United States Department of Agriculture

NRCS Natural Resources Conservation Service

Washington
Water Supply Outlook Report
January 1, 2017

Browntop Aerial Marker, Skagit River, Chase Kingslien, 12/31/2016

Reminder: We are soliciting field work photos from our snow surveyors again this year. Each month we pick one to grace the cover of this report. The photographer will be given proper credit of course. Please include all specific information when submitting photos. Scott.pattee@wa.usda.gov

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

January 2017

General Outlook

After a hot dry summer Washington ended water year 2016 and began this water year with much above normal rainfall. It took a while but temperatures finally cooled off and snow started to accumulate in earnest in early December, which seemed to not let up. Even though snow continues to pile up from valley floor to mountain top the mountain snow isn't keeping up with "normal" accumulation amounts. Heavy valley snow like we have leads to a misperception of mountain snow pack. Yes we are getting snow but it's about the same everywhere and many just wish it would go back to mountains where it belongs. The most recent short term forecast is for below normal temperatures and above normal precipitation. NWS 3-month outlook is for equal chances of temperature and above normal precipitation which could well mean a continuation of mountain snow accumulation, much needed in several basins. http://www.cpc.ncep.noaa.gov/

Snowpack

The January 1 statewide SNOTEL readings were 118% of normal, slightly lower than this time last year. Stemilt Creek near Wenatchee reported the lowest readings at 56% of the 30-year median for January 1 and the Tolt Basin had the most snow with 193%. Most basins are recording near to above normal snowpack. 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	83	90
Newman Lake	74	130
Pend Oreille	88	99
Okanogan	93	130
Methow	100	136
Conconully Lake	64	115
Central Columbia	93	120
Upper Yakima	93	132
Lower Yakima	92	134
Ahtanum Creek	85	143
Walla Walla	117	117
Lower Snake	105	110
Cowlitz	115	125
Lewis	146	122
White	95	120
Green	112	134
Puyallup	115	138
Cedar	149	170
Snoqualmie	140	112
Skykomish	124	83
Skagit	104	127
Nooksack	136	123
Olympic Peninsula	126	143

Precipitation

Washington State received near to below normal precipitation for the month of December however year to date averages remain much above normal. We started the water year off with already wet conditions and continued the first two months with much above normal rainfall. October was impressive with over 300% of average in most basins, setting new daily and monthly accumulations.

RIVER BASIN	JANUARY PERCENT OF AVERAGE	WATER YEAR PERCENT OF AVERAGE
Spokane	89	128
Pend Oreille	112	120
Upper Columbia	65	132
Central Columbia	94	120
Upper Yakima	111	111
Lower Yakima	93	129
Walla Walla	124	129
Lower Snake	116	116
Lower Columbia	90	143
South Puget Sound	107	121
Central Puget Sound	114	116
North Puget Sound	82	119
Olympic Peninsula	51	150

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 very wet fall helped buffer many reservoirs to above normal levels for this time of year. January 1 Reservoir storage in the Yakima Basin was 362,000-acre feet, 105% of average for the Upper Reaches and 127,000-acre feet or 122% of average for Rimrock and Bumping Lakes. The power generation reservoirs included the following: Coeur d'Alene Lake, 55,000 acre feet, 59% of average and 23% of capacity; and the Skagit River reservoirs at 64% of average and 55% 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	23	59
Pend Oreille	39	85
Upper Columbia	82	139
Central Columbia	N/A	N/A
Upper Yakima	43	105
Lower Yakima	55	122
Lower Snake	71	103
North Puget Sound	52	64

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, 112%; White River, 106%; and Skagit River, 97%. Some Eastern Washington streams include the Yakima River near Parker 97%, Wenatchee River at Plain 100%; and Spokane River near Post Falls 93%. 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	93-108
Pend Oreille	110-114
Upper Columbia	84-99
Central Columbia	96-100
Upper Yakima	94-98
Lower Yakima	93-101
Walla Walla	97-112
Lower Snake	105-146
Lower Columbia	96-111
South Puget Sound	106-117
Central Puget Sound	100-137
North Puget Sound	94-97
Olympic Peninsula	109-113

STREAM	PERCENT OF AVERAGE JANUARY STREAMFLOWS
Pend Oreille at Albeni Fall Dam	109
Kettle at Laurier	247
Columbia at Birchbank	125
Spokane at Spokane	95
Similkameen at Nighthawk	87
Okanogan at Tonasket	118
Methow at Pateros	140
Chelan at Chelan	103
Wenatchee at Pashastin	80
Cle Elum near Roslyn	66
Yakima at Parker	65
Naches at Naches	68
Grande Ronde at Troy	94
Snake below Lower Granite Dam	72
Columbia River at The Dalles	98
Lewis at Merwin Dam	78
Cowlitz below Mayfield Dam	86
Skagit at Concrete	69
Dungeness near Sequim	60

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.

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

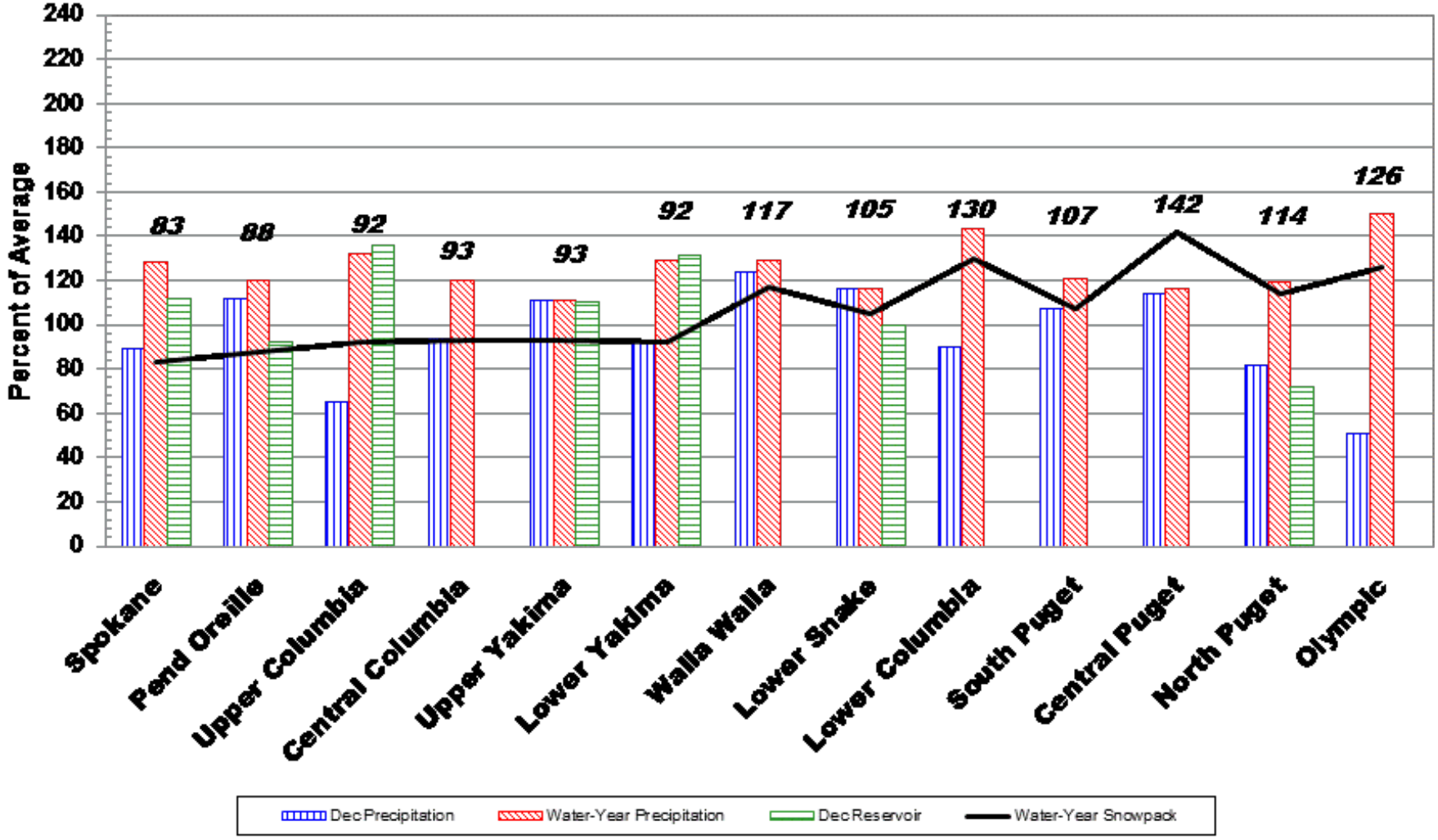
Washington:
http://www.nrcs.usda.gov/wps/portal/nrcs/site/wa/home/

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

NRCS Natural Resources Conservation Service

January 1, 2017 - Snowpack, Precipitation and Reservoir Conditions at a Glance

(Water Year = October 1 - Current Date)



Joint Meeting of the
Western Snow Conference
And the
Weather Modification Association

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 North Continental Area Committee is making plans for the 85th Annual Western Snow Conference in 2017.

Mark your calendar and start thinking about submitting a paper to attend the 2017 Western Snow Conference:

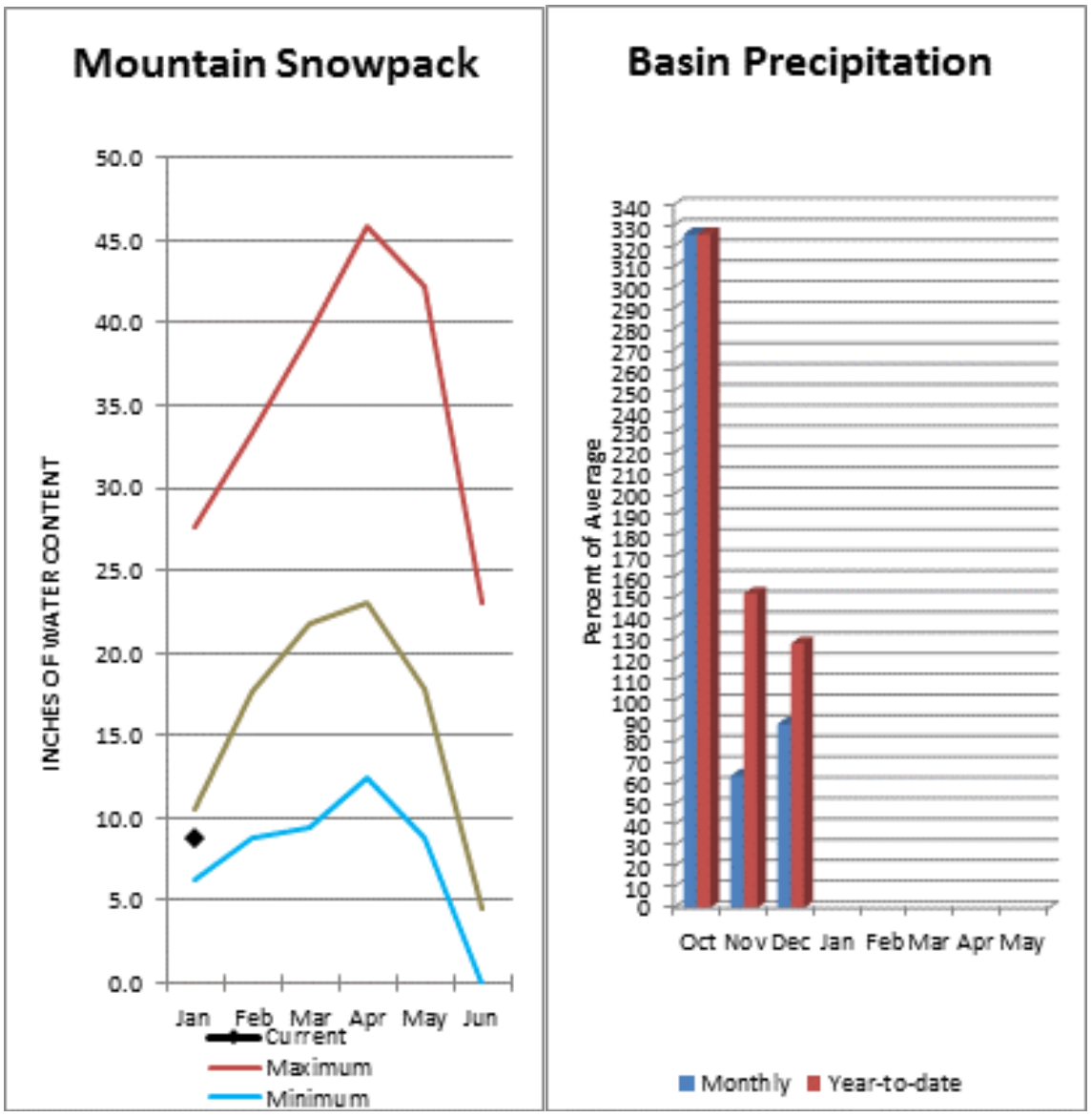
Dates: April 17-20, 2017
Location: Boise, ID

This first ever combined conference with the Weather Modification Association will kick off with a Monday afternoon short course entitled "Tracing the Effects of Cloud Seeding through the Hydrologic Cycle" with several invited experts in the field. Tuesday will begin with a joint plenary session, followed by concurrent sessions of oral and poster presentations. On Thursday, a technical tour will include a visit to the Dry Creek Experimental Watershed, A NRCS SNOTEL site, and a collaborative weather station for youth education.

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 93% of average near Post Falls and 95% at Long Lake. The Chamokane River near Long Lake forecasted to have 108% of average flows for the May-August period. The forecast is based on a basin snowpack that is 83% of normal and precipitation that is 128% of average for the water year. Precipitation for December was below normal at 89% of average. Streamflow on the Spokane River at Spokane was 95% of average for December. January 1 storage in Coeur d'Alene Lake was 55,000 acre feet, 59% of average and 23% of capacity. Snowpack at Quartz Peak SNOTEL site was 74% of average with 7.2 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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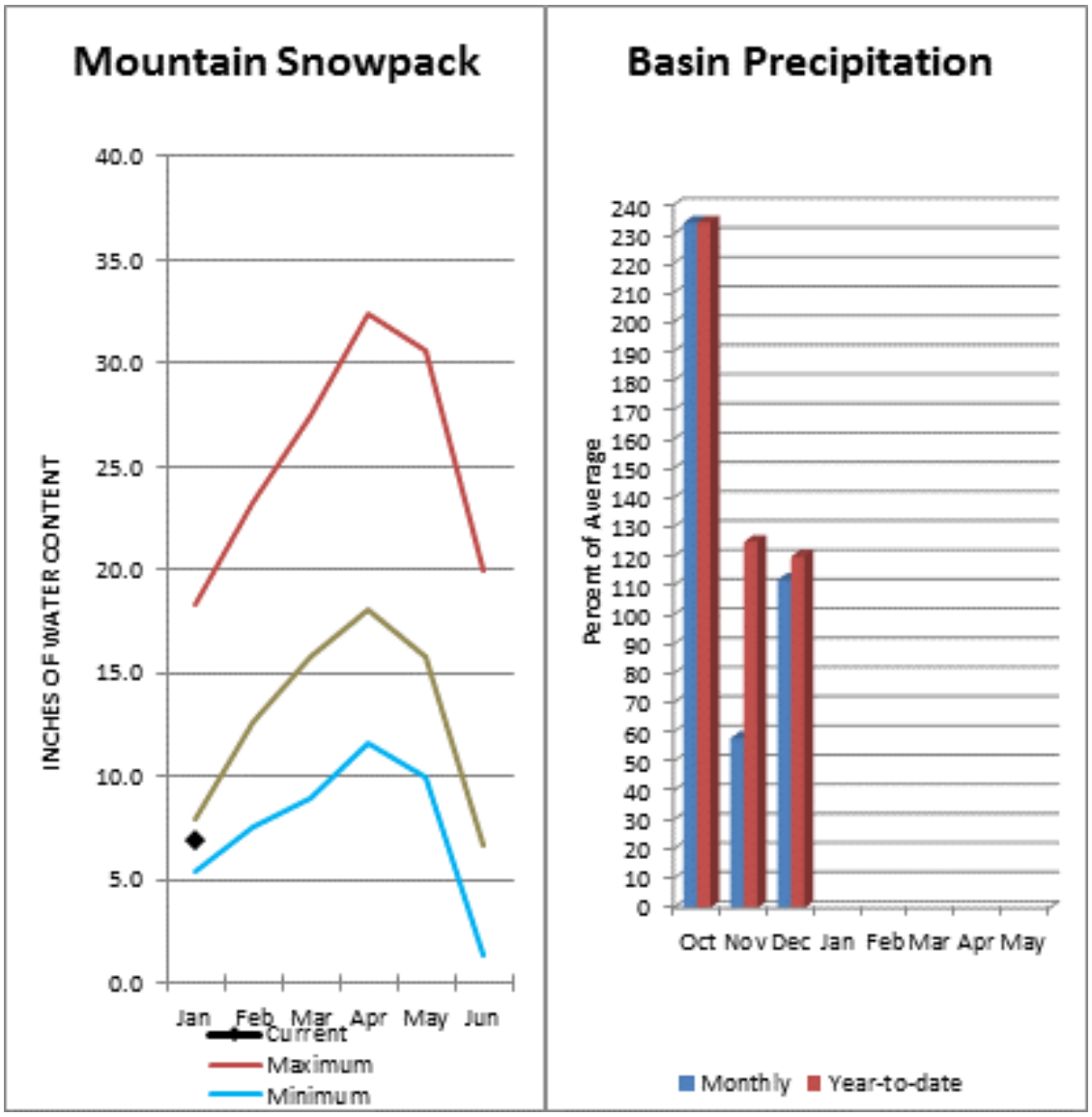
Spokane
Streamflow Forecasts - January 1, 2017

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	1320	1860	2220	93%	2590	3130	2390
	APR-SEP	1380	1930	2300	93%	2670	3220	2480
Spokane R at Long Lake[2]								
	APR-JUL	1470	2080	2500	95%	2910	3520	2620
	APR-SEP	1650	2280	2700	95%	3130	3760	2850
Chamokane Ck nr Long Lake								
	MAY-AUG	6.6	8.6	10	108%	11.3	13.4	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 December, 2016	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Lake Coeur d' Alene	54.9	60.7	93.7	238.5
Basin-wide Total	54.9	60.7	93.7	238.5
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis January 1, 2017	# of Sites	% Median	Last Year % Median
Spokane	11	83%	90%
Newman Lake	1	74%	130%



The April – September average forecast for the Priest River near the town of Priest River is 114% and the Pend Orielle below Box Canyon is 110%. December streamflow was 109% of average on the Pend Oreille River and 125% on the Columbia at Birchbank. January 1 snow cover was 88% of normal in the Pend Oreille Basin River Basin. Bunchgrass Meadows SNOTEL site had 6.8 inches of snow water on the snow pillow. Normally Bunchgrass would have 11.6 inches on January 1. Precipitation during December was 112% of average, dropping the year-to-date precipitation at 120% of average. Reservoir storage in the basin, including Lake Pend Oreille and Priest Lake was 85% of normal. Average temperatures were much below normal for December but 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 - January 1, 2017

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]								
	APR-JUL	10100	11800	12900	109%	14100	15800	11800
	APR-SEP	11100	12900	14100	110%	15300	17000	12800
Priest R nr Priest River[2]								
	APR-JUL	665	805	900	115%	995	1140	780
	APR-SEP	700	850	950	114%	1050	1200	830
Pend Oreille R bl Box Canyon[2]								
	APR-JUL	10200	11900	13100	110%	14200	16000	11900
	APR-SEP	11300	13100	14300	110%	15500	17300	13000

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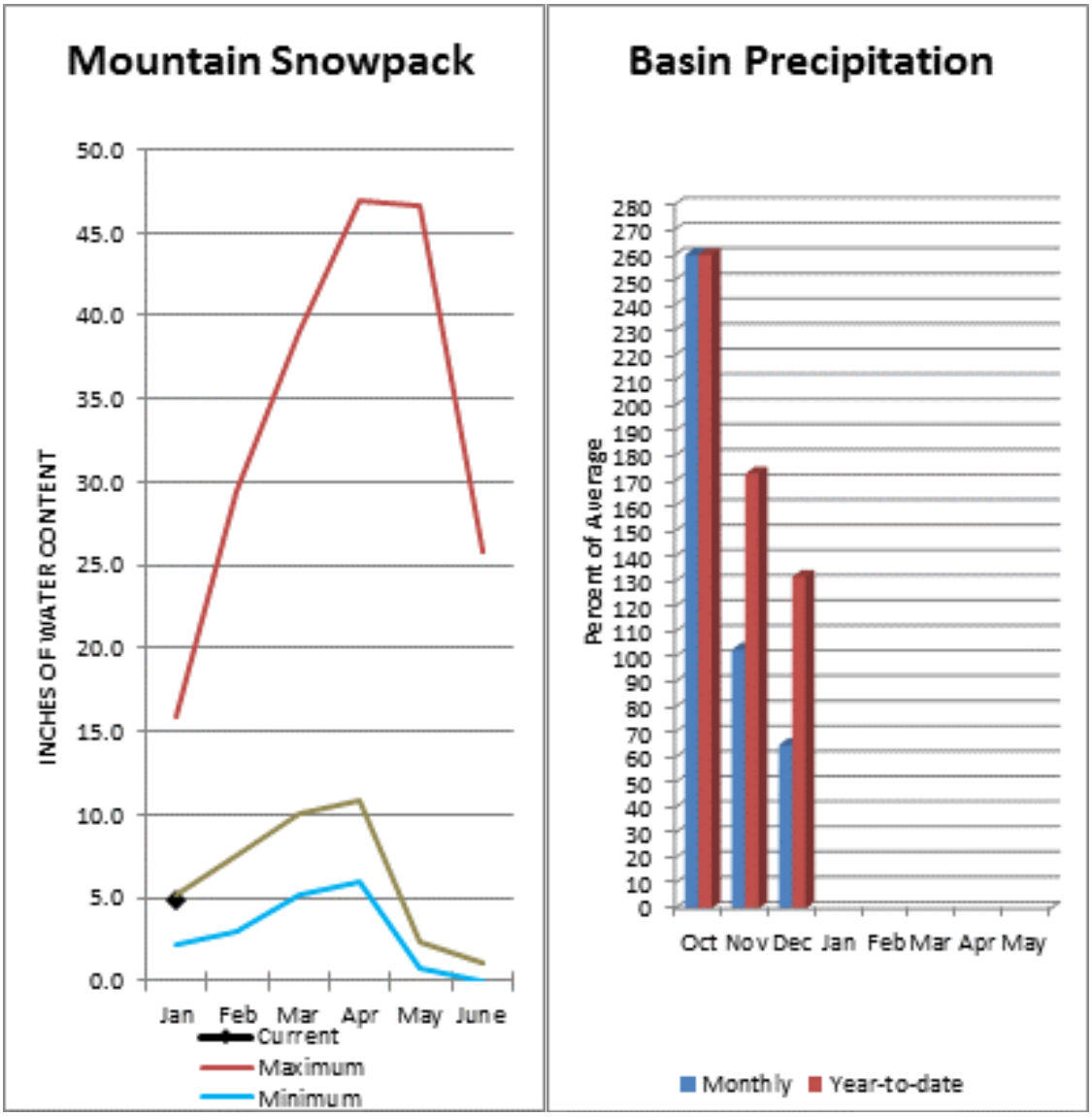
2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions
3) Median value used in place of average

Reservoir Storage End of December, 2016	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Lake Pend Oreille	590.8	575.8	708.2	1561.3
Priest Lake	57.5	61.1	56.5	119.3
Basin-wide Total	648.3	636.8	764.7	1680.6
# of reservoirs	2	2	2	2

Watershed Snowpack Analysis January 1, 2017	# of Sites	% Median	Last Year % Median
Pend Oreille Basins	50	88%	99%
Colville River	0		
Kettle River	3	77%	123%



Summer runoff average forecast for the Okanogan River is 84%, Similkameen River is 95%, and Methow River is 116%. January 1 snow cover on the Okanogan was 93% of normal, Omak Creek was 108% and the Methow was 100%. December precipitation in the Upper Columbia was 65% of average, with precipitation for the water year at 132% of average. December streamflow for the Methow River was 140% of average, 118% for the Okanogan River and 87% for the Similkameen. Snow-water content at Salmon Meadows SNOTEL was 3.0 inches or 64% of normal for January 1. Combined storage in the Conconully Reservoirs was 19,200 acre-feet or 139% of normal. Temperatures were much below normal for December but closer to normal for the water year.

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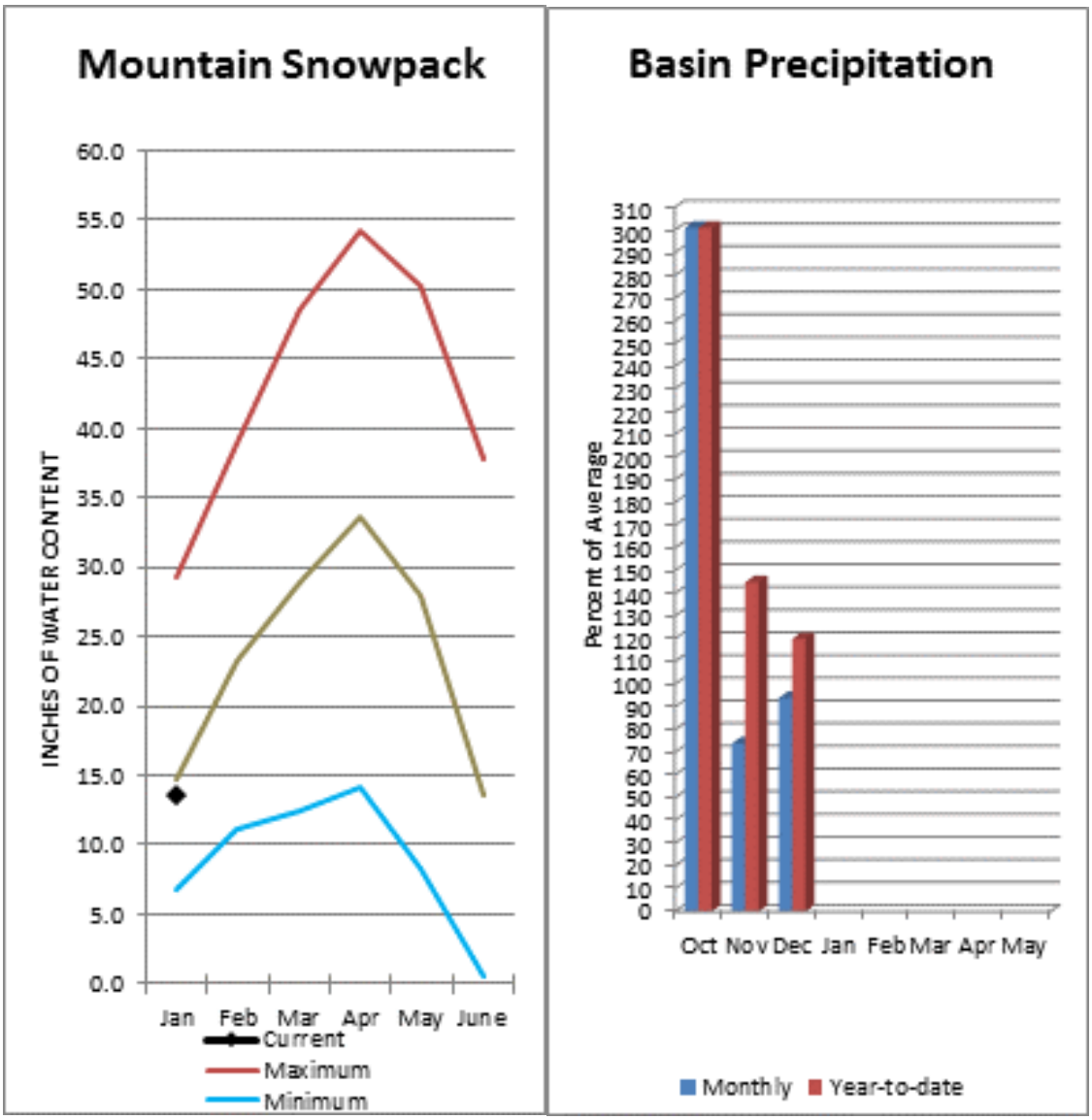
Upper Columbia Basins
Streamflow Forecasts - January 1, 2017

Upper 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						
Kettle R nr Laurier								
	APR-JUL	1000	1330	1560	87%	1790	2120	1800
	APR-SEP	1020	1370	1610	86%	1850	2200	1880
Colville R at Kettle Falls								
	APR-JUL	0.54	46	78	66%	109	155	119
	APR-SEP	34	52	86	66%	120	171	131
Columbia R at Grand Coulee[1,2]								
	APR-JUL	42200		48500	95%		57100	51015
	APR-SEP	50200		57700	96%		67600	60110
Similkameen R nr Nighthawk[1]								
	APR-JUL	775	1000	1160	97%	1320	1550	1200
	APR-SEP	810	1050	1220	95%	1390	1630	1280
Okanogan R nr Tonasket[1]								
	APR-JUL	700	1030	1260	85%	1480	1810	1480
	APR-SEP	760	1130	1380	84%	1630	2000	1650
Okanogan R at Malott[1]								
	APR-JUL	700	1050	1280	88%	1510	1860	1450
	APR-SEP	755	1140	1400	86%	1660	2040	1620
Methow R nr Pateros								
	APR-JUL	505	700	830	99%	960	1150	835
	APR-SEP	545	750	890	99%	1030	1230	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 December, 2016	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Conconully Lake (Salmon Lake Dam)	8.5	7.1	7.3	10.5
Conconully Reservoir	10.7	5.7	6.5	13.0
Basin-wide Total	19.2	12.7	13.8	23.5
# of reservoirs	2	2	2	2

Watershed Snowpack Analysis January 1, 2017	# of Sites	% Median	Last Year % Median
Upper Columbia Basins	7	92%	127%
Okanogan River	6	93%	130%
Omak Creek	1	108%	121%
Sanpoil River	0		
Similkameen River	1	88%	129%
Toats Coulee Creek	0		
Conconully Lake	1	64%	115%
Methow River	3	100%	136%



Precipitation during December was 94% of average in the basin and 120% for the year-to-date. Runoff for Entiat River is forecast to be 98% of average for the summer. The April-September average forecast for Chelan River is 96%, Wenatchee River at Plain is 100%, Stehekin River is 98% and Icicle Creek is 98%. December average streamflow on the Chelan River was 103% and on the Wenatchee River 80%. January 1 snowpack in the Wenatchee River Basin was 93% of normal; the Chelan, 96%; the Entiat, 74%; Stemilt Creek, 58% and Colockum Creek, 75%. Reservoir storage in Lake Chelan was not available. Lyman Lake SNOTEL had the most snow water with 31.6 inches of water. This site would normally have 26.4 inches on January 1. Temperatures were slightly below normal for December 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 - January 1, 2017

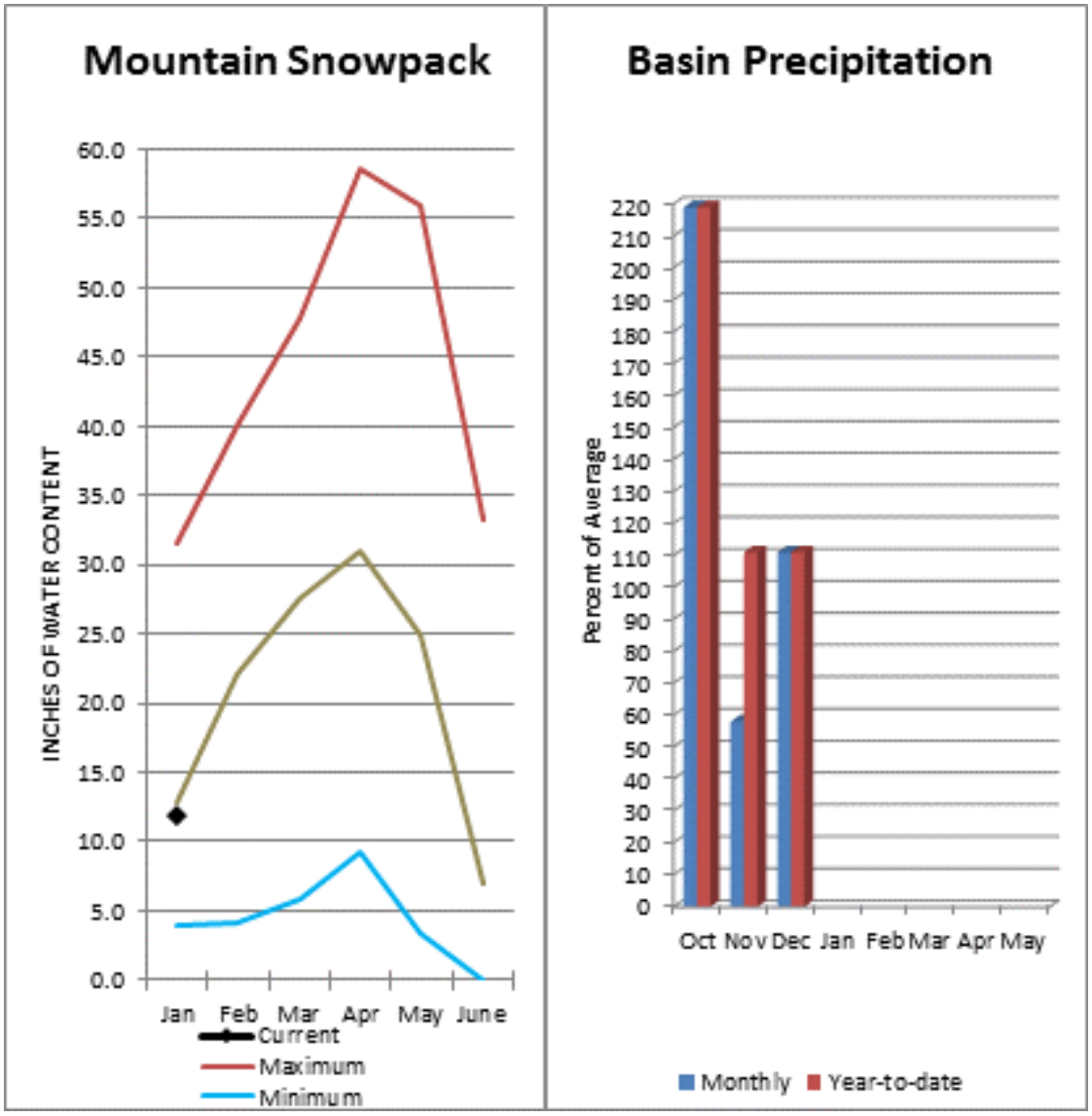
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

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	510	605	670	99%	735	835	680
	APR-SEP	595	705	775	98%	850	955	790
Chelan R at Chelan								
	APR-JUL	720	865	965	97%	1060	1200	1000
	APR-SEP	790	955	1070	96%	1180	1350	1120
Entiat R nr Ardenvoir								
	APR-JUL	134	172	199	100%	225	265	200
	APR-SEP	144	187	215	98%	245	290	220
Wenatchee R at Plain								
	APR-JUL	705	875	990	100%	1110	1280	990
	APR-SEP	760	950	1080	100%	1210	1400	1080
Icicle Ck nr Leavenworth								
	APR-JUL	192	240	275	100%	305	355	275
	APR-SEP	210	260	295	98%	330	385	300
Wenatchee R at Peshastin								
	APR-JUL	985	1210	1360	99%	1510	1730	1370
	APR-SEP	1050	1300	1470	99%	1630	1880	1490
Columbia R bl Rock Island Dam[2]								
	APR-JUL	46200		53000	95%		62700	55772
	APR-SEP	54000		62900	96%		73500	65202

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, 2016	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Lake Chelan		448.5	411.3	676.1
Basin-wide Total		0.0	0.0	0.0
# of reservoirs	0	0	0	0

Watershed Snowpack Analysis January 1, 2017	# of Sites	% Median	Last Year % Median
Central Columbia Basins	3	96%	117%
Chelan Lake Basin	3	96%	117%
Entiat River	1	74%	103%
Wenatchee River	7	93%	120%
Stemilt Creek	1	58%	138%
Colockum Creek	1	75%	169%



January 1 reservoir storage for the Upper Yakima reservoirs was 362,000-acre feet, 105% of average. Forecasts for the Yakima River at Cle Elum are 94% of average and the Teanaway River near Cle Elum is at 94%. 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 66%. January 1 snowpack was 93% based upon 8 snow course and SNOTEL readings within the Upper Yakima Basin. Precipitation was 111% of average for December and 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.

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

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Upper Yakima River
Streamflow Forecasts - January 1, 2017

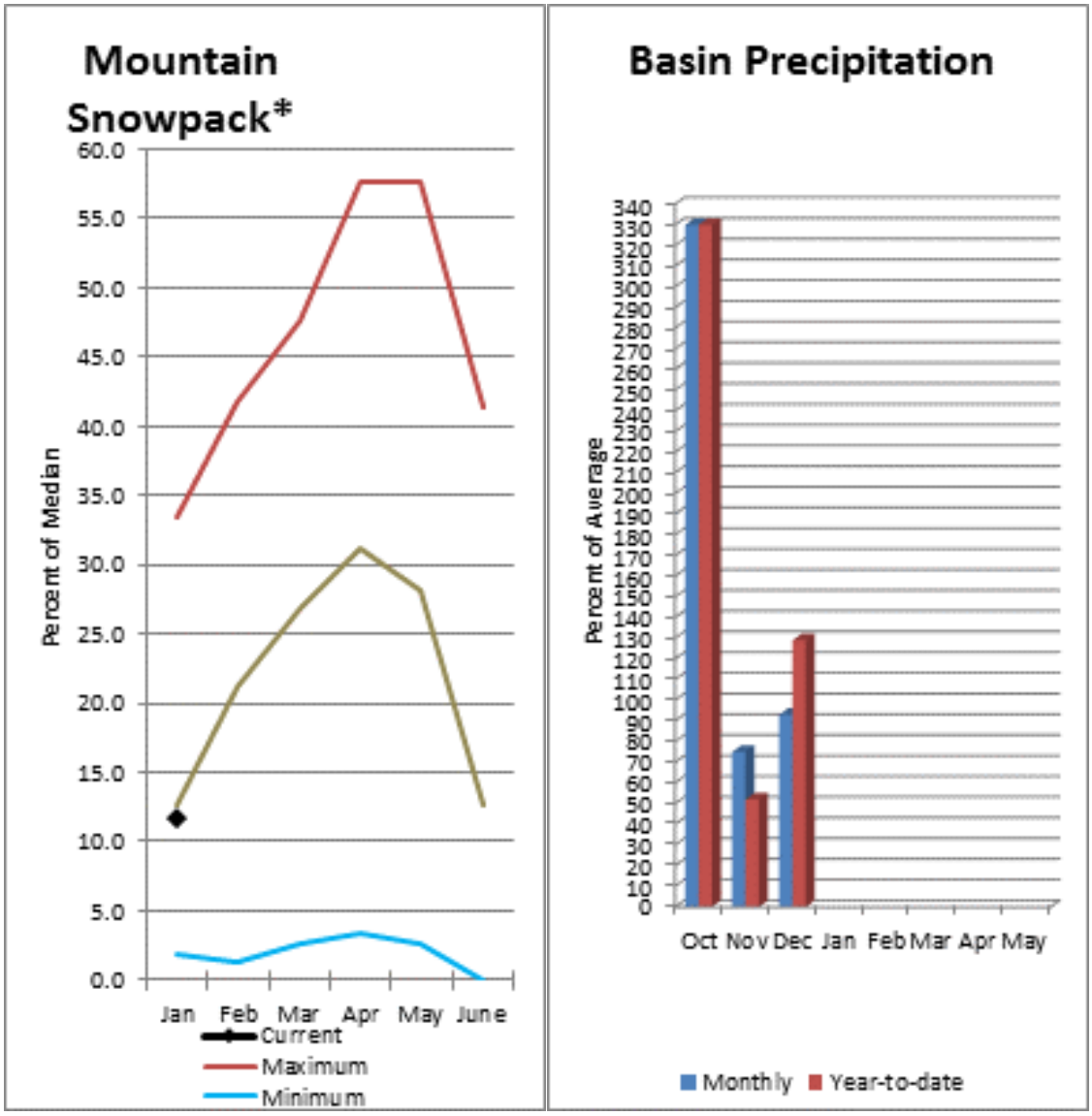
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

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	69	95	113	97%	130	157	116
	APR-SEP	77	104	123	98%	141	168	126
Kachess Reservoir Inflow [2]								
	APR-JUL	60	84	100	96%	116	139	104
	APR-SEP	68	92	108	96%	124	147	113
Cle Elum Lake Inflow [2]								
	APR-JUL	250	320	370	96%	415	490	385
	APR-SEP	270	345	400	96%	450	525	415
Yakima R at Cle Elum [2]								
	APR-JUL	440	600	710	94%	815	975	755
	APR-SEP	495	665	780	94%	890	1060	830
Teanaway R bl Forks nr Cle Elum								
	APR-JUL	58	96	122	94%	148	186	130
	APR-SEP	60	99	125	94%	151	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 December, 2016	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Keechelus	70.8	96.0	68.5	157.8
Kachess	123.5	110.8	113.4	239.0
Cle Elum	167.8	218.3	164.0	436.9
Basin-wide Total	362.1	425.2	345.9	833.7
# of reservoirs	3	3	3	3

Watershed Snowpack Analysis January 1, 2017	# of Sites	% Median	Last Year % Median
Upper Yakima River	8	93%	132%



December average streamflows within the basin were: Yakima River near Parker, 65% and the Naches River near Naches, 68%. January 1 reservoir storage for Bumping and Rimrock reservoirs was 127,000-acre feet, 122% of average. Forecast averages for Yakima River near Parker are 97%; American River near Nile, 99%; Ahtanum Creek, 93%; and Klickitat River near Glenwood, 96%. January 1 snowpack was 92% based upon 7 snow course and SNOTEL readings within the Lower Yakima Basin and Ahtanum Creek reported in at 85% of normal. Precipitation was 93% of average for December and 129% for the water-year. Temperatures were much below 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.

