	3.2	8.1	73%	13	20	11.1
	APR-SEP	1.8	3.6	9	71%	14.4	22	12.7
Cut Bank Ck nr Browning	APR-JUL	40	54	64	93%	74	88	69
	APR-SEP	43	59	69	92%	79	95	75
Marias R nr Shelby <sup>2</sup>	APR-JUL	131	235	310	90%	380	490	345
	APR-SEP	123	235	315	88%	395	505	360
Teton R nr Dutton	APR-JUL	5	20	40	95%	59	87	42
	APR-SEP	5.2	25	45	94%	66	97	48

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

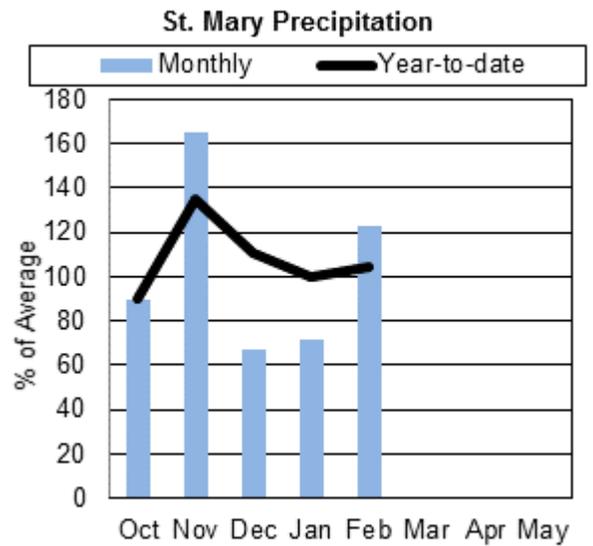
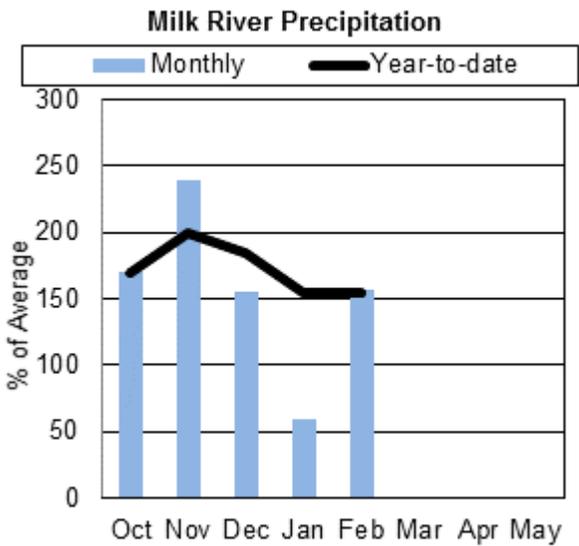
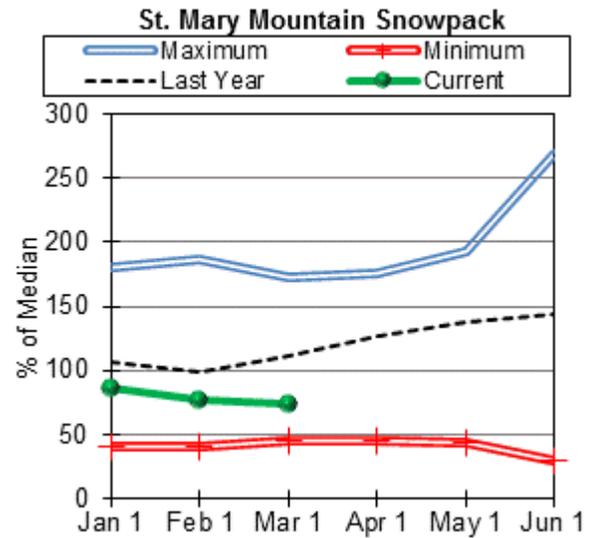
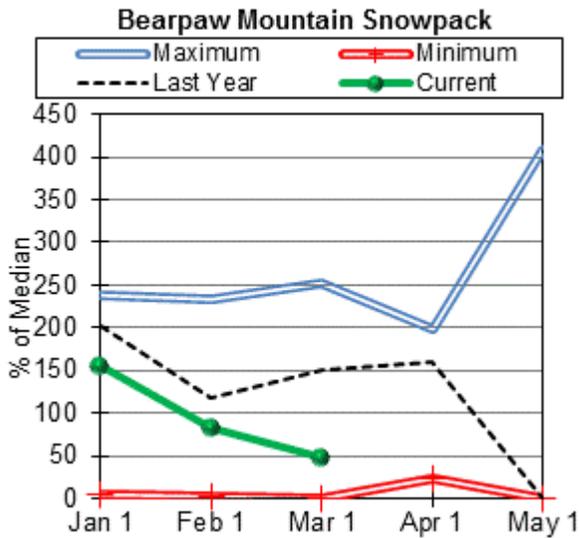
2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions

