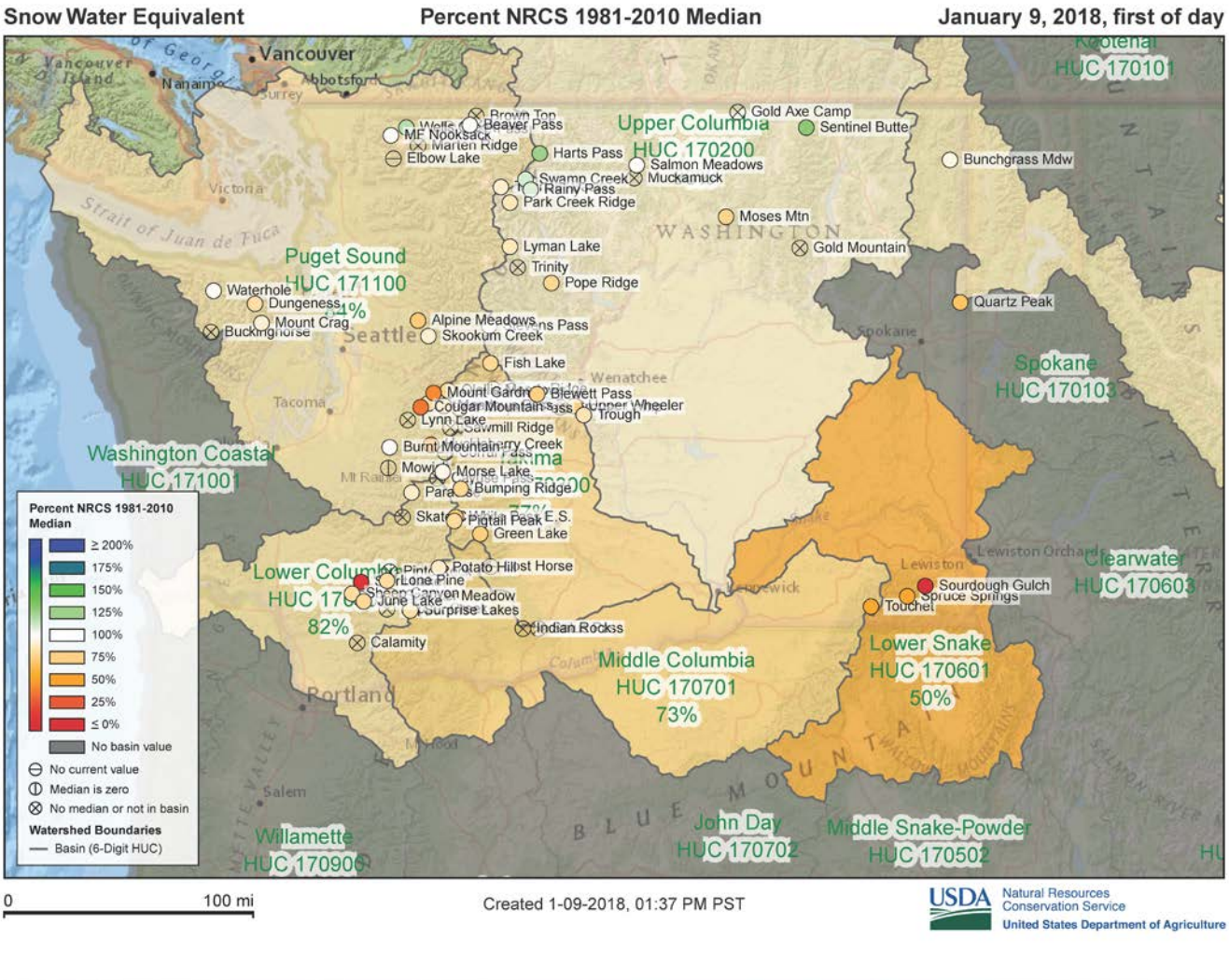
United States Department of Agriculture

NRCS Natural Resources Conservation Service

Washington
Water Supply Outlook Report
January 1, 2018



This is an export graphic from the most recent version of the Interactive Map Tool; HUC basin and SNOTEL site percent of median for Washington.

Water Supply Outlook Reports
and
Federal - State – Private Cooperative Snow Surveys

For more water supply and resource management information, contact:

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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 it 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 prepare runoff forecasts. These forecasts are coordinated between hydrologists in the Natural Resources Conservation Service and the National Weather Service. Unless otherwise specified, all forecasts are for flows that would occur naturally without any upstream influences.

Forecasts of any kind, of course, 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 uncertain 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.

Washington
Water Supply Outlook

January 2018

General Outlook

Another record hot summer and+ wet fall led into what appears to be a typical La Nina for Washington, with warm wet conditions across the state. Warmer in the southern regions but cooler north where the jet stream brought adequate snowfall to help many ski areas open by or before the Thanksgiving weekend. However, a warm dry spell in early December slowed snow accumulation and thus winter recreation, but by the start of the new year everyone was burning down the slopes with holiday gifts of fresh powder, new wax and tight turns. The most recent forecast through mid-January shows a high probability for above normal temperatures and above normal precipitation, which does not bode well for heavy snow accumulation. NWS 3-month (JFM) forecast indicates below normal temperatures and above normal precipitation, which is our best shot at finishing the season with normal mountain snowpack. http://www.cpc.ncep.noaa.gov/

Snowpack

The January 1 statewide SNOTEL readings were 95% of normal, slightly lower than this time last year. The lowest readings in the state were at 64% of the 30-year median for January 1 in both the Walla Walla and Green river basins. The Nooksack Basin had the most snow with 139%. Basins across northern Washington favor higher snowpack conditions than those further south. Westside medians from SNOTEL, and January 1 snow surveys, included the North Puget Sound river basins with 114% of normal, the Central and South Puget river basins with 143% and 107% respectively, and the Lower Columbia basins with 130% of normal. Snowpack along the east slopes of the Cascade Mountains included the Yakima area with 92% and the Wenatchee area with 93%. Snowpack in the Spokane River Basin was at 83% and the Walla Walla River Basin had 117% of the long term median.

BASIN	PERCENT OF MEDIAN	LAST YEAR PERCENT MEDIAN
Spokane	94	83
Newman Lake	77	74
Pend Oreille	124	88
Okanogan	118	93
Methow	124	100
Conconully Lake	100	64
Central Columbia	88	93
Upper Yakima	78	93
Lower Yakima	85	95
Ahtanum Creek	68	85
Walla Walla	64	17
Lower Snake	77	104
Cowlitz	89	115
Lewis	94	146
White	105	103
Green	64	112
Puyallup	111	134
Cedar	87	145
Snoqualmie	86	140
Skykomish	89	124
Skagit	112	103
Nooksack	139	132
Olympic Peninsula	107	126

Precipitation

December precipitation was hit and miss across the state but basically near normal overall. Fortunately, the water-year started off great with near to above normal conditions throughout the state. Cold temperatures and snow started in early November but then warmed back to mostly rain until mid-December.

RIVER BASIN	DECEMBER PERCENT OF AVERAGE	WATER YEAR PERCENT OF AVERAGE
Spokane	92	110
Pend Oreille	116	115
Upper Columbia	50	106
Central Columbia	76	112
Upper Yakima	83	108
Lower Yakima	74	119
Walla Walla	103	112
Lower Snake	92	105
Lower Columbia	82	115
South Puget Sound	94	126
Central Puget Sound	100	118
North Puget Sound	79	116
Olympic Peninsula	49	107

Reservoir

Water-year 2017 ended with near to above normal storage levels in Eastern WA and slightly below normal in the western part of the state. Most likely due to management practices. Seasonal reservoir levels in Washington can vary greatly due to specific watershed management practices required in preparation for irrigation season, fisheries management, power generation, municipal demands and flood control. A wet fall helped maintain end of summer storage as well. January 1 Reservoir storage in the Yakima Basin was 272,000-acre feet, 126% of average for the Upper Reaches and 88,000-acre feet or 104% of average for Rimrock and Bumping Lakes. The power generation reservoirs included the following: Coeur d'Alene Lake, 188,000-acre feet, 99% of average and 79% of capacity; and the Skagit River reservoirs at 68% of average and 93% of capacity. Recent climate impacts and management procedures may affect these numbers on a daily or weekly basis.

BASIN	PERCENT OF CAPACITY	CURRENT STORAGE AS PERCENT OF AVERAGE
Spokane	79	99
Pend Oreille	92	104
Upper Columbia	67	121
Central Columbia	N/A	N/A
Upper Yakima	33	126
Lower Yakima	38	104
Lower Snake	64	90
North Puget Sound	65	68

For more information contact your local Natural Resources Conservation Service office.

Streamflow

Early winter forecasts for April-September stream flows are never quite as robust as they are later in the season when we know more about the winter climatology. At times only a few degrees warmer or cooler than forecasted can make or break stream flow predictions. April-September forecasts for some Western Washington streams include the Cedar River near Cedar Falls, 99%; White River, 105%; and Skagit River, 99%. Some Eastern Washington streams include the Yakima River near Parker 93%, Wenatchee River at Plain 94%; and Spokane River near Post Falls 100%. Volumetric forecasts are developed using current, historic and average snowpack, precipitation and streamflow data collected and coordinated by organizations cooperating with NRCS. Caution should be used when using early season forecasts for critical water resource management decisions since governing conditions are likely to change for the better or the worse

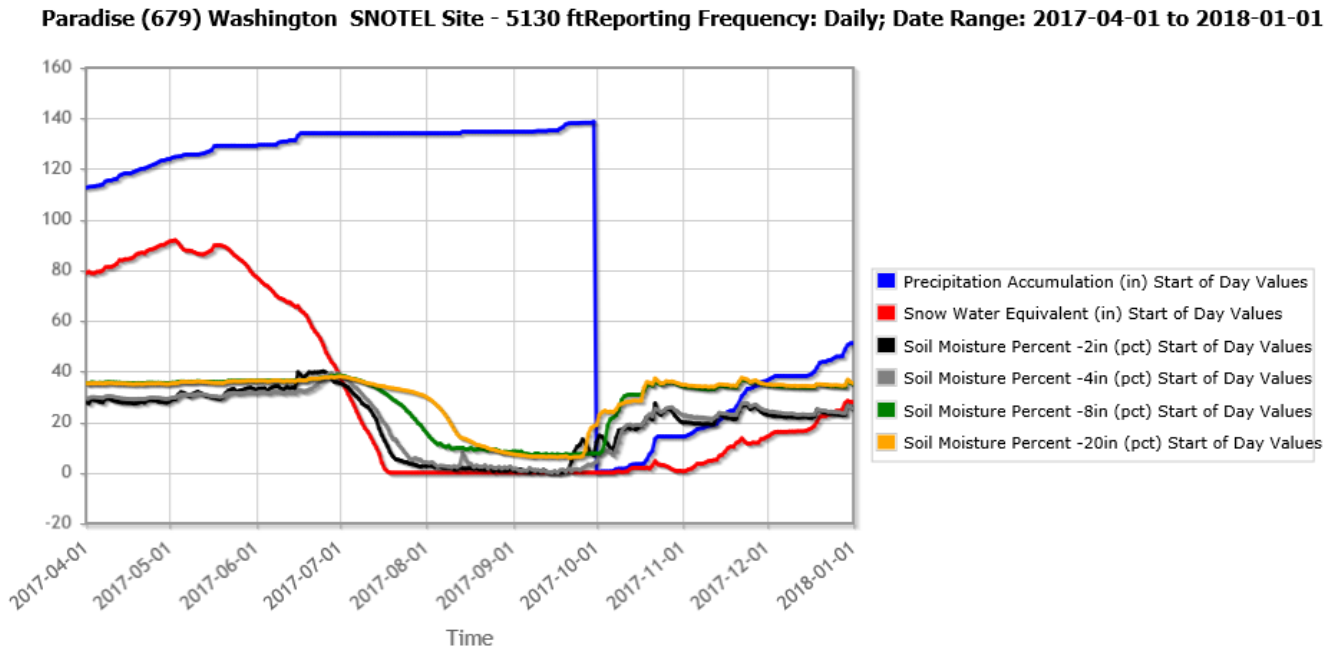
BASIN	PERCENT OF AVERAGE (50 PERCENT CHANCE OF EXCEEDENCE)
Spokane	83-101
Priest River	92
Upper Columbia	71-116
Central Columbia	88-102
Upper Yakima	92-96
Lower Yakima	89-95
Walla Walla	93-100
Lower Snake	85-114
Lower Columbia	89-104
South Puget Sound	90-105
Central Puget Sound	96-99
North Puget Sound	92-99
Olympic Peninsula	100-102

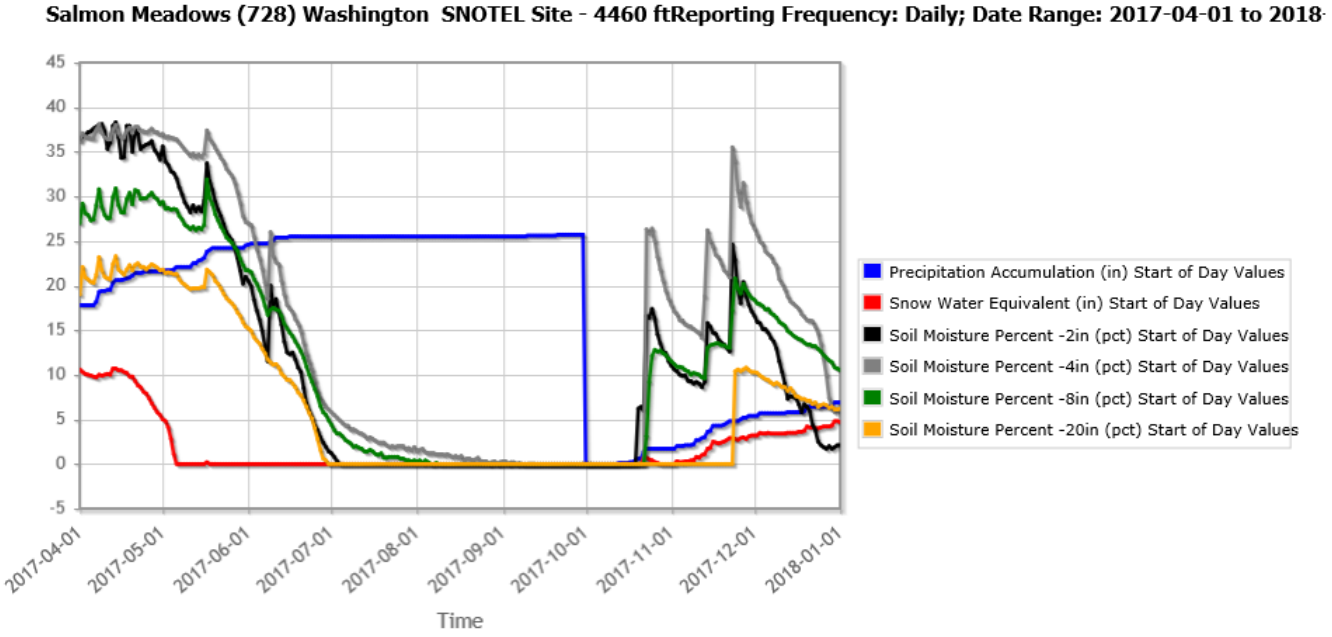
STREAM	PERCENT OF AVERAGE DECEMBER STREAMFLOWS
Pend Oreille at Albeni Fall Dam	112
Kettle at Laurier	80
Columbia at Birchbank	87
Spokane at Spokane	101
Similkameen at Nighthawk	161
Okanogan at Tonasket	142
Methow at Pateros	160
Chelan at Chelan	135
Wenatchee at Pashastin	108
Cle Elum near Roslyn	94
Yakima at Parker	107
Naches at Naches	124
Grande Ronde at Troy	100
Snake below Lower Granite Dam	110
Columbia River at The Dalles	101
Lewis at Merwin Dam	92
Cowlitz below Mayfield Dam	113
Skagit at Concrete	94
Dungeness near Sequim	77

For more information contact your local Natural Resources Conservation Service office.

Soil Moisture

Near to above normal fall precipitation provided for wet and nearly saturated soils (60-70% saturation) as the snow finally began to accumulate in mid-December. Great fall soil moisture conditions can help buffer low snowpack runoff come spring however it is too early in the season to count those chickens. Current soil moisture data is available from a limited number of SNOTEL sites scattered throughout each basin. As the effort continues to install additional sensors and more years of data are acquired this information will become invaluable to the streamflow forecasting community. Following are example graphs from both a wet, deep snow site and a dry, shallow snow site. Both show excellent response from spring melt, summer dry, fall rain and snow accumulation.





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Helpful Internet Addresses

NRCS Snow Survey and Climate Services Homepages

Washington:
http://www.nrcs.usda.gov/wps/portal/nrcs/main/wa/snow/

Oregon:
http://www.nrcs.usda.gov/wps/portal/nrcs/main/or/snow/

Idaho:
http://www.nrcs.usda.gov/wps/portal/nrcs/main/id/snow/

National Water and Climate Center (NWCC):
http://www.wcc.nrcs.usda.gov

USDA-NRCS Agency Homepages

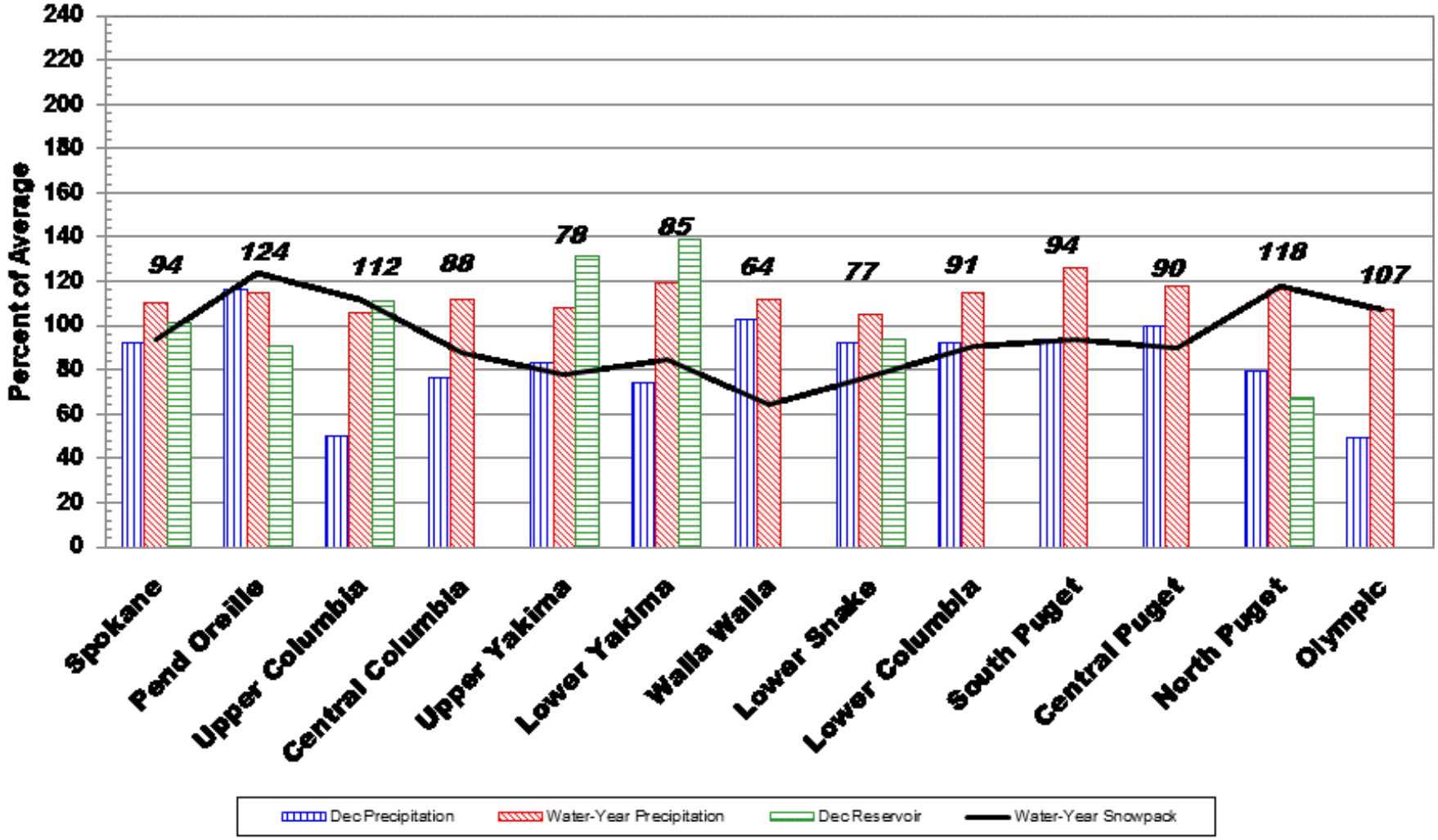
Washington:
http://www.nrcs.usda.gov/wps/portal/nrcs/site/wa/home/

NRCS National:
http://www.nrcs.usda.gov/wps/portal/nrcs/site/national/home/

NRCS Natural Resources Conservation Service

January 1, 2018 - Snowpack, Precipitation and Reservoir Conditions at a Glance

(Water Year = October 1 - Current Date)



86th Meeting of the Western Snow Conference

The Western Snow Conference is an annual tradition which started in 1932 as an international forum for individuals and organizations to share scientific, management and socio-political information on snow and runoff. The principal aim of the Western Snow Conference is to advance snow and hydrological sciences. The South Continental Area Committee is making plans for the 86th Annual Western Snow Conference in 2018.

Mark your calendar and start thinking about submitting a paper to attend the 2018 Western Snow Conference:

Dates: April 16-19, 2018
Location: Albuquerque, NM

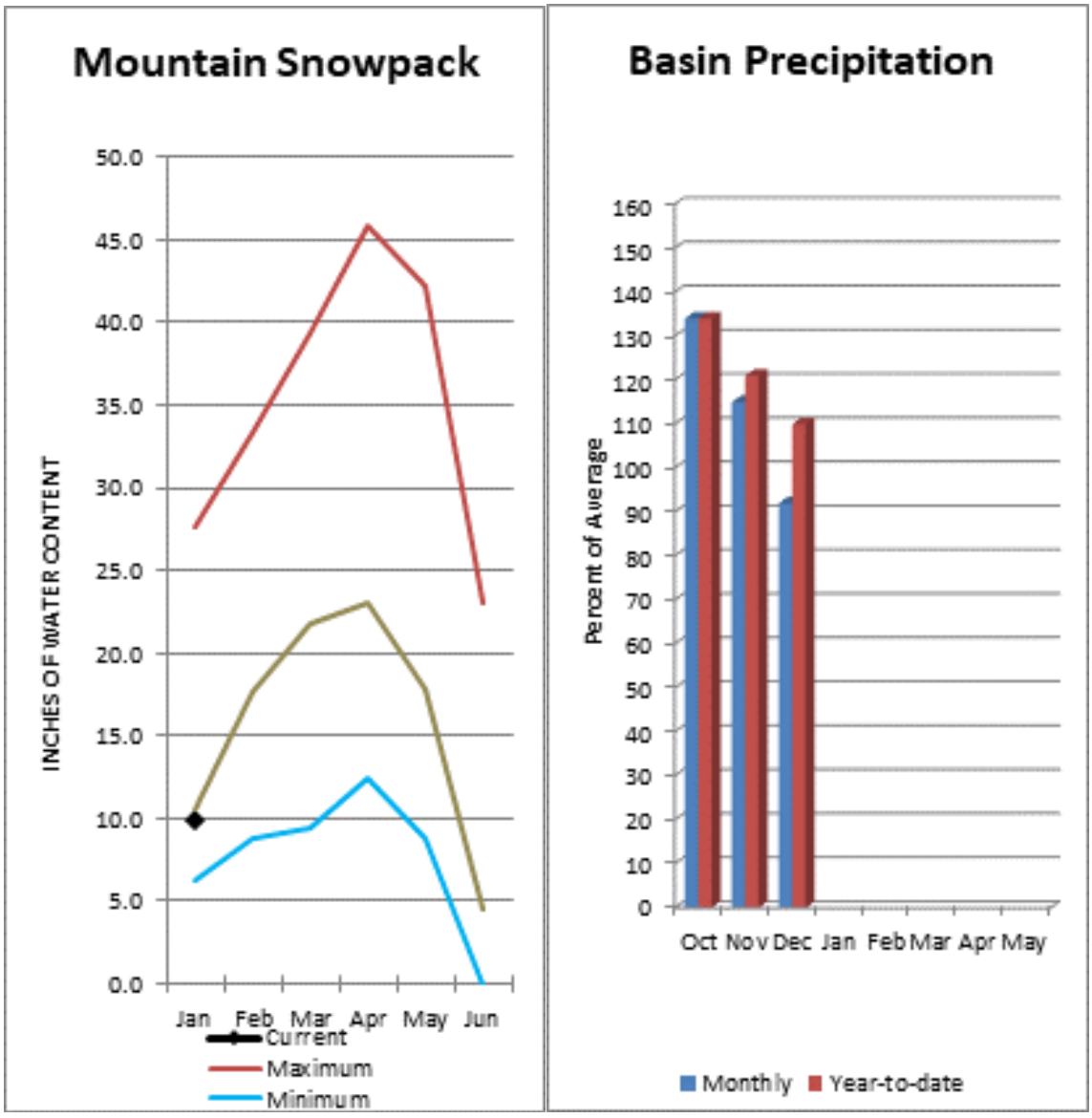
The South Continental Committee will compile a full agenda of oral and poster papers. In addition, a Monday short course is being planned which will focus on communicating scientific information and building narratives to effectively reach broad audiences. On Thursday a technical tour is planned of historic and hydrologic points of interest in the lower Rio Grande Valley, including the first stream gaging station installed in the United States.

The conference will be held at the beautiful Crowne Plaza Albuquerque located at the historic and cultural crossroads of El Camino Real and Route 66. Nearby attractions include historic Old Town, Petroglyph National Monument, the Indian Pueblo Cultural Center, Sandia Peak Tramway, ABQ BioPark, many brew pubs and museums. The Hotel will honor government per diem rate for our conference.

Additional information about the conference and the Call for Papers will be posted on the WSC web page at http://www.westernsnowconference.org/

Also find Western Snow Conference on Facebook and Twitter.

Spokane River Basin



The January 1 forecasts for summer runoff within the Spokane River Basin are 100% of average near Post Falls and 101% at Long Lake. The Chamokane River near Long Lake forecasted to have 83% of average flows for the May-August period. The forecast is based on a basin snowpack that is 94% of normal and precipitation that is 110% of average for the water year. Precipitation for December was slightly below normal at 92% of average. Streamflow on the Spokane River at Spokane was 101% of average for December. January 1 storage in Coeur d'Alene Lake was 95,000-acre feet, 101% of average and 40% of capacity. Snowpack at Quartz Peak SNOTEL site was 77% of average with 7.5 inches of water content. Average temperatures in the Spokane basin were colder than normal for December but averaged near normal for the water year.

For more information contact your local Natural Resources Conservation Service office.

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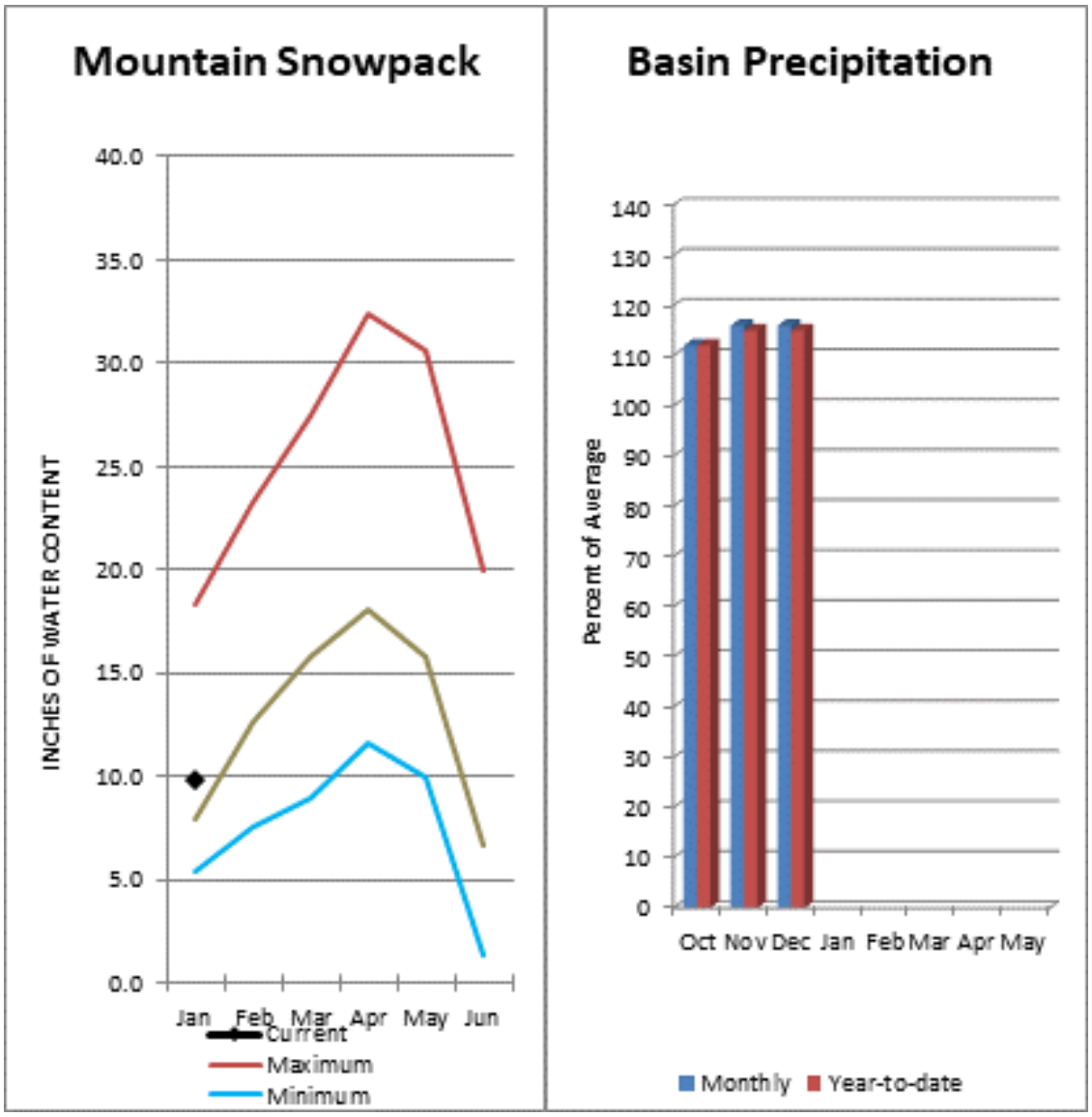
Spokane
Streamflow Forecasts - January 1, 2018

Spokane	Forecast Period	Forecast Exceedance Probabilities for Risk Assessment: Chance that actual volume will exceed forecast — 90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Spokane R nr Post Falls[2]								
	APR-JUL	1490	2020	2390	100%	2760	3290	2390
	APR-SEP	1550	2100	2470	100%	2840	3390	2480
Spokane R at Long Lake[2]								
	APR-JUL	1660	2270	2680	102%	3090	3700	2620
	APR-SEP	1830	2460	2890	101%	3320	3950	2850
Chamokane Ck nr Long Lake								
	MAY-AUG	4.3	6.3	7.7	83%	9	11.1	9.3

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

Reservoir Storage End of December, 2017	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Lake Coeur d' Alene	95.0	54.9	93.7	238.5
Basin-wide Total	95.0	54.9	93.7	238.5
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis January 1, 2018	# of Sites	% Median	Last Year % Median
Spokane	11	94%	83%
Newman Lake	1	77%	74%



The April – September average forecast for the Priest River near the town of Priest River is 92%. December streamflow was 112% of average on the Pend Oreille River and 87% on the Columbia at Birchbank. January 1 snow cover was 124% of normal in the Pend Oreille Basin River Basin. Bunchgrass Meadows SNOTEL site had 11.2 inches of snow water on the snow pillow. Normally Bunchgrass would have 11.6 inches on January 1. Precipitation during December was 116% of average, dropping the year-to-date precipitation at 115% of average. Reservoir storage in the basin, including Lake Pend Oreille and Priest Lake was 91% of normal. Average temperatures were slightly below normal for December but near normal for the water year.

For more information contact your local Natural Resources Conservation Service office.

Pend Oreille River Basins

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Pend Oreille Basins
Streamflow Forecasts - January 1, 2018

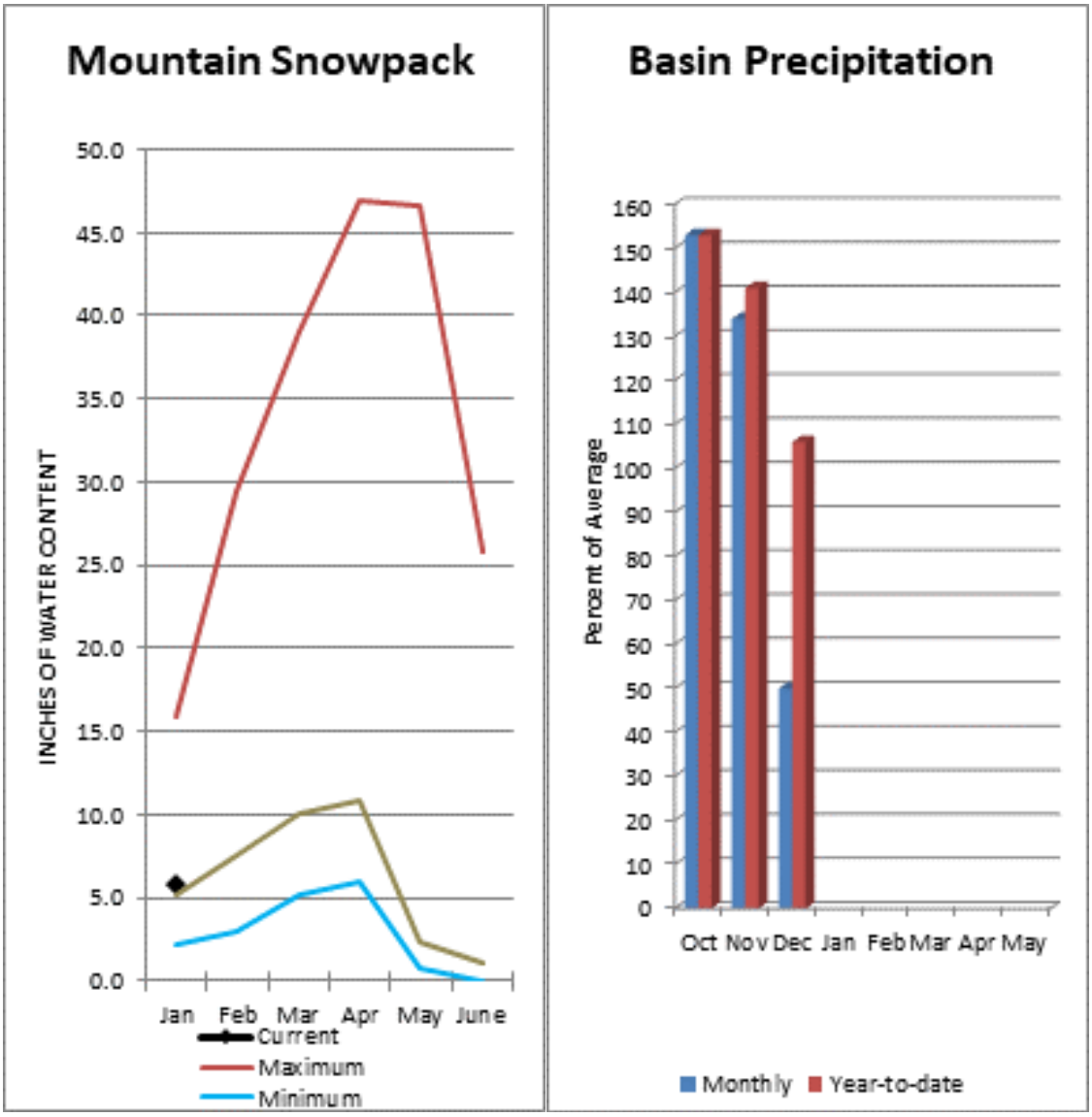
Pend Oreille Basins	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
		Forecast Exceedance Probabilities for Risk Assessment Chance that actual volume will exceed forecast						
Pend Oreille Lake Inflow[2]								
Priest R nr Priest River[2]								
	APR-JUL	480	620	715	92%	810	955	780
	APR-SEP	510	660	760	92%	860	1010	830
Pend Oreille R bl Box Canyon[2]								

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

Reservoir Storage End of December, 2017	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Lake Pend Oreille	645.4	590.8	708.2	1561.3
Priest Lake	48.2	57.5	56.5	119.3
Basin-wide Total	693.6	648.3	764.7	1680.6
# of reservoirs	2	2	2	2

Watershed Snowpack Analysis January 1, 2018	# of Sites	% Median	Last Year % Median
Pend Oreille Basins	50	124%	88%
Colville River	0		
Kettle River	3	104%	76%

Upper Columbia River Basins



Summer runoff average forecast for the Okanogan River is 106%, Similkameen River is 116%, and Methow River is 109%. January 1 snow cover on the Okanogan was 118% of normal, Omak Creek was 76% and the Methow was 124%. December precipitation in the Upper Columbia was 50% of average, with precipitation for the water year at 106% of average. December streamflow for the Methow River was 110% of average, 142% for the Okanogan River and 161% for the Similkameen. Snow-water content at Salmon Meadows SNOTEL was 4.7 inches or 100% of normal for January 1. Combined storage in the Conconully Reservoirs was 15,300 acre-feet or 111% of normal. Temperatures were near normal for December but slightly below normal for the water year.

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Upper Columbia Basins
Streamflow Forecasts - January 1, 2018

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

Upper Columbia Basins	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Kettle R nr Laurier								
	APR-JUL	1160	1490	1720	96%	1940	2270	1800
	APR-SEP	1200	1550	1780	95%	2020	2370	1880
Colville R at Kettle Falls								
	APR-JUL	32	58	84	71%	115	161	119
	APR-SEP	35	64	93	71%	127	177	131
Columbia R at Grand Coulee-NWS[2]								
	APR-JUL	43400		50700	99%		60200	51000
	APR-SEP	51500		60500	101%		71100	60100
Similkameen R nr Nighthawk								
	APR-JUL	1000	1230	1390	116%	1550	1780	1200
	APR-SEP	1080	1320	1490	116%	1660	1900	1280
Okanogan R nr Tonasket								
	APR-JUL	965	1290	1520	103%	1750	2080	1480
	APR-SEP	1070	1440	1690	102%	1940	2310	1650
Okanogan R at Malott								
	APR-JUL	800	1320	1550	107%	1780	2300	1450
	APR-SEP	1080	1460	1720	106%	1980	2360	1620
Methow R nr Pateros								
	APR-JUL	590	785	915	110%	1050	1240	835
	APR-SEP	640	845	980	109%	1120	1320	895

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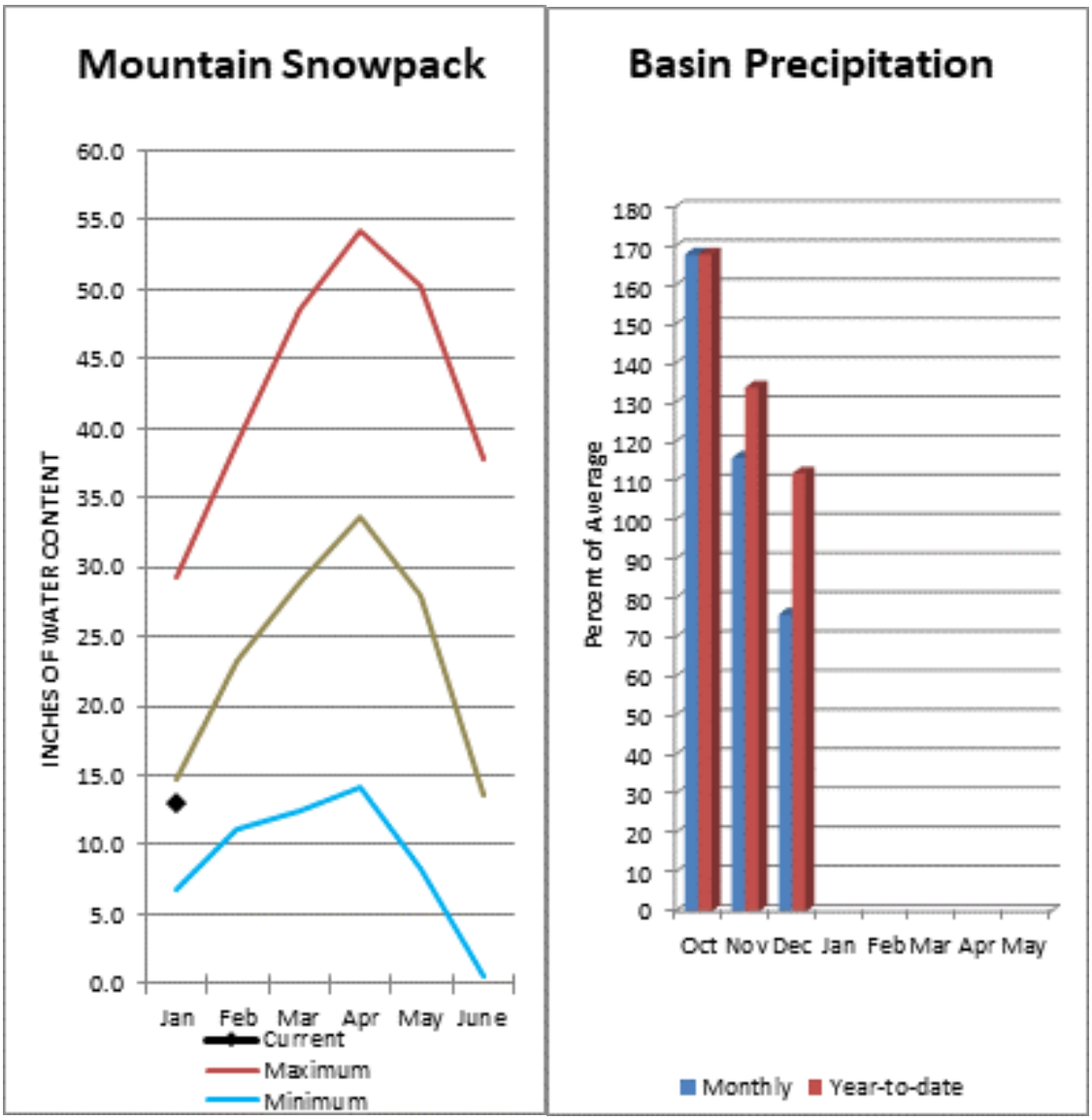
2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions
3) Median value used in place of average

Reservoir Storage End of December, 2017	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Conconully Lake (Salmon Lake Dam)	7.7	8.5	7.3	10.5
Conconully Reservoir	7.6	10.7	6.5	13.0
Basin-wide Total	15.3	19.2	13.8	23.5
# of reservoirs	2	2	2	2

Watershed Snowpack Analysis January 1, 2018	# of Sites	% Median	Last Year % Median
Upper Columbia Basins	7	112%	92%
Okanogan River	6	118%	93%
Omak Creek	1	76%	108%
Sanpoil River	0		
Similkameen River	1	113%	88%
Toats Coulee Creek	0		
Conconully Lake	1	100%	64%
Methow River	3	124%	100%



Precipitation during December was 77% of average in the basin and 113% for the year-to-date. Runoff for Entiat River is forecast to be 88% of average for the summer. The April-September average forecast for Chelan River is 96%, Wenatchee River at Plain is 94%, Stehekin River is 99% and Icicle Creek is 95%. December average streamflow on the Chelan River was 135% and on the Wenatchee River 108%. January 1 snowpack in the Wenatchee River Basin was 88% of normal; the Chelan, 98%; the Entiat, 72%; Stemilt Creek, 84% and Colockum Creek, 94%. Reservoir storage in Lake Chelan was not available. Lyman Lake SNOTEL had the most snow water with 24.1 inches of water. This site would normally have 26.4 inches on January 1. Temperatures were near normal for both December and the water year.

For more information contact your local Natural Resources Conservation Service office.

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Central Columbia Basins
Streamflow Forecasts - January 1, 2018

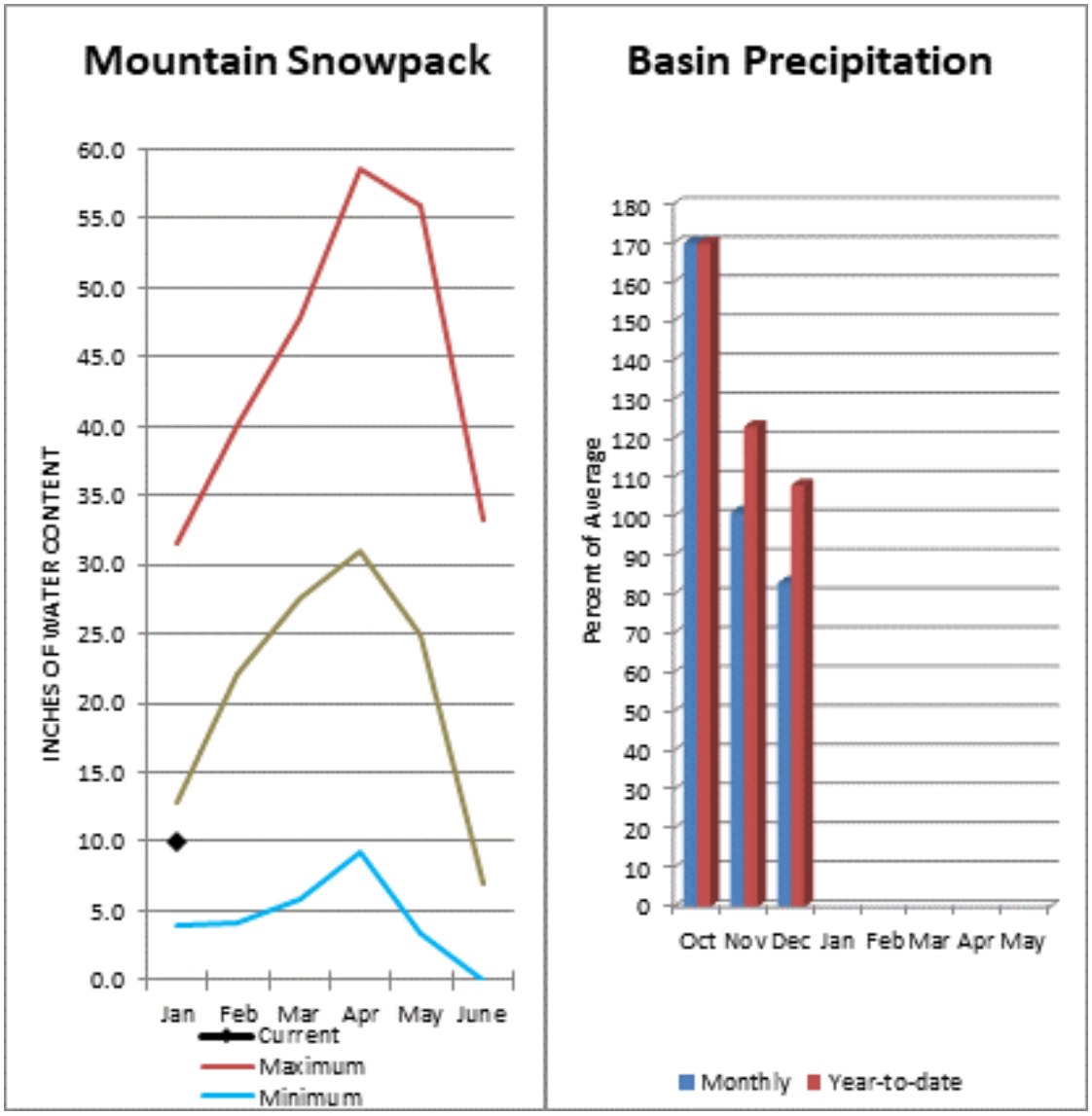
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

Central Columbia Basins	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Stehekin R at Stehekin								
	APR-JUL	520	615	680	100%	745	840	680
	APR-SEP	605	710	785	99%	855	965	790
Chelan R at Chelan								
	APR-JUL	715	860	960	96%	1060	1200	1000
	APR-SEP	785	955	1070	96%	1180	1350	1120
Entiat R nr Ardenvoir								
	APR-JUL	113	151	178	89%	205	245	200
	APR-SEP	120	163	193	88%	220	265	220
Wenatchee R at Plain								
	APR-JUL	650	820	935	94%	1050	1220	990
	APR-SEP	695	890	1020	94%	1150	1340	1080
Icicle Ck nr Leavenworth								
	APR-JUL	181	230	260	95%	295	340	275
	APR-SEP	195	245	285	95%	320	370	300
Wenatchee R at Peshastin								
	APR-JUL	910	1130	1280	93%	1430	1650	1370
	APR-SEP	985	1230	1400	94%	1570	1810	1490
Columbia R bl Rock Island Dam-NWS[2]								
	APR-JUL	47100		55100	99%		66300	55800
	APR-SEP	55600		66200	102%		78400	65200

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 December, 2017	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Lake Chelan			411.3	676.1
Basin-wide Total			0.0	0.0
# of reservoirs	0	0	0	0

Watershed Snowpack Analysis January 1, 2018	# of Sites	% Median	Last Year % Median
Central Columbia Basins	3	98%	97%
Chelan Lake Basin	3	98%	97%
Entiat River	1	72%	74%
Wenatchee River	7	88%	93%
Stemilt Creek	1	84%	58%
Colockum Creek	1	94%	75%



January 1 reservoir storage for the Upper Yakima reservoirs was 452,000-acre feet, 131% of average. Forecasts for the Yakima River at Cle Elum are 92% of average and the Teanaway River near Cle Elum is at 92%. Lake inflows are all forecasted to be near average this summer as well. December streamflow within the basin was Cle Elum River near Roslyn at 94%. January 1 snowpack was 78% based upon 8 snow course and SNOTEL readings within the Upper Yakima Basin. Precipitation was 82% of average for December and 108% for the water-year. Volume forecasts for the Yakima Basin are for natural flow. As such, they may differ from the U.S. Bureau of Reclamation's forecast for the total water supply available, which includes irrigation return flow.

****Due to the devastating fire within the Teanaway and Cle Elum rivers this past summer, streamflow forecasts and thus runoff rates may be greatly affected come spring and summer. Sasse Ridge SNOTEL site was burned through but not lost to the fire. Area hydrology will be adversely changed for quite some time.**

For more information contact your local Natural Resources Conservation Service office.

Upper Yakima River Basin

Data Current as of: 1/5/2018 3:20:13 PM

Upper Yakima River
Streamflow Forecasts - January 1, 2018

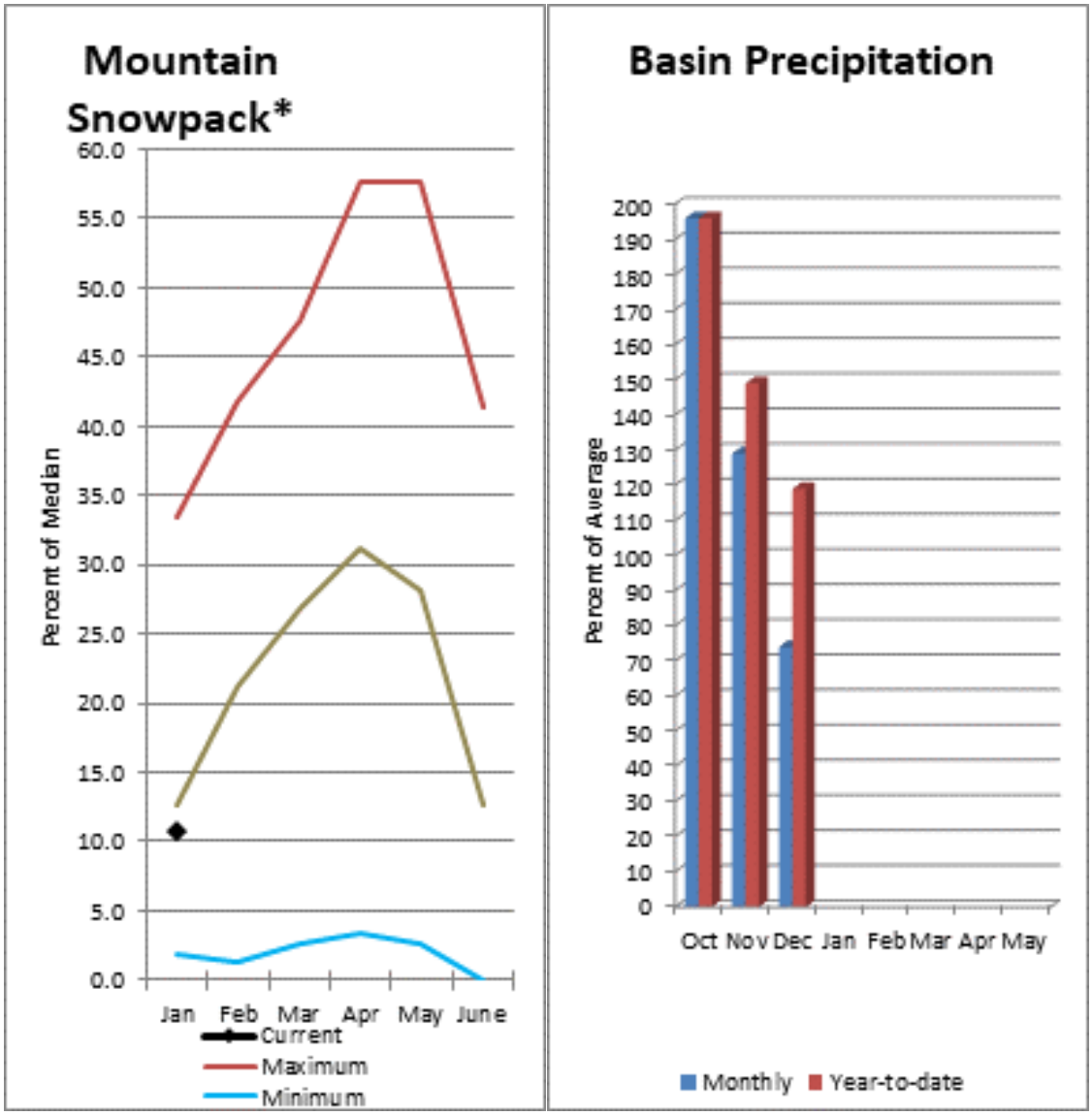
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

Upper Yakima River	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Keechelus Reservoir Inflow[2]								
	APR-JUL	67	93	111	96%	129	155	116
	APR-SEP	76	103	121	96%	139	166	126
Kachess Reservoir Inflow [2]								
	APR-JUL	59	82	98	94%	114	137	104
	APR-SEP	67	90	106	94%	122	146	113
Cle Elum Lake Inflow [2]								
	APR-JUL	245	315	365	95%	410	485	385
	APR-SEP	265	340	395	95%	445	520	415
Yakima R at Cle Elum [2]								
	APR-JUL	430	590	700	93%	805	965	755
	APR-SEP	485	655	765	92%	880	1050	830
Teanaway R bl Forks nr Cle Elum								
	APR-JUL	56	94	119	92%	145	183	130
	APR-SEP	58	96	122	92%	148	186	133

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 December, 2017	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Keechelus	93.7	70.8	68.5	157.8
Kachess	145.7	123.5	113.4	239.0
Cle Elum	212.2	167.8	164.0	436.9
Basin-wide Total	451.6	362.1	345.9	833.7
# of reservoirs	3	3	3	3

Watershed Snowpack Analysis January 1, 2018	# of Sites	% Median	Last Year % Median
Upper Yakima River	8	78%	93%



December average streamflows within the basin were: Yakima River near Parker, 107% and the Naches River near Naches, 124%. January 1 reservoir storage for Bumping and Rimrock reservoirs was 145,000-acre feet, 131% of average. Forecast runoff averages for Yakima River near Parker are 93%; American River near Nile, 93%; Ahtanum Creek, 90%; and Klickitat River near Glenwood, 89%. January 1 snowpack was 85% based upon 6 snow course and SNOTEL readings within the Lower Yakima Basin and Ahtanum Creek reported in at 68% of normal. Precipitation was 74% of average for December and 119% for the water-year. Temperatures were near normal for December and near normal for the water year. Volume forecasts for Yakima Basin are for natural flow. As such, they may differ from the U.S. Bureau of Reclamation's forecast for the total water supply available, which includes irrigation return flow. ****The Norse Peak fire consumed over 55,000 acres in Yakima and Pierce counties as well as destroying the Corral Pass SNOTEL site and threatening Crystal Mtn. Ski Area. Damages are still being assessed.**

For more information contact your local Natural Resources Conservation Service office.

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Lower Yakima River
Streamflow Forecasts - January 1, 2018

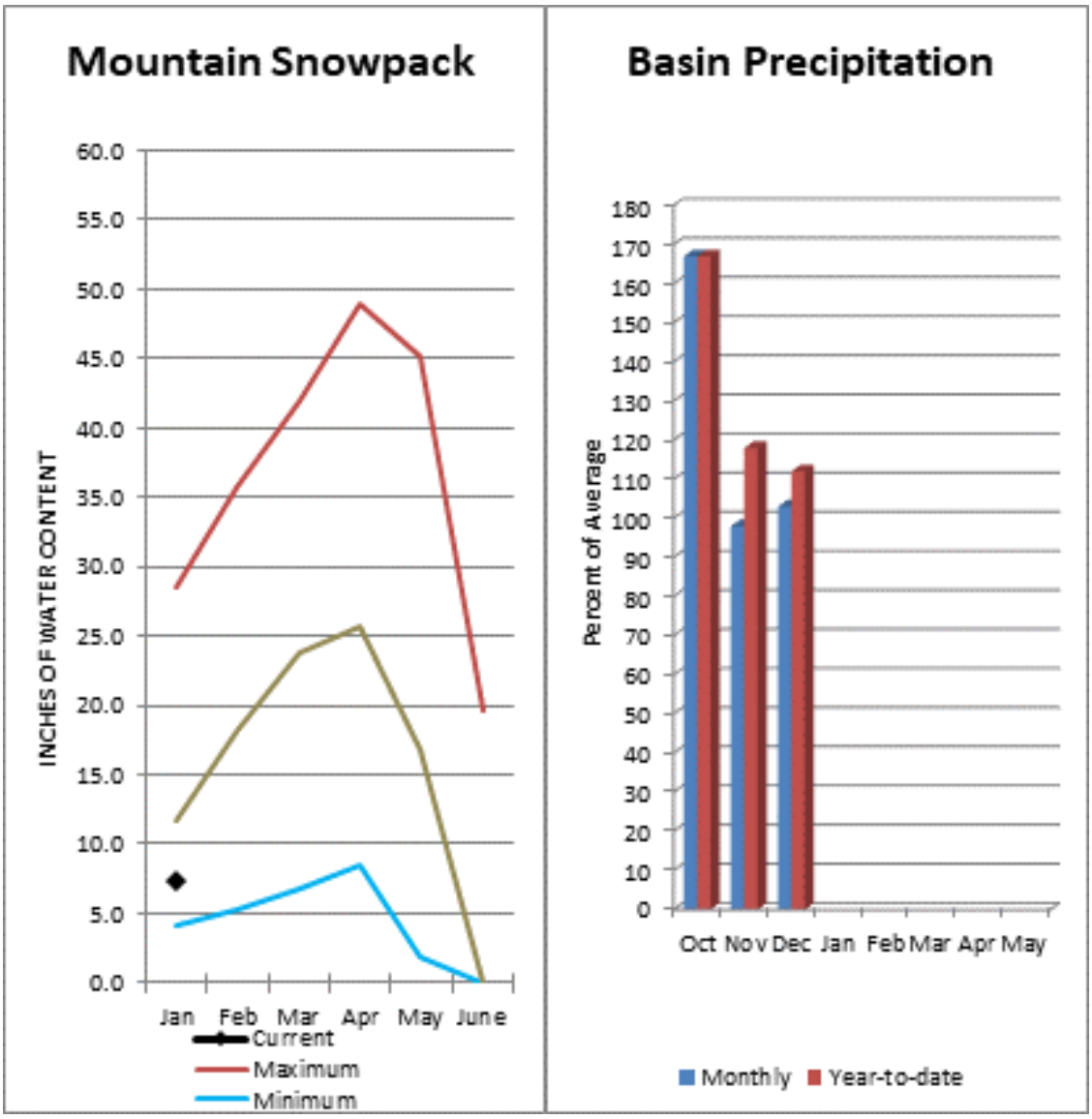
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

Lower Yakima River	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Bumping Lake Inflow [2]								
	APR-JUL	68	91	106	93%	121	143	114
	APR-SEP	73	98	115	93%	131	156	123
American R nr Nile								
	APR-JUL	60	81	95	93%	108	129	102
	APR-SEP	64	87	102	93%	117	140	110
Rimrock Lake Inflow [2]								
	APR-JUL	121	153	175	94%	197	230	187
	APR-SEP	142	179	205	93%	230	270	220
Naches R nr Naches								
	APR-JUL	375	545	655	94%	770	940	700
	APR-SEP	405	590	715	94%	840	1020	760
Ahtanum Ck at Union Gap								
	APR-JUL	5.2	16	23	85%	31	41	27
	APR-SEP	7	18	26	90%	33	44	29
Yakima R nr Parker [2]								
	APR-JUL	890	1280	1540	93%	1800	2190	1660
	APR-SEP	985	1400	1690	93%	1970	2390	1820
Klickitat R nr Glenwood								
	APR-JUL	60	91	113	90%	134	165	126
	APR-SEP	68	102	124	89%	147	181	139
Klickitat R nr Pitt								
	APR-JUL	255	350	410	94%	475	570	435
	APR-SEP	315	420	495	95%	565	675	520

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 December, 2017	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Bumping Lake	19.3	14.5	11.5	33.7
Rimrock	125.4	112.2	92.4	198.0
Basin-wide Total	144.7	126.7	103.9	231.7
# of reservoirs	2	2	2	2

Watershed Snowpack Analysis January 1, 2018	# of Sites	% Median	Last Year % Median
Lower Yakima River	6	85%	95%
Ahtanum Creek	2	68%	85%



December precipitation was 103% of average, maintaining the year-to-date precipitation at 112% of average. Snowpack in the basin was only 64% of normal. Streamflow forecasts are 93% of average for Mill Creek and 100% for the SF Walla Walla near Milton-Freewater. Average temperatures were below normal for December but averaged closer to normal for the water year.

For more information contact your local Natural Resources Conservation Service office.

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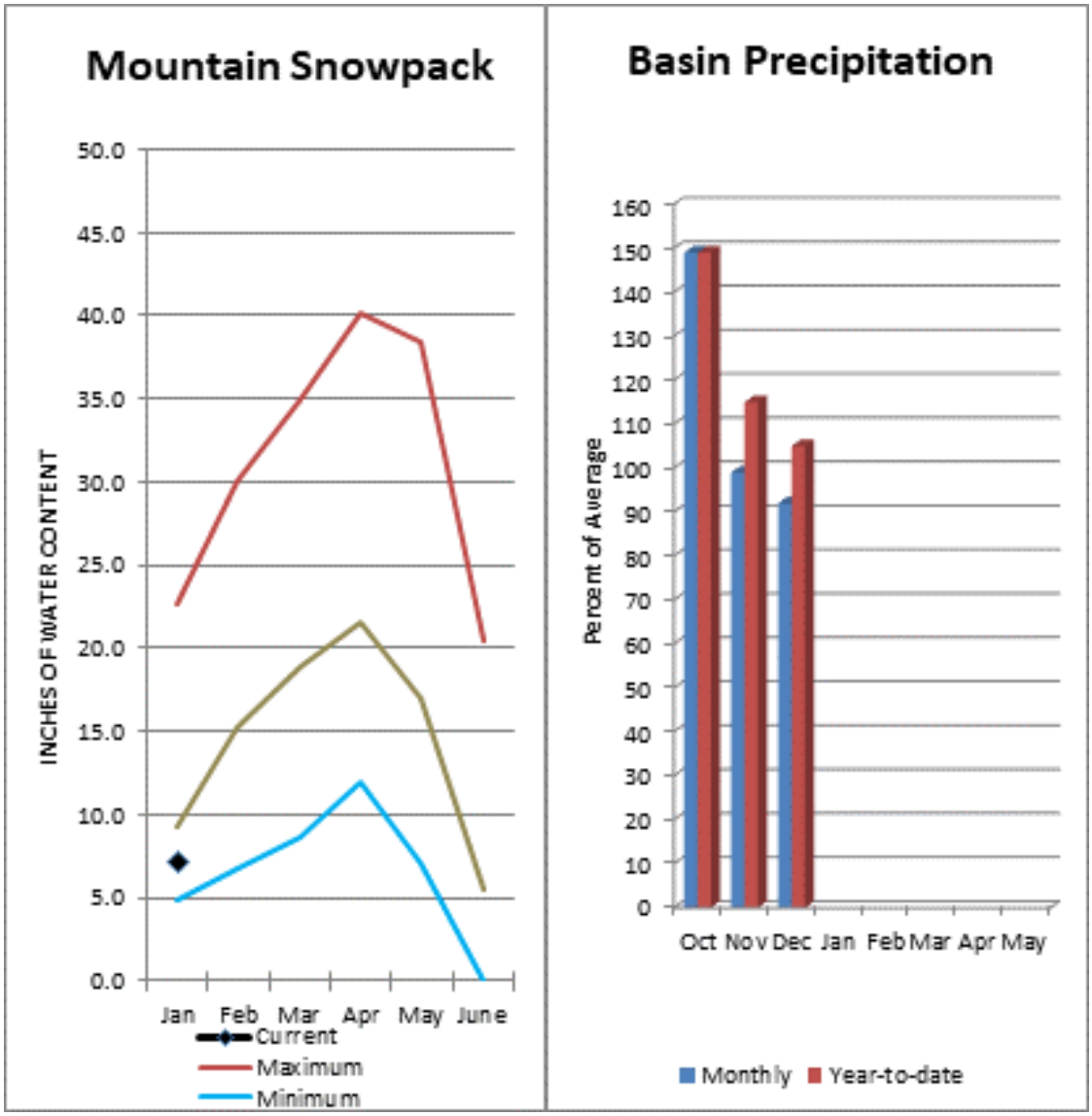
Walla Walla River
Streamflow Forecasts - January 1, 2018

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

Walla Walla River	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
SF Walla Walla R nr Milton-Freewater								
	MAR-JUL	51	61	68	100%	74	84	68
	APR-SEP	50	59	66	100%	72	82	66
Mill Ck nr Walla Walla								
	APR-JUL	15.2	19.2	22	92%	25	29	24
	APR-SEP	18.2	23	25	93%	28	33	27

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

Watershed Snowpack Analysis January 1, 2018	# of Sites	% Median	Last Year % Median
Walla Walla River	2	64%	117%



The Grande Ronde River can expect summer flows to be about 85% of normal. The forecast for Asotin Creek at Asotin predicts 94% of average flows for the April – July runoff period. December precipitation was 92% of average, bringing the year-to-date precipitation to 105% of average. January 1 snowpack readings averaged 77% of normal. December streamflow was 110% of average for Snake River below Lower Granite Dam and 100% for Grande Ronde River near Troy. Dworshak Reservoir storage was 94% of average. Average temperatures were much below normal for December but closer to normal for the water year.

For more information contact your local Natural Resources Conservation Service office.

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Lower Snake, Grande Ronde, Clearwater Basins
Streamflow Forecasts - January 1, 2018

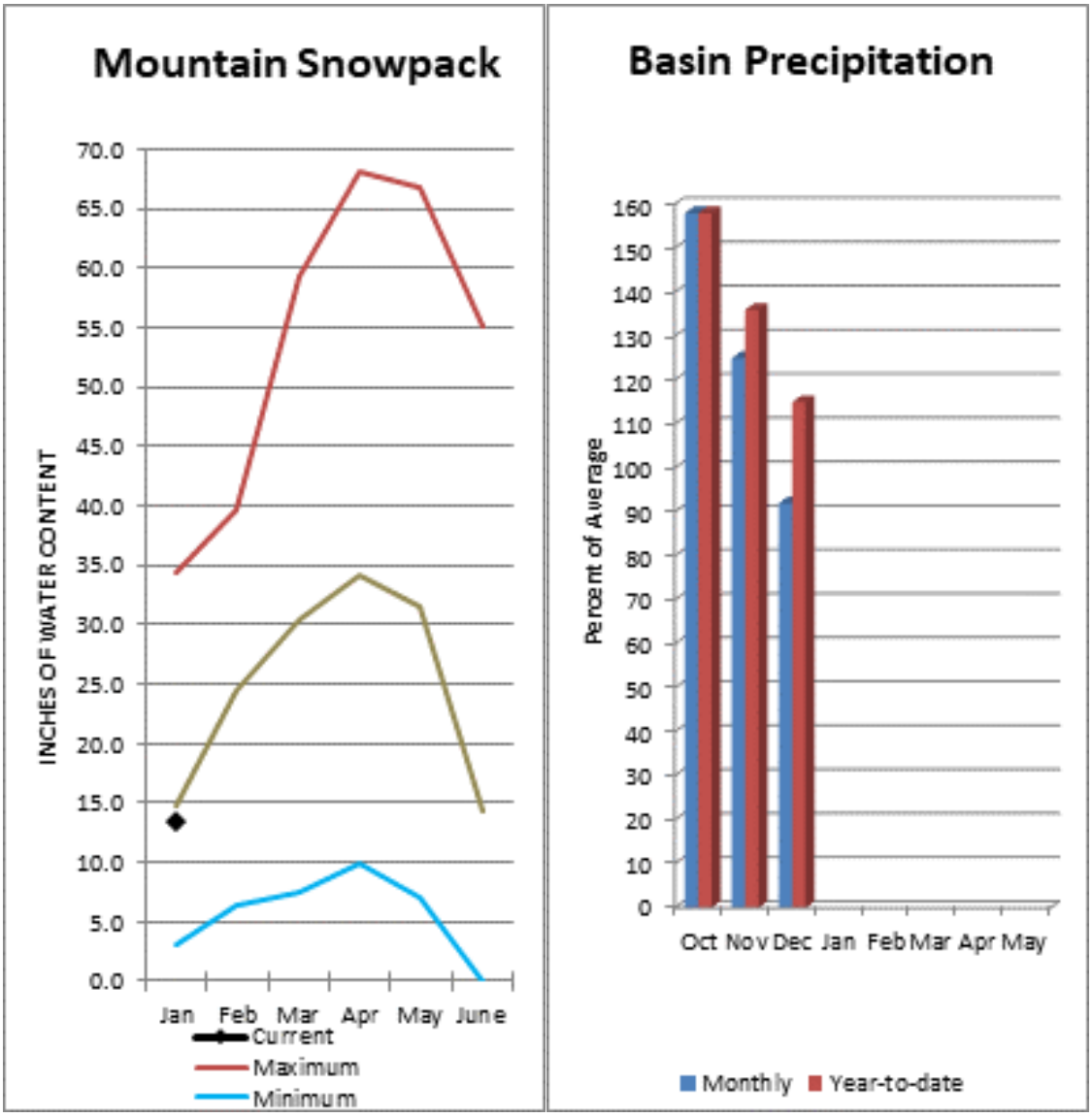
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

Lower Snake, Grande Ronde, Clearwater Basins	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Grande Ronde R at Troy								
	MAR-JUL	810	1100	1300	86%	1490	1780	1510
	APR-SEP	665	930	1110	85%	1290	1560	1310
Asotin Ck at Asotin								
	APR-JUL	15.1	26	33	94%	41	52	35
Clearwater R at Spalding[2]								
	APR-JUL	5740	7030	7900	115%	8770	10000	6890
	APR-SEP	6110	7420	8310	114%	9200	10500	7270
Snake R bl Lower Granite Dam-NWS[2]								
	APR-JUL	13900		21400	108%		26500	19800
	APR-SEP	15800		23800	107%		29000	22300

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 December, 2017	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Dworshak Reservoir	2247.5	2470.4	2403.0	3468.0
Basin-wide Total	2247.5	2470.4	2403.0	3468.0
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis January 1, 2018	# of Sites	% Median	Last Year % Median
Lower Snake, Grande Ronde, Clearwater Basins	11	77%	104%



Forecasts for April – September streamflows within the basin are Lewis River at Ariel, 98% and Cowlitz River at Castle Rock, 98% of average. The Columbia at The Dalles is forecasted to have 102% of average flows this summer according to the River Forecast Center. December average streamflow for Cowlitz River was 133% and the Columbia River at The Dalles was 101% of average. December precipitation was 82% of average and the water-year average was 115%. January 1 snow cover for Cowlitz River was 89%, and Lewis River was 94% of normal. Temperatures were slightly below normal during December but near average for the water year.