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

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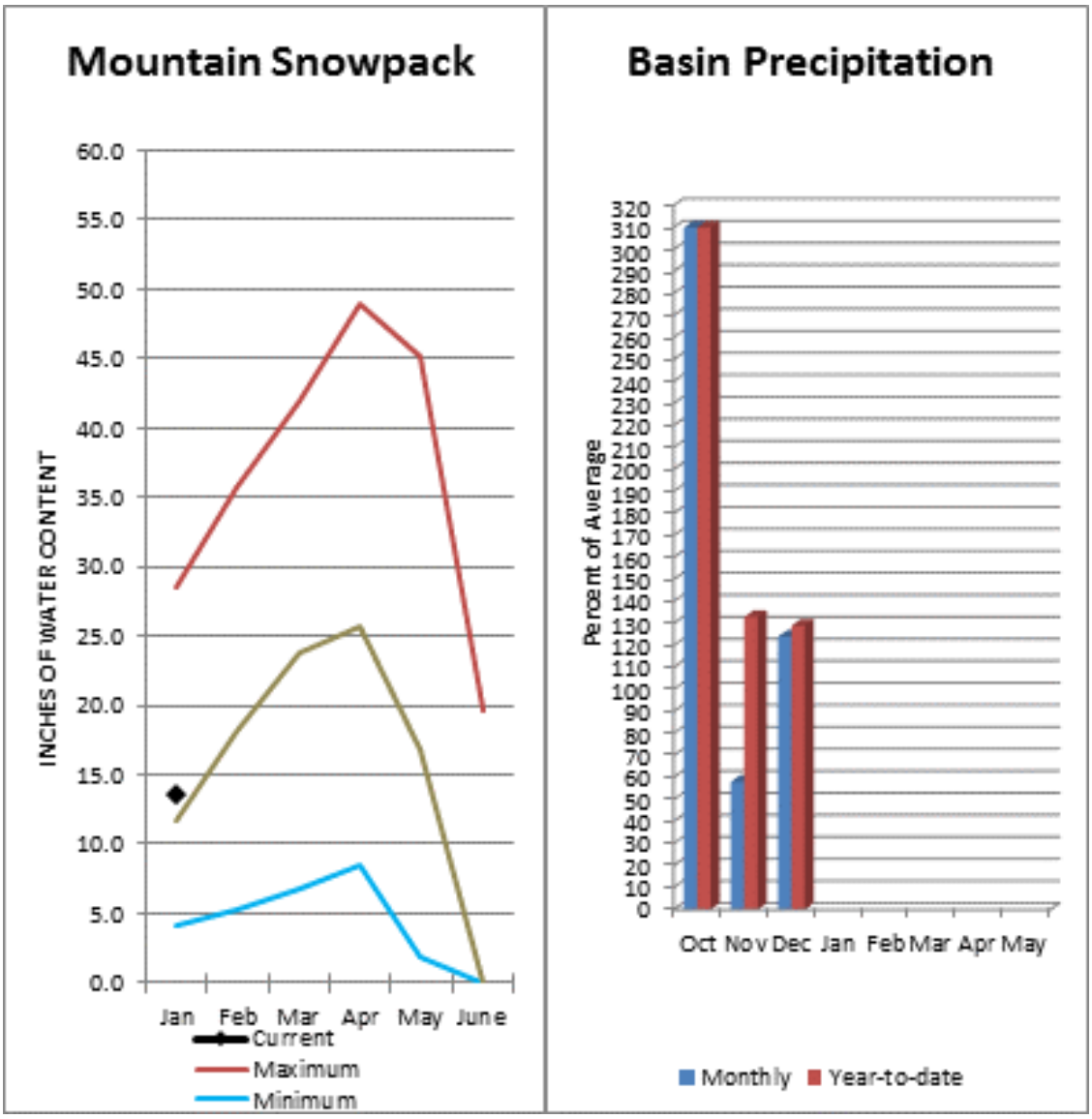
Lower Yakima River
Streamflow Forecasts - January 1, 2017

Lower Yakima 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						
Bumping Lake Inflow [2]								
	APR-JUL	75	97	112	98%	128	150	114
	APR-SEP	81	105	122	99%	139	163	123
American R nr Nile								
	APR-JUL	67	87	101	99%	115	135	102
	APR-SEP	71	94	109	99%	124	147	110
Rimrock Lake Inflow [2]								
	APR-JUL	129	162	183	98%	205	240	187
	APR-SEP	153	191	215	98%	240	280	220
Naches R nr Naches								
	APR-JUL	420	585	700	100%	815	980	700
	APR-SEP	455	640	765	101%	890	1070	760
Ahtanum Ck at Union Gap								
	APR-JUL	6.6	17.4	25	93%	32	43	27
	APR-SEP	8.4	19.4	27	93%	34	45	29
Yakima R nr Parker [2]								
	APR-JUL	980	1360	1610	97%	1870	2250	1660
	APR-SEP	1080	1490	1760	97%	2040	2450	1820
Klickitat R nr Glenwood								
	APR-JUL	68	100	121	96%	142	173	126
	APR-SEP	77	111	133	96%	156	190	139
Klickitat R nr Pitt								
	APR-JUL	280	370	435	100%	500	595	435
	APR-SEP	345	450	525	101%	595	705	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, 2016	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Bumping Lake	14.5	19.5	11.5	33.7
Rimrock	112.2	116.9	92.4	198.0
Basin-wide Total	126.7	136.4	103.9	231.7
# of reservoirs	2	2	2	2

Watershed Snowpack Analysis January 1, 2017	# of Sites	% Median	Last Year % Median
Lower Yakima River	7	92%	134%
Ahtanum Creek	2	85%	143%



December precipitation was 124% of average, maintaining the year-to-date precipitation at 129% of average. Snowpack in the basin was 117% of normal. Streamflow forecasts are 107% of average for Mill Creek and 112% for the SF Walla Walla near Milton-Freewater. Average temperatures were much 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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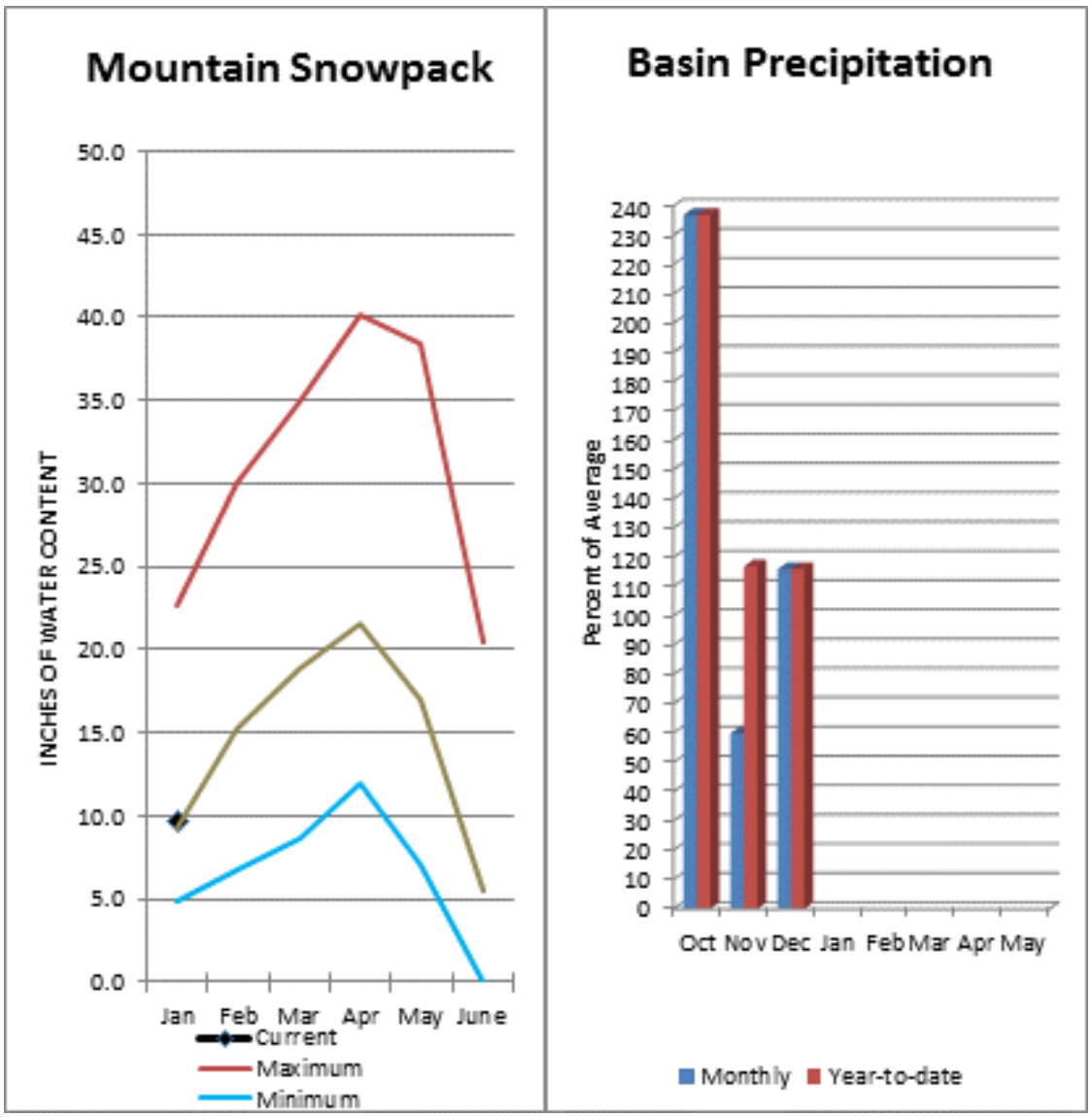
Walla Walla River
Streamflow Forecasts - January 1, 2017

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-SEP	71	81	89	111%	96	106	80
	APR-JUL	45	54	61	113%	67	76	54
	APR-SEP	58	67	74	112%	80	90	66
Mill Ck nr Walla Walla								
	APR-JUL	18.9	23	26	108%	29	33	24
	APR-SEP	22	26	29	107%	32	36	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, 2017	# of Sites	% Median	Last Year % Median
Walla Walla River	2	117%	117%



The Grande Ronde River can expect summer flows to be about 111% of normal. The forecast for Asotin Creek at Asotin predicts 146% of average flows for the April – July runoff period. December precipitation was 116% of average, bringing the year-to-date precipitation to 116% of average. January 1 snowpack readings averaged 105% of normal. December streamflow was 72% of average for Snake River below Lower Granite Dam and 94% for Grande Ronde River near Troy. Dworshak Reservoir storage was 103% 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, 2017

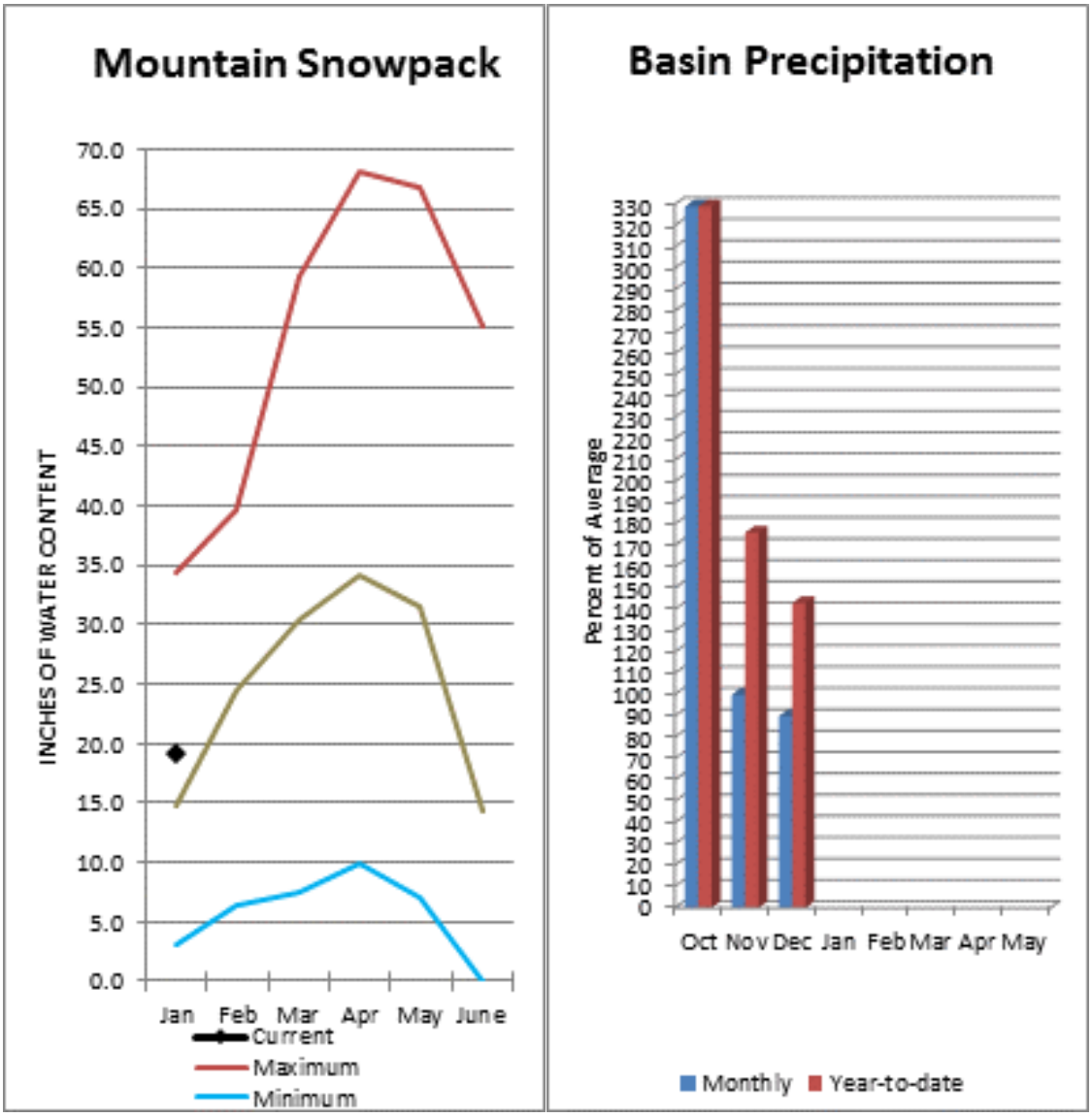
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

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	1190	1480	1670	111%	1870	2160	1510
	APR-SEP	1000	1270	1450	111%	1630	1900	1310
Asotin Ck at Asotin								
	APR-JUL	33	44	51	146%	58	69	35
Clearwater R at Spalding[2]								
	APR-JUL	5070	6360	7230	105%	8100	9380	6890
	APR-SEP	5420	6730	7620	105%	8510	9820	7270
Snake R bl Lower Granite Dam[12]								
	APR-JUL	10200	17700	21100	106%	24500	31900	19848
	APR-SEP	11600	20000	23800	107%	27700	36100	22280

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, 2016	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Dworshak Reservoir	2470.4	2274.5	2403.0	3468.0
Basin-wide Total	2470.4	2274.5	2403.0	3468.0
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis January 1, 2017	# of Sites	% Median	Last Year % Median
Lower Snake, Grande Ronde, Clearwater Basins	11	105%	110%



Forecasts for April – September streamflows within the basin are Lewis River at Ariel, 100% and Cowlitz River at Castle Rock, 105% of average. The Columbia at The Dalles is forecasted to have 100% of average flows this summer according to the River Forecast Center. December average streamflow for Cowlitz River was 86%. The Columbia River at The Dalles was 98% of average. December precipitation was 90% of average and the water-year average was 143%. January 1 snow cover for Cowlitz River was 115%, and Lewis River was 146% of normal. Temperatures were below normal during December but near average for the water year.

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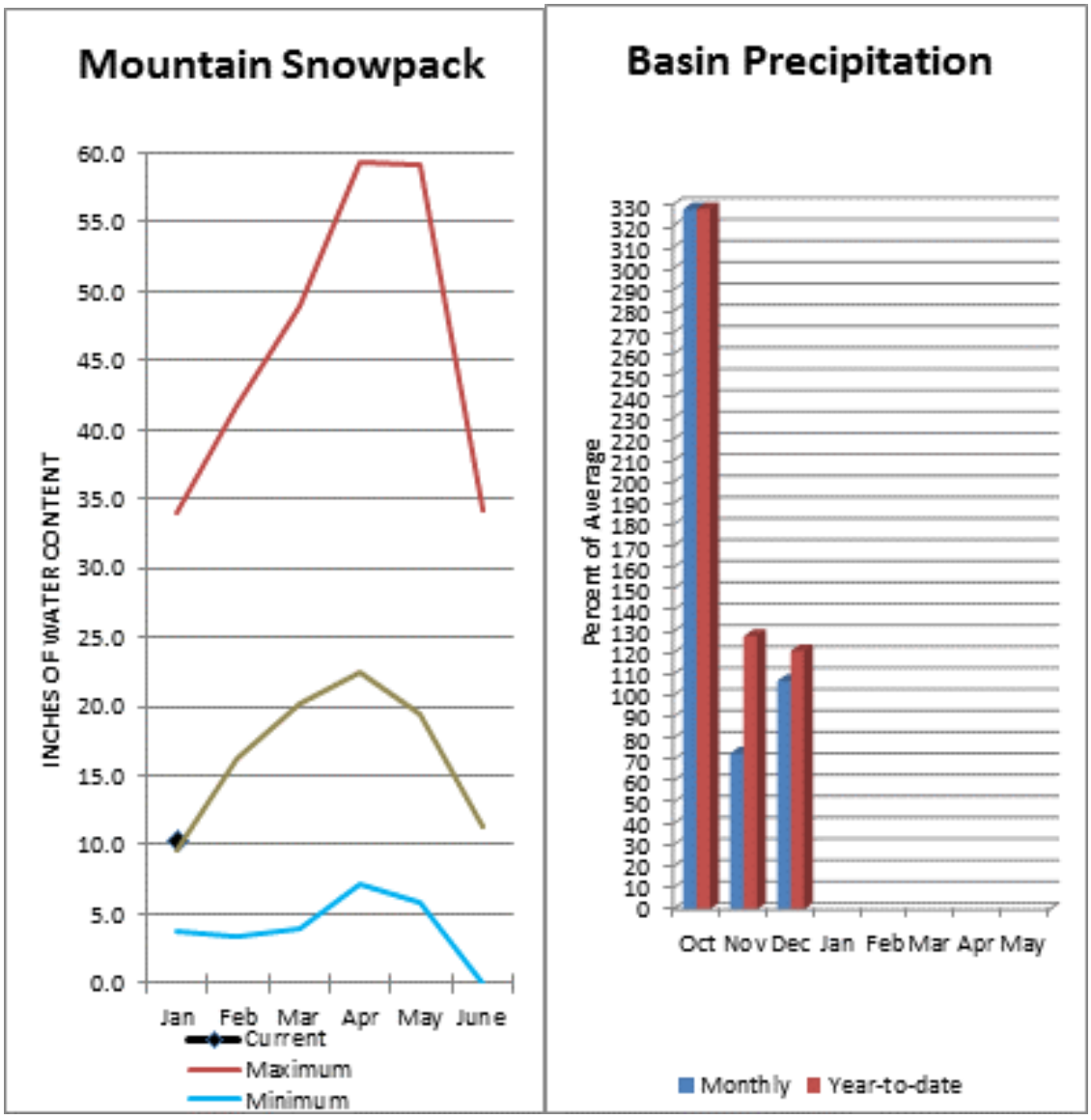
Lower Columbia Basins
Streamflow Forecasts - January 1, 2017

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[2]								
	APR-JUL	65900		78900	99%		91700	79900
	APR-SEP	77600		92600	100%		106000	92700
Klickitat R nr Glenwood								
	APR-JUL	68	100	121	96%	142	173	126
	APR-SEP	77	111	133	96%	156	190	139
Klickitat R nr Pitt								
	APR-JUL	280	370	435	100%	500	595	435
	APR-SEP	345	450	525	101%	595	705	520
Lewis R at Ariel[2]								
	APR-JUL	695	870	990	102%	1110	1280	970
	APR-SEP	805	990	1120	100%	1240	1420	1120
Cowlitz R bl Mayfiled[2]								
	APR-JUL	1220	1530	1740	107%	1940	2250	1620
	APR-SEP	1410	1790	2050	111%	2310	2690	1840
Cowlitz R at Castle Rock[2]								
	APR-JUL	1800	2100	2310	104%	2510	2820	2230
	APR-SEP	2060	2410	2650	105%	2880	3230	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, 2017	# of Sites	% Median	Last Year % Median
Lower Columbia Basins	11	130%	124%
Lewis River	5	146%	122%
Cowlitz River	6	115%	125%



Summer runoff is forecast to be 117% of normal for the Green River below Howard Hanson Dam and 106% for the White River near Buckley. January 1 snowpack was 95% of average for the White River, 115% for Puyallup River and 112% in the Green River Basin. December precipitation was 107% of average, bringing the water year-to-date to 121% of average for the basins. Average temperatures in the area were below normal for December but near normal for the water-year.

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

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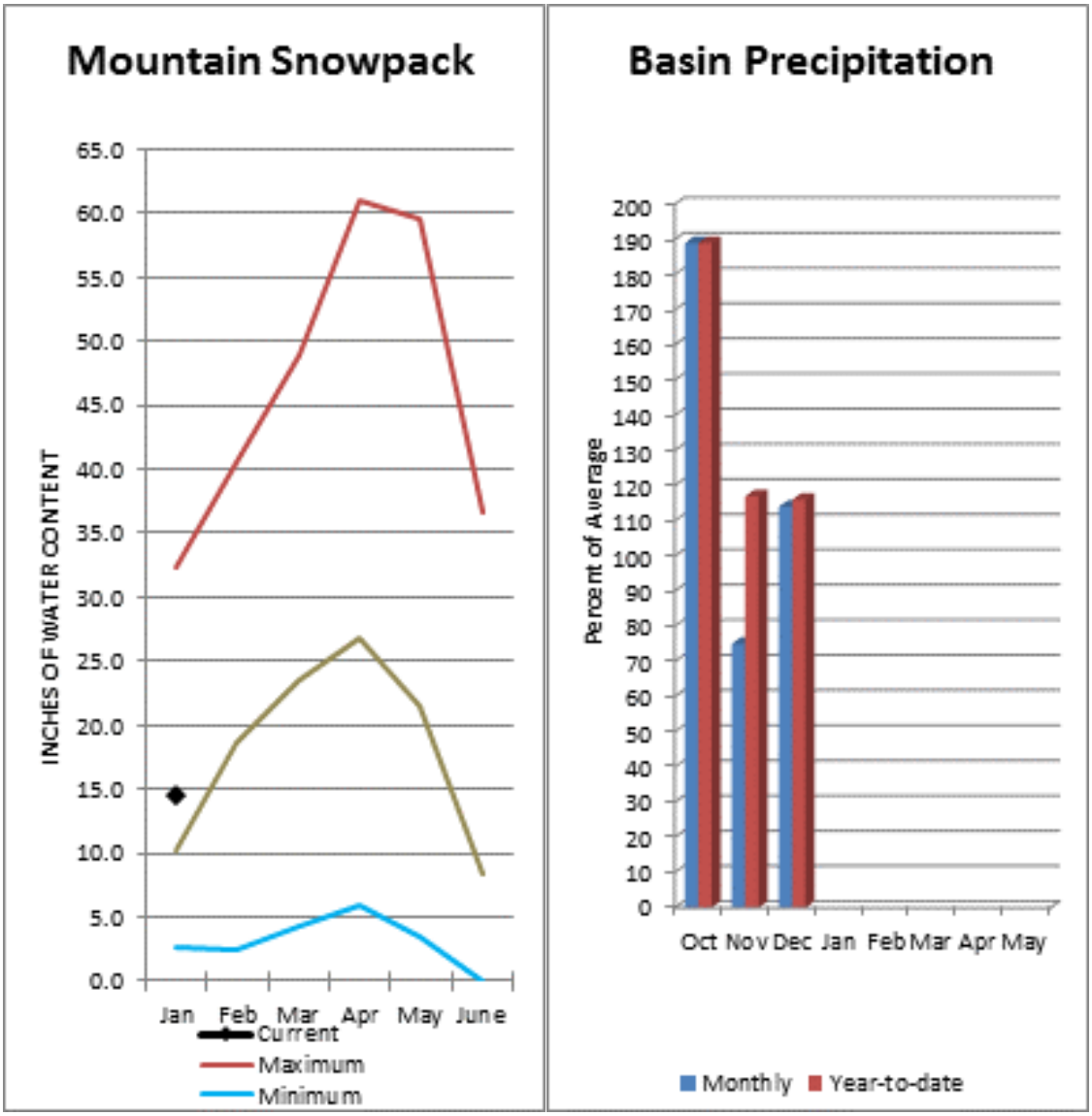
South Puget Sound Basins
Streamflow Forecasts - January 1, 2017

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	345	420	460	107%	495	575	430
	APR-SEP	415	505	545	106%	590	680	515
Green R bl Howard A Hanson Dam[1,2]								
	APR-JUL	192	250	280	119%	305	365	235
	APR-SEP	215	275	305	117%	330	390	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, 2017	# of Sites	% Median	Last Year % Median
South Puget Sound Basins	10	107%	131%
White River	3	95%	120%
Green River	2	112%	134%



Forecast for spring and summer flows are: 112% for Cedar River near Cedar Falls; 111% for Rex River; 137% for South Fork of the Tolt River; and 100% for Taylor Creek near Selleck. Basin-wide precipitation for December was 114% of average, bringing water-year-to-date to 116% of average. January 1 median snow cover in Cedar River Basin was 149%, Tolt River Basin was 193%, Snoqualmie River Basin was 140%, and Skykomish River Basin was 124%. Temperatures were below normal for December and near normal for the water-year.

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

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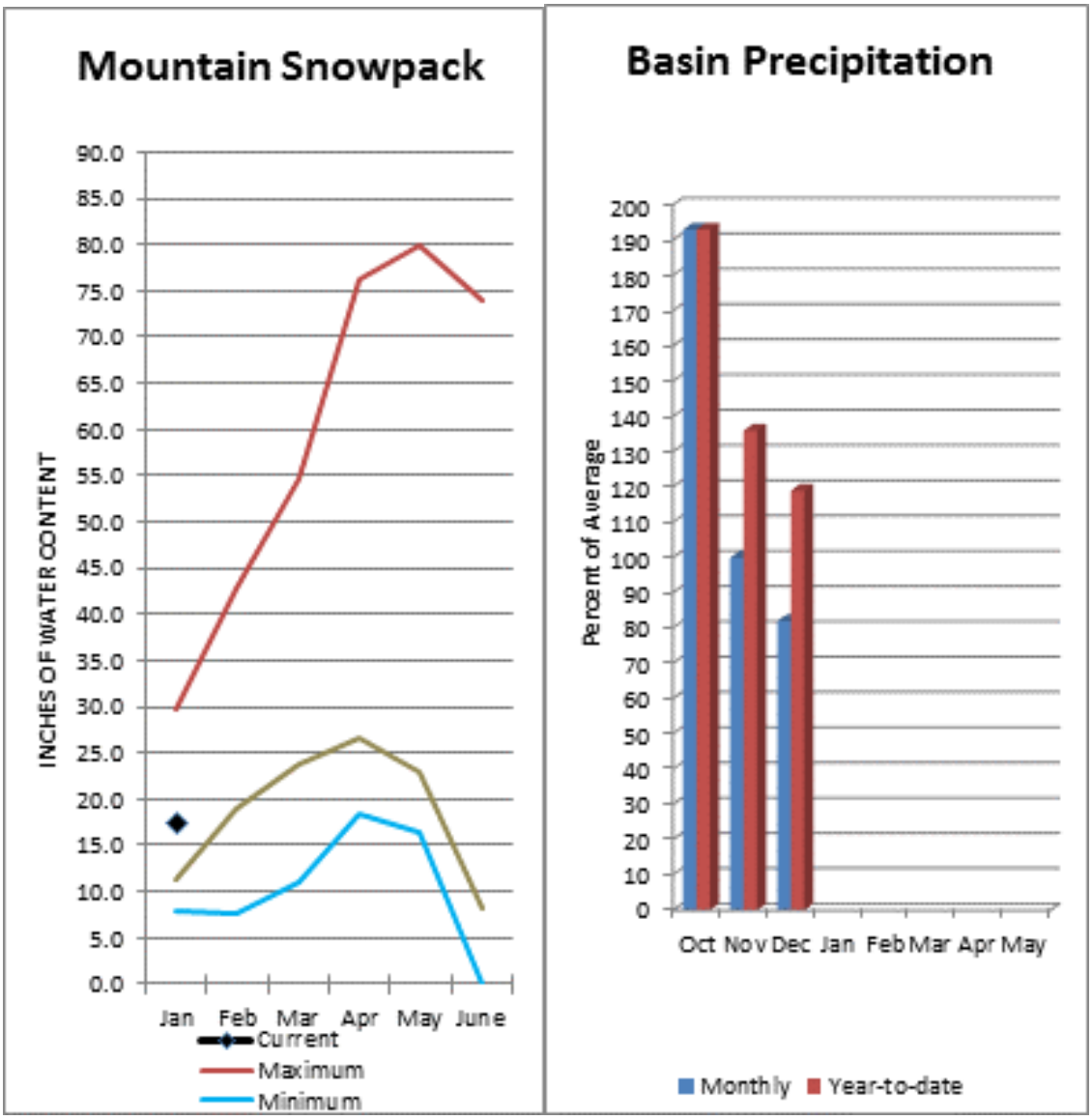
Central Puget Sound Basins
Streamflow Forecasts - January 1, 2017

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	53	68	78	111%	88	103	70
	APR-SEP	59	75	85	112%	95	110	76
Rex R nr Cedar Falls								
	APR-JUL	17.3	24	28	117%	32	38	24
	APR-SEP	19.8	26	30	111%	35	41	27
Taylor Ck nr Selleck								
	APR-JUL	15	18.4	21	105%	23	27	20
	APR-SEP	18.4	22	24	100%	27	31	24
SF Tolt R nr Index								
	APR-JUL	14.5	17.3	19.2	135%	21	24	14.2
	APR-SEP	17.1	20	22	137%	24	27	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, 2017	# of Sites	% Median	Last Year % Median
Central Puget Sound Basins	12	143%	134%
Puyallup River	5	115%	138%
Cedar River	4	149%	170%
Tolt River	2	193%	105%
Snoqualimie River	4	140%	112%
Skykomish River	2	124%	83%



Forecast for Skagit River streamflow at Newhalem is 97% of average for the spring and summer period. December streamflow in Skagit River was 69% of average. Other forecast points included Baker River at 94% and Thunder Creek at 95% of average. Basin-wide precipitation for December was 82% of average, bringing water-year-to-date to 119% of average. January 1 average snow cover in Skagit River Basin was 105% and the Nooksack River Basin was 136%. January 1 Skagit River reservoir storage was 64% of average and 52% of capacity. Average temperatures were below 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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North Puget Sound Basins
Streamflow Forecasts - January 1, 2017

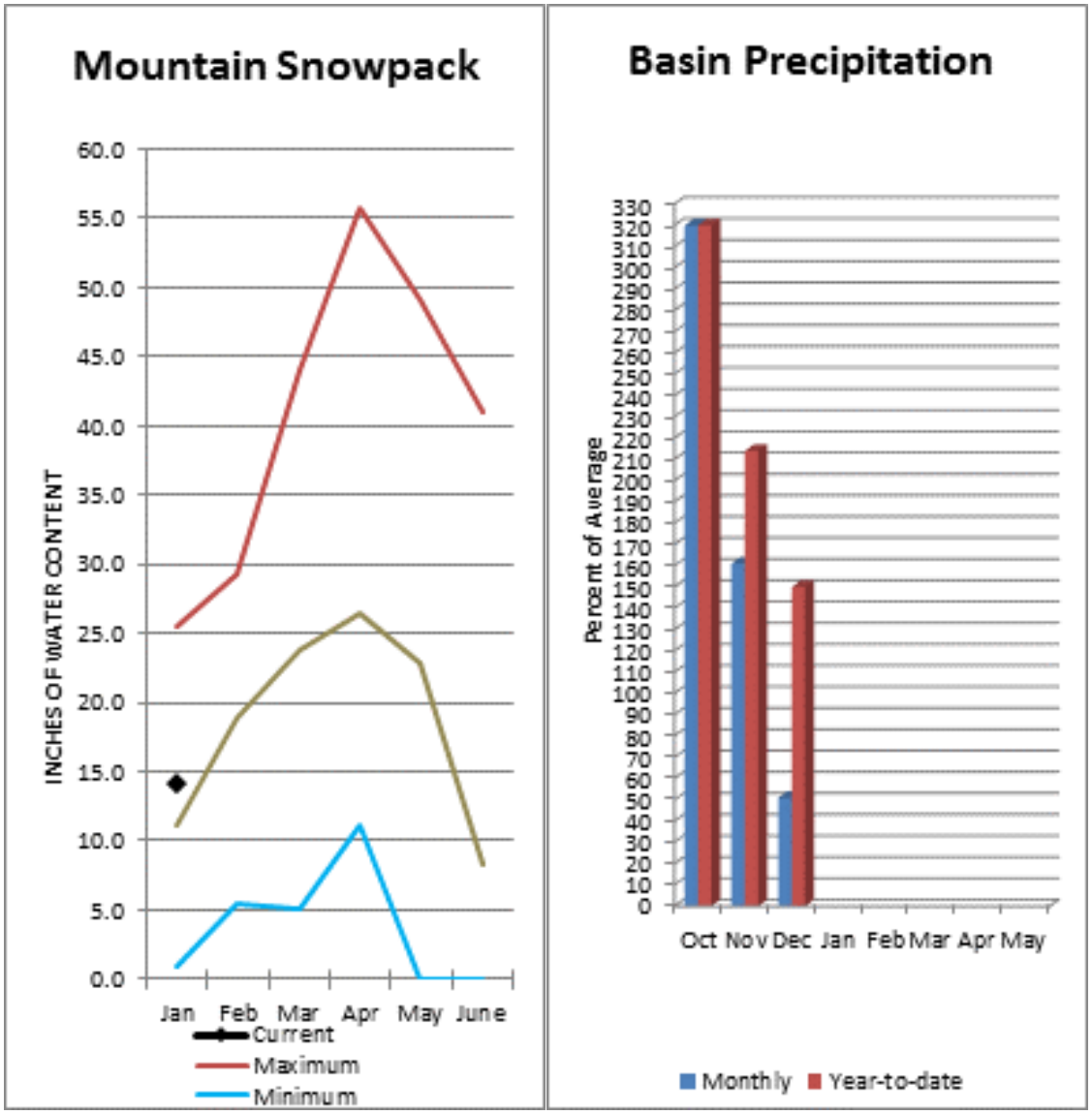
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

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	189	210	225	96%	235	255	235
	APR-SEP	275	300	315	95%	335	360	330
Skagit R at Newhalem[2]								
	APR-JUL	1350	1540	1670	99%	1800	1990	1680
	APR-SEP	1610	1830	1970	97%	2120	2340	2030
Baker R at Concrete								
	APR-JUL	535	635	705	90%	780	880	780
	APR-SEP	690	830	925	94%	1020	1160	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, 2016	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Ross	727.8	823.0	1135.0	1404.1
Diablo Reservoir			85.8	90.6
Basin-wide Total	727.8	823.0	1135.0	1404.1
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis January 1, 2017	# of Sites	% Median	Last Year % Median
North Puget Sound Basins	10	114%	126%
Skagit River	7	104%	127%
Baker River	0		
Nooksack River	3	136%	123%



Forecasted average runoff for streamflow for the Dungeness River is 109% and Elwha River is 113% December runoff in the Dungeness River was 60% of normal. Big Quilcene and Wynoochee rivers may expect near average runoff this summer as well. December precipitation was 51% of average. Precipitation has accumulated at 150% of average for the water year. December precipitation at Quillayute was 103% of normal. Olympic Peninsula snowpack averaged 126% of normal on January 1. Temperatures were below average for December and near normal for the water year.

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

Data Current as of: 1/6/2017 12:37:28 PM

Olympic Penninsula
Streamflow Forecasts - January 1, 2017

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	120	131	109%	142	158	120
	APR-SEP	125	144	158	109%	171	190	145
Elwha R at McDonald Bridge nr Port Angeles								
	APR-JUL	355	410	445	111%	485	535	400
	APR-SEP	425	485	530	113%	570	630	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, 2017	# of Sites	% Median	Last Year % Median
Olympic Penninsula	3	126%	143%

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
2021 E. College Way, Suite 214
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
February 1, 2017

A ghostly snow depth tower at
Rainy Pass SNOTEL, 1/29/17
Doug Uttecht, Northwest Helicopters

Reminder: We are soliciting field work photos from our snow surveyors again this year. Each month we pick one to grace the cover of this report. The photographer will be given proper credit of course. Please include all specific information when submitting photos. Scott.pattee@wa.usda.gov

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

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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

February 2017

General Outlook

Washington experienced one of the coldest and driest January's in the history of SNOTEL. Temperatures reached up to 20 degrees below normal and total precipitation accumulation was as low as 28% of average. 7 SNOTEL sites set new record low precipitation accumulation and many more were very close. 1 SNOTEL site with 30 years of data set a new low snow water content record at only 53% of normal and many others were very near to a record. Though it seems to the average eye that there is a large amount of snow on the ground the mountains did not keep up the pace seemingly falling behind on a daily basis. The most recent short term forecast (30-day) is for above normal temperatures and above normal precipitation which does not bode well for mountain snow accumulation. NWS 3-month outlook is for below normal temperatures and above normal precipitation. http://www.cpc.ncep.noaa.gov/

Snowpack

The February 1 statewide SNOTEL readings were 91% of normal however recent storms brought that number back up to 102% of normal. Entiat River near Wenatchee reported the lowest 1st of month readings at 69% of the 30-year median for February 1 and the Lewis River Basin had the most snow with 125%. Westside medians from SNOTEL, and February 1 snow surveys, included the North Puget Sound river basins with 89% of normal, the Central and South Puget river basins with 88% and 78% respectively, and the Lower Columbia basins with 111% of normal. Snowpack along the east slopes of the Cascade Mountains included the Yakima area with 75% and the Wenatchee area with 77%. Snowpack in the Spokane River Basin was at 71% and the Walla Walla River Basin had 108% of the long term median.

BASIN	PERCENT OF MEDIAN	LAST YEAR PERCENT MEDIAN
Spokane	71	87
Newman Lake	83	113
Pend Oreille	75	92
Okanogan	93	130
Methow	88	128
Conconully Lake	64	115
Central Columbia	77	108
Upper Yakima	72	110
Lower Yakima	78	118
Ahtanum Creek	89	123
Walla Walla	108	122
Lower Snake	85	104
Cowlitz	97	104
Lewis	125	111
White	76	108
Green	79	100
Puyallup	80	111
Cedar	84	118
Snoqualmie	95	86
Skykomish	83	68
Skagit	83	114
Nooksack	84	77
Olympic Peninsula	110	101

Precipitation

Washington State received much below normal precipitation for the month of January however year to date averages remain near normal. The cold dry weather of January worked hard to erode the surplus precipitation levels brought to us last fall. The highest percent of average rain fall came from the Olympic and Upper Columbia basins at 73%. The lowest was in the Central Puget at only 31%. Year to date averages range from 128% in the Olympics to 85% in the Upper Yakima. As usually the wettest area in the state was around Mt. St. Helens with June Lake recording 17.1 inches, 9 inches shy of the median of 26.1 inches.

RIVER BASIN	JANUARY PERCENT OF AVERAGE	WATER YEAR PERCENT OF AVERAGE
Spokane	48	105
Pend Oreille	49	100
Upper Columbia	73	116
Central Columbia	49	98
Upper Yakima	36	85
Lower Yakima	67	111
Walla Walla	64	110
Lower Snake	55	98
Lower Columbia	69	122
South Puget Sound	42	95
Central Puget Sound	31	89
North Puget Sound	46	110
Olympic Peninsula	73	128

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 very wet fall helped buffer many reservoirs to above normal levels for this time of year. February 1 Reservoir storage in the Yakima Basin was 360,000-acre feet, 89% of average for the Upper Reaches and 137,000-acre feet or 112% of average for Rimrock and Bumping Lakes. The power generation reservoirs included the following: Coeur d'Alene Lake, 46,000 acre feet, 48% of average and 19% of capacity; and the Skagit River reservoirs at 48% of average and 34% 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	19	48
Pend Oreille	38	78
Upper Columbia	84	138
Central Columbia	N/A	N/A
Upper Yakima	43	89
Lower Yakima	59	112
Lower Snake	66	98
North Puget Sound	34	48

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

Streamflow

Due to the lack of precipitation in January streamflow forecasts have made significant declines in many basins from last month. April-September forecasts for some Western Washington streams include the Cedar River near Cedar Falls, 86%; White River, 93%; and Skagit River, 83%. Some Eastern Washington streams include the Yakima River near Parker 77%, Wenatchee River at Plain 78%; and Spokane River near Post Falls 61%. 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	61-109
Pend Oreille	89-91
Upper Columbia	58-99
Central Columbia	78-92
Upper Yakima	65-79
Lower Yakima	77-93
Walla Walla	100-104
Lower Snake	88-111
Lower Columbia	94-107
South Puget Sound	88-93
Central Puget Sound	86-98
North Puget Sound	83-91
Olympic Peninsula	96-98

STREAM	PERCENT OF AVERAGE FEBRUARY STREAMFLOWS
Pend Oreille at Albeni Fall Dam	75
Kettle at Laurier	106
Columbia at Birchbank	110
Spokane at Spokane	55
Similkameen at Nighthawk	72
Okanogan at Tonasket	92
Methow at Pateros	104
Chelan at Chelan	77
Wenatchee at Pashastin	61
Cle Elum near Roslyn	30
Yakima at Parker	41
Naches at Naches	68
Grande Ronde at Troy	49
Snake below Lower Granite Dam	64
Columbia River at The Dalles	99
Lewis at Merwin Dam	53
Cowlitz below Mayfield Dam	66
Skagit at Concrete	58
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-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.