3) Median value used in place of average

Reservoir Storage End of February, 2015	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Gibson Res	24.6	16.6	43.1	99.1
Pishkun Res	19.4	6.1	17.2	32.0
Willow Creek Res - Augusta	29.7	27.1	23.3	32.2
Lower Two Medicine Lake	8.9	6.3	8.4	11.9
Four Horns Lake	9.9	11.2	10.1	19.2
Swift Res	21.3	14.3	16.5	30.0
Lake Frances	70.7	35.2	57.5	112.0
Lake Elwell (Tiber)	803.1	704.1	693.8	1347.0
Basin-wide Total	987.7	820.9	869.9	1683.4
# of reservoirs	8	8	8	8

Watershed Snowpack Analysis March 1st, 2015	# of Sites	% Median	Last Year % Median
SUN	6	97%	139%
TETON	4	77%	134%
MARIAS	4	79%	127%
SUN-TETON-MARIAS	11	87%	133%

# St. Mary and Milk River Basins



The Saint-Mary-Milk River Basin hasn't seen above normal snowpack conditions since December 11<sup>th</sup> of this water year. Starting the calendar year at 91 percent of normal the basin has seen approximately a 13 percent reduction each month in percentage of normal snowpack conditions. Currently the Saint-Mary-Milk River Basin has the lowest percent of normal snowpack conditions east of the Divide. Three of six Snow Courses in the Cypress Hills of Canada had no snow on March 1<sup>st</sup>. Further south in the Bears Paw Mountains, Rocky Boy SNOTEL site received 0.6 inches of snow water equivalent in February and is at 115 percent of normal. Many Glacier SNOTEL site in the Saint Mary River Basin had a net loss of 0.7 inches of snow water equivalent in February and is currently at 37 percent of normal. Overall the Saint Mary-Milk River Basin snowpack is below average at 65 percent of normal, while last year at this time the basin was 125 percent of normal.

Valley weather stations received 112 percent of monthly average precipitation for February, while mountain SNOTEL sites received 130 percent. Currently on March 1<sup>st</sup>, the Saint-Mary-Milk River Basin is 116 percent of the water year-to-date average. Last year at this time the basin was 91 percent of average.

Basin-wide reservoir storage is currently at 179 percent of average, and 139 percent of last year at this time.

The basin-wide average April-July streamflow forecast for the Saint Mary-Milk River is currently at 70 percent of average and 55 percent of last year.

## St. Mary & Milk Basins Streamflow Forecasts - March 1st, 2015

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

ST. MARY & MILK BASINS	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Lake Sherburne Inflow								
	APR-JUL	63	72	78	80%	85	94	97
	APR-SEP	76	86	93	83%	99	109	112
St. Mary R nr Babb <sup>2</sup>								
	APR-JUL	225	265	290	78%	320	360	370
	APR-SEP	270	315	345	81%	370	415	425
St. Mary R at Intl Boundary <sup>2</sup>								
	APR-JUL	225	285	325	75%	370	425	435
	APR-SEP	285	350	390	77%	435	495	505
Milk R at Western Crossing of Intl Bndry, AB								
Milk R at Eastern Crossing of Intl Bndry								

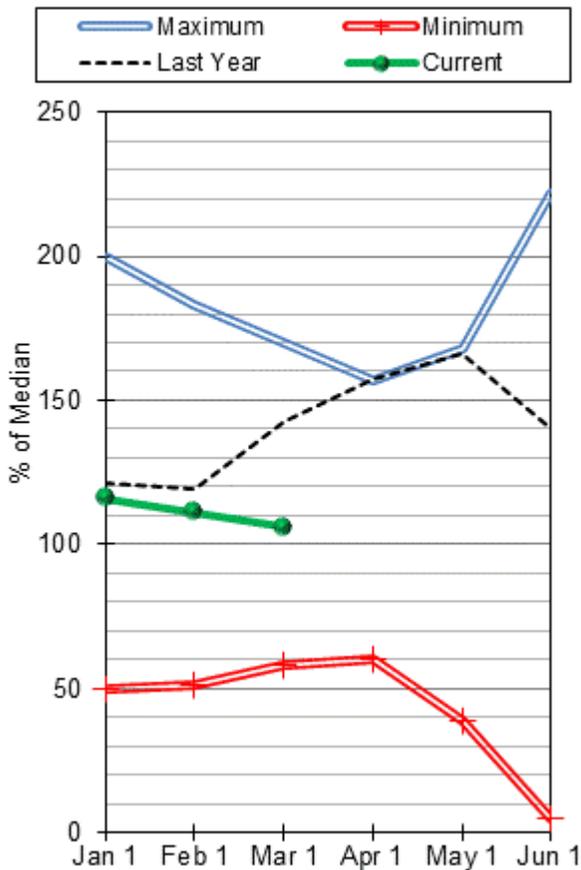
- 1) 90% and 10% exceedance probabilities are actually 95% and 5%
- 2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions
- 3) Median value used in place of average

Reservoir Storage End of February, 2015	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Lake Sherburne	58.6	30.8	30.7	64.3
Fresno Res	82.3	54.0	42.6	127.0
Nelson Res	44.7	49.2	30.4	66.8
Basin-wide Total	185.5	134.0	103.7	258.1
# of reservoirs	3	3	3	3

