USDA United States Department of Agriculture

Natural Resources Conservation Service

Idaho Water Supply Outlook Report

June 1, 2018

O'Neil Creek SNOTEL site installation in the Salmon Falls basin, June 6, 2018.
Photo courtesy of Danny Tappa (NRCS-Idaho Snow Survey)

Members of the Idaho Snow Survey staff completed the O'Neil Creek SNOTEL installation on June 7, 2018. The nearby O'Neil Creek snow course (not pictured) was manually measured twice a year on March 1 and April 1. This site is about a two hour drive off the closest paved road, Highway 93 just south of Jackpot, Nevada.

Upgrading this site to SNOTEL results in automated hourly data year-round. That's an increase of 8,758 point measurements, and a greater suite of information (temperature, cumulative precipitation, soil moisture, etc.). At 6,430' in elevation, this location represents one of the most critical zones to the annual water budget in the Salmon Falls basin. Water users on the Salmon Falls tract irrigate more than 7,500 acres and heavily rely on snow-driven runoff for their water supply, which isn't as reliable as that of many basins across Idaho. The addition of an O'Neil Creek SNOTEL site should help water-management decisions, especially when planning for water shortages or surpluses.

Water Supply Outlook Report
Federal - State – Private Cooperative Snow Surveys

For more water supply and resource management information:

Contact: Your local county Natural Resources Conservation Service Office
Internet Web Address: http://www.id.nrcs.usda.gov/snow/
Natural Resources Conservation Service Snow Surveys
9173 West Barnes Drive, Suite C
Boise, Idaho 83709-1574 (208) 378-5700 ext. 5

To join a free email subscription list contact us by email at: IDBOISE-NRCS-SNOW@one.usda.gov

How forecasts are made

Most of the annual streamflow in the western United States originates as snowfall that has accumulated in the mountains during the winter and early spring. As the snowpack accumulates, hydrologists estimate the runoff that will occur when the snow melts. Measurements of snow water equivalent at selected manual snow courses and automated SNOTEL sites, along with precipitation, antecedent streamflow, and indices of the El Niño / Southern Oscillation are used in computerized statistical and simulation models to produce runoff forecasts. Unless otherwise specified, all forecasts are for flows that would occur naturally without any upstream influences.

Forecasts of any kind are not perfect. Streamflow forecast uncertainty arises from three primary sources: (1) uncertain knowledge of future weather conditions, (2) uncertainty in the forecasting procedure, and (3) errors in the data. The forecast, therefore, must be interpreted not as a single value but rather as a range of values with specific probabilities of occurrence. The middle of the range is expressed by the 50% exceedance probability forecast, for which there is a 50% chance that the actual flow will be above, and a 50% chance that the actual flow will be below, this value. To describe the expected range around this 50% value, four other forecasts are provided, two smaller values (90% and 70% exceedance probability) and two larger values (30%, and 10% exceedance probability). For example, there is a 90% chance that the actual flow will be more than the 90% exceedance probability forecast. The others can be interpreted similarly.

The wider the spread among these values, the more uncertainty is in the forecast. As the season progresses, forecasts become more accurate, primarily because a greater portion of the future weather conditions become known; this is reflected by a narrowing of the range around the 50% exceedance probability forecast. Users should take this uncertainty into consideration when making operational decisions by selecting forecasts corresponding to the level of risk they are willing to assume about the amount of water to be expected. If users anticipate receiving a lesser supply of water, or if they wish to increase their chances of having an adequate supply of water for their operations, they may want to base their decisions on the 90% or 70% exceedance probability forecasts, or something in between. On the other hand, if users are concerned about receiving too much water (for example, threat of flooding), they may want to base their decisions on the 30% or 10% exceedance probability forecasts, or something in between. Regardless of the forecast value users choose for operations, they should be prepared to deal with either more or less water. (Users should remember that even if the 90% exceedance probability forecast is used, there is still a 10% chance of receiving less than this amount.) By using the exceedance probability information, users can easily determine the chances of receiving more or less water.

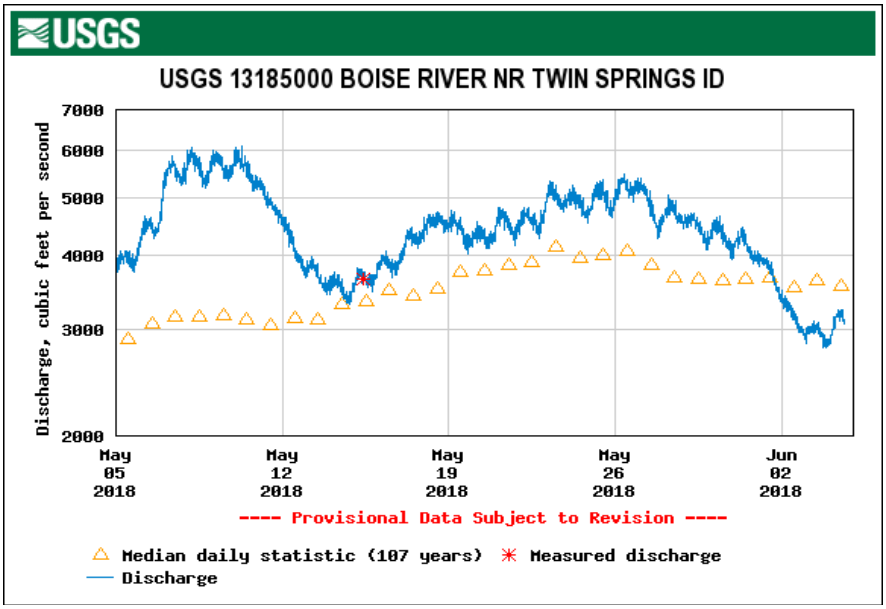
IDAHO WATER SUPPLY OUTLOOK REPORT

June 1, 2018

SUMMARY

Warm weather in early May started melting the mountain snow faster and earlier than normal. As a result, a lot of snow melted during May increasing rivers across the state. Luckily, a cold front on May 10 slowed the snowmelt – allowing us to 'drag our feet'. Having the snow melt later rather than earlier is key to having higher natural streamflow levels in the middle of summer when streams are typically low. Just as interesting is the fact that another cold front passed through the state June 1 and did the same thing. Intermittent cold fronts brought a return of freezing night time temperatures in the mountains, which greatly benefited Idaho's numerous water users by slowing the snowmelt process down and will help to keep flows higher a little longer before the typical low flows occur.

The reduced snowmelt and subsequent streamflow is illustrated in this USGS daily streamflow chart. The daily increases and decreases in streamflow are primarily a function of the snow melt water feeding the stream each day based on the previous day's air temperatures.



Overall, most of Idaho's water users will have an adequate supply resulting from a combination of the 2017 snowfall that provided excellent reservoir carryover storage and streamflows that were above average all winter. The exceptions are the users in the Big Lost and Little Lost basins, where it depends how long natural flows stay high enough to meet demands. In contrast, parts of northern Idaho will have plenty of water from the Montana rivers flowing into Idaho. The Clark Fork was flowing at or near record high levels near Missoula and will remain high all summer from the record high snowpack on the east side of the continental divide. As a result, Lake Pend Oreille is full and has been releasing more than 100,000 cfs through Newport, Idaho.

Water users should keep in mind these residual streamflow forecasts are for the June-July and June-September periods and are a challenge to forecast depending upon how much of the runoff has passed. For example, Idaho's high desert rivers are in full recession and are easier to forecast while central Idaho streams just peaked and are starting to decrease. Users should still consider using all five exceedance forecasts in their decision making process.

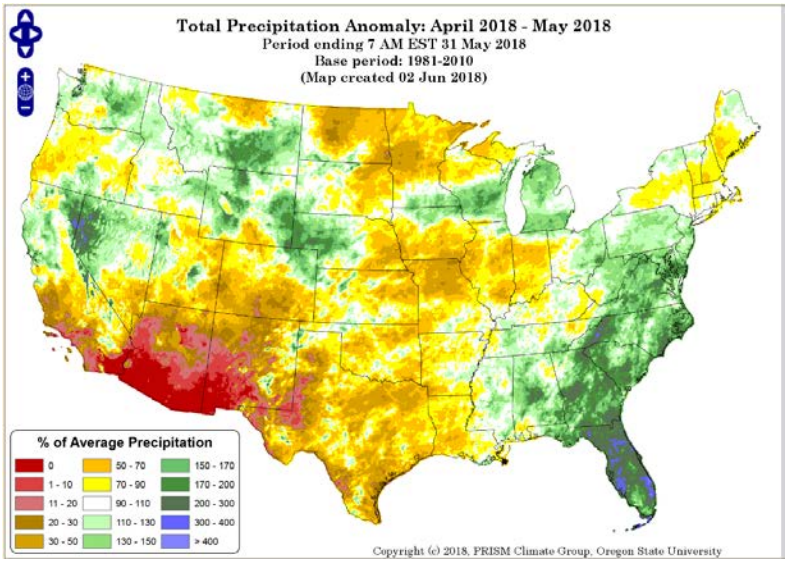
SNOWPACK

June 1 snow water content amounts vary across Idaho depending upon elevation in the basin and how much snow fell this winter. The Clearwater basin hosts the most snow (highest percentages) at 115% of median, followed closely by the Spokane at 113%. Basins with a near normal June 1 snowpack include Northern Idaho, Spokane, Big Lost, Henrys Fork and Upper Snake in Wyoming. Combining this remaining snow with the current above average streamflow in these basins should keep flows near or above average well into the later summer months. Elsewhere, the remaining snow in the Big Wood basin is 54% while other central and southern Idaho basins are less than half of normal. Snow measuring sites are melted out in the Weiser, Owyhee, Salmon Falls and Oakley basins.

PRECIPITATION

May's precipitation pattern was interesting as it brought a swath of above normal precipitation from the Owyhee basin into central Idaho – including the Big Lost and Little Lost basins – and into the Henrys Fork basin. The spring precipitation pattern was unusual as it lasted for several weeks and brought scattered but intense precipitation events, some with thunder and lightning. May's monthly precipitation percentages were the highest in the Big Lost basin at 182% of average. The Little Wood, Little Lost and Bruneau basins received 120 to 140% of their average May amounts. The least amount was only about half of average in the Northern Panhandle Region. In contrast, April brought above normal precipitation north of the Salmon River and Upper Snake in eastern Idaho / western Wyoming, and below normal amounts south of the Salmon River.

Combining April and May precipitation as displayed in the OSU PRISM map below illustrates where normal or better spring precipitation has fallen so far. This above normal spring precipitation pattern brought localized flooding in some areas, but also provided benefits in others by adding runoff to the spring and summer streamflow volumes, extending the duration of higher flows, and providing much needed moisture in Idaho's rangeland.



Water year-to-date precipitation remains the highest in northern Idaho and the Upper Snake in Wyoming at 110 to 125% of average. The lowest totals since October 1 are across Idaho's southern border ranging from 80 to 90% of average, with the exception of the Bruneau basin at 94% because of May's above normal precipitation. Across the middle of Idaho, water year-to-date amounts range from 90% of average in the Weiser basin to 110% in the Henrys Fork. On an interesting note, the

Clearwater basin has already received its annual precipitation with four months still to go in the water year. In contrast, at this time in 2017, the whole state had received its normal annual precipitation amounts with a few central Idaho basins receiving two-thirds more than their average annual precipitation by June 1 of last year.

RESERVOIRS

Overall, Idaho's reservoirs remain in great shape. Some reservoirs like the Owyhee, Salmon Falls, and Oakley have already peaked for the season and are being drafted as irrigation demand exceeds inflows. A few are at or near full, such as Little Wood, American Falls, Ririe, Island Park and Henrys Lake. Magic and Mackay reservoirs are full and passing inflows. Final fill of the Boise and Payette reservoir systems will occur soon, while the Jackson Lake, Palisades, and Dworshak reservoirs will complete final fill after inflows subside a little more.

In northern Idaho, record high snow in Montana has resulted in near or record high runoff on the Clark Fork with sustained flows more than 100,000 cfs into Lake Pend Orielle. Lake Pend Oreille is passing inflow as the lake is 109% of capacity with more than 100,000 cfs coming out of Lake Pend Oreille daily since May 12. Priest Lake storage peaked in mid-May and is currently at 132% capacity, which is 115% of average as the lake drains down to its normal summer level. Lake Coeur d'Alene is 162% full, 145% of average and in good shape to provide adequate supplies all summer.

STREAMFLOW

The majority of streams across the state have seen their snowmelt streamflow peak for the season. The May rain provided a boost in runoff for many of the rivers except in southern Idaho (Owyhee River, Bruneau River, Salmon Falls Creek, Goose and Trapper). The rains helped by extending the current flow levels a bit longer until the typical low summer baseflow levels arrive now that the snow has melted in these drainages.

As mentioned last month, to assist and educate water users about the timing of snowmelt streamflow peaks, NRCS has collaborated with Boise State University to update snowmelt timing runoff products. These snowmelt streamflow relationship graphs are updated several times a week on this web page along with additional streamflow graphs: Peak Streamflow Information.

The Big Lost River just had its snowmelt seasonal peak in late May after the Lost-Wood Divide melted out and Smiley Mountain approached half melt. The Teton River is one of last rivers to reach its seasonal snowmelt peak in Idaho along with the Buffalo Fork in the Snake River headwaters of Wyoming. Based on these recently updated snow-to-flow relationships, the Teton River peaks after Philips Bench melts out and Grand Targhee reaches about half melted.