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

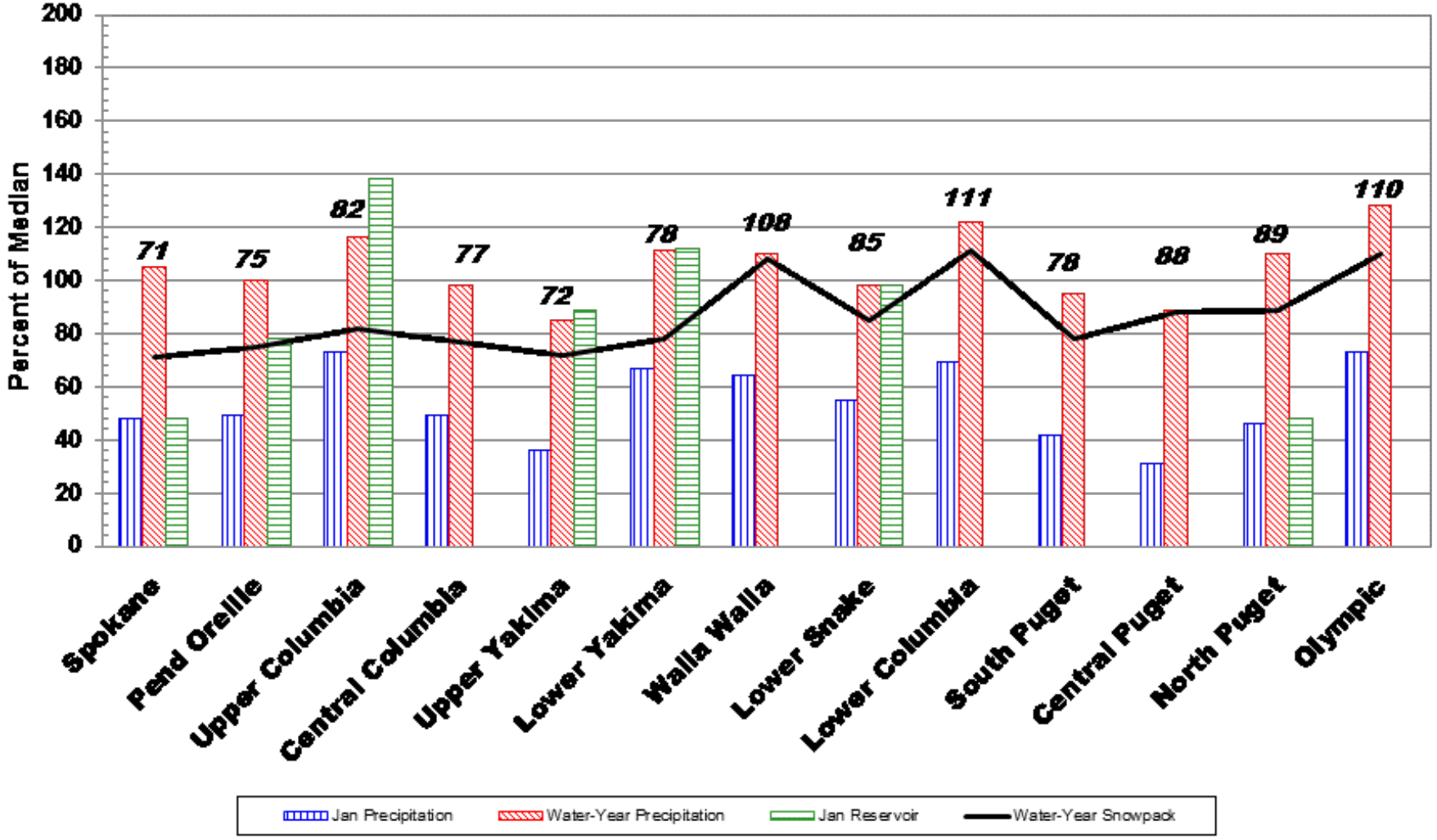
Washington:
http://www.nrcs.usda.gov/wps/portal/nrcs/site/wa/home/

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

NRCS Natural Resources Conservation Service

February 1, 2017 - Snowpack, Precipitation and Reservoir Conditions at a Glance

(Water Year = October 1 - Current Date)



Joint Meeting of the
Western Snow Conference
And the
Weather Modification Association

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 North Continental Area Committee is making plans for the 85th Annual Western Snow Conference in 2017.

Mark your calendar and start thinking about submitting a paper to attend the 2017 Western Snow Conference:

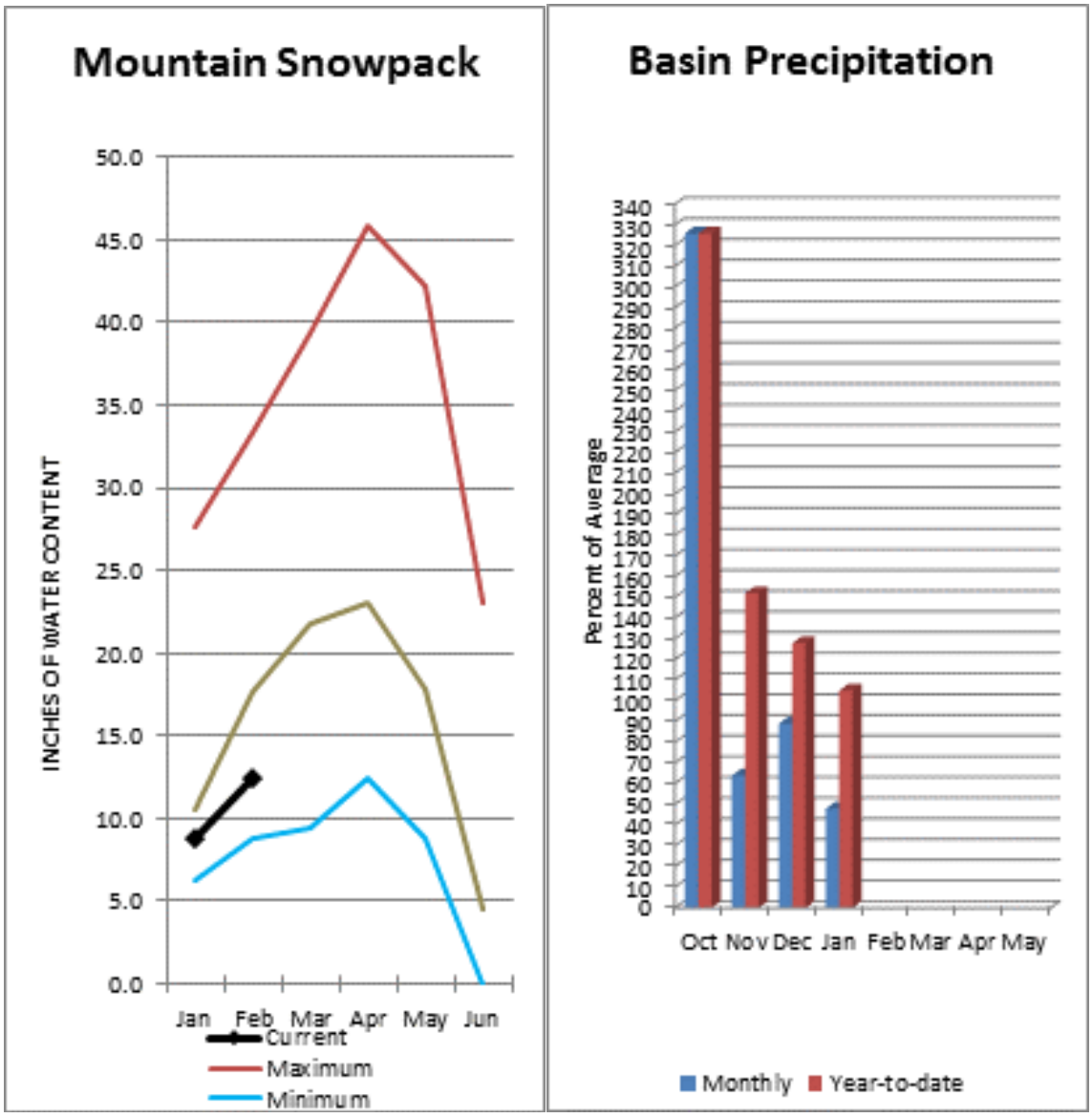
Dates: April 17-20, 2017
Location: Boise, ID

This first ever combined conference with the Weather Modification Association will kick off with a Monday afternoon short course entitled "Tracing the Effects of Cloud Seeding through the Hydrologic Cycle" with several invited experts in the field. Tuesday will begin with a joint plenary session, followed by concurrent sessions of oral and poster presentations. On Thursday, a technical tour will include a visit to the Dry Creek Experimental Watershed, A NRCS SNOTEL site, and a collaborative weather station for youth education.

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 61% of average near Post Falls and 65% at Long Lake. The Chamokane River near Long Lake forecasted to have 109% of average flows for the May-August period. The forecast is based on a basin snowpack that is 71% of normal and precipitation that is 105% of average for the water year. Precipitation for January was much below normal at 48% of average. Streamflow on the Spokane River at Spokane was 55% of average for January. February 1 storage in Coeur d'Alene Lake was 46,000 acre feet, 48% of average and 19% of capacity. Snowpack at Quartz Peak SNOTEL site was 76% of average with 11.2 inches of water content. Average temperatures in the Spokane basin were much colder than normal for January but averaged near normal for the water year.

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

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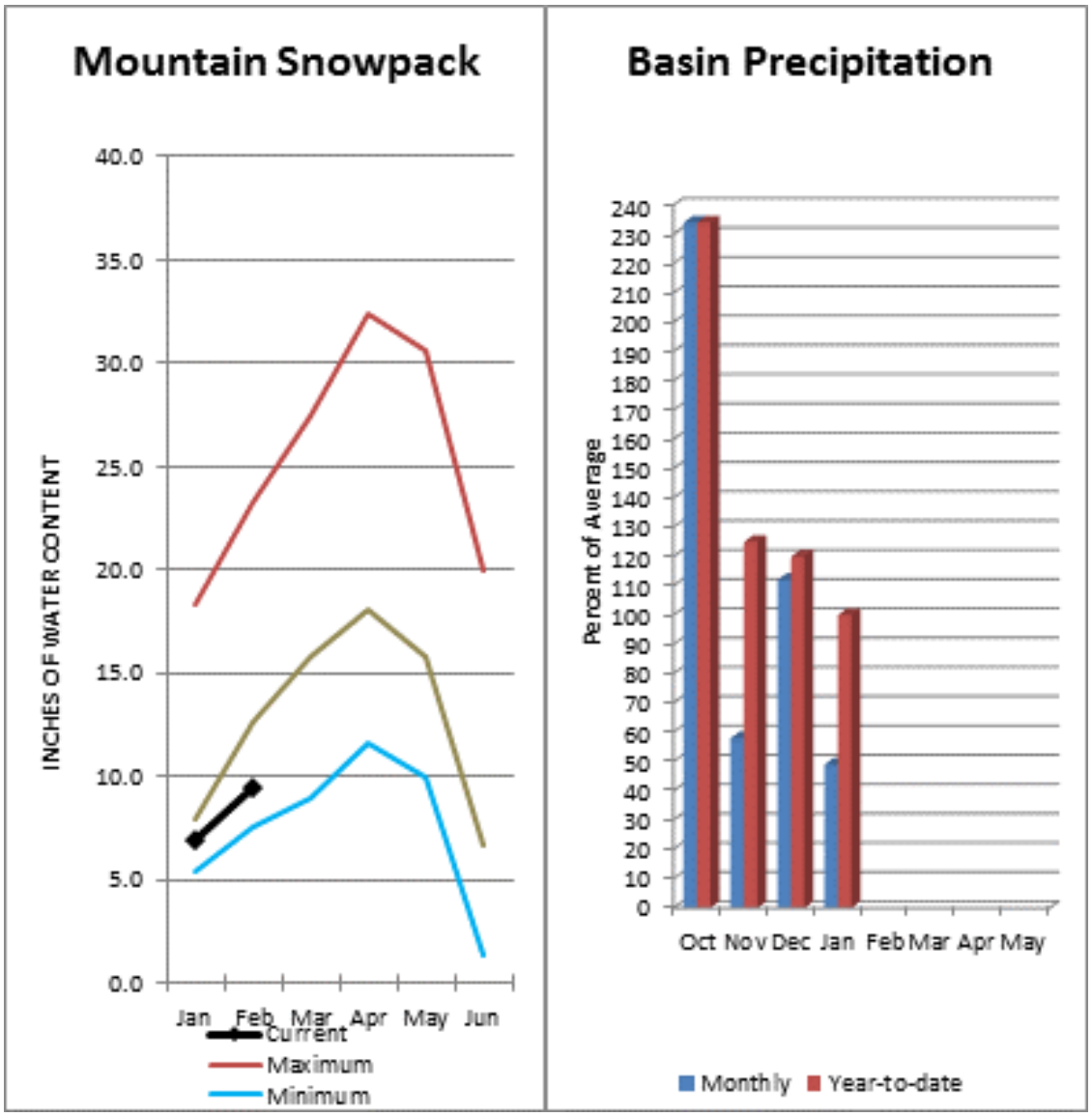
Spokane
Streamflow Forecasts - February 1, 2017

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	845	1210	1460	61%	1710	2080	2390
	APR-SEP	905	1270	1520	61%	1770	2140	2480
Spokane R at Long Lake[2]								
	APR-JUL	995	1400	1680	64%	1960	2360	2620
	APR-SEP	1160	1570	1850	65%	2130	2540	2850
Chamokane Ck nr Long Lake								
	MAY-AUG	4.4	7.8	10.1	109%	12.4	15.8	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, 2017	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Lake Coeur d' Alene	46.3	114.1	96.3	238.5
Basin-wide Total	46.3	114.1	96.3	238.5
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis February 1, 2017	# of Sites	% Median	Last Year % Median
Spokane	13	71%	87%
Newman Lake	3	83%	113%



The April – September average forecast for the Priest River near the town of Priest River is 89% and the Pend Orielle below Box Canyon is 90%. January streamflow was 75% of average on the Pend Oreille River and 110% on the Columbia at Birchbank. February 1 snow cover was 75% of normal in the Pend Oreille Basin River Basin. Bunchgrass Meadows SNOTEL site had 9.5 inches of snow water on the snow pillow. Normally Bunchgrass would have 18 inches on February 1. Precipitation during January was 49% of average, dropping the year-to-date precipitation at 100% of average. Reservoir storage in the basin, including Lake Pend Oreille and Priest Lake was 78% of normal. Average temperatures were much below normal for January but 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 - February 1, 2017

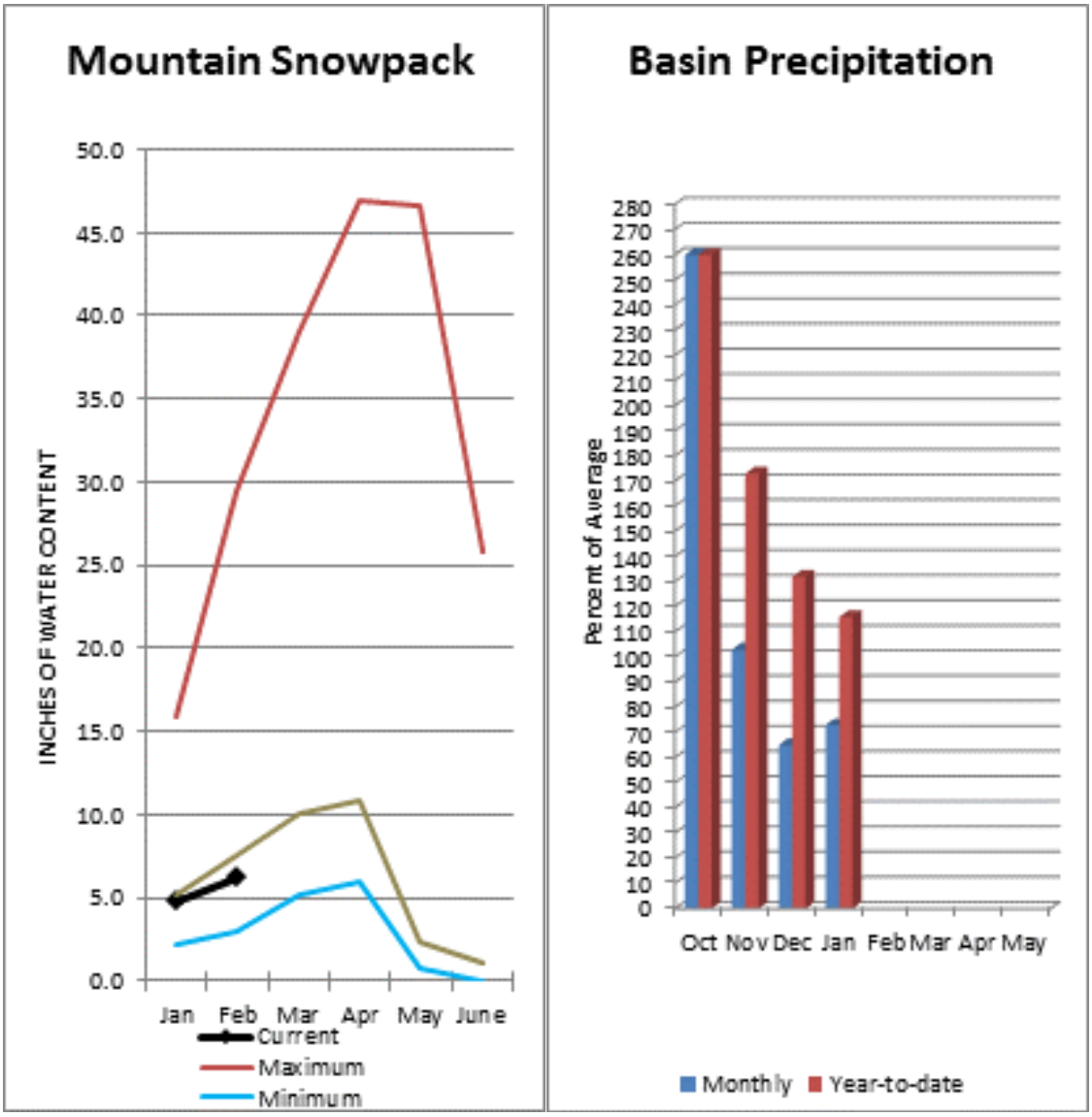
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

Pend Oreille Basins	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Pend Oreille Lake Inflow[2]								
	APR-JUL	8520	9760	10600	90%	11400	12700	11800
	APR-SEP	9400	10700	11600	91%	12500	13800	12800
Priest R nr Priest River[2]								
	APR-JUL	535	635	700	90%	765	865	780
	APR-SEP	560	665	740	89%	815	920	830
Pend Oreille R bl Box Canyon[2]								
	APR-JUL	8620	9880	10700	90%	11600	12900	11900
	APR-SEP	9520	10800	11700	90%	12700	14000	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 January, 2017	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Lake Pend Oreille	589.1	629.3	753.9	1561.3
Priest Lake	45.6	54.2	56.7	119.3
Basin-wide Total	634.7	683.5	810.6	1680.6
# of reservoirs	2	2	2	2

Watershed Snowpack Analysis February 1, 2017	# of Sites	% Median	Last Year % Median
Pend Oreille Basins	55	75%	93%
Colville River	1	84%	82%
Kettle River	5	72%	134%



Summer runoff average forecast for the Okanogan River is 76%, Similkameen River is 88%, and Methow River is 99%. February 1 snow cover on the Okanogan was 80% of normal, Omak Creek was 109% and the Methow was 88%. January precipitation in the Upper Columbia was 73% of average, with precipitation for the water year at 116% of average. January streamflow for the Methow River was 104% of average, 92% for the Okanogan River and 72% for the Similkameen. Snow-water content at Salmon Meadows SNOTEL was 6.4 inches or 97% of normal for February 1. Combined storage in the Conconully Reservoirs was 19,700 acre-feet or 138% of normal. Temperatures were much below normal for January but closer to normal for the water year.

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Upper Columbia Basins
Streamflow Forecasts - February 1, 2017

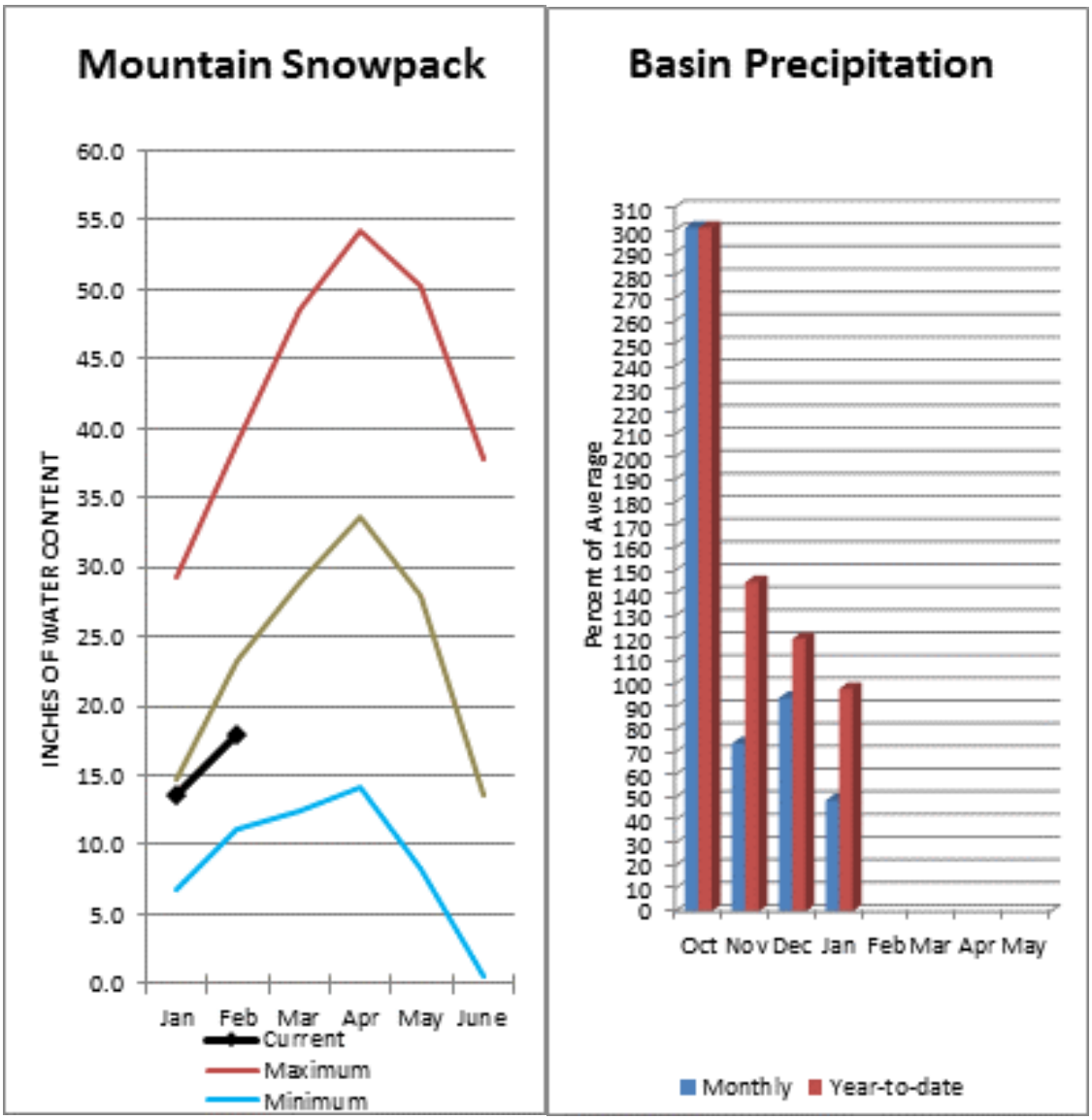
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

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	930	1190	1360	76%	1540	1790	1800
	APR-SEP	950	1220	1400	74%	1580	1850	1880
Colville R at Kettle Falls								
	APR-JUL	27	39	68	57%	97	140	119
	APR-SEP	30	44	76	58%	108	156	131
Columbia R at Grand Coulee[1,2]								
	APR-JUL	40900		46700	92%		54100	51000
	APR-SEP	49300		55300	92%		64700	60100
Similkameen R nr Nighthawk[1]								
	APR-JUL	730	925	1060	88%	1190	1380	1200
	APR-SEP	780	985	1120	88%	1260	1460	1280
Okanogan R nr Tonasket[1]								
	APR-JUL	655	945	1140	77%	1330	1620	1480
	APR-SEP	710	1030	1250	76%	1470	1790	1650
Okanogan R at Malott[1]								
	APR-JUL	670	960	1160	80%	1360	1650	1450
	APR-SEP	735	1060	1280	79%	1500	1820	1620
Methow R nr Pateros								
	APR-JUL	555	715	825	99%	935	1100	835
	APR-SEP	595	770	885	99%	1000	1180	895
Columbia R at Birchbank[1,2]								

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, 2017	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Conconully Lake (Salmon Lake Dam)	8.6	3.9	7.3	10.5
Conconully Reservoir	11.2	6.2	7.0	13.0
Basin-wide Total	19.7	10.1	14.3	23.5
# of reservoirs	2	2	2	2

Watershed Snowpack Analysis February 1, 2017	# of Sites	% Median	Last Year % Median
Upper Columbia Basins	16	81%	120%
Okanogan River	12	81%	152%
Omak Creek	2	109%	145%
Sanpoil River	1	129%	48%
Similkameen River	4	73%	105%
Toats Coulee Creek	0		
Conconully Lake	1	97%	148%
Methow River	4	88%	128%



Precipitation during January was 49% of average in the basin and 98% for the year-to-date. Runoff for Entiat River is forecast to be 78% of average for the summer. The April-September average forecast for Chelan River is 82%, Wenatchee River at Plain is 78%, Stehekin River is 85% and Icicle Creek is 80%. January average streamflow on the Chelan River was 77% and on the Wenatchee River 61%. February 1 snowpack in the Wenatchee River Basin was 77% of normal; the Chelan, 78%; the Entiat, 68%; Stemilt Creek, 78% and Colockum Creek, 111%. Reservoir storage in Lake Chelan was not available. Lyman Lake SNOTEL had the most snow water with 38.4 inches of water. This site would normally have 40.1 inches on February 1. Temperatures were much below 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 Columbia Basins
Streamflow Forecasts - February 1, 2017

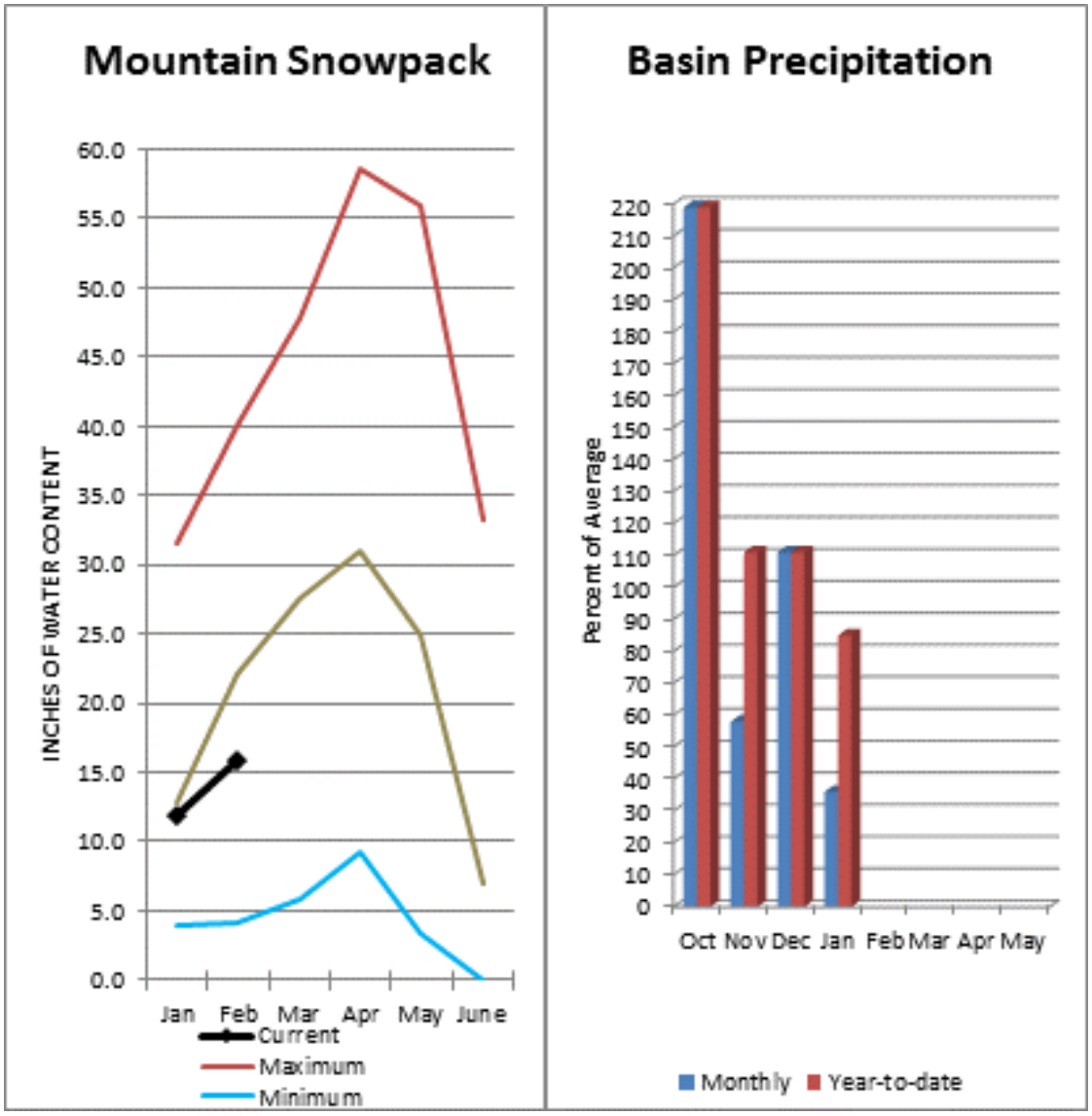
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

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	445	530	585	86%	640	720	680
	APR-SEP	515	610	670	85%	735	830	790
Chelan R at Chelan								
	APR-JUL	620	740	820	82%	905	1030	1000
	APR-SEP	670	815	915	82%	1010	1160	1120
Entiat R nr Ardenvoir								
	APR-JUL	104	136	157	79%	179	210	200
	APR-SEP	110	146	171	78%	195	230	220
Wenatchee R at Plain								
	APR-JUL	540	680	775	78%	875	1010	990
	APR-SEP	570	730	840	78%	955	1110	1080
Icicle Ck nr Leavenworth								
	APR-JUL	150	191	220	80%	250	290	275
	APR-SEP	160	205	240	80%	270	315	300
Wenatchee R at Peshastin								
	APR-JUL	780	955	1080	79%	1200	1370	1370
	APR-SEP	820	1020	1160	78%	1300	1500	1490
Columbia R bl Rock Island Dam[2]								
	APR-JUL	44000		51000	91%		60200	55800
	APR-SEP	52900		60300	92%		70200	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, 2017	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Lake Chelan		357.8	343.1	676.1
Basin-wide Total		0.0	0.0	0.0
# of reservoirs	0	0	0	0

Watershed Snowpack Analysis February 1, 2017	# of Sites	% Median	Last Year % Median
Central Columbia Basins	3	78%	113%
Chelan Lake Basin	3	78%	113%
Entiat River	1	69%	107%
Wenatchee River	7	77%	108%
Stemilt Creek	1	78%	122%
Colockum Creek	1	111%	175%



February 1 reservoir storage for the Upper Yakima reservoirs was 360,000-acre feet, 89% of average. Forecasts for the Yakima River at Cle Elum are 75% of average and the Teanaway River near Cle Elum is at 65%. Lake inflows are all forecasted to be in the 75-80% range this summer as well. January streamflow within the basin was Cle Elum River near Roslyn at 30%. February 1 snowpack was 72% based upon 8 snow course and SNOTEL readings within the Upper Yakima Basin. Precipitation was 36% of average for January and 85% 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.

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

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Upper Yakima River
Streamflow Forecasts - February 1, 2017

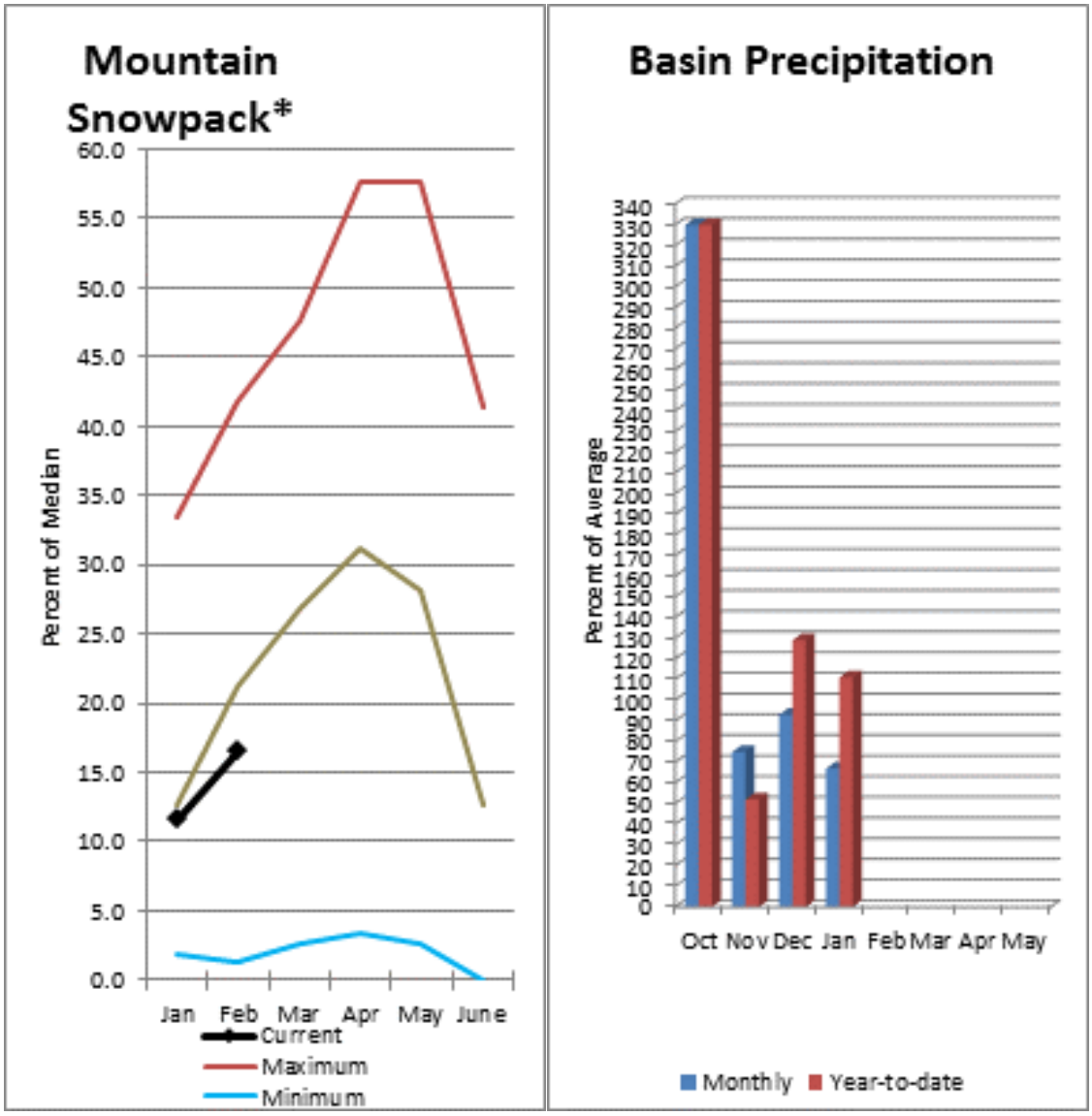
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

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	52	75	91	78%	106	129	116
	APR-SEP	59	83	100	79%	116	141	126
Kachess Reservoir Inflow [2]								
	APR-JUL	45	65	78	75%	91	111	104
	APR-SEP	52	72	86	76%	100	120	113
Cle Elum Lake Inflow [2]								
	APR-JUL	205	260	295	77%	335	390	385
	APR-SEP	220	280	320	77%	365	425	415
Yakima R at Cle Elum [2]								
	APR-JUL	335	465	555	74%	645	775	755
	APR-SEP	385	525	620	75%	715	855	830
Teanaway R bl Forks nr Cle Elum								
	APR-JUL	32	63	85	65%	106	137	130
	APR-SEP	34	66	87	65%	109	140	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, 2017	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Keechelus	69.3	101.4	82.1	157.8
Kachess	124.6	119.8	130.8	239.0
Cle Elum	166.1	233.1	191.5	436.9
Basin-wide Total	359.9	454.2	404.4	833.7
# of reservoirs	3	3	3	3

Watershed Snowpack Analysis February 1, 2017	# of Sites	% Median	Last Year % Median
Upper Yakima River	8	72%	110%



January average streamflows within the basin were: Yakima River near Parker, 41% and the Naches River near Naches, 68%. February 1 reservoir storage for Bumping and Rimrock reservoirs was 137,000-acre feet, 112% of average. Forecast averages for Yakima River near Parker are 77%; American River near Nile, 82%; Ahtanum Creek, 93%; and Klickitat River near Glenwood, 86%. February 1 snowpack was 78% based upon 7 snow course and SNOTEL readings within the Lower Yakima Basin and Ahtanum Creek reported in at 89% of normal. Precipitation was 67% of average for January and 111% for the water-year. Temperatures were much below normal for January 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.

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

Data Current as of: 2/3/2017 4:09:38 PM

Lower Yakima River
Streamflow Forecasts - February 1, 2017

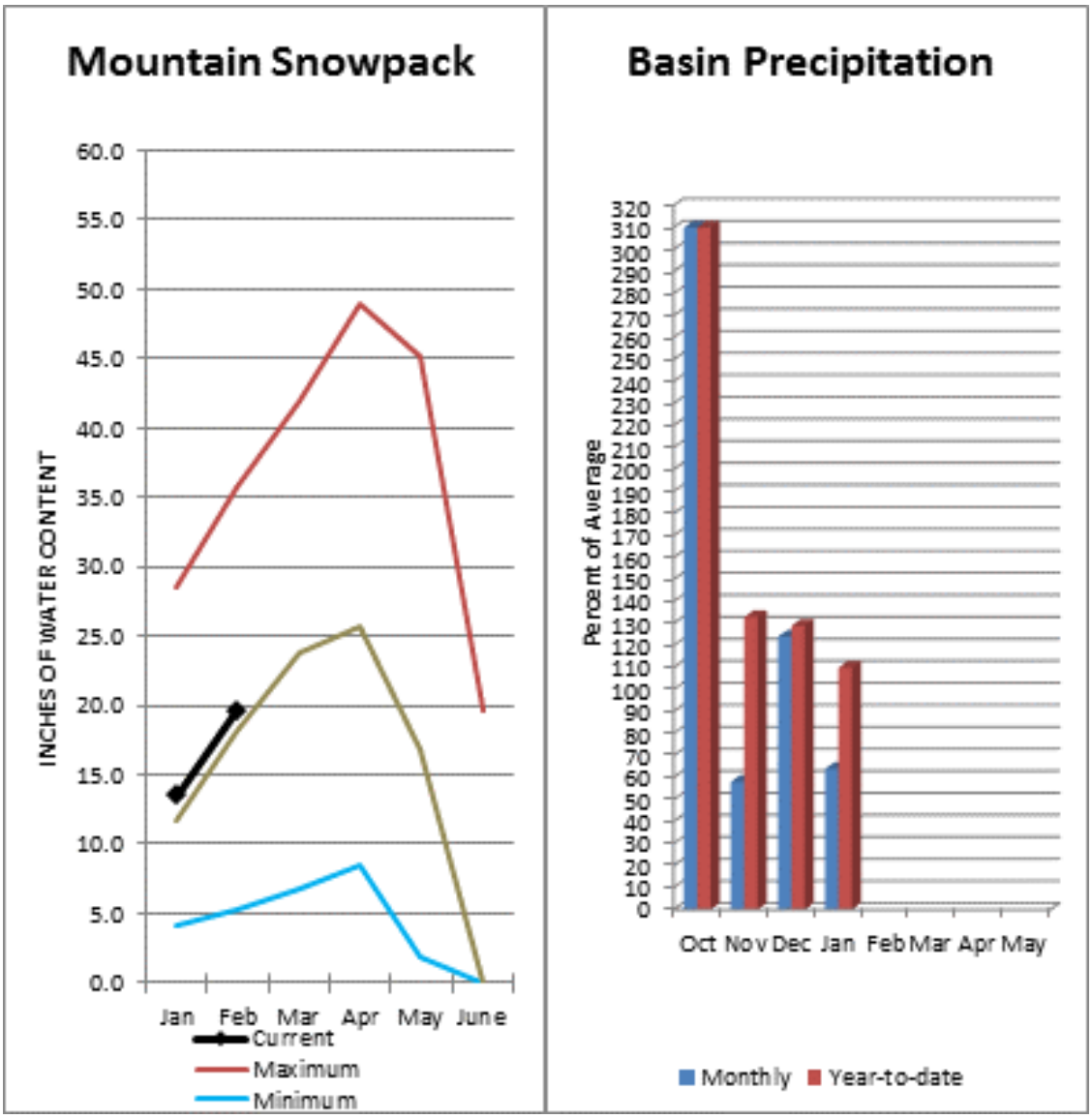
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

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	65	82	94	82%	106	123	114
	APR-SEP	69	88	102	83%	115	135	123
American R nr Nile								
	APR-JUL	58	73	83	81%	93	109	102
	APR-SEP	60	78	90	82%	101	119	110
Rimrock Lake Inflow [2]								
	APR-JUL	122	146	163	87%	179	205	187
	APR-SEP	143	173	193	88%	215	245	220
Naches R nr Naches								
	APR-JUL	360	490	580	83%	670	800	700
	APR-SEP	385	530	630	83%	735	880	760
Ahtanum Ck at Union Gap								
	APR-JUL	10	18.8	25	93%	31	39	27
	APR-SEP	11.8	21	27	93%	33	42	29
Yakima R nr Parker [2]								
	APR-JUL	780	1070	1270	77%	1480	1770	1660
	APR-SEP	865	1180	1400	77%	1610	1930	1820
Klickitat R nr Glenwood								
	APR-JUL	68	92	108	86%	125	149	126
	APR-SEP	76	102	120	86%	138	164	139
Klickitat R nr Pitt								
	APR-JUL	270	345	395	91%	445	520	435
	APR-SEP	335	425	480	92%	540	625	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, 2017	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Bumping Lake	14.9	21.0	12.7	33.7
Rimrock	122.1	134.9	109.6	198.0
Basin-wide Total	137.0	155.9	122.3	231.7
# of reservoirs	2	2	2	2

Watershed Snowpack Analysis February 1, 2017	# of Sites	% Median	Last Year % Median
Lower Yakima River	7	78%	118%
Ahtanum Creek	2	89%	123%



January precipitation was 64% of average, maintaining the year-to-date precipitation at 110% of average. Snowpack in the basin was 108% of normal. Streamflow forecasts are 104% of average for Mill Creek and 109% for the SF Walla Walla near Milton-Freewater. Average temperatures were much below normal for January and slightly below normal for the water year.