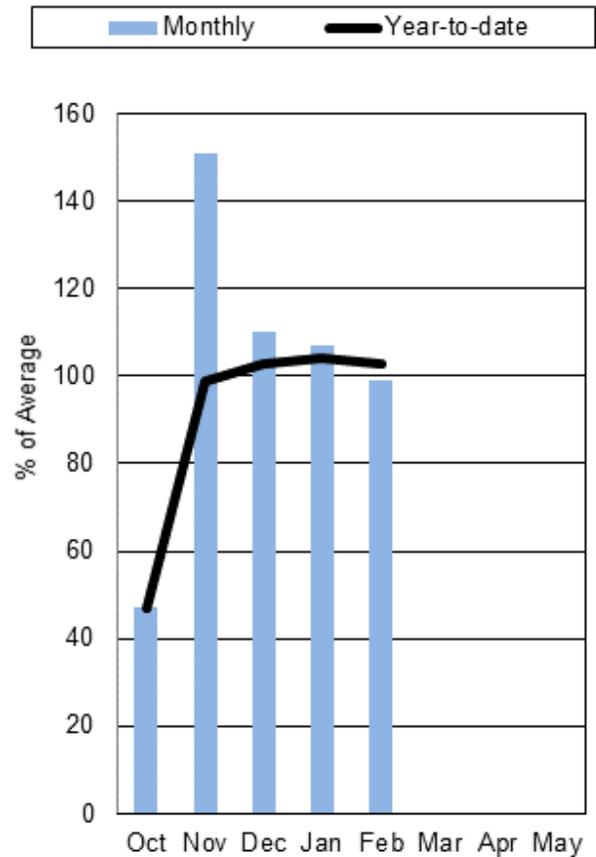
Watershed Snowpack Analysis March 1st, 2015	# of Sites	% Median	Last Year % Median
ST. MARY	3	74%	112%
BEARPAW MOUNTAINS	3	79%	142%
CYPRESS HILLS, CANADA	6	27%	158%
MILK RIVER BASIN	9	48%	151%
ST. MARY & MILK BASINS	12	65%	125%

# Upper Yellowstone River Basin

## Mountain Snowpack



## Precipitation



The basin-wide snowpack in the Upper Yellowstone River Basin started the month of February at 111 percent of normal. On average Upper Yellowstone River Basin SNOTEL sites received 2.6 inches of snow water equivalent during the month of February. This year the month of February only yielded 2.3 inches. The first ten days of the month provided the basin with its largest accumulation, increasing the basin-wide snow water equivalent by 1.1 inches. This storm fell mostly as snow at SNOTEL sites. However, it was followed by above average temperatures. The East Boulder Mine SNOTEL site (Elevation 6335 ft.) melted out on February 13<sup>th</sup> before accumulating 0.8 inches of snow water equivalent by March 1<sup>st</sup>. Currently the basin is above average at 106 percent of normal snowpack, while last year at this time the basin was 143 percent of normal.

Valley weather stations received 128 percent of monthly average precipitation for February, while mountain SNOTEL sites received 95 percent. Currently on March 1<sup>st</sup>, the Upper Yellowstone River Basin is 103 percent of the water year-to-date average. Last year at this time the basin was 131 percent of average.

Basin-wide reservoir storage is currently at 124 percent of average, and 113 percent of last year at this time.

The basin-wide average April-July streamflow forecast for the Upper Yellowstone River is currently at 103 percent of average and 70 percent of last year.

## Upper Yellowstone River Basin Streamflow Forecasts - March 1st, 2015

Forecast Exceedance Probabilities for Risk Assessment Chance that actual volume will exceed forecast
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UPPER YELLOWSTONE RIVER BASIN	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Yellowstone R at Yellowstone Lake Outlet								
	APR-JUL	390	460	505	88%	550	620	575
	APR-SEP	515	605	665	86%	725	815	770
Yellowstone R at Corwin Springs								
	APR-JUL	1290	1480	1600	101%	1720	1910	1590
	APR-SEP	1510	1730	1880	100%	2030	2250	1880
Yellowstone R at Livingston								
	APR-JUL	1440	1670	1830	102%	1980	2210	1800
	APR-SEP	1690	1960	2150	100%	2340	2610	2140
Shields R nr Livingston								
	APR-JUL	34	79	110	85%	141	186	129
	APR-SEP	35	86	120	84%	154	205	143
Boulder R at Big Timber								
	APR-JUL	220	265	295	105%	325	370	280
	APR-SEP	235	285	320	107%	355	405	300
Mystic Lake Inflow <sup>2</sup>								
	APR-JUL	51	56	60	102%	64	69	59
	APR-SEP	65	72	77	104%	82	89	74
Stillwater R nr Absarokee <sup>2</sup>								
	APR-JUL	355	415	460	103%	505	565	445
	APR-SEP	415	490	540	104%	595	665	520
Clarks Fk Yellowstone R nr Belfry								
	APR-JUL	495	555	595	117%	635	695	510
	APR-SEP	540	605	650	118%	695	760	550
Cooney Reservoir Inflow								
	APR-JUL	20	33	41	108%	50	63	38
	APR-SEP	28	42	51	106%	61	75	48
Yellowstone R at Billings								
	APR-JUL	2440	3000	3380	105%	3760	4320	3230
	APR-SEP	2760	3420	3870	104%	4320	4990	3730