Snow-Stream Comparison: Teton River and Phillips Bench SNOTEL | Grand Targhee SNOTEL

Another collaborative project with BSU was to determine the Day Of Allocation (DOA) for the Boise, Payette and Upper Snake. The DOA is the day based on water right accounting that irrigation demand exceeds natural streamflow and water users start to use water from their reservoir storage account for the rest of the season.

DOAs were calculated in early May based on the correlation with peak snow water equivalent at several SNOTEL sites and again in early June 1 based on the ratio of snow melt during the month of May. These predictions are typically used with a range of dates based on the standard error of the equation, but due to technical difficulties, we are not able to provide the range at this time. Similar to lesson learned with our five exceedance volume streamflow forecasts, a drier spring or rapid May snowmelt will allow the DOA to occur earlier, while a wet weather will push the DOA out farther.

Basin	May Prediction	June Prediction	Average DOA
Boise River	**June 20, 2018**	**June 6**	**June 20**
Payette River	**July 10, 2018**	**July 3**	**July 10**
Upper Snake	**June 27, 2018**	**July 1**	**June 26**

Note: The volumes referenced in these narratives are the 50% Chance of Exceeding Forecast, unless otherwise noted. Users may wish to use a different forecast to reduce their risk of having too much or too little water.

RECREATION

Not much else to say except, enjoy Idaho! A few basins, like the Big Lost River Teton River and Buffalo Fork in Wyoming still have enough snow to generate another increase in flow. Time will tell if this peak exceeds the previous peak or not. This winter's good snowfall will help to keep Idaho's rivers in the Clearwater basin and north flowing near into the summer. To stay current on the recession flows, the streamflow recession graphs on this page will be updated several times a month with a similar flow year and two week projections as the flows continue to recede to their summer time levels.

Peak Streamflow Information

SAVE THE DATE

Tentative date: November 8, 2017
Idaho Fall Water Supply Outlook for the 2018 - 2019 Season

A public session to discuss the 2018 runoff season and the upcoming 2019 water supply outlook along with agency project updates is tentatively scheduled for November 8, 2018 in Boise. The morning session will provide an update on current climate conditions, reservoir storage, and weather outlooks for the coming winter. The afternoon session will include updates by different agencies. If you have suggestions for topics, let us know.

Date: Thursday, November 8, 2018
Location: 'The Auditorium' located in the Washington Group Plaza at 720 Park Blvd. Boise.

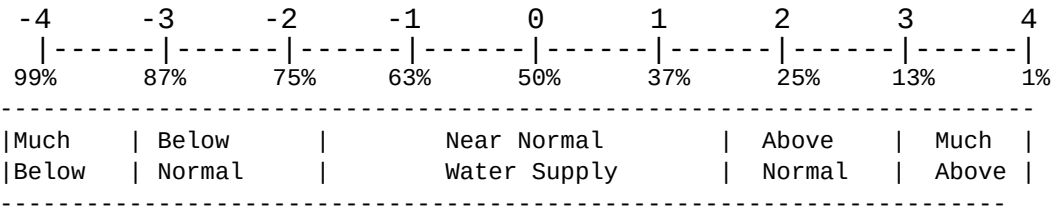
IDAHO SURFACE WATER SUPPLY INDEX (SWSI) June 1, 2018

The Surface Water Supply Index (SWSI) is a predictive indicator of surface water availability within a watershed for the spring and summer water use season. The index is calculated by combining pre-runoff reservoir storage (carryover) with forecasts of spring and summer streamflow. SWSI values are scaled from +4.0 (abundant supply) to -4.0 (extremely dry), with a value of zero indicating a median water supply as compared to historical occurrences. The SWSI analysis period is from 1981 to present.

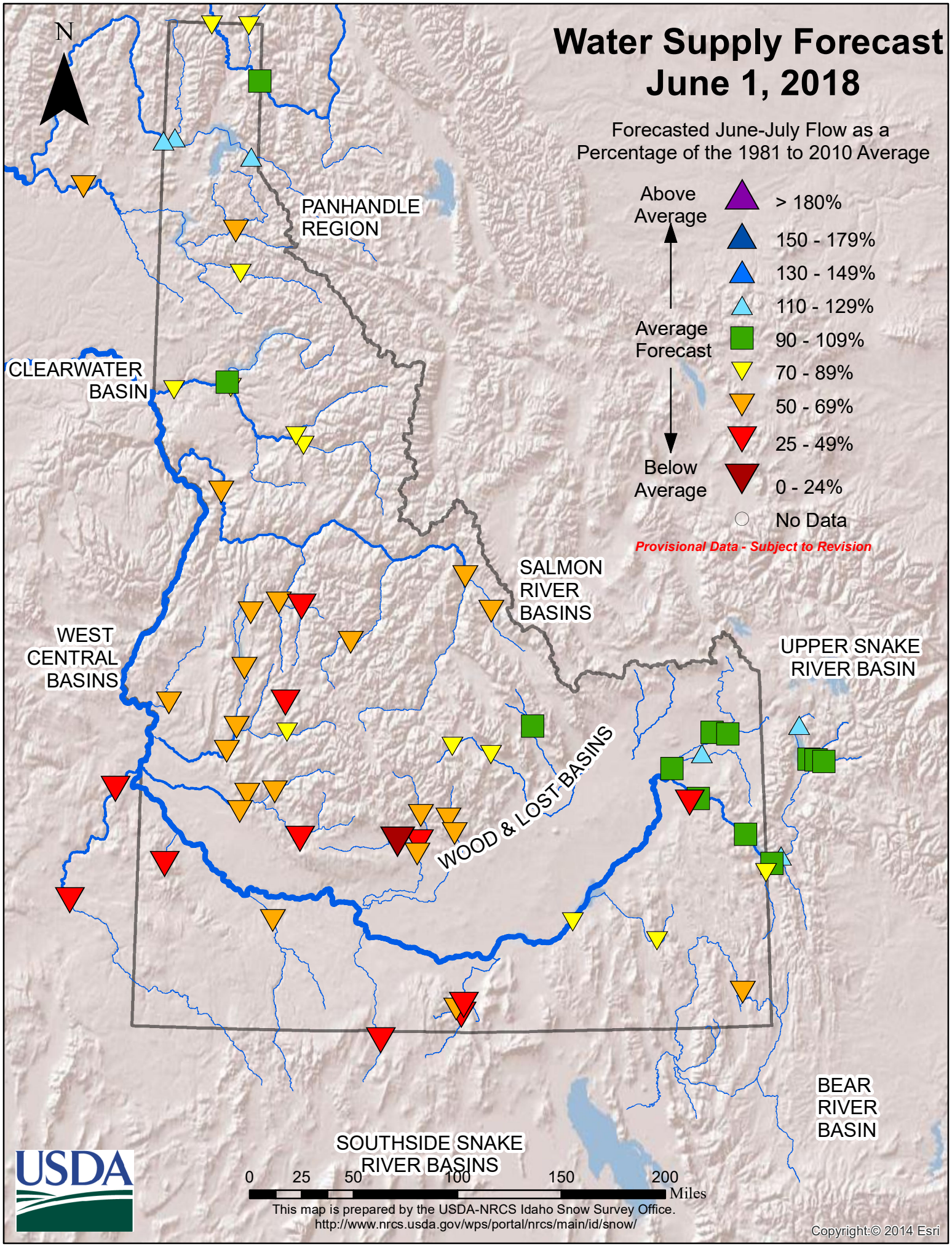
SWSI values provide a more comprehensive outlook of water availability by combining streamflow forecasts and reservoir storage. The SWSI index allows comparison of water availability between basins for drought or flood severity analysis. Threshold SWSI values have been determined for some basins to indicate the potential for agricultural irrigation water shortages.

BASIN or REGION	*SWSI Value*	*Most Recent Year With Similar SWSI Value*	*Agricultural Water Supply Shortage May Occur When SWSI is Less Than*
Spokane	**-0.8**	**2000**	**NA**
Clearwater	**-1.0**	**2017**	**NA**
Salmon	**-2.5**	**2016**	**NA**
Weiser	**-1.2**	**2012**	**NA**
Payette	**-1.9**	**2005**	**NA**
Boise	**-1.0**	**2016**	**-2.4**
Big Wood above Hailey	**-0.8**	**2016**	**NA**
Big Wood	**0.8**	**2012**	**-0.7**
Little Wood	**0.5**	**2010**	**-1.8**
Big Lost	**0.3**	**2005**	**0.4**
Little Lost	**0.5**	**2005**	**1.1**
Teton	**1.0**	**2009**	**-3.9**
Henrys Fork	**1.4**	**2010**	**-2.6**
Snake (Heise)	**1.0**	**2008**	**-1.5**
Oakley	**0.4**	**2012**	**0.7**
Salmon Falls above Jackpot	**-1.6**	**2014**	**NA**
Salmon Falls	**1.0**	**2016**	**-0.9**
Bruneau	**-0.5**	**2004**	**NA**
Owyhee	**-0.1**	**2012**	**-2.4**
Bear River	**1.9**	**2011**	**-3.9**

SWSI SCALE, PERCENT CHANCE OF EXCEEDANCE, AND INTERPRETATION



NA=Not Available / Not Applicable; Note: The Percent Chance of Exceedance is an indicator of how often a range of SWSI values might be expected to occur. Each SWSI unit represents about 12% of the historical occurrences. As an example of interpreting the above scale, the SWSI can be expected to be greater than -3.0, 87% of the time and less than -3.0, 13% of the time. Half the time, the SWSI will be below and half the time above a value of zero. The interval between -1.5 and +1.5 described as "Near Normal Water Supply," represents three SWSI units and would be expected to occur about one-third (36%) of the time.