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

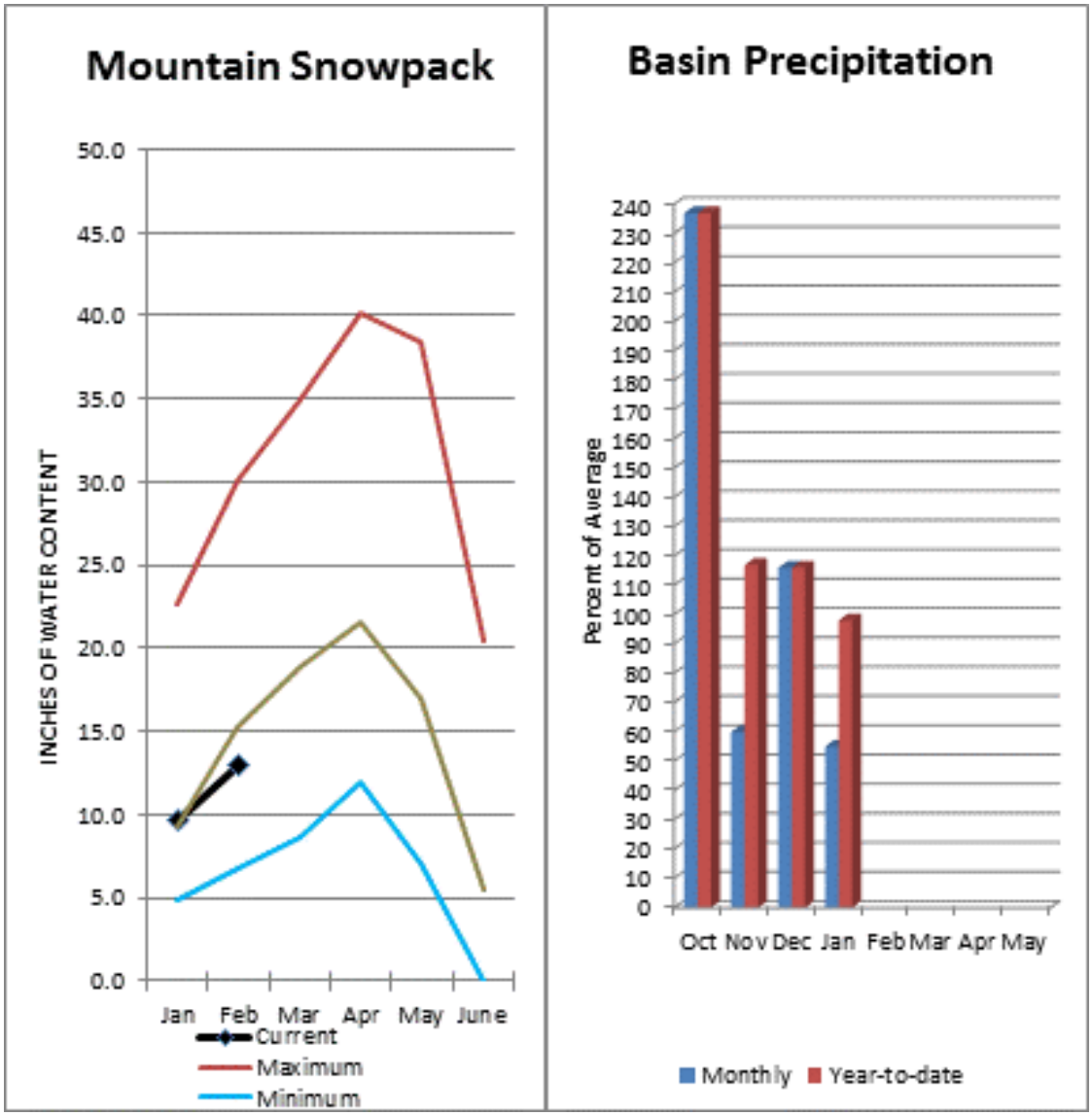
Data Current as of: 2/3/2017 8:27:29 PM

Walla Walla River
Streamflow Forecasts - February 1, 2017

		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 Wall R nr Milton-Freewater								
	MAR-SEP	70	80	87	109%	93	103	80
	APR-JUL	45	53	59	109%	65	73	54
	APR-SEP	57	66	72	109%	78	87	66
Mill Ck nr Walla Walla								
	APR-JUL	18	22	24	100%	27	30	24
	APR-SEP	21	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 February 1, 2017	# of Sites	% Median	Last Year % Median
Walla Walla River	2	108%	122%



The Snake River below Lower Granit Dam can expect summer flows to be about 107% of normal. The forecast for Asotin Creek at Asotin predicts 111% of average flows for the April – July runoff period. January precipitation was 55% of average, bringing the year-to-date precipitation to 98% of average. February 1 snowpack readings averaged 85% of normal. January streamflow was 64% of average for Snake River below Lower Granite Dam and 49% for Grande Ronde River near Troy. Dworshak Reservoir storage was 98% of average. Average temperatures were much below normal for January and slightly below normal for the water year.

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

Data Current as of: 2/3/2017 8:27:31 PM

Lower Snake, Grande Ronde, Clearwater Basins
Streamflow Forecasts - February 1, 2017

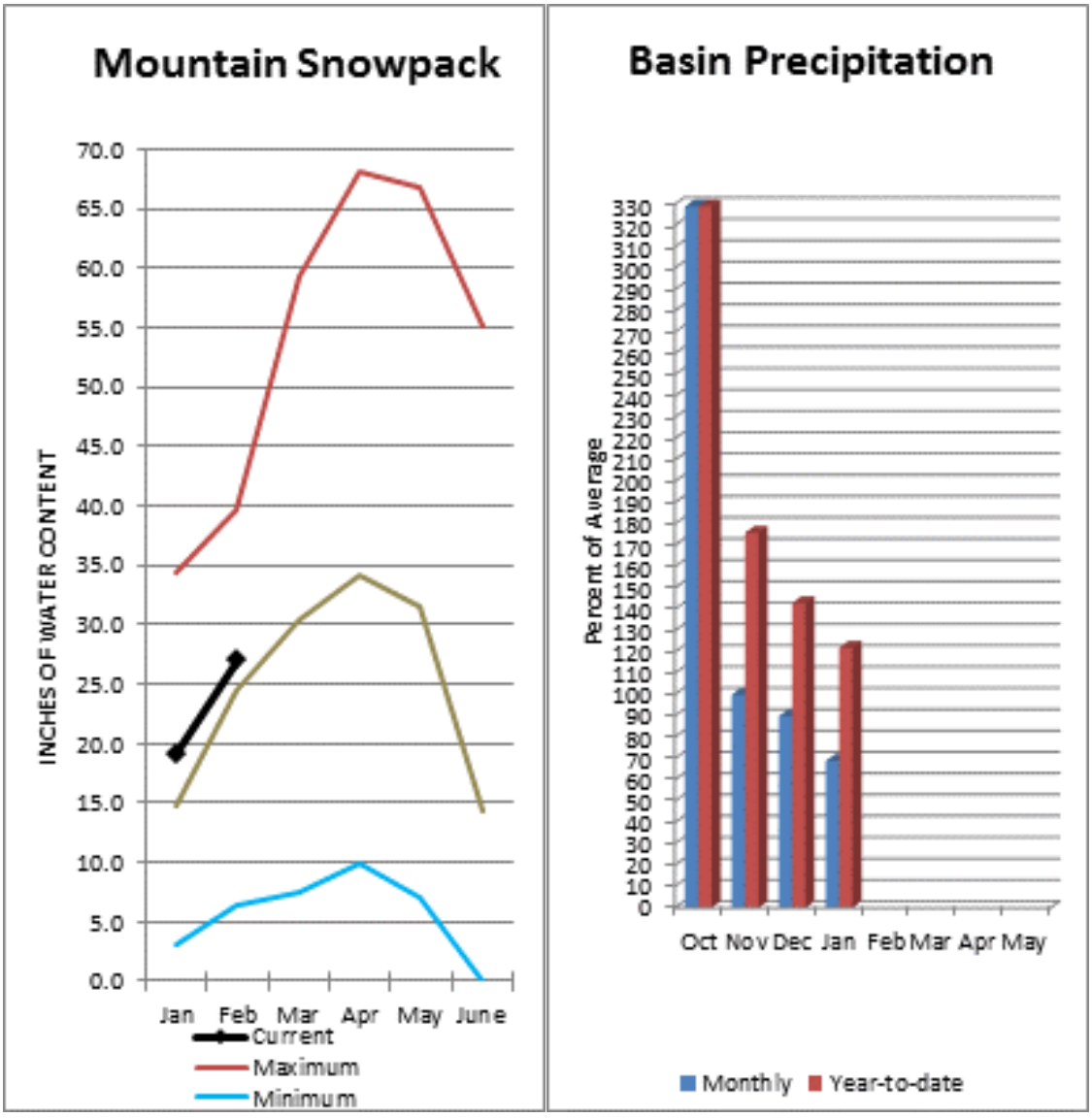
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

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	1150	1400	1570	104%	1740	1990	1510
	APR-SEP	965	1200	1360	104%	1510	1750	1310
Asotin Ck at Asotin								
	APR-JUL	24	33	39	111%	45	54	35
Clearwater R at Spalding[2]								
	APR-JUL	4490	5420	6040	88%	6670	7600	6890
	APR-SEP	4790	5740	6390	88%	7030	7990	7270
Snake R bl Lower Granite Dam[12]								
	APR-JUL	12000	18400	21300	107%	24200	30600	19848
	APR-SEP	13500	20700	23900	107%	27200	34400	22280

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, 2017	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Dworshak Reservoir	2297.8	2347.1	2335.0	3468.0
Basin-wide Total	2297.8	2347.1	2335.0	3468.0
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis February 1, 2017	# of Sites	% Median	Last Year % Median
Lower Snake, Grande Ronde, Clearwater Basins	13	85%	104%



Forecasts for April – September streamflows within the basin are Lewis River at Ariel, 100% and Cowlitz River at Castle Rock, 104% of average. The Columbia at The Dalles is forecasted to have 94% of average flows this summer according to the River Forecast Center. January average streamflow for Cowlitz River was 66%. The Columbia River at The Dalles was 99% of average. January precipitation was 69% of average and the water-year average was 122%. February 1 snow cover for Cowlitz River was 97%, and Lewis River was 125% of normal. Temperatures were below normal during January but near average for the water year.

Data Current as of: 2/3/2017 4:09:49 PM

Lower Columbia Basins
Streamflow Forecasts - February 1, 2017

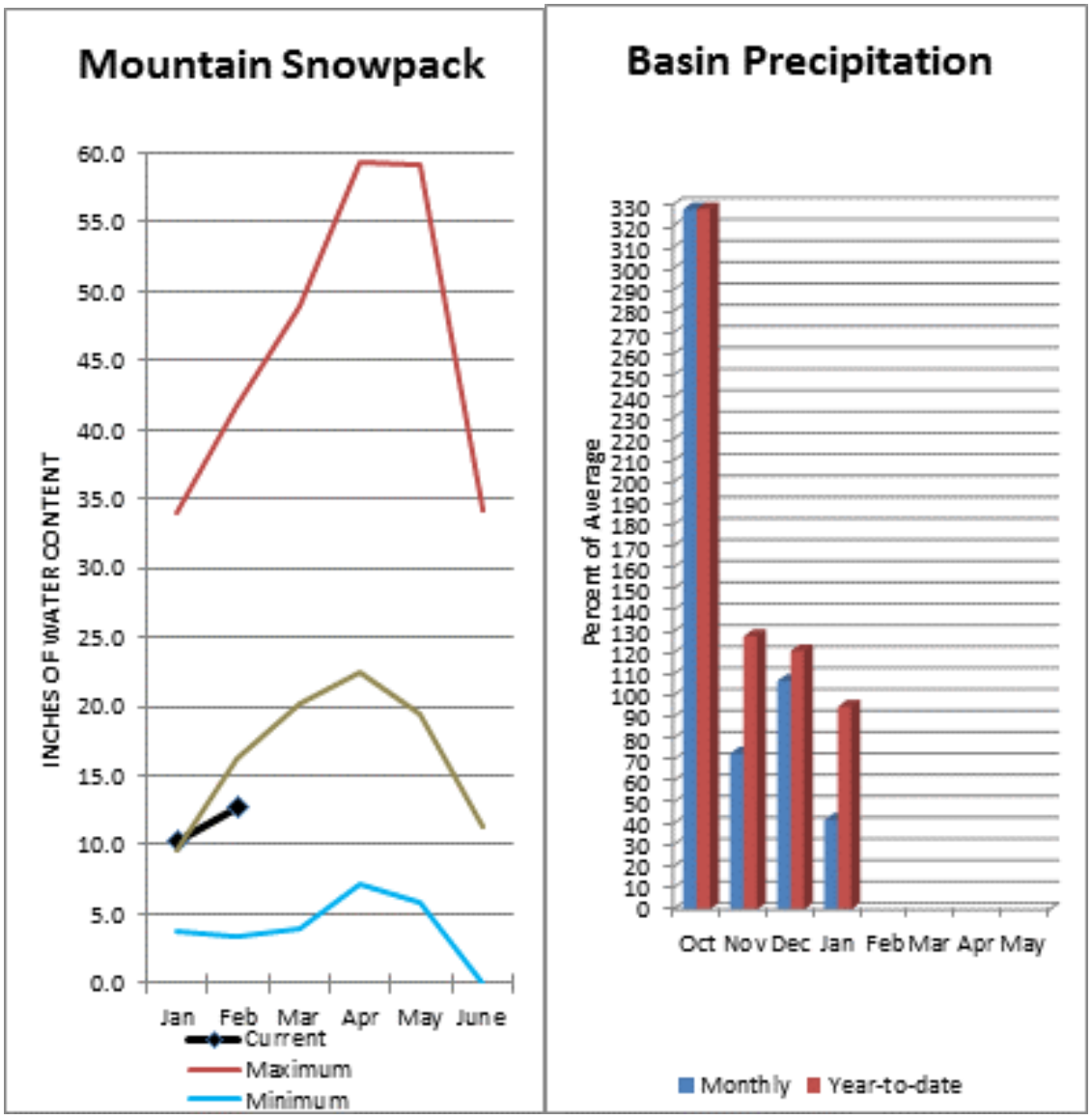
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

Lower Columbia Basins	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Columbia R at The Dalles[2]								
	APR-JUL	65500		74800	94%		86900	79900
	APR-SEP	77300		86700	94%		101000	92700
Klickitat R nr Glenwood								
	APR-JUL	68	92	108	86%	125	149	126
	APR-SEP	76	102	120	86%	138	164	139
Klickitat R nr Pitt								
	APR-JUL	270	345	395	91%	445	520	435
	APR-SEP	335	425	480	92%	540	625	520
Lewis R at Ariel[2]								
	APR-JUL	695	865	985	102%	1100	1270	970
	APR-SEP	815	1000	1120	100%	1250	1430	1120
Cowlitz R bl Mayfiled[2]								
	APR-JUL	1320	1520	1660	102%	1800	2000	1620
	APR-SEP	1580	1820	1970	107%	2130	2360	1840
Cowlitz R at Castle Rock[2]								
	APR-JUL	1890	2120	2270	102%	2430	2660	2230
	APR-SEP	2420	2530	2620	104%	2700	2810	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, 2017	# of Sites	% Median	Last Year % Median
Lower Columbia Basins	11	111%	108%
Lewis River	5	125%	111%
Cowlitz River	6	97%	104%

South Puget Sound River Basins



Summer runoff is forecast to be 88% of normal for the Green River below Howard Hanson Dam and 93% for the White River near Buckley. February 1 snowpack was 76% of average for the White River, 80% for Puyallup River and 79% in the Green River Basin. January precipitation was 42% of average, bringing the water year-to-date to 95% of average for the basins. Average temperatures in the area were below normal for January but 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 - February 1, 2017

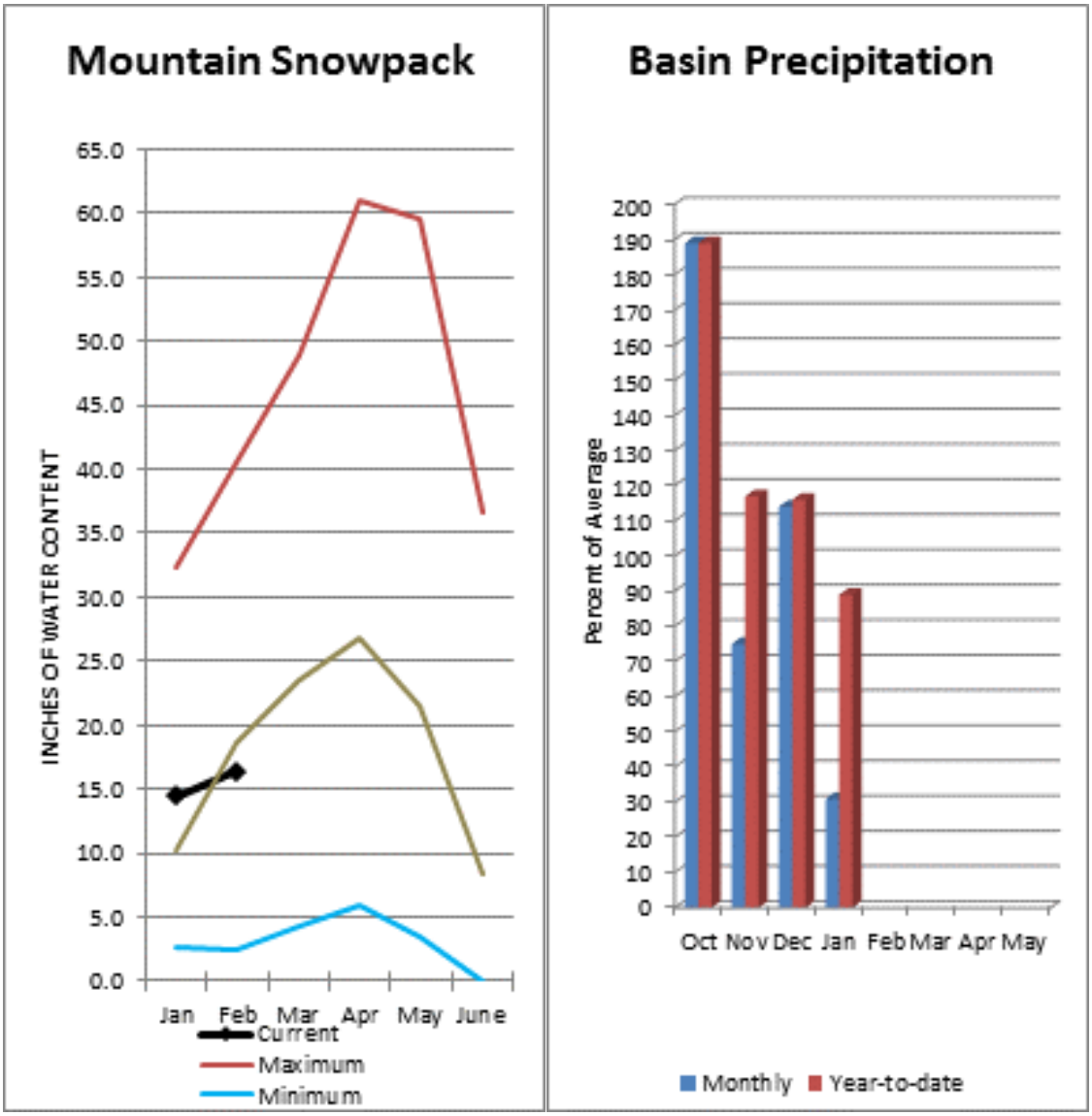
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

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	290	365	400	93%	435	510	430
	APR-SEP	350	440	480	93%	520	610	515
Green R bl Howard A Hanson Dam[1,2]								
	APR-JUL	113	179	210	89%	240	305	235
	APR-SEP	135	200	230	88%	260	330	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, 2017	# of Sites	% Median	Last Year % Median
South Puget Sound Basins	10	78%	107%
White River	3	76%	108%
Green River	2	79%	100%

Central Puget Sound River Basins



Forecast for spring and summer flows are: 86% for Cedar River near Cedar Falls; 89% for Rex River; 98% for South Fork of the Tolt River; and 88% for Taylor Creek near Selleck. Basin-wide precipitation for January was 31% of average, bringing water-year-to-date to 89% of average. February 1 median snow cover in Cedar River Basin was 84%, Tolt River Basin was 116%, Snoqualmie River Basin was 95%, and Skykomish River Basin was 83%. Temperatures were below 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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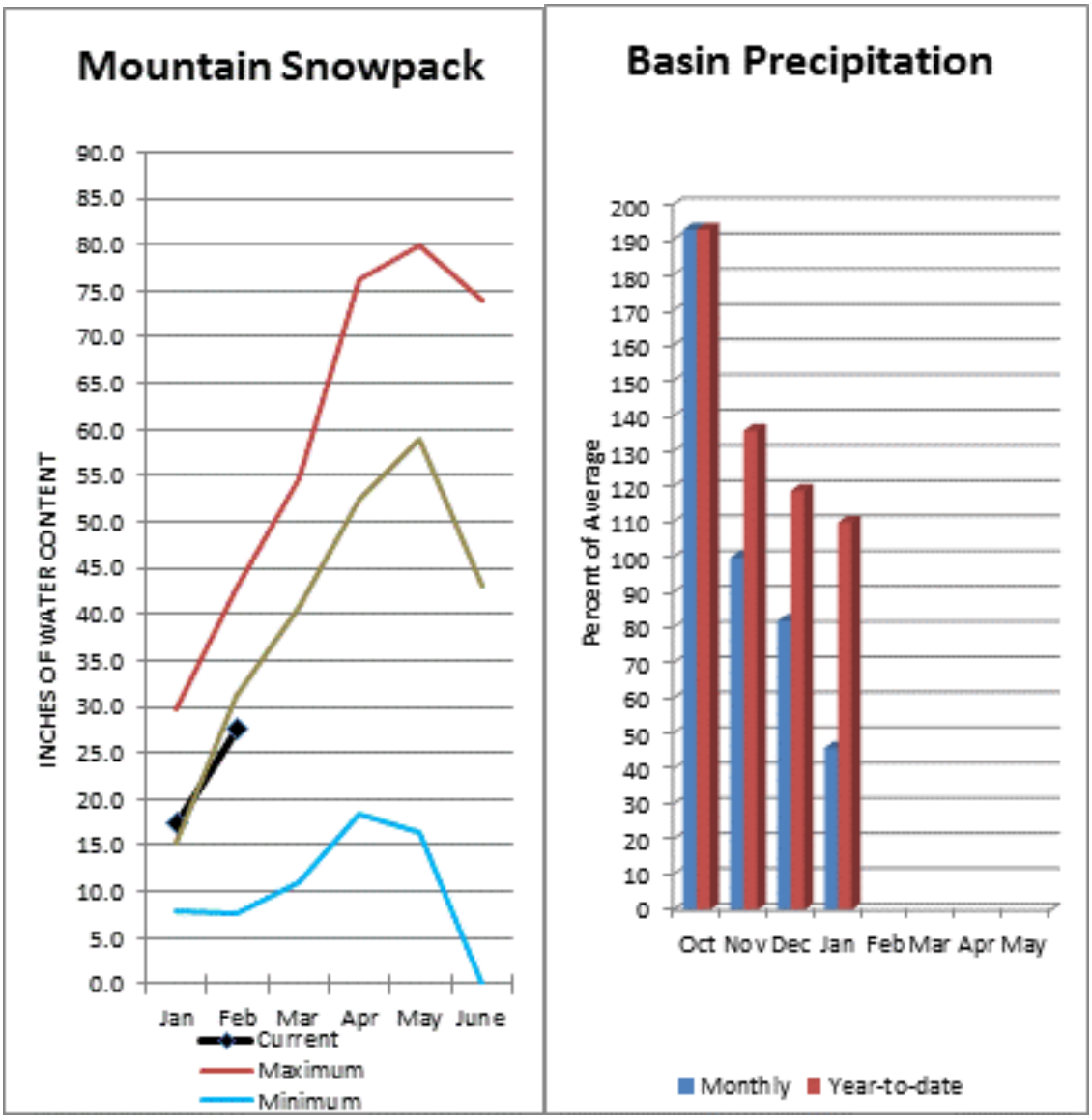
Central Puget Sound Basins
Streamflow Forecasts - February 1, 2017

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	41	52	59	84%	66	77	70
	APR-SEP	46	58	65	86%	73	84	76
Rex R nr Cedar Falls								
	APR-JUL	12.8	17.7	21	88%	24	29	24
	APR-SEP	15.3	20	24	89%	27	32	27
Taylor Ck nr Selleck								
	APR-JUL	12.5	15.6	17.8	89%	19.9	23	20
	APR-SEP	15.7	19.1	21	88%	24	27	24
SF Tolt R nr Index								
	APR-JUL	9.6	11.9	13.5	95%	15.1	17.4	14.2
	APR-SEP	11.5	14	15.7	98%	17.4	19.9	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, 2017	# of Sites	% Median	Last Year % Median
Central Puget Sound Basins	12	88%	98%
Puyallup River	5	80%	111%
Cedar River	4	84%	118%
Tolt River	2	116%	66%
Snoqualimie River	4	95%	86%
Skykomish River	2	83%	68%



Forecast for Skagit River streamflow at Newhalem is 83% of average for the spring and summer period. January streamflow in Skagit River was 58% of average. Other forecast points included Baker River at 91% and Thunder Creek at 86% of average. Basin-wide precipitation for January was 46% of average, bringing water-year-to-date to 100% of average. February 1 average snow cover in Skagit River Basin was 83%, the Baker River Basin was 97% and the Nooksack River Basin was 84%. February 1 Skagit River reservoir storage was 48% of average and 34% of capacity. Average temperatures were below normal for February and slightly below normal 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 - February 1, 2017

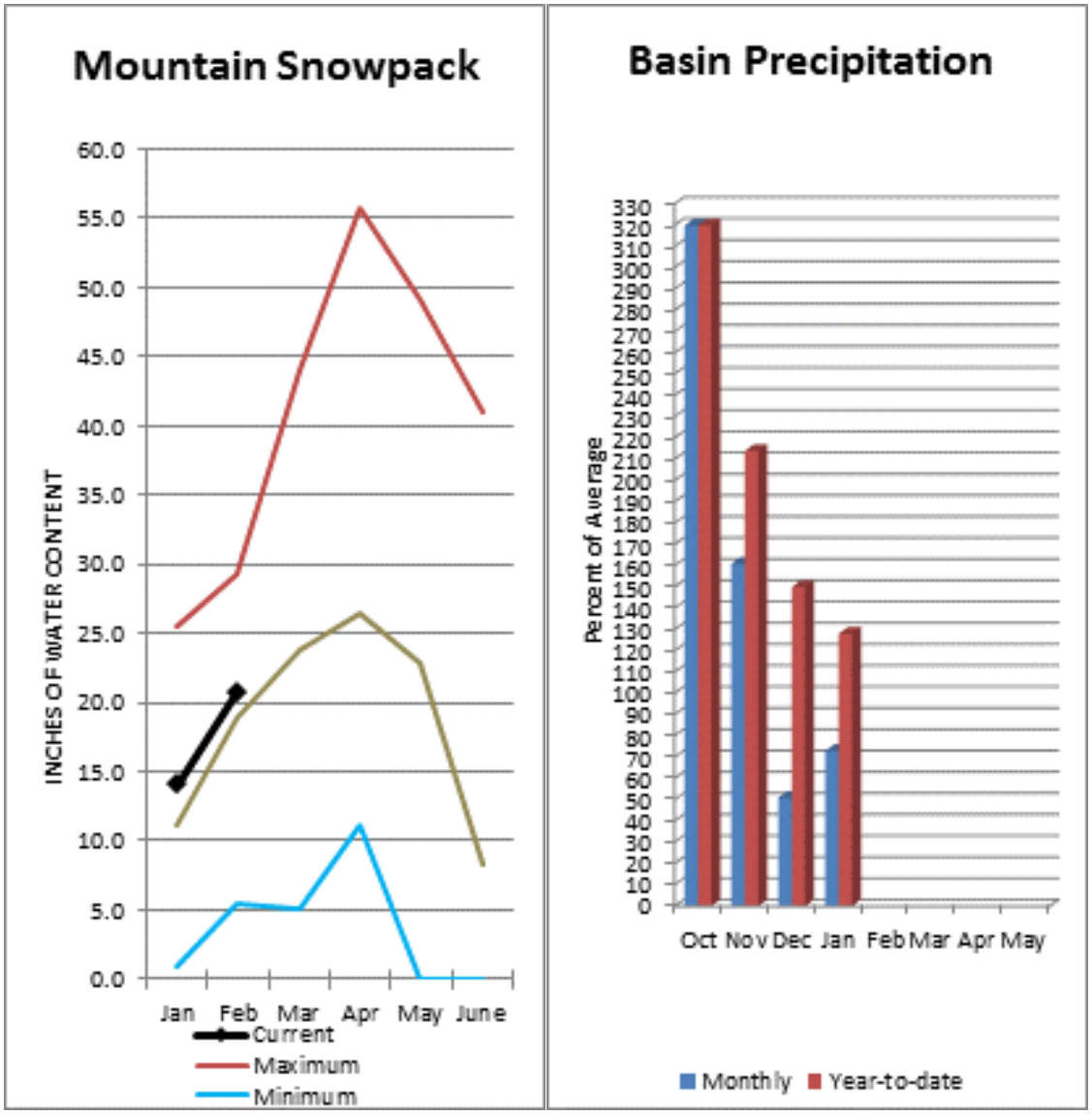
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

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	173	190	200	85%	215	230	235
	APR-SEP	255	275	285	86%	300	320	330
Skagit R at Newhalem[2]								
	APR-JUL	1200	1340	1430	85%	1520	1660	1680
	APR-SEP	1440	1590	1690	83%	1800	1950	2030
Baker R at Concrete								
	APR-JUL	565	645	700	90%	760	840	780
	APR-SEP	735	830	890	91%	950	1040	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, 2017	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Ross	476.1	628.6	996.3	1404.1
Diablo Reservoir			85.8	90.6
Basin-wide Total	476.1	628.6	996.3	1404.1
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis February 1, 2017	# of Sites	% Median	Last Year % Median
North Puget Sound Basins	22	89%	100%
Skagit River	13	83%	113%
Baker River	6	97%	96%
Nooksack River	3	84%	77%



Forecasted average runoff for streamflow for the Dungeness River is 96% and Elwha River is 98% January runoff in the Dungeness River was 77% of normal. Big Quilcene and Wynoochee rivers may expect near average runoff this summer as well. January precipitation was 73% of average. Precipitation has accumulated at 128% of average for the water year. January precipitation at Quillayute was 127% of normal. Olympic Peninsula snowpack averaged 110% of normal on February 1. Temperatures were much below 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: 2/3/2017 4:10:03 PM

Olympic Penninsula
Streamflow Forecasts - February 1, 2017

Olympic Penninsula	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						
Dungeness R nr Sequim								
	APR-JUL	94	106	114	95%	122	134	120
	APR-SEP	114	129	139	96%	149	165	145
Elwha R at McDonald Bridge nr Port Angeles								
	APR-JUL	320	360	390	98%	415	455	400
	APR-SEP	380	425	460	98%	495	545	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, 2017	# of Sites	% Median	Last Year % Median
Olympic Penninsula	6	110%	101%

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, 2017

Winter over the Pickets
North Cascades National Park
Keith Kingslien

Reminder: We are soliciting field work photos from our snow surveyors again this year. Each month we pick one to grace the cover of this report. The photographer will be given proper credit of course. Please include all specific information when submitting photos. Scott.pattee@wa.usda.gov

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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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 2017

General Outlook

Washington went from one of the driest months in January to one of the wettest in February. Daily mountain rainfall records were shattered at many SNOTEL sites in early February. From once was the start of another dismal snow year the precipitation and cool temperatures last month brought a bounty of fresh snow rebuilding an eroded pack back to near or above normal in all basins in the state. Forecasts for spring and summer runoff have increase by 10-20 percentage points. At about 85% of the way through the season it's good to still see the most recent short term forecast (30-day) have a strong probability for below normal temperatures and above normal precipitation. More mountain snow is what we need to at least maintain where we are now and carry us into the growing season. NWS 3-month outlook is for above normal precipitation but has uncertainty of temperature. http://www.cpc.ncep.noaa.gov/

Snowpack

The March 1 statewide SNOTEL readings were 108%, a marked improvement over last month. The Kettle and Similkameen rivers reported the lowest snowpack at 81% of the 30-year median for March 1, both of which are fed primarily by Canadian data which is trending considerably lower than the U.S. side. The Lewis River Basin had the most snow with 144%. Westside medians from SNOTEL, and March 1 snow surveys, included the North Puget Sound river basins with 91% of normal, the Central and South Puget river basins with 111% and 95% respectively, and the Lower Columbia basins with 128% of normal. Snowpack along the east slopes of the Cascade Mountains included the Yakima area with 95% and the Wenatchee area with 93%. Snowpack in the Spokane River Basin was at 92% and the Walla Walla River Basin had 122% of the long term median.

BASIN	PERCENT OF MEDIAN	LAST YEAR PERCENT MEDIAN
Spokane	92	84
Newman Lake	95	81
Pend Oreille	97	92
Okanogan	88	128
Methow	100	135
Conconully Lake	110	128
Central Columbia	93	101
Upper Yakima	93	97
Lower Yakima	98	114
Ahtanum Creek	110	110
Walla Walla	122	107
Lower Snake	109	95
Cowlitz	111	101
Lewis	144	105
White	91	101
Green	96	81
Puyallup	97	98
Cedar	120	104
Snoqualmie	108	74
Skykomish	107	67
Skagit	92	106
Nooksack	88	85
Olympic Peninsula	112	97

Precipitation

Washington State received much above normal precipitation for the month of February with year to date averages remain near to slightly above normal. The highest percent of average rain fall came from the Olympic and Lower Snake basins at 208% and 204%. The lowest was in the Upper Columbia at 122%. Year to date averages range from 138% in the Olympics to 94% in the Upper Yakima. As usual the wettest area in the state was around Mt. St. Helens with Swift Creek SNOTEL recording 35.1 inches, nearly 22 inches more than the 30-year average or 262% of average.

RIVER BASIN	FEBRUARY PERCENT OF AVERAGE	WATER YEAR PERCENT OF AVERAGE
Spokane	188	119
Pend Oreille	180	115
Upper Columbia	122	117
Central Columbia	148	105
Upper Yakima	145	94
Lower Yakima	194	125
Walla Walla	185	123
Lower Snake	204	117
Lower Columbia	191	133
South Puget Sound	193	110
Central Puget Sound	161	99
North Puget Sound	179	110
Olympic Peninsula	208	138

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 375,000-acre feet, 83% of average for the Upper Reaches and 163,000-acre feet or 120% of average for Rimrock and Bumping Lakes. The power generation reservoirs included the following: Coeur d'Alene Lake, 202,000 acre feet, 152% of average and 85% of capacity; and the Skagit River reservoirs at 56% of average and 33% 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	85	152
Pend Oreille	45	90
Upper Columbia	82	131
Central Columbia	N/A	N/A
Upper Yakima	45	83
Lower Yakima	71	120
Lower Snake	66	97
North Puget Sound	33	56

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

Streamflow

With excellent precipitation and snowfall in February streamflow forecasts have made significant rebounds in many basins from last month. April-September forecasts for some Western Washington streams include the Cedar River near Cedar Falls, 95%; White River, 107%; and Skagit River, 90%. Some Eastern Washington streams include the Yakima River near Parker 97%, Wenatchee River at Pashastin 88%; and Spokane River near Post Falls 92%. 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	92-97
Pend Oreille	107-114
Upper Columbia	84-109
Central Columbia	88-103
Upper Yakima	82-90
Lower Yakima	99-131
Walla Walla	111-118
Lower Snake	102-126
Lower Columbia	104-112
South Puget Sound	102-107
Central Puget Sound	100-108
North Puget Sound	90-98
Olympic Peninsula	101-103

STREAM	PERCENT OF AVERAGE MARCH STREAMFLOWS
Pend Oreille at Albeni Fall Dam	143
Kettle at Laurier	118
Columbia at Birchbank	117
Spokane at Spokane	177
Similkameen at Nighthawk	75
Okanogan at Tonasket	86
Methow at Pateros	106
Chelan at Chelan	89
Wenatchee at Pashastin	45
Cle Elum near Roslyn	61
Yakima at Parker	69
Naches at Naches	117
Grande Ronde at Troy	149
Snake below Lower Granite Dam	149
Columbia River at The Dalles	138
Lewis at Merwin Dam	135
Cowlitz below Mayfield Dam	139
Skagit at Concrete	140
Dungeness near Sequim	161

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-November. 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.

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

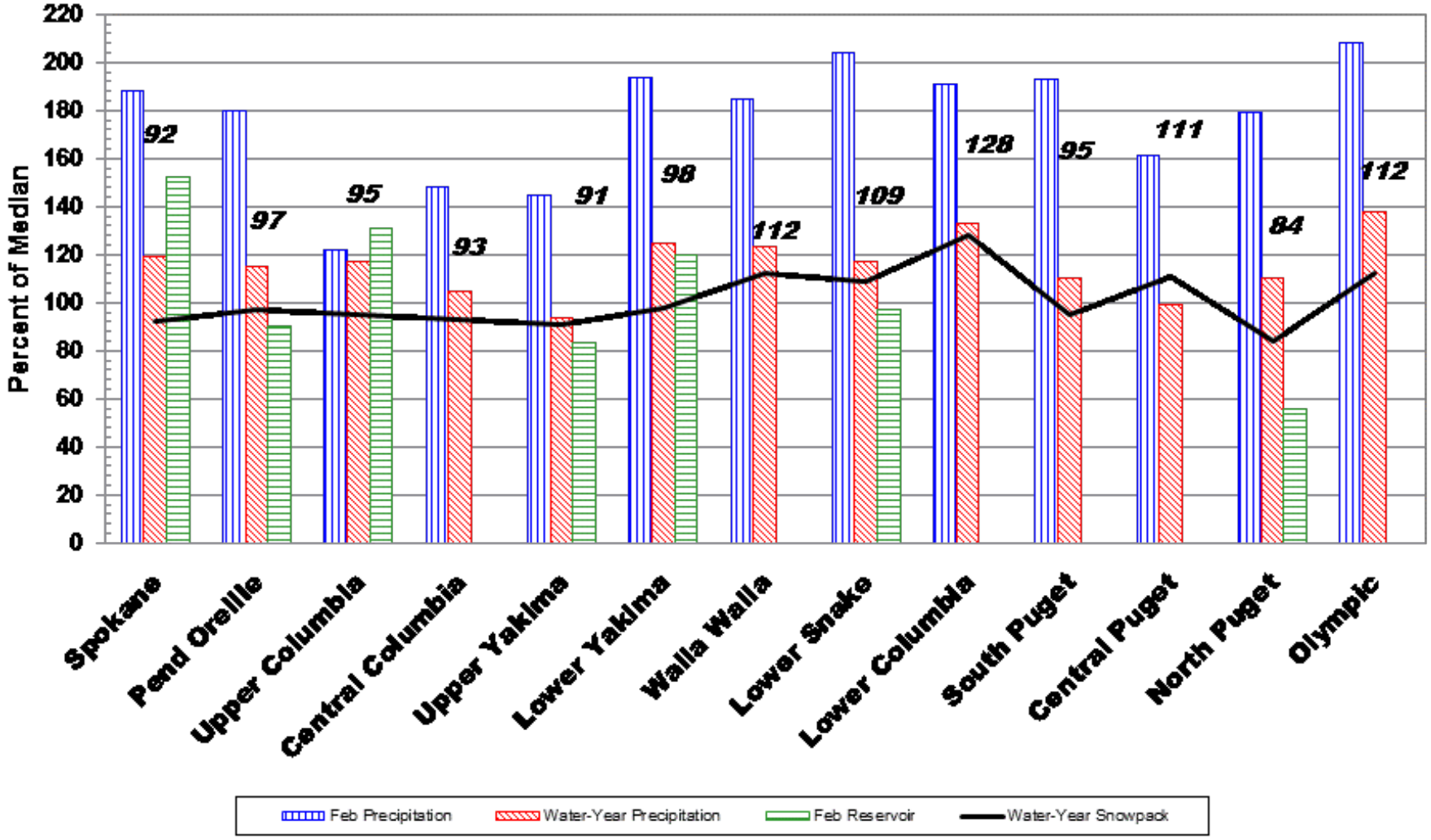
Washington:
http://www.nrcs.usda.gov/wps/portal/nrcs/site/wa/home/

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

NRCS Natural Resources Conservation Service

March 1, 2017 - Snowpack, Precipitation and Reservoir Conditions at a Glance

(Water Year = October 1 - Current Date)



Joint Meeting of the
Western Snow Conference
And the
Weather Modification Association

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 North Continental Area Committee is making plans for the 85th Annual Western Snow Conference in 2017.