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

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

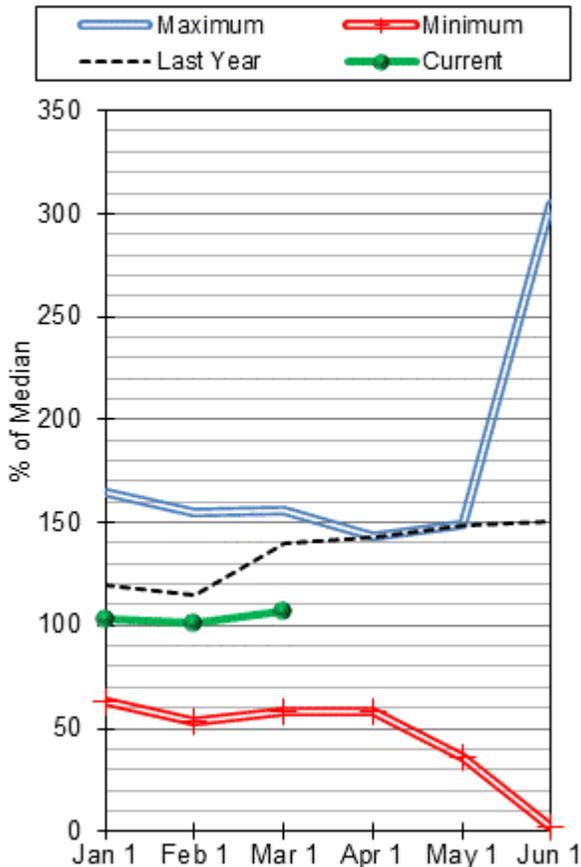
3) Median value used in place of average

Reservoir Storage End of February, 2015	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Mystic Lake	3.9	3.7	3.0	21.0
Cooney Res	22.0	19.3	17.9	27.4
Basin-wide Total	25.9	23.0	20.9	48.4
# of reservoirs	2	2	2	2

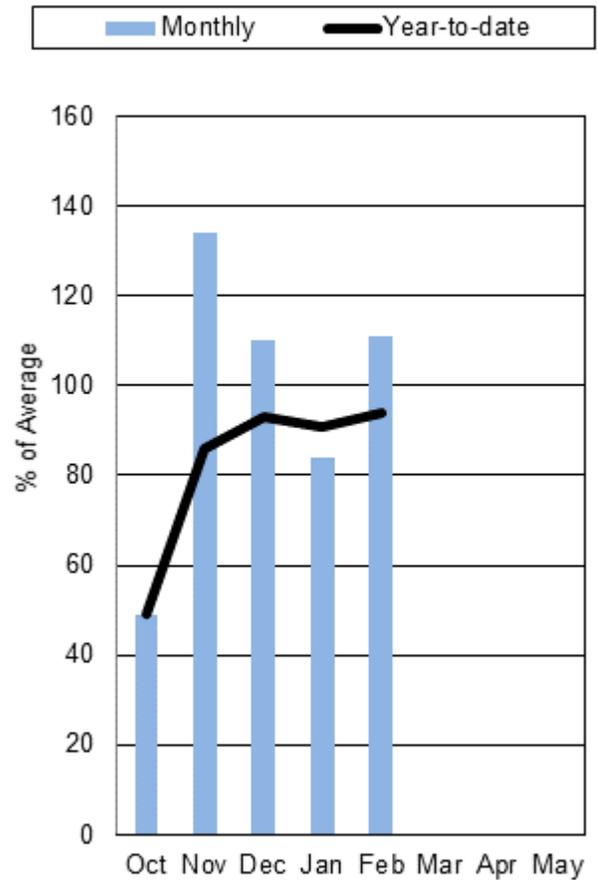
Watershed Snowpack Analysis March 1st, 2015	# of Sites	% Median	Last Year % Median
YELLOWSTONE ab LIVINGSTON	13	98%	127%
SHIELDS	4	109%	149%
BOULDER-STILLWATER	3	110%	147%
RED LODGE-ROCK CREEK	5	129%	192%
CLARK'S FORK	7	114%	148%
UPPER YELLOWSTONE RIVER BASIN	29	106%	143%

# Lower Yellowstone River Basin

### Mountain Snowpack



### Precipitation



The Lower Yellowstone River Basin seemed to be the anomaly of the 14 major basins this Water Supply Outlook Report summarizes. Over the course of February it was the only basin that saw an increase (5 percent) in its snow water equivalent percentage of normal. The Powder River Basin saw the largest increase in snowpack percentage of normal, ending the month at 126 percent of normal. On February 14<sup>th</sup> a storm delivered 1.3 inches of snow water equivalent to the Bear Trap Meadow SNOTEL site (Elevation 8200 ft.) in the southern Bighorn Mountains. Of the Lower Yellowstone’s major sub-basins the Wind River ended February with the lowest percentage of normal at 101 percent. Overall the basin snowpack is above average at 107 percent of normal, while last year at this time the basin was 140 percent of normal.