N
Water Supply Forecast
June 1, 2018
Forecasted June-July Flow as a
Percentage of the 1981 to 2010 Average
Above Average
Average Forecast
Below Average
> 180%
150 - 179%
130 - 149%
110 - 129%
90 - 109%
70 - 89%
50 - 69%
25 - 49%
0 - 24%
No Data
Provisional Data - Subject to Revision
PANHANDLE REGION
CLEARWATER BASIN
SALMON RIVER BASINS
WEST CENTRAL BASINS
UPPER SNAKE RIVER BASIN
WOOD & LOST BASINS
BEAR RIVER BASIN
SOUTHSIDE SNAKE RIVER BASINS
USDA
0 25 50 100 150 200
Miles
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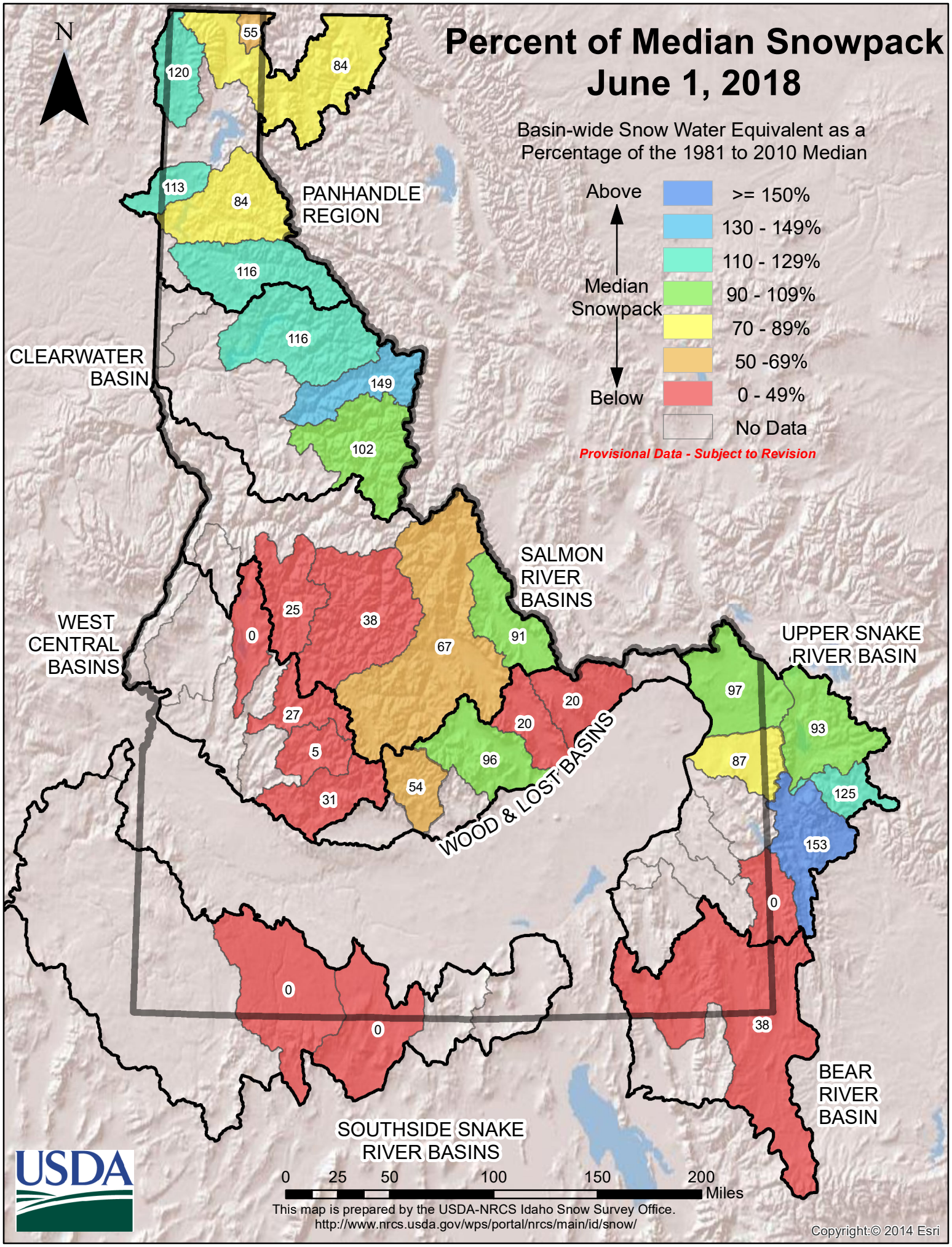
Percent of Median Snowpack
June 1, 2018
Basin-wide Snow Water Equivalent as a Percentage of the 1981 to 2010 Median
Above
Median Snowpack
Below
>= 150%
130 - 149%
110 - 129%
90 - 109%
70 - 89%
50 -69%
0 - 49%
No Data
Provisional Data - Subject to Revision
N
PANHANDLE REGION
CLEARWATER BASIN
SALMON RIVER BASINS
WEST CENTRAL BASINS
UPPER SNAKE RIVER BASIN
WOOD & LOST BASINS
BEAR RIVER BASIN
SOUTHSIDE SNAKE RIVER BASINS
120
55
84
113
84
116
116
149
102
0
25
38
67
91
27
5
31
54
96
20
20
97
93
87
125
153
0
0
0
38
0 25 50 100 150 200
Miles
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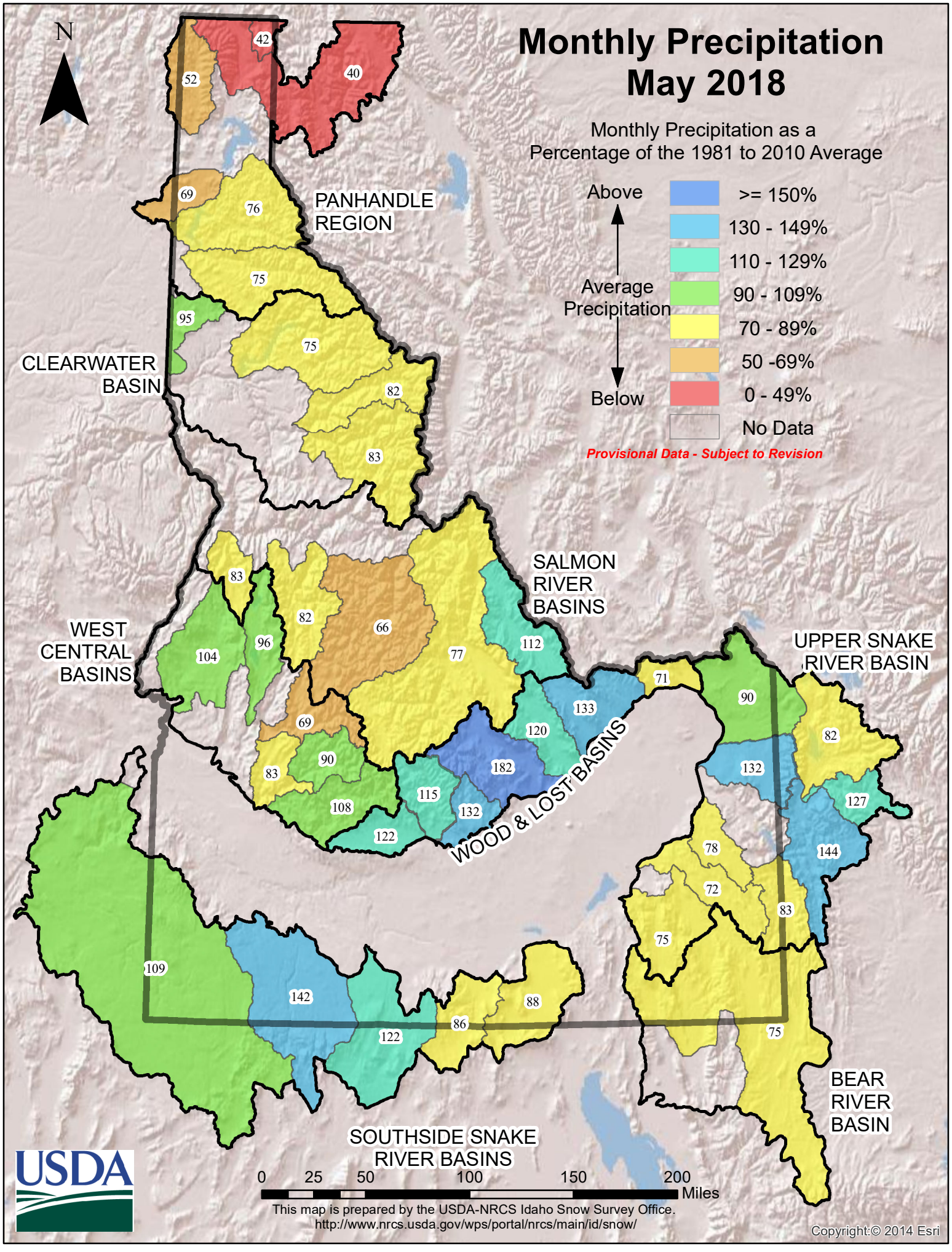
N
Monthly Precipitation
May 2018
Monthly Precipitation as a
Percentage of the 1981 to 2010 Average
Above
Average
Precipitation
Below
>= 150%
130 - 149%
110 - 129%
90 - 109%
70 - 89%
50 -69%
0 - 49%
No Data
Provisional Data - Subject to Revision
PANHANDLE
REGION
CLEARWATER
BASIN
SALMON
RIVER
BASINS
WEST
CENTRAL
BASINS
UPPER SNAKE
RIVER BASIN
WOOD & LOST BASINS
SOUTHSIDE SNAKE
RIVER BASINS
BEAR
RIVER
BASIN
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78
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Miles
USDA
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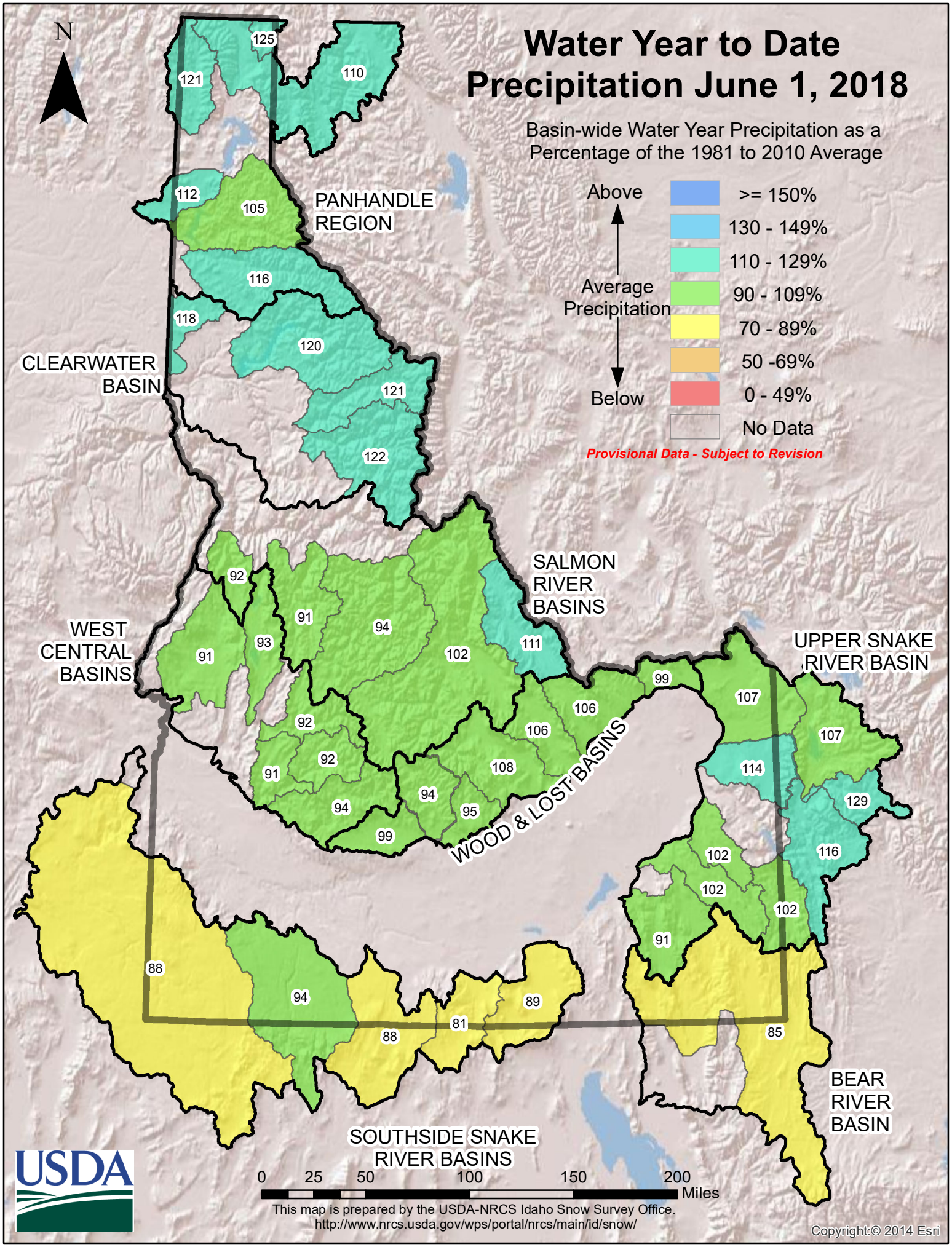
N
Water Year to Date Precipitation June 1, 2018
Basin-wide Water Year Precipitation as a Percentage of the 1981 to 2010 Average
Above
Average Precipitation
Below
>= 150%
130 - 149%
110 - 129%
90 - 109%
70 - 89%
50 -69%
0 - 49%
No Data
Provisional Data - Subject to Revision
PANHANDLE REGION
CLEARWATER BASIN
SALMON RIVER BASINS
WEST CENTRAL BASINS
UPPER SNAKE RIVER BASIN
WOOD & LOST BASINS
SOUTHSIDE SNAKE RIVER BASINS
BEAR RIVER BASIN
125
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0 25 50 100 150 200
Miles
USDA
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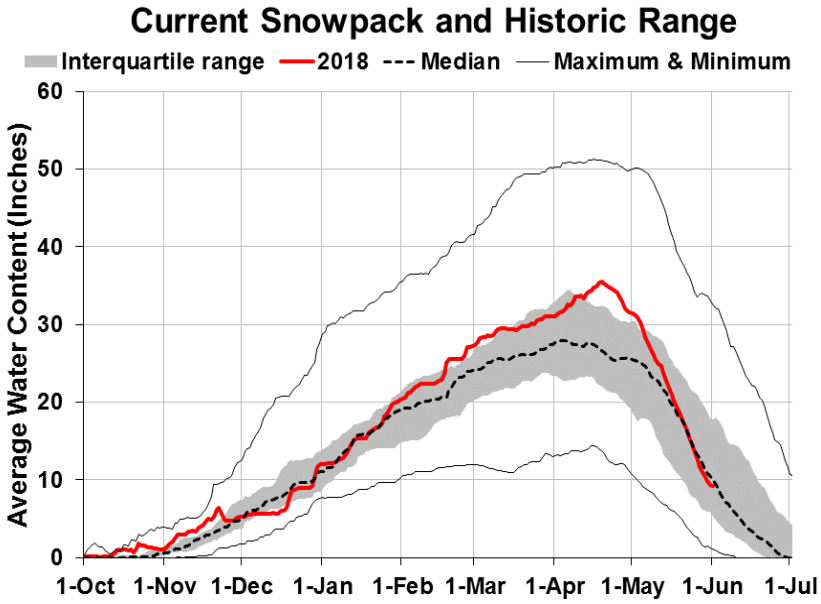
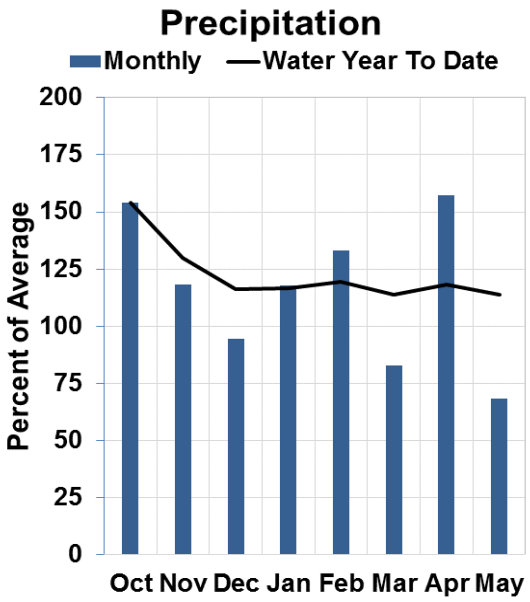
Panhandle Region

June 1, 2018





WATER SUPPLY OUTLOOK

Summer conditions came early to the Panhandle, where May precipitation totals were less than 75% of average and temperatures were warmer than normal. After a healthy snow accumulation season left peak snowpack totals at 110-150% of normal in mid-April, the warm temperatures and rapid melting this past month will likely result in normal or earlier than normal meltout dates for sites with remaining snow. As of June 1, some snow monitoring sites still have over 25” of snow water equivalent on the ground, but with another warm month projected ahead, these sites will likely be snow-free by July 1.