Mark your calendar and start thinking about submitting a paper to attend the 2017 Western Snow Conference:

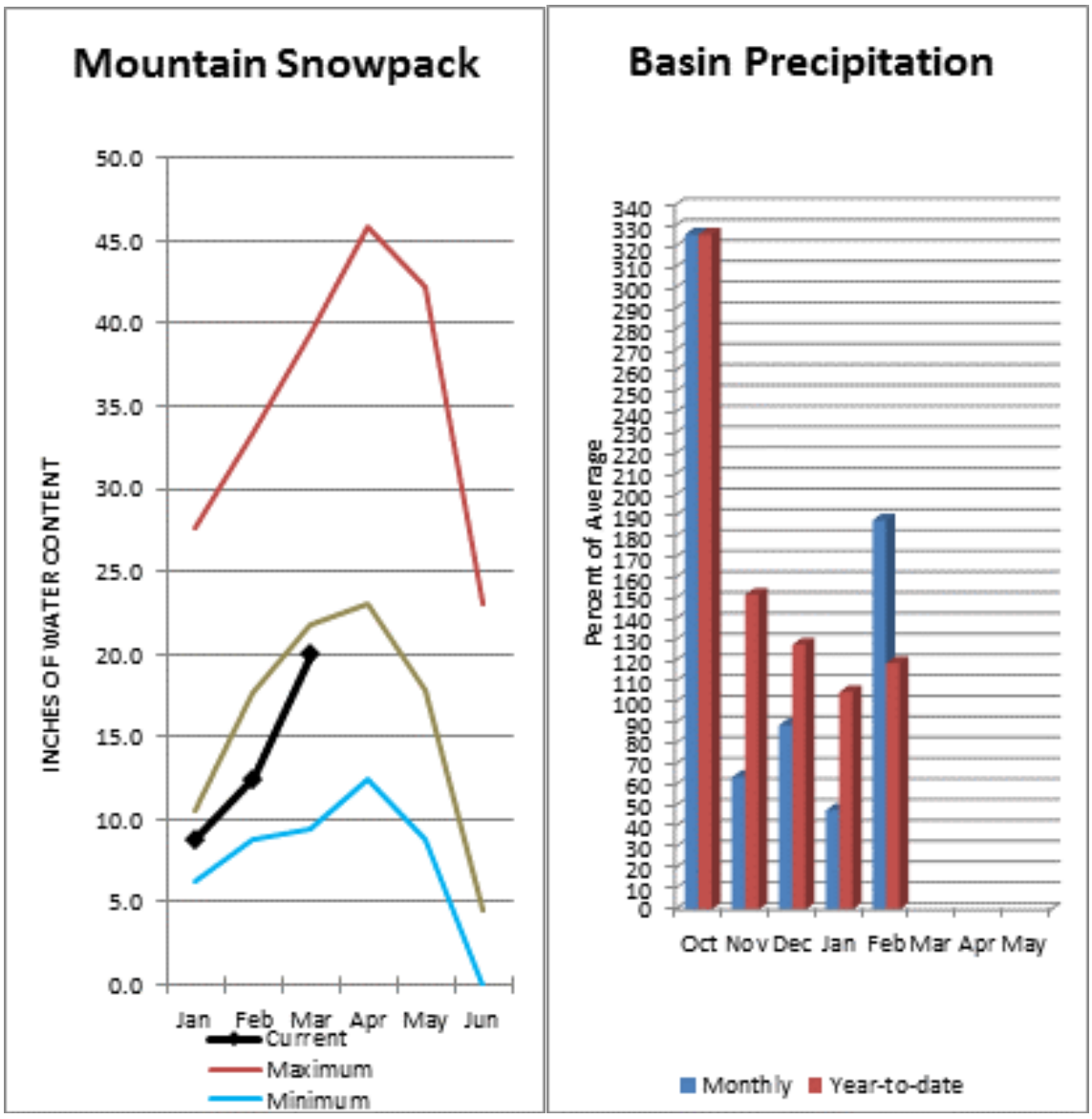
Dates: April 17-20, 2017
Location: Boise, ID

This first ever combined conference with the Weather Modification Association will kick off with a Monday afternoon short course entitled "Tracing the Effects of Cloud Seeding through the Hydrologic Cycle" with several invited experts in the field. Tuesday will begin with a joint plenary session, followed by concurrent sessions of oral and poster presentations. On Thursday, a technical tour will include a visit to the Dry Creek Experimental Watershed, A NRCS SNOTEL site, and a collaborative weather station for youth education.

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 March 1 forecasts for summer runoff within the Spokane River Basin are 92% of average near Post Falls and 94% at Long Lake. The Chamokane River near Long Lake forecasted to have 97% of average flows for the May-August period. The forecast is based on a basin snowpack that is 92% of normal and precipitation that is 119% of average for the water year. Precipitation for February was much above normal at 188% of average. Streamflow on the Spokane River at Spokane was 177% of average for February. March 1 storage in Coeur d'Alene Lake was 202,000 acre feet, 152% of average and 85% of capacity. Snowpack at Quartz Peak SNOTEL site was 88% of average with 17.1 inches of water content. Average temperatures in the Spokane basin were 4-6 degrees colder 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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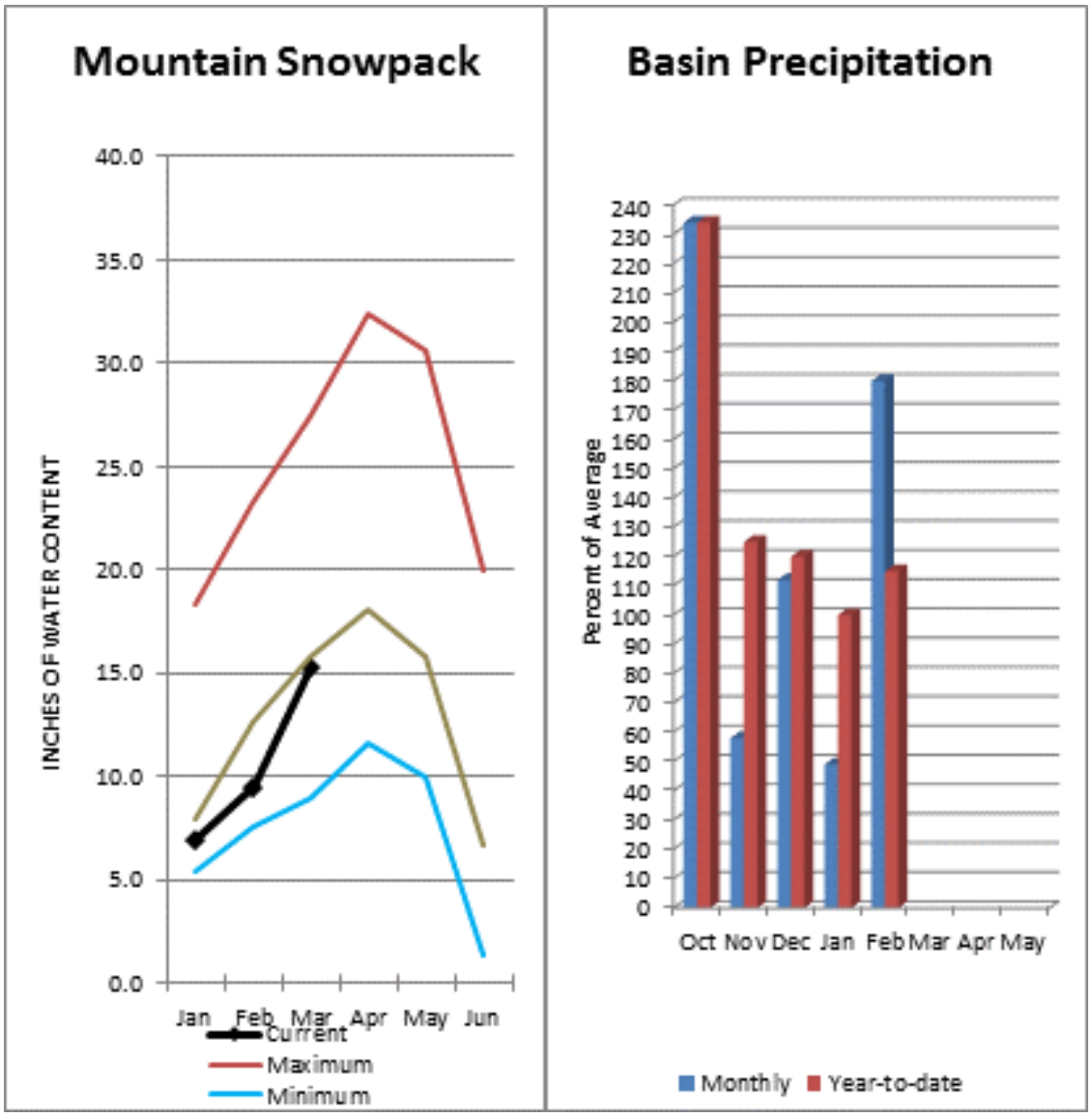
Spokane
Streamflow Forecasts - March 1, 2017

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	1500	1920	2200	92%	2480	2900	2390
	APR-SEP	1570	1990	2280	92%	2560	2980	2480
Spokane R at Long Lake[2]								
	APR-JUL	1720	2170	2480	95%	2780	3230	2620
	APR-SEP	1910	2370	2680	94%	3000	3460	2850
Chamokane Ck nr Long Lake								
	MAY-AUG	3.9	6.9	9	97%	11.1	14.2	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, 2017	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Lake Coeur d' Alene	202.3	171.4	132.8	238.5
Basin-wide Total	202.3	171.4	132.8	238.5
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis March 1, 2017	# of Sites	% Median	Last Year % Median
Spokane	17	91%	83%
Newman Lake	3	95%	81%



The April – September average forecast for the Priest River near the town of Priest River is 114% and the Pend Orielle below Box Canyon is 107%. February streamflow was 143% of average on the Pend Oreille River and 117% on the Columbia at Birchbank. March 1 snow cover was 97% of normal in the Pend Oreille Basin River Basin. Bunchgrass Meadows SNOTEL site had 18.4 inches of snow water on the snow pillow. Normally Bunchgrass would have 22.5 inches on March 1. Precipitation during February was 180% of average, boosting the year-to-date precipitation to 115% of average. Reservoir storage in the basin, including Lake Pend Oreille and Priest Lake was 90% of normal. Average temperatures were 4-6 degrees below normal for February but 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 - March 1, 2017

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]								
	APR-JUL	10500	11800	12600	107%	13400	14600	11800
	APR-SEP	11500	12800	13700	107%	14600	16000	12800
Priest R nr Priest River[2]								
	APR-JUL	755	840	895	115%	955	1040	780
	APR-SEP	795	885	950	114%	1010	1100	830
Pend Oreille R bl Box Canyon[2]								
	APR-JUL	10700	11900	12800	108%	13600	14800	11900
	APR-SEP	11600	13000	13900	107%	14800	16200	13000

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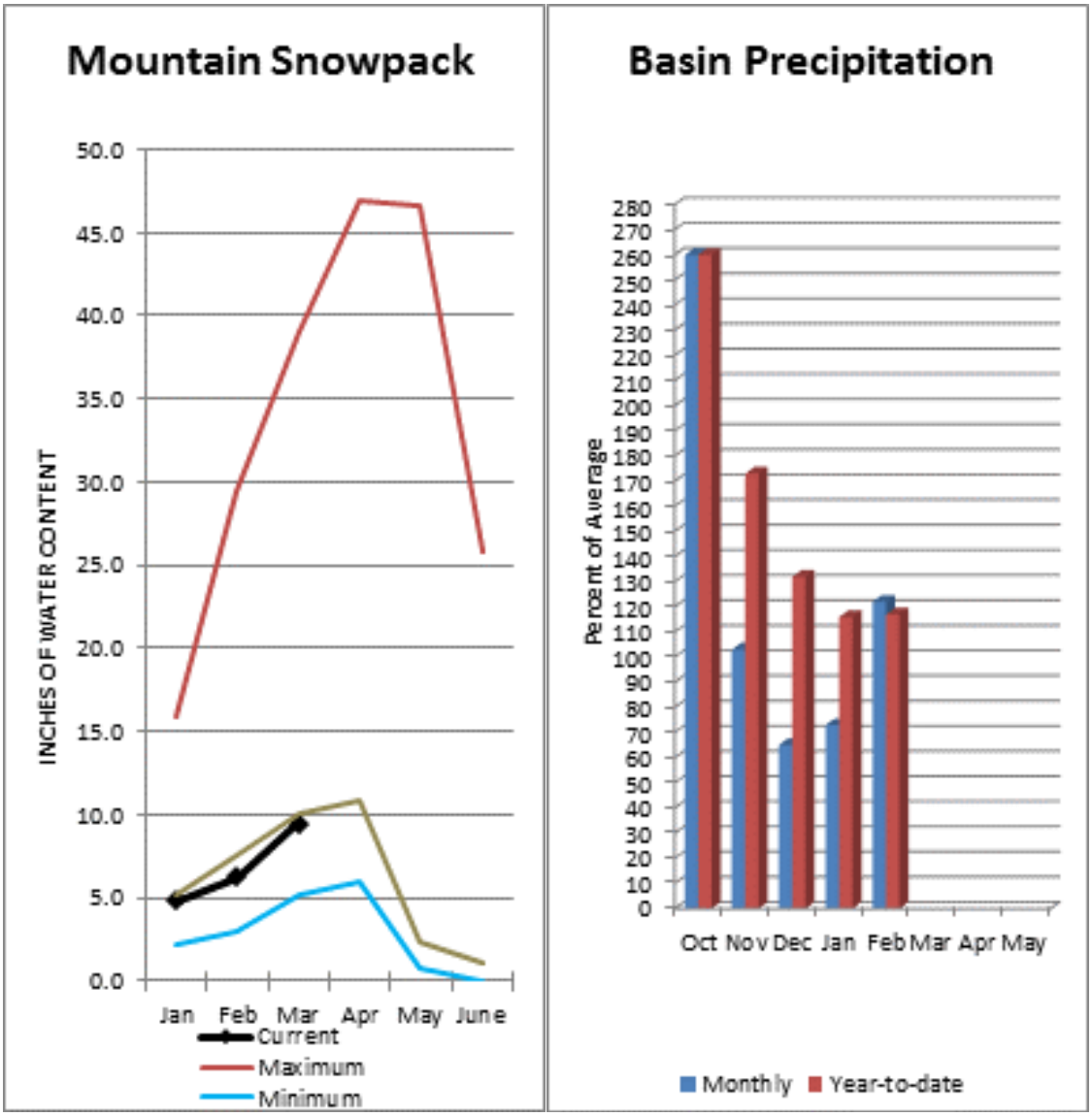
3) Median value used in place of average

Reservoir Storage End of February, 2017	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Lake Pend Oreille	700.0	665.3	792.6	1561.3
Priest Lake	61.3	64.1	57.1	119.3
Basin-wide Total	761.2	729.5	849.7	1680.6
# of reservoirs	2	2	2	2

Watershed Snowpack Analysis March 1, 2017	# of Sites	% Median	Last Year % Median
Pend Oreille Basins	66	97%	92%
Colville River	2	84%	84%
Kettle River	5	100%	122%



Summer runoff average forecast for the Okanogan River is 89%, Similkameen River is 91%, and Methow River is 109%. March 1 snow cover on the Okanogan was 88% of normal, Omak Creek was 118% and the Methow was 100%. February precipitation in the Upper Columbia was 122% of average, with precipitation for the water year at 117% of average. February streamflow for the Methow River was 106% of average, 86% for the Okanogan River and 75% for the Similkameen. Snow-water content at Salmon Meadows SNOTEL was 8.8 inches or 101% of normal for March 1. Combined storage in the Conconully Reservoirs was 19,200 acre-feet or 131% of normal. Temperatures were 4-8 degrees below normal for February and slightly below normal for the water year.

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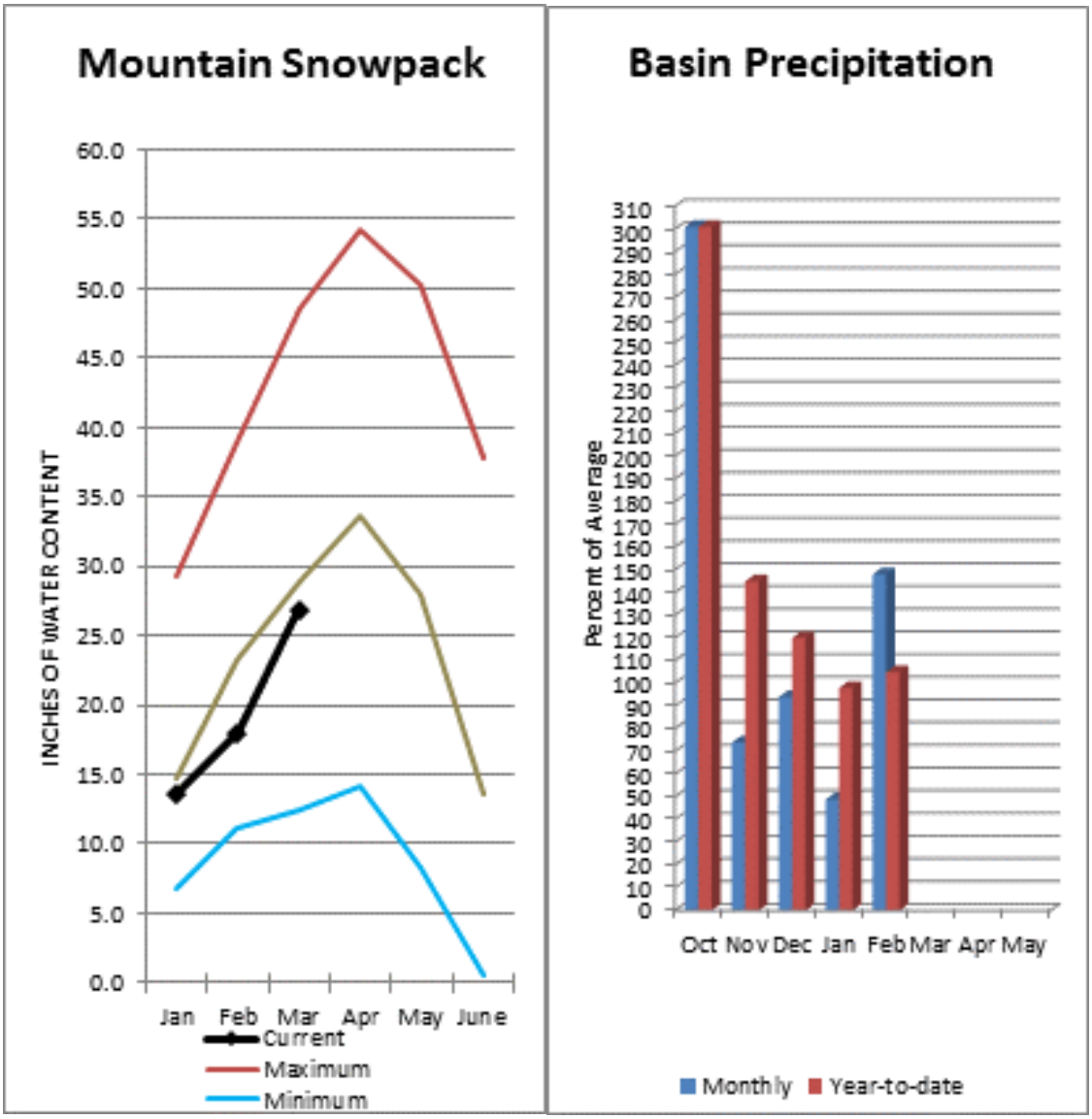
Upper Columbia Basins
Streamflow Forecasts - March 1, 2017

Upper 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						
Kettle R nr Laurier								
	APR-JUL	1190	1390	1520	84%	1660	1860	1800
	APR-SEP	1230	1440	1580	84%	1720	1930	1880
Colville R at Kettle Falls								
	APR-JUL	33	73	100	84%	127	167	119
	APR-SEP	37	80	110	84%	140	183	131
Columbia R at Grand Coulee[1,2]								
	APR-JUL	46500		51200	100%		56800	51000
	APR-SEP	55400		61400	102%		67200	60100
Similkameen R nr Nighthawk[1]								
	APR-JUL	830	990	1100	92%	1200	1360	1200
	APR-SEP	880	1050	1170	91%	1280	1460	1280
Okanogan R nr Tonasket[1]								
	APR-JUL	840	1100	1280	86%	1460	1710	1480
	APR-SEP	915	1210	1420	86%	1620	1920	1650
Okanogan R at Malott[1]								
	APR-JUL	855	1120	1300	90%	1480	1750	1450
	APR-SEP	925	1230	1440	89%	1650	1950	1620
Methow R nr Pateros								
	APR-JUL	680	815	910	109%	1000	1140	835
	APR-SEP	730	875	975	109%	1070	1220	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, 2017	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Conconully Lake (Salmon Lake Dam)	8.6	7.2	7.3	10.5
Conconully Reservoir	10.6	6.8	7.4	13.0
Basin-wide Total	19.2	14.0	14.7	23.5
# of reservoirs	2	2	2	2

Watershed Snowpack Analysis March 1, 2017	# of Sites	% Median	Last Year % Median
Upper Columbia Basins	23	95%	125%
Okanogan River	15	93%	127%
Omak Creek	3	118%	130%
Sanpoil River	0		
Similkameen River	4	81%	103%
Toats Coulee Creek	3	100%	139%
Conconully Lake	3	110%	128%
Methow River	5	100%	135%



Precipitation during February was 148% of average in the basin and 105% for the year-to-date. Runoff for Entiat River is forecast to be 89% of average for the summer. The April-September average forecast for Chelan River is 93%, Wenatchee River at Pashastin is 88%, Stehekin River is 93% and Icicle Creek is 88%. February average streamflow on the Chelan River was 89% and on the Wenatchee River 45%. March 1 snowpack in the Wenatchee River Basin was 93% of normal; the Chelan, 89%; the Entiat, 90%; Stemilt Creek, 102% and Colockum Creek, 152%. Reservoir storage in Lake Chelan was not available. Lyman Lake SNOTEL had the most snow water with 49.3 inches of water. This site would normally have 48.6 inches on March 1. Temperatures were much 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 Columbia Basins
Streamflow Forecasts - March 1, 2017

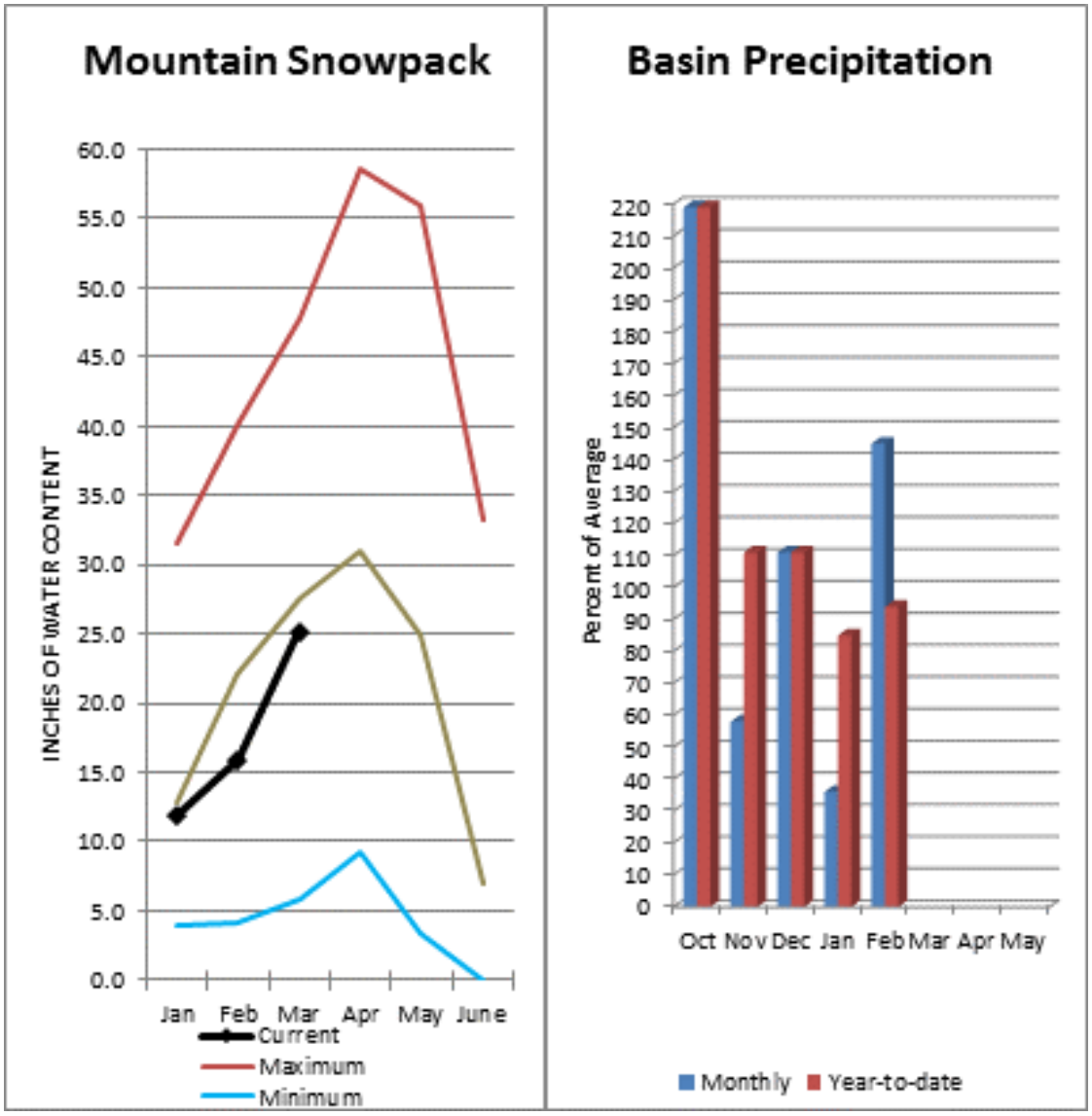
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

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	515	590	640	94%	690	765	680
	APR-SEP	600	680	735	93%	795	875	790
Chelan R at Chelan								
	APR-JUL	750	860	930	93%	1000	1110	1000
	APR-SEP	825	950	1040	93%	1120	1240	1120
Entiat R nr Ardenvoir								
	APR-JUL	137	163	181	91%	198	225	200
	APR-SEP	148	177	196	89%	215	245	220
Wenatchee R at Plain								
	APR-JUL	685	805	885	89%	965	1090	990
	APR-SEP	730	870	960	89%	1050	1190	1080
Icicle Ck nr Leavenworth								
	APR-JUL	183	220	245	89%	275	310	275
	APR-SEP	197	240	265	88%	295	340	300
Wenatchee R at Peshastin								
	APR-JUL	955	1110	1210	88%	1320	1470	1370
	APR-SEP	1020	1200	1310	88%	1430	1610	1490
Columbia R bl Rock Island Dam[2]								
	APR-JUL	60100		55800	100%		72900	55800
	APR-SEP	61700		67100	103%		74500	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, 2017	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Lake Chelan		312.7	279.8	676.1
Basin-wide Total		0.0	0.0	0.0
# of reservoirs	0	0	0	0

Watershed Snowpack Analysis March 1, 2017	# of Sites	% Median	Last Year % Median
Central Columbia Basins	3	89%	113%
Chelan Lake Basin	3	89%	113%
Entiat River	1	90%	90%
Wenatchee River	7	93%	101%
Stemilt Creek	1	102%	108%
Colockum Creek	1	152%	166%



March 1 reservoir storage for the Upper Yakima reservoirs was 375,000-acre feet, 83% of average. Forecasts for the Yakima River at Cle Elum are 86% of average and the Teanaway River near Cle Elum is at 82%. Lake inflows are all forecasted to be in the 80-90% range this summer as well. February streamflow within the basin was Cle Elum River near Roslyn at 61%. March 1 snowpack was 93% based upon 8 snow course and SNOTEL readings within the Upper Yakima Basin. Precipitation was 194% of average for February and 94% 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.

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

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Upper Yakima River
Streamflow Forecasts - March 1, 2017

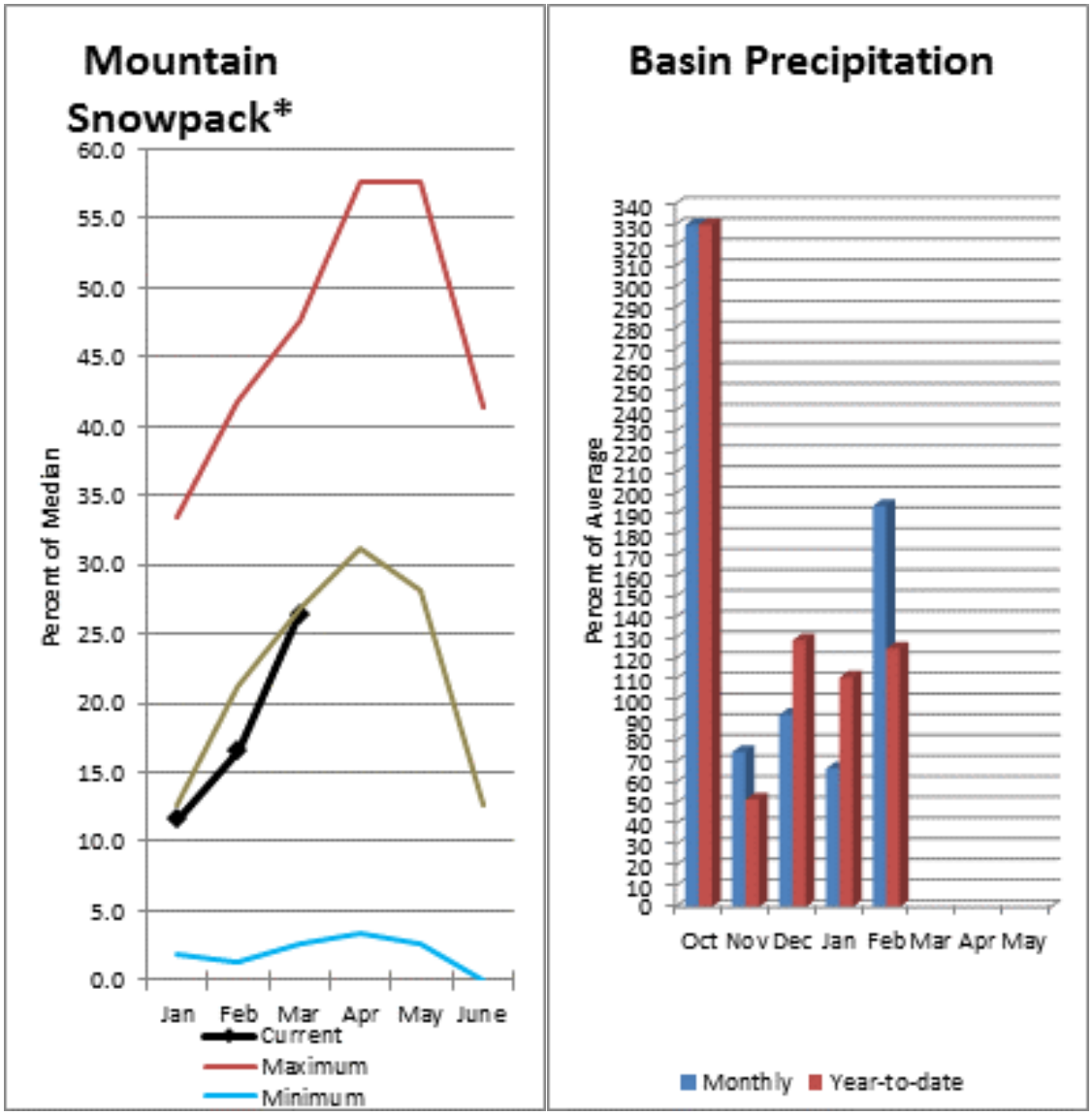
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

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	69	89	103	89%	117	138	116
	APR-SEP	77	98	113	90%	128	149	126
Kachess Reservoir Inflow [2]								
	APR-JUL	62	79	90	87%	102	118	104
	APR-SEP	70	87	99	88%	110	127	113
Cle Elum Lake Inflow [2]								
	APR-JUL	260	305	340	88%	370	415	385
	APR-SEP	280	330	365	88%	400	450	415
Yakima R at Cle Elum [2]								
	APR-JUL	440	565	650	86%	730	855	755
	APR-SEP	495	625	715	86%	805	940	830
Teanaway R bl Forks nr Cle Elum								
	APR-JUL	62	88	106	82%	124	151	130
	APR-SEP	64	91	109	82%	127	154	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, 2017	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Keechelus	72.6	128.5	92.3	157.8
Kachess	127.7	150.1	143.6	239.0
Cle Elum	174.3	301.9	214.4	436.9
Basin-wide Total	374.7	580.5	450.3	833.7
# of reservoirs	3	3	3	3

Watershed Snowpack Analysis March 1, 2017	# of Sites	% Median	Last Year % Median
Upper Yakima River	8	93%	97%



February average streamflows within the basin were: Yakima River near Parker, 69% and the Naches River near Naches, 117%. March 1 reservoir storage for Bumping and Rimrock reservoirs was 163,000-acre feet, 120% of average. Forecast averages for Yakima River near Parker are 97%; American River near Nile, 99%; Ahtanum Creek, 131%; and Klickitat River near Glenwood, 107%. March 1 snowpack was 98% based upon 7 snow course and SNOTEL readings within the Lower Yakima Basin and Ahtanum Creek reported in at 110% of normal. Precipitation was 194% of average for February and 125% for the water-year. Temperatures were much below normal for February 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.

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

Data Current as of: 3/3/2017 4:15:57 PM

Lower Yakima River
Streamflow Forecasts - March 1, 2017

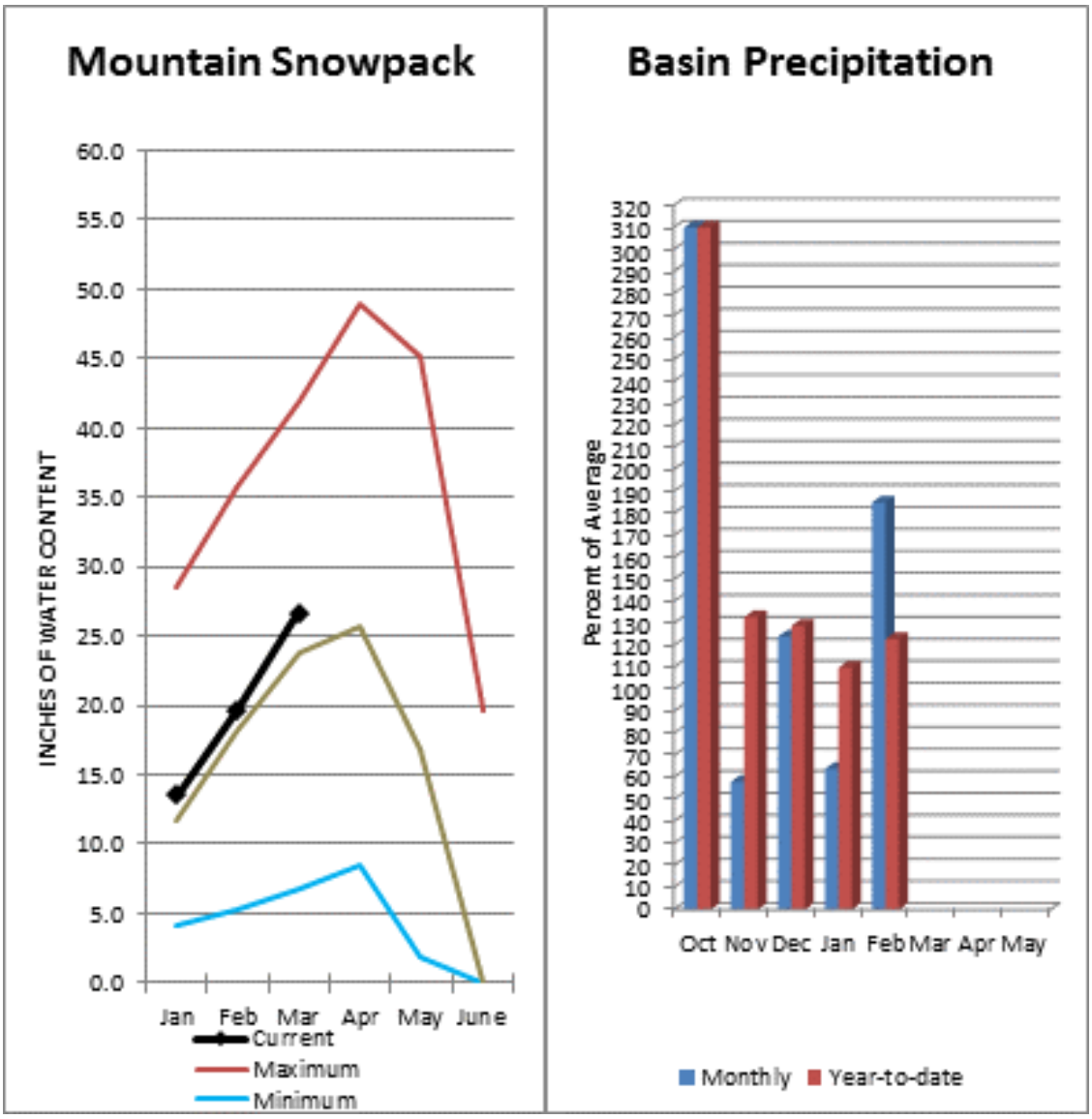
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

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	86	101	112	98%	123	139	114
	APR-SEP	93	110	122	99%	134	151	123
American R nr Nile								
	APR-JUL	78	91	101	99%	110	124	102
	APR-SEP	83	98	109	99%	119	135	110
Rimrock Lake Inflow [2]								
	APR-JUL	156	178	193	103%	205	230	187
	APR-SEP	184	210	230	105%	245	270	220
Naches R nr Naches								
	APR-JUL	515	635	715	102%	800	920	700
	APR-SEP	555	690	785	103%	875	1010	760
Ahtanum Ck at Union Gap								
	APR-JUL	21	30	35	130%	41	49	27
	APR-SEP	23	32	38	131%	44	52	29
Yakima R nr Parker [2]								
	APR-JUL	1140	1420	1600	96%	1790	2070	1660
	APR-SEP	1260	1560	1760	97%	1960	2250	1820
Klickitat R nr Glenwood								
	APR-JUL	100	121	135	107%	150	170	126
	APR-SEP	112	134	149	107%	164	186	139
Klickitat R nr Pitt								
	APR-JUL	365	435	480	110%	525	595	435
	APR-SEP	445	525	575	111%	630	705	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, 2017	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Bumping Lake	15.8	20.8	13.3	33.7
Rimrock	147.6	177.8	123.3	198.0
Basin-wide Total	163.4	198.6	136.6	231.7
# of reservoirs	2	2	2	2

Watershed Snowpack Analysis March 1, 2017	# of Sites	% Median	Last Year % Median
Lower Yakima River	7	98%	114%
Ahtanum Creek	2	110%	110%



February precipitation was 185% of average, maintaining the year-to-date precipitation at 123% of average. Snowpack in the basin was 122% of normal. Streamflow forecasts are 111% of average for Mill Creek and 118% for the SF Walla Walla near Milton-Freewater. Average temperatures were much below normal for February and slightly below normal for the water year.

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

Data Current as of: 3/3/2017 4:15:59 PM

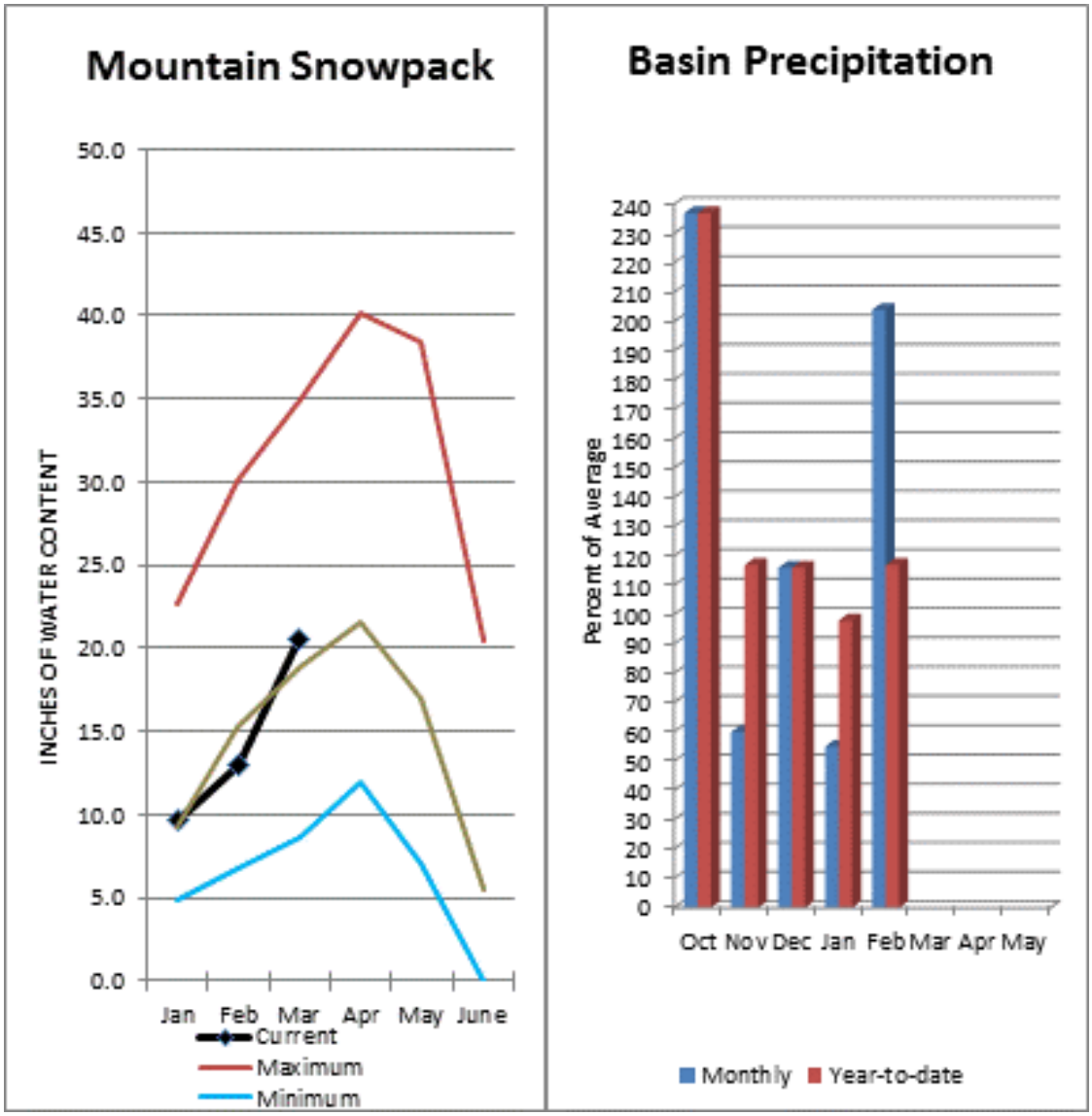
Walla Walla River
Streamflow Forecasts - March 1, 2017

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-SEP	78	88	94	118%	100	110	80
	APR-JUL	50	59	64	119%	70	78	54
	APR-SEP	63	72	78	118%	84	93	66
Mill Ck nr Walla Walla								
	APR-JUL	19.9	24	27	113%	30	34	24
	APR-SEP	23	27	30	111%	33	38	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, 2017	# of Sites	% Median	Last Year % Median
Walla Walla River	2	122%	107%



The Snake River below Lower Granit Dam can expect summer flows to be about 124% of normal. The forecast for Asotin Creek at Asotin predicts 126% of average flows for the April – July runoff period. February precipitation was 204% of average, bringing the year-to-date precipitation to 117% of average. March 1 snowpack readings averaged 109% of normal. February streamflow was 149% of average for Snake River below Lower Granite Dam and 149% for Grande Ronde River near Troy. Dworshak Reservoir storage was 97% of average. Average temperatures were much below normal for February and slightly below normal for the water year.