Valley weather stations received 90 percent of monthly average precipitation for February, while mountain SNOTEL sites received 115 percent. Currently on March 1<sup>st</sup>, the Lower Yellowstone River Basin is 94 percent of the water year-to-date average. Last year at this time the basin was 131 percent of average.

Basin-wide reservoir storage is currently at 114 percent of average, and 112 percent of last year at this time.

The basin-wide average April-July streamflow forecast for the Lower Yellowstone River is currently at 104 percent of average and 66 percent of last year.

## Lower Yellowstone River Basin (Wyoming) Streamflow Forecasts - March 1st, 2015

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>	APR-JUL	750	1130	1380	100%	1640	2020	1380
	APR-SEP	765	1190	1480	101%	1760	2190	1460
Little Bighorn R nr Hardin	APR-JUL	53	81	100	102%	119	147	98
	APR-SEP	61	92	113	102%	134	165	111
Tongue R nr Dayton <sup>2</sup>	APR-JUL	57	75	88	102%	101	119	86
	APR-SEP	66	86	100	102%	114	134	98
Big Goose Ck nr Sheridan	APR-JUL	27	38	46	100%	54	65	46
	APR-SEP	34	46	54	100%	62	74	54
Little Goose Ck nr Bighorn	APR-JUL	19	26	31	100%	36	43	31
	APR-SEP	26	34	39	100%	44	52	39
Tongue River Reservoir Inflow <sup>2</sup>	APR-JUL	85	150	195	101%	240	305	193
	APR-SEP	102	171	220	102%	265	335	215
Yellowstone R at Miles City <sup>2</sup>	APR-JUL	3350	4300	4950	104%	5600	6560	4780
	APR-SEP	3720	4860	5630	103%	6400	7540	5450
Powder R at Moorehead	APR-JUL	75	143	189	107%	235	305	177
	APR-SEP	92	162	210	107%	255	330	196
Powder R nr Locate	APR-JUL	79	159	215	108%	270	350	199
	APR-SEP	93	179	235	107%	295	380	220
Yellowstone R nr Sidney <sup>2</sup>	APR-JUL	3200	4300	5040	104%	5780	6880	4830
	APR-SEP	3450	4760	5640	104%	6530	7830	5430

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

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

3) Median value used in place of average

Reservoir Storage End of February, 2015	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Bighorn Lake	887.7	866.4	797.1	1356.0
Tongue River Res	52.1	55.0	28.2	79.1
Basin-wide Total	939.8	921.4	825.3	1435.1
# of reservoirs	2	2	2	2

Watershed Snowpack Analysis March 1st, 2015	# of Sites	% Median	Last Year % Median
WIND RIVER (Wyoming)	18	101%	137%
SHOSHONE RIVER (Wyoming)	4	103%	144%
BIGHORN RIVER (Wyoming)	18	111%	146%
LITTLE BIGHORN (Wyoming)	3	104%	133%
TONGUE RIVER (Wyoming)	9	104%	133%
POWDER RIVER (Wyoming)	9	126%	154%
LOWER YELLOWSTONE RIVER BASIN (Wyoming)	46	107%	140%