June-July cumulative streamflow forecasts for some basins remain above average, including the Clark Fork (117%) and the Kootenai (101%), where snow is lingering at higher elevation sites. For basins in which the snow melted out earlier than normal, streamflow forecasts range from 57% of average on the NF Coeur d’Alene at Enaville to 89% of average on the Moyie River at Eastport.

Some areas in Bonner and Pend Oreille counties have already experienced the ill effects of an above-average snow year in northern Idaho and western Montana followed by rapid melting and runoff, with localized flooding in recent weeks. These elevated inflows have left water levels in all area reservoirs at above normal for this time of year: Priest Lake storage is at 115% of average, Pend Oreille at 127%, and Coeur d’Alene at 145%.

Panhandle Region Streamflow Forecasts - June 1, 2018

Forecast Point	Forecast Period	Forecast Exceedance Probabilities for Risk Assessment <--Drier----------Projected Volume----------Wetter--> 90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Moyie R at Eastport	JUN-JUL	74	101	119	89%	136	163	133
	JUN-SEP	83	112	132	90%	151	180	147
Kootenai R at Leonia 1 & 2	JUN-JUL	2830	3420	3690	101%	3960	4560	3640
	JUN-SEP	3630	4350	4680	101%	5010	5730	4640
Boundary Ck nr Porthill	JUN-JUL	21	30	36	86%	42	51	42
	JUN-SEP	24	34	41	85%	48	58	48
Clark Fork R at Whitehorse Rapids 1 & 2	JUN-JUL	4850	5600	5940	117%	6280	7030	5070
	JUN-SEP	5740	6640	7040	116%	7440	8340	6090
Pend Oreille Lake Inflow 2	JUN-JUL	5440	6030	6420	117%	6810	7400	5480
	JUN-SEP	6380	7080	7550	116%	8020	8720	6520
Priest R nr Priest River 2	JUN-JUL	280	325	355	129%	390	435	275
	JUN-SEP	325	380	420	129%	455	515	325
NF Coeur dAlene R at Enaville	JUN-JUL	54	70	86	57%	104	129	150
	JUN-SEP	68	90	108	58%	128	159	187
St. Joe R at Calder 2	JUN-JUL	173	235	280	81%	325	385	345
	JUN-SEP	220	285	330	80%	375	440	410
Spokane R nr Post Falls 2	JUN-JUL	260	345	405	65%	465	550	620
	JUN-SEP	245	360	440	62%	520	635	705
Spokane R at Long Lake	JUN-JUL	390	485	550	69%	615	710	795
	JUN-SEP	480	615	705	68%	795	930	1030

Normals based on 1981-2010 reference period: streamflow, precipitation, & reservoir normals are averages, SWE normals are medians.

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

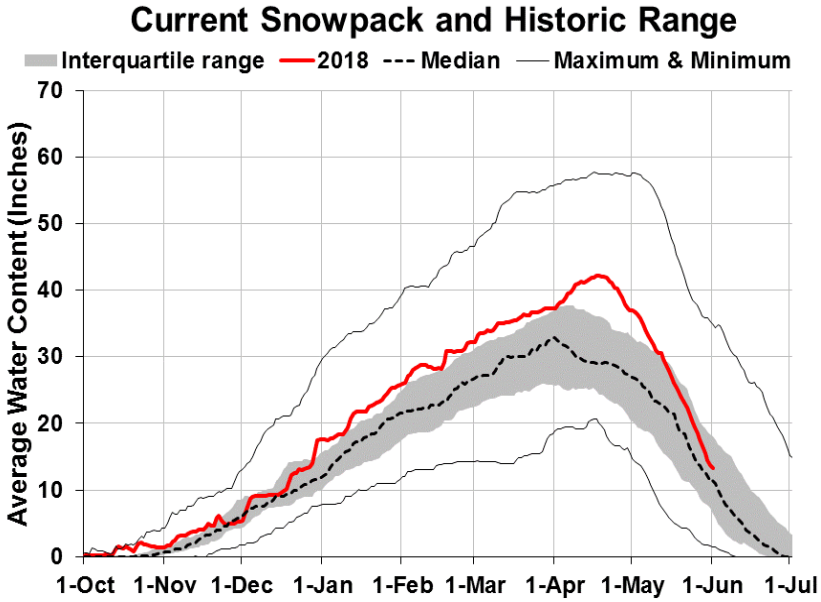
2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions

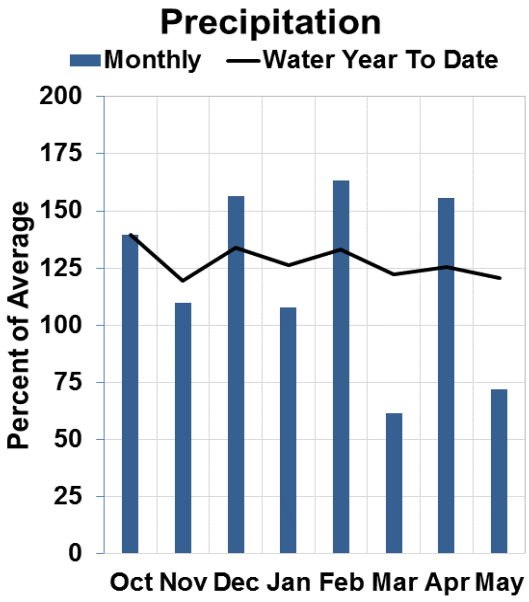
Reservoir Storage (KAF): End of May				
Reservoir Name	Current (KAF)	Last YR	Average (KAF)	Capacity (KAF)
Hungry Horse Lake	3023.0	2961.6	2733.0	3451.0
Flathead Lake	1697.8	1513.7	1538.0	1791.0
Noxon Rapids Reservoir	329.9	328.6	324.2	335.0
Lake Pend Oreille	1694.8	1325.3	1337.0	1561.3
Priest Lake	157.9	143.9	137.2	119.3
Lake Coeur d' Alene	385.5	229.4	265.5	238.5

Watershed Snowpack Analysis: June 1, 2018			
Basin Name	# of Sites	% of Median 2018	2017
Moyie River	5	55%	124%
Priest River	2	120%	137%
Rathdrum Creek	2		
Coeur d' Alene River	4	84%	140%
St. Joe River	4	116%	133%
Spokane River	10	113%	134%
Palouse River	2		
Kootenai ab Bonners Ferry	14	84%	137%

Clearwater River Basin

June 1, 2018





WATER SUPPLY OUTLOOK

After a cool and wet April in the Clearwater Basin, May's precipitation totals were less than 75% of average and temperatures were several degrees warmer than normal. After well above average winter and spring snow accumulation left peak totals at 110-150% of normal in mid-April, the warm temperatures and rapid melting this past month will likely result in normal or earlier than normal meltout dates for sites with remaining snow. As of June 1, some snow monitoring sites still have over 30" of snow water equivalent on the ground, but with another warm month projected ahead, these sites will likely be snow-free by early July.

June-July cumulative streamflow forecasts for Clearwater points are near or above-average. The NF Clearwater (Dworshak Reservoir Inflow) is forecast to run the highest relative to normal in the next two months, with a 96% of average median forecast.

Clearwater River Basin Streamflow Forecasts - June 1, 2018

Forecast Point	Forecast Period	Forecast Exceedance Probabilities for Risk Assessment <--Drier----------Projected Volume----------Wetter--> 90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Selway R nr Lowell	JUN-JUL	520	640	725	88%	810	930	820
	JUN-SEP	595	730	820	90%	910	1050	915
Lochsa R nr Lowell	JUN-JUL	300	385	445	79%	505	590	565
	JUN-SEP	350	445	510	80%	575	670	640
Dworshak Reservoir Inflow 2	JUN-JUL	570	715	815	96%	915	1060	845
	JUN-SEP	695	860	965	97%	1080	1240	1000
Clearwater R at Orofino	JUN-JUL	980	1280	1480	86%	1680	1980	1730
	JUN-SEP	1150	1480	1710	87%	1940	2270	1960
Clearwater R at Spalding 2	JUN-JUL	1580	2030	2330	89%	2630	3080	2610
	JUN-SEP	1850	2360	2700	90%	3040	3550	2990

Normals based on 1981-2010 reference period: streamflow, precipitation, & reservoir normals are averages, SWE normals are medians.

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

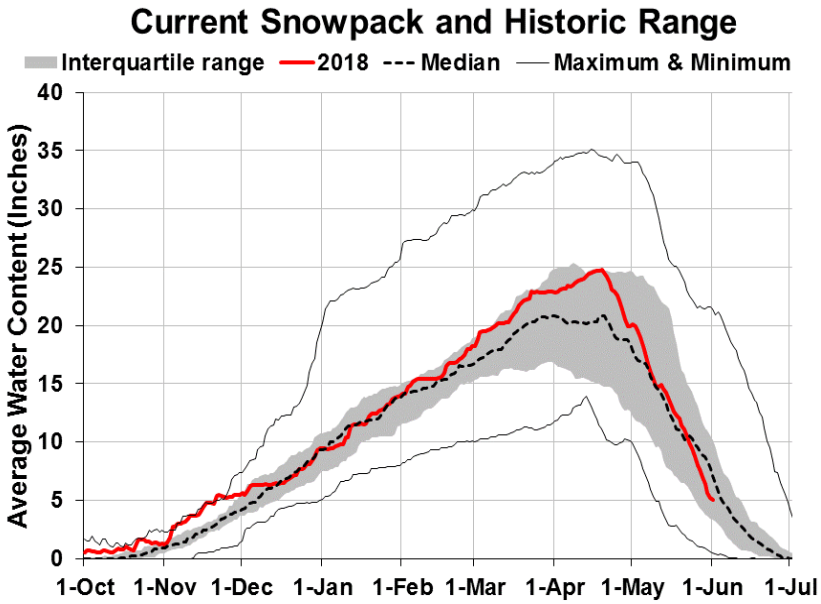
2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions

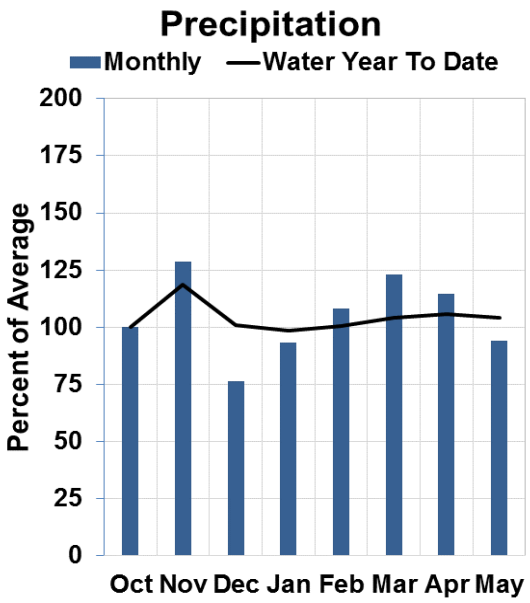
Reservoir Storage (KAF): End of May				
Reservoir Name	Current (KAF)	Last YR	Average (KAF)	Capacity (KAF)
Dworshak Reservoir	3127.3	3086.2	3113.0	3468.0

Watershed Snowpack Analysis: June 1, 2018			
Basin Name	# of Sites	% of Median 2018	2017
NF Clearwater River	8	116%	137%
Lochsa River	2	149%	216%
Selway River	4	102%	72%
Clearwater Basin Total	15	115%	131%

Salmon River Basin

June 1, 2018





WATER SUPPLY OUTLOOK

May precipitation was slightly below normal in the expansive Salmon River basin, while water year precipitation is slightly above normal. The snowpack graph above illustrates that the Salmon basin snowpack reached its seasonal peak in mid-April and experienced rapid ablation throughout May. The seasonal snowpack peak was about 125% of the normal, so even though current snow numbers are lower than normal for June 1st, the stage was set earlier in the season for plentiful snow-driven runoff.

Streamflow volume for the Salmon River along its main stem is forecast to be below normal. There is some forecast variability between sub-drainages; the median forecast for the MF Salmon is nearly 70% of average while the SF Salmon and Johnson Creek are ~50% of average. As we highlighted in the May 1 report, the MF Salmon snow-driven peak was likely to occur within the first 2 weeks of May, which ended up happening on May 10th (>10,000 CFS at the MF Lodge gage). At this point, all major rivers in the Salmon River basin have likely peaked.

Salmon River Streamflow Forecasts - June 1, 2018

Forecast Point	Forecast Period	Forecast Exceedance Probabilities for Risk Assessment <--Drier----------Projected Volume----------Wetter--> 90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Salmon R at Salmon	JUN-JUL	225	270	300	65%	330	375	460
	JUN-SEP	280	340	380	65%	420	480	585
Lemhi R nr Lemhi	JUN-JUL	17.4	23	28	64%	33	41	44
	JUN-SEP	26	33	39	65%	45	55	60
MF Salmon R at MF Lodge	JUN-JUL	112	170	210	67%	250	310	315
	JUN-SEP	137	210	260	67%	310	385	390
Sf Salmon R nr Krassel Ranger Station	JUN-JUL	27	48	62	52%	76	97	119
	JUN-SEP	46	62	73	53%	84	100	138
Johnson Ck at Yellow Pine Id	JUN-JUL	21	35	45	48%	55	69	94
	JUN-SEP	27	40	48	45%	56	69	107
Salmon R at White Bird	JUN-JUL	1070	1440	1700	62%	1960	2330	2760
	JUN-SEP	1310	1760	2060	62%	2360	2810	3330

Normals based on 1981-2010 reference period: streamflow, precipitation, & reservoir normals are averages, SWE normals are medians.