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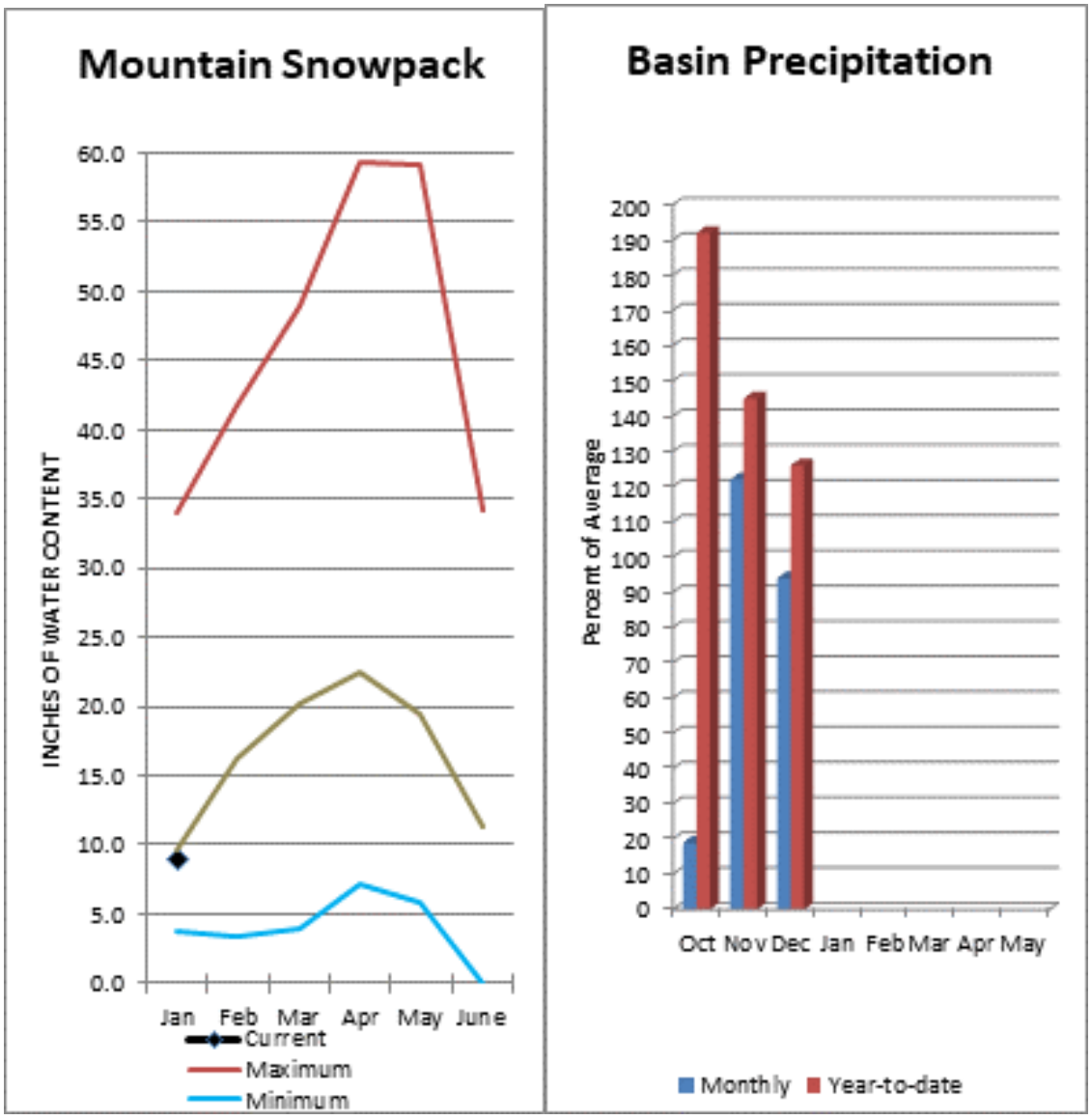
Lower Columbia Basins
Streamflow Forecasts - January 1, 2018

Lower Columbia Basins	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
		Forecast Exceedance Probabilities for Risk Assessment Chance that actual volume will exceed forecast						
Columbia R at The Dalles-NWS[2]								
	APR-JUL	67300		80200	100%		95100	79900
	APR-SEP	78300		94500	102%		111000	92700
Klickitat R nr Glenwood								
	APR-JUL	60	91	113	90%	134	165	126
	APR-SEP	68	102	124	89%	147	181	139
Klickitat R nr Pitt								
	APR-JUL	255	350	410	94%	475	570	435
	APR-SEP	315	420	495	95%	565	675	520
Lewis R at Ariel[2]								
	APR-JUL	675	850	970	100%	1090	1260	970
	APR-SEP	785	970	1100	98%	1220	1400	1120
Cowlitz R bl Mayfiled[2]								
	APR-JUL	1090	1400	1600	99%	1810	2110	1620
	APR-SEP	1270	1650	1910	104%	2170	2550	1840
Cowlitz R at Castle Rock[2]								
	APR-JUL	1630	1940	2140	96%	2350	2660	2230
	APR-SEP	1890	2230	2470	98%	2700	3050	2520

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

Watershed Snowpack Analysis January 1, 2018	# of Sites	% Median	Last Year % Median
Lower Columbia Basins	11	91%	130%
Lewis River	5	94%	146%
Cowlitz River	6	89%	115%



Summer runoff is forecast to be 90% of normal for the Green River below Howard Hanson Dam and 105% for the White River near Buckley. January 1 snowpack was 105% of average for the White River, 111% for Puyallup River and 64% in the Green River Basin. December precipitation was 94% of average, bringing the water year-to-date to 126% of average for the basins. Average temperatures in the area were below normal for December and for the water-year.

For more information contact your local Natural Resources Conservation Service office.

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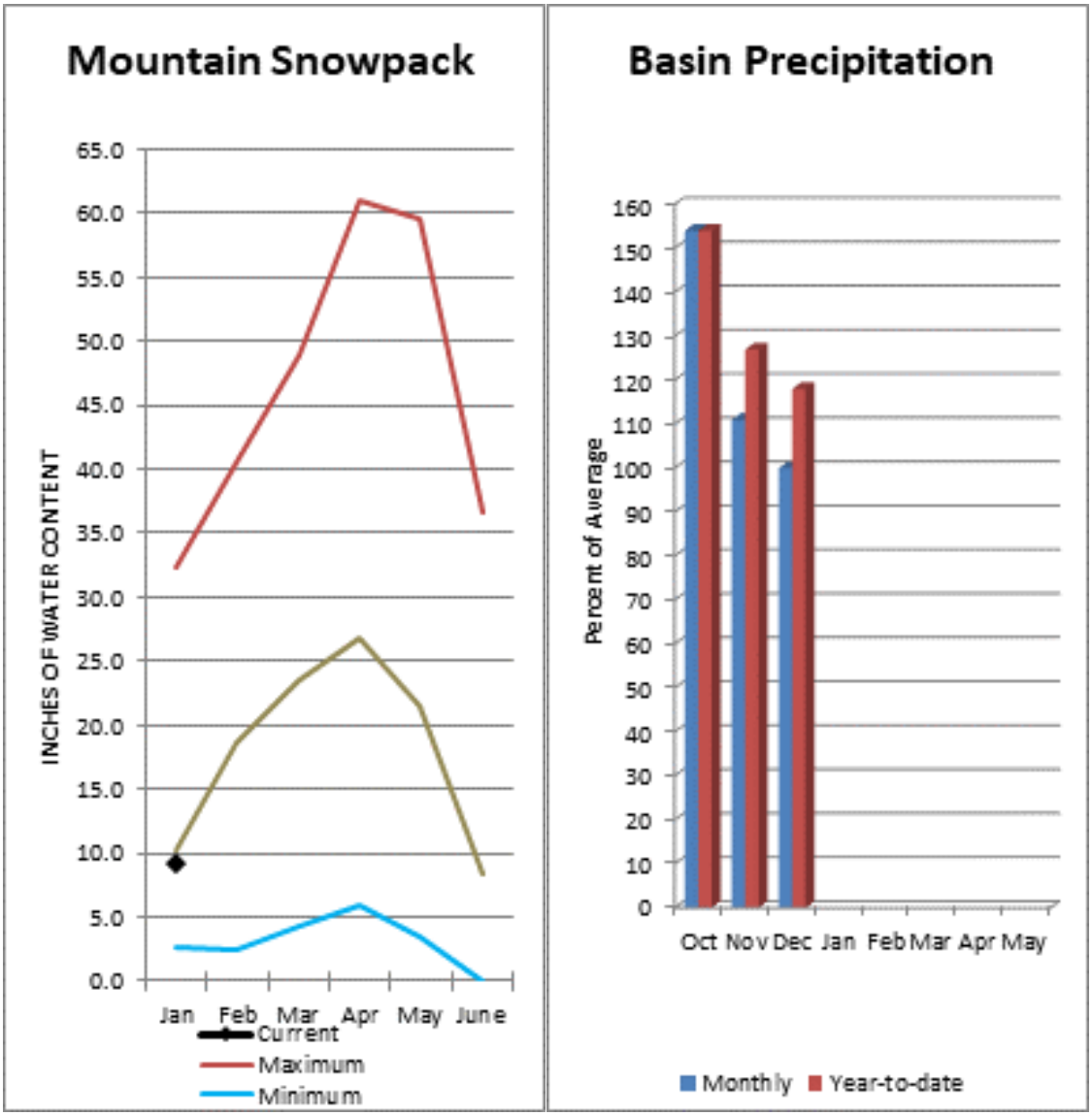
South Puget Sound Basins
Streamflow Forecasts - January 1, 2018

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

South Puget Sound Basins	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
White R nr Buckley[1,2]								
	APR-JUL	335	415	450	105%	485	565	430
	APR-SEP	405	500	540	105%	580	670	515
Green R bl Howard A Hanson Dam[1,2]								
	APR-JUL	127	187	215	91%	240	300	235
	APR-SEP	150	210	235	90%	265	325	260

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

Watershed Snowpack Analysis January 1, 2018	# of Sites	% Median	Last Year % Median
South Puget Sound Basins	8	94%	117%
White River	2	105%	103%
Green River	2	64%	112%



Forecast for spring and summer flows are: 99% for Cedar River near Cedar Falls; 96% for Rex River; 99% for South Fork of the Tolt River; and 96% for Taylor Creek near Selleck. Basin-wide precipitation for December was 100% of average, bringing water-year-to-date to 117% of average. January 1 median snow cover in Cedar River Basin was 87%, Tolt River Basin was 94%, Snoqualmie River Basin was 86%, and Skykomish River Basin was 89%. Temperatures were below normal for December and for the water-year.

For more information contact your local Natural Resources Conservation Service office.

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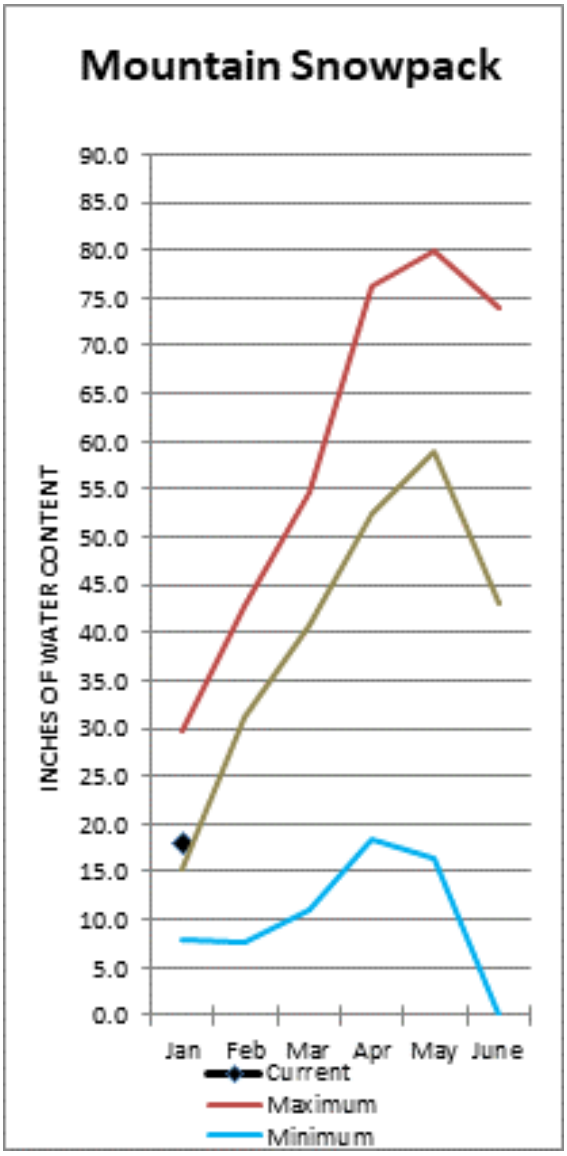
Central Puget Sound Basins
Streamflow Forecasts - January 1, 2018

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

Central Puget Sound Basins	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Cedar R nr Cedar Falls								
	APR-JUL	43	58	68	97%	78	93	70
	APR-SEP	49	65	75	99%	85	100	76
Rex R nr Cedar Falls								
	APR-JUL	13.2	19.3	24	100%	28	34	24
	APR-SEP	15.6	22	26	96%	30	37	27
Taylor Ck nr Selleck								
	APR-JUL	13.2	16.7	19	95%	21	25	20
	APR-SEP	16.6	20	23	96%	25	29	24
SF Tolt R nr Index								
	APR-JUL	9.3	12	13.9	98%	15.8	18.5	14.2
	APR-SEP	11.2	14	15.9	99%	17.8	21	16.1

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

Watershed Snowpack Analysis January 1, 2018	# of Sites	% Median	Last Year % Median
Central Puget Sound Basins	12	90%	141%
Puyallup River	4	111%	134%
Cedar River	4	87%	145%
Tolt River	2	94%	193%
Snoqualimie River	4	86%	140%
Skykomish River	2	89%	124%



Forecast for Skagit River streamflow at Newhalem is 99% of average for the spring and summer period. December streamflow in Skagit River was 94% of average. Other forecast points included Baker River at 92% and Thunder Creek at 97% of average. Basin-wide precipitation for December was 79% of average, bringing water-year-to-date to 116% of average. January 1 average snow cover in Skagit River Basin was 112% and the Nooksack River Basin was 139%. January 1 Skagit River reservoir storage was 67% of average and 55% of capacity. Average temperatures were below normal for December and for the water year.

For more information contact your local Natural Resources Conservation Service office.

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North Puget Sound Basins
Streamflow Forecasts - January 1, 2018

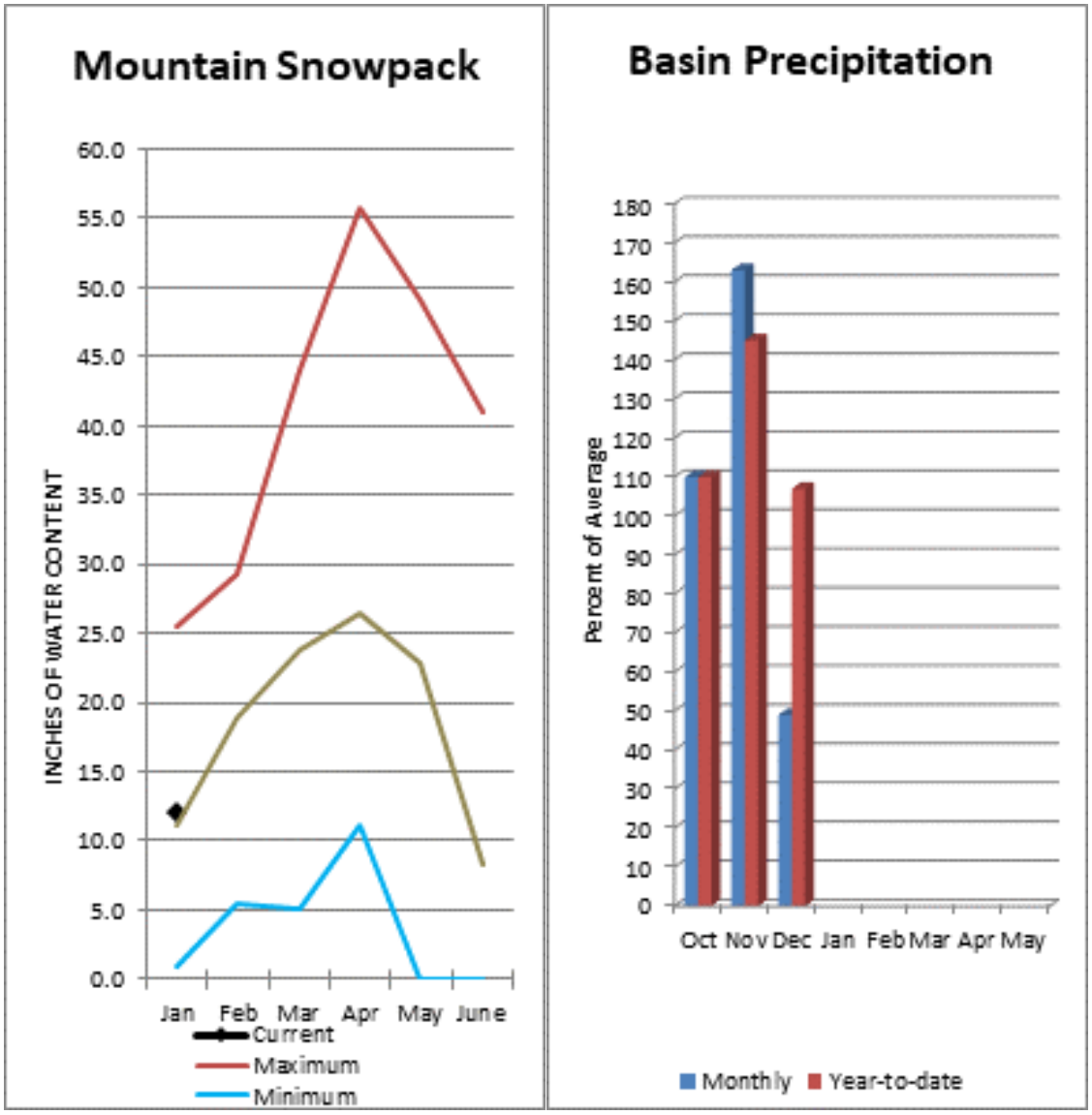
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

North Puget Sound Basins	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Thunder Ck nr Newhalem								
	APR-JUL	195	215	230	98%	245	265	235
	APR-SEP	280	305	320	97%	340	365	330
Skagit R at Newhalem[2]								
	APR-JUL	1370	1560	1690	101%	1820	2010	1680
	APR-SEP	1630	1850	2000	99%	2150	2360	2030
Baker R at Concrete								
	APR-JUL	515	620	690	88%	760	865	780
	APR-SEP	670	810	900	92%	995	1140	980

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 December, 2017	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Ross	735.6	727.8	1135.0	1404.1
Diablo Reservoir	84.8	85.5	85.8	90.6
Basin-wide Total	820.4	813.3	1220.8	1494.7
# of reservoirs	2	2	2	2

Watershed Snowpack Analysis January 1, 2018	# of Sites	% Median	Last Year % Median
North Puget Sound Basins	10	118%	109%
Skagit River	8	112%	103%
Baker River	0		
Nooksack River	2	139%	132%



Forecasted average runoff for streamflow for the Dungeness River is 100% and Elwha River is 102% December runoff in the Dungeness River was 77% of normal. Big Quilcene and Wynoochee rivers may expect near average runoff this summer as well. December precipitation was 49% of average. Precipitation has accumulated at 107% of average for the water year. December precipitation at Quillayute was 85% of normal. Olympic Peninsula snowpack averaged 107% of normal on January 1. Temperatures were near average for December and slightly below normal for the water year.

For more information contact your local Natural Resources Conservation Service office.

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Olympic Penninsula
Streamflow Forecasts - January 1, 2018

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

Olympic Penninsula	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Dungeness R nr Sequim								
	APR-JUL	94	110	121	101%	132	148	120
	APR-SEP	112	132	145	100%	158	178	145
Elwha R at McDonald Br nr Port Angeles								
	APR-JUL	315	370	405	101%	445	495	400
	APR-SEP	375	440	480	102%	525	585	470

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

Watershed Snowpack Analysis January 1, 2018	# of Sites	% Median	Last Year % Median
Olympic Penninsula	3	107%	126%

Issued by

Jason Weller
Chief
Natural Resources Conservation Service
U.S. Department of Agriculture

Released by

Roylene Rides At The Door
State Conservationist
Natural Resources Conservation Service
Spokane, Washington

The Following Organizations Cooperate with the Natural Resources Conservation Service in Snow Survey Work*:

Canada	Snow Survey Network Program – British Columbia Ministry of Environment
	River Forecast Center – British Columbia Ministry of Forests, Lands and Natural Resource Operations
State	Washington State Department of Ecology
	Washington State Department of Natural Resources
Federal	Department of the Army
	Corps of Engineers
	U.S. Department of Agriculture
	Forest Service
	U.S. Department of Commerce
	NOAA, National Weather Service
	U.S. Department of Interior
	Bonneville Power Administration
	Bureau of Reclamation
	Geological Survey
	National Park Service
	Bureau of Indian Affairs
	Recourse Conservation & Development Councils
Local	City of Tacoma
	City of Seattle
	Chelan County P.U.D.
	Pacific Power and Light Company
	Puget Sound Energy
	Washington Water Power Company
	Snohomish County P.U.D.
	Colville Confederated Tribes
	Spokane County
	Yakama Indian Nation
	Whatcom County
	Pierce County
	Kalispel Tribe of Indians
	Spokane Indian Tribe
	Jamestown S'klallum Tribe
Private	Okanogan Irrigation District
	Wenatchee Heights Irrigation District
	Newman Lake Homeowners Association
	Whitestone Reclamation District

***Other organizations and individuals furnish valuable information for the snow survey reports. Their cooperation is gratefully acknowledged.**

Washington Snow Survey Office
2005 E. College Way, Suite 203
Mount Vernon, WA 98273-2873

Washington Water Supply Outlook Report

Natural Resources Conservation Service
Spokane, WA

NRCS Natural Resources Conservation Service

United States Department of Agriculture

Washington
Water Supply Outlook Report
February 1, 2018

Olympic National Park Ranger Jack Hughes and co-worker Janet Kailin measuring snow at the Cox Valley Snow Course, Spring 1984. Jack first established and measured Cox Valley SC February 1968, 50 years ago. According to Park records Jack conducted his first snow survey at Deer Park snow course February 1, 1966 and continued to lead the snow survey program until his last survey May 1, 2010. 44 years of distinguished service to the cooperative Snow Survey Program.
Photo curtesy: Olympic National Park Archives

Water Supply Outlook Reports
and
Federal - State – Private Cooperative Snow Surveys

For more water supply and resource management information, contact:

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(509) 323-2955

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 it 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 prepare runoff forecasts. These forecasts are coordinated between hydrologists in the Natural Resources Conservation Service and the National Weather Service. Unless otherwise specified, all forecasts are for flows that would occur naturally without any upstream influences.

Forecasts of any kind, of course, 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 uncertain 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.

Washington
Water Supply Outlook

February 2018

General Outlook

With 60-70% or more of the winter gone Washington State has managed to hold on to a respectable snowpack throughout most of the state, unlike our neighbors to the south. La Nina has held strong and though it seems like it's been extremely warm and wet, snow water continues to accumulate whether it be snow or rain on snow it's all water that can be saved for later use. Some rivers have run high, but reservoirs are also filling from rain runoff. The most recent forecast through mid-February shows most probability for near normal temperatures and below normal precipitation, which does not bode well for heavy snow accumulation. NWS 3-month (FMA) forecast indicates below normal temperatures and above normal precipitation, which is our best shot at finishing the season with normal mountain snowpack. http://www.cpc.ncep.noaa.gov/

Snowpack

The February 1 statewide SNOTEL readings were 100% of normal, 8% higher than this time last year. The lowest readings in the state were at 69% of the 30-year median for February 1 in Ahtanum Creek basins. The Conconully Basin had the most snow with 142%. Basins across northern Washington favor higher snowpack conditions than those further south. Westside medians from SNOTEL, and February 1 snow surveys, included the North Puget Sound river basins with 111% of normal, the Central and South Puget river basins with 95% and the Lower Columbia basins with 104% of normal. Snowpack along the east slopes of the Cascade Mountains included the Yakima area with 95% and the Wenatchee area with 105%. Snowpack in the Spokane River Basin was at 97% and the Walla Walla River Basin had 82% of the long-term median.

BASIN	PERCENT OF MEDIAN	LAST YEAR PERCENT MEDIAN
Spokane	97	71
Newman Lake	90	86
Pend Oreille	123	76
Okanogan	130	100
Methow	128	88
Conconully Lake	142	127
Central Columbia	105	78
Upper Yakima	98	72
Lower Yakima	90	81
Ahtanum Creek	69	89
Walla Walla	82	108
Lower Snake	89	88
Cowlitz	100	97
Lewis	109	125
White	109	83
Green	70	79
Puyallup	107	88
Cedar	90	84
Snoqualmie	94	95
Skykomish	102	84
Skagit	114	84
Nooksack	97	86
Olympic Peninsula	132	104

Precipitation

January precipitation was near to above average across the state. Some locations in the Cascade and Olympic ranges received over 30" of precipitation which is well above normal for those sites. So far in the first week of this month we have seen 200% and up to almost 500% normal rainfall across the state.

RIVER BASIN	JANUARY PERCENT OF AVERAGE	WATER YEAR PERCENT OF AVERAGE
Spokane	115	111
Pend Oreille	110	114
Upper Columbia	135	114
Central Columbia	102	110
Upper Yakima	105	107
Lower Yakima	116	118
Walla Walla	104	110
Lower Snake	98	103
Lower Columbia	118	116
South Puget Sound	109	121
Central Puget Sound	110	115
North Puget Sound	116	111
Olympic Peninsula	128	113

Reservoir

Seasonal reservoir levels in Washington can vary greatly due to specific watershed management practices required in preparation for irrigation season, fisheries management, power generation, municipal demands and flood control. A wet fall helped maintain end of summer storage and continues into winter. February 1 Reservoir storage in the Yakima Basin was 503,000-acre feet, 124% of average for the Upper Reaches and 167,000-acre feet or 137% of average for Rimrock and Bumping Lakes. The power generation reservoirs included the following: Coeur d'Alene Lake, 136,000-acre feet, 141% of average and 57% of capacity; and the Skagit River reservoirs at 61% of average and 44% of capacity. Recent climate impacts and management procedures may affect these numbers on a daily or weekly basis.

BASIN	PERCENT OF CAPACITY	CURRENT STORAGE AS PERCENT OF AVERAGE
Spokane	57	141
Pend Oreille	50	104
Upper Columbia	69	114
Central Columbia	N/A	N/A
Upper Yakima	60	124
Lower Yakima	72	137
Lower Snake	68	101
North Puget Sound	44	61

For more information contact your local Natural Resources Conservation Service office.

Streamflow

Early winter forecasts for April-September stream flows are never quite as robust as they are later in the season when we know more about the winter climatology. At times only a few degrees warmer or cooler than forecasted can make or break stream flow predictions. April-September forecasts for some Western Washington streams include the Cedar River near Cedar Falls, 96%; White River, 101%; and Skagit River, 103%. Some Eastern Washington streams include the Yakima River near Parker 100%, Wenatchee River at Plain 103%; and Spokane River near Post Falls 103%. Volumetric forecasts are developed using current, historic and average snowpack, precipitation and streamflow data collected and coordinated by organizations cooperating with NRCS. Caution should be used when using early season forecasts for critical water resource management decisions since governing conditions are likely to change for the better or the worse

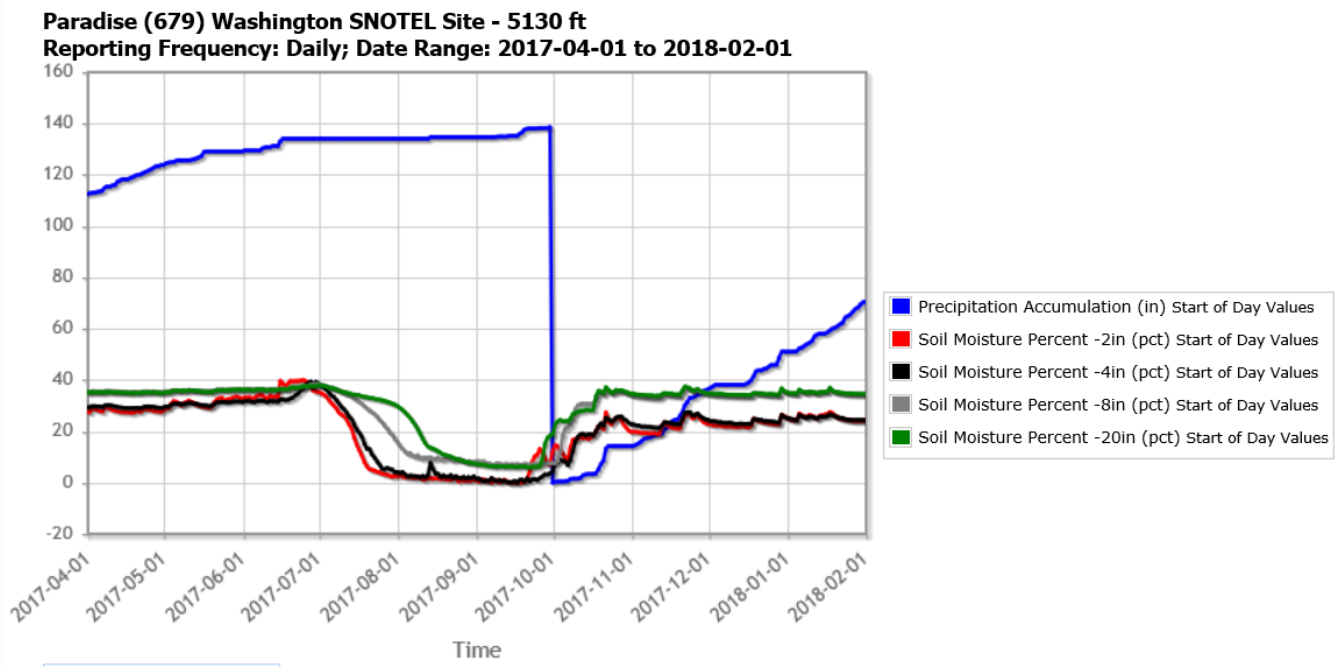
BASIN	PERCENT OF AVERAGE (50 PERCENT CHANCE OF EXCEEDENCE)
Spokane	104-131
Priest River	110
Upper Columbia	95-129
Central Columbia	95-112
Upper Yakima	99-103
Lower Yakima	86-104
Walla Walla	96-102
Lower Snake	85-115
Lower Columbia	95-107
South Puget Sound	87-101
Central Puget Sound	86-106
North Puget Sound	100-105
Olympic Peninsula	104-106

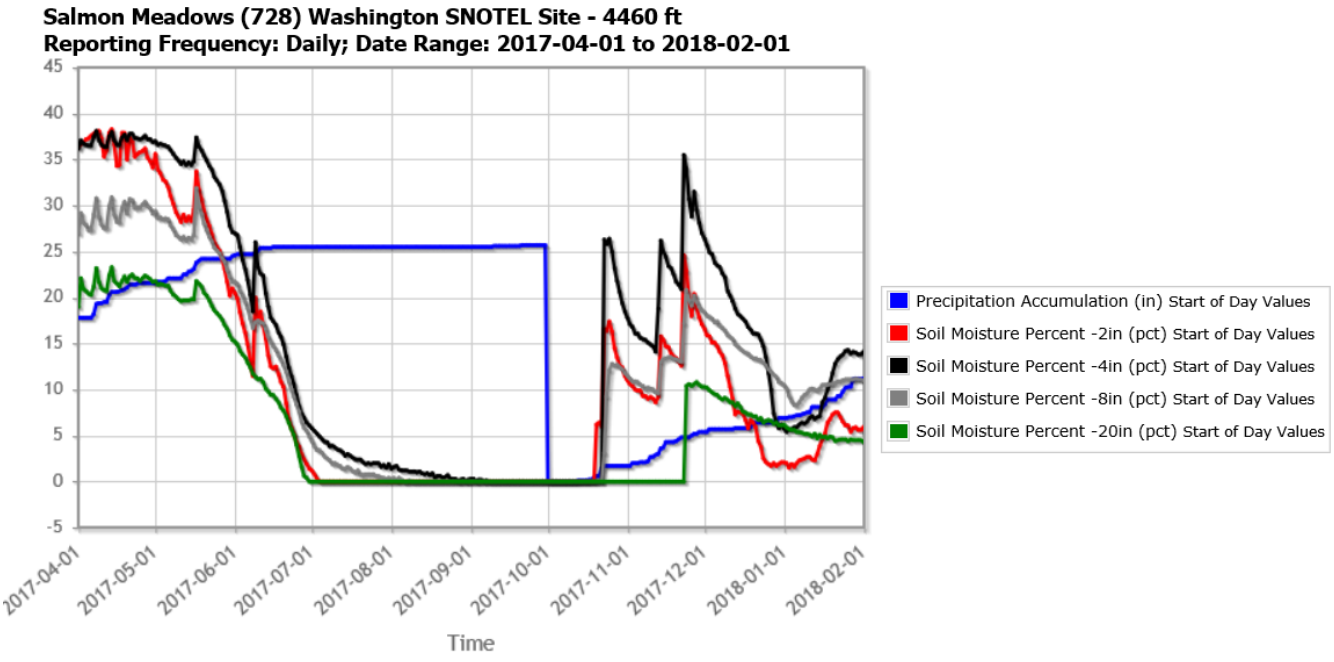
STREAM	PERCENT OF AVERAGE JANUARY STREAMFLOWS
Pend Oreille at Albeni Fall Dam	116
Kettle at Laurier	84
Columbia at Birchbank	102
Spokane at Spokane	171
Similkameen at Nighthawk	162
Okanogan at Tonasket	105
Methow at Pateros	131
Chelan at Chelan	108
Wenatchee at Pashastin	76
Cle Elum near Roslyn	90
Yakima at Parker	108
Naches at Naches	132
Grande Ronde at Troy	156
Snake below Lower Granite Dam	135
Columbia River at The Dalles	119
Lewis at Merwin Dam	132
Cowlitz below Mayfield Dam	131
Skagit at Concrete	127
Dungeness near Sequim	103

For more information contact your local Natural Resources Conservation Service office.

Soil Moisture

Near to above normal fall precipitation provided for wet and nearly saturated soils (60-70% saturation) as the snow finally began to accumulate in mid-January. Great fall soil moisture conditions can help buffer low snowpack runoff come spring however it is too early in the season to count those chickens. Current soil moisture data is available from a limited number of SNOTEL sites scattered throughout each basin. As the effort continues to install additional sensors and more years of data are acquired this information will become invaluable to the streamflow forecasting community. Following are example graphs from both a wet, deep snow site (Paradise) and a dry, shallow snow site (Salmon Meadows). Both show excellent response from spring melt, summer dry, fall rain and snow accumulation. It's also interesting to note the winter response to storms at Salmon compared to little response at Paradise indicating constant soil saturation at Paradise and winter drying at Salmon Meadows.





Natural Resources Conservation Service

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Snow, Water and Climate Services

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Helpful Internet Addresses

NRCS Snow Survey and Climate Services Homepages

Washington:
http://www.nrcs.usda.gov/wps/portal/nrcs/main/wa/snow/

Oregon:
http://www.nrcs.usda.gov/wps/portal/nrcs/main/or/snow/

Idaho:
http://www.nrcs.usda.gov/wps/portal/nrcs/main/id/snow/

National Water and Climate Center (NWCC):
http://www.wcc.nrcs.usda.gov

USDA-NRCS Agency Homepages

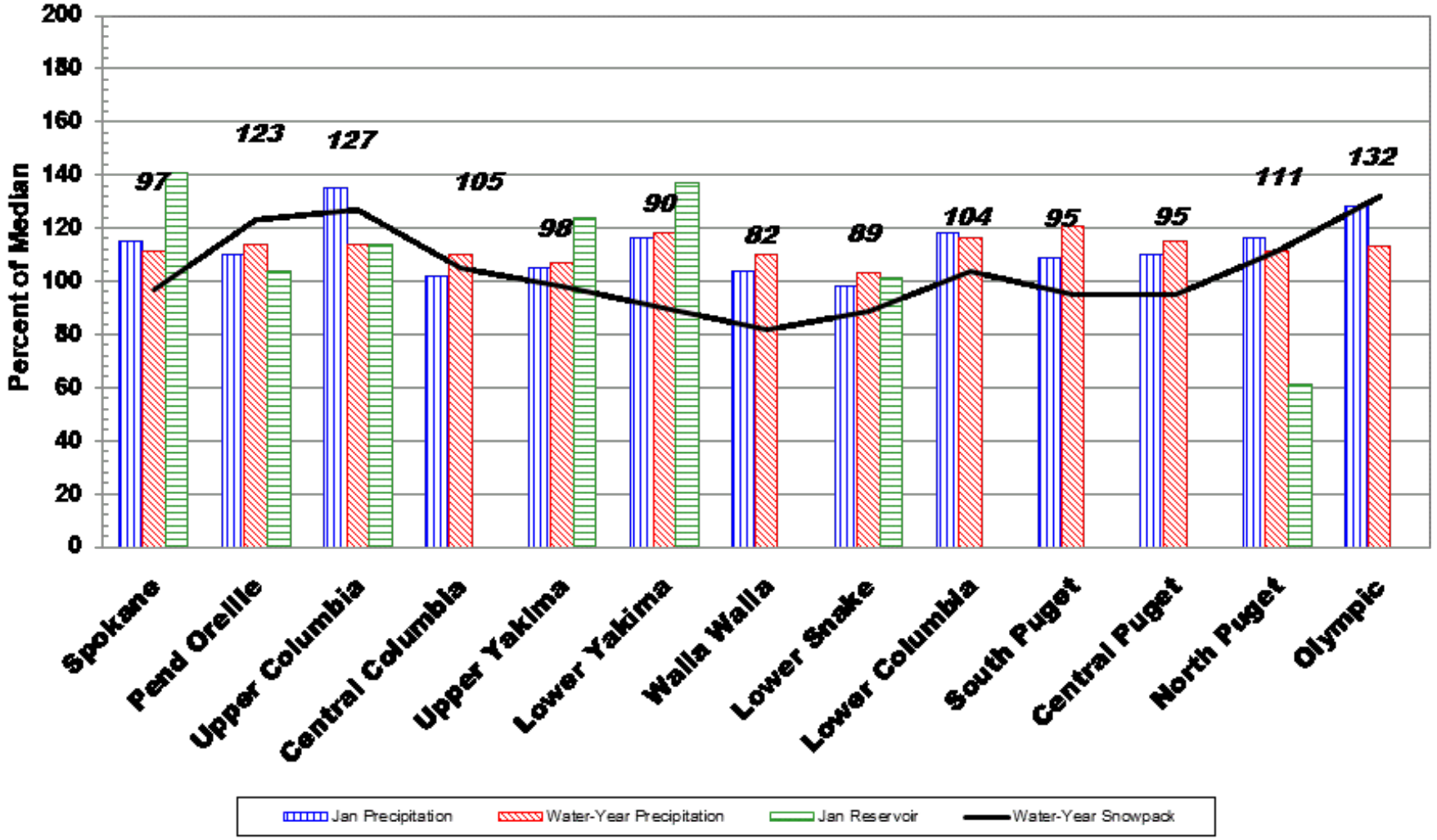
Washington:
http://www.nrcs.usda.gov/wps/portal/nrcs/site/wa/home/

NRCS National:
http://www.nrcs.usda.gov/wps/portal/nrcs/site/national/home/

NRCS Natural Resources Conservation Service

February 1, 2018 - Snowpack, Precipitation and Reservoir Conditions at a Glance

(Water Year = October 1 - Current Date)



86th Meeting of the Western Snow Conference

The Western Snow Conference is an annual tradition which started in 1932 as an international forum for individuals and organizations to share scientific, management and socio-political information on snow and runoff. The principal aim of the Western Snow Conference is to advance snow and hydrological sciences. The South Continental Area Committee is making plans for the 86th Annual Western Snow Conference in 2018.

Mark your calendar and start thinking about submitting a paper to attend the 2018 Western Snow Conference:

Dates: April 16-19, 2018
Location: Albuquerque, NM

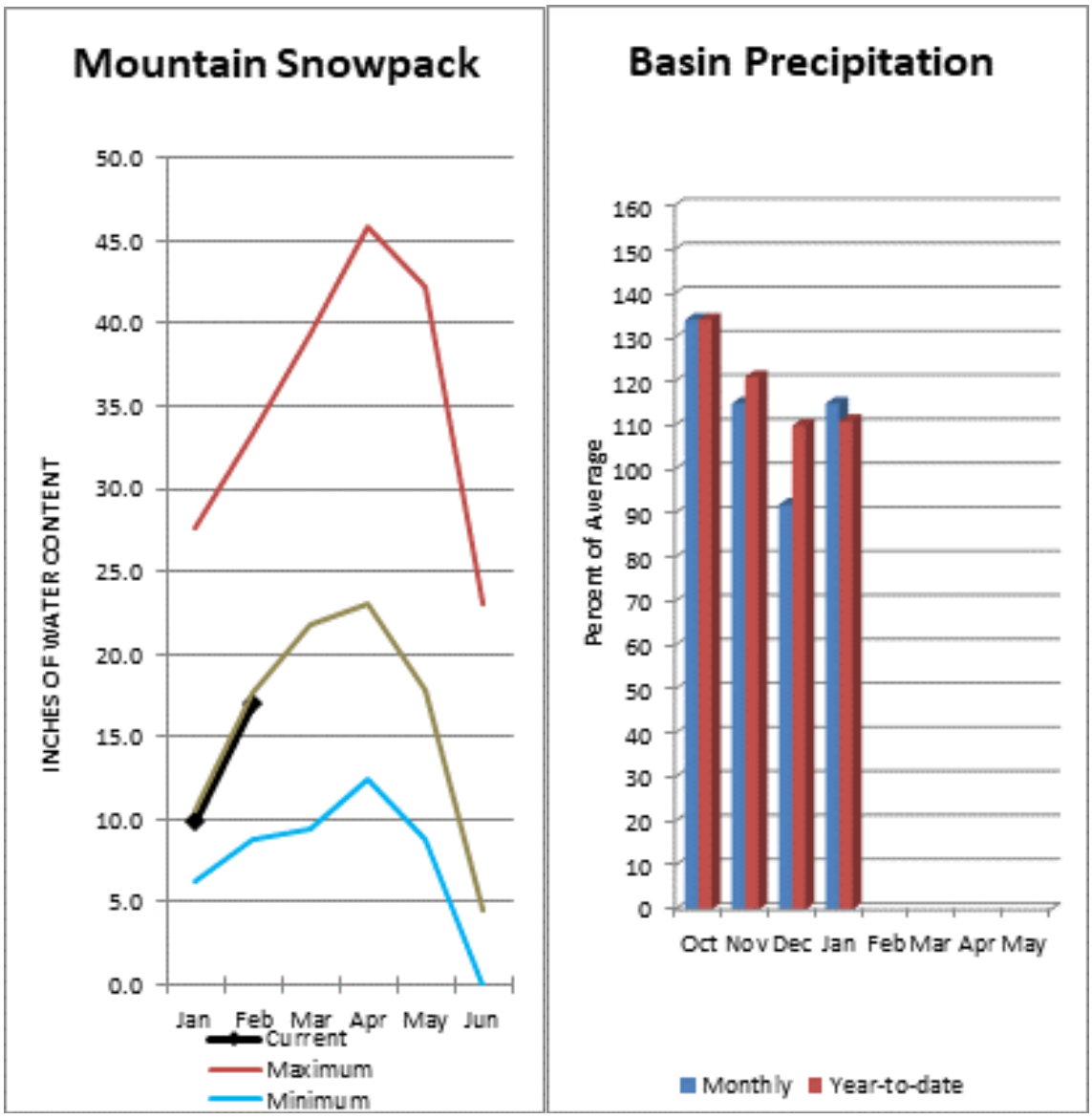
The South Continental Committee will compile a full agenda of oral and poster papers. In addition, a Monday short course is being planned which will focus on communicating scientific information and building narratives to effectively reach broad audiences. On Thursday a technical tour is planned of historic and hydrologic points of interest in the lower Rio Grande Valley, including the first stream gaging station installed in the United States.

The conference will be held at the beautiful Crowne Plaza Albuquerque located at the historic and cultural crossroads of El Camino Real and Route 66. Nearby attractions include historic Old Town, Petroglyph National Monument, the Indian Pueblo Cultural Center, Sandia Peak Tramway, ABQ BioPark, many brew pubs and museums. The Hotel will honor government per diem rate for our conference.

Additional information about the conference and the Call for Papers will be posted on the WSC web page at http://www.westernsnowconference.org/

Also find Western Snow Conference on Facebook and Twitter.

Spokane River Basin



The February 1 forecasts for summer runoff within the Spokane River Basin are 103% of average near Post Falls and 105% at Long Lake. The Chamokane River near Long Lake forecasted to have 131% of average flows for the May-August period. The forecast is based on a basin snowpack that is 97% of normal and precipitation that is 111% of average for the water year. Precipitation for January was above normal at 115% of average. Streamflow on the Spokane River at Spokane was 171% of average for January. February 1 storage in Coeur d'Alene Lake was 136,000-acre feet, 141% of average and 57% of capacity. Snowpack at Quartz Peak SNOTEL site was 98% of average with 14.8 inches of water content. Average temperatures in the Spokane basin were much than normal for January but averaged slightly above normal for the water year.

For more information contact your local Natural Resources Conservation Service office.

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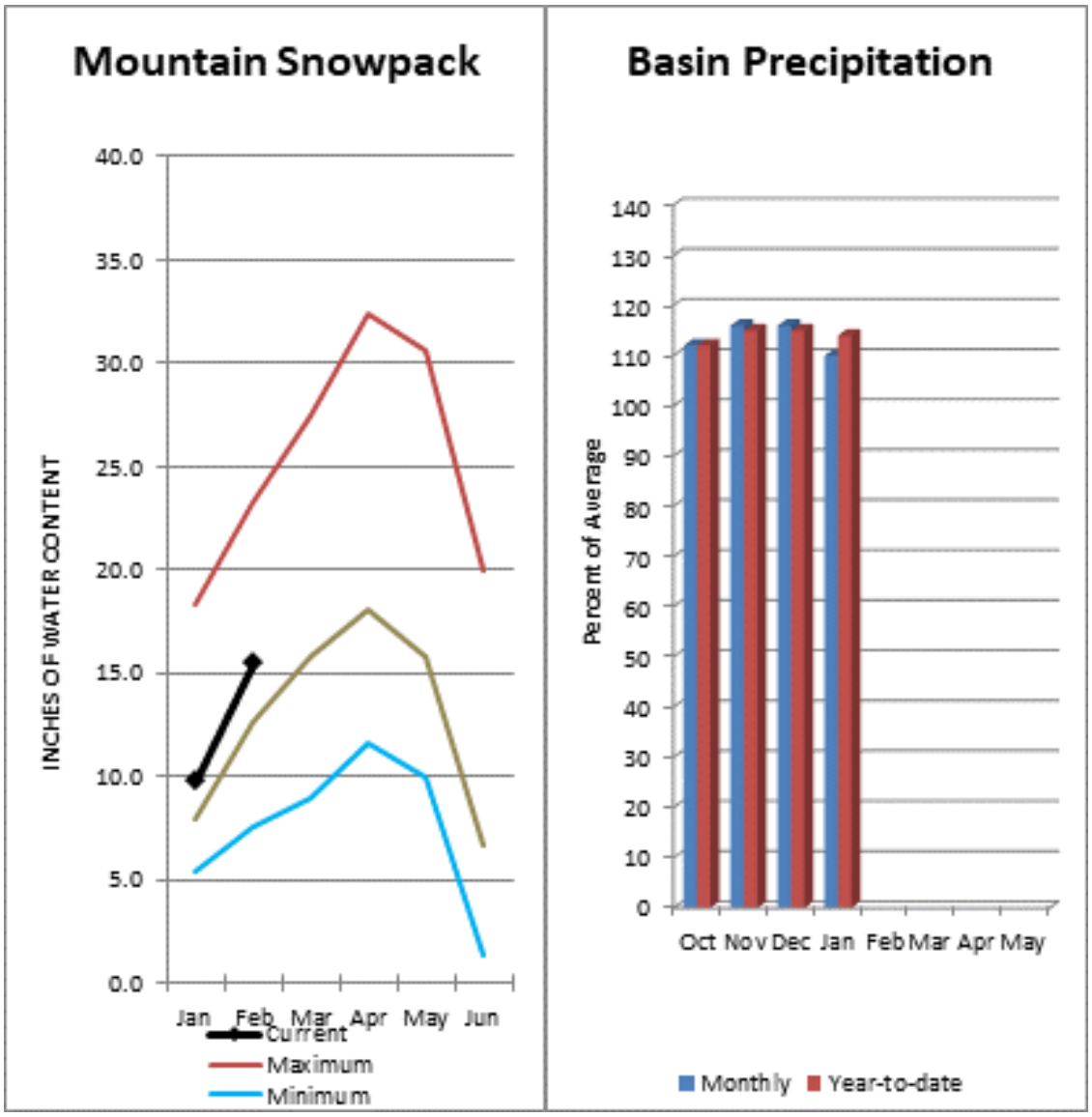
Spokane
Streamflow Forecasts - February 1, 2018

Spokane	Forecast Period	Forecast Exceedance Probabilities for Risk Assessment: Chance that actual volume will exceed forecast — 90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Spokane R nr Post Falls[2]								
	APR-JUL	1860	2230	2480	104%	2730	3100	2390
	APR-SEP	1940	2310	2560	103%	2810	3170	2480
Spokane R at Long Lake[2]								
	APR-JUL	2090	2500	2780	106%	3050	3460	2620
	APR-SEP	2290	2710	2990	105%	3270	3680	2850
Chamokane Ck nr Long Lake								
	MAY-AUG	6.5	9.9	12.2	131%	14.5	17.9	9.3

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

Reservoir Storage End of January, 2018	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Lake Coeur d' Alene	135.6	46.3	96.3	238.5
Basin-wide Total	135.6	46.3	96.3	238.5
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis February 1, 2018	# of Sites	% Median	Last Year % Median
Spokane	13	97%	71%
Newman Lake	3	90%	86%



The April – September average forecast for the Priest River near the town of Priest River is 110%. January streamflow was 116% of average on the Pend Oreille River and 102% on the Columbia at Birchbank. February 1 snow cover was 122% of normal in the Pend Oreille Basin River Basin. Bunchgrass Meadows SNOTEL site had 21.9 inches of snow water on the snow pillow. Normally Bunchgrass would have 18.0 inches on February 1. Precipitation during January was 110% of average, dropping the year-to-date precipitation at 114% of average. Reservoir storage in the basin, including Lake Pend Oreille and Priest Lake was 104% of normal. Average temperatures were much warmer normal for January and slightly warmer than normal for the water year.

For more information contact your local Natural Resources Conservation Service office.

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Pend Oreille Basins
Streamflow Forecasts - February 1, 2018

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

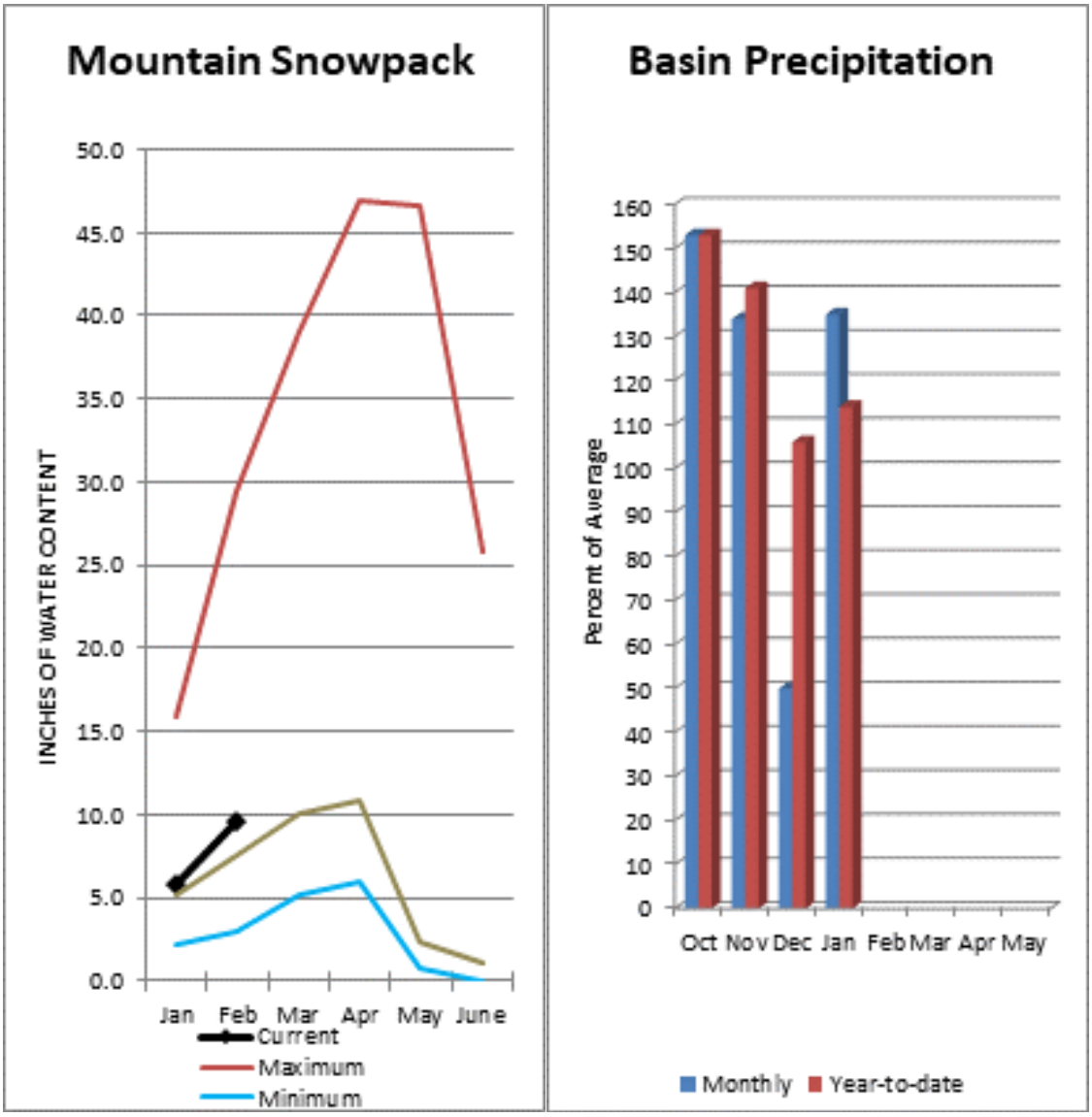
Pend Oreille Basins	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Pend Oreille Lake Inflow[2]								
Priest R nr Priest River[2]								
	APR-JUL	690	790	855	110%	920	1020	780
	APR-SEP	730	835	910	110%	980	1090	830
Pend Oreille R bl Box Canyon[2]								

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

Reservoir Storage End of January, 2018	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Lake Pend Oreille	788.7	589.1	753.9	1561.3
Priest Lake	55.6	45.6	56.7	119.3
Basin-wide Total	844.3	634.7	810.6	1680.6
# of reservoirs	2	2	2	2

Watershed Snowpack Analysis February 1, 2018	# of Sites	% Median	Last Year % Median
Pend Oreille Basins	54	122%	75%
Colville River	1	108%	84%
Kettle River	7	125%	74%

Upper Columbia River Basins



Summer runoff average forecast for the Okanogan River is 129%, Similkameen River is 125%, and Methow River is 121%. February 1 snow cover on the Okanogan was 126% of normal, Omak Creek was 131% and the Methow was 128%. January precipitation in the Upper Columbia was 135% of average, with precipitation for the water year at 114% of average. January streamflow for the Methow River was 131% of average, 105% for the Okanogan River and 161% for the Similkameen. Snow-water content at Salmon Meadows SNOTEL was 9.3 inches or 141% of normal for February 1. Combined storage in the Conconully Reservoirs was 16,300 acre-feet or 114% of normal. Temperatures were much above normal for January but slightly above normal for the water year.

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Upper Columbia Basins
Streamflow Forecasts - February 1, 2018

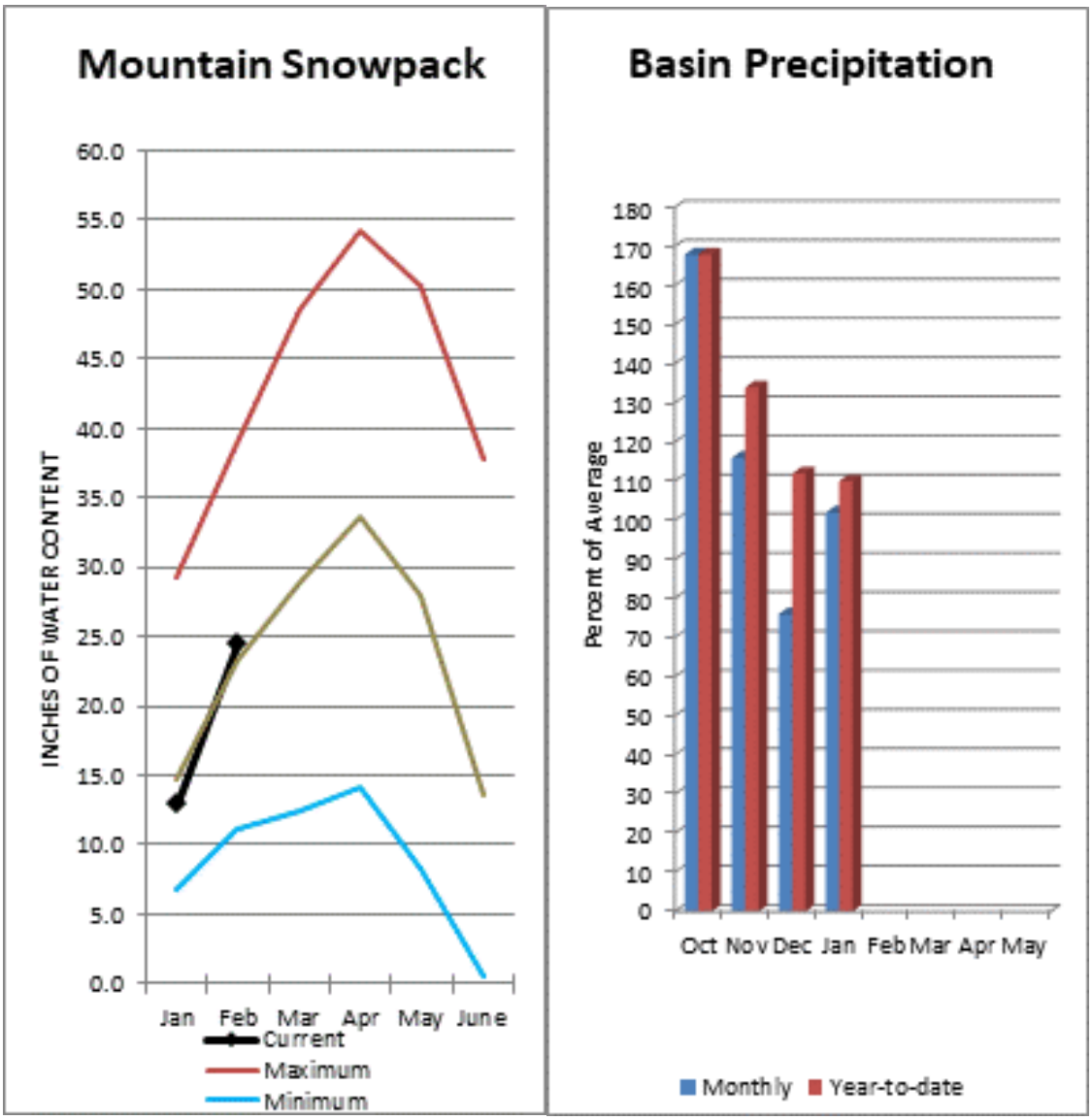
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

Upper Columbia Basins	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Kettle R nr Laurier								
	APR-JUL	1770	2030	2200	122%	2370	2630	1800
	APR-SEP	1850	2120	2300	122%	2480	2750	1880
Colville R at Kettle Falls								
	APR-JUL	43	86	115	97%	144	187	119
	APR-SEP	45	93	125	95%	157	205	131
Columbia R at Grand Coulee-NWS[2]								
	APR-JUL	50200		57100	112%		63500	51000
	APR-SEP	60000		66500	111%		75200	60100
Similkameen R nr Nighthawk								
	APR-JUL	1170	1370	1500	125%	1630	1830	1200
	APR-SEP	1260	1460	1600	125%	1740	1940	1280
Okanogan R nr Tonasket								
	APR-JUL	1370	1650	1850	125%	2050	2330	1480
	APR-SEP	1560	1880	2100	127%	2320	2640	1650
Okanogan R at Malott								
	APR-JUL	1400	1690	1890	130%	2080	2370	1450
	APR-SEP	1540	1870	2090	129%	2310	2630	1620
Methow R nr Pateros								
	APR-JUL	730	890	1000	120%	1110	1270	835
	APR-SEP	785	955	1080	121%	1190	1370	895

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 January, 2018	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Conconully Lake (Salmon Lake Dam)	7.8	8.6	7.3	10.5
Conconully Reservoir	8.5	11.2	7.0	13.0
Basin-wide Total	16.3	19.7	14.3	23.5
# of reservoirs	2	2	2	2

Watershed Snowpack Analysis February 1, 2018	# of Sites	% Median	Last Year % Median
Upper Columbia Basins	22	124%	89%
Okanogan River	14	126%	88%
Omak Creek	3	131%	124%
Sanpoil River	1	68%	129%
Similkameen River	4	122%	73%
Toats Coulee Creek	3	128%	88%
Conconully Lake	3	142%	127%
Methow River	4	128%	88%



Precipitation during January was 102% of average in the basin and 110% for the year-to-date. Runoff for Entiat River is forecast to be 95% of average for the summer. The April-September average forecast for Chelan River is 104%, Wenatchee River at Plain is 103%, Stehekin River is 105% and Icicle Creek is 100%. January average streamflow on the Chelan River was 108% and on the Wenatchee River 76%. February 1 snowpack in the Wenatchee River Basin was 102% of normal; the Chelan, 108%; the Entiat, 105%; Stemilt Creek, 83% and Colockum Creek, 118%. Reservoir storage in Lake Chelan was not available. Lyman Lake SNOTEL had the most snow water with 39.4 inches of water. This site would normally have 40.1 inches on February 1. Temperatures were much above normal for January and slightly above for the water year.

For more information contact your local Natural Resources Conservation Service office.

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Central Columbia Basins
Streamflow Forecasts - February 1, 2018

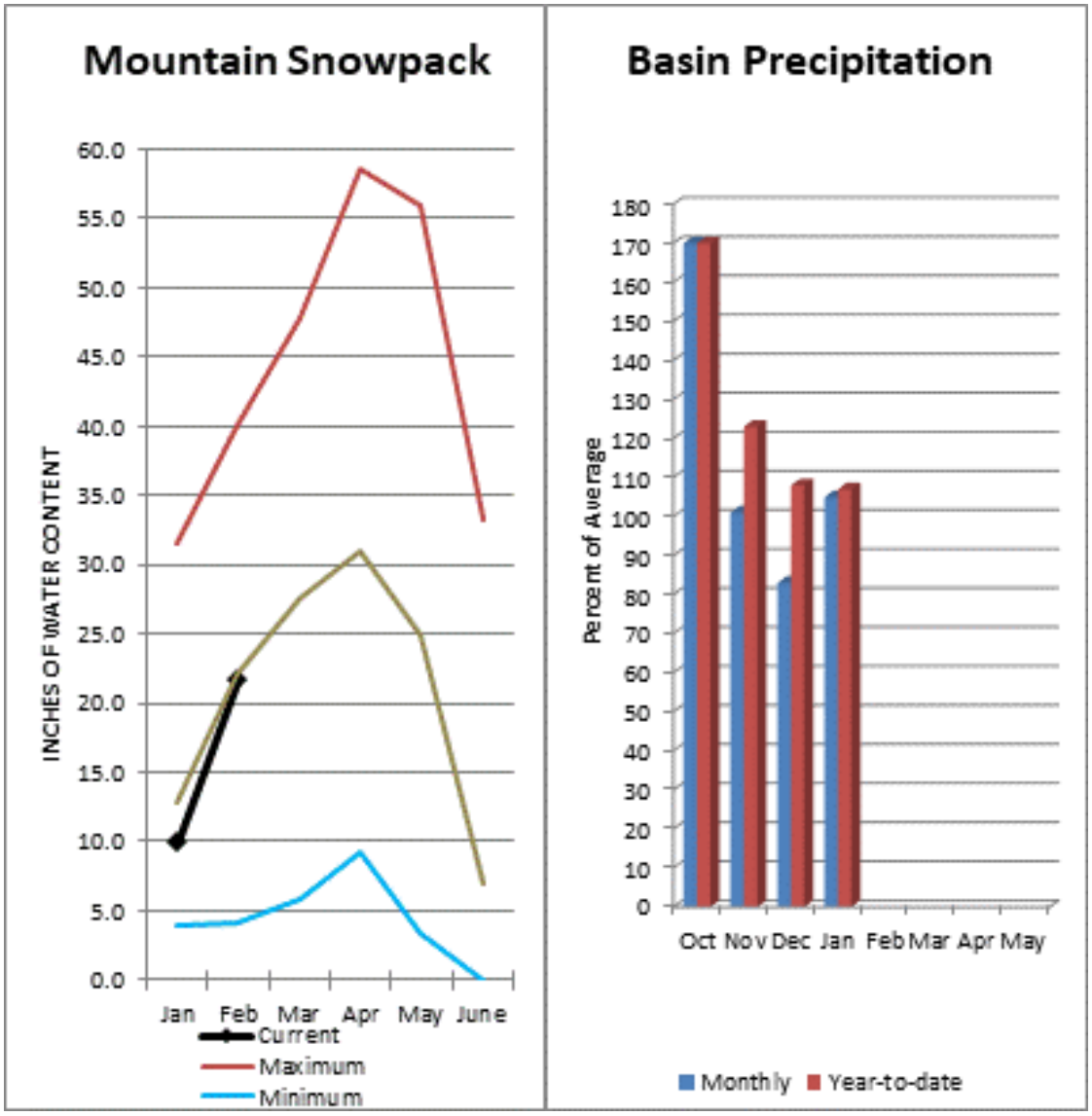
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

Central Columbia Basins	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Stehekin R at Stehekin								
	APR-JUL	580	660	715	105%	770	855	680
	APR-SEP	675	765	830	105%	890	985	790
Chelan R at Chelan								
	APR-JUL	840	960	1040	104%	1130	1250	1000
	APR-SEP	920	1070	1170	104%	1270	1410	1120
Entiat R nr Ardenvoir								
	APR-JUL	141	173	194	97%	215	250	200
	APR-SEP	151	187	210	95%	235	275	220
Wenatchee R at Plain								
	APR-JUL	775	915	1010	102%	1110	1250	990
	APR-SEP	835	995	1110	103%	1220	1380	1080
Icicle Ck nr Leavenworth								
	APR-JUL	210	250	275	100%	305	345	275
	APR-SEP	225	270	300	100%	335	380	300
Wenatchee R at Peshastin								
	APR-JUL	1070	1250	1370	100%	1490	1660	1370
	APR-SEP	1150	1350	1490	100%	1630	1830	1490
Columbia R bl Rock Island Dam-NWS[2]								
	APR-JUL	54500		61800	111%		71400	55800
	APR-SEP	64900		73200	112%		82700	65200

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 January, 2018	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Lake Chelan			343.1	676.1
Basin-wide Total			0.0	0.0
# of reservoirs	0	0	0	0

Watershed Snowpack Analysis February 1, 2018	# of Sites	% Median	Last Year % Median
Central Columbia Basins	3	108%	79%
Chelan Lake Basin	3	108%	79%
Entiat River	1	105%	69%
Wenatchee River	7	102%	77%
Stemilt Creek	1	83%	78%
Colockum Creek	1	118%	111%



February 1 reservoir storage for the Upper Yakima reservoirs was 503,000-acre feet, 124% of average. Forecasts for the Yakima River at Cle Elum are 99% of average and the Teanaway River near Cle Elum is at 102%. Lake inflows are all forecasted to be near average this summer as well. January streamflow within the basin was Cle Elum River near Roslyn at 90%. February 1 snowpack was 98% based upon 8 snow course and SNOTEL readings within the Upper Yakima Basin. Precipitation was 105% of average for January and 107% for the water-year. Volume forecasts for the Yakima Basin are for natural flow. As such, they may differ from the U.S. Bureau of Reclamation's forecast for the total water supply available, which includes irrigation return flow.

****Due to the devastating fire within the Teanaway and Cle Elum rivers this past summer, streamflow forecasts and thus runoff rates may be greatly affected come spring and summer. Sasse Ridge SNOTEL site was burned through but not lost to the fire. Area hydrology will be adversely changed for quite some time.**

For more information contact your local Natural Resources Conservation Service office.