## Montana Site Report

	Network	Elevation (ft)	Depth (in)	SWE (in)	Median (in)	% Median	Last Year SWE (in)	Last Year % Median
Albro Lake	SNOTEL	8300	46	12.5	13.8	91%	21.7	157%
Ambrose	SC	6480	31	9.7	9.2	105%		
Arch Falls	SC	7350	28	6.6	7.8	85%	9.0	115%
Ashley Divide	SC	4820	6	1.6	5.3	30%	6.7	126%
Badger Pass	SNOTEL	6900	70	25.7	23.7	108%	30.8	130%
Banfield Mountain	SNOTEL	5600	29	8.5	14.3	59%	14.8	103%
Baree Creek	SC	5500						
Baree Midway	SC	4600	34	11.4	23.6	48%	25.6	108%
Baree Trail	SC	3800	4	1.3	7.8	17%	9.0	115%
Barker Lakes	SNOTEL	8250	42	10.9	10.3	106%	15.3	149%
Basin Creek	SNOTEL	7180	26	6.4	5.5	116%	10.0	182%
Bassoo Peak	SC	5150	14	4.0	7.6	53%		
Beagle Springs	SNOTEL	8850	30	6.3	6.3	100%	7.9	125%
Bear Basin	SC	8150			14.7		15.8	107%
Bear Mountain	SNOTEL	5400	56	21.4	48.4	44%	38.7	80%
Beartooth Lake	SNOTEL	9360	61	18.0	16.7	108%	24.0	144%
Beaver Creek	SNOTEL	7850	44	12.4	14.0	89%	16.0	114%
Big Snowy	SC	7150	48	12.2	13.8	88%	17.5	127%
Bisson Creek	SNOTEL	4920	24	7.9	8.4	94%	10.9	130%
Black Bear	SNOTEL	8170	68	23.7	29.6	80%	30.0	101%
Black Mountain	SC	7750	42	11.4	11.0	104%	10.9	99%
Black Pine	SNOTEL	7210	36	9.8	8.2	120%	13.3	162%
Blacktail	SC	5650	22	8.6	11.0	78%	12.4	113%
Blacktail Mtn	SNOTEL	5650	23	7.5			12.3	
Bloody Dick	SNOTEL	7600	39	10.2	9.3	110%	13.9	149%
Bots Sots	SC	7750	30	8.3	5.3	157%	10.4	196%
Boulder Mountain	SNOTEL	7950	50	14.4	15.4	94%	21.8	142%
Box Canyon	SNOTEL	6670	29	8.7	7.4	118%	11.1	150%
Boxelder Creek	SC	5100	19	4.8	5.6	86%	6.3	113%
Brackett Creek	SNOTEL	7320	59	20.4	14.4	142%	22.4	156%
Bristow Creek	SC	3900						
Brush Creek Timber	SC	5000	11	4.1	6.3	65%	16.4	260%
Bull Mountain	SC	6600	19	5.2	4.8	108%	6.0	125%
Burnt Mtn	SNOTEL	5880	15	3.0	4.0	75%	8.2	205%
Cabin Creek	SC	5200	19	5.6	4.9	114%	6.4	131%
Calvert Creek	SNOTEL	6430	25	7.5	6.8	110%	10.7	157%
Camp Senia	SC	7890	38	8.4	3.8	221%	13.7	361%
Canyon	SNOTEL	7870	36	9.6	10.5	91%	11.3	108%
Carrot Basin	SNOTEL	9000	57	17.1	20.4	84%	21.1	103%
Carrot Basin	SC	9000						
Chessman Reservoir	SC	6200	18	5.0	2.8	179%	7.7	275%
Chicago Ridge	SC	5800	56	21.0			32.6	
Chicken Creek	SC	4060	34	12.0	12.8	94%	17.1	134%
Clover Meadow	SNOTEL	8600	36	9.2	12.4	74%	12.7	102%
Cole Creek	SNOTEL	7850	44	11.3	9.9	114%	15.1	153%
Combination	SNOTEL	5600	9	2.2	4.1	54%	7.0	171%
Copper Bottom	SNOTEL	5200	10	3.5			9.1	
Copper Camp	SNOTEL	6950	73	30.6			37.1	
Copper Camp	SC	6950						
Copper Mountain	SC	7700	32	9.7	8.0	121%	9.1	114%
Cottonwood Creek	SC	6400	22	5.2	5.2	100%		
Coyote Hill	SC	4200	23	8.9	7.8	114%		
Crevice Mountain	SC	8400	19	3.6	8.6	42%	11.0	128%
Crystal Lake	SNOTEL	6050	46	11.4	9.1	125%	13.4	147%
Dad Creek Lake	SC	8800			9.8			