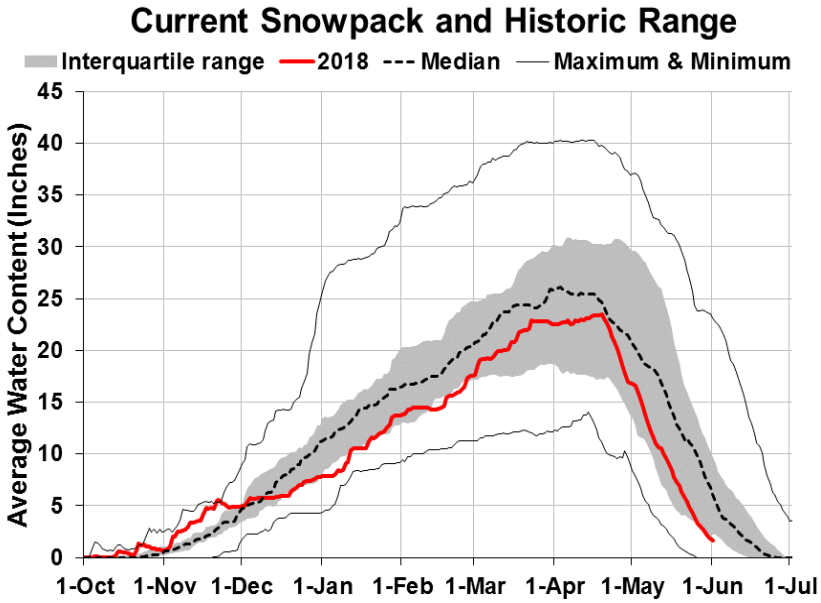
1) 90% and 10% exceedance probabilities are actually 95% and 5%

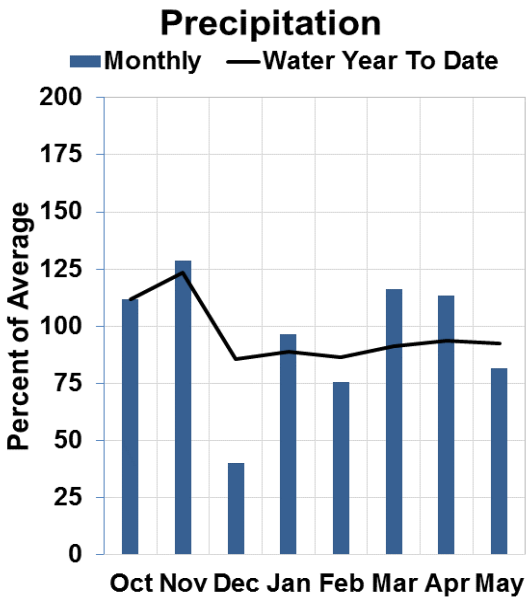
2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions

Watershed Snowpack Analysis: June 1, 2018 Basin Name	# of Sites	% of Median 2018	2017
Salmon River ab Salmon	6	67%	268%
Lemhi River	7	91%	128%
MF Salmon River	3	38%	231%
SF Salmon River	3	25%	181%
Little Salmon River	4		
Salmon Basin Total	23	65%	192%

West Central Basins

June 1, 2018





WATER SUPPLY OUTLOOK

Monthly precipitation was slightly below normal across the West Central basins as whole, with the Weiser River drainage receiving the most at nearly 104% of normal. Water year (Oct. 1 through March 31) precipitation is approximately 90% of normal. The nature of May precipitation this year, which was mostly pop-up isolated storms, makes for much less uniform area-wide precipitation. For example, in the Weiser River drainage Van Wyck SNOTEL recorded 185% of normal monthly precipitation while Bear Saddle SNOTEL (35 miles to the NW) recorded only 68% of normal. The snowpack peak has long since passed, and warmer than normal temperatures in May resulted in rapid snowmelt. There's little to no snow remaining in these basins except for the highest peaks (>9,000 ft).

The combined Boise system (Anderson Ranch + Arrowrock + Lucky Peak) is 98% full and 119% of average. The Payette system (Deadwood + Cascade) is 92% full and 102% of average. Forecasts range from approximately 40 to 75% of average for all points in the West Central basins. Even with a below normal seasonal snowpack and expected below average streamflow, shortages are not anticipated for users on the major projects in the West Central basins due in part to much above reservoir carryover from 2017.

West Central Basins Streamflow Forecasts - June 1, 2018

Forecast Point	Forecast Period	Forecast Exceedance Probabilities for Risk Assessment <--Drier----------Projected Volume----------Wetter--> 90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
SF Boise R at Anderson Ranch Dam 2	JUN-JUL	42	64	79	42%	94	116	186
	JUN-SEP	59	85	103	47%	120	146	220
Boise R nr Twin Springs	JUN-JUL	96	119	135	56%	150	174	240
	JUN-SEP	128	156	175	60%	194	220	290
Mores Ck nr Arrowrock Dam	JUN-JUL	8.5	12.4	15.4	57%	18.7	24	27
	JUN-SEP	10.4	14.9	18.4	59%	22	29	31
Boise R nr Boise 2	JUN-JUL	169	215	245	51%	280	325	480
	JUN-SEP	240	295	330	57%	365	420	580
Lake Fork Payette R nr McCall	JUN-JUL	18.6	23	26	68%	29	34	38
	JUN-SEP	20	25	28	68%	31	37	41
NF Payette R at Cascade 2	JUN-JUL	50	79	99	55%	119	148	179
	JUN-SEP	60	91	112	58%	134	165	192
NF Payette R nr Banks 2	JUN-JUL	23	79	118	54%	157	215	220
	JUN-SEP	35	95	137	57%	178	240	240
SF Payette R at Lowman	JUN-JUL	126	141	152	72%	164	182	210
	JUN-SEP	165	184	198	76%	210	235	260
Deadwood Reservoir Inflow 2	JUN-JUL	15.4	22	26	48%	31	38	54
	JUN-SEP	20	28	34	54%	39	47	63
Payette R nr Horseshoe Bend 2	JUN-JUL	230	315	370	59%	430	515	625
	JUN-SEP	330	415	475	61%	535	625	775
Weiser R nr Weiser	JUN-JUL	36	52	64	65%	77	100	99
	JUN-SEP	57	75	88	69%	103	127	127

Normals based on 1981-2010 reference period: streamflow, precipitation, & reservoir normals are averages, SWE normals are medians.

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

Reservoir Storage (KAF): End of May

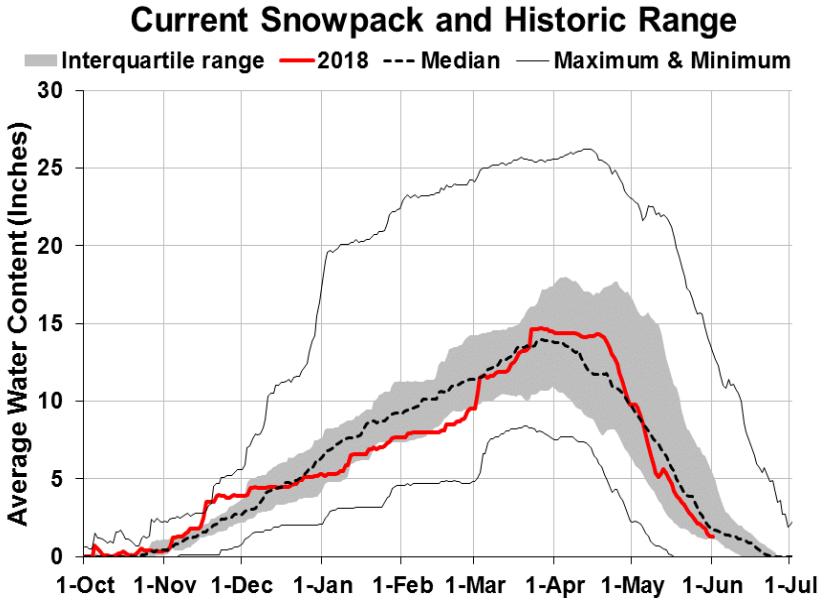
Reservoir Name	Current (KAF)	Last YR	Average (KAF)	Capacity (KAF)
Anderson Ranch Reservoir	446.4	437.3	375.3	450.2
Arrowrock Reservoir	260.8	261.3	198.1	272.2
Lucky Peak Reservoir	286.7	219.8	262.1	293.2
Sub-Basin Total	**993.9**	**918.4**	**835.5**	**1015.6**
Deadwood Reservoir	151.7	142.4	145.5	161.9
Cascade Reservoir	638.3	612.2	625.3	693.2
Sub-Basin Total	**790.0**	**754.6**	**770.8**	**855.1**
Lake Lowell	152.9	153.4	122.9	165.2
Mann Creek Reservoir	10.2	10.9	10.5	11.1

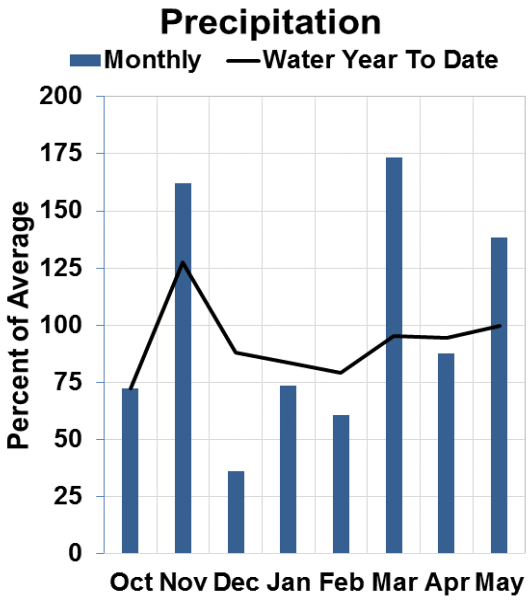
Watershed Snowpack Analysis: June 1, 2018

Basin Name	# of Sites	% of Median 2018	2017
SF Boise River	5	31%	211%
MF & NF Boise Rivers	5	5%	204%
Mores Creek	1		
Canyon Creek	1		
Boise Basin Total	9	27%	213%
NF Payette River	6	0%	179%
SF Payette River	4	27%	230%
Payette Basin Total	11	18%	212%
Mann Creek	1		
Weiser Basin Total	4		

Wood & Lost River Basin

June 1, 2018





WATER SUPPLY OUTLOOK

Precipitation was above normal across the Wood & Lost River basins in May. Since Oct 1, water year precipitation totals are about average. As was to be expected, snowmelt continued throughout June and there's little to no snow remaining below ~9,000 ft in elevation.

Mackay Reservoir is holding 99% of capacity (127% of average), Little Wood is 99% full (109% of average), and Magic is still full and spilling excess inflows. Streamflow forecasts generally range from 65 to 95% of average, except for Camas Creek near Blaine (24%). Above normal precipitation during March and April secured plentiful irrigation supplies for users in the Wood & Lost River drainages.

Wood and Lost Basins Streamflow Forecasts - June 1, 2018

Forecast Point	Forecast Period	Forecast Exceedance Probabilities for Risk Assessment <--Drier----------Projected Volume----------Wetter--> 90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
	JUN-JUL							8.6
Little Lost R nr Howe	JUN-JUL	11.1	13.3	14.8	95%	16.3	18.4	15.5
	JUN-SEP	14.9	18.1	20	91%	23	26	22
Big Lost R at Howell Ranch	JUN-JUL	56	74	86	84%	99	117	102
	JUN-SEP	68	90	105	86%	119	141	122
Big Lost R bl Mackay Reservoir	JUN-JUL	39	56	67	82%	79	96	82
	JUN-SEP	56	78	93	85%	108	131	109
Little Wood R ab High Five Ck	JUN-JUL	12	16.2	19.4	67%	23	29	29
	JUN-SEP	15.1	20	24	69%	29	35	35
Little Wood R nr Carey 2	JUN-JUL	7.9	14.9	19.7	68%	24	31	29
	JUN-SEP	10.9	18.7	24	69%	29	37	35
Big Wood R at Hailey	JUN-JUL	58	72	82	65%	92	106	127
	JUN-SEP	72	90	103	66%	116	134	155
Big Wood R ab Magic Reservoir	JUN-JUL	6	29	44	49%	59	82	89
	JUN-SEP	8.2	34	52	51%	69	95	101
Camas Ck nr Blaine	JUN-JUL	0.13	1.27	2.7	24%	4.7	8.6	11.1
	JUN-SEP	0.22	1.55	3.1	26%	5.3	9.4	11.7
Big Wood R bl Magic Dam 2	JUN-JUL	17	36	50	52%	63	82	97
	JUN-SEP	23	45	60	54%	75	97	111

Normals based on 1981-2010 reference period: streamflow, precipitation, & reservoir normals are averages, SWE normals are medians.