Upper Yakima River Basin

Data Current as of: 2/5/2018 5:02:16 PM

Upper Yakima River
Streamflow Forecasts - February 1, 2018

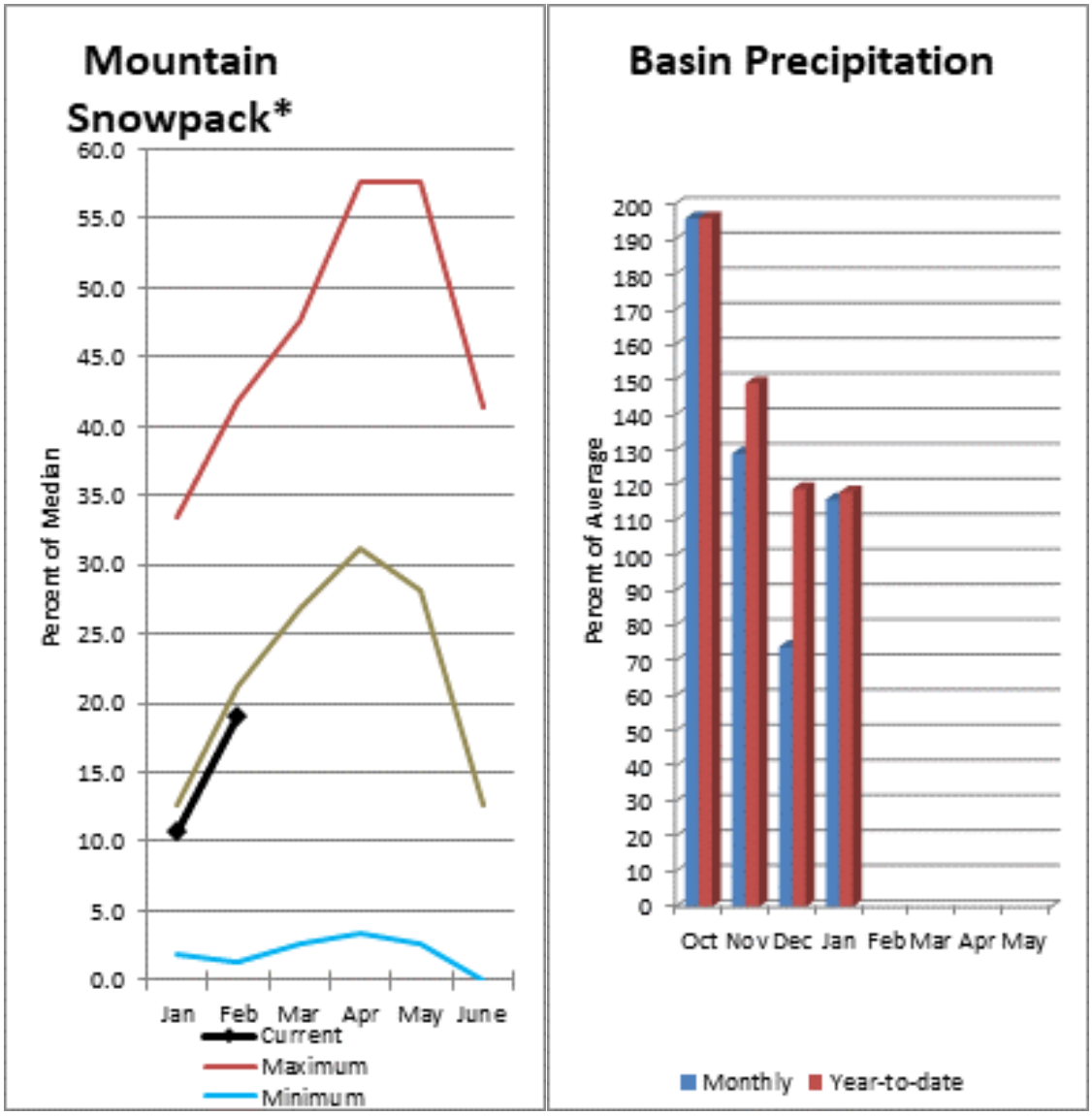
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

Upper Yakima River	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Keechelus Reservoir Inflow[2]								
	APR-JUL	80	103	119	103%	135	158	116
	APR-SEP	89	113	130	103%	146	171	126
Kachess Reservoir Inflow [2]								
	APR-JUL	73	93	106	102%	119	139	104
	APR-SEP	80	101	114	101%	128	148	113
Cle Elum Lake Inflow [2]								
	APR-JUL	295	350	390	101%	425	480	385
	APR-SEP	315	380	420	101%	465	525	415
Yakima R at Cle Elum [2]								
	APR-JUL	530	660	750	99%	840	970	755
	APR-SEP	590	730	825	99%	920	1060	830
Teanaway R bl Forks nr Cle Elum								
	APR-JUL	80	112	133	102%	154	185	130
	APR-SEP	82	114	136	102%	157	189	133

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 January, 2018	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Keechelus	109.0	69.3	82.1	157.8
Kachess	161.4	124.6	130.8	239.0
Cle Elum	232.8	166.1	191.5	436.9
Basin-wide Total	503.2	359.9	404.4	833.7
# of reservoirs	3	3	3	3

Watershed Snowpack Analysis February 1, 2018	# of Sites	% Median	Last Year % Median
Upper Yakima River	8	98%	72%



January average streamflows within the basin were: Yakima River near Parker, 108% and the Naches River near Naches, 132%. February 1 reservoir storage for Bumping and Rimrock reservoirs was 167,000-acre feet, 137% of average. Forecast runoff averages for Yakima River near Parker are 100%; American River near Nile, 103%; Ahtanum Creek, 86%; and Klickitat River near Glenwood, 96%. February 1 snowpack was 90% based upon 6 snow course and SNOTEL readings within the Lower Yakima Basin and Ahtanum Creek reported in at 69% of normal. Precipitation was 116% of average for January and 118% for the water-year. Temperatures were much above normal for January and slightly above normal for the water year. Volume forecasts for Yakima Basin are for natural flow. As such, they may differ from the U.S. Bureau of Reclamation's forecast for the total water supply available, which includes irrigation return flow. ****The Norse Peak fire consumed over 55,000 acres in Yakima and Pierce counties as well as destroying the Corral Pass SNOTEL site and threatening Crystal Mtn. Ski Area. Damages are still being assessed.**

For more information contact your local Natural Resources Conservation Service office.

Data Current as of: 2/5/2018 5:02:19 PM

Lower Yakima River
Streamflow Forecasts - February 1, 2018

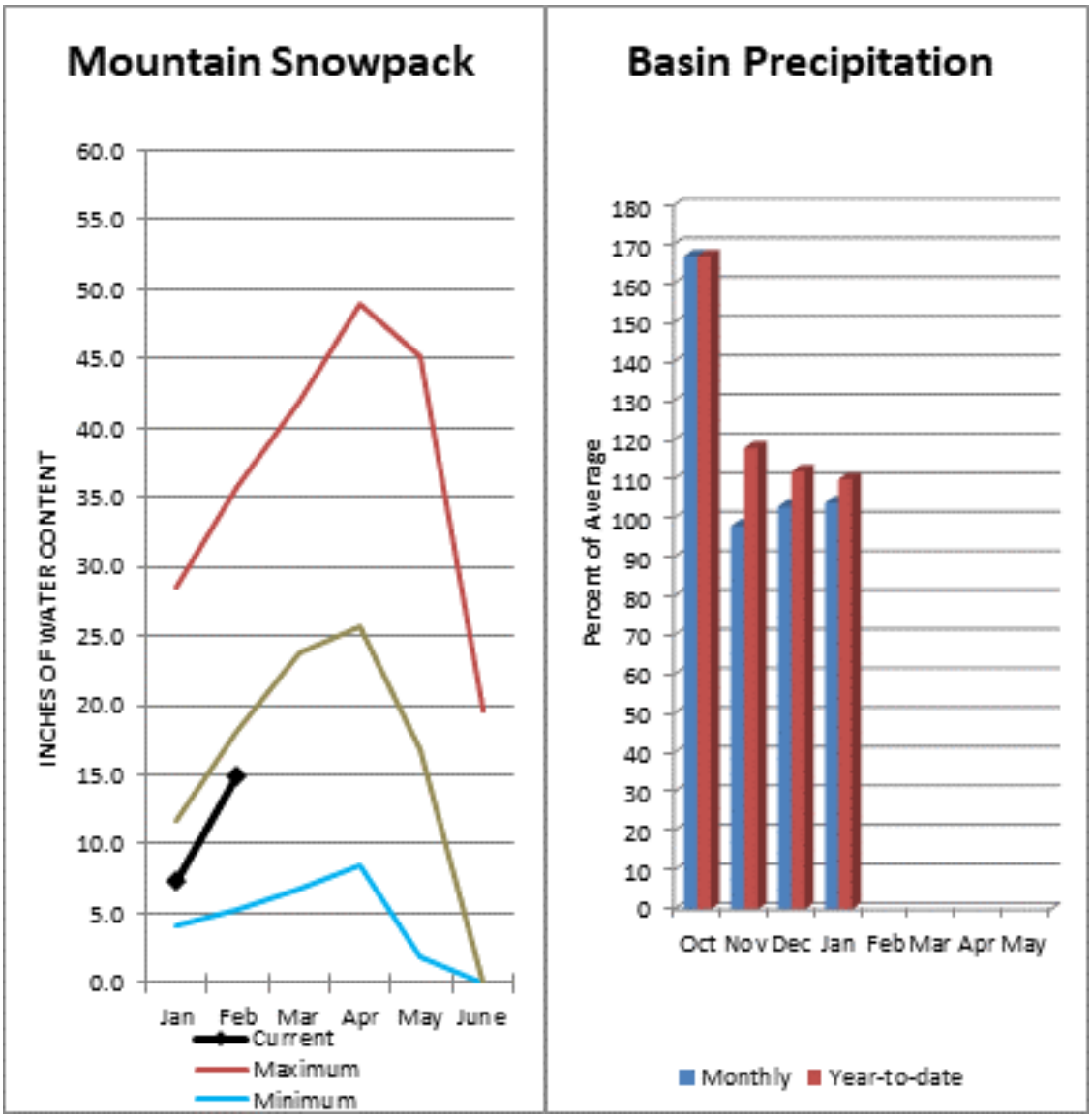
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

Lower Yakima River	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Bumping Lake Inflow [2]								
	APR-JUL	87	104	116	102%	128	145	114
	APR-SEP	93	113	126	102%	139	159	123
American R nr Nile								
	APR-JUL	79	94	104	102%	115	130	102
	APR-SEP	83	101	113	103%	125	142	110
Rimrock Lake Inflow [2]								
	APR-JUL	146	170	186	99%	200	225	187
	APR-SEP	170	200	220	100%	240	270	220
Naches R nr Naches								
	APR-JUL	500	635	725	104%	810	945	700
	APR-SEP	540	690	790	104%	890	1040	760
Ahtanum Ck at Union Gap								
	APR-JUL	7.8	16.6	23	85%	29	37	27
	APR-SEP	9.6	18.6	25	86%	31	40	29
Yakima R nr Parker [2]								
	APR-JUL	1170	1470	1670	101%	1870	2170	1660
	APR-SEP	1280	1600	1820	100%	2040	2360	1820
Klickitat R nr Glenwood								
	APR-JUL	80	104	121	96%	137	161	126
	APR-SEP	89	115	133	96%	151	177	139
Klickitat R nr Pitt								
	APR-JUL	310	385	435	100%	485	560	435
	APR-SEP	380	465	525	101%	585	670	520

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 January, 2018	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Bumping Lake	15.9	14.9	12.7	33.7
Rimrock	151.3	122.1	109.6	198.0
Basin-wide Total	167.2	137.0	122.3	231.7
# of reservoirs	2	2	2	2

Watershed Snowpack Analysis February 1, 2018	# of Sites	% Median	Last Year % Median
Lower Yakima River	6	90%	81%
Ahtanum Creek	2	69%	89%



January precipitation was 104% of average, maintaining the year-to-date precipitation at 110% of average. Snowpack in the basin was only 82% of normal. Streamflow forecasts are 96% of average for Mill Creek and 102% for the SF Walla Walla near Milton-Freewater. Average temperatures were much above normal for January but averaged closer to normal for the water year.

For more information contact your local Natural Resources Conservation Service office.

Data Current as of: 2/5/2018 5:02:22 PM

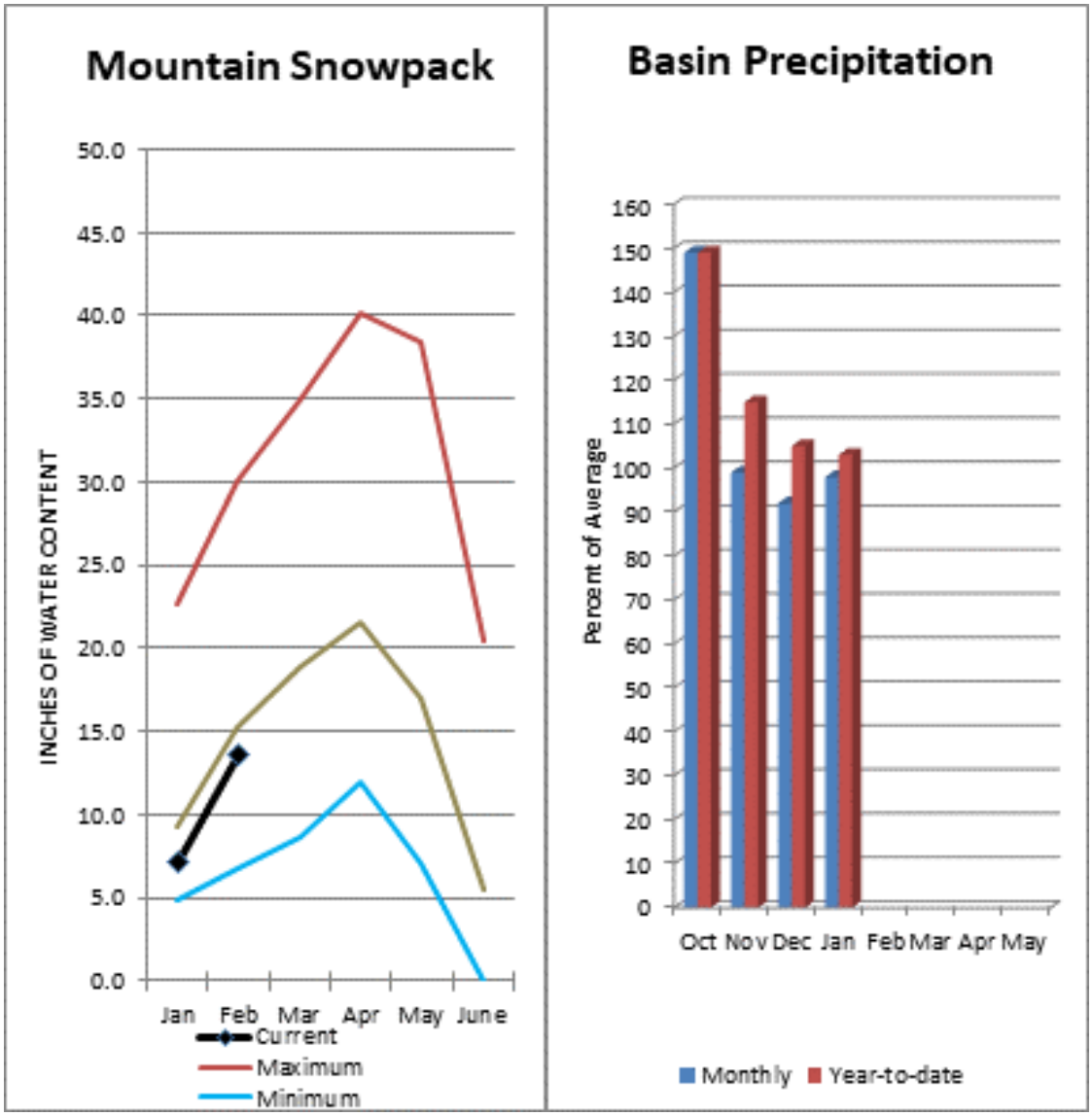
Walla Walla River
Streamflow Forecasts - February 1, 2018

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

Walla Walla River	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
SF Walla Walla R nr Milton-Freewater								
	MAR-JUL	53	62	69	101%	75	84	68
	APR-SEP	52	61	67	102%	73	82	66
Mill Ck nr Walla Walla								
	APR-JUL	16	19.8	22	92%	25	29	24
	APR-SEP	19.1	23	26	96%	28	32	27

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

Watershed Snowpack Analysis February 1, 2018	# of Sites	% Median	Last Year % Median
Walla Walla River	2	82%	108%



The Grande Ronde River can expect summer flows to be about 85% of normal. The forecast for Asotin Creek at Asotin predicts 91% of average flows for the April – July runoff period. January precipitation was 98% of average, bringing the year-to-date precipitation to 103% of average. February 1 snowpack readings averaged 85% of normal. January streamflow was 135% of average for Snake River below Lower Granite Dam and 156% for Grande Ronde River near Troy. Dworshak Reservoir storage was 101% of average. Average temperatures were much above normal for January but closer to normal for the water year.

For more information contact your local Natural Resources Conservation Service office.

Data Current as of: 2/5/2018 5:02:26 PM

Lower Snake, Grande Ronde, Clearwater Basins
Streamflow Forecasts - February 1, 2018

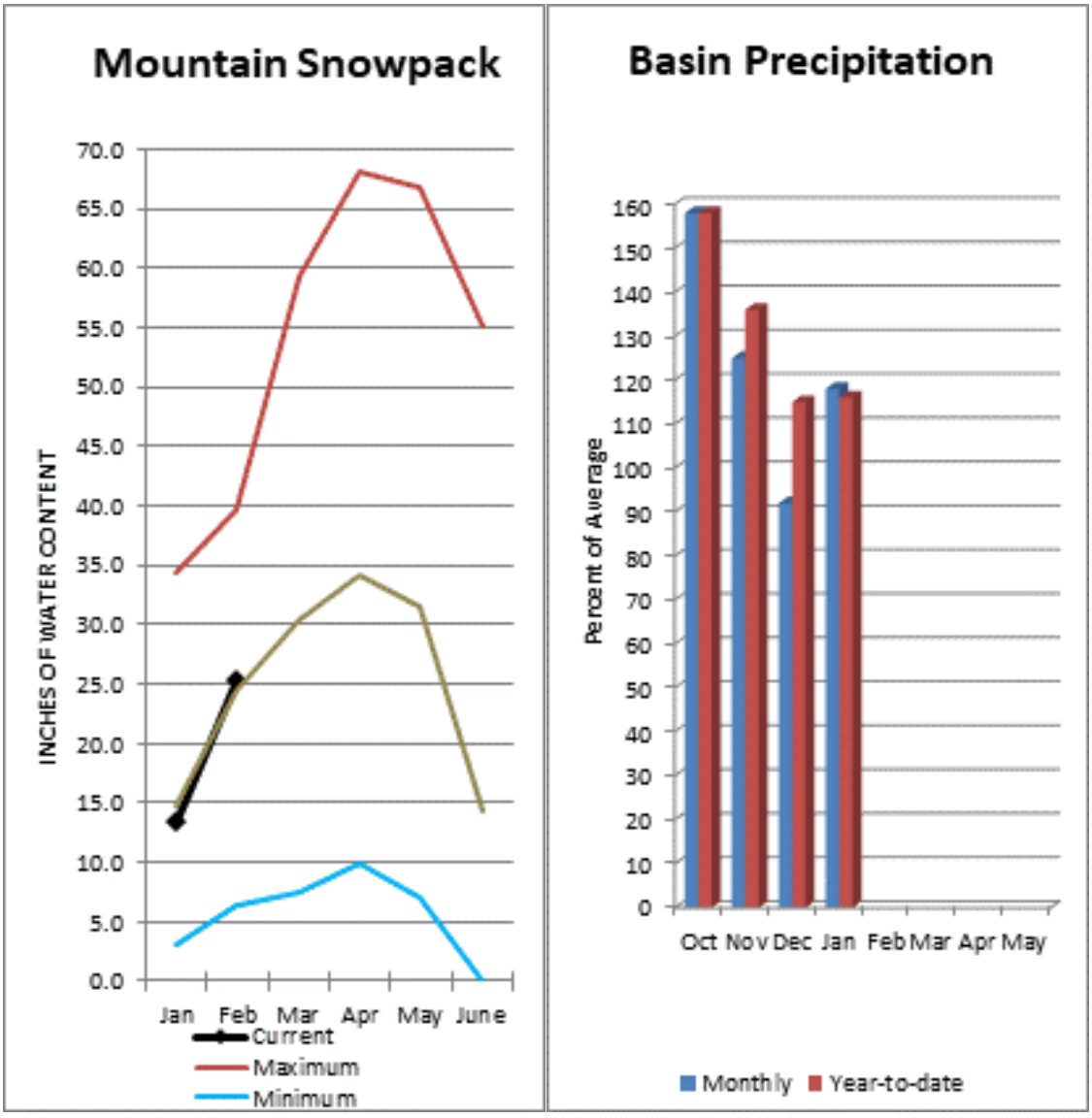
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

Lower Snake, Grande Ronde, Clearwater Basins	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Grande Ronde R at Troy								
	MAR-JUL	885	1130	1300	86%	1470	1710	1510
	APR-SEP	725	955	1110	85%	1270	1500	1310
Asotin Ck at Asotin								
	APR-JUL	17.3	26	32	91%	39	48	35
Clearwater R at Spalding[2]								
	APR-JUL	6410	7340	7970	116%	8600	9530	6890
	APR-SEP	6790	7740	8390	115%	9030	9980	7270
Snake R bl Lower Granite Dam-NWS[2]								
	APR-JUL	15700		20500	104%		24100	19800
	APR-SEP	17800		23000	103%		26700	22300

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 January, 2018	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Dworshak Reservoir	2359.0	2297.8	2335.0	3468.0
Basin-wide Total	2359.0	2297.8	2335.0	3468.0
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis February 1, 2018	# of Sites	% Median	Last Year % Median
Lower Snake, Grande Ronde, Clearwater Basins	13	85%	85%



Forecasts for April – September streamflows within the basin are Lewis River at Ariel, 95% and Cowlitz River at Castle Rock, 105% of average. The Columbia at The Dalles is forecasted to have 107% of average flows this summer according to the River Forecast Center. January average streamflow for Cowlitz River was 131% and the Columbia River at The Dalles was 119% of average. January precipitation was 118% of average and the water-year average was 116%. February 1 snow cover for Cowlitz River was 100%, and Lewis River was 109% of normal. Temperatures were above normal during January but near average for the water year.

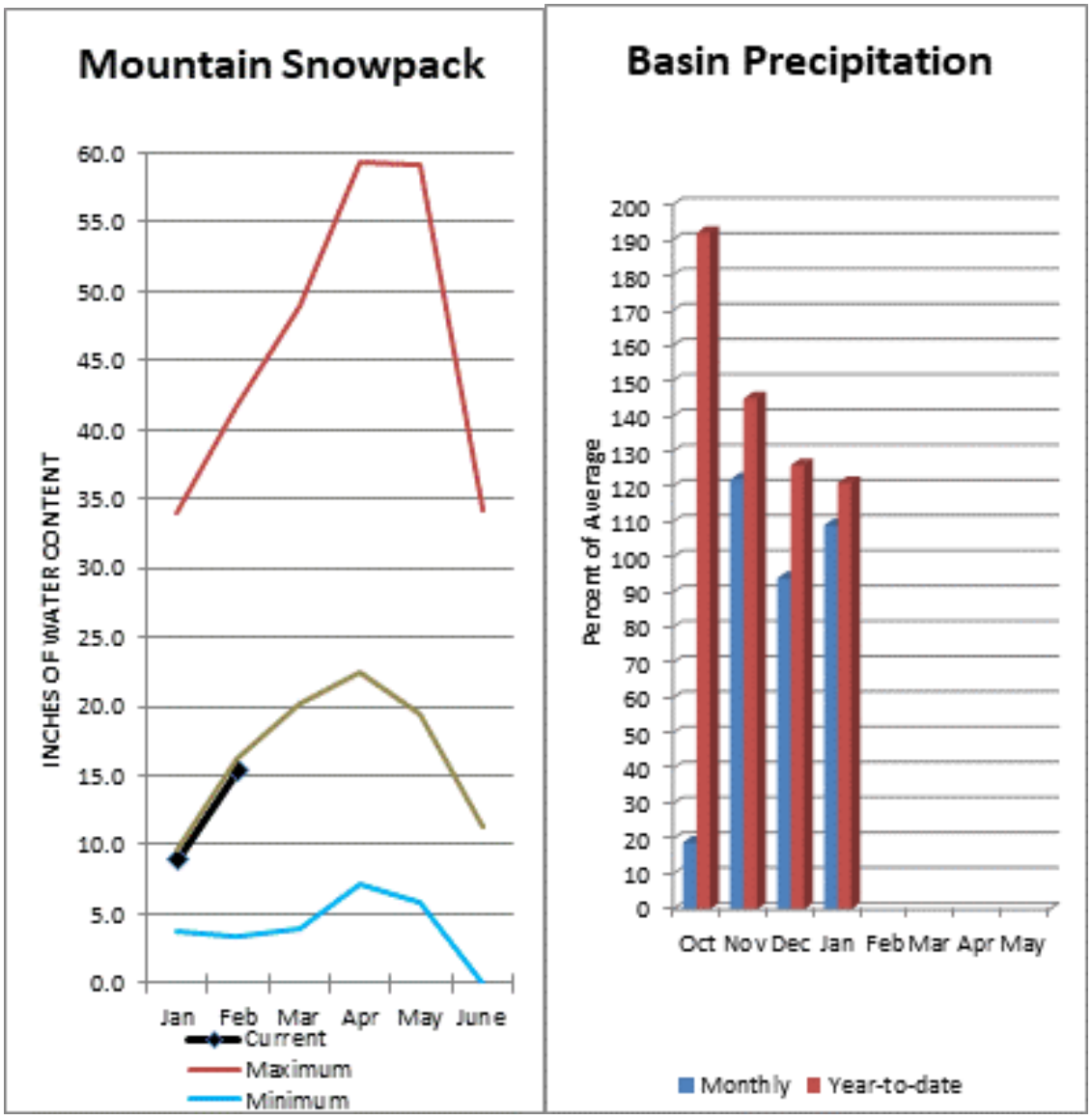
Data Current as of: 2/5/2018 5:02:29 PM

Lower Columbia Basins
Streamflow Forecasts - February 1, 2018

Lower Columbia Basins	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
		Forecast Exceedance Probabilities for Risk Assessment Chance that actual volume will exceed forecast						
Columbia R at The Dalles-NWS[2]								
	APR-JUL	76100		85600	107%		97800	79900
	APR-SEP	88200		99200	107%		112000	92700
Klickitat R nr Glenwood								
	APR-JUL	80	104	121	96%	137	161	126
	APR-SEP	89	115	133	96%	151	177	139
Klickitat R nr Pitt								
	APR-JUL	310	385	435	100%	485	560	435
	APR-SEP	380	465	525	101%	585	670	520
Lewis R at Ariel[2]								
	APR-JUL	670	840	960	99%	1080	1250	970
	APR-SEP	755	940	1060	95%	1190	1370	1120
Cowlitz R bl Mayfiled[2]								
	APR-JUL	1230	1430	1570	97%	1710	1910	1620
	APR-SEP	1490	1720	1880	102%	2040	2270	1840
Cowlitz R at Castle Rock[2]								
	APR-JUL	1790	2020	2180	98%	2330	2560	2230
	APR-SEP	2440	2560	2640	105%	2720	2840	2520

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

Watershed Snowpack Analysis February 1, 2018	# of Sites	% Median	Last Year % Median
Lower Columbia Basins	11	104%	111%
Lewis River	5	109%	125%
Cowlitz River	6	100%	97%



Summer runoff is forecast to be 87% of normal for the Green River below Howard Hanson Dam and 101% for the White River near Buckley. February 1 snowpack was 109% of average for the White River, 107% for Puyallup River and 70% in the Green River Basin. January precipitation was 109% of average, bringing the water year-to-date to 121% of average for the basins. Average temperatures in the area were above normal for January and for the water-year.

For more information contact your local Natural Resources Conservation Service office.

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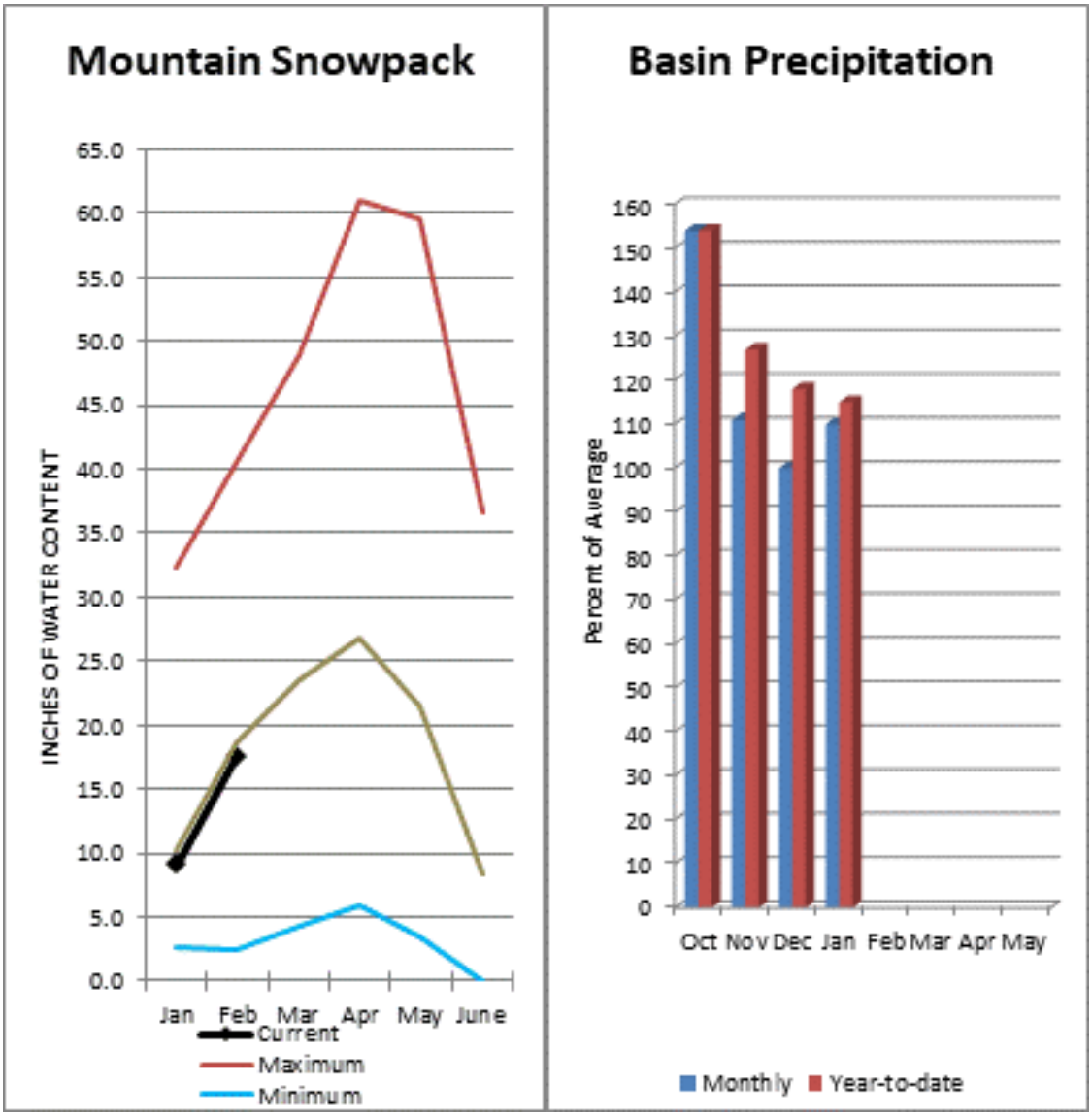
South Puget Sound Basins
Streamflow Forecasts - February 1, 2018

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

South Puget Sound Basins	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
White R nr Buckley[1,2]								
	APR-JUL	325	400	435	101%	470	545	430
	APR-SEP	390	480	520	101%	560	650	515
Green R bl Howard A Hanson Dam[1,2]								
	APR-JUL	107	173	205	87%	235	300	235
	APR-SEP	128	195	225	87%	255	325	260

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

Watershed Snowpack Analysis February 1, 2018	# of Sites	% Median	Last Year % Median
South Puget Sound Basins	8	95%	83%
White River	2	109%	83%
Green River	2	70%	79%



Forecast for spring and summer flows are: 97% for Cedar River near Cedar Falls; 96% for Rex River; 106% for South Fork of the Tolt River; and 96% for Taylor Creek near Selleck. Basin-wide precipitation for January was 110% of average, bringing water-year-to-date to 115% of average. February 1 median snow cover in Cedar River Basin was 90%, Tolt River Basin was 94%, Snoqualmie River Basin was 94%, and Skykomish River Basin was 102%. Temperatures were above normal for January and near normal for the water-year.

For more information contact your local Natural Resources Conservation Service office.

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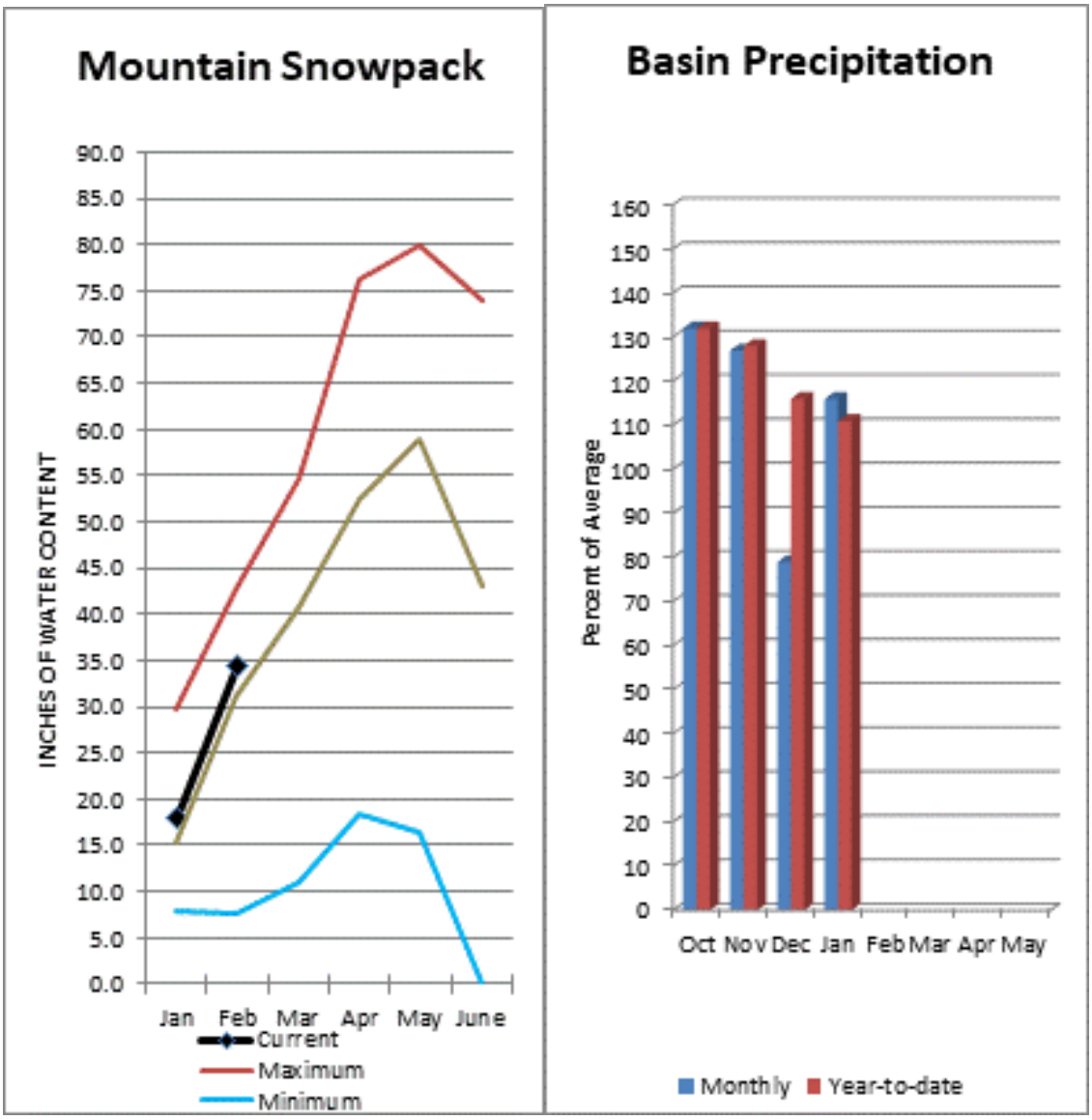
Central Puget Sound Basins
Streamflow Forecasts - February 1, 2018

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

Central Puget Sound Basins	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Cedar R nr Cedar Falls								
	APR-JUL	49	60	67	96%	74	85	70
	APR-SEP	55	66	74	97%	81	93	76
Rex R nr Cedar Falls								
	APR-JUL	15.2	20	24	100%	27	32	24
	APR-SEP	17.7	23	26	96%	30	35	27
Taylor Ck nr Selleck								
	APR-JUL	13.8	16.9	19	95%	21	24	20
	APR-SEP	17.2	20	23	96%	25	28	24
SF Tolt R nr Index								
	APR-JUL	11.2	13.5	15.1	106%	16.7	19	14.2
	APR-SEP	13	15.4	17.1	106%	18.8	21	16.1

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

Watershed Snowpack Analysis February 1, 2018	# of Sites	% Median	Last Year % Median
Central Puget Sound Basins	12	95%	88%
Puyallup River	4	107%	88%
Cedar River	4	90%	84%
Tolt River	2	94%	116%
Snoqualimie River	4	94%	95%
Skykomish River	2	102%	84%



Forecast for Skagit River streamflow at Newhalem is 103% of average for the spring and summer period. January streamflow in Skagit River was 127% of average. Other forecast points included Baker River at 105% and Thunder Creek at 100% of average. Basin-wide precipitation for January was 116% of average, bringing water-year-to-date to 111% of average. February 1 average snow cover in Skagit River Basin was 114% and the Nooksack River Basin was 97%. February 1 Skagit River reservoir storage was 61% of average and 44% of capacity. Average temperatures were slightly above normal for January and near average for the water year.

For more information contact your local Natural Resources Conservation Service office.

Data Current as of: 2/5/2018 5:02:40 PM

North Puget Sound Basins
Streamflow Forecasts - February 1, 2018

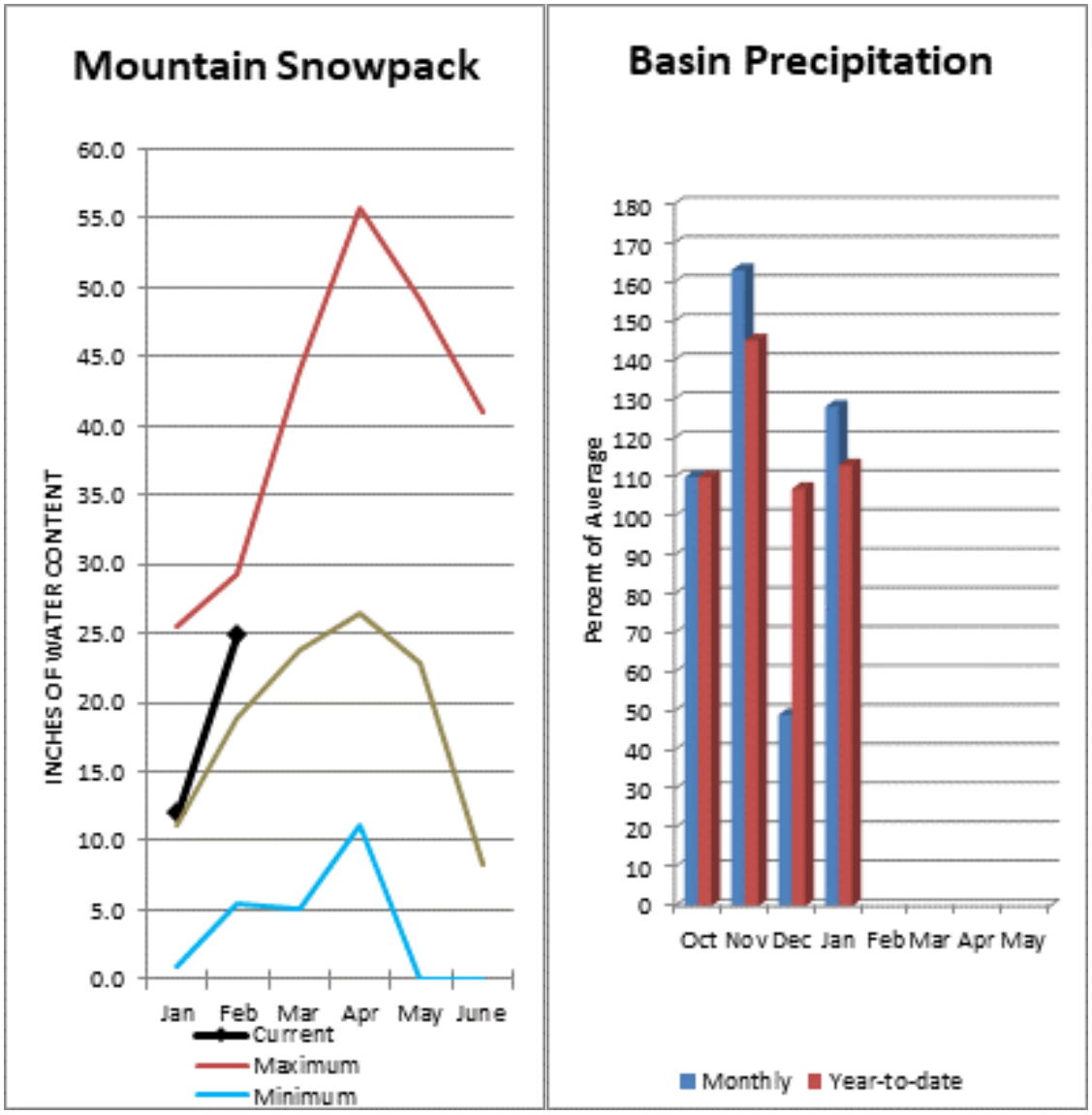
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

North Puget Sound Basins	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Thunder Ck nr Newhalem								
	APR-JUL	210	225	240	102%	250	265	235
	APR-SEP	300	320	330	100%	345	365	330
Skagit R at Newhalem[2]								
	APR-JUL	1540	1680	1770	105%	1860	2000	1680
	APR-SEP	1830	1990	2090	103%	2190	2350	2030
Baker R at Concrete								
	APR-JUL	670	750	810	104%	865	950	780
	APR-SEP	875	965	1030	105%	1090	1180	980

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 January, 2018	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Ross	579.4	476.1	996.3	1404.1
Diablo Reservoir	83.6	86.3	85.8	90.6
Basin-wide Total	663.0	562.4	1082.1	1494.7
# of reservoirs	2	2	2	2

Watershed Snowpack Analysis February 1, 2018	# of Sites	% Median	Last Year % Median
North Puget Sound Basins	13	111%	84%
Skagit River	11	114%	84%
Baker River	0		
Nooksack River	2	97%	86%



Forecasted average runoff for streamflow for the Dungeness River is 104% and Elwha River is 106% January runoff in the Dungeness River was 103% of normal. Big Quilcene and Wynoochee rivers may expect near average runoff this summer as well. January precipitation was 128% of average. Precipitation has accumulated at 113% of average for the water year. January precipitation at Quillayute was 151% of normal. Olympic Peninsula snowpack averaged 130% of normal on February 1. Temperatures were above average for January and near normal for the water year.

For more information contact your local Natural Resources Conservation Service office.

Data Current as of: 2/5/2018 5:02:43 PM

Olympic Penninsula
Streamflow Forecasts - February 1, 2018

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

Olympic Penninsula	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Dungeness R nr Sequim								
	APR-JUL	104	116	124	103%	132	144	120
	APR-SEP	125	140	151	104%	161	176	145
Elwha R at McDonald Br nr Port Angeles								
	APR-JUL	355	395	420	105%	450	490	400
	APR-SEP	415	465	500	106%	535	580	470

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

Watershed Snowpack Analysis February 1, 2018	# of Sites	% Median	Last Year % Median
Olympic Penninsula	6	130%	110%

Issued by

Jason Weller
Chief
Natural Resources Conservation Service
U.S. Department of Agriculture

Released by

Roylene Rides At The Door
State Conservationist
Natural Resources Conservation Service
Spokane, Washington

The Following Organizations Cooperate with the Natural Resources Conservation Service in Snow Survey Work*:

Canada	Snow Survey Network Program – British Columbia Ministry of Environment
	River Forecast Center – British Columbia Ministry of Forests, Lands and Natural Resource Operations
State	Washington State Department of Ecology
	Washington State Department of Natural Resources
Federal	Department of the Army
	Corps of Engineers
	U.S. Department of Agriculture
	Forest Service
	U.S. Department of Commerce
	NOAA, National Weather Service
	U.S. Department of Interior
	Bonneville Power Administration
	Bureau of Reclamation
	Geological Survey
	National Park Service
	Bureau of Indian Affairs
	Recourse Conservation & Development Councils
Local	City of Tacoma
	City of Seattle
	Chelan County P.U.D.
	Pacific Power and Light Company
	Puget Sound Energy
	Washington Water Power Company
	Snohomish County P.U.D.
	Colville Confederated Tribes
	Spokane County
	Yakama Indian Nation
	Whatcom County
	Pierce County
	Kalispel Tribe of Indians
	Spokane Indian Tribe
	Jamestown S'klallum Tribe
Private	Okanogan Irrigation District
	Wenatchee Heights Irrigation District
	Newman Lake Homeowners Association
	Whitestone Reclamation District

***Other organizations and individuals furnish valuable information for the snow survey reports. Their cooperation is gratefully acknowledged.**

Washington Snow Survey Office
2005 E. College Way, Suite 203
Mount Vernon, WA 98273-2873

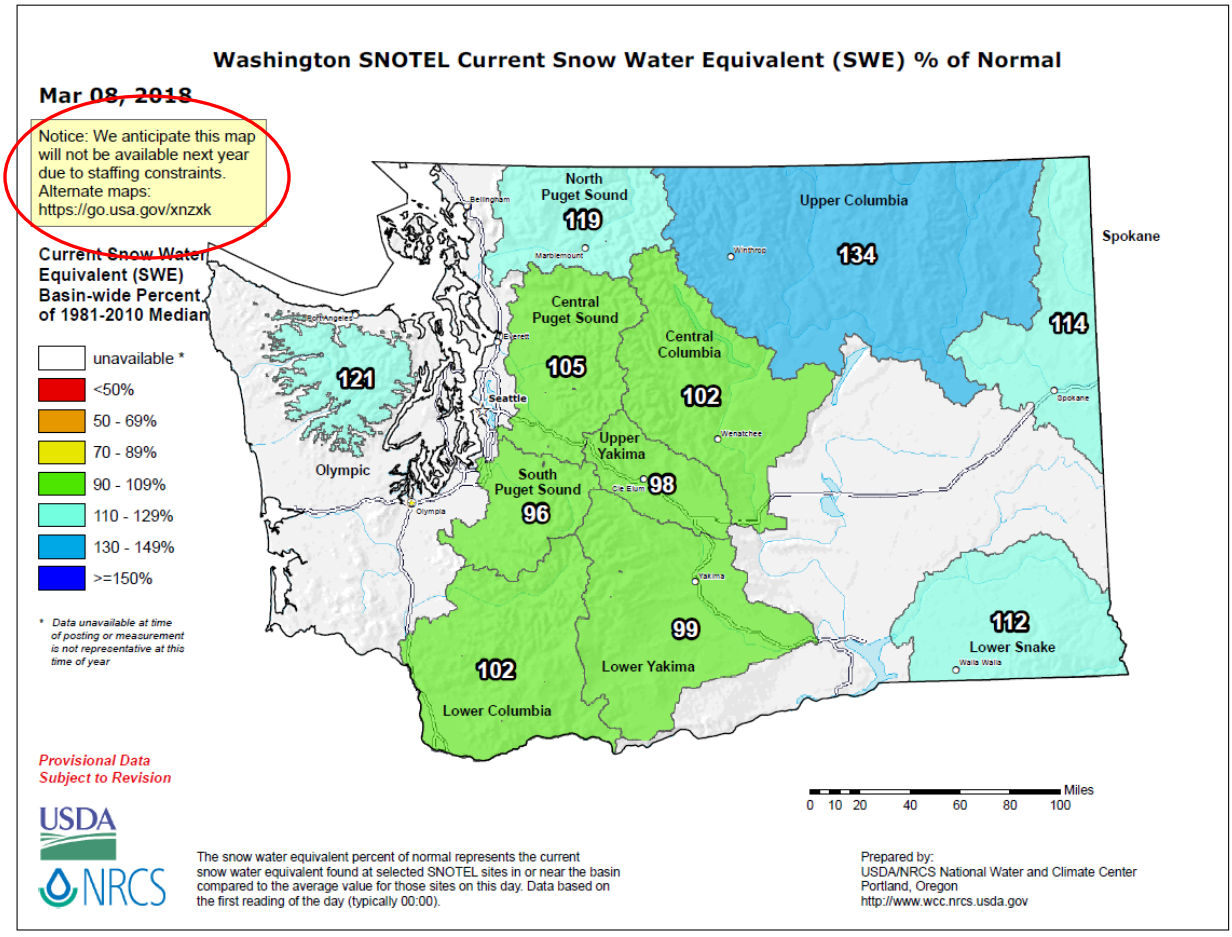
Washington Water Supply Outlook Report

Natural Resources Conservation Service
Spokane, WA

United States Department of Agriculture

NRCS Natural Resources Conservation Service

Washington Water Supply Outlook Report March 1, 2018



HOT TOPIC: Recent "Notice" additions to specific products have drawn interest. As paraphrased for one stakeholder in this state, "We depend on accurate, timely water supply information from NRCS and others. The basin-filled SWE maps are great for communicating about snowpack conditions. We use them frequently and in a variety of ways because they are simple, direct, and easily recognizable as snowpack maps.***" – Jeff Marti, WA Dept. of Ecology***

Water Supply Outlook Reports
and
Federal - State – Private Cooperative Snow Surveys

For more water supply and resource management information, contact:

Local Natural Resources Conservation Service Field Office

or

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W 316 Boone Ave., Suite 450
Spokane, WA 99201
(509) 323-2955

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 it 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 prepare runoff forecasts. These forecasts are coordinated between hydrologists in the Natural Resources Conservation Service and the National Weather Service. Unless otherwise specified, all forecasts are for flows that would occur naturally without any upstream influences.

Forecasts of any kind, of course, 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 uncertain 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.

Washington
Water Supply Outlook

March 2018

General Outlook

February in Washington was warm and very wet with only appreciable snow accumulation coming late in the month. Unfortunately, this also brought with it tragedy with six lives lost to avalanche accidents late in February and early this month. A fresh dump of perfect powder fell upon weak and unstable surface snow enticed recreationists back into the mountains, the perfect recipe for disaster. The warnings were posted however not all take the time to prepare properly. The most recent forecast through mid-March shows most probability for above normal temperatures and above normal precipitation with a cooling trend towards the end of the month. Overall 1-month forecast for March was for below normal temperatures and above normal precipitation. Taking us through the end of winter and beginning spring, NWS 3-month (MAM) forecast indicates below normal temperatures with equal chances of precipitation. Remember to set your clocks forward one hour this Sunday for Day Light Savings Time. http://www.cpc.ncep.noaa.gov/

Snowpack

The March 1 statewide SNOTEL readings were 108% of normal. The lowest readings in the state were at 72% of the 30-year median for March 1 in Ahtanum Creek basin. The Okanogan Basin had the most snow with 141%. Basins across northern Washington favor higher snowpack conditions than those further south. Westside medians from SNOTEL, and March 1 snow surveys, included the North Puget Sound river basins with 117% of normal, the Central and South Puget river basins with 107% and the Lower Columbia basins with 110% of normal. Snowpack along the east slopes of the Cascade Mountains included the Yakima area with 86% and the Wenatchee area with 105%. Snowpack in the Spokane River Basin was at 107% and the Walla Walla River Basin had 82% of the long-term median.

BASIN	PERCENT OF MEDIAN	LAST YEAR PERCENT MEDIAN
Spokane	107	91
Newman Lake	96	95
Pend Oreille	140	96
Okanogan	141	98
Methow	131	99
Conconully Lake	114	101
Central Columbia	105	93
Upper Yakima	96	93
Lower Yakima	91	101
Ahtanum Creek	72	110
Walla Walla	82	122
Lower Snake	89	106
Cowlitz	111	111
Lewis	109	144
White	110	98
Green	80	96
Puyallup	111	105
Cedar	101	121
Snoqualmie	108	108
Skykomish	119	107
Skagit	118	94
Nooksack	115	88
Olympic Peninsula	128	112

Precipitation

February precipitation was mostly above average across the state. The Olympic Mountains were the driest with only 86% of normal total precipitation. Conversely, directly east across Puget Sound, the upper Tolt River Basin recorded 229% with as much as 30.1 inches at Skookum Creek SNOTEL.

RIVER BASIN	FEBRUARY PERCENT OF AVERAGE	WATER YEAR PERCENT OF AVERAGE
Spokane	141	116
Pend Oreille	184	126
Upper Columbia	104	113
Central Columbia	126	113
Upper Yakima	128	111
Lower Yakima	105	116
Walla Walla	169	119
Lower Snake	141	110
Lower Columbia	108	115
South Puget Sound	151	126
Central Puget Sound	183	125
North Puget Sound	183	122
Olympic Peninsula	86	110

Reservoir

Seasonal reservoir levels in Washington can vary greatly due to specific watershed management practices required in preparation for irrigation season, fisheries management, power generation, municipal demands and flood control. March 1 Reservoir storage in the Yakima Basin was 595,000-acre feet, 132% of average for the Upper Reaches and 197,000-acre feet or 144% of average for Rimrock and Bumping Lakes. The power generation reservoirs included the following: Coeur d'Alene Lake, 109,000-acre feet, 82% of average and 46% of capacity; and the Skagit River reservoirs at 43% of average and 26% of capacity. Recent climate impacts and management procedures may affect these numbers on a daily or weekly basis.

BASIN	PERCENT OF CAPACITY	CURRENT STORAGE AS PERCENT OF AVERAGE
Spokane	46	82
Pend Oreille	43	84
Upper Columbia	72	116
Central Columbia	N/A	N/A
Upper Yakima	71	132
Lower Yakima	85	144
Lower Snake	60	88
North Puget Sound	26	43

For more information contact your local Natural Resources Conservation Service office.

Streamflow

Mid-winter forecasts for April-September stream flows begin to paint a clearer picture of what may be to come. At times, only a few degrees warmer or cooler than forecasted can make or break stream flow predictions but so far, we are looking stellar in Washington. April-September forecasts for some Western Washington streams include the Cedar River near Cedar Falls, 105%; White River, 107%; and Skagit River, 110%. Some Eastern Washington streams include the Yakima River near Parker 103%, Wenatchee River at Plain 105%; and Spokane River near Post Falls 116%. Volumetric forecasts are developed using current, historic and average snowpack, precipitation and streamflow data collected and coordinated by organizations cooperating with NRCS.

BASIN	PERCENT OF AVERAGE (50 PERCENT CHANCE OF EXCEEDENCE)
Spokane	111-117
Priest River	108-134
Upper Columbia	95-141
Central Columbia	95-117
Upper Yakima	102-107
Lower Yakima	86-106
Walla Walla	100-105
Lower Snake	92-128
Lower Columbia	96-113
South Puget Sound	90-107
Central Puget Sound	100-124
North Puget Sound	94-110
Olympic Peninsula	104-105

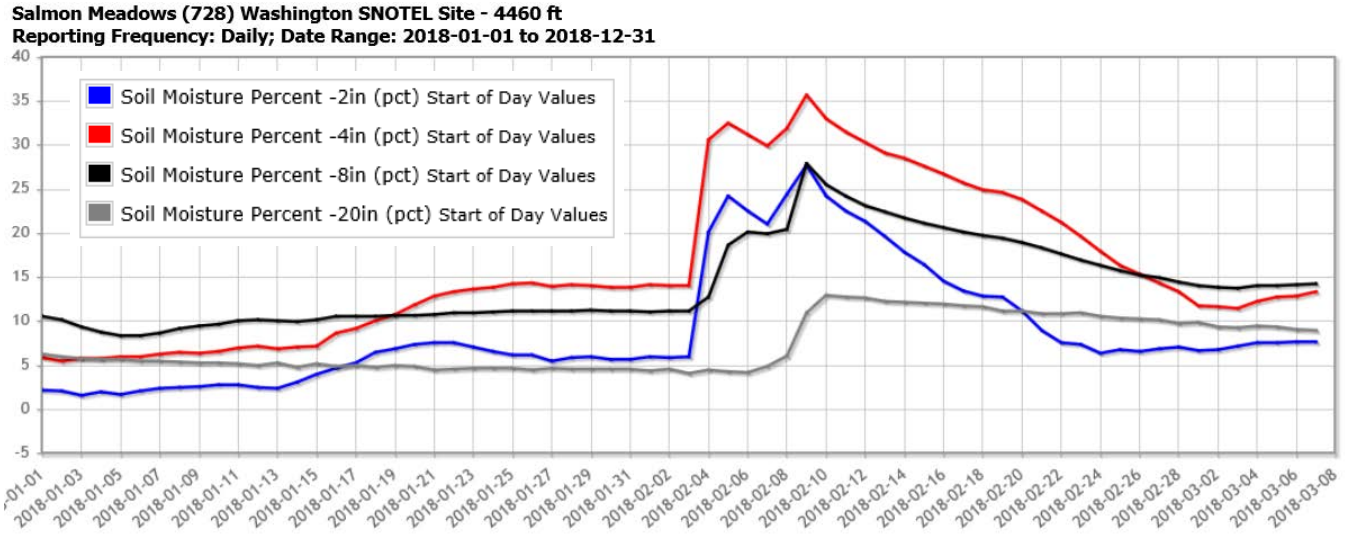
STREAM	PERCENT OF AVERAGE FEBRUARY STREAMFLOWS
Pend Oreille at Albeni Fall Dam	151
Kettle at Laurier	76
Columbia at Birchbank	106
Spokane at Spokane	180
Similkameen at Nighthawk	177
Okanogan at Tonasket	152
Methow at Pateros	182
Chelan at Chelan	196
Wenatchee at Pashastin	177
Cle Elum near Roslyn	170
Yakima at Parker	156
Naches at Naches	185
Grande Ronde at Troy	149
Snake below Lower Granite Dam	128
Columbia River at The Dalles	123
Lewis at Merwin Dam	88
Cowlitz below Mayfield Dam	127
Skagit at Concrete	154
Dungeness near Sequim	121

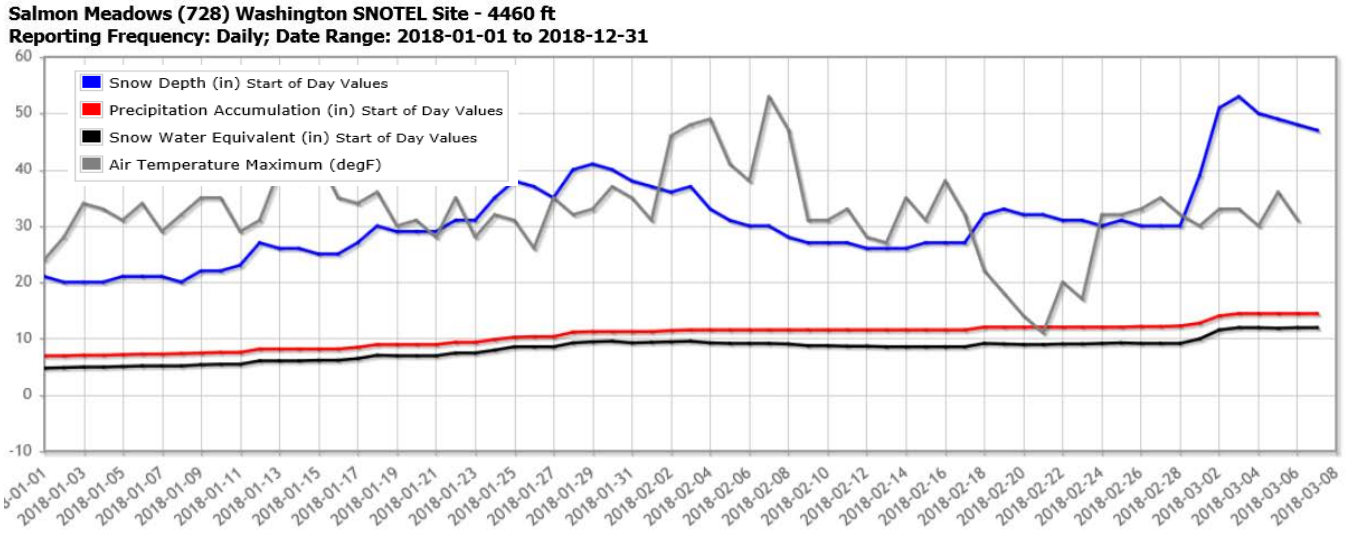
For more information contact your local Natural Resources Conservation Service office.

Soil Moisture

Current soil moisture data is available from a limited number of SNOTEL sites scattered throughout each basin. As the effort continues to install additional sensors and more years of data are acquired this information will become invaluable to the streamflow forecasting community.

Following are example graphs from Salmon Meadows SNOTEL in the Conconully Basin, Okanogan Co. depicting calendar year soil moisture as compared to climatic conditions for the same period. Interesting to note the sudden and rapid increase in soil moisture during the warm but mostly dry event beginning February 2nd. Even with 30" of snow on the ground an extreme wetting was measured without noticeable snow water or precipitation accumulation or ablation. Surface soils were brought from near dry to near saturation in only a few days with influence down to the 20" mark. For more detailed information about Salmon Meadows soils follow this link: https://www.nrcs.usda.gov/wps/portal/nrcs/detail/or/snow/products/?cid=nrcs142p2_046366





Natural Resources Conservation Service

Washington State
Snow, Water and Climate Services

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Helpful Internet Addresses

NRCS Snow Survey and Climate Services Homepages

Washington:
http://www.nrcs.usda.gov/wps/portal/nrcs/main/wa/snow/

Oregon:
http://www.nrcs.usda.gov/wps/portal/nrcs/main/or/snow/

Idaho:
http://www.nrcs.usda.gov/wps/portal/nrcs/main/id/snow/

National Water and Climate Center (NWCC):
http://www.wcc.nrcs.usda.gov

USDA-NRCS Agency Homepages

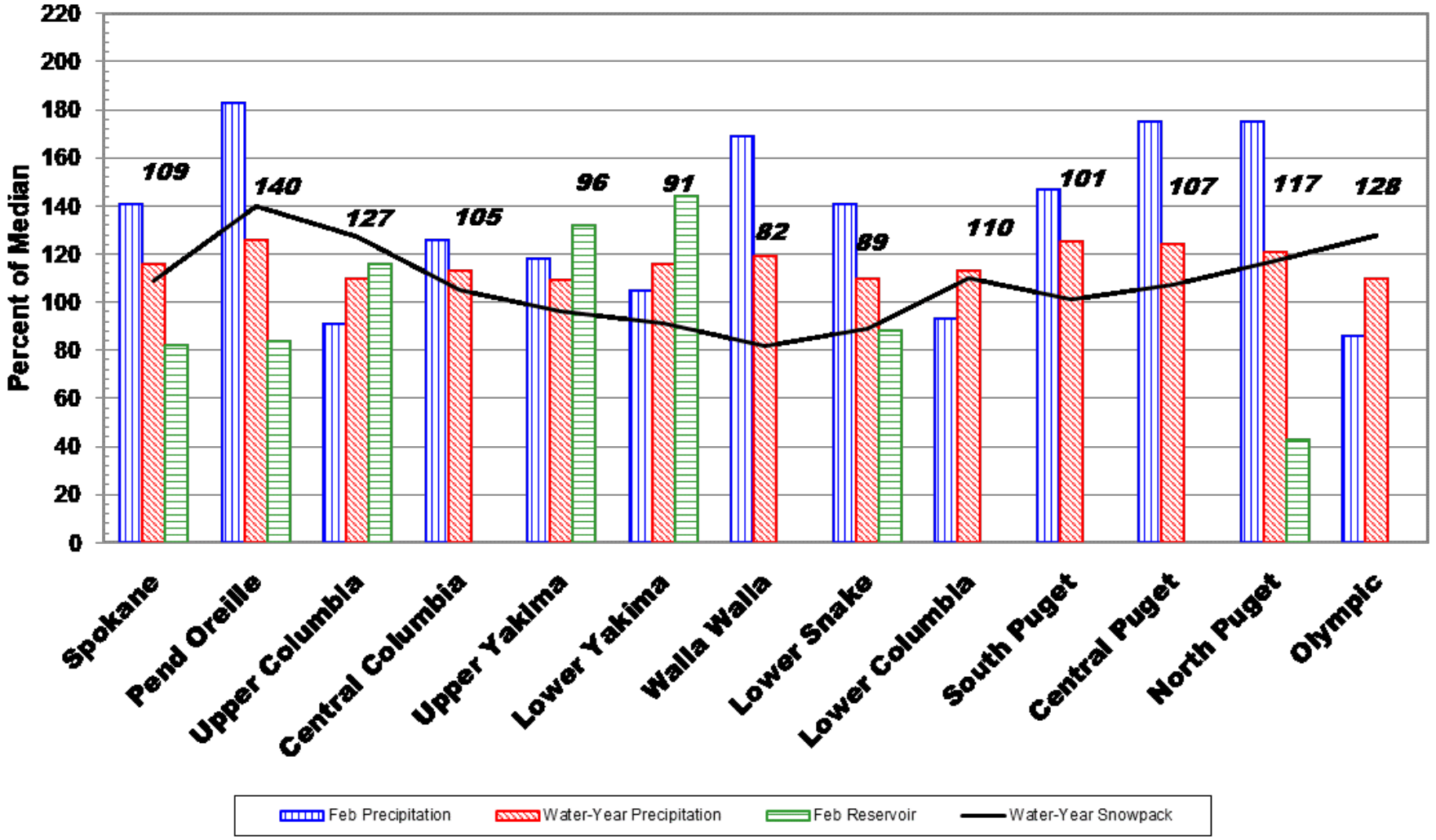
Washington:
http://www.nrcs.usda.gov/wps/portal/nrcs/site/wa/home/

NRCS National:
http://www.nrcs.usda.gov/wps/portal/nrcs/site/national/home/

NRCS Natural Resources Conservation Service

March 1, 2018 - Snowpack, Precipitation and Reservoir Conditions at a Glance

(Water Year = October 1 - Current Date)



86th Meeting of the Western Snow Conference

The Western Snow Conference is an annual tradition which started in 1932 as an international forum for individuals and organizations to share scientific, management and socio-political information on snow and runoff. The principal aim of the Western Snow Conference is to advance snow and hydrological sciences. The South Continental Area Committee is making plans for the 86th Annual Western Snow Conference in 2018.

Mark your calendar for these important dates:

25$ late fee assessed for all registrations submitted after March 31.
Crown Plaza Hotel block of rooms cut off is April 13 but will fill fast.

Dates: April 16-19, 2018
Location: Albuquerque, NM

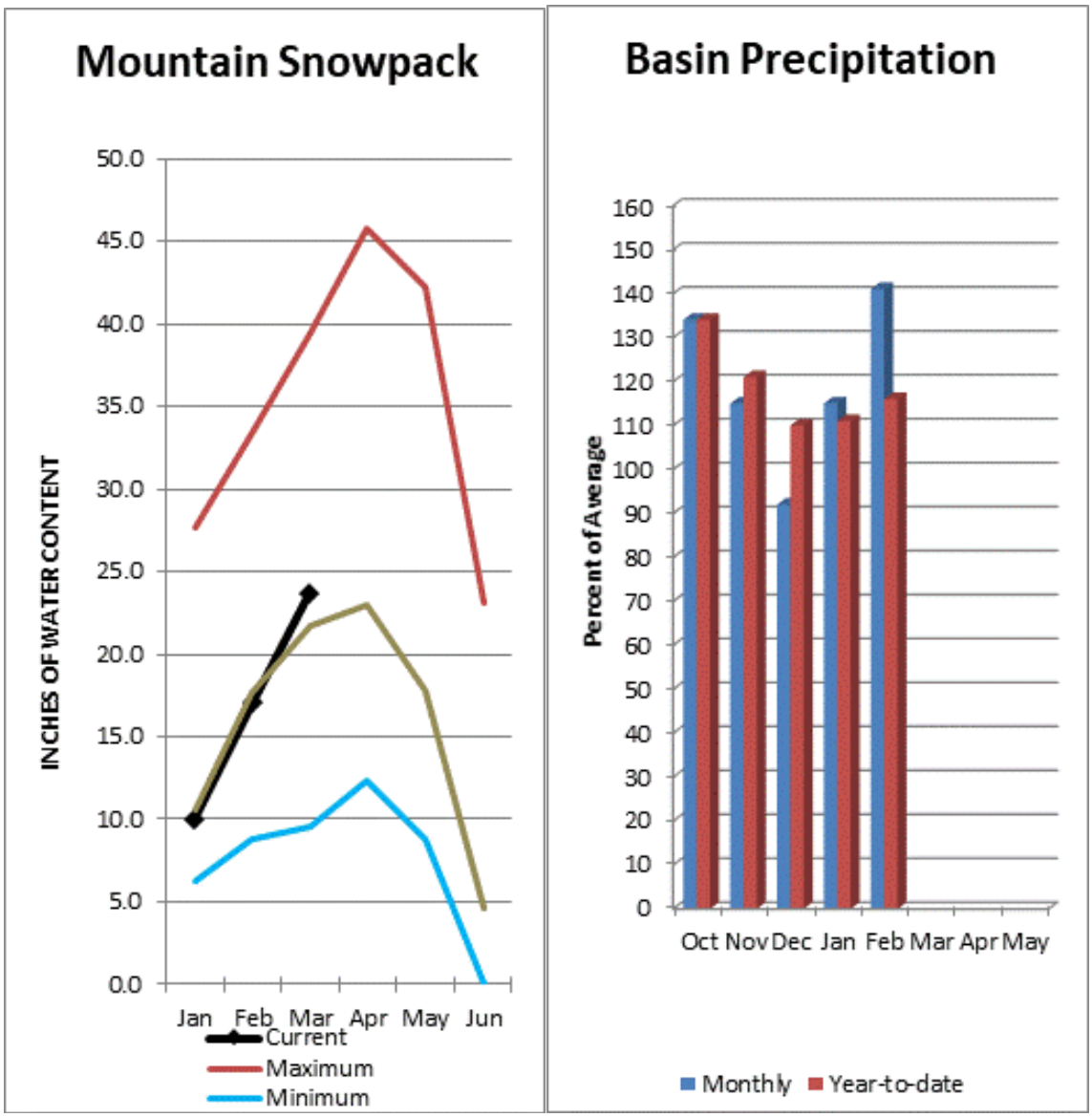
The South Continental Committee will compile a full agenda of oral and poster papers. In addition, a Monday short course is being planned which will focus on communicating scientific information and building narratives to effectively reach broad audiences. On Thursday a technical tour is planned of historic and hydrologic points of interest in the lower Rio Grande Valley, including the first stream gaging station installed in the United States.