	Network	Elevation (ft)	Depth (in)	SWE (in)	Median (in)	% Median	Last Year SWE (in)	Last Year % Median
Daisy Peak	SNOTEL	7600	29	7.9	7.2	110%	11.2	156%
Daly Creek	SNOTEL	5780	28	8.0	8.4	95%	13.5	161%
Darkhorse Lake	SNOTEL	8600	80	26.4	22.2	119%	31.9	144%
Deadman Creek	SNOTEL	6450	34	10.5	8.0	131%	12.0	150%
Desert Mountain	SC	5600	29	8.9	10.8	82%		
Discovery Basin	SC	7050	34	9.9	7.4	134%	10.5	142%
Divide	SNOTEL	7800	27	5.7	8.1	70%	7.1	88%
Dix Hill	SC	6400	24	7.0	8.2	85%	12.0	146%
Dupuyer Creek	SNOTEL	5750	14	2.9	7.1	41%	9.4	132%
Eagle Creek	SC	7000	46	15.0			17.7	
East Boulder Mine	SNOTEL	6335	7	0.7			6.0	
El Dorado Mine	SC	7800	37	10.6	12.9	82%	11.8	91%
Elk Horn Springs	SC	7800	28	8.0	6.8	118%	9.8	144%
Elk Peak	SNOTEL	7600	49	16.5			23.5	
Elk Peak	SC	8000	40	11.0	10.4	106%	18.3	176%
Emery Creek	SNOTEL	4350	32	11.7	12.5	94%	15.0	120%
Emery Creek	SC	4350						
Fatty Creek	SC	5500	49	18.0	17.4	103%		
Fish Creek	SC	8000	35	8.0	7.0	114%	14.3	204%
Fisher Creek	SNOTEL	9100	82	26.7	25.8	103%	33.7	131%
Flattop Mtn.	SNOTEL	6300	90	30.4	33.8	90%	36.8	109%
Fleecer Ridge	SC	7500	30	8.6	7.7	112%	11.1	144%
Foolhen	SC	8280	37	11.0	11.0	100%		
Forest Lake	SC	6400	38	11.9			14.2	
Four Mile	SC	6900	19	5.2	6.0	87%	9.4	157%
Freight Creek	SC	6000	29	7.6	10.4	73%	13.4	129%
Frohner Meadow	SNOTEL	6480	24	7.0	5.9	119%	10.8	183%
Garver Creek	SNOTEL	4250	18	5.3	8.0	66%	8.1	101%
Gibbons Pass	SC	7100						
Goat Mountain	SC	7000	24	6.6	7.6	87%	12.8	168%
Government Saddle	SC	5270	45	16.4			26.4	
Grave Creek	SNOTEL	4300	27	10.6	13.5	79%	16.1	119%
Griffin Creek Divide	SC	5150	19	5.4	8.1	67%	10.7	132%
Hand Creek	SNOTEL	5035	17	6.4	9.5	67%	11.8	124%
Hawkins Lake	SNOTEL	6450	45	15.9	19.3	82%	19.7	102%
Haymaker	SC	8050						
Hebgen Dam	SC	6550	29	7.2	9.2	78%	7.4	80%
Hell Roaring Divide	SC	5770	53	19.8	23.9	83%	25.9	108%
Herrig Junction	SC	4850	44	17.0	21.2	80%	23.1	109%
Highwood Divide	SC	5650	12	2.0	6.0	33%	6.3	105%
Highwood Station	SC	4600	11	1.7	3.6	47%	6.0	167%
Holbrook	SC	4530	16	4.9	7.6	64%	9.7	128%
Hoodoo Basin	SNOTEL	6050	72	24.2	32.3	75%	37.3	115%
Humboldt Gulch	SNOTEL	4250	20	5.8	9.8	59%	16.2	165%
Jakes Canyon	SC	9040	38	9.1	9.6	95%		
Johnson Park	SC	6450			4.6			
Kishenehn	SC	3890	19	5.2	7.2	72%	9.9	138%
Kraft Creek	SNOTEL	4750	25	7.3			19.6	
Lake Camp	SC	7780	28	7.2	7.8	92%	8.7	112%
Lake Creek	SC	6100			6.6			
Lakeview Canyon	SC	6930			7.2			
Lakeview Ridge	SNOTEL	7400	17	4.2	8.5	49%	5.2	61%
Lemhi Ridge	SNOTEL	8100	32	8.7	8.1	107%	11.8	146%
Lick Creek	SNOTEL	6860	29	7.6	8.2	93%	10.0	122%
Little Park	SC	7400	41	12.0	11.4	105%	13.8	121%
Logan Creek	SC	4300	16	4.8	5.5	87%	7.9	144%
Lolo Pass	SNOTEL	5240	55	18.5	22.9	81%	29.5	129%

	Network	Elevation (ft)	Depth (in)	SWE (in)	Median (in)	% Median	Last Year SWE (in)	Last Year % Median
Lone Mountain	SNOTEL	8880	38	11.2	13.2	85%	17.2	130%
Lookout	SNOTEL	5140	28	9.7	24.5	40%	23.7	97%
Lower Twin	SNOTEL	7900	45	8.4	13.0	65%	19.1	147%
Lubrecht Flume	SNOTEL	4680	17	5.2	4.7	111%	8.1	172%
Lubrecht Forest No 3	SC	5450	7	1.8	4.4	41%	7.9	180%
Lubrecht Forest No 4	SC	4650	2	0.6	2.1	29%	4.3	205%
Lubrecht Forest No 6	SC	4040	12	3.0	2.7	111%	7.3	270%
Lubrecht Hydroplot	SC	4200	18	6.3	4.1	154%	7.3	178%
Lupine Creek	SC	7380	24	5.6	6.4	88%	7.0	109%
Madison Plateau	SNOTEL	7750	45	13.7	17.8	77%	17.1	96%
Many Glacier	SNOTEL	4900	16	4.2	11.5	37%	12.9	112%
Marias Pass	SC	5250	27	6.9	13.1	53%	15.5	118%
Mineral Creek	SC	4000	23	9.0	13.9	65%	16.6	119%
Monument Peak	SNOTEL	8850	58	16.8	15.2	111%	21.6	142%
Moss Peak	SNOTEL	6780	95	34.3	28.1	122%	33.2	118%
Moulton Reservoir	SC	6850	27	7.0	6.0	117%		
Mount Allen No 7	SC	5700						
Mount Lockhart	SNOTEL	6400	48	14.9	15.2	98%	20.7	136%
Mudd Lake	SC	7650			15.1			
Mule Creek	SNOTEL	8300	45	12.7	11.2	113%	17.7	158%
N Fk Elk Creek	SNOTEL	6250	33	10.0	8.9	112%	13.3	149%
Nevada Ridge	SNOTEL	7020	42	12.7	10.9	117%	15.6	143%
New World	SC	6900	35	9.1	10.0	91%	12.0	120%
Nez Perce Camp	SNOTEL	5650	40	11.4	10.8	106%	17.7	164%
Noisy Basin	SNOTEL	6040	91	34.7	31.5	110%	34.2	109%
Norris Basin	SC	7550	23	6.2	8.0	78%	8.8	110%
North Fork Jocko	SNOTEL	6330	92	32.5	33.5	97%	38.8	116%
Northeast Entrance	SNOTEL	7350	32	9.4	8.2	115%	12.2	149%
Onion Park	SNOTEL	7410	50	12.7	10.1	126%	12.6	125%
Ophir Park	SC	7150	35	10.3	11.2	92%	15.0	134%
Parker Peak	SNOTEL	9400	63	19.0	16.0	119%	24.1	151%
Peterson Meadows	SNOTEL	7200	32	8.7	7.1	123%	11.3	159%
Pickfoot Creek	SNOTEL	6650	33	8.9	8.4	106%	13.7	163%
Pike Creek	SNOTEL	5930	13	2.5			7.5	
Pipestone Pass	SC	7200	18	5.3	3.2	166%	5.6	175%
Placer Basin	SNOTEL	8830	52	13.4	12.8	105%	19.3	151%
Poorman Creek	SNOTEL	5100	41	13.8	30.9	45%	32.6	106%
Porcupine	SNOTEL	6500	13	3.2	5.2	62%	8.7	167%
Potomageton Park	SC	7150	37	10.5	11.4	92%	13.3	117%
Revais	SC	4800	11	0.8	1.8	44%		
Rock Creek Mdws	SC	3400	24	8.0			14.0	
Rocker Peak	SNOTEL	8000	44	11.9	10.1	118%	16.4	162%
Rocky Boy	SNOTEL	4700	17	4.6	4.0	115%	6.2	155%
Roland Summit	SC	5120	43	16.8	27.0	62%	34.1	126%
S Fork Shields	SNOTEL	8100	38	10.6	11.8	90%	17.1	145%
Sacajawea	SNOTEL	6550	44	13.2	11.9	111%	16.4	138%
Saddle Mtn.	SNOTEL	7940	67	22.3	19.0	117%	29.3	154%
Short Creek	SNOTEL	7000	15	3.4	4.4	77%	4.2	95%
Shower Falls	SNOTEL	8100	61	16.4	15.6	105%	19.6	126%
Skalkaho Summit	SNOTEL	7250	52	17.2	17.5	98%	23.3	133%
Sleeping Woman	SNOTEL	6150	36	11.5	12.2	94%	17.3	142%
Slide Rock Mountain	SC	7100	39	11.6	10.1	115%	14.5	144%
Spotted Bear Mountain	SC	7000	22	7.5	10.7	70%	13.5	126%
Spur Park	SNOTEL	8100	60	18.9	15.5	122%	23.5	152%
Stahl Peak	SNOTEL	6030	67	24.1	27.5	88%	26.2	95%
Stahl Peak	SC	6030						
Stemple Pass	SC	6600	30	8.2	7.0	117%	9.2	131%