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

Reservoir Storage (KAF): End of May

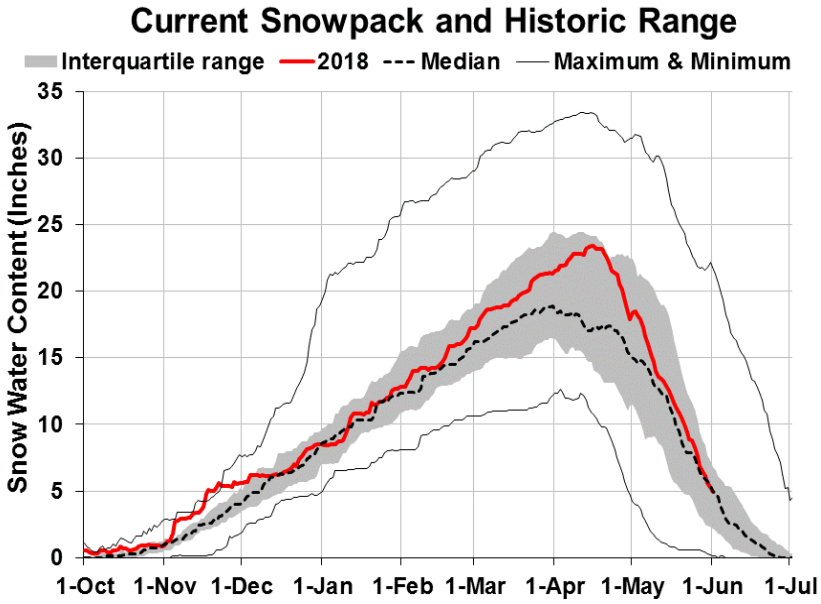
Reservoir Name	Current (KAF)	Last YR	Average (KAF)	Capacity (KAF)
Mackay Reservoir	44.0	25.7	34.6	44.4
Little Wood Reservoir	29.8	26.2	27.3	30.0
Magic Reservoir	191.9	184.9	130.3	191.5

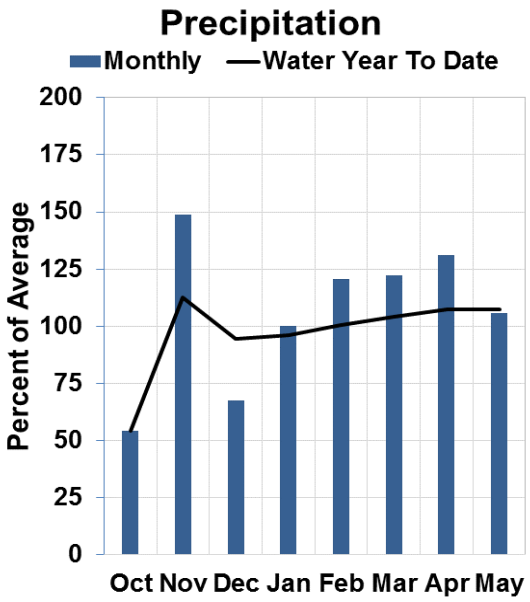
Watershed Snowpack Analysis: June 1, 2018

Basin Name	# of Sites	% of Median 2018	% of Median 2017
Camas-Beaver Creeks	2		
Birch-Medicine Lodge Creeks	2	20%	266%
Little Lost River	3	20%	266%
Big Lost River ab Mackay	4	96%	305%
Big Lost Basin Total	5	96%	305%
Fish Creek	0		
Little Wood River	3		
Big Wood River ab Hailey	6	54%	319%
Camas Creek	2		
Big Wood Basin Total	8	54%	319%

Upper Snake River Basin

June 1, 2018





WATER SUPPLY OUTLOOK

As a whole, May precipitation was near normal across the Upper Snake basin and water year to date precipitation is tracking slightly above normal. Peak snowpack occurred in April and was substantially above normal for the 2nd consecutive year; May brought warmer than normal temperatures and rapid snow loss which resulted in widespread higher than normal streamflow. Currently, basin wide snowpack is nearly normal (97%) for June 1st.

The Upper Snake reservoir storage system is currently at 95% of capacity and 119% of average. Throughout the month of May reservoir managers were filling Jackson Lake (92% of capacity) and Palisades Reservoir (88% of capacity). American Falls Reservoir is plumb full at 100% of capacity. Near normal streamflow volumes are expected for Snake River near Heise and Henrys Fork near Rexburg for the remainder of the runoff season.

Upper Snake River Basin Streamflow Forecasts - June 1, 2018

Forecast Point	Forecast Period	Forecast Exceedance Probabilities for Risk Assessment <--Drier----------Projected Volume----------Wetter--> 90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Henrys Fk nr Ashton 2	JUN-JUL	171	205	230	100%	250	285	230
	JUN-SEP	325	375	405	99%	440	490	410
Falls R nr Ashton 2	JUN-JUL	140	166	183	101%	200	225	182
	JUN-SEP	205	235	255	102%	280	310	250
Teton R nr Driggs	JUN-JUL	86	100	109	109%	119	132	100
	JUN-SEP	122	139	151	109%	163	181	139
Teton R nr St Anthony	JUN-JUL	180	215	235	112%	255	290	210
	JUN-SEP	245	285	310	111%	335	375	280
Henrys Fk nr Rexburg 2	JUN-JUL	555	655	725	102%	795	895	710
	JUN-SEP	850	1000	1100	100%	1210	1360	1100
Snake R at Flagg Ranch	JUN-JUL	210	245	265	113%	290	320	235
	JUN-SEP	255	290	315	113%	340	375	280
Snake R nr Moran 2	JUN-JUL	355	410	445	105%	485	535	425
	JUN-SEP	425	490	535	106%	575	640	505
Pacific Ck at Moran	JUN-JUL	64	79	90	105%	101	116	86
	JUN-SEP	71	88	99	103%	110	127	96
Buffalo Fk ab Lava Ck nr Moran	JUN-JUL	182	205	220	107%	235	260	205
	JUN-SEP	215	240	260	108%	280	305	240
Snake R ab Reservoir nr Alpine 2	JUN-JUL	1370	1480	1560	122%	1630	1750	1280
	JUN-SEP	1710	1840	1930	120%	2020	2150	1610
Greys R ab Reservoir nr Alpine	JUN-JUL	130	145	156	95%	166	181	164
	JUN-SEP	173	192	205	95%	215	235	215
Salt R ab Reservoir nr Etna	JUN-JUL	61	84	100	70%	115	138	143
	JUN-SEP	110	138	158	75%	177	205	210
Snake R nr Irwin 2	JUN-JUL	1460	1610	1710	101%	1810	1960	1700
	JUN-SEP	1900	2080	2200	100%	2320	2500	2190
Snake R nr Heise 2	JUN-JUL	1560	1710	1810	101%	1920	2070	1800
	JUN-SEP	2050	2240	2360	100%	2490	2680	2350
Willow Ck nr Ririe 2	JUN-JUL	0.96	3.2	5.5	38%	8.5	13.9	14.4
Portneuf R at Topaz	JUN-JUL	13.7	18.3	22	79%	25	29	28
	JUN-SEP	22	30	35	78%	40	48	45
Snake R at Neeley 2	JUN-JUL	380	670	865	77%	1060	1340	1130
	JUN-SEP	310	670	915	71%	1160	1520	1290

Normals based on 1981-2010 reference period: streamflow, precipitation, & reservoir normals are averages, SWE normals are medians.

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

Reservoir Storage (KAF): End of May

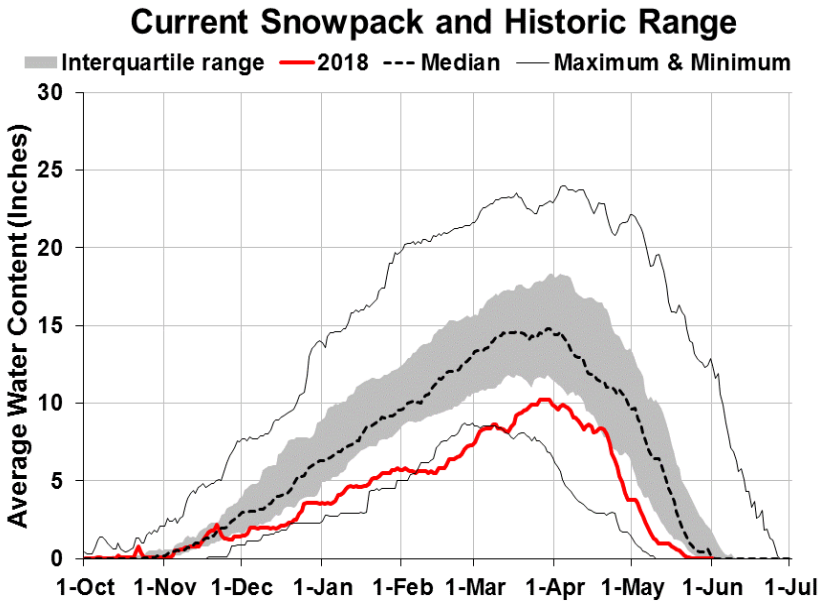
Reservoir Name	Current (KAF)	Last YR	Average (KAF)	Capacity (KAF)
Jackson Lake	780.5	675.1	605.7	847.0
Palisades Reservoir	1229.8	820.9	1027.0	1400.0
Sub-Basin Total	**2010.3**	**1495.9**	**1632.7**	**2247.0**
Henrys Lake	91.8	88.1	85.6	90.4
Island Park Reservoir	134.4	135.0	133.4	135.2
Grassy Lake	15.3	14.9	14.3	15.2
Sub-Basin Total	**241.5**	**238.0**	**233.3**	**240.8**
Ririe Reservoir	80.9	81.0	69.6	80.5
Blackfoot Reservoir	334.0	318.1	235.2	337.0
American Falls Reservoir	1666.8	1645.9	1459.0	1672.6
Basin-Wide Total	**4333.6**	**3779.0**	**3629.8**	**4577.9**

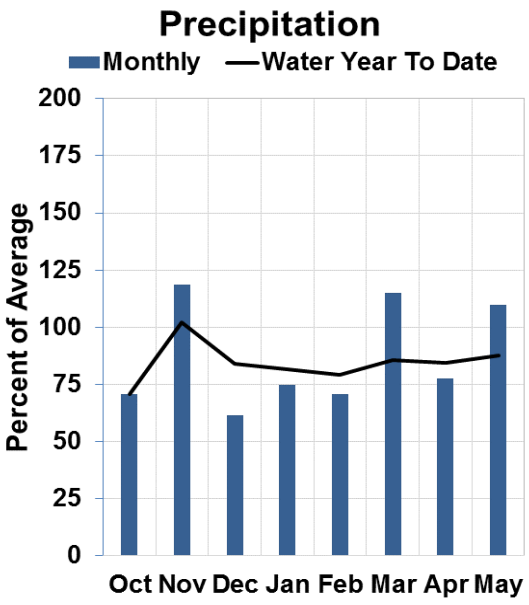
Watershed Snowpack Analysis: June 1, 2018

Basin Name	# of Sites	% of Median 2018	2017
Henrys Fork-Falls River	5	97%	180%
Teton River	3	87%	144%
Henrys Fork ab Rexburg	8	92%	161%
Snake River ab Jackson Lake	5	93%	203%
Pacific Creek	2	104%	191%
Buffalo Fork	1	116%	147%
Gros Ventre River	3	125%	227%
Hoback River	5	153%	373%
Greys River	4	105%	313%
Salt River	3	0%	613%
Snake ab Palisades Resv	18	102%	245%
Willow Creek - Ririe	2		
Blackfoot River	2		
Portneuf River	3		
Snake River ab American Falls	27	102%	218%

Southside Snake River Basins

June 1, 2018





WATER SUPPLY OUTLOOK

The snow at the Southside Snake River basins' SNOTEL sites has gone, and the flows are likely returning to the low summer flows. Though the snow is gone, May was a good month for precipitation in the Southside Snake. While Raft River and Goose-Trapper creeks were slightly below average for the month at 88% and 86% respectively; Owyhee, Salmon Falls Creek, Bruneau River, and Reynolds Creek basins ranged from 109% to 150% of normal. Annual precipitation has remained slightly lower than normal despite May's uptick. The Southside Snake River basins water year to date precipitation range from 81% to 90% of normal.

Irrigations supplies in the Southside Snake should be adequate for the remainder of runoff season due to carryover storage from last year's snowmelt. Reservoir storage ranges from a low of 97% of average for the Brownlee Reservoir to a high of 132% of average for the Wild Horse Reservoir. With June to July median forecasts ranging from 31% of average for Reynolds Creek at Tollgate and a high forecast of 68% of average for Trapper Creek near Oakley, the reservoir storage remains the bright spot for the Southside Snake as it has been all year.