The conference will be held at the beautiful Crowne Plaza Albuquerque located at the historic and cultural crossroads of El Camino Real and Route 66. Nearby attractions include historic Old Town, Petroglyph National Monument, the Indian Pueblo Cultural Center, Sandia Peak Tramway, ABQ BioPark, many brew pubs and museums. The Hotel will honor government per diem rate for our conference.

On-line registration, draft agenda and other information is available on the conference web site: http://www.westernsnowconference.org/

Also find Western Snow Conference on Facebook and Twitter.

Spokane River Basin



The March 1 forecasts for summer runoff within the Spokane River Basin are 116% of average near Post Falls and 117% at Long Lake. The Chamokane River near Long Lake forecasted to have 111% of average flows for the May-August period. The forecast is based on a basin snowpack that is 96% of normal and precipitation that is 116% of average for the water year. Precipitation for February was above normal at 141% of average. Streamflow on the Spokane River at Spokane was 180% of average for February. March 1 storage in Coeur d'Alene Lake was 109,000-acre feet, 82% of average and 46% of capacity. Snowpack at Quartz Peak SNOTEL site was 98% of average with 19.1 inches of water content. Average temperatures in the Spokane basin were slightly cooler than normal for February but averaged near normal for the water year.

For more information contact your local Natural Resources Conservation Service office.

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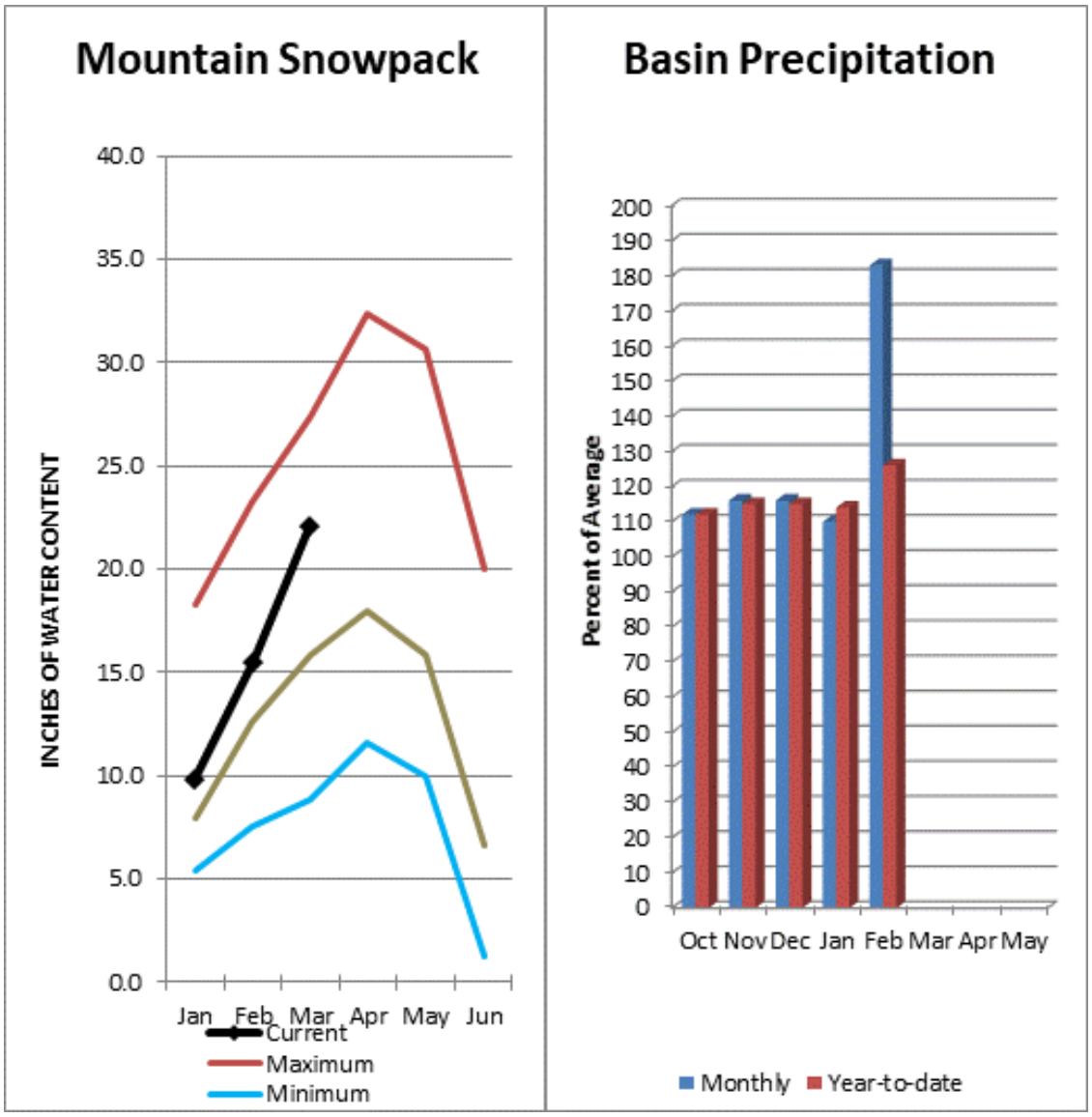
Spokane
Streamflow Forecasts - March 1, 2018

Spokane	Forecast Period	Forecast Exceedance Probabilities for Risk Assessment: Chance that actual volume will exceed forecast — 90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Spokane R nr Post Falls[2]								
	APR-JUL	2060	2480	2760	115%	3040	3460	2390
	APR-SEP	2170	2590	2870	116%	3160	3580	2480
Spokane R at Long Lake[2]								
	APR-JUL	2320	2770	3080	118%	3390	3840	2620
	APR-SEP	2550	3010	3330	117%	3640	4100	2850
Chamokane Ck nr Long Lake								
	MAY-AUG	5.1	8.2	10.3	111%	12.3	15.4	9.3

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

Reservoir Storage End of February, 2018	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Lake Coeur d' Alene	109.2	202.3	132.8	238.5
Basin-wide Total	109.2	202.3	132.8	238.5
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis March 1, 2018	# of Sites	% Median	Last Year % Median
Spokane	11	109%	90%
Newman Lake	3	96%	95%



The April – September average forecast for the Priest River near the town of Priest River is 108% and the Pend Oreille at Box canyon is 134%. February streamflow was 151% of average on the Pend Oreille River and 106% on the Columbia at Birchbank. March 1 snow cover was 140% of normal in the Pend Oreille Basin River Basin. Bunchgrass Meadows SNOTEL site had 25.9 inches of snow water on the snow pillow. Normally Bunchgrass would have 22.5 inches on March 1. Precipitation during February was 184% of average, bringing the year-to-date precipitation to 126% of average. Reservoir storage in the basin, including Lake Pend Oreille and Priest Lake was 84% of normal. Average temperatures were cooler normal for February and near normal for the water year.

For more information contact your local Natural Resources Conservation Service office.

Pend Oreille River Basins

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Pend Oreille Basins
Streamflow Forecasts - March 1, 2018

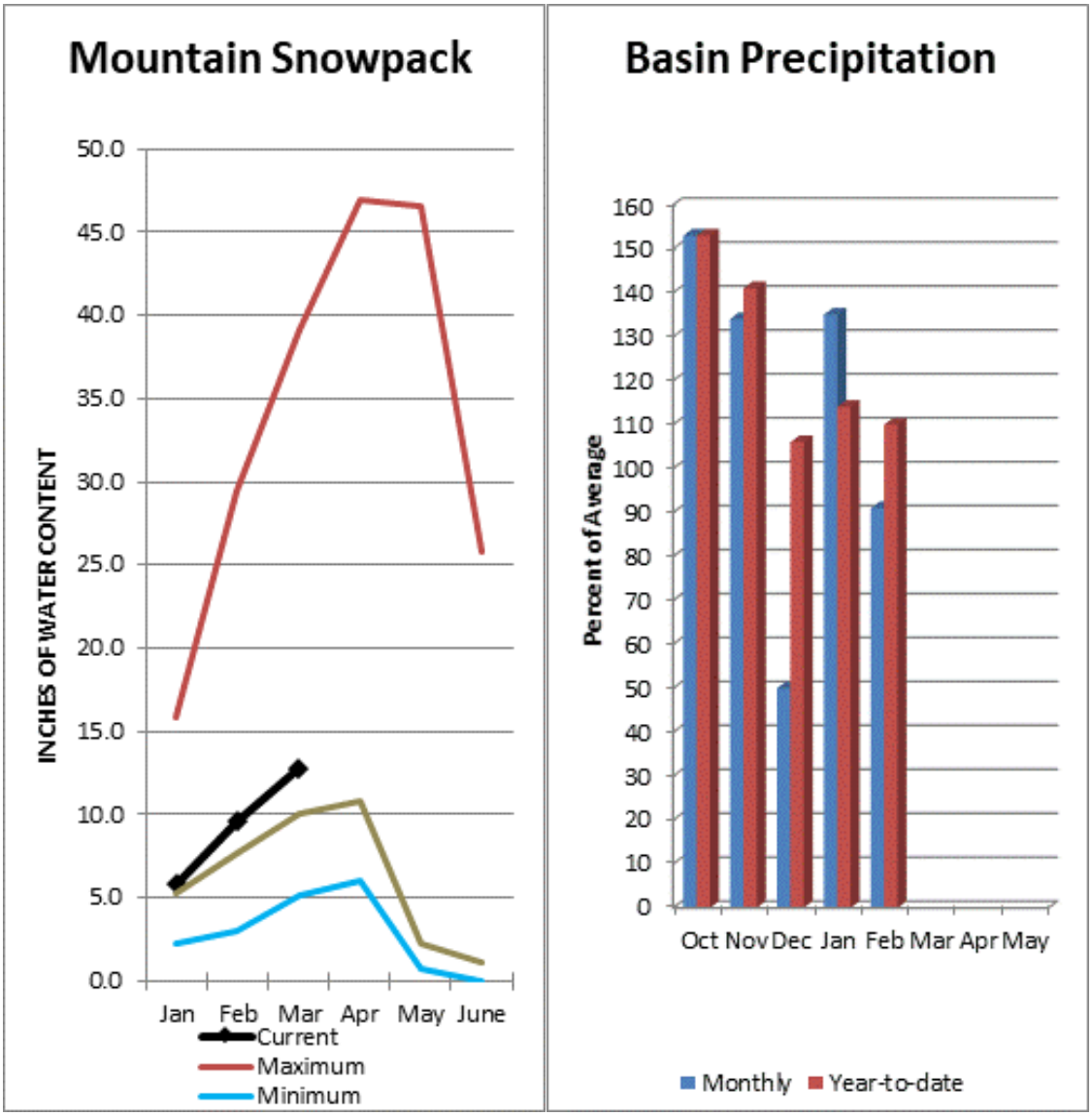
Pend Oreille Basins	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
		Forecast Exceedance Probabilities for Risk Assessment Chance that actual volume will exceed forecast						
Pend Oreille Lake Inflow[2]								
	APR-JUL	13800	15000	15900	135%	16700	17900	11800
	APR-SEP	15000	16300	17200	134%	18100	19500	12800
Priest R nr Priest River[2]								
	APR-JUL	705	790	850	109%	905	990	780
	APR-SEP	745	840	900	108%	965	1060	830
Pend Oreille R bl Box Canyon[2]								
	APR-JUL	14000	15300	16100	135%	16900	18200	11900
	APR-SEP	15100	16500	17400	134%	18400	19700	13000

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, 2018	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Lake Pend Oreille	668.3	700.0	792.6	1561.3
Priest Lake	49.4	61.3	57.1	119.3
Basin-wide Total	717.7	761.2	849.7	1680.6
# of reservoirs	2	2	2	2

Watershed Snowpack Analysis March 1, 2018	# of Sites	% Median	Last Year % Median
Pend Oreille Basins	72	140%	96%
Colville River	2	105%	84%
Kettle River	4	132%	82%

Upper Columbia River Basins



Summer runoff average forecast for the Okanogan River is 136%, Similkameen River is 141%, and Methow River is 124%. March 1 snow cover on the Okanogan was 141% of normal, Omak Creek was 109% and the Methow was 131%. February precipitation in the Upper Columbia was 104% of average, with precipitation for the water year at 113% of average. February streamflow for the Methow River was 182% of average, 152% for the Okanogan River and 177% for the Similkameen. Snow-water content at Salmon Meadows SNOTEL was 9.3 inches or 114% of normal for March 1. Combined storage in the Conconully Reservoirs was 17,000 acre-feet or 116% of normal. Temperatures were below normal for February and for the water year.

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Upper Columbia Basins
Streamflow Forecasts - March 1, 2018

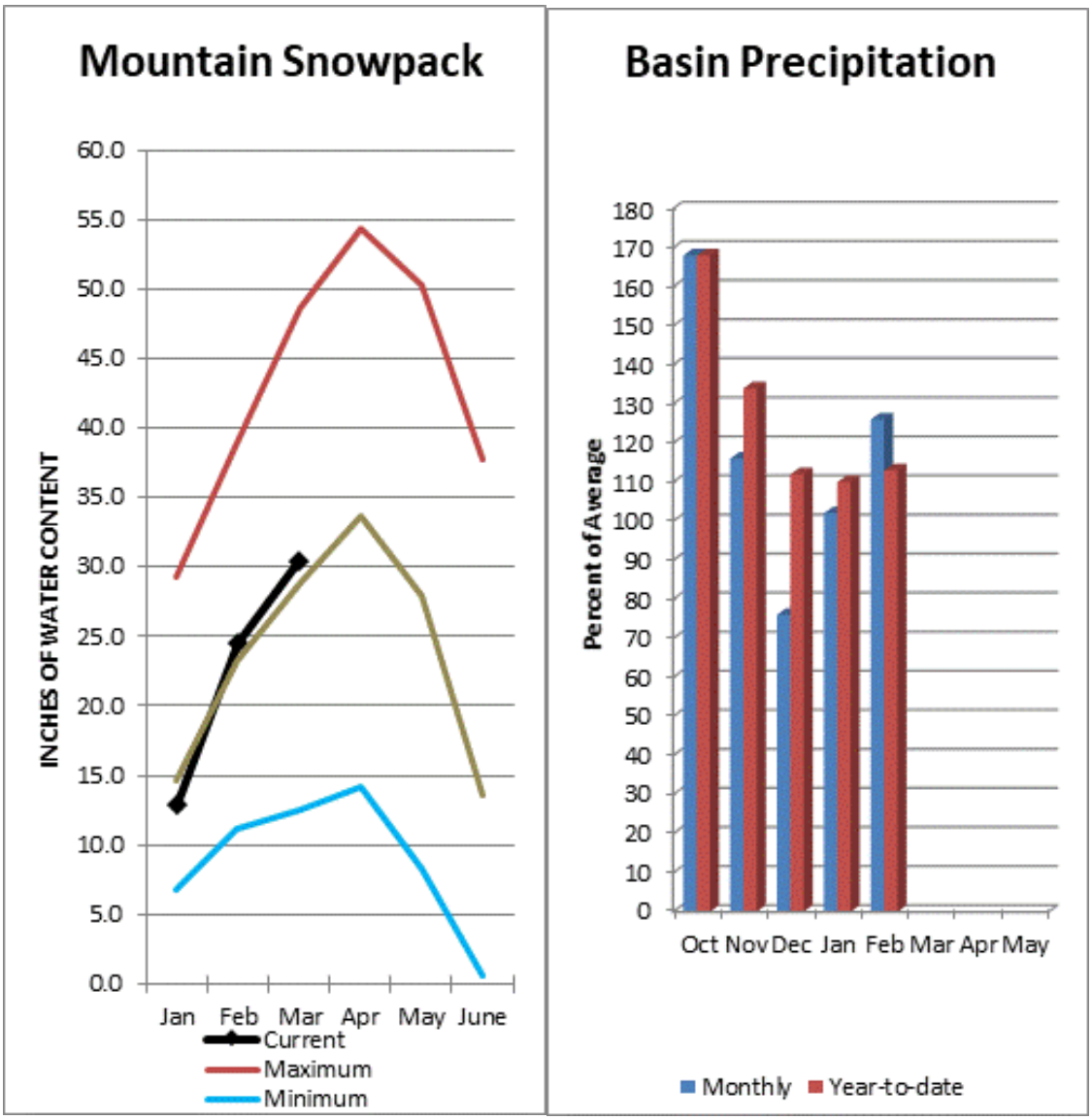
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

Upper Columbia Basins	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Kettle R nr Laurier								
	APR-JUL	2080	2280	2410	134%	2550	2750	1800
	APR-SEP	2180	2390	2530	135%	2670	2880	1880
Colville R at Kettle Falls								
	APR-JUL	48	88	115	97%	142	182	119
	APR-SEP	52	95	125	95%	155	198	131
Columbia R at Grand Coulee-NWS[2]								
	APR-JUL	54100		59200	116%		65900	51000
	APR-SEP	63800		70100	117%		77500	60100
Similkameen R nr Nighthawk								
	APR-JUL	1440	1590	1700	142%	1810	1960	1200
	APR-SEP	1510	1680	1800	141%	1920	2090	1280
Okanogan R nr Tonasket								
	APR-JUL	1510	1770	1950	132%	2130	2390	1480
	APR-SEP	1800	2100	2300	139%	2500	2800	1650
Okanogan R at Malott								
	APR-JUL	1540	1810	1990	137%	2170	2440	1450
	APR-SEP	1690	1990	2200	136%	2410	2710	1620
Methow R nr Pateros								
	APR-JUL	810	945	1040	125%	1130	1270	835
	APR-SEP	870	1020	1110	124%	1210	1360	895

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, 2018	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Conconully Lake (Salmon Lake Dam)	7.8	8.6	7.3	10.5
Conconully Reservoir	9.2	10.6	7.4	13.0
Basin-wide Total	17.0	19.2	14.7	23.5
# of reservoirs	2	2	2	2

Watershed Snowpack Analysis March 1, 2018	# of Sites	% Median	Last Year % Median
Upper Columbia Basins	13	127%	96%
Okanogan River	7	141%	98%
Omak Creek	3	109%	118%
Sanpoil River	0		
Similkameen River	4	128%	81%
Toats Coulee Creek	0		
Conconully Lake	1	114%	101%
Methow River	4	131%	99%



Precipitation during February was 126% of average in the basin and 113% for the year-to-date. Runoff for Entiat River is forecast to be 95% of average for the summer. The April-September average forecast for Chelan River is 104%, Wenatchee River at Plain is 105%, Stehekin River is 108% and Icicle Creek is 105%. February average streamflow on the Chelan River was 196% and on the Wenatchee River 177%. March 1 snowpack in the Wenatchee River Basin was 105% of normal; the Chelan, 111%; the Entiat, 90%; Stemilt Creek, 82% and Colockum Creek, 124%. Reservoir storage in Lake Chelan was not available. Lyman Lake SNOTEL had the most snow water with 51.4 inches of water. This site would normally have 48.6 inches on March 1. Temperatures were slightly below normal for February and near normal for the water year. Snow Surveyors from Chelan PUD were finally able to make a helicopter flight into the basin to personally check on conditions and found all sites to be properly functional.

For more information contact your local Natural Resources Conservation Service office.

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Central Columbia Basins
Streamflow Forecasts - March 1, 2018

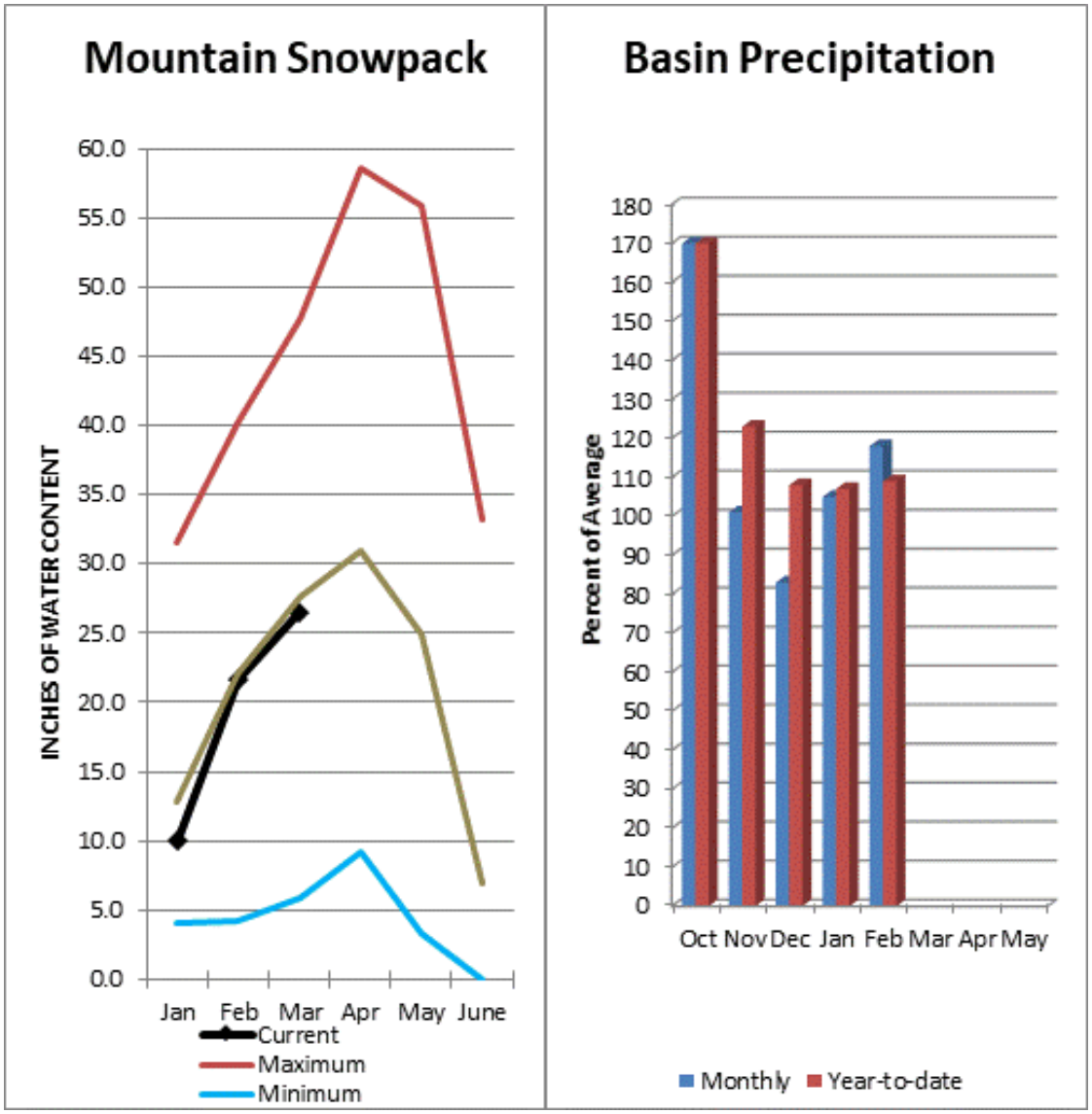
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

Central Columbia Basins	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Stehekin R at Stehekin								
	APR-JUL	610	685	735	108%	785	860	680
	APR-SEP	710	795	850	108%	905	990	790
Chelan R at Chelan								
	APR-JUL	860	970	1040	104%	1110	1220	1000
	APR-SEP	955	1080	1160	104%	1250	1370	1120
Entiat R nr Ardenvoir								
	APR-JUL	151	177	194	97%	210	240	200
	APR-SEP	163	191	210	95%	230	260	220
Wenatchee R at Plain								
	APR-JUL	835	955	1040	105%	1120	1240	990
	APR-SEP	905	1040	1130	105%	1230	1360	1080
Icicle Ck nr Leavenworth								
	APR-JUL	225	265	290	105%	315	350	275
	APR-SEP	245	285	315	105%	340	385	300
Wenatchee R at Peshastin								
	APR-JUL	1170	1320	1430	104%	1530	1680	1370
	APR-SEP	1260	1440	1560	105%	1670	1850	1490
Columbia R bl Rock Island Dam-NWS[2]								
	APR-JUL	59600		64900	116%		72600	55800
	APR-SEP	69400		76500	117%		84100	65200

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, 2018	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Lake Chelan			279.8	676.1
Basin-wide Total			0.0	0.0
# of reservoirs	0	0	0	0

Watershed Snowpack Analysis March 1, 2018	# of Sites	% Median	Last Year % Median
Central Columbia Basins	3	111%	92%
Chelan Lake Basin	3	111%	92%
Entiat River	1	90%	90%
Wenatchee River	7	105%	93%
Stemilt Creek	1	82%	102%
Colockum Creek	1	124%	152%



March 1 reservoir storage for the Upper Yakima reservoirs was 595,000-acre feet, 132% of average. Forecasts for the Yakima River at Cle Elum are 102% of average and the Teanaway River near Cle Elum is at 107%. Lake inflows are all forecasted to be near average this summer as well. February streamflow within the basin was Cle Elum River near Roslyn at 170%. March 1 snowpack was 96% based upon 8 snow course and SNOTEL readings within the Upper Yakima Basin. Precipitation was 128% of average for February and 111% for the water-year. Volume forecasts for the Yakima Basin are for natural flow. As such, they may differ from the U.S. Bureau of Reclamation's forecast for the total water supply available, which includes irrigation return flow.

****Due to the devastating fire within the Teanaway and Cle Elum rivers this past summer, streamflow forecasts and thus runoff rates may be greatly affected come spring and summer. Sasse Ridge SNOTEL site was burned through but not lost to the fire. Area hydrology will be adversely changed for quite some time.**

For more information contact your local Natural Resources Conservation Service office.

Upper Yakima River Basin

Data Current as of: 3/6/2018 9:57:51 AM

Upper Yakima River
Streamflow Forecasts - March 1, 2018

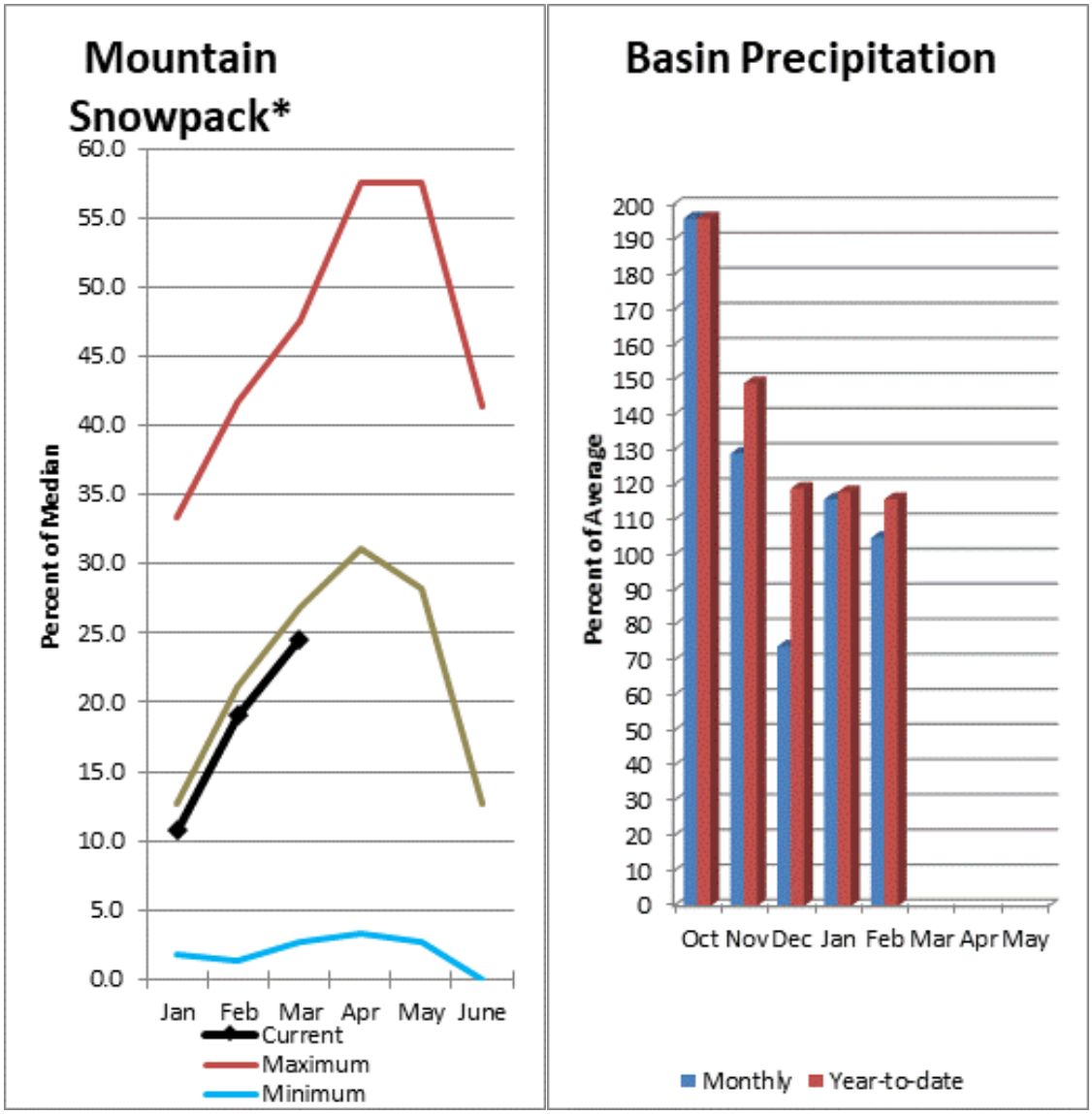
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

Upper Yakima River	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Keechelus Reservoir Inflow[2]								
	APR-JUL	89	109	123	106%	137	157	116
	APR-SEP	98	119	134	106%	149	170	126
Kachess Reservoir Inflow [2]								
	APR-JUL	82	98	110	106%	121	137	104
	APR-SEP	89	106	118	104%	130	147	113
Cle Elum Lake Inflow [2]								
	APR-JUL	320	370	400	104%	430	480	385
	APR-SEP	350	400	435	105%	470	520	415
Yakima R at Cle Elum [2]								
	APR-JUL	570	690	775	103%	860	980	755
	APR-SEP	625	760	850	102%	940	1070	830
Teanaway R bl Forks nr Cle Elum								
	APR-JUL	95	121	139	107%	157	183	130
	APR-SEP	97	124	142	107%	160	187	133

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, 2018	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Keechelus	131.1	72.6	92.3	157.8
Kachess	185.9	127.7	143.6	239.0
Cle Elum	278.4	174.3	214.4	436.9
Basin-wide Total	595.4	374.7	450.3	833.7
# of reservoirs	3	3	3	3

Watershed Snowpack Analysis March 1, 2018	# of Sites	% Median	Last Year % Median
Upper Yakima River	8	96%	93%



February average streamflows within the basin were: Yakima River near Parker, 157% and the Naches River near Naches, 185%. March 1 reservoir storage for Bumping and Rimrock reservoirs was 197,000-acre feet, 144% of average. Forecast runoff averages for Yakima River near Parker are 103%; American River near Nile, 104%; Ahtanum Creek, 86%; and Klickitat River near Glenwood, 100%. March 1 snowpack was 91% based upon 6 snow course and SNOTEL readings within the Lower Yakima Basin and Ahtanum Creek reported in at 72% of normal. Precipitation was 105% of average for February and 116% for the water-year. Temperatures were near normal for February and slightly above normal for the water year. Volume forecasts for Yakima Basin are for natural flow. As such, they may differ from the U.S. Bureau of Reclamation's forecast for the total water supply available, which includes irrigation return flow. ****The Norse Peak fire consumed over 55,000 acres in Yakima and Pierce counties as well as destroying the Corral Pass SNOTEL site and threatening Crystal Mtn. Ski Area. Damages are still being assessed.**

For more information contact your local Natural Resources Conservation Service office.

Data Current as of: 3/6/2018 9:57:54 AM

Lower Yakima River
Streamflow Forecasts - March 1, 2018

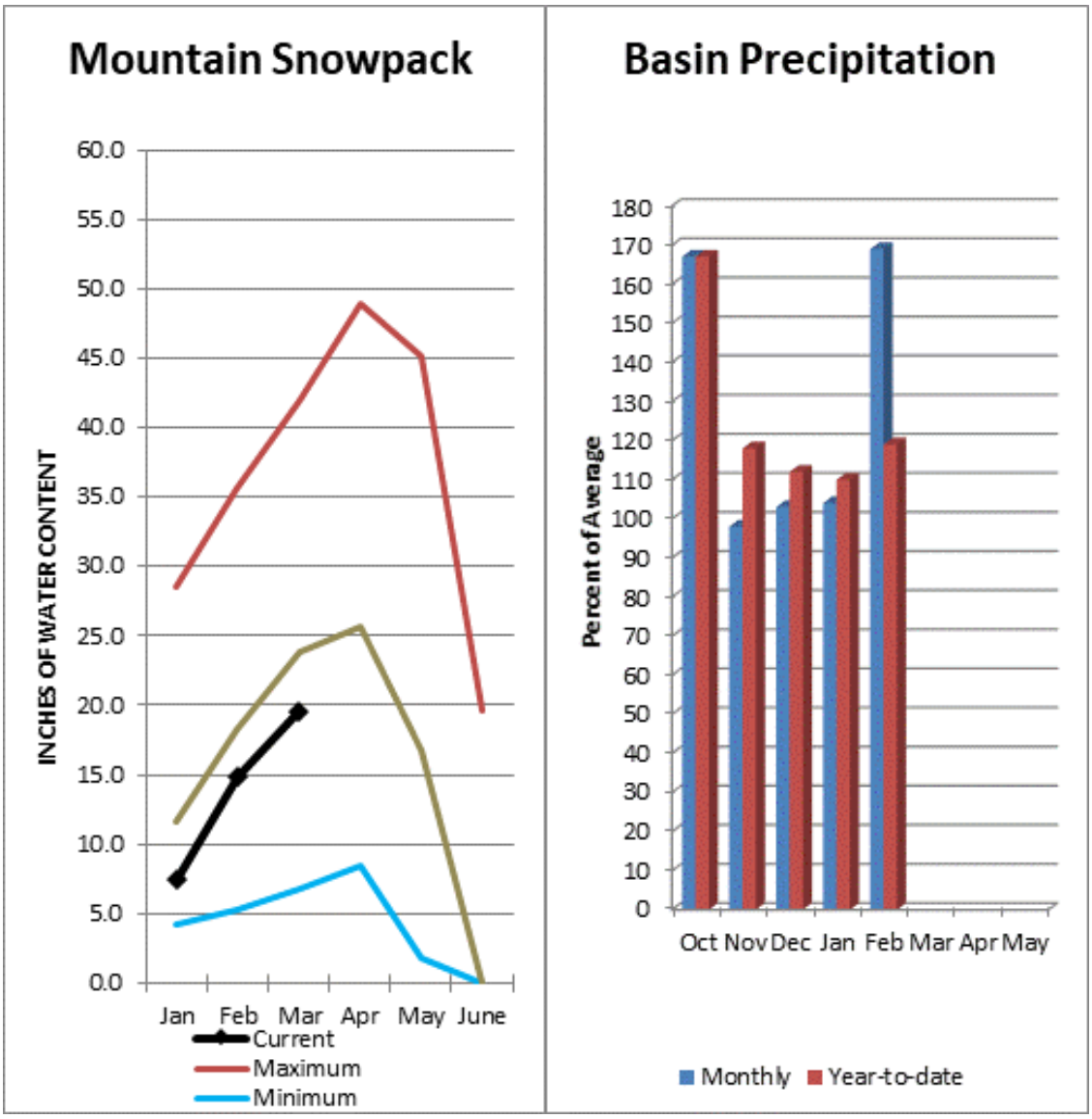
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

Lower Yakima River	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Bumping Lake Inflow [2]								
	APR-JUL	91	107	118	104%	128	144	114
	APR-SEP	99	116	128	104%	140	157	123
American R nr Nile								
	APR-JUL	83	97	106	104%	115	129	102
	APR-SEP	89	104	114	104%	125	140	110
Rimrock Lake Inflow [2]								
	APR-JUL	152	174	188	101%	205	225	187
	APR-SEP	179	205	225	102%	240	265	220
Naches R nr Naches								
	APR-JUL	530	655	735	105%	820	940	700
	APR-SEP	575	710	805	106%	895	1030	760
Ahtanum Ck at Union Gap								
	APR-JUL	9.2	17.6	23	85%	29	37	27
	APR-SEP	11	19.6	25	86%	31	40	29
Yakima R nr Parker [2]								
	APR-JUL	1240	1520	1710	103%	1900	2170	1660
	APR-SEP	1370	1670	1870	103%	2060	2360	1820
Klickitat R nr Glenwood								
	APR-JUL	91	112	126	100%	140	161	126
	APR-SEP	102	124	139	100%	154	176	139
Klickitat R nr Pitt								
	APR-JUL	335	405	450	103%	500	565	435
	APR-SEP	415	490	545	105%	595	675	520

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, 2018	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Bumping Lake	18.8	15.8	13.3	33.7
Rimrock	177.9	147.6	123.3	198.0
Basin-wide Total	196.7	163.4	136.6	231.7
# of reservoirs	2	2	2	2

Watershed Snowpack Analysis March 1, 2018	# of Sites	% Median	Last Year % Median
Lower Yakima River	6	91%	101%
Ahtanum Creek	2	72%	110%



February precipitation was 169% of average, maintaining the year-to-date precipitation at 119% of average. Snowpack in the basin remained low at 82% of normal. Streamflow forecasts are 100% of average for Mill Creek and 105% for the SF Walla Walla near Milton-Freewater. Average temperatures were below normal for February but averaged closer to normal for the water year.

For more information contact your local Natural Resources Conservation Service office.

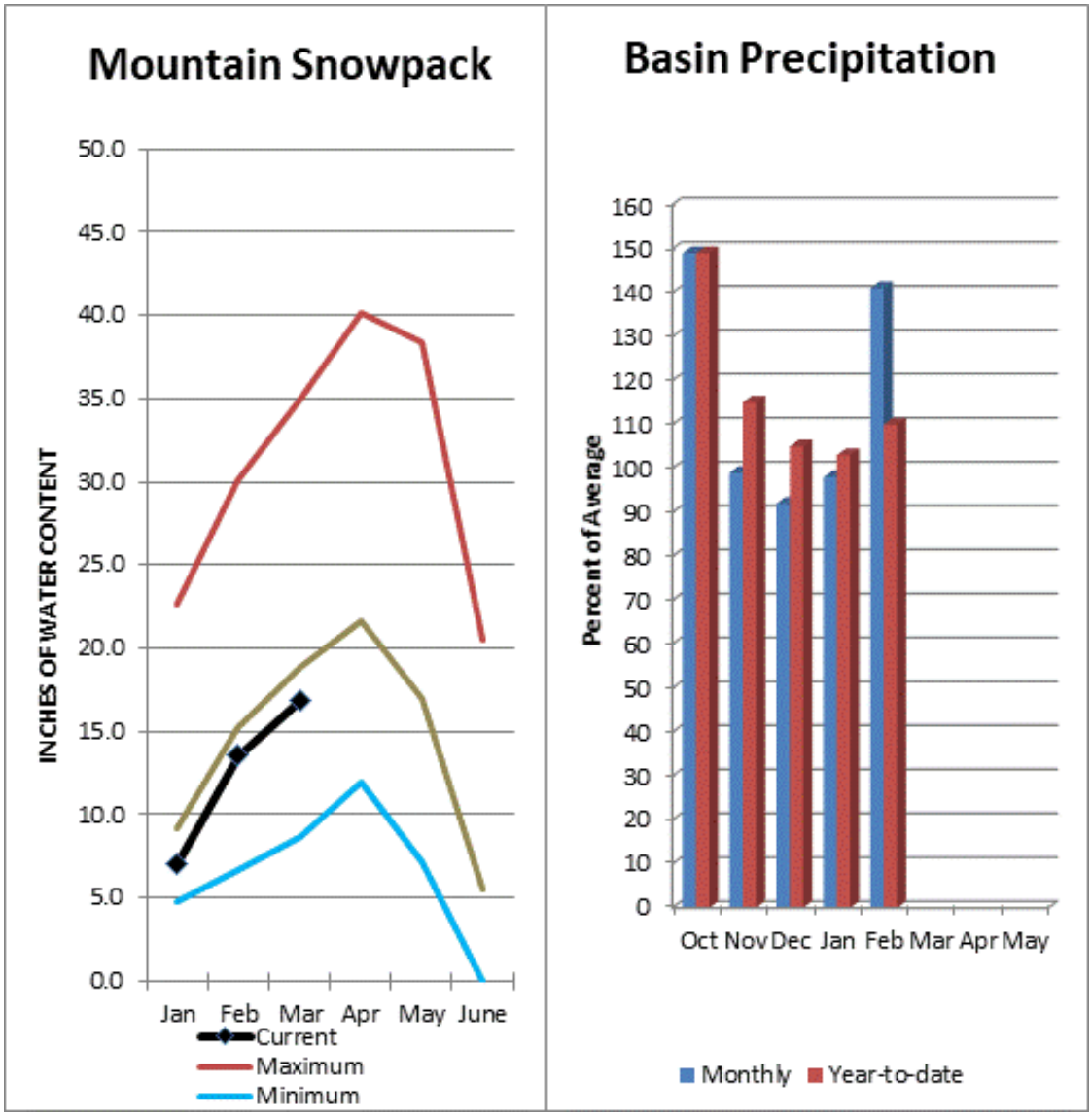
Data Current as of: 3/6/2018 9:57:58 AM

Walla Walla River
Streamflow Forecasts - March 1, 2018

		Forecast Exceedance Probabilities for Risk Assessment Chance that actual volume will exceed forecast						
Walla Walla River	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
SF Walla Walla R nr Milton-Freewater								
	MAR-JUL	57	65	71	104%	77	86	68
	APR-SEP	54	63	69	105%	75	84	66
Mill Ck nr Walla Walla								
	APR-JUL	16.8	21	24	100%	27	31	24
	APR-SEP	19.9	24	27	100%	30	34	27

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

Watershed Snowpack Analysis March 1, 2018	# of Sites	% Median	Last Year % Median
Walla Walla River	2	82%	122%



The Grande Ronde River can expect summer flows to be about 92% of normal. The forecast for Asotin Creek at Asotin predicts 100% of average flows for the April – July runoff period. February precipitation was 141% of average, bringing the year-to-date precipitation to 110% of average. March 1 snowpack readings averaged 89% of normal. February streamflow was 128% of average for Snake River below Lower Granite Dam and 149% for Grande Ronde River near Troy. Dworshak Reservoir storage was 88% of average. Average temperatures were slightly below normal for February but closer to normal for the water year.

For more information contact your local Natural Resources Conservation Service office.

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Lower Snake, Grande Ronde, Clearwater Basins
Streamflow Forecasts - March 1, 2018

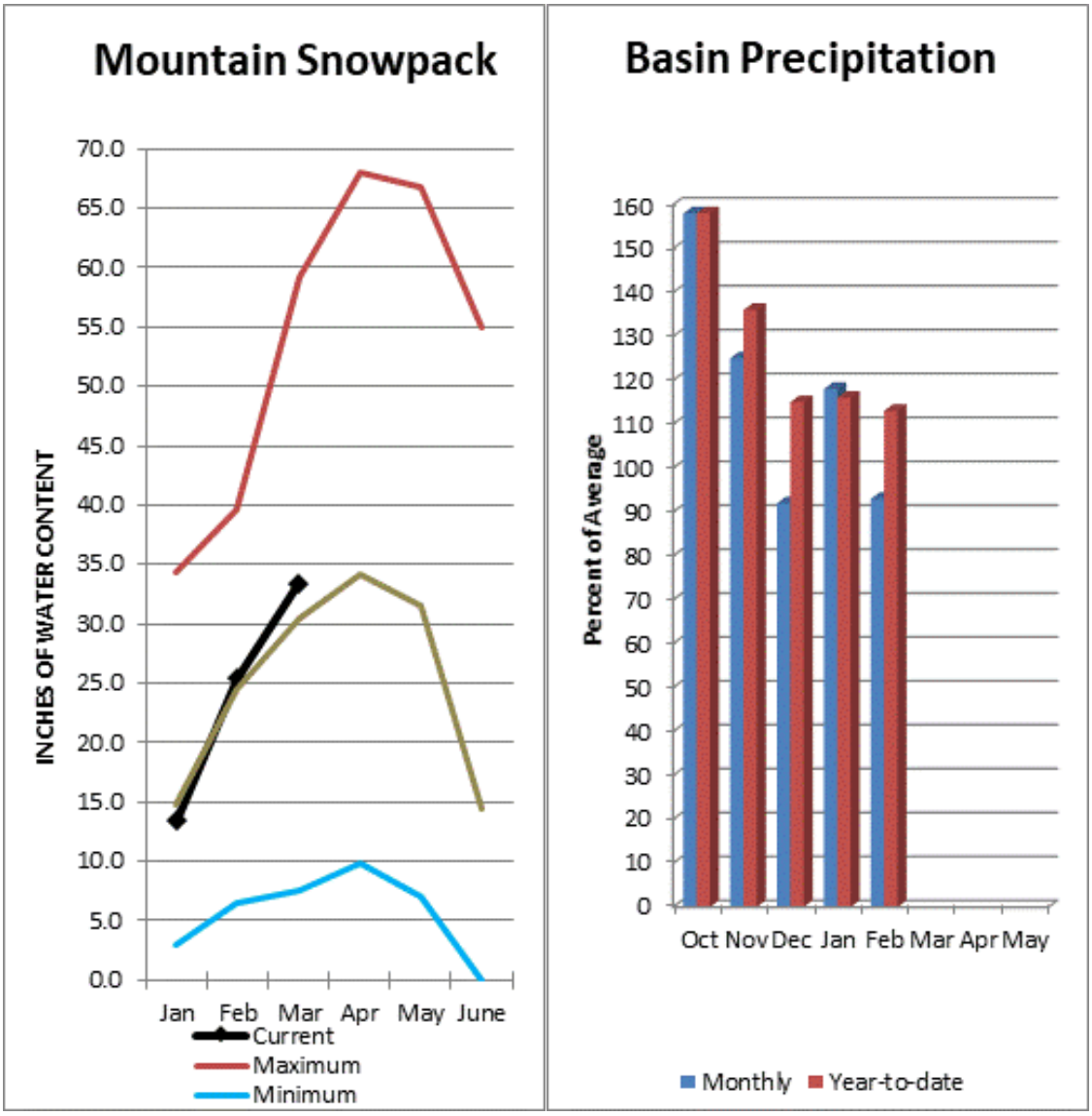
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

Lower Snake, Grande Ronde, Clearwater Basins	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Grande Ronde R at Troy								
	MAR-JUL	970	1220	1390	92%	1550	1800	1510
	APR-SEP	780	1030	1200	92%	1370	1620	1310
Asotin Ck at Asotin								
	APR-JUL	21	29	35	100%	41	50	35
Clearwater R at Spalding[2]								
	APR-JUL	7330	8260	8890	129%	9520	10400	6890
	APR-SEP	7700	8660	9310	128%	9970	10900	7270
Snake R bl Lower Granite Dam-NWS[2]								
	APR-JUL	18000		22200	112%		27100	19800
	APR-SEP	20300		24700	111%		30000	22300

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, 2018	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Dworshak Reservoir	2065.1	2286.0	2358.0	3468.0
Basin-wide Total	2065.1	2286.0	2358.0	3468.0
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis March 1, 2018	# of Sites	% Median	Last Year % Median
Lower Snake, Grande Ronde, Clearwater Basins	14	89%	106%



Forecasts for April – September streamflows within the basin are Lewis River at Ariel, 96% and Cowlitz River at Castle Rock, 107% of average. The Columbia at The Dalles is forecasted to have 113% of average flows this summer according to the River Forecast Center. February average streamflow for Cowlitz River was 127% and the Columbia River at The Dalles was 123% of average. February precipitation was 108% of average and the water-year average was 115%. March 1 snow cover for Cowlitz River was 111%, and Lewis River was 109% of normal. Temperatures were below normal during February but near average for the water year.

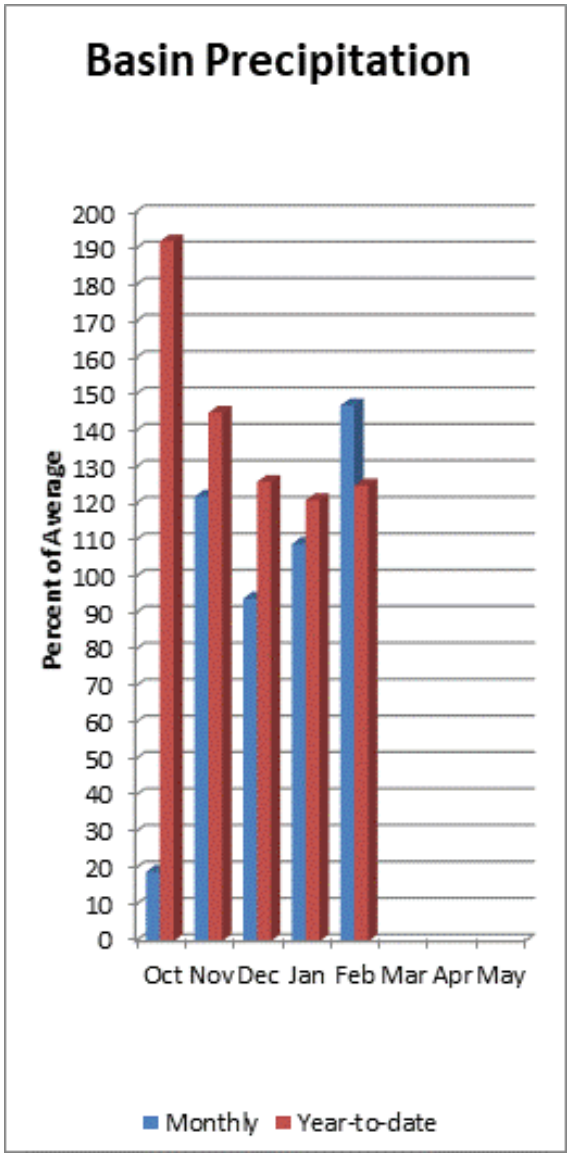
Data Current as of: 3/6/2018 9:58:05 AM

Lower Columbia Basins
Streamflow Forecasts - March 1, 2018

		Forecast Exceedance Probabilities for Risk Assessment Chance that actual volume will exceed forecast						
Lower Columbia Basins	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Columbia R at The Dalles-NWS[2]								
	APR-JUL	81400		90200	113%		101000	79900
	APR-SEP	95000		105000	113%		116000	92700
Klickitat R nr Glenwood								
	APR-JUL	91	112	126	100%	140	161	126
	APR-SEP	102	124	139	100%	154	176	139
Klickitat R nr Pitt								
	APR-JUL	335	405	450	103%	500	565	435
	APR-SEP	415	490	545	105%	595	675	520
Lewis R at Ariel[2]								
	APR-JUL	675	840	955	98%	1070	1230	970
	APR-SEP	770	945	1070	96%	1180	1360	1120
Cowlitz R bl Mayfiled[2]								
	APR-JUL	1270	1520	1690	104%	1860	2110	1620
	APR-SEP	1500	1800	2010	109%	2210	2510	1840
Cowlitz R at Castle Rock[2]								
	APR-JUL	1850	2130	2320	104%	2510	2790	2230
	APR-SEP	2170	2480	2690	107%	2900	3200	2520

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

Watershed Snowpack Analysis March 1, 2018	# of Sites	% Median	Last Year % Median
Lower Columbia Basins	11	110%	128%
Lewis River	5	109%	144%
Cowlitz River	6	111%	111%



Summer runoff is forecast to be 90% of normal for the Green River below Howard Hanson Dam and 107% for the White River near Buckley. March 1 snowpack was 110% of average for the White River, 111% for Puyallup River and 80% in the Green River Basin. February precipitation was 151% of average, bringing the water year-to-date to 126% of average for the basins. Average temperatures in the area were below normal for February and near normal for the water-year.

For more information contact your local Natural Resources Conservation Service office.

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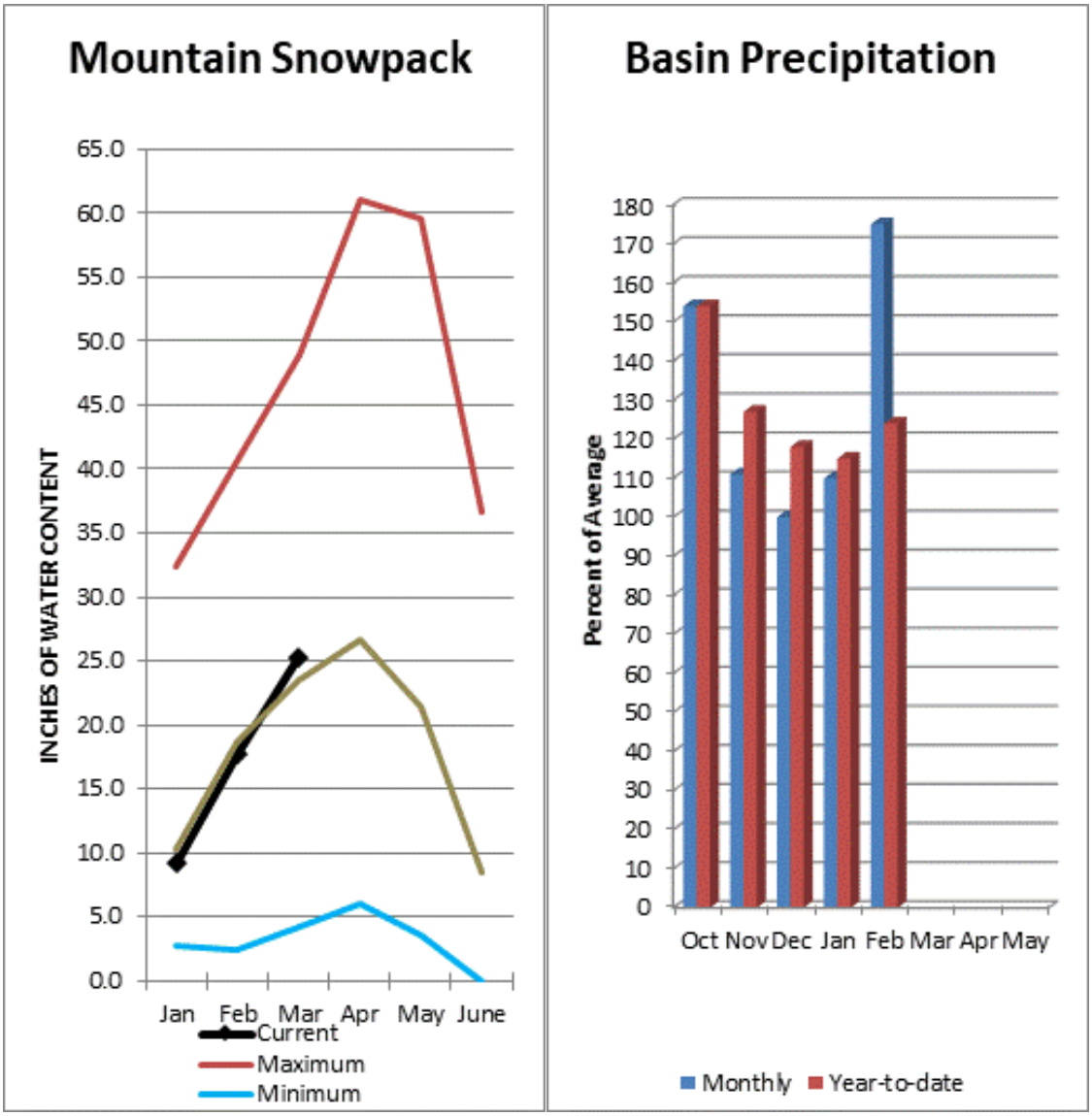
South Puget Sound Basins
Streamflow Forecasts - March 1, 2018

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

South Puget Sound Basins	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
White R nr Buckley[1,2]								
	APR-JUL	350	425	460	107%	495	575	430
	APR-SEP	420	510	550	107%	590	680	515
Green R bl Howard A Hanson Dam[1,2]								
	APR-JUL	115	182	215	91%	245	310	235
	APR-SEP	135	205	235	90%	265	335	260

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

Watershed Snowpack Analysis March 1, 2018	# of Sites	% Median	Last Year % Median
South Puget Sound Basins	8	101%	100%
White River	2	110%	98%
Green River	2	80%	96%



Forecast for spring and summer flows are: 105% for Cedar River near Cedar Falls; 107% for Rex River; 124% for South Fork of the Tolt River; and 100% for Taylor Creek near Selleck. Basin-wide precipitation for February was 182% of average, bringing water-year-to-date to 125% of average. March 1 median snow cover in Cedar River Basin was 101%, Tolt River Basin was 118%, Snoqualmie River Basin was 108%, and Skykomish River Basin was 119%. Temperatures were below normal for February and near normal for the water-year.

For more information contact your local Natural Resources Conservation Service office.

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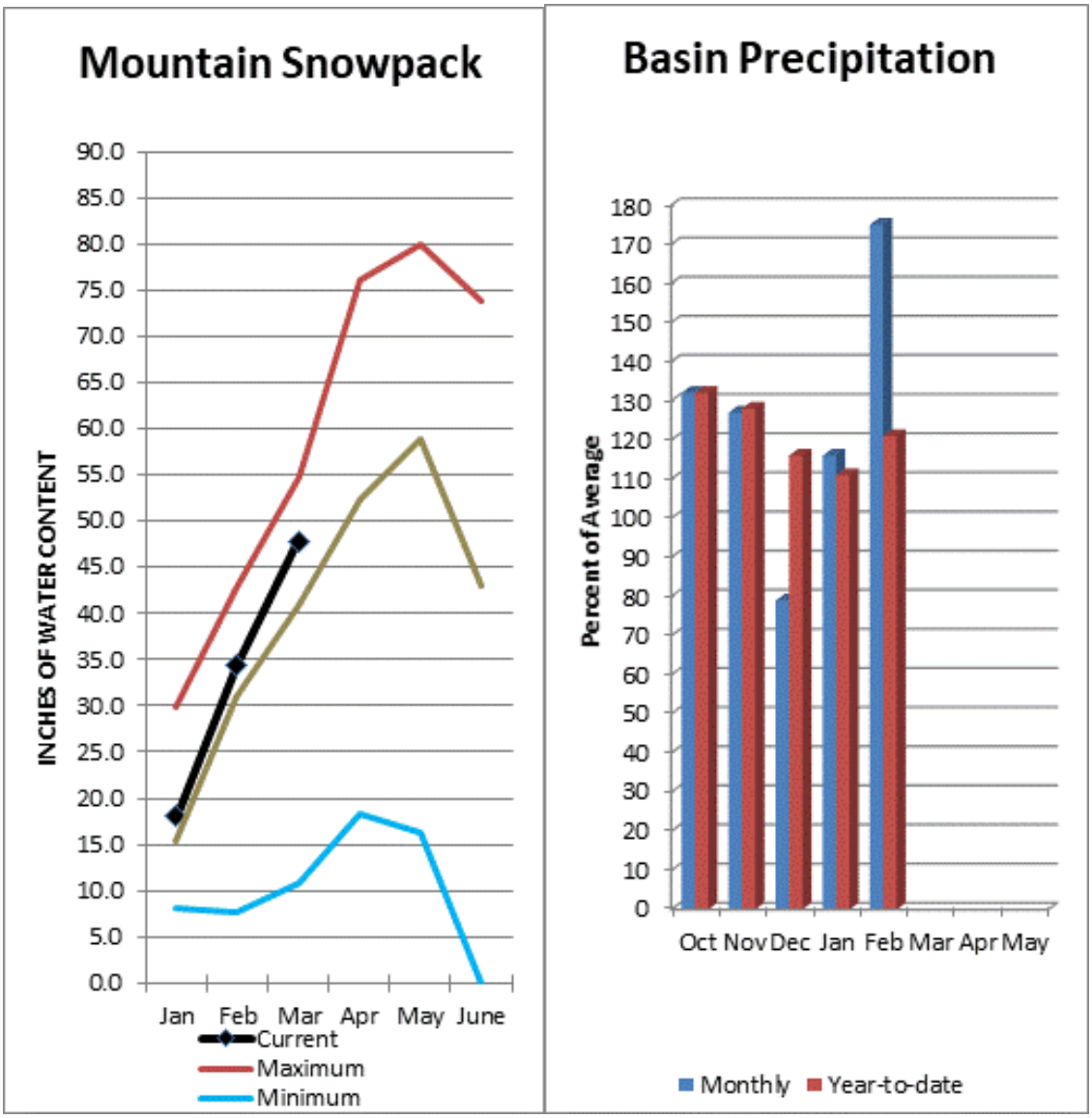
Central Puget Sound Basins
Streamflow Forecasts - March 1, 2018

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

Central Puget Sound Basins	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Cedar R nr Cedar Falls								
	APR-JUL	56	66	73	104%	80	90	70
	APR-SEP	62	72	80	105%	87	97	76
Rex R nr Cedar Falls								
	APR-JUL	18.1	23	26	108%	29	34	24
	APR-SEP	20	25	29	107%	32	37	27
Taylor Ck nr Selleck								
	APR-JUL	15.4	18.4	20	100%	22	25	20
	APR-SEP	18.7	22	24	100%	26	30	24
SF Tolt R nr Index								
	APR-JUL	14.3	16.6	18.2	128%	19.8	22	14.2
	APR-SEP	15.9	18.5	20	124%	22	25	16.1

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

Watershed Snowpack Analysis March 1, 2018	# of Sites	% Median	Last Year % Median
Central Puget Sound Basins	15	107%	111%
Puyallup River	4	111%	105%
Cedar River	6	101%	121%
Tolt River	3	118%	121%
Snoqualimie River	5	108%	108%
Skykomish River	3	119%	107%



Forecast for Skagit River streamflow at Newhalem is 110% of average for the spring and summer period. February streamflow in Skagit River was 154% of average. Other forecast points included Baker River at 94% and Thunder Creek at 102% of average. Basin-wide precipitation for February was 183% of average, bringing water-year-to-date to 122% of average. March 1 average snow cover in Skagit River Basin was 118% and the Nooksack River Basin was 115%. March 1 Skagit River reservoir storage was 43% of average and 26% of capacity as Seattle City Light prepares for spring Steelhead Shaping, where river flows are closely regulated to support spawning season. Average temperatures were much cooler than normal for February and slightly below average for the water year.

For more information contact your local Natural Resources Conservation Service office.

Data Current as of: 3/6/2018 9:58:15 AM

North Puget Sound Basins
Streamflow Forecasts - March 1, 2018

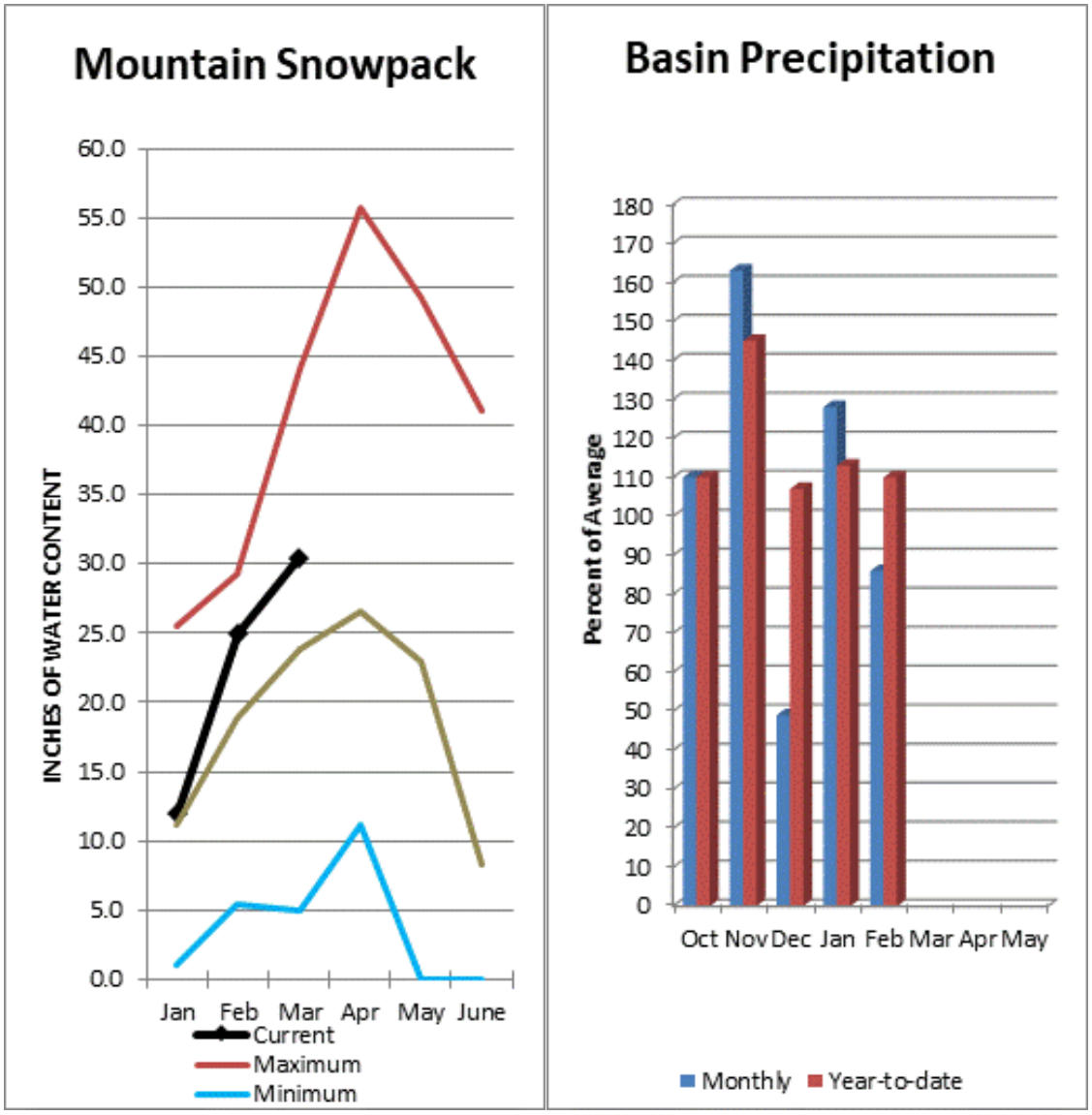
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

North Puget Sound Basins	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Thunder Ck nr Newhalem								
	APR-JUL	205	225	240	102%	255	275	235
	APR-SEP	295	320	335	102%	350	375	330
Skagit R at Newhalem[2]								
	APR-JUL	1650	1800	1900	113%	2000	2150	1680
	APR-SEP	1960	2130	2240	110%	2350	2520	2030
Baker R at Concrete								
	APR-JUL	600	690	755	97%	820	915	780
	APR-SEP	710	840	925	94%	1010	1140	980

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, 2018	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Ross	358.8	462.6	832.4	1404.1
Diablo Reservoir		85.1	86.2	90.6
Basin-wide Total	358.8	462.6	832.4	1404.1
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis March 1, 2018	# of Sites	% Median	Last Year % Median
North Puget Sound Basins	16	117%	93%
Skagit River	13	118%	94%
Baker River	0		
Nooksack River	3	115%	88%



Forecasted average runoff for streamflow for the Dungeness River is 104% and Elwha River is 105% February runoff in the Dungeness River was 121% of normal. Big Quilcene and Wynoochee rivers may expect near average runoff this summer as well. February precipitation was 86% of average. Precipitation has accumulated at 110% of average for the water year. February precipitation at Quillayute was 109% of normal. Olympic Peninsula snowpack averaged 128% of normal on March 1. Temperatures were below average for February and near normal for the water year.

For more information contact your local Natural Resources Conservation Service office.

Data Current as of: 3/6/2018 9:58:19 AM

Olympic Penninsula
Streamflow Forecasts - March 1, 2018

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

Olympic Penninsula	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Dungeness R nr Sequim								
	APR-JUL	102	115	124	103%	133	146	120
	APR-SEP	123	139	151	104%	162	179	145
Elwha R at McDonald Br nr Port Angeles								
	APR-JUL	350	395	420	105%	450	495	400
	APR-SEP	405	460	495	105%	530	585	470

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

Watershed Snowpack Analysis March 1, 2018	# of Sites	% Median	Last Year % Median
Olympic Penninsula	6	128%	112%

Issued by

Jason Weller
Chief
Natural Resources Conservation Service
U.S. Department of Agriculture

Released by

Roylene Rides At The Door
State Conservationist
Natural Resources Conservation Service
Spokane, Washington

The Following Organizations Cooperate with the Natural Resources Conservation Service in Snow Survey Work*:

Canada	Snow Survey Network Program – British Columbia Ministry of Environment
	River Forecast Center – British Columbia Ministry of Forests, Lands and Natural Resource Operations
State	Washington State Department of Ecology
	Washington State Department of Natural Resources
Federal	Department of the Army
	Corps of Engineers
	U.S. Department of Agriculture
	Forest Service
	U.S. Department of Commerce
	NOAA, National Weather Service
	U.S. Department of Interior
	Bonneville Power Administration
	Bureau of Reclamation
	Geological Survey
	National Park Service
	Bureau of Indian Affairs
	Recourse Conservation & Development Councils
Local	City of Tacoma
	City of Seattle
	Chelan County P.U.D.
	Pacific Power and Light Company
	Puget Sound Energy
	Washington Water Power Company
	Snohomish County P.U.D.
	Colville Confederated Tribes
	Spokane County
	Yakama Indian Nation
	Whatcom County
	Pierce County
	Kalispel Tribe of Indians
	Spokane Indian Tribe
	Jamestown S'klallum Tribe
Private	Okanogan Irrigation District
	Wenatchee Heights Irrigation District
	Newman Lake Homeowners Association
	Whitestone Reclamation District

***Other organizations and individuals furnish valuable information for the snow survey reports. Their cooperation is gratefully acknowledged.**

Washington Snow Survey Office
2005 E. College Way, Suite 203
Mount Vernon, WA 98273-2873

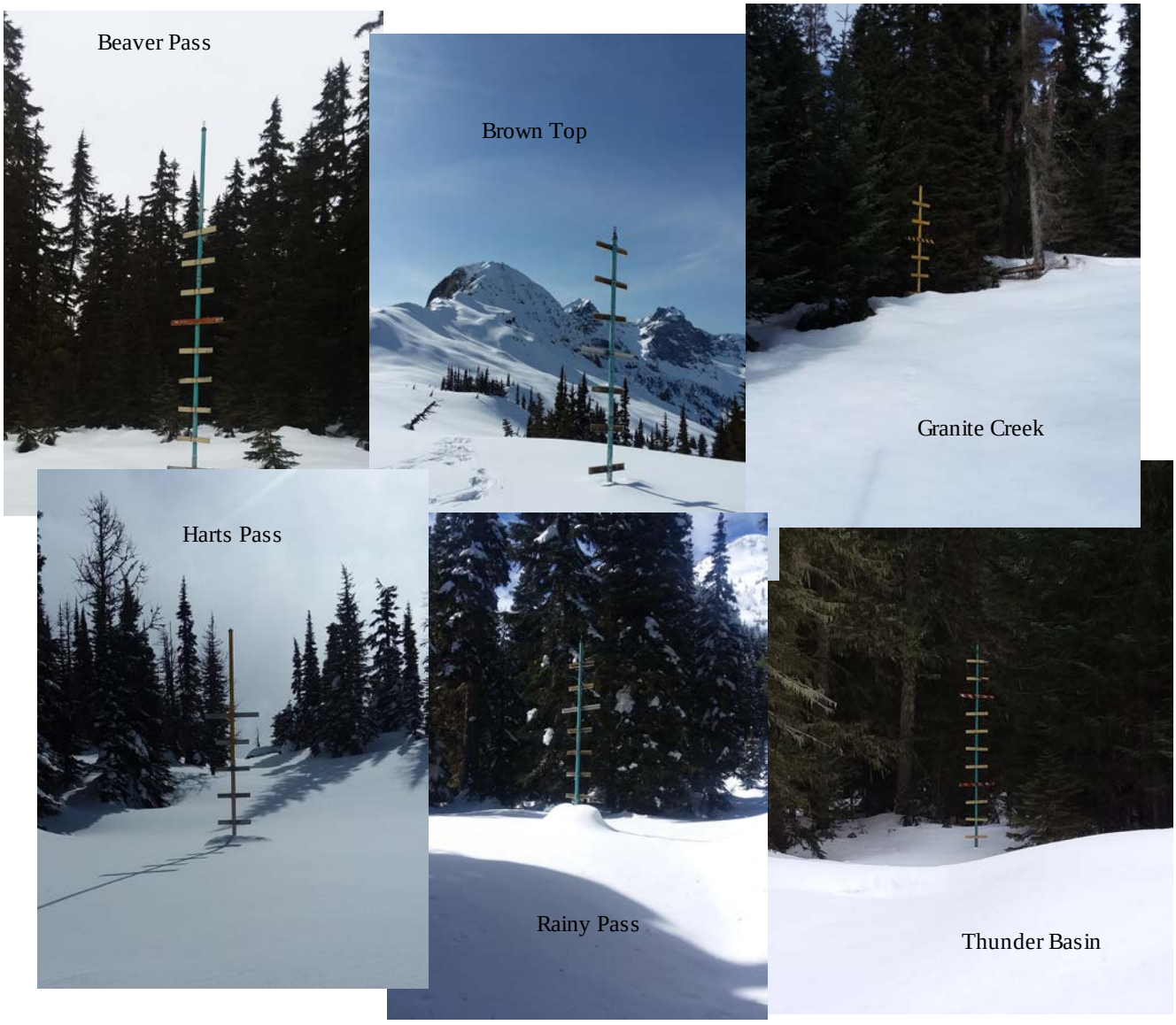
Washington Water Supply Outlook Report

Natural Resources Conservation Service
Spokane, WA

United States Department of Agriculture

NRCS Natural Resources Conservation Service

Washington Water Supply Outlook Report April 1, 2018



Aerial Markers of the Skagit Valley: Photos by Volunteer Snow Surveyor Chase Kingslien

Water Supply Outlook Reports
and
Federal - State – Private Cooperative Snow Surveys

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Howforecasts 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 it 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 prepare runoff forecasts. These forecasts are coordinated between hydrologists in the Natural Resources Conservation Service and the National Weather Service. Unless otherwise specified, all forecasts are for flows that would occur naturally without any upstream influences.