	Network	Elevation (ft)	Depth (in)	SWE (in)	Median (in)	% Median	Last Year SWE (in)	Last Year % Median
Storm Lake	SC	7780	42	11.0	9.5	116%	11.7	123%
Stringer Creek	SNOTEL	6550	40	10.2	8.6	119%	11.9	138%
Stryker Basin	SC	6180	64	23.6	25.0	94%	29.0	116%
Stuart Mountain	SNOTEL	7400	82	28.5	25.9	110%	30.0	116%
Taylor Road	SC	4080	5	0.5	3.0	17%	5.4	180%
Ten Mile Lower	SC	6600	25	6.7	5.4	124%	11.5	213%
Ten Mile Middle	SC	6800	33	8.4	7.5	112%	13.6	181%
Tepee Creek	SNOTEL	8000	33	8.6	10.6	81%	8.8	83%
Timberline Creek	SC	8850	40	10.5	9.2	114%	14.3	155%
Tizer Basin	SNOTEL	6880	29	6.9	7.3	95%	11.4	156%
Trinkus Lake	SC	6100	88	34.2	32.4	106%	34.3	106%
Truman Creek	SC	4060	0	0.0	4.0	0%		
Twelvemile Creek	SNOTEL	5600	31	10.9	13.8	79%	22.2	161%
Twenty-One Mile	SC	7150	32	9.8	12.4	79%	11.1	90%
Twin Lakes	SNOTEL	6400	73	31.3	30.2	104%	43.9	145%
Upper Holland Lake	SC	6200	66	23.4	26.0	90%	29.7	114%
Waldron	SNOTEL	5600	25	6.5	8.9	73%	12.1	136%
Warm Springs	SNOTEL	7800	66	19.6	14.8	132%	22.2	150%
Weasel Divide	SC	5450	48	18.1	26.2	69%	24.6	94%
West Yellowstone	SNOTEL	6700	27	7.3	9.0	81%	10.2	113%
Whiskey Creek	SNOTEL	6800	34	9.1	12.0	76%	12.6	105%
White Elephant	SNOTEL	7710	47	15.2	20.4	75%	17.9	88%
White Mill	SNOTEL	8700	63	22.2	18.3	121%	25.9	142%
Wolverine	SNOTEL	7650	35	10.9	8.5	128%	15.3	180%
Wood Creek	SNOTEL	5960	24	6.1	7.5	81%	10.6	141%
Wrong Creek	SC	5700	30	8.8	8.8	100%	11.6	132%
Wrong Ridge	SC	6800		12.7	12.4	102%	16.1	130%
Younts Peak	SNOTEL	8350			11.7			

*Issued by:*

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