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

Data Current as of: 3/3/2017 4:16:01 PM

Lower Snake, Grande Ronde, Clearwater Basins
Streamflow Forecasts - March 1, 2017

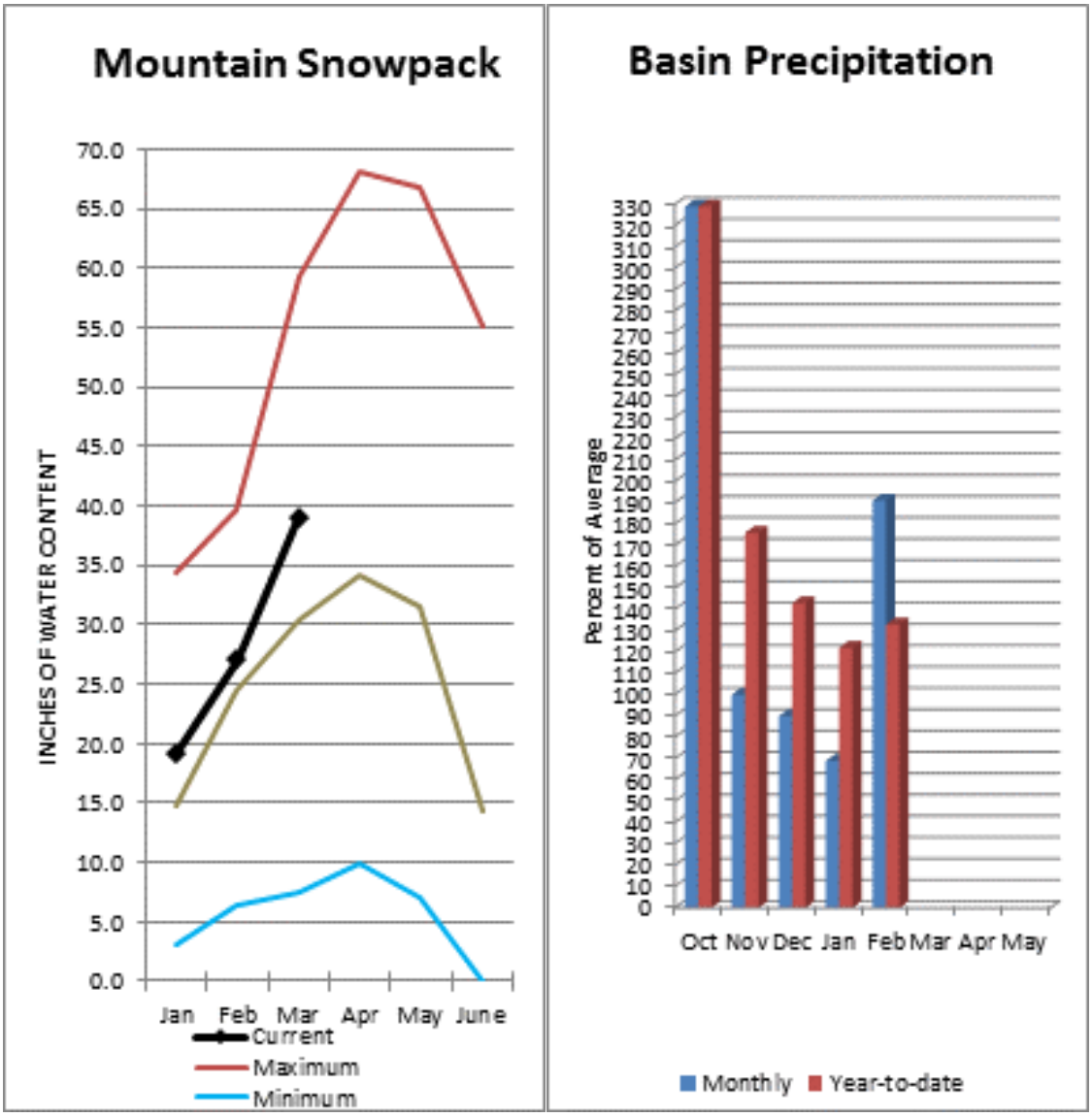
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

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	1370	1610	1780	118%	1950	2200	1510
	APR-SEP	1110	1360	1530	117%	1700	1950	1310
Asotin Ck at Asotin								
	APR-JUL	29	38	44	126%	50	59	35
Clearwater R at Spalding[2]								
	APR-JUL	5520	6450	7080	103%	7710	8640	6890
	APR-SEP	5840	6800	7450	102%	8110	9070	7270
Snake R bl Lower Granite Dam[12]								
	APR-JUL	17100	22100	24400	123%	26700	31700	19848
	APR-SEP	19500	25100	27700	124%	30300	35900	22280

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, 2017	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Dworshak Reservoir	2286.0	2670.9	2358.0	3468.0
Basin-wide Total	2286.0	2670.9	2358.0	3468.0
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis March 1, 2017	# of Sites	% Median	Last Year % Median
Lower Snake, Grande Ronde, Clearwater Basins	13	109%	95%



Forecasts for April – September streamflows within the basin are Lewis River at Ariel, 104% and Cowlitz River at Castle Rock, 109% of average. The Columbia at The Dalles is forecasted to have 108% of average flows this summer according to the River Forecast Center. February average streamflow for Cowlitz River was 139%. The Columbia River at The Dalles was 138% of average. February precipitation was 191% of average and the water-year average was 133%. March 1 snow cover for Cowlitz River was 111%, and Lewis River was 144% of normal. Temperatures were below normal during February but near average for the water year.

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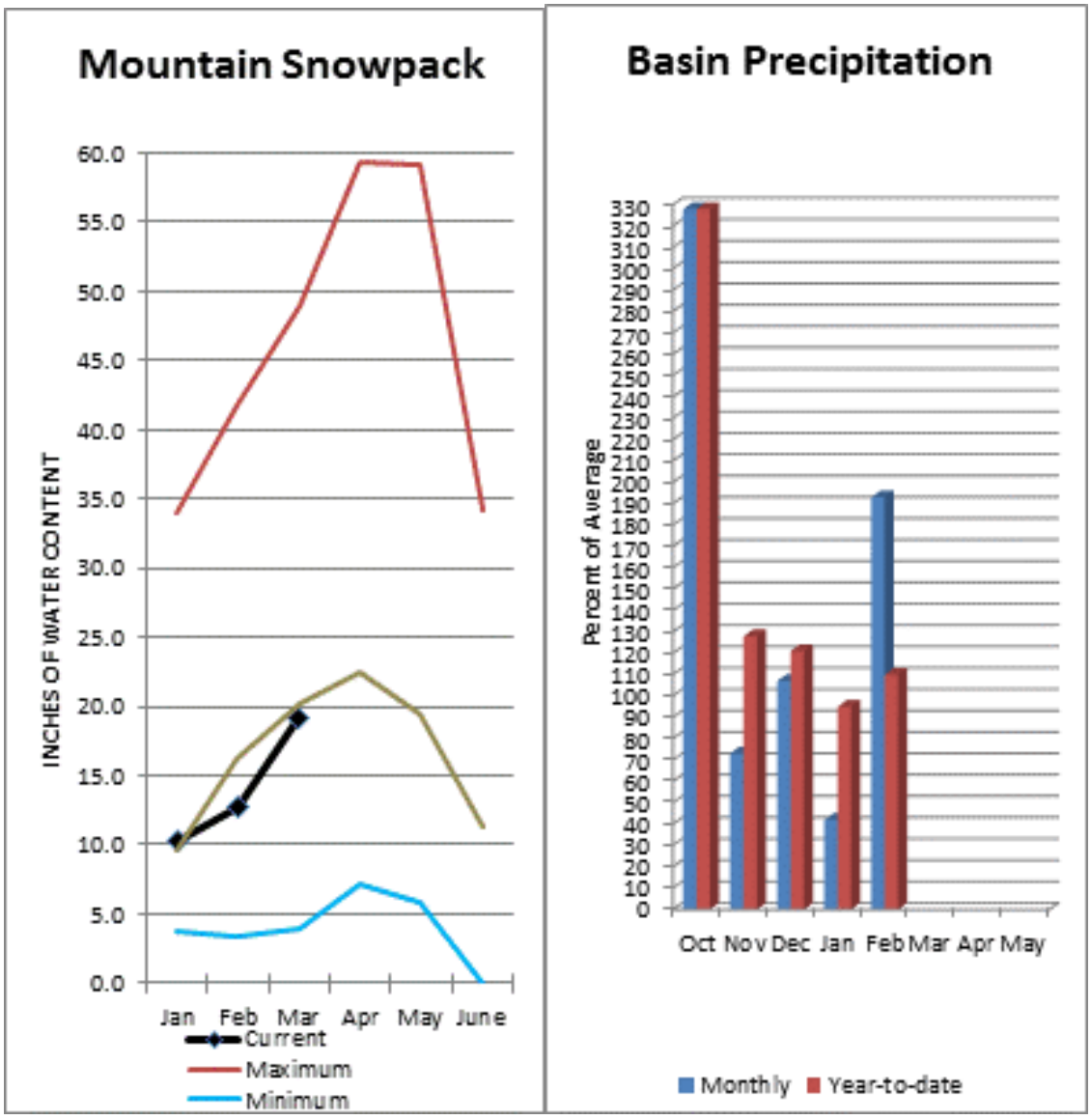
Lower Columbia Basins
Streamflow Forecasts - March 1, 2017

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[2]								
	APR-JUL	77400		85800	107%		96200	79900
	APR-SEP	89900		99700	108%		110000	92700
Klickitat R nr Glenwood								
	APR-JUL	100	121	135	107%	150	170	126
	APR-SEP	112	134	149	107%	164	186	139
Klickitat R nr Pitt								
	APR-JUL	365	435	480	110%	525	595	435
	APR-SEP	445	525	575	111%	630	705	520
Lewis R at Ariel[2]								
	APR-JUL	760	925	1040	107%	1150	1320	970
	APR-SEP	880	1050	1170	104%	1290	1470	1120
Cowlitz R bl Mayfiled[2]								
	APR-JUL	1380	1630	1800	111%	1970	2220	1620
	APR-SEP	1560	1860	2060	112%	2260	2560	1840
Cowlitz R at Castle Rock[2]								
	APR-JUL	1960	2240	2430	109%	2620	2900	2230
	APR-SEP	2240	2540	2750	109%	2960	3260	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, 2017	# of Sites	% Median	Last Year % Median
Lower Columbia Basins	11	128%	103%
Lewis River	5	144%	105%
Cowlitz River	6	111%	101%



Summer runoff is forecast to be 102% of normal for the Green River below Howard Hanson Dam and 107% for the White River near Buckley. March 1 snowpack was 91% of average for the White River, 97% for Puyallup River and 96% in the Green River Basin. February precipitation was 193% of average, bringing the water year-to-date to 110% of average for the basins. Average temperatures in the area were below normal for February but 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, 2017

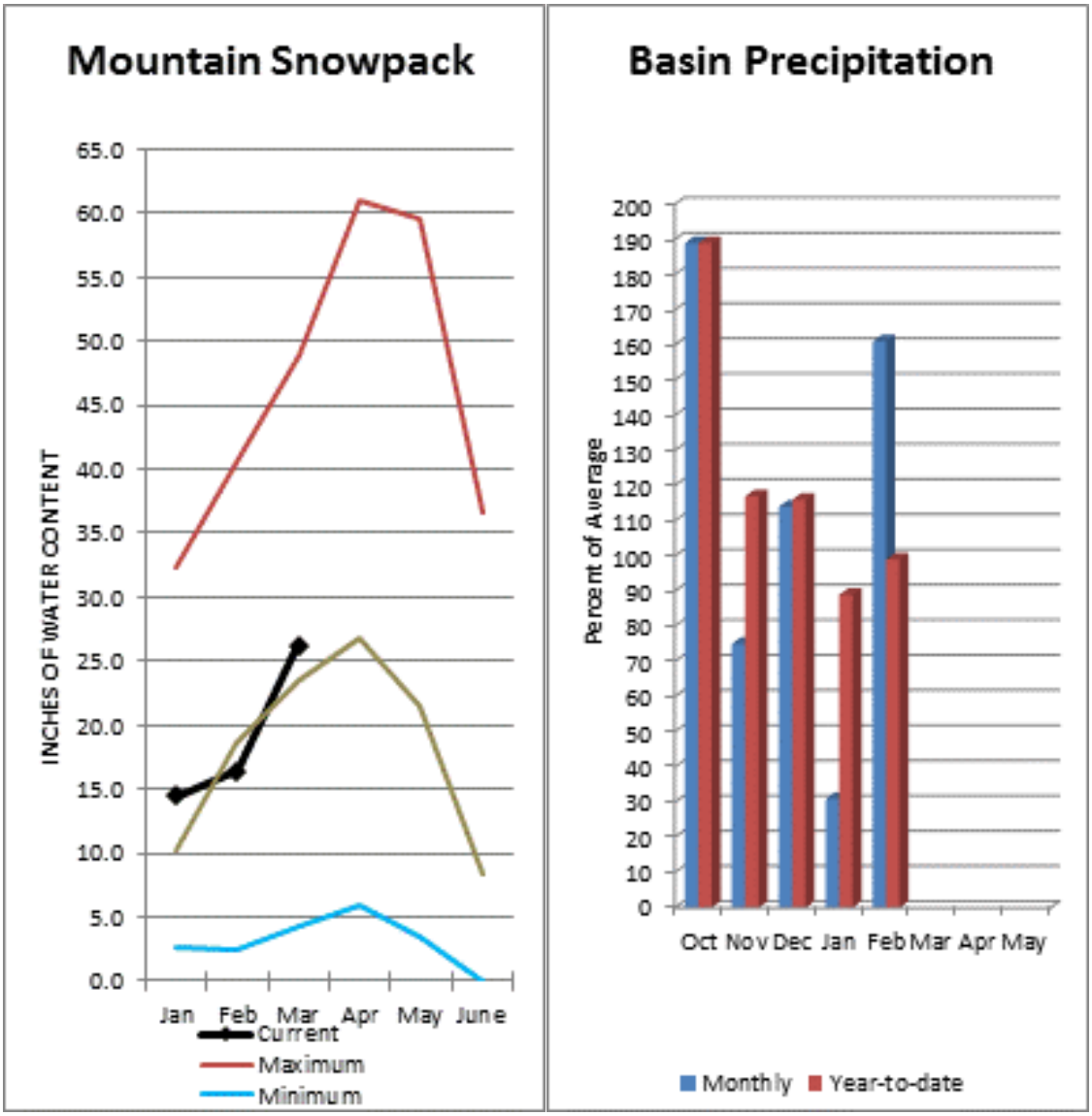
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

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	142	210	240	102%	270	340	235
	APR-SEP	163	230	265	102%	295	365	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, 2017	# of Sites	% Median	Last Year % Median
South Puget Sound Basins	10	95%	95%
White River	3	91%	101%
Green River	2	96%	81%

Central Puget Sound River Basins



Forecast for spring and summer flows are: 101% for Cedar River near Cedar Falls; 107% for Rex River; 108% for South Fork of the Tolt River; and 100% for Taylor Creek near Selleck. Basin-wide precipitation for February was 161% of average, bringing water-year-to-date to 99% of average. March 1 median snow cover in Cedar River Basin was 120%, Tolt River Basin was 121%, Snoqualmie River Basin was 108%, and Skykomish River Basin was 107%. Temperatures were below normal for February and near normal for the water-year.

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

Data Current as of: 3/3/2017 4:16:08 PM

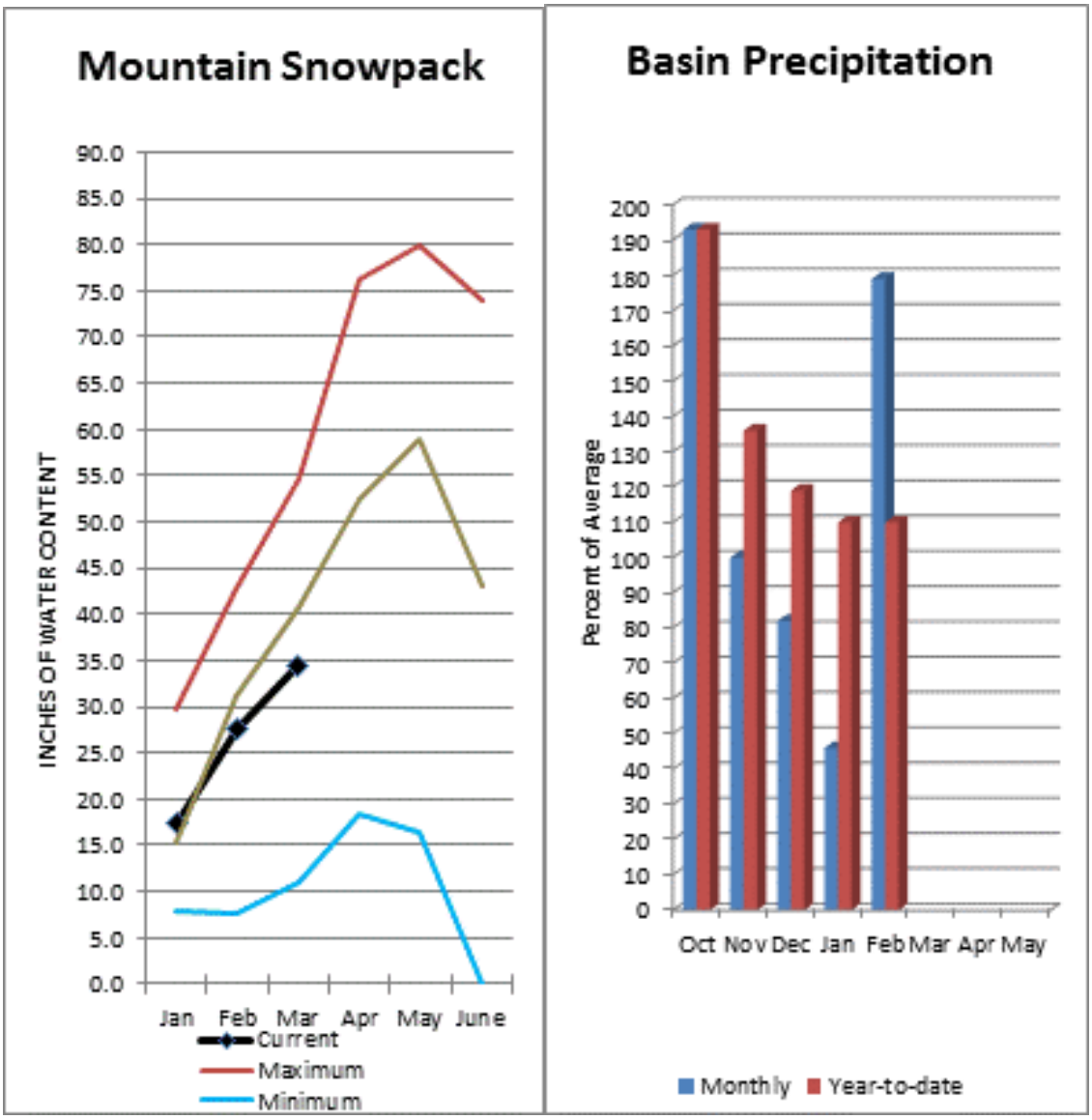
Central Puget Sound Basins
Streamflow Forecasts - March 1, 2017

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	53	64	71	101%	78	88	70
	APR-SEP	59	70	77	101%	84	95	76
Rex R nr Cedar Falls								
	APR-JUL	17.9	23	26	108%	29	34	24
	APR-SEP	20	25	29	107%	32	37	27
Taylor Ck nr Selleck								
	APR-JUL	15	18	20	100%	22	25	20
	APR-SEP	18.3	22	24	100%	26	29	24
SF Tolt R nr Index								
	APR-JUL	11.6	14	15.6	110%	17.2	19.5	14.2
	APR-SEP	13	15.6	17.4	108%	19.2	22	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, 2017	# of Sites	% Median	Last Year % Median
Central Puget Sound Basins	15	111%	84%
Puyallup River	5	97%	98%
Cedar River	6	120%	104%
Tolt River	3	121%	59%
Snoqualimie River	5	108%	74%
Skykomish River	3	107%	67%



Forecast for Skagit River streamflow at Newhalem is 90% of average for the spring and summer period. February streamflow in Skagit River was 140% of average. Other forecast points included Baker River at 98% and Thunder Creek at 95% of average. Basin-wide precipitation for February was 179% of average, bringing water-year-to-date to 110% of average. March 1 average snow cover in Skagit River Basin was 92% and the Nooksack River Basin was 88%. March 1 Skagit River reservoir storage was 56% of average and 33% of capacity. Average temperatures were below normal for March and slightly below normal 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 - March 1, 2017

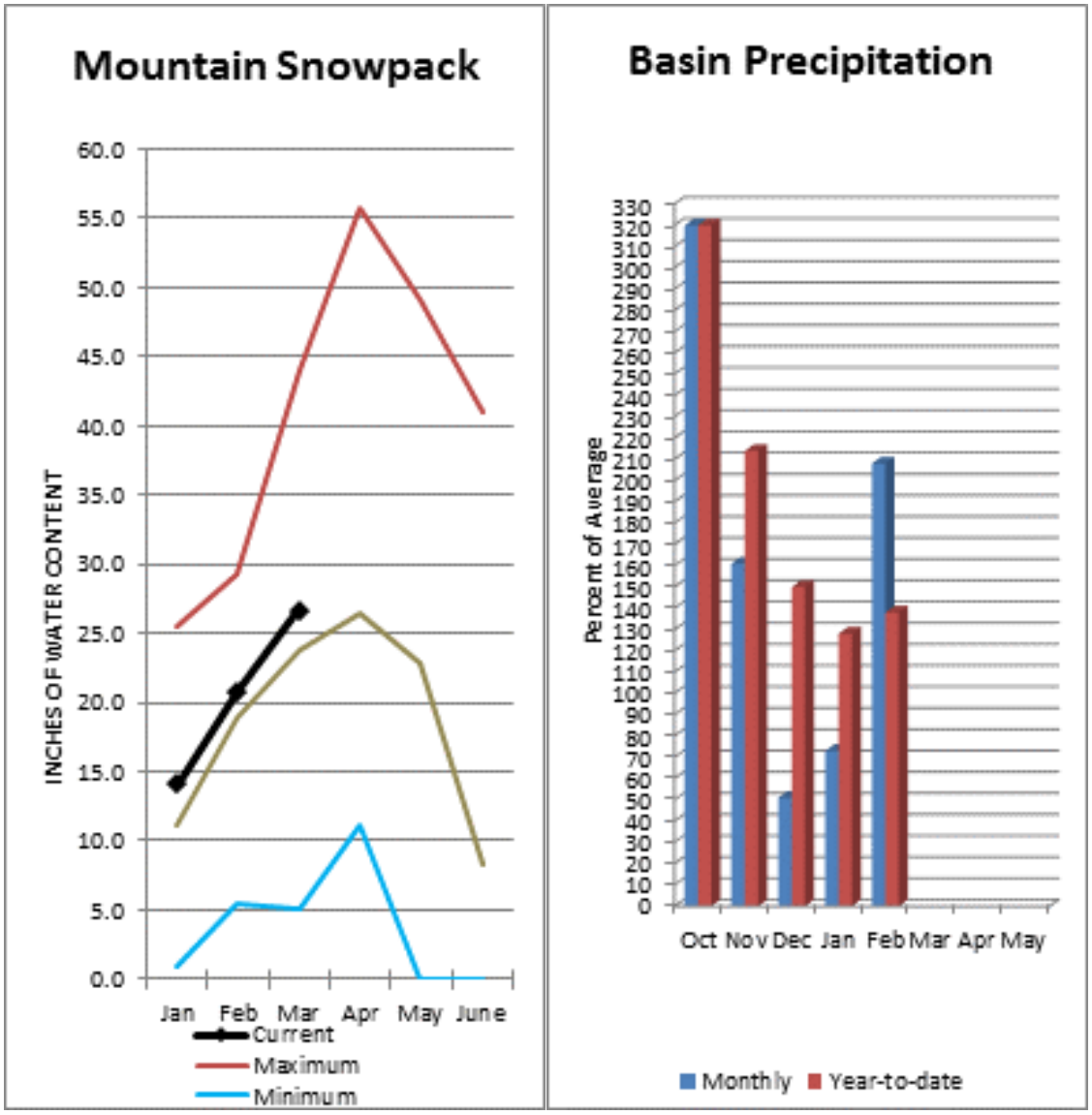
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

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	189	210	220	94%	235	255	235
	APR-SEP	275	300	315	95%	330	350	330
Skagit R at Newhalem[2]								
	APR-JUL	1300	1450	1550	92%	1650	1800	1680
	APR-SEP	1560	1720	1830	90%	1950	2110	2030
Baker R at Concrete								
	APR-JUL	595	690	755	97%	820	915	780
	APR-SEP	745	870	960	98%	1050	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 February, 2017	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Ross	462.6	604.8	832.4	1404.1
Diablo Reservoir			86.2	90.6
Basin-wide Total	462.6	604.8	832.4	1404.1
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis March 1, 2017	# of Sites	% Median	Last Year % Median
North Puget Sound Basins	16	91%	101%
Skagit River	13	92%	106%
Baker River	0		
Nooksack River	3	88%	85%



Forecasted average runoff for streamflow for the Dungeness River is 101% and Elwha River is 103% February runoff in the Dungeness River was 161% of normal. Big Quilcene and Wynoochee rivers may expect near average runoff this summer as well. February precipitation was 208% of average. Precipitation has accumulated at 138% of average for the water year. February precipitation at Quillayute was 135% of normal. Olympic Peninsula snowpack averaged 112% 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: 3/3/2017 4:16:13 PM

Olympic Penninsula
Streamflow Forecasts - March 1, 2017

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	100	113	122	102%	131	144	120
	APR-SEP	119	136	147	101%	159	176	145
Elwha R at McDonald Bridge nr Port Angeles								
	APR-JUL	340	385	410	103%	440	485	400
	APR-SEP	395	450	485	103%	520	575	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, 2017	# of Sites	% Median	Last Year % Median
Olympic Penninsula	6	112%	97%

Issued by

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, 2017

Worst spring flooding for Stevens County in many years where a state of emergency was declared
Photo courtesy of Stevens Co. Fire District 1, March 2017

Reminder: We are soliciting field work photos from our snow surveyors again this year. Each month we pick one to grace the cover of this report. The photographer will be given proper credit of course. Please include all specific information when submitting photos. Scott.pattee@wa.usda.gov

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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Natural Resources Conservation Service
2005 E. College Way, Suite 203
Mt. Vernon, WA 98273-2873
(360) 428-7684

or

Larry Johnson
State Conservation Engineer
Natural Resources Conservation Service
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

April 2017

General Outlook

Washington experienced another super wet month. Cool temperatures brought abundant mountain snow but also much localized flooding throughout mostly Eastern Washington where rain helped bring off the remaining low elevation snow. Under current conditions and with snowpack at near peak levels the confidence in streamflow forecast calculations increase dramatically. As snowpack is above normal so are most streamflow forecasts for spring and summer runoff. Continued cool weather will help retain mountain snow until we really need it. Short term weather forecasts call for a continuation of below normal temperatures and above normal precipitation for the next few weeks. The latest NWS 3-month outlook is for equal chances of above, below or near normal conditions for both precipitation and temperature. http://www.cpc.ncep.noaa.gov/

Snowpack

The April 1 statewide SNOTEL readings were 121% of normal. The Colville River reported the lowest snowpack at 94% of the 30-year median for April 1. The North Puget Basin was the big winner receiving nearly 30 inches of water content for the month boosting it from below too much above normal. The Lewis River Basin had the most snow with 161%. Westside medians from SNOTEL, and April 1 snow surveys, included the North Puget Sound river basins with 120% of normal, the Central and South Puget river basins with 122% and 102% respectively, and the Lower Columbia basins with 141% of normal. Snowpack along the east slopes of the Cascade Mountains included the Yakima area with 109% and the Wenatchee area with 113%. Snowpack in the Spokane River Basin was at 97% and the Walla Walla River Basin had 129% of the long term median.

BASIN	PERCENT OF MEDIAN	LAST YEAR PERCENT MEDIAN
Spokane	97	95
Newman Lake	115	120
Pend Oreille	100	98
Okanogan	110	140
Methow	119	135
Conconully Lake	122	144
Central Columbia	113	108
Upper Yakima	110	103
Lower Yakima	108	117
Ahtanum Creek	102	122
Walla Walla	129	127
Lower Snake	105	107
Cowlitz	120	114
Lewis	161	118
White	96	109
Green	109	87
Puyallup	103	106
Cedar	130	112
Snoqualmie	118	88
Skykomish	121	80
Skagit	122	111
Nooksack	112	91
Olympic Peninsula	119	108

Precipitation

Washington State received much above normal precipitation for the month of March brining all year to date averages above normal. The highest percent of average rain fall fell in the Lewis River at 207% of normal however the Walla and Newman lake areas each received 206% last month. The lowest was on the Olympic Peninsula at 140%. As usual the wettest area in the state was around Mt. St. Helens with June Lake SNOTEL recording 40.4 inches, more than double the 30-year average or 209% of average.

RIVER BASIN	MARCH PERCENT OF AVERAGE	WATER YEAR PERCENT OF AVERAGE
Spokane	204	131
Pend Oreille	179	125
Upper Columbia	152	122
Central Columbia	198	117
Upper Yakima	190	106
Lower Yakima	200	135
Walla Walla	206	135
Lower Snake	177	125
Lower Columbia	200	142
South Puget Sound	174	119
Central Puget Sound	178	111
North Puget Sound	192	121
Olympic Peninsula	140	138

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 473,000-acre feet, 92% of average for the Upper Reaches and 196,000-acre feet or 130% of average for Rimrock and Bumping Lakes. The power generation reservoirs included the following: Coeur d'Alene Lake, 464,000 acre feet, 280% of average and 194% of capacity; and the Skagit River reservoirs at 62% of average and 32% 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	194	280
Pend Oreille	66	132
Upper Columbia	80	125
Central Columbia	N/A	N/A
Upper Yakima	57	92
Lower Yakima	85	130
Lower Snake	67	97
North Puget Sound	32	62

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

Streamflow

With nearly 200% of normal precipitation in March streamflow forecasts have seen significant increases in all basins from last month. April-September forecasts for some Western Washington streams include the Cedar River near Cedar Falls, 113%; White River, 108%; and Skagit River, 117%. Some Eastern Washington streams include the Yakima River near Parker 112%, Wenatchee River at Pashastin 103%; and Spokane River near Post Falls 105%. 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	105-106
Pend Oreille	115-125
Upper Columbia	103-124
Central Columbia	103-114
Upper Yakima	100-104
Lower Yakima	112-131
Walla Walla	122-127
Lower Snake	114-140
Lower Columbia	116-123
South Puget Sound	104-108
Central Puget Sound	104-121
North Puget Sound	100-117
Olympic Peninsula	108-109

STREAM	PERCENT OF AVERAGE APRIL STREAMFLOWS
Pend Oreille at Albeni Fall Dam	277
Kettle at Laurier	157
Columbia at Birchbank	167
Spokane at Spokane	306
Similkameen at Nighthawk	95
Okanogan at Tonasket	93
Methow at Pateros	102
Chelan at Chelan	109
Wenatchee at Pashastin	116
Cle Elum near Roslyn	146
Yakima at Parker	175
Naches at Naches	225
Grande Ronde at Troy	271
Snake below Lower Granite Dam	254
Columbia River at The Dalles	225
Lewis at Merwin Dam	190
Cowlitz below Mayfield Dam	195
Skagit at Concrete	183
Dungeness near Sequim	154

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-November. 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.

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

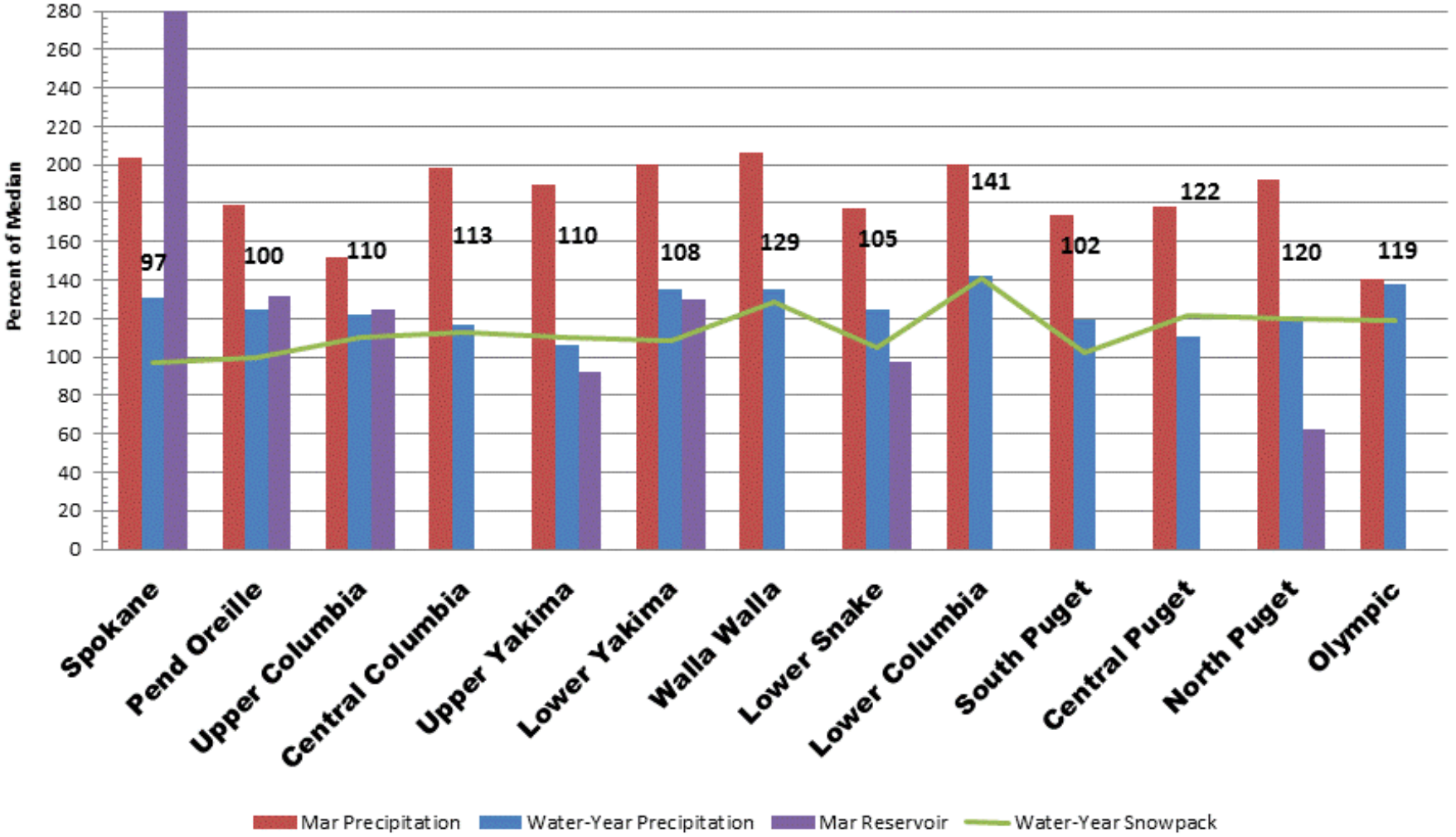
Washington:
http://www.nrcs.usda.gov/wps/portal/nrcs/site/wa/home/

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

NRCS Natural Resources Conservation Service

April 1, 2017 - Snowpack, Precipitation and Reservoir Conditions at a Glance

(Water Year = October 1 - Current Date)



Joint Meeting of the
Western Snow Conference
And the
Weather Modification Association

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 North Continental Area Committee is making plans for the 85th Annual Western Snow Conference in 2017.

Mark your calendar and start thinking about submitting a paper to attend the 2017 Western Snow Conference:

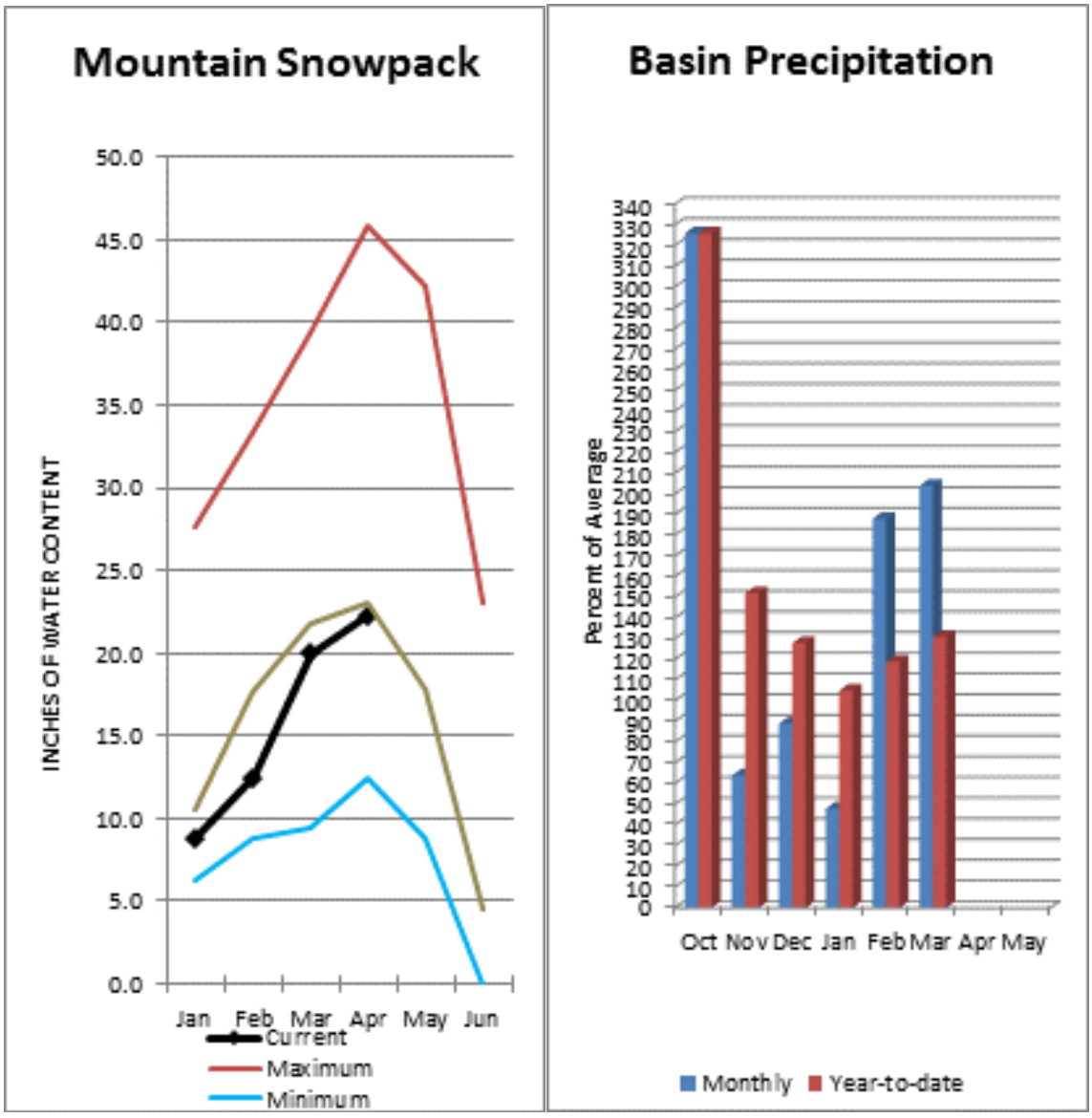
Dates: April 17-20, 2017
Location: Boise, ID

This first ever combined conference with the Weather Modification Association will kick off with a Monday afternoon short course entitled "Tracing the Effects of Cloud Seeding through the Hydrologic Cycle" with several invited experts in the field. Tuesday will begin with a joint plenary session, followed by concurrent sessions of oral and poster presentations. On Thursday, a technical tour will include a visit to the Dry Creek Experimental Watershed, A NRCS SNOTEL site, and a collaborative weather station for youth education.