Forecasts of any kind, of course, 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 uncertain 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.

Washington
Water Supply Outlook

April 2018

General Outlook

With peak snowpack in the books for most of Washington the state can look forward to favorable water supply. Weather forecasts favor a cool spring which promotes a normal runoff and sustained flows throughout the summer. Current soil moisture conditions also point to increased runoff. Most current forecast through mid-April shows most probability for below normal temperatures and above normal precipitation with a trend towards normal temperatures by the end of the month. Overall 1-month forecast for April is for below normal temperatures and above normal precipitation. Guiding us through spring and into summer, NWS 3-month (AMJ) forecast indicates equal chances for both temperature and precipitation. http://www.cpc.ncep.noaa.gov/

Snowpack

The April 1 statewide SNOTEL readings were 113% of normal. The lowest readings in the state were at 79% of the 30-year median for April 1 in Ahtanum Creek basin. The Toats Coulee Creek Basin near Tonasket had the most snow from April 1 snow survey with 203%. Basins across northern Washington favor higher snowpack conditions than those further south. Westside medians from SNOTEL, and April 1 snow surveys, included the North Puget Sound river basins with 120% of normal, the Central Puget river basins with 111%, the South Puget Sound at 103% and the Lower Columbia basins with 113% of normal. Snowpack along the east slopes of the Cascade Mountains included the Yakima area with 95% and the Wenatchee area with 107%. Snowpack in the Spokane River Basin was at 118% and the Walla Walla River Basin had 96% of the long-term median.

BASIN	PERCENT OF MEDIAN	LAST YEAR PERCENT MEDIAN
Spokane	118	95
Newman Lake	155	115
Pend Oreille	139	100
Okanogan	141	113
Methow	129	119
Conconully Lake	160	122
Central Columbia	107	113
Upper Yakima	98	111
Lower Yakima	92	111
Ahtanum Creek	79	102
Walla Walla	96	129
Lower Snake	94	105
Cowlitz	111	120
Lewis	115	161
White	103	98
Green	100	146
Puyallup	107	108
Cedar	103	134
Snoqualmie	112	118
Skykomish	119	121
Skagit	120	119
Nooksack	130	112
Olympic Peninsula	115	119

Precipitation

March precipitation was below normal for the whole state except for the Upper Columbia Basin where Salmon Meadows SNOTEL recorded 243% of normal precipitation and Omak was 225%. Other sites in the basin were above normal as well. In the mean-time The Upper Yakima and Olympic Peninsula only received about half of the normal precipitation they should have.

RIVER BASIN	MARCH PERCENT OF AVERAGE	WATER YEAR PERCENT OF AVERAGE
Spokane	74	110
Pend Oreille	94	121
Upper Columbia	133	116
Central Columbia	72	108
Upper Yakima	58	103
Lower Yakima	60	107
Walla Walla	83	114
Lower Snake	95	109
Lower Columbia	57	106
South Puget Sound	63	115
Central Puget Sound	70	160
North Puget Sound	70	114
Olympic Peninsula	52	102

Reservoir

Seasonal reservoir levels in Washington can vary greatly due to specific watershed management practices required in preparation for irrigation season, fisheries management, power generation, municipal demands and flood control. April 1 Reservoir storage in the Yakima Basin was 603,000-acre feet, 118% of average for the Upper Reaches and 194,000-acre feet or 128% of average for Rimrock and Bumping Lakes. Both basins are 70-80% of capacity in anticipation of spring freshet. The power generation reservoirs included the following: Coeur d'Alene Lake, 134,000-acre feet, 81% of average and 56% of capacity. Skagit River reservoirs are currently drawn down below gauge height in anticipation of spring runoff and in support of spawning Steelhead. Recent climate impacts and management procedures may affect these numbers on a daily or weekly basis.

BASIN	PERCENT OF CAPACITY	CURRENT STORAGE AS PERCENT OF AVERAGE
Spokane	56	81
Pend Oreille	38	76
Upper Columbia	57	88
Central Columbia	N/A	N/A
Upper Yakima	72	118
Lower Yakima	84	128
Lower Snake	45	64
North Puget Sound	N/A	N/A

For more information contact your local Natural Resources Conservation Service office.

Streamflow

Mid-winter forecasts for April-September stream flows begin to paint a clearer picture of what may be to come. At times, only a few degrees warmer or cooler than forecasted can make or break stream flow predictions but so far, we are looking stellar in Washington. April-September forecasts for some Western Washington streams include the Cedar River near Cedar Falls, 105%; White River, 107%; and Skagit River, 110%. Some Eastern Washington streams include the Yakima River near Parker 103%, Wenatchee River at Plain 105%; and Spokane River near Post Falls 116%. Volumetric forecasts are developed using current, historic and average snowpack, precipitation and streamflow data collected and coordinated by organizations cooperating with NRCS.

BASIN	PERCENT OF AVERAGE (50 PERCENT CHANCE OF EXCEEDENCE)
Spokane	106-108
Priest River	108-135
Upper Columbia	118-153
Central Columbia	93-118
Upper Yakima	99-103
Lower Yakima	83-98
Walla Walla	104-106
Lower Snake	96-125
Lower Columbia	93-112
South Puget Sound	102-103
Central Puget Sound	100-124
North Puget Sound	100-111
Olympic Peninsula	103-104

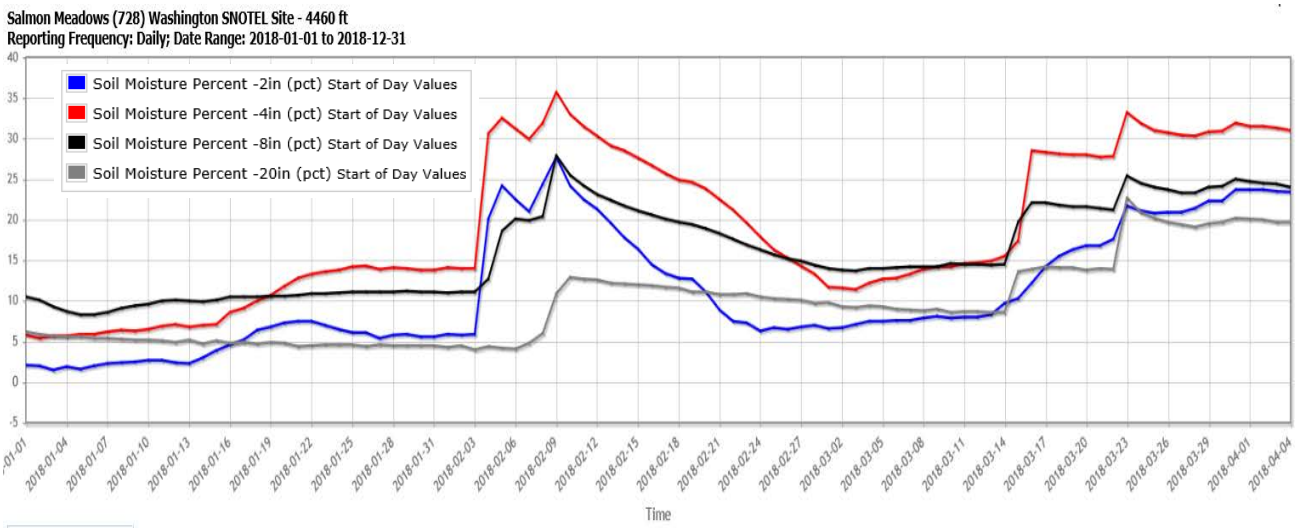
STREAM	PERCENT OF AVERAGE MARCH STREAMFLOWS
Pend Oreille at Albeni Fall Dam	88
Kettle at Laurier	65
Columbia at Birchbank	79
Spokane at Spokane	180
Similkameen at Nighthawk	110
Okanogan at Tonasket	136
Methow at Pateros	128
Chelan at Chelan	86
Wenatchee at Pashastin	71
Cle Elum near Roslyn	58
Yakima at Parker	67
Naches at Naches	72
Grande Ronde at Troy	101
Snake below Lower Granite Dam	91
Columbia River at The Dalles	90
Lewis at Merwin Dam	66
Cowlitz below Mayfield Dam	71
Skagit at Concrete	72
Dungeness near Sequim	70

For more information contact your local Natural Resources Conservation Service office.

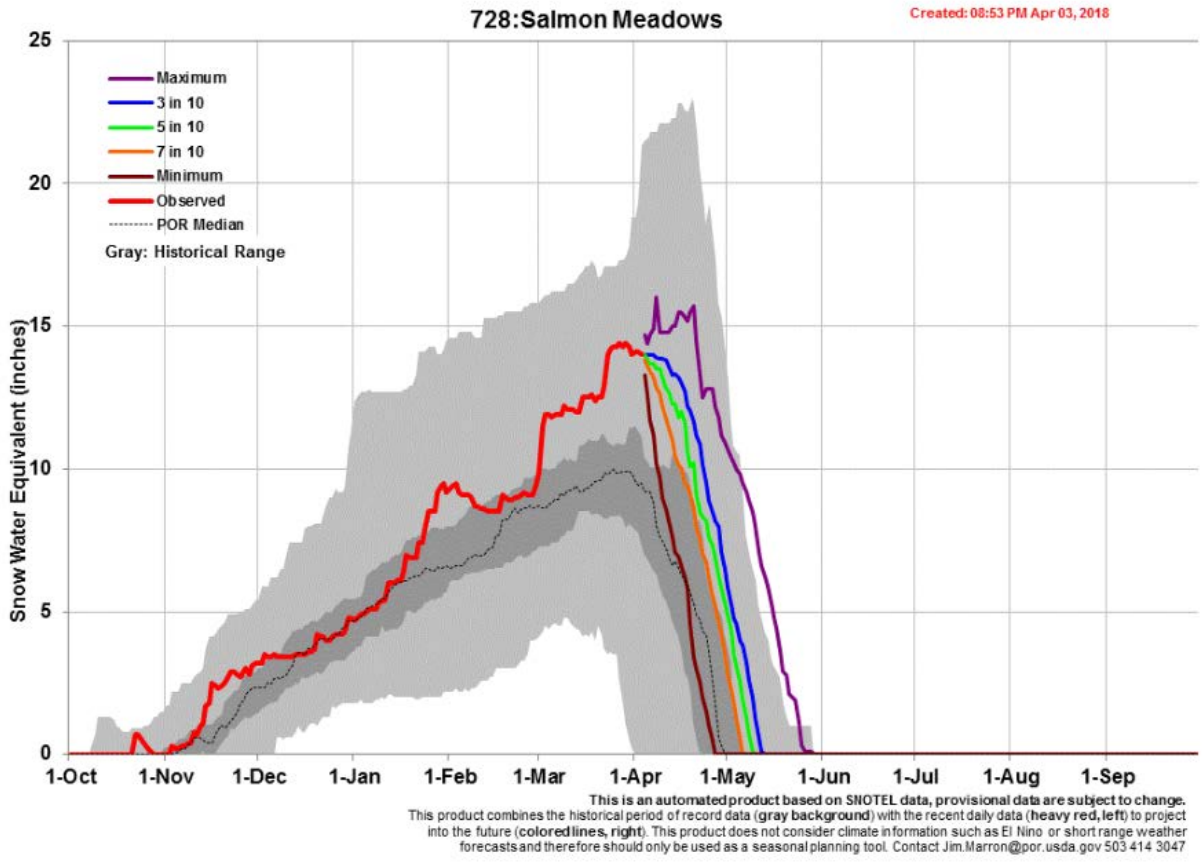
Soil Moisture

Current soil moisture data is available from a limited number of SNOTEL sites scattered throughout each basin. As the effort continues to install additional sensors and more years of data are acquired this information will become invaluable to the streamflow forecasting community.

Following are example graphs from Salmon Meadows SNOTEL in the Conconully Basin, Okanogan Co. depicting calendar year soil moisture as compared to the snowpack projection graph. To note is the recent gradual increase in soil moisture as the snowpack reached seasonal peak to begin the average annual melt curve. For more detailed information about Salmon Meadows soils follow this link:
Salmon Meadows Profile Information



SNOTEL projection graphics



Natural Resources Conservation Service

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Helpful Internet Addresses

NRCS Snow Survey and Climate Services Homepages

Washington:
http://www.nrcs.usda.gov/wps/portal/nrcs/main/wa/snow/

Oregon:
http://www.nrcs.usda.gov/wps/portal/nrcs/main/or/snow/

Idaho:
http://www.nrcs.usda.gov/wps/portal/nrcs/main/id/snow/

National Water and Climate Center (NWCC):
http://www.wcc.nrcs.usda.gov

USDA-NRCS Agency Homepages

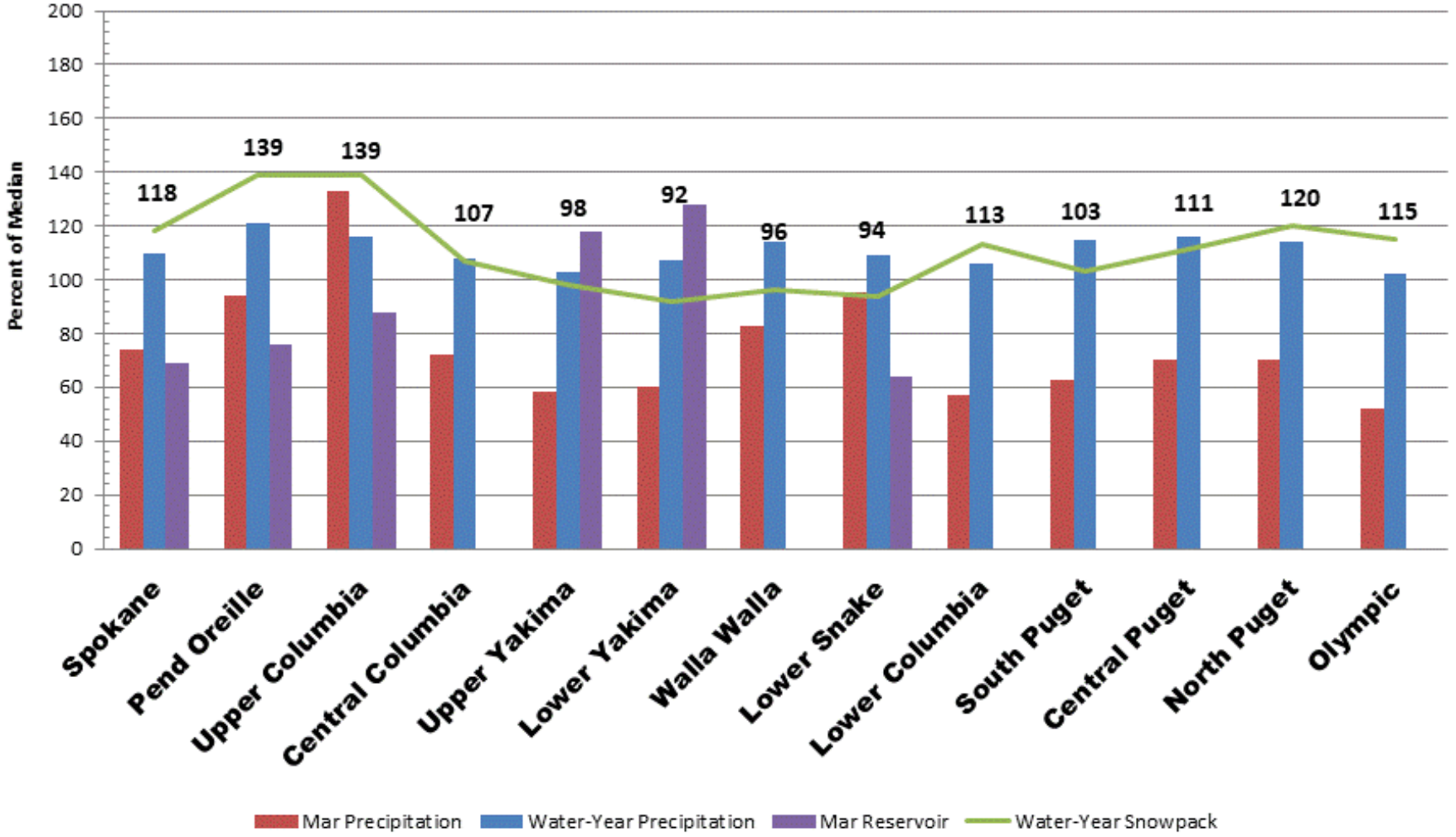
Washington:
http://www.nrcs.usda.gov/wps/portal/nrcs/site/wa/home/

NRCS National:
http://www.nrcs.usda.gov/wps/portal/nrcs/site/national/home/

NRCS Natural Resources Conservation Service

April 1, 2018 - Snowpack, Precipitation and Reservoir Conditions at a Glance

(Water Year = October 1 - Current Date)



86th Meeting of the Western Snow Conference

The Western Snow Conference is an annual tradition which started in 1932 as an international forum for individuals and organizations to share scientific, management and socio-political information on snow and runoff. The principal aim of the Western Snow Conference is to advance snow and hydrological sciences. The South Continental Area Committee is making plans for the 86th Annual Western Snow Conference in 2018.

Mark your calendar for these important dates:

25$ late fee assessed for all registrations submitted after April 31.
Crown Plaza Hotel block of rooms cut off is April 13 but will fill fast.

Dates: April 16-19, 2018
Location: Albuquerque, NM

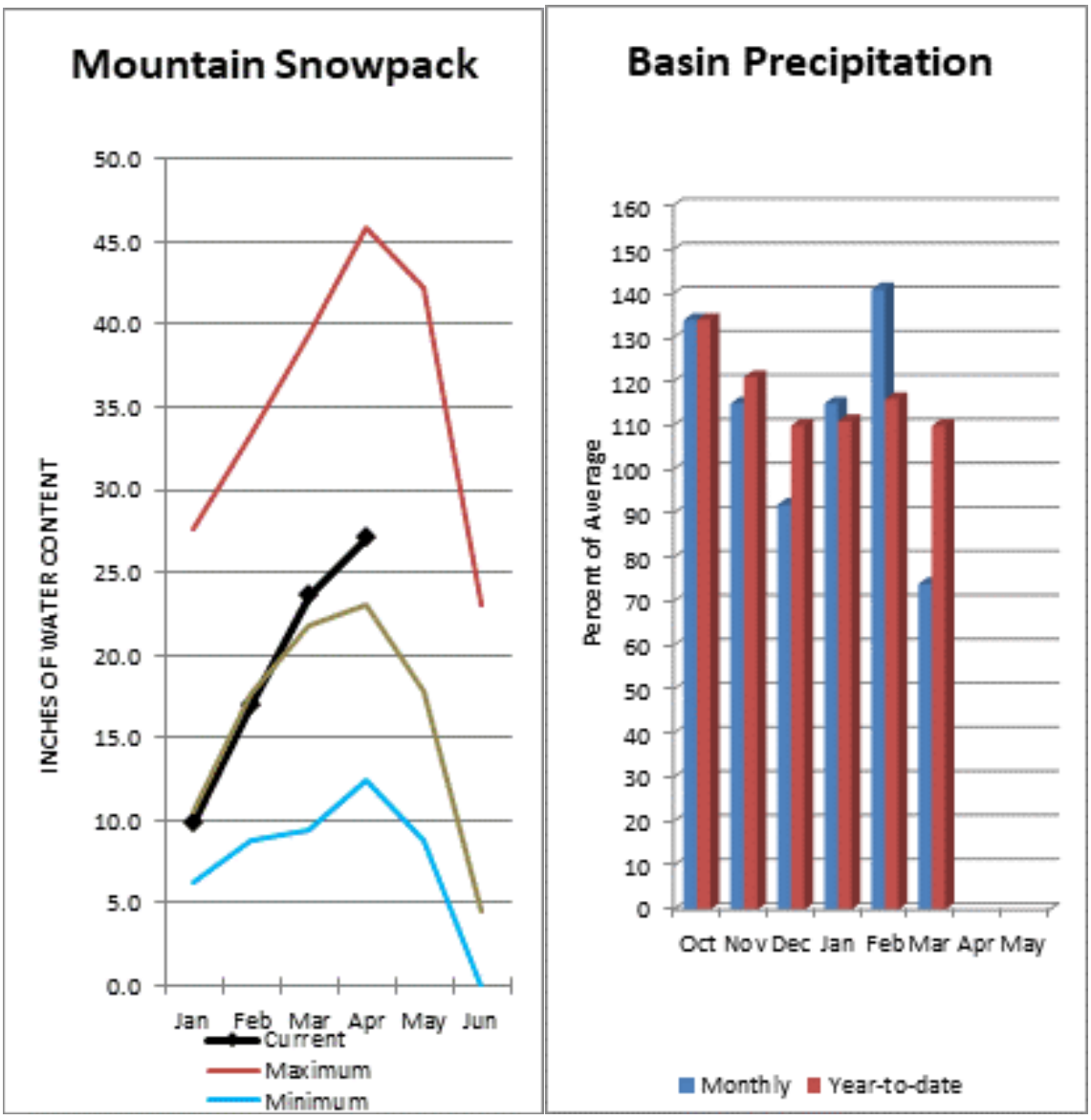
The South Continental Committee will compile a full agenda of oral and poster papers. In addition, a Monday short course is being planned which will focus on communicating scientific information and building narratives to effectively reach broad audiences. On Thursday a technical tour is planned of historic and hydrologic points of interest in the lower Rio Grande Valley, including the first stream gaging station installed in the United States.

The conference will be held at the beautiful Crowne Plaza Albuquerque located at the historic and cultural crossroads of El Camino Real and Route 66. Nearby attractions include historic Old Town, Petroglyph National Monument, the Indian Pueblo Cultural Center, Sandia Peak Tramway, ABQ BioPark, many brew pubs and museums. The Hotel will honor government per diem rate for our conference.

On-line registration, draft agenda and other information is available on the conference web site: http://www.westernsnowconference.org/

Also find Western Snow Conference on Facebook and Twitter.

Spokane River Basin



The April 1 forecasts for summer runoff within the Spokane River Basin are 108% of average near Post Falls and at Long Lake. The Chamokane River near Long Lake forecasted to have 106% of average flows for the May-August period. The forecast is based on a basin snowpack that is 117% of normal and precipitation that is 110% of average for the water year. Precipitation for March was above normal at 92% of average. Streamflow on the Spokane River at Spokane was 88% of average for March. April 1 storage in Coeur d'Alene Lake was 133,400-acre feet, 81% of average and 56% of capacity. Snowpack at Quartz Peak SNOTEL site was 113% of average with 21.3 inches of water content. Average temperatures in the Spokane basin were slightly cooler than normal for March but averaged near normal for the water year.

For more information contact your local Natural Resources Conservation Service office.

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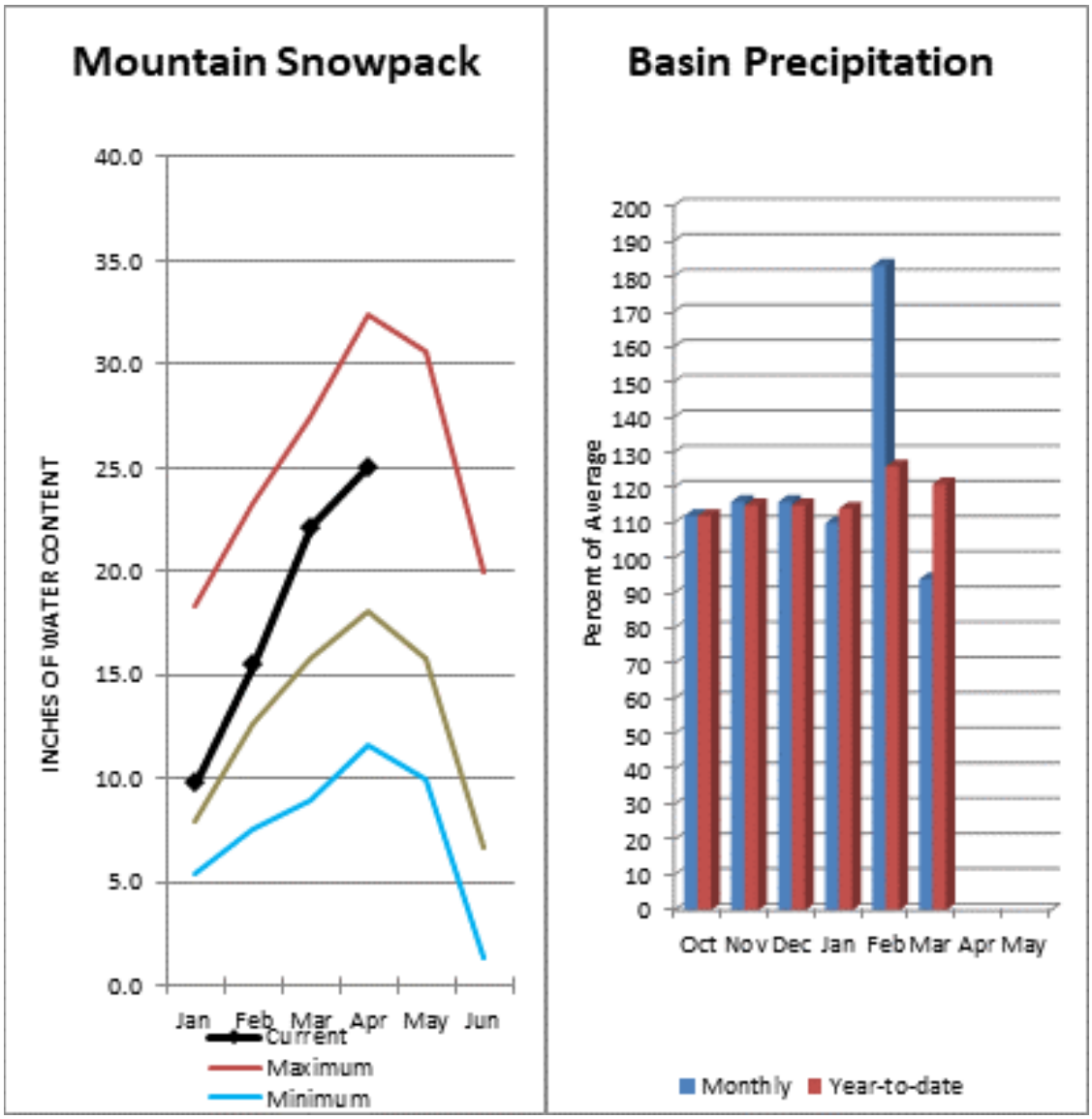
Spokane
Streamflow Forecasts - April 1, 2018

Spokane	Forecast Period	Forecast Exceedance Probabilities for Risk Assessment: Chance that actual volume will exceed forecast — 90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Spokane R nr Post Falls[2]								
	APR-JUL	2030	2360	2590	108%	2810	3150	2390
	APR-SEP	2100	2440	2680	108%	2910	3250	2480
Spokane R at Long Lake[2]								
	APR-JUL	2210	2570	2820	108%	3070	3430	2620
	APR-SEP	2440	2820	3080	108%	3340	3720	2850
Chamokane Ck nr Long Lake								
	MAY-AUG	6.2	8.4	9.9	106%	11.4	13.6	9.3

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

Reservoir Storage End of March, 2018	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Lake Coeur d' Alene	133.4	463.6	165.5	238.5
Basin-wide Total	133.4	463.6	165.5	238.5
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis April 1, 2018	# of Sites	% Median	Last Year % Median
Spokane	17	117%	95%
Newman Lake	3	155%	115%



The April – September average forecast for the Priest River near the town of Priest River is 108% and the Pend Oreille at Box canyon is 135%. March streamflow was 88% of average on the Pend Oreille River and 79% on the Columbia at Birchbank. April 1 snow cover was 139% of normal in the Pend Oreille Basin River Basin. Bunchgrass Meadows SNOTEL site had 32 inches of snow water on the snow pillow. Normally Bunchgrass would have 26.2 inches on April 1. Precipitation during March was 94% of average, bringing the year-to-date precipitation to 121% of average. Reservoir storage in the basin, including Lake Pend Oreille and Priest Lake was 76% of normal. Average temperatures were cooler than normal for March and near normal for the water year.

For more information contact your local Natural Resources Conservation Service office.

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Pend Oreille Basins
Streamflow Forecasts - April 1, 2018

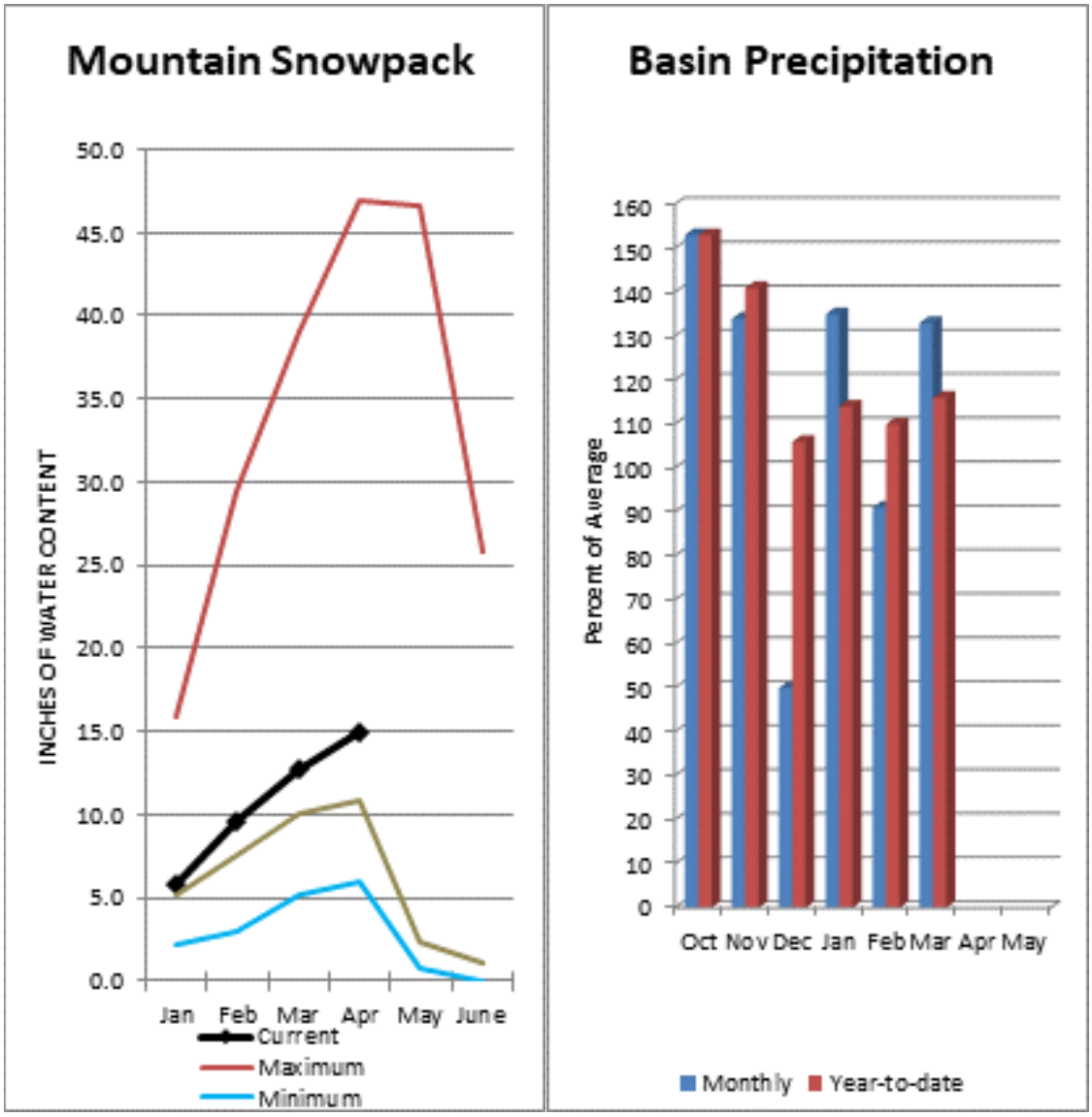
Pend Oreille Basins	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
		Forecast Exceedance Probabilities for Risk Assessment Chance that actual volume will exceed forecast						
Pend Oreille Lake Inflow[2]								
	APR-JUL	14400	15400	16100	136%	16800	17800	11800
	APR-SEP	15300	16500	17300	135%	18100	19300	12800
Priest R nr Priest River[2]								
	APR-JUL	720	795	845	108%	895	975	780
	APR-SEP	755	840	895	108%	955	1040	830
Pend Oreille R bl Box Canyon[2]								
	APR-JUL	14500	15600	16300	137%	17000	18100	11900
	APR-SEP	15500	16700	17500	135%	18300	19600	13000

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 March, 2018	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Lake Pend Oreille	586.6	1011.9	773.0	1561.3
Priest Lake	53.0	100.9	67.6	119.3
Basin-wide Total	639.6	1112.8	840.6	1680.6
# of reservoirs	2	2	2	2

Watershed Snowpack Analysis April 1, 2018	# of Sites	% Median	Last Year % Median
Pend Oreille Basins	71	139%	100%
Colville River	3	132%	94%
Kettle River	7	161%	110%

Upper Columbia River Basins



Summer runoff average forecast for the Okanogan River is 146%, Similkameen River is 148%, and Methow River is 142%. April 1 snow cover on the Okanogan was 141% of normal, Omak Creek was 130% and the Methow was 129%. March precipitation in the Upper Columbia was 133% of average, with precipitation for the water year at 116% of average. March streamflow for the Methow River was 128% of average, 136% for the Okanogan River and 110% for the Similkameen. Snow-water content at Salmon Meadows SNOTEL was 14.1 inches or 155% of normal for April 1. Combined storage in the Conconully Reservoirs was 13,300 acre-feet or 88% of normal. Temperatures were below normal for March and for the water year.

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Upper Columbia Basins
Streamflow Forecasts - April 1, 2018

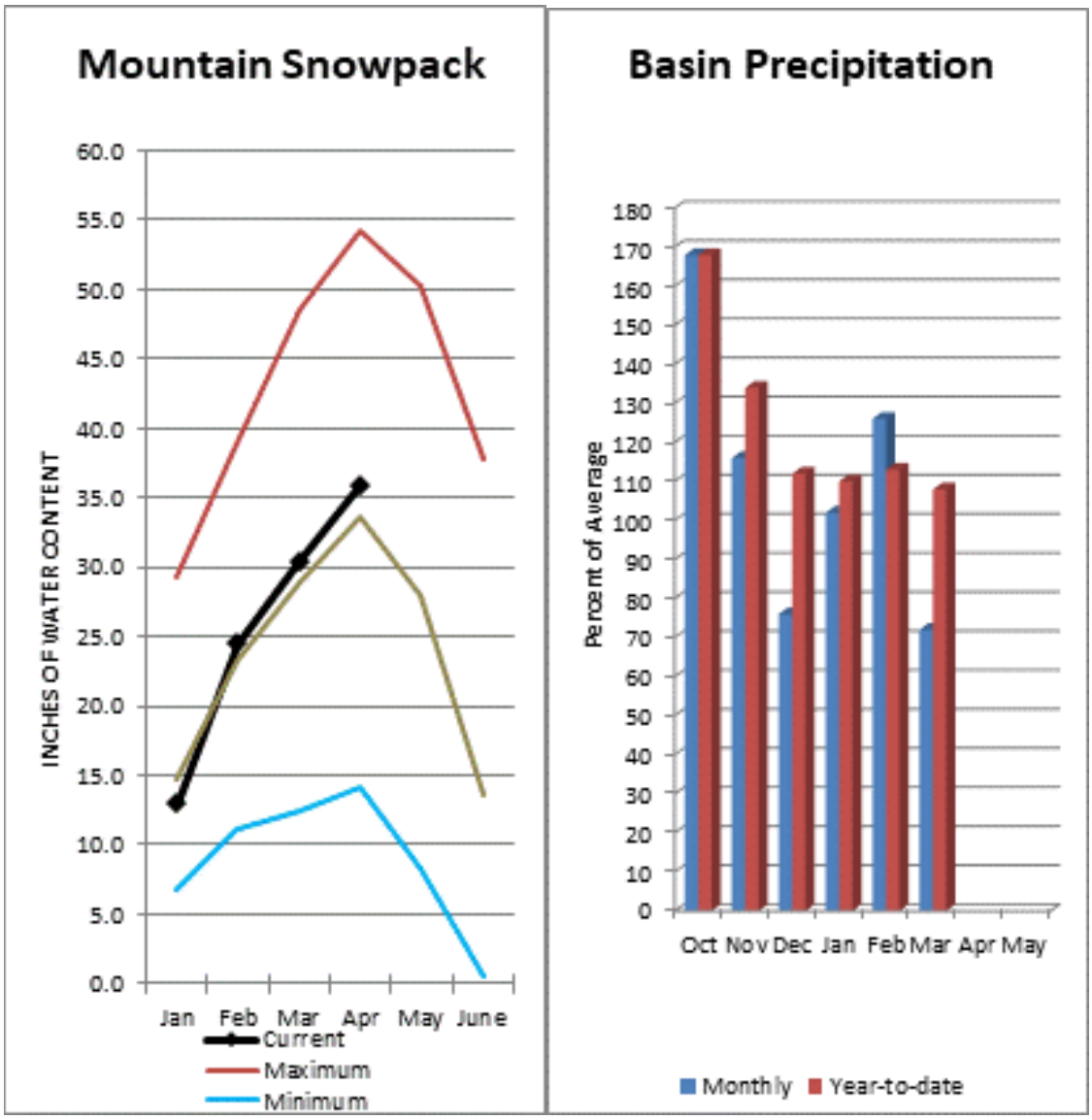
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

Upper Columbia Basins	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Kettle R nr Laurier								
	APR-JUL	2430	2630	2760	153%	2900	3100	1800
	APR-SEP	2520	2740	2880	153%	3030	3240	1880
Colville R at Kettle Falls								
	APR-JUL	82	122	149	125%	176	215	119
	APR-SEP	90	133	162	124%	192	235	131
Columbia R at Grand Coulee-NWS[2]								
	APR-JUL	54700		59700	117%		65300	51000
	APR-SEP	65100		70800	118%		74600	60100
Similkameen R nr Nighthawk								
	APR-JUL	1560	1700	1800	150%	1900	2040	1200
	APR-SEP	1650	1800	1900	148%	2000	2150	1280
Okanogan R nr Tonasket								
	APR-JUL	1770	1970	2100	142%	2230	2430	1480
	APR-SEP	1970	2190	2350	142%	2510	2730	1650
Okanogan R at Malott								
	APR-JUL	1800	2000	2140	148%	2280	2480	1450
	APR-SEP	1970	2210	2370	146%	2530	2770	1620
Methow R nr Pateros								
	APR-JUL	1020	1120	1190	143%	1260	1360	835
	APR-SEP	1090	1200	1270	142%	1350	1450	895

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 March, 2018	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Conconully Lake (Salmon Lake Dam)	8.1	8.8	7.3	10.5
Conconully Reservoir	5.2	10.0	7.8	13.0
Basin-wide Total	13.3	18.8	15.1	23.5
# of reservoirs	2	2	2	2

Watershed Snowpack Analysis April 1, 2018	# of Sites	% Median	Last Year % Median
Upper Columbia Basins	24	138%	110%
Okanogan River	15	141%	110%
Omak Creek	1	130%	114%
Sanpoil River	0		
Similkameen River	5	134%	96%
Toats Coulee Creek	4	203%	131%
Conconully Lake	3	160%	122%
Methow River	5	129%	119%



Precipitation during March was 72% of average in the basin and 108% for the year-to-date. Runoff for Entiat River is forecast to be 93% of average for the summer. The April-September average forecast for Chelan River is 102%, Wenatchee River at Plain is 103%, Stehekin River is 106% and Icicle Creek is 102%. March average streamflow on the Chelan River was 86% and on the Wenatchee River 71%. April 1 snowpack in the Wenatchee River Basin was 107% of normal; the Chelan, 115%; the Entiat, 89%; Stemilt Creek, 80% and Colockum Creek, 148%. Reservoir storage in Lake Chelan was not available. Lyman Lake SNOTEL had the most snow water with 60 inches of water. This site would normally have 57.6 inches on April 1. Temperatures were slightly below normal for March and near normal for the water year.

For more information contact your local Natural Resources Conservation Service office.

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Central Columbia Basins
Streamflow Forecasts - April 1, 2018

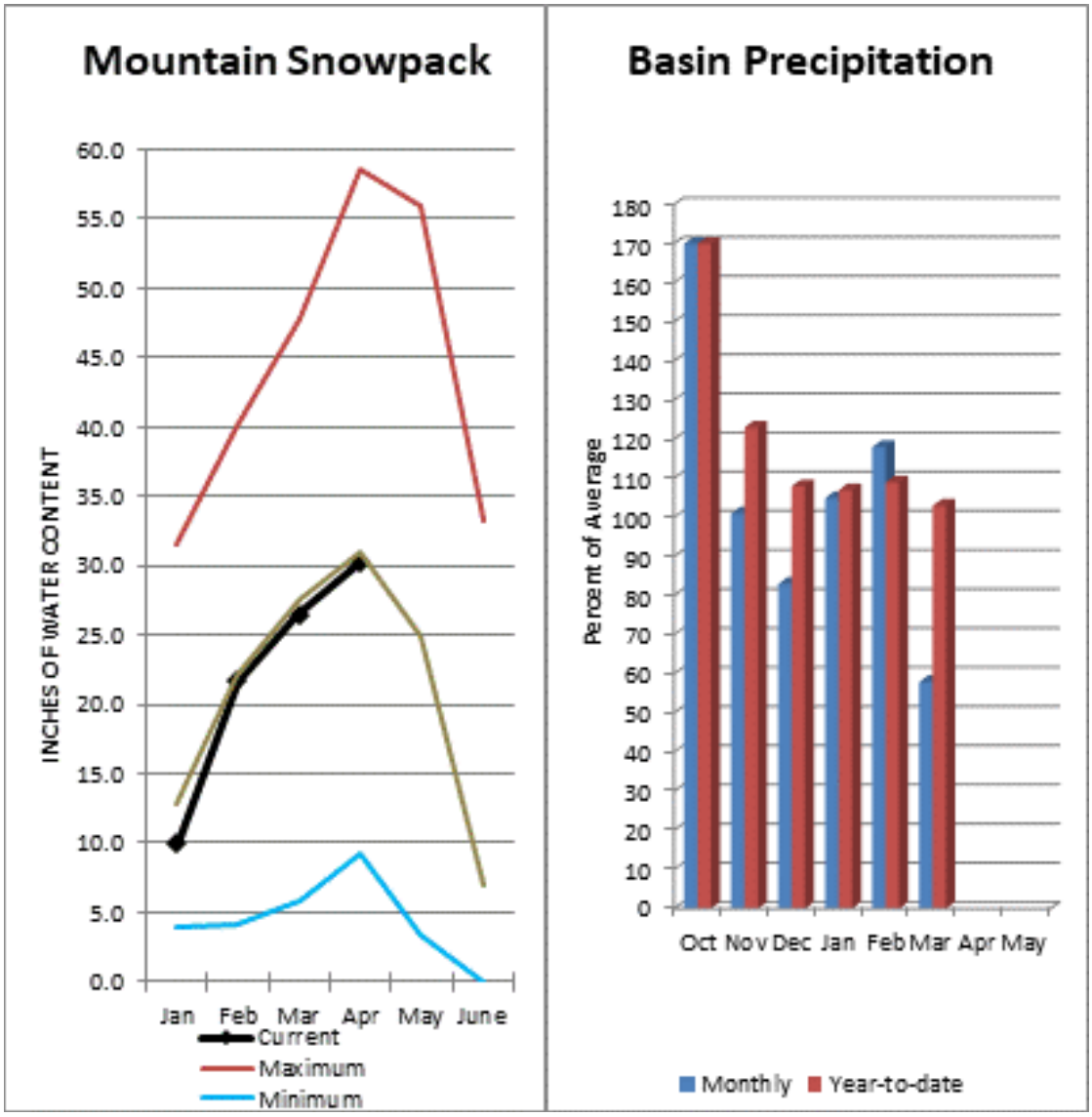
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

Central Columbia Basins	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Stehekin R at Stehekin								
	APR-JUL	625	680	720	106%	760	815	680
	APR-SEP	735	795	835	106%	875	930	790
Chelan R at Chelan								
	APR-JUL	895	970	1020	102%	1070	1140	1000
	APR-SEP	1000	1080	1140	102%	1200	1280	1120
Entiat R nr Ardenvoir								
	APR-JUL	154	175	189	95%	205	225	200
	APR-SEP	167	190	205	93%	220	245	220
Wenatchee R at Plain								
	APR-JUL	880	960	1010	102%	1070	1150	990
	APR-SEP	950	1040	1110	103%	1170	1260	1080
Icicle Ck nr Leavenworth								
	APR-JUL	230	260	280	102%	300	330	275
	APR-SEP	250	280	305	102%	325	360	300
Wenatchee R at Peshastin								
	APR-JUL	1210	1310	1380	101%	1450	1550	1370
	APR-SEP	1310	1430	1510	101%	1590	1700	1490
Columbia R bl Rock Island Dam-NWS[2]								
	APR-JUL	60000		65500	117%		71300	55800
	APR-SEP	70700		76900	118%		81100	65200

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 March, 2018	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Lake Chelan			256.1	676.1
Basin-wide Total			0.0	0.0
# of reservoirs	0	0	0	0

Watershed Snowpack Analysis April 1, 2018	# of Sites	% Median	Last Year % Median
Central Columbia Basins	5	115%	114%
Chelan Lake Basin	5	115%	114%
Entiat River	1	89%	104%
Wenatchee River	7	107%	113%
Stemilt Creek	1	80%	109%
Colockum Creek	1	148%	188%



April 1 reservoir storage for the Upper Yakima reservoirs was 603,000-acre feet, 118% of average. Forecasts for the Yakima River at Cle Elum are 99% of average and the Teanaway River near Cle Elum is at 102%. Lake inflows are all forecasted to be near average this summer as well. March streamflow within the basin was Cle Elum River near Roslyn at 58%. April 1 snowpack was 98% based upon 8 snow course and SNOTEL readings within the Upper Yakima Basin. Precipitation was 58% of average for March and 103% for the water-year. Volume forecasts for the Yakima Basin are for natural flow. As such, they may differ from the U.S. Bureau of Reclamation's forecast for the total water supply available, which includes irrigation return flow.

****Due to the devastating fire within the Teanaway and Cle Elum rivers this past summer, streamflow forecasts and thus runoff rates may be greatly affected come spring and summer. Sasse Ridge SNOTEL site was burned through but not lost to the fire. Area hydrology will be adversely changed for quite some time.**

For more information contact your local Natural Resources Conservation Service office.

Upper Yakima River Basin

Data Current as of: 4/5/2018 1:41:14 PM

Upper Yakima River
Streamflow Forecasts - April 1, 2018

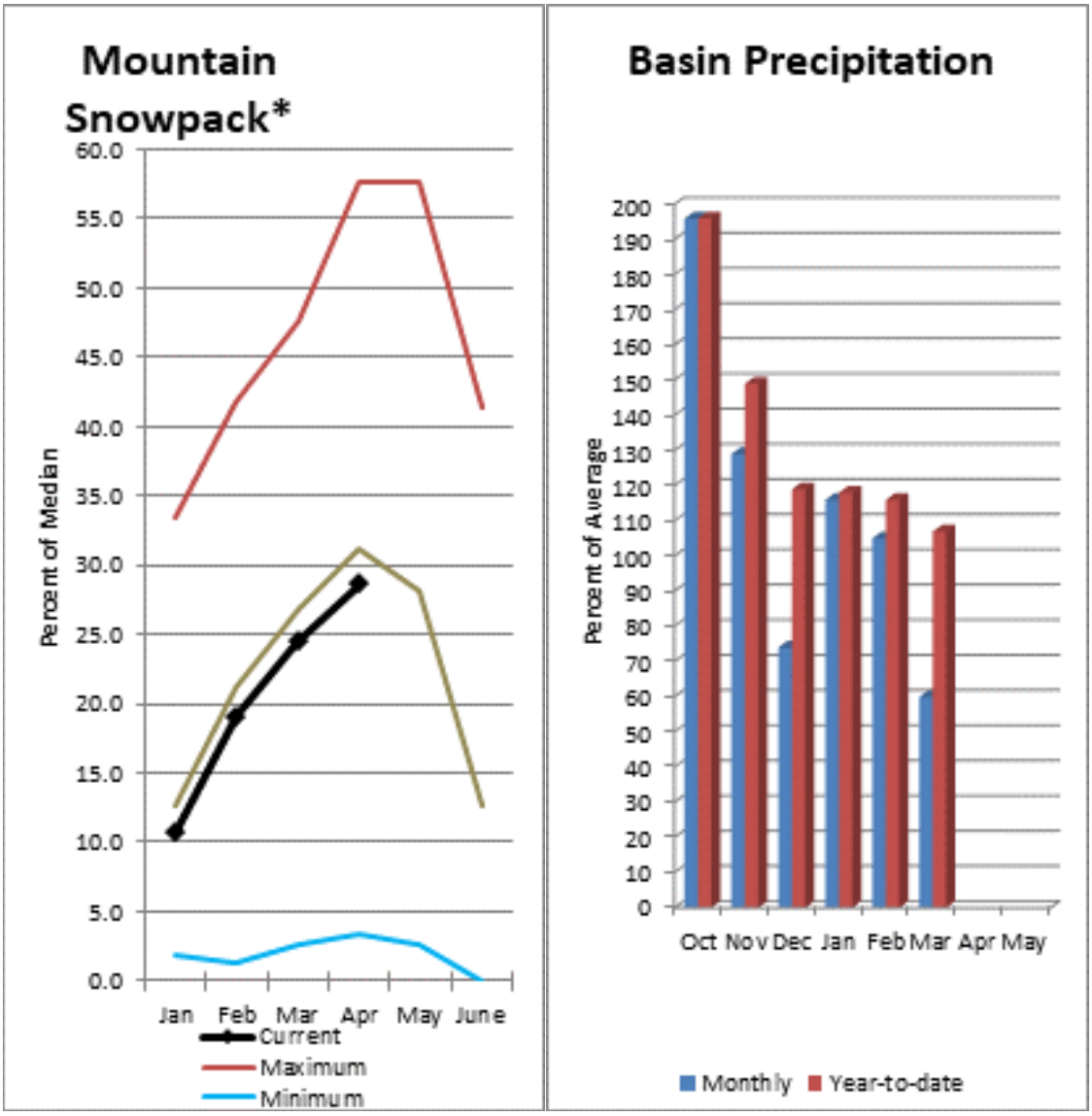
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

Upper Yakima River	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Keechelus Reservoir Inflow[2]								
	APR-JUL	97	110	119	103%	128	141	116
	APR-SEP	105	120	130	103%	139	154	126
Kachess Reservoir Inflow [2]								
	APR-JUL	89	99	106	102%	112	122	104
	APR-SEP	97	107	114	101%	121	131	113
Cle Elum Lake Inflow [2]								
	APR-JUL	340	370	385	100%	405	430	385
	APR-SEP	370	400	420	101%	440	470	415
Yakima R at Cle Elum [2]								
	APR-JUL	625	700	750	99%	800	870	755
	APR-SEP	685	765	820	99%	875	960	830
Teanaway R bl Forks nr Cle Elum								
	APR-JUL	99	119	132	102%	145	165	130
	APR-SEP	101	121	135	102%	149	169	133

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 March, 2018	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Keechelus	128.6	96.0	106.3	157.8
Kachess	184.2	152.3	159.8	239.0
Cle Elum	290.1	224.6	246.3	436.9
Basin-wide Total	602.9	472.8	512.4	833.7
# of reservoirs	3	3	3	3

Watershed Snowpack Analysis April 1, 2018	# of Sites	% Median	Last Year % Median
Upper Yakima River	8	98%	111%



March average streamflows within the basin were: Yakima River near Parker, 67% and the Naches River near Naches, 72%. April 1 reservoir storage for Bumping and Rimrock reservoirs was 194,000-acre feet, 88% of average. Forecast runoff averages for Yakima River near Parker are 97%; American River near Nile, 95%; Ahtanum Creek, 83%; and Klickitat River near Glenwood, 93%. April 1 snowpack was 92% based upon 6 snow course and SNOTEL readings within the Lower Yakima Basin and Ahtanum Creek reported in at 79% of normal. Precipitation was 60% of average for March and 107% for the water-year. Temperatures were near normal for March and slightly above normal for the water year. Volume forecasts for Yakima Basin are for natural flow. As such, they may differ from the U.S. Bureau of Reclamation's forecast for the total water supply available, which includes irrigation return flow. ****The Norse Peak fire consumed over 55,000 acres in Yakima and Pierce counties as well as destroying the Corral Pass SNOTEL site and threatening Crystal Mtn. Ski Area. Damages are still being assessed.**

For more information contact your local Natural Resources Conservation Service office.

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Lower Yakima River
Streamflow Forecasts - April 1, 2018

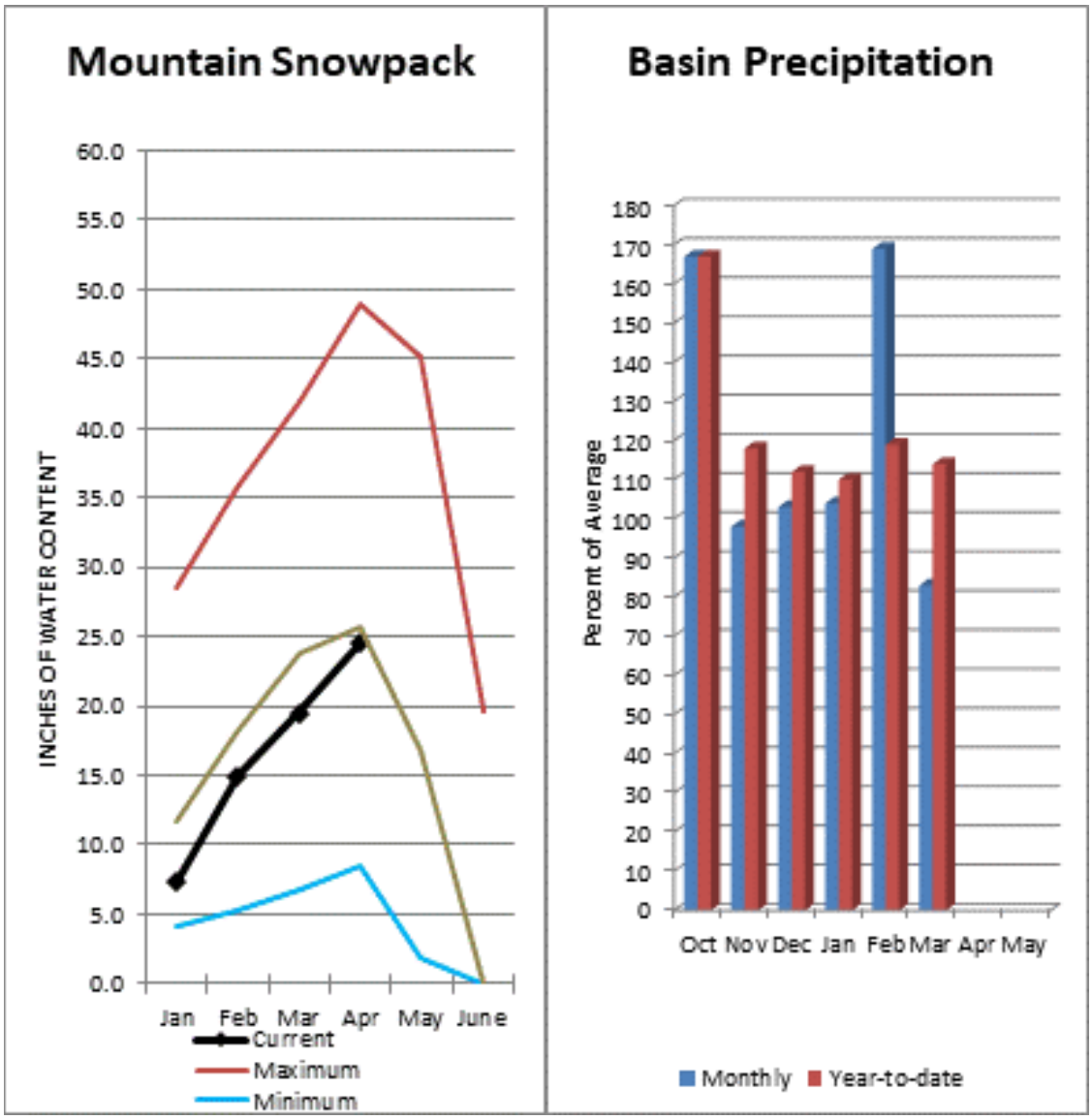
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

Lower Yakima River	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Bumping Lake Inflow [2]								
	APR-JUL	89	100	108	95%	115	126	114
	APR-SEP	96	108	117	95%	125	137	123
American R nr Nile								
	APR-JUL	79	89	96	94%	103	113	102
	APR-SEP	84	96	104	95%	112	124	110
Rimrock Lake Inflow [2]								
	APR-JUL	152	166	176	94%	186	200	187
	APR-SEP	179	196	210	95%	220	235	220
Naches R nr Naches								
	APR-JUL	515	605	665	95%	725	815	700
	APR-SEP	555	660	730	96%	800	900	760
Ahtanum Ck at Union Gap								
	APR-JUL	9.8	17	22	81%	27	34	27
	APR-SEP	11.6	19	24	83%	29	36	29
Yakima R nr Parker [2]								
	APR-JUL	1330	1490	1610	97%	1720	1890	1660
	APR-SEP	1450	1630	1760	97%	1880	2060	1820
Klickitat R nr Glenwood								
	APR-JUL	92	107	117	93%	127	142	126
	APR-SEP	102	118	129	93%	140	156	139
Klickitat R nr Pitt								
	APR-JUL	330	385	425	98%	460	515	435
	APR-SEP	405	470	510	98%	555	615	520

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 March, 2018	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Bumping Lake	17.0	22.9	14.6	33.7
Rimrock	177.2	173.1	136.6	198.0
Basin-wide Total	194.2	196.0	151.2	231.7
# of reservoirs	2	2	2	2

Watershed Snowpack Analysis April 1, 2018	# of Sites	% Median	Last Year % Median
Lower Yakima River	6	92%	111%
Ahtanum Creek	2	79%	102%



March precipitation was 83% of average, maintaining the year-to-date precipitation at 114% of average. Snowpack in the basin made a dramatic increase to near average at 96% of normal. Streamflow forecasts are 104% of average for Mill Creek and 106% for the SF Walla Walla near Milton-Freewater. Average temperatures were below normal for March but averaged closer to normal for the water year.

For more information contact your local Natural Resources Conservation Service office.

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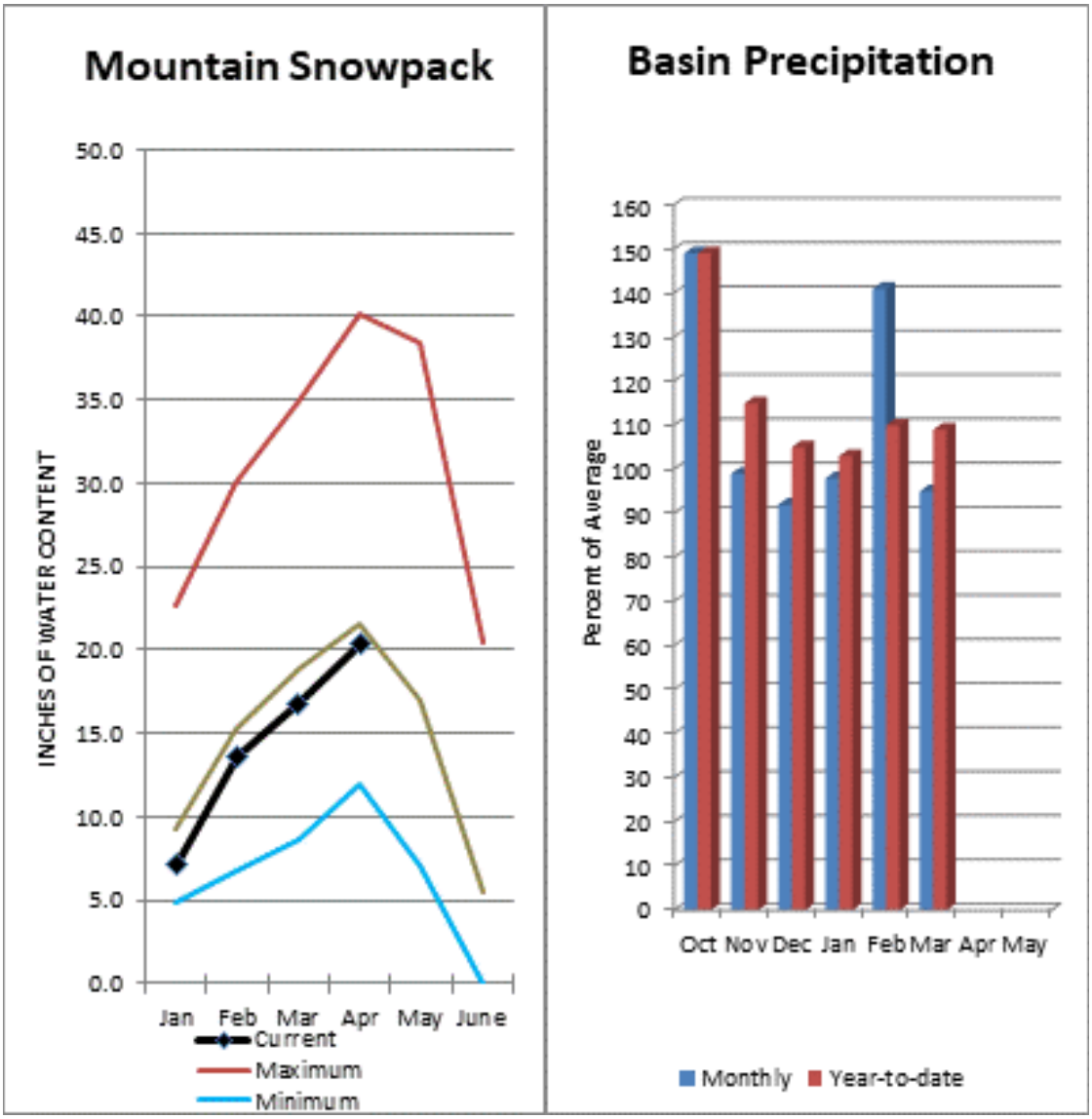
Walla Walla River
Streamflow Forecasts - April 1, 2018

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

Walla Walla River	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
SF Walla Walla R nr Milton-Freewater								
	APR-JUL	46	53	57	106%	62	69	54
	APR-SEP	58	65	70	106%	75	83	66
Mill Ck nr Walla Walla								
	APR-JUL	18.8	22	24	100%	27	30	24
	APR-SEP	22	25	28	104%	30	34	27

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

Watershed Snowpack Analysis April 1, 2018	# of Sites	% Median	Last Year % Median
Walla Walla River	2	96%	129%



The Grande Ronde River can expect summer flows to be about 96% of normal. The forecast for Asotin Creek at Asotin predicts 131% of average flows for the April – July runoff period. March precipitation was 95% of average, bringing the year-to-date precipitation to 109% of average. April 1 snowpack readings averaged 94% of normal. March streamflow was 91% of average for Snake River below Lower Granite Dam and 101% for Grande Ronde River near Troy. Dworshak Reservoir storage was 64% of average. Average temperatures were slightly below normal for March but closer to normal for the water year.

For more information contact your local Natural Resources Conservation Service office.

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Lower Snake, Grande Ronde, Clearwater Basins
Streamflow Forecasts - April 1, 2018

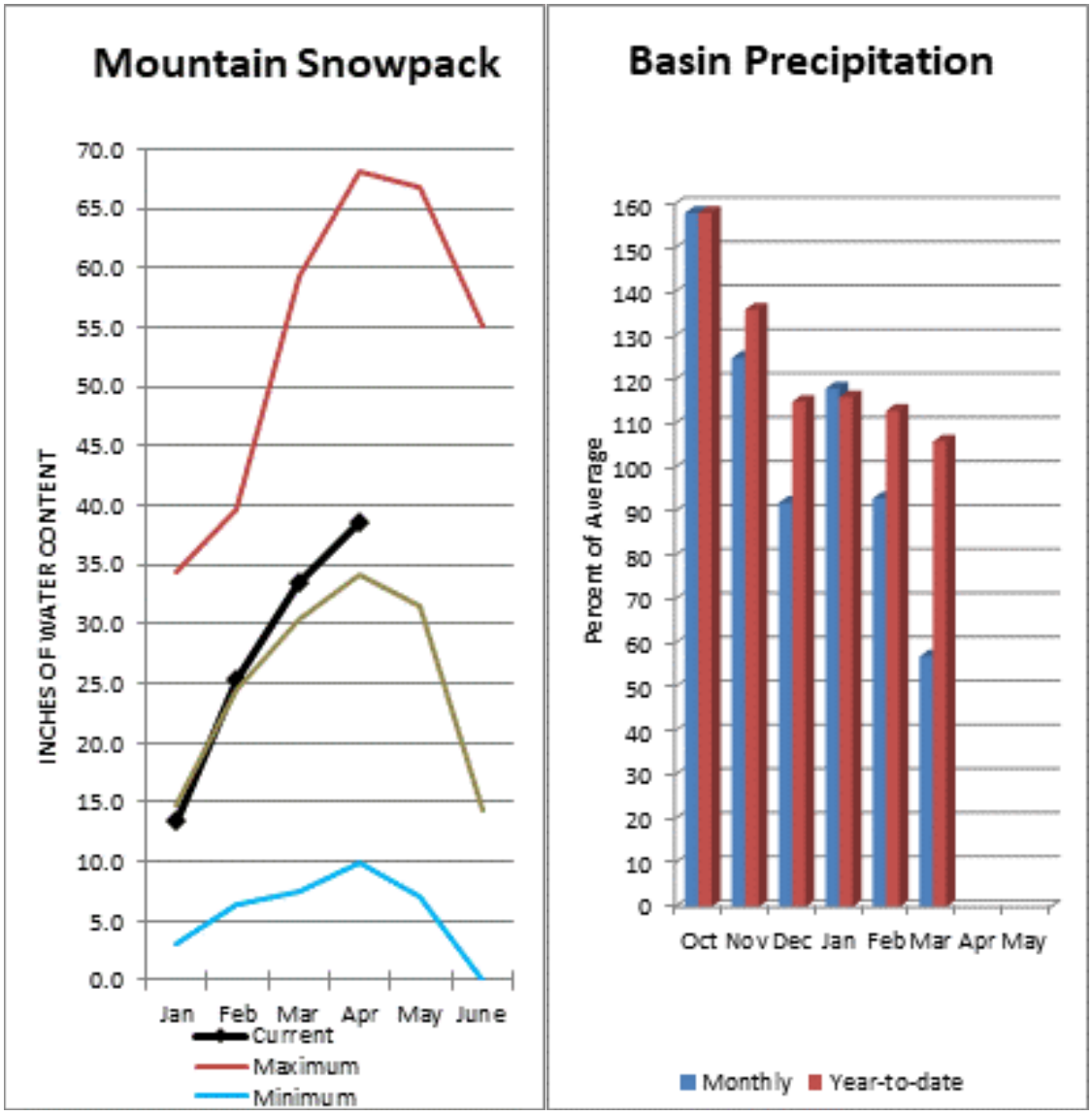
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

Lower Snake, Grande Ronde, Clearwater Basins	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Grande Ronde R at Troy								
	APR-JUL	860	1050	1170	96%	1300	1490	1220
	APR-SEP	935	1130	1260	96%	1390	1580	1310
Asotin Ck at Asotin								
Clearwater R at Spalding[2]								
	APR-JUL	7350	8130	8650	126%	9170	9940	6890
	APR-SEP	7700	8510	9070	125%	9620	10400	7270
Snake R bl Lower Granite Dam-NWS[2]								
	APR-JUL	18900		21500	109%		25600	19800
	APR-SEP	21400		23900	107%		28300	22300

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 March, 2018	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Dworshak Reservoir	1554.1	2336.9	2417.0	3468.0
Basin-wide Total	1554.1	2336.9	2417.0	3468.0
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis April 1, 2018	# of Sites	% Median	Last Year % Median
Lower Snake, Grande Ronde, Clearwater Basins	15	94%	104%



Forecasts for April – September streamflows within the basin are Lewis River at Ariel, 99% and Cowlitz River at Castle Rock, 101% of average. The Columbia at The Dalles is forecasted to have 112% of average flows this summer according to the River Forecast Center. March average streamflow for Cowlitz River was 71% and the Columbia River at The Dalles was 90% of average. March precipitation was 57% of average and the water-year average was 106%. April 1 snow cover for Cowlitz River was 111%, and Lewis River was 115% of normal. Temperatures were below normal during March but near average for the water year.