Southside Snake River Basins Streamflow Forecasts - June 1, 2018

Forecast Point	Forecast Period	Forecast Exceedance Probabilities for Risk Assessment <--Drier----------Projected Volume----------Wetter--> 90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Goose Ck abv Trapper Ck nr Oakley	JUN-JUL	0.48	1.07	1.61	34%	2.3	3.4	4.7
	JUN-SEP	0.79	1.59	2.3	38%	3.1	4.6	6
Trapper Ck nr Oakley	JUN-JUL	0.88	1.1	1.26	68%	1.44	1.72	1.85
	JUN-SEP	1.83	2.1	2.4	80%	2.6	2.9	3
Oakley Reservoir Inflow	JUN-JUL	1.35	2.2	2.9	45%	3.6	5	6.5
	JUN-SEP	2.6	3.8	4.7	52%	5.7	7.4	9
Salmon Falls Ck nr San Jacinto	JUN-JUL	1.94	6	8.8	44%	11.5	15.6	20
	JUN-SEP	4.6	8.8	11.7	49%	14.6	18.8	24
Bruneau R nr Hot Spring	JUN-JUL	24	35	42	64%	50	60	66
	JUN-SEP	29	41	49	65%	57	69	75
Reynolds Ck at Tollgate	JUN-JUL	0.1	0.16	0.5	31%	0.84	1.35	1.61
Owyhee R nr Rome	JUN-JUL	7	15.3	23	37%	32	48	63
	JUN-SEP	14.2	25	35	44%	45	64	80
Owyhee R bl Owyhee Dam 2	JUN-JUL	15.5	27	36	47%	46	64	76
	JUN-SEP	35	50	61	58%	74	96	106
Snake R bl Lower Granite Dam 1	JUN-JUL	6160		6490	78%		6920	8360
	JUN-SEP	8610		8990	83%		9570	10800

Normals based on 1981-2010 reference period: streamflow, precipitation, & reservoir normals are averages, SWE normals are medians.

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

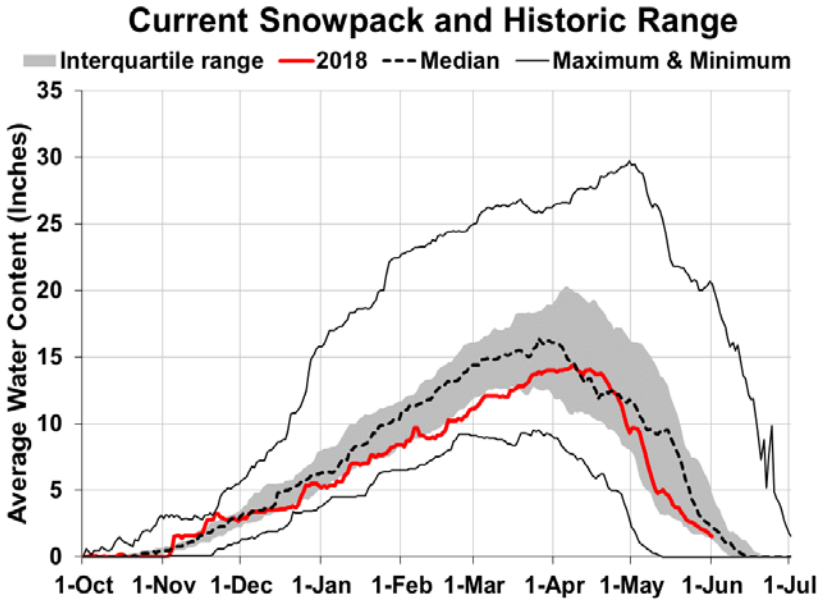
2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions

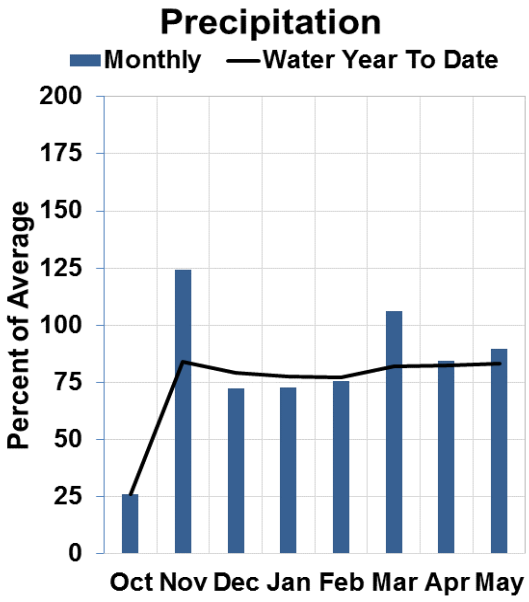
Reservoir Storage (KAF): End of May				
Reservoir Name	Current (KAF)	Last YR	Average (KAF)	Capacity (KAF)
Oakley Reservoir	38.9	60.6	37.4	75.6
Salmon Falls Reservoir	100.4	163.3	82.7	182.6
Wild Horse Reservoir	68.7	73.2	52.0	71.5
Lake Owyhee	523.1	715.5	536.2	715.0
Brownlee Reservoir	1308.8	1189.5	1343.0	1420.0

Watershed Snowpack Analysis: June 1, 2018			
Basin Name	# of Sites	% of Median 2018	2017
Raft River	1		
Goose-Trapper Creeks	2		
Salmon Falls Creek	5	0%	815%
Bruneau River	5	0%	815%
Reynolds Creek	1		
Owyhee Basin Total	8		
Owyhee Basin Snotel Total	8		

Bear River Basin

June 1, 2018





WATER SUPPLY OUTLOOK

The Bear River snowpack is currently at 38% of normal, compared to 319% at this time last year. Spring Creek Divide, which is one of two SNOTEL sites in the basin still reporting snow water equivalent(SWE) as of June 1st, has 10.5 inches of SWE representing 91% of normal. Precipitation for the Bear River remains below normal for the water year to date. With the exception of Montpelier Creek which received 105% of normal May precipitation and is now at 96% of normal for the year, the Bear River ranges from 78% to 84% of normal for annual precipitation.

Bear Lake will reach nearly the same capacity as last year at 82% normal which is 151% of normal thanks in large part to carryover from the large snowpack received last year. Montpelier is spilling over the spillway at 4050 acre-feet to begin June. Forecasts have natural flows for the Bear River drainage ranging from 25% to 88% of normal.

Bear River Basin Streamflow Forecasts - June 1, 2018

Forecast Point	Forecast Period	Forecast Exceedance Probabilities for Risk Assessment <--Drier----------Projected Volume----------Wetter--> 90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Bear R nr UT-WY State Line	APR-JUL	40	57	69	62%	81	98	112
	APR-SEP	43	63	76	62%	89	109	123
	JUN-JUL	9.7	24	33	50%	42	56	66
Bear R ab Resv nr Woodruff	APR-JUL	3.6	38	63	52%	87	124	121
	APR-SEP	6.4	38	66	52%	94	136	128
	JUN-JUL	2.8	6.3	17	30%	33	55	57
Big Ck nr Randolph	APR-JUL	0.23	0.83	1.7	45%	2.6	3.9	3.8
	JUN-JUL	0.07	0.24	0.7	42%	1.16	1.84	1.66
Smiths Fk nr Border	APR-JUL	62	71	77	87%	84	93	89
	APR-SEP	74	84	91	88%	98	108	104
	JUN-JUL	32	38	42	84%	46	52	50
Bear R bl Stewart Dam 2	APR-JUL	31	75	105	57%	135	179	183
	APR-SEP	35	84	117	57%	150	199	205
	JUN-JUL	1.61	30	49	53%	68	96	93
Little Bear at Paradise	APR-JUL	7.4	13.8	18.2	40%	23	29	45
	JUN-JUL	0.34	0.8	2.8	25%	4.8	7.8	11.3
Logan R nr Logan	APR-JUL	64	75	83	75%	90	102	111
	JUN-JUL	27	36	42	69%	49	58	61
Blacksmith Fk nr Hyrum	APR-JUL	9.1	22	30	70%	39	51	43
	JUN-JUL	4.9	8.9	11.6	72%	14.2	18.2	16.2

Normals based on 1981-2010 reference period: streamflow, precipitation, & reservoir normals are averages, SWE normals are medians.

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

Reservoir Storage (KAF): End of May				
Reservoir Name	Current (KAF)	Last YR	Average (KAF)	Capacity (KAF)
Bear Lake	1071.8	1080.9	710.6	1302.0
Montpelier Reservoir	4.1	3.1	3.4	4.0

Watershed Snowpack Analysis: June 1, 2018			
Basin Name	# of Sites	% of Median 2018	2017
Smiths-Thomas Forks	3	91%	247%
Bear River ab WY-ID Line	9	44%	291%
Montpelier Creek	1		
Mink Creek	1		
Cub River	1	0%	443%
Bear River ab ID-UT Line	15	38%	319%
Malad River	1		

Streamflow Adjustment List for All Forecasts Published in Idaho Water Supply Outlook Report: Streamflow forecasts are projections of runoff volumes that would occur without influences from upstream reservoirs or diversions. These values are referred to as natural, unregulated or adjusted flows. To make these adjustments, changes in reservoir storage, diversions, and inter-basin transfers are added or subtracted from the observed (actual) streamflow volumes. The following list documents the adjustments made for each forecast point. **(Revised Feb. 2015).**

Panhandle Region

Kootenai R at Leonia, MT (2)
+ Lake Koocanusa storage change

Moyie R at Eastport – no corrections

Boundary Ck nr Porthill – no corrections

Clark Fork R at Whitehorse Rapids (2)
+ Hungry Horse storage change
+ Flathead Lake storage change
+ Noxon Res storage change

Pend Oreille Lake Inflow (2)
+ Pend Oreille R at Newport, WA
+ Hungry Horse Res storage change
+ Flathead Lake storage change
+ Noxon Res storage change
+ Lake Pend Oreille storage change
+ Priest Lake storage change

Priest R nr Priest R (2)
+ Priest Lake storage change

NF Coeur d' Alene R at Enaville - no corrections

St. Joe R at Calder- no corrections

Spokane R nr Post Falls (2)
+ Lake Coeur d' Alene storage change

Spokane R at Long Lake, WA (2)
+ Lake Coeur d' Alene storage change
+ Long Lake, WA storage change

Clearwater River Basin

Selway R nr Lowell - no corrections

Lochsa R nr Lowell - no corrections

Dworshak Res Inflow (2)
+ Clearwater R nr Peck
- Clearwater R at Orofino
+ Dworshak Res storage change

Clearwater R at Orofino - no corrections

Clearwater R at Spalding (2)
+ Dworshak Res storage change

Salmon River Basin

Salmon R at Salmon - no corrections

Lemhi R nr Lemhi – no corrections

MF Salmon R at MF Lodge – no corrections

SF Salmon R nr Krassel Ranger Station – no corrections

Johnson Creek at Yellow pine – no corrections

Salmon R at White Bird - no corrections

West Central Basins

Boise R nr Twin Springs - no corrections

SF Boise R at Anderson Ranch Dam (2)
+ Anderson Ranch Res storage change

Mores Ck nr Arrowrock Dam – no corrections

Boise R nr Boise (2)
+ Anderson Ranch Res storage change
+ Arrowrock Res storage change
+ Lucky Peak Res storage change

SF Payette R at Lowman - no corrections

Deadwood Res Inflow (2)
+ Deadwood R bl Deadwood Res nr Lowman
+ Deadwood Res storage change

Lake Fork Payette R nr McCall – no corrections

NF Payette R at Cascade (2)
+ Payette Lake storage change
+ Cascade Res storage change

NF Payette R nr Banks (2)
+ Payette Lake storage change
+ Cascade Res storage change

Payette R nr Horseshoe Bend (2)
+ Deadwood Res storage change
+ Payette Lake storage change
+ Cascade Res storage change

Weiser R nr Weiser - no corrections

Wood and Lost Basins

Little Lost R bl Wet Ck nr Howe - no corrections

Big Lost R at Howell Ranch - no corrections

Big Lost R bl Mackay Res nr Mackay (2)
+ Mackay Res storage change

Little Wood R ab High Five Ck – no corrections

Little Wood R nr Carey (2)
+ Little Wood Res storage change

Big Wood R at Hailey - no corrections

Big Wood R ab Magic Res (2)
+ Big Wood R nr Bellevue (1912-1996)
+ Big Wood R at Stanton Crossing nr Bellevue (1997 to present)
+ Willow Ck (1997 to present)

Camas Ck nr Blaine – no corrections

Magic Res Inflow (2)
+ Big Wood R bl Magic Dam
+ Magic Res storage change

Upper Snake River Basin

Falls R nr Ashton (2)
+ Grassy Lake storage change
+ Diversions from Falls R ab nr Ashton

Henrys Fork nr Ashton (2)
+ Henrys Lake storage change
+ Island Park Res storage change

Teton R nr Driggs - no corrections

Teton R nr St. Anthony (2)
- Cross Cut Canal into Teton R
+ Sum of Diversions for Teton R ab St. Anthony
+ Teton Dam for water year 1976 only

Henrys Fork nr Rexburg (2)
+ Henrys Lake storage change
+ Island Park Res storage change
+ Grassy Lake storage change
+ 3 Diversions from Falls R ab Ashton-Chester
+ 6 Diversions from Falls R abv Ashton
+ 7 Diversions from Henrys Fk btw Ashton to St. Anthony
+ 21 Diversions from Henrys Fk btw St. Anthony to Rexburg
Snake R nr Flagg Ranch, WY – no corrections
Snake R nr Moran, WY (2)
+ Jackson Lake storage change
Pacific Ck at Moran, WY - no corrections
Buffalo Fork ab Lava nr Moran, WY - no corrections
Snake R ab Res nr Alpine, WY (2)
+ Jackson Lake storage change
Greys R nr Alpine, WY - no corrections
Salt R R nr Etna, WY - no corrections
Palisades Res Inflow (2)
+ Snake R nr Irwin
+ Jackson Lake storage change
+ Palisades Res storage change
Snake R nr Heise (2)
+ Jackson Lake storage change
+ Palisades Res storage change
Ririe Res Inflow (2)
+ Willow Ck nr Ririe
+ Ririe Res storage change
The forecasted natural volume for Willow Creek nr Ririe <u>does not include</u> Grays Lake water diverted from Willow Creek drainage through the Clarks Cut diversion and into Blackfoot Reservoir.
Blackfoot R ab Res nr Henry (2)
+ Blackfoot Res storage change
The forecasted Blackfoot Reservoir Inflow <u>includes</u> Grays Lake water diverted from the Willow Creek drainage through the Clarks Cut diversion and into Blackfoot Reservoir.
Portneuf R at Topaz - no corrections
American Falls Res Inflow (2)
+ Snake R at Neeley
+ Jackson Lake storage change
+ Palisades Res storage change
+ American Falls storage change
+ Teton Dam for water year 1976 only