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 April 1 forecasts for summer runoff within the Spokane River Basin are 105% 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 97% of normal and precipitation that is 131% of average for the water year. Precipitation for March was much above normal at 204% of average. Streamflow on the Spokane River at Spokane was 306% of average for March. April 1 storage in Coeur d'Alene Lake was 464,000 acre feet, 280% of average and 194% of capacity. Snowpack at Quartz Peak SNOTEL site was 103% of average with 18.9 inches of water content. Average temperatures in the Spokane basin were slightly colder 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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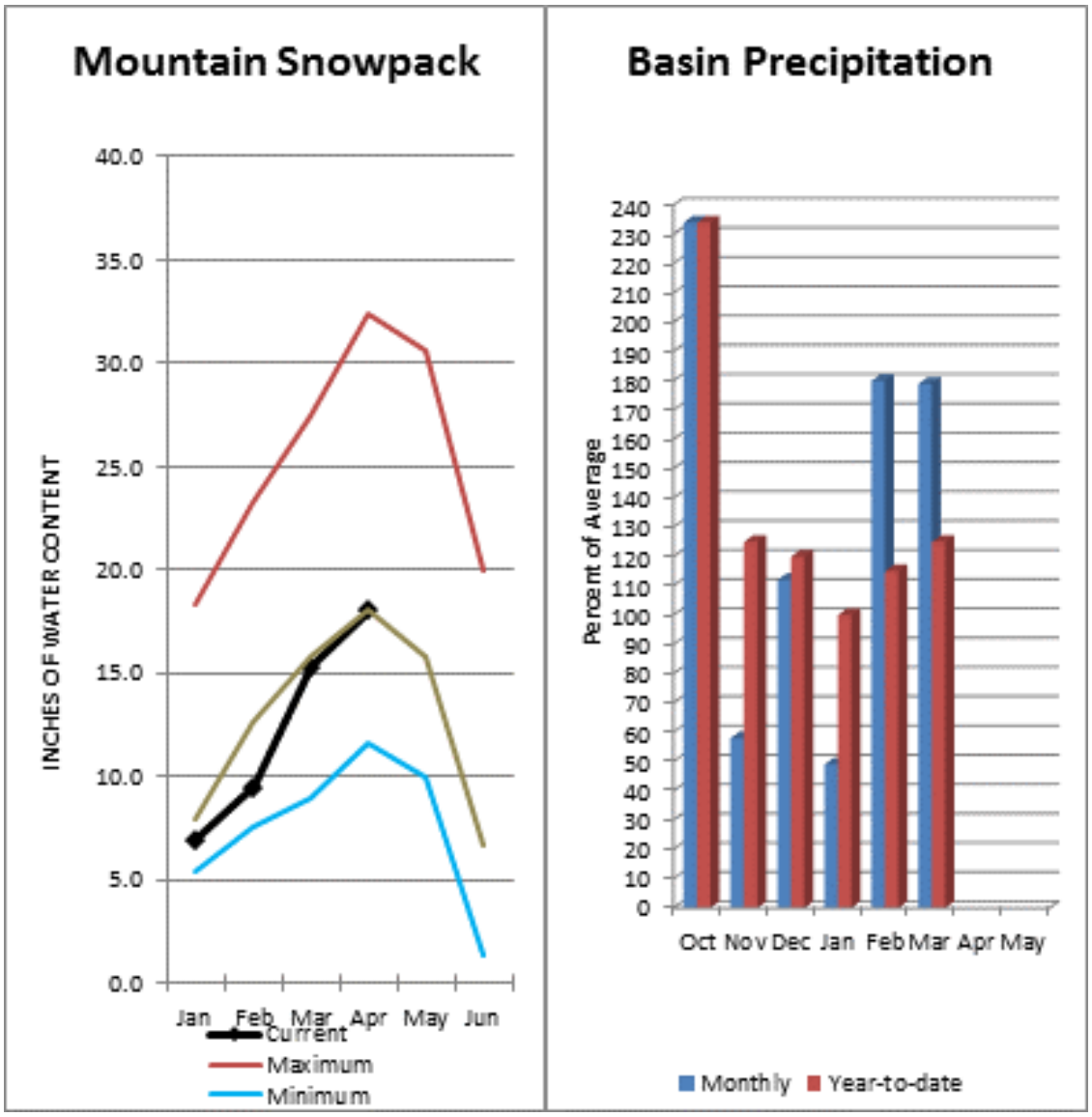
Spokane
Streamflow Forecasts - April 1, 2017

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	1950	2280	2510	105%	2730	3070	2390
	APR-SEP	2020	2360	2600	105%	2830	3170	2480
Spokane R at Long Lake[2]								
	APR-JUL	2120	2480	2730	104%	2980	3350	2620
	APR-SEP	2350	2730	2990	105%	3250	3630	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, 2017	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Lake Coeur d' Alene	463.6	181.3	165.5	238.5
Basin-wide Total	463.6	181.3	165.5	238.5
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis April 1, 2017	# of Sites	% Median	Last Year % Median
Spokane	16	97%	95%
Newman Lake	3	115%	120%



The April – September average forecast for the Priest River near the town of Priest River is 125% and the Pend Orielle below Box Canyon is 115%. March streamflow was 277% of average on the Pend Oreille River and 167% on the Columbia at Birchbank. April 1 snow cover was 100% of normal in the Pend Oreille Basin River Basin. Bunchgrass Meadows SNOTEL site had 25.3 inches of snow water on the snow pillow. Normally Bunchgrass would have 26.2 inches on April 1. Precipitation during March was 179% of average, boosting the year-to-date precipitation to 125% of average. Reservoir storage in the basin, including Lake Pend Oreille and Priest Lake was 132% of normal. Average temperatures were slightly below normal for March but 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, 2017

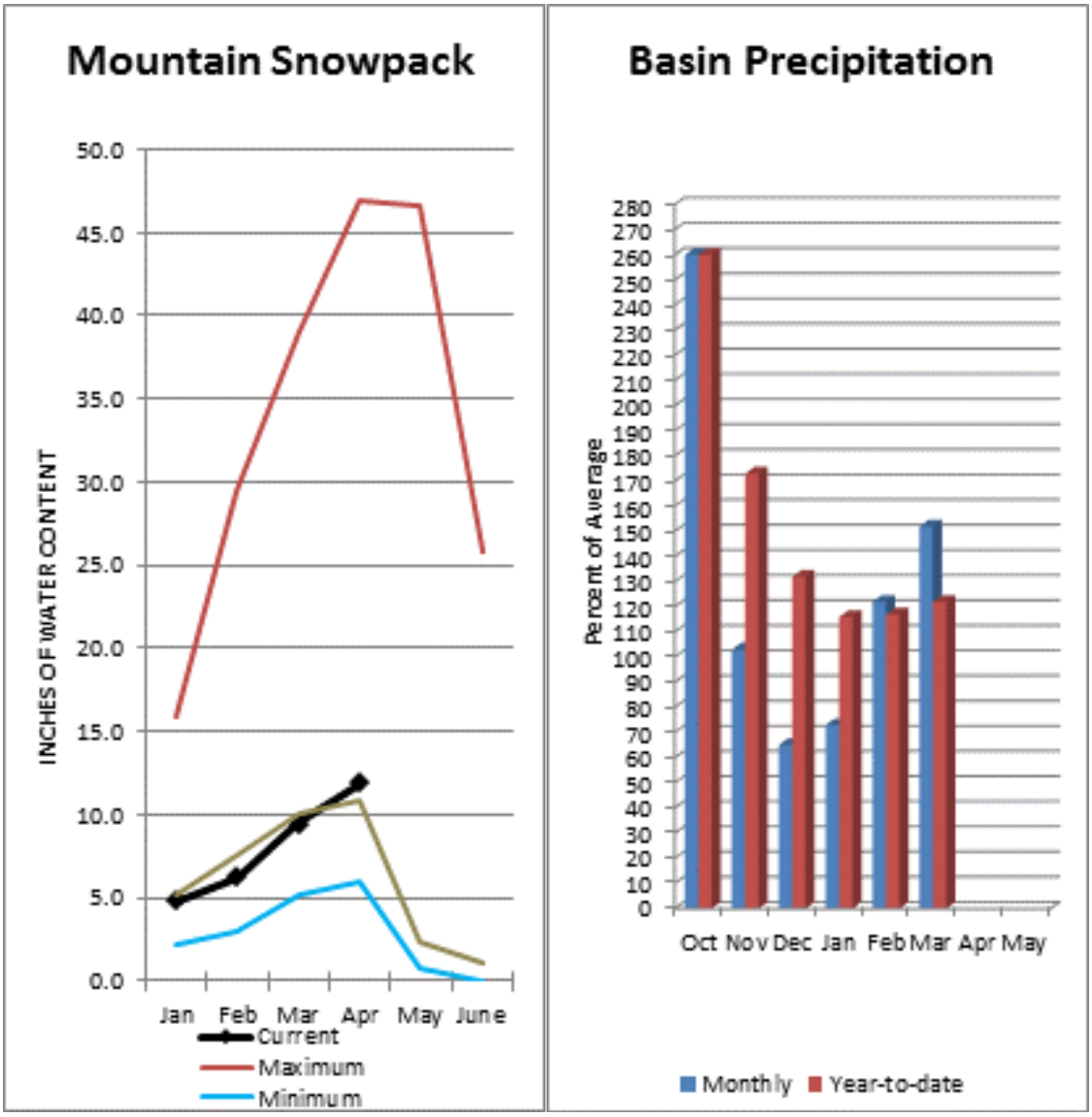
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

Pend Oreille Basins	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Pend Oreille Lake Inflow[2]								
	APR-JUL	12000	13000	13700	116%	14400	15500	11800
	APR-SEP	12900	14000	14800	116%	15700	16800	12800
Priest R nr Priest River[2]								
	APR-JUL	855	930	980	126%	1030	1110	780
	APR-SEP	895	980	1040	125%	1090	1180	830
Pend Oreille R bl Box Canyon[2]								
	APR-JUL	12100	13200	13900	117%	14600	15600	11900
	APR-SEP	13000	14200	15000	115%	15800	17000	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, 2017	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Lake Pend Oreille	1011.9	605.6	773.0	1561.3
Priest Lake	100.9	83.1	67.6	119.3
Basin-wide Total	1112.8	688.7	840.6	1680.6
# of reservoirs	2	2	2	2

Watershed Snowpack Analysis April 1, 2017	# of Sites	% Median	Last Year % Median
Pend Oreille Basins	71	100%	98%
Colville River	3	94%	108%
Kettle River	6	112%	147%



Summer runoff average forecast for the Okanogan River is 113%, Similkameen River is 103%, and Methow River is 124%. April 1 snow cover on the Okanogan was 110% of normal, Omak Creek was 114% and the Methow was 119%. March precipitation in the Upper Columbia was 152% of average, with precipitation for the water year at 122% of average. March streamflow for the Methow River was 102% of average, 93% for the Okanogan River and 95% for the Similkameen. Snow-water content at Salmon Meadows SNOTEL was 10.6 inches or 116% of normal for April 1. Combined storage in the Conconully Reservoirs was 18,800 acre-feet or 125% of normal. Temperatures were much below normal for March and slightly below normal for the water year.

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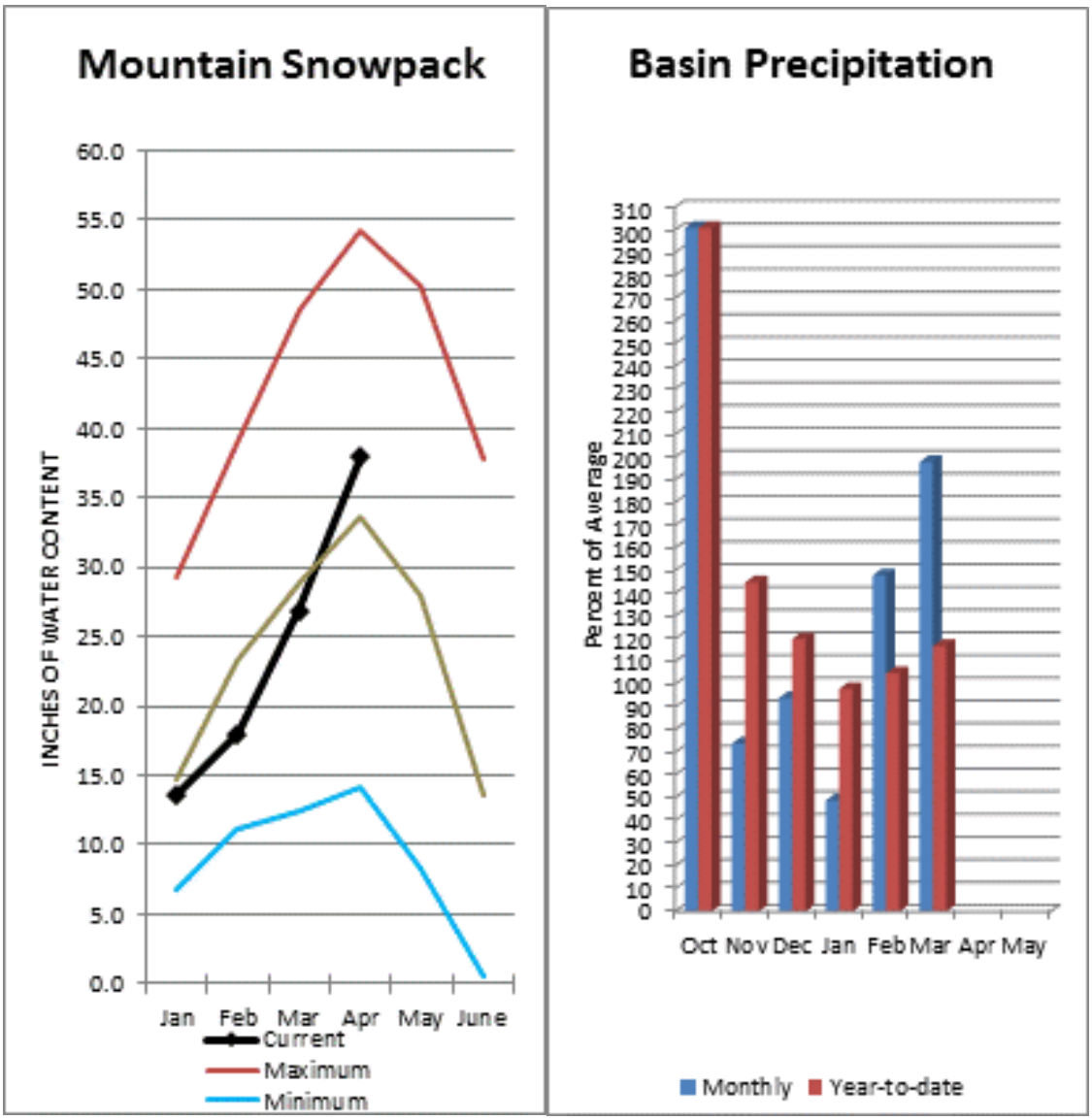
Upper Columbia Basins
Streamflow Forecasts - April 1, 2017

Upper 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						
Kettle R nr Laurier								
	APR-JUL	1630	1830	1960	109%	2090	2290	1800
	APR-SEP	1680	1890	2030	108%	2180	2390	1880
Colville R at Kettle Falls								
	APR-JUL	73	113	140	118%	167	205	119
	APR-SEP	87	131	160	122%	189	235	131
Columbia R at Grand Coulee[1,2]								
	APR-JUL	54400		58400	115%		65000	51000
	APR-SEP	64800		68700	114%		74400	60100
Similkameen R nr Nighthawk[1]								
	APR-JUL	1000	1140	1240	103%	1330	1480	1200
	APR-SEP	1070	1220	1320	103%	1420	1570	1280
Okanogan R nr Tonasket[1]								
	APR-JUL	1360	1550	1690	114%	1820	2020	1480
	APR-SEP	1490	1710	1870	113%	2030	2250	1650
Okanogan R at Malott[1]								
	APR-JUL	1380	1580	1720	119%	1860	2060	1450
	APR-SEP	1510	1740	1900	117%	2060	2300	1620
Methow R nr Pateros								
	APR-JUL	870	970	1040	125%	1110	1210	835
	APR-SEP	935	1040	1110	124%	1190	1290	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, 2017	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Conconully Lake (Salmon Lake Dam)	8.8	7.5	7.3	10.5
Conconully Reservoir	10.0	8.0	7.8	13.0
Basin-wide Total	18.8	15.5	15.1	23.5
# of reservoirs	2	2	2	2

Watershed Snowpack Analysis April 1, 2017	# of Sites	% Median	Last Year % Median
Upper Columbia Basins	24	110%	132%
Okanogan River	15	110%	140%
Omak Creek	1	114%	133%
Sanpoil River	0		
Similkameen River	5	96%	106%
Toats Coulee Creek	4	131%	171%
Conconully Lake	3	122%	144%
Methow River	5	119%	135%



Precipitation during March was 198% of average in the basin and 117% for the year-to-date. Runoff for Entiat River is forecast to be 105% of average for the summer. The April-September average forecast for Chelan River is 107%, Wenatchee River at Pashastin is 103%, Stehekin River is 107% and Icicle Creek is 103%. March average streamflow on the Chelan River was 109% and on the Wenatchee River 116%. April 1 snowpack in the Wenatchee River Basin was 113% of normal; the Chelan, 110%; the Entiat, 104%; Stemilt Creek, 109% and Colockum Creek, 188%. Reservoir storage in Lake Chelan was not available. Lyman Lake SNOTEL had the most snow water with 64.8 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, 2017

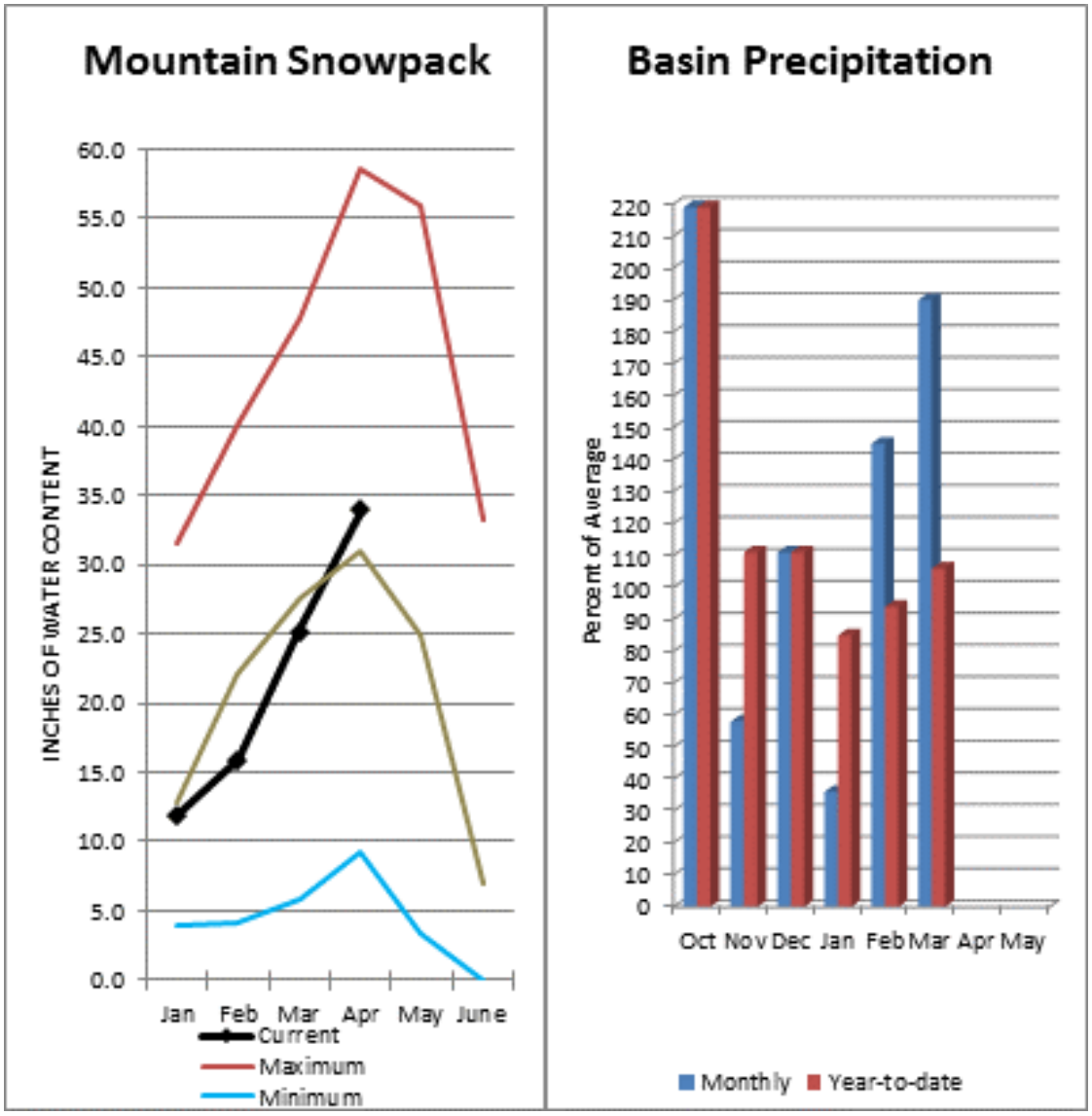
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

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	630	690	730	107%	765	825	680
	APR-SEP	745	805	845	107%	885	940	790
Chelan R at Chelan								
	APR-JUL	945	1020	1070	107%	1120	1190	1000
	APR-SEP	1060	1140	1200	107%	1250	1340	1120
Entiat R nr Ardenvoir								
	APR-JUL	176	197	210	105%	225	245	200
	APR-SEP	190	215	230	105%	245	270	220
Wenatchee R at Plain								
	APR-JUL	895	975	1030	104%	1090	1170	990
	APR-SEP	970	1060	1130	105%	1190	1280	1080
Icicle Ck nr Leavenworth								
	APR-JUL	235	265	285	104%	305	335	275
	APR-SEP	255	290	310	103%	335	365	300
Wenatchee R at Peshastin								
	APR-JUL	1240	1340	1410	103%	1480	1580	1370
	APR-SEP	1340	1460	1540	103%	1610	1730	1490
Columbia R bl Rock Island Dam[2]								
	APR-JUL	59300		63500	114%		71100	55800
	APR-SEP	69800		74500	114%		80500	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, 2017	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Lake Chelan		283.6	256.1	676.1
Basin-wide Total		0.0	0.0	0.0
# of reservoirs	0	0	0	0

Watershed Snowpack Analysis April 1, 2017	# of Sites	% Median	Last Year % Median
Central Columbia Basins	3	110%	119%
Chelan Lake Basin	3	110%	119%
Entiat River	1	104%	94%
Wenatchee River	7	113%	108%
Stemilt Creek	1	109%	116%
Colockum Creek	1	188%	205%



April 1 reservoir storage for the Upper Yakima reservoirs was 473,000-acre feet, 92% of average. Forecasts for the Yakima River at Cle Elum are 100% of average and the Teanaway River near Cle Elum is at 102%. Lake inflows are all forecasted to be near normal this summer as well. March streamflow within the basin was Cle Elum River near Roslyn at 146%. April 1 snowpack was 110% based upon 9 snow course and SNOTEL readings within the Upper Yakima Basin. Precipitation was 190% of average for March and 106% 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.

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

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Upper Yakima River
Streamflow Forecasts - April 1, 2017

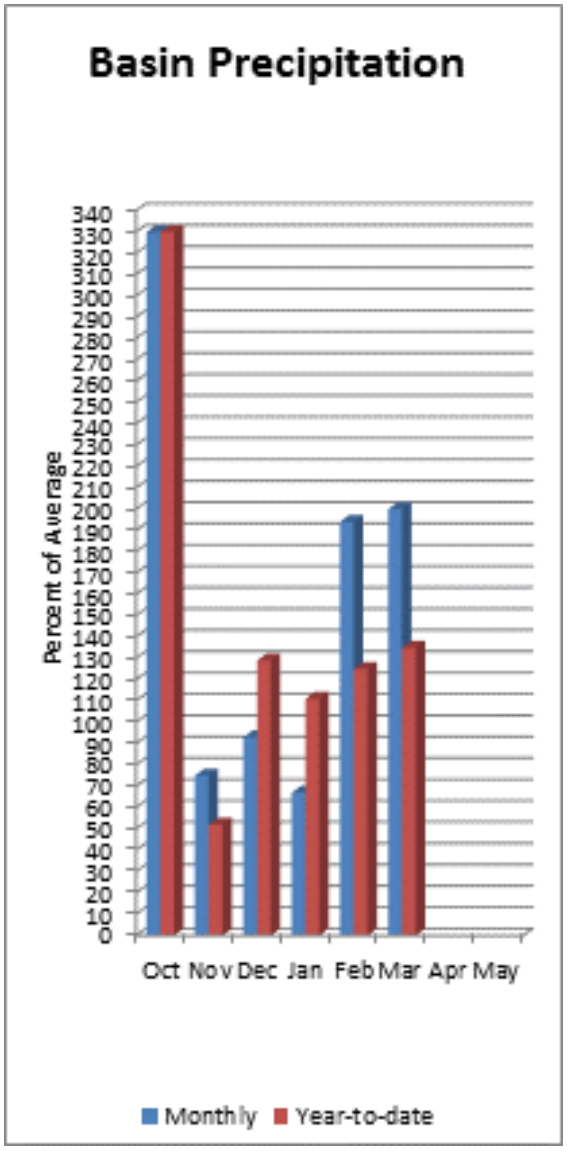
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

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	98	111	120	103%	129	142	116
	APR-SEP	106	121	131	104%	140	155	126
Kachess Reservoir Inflow [2]								
	APR-JUL	90	100	106	102%	113	123	104
	APR-SEP	98	108	115	102%	122	132	113
Cle Elum Lake Inflow [2]								
	APR-JUL	345	370	390	101%	410	435	385
	APR-SEP	375	400	425	102%	445	475	415
Yakima R at Cle Elum [2]								
	APR-JUL	630	705	755	100%	805	880	755
	APR-SEP	690	775	830	100%	885	965	830
Teanaway R bl Forks nr Cle Elum								
	APR-JUL	101	120	134	103%	147	167	130
	APR-SEP	103	123	136	102%	150	170	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, 2017	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Keechelus	96.0	145.0	106.3	157.8
Kachess	152.3	172.9	159.8	239.0
Cle Elum	224.6	346.3	246.3	436.9
Basin-wide Total	472.8	664.2	512.4	833.7
# of reservoirs	3	3	3	3

Watershed Snowpack Analysis April 1, 2017	# of Sites	% Median	Last Year % Median
Upper Yakima River	9	110%	103%



March average streamflows within the basin were: Yakima River near Parker, 175% and the Naches River near Naches, 225%. April 1 reservoir storage for Bumping and Rimrock reservoirs was 196,000-acre feet, 130% of average. Forecast averages for Yakima River near Parker are 112%; American River near Nile, 116%; Ahtanum Creek, 131%; and Klickitat River near Glenwood, 117%. April 1 snowpack was 108% based upon 7 snow course and SNOTEL readings within the Lower Yakima Basin and Ahtanum Creek reported in at 102% of normal. Precipitation was 200% of average for March and 135% for the water-year. Temperatures were above normal for March 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.

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

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Lower Yakima River
Streamflow Forecasts - April 1, 2017

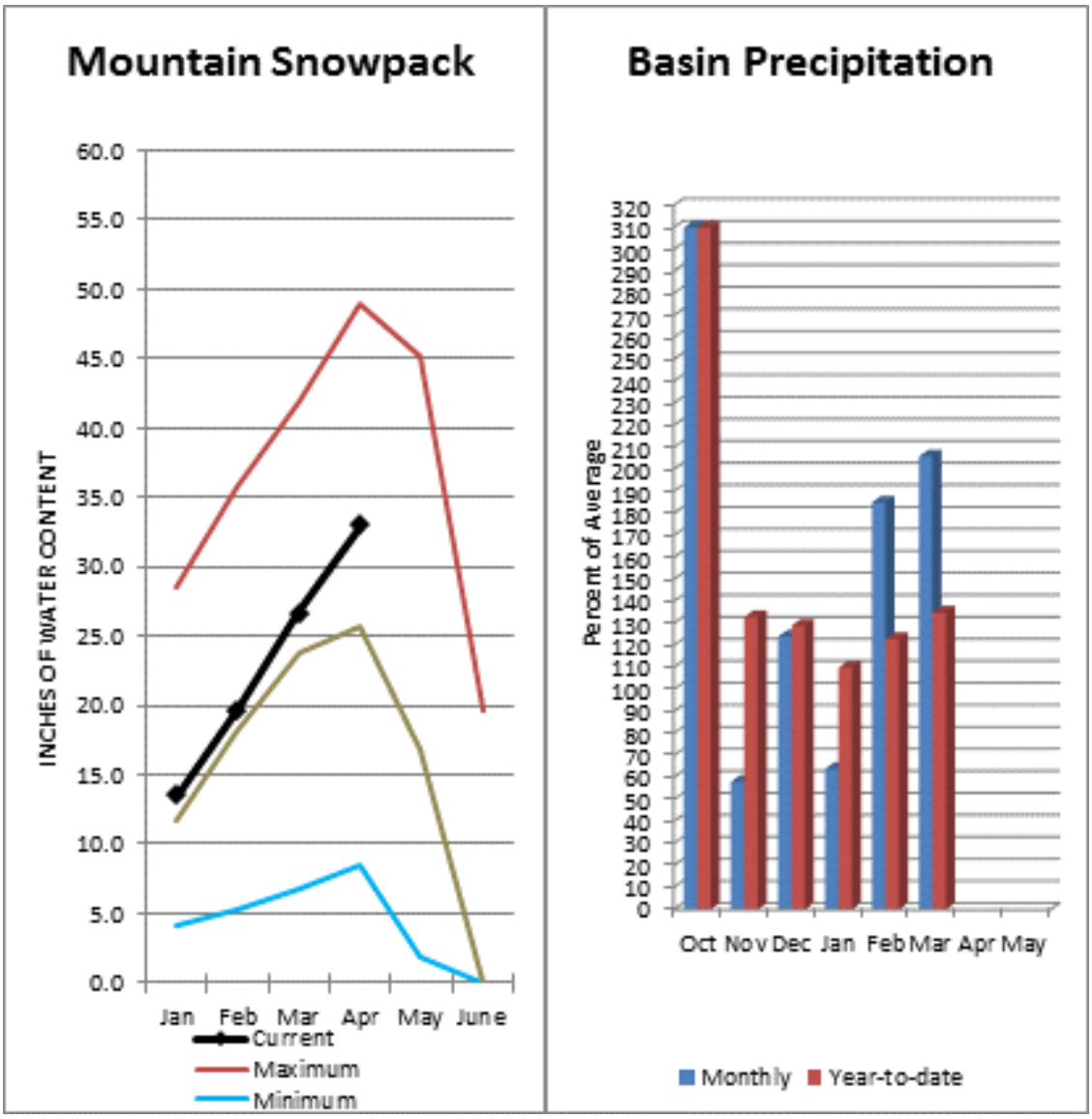
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

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	112	123	131	115%	138	150	114
	APR-SEP	122	134	143	116%	151	163	123
American R nr Nile								
	APR-JUL	101	111	118	116%	125	135	102
	APR-SEP	108	120	128	116%	136	148	110
Rimrock Lake Inflow [2]								
	APR-JUL	190	205	215	115%	225	240	187
	APR-SEP	225	240	250	114%	265	280	220
Naches R nr Naches								
	APR-JUL	695	785	845	121%	905	995	700
	APR-SEP	750	850	920	121%	990	1090	760
Ahtanum Ck at Union Gap								
	APR-JUL	23	31	35	130%	40	47	27
	APR-SEP	26	33	38	131%	43	50	29
Yakima R nr Parker [2]								
	APR-JUL	1570	1740	1850	111%	1970	2140	1660
	APR-SEP	1720	1900	2030	112%	2150	2330	1820
Klickitat R nr Glenwood								
	APR-JUL	123	138	148	117%	158	173	126
	APR-SEP	136	152	162	117%	173	189	139
Klickitat R nr Pitt								
	APR-JUL	430	480	520	120%	555	610	435
	APR-SEP	515	575	620	119%	660	725	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, 2017	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Bumping Lake	22.9	17.5	14.6	33.7
Rimrock	173.1	178.6	136.6	198.0
Basin-wide Total	196.0	196.0	151.2	231.7
# of reservoirs	2	2	2	2

Watershed Snowpack Analysis April 1, 2017	# of Sites	% Median	Last Year % Median
Lower Yakima River	7	108%	117%
Ahtanum Creek	2	102%	122%



March precipitation was 206% of average, maintaining the year-to-date precipitation at 135% of average. Snowpack in the basin was 129% of normal. Streamflow forecasts are 122% of average for Mill Creek and 127% for the SF Walla Walla near Milton-Freewater. Average temperatures were slightly below normal for March and slightly below normal for the water year.

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

Data Current as of: 4/5/2017 4:23:22 PM

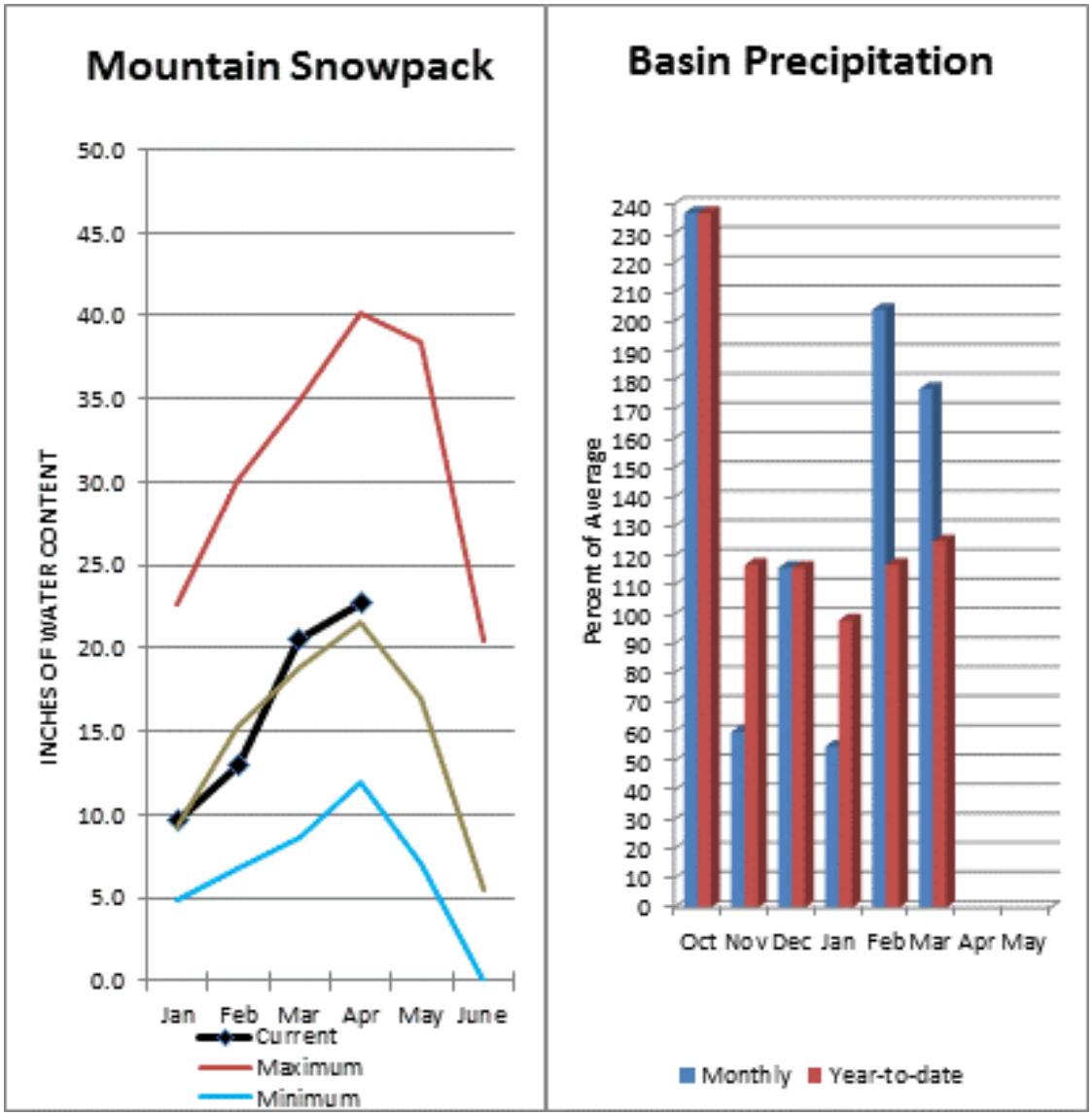
Walla Walla River
Streamflow Forecasts - April 1, 2017

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	58	65	70	130%	75	82	54
	APR-SEP	71	78	84	127%	89	96	66
Mill Ck nr Walla Walla								
	APR-JUL	24	27	29	121%	32	35	24
	APR-SEP	27	31	33	122%	35	39	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, 2017	# of Sites	% Median	Last Year % Median
Walla Walla River	2	129%	127%



The Snake River below Lower Granit Dam can expect summer flows to be about 140% of normal. The forecast for Asotin Creek at Asotin predicts 126% of average flows for the April – July runoff period. March precipitation was 177% of average, bringing the year-to-date precipitation to 125% of average. April 1 snowpack readings averaged 105% of normal. March streamflow was 254% of average for Snake River below Lower Granite Dam and 271% for Grande Ronde River near Troy. Dworshak Reservoir storage was 97% of average. Average temperatures were slightly below normal for March and slightly below normal for the water year.

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

Data Current as of: 4/5/2017 4:23:24 PM

Lower Snake, Grande Ronde, Clearwater Basins
Streamflow Forecasts - April 1, 2017

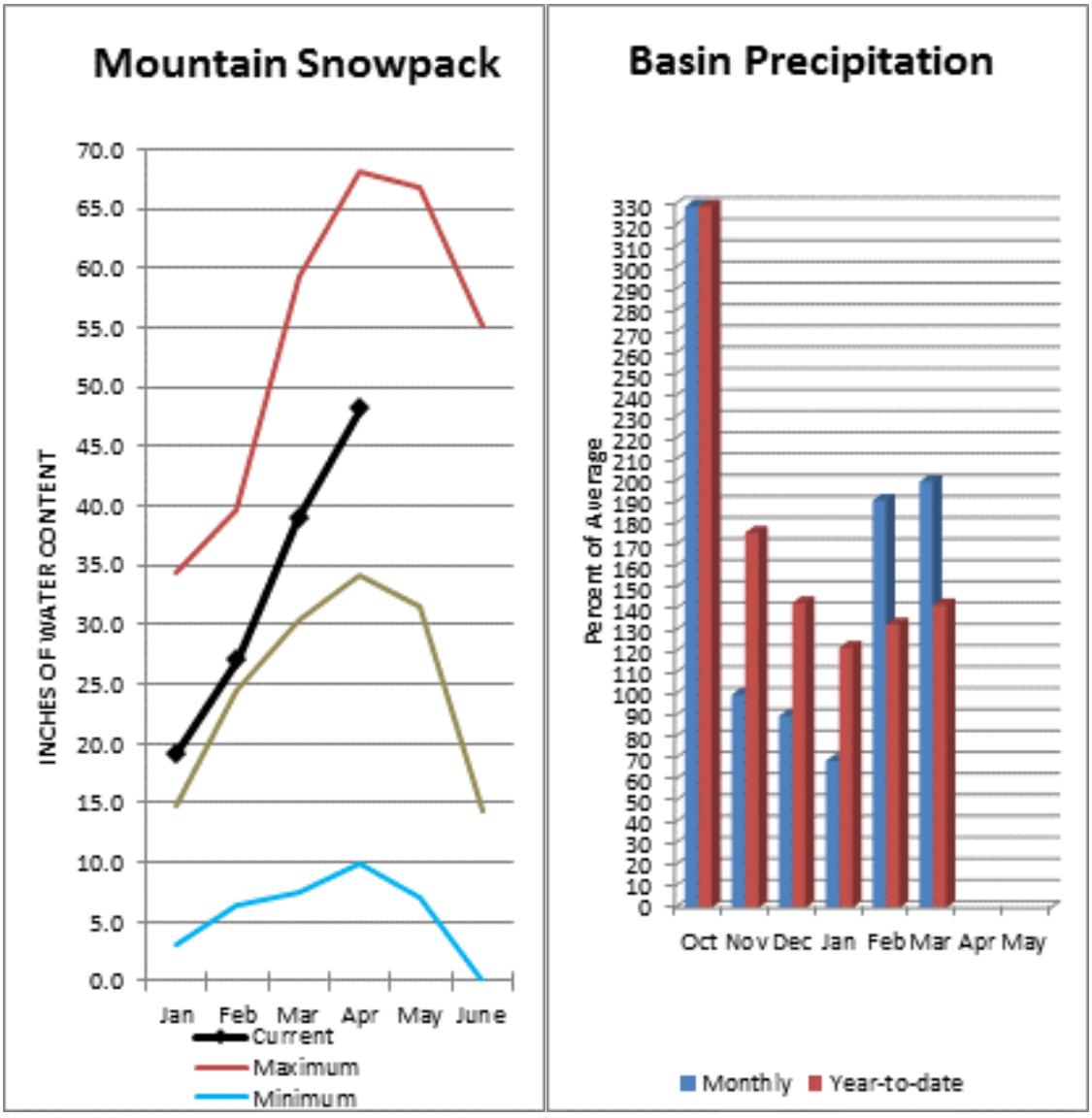
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

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	1160	1350	1480	121%	1610	1790	1220
	APR-SEP	1260	1450	1580	121%	1710	1900	1310
Asotin Ck at Asotin								
	APR-JUL	31	39	44	126%	49	56	35
Clearwater R at Spalding[2]								
	APR-JUL	6590	7360	7890	115%	8410	9180	6890
	APR-SEP	6930	7740	8290	114%	8840	9660	7270
Snake R bl Lower Granite Dam[12]								

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, 2017	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Dworshak Reservoir	2336.9	2918.4	2417.0	3468.0
Basin-wide Total	2336.9	2918.4	2417.0	3468.0
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis April 1, 2017	# of Sites	% Median	Last Year % Median
Lower Snake, Grande Ronde, Clearwater Basins	14	105%	107%



Forecasts for April – September streamflows within the basin are Lewis River at Ariel, 117% and Cowlitz River at Castle Rock, 123% of average. The Columbia at The Dalles is forecasted to have 120% of average flows this summer according to the River Forecast Center. March average streamflow for Cowlitz River was 195%. The Columbia River at The Dalles was 225% of average. March precipitation was 200% of average and the water-year average was 142%. April 1 snow cover for Cowlitz River was 120%, and Lewis River was 161% of normal. Temperatures were below normal during March but near average for the water year.

Data Current as of: 4/5/2017 4:23:27 PM

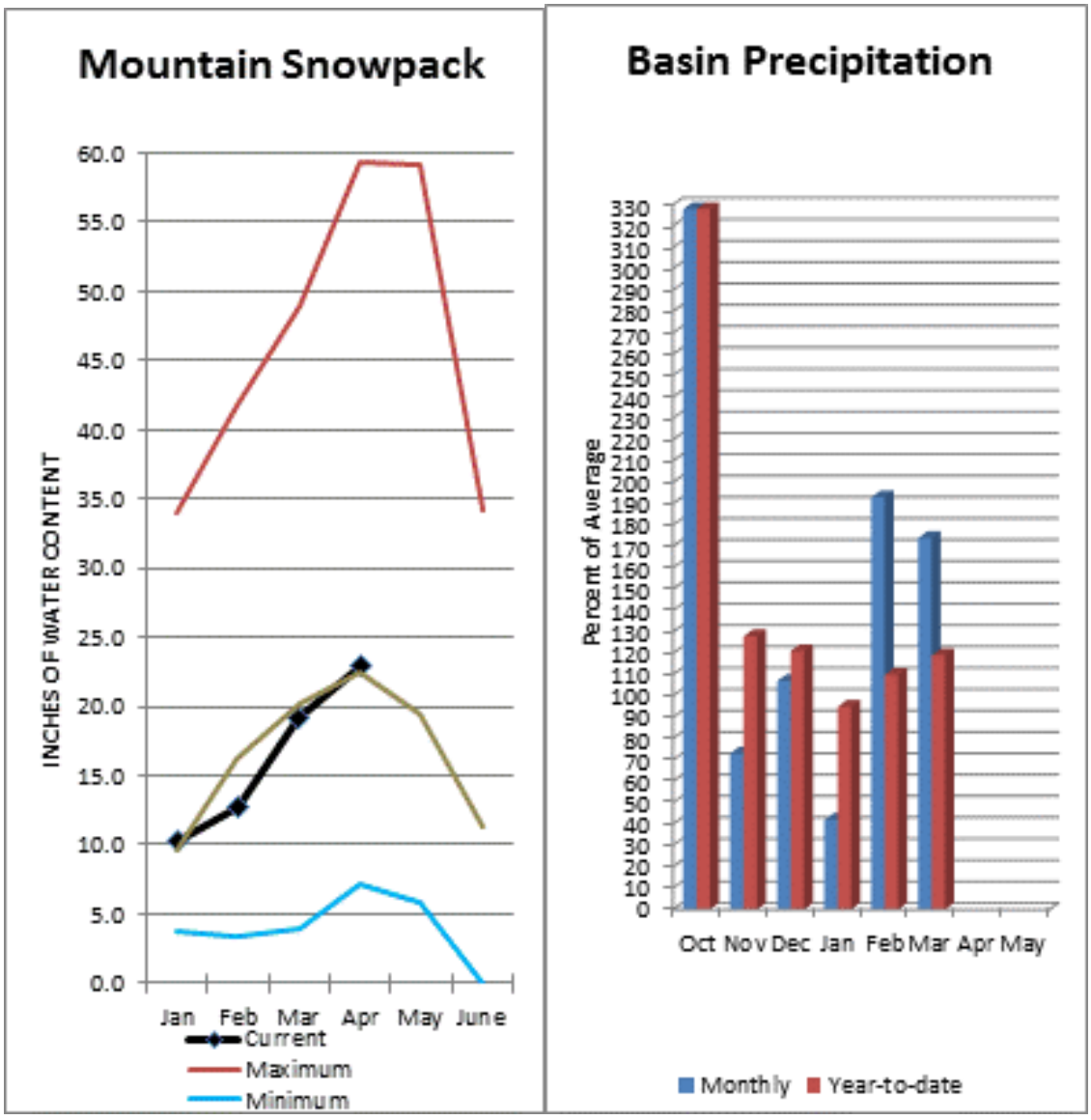
Lower Columbia Basins
Streamflow Forecasts - April 1, 2017

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[2]								
	APR-JUL	90700		96700	121%		107000	79900
	APR-SEP	105000		111000	120%		120000	92700
Klickitat R nr Glenwood								
	APR-JUL	123	138	148	117%	158	173	126
	APR-SEP	136	152	162	117%	173	189	139
Klickitat R nr Pitt								
	APR-JUL	430	480	520	120%	555	610	435
	APR-SEP	515	575	620	119%	660	725	520
Lewis R at Ariel[2]								
	APR-JUL	885	1050	1170	121%	1290	1450	970
	APR-SEP	1020	1190	1310	117%	1430	1610	1120
Cowlitz R bl Mayfiled[2]								
	APR-JUL	1660	1870	2010	124%	2150	2360	1620
	APR-SEP	1880	2110	2260	123%	2420	2640	1840
Cowlitz R at Castle Rock[2]								
	APR-JUL	2120	2420	2620	117%	2820	3120	2230
	APR-SEP	2400	2710	2920	116%	3140	3450	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, 2017	# of Sites	% Median	Last Year % Median
Lower Columbia Basins	11	141%	116%
Lewis River	5	161%	118%
Cowlitz River	6	120%	114%



Summer runoff is forecast to be 104% of normal for the Green River below Howard Hanson Dam and 108% for the White River near Buckley. April 1 snowpack was 96% of average for the White River, 103% for Puyallup River and 109% in the Green River Basin. March precipitation was 174% of average, bringing the water year-to-date to 119% of average for the basins. Average temperatures in the area were slightly below normal for March but 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, 2017

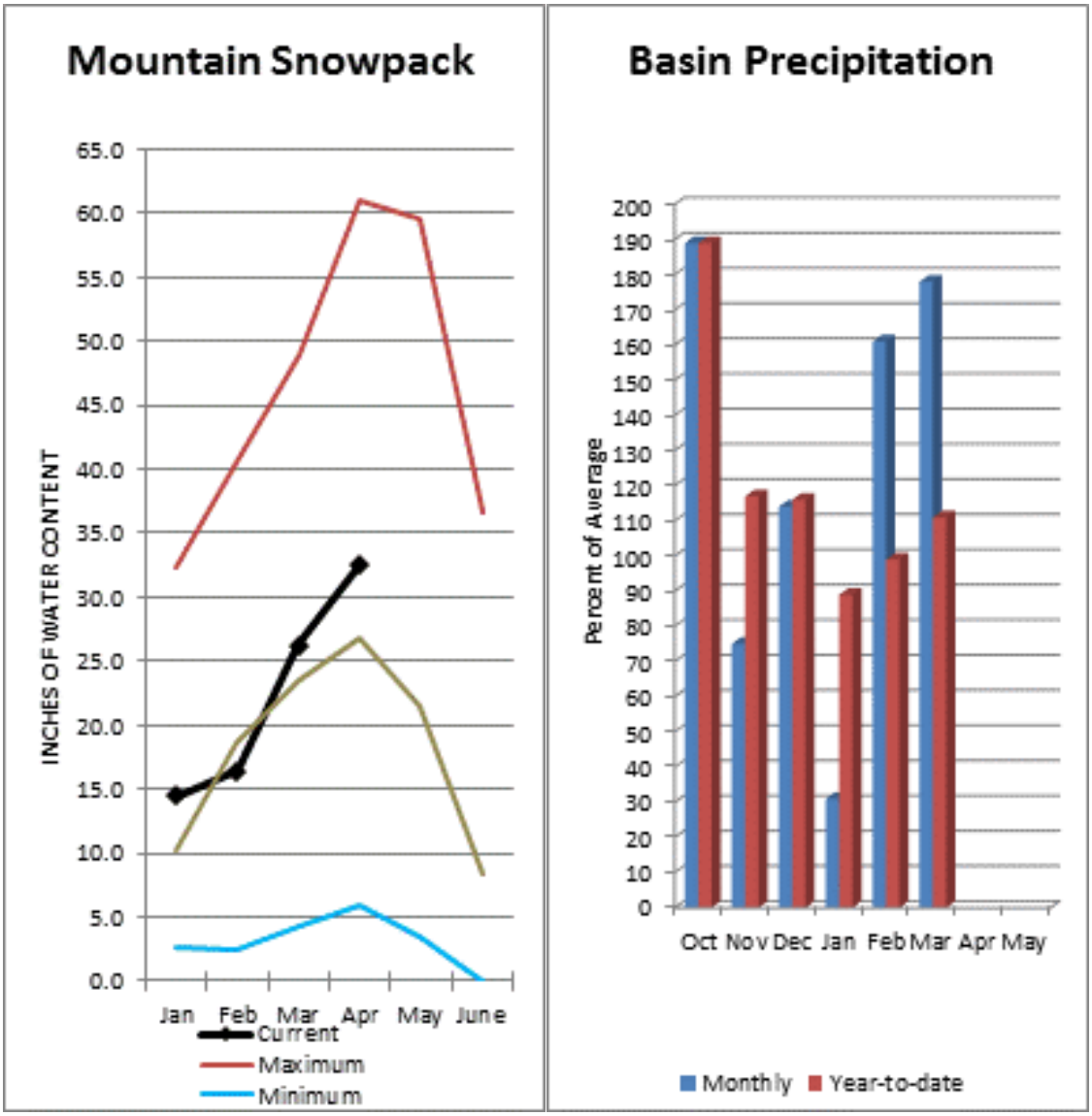
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

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	355	430	460	107%	495	570	430
	APR-SEP	430	515	555	108%	590	675	515
Green R bl Howard A Hanson Dam[1,2]								
	APR-JUL	175	225	245	104%	270	315	235
	APR-SEP	193	245	270	104%	290	345	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, 2017	# of Sites	% Median	Last Year % Median
South Puget Sound Basins	10	102%	103%
White River	3	96%	109%
Green River	2	109%	87%

Central Puget Sound River Basins



Forecast for spring and summer flows are: 113% for Cedar River near Cedar Falls; 115% for Rex River; 121% for South Fork of the Tolt River; and 104% for Taylor Creek near Selleck. Basin-wide precipitation for March was 178% of average, bringing water-year-to-date to 111% of average. April 1 median snow cover in Cedar River Basin was 130%, Tolt River Basin was 128%, Snoqualmie River Basin was 118%, and Skykomish River Basin was 121%. 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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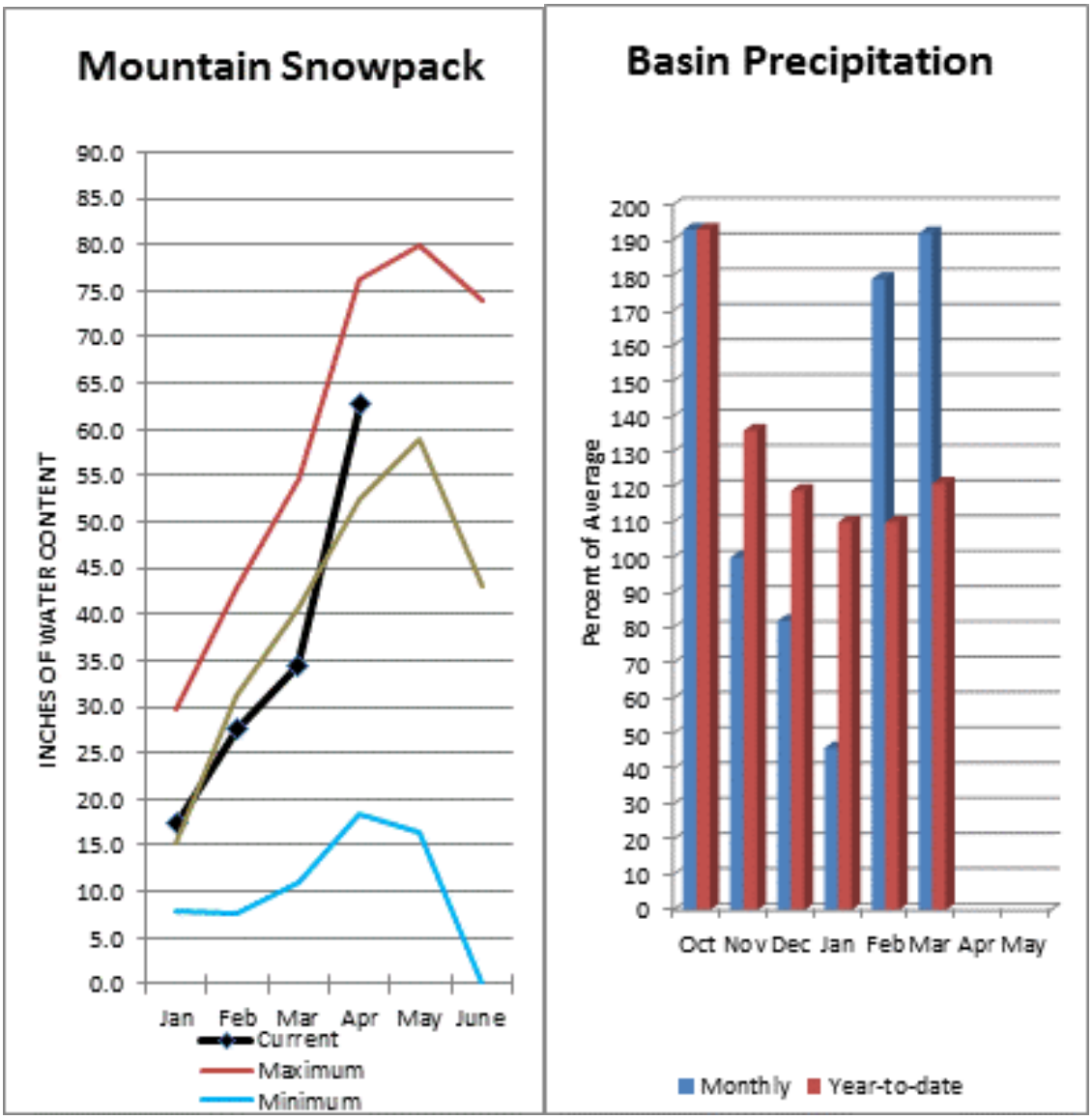
Central Puget Sound Basins
Streamflow Forecasts - April 1, 2017

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	65	73	79	113%	84	92	70
	APR-SEP	71	79	86	113%	92	100	76
Rex R nr Cedar Falls								
	APR-JUL	22	25	28	117%	31	35	24
	APR-SEP	24	28	31	115%	33	38	27
Taylor Ck nr Selleck								
	APR-JUL	17	19.5	21	105%	23	25	20
	APR-SEP	20	23	25	104%	27	30	24
SF Tolt R nr Index								
	APR-JUL	13.7	15.8	17.2	121%	18.6	21	14.2
	APR-SEP	15.3	17.8	19.5	121%	21	24	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, 2017	# of Sites	% Median	Last Year % Median
Central Puget Sound Basins	14	122%	95%
Puyallup River	5	103%	106%
Cedar River	5	130%	112%
Tolt River	3	128%	77%
Snoqualimie River	5	118%	88%
Skykomish River	3	121%	80%



Forecast for Skagit River streamflow at Newhalem is 117% of average for the spring and summer period. March streamflow in Skagit River was 183% of average. Other forecast points included Baker River at 106% and Thunder Creek at 100% of average. Basin-wide precipitation for March was 192% of average, bringing water-year-to-date to 121% of average. April 1 average snow cover in Skagit River Basin was 122%, the Nooksack River Basin was 112% and the Baker River Basin was 115%. April 1 Skagit River reservoir storage was 62% of average and 32% of capacity. Average temperatures were much below normal for April and slightly below normal 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 - April 1, 2017

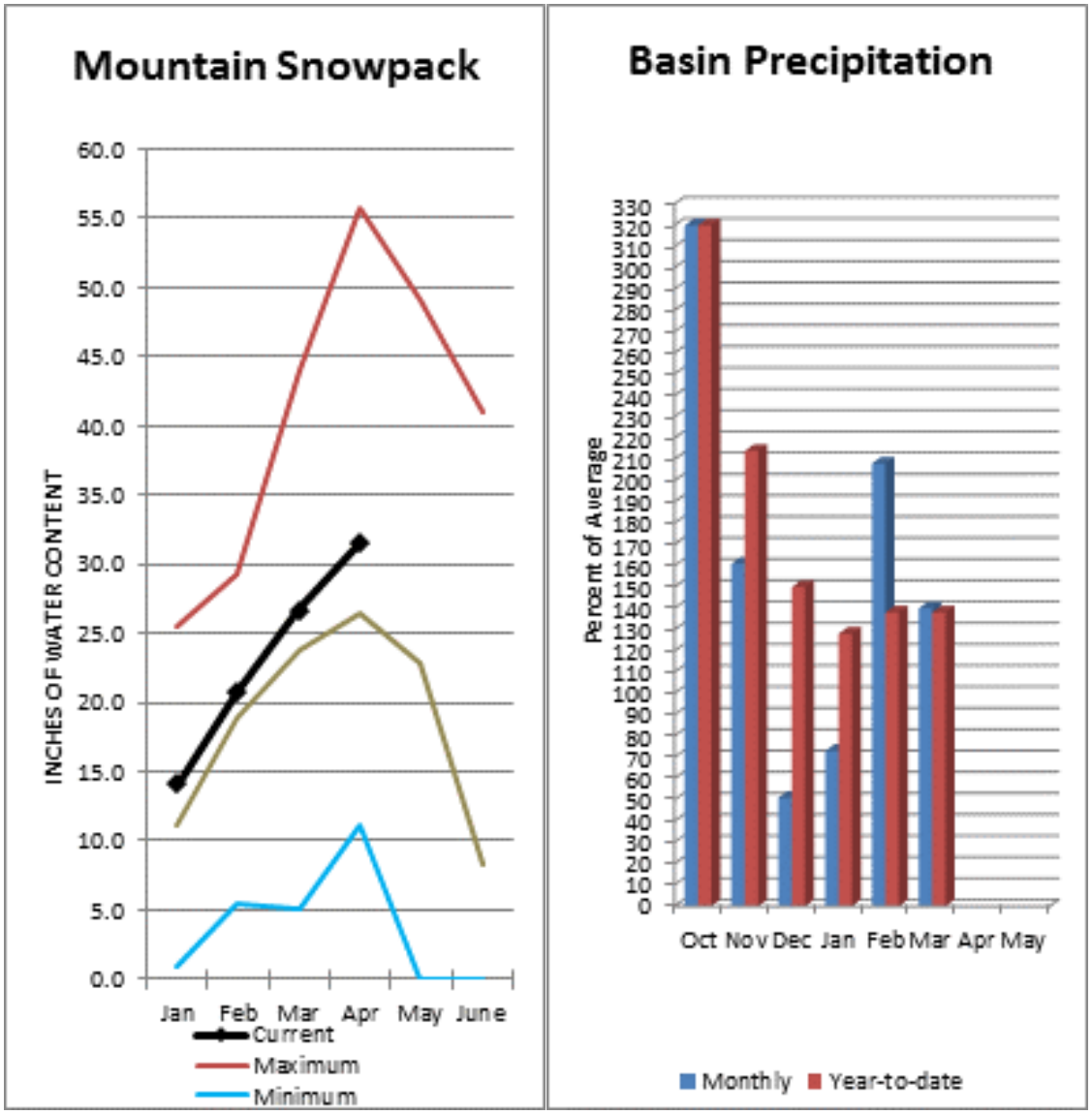
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

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	265	235
	APR-SEP	295	315	330	100%	345	365	330
Skagit R at Newhalem[2]								
	APR-JUL	1850	1960	2030	121%	2100	2210	1680
	APR-SEP	2170	2290	2380	117%	2460	2590	2030
Baker R at Concrete								
	APR-JUL	665	750	810	104%	865	950	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, 2017	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Ross	456.2	466.8	730.5	1404.1
Diablo Reservoir			86.0	90.6
Basin-wide Total	456.2	466.8	730.5	1404.1
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis April 1, 2017	# of Sites	% Median	Last Year % Median
North Puget Sound Basins	24	118%	105%
Skagit River	15	122%	111%
Baker River	6	115%	103%
Nooksack River	3	112%	91%



Forecasted average runoff for streamflow for the Dungeness River is 108% and Elwha River is 109% March runoff in the Dungeness River was 154% of normal. Big Quilcene and Wynoochee rivers may expect near average runoff this summer as well. March precipitation was 140% of average. Precipitation has accumulated at 138% of average for the water year. March precipitation at Quillayute was 212% of normal. Olympic Peninsula snowpack averaged 119% of normal on April 1. Temperatures were slightly 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: 4/5/2017 4:23:37 PM

Olympic Penninsula
Streamflow Forecasts - April 1, 2017

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	105	119	128	107%	138	151	120
	APR-SEP	127	144	156	108%	168	185	145
Elwha R at McDonald Bridge nr Port Angeles								
	APR-JUL	370	410	435	109%	460	500	400
	APR-SEP	430	480	510	109%	545	595	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, 2017	# of Sites	% Median	Last Year % Median
Olympic Penninsula	6	119%	108%

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
	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
	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

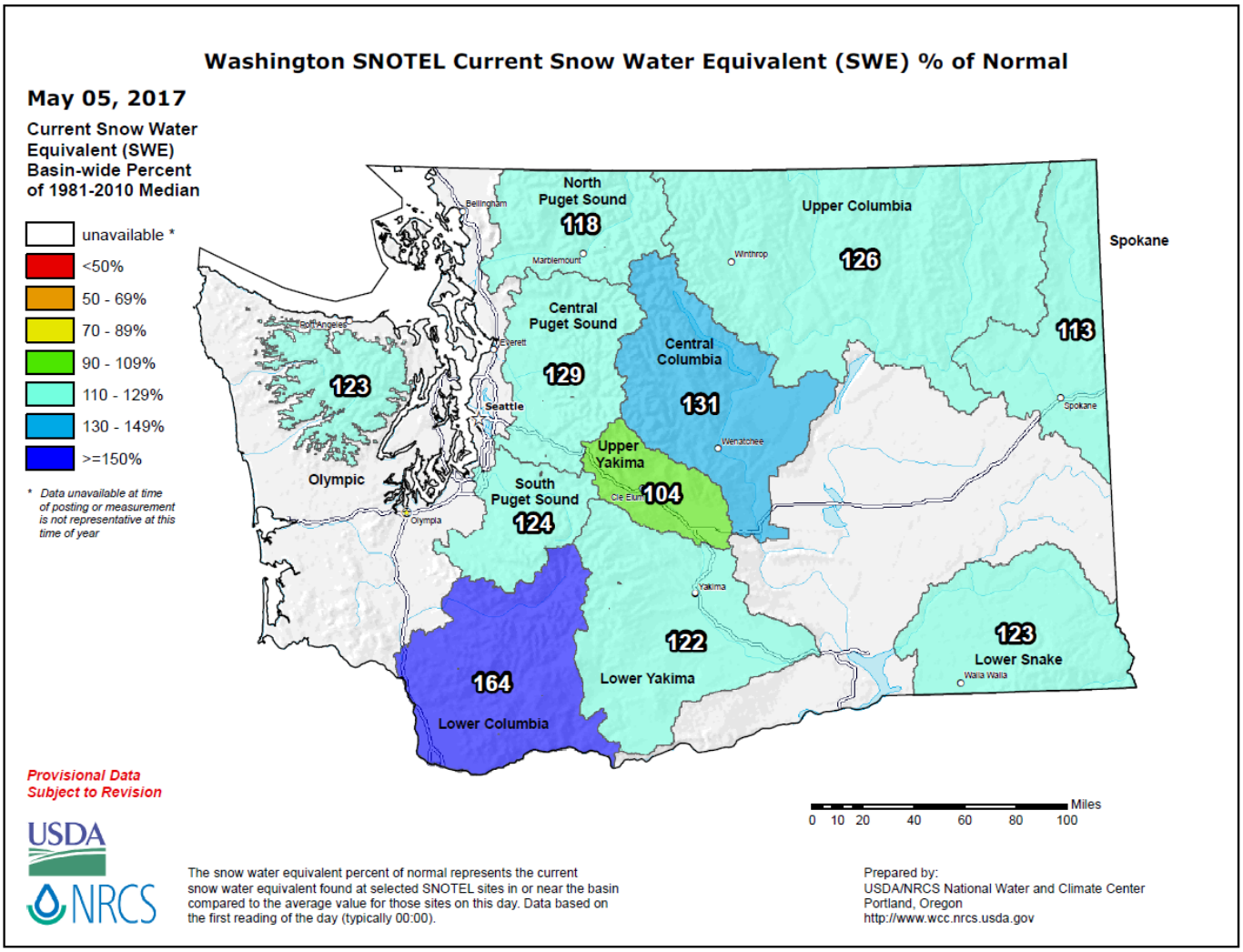
Washington Water Supply Outlook Report

Natural Resources Conservation Service
Spokane, WA

United States Department of Agriculture

NRCS Natural Resources Conservation Service

Washington
Water Supply Outlook Report
May 1, 2017



A stellar snowpack promises to provide ample water supplies throughout the state this year.

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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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 2017

General Outlook

As the rain sodden pattern continued through April we were fortunate enough to maintain a very healthy snowpack. As we transition into spring and then summer it is pretty obvious that we will have abundant water for all uses this year. After two sketchy years water managers should be able to relax and enjoy the summer. Rafting and fishing should also be at its best. The only complaint thus far has been too much water and not enough sun shine but those should both be remedied shortly. Short term weather forecasts call for a continuation of below normal temperatures and above normal precipitation for the next few weeks. However the latest NWS 3-month outlook is for equal chances of above, below or near normal precipitation but above normal temperatures for the PNW. http://www.cpc.ncep.noaa.gov/

Snowpack

The May 1 statewide SNOTEL readings were 140% of normal, up from 121% last month. Pope Ridge SNOTEL in the Entiat reported the lowest snowpack at 94% of the 30-year median for May 1. The Lewis River Basin retained the crown reporting in with the most snow at 192%. Westside medians from SNOTEL, and May 1 snow surveys, included the North Puget Sound river basins with 120% of normal, the Central and South Puget river basins with 141% and 119% respectively, and the Lower Columbia basins with 166% of normal. Snowpack along the east slopes of the Cascade Mountains included the Yakima area with 116% and the Wenatchee area with 125%. Snowpack in the Spokane River Basin was at 114% and the Walla Walla River Basin had 177% of the long term median.

BASIN	PERCENT OF MEDIAN	LAST YEAR PERCENT MEDIAN
Spokane	114	51
Newman Lake	96	0
Pend Oreille	116	70
Okanogan	146	90
Methow	138	98
Central Columbia	125	74
Upper Yakima	110	65
Lower Yakima	123	80
Ahtanum Creek	125	55
Walla Walla	177	76
Lower Snake	127	74
Cowlitz	141	95
Lewis	192	89
White	113	87
Green	123	55
Puyallup	123	79
Cedar	167	72
Snoqualmie	131	58
Skykomish	130	59
Skagit	123	92
Nooksack	116	55
Olympic Peninsula	135	75

Precipitation

Washington State received much above normal precipitation for the month of April bringing all year to date averages above normal. The highest percent of average rain fall fell in the Conconully Lake area with 238% of normal at Salmon Meadows SNOTEL. The lowest was in the Upper Yakima and Green River at 104%. As usual the wettest area in the state was around Mt. St. Helens with Swift Creek SNOTEL recording 19.1 inches, or 163% of average.

RIVER BASIN	APRIL PERCENT OF AVERAGE	WATER YEAR PERCENT OF AVERAGE
Spokane	135	132
Pend Oreille	118	124
Upper Columbia	160	125
Central Columbia	139	119
Upper Yakima	104	106
Lower Yakima	151	137
Walla Walla	114	133
Lower Snake	143	127
Lower Columbia	152	143
South Puget Sound	126	120
Central Puget Sound	122	112
North Puget Sound	131	122
Olympic Peninsula	163	140

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 473,000-acre feet, 92% of average for the Upper Reaches and 196,000-acre feet or 130% of average for Rimrock and Bumping Lakes. The power generation reservoirs included the following: Coeur d'Alene Lake, 464,000 acre feet, 280% of average and 194% of capacity; and the Skagit River reservoirs at 62% of average and 32% 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	104	109
Pend Oreille	63	103
Upper Columbia	91	130
Central Columbia	N/A	N/A
Upper Yakima	68	93
Lower Yakima	85	111
Lower Snake	66	87
North Puget Sound	31	57

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

Streamflow

Due to above average precipitation and below normal temperatures in April streamflow forecasts for May thru September have seen significant increases in all basins from last month. Forecasts for some Western Washington streams include the Cedar River near Cedar Falls, 113%; White River, 112%; and Skagit River, 111%. Some Eastern Washington streams include the Yakima River near Parker 114%, Wenatchee River at Pashastin 106%; and Spokane River near Post Falls 120%. 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	120-134
Pend Oreille	130-146
Upper Columbia	114-147
Central Columbia	106-117
Upper Yakima	99-103
Lower Yakima	114-157
Walla Walla	121-133
Lower Snake	117-142
Lower Columbia	120-140
South Puget Sound	102-112
Central Puget Sound	105-128
North Puget Sound	102-111
Olympic Peninsula	111-113

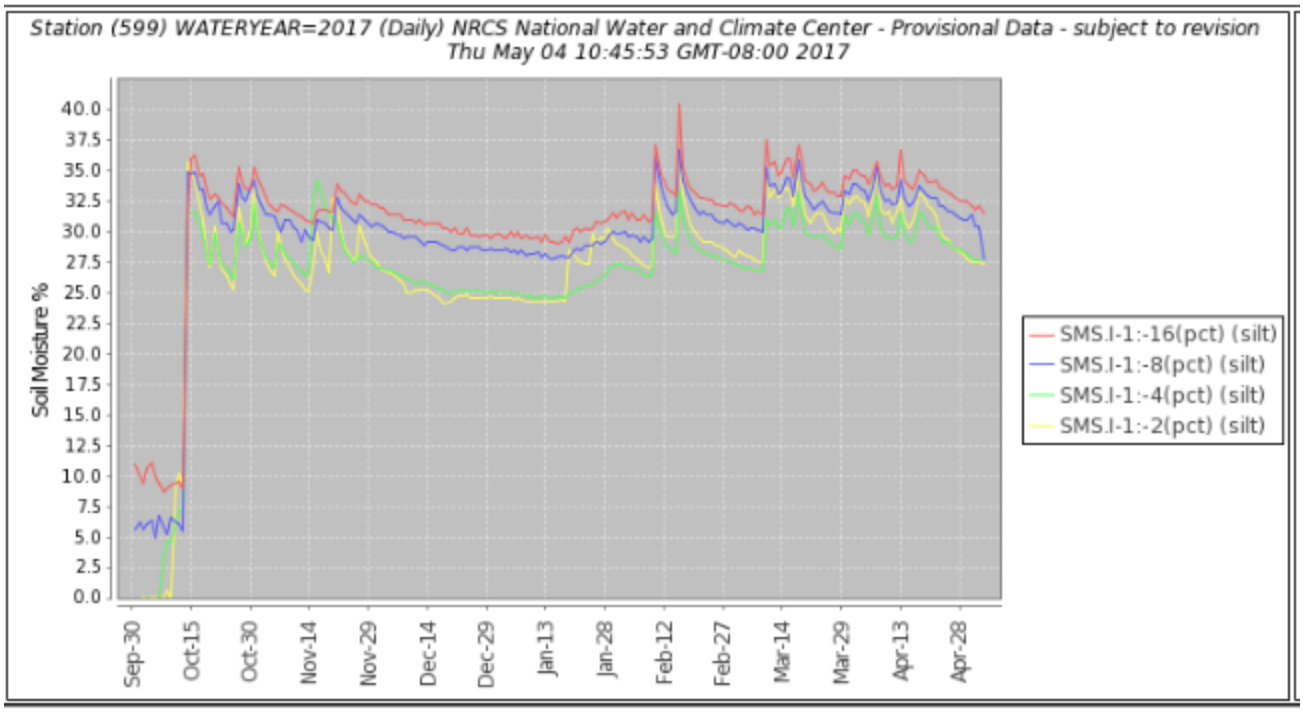
STREAM	PERCENT OF AVERAGE MAY STREAMFLOWS
Pend Oreille at Albeni Fall Dam	152
Kettle at Laurier	160
Columbia at Birchbank	123
Spokane at Spokane	141
Similkameen at Nighthawk	94
Okanogan at Tonasket	114
Methow at Pateros	143
Chelan at Chelan	122
Wenatchee at Pashastin	111
Cle Elum near Roslyn	105
Yakima at Parker	160
Naches at Naches	155
Grande Ronde at Troy	151
Snake below Lower Granite Dam	173
Columbia River at The Dalles	158
Lewis at Merwin Dam	130
Cowlitz below Mayfield Dam	136
Skagit at Concrete	117
Dungeness near Sequim	120

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

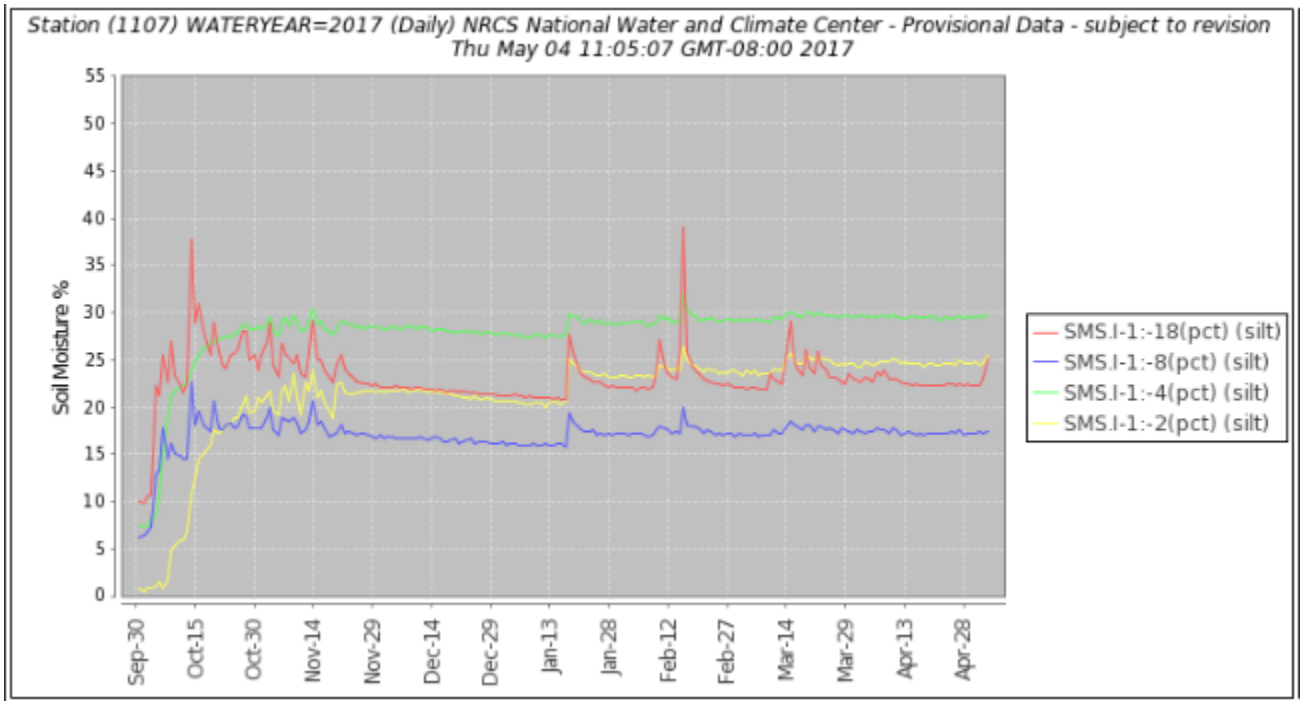
Soil Moisture

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-November. The graphs below clearly show the fall rain followed by snow and cold then the rain on snow events that caused localized 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.

Lost Horse SNOTEL Water Year 2017



Buckinghorse SNOTEL Water Year 2017



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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

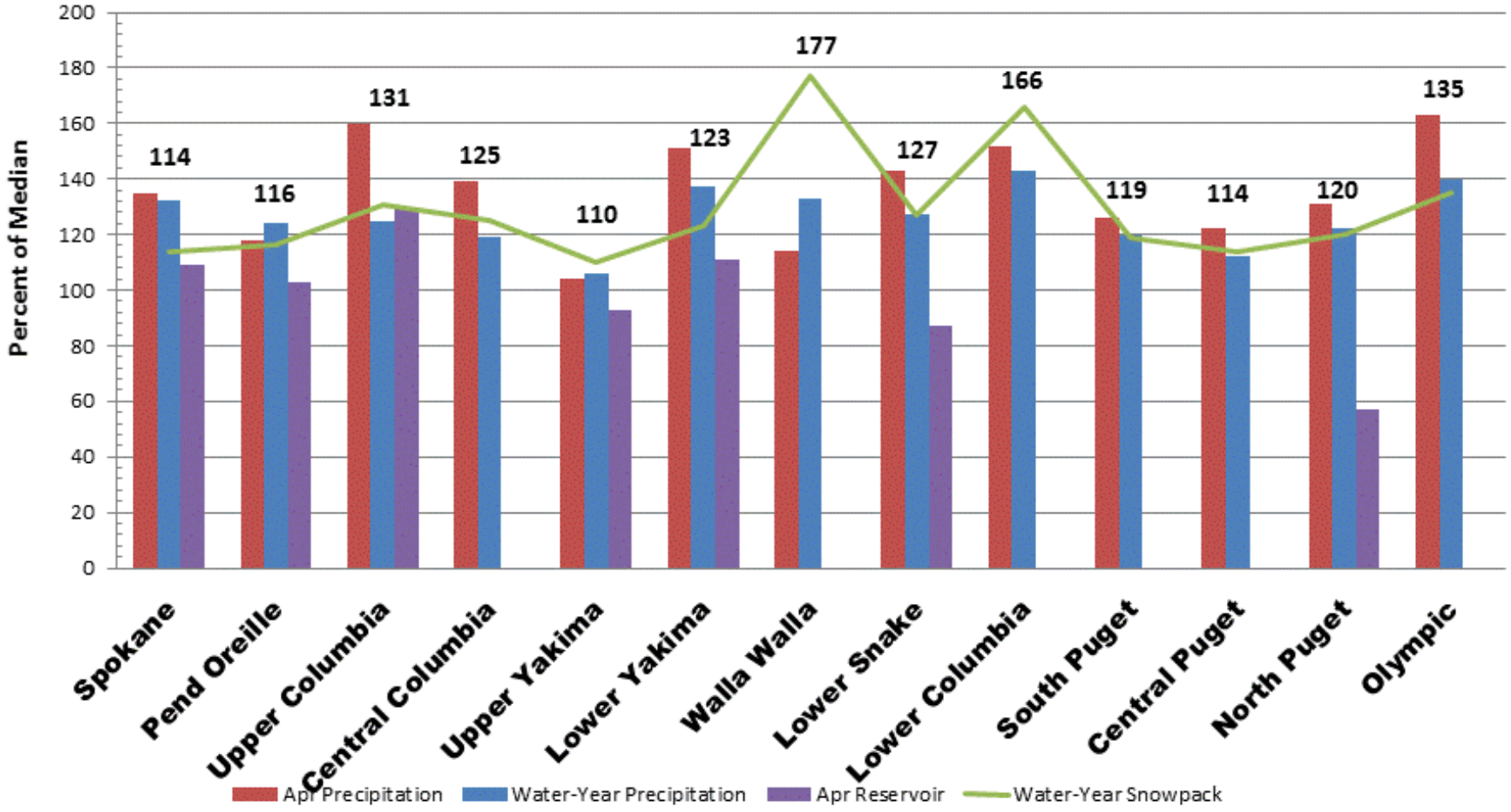
Washington:
http://www.nrcs.usda.gov/wps/portal/nrcs/site/wa/home/

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

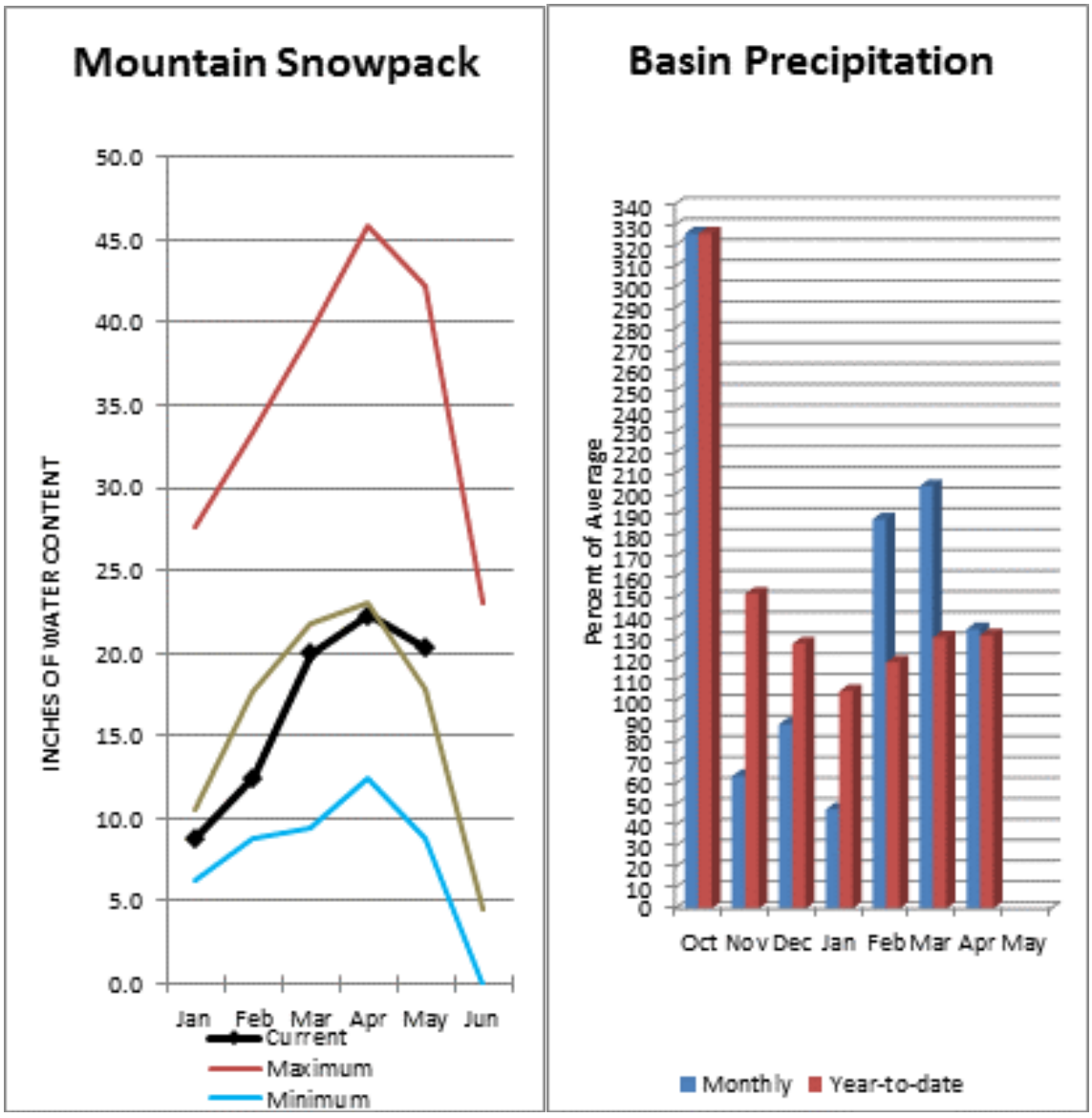
NRCS Natural Resources Conservation Service

May 1, 2017 - 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 120% of average near Post Falls and at Long Lake. The Chamokane