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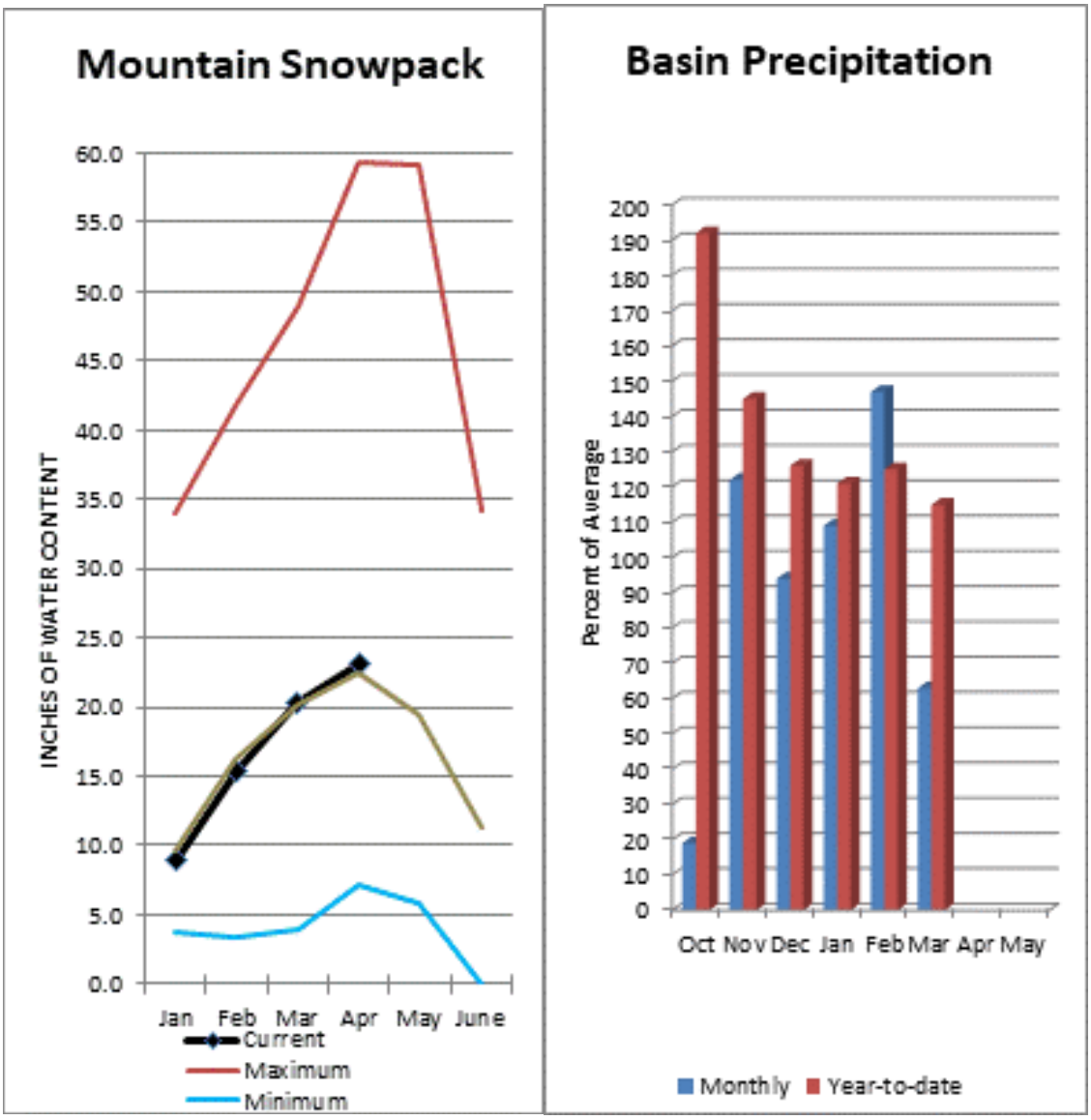
Lower Columbia Basins
Streamflow Forecasts - April 1, 2018

Lower Columbia Basins	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
		Forecast Exceedance Probabilities for Risk Assessment Chance that actual volume will exceed forecast						
Columbia R at The Dalles-NWS[2]								
	APR-JUL	82900		89700	112%		98400	79900
	APR-SEP	96600		104000	112%		113000	92700
Klickitat R nr Glenwood								
	APR-JUL	92	107	117	93%	127	142	126
	APR-SEP	102	118	129	93%	140	156	139
Klickitat R nr Pitt								
	APR-JUL	330	385	425	98%	460	515	435
	APR-SEP	405	470	510	98%	555	615	520
Lewis R at Ariel[2]								
	APR-JUL	695	865	980	101%	1090	1260	970
	APR-SEP	815	990	1110	99%	1230	1410	1120
Cowlitz R bl Mayfiled[2]								
	APR-JUL	1370	1580	1720	106%	1860	2070	1620
	APR-SEP	1570	1790	1940	105%	2100	2320	1840
Cowlitz R at Castle Rock[2]								
	APR-JUL	1770	2070	2270	102%	2470	2760	2230
	APR-SEP	2020	2330	2550	101%	2760	3070	2520

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

Watershed Snowpack Analysis April 1, 2018	# of Sites	% Median	Last Year % Median
Lower Columbia Basins	11	113%	141%
Lewis River	5	115%	161%
Cowlitz River	6	111%	120%



Summer runoff is forecast to be 102% of normal for the Green River below Howard Hanson Dam and 103% for the White River near Buckley. April 1 snowpack was 103% of average for the White River, 107% for Puyallup River and 199% in the Green River Basin. March precipitation was 63% of average, bringing the water year-to-date to 115% of average for the basins. Average temperatures in the area were below normal for March and near normal for the water-year.

For more information contact your local Natural Resources Conservation Service office.

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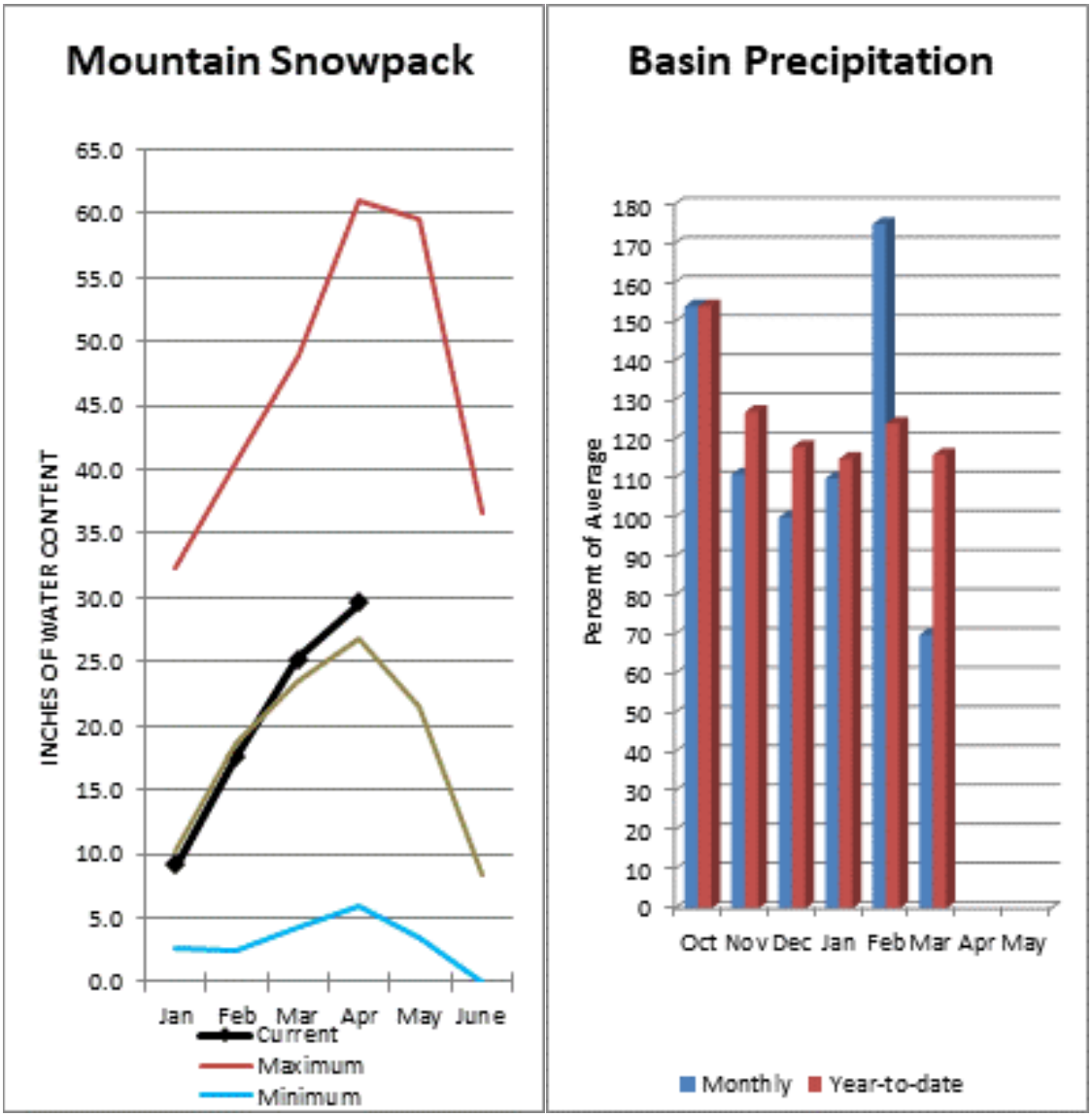
South Puget Sound Basins
Streamflow Forecasts - April 1, 2018

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

South Puget Sound Basins	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
White R nr Buckley[1,2]								
	APR-JUL	335	410	445	103%	475	550	430
	APR-SEP	410	490	530	103%	570	655	515
Green R bl Howard A Hanson Dam[1,2]								
	APR-JUL	157	215	240	102%	265	325	235
	APR-SEP	177	235	265	102%	290	350	260

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

Watershed Snowpack Analysis April 1, 2018	# of Sites	% Median	Last Year % Median
South Puget Sound Basins	10	103%	120%
White River	2	103%	98%
Green River	4	100%	146%



Forecast for spring and summer flows are: 104% for Cedar River near Cedar Falls; 104% for Rex River; 124% for South Fork of the Tolt River; and 100% for Taylor Creek near Selleck. Basin-wide precipitation for March was 70% of average, bringing water-year-to-date to 116% of average. April 1 median snow cover in Cedar River Basin was 103%, Tolt River Basin was 123%, Snoqualmie River Basin was 112%, and Skykomish River Basin was 119%. Temperatures were below normal for March and near normal for the water-year.

For more information contact your local Natural Resources Conservation Service office.

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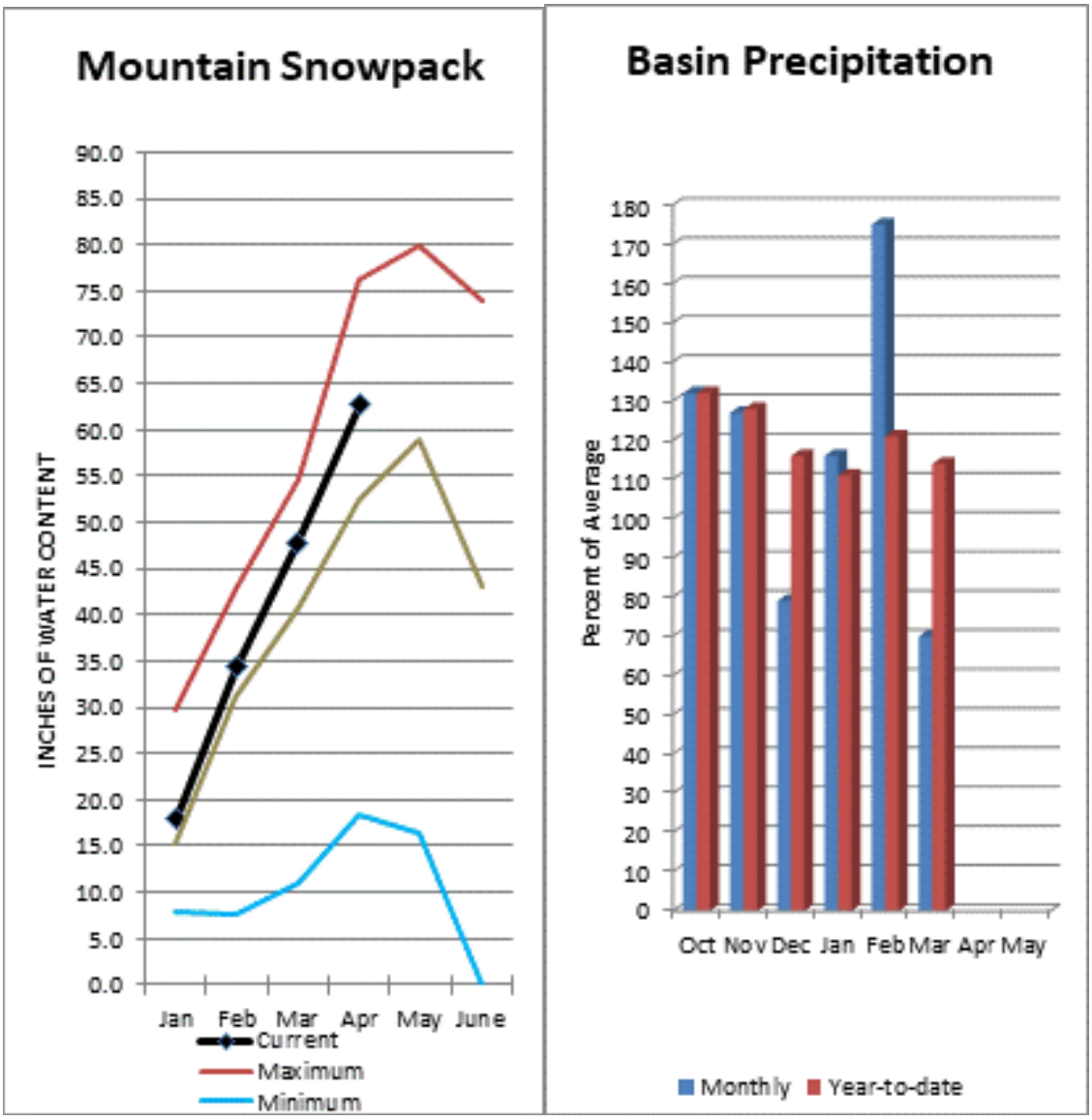
Central Puget Sound Basins
Streamflow Forecasts - April 1, 2018

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

Central Puget Sound Basins	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Cedar R nr Cedar Falls								
	APR-JUL	58	67	72	103%	78	86	70
	APR-SEP	64	73	79	104%	85	94	76
Rex R nr Cedar Falls								
	APR-JUL	18.9	23	25	104%	28	32	24
	APR-SEP	21	25	28	104%	31	35	27
Taylor Ck nr Selleck								
	APR-JUL	15.8	18.3	20	100%	22	24	20
	APR-SEP	19	22	24	100%	26	28	24
SF Tolt R nr Index								
	APR-JUL	14.6	16.7	18.1	127%	19.6	22	14.2
	APR-SEP	16.3	18.8	20	124%	22	25	16.1

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

Watershed Snowpack Analysis April 1, 2018	# of Sites	% Median	Last Year % Median
Central Puget Sound Basins	15	111%	123%
Puyallup River	4	107%	108%
Cedar River	6	103%	134%
Tolt River	3	123%	128%
Snoqualimie River	5	112%	118%
Skykomish River	3	119%	121%



Forecast for Skagit River streamflow at Newhalem is 111% of average for the spring and summer period. March streamflow in Skagit River was 72% of average. Other forecast points included Baker River at 106% and Thunder Creek at 100% of average. Basin-wide precipitation for March was 70% of average, bringing water-year-to-date to 114% of average. April 1 average snow cover in Skagit River Basin was 121% and the Nooksack River Basin was 130%. April 1 Skagit River reservoir storage was drawn down below gauge height as Seattle City Light prepares for spring Steelhead Shaping, where river flows are closely regulated to support spawning season. Average temperatures were much cooler than normal for March and slightly below average for the water year.

For more information contact your local Natural Resources Conservation Service office.

Data Current as of: 4/5/2018 1:41:58 PM

North Puget Sound Basins
Streamflow Forecasts - April 1, 2018

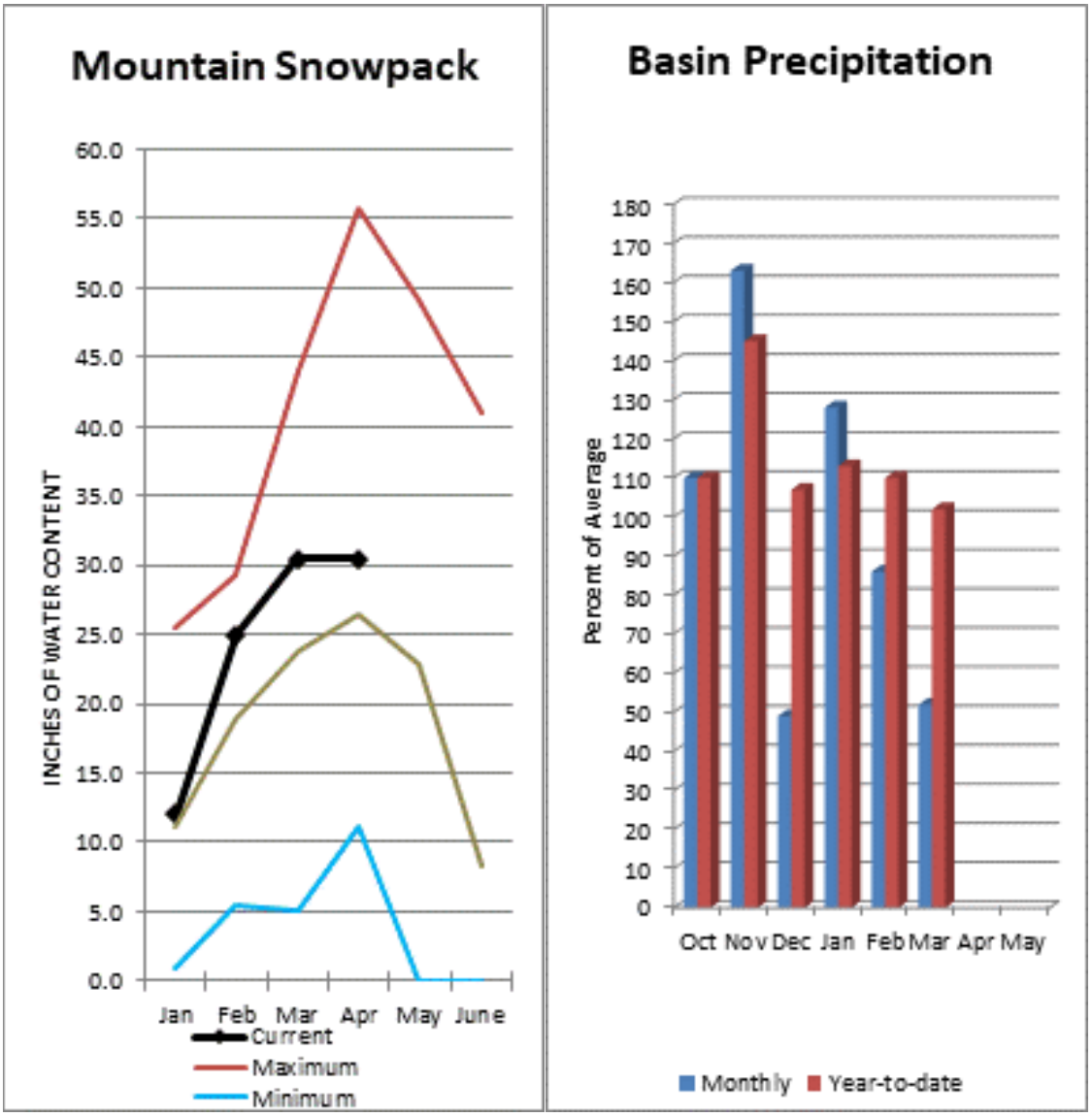
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

North Puget Sound Basins	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Thunder Ck nr Newhalem								
	APR-JUL	205	225	235	100%	250	270	235
	APR-SEP	295	320	330	100%	345	370	330
Skagit R at Newhalem[2]								
	APR-JUL	1740	1850	1920	114%	1990	2100	1680
	APR-SEP	2050	2180	2260	111%	2350	2470	2030
Baker R at Concrete								
	APR-JUL	665	750	805	103%	865	945	780
	APR-SEP	825	950	1040	106%	1120	1250	980

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 March, 2018	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Ross		456.2	730.5	1404.1
Diablo Reservoir		85.0	86.0	90.6
Basin-wide Total		0.0	0.0	0.0
# of reservoirs	0	0	0	0

Watershed Snowpack Analysis April 1, 2018	# of Sites	% Median	Last Year % Median
North Puget Sound Basins	19	121%	117%
Skagit River	15	121%	120%
Baker River	1	106%	114%
Nooksack River	3	130%	112%



Forecasted average runoff for streamflow for the Dungeness River is 103% and Elwha River is 104% March runoff in the Dungeness River was 70% of normal. Big Quilcene and Wynoochee rivers may expect near average runoff this summer as well. March precipitation was 52% of average. Precipitation has accumulated at 102% of average for the water year. March precipitation at Quillayute was 58% of normal. Olympic Peninsula snowpack averaged 117% of normal on April 1. Temperatures were below average for March and near normal for the water year.

For more information contact your local Natural Resources Conservation Service office.

Data Current as of: 4/5/2018 1:42:05 PM

Olympic Penninsula
Streamflow Forecasts - April 1, 2018

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

Olympic Penninsula	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Dungeness R nr Sequim								
	APR-JUL	99	113	122	102%	131	145	120
	APR-SEP	120	137	149	103%	160	177	145
Elwha R at McDonald Br nr Port Angeles								
	APR-JUL	350	390	415	104%	440	480	400
	APR-SEP	410	455	490	104%	525	570	470

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

Watershed Snowpack Analysis April 1, 2018	# of Sites	% Median	Last Year % Median
Olympic Penninsula	6	117%	119%

Issued by

Leonard Jordan
Acting Chief
Natural Resources Conservation Service
U.S. Department of Agriculture

Released by

Roylene Rides-at-the-Door
State Conservationist
Natural Resources Conservation Service
Spokane, Washington

The Following Organizations Cooperate with the Natural Resources Conservation Service in Snow Survey Work*:

Canada	Snow Survey Network Program – British Columbia Ministry of Environment
	River Forecast Center – British Columbia Ministry of Forests, Lands and Natural Resource Operations
State	Washington State Department of Ecology
	Washington State Department of Natural Resources
Federal	Department of the Army
	Corps of Engineers
	U.S. Department of Agriculture
	Forest Service
	U.S. Department of Commerce
	NOAA, National Weather Service
	U.S. Department of Interior
	Bonneville Power Administration
	Bureau of Reclamation
	Geological Survey
	National Park Service
	Bureau of Indian Affairs
Local	City of Tacoma
	City of Seattle
	City of Bellingham
	Chelan County P.U.D.
	Pacific Power/PacificCorp
	Puget Sound Energy
	Washington Water Power Company
	Snohomish County P.U.D.
	Colville Confederated Tribes
	Spokane County
	Yakama Indian Nation
	Whatcom County
	Pierce County
	Kalispel Tribe of Indians
	Spokane Indian Tribe
	Jamestown S'Klallam Tribe
Private	Okanogan Irrigation District
	Wenatchee Heights Irrigation District
	Newman Lake Homeowners Association
	Whitestone Reclamation District
	Kinross Mining

***Other organizations and individuals furnish valuable information for the snow survey reports. Their cooperation is gratefully acknowledged.**

Washington Snow Survey Office
2005 E. College Way, Suite 203
Mount Vernon, WA 98273-2873

Washington Water Supply Outlook Report

Natural Resources Conservation Service
Spokane, WA

United States Department of Agriculture

NRCS Natural Resources Conservation Service

Washington
Water Supply Outlook Report
May 1, 2018

Ross Lake on April 29th. Lake elevation 1494 feet, lowest in many years, exposing stumps and islands seldom seen. – Photo; Ole Kjosnes, Seattle City Light.

Water Supply Outlook Reports
and
Federal - State – Private Cooperative Snow Surveys

For more water supply and resource management information, contact:

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(509) 323-2955

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 it 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 prepare runoff forecasts. These forecasts are coordinated between hydrologists in the Natural Resources Conservation Service and the National Weather Service. Unless otherwise specified, all forecasts are for flows that would occur naturally without any upstream influences.

Forecasts of any kind, of course, 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 uncertain 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.

Washington
Water Supply Outlook

May 2018

General Outlook

With a 2-3-week delay in peak snow accumulation and resulting snowmelt runoff statewide snowpack remains higher than normal. Above normal rainfall also added moisture to the snowpack which helped drive densities up to the point of melt. Most current forecast through mid-May shows most probability for above normal temperatures and above normal precipitation with a trend towards warm and dry by the end of the month. Overall 1-month forecast for May is for above normal temperatures and below normal precipitation. Guiding us through spring and into summer, NWS 3-month (MJJ) forecast indicates greatest chances of above normal temperatures with below normal rainfall. http://www.cpc.ncep.noaa.gov/

Snowpack

The May 1 statewide SNOTEL readings were 125% of normal. The lowest readings in the state were at 56% of the 30-year median for May 1 in Ahtanum Creek basin. Canadian sites feeding the Kettle River were the highest at 193% of normal. Basins across northern Washington favor higher snowpack conditions than those further south. Westside medians from SNOTEL, and May 1 snow surveys, included the North Puget Sound river basins with 129% of normal, the Central Puget river basins with 140%, the South Puget Sound at 110% and the Lower Columbia basins with 125% of normal. Snowpack along the east slopes of the Cascade Mountains included the Yakima area with 97% and the Wenatchee area with 117%. Snowpack in the Spokane River Basin was at 145% and the Walla Walla River Basin increased to 116% of the long-term median.

BASIN	PERCENT OF MEDIAN	LAST YEAR PERCENT MEDIAN
Spokane	145	114
Newman Lake	112	96
Pend Oreille	164	116
Okanogan	158	148
Methow	129	131
Omak	153	165
Wenatchee	117	127
Upper Yakima	104	105
Lower Yakima	90	132
Ahtanum Creek	56	125
Walla Walla	116	177
Lower Snake	100	127
Cowlitz	119	141
Lewis	131	192
White	111	117
Green	92	123
Puyallup	122	133
Cedar	142	167
Snoqualmie	135	131
Skykomish	143	130
Skagit	130	123
Nooksack	127	110
Olympic Peninsula	138	135

Precipitation

May made up for an unseasonably dry April with much above normal precipitation throughout the entire state. Many records were broken for total monthly precipitation at both SNOTEL and coop weather stations in the state but primarily in the Central and North Cascades and Olympic Peninsula. The highest departure from normal was in Winthrop at 288% of normal however the wettest location was Alpine Meadows SNOTEL in the Tolt watershed with 28.7" of rain.

RIVER BASIN	APRIL PERCENT OF AVERAGE	WATER YEAR PERCENT OF AVERAGE
Spokane	166	116
Pend Oreille	136	123
Upper Columbia	152	119
Central Columbia	179	112
Upper Yakima	172	109
Lower Yakima	135	110
Walla Walla	144	117
Lower Snake	146	113
Lower Columbia	159	111
South Puget Sound	146	118
Central Puget Sound	193	122
North Puget Sound	164	116
Olympic Peninsula	165	107

Reservoir

Seasonal reservoir levels in Washington can vary greatly due to specific watershed management practices required in preparation for irrigation season, fisheries management, power generation, municipal demands and flood control. May 1 Reservoir storage in the Yakima Basin was 722,000-acre feet, 119% of average for the Upper Reaches and 194,000-acre feet or 108% of average for Rimrock and Bumping Lakes. Both basins are 80-90% of capacity in anticipation of spring freshet. The power generation reservoirs included the following: Coeur d'Alene Lake, 306,000-acre feet, 134% of average and 128% of capacity. Skagit River reservoirs are currently drawn down to near record lows in anticipation of spring runoff and in support of spawning Steelhead. Recent climate impacts and management procedures may affect these numbers on a daily or weekly basis.

BASIN	PERCENT OF CAPACITY	CURRENT STORAGE AS PERCENT OF AVERAGE
Spokane	104	134
Pend Oreille	63	103
Upper Columbia	84	120
Central Columbia	N/A	N/A
Upper Yakima	87	119
Lower Yakima	84	108
Lower Snake	55	72
North Puget Sound	7	13

For more information contact your local Natural Resources Conservation Service office.

Streamflow

Following the snowpack forecast in the northern region of the state are predicted to be above-much above average for the May – September period. The Columbia River will also see elevated flows from the border to the mouth of the river. May-September forecasts for some Western Washington streams include the Cedar River near Cedar Falls, 107%; White River, 105%; and Skagit River, 116%. Some Eastern Washington streams include the Yakima River near Parker 101%, Wenatchee River at Plain 107%; and Spokane River near Post Falls 122%. Volumetric forecasts are developed using current, historic and average snowpack, precipitation and streamflow data collected and coordinated by organizations cooperating with NRCS.

BASIN	PERCENT OF AVERAGE (50 PERCENT CHANCE OF EXCEEDENCE)
Spokane	122-140
Priest River	121-146
Upper Columbia	127-163
Central Columbia	102-128
Upper Yakima	104-109
Lower Yakima	78-102
Walla Walla	106-112
Lower Snake	83-130
Lower Columbia	93-122
South Puget Sound	85-105
Central Puget Sound	102-127
North Puget Sound	103-116
Olympic Peninsula	108-110

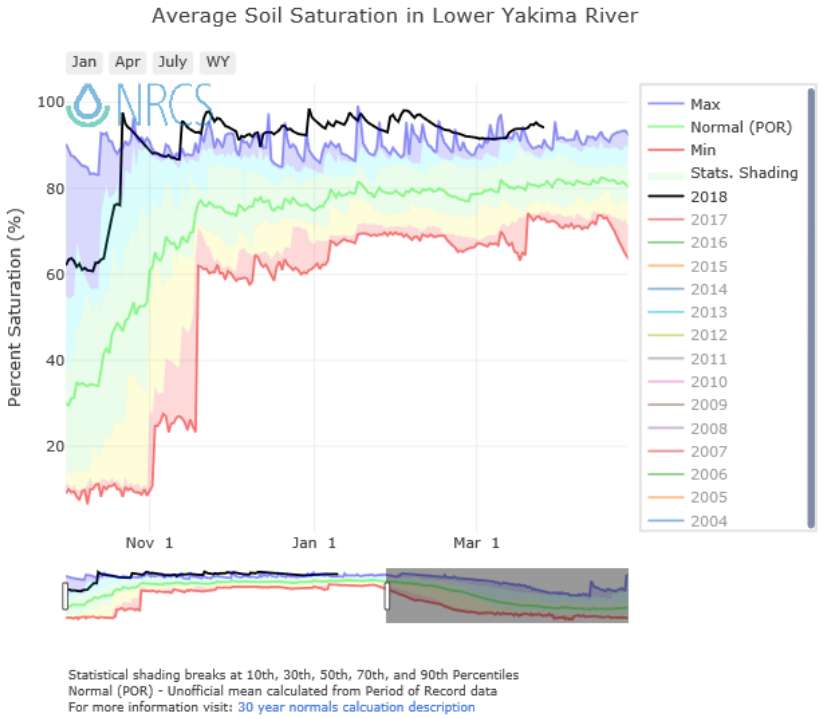
STREAM	PERCENT OF AVERAGE APRIL STREAMFLOWS
Pend Oreille at Albeni Fall Dam	123
Kettle at Laurier	136
Columbia at Birchbank	90
Spokane at Spokane	142
Similkameen at Nighthawk	151
Okanogan at Tonasket	194
Methow at Pateros	159
Chelan at Chelan	110
Wenatchee at Pashastin	103
Cle Elum near Roslyn	112
Yakima at Parker	118
Naches at Naches	124
Grande Ronde at Troy	119
Snake below Lower Granite Dam	131
Columbia River at The Dalles	119
Lewis at Merwin Dam	143
Cowlitz below Mayfield Dam	126
Skagit at Concrete	121
Dungeness near Sequim	116

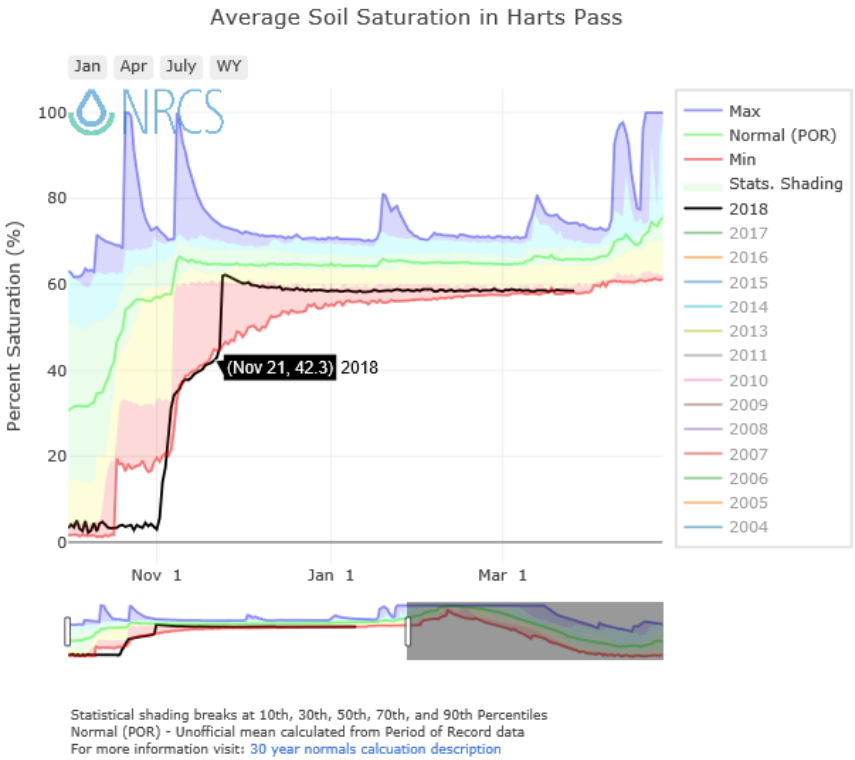
For more information contact your local Natural Resources Conservation Service office.

Soil Moisture

Current soil moisture data is available from a limited number of SNOTEL sites scattered throughout each basin. As the effort continues to install additional sensors and more years of data are acquired this information will become invaluable to the streamflow forecasting community.

Following are example graphs depicting new products that we hope to have available system wide very soon. Along with soils products there will be like graphs for snowpack, precipitation and temperature. Currently they only utilize daily SNOTEL data however there are plans for monthly products that will use manual snow course and coop precipitation data. Graphs are interactive and user friendly.





Natural Resources Conservation Service

Washington State
Snow, Water and Climate Services

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Helpful Internet Addresses

NRCS Snow Survey and Climate Services Homepages

Washington:
http://www.nrcs.usda.gov/wps/portal/nrcs/main/wa/snow/

Oregon:
http://www.nrcs.usda.gov/wps/portal/nrcs/main/or/snow/

Idaho:
http://www.nrcs.usda.gov/wps/portal/nrcs/main/id/snow/

National Water and Climate Center (NWCC):
http://www.wcc.nrcs.usda.gov

USDA-NRCS Agency Homepages

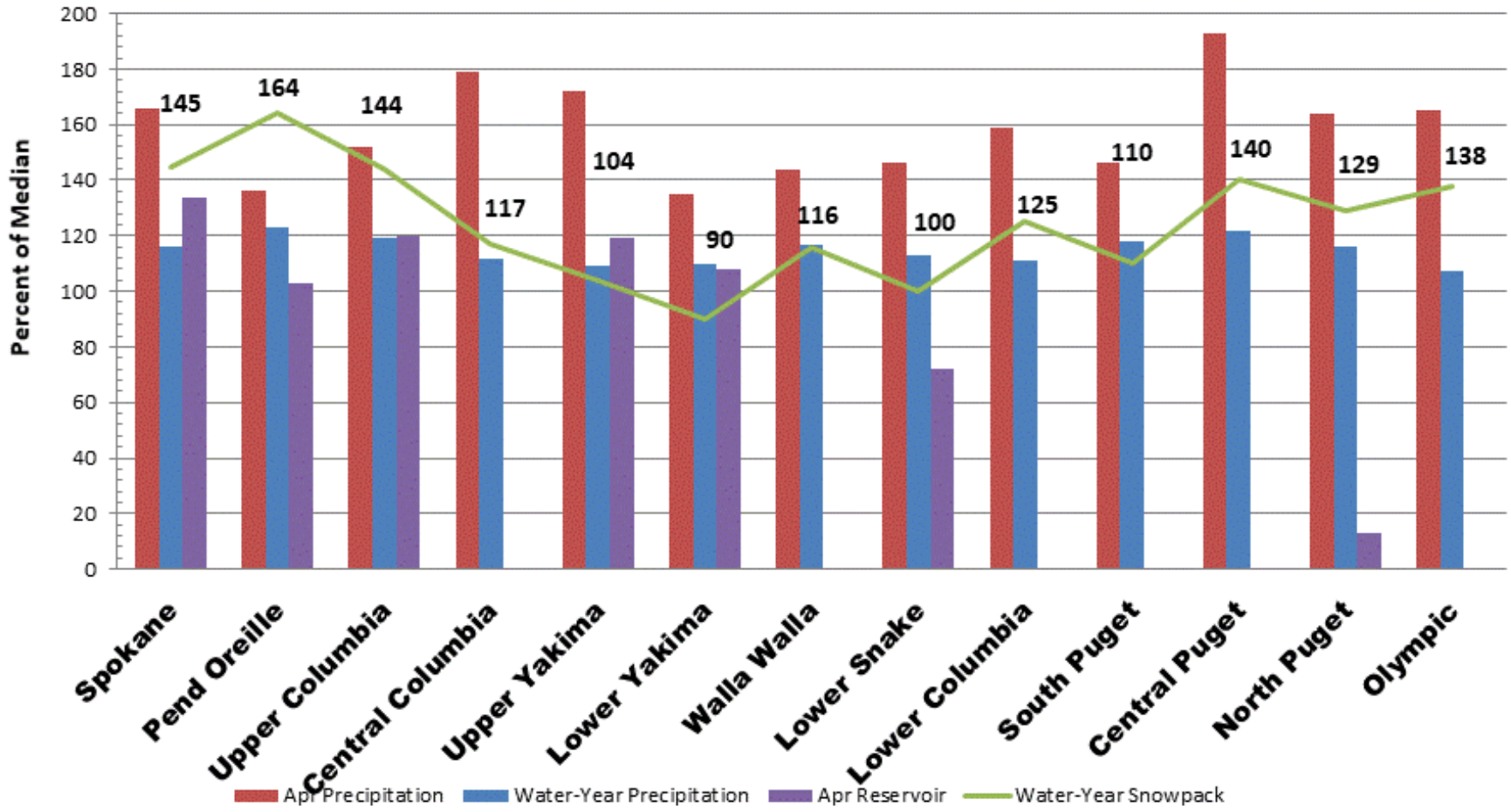
Washington:
http://www.nrcs.usda.gov/wps/portal/nrcs/site/wa/home/

NRCS National:
http://www.nrcs.usda.gov/wps/portal/nrcs/site/national/home/

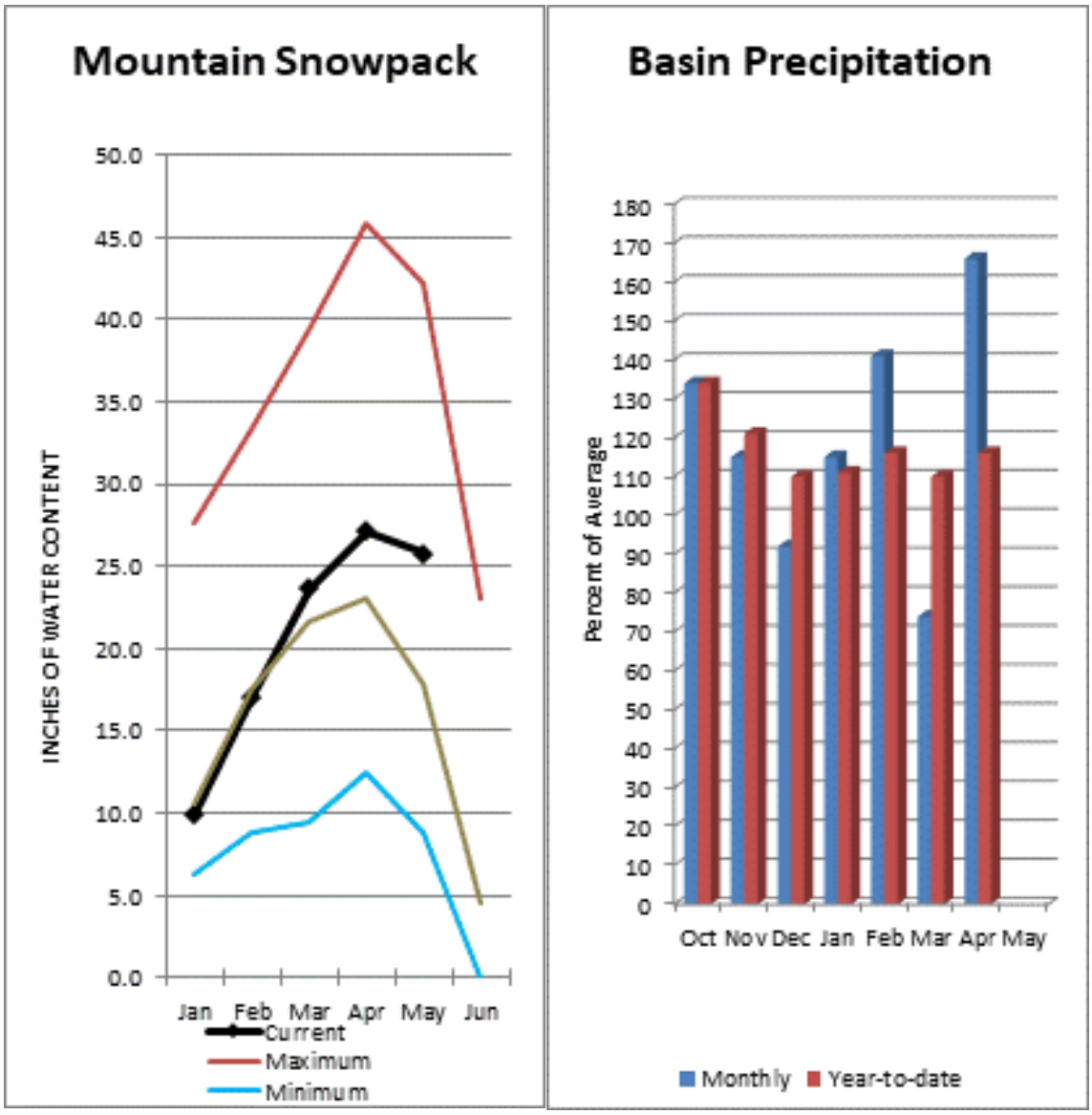
NRCS Natural Resources Conservation Service

May 1, 2018 - Snowpack, Precipitation and Reservoir Conditions at a Glance

(Water Year = October 1 - Current Date)



Spokane River Basin



The May 1 forecasts for summer runoff within the Spokane River Basin are 122% of average near Post Falls and at Long Lake. The Chamokane River near Long Lake forecasted to have 140% of average flows for the May-August period. The forecast is based on a basin snowpack that is 145% of normal and precipitation that is 116% of average for the water year. Precipitation for April was above normal at 166% of average. Streamflow on the Spokane River at Spokane was 142% of average for April. May 1 storage in Coeur d'Alene Lake was 306,200-acre feet, 134% of average and 128% of capacity. Snowpack at Quartz Peak SNOTEL site was 112% of average with 16.1 inches of water content. Average temperatures in the Spokane basin were near normal for April and for the water year.

For more information contact your local Natural Resources Conservation Service office.

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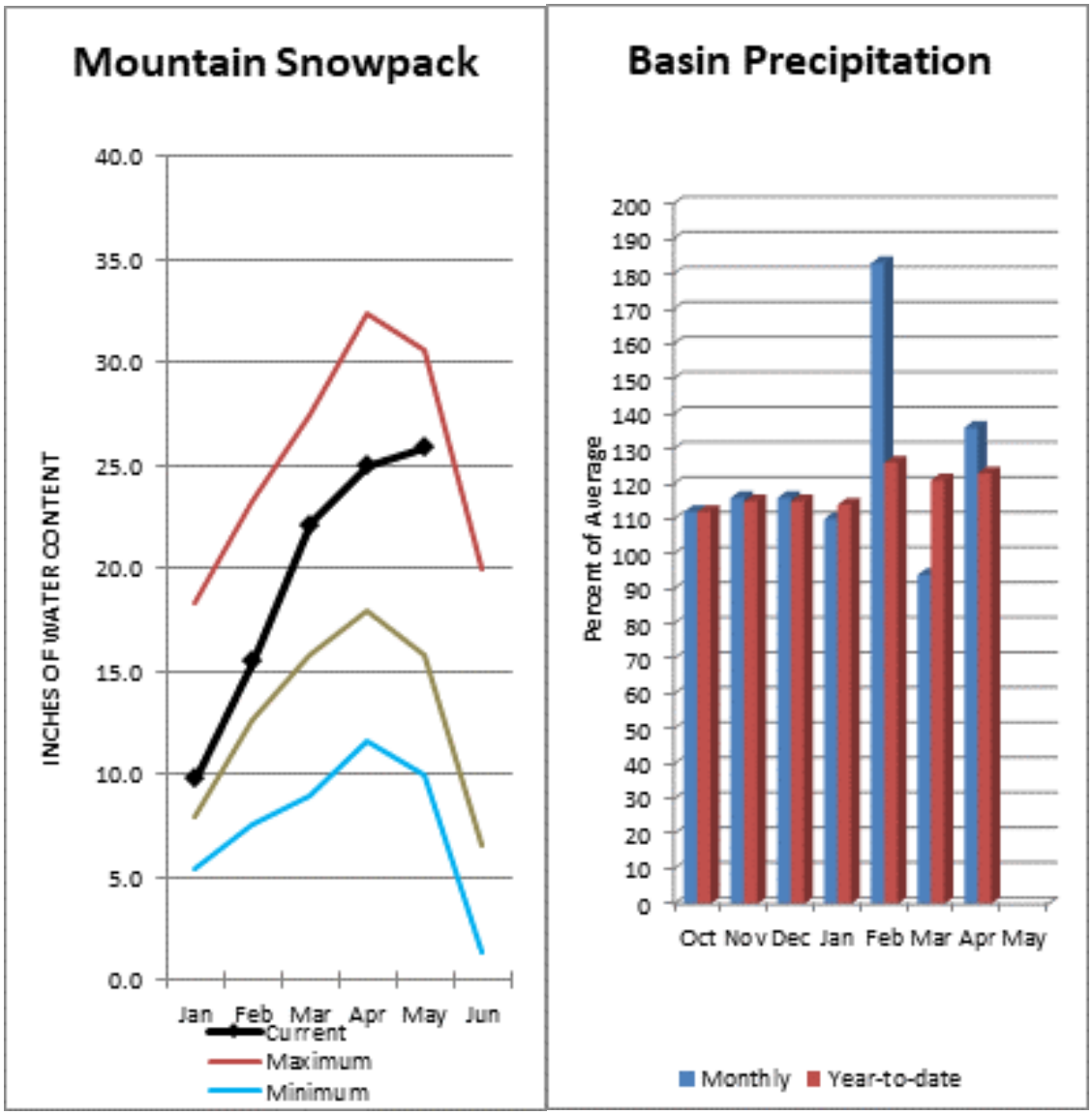
Spokane
Streamflow Forecasts - May 1, 2018

Spokane	Forecast Period	Forecast Exceedance Probabilities for Risk Assessment: Chance that actual volume will exceed forecast — 90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Spokane R nr Post Falls[2]								
	MAY-JUL	1420	1690	1870	122%	2060	2330	1530
	MAY-SEP	1480	1780	1980	122%	2180	2480	1620
Spokane R at Long Lake[2]								
	MAY-JUL	1590	1910	2130	125%	2350	2680	1710
	MAY-SEP	1800	2150	2380	122%	2620	2960	1950
Chamokane Ck nr Long Lake								
	MAY-AUG	8.4	11.1	13	140%	14.8	17.6	9.3

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

Reservoir Storage End of April, 2018	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Lake Coeur d' Alene	306.2	248.0	228.0	238.5
Basin-wide Total	306.2	248.0	228.0	238.5
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis May 1, 2018	# of Sites	% Median	Last Year % Median
Spokane	11	145%	114%
Newman Lake	1	112%	96%



The May – September average forecast for the Priest River near the town of Priest River is 121% and the Pend Oreille at Box canyon is 146%. April streamflow was 123% of average on the Pend Oreille River and 90% on the Columbia at Birchbank. May 1 snow cover was 164% of normal in the Pend Oreille Basin River Basin. Bunchgrass Meadows SNOTEL site had 36.1 inches of snow water on the snow pillow. Normally Bunchgrass would have 23.6 inches on May 1. Precipitation during April was 136% of average, bringing the year-to-date precipitation to 123% of average. Reservoir storage in the basin, including Lake Pend Oreille and Priest Lake was 103% of normal. Average temperatures were near normal for the month and the water year.

For more information contact your local Natural Resources Conservation Service office.

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Pend Oreille Basins
Streamflow Forecasts - May 1, 2018

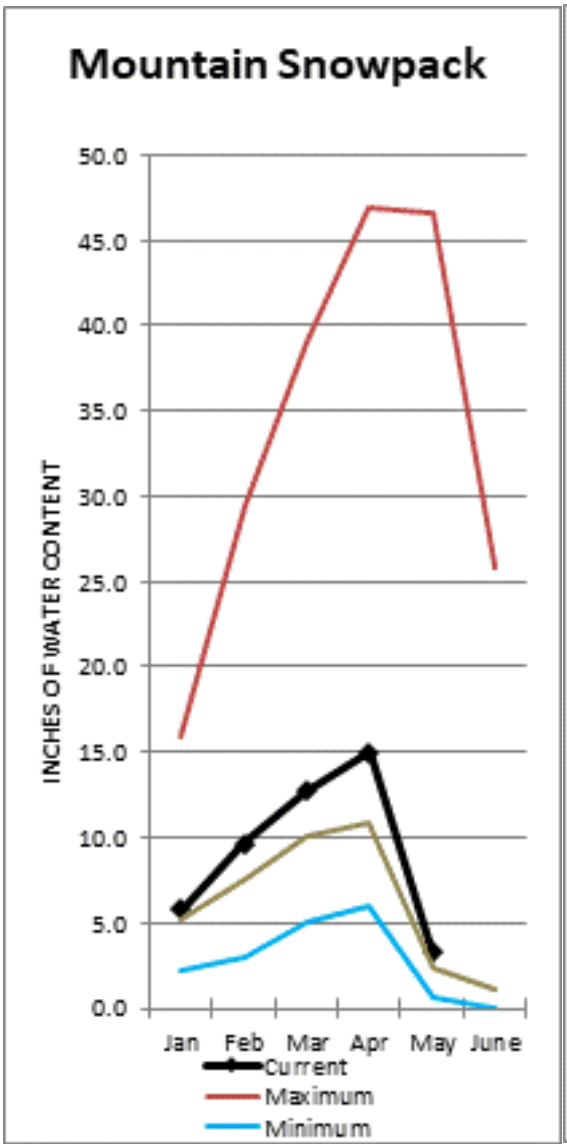
Pend Oreille Basins	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
		Forecast Exceedance Probabilities for Risk Assessment Chance that actual volume will exceed forecast						
Pend Oreille Lake Inflow[2]								
	MAY-JUL	12500	13500	14100	146%	14800	15700	9690
	MAY-SEP	13700	14800	15600	146%	16300	17400	10700
Priest R nr Priest River[2]								
	MAY-JUL	600	665	710	122%	755	820	580
	MAY-SEP	635	710	765	121%	815	890	630
Pend Oreille R bl Box Canyon[2]								
	MAY-JUL	12600	13600	14200	146%	14900	15800	9750
	MAY-SEP	13900	15000	15800	146%	16500	17600	10800

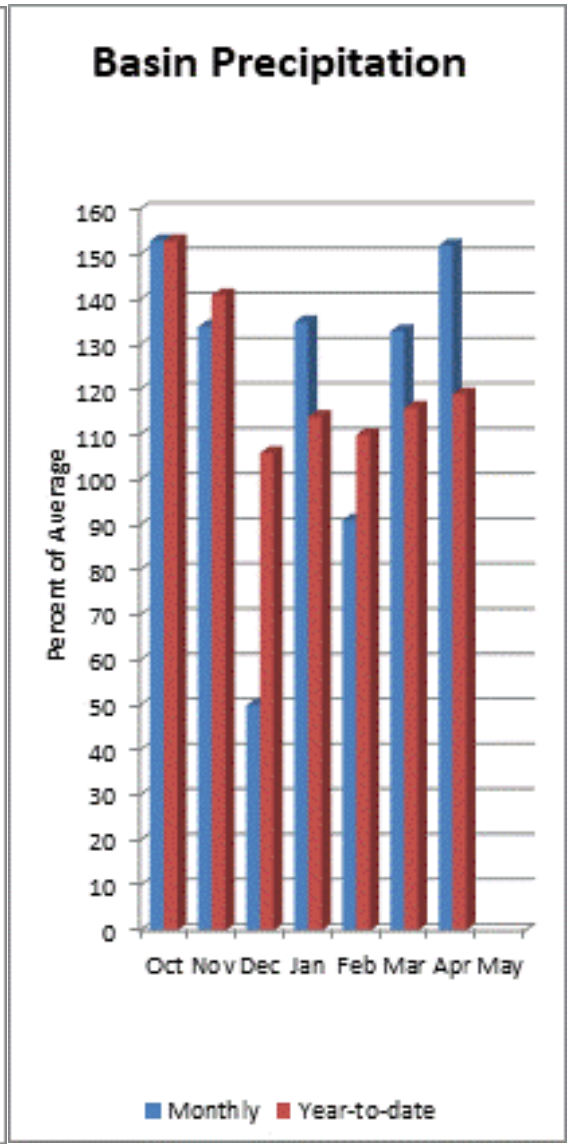
1) 90% and 10% exceedance probabilities are actually 95% and 5%
2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions
3) Median value used in place of average

Reservoir Storage End of April, 2018	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Lake Pend Oreille	959.7	953.4	931.7	1561.3
Priest Lake	105.0	113.5	101.9	119.3
Basin-wide Total	1064.7	1066.9	1033.6	1680.6
# of reservoirs	2	2	2	2

Watershed Snowpack Analysis May 1, 2018	# of Sites	% Median	Last Year % Median
Pend Oreille Basins	66	164%	116%
Colville River	0		
Kettle River	4	182%	135%

Upper Columbia River Basins





Summer runoff average forecast for the Okanogan River is 139%, Similkameen River is 163%, and Methow River is 135%. May 1 snow cover on the Okanogan was 162% of normal, Omak Creek was 153% and the Methow was 129%. April precipitation in the Upper Columbia was 152% of average, with precipitation for the water year at 119% of average. April streamflow for the Methow River was 159% of average, 194% for the Okanogan River and 151% for the Similkameen. Snow-water content at Salmon Meadows SNOTEL was 5.5 inches. This site would normally have no snow be May 1. Combined storage in the Conconully Reservoirs was 19,900 acre-feet or 120% of normal. Temperatures balanced out to near normal for both the month and water year

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Upper Columbia Basins
Streamflow Forecasts - May 1, 2018

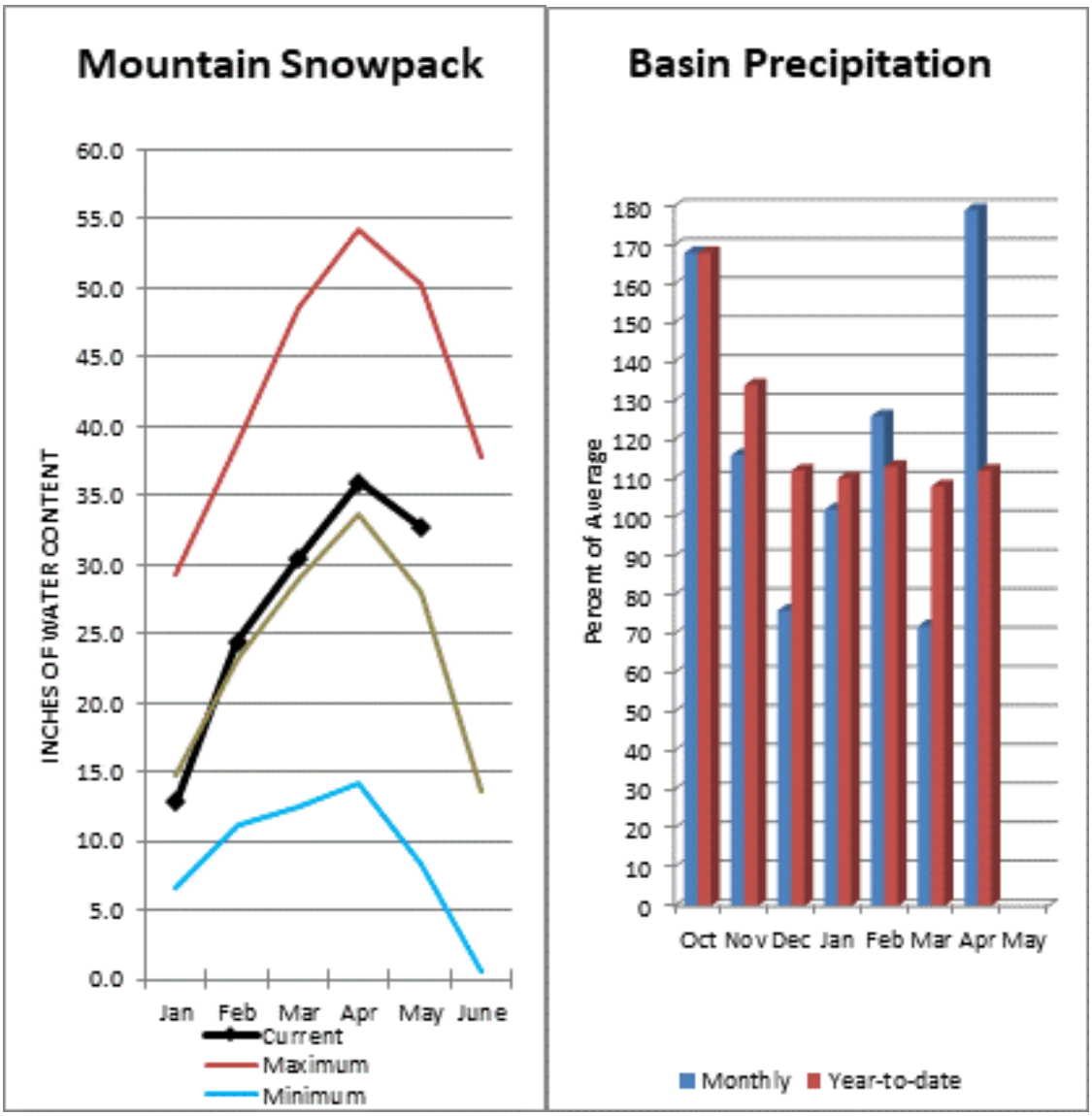
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

Upper Columbia Basins	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Kettle R nr Laurier								
	MAY-JUL	1890	2100	2240	154%	2380	2590	1450
	MAY-SEP	1960	2190	2350	154%	2510	2740	1530
Colville R at Kettle Falls								
	MAY-JUL	64	88	105	146%	122	147	72
	MAY-SEP	73	101	120	143%	139	167	84
Columbia R at Grand Coulee-NWS[2]								
	MAY-JUL	52800		56100	128%		61700	43900
	MAY-SEP	62500		67100	127%		71400	53000
Similkameen R nr Nighthawk								
	MAY-JUL	1510	1650	1740	164%	1830	1970	1060
	MAY-SEP	1620	1770	1860	163%	1960	2110	1140
Okanogan R nr Tonasket								
	MAY-JUL	1430	1620	1750	135%	1880	2070	1300
	MAY-SEP	1570	1800	1960	133%	2120	2350	1470
Okanogan R at Malott								
	MAY-JUL	1450	1650	1780	140%	1920	2120	1270
	MAY-SEP	1600	1840	2000	139%	2160	2400	1440
Methow R nr Pateros								
	MAY-JUL	825	920	985	135%	1050	1150	730
	MAY-SEP	895	995	1070	135%	1140	1240	790

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 April, 2018	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Conconully Lake (Salmon Lake Dam)	9.1	9.6	7.6	10.5
Conconully Reservoir	10.7	11.7	8.9	13.0
Basin-wide Total	19.9	21.4	16.5	23.5
# of reservoirs	2	2	2	2

Watershed Snowpack Analysis May 1, 2018	# of Sites	% Median	Last Year % Median
Upper Columbia Basins	17	145%	131%
Okanogan River	14	162%	149%
Omak Creek	1	153%	165%
Sanpoil River	0		
Similkameen River	5	156%	120%
Toats Coulee Creek	0		
Conconully Lake	1		
Methow River	4	129%	131%



Precipitation during April was 179% of average in the basin and 112% for the year-to-date. Runoff for Entiat River is forecast to be 102% of average for the summer. The May-September average forecast for Chelan River is 113%, Wenatchee River at Plain is 108%, Stehekin River is 111% and Icicle Creek is 110%. April average streamflow on the Chelan River was 110% and on the Wenatchee River 103%. May 1 snowpack in the Wenatchee River Basin was 117% of normal; the Chelan, 121%; Stemilt Creek, 44% and Colockum Creek, 322% at Trough SNOTEL. Reservoir storage in Lake Chelan was not available. Lyman Lake SNOTEL had the most snow water with 67.6 inches of water. This site would normally have 61.2 inches on May 1. Temperatures were near normal for April and near normal for the water year.

For more information contact your local Natural Resources Conservation Service office.

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Central Columbia Basins
Streamflow Forecasts - May 1, 2018

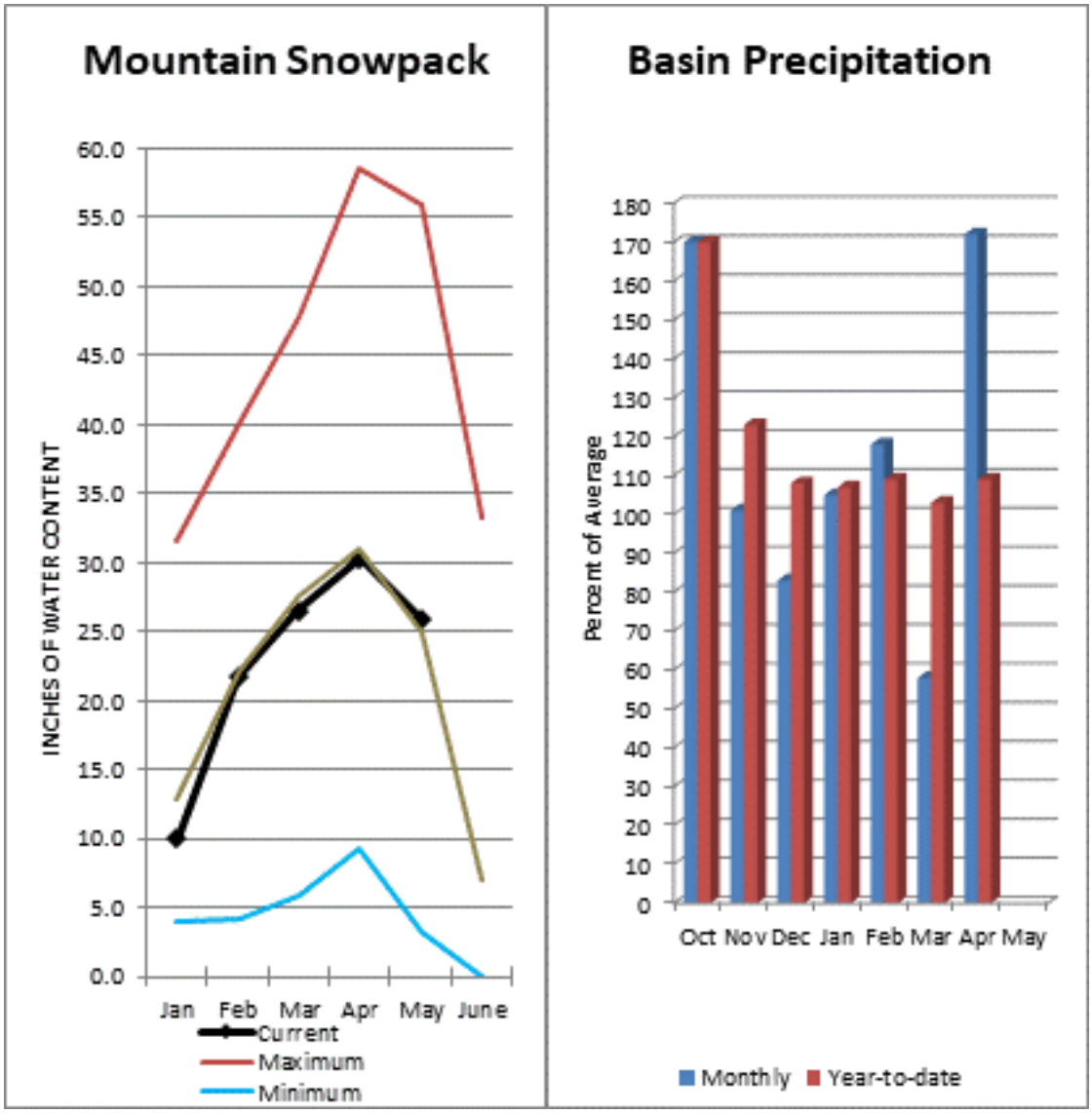
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

Central Columbia Basins	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Stehekin R at Stehekin								
	MAY-JUL	575	630	665	112%	705	760	595
	MAY-SEP	695	750	785	111%	825	880	705
Chelan R at Chelan								
	MAY-JUL	865	930	975	113%	1020	1080	860
	MAY-SEP	980	1050	1100	113%	1150	1220	975
Entiat R nr Ardenvoir								
	MAY-JUL	154	172	185	104%	198	215	178
	MAY-SEP	165	186	200	102%	215	235	196
Wenatchee R at Plain								
	MAY-JUL	760	835	880	107%	930	1000	825
	MAY-SEP	845	925	980	107%	1030	1110	920
Icicle Ck nr Leavenworth								
	MAY-JUL	210	240	255	109%	275	305	235
	MAY-SEP	230	260	285	110%	305	335	260
Wenatchee R at Peshastin								
	MAY-JUL	1060	1150	1210	106%	1280	1370	1140
	MAY-SEP	1180	1290	1360	108%	1430	1540	1260
Columbia R bl Rock Island Dam-NWS[2]								
	MAY-JUL	58200		61800	129%		67900	47900
	MAY-SEP	68400		73200	128%		78600	57400

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 April, 2018	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Lake Chelan			300.7	676.1
Basin-wide Total			0.0	0.0
# of reservoirs	0	0	0	0

Watershed Snowpack Analysis May 1, 2018	# of Sites	% Median	Last Year % Median
Central Columbia Basins	3	121%	120%
Chelan Lake Basin	3	121%	120%
Entiat River	1	0%	94%
Wenatchee River	6	117%	127%
Stemilt Creek	1	44%	162%
Colockum Creek	1	322%	722%



May 1 reservoir storage for the Upper Yakima reservoirs was 722,000-acre feet, 119% of average. Forecasts for the Yakima River at Cle Elum are 104% of average and the Teanaway River near Cle Elum is at 109%. Lake inflows are all forecasted to be near average this summer as well. April streamflow within the basin was Cle Elum River near Roslyn at 112%. May 1 snowpack was 103% based upon 6 snow course and SNOTEL readings within the Upper Yakima Basin. Precipitation was 172% of average for April and 109% for the water-year. Volume forecasts for the Yakima Basin are for natural flow. As such, they may differ from the U.S. Bureau of Reclamation's forecast for the total water supply available, which includes irrigation return flow.

****Due to the devastating fire within the Teanaway and Cle Elum rivers this past summer, streamflow forecasts and thus runoff rates may be greatly affected come spring and summer. Sasse Ridge SNOTEL site was burned through but not lost to the fire. Area hydrology will be adversely changed for quite some time.**

For more information contact your local Natural Resources Conservation Service office.