<u>Southside Snake River Basins</u>
Goose Ck nr Oakley - no adjustments
Trapper Ck nr Oakley - no adjustments
Oakley Res Inflow - *<u>flow does not include</u> Birch Creek*
+ Goose Ck
+ Trapper Ck
Salmon Falls Ck nr San Jacinto, NV - no corrections
Bruneau R nr Hot Springs - no corrections
Reynolds Ck at Tollgate - no corrections
Owyhee R nr Gold Ck, NV (2)
+ Wildhorse Res storage change
Owyhee R nr Rome, OR – no Corrections
Owyhee Res Inflow (2)
+ Owyhee R bl Owyhee Dam, OR
+ Lake Owyhee storage change
+ Diversions to North and South Canals

<u>Bear River Basin</u>
Bear R nr UT-WY Stateline, UT- no corrections
Bear R abv Res nr Woodruff, UT- no corrections
Big Ck nr Randolph, UT - no corrections
Smiths Fork nr Border, WY - no corrections
Bear R bl Stewart Dam (2)
+ Bear R bl Stewart Dam
+ Rainbow Inlet Canal
Little Bear R at Paradise, UT - no corrections
Logan R nr Logan, UT - no corrections
Blacksmith Fk nr Hyrum, UT - no corrections

<u>Reservoir Capacity Definitions</u> (Units in 1,000 Acre-Feet, KAF)
Different agencies use various definitions when reporting reservoir capacity and contents. Reservoir storage terms include dead, inactive, active, and surcharge storage. This table lists the volumes for each reservoir, and defines the storage volumes NRCS uses when reporting capacity and current reservoir storage. In most cases, NRCS reports usable storage which includes active and/or inactive storage. **(Revised Feb. 2015)**

Basin- Lake or Reservoir	Dead Storage	Inactive Storage	Active Storage	Surcharge Storage	NRCS Capacity	NRCS Capacity Includes
<u>Panhandle Region</u>						
Hungry Horse	39.73	---	**3451.00**	---	**3451.0**	Active
Flathead Lake	Unknown	---	**1791.00**	---	**1791.0**	Active
Noxon	Unknown	---	**335.00**	---	**335.0**	Active
Lake Pend Oreille	**406.20**	**112.40**	**1042.70**	**---**	**1561.3**	Dead + Inactive + Active
Lake Coeur d'Alene	Unknown	13.50	**225.00**	**---**	**238.5**	Inactive + Active
Priest Lake	**20.00**	**28.00**	**71.30**	**---**	**119.3**	Dead + Inactive + Active
<u>Clearwater Basin</u>						
Dworshak	Unknown	**1452.00**	**2016.00**	**---**	**3468.0**	Inactive + Active
<u>West Central Basins</u>						
Anderson Ranch	24.90	**37.00**	**413.10**	---	450.1	Inactive + Active
Arrowrock	Unknown	---	**272.20**	**---**	**272.2**	Active
Lucky Peak	Unknown	**28.80**	**264.40**	13.80	**293.2**	Inactive + Active
Lake Lowell	7.90	**5.80**	**159.40**	---	165.2	Inactive + Active
Deadwood	Unknown	---	**161.90**	**---**	**161.9**	Active
Cascade	Unknown	**46.70**	**646.50**	**---**	**693.2**	Inactive + Active
Mann Creek	1.61	0.24	**11.10**	**---**	**11.1**	Active
<u>Wood and Lost Basins</u>						
Mackay	0.13	---	**44.37**	**---**	**44.4**	Active
Little Wood	Unknown	---	**30.00**	**---**	**30.0**	Active
Magic	Unknown	---	**191.50**	**---**	**191.5**	Active
<u>Upper Snake Basin</u>						
Jackson Lake	Unknown	---	**847.00**	**---**	**847.0**	Active
Palisades	44.10	**155.50**	**1200.00**	**---**	**1400.0**	Dead + Inactive+Active
Henrys Lake	Unknown	---	**90.40**	**---**	**90.4**	Active
Island Park	0.40	---	**127.30**	**7.90**	**135.2**	Active + Surcharge
Grassy Lake	Unknown	---	**15.18**	**---**	**15.2**	Active
Ririe	4.00	6.00	**80.54**	10.00	**80.5**	Active
Blackfoot	0.00	---	**333.50**	3.50	**333.50**	Active (rev. 2/1/2015)
American Falls	Unknown	---	**1672.60**	**---**	**1672.6**	Active
<u>Southside Snake Basins</u>						
Oakley	0.00	---	**75.60**	**---**	**75.6**	Active
Salmon Falls	48.00	**5.00**	**182.65**	**---**	**182.6**	Active
Wild Horse	Unknown	---	**71.50**	**---**	**71.5**	Active
Lake Owyhee	406.83	---	**715.00**	**---**	**715.0**	Active
Brownlee	0.45	**444.70**	**975.30**	**---**	**1420.0**	Inactive + Active
<u>Bear River Basin</u>						
Bear Lake	5000.00	119.00	**1302.00**	**---**	**1302.0**	Active:
Capacity does not include 119 KAF that can be used, historic values below this level are rounded to zero						
Montpelier	**0.21**	**---**	**3.84**	**---**	**4.0**	Dead + Active

Interpreting Water Supply Forecasts

Each month, five forecasts are issued for each forecast point and each forecast period. Unless otherwise specified, all streamflow forecasts are for streamflow volumes that would occur naturally without any upstream influences. Water users need to know what the different forecasts represent if they are to use the information correctly when making operational decisions. The following is an explanation of each of the forecasts.

90 Percent Chance of Exceedance Forecast. There is a 90 percent chance that the actual streamflow volume will exceed this forecast value, and there is a 10 percent chance that the actual streamflow volume will be less than this forecast value.

70 Percent Chance of Exceedance Forecast. There is a 70 percent chance that the actual streamflow volume will exceed this forecast value, and there is a 30 percent chance that the actual streamflow volume will be less than this forecast value.

50 Percent Chance of Exceedance Forecast. There is a 50 percent chance that the actual streamflow volume will exceed this forecast value, and there is a 50 percent chance that the actual streamflow volume will be less than this forecast value. Generally, this forecast is the middle of the range of possible streamflow volumes that can be produced given current conditions.

30 Percent Chance of Exceedance Forecast. There is a 30 percent chance that the actual streamflow volume will exceed this forecast value, and there is a 70 percent chance that the actual streamflow volume will be less than this forecast value.

10 Percent Chance of Exceedance Forecast. There is a 10 percent chance that the actual streamflow volume will exceed this forecast value, and there is a 90 percent chance that the actual streamflow volume will be less than this forecast value.

*Note: There is still a 20 percent chance that actual streamflow volumes will fall either below the 90 percent exceedance forecast or above the 10 percent exceedance forecast.

These forecasts represent the uncertainty inherent in making streamflow predictions. This uncertainty may include sources such as: unknown future weather conditions, uncertainties associated with the various prediction methodologies, and the spatial coverage of the data network in a given basin.

30-Year Average. The 30-year average streamflow for each forecast period is provided for comparison. The average is based on data from 1981-2010. The % AVG. column compares the 50% chance of exceedance forecast to the 30-year average streamflow; values above 100% denote when the 50% chance of exceedance forecast would be greater than the 30-year average streamflow.

AF - Acre-feet, forecasted volume of water are typically in thousands of acre-feet (KAF).

These forecasts are given to users to help make risk-based decisions. Users can select the forecast corresponding to the level of risk they are willing to accept in order to minimize the negative impacts of having more or less water than planned for.

To Decrease the Chance of Having Less Water than Planned for
A user might determine that making decisions based on a 50 percent chance of exceedance forecast is too much risk to take (there is still a 50% chance that the user will receive less than this amount). To reduce the risk of having less water than planned for, users can base their operational decisions on one of the forecasts with a greater chance of being exceeded such as the 90 or 70 percent exceedance forecasts.

To Decrease the Chance of Having More Water than Planned for
A user might determine that making decisions based on a 50 percent chance of exceedance forecast is too much risk to take (there is still a 50% chance that the user will receive more than this amount). To reduce the risk of having more water than planned for, users can base their operational decisions on one of the forecasts with a lesser chance of being exceeded such as the 30 or 10 percent exceedance forecasts.

Forecast use example:

Using the 50 Percent Exceedance Forecast. Using the example forecasts shown on the next page, there is a 50% chance that actual streamflow volume at the Henry's Fork near Ashton will be less than 280 KAF between June 1 and Sept. 30. There is also a 50% chance that actual streamflow volume will be greater than 280 KAF.

Using the 90 and 70 Percent Exceedance Forecasts. If an unexpected shortage of water could cause problems (such as irrigated agriculture), users might want to plan on receiving 245 KAF during Jun 1 through September 30 (from the 70 percent exceedance forecast). There is a 30% chance of receiving *less* than 245 KAF.

Alternatively, if users determine the risk of using the 70 percent exceedance forecast is too great, then they might plan on receiving 198 KAF (from the **90** percent exceedance forecast). There is 10% chance of receiving less than 72 KAF.

Using the 30 or 10 Percent Exceedance Forecasts. If an unexpected excess of water could cause problems (such as operating a flood control reservoir), users might plan on receiving 315 KAF between June 1 and Sept. 30 (from the 30 percent exceedance forecast). There is a 30% chance of receiving *more* than 315 KAF.

Alternatively, if users determine the risk of using the 30 percent exceedance forecast is too great, then they might plan on receiving 360 KAF (from the 10 percent exceedance forecast). There is a 10% chance of receiving more than 360 KAF. Users could also choose a volume in between any of these values to reflect their desired risk level.

Upper Snake River Basin Streamflow Forecasts - June 1, 2015

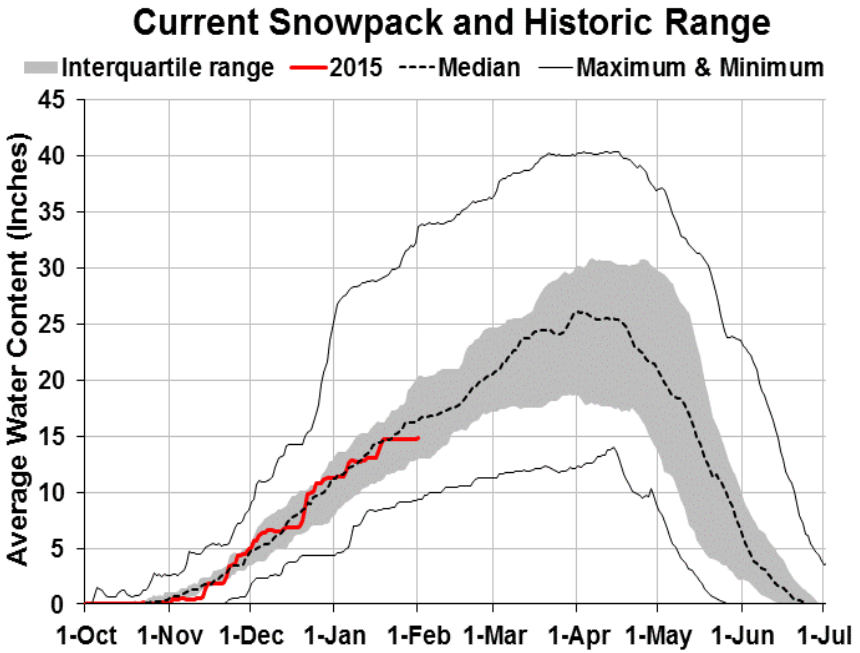
Forecast Point	Forecast Period	Forecast Exceedance Probabilities for Risk Assessment <---Drier----------Projected Volume----------Wetter---> 90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Henrys Fk nr Ashton	JUN-JUL	72	106	129	56	152	186	230
	JUN-SEP	198	245	280	68	315	360	410

Interpreting Snowpack Plots

Basin snowpack plots represent snow water equivalent indices using the average daily SNOTEL data[1] from several sites in or near individual basins. The solid red line (2015), which represents the current water year snowpack water content, can be compared to the normal dashed black line (Median) which is considered "normal", as well as the SNOTEL observed historical snowpack range for each basin. This allows users to gather important information about the current year's snowpack as well as the historical variability of snowpack in each basin.

The gray shaded area represents the interquartile range (also known as the "middle fifty"), which is the 25th to 75th percentiles of the historical daily snowpack data for each basin. Percentiles depict the value of the average snowpack below which the given percent of historical years fall. For example, the top part of the interquartile range (75th percentile) indicates that the snowpack index has been below this line for 75 percent of the period of record, whereas the reverse is true for the lower part of the interquartile range (25th percentile). This means 50 percent of the time the snowpack index is within the interquartile range (gray area) during the period of record.

[1] All data used for these plots come from daily SNOTEL data only and does not include snow course data (collected monthly), whereas the official basin snowpack percent of normal includes both SNOTEL and snow course data, potentially leading to slight discrepancies between plots and official basin percent of normal.



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