Upper Yakima River Basin

Data Current as of: 5/4/2018 11:29:54 AM

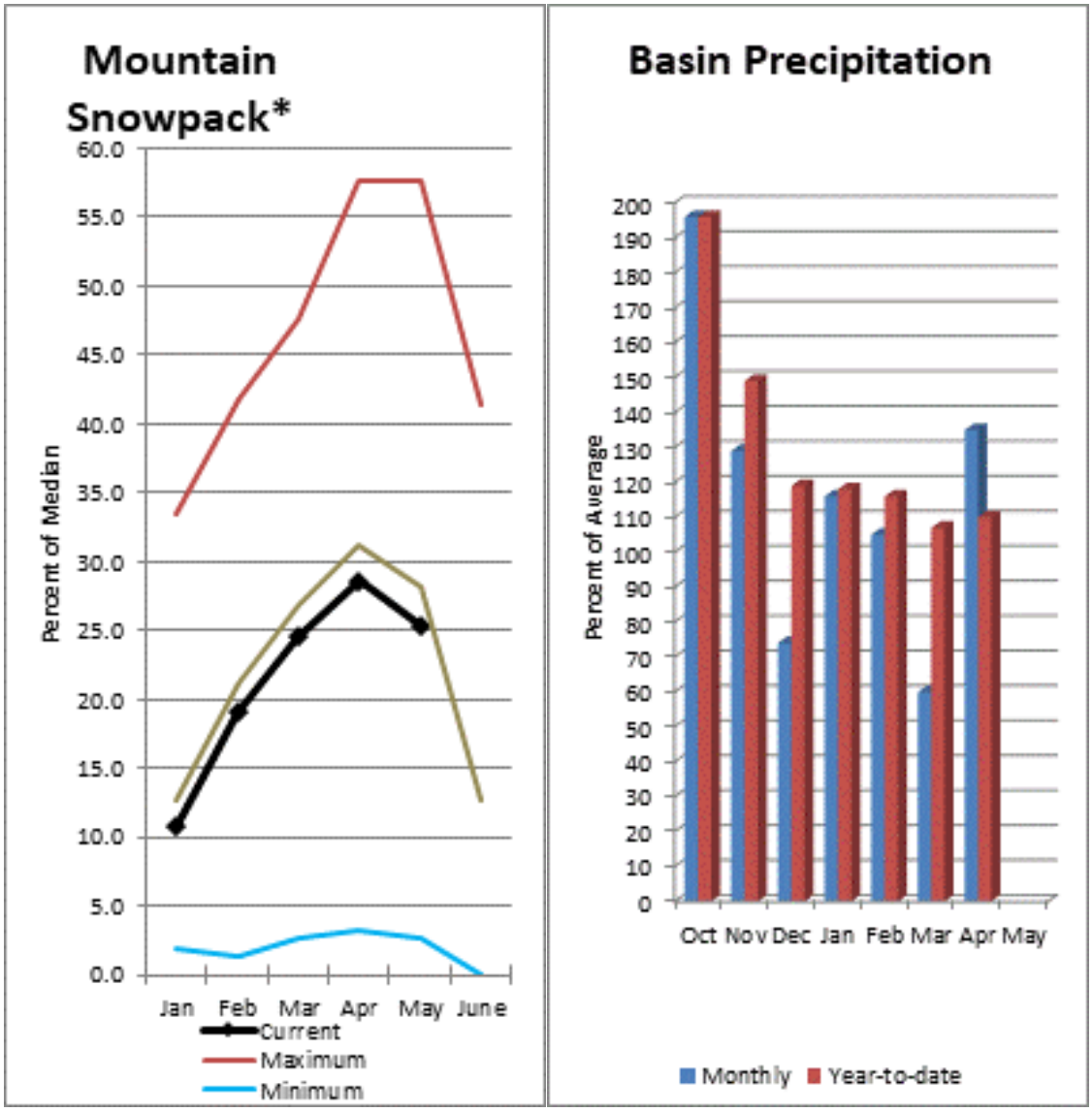
Upper Yakima River
Streamflow Forecasts - May 1, 2018

		Forecast Exceedance Probabilities for Risk Assessment Chance that actual volume will exceed forecast						
Upper Yakima River	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Keechelus Reservoir Inflow[2]								
	MAY-JUL	74	85	93	109%	100	112	85
	MAY-SEP	82	95	104	108%	112	125	96
Kachess Reservoir Inflow [2]								
	MAY-JUL	70	77	82	108%	86	93	76
	MAY-SEP	77	85	90	107%	96	104	84
Cle Elum Lake Inflow [2]								
	MAY-JUL	290	310	325	107%	335	355	305
	MAY-SEP	320	345	360	106%	375	395	340
Yakima R at Cle Elum [2]								
	MAY-JUL	505	560	595	104%	630	685	570
	MAY-SEP	565	630	670	104%	710	770	645
Teanaway R bl Forks nr Cle Elum								
	MAY-JUL	62	77	87	110%	96	111	79
	MAY-SEP	64	79	89	109%	100	115	82

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 April, 2018	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Keechelus	150.9	117.0	122.1	157.8
Kachess	216.5	177.0	183.7	239.0
Cle Elum	354.1	272.9	302.6	436.9
Basin-wide Total	721.6	566.9	608.4	833.7
# of reservoirs	3	3	3	3

Watershed Snowpack Analysis May 1, 2018	# of Sites	% Median	Last Year % Median
Upper Yakima River	6	103%	109%



April average streamflows within the basin were: Yakima River near Parker, 118% and the Naches River near Naches, 124%. May 1 reservoir storage for Bumping and Rimrock reservoirs was 194,000-acre feet, 108% of average. Forecast runoff averages for Yakima River near Parker are 101%; American River near Nile, 100%; Ahtanum Creek, 78%; and Klickitat River near Glenwood, 93%. May 1 snowpack was 90% based upon 6 snow course and SNOTEL readings within the Lower Yakima Basin and Ahtanum Creek reported in at 56% of normal. Precipitation was 135% of average for April and 110% for the water-year. Temperatures were near normal for April and for the water year. Volume forecasts for Yakima Basin are for natural flow. As such, they may differ from the U.S. Bureau of Reclamation's forecast for the total water supply available, which includes irrigation return flow.

****The Norse Peak fire consumed over 55,000 acres in Yakima and Pierce counties as well as destroying the Corral Pass SNOTEL site and threatening Crystal Mtn. Ski Area. Damages are still being assessed.**

For more information contact your local Natural Resources Conservation Service office.

Data Current as of: 5/4/2018 11:30:04 AM

Lower Yakima River
Streamflow Forecasts - May 1, 2018

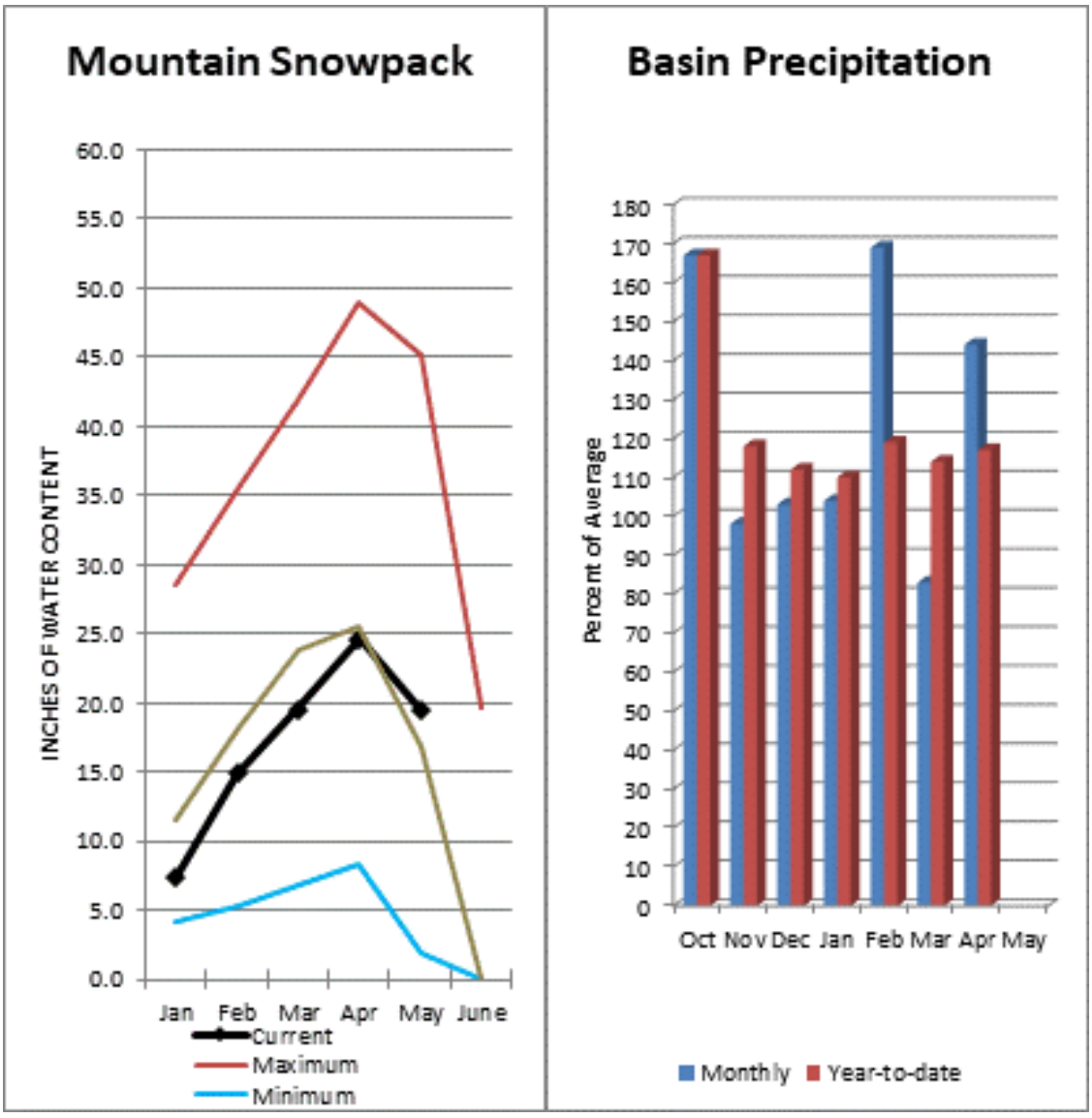
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

Lower Yakima River	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Bumping Lake Inflow [2]								
	MAY-JUL	81	88	93	100%	98	105	93
	MAY-SEP	89	97	103	100%	109	117	103
American R nr Nile								
	MAY-JUL	69	78	84	100%	90	99	84
	MAY-SEP	74	85	92	100%	99	110	92
Rimrock Lake Inflow [2]								
	MAY-JUL	129	139	146	97%	153	163	151
	MAY-SEP	157	170	180	97%	189	200	185
Naches R nr Naches								
	MAY-JUL	425	495	545	101%	590	660	540
	MAY-SEP	465	550	610	102%	665	750	600
Ahtanum Ck at Union Gap								
	MAY-JUL	5	10.4	14.1	73%	17.8	23	19.3
	MAY-SEP	6.7	12.4	16.3	78%	20	26	21
Yakima R nr Parker [2]								
	MAY-JUL	1070	1170	1250	102%	1320	1420	1230
	MAY-SEP	1220	1330	1400	101%	1480	1590	1390
Klickitat R nr Glenwood								
	MAY-JUL	67	80	89	92%	98	112	97
	MAY-SEP	78	92	102	93%	111	125	110
Klickitat R nr Pitt								
	MAY-JUL	240	275	300	98%	325	360	305
	MAY-SEP	320	360	390	99%	420	465	395

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 April, 2018	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Bumping Lake	19.6	25.7	21.7	33.7
Rimrock	174.0	172.1	156.9	198.0
Basin-wide Total	193.6	197.8	178.6	231.7
# of reservoirs	2	2	2	2

Watershed Snowpack Analysis May 1, 2018	# of Sites	% Median	Last Year % Median
Lower Yakima River	6	90%	132%
Ahtanum Creek	2	56%	125%



April precipitation was 144% of average, maintaining the year-to-date precipitation at 117% of average. Snowpack in the basin made a dramatic increase to above average at 116% of normal. Streamflow forecasts are 116% of average for Mill Creek and 112% for the SF Walla Walla near Milton-Freewater. Temperatures remained near normal for the month and for the water year.

For more information contact your local Natural Resources Conservation Service office.

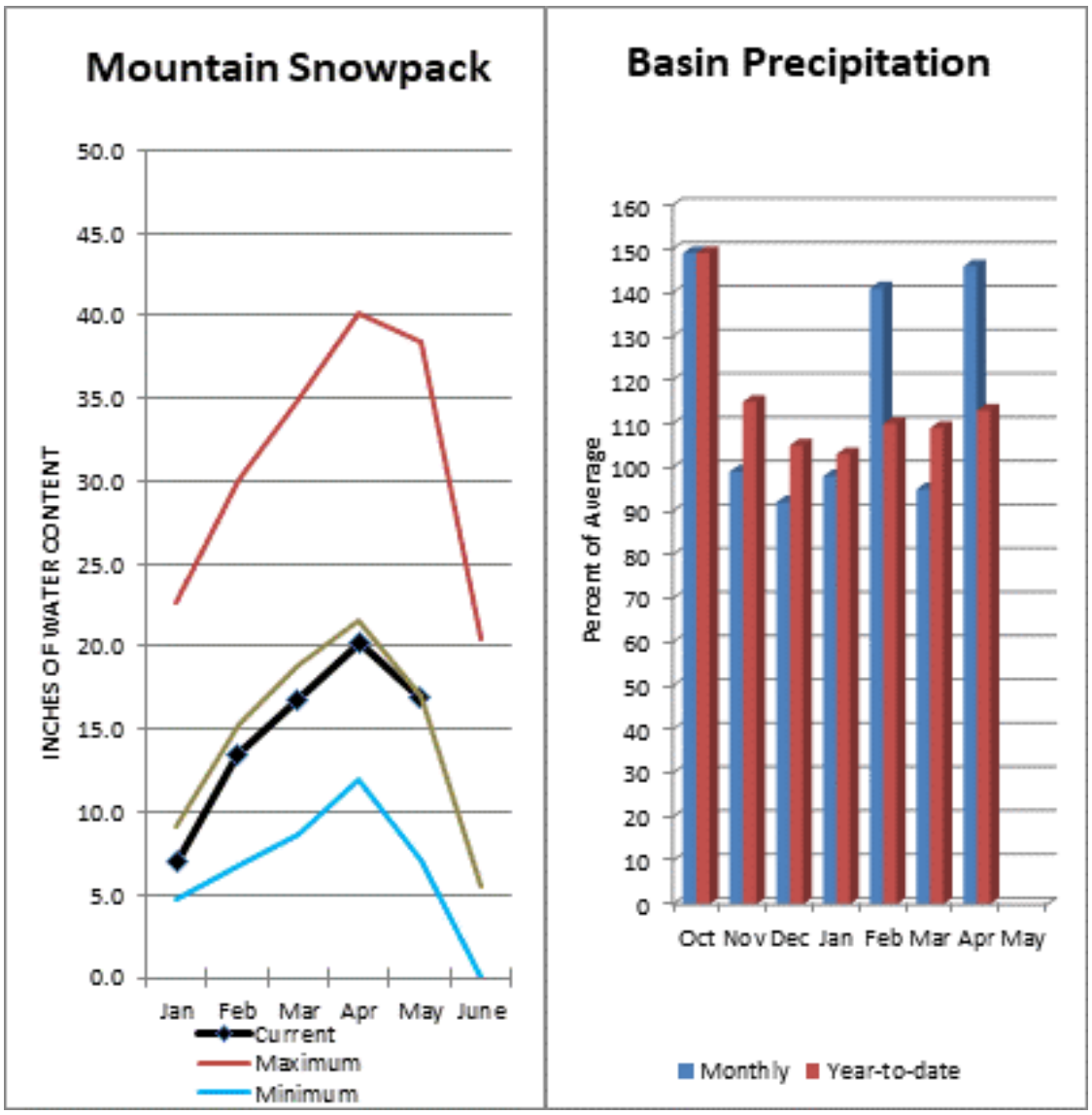
Data Current as of: 5/4/2018 11:30:12 AM

Walla Walla River
Streamflow Forecasts - May 1, 2018

Walla Walla River	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
		Forecast Exceedance Probabilities for Risk Assessment Chance that actual volume will exceed forecast						
SF Walla Walla R nr Milton-Freewater								
	MAY-JUL	32	38	42	114%	45	51	37
	MAY-SEP	45	51	55	112%	59	64	49
Mill Ck nr Walla Walla								
	MAY-JUL	10.9	13.2	14.7	106%	16.3	18.6	13.9
	MAY-SEP	14.2	16.6	18.3	106%	19.9	22	17.3

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

Watershed Snowpack Analysis May 1, 2018	# of Sites	% Median	Last Year % Median
Walla Walla River	2	116%	177%



The Grande Ronde River can expect summer flows to be about 103% of normal. The forecast for Asotin Creek at Asotin predicts 83% of average flows for the May – July runoff period. April precipitation was 146% of average, bringing the year-to-date precipitation to 113% of average. May 1 snowpack readings averaged 100% of normal. April streamflow was 131% of average for Snake River below Lower Granite Dam and 119% for Grande Ronde River near Troy. Dworshak Reservoir storage was 72% of average. Average temperatures were near normal for April for the water year.

For more information contact your local Natural Resources Conservation Service office.

Data Current as of: 5/4/2018 11:30:22 AM

Lower Snake, Grande Ronde, Clearwater Basins
Streamflow Forecasts - May 1, 2018

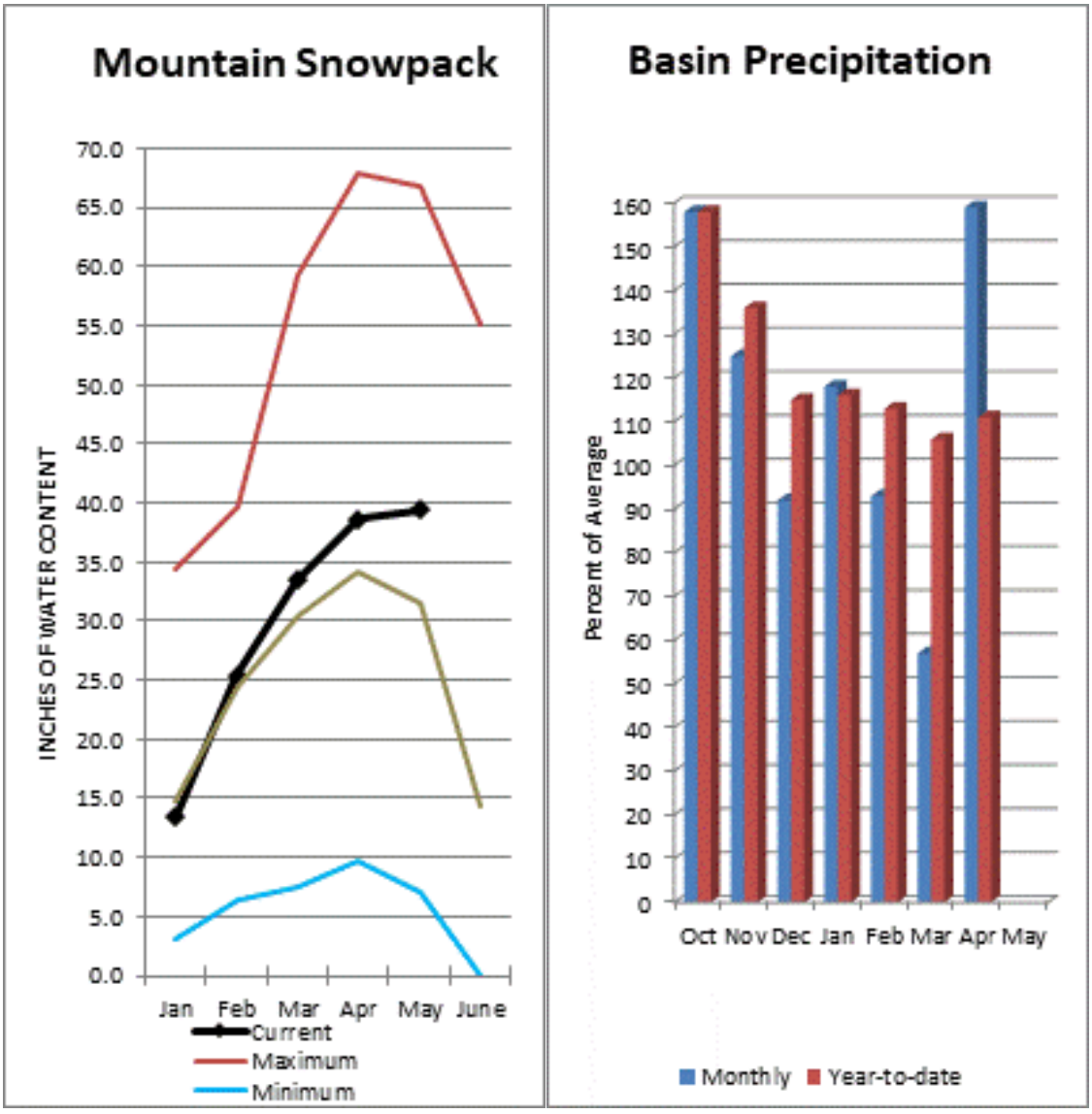
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

Lower Snake, Grande Ronde, Clearwater Basins	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Grande Ronde R at Troy								
	MAY-JUL	645	790	890	103%	985	1130	860
	MAY-SEP	730	875	975	103%	1080	1220	945
Asotin Ck at Asotin								
	MAY-JUL	11.8	16.9	20	83%	24	29	24
Clearwater R at Spalding[2]								
	MAY-JUL	5990	6520	6890	131%	7250	7780	5260
	MAY-SEP	6360	6930	7320	130%	7710	8280	5640
Snake R bl Lower Granite Dam-NWS[2]								
	MAY-JUL	15500		16500	108%		18900	15300
	MAY-SEP	17900		19100	108%		21900	17700

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 April, 2018	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Dworshak Reservoir	1895.8	2303.2	2646.0	3468.0
Basin-wide Total	1895.8	2303.2	2646.0	3468.0
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis May 1, 2018	# of Sites	% Median	Last Year % Median
Lower Snake, Grande Ronde, Clearwater Basins	13	100%	127%



Forecasts for May – September streamflows within the basin are Lewis River at Ariel, 104% and Cowlitz River at Castle Rock, 117% of average. The Columbia at The Dalles is forecasted to have 121% of average flows this summer according to the River Forecast Center. April average streamflow for Cowlitz River was 126% and the Columbia River at The Dalles was 119% of average. April precipitation was 159% of average and the water-year average was 111%. May 1 snow cover for Cowlitz River was 119%, and Lewis River was 131% of normal. Temperatures were near normal during April and for the water year.

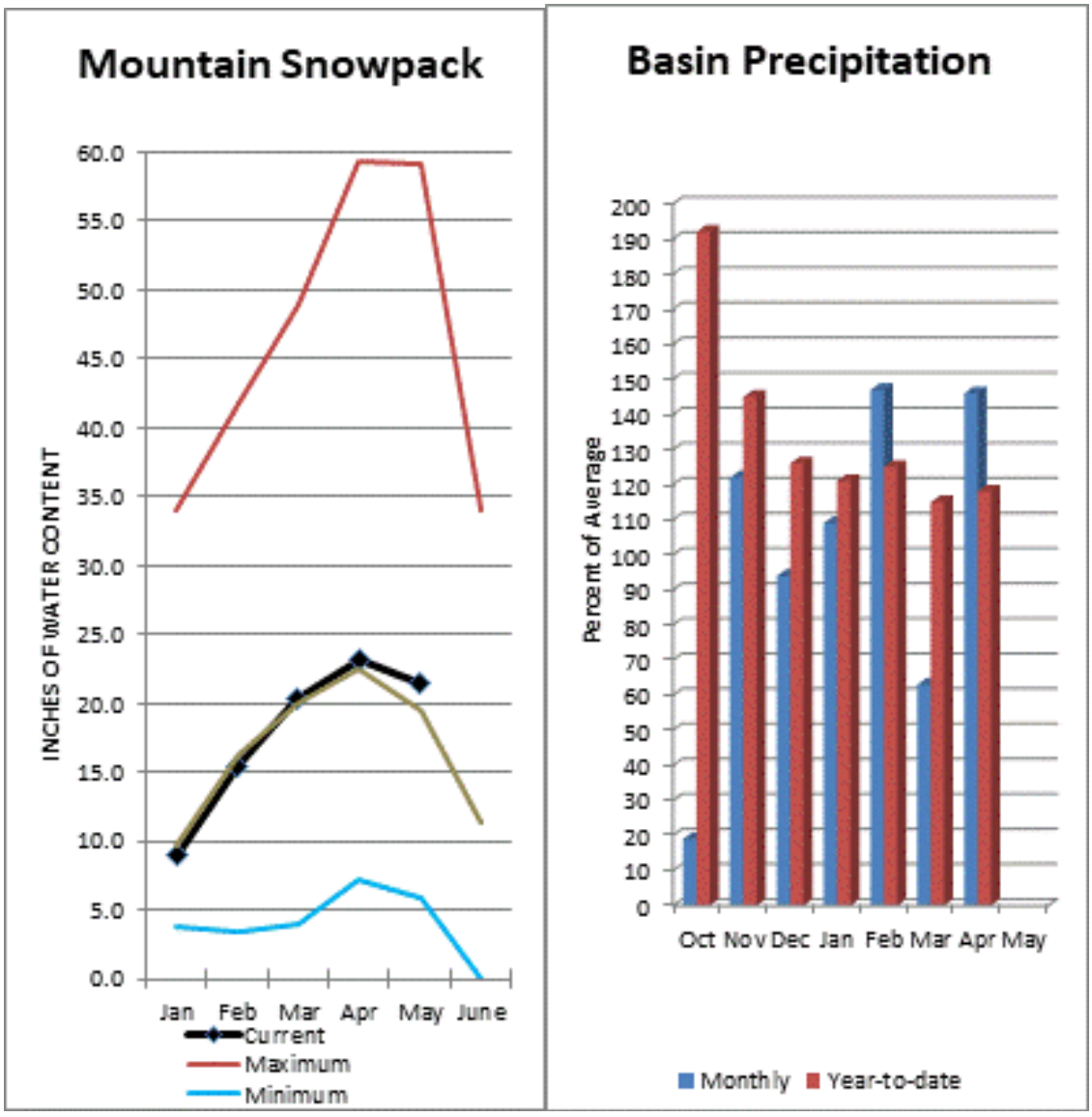
Data Current as of: 5/4/2018 11:30:29 AM

Lower Columbia Basins
Streamflow Forecasts - May 1, 2018

Lower Columbia Basins	Forecast Period	Forecast Exceedance Probabilities for Risk Assessment Chance that actual volume will exceed forecast 90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Columbia R at The Dalles-NWS[2]								
	MAY-JUL	76100		81300	123%		88300	66000
	MAY-SEP	90000		95700	121%		103000	78900
Klickitat R nr Glenwood								
	MAY-JUL	67	80	89	92%	98	112	97
	MAY-SEP	78	92	102	93%	111	125	110
Klickitat R nr Pitt								
	MAY-JUL	240	275	300	98%	325	360	305
	MAY-SEP	320	360	390	99%	420	465	395
Lewis R at Ariel[2]								
	MAY-JUL	520	605	665	108%	725	815	615
	MAY-SEP	640	735	800	104%	865	955	770
Cowlitz R bl Mayfiled[2]								
	MAY-JUL	1100	1280	1400	119%	1510	1690	1180
	MAY-SEP	1310	1540	1700	122%	1860	2090	1390
Cowlitz R at Castle Rock[2]								
	MAY-JUL	1520	1720	1860	116%	1990	2190	1600
	MAY-SEP	1860	2070	2220	117%	2370	2580	1890

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

Watershed Snowpack Analysis May 1, 2018	# of Sites	% Median	Last Year % Median
Lower Columbia Basins	11	125%	166%
Lewis River	5	131%	192%
Cowlitz River	6	119%	141%



Summer runoff is forecast to be 85% of normal for the Green River below Howard Hanson Dam and 105% for the White River near Buckley. May 1 snowpack was 111% of average for the White River, 122% for Puyallup River and 92% in the Green River Basin. April precipitation was 63% of average, bringing the water year-to-date to 115% of average for the basins. Average temperatures in the area were below normal for April and near normal for the water-year.

For more information contact your local Natural Resources Conservation Service office.

Data Current as of: 5/4/2018 11:30:37 AM

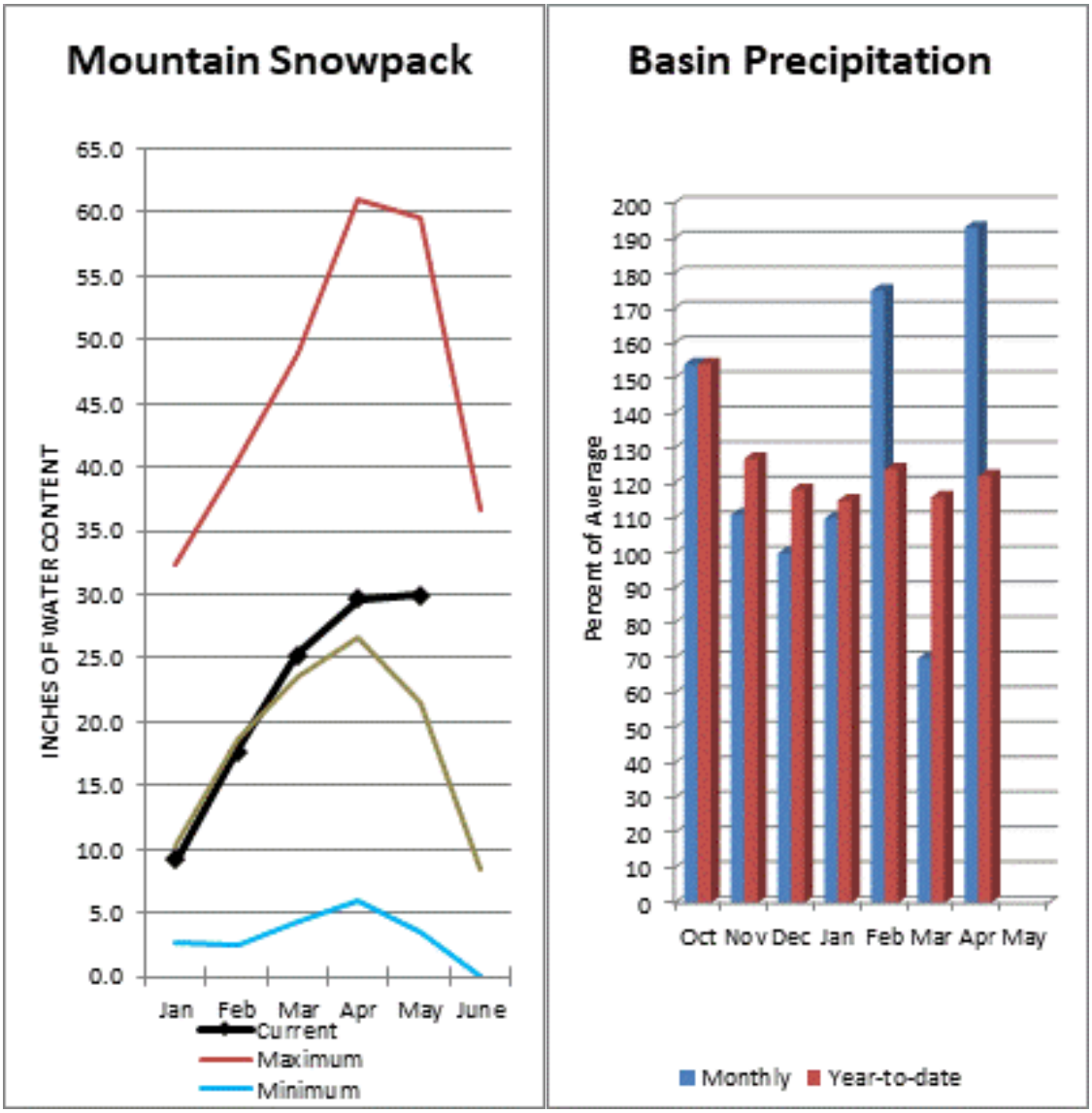
South Puget Sound Basins
Streamflow Forecasts - May 1, 2018

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

South Puget Sound Basins	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
White R nr Buckley[1,2]								
	MAY-JUL	255	320	350	106%	380	450	330
	MAY-SEP	325	405	440	105%	480	560	420
Green R bl Howard A Hanson Dam[1,2]								
	MAY-JUL	75	109	125	82%	141	176	152
	MAY-SEP	91	131	149	85%	167	205	175

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

Watershed Snowpack Analysis May 1, 2018	# of Sites	% Median	Last Year % Median
South Puget Sound Basins	8	110%	125%
White River	2	111%	117%
Green River	2	92%	123%



Forecast for spring and summer flows are: 107% for Cedar River near Cedar Falls; 108% for Rex River; 127% for South Fork of the Tolt River; and 102% for Taylor Creek near Selleck. Basin-wide precipitation for April was 193% of average, bringing water-year-to-date to 122% of average. May 1 median snow cover in Cedar River Basin was 142%, Tolt River Basin was 179%, Snoqualmie River Basin was 135%, and Skykomish River Basin was 143%. Temperatures were near normal for April and near normal for the water-year.

For more information contact your local Natural Resources Conservation Service office.

Data Current as of: 5/4/2018 11:30:45 AM

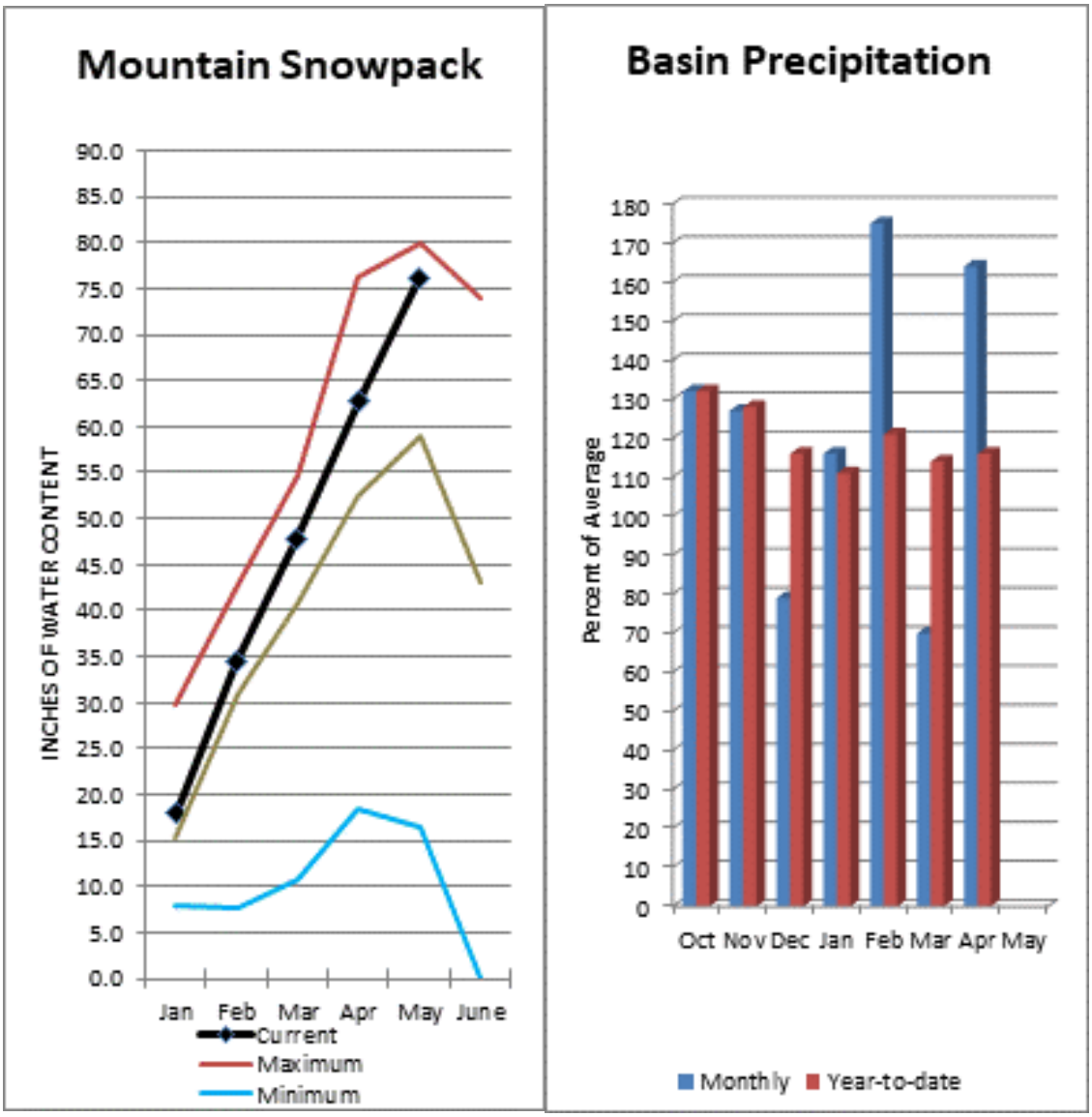
Central Puget Sound Basins
Streamflow Forecasts - May 1, 2018

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

Central Puget Sound Basins	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Cedar R nr Cedar Falls								
	MAY-JUL	44	50	54	110%	58	65	49
	MAY-SEP	48	55	60	107%	65	73	56
Rex R nr Cedar Falls								
	MAY-JUL	13.3	16	17.8	110%	19.7	22	16.2
	MAY-SEP	14.5	17.8	20	108%	22	25	18.5
Taylor Ck nr Selleck								
	MAY-JUL	11.3	12.8	13.7	103%	14.7	16.1	13.3
	MAY-SEP	14.2	16	17.2	102%	18.5	20	16.9
SF Tolt R nr Index								
	MAY-JUL	10.5	12.5	13.9	134%	15.3	17.3	10.4
	MAY-SEP	11.2	13.8	15.6	127%	17.4	20	12.3

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

Watershed Snowpack Analysis May 1, 2018	# of Sites	% Median	Last Year % Median
Central Puget Sound Basins	12	140%	141%
Puyallup River	4	122%	133%
Cedar River	4	142%	167%
Tolt River	2	179%	167%
Snoqualimie River	4	135%	131%
Skykomish River	2	143%	130%



Forecast for Skagit River streamflow at Newhalem is 116% of average for the spring and summer period. April streamflow in Skagit River was 121% of average. Other forecast points included Baker River at 110% and Thunder Creek at 103% of average. Basin-wide precipitation for April was 164% of average, bringing water-year-to-date to 116% of average. May 1 average snow cover in Skagit River Basin was 130% and the Nooksack River Basin was 127%. May 1 Skagit River reservoir storage was drawn down below gauge height as Seattle City Light prepares for spring Steelhead Shaping, where river flows are closely regulated to support spawning season. Average temperatures were near normal for April and for the water year.

For more information contact your local Natural Resources Conservation Service office.

Data Current as of: 5/4/2018 11:30:55 AM

North Puget Sound Basins
Streamflow Forecasts - May 1, 2018

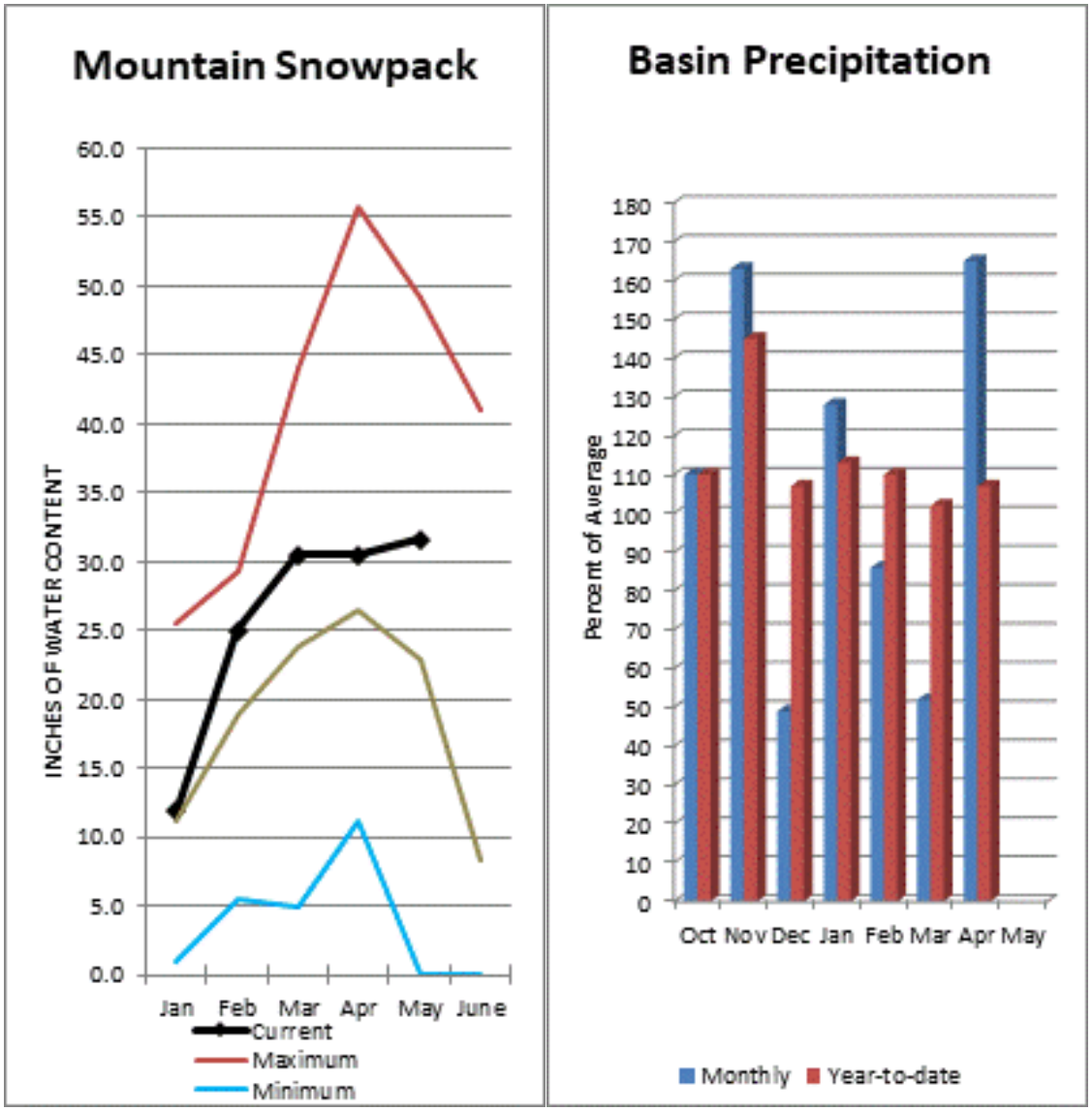
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

North Puget Sound Basins	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Thunder Ck nr Newhalem								
	MAY-JUL	186	205	215	102%	230	250	210
	MAY-SEP	275	300	315	103%	330	350	305
Skagit R at Newhalem[2]								
	MAY-JUL	1540	1640	1710	120%	1770	1870	1420
	MAY-SEP	1850	1970	2060	116%	2140	2260	1770
Baker R at Concrete								
	MAY-JUL	555	630	680	107%	730	800	635
	MAY-SEP	715	835	915	110%	990	1110	835

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 April, 2018	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Ross	101.0	433.0	754.4	1404.1
Diablo Reservoir		85.3	85.9	90.6
Basin-wide Total	101.0	433.0	754.4	1404.1
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis May 1, 2018	# of Sites	% Median	Last Year % Median
North Puget Sound Basins	17	129%	119%
Skagit River	15	130%	123%
Baker River	0		
Nooksack River	2	127%	110%



Forecasted average runoff for streamflow for the Dungeness River is 108% and Elwha River is 110% April runoff in the Dungeness River was 116% of normal. Big Quilcene and Wynoochee rivers may expect near average runoff this summer as well. April precipitation was 165% of average. Precipitation has accumulated at 107% of average for the water year. Both Waterhole SNOTEL and Sequim 2E COOP stations set new record highs for April precipitation. Olympic Peninsula snowpack averaged 138% of normal on May 1. Temperatures were below average for April and near normal for the water year.

For more information contact your local Natural Resources Conservation Service office.

Data Current as of: 5/4/2018 11:31:04 AM

Olympic Penninsula
Streamflow Forecasts - May 1, 2018

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

Olympic Penninsula	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Dungeness R nr Sequim								
	MAY-JUL	89	100	107	106%	114	125	101
	MAY-SEP	113	126	135	108%	144	157	125
Elwha R at McDonald Br nr Port Angeles								
	MAY-JUL	305	330	350	109%	370	395	320
	MAY-SEP	370	405	430	110%	450	485	390

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

Watershed Snowpack Analysis May 1, 2018	# of Sites	% Median	Last Year % Median
Olympic Penninsula	6	138%	135%

Issued by

Leonard Jordan
Acting Chief
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U.S. Department of Agriculture

Released by

Roylene Rides-at-the-Door
State Conservationist
Natural Resources Conservation Service
Spokane, Washington

The Following Organizations Cooperate with the Natural Resources Conservation Service in Snow Survey Work*:

Canada	Snow Survey Network Program – British Columbia Ministry of Environment
	River Forecast Center – British Columbia Ministry of Forests, Lands and Natural Resource Operations
State	Washington State Department of Ecology
	Washington State Department of Natural Resources
Federal	Department of the Army
	Corps of Engineers
	U.S. Department of Agriculture
	Forest Service
	U.S. Department of Commerce
	NOAA, National Weather Service
	U.S. Department of Interior
	Bonneville Power Administration
	Bureau of Reclamation
	Geological Survey
	National Park Service
	Bureau of Indian Affairs
Local	City of Tacoma
	City of Seattle
	City of Bellingham
	Chelan County P.U.D.
	Pacific Power/PacificCorp
	Puget Sound Energy
	Washington Water Power Company
	Snohomish County P.U.D.
	Colville Confederated Tribes
	Spokane County
	Yakama Indian Nation
	Whatcom County
	Pierce County
	Kalispel Tribe of Indians
	Spokane Indian Tribe
	Jamestown S'Klallam Tribe
Private	Okanogan Irrigation District
	Wenatchee Heights Irrigation District
	Newman Lake Homeowners Association
	Whitestone Reclamation District
	Kinross Mining

***Other organizations and individuals furnish valuable information for the snow survey reports. Their cooperation is gratefully acknowledged.**

Washington Snow Survey Office
2005 E. College Way, Suite 203
Mount Vernon, WA 98273-2873

Washington Water Supply Outlook Report

Natural Resources Conservation Service
Spokane, WA

United States Department of Agriculture

NRCS Natural Resources Conservation Service

Washington
Water Supply Outlook Report
June 1, 2018

Flooded Kettle River, Stevens County, WA, May 11, 2018 – Bart Ausland, NRCS Colville, WA

Water Supply Outlook Reports
and
Federal - State – Private Cooperative Snow Surveys

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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 it 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 prepare runoff forecasts. These forecasts are coordinated between hydrologists in the Natural Resources Conservation Service and the National Weather Service. Unless otherwise specified, all forecasts are for flows that would occur naturally without any upstream influences.

Forecasts of any kind, of course, 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 uncertain 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.

Washington
Water Supply Outlook

June 2018

General Outlook

When the snow started to melt it came like a freight train rolling downhill without brakes. Above normal temperatures and dry, sunny skies caused major flooding along rivers in North Central Washington. Some to say it was the worst flooding since 1972 when locals were convinced to fortify and build additional flood protection, which most likely helped reduce damage this year. Most current forecast through mid-June shows most probability for below normal temperatures and near to slightly above normal precipitation with a trend towards warm and dry by the end of the month. Overall 1-month forecast for June is for above normal temperatures and below normal precipitation. Guiding us through spring and into summer, NWS 3-month (JJA) forecast indicates greatest chances for continuance of warm and dry. http://www.cpc.ncep.noaa.gov/ Also attached to this report is a copy of the North Cascades National Park 2018 Spring Glacier Page, please direct any questions or comments regarding the Glacier Page to the contacts listed at the top of the Page.

Snowpack

The June 1 statewide SNOTEL readings were 97% of normal, with the caveat that only 25 of 72 sites had snow remaining. The following basin percentages may be based on as few as 1 or 2 SNOTEL sites so may not provide a valid measure of conditions. Extended warm weather forced record snow melt statewide. Westside medians from SNOTEL, and June 1 snow surveys, included the North Puget Sound river basins with 83% of normal, the Central Puget river basins with 84%, the South Puget Sound at 84% and the Lower Columbia basins with 108% of normal. Snowpack along the east slopes of the Cascade Mountains included the Yakima area with 60% and the Wenatchee area with 82%. Only 2 sites out of 20 in the Spokane Basin are holding on to 103% of normal snowpack.

BASIN	PERCENT OF MEDIAN	LAST YEAR PERCENT MEDIAN
Spokane	103	125
Newman Lake	0	0
Pend Oreille	108	130
Okanogan	77	190
Methow	88	136
Omak	0	0
Wenatchee	82	123
Upper Yakima	49	94
Lower Yakima	72	118
Ahtanum Creek	0	0
Walla Walla	43 (POR)	136 (POR)
Lower Snake	65	161
Cowlitz	94	166
Lewis	131	338
White	98	129
Green	17	82
Puyallup	98	129
Cedar	0	0
Snoqualmie	83	113
Skykomish	128	149
Skagit	74	124
Nooksack	96	114
Olympic Peninsula	117	199

Precipitation

May was a very dry month for most of the state though water year averages remain near to above normal. June Lake SNOTEL, quite often the wettest location in the state, only recorded 0.6 inches of rain or 7% of the long-term average. Where-as Upper Wheeler, a dry site, recorded 178% in the Wenatchee basin which was only 59% basin wide.

RIVER BASIN	MAY PERCENT OF AVERAGE	WATER YEAR PERCENT OF AVERAGE
Spokane	67	112
Pend Oreille	84	119
Upper Columbia	44	112
Central Columbia	59	110
Upper Yakima	60	106
Lower Yakima	42	106
Walla Walla	76	114
Lower Snake	92	111
Lower Columbia	26	106
South Puget Sound	43	113
Central Puget Sound	44	117
North Puget Sound	29	112
Olympic Peninsula	20	102

Reservoir

Seasonal reservoir levels in Washington can vary greatly due to specific watershed management practices required in preparation for irrigation season, fisheries management, power generation, municipal demands and flood control. June 1 Reservoir storage in the Yakima Basin was 830,000-acre feet, 115% of average for the Upper Reaches and 223,000-acre feet or 103% of average for Rimrock and Bumping Lakes. Both basins are at or near full capacity. The power generation reservoirs included the following: Coeur d'Alene Lake, 386,000-acre feet, 145% of average and 162% of capacity. Skagit River reservoirs have refilled to near capacity and 112% of normal for this date. Recent climate impacts and management procedures June affect these numbers on a daily or weekly basis.

BASIN	PERCENT OF CAPACITY	CURRENT STORAGE AS PERCENT OF AVERAGE
Spokane	162	145
Pend Oreille	110	126
Upper Columbia	97	124
Central Columbia	N/A	N/A
Upper Yakima	100	115
Lower Yakima	96	103
Lower Snake	90	100
North Puget Sound	112	83

For more information contact your local Natural Resources Conservation Service office.

Streamflow

A tricky set of forecasts for June with heavy melt and runoff in May skewing the seasonal runoff earlier than “normal”. Positive temperature anomalies across the region in May and well above median snowpack led to historic flooding along the Canadian border. What was a near too much above median snowpack on May 1 is gone in all but the highest elevations, with most streams coming off their peaks and in full recession. The outlook for the summer streamflow is not nearly as abundant as it was just one month ago. Many rivers east of the Cascades in Washington saw record May volumes, including the mainstem of the Columbia which has >80 years of record at most gages. The robust May runoff will be at the expense of streamflow for the remainder of the spring and summer. June-September forecasts for some Western Washington streams include the Cedar River near Cedar Falls, 81%; White River, 71%; and Skagit River, 102%. Some Eastern Washington streams include the Yakima River near Parker 71%, Wenatchee River at Plain 83%; and Spokane River near Post Falls 62%. Volumetric forecasts are developed using current, historic and average snowpack, precipitation and streamflow data collected and coordinated by organizations cooperating with NRCS.

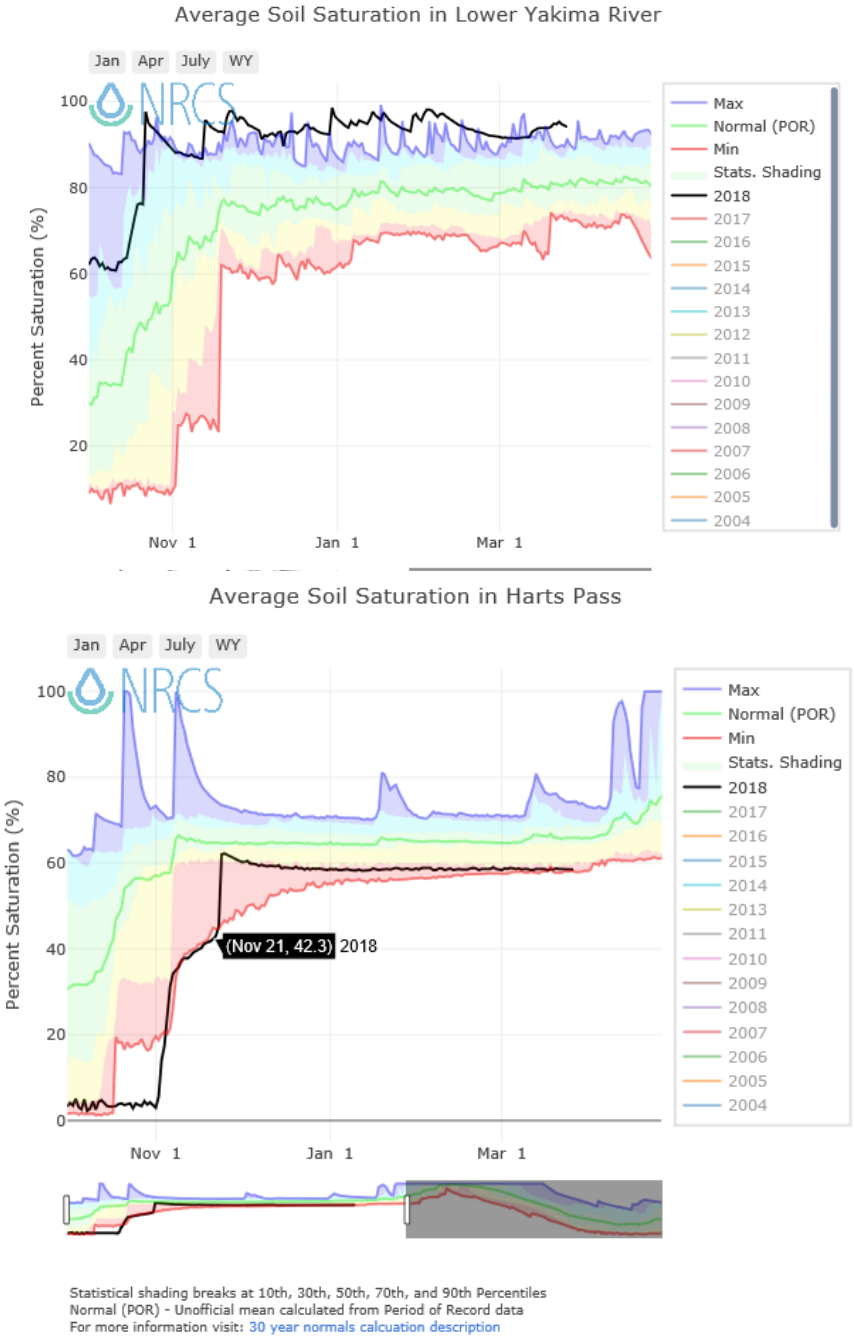
BASIN	PERCENT OF AVERAGE (50 PERCENT CHANCE OF EXCEEDENCE)
Spokane	62-78
Pend Oreille River	116-129
Upper Columbia	68-93
Central Columbia	73-93
Upper Yakima	62-72
Lower Yakima	58-76
Walla Walla	55-100
Lower Snake	57-90
Lower Columbia	58-96
South Puget Sound	71-73
Central Puget Sound	81-96
North Puget Sound	90-105
Olympic Peninsula	74-84

STREAM	PERCENT OF AVERAGE MAY STREAMFLOWS
Pend Oreille at Albeni Fall Dam	206
Kettle at Laurier	223
Columbia at Birchbank	184
Spokane at Spokane	150
Similkameen at Nighthawk	271
Okanogan at Tonasket	265
Methow at Pateros	247
Chelan at Chelan	195
Wenatchee at Pashastin	172
Cle Elum near Roslyn	168
Yakima at Parker	142
Naches at Naches	137
Grande Ronde at Troy	106
Snake below Lower Granite Dam	149
Columbia River at The Dalles	167
Lewis at Merwin Dam	85
Cowlitz below Mayfield Dam	100
Skagit at Concrete	157
Dungeness near Sequim	151

Soil Moisture

Current soil moisture data is available from a limited number of SNOTEL sites scattered throughout each basin. As the effort continues to install additional sensors and more years of data are acquired this information will become invaluable to the streamflow forecasting community.

Following are example graphs depicting new products that we hope to have available system wide very soon. Along with soils products there will be like graphs for snowpack, precipitation and temperature. Currently they only utilize daily SNOTEL data however there are plans for monthly products that will use manual snow course and coop precipitation data. Graphs are interactive and user friendly.



Natural Resources Conservation Service

Washington State
Snow, Water and Climate Services

Program Contacts

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Helpful Internet Addresses

NRCS Snow Survey and Climate Services Homepages

Washington:
http://www.nrcs.usda.gov/wps/portal/nrcs/main/wa/snow/

Oregon:
http://www.nrcs.usda.gov/wps/portal/nrcs/main/or/snow/

Idaho:
http://www.nrcs.usda.gov/wps/portal/nrcs/main/id/snow/

National Water and Climate Center (NWCC):
http://www.wcc.nrcs.usda.gov

USDA-NRCS Agency Homepages

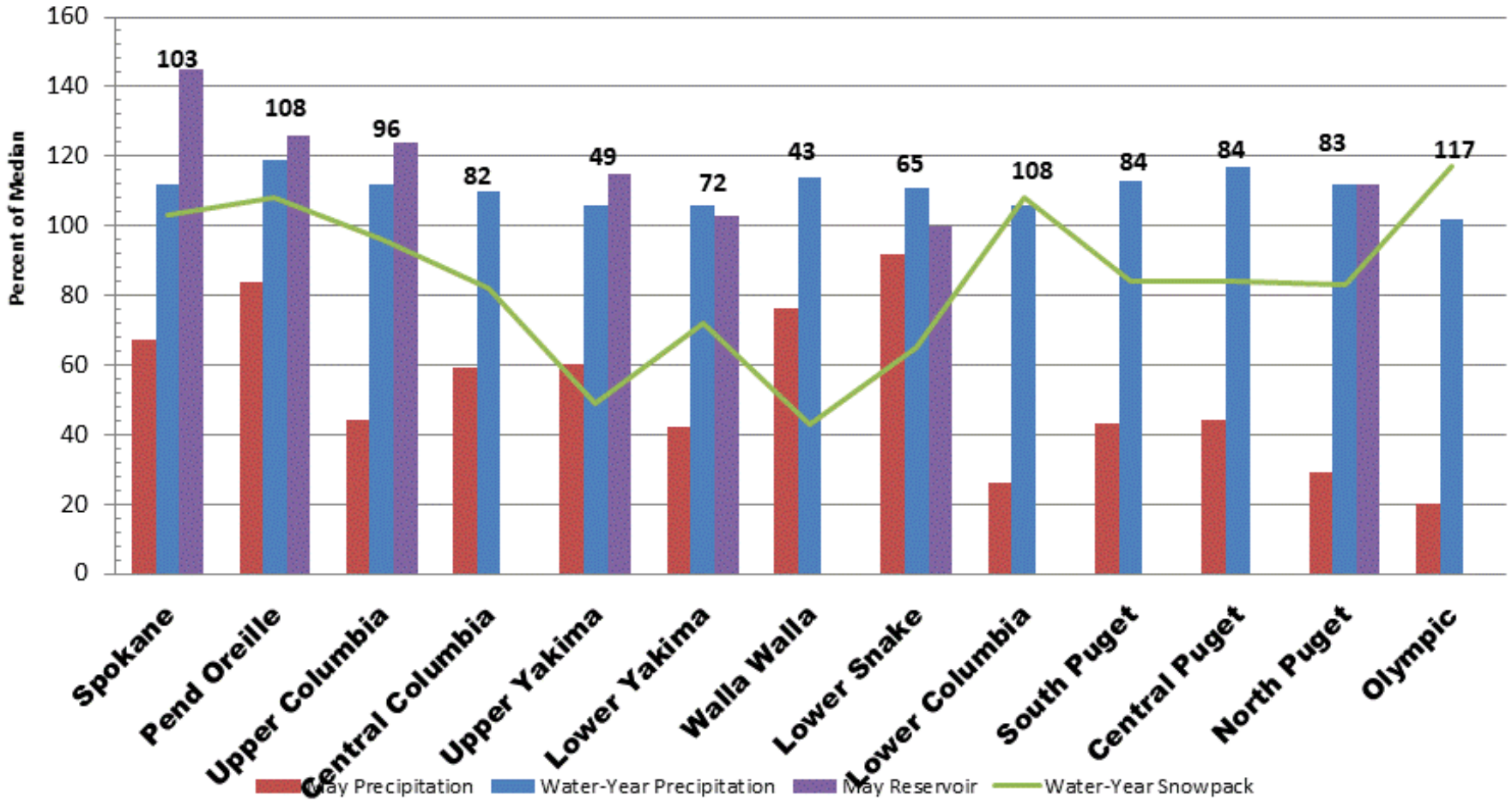
Washington:
http://www.nrcs.usda.gov/wps/portal/nrcs/site/wa/home/

NRCS National:
http://www.nrcs.usda.gov/wps/portal/nrcs/site/national/home/

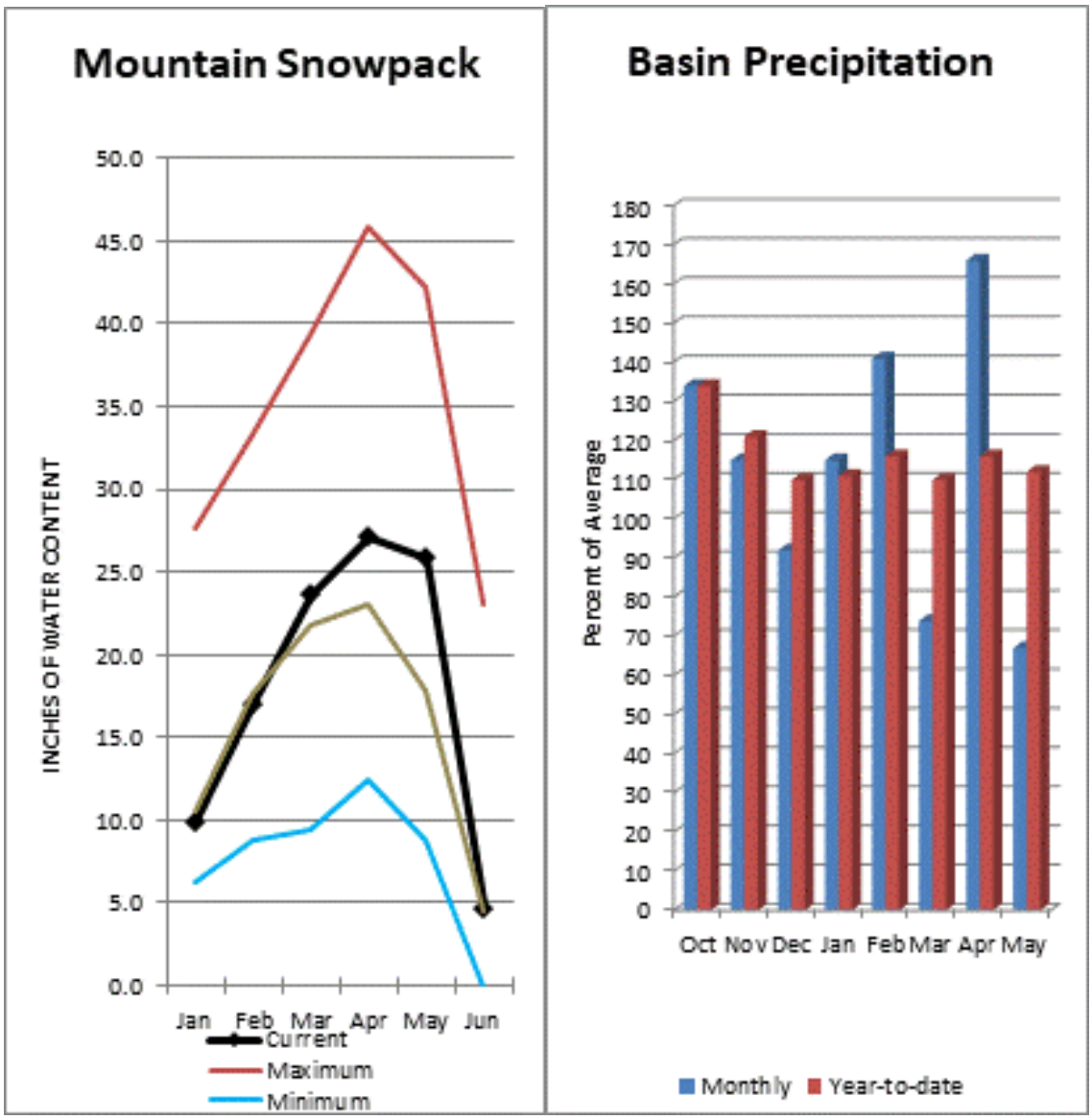
NRCS Natural Resources Conservation Service

June 1, 2018 - Snowpack, Precipitation and Reservoir Conditions at a Glance

(Water Year = October 1 - Current Date)



Spokane River Basin



The June 1 forecasts for summer runoff within the Spokane River Basin are 62% of average near Post Falls and 68% at Long Lake. The Chamokane River near Long Lake forecasted to have 78% of average flows for the June-August period. The forecast is based on a basin snowpack that is 103% of normal and precipitation that is 112% of average for the water year. Snow was only present at the upper elevation sites. Precipitation for May was below normal at 67% of average. Streamflow on the Spokane River at Spokane was 150% of average for May. June 1 storage in Coeur d'Alene Lake was 385,500-acre feet, 145% of average and 162% of capacity. Average temperatures in the Spokane basin were much above normal for May but remain closer normal for the water year.

For more information contact your local Natural Resources Conservation Service office.

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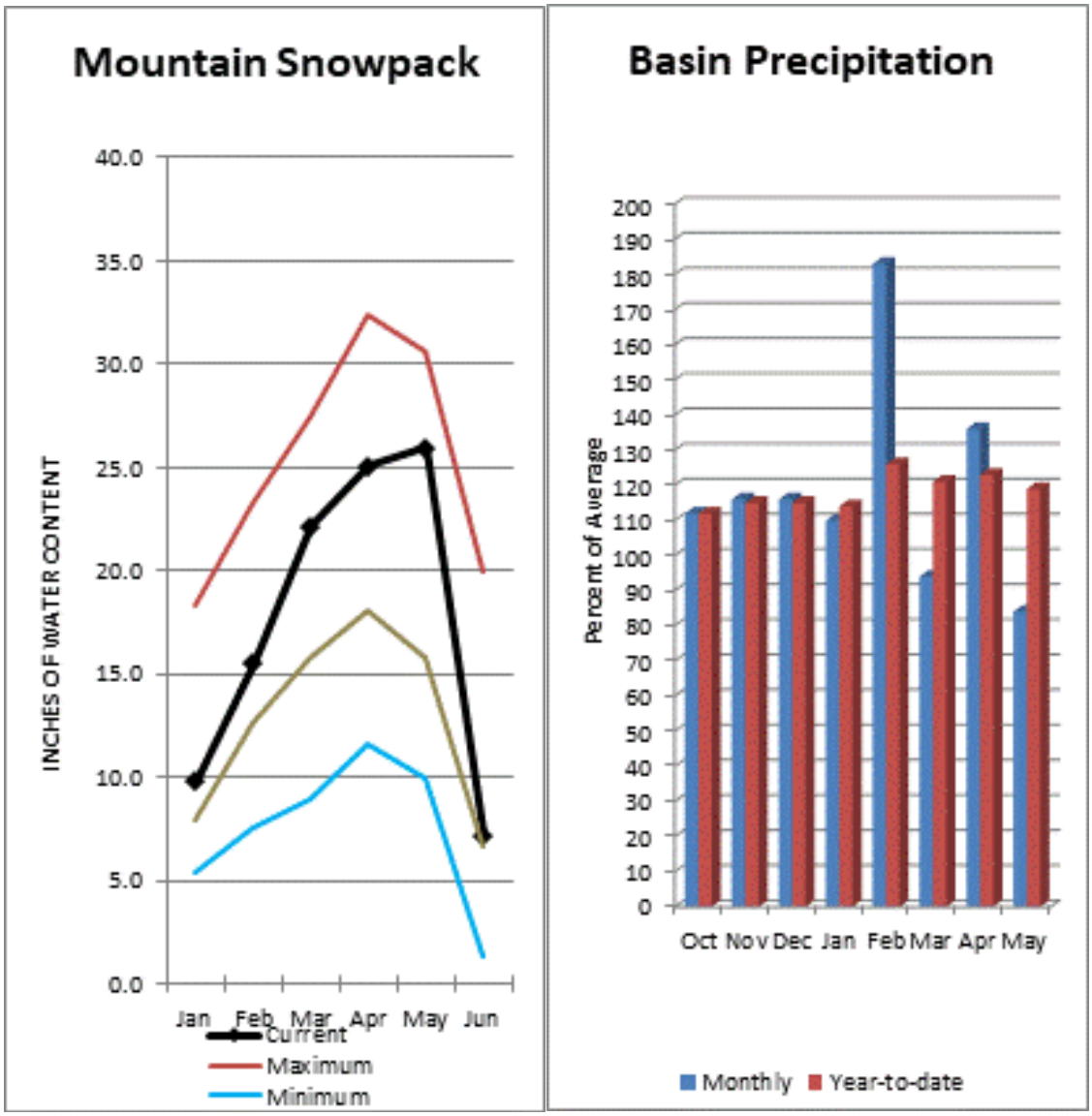
Spokane
Streamflow Forecasts - June 1, 2018

Spokane	Forecast Period	Forecast Exceedance Probabilities for Risk Assessment: Chance that actual volume will exceed forecast — 90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
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[2]								
	JUN-JUL	390	485	550	69%	615	710	795
	JUN-SEP	480	615	705	68%	795	930	1030
Chamokane Ck nr Long Lake								
	JUN-AUG	2.9	3.8	4.5	78%	5.2	6.1	5.8

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

Reservoir Storage End of May, 2018	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Lake Coeur d' Alene	385.5	229.4	265.5	238.5
Basin-wide Total	385.5	229.4	265.5	238.5
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis June 1, 2018	# of Sites	% Median	Last Year % Median
Spokane	9	103%	125%
Newman Lake	1		



The June – September average forecast for the Priest River near the town of Priest River is 129% and the Pend Oreille at Box canyon is 116%. May streamflow was 206% of average on the Pend Oreille River and 184% on the Columbia at Birchbank. June 1 snow cover was 108% of normal in the Pend Oreille Basin River Basin. Bunchgrass Meadows SNOTEL site had 9 inches of snow water on the snow pillow. Normally Bunchgrass would have 6.4 inches on June 1. Precipitation during May was 84% of average, bringing the year-to-date precipitation to 119% of average. Reservoir storage in the basin, including Lake Pend Oreille and Priest Lake was 126% of normal. Average temperatures were much above normal for the month but near the water year.

For more information contact your local Natural Resources Conservation Service office.

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Pend Oreille Basins
Streamflow Forecasts - June 1, 2018

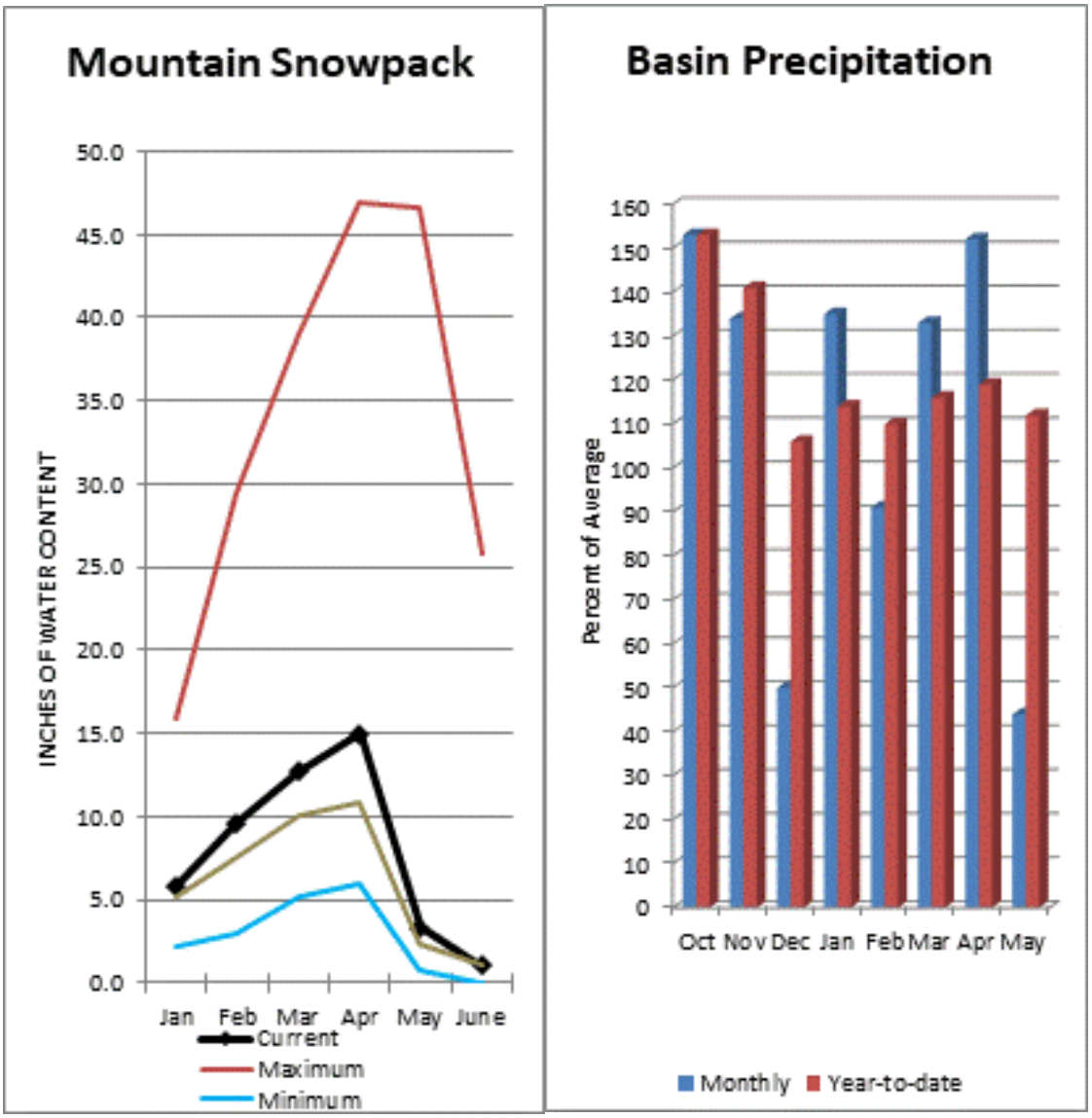
Pend Oreille Basins	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
		Forecast Exceedance Probabilities for Risk Assessment Chance that actual volume will exceed forecast						
Pend Oreille Lake Inflow[2]								
	JUN-JUL	5440	6030	6420	117%	6810	7400	5480
	JUN-SEP	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
Pend Oreille R bl Box Canyon[2]								
	JUN-JUL	5510	6100	6500	117%	6900	7490	5540
	JUN-SEP	6440	7160	7640	116%	8120	8840	6600

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

Reservoir Storage End of May, 2018	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Lake Pend Oreille	1694.8	1325.3	1337.0	1561.3
Priest Lake	157.9	143.9	137.2	119.3
Basin-wide Total	1852.7	1469.1	1474.2	1680.6
# of reservoirs	2	2	2	2

Watershed Snowpack Analysis June 1, 2018	# of Sites	% Median	Last Year % Median
Pend Oreille Basins	36	108%	130%
Colville River	0		
Kettle River	2	76%	153%

Upper Columbia River Basins



Summer runoff average forecast for the Okanogan River is 87%, Similkameen River is 86%, and Methow River is 72%. June 1 snow cover on the Okanogan was 77% of normal, Omak Creek was 0% and the Methow was 88%. May precipitation in the Upper Columbia was 44% of average, with precipitation for the water year at 112% of average. May streamflow for the Methow River was 247% of average, 265% for the Okanogan River and 271% for the Similkameen. Rapid snowmelt led to record flooding throughout the basin. Combined storage in the Conconully Reservoirs was 22,800 acre-feet or 124% of normal. Temperatures much above normal for the month and near normal for the water year.

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Upper Columbia Basins
Streamflow Forecasts - June 1, 2018

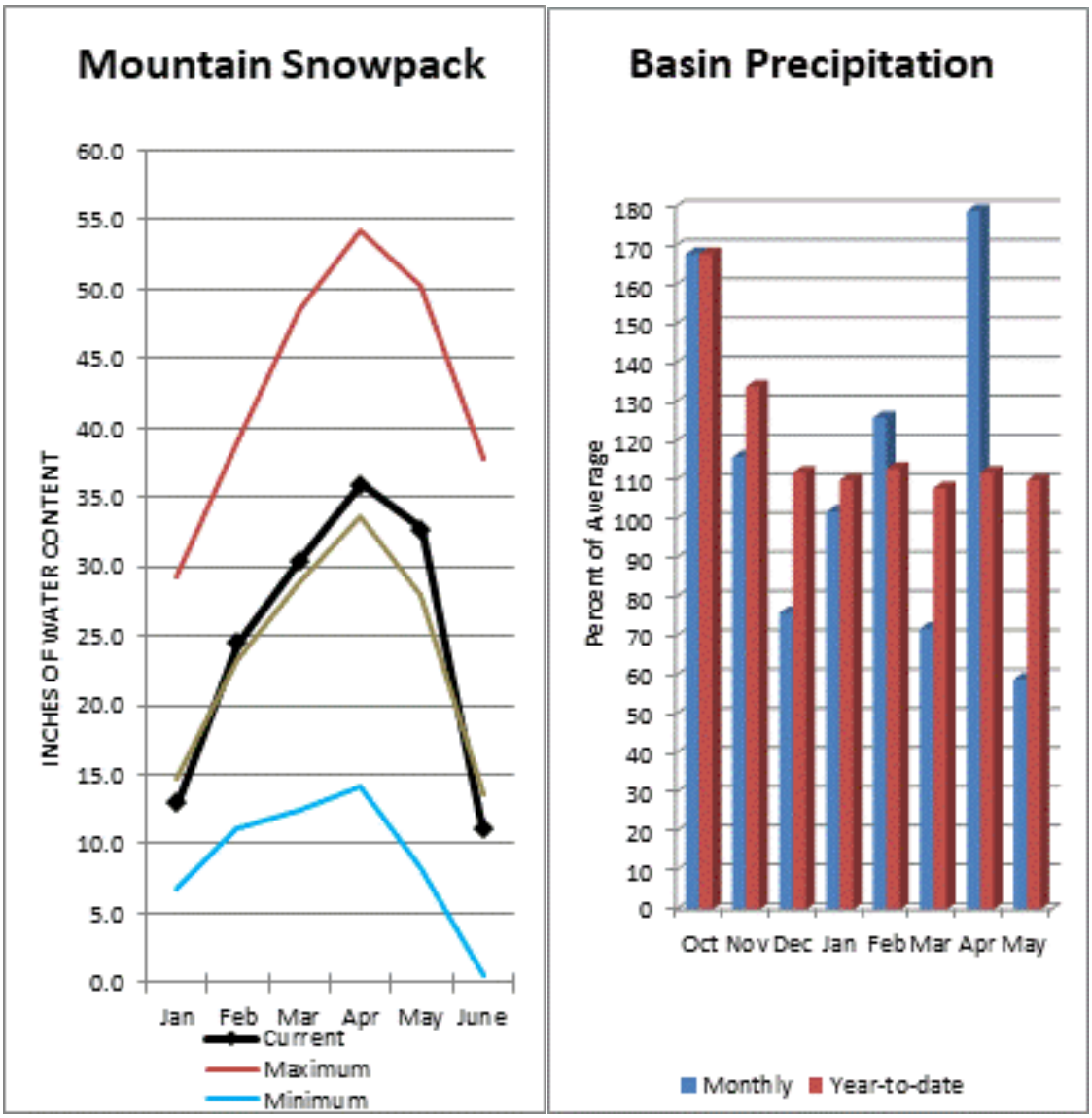
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

Upper Columbia Basins	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Kettle R nr Laurier								
	JUN-JUL	240	365	450	62%	535	660	730
	JUN-SEP	305	450	550	68%	650	795	810
Colville R at Kettle Falls								
	JUN-JUL	16.4	23	28	82%	33	40	34
	JUN-SEP	23	32	38	83%	44	53	46
Columbia R at Grand Coulee-NWS[2]								
	JUN-JUL	23200		24500	86%		27100	28400
	JUN-SEP	32200		34800	93%		37500	37500
Similkameen R nr Nighthawk								
	JUN-JUL	390	470	520	85%	570	650	610
	JUN-SEP	445	535	600	86%	665	755	695
Okanogan R nr Tonasket								
	JUN-JUL	395	530	625	81%	720	855	775
	JUN-SEP	465	655	785	83%	915	1100	945
Okanogan R at Malott								
	JUN-JUL	410	550	640	84%	730	870	760
	JUN-SEP	490	675	805	87%	930	1120	925
Methow R nr Pateros								
	JUN-JUL	235	275	300	71%	325	365	425
	JUN-SEP	275	320	350	72%	380	425	485

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

Reservoir Storage End of May, 2018	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Conconully Lake (Salmon Lake Dam)	10.0	10.5	8.3	10.5
Conconully Reservoir	12.9	13.3	10.1	13.0
Basin-wide Total	22.8	23.8	18.4	23.5
# of reservoirs	2	2	2	2

Watershed Snowpack Analysis June 1, 2018	# of Sites	% Median	Last Year % Median
Upper Columbia Basins	6	96%	134%
Okanogan River	5	77%	190%
Omak Creek	1		
Sanpoil River	0		
Similkameen River	1	87%	104%
Toats Coulee Creek	0		
Conconully Lake	1		
Methow River	3	88%	136%



Precipitation during May was 59% of average in the basin and 110% for the year-to-date. Runoff for Entiat River is forecast to be 73% of average for the summer. The June-September average forecast for Chelan River is 86%, Wenatchee River at Plain is 83%, Stehekin River is 88% and Icicle Creek is 80%. May average streamflow on the Chelan River was 195% and on the Wenatchee River 172%. June 1 snowpack in the Wenatchee River Basin was 82% of normal; the Chelan, 79%. Stemilt Creek and Colockum Creek snow had melted. Reservoir storage in Lake Chelan was not available. Lyman Lake SNOTEL had the most snow water with 39.6 inches of water. This site would normally have 48.9 inches on June 1. Temperatures were near normal for May and near normal for the water year.

For more information contact your local Natural Resources Conservation Service office.

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Central Columbia Basins
Streamflow Forecasts - June 1, 2018

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

Central Columbia Basins	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Stehekin R at Stehekin								
	JUN-JUL	265	305	330	87%	355	395	380
	JUN-SEP	370	405	430	88%	455	490	490
Chelan R at Chelan								
	JUN-JUL	370	425	465	86%	505	560	540
	JUN-SEP	450	520	565	86%	615	685	660
Entiat R nr Ardenvoir								
	JUN-JUL	59	73	83	73%	93	107	113
	JUN-SEP	65	83	95	73%	107	125	131
Wenatchee R at Plain								
	JUN-JUL	335	385	415	82%	450	500	505
	JUN-SEP	395	455	495	83%	535	590	595
Icicle Ck nr Leavenworth								
	JUN-JUL	70	94	110	79%	126	150	139
	JUN-SEP	83	111	130	80%	149	177	163
Wenatchee R at Peshastin								
	JUN-JUL	445	510	555	81%	600	670	685
	JUN-SEP	515	600	655	81%	710	790	810
Columbia R bl Rock Island Dam-NWS[2]								
	JUN-JUL	25100		26500	86%		29200	30800
	JUN-SEP	34600		37300	93%		40400	40200

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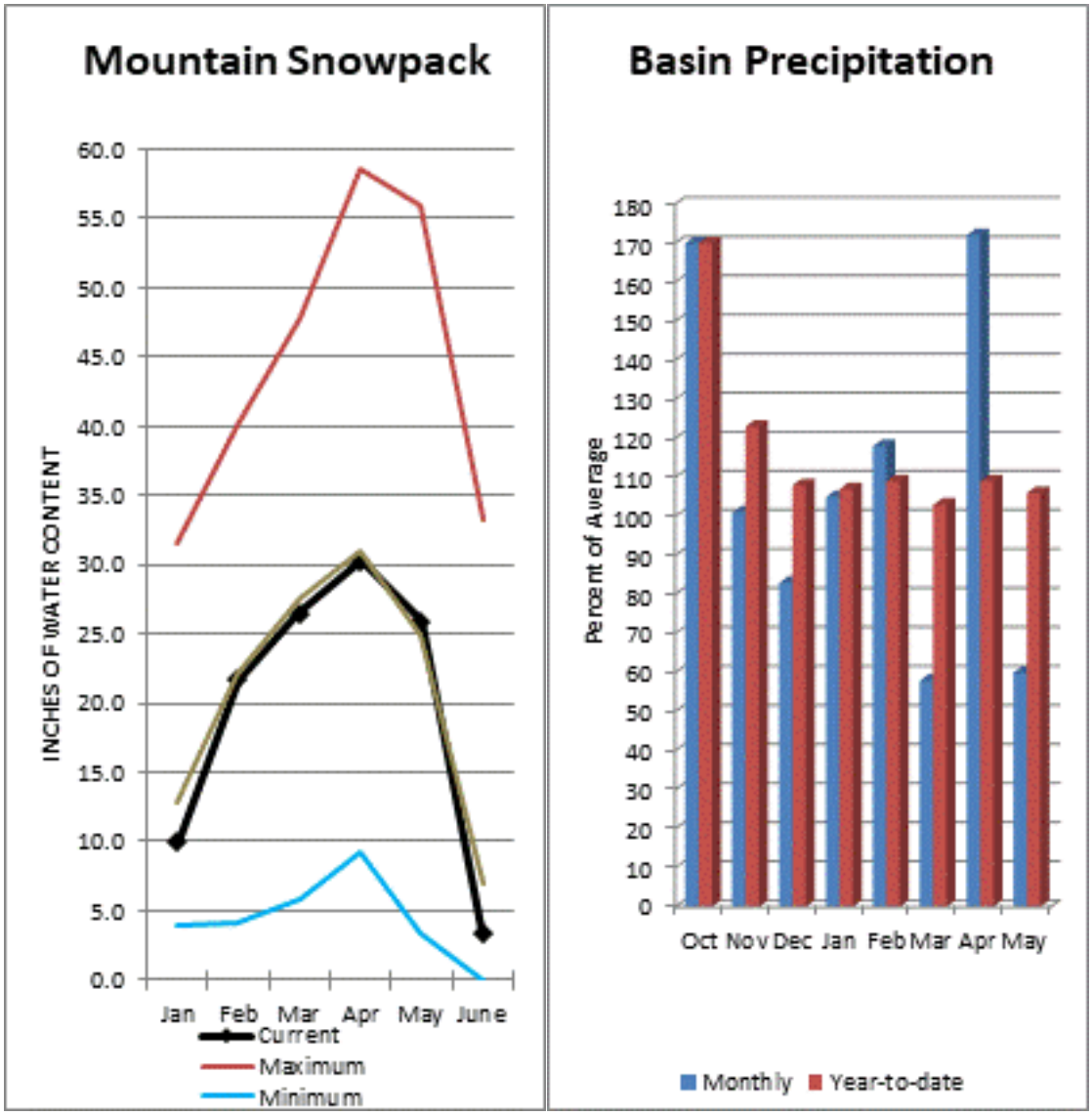
2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions
3) Median value used in place of average

Reservoir Storage End of May, 2018	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Lake Chelan			491.0	676.1
Basin-wide Total			0.0	0.0
# of reservoirs	0	0	0	0

Watershed Snowpack Analysis June 1, 2018	# of Sites	% Median	Last Year % Median
Central Columbia Basins	3	79%	122%
Chelan Lake Basin	3	79%	122%
Entiat River	1		
Wenatchee River	6	82%	123%
Stemilt Creek	1		
Colockum Creek	1		



June 1 reservoir storage for the Upper Yakima reservoirs was 830,000-acre feet, 115% of average. Forecasts for the Yakima River at Cle Elum are 71% of average and the Teanaway River near Cle Elum is at 72%. Lake inflows are all forecasted to be slightly below average this summer as well, due to early and rapid melt in May. May streamflow within the basin was Cle Elum River near Roslyn at 168%. June 1 snowpack was 49% based upon 5 snow SNOTEL readings within the Upper Yakima Basin. Precipitation was 60% of average for May and 106% for the water-year. Volume forecasts for the Yakima Basin are for natural flow. As such, they June differ from the U.S. Bureau of Reclamation's forecast for the total water supply available, which includes irrigation return flow.

****Due to the devastating fire within the Teanaway and Cle Elum rivers this past summer, streamflow forecasts and thus runoff rates June be greatly affected come spring and summer. Sasse Ridge SNOTEL site was burned through but not lost to the fire. Area hydrology will be adversely changed for quite some time.**

For more information contact your local Natural Resources Conservation Service office.

Upper Yakima River Basin

Data Current as of: 6/8/2018 10:00:02 AM

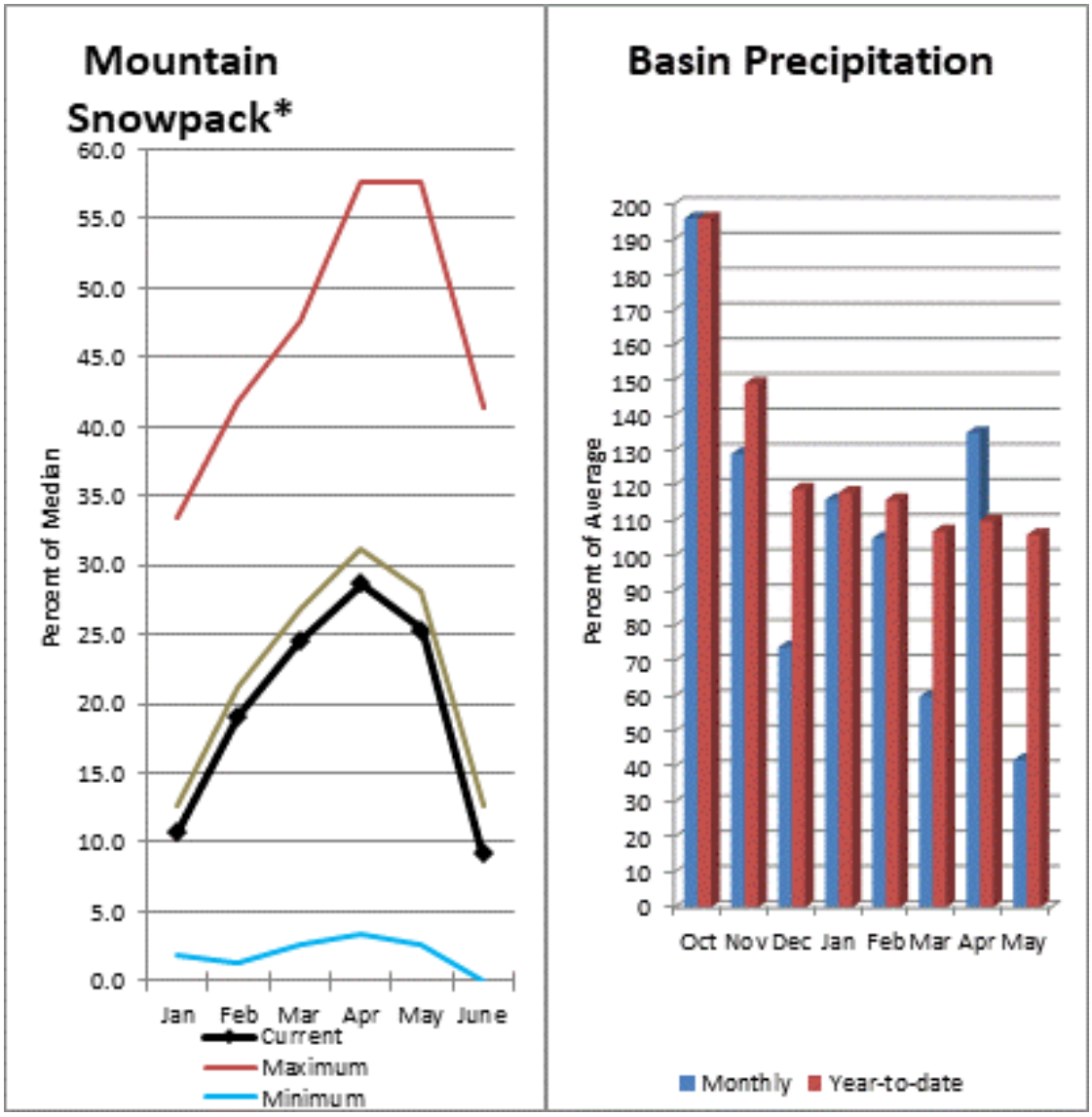
Upper Yakima River
Streamflow Forecasts - June 1, 2018

		Forecast Exceedance Probabilities for Risk Assessment Chance that actual volume will exceed forecast						
Upper Yakima River	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Keechelus Reservoir Inflow[2]								
	JUN-JUL	11.4	19.5	25	60%	30	39	42
	JUN-SEP	15.3	25	32	62%	39	49	52
Kachess Reservoir Inflow [2]								
	JUN-JUL	14.9	19.7	23	64%	26	31	36
	JUN-SEP	18.2	24	28	62%	32	38	45
Cle Elum Lake Inflow [2]								
	JUN-JUL	89	107	120	71%	133	151	170
	JUN-SEP	107	129	145	71%	161	183	205
Yakima R at Cle Elum [2]								
	JUN-JUL	144	183	210	72%	235	275	290
	JUN-SEP	178	225	260	71%	295	340	365
Teanaway R bl Forks nr Cle Elum								
	JUN-JUL	2.6	13.1	20	67%	27	38	30
	JUN-SEP	4.6	15.5	23	72%	30	41	32

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

Reservoir Storage End of May, 2018	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Keechelus	158.0	157.3	135.9	157.8
Kachess	237.2	229.5	204.0	239.0
Cle Elum	435.0	421.7	383.4	436.9
Basin-wide Total	830.2	808.5	723.3	833.7
# of reservoirs	3	3	3	3

Watershed Snowpack Analysis June 1, 2018	# of Sites	% Median	Last Year % Median
Upper Yakima River	5	49%	94%



May average streamflows within the basin were: Yakima River near Parker, 142% and the Naches River near Naches, 137%. June 1 reservoir storage for Bumping and Rimrock reservoirs was 223,000-acre feet, 103% of average. Forecast runoff averages for Yakima River near Parker are 71%; American River near Nile, 66%; Ahtanum Creek, 59%; and Klickitat River near Glenwood, 58%. June 1 snowpack was 72% based upon 5 SNOTEL readings within the Lower Yakima Basin. Both Green Lake and Lost Horse SNOTEL sites melted out about 2 weeks early. Precipitation was 42% of average for May and 106% for the water-year. Temperatures were near much above normal for May but closer to normal for the water year. Volume forecasts for Yakima Basin are for natural flow. As such, they June differ from the U.S. Bureau of Reclamation's forecast for the total water supply available, which includes irrigation return flow.

Data Current as of: 6/8/2018 10:00:07 AM

Lower Yakima River
Streamflow Forecasts - June 1, 2018

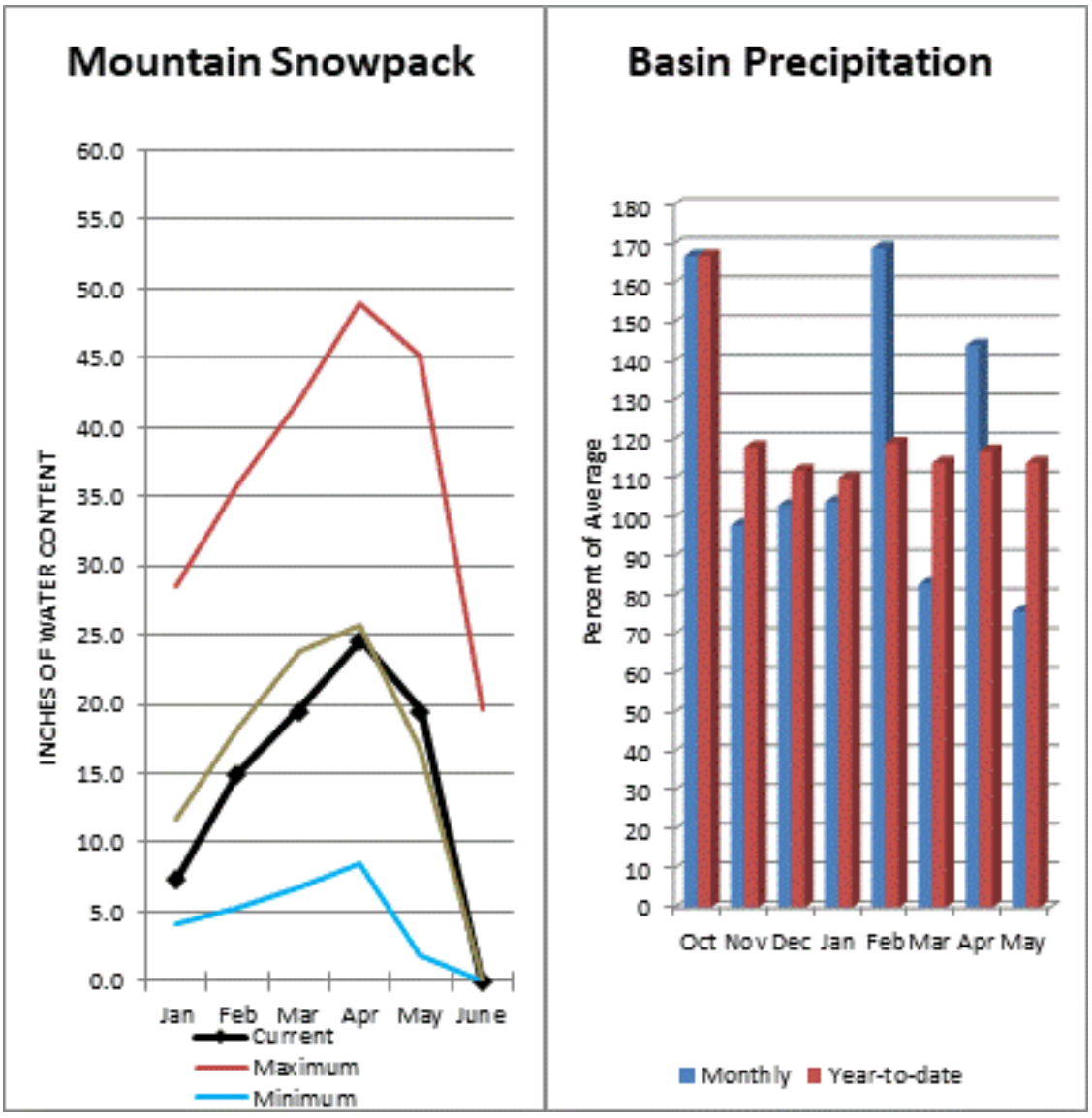
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

Lower Yakima River	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Bumping Lake Inflow [2]								
	JUN-JUL	21	28	33	63%	38	45	52
	JUN-SEP	24	33	39	64%	45	54	61
American R nr Nile								
	JUN-JUL	17.9	26	31	65%	36	44	48
	JUN-SEP	21	30	37	66%	44	53	56
Rimrock Lake Inflow [2]								
	JUN-JUL	47	55	60	66%	65	73	91
	JUN-SEP	65	77	85	69%	93	105	124
Naches R nr Naches								
	JUN-JUL	116	160	190	67%	220	265	285
	JUN-SEP	149	205	245	71%	280	340	345
Ahtanum Ck at Union Gap								
	JUN-JUL	1.1	3.2	4.7	52%	6.1	8.2	9
	JUN-SEP	2.7	5.1	6.7	59%	8.4	10.8	11.3
Yakima R nr Parker [2]								
	JUN-JUL	300	370	415	68%	465	535	610
	JUN-SEP	405	490	545	71%	600	685	770
Klickitat R nr Glenwood								
	JUN-JUL	15	21	25	53%	29	35	47
	JUN-SEP	23	30	35	58%	40	47	60
Klickitat R nr Pitt								
	JUN-JUL	91	107	118	70%	129	145	168
	JUN-SEP	154	178	194	76%	210	235	255

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

Reservoir Storage End of May, 2018	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Bumping Lake	32.1	34.5	32.3	33.7
Rimrock	190.7	193.2	183.1	198.0
Basin-wide Total	222.9	227.7	215.4	231.7
# of reservoirs	2	2	2	2

Watershed Snowpack Analysis June 1, 2018	# of Sites	% Median	Last Year % Median
Lower Yakima River	5	72%	118%
Ahtanum Creek	2	0%	0%



May precipitation was 76% of average, maintaining the year-to-date precipitation at 114% of average. Extremely warm temperatures brought the remaining snow off of all SNOTEL sites 1-2 weeks earlier than normal. Streamflow forecasts are 55% of average for Mill Creek and 100% for the SF Walla Walla near Milton-Freewater.

For more information contact your local Natural Resources Conservation Service office.

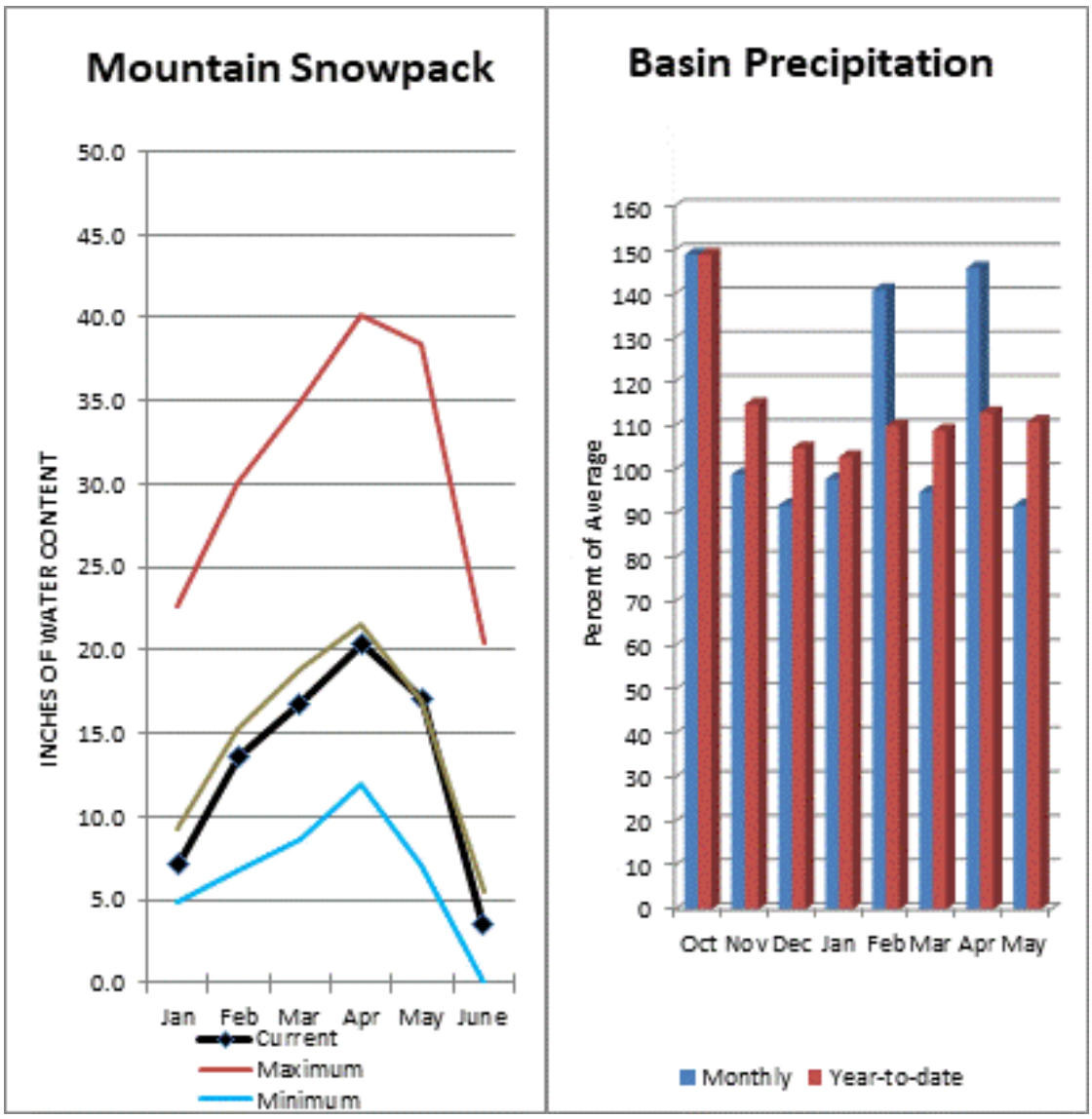
Data Current as of: 6/8/2018 10:00:13 AM

Walla Walla River
Streamflow Forecasts - June 1, 2018

		Forecast Exceedance Probabilities for Risk Assessment Chance that actual volume will exceed forecast						
Walla Walla River	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
SF Walla Walla R nr Milton-Freewater								
	JUN-JUL	14.4	17	18.8	103%	21	23	18.2
	JUN-SEP	26	29	31	100%	34	37	31
Mill Ck nr Walla Walla								
	JUN-JUL	1.15	2.4	3.3	53%	4.2	5.4	6.2
	JUN-SEP	2.8	4.3	5.3	55%	6.3	7.8	9.6

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

Watershed Snowpack Analysis June 1, 2018	# of Sites	% Median	Last Year % Median
Walla Walla River	2		



The Grande Ronde River can expect summer flows to be about 103% of normal. The forecast for Asotin Creek at Asotin predicts 57% of average flows for the June – July runoff period. May precipitation was 92% of average, bringing the year-to-date precipitation to 111% of average. June 1 snowpack readings averaged 65% of normal. May streamflow was 149% of average for Snake River below Lower Granite Dam and 106% for Grande Ronde River near Troy. Dworshak Reservoir storage was 100% of average and 90% of capacity. Average temperatures were much above normal for May but near normal for the water year.

For more information contact your local Natural Resources Conservation Service office.

Data Current as of: 6/8/2018 10:00:18 AM

Lower Snake, Grande Ronde, Clearwater Basins
Streamflow Forecasts - June 1, 2018

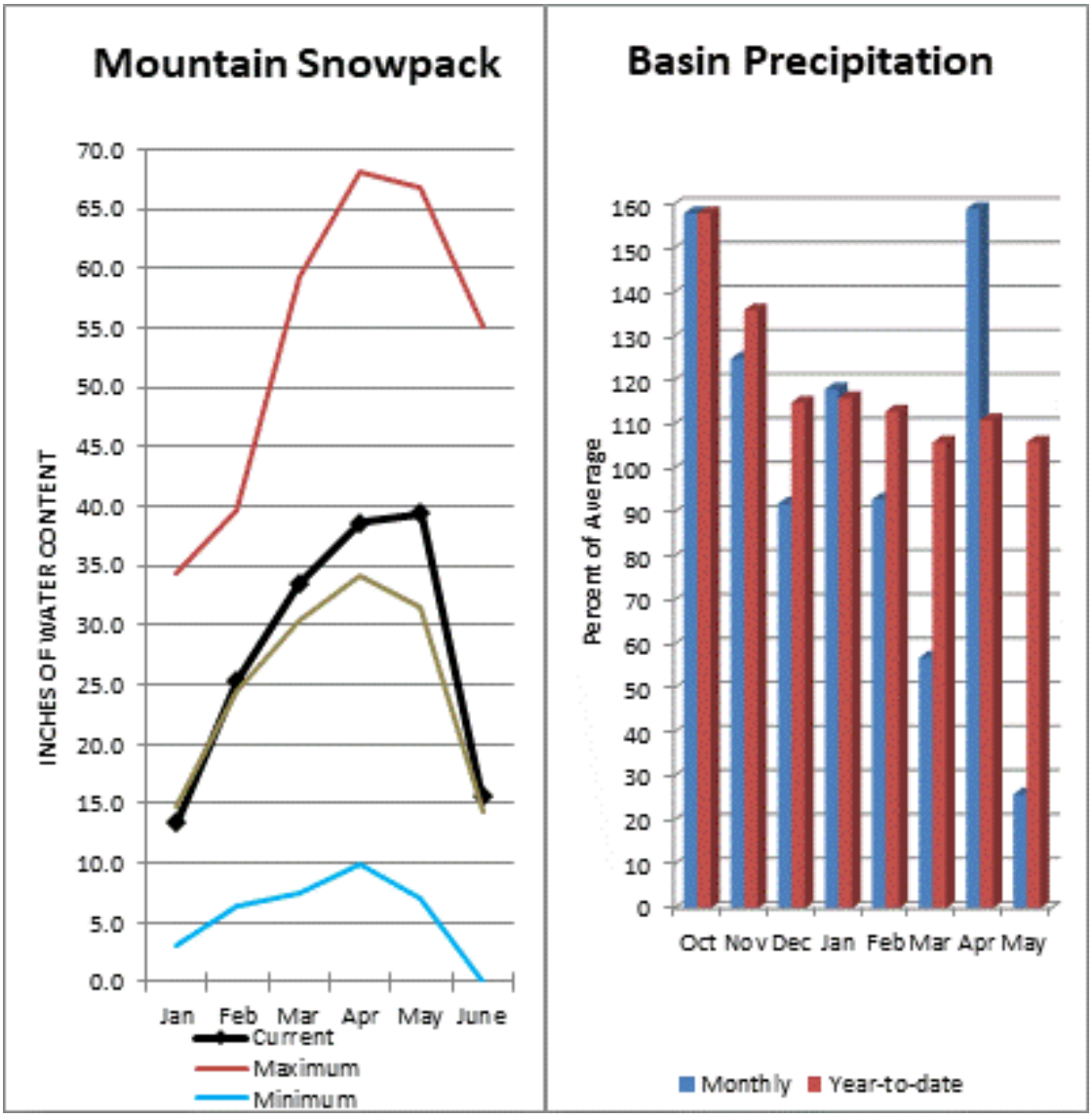
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

Lower Snake, Grande Ronde, Clearwater Basins	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Grande Ronde R at Troy								
	JUN-JUL	330	400	450	105%	500	570	430
	JUN-SEP	415	490	535	103%	585	660	520
Asotin Ck at Asotin								
	JUN-JUL	2.5	4.8	6.3	57%	7.8	10.1	11
Clearwater R at Spalding[2]								
	JUN-JUL	1580	2030	2330	89%	2630	3080	2610
	JUN-SEP	1850	2360	2700	90%	3040	3550	2990
Snake R bl Lower Granite Dam-NWS[2]								
	JUN-JUL	6160		6490	78%		6920	8360
	JUN-SEP	8610		8990	83%		9570	10800

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

Reservoir Storage End of May, 2018	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Dworshak Reservoir	3127.3	3086.2	3113.0	3468.0
Basin-wide Total	3127.3	3086.2	3113.0	3468.0
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis June 1, 2018	# of Sites	% Median	Last Year % Median
Lower Snake, Grande Ronde, Clearwater Basins	11	65%	161%



Forecasts for June – September streamflows within the basin are Lewis River at Ariel, 91% and Cowlitz River at Castle Rock, 96% of average. The Columbia at The Dalles is forecasted to have 89% of average flows this summer according to the River Forecast Center. May average streamflow for Cowlitz River was 100% and the Columbia River at The Dalles was 167% of average. May precipitation was only 26% of average and the water-year average was 106%. June 1 snow cover for Cowlitz River was 94%, and Lewis River was 131% of normal. Temperatures were above normal during May and near normal for the water year.

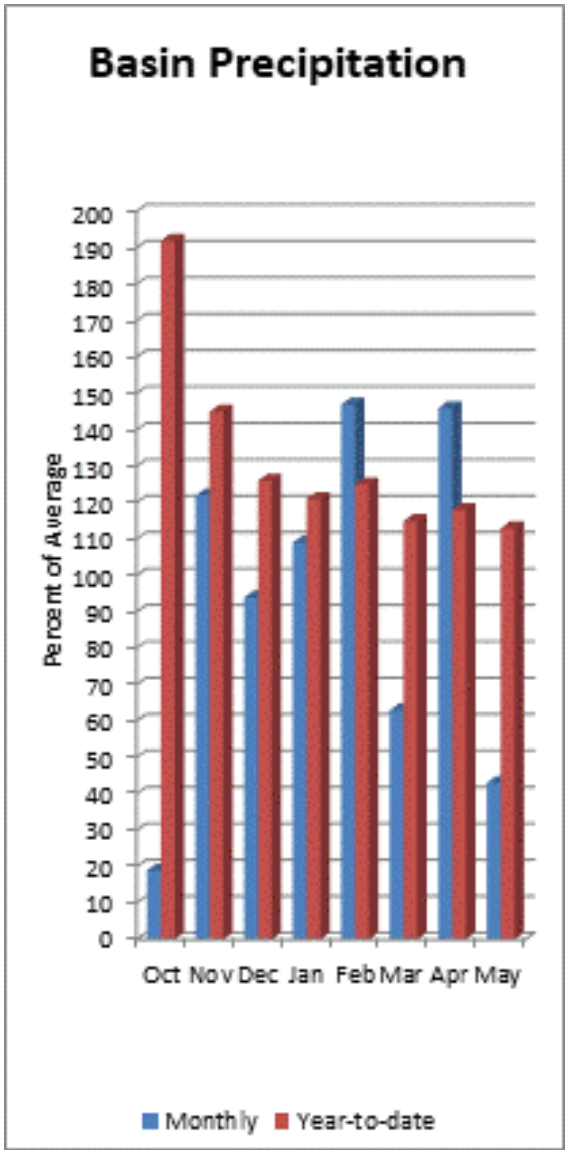
Data Current as of: 6/8/2018 10:00:24 AM

Lower Columbia Basins
Streamflow Forecasts - June 1, 2018

Lower Columbia Basins	Forecast Period	Forecast Exceedance Probabilities for Risk Assessment Chance that actual volume will exceed forecast 90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Columbia R at The Dalles-NWS[2]								
	JUN-JUL	32600		34200	84%		37300	40700
	JUN-SEP	45000		47800	89%		51700	53500
Klickitat R nr Glenwood								
	JUN-JUL	15	21	25	53%	29	35	47
	JUN-SEP	23	30	35	58%	40	47	60
Klickitat R nr Pitt								
	JUN-JUL	91	107	118	70%	129	145	168
	JUN-SEP	154	178	194	76%	210	235	255
Lewis R at Ariel[2]								
	JUN-JUL	205	245	275	89%	305	345	310
	JUN-SEP	295	370	420	91%	470	545	460
Cowlitz R bl Mayfiled[2]								
	JUN-JUL	395	500	570	87%	640	745	655
	JUN-SEP	545	665	750	86%	835	955	870
Cowlitz R at Castle Rock[2]								
	JUN-JUL	660	755	815	92%	880	975	890
	JUN-SEP	955	1060	1130	96%	1200	1300	1180

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

Watershed Snowpack Analysis June 1, 2018	# of Sites	% Median	Last Year % Median
Lower Columbia Basins	11	108%	235%
Lewis River	5	131%	338%
Cowlitz River	6	94%	166%



Summer runoff is forecast to be 73% of normal for the Green River below Howard Hanson Dam and 71% for the White River near Buckley. June 1 snowpack was 98% of average for the White River, 98% for Puyallup River and 17% in the Green River Basin. May precipitation was 43% of average, bringing the water year-to-date to 113% of average for the basins. Average temperatures in the area were above normal for May and near normal for the water-year.

For more information contact your local Natural Resources Conservation Service office.

Data Current as of: 6/8/2018 10:00:30 AM

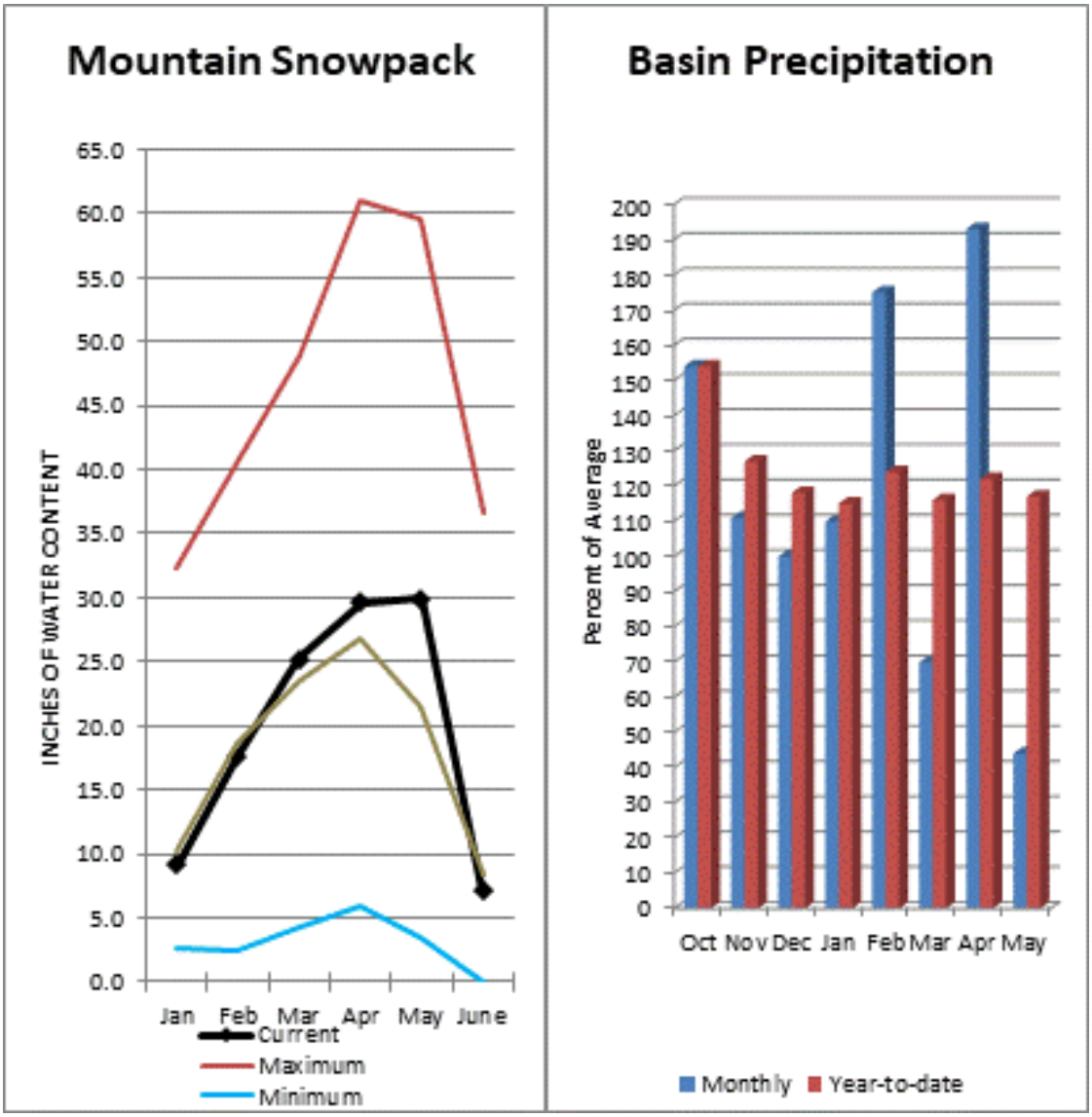
South Puget Sound Basins
Streamflow Forecasts - June 1, 2018

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

South Puget Sound Basins	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
White R nr Buckley[1,2]								
	JUN-JUL	85	127	146	71%	165	205	205
	JUN-SEP	132	186	210	71%	235	290	295
Green R bl Howard A Hanson Dam[1,2]								
	JUN-JUL	18.5	39	49	72%	59	80	68
	JUN-SEP	27	54	66	73%	78	105	91

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

Watershed Snowpack Analysis June 1, 2018	# of Sites	% Median	Last Year % Median
South Puget Sound Basins	8	84%	121%
White River	2	98%	129%
Green River	2	17%	82%



Forecast for spring and summer flows are: 81% for Cedar River near Cedar Falls; 74% for Rex River; 64% for South Fork of the Tolt River; and 85% for Taylor Creek near Selleck. Basin-wide precipitation for May was 44% of average, bringing water-year-to-date to 117% of average. June 1 median snow cover in Tolt River Basin was 131%, Snoqualmie River Basin was 83%, and Skykomish River Basin was 128%. The Cedar River Basin is normally melted out by June 1. Temperatures were above normal for May and near normal for the water-year.

For more information contact your local Natural Resources Conservation Service office.

Data Current as of: 6/8/2018 10:00:37 AM

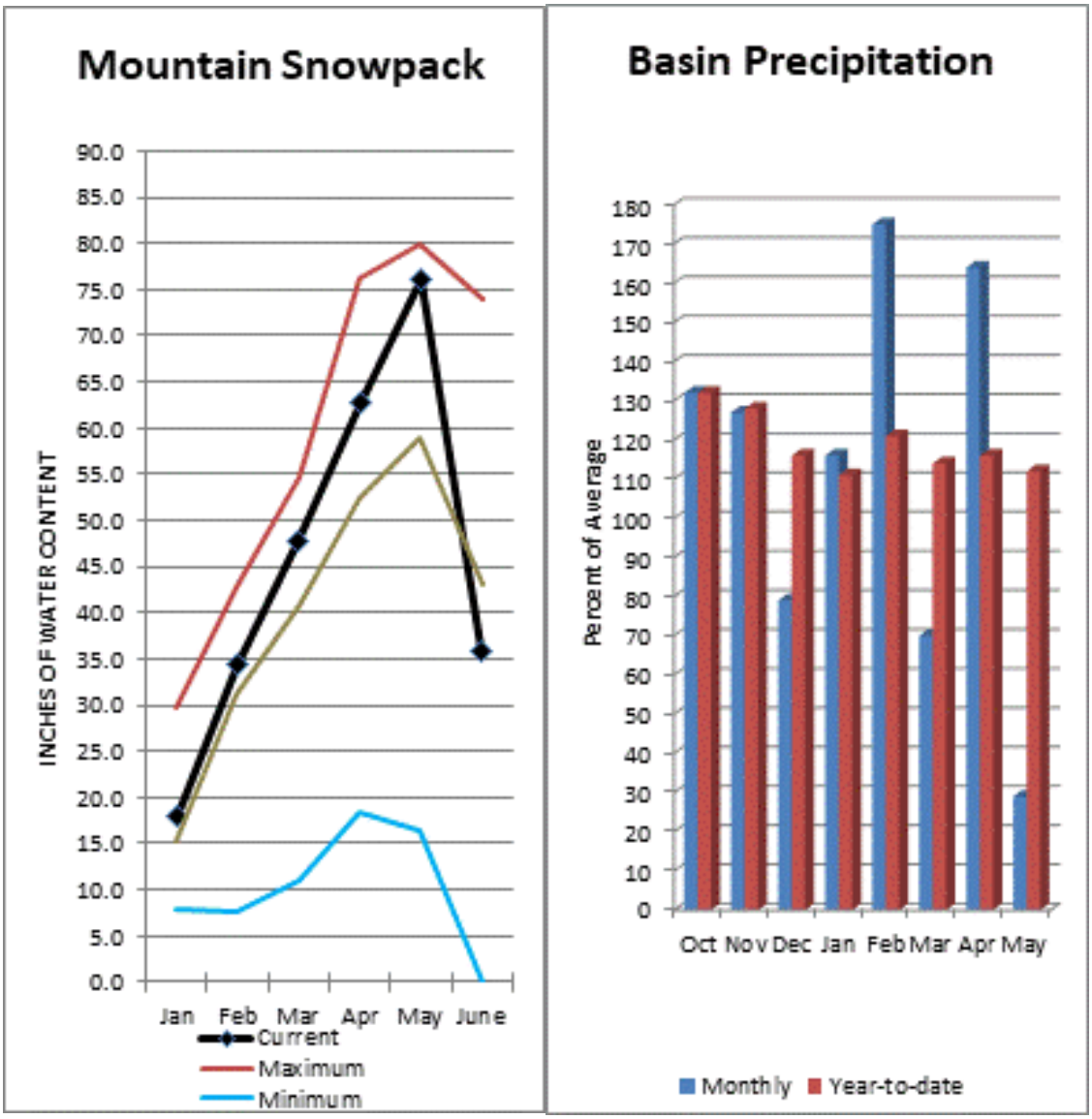
Central Puget Sound Basins
Streamflow Forecasts - June 1, 2018

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

Central Puget Sound Basins	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Cedar R nr Cedar Falls								
	JUN-JUL	11.2	15.9	19	76%	22	27	25
	JUN-SEP	15.2	21	25	81%	29	35	31
Rex R nr Cedar Falls								
	JUN-JUL	2.3	4	5.2	71%	6.4	8.1	7.3
	JUN-SEP	4.2	5.9	7.1	74%	8.3	10	9.6
Taylor Ck nr Selleck								
	JUN-JUL	4.3	5.5	6.3	84%	7.1	8.3	7.5
	JUN-SEP	6.7	8.3	9.4	85%	10.5	12.1	11.1
SF Tolt R nr Index								
	JUN-JUL	2.6	4.2	5.3	96%	6.3	7.9	5.5
	JUN-SEP	1.57	3.5	4.8	64%	6.1	8.1	7.5

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

Watershed Snowpack Analysis June 1, 2018	# of Sites	% Median	Last Year % Median
Central Puget Sound Basins	12	84%	135%
Puyallup River	4	98%	129%
Cedar River	4		
Tolt River	2	131%	143%
Snoqualimie River	4	83%	113%
Skykomish River	2	128%	149%



Forecast for Skagit River streamflow at Newhalem is 102% of average for the spring and summer period. May streamflow in Skagit River was 157% of average. Other forecast points included Baker River at 105% and Thunder Creek at 102% of average. Basin-wide precipitation for May was 29% of average, bringing water-year-to-date to 112% of average. June 1 average snow cover in Skagit River Basin was 74% and the Nooksack River Basin was 96%. By June 1 Ross reservoir had refilled to 74% of average and 55% of capacity. Seattle City Light anticipated complete refill by the time the snow all melts. Average temperatures were above normal for May and near normal for the water year.

For more information contact your local Natural Resources Conservation Service office.

Data Current as of: 6/8/2018 10:00:45 AM

North Puget Sound Basins
Streamflow Forecasts - June 1, 2018

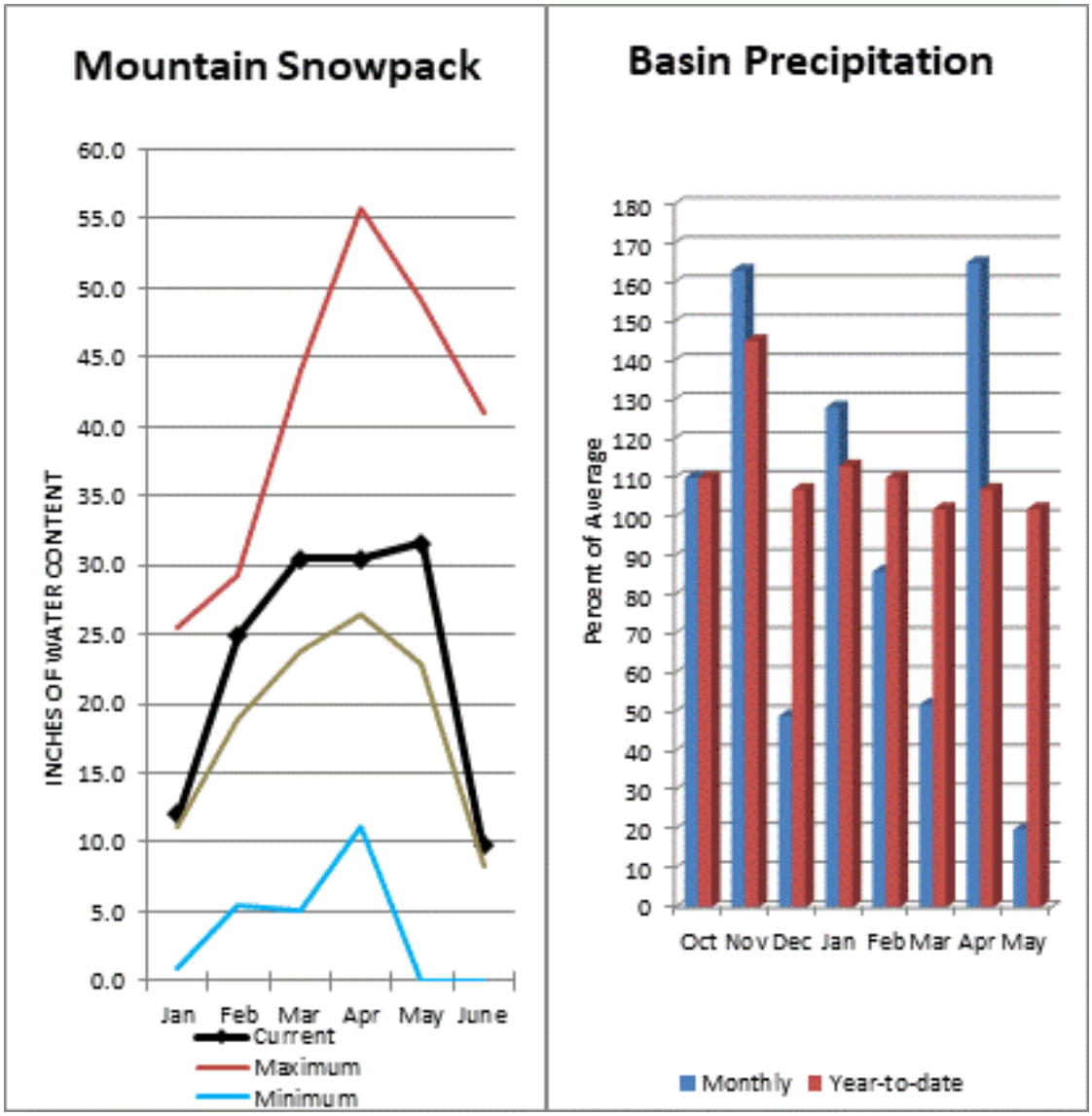
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

North Puget Sound Basins	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Thunder Ck nr Newhalem								
	JUN-JUL	114	129	140	90%	151	166	155
	JUN-SEP	191	210	225	90%	240	260	250
Skagit R at Newhalem[2]								
	JUN-JUL	815	895	955	106%	1010	1090	900
	JUN-SEP	1080	1190	1270	102%	1340	1450	1250
Baker R at Concrete								
	JUN-JUL	305	370	420	100%	465	530	420
	JUN-SEP	455	570	650	105%	730	850	620

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

Reservoir Storage End of May, 2018	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Ross	779.1	774.3	1050.0	1404.1
Diablo Reservoir		86.0	86.6	90.6
Basin-wide Total	779.1	774.3	1050.0	1404.1
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis June 1, 2018	# of Sites	% Median	Last Year % Median
North Puget Sound Basins	7	83%	120%
Skagit River	5	74%	124%
Baker River	0		
Nooksack River	2	96%	114%



Forecasted average runoff for streamflow for the Dungeness River is 74% and Elwha River is 84% May runoff in the Dungeness River was 151% of normal. Big Quilcene and Wynoochee rivers may expect slightly below average runoff this summer as well. May precipitation was a dismal 20% of average. Quillayute AP recorded the 2nd lowest precipitation amount in 52 years at only 0.8 inches for the entire month of May, 2015 was the lowest year on record. Olympic Peninsula snowpack averaged 117% of normal on June 1. Precipitation has accumulated at 102% of average for the water year. Temperatures were above average for May and near normal for the water year.

For more information contact your local Natural Resources Conservation Service office.

Data Current as of: 6/8/2018 10:00:56 AM

Olympic Penninsula
Streamflow Forecasts - June 1, 2018

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

Olympic Penninsula	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Dungeness R nr Sequim								
	JUN-JUL	35	44	50	74%	56	65	68
	JUN-SEP	48	60	68	74%	76	88	92
Elwha R at McDonald Br nr Port Angeles								
	JUN-JUL	138	157	170	83%	183	200	205
	JUN-SEP	185	210	230	84%	250	275	275

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

Watershed Snowpack Analysis June 1, 2018	# of Sites	% Median	Last Year % Median
Olympic Penninsula	2	117%	199%

Issued by

Leonard Jordan
Acting Chief
Natural Resources Conservation Service
U.S. Department of Agriculture

Released by

Roylene Rides-at-the-Door
State Conservationist
Natural Resources Conservation Service
Spokane, Washington

The Following Organizations Cooperate with the Natural Resources Conservation Service in Snow Survey Work*:

Canada	Snow Survey Network Program – British Columbia Ministry of Environment
	River Forecast Center – British Columbia Ministry of Forests, Lands and Natural Resource Operations
State	Washington State Department of Ecology
	Washington State Department of Natural Resources
Federal	Department of the Army
	Corps of Engineers
	U.S. Department of Agriculture
	Forest Service
	U.S. Department of Commerce
	NOAA, National Weather Service
	U.S. Department of Interior
	Bonneville Power Administration
	Bureau of Reclamation
	Geological Survey
	National Park Service
	Bureau of Indian Affairs
Local	City of Tacoma
	City of Seattle
	City of Bellingham
	Chelan County P.U.D.
	Pacific Power/PacificCorp
	Puget Sound Energy
	Washington Water Power Company
	Snohomish County P.U.D.
	Colville Confederated Tribes
	Spokane County
	Yakama Indian Nation
	Whatcom County
	Pierce County
	Kalispel Tribe of Indians
	Spokane Indian Tribe
	Jamestown S'Klallam Tribe
Private	Okanogan Irrigation District
	Wenatchee Heights Irrigation District
	Newman Lake Homeowners Association
	Whitestone Reclamation District
	Kinross Mining

***Other organizations and individuals furnish valuable information for the snow survey reports. Their cooperation is gratefully acknowledged.**

Washington Snow Survey Office
2005 E. College Way, Suite 203
Mount Vernon, WA 98273-2873

Washington Water Supply Outlook Report

Natural Resources Conservation Service
Spokane, WA

2018 Spring Glacier Page

North Cascades National Park Complex

National Park Service
U.S. Department of the Interior

Natural Resource Stewardship & Science
North Coast and Cascades Network

The National Park Service began monitoring glaciers in North Cascades National Park Complex (NOCA) in 1993 and Mt. Rainier National Park in 2003 (see the Mount Rainier Glacier Page). Goals for this program and additional data can be found at http://science.nature.nps.gov/im/units/nccn/monitor/glaciers.cfm or contact Jon_Riedel@nps.gov or Mike_Larrabee@nps.gov.

The four glaciers monitored at NOCA are located in the headwaters of four watersheds, each with large hydroelectric dams (Figure 1). The glaciers represent a range in elevation from 5600 to 8300 feet and a range in climatic conditions from maritime to continental. Each glacier is visited three times annually in order to measure winter accumulation and summer melt. Measurements are taken at a series of points down the centerline of the glacier and then those data are integrated across the entire glacier surface to determine mass balance for the whole glacier.

In 2017, annual balances varied slightly between the four surveyed glaciers, but were all close to zero. Negative annual balances were observed at Noisy Creek, North Klawatti, and Sandalee Glaciers. A positive annual balance was observed at Silver Glacier, which is a higher elevation, more easterly glacier.

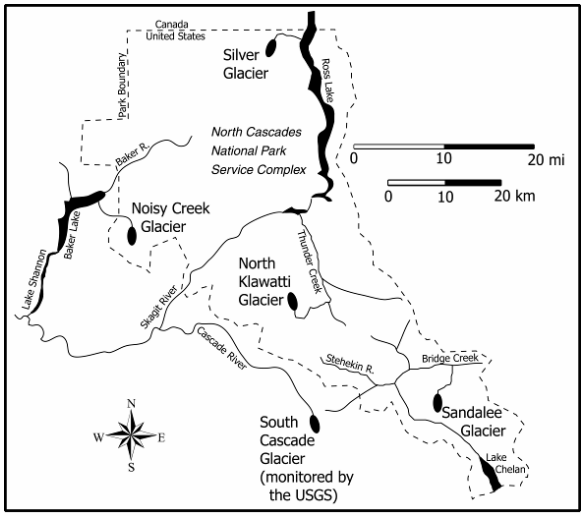


Figure 1. Glaciers monitored at North Cascades National Park Service Complex

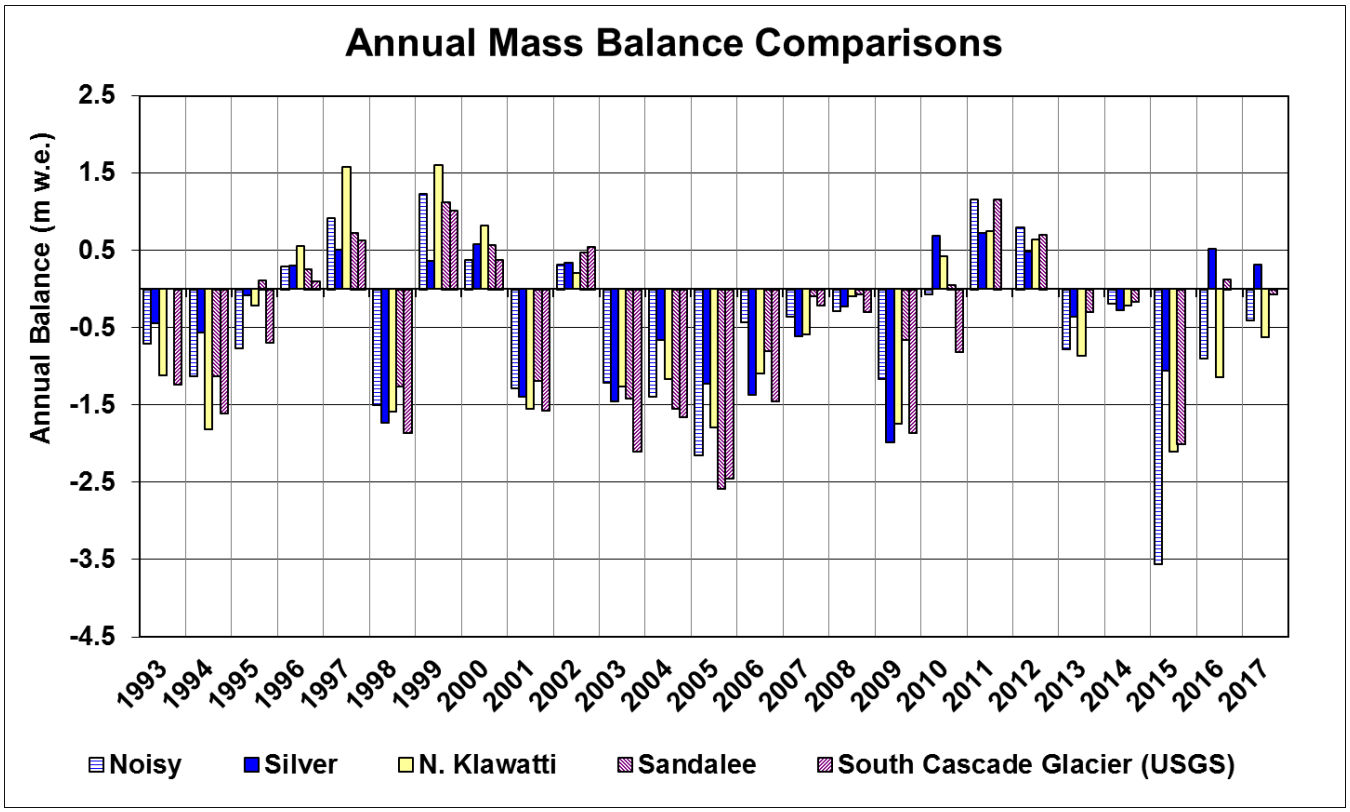


Figure 2. ***Provisional*** annual mass balance of four glaciers monitored at North Cascades National Park Service Complex

Table 1. ***Provisional*** 2018 winter accumulation data, period of record average and percent of average. Winter accumulation is provided as inches water equivalent.

Elevation (feet)	2017 Accumulation (inches w.e.)	Average Accumulation (inches w.e.)	Percent of Average
Noisy Creek Glacier			
Entire Glacier	130	123	105
5965'	156	139	112
5814'	118	119	99
5709'	119	114	104
5591'	122	116	105
N. Klawatti Glacier			
Entire Glacier	139	117	119
7585'	155	124	125
7270'	142	120	118
6824'	152	125	122
6286'	106	102	103
5997'	97	91	107
Sandalee Glacier			
Entire Glacier	132	112	117
7395'	122	104	117
7146'	131	112	117
6831'	130	104	125
6549'	156	127	123
Silver Glacier			
Entire Glacier	-	89	-
8327'	-	105	-
7881'	92	89	104
7500'	99	107	92
7211'	109	66	165

2018 winter accumulation was measured on April 23rd and 24th on four glaciers (Table 1). The provisional data indicate snowpack was above average. Snowpack depth at the highest stake on Silver Glacier was not determined because it exceeded the length of the snow probe (394 inch). These data are tentative and will be revised after mid-summer visits. Snow densities used for calculations were: Noisy Creek (0.46), North Klawatti (0.46), Sandalee (0.44) and Silver (0.45). Densities are based on field measurements and observations from nearby SNOTEL sites.

The 2017 estimates of glacial contribution to runoff for four watersheds are based on mass balance measurements and GIS analyses to determine glacier area within 165 ft (50-meter) elevation bands (Table 2). Glaciers reduce the variation of flow in these watersheds by providing melt water from firn and ice during summer drought, in dry/warm years, and by storing water in excess snowpack during wet/cool years. Glacial contribution to stream flow in these watersheds varies by as much as 100% annually. The magnitude of glacial contribution to streamflow is large, but varies by the amount of glacial cover in each watershed. Thunder Creek is 12% glacierized; Baker River, 4%; Stehekin River, 2%; and Ross Lake, 0.9% (Dicks 2013).

The glacierized area of a watershed primarily dictates the glacier contribution to runoff. However, the relative importance of glacial contribution to streamflow also generally increases from west to east due to lower snowfall east of the hydrologic crest of the North Cascades. In 2017, glacier contribution to summer streamflow was modestly above average in all four watersheds.

Table 2. ***Provisional*** glacial contribution to summer stream flow (May 1 to Sept. 30) for four watersheds. Data from 1993-2017, except Sandalee Glacier and Stehekin River watershed (1995-2017).

	May-September Runoff (thousands acre-feet)				% Glacial Runoff to Total Summer Runoff			
	2016	mean	min	max	2016	mean	min	max
Baker River watershed								
Noisy Creek Glacier	1.5	1.4	1.0	2.1	---	---	---	---
All glaciers	107.2	88.8	58.4	136.1	12.1	12.0	6.7	29.7
Thunder Creek watershed								
North Klawatti Glacier	4.6	4.0	2.5	5.8	---	---	---	---
All glaciers	101.6	84.5	57.1	127.9	29.4	27.7	17.4	42.9
Stehekin River watershed								
Sandalee Glacier	0.5	0.4	0.3	0.7	---	---	---	---
All glaciers	61.2	51.0	34.3	77.2	7.1	7.6	4.1	15.9
Ross Lake watershed								
Silver Glacier	1.0	0.9	0.5	1.4	---	---	---	---
All glaciers	73.1	61.0	40.3	93.1	7.5	5.3	2.3	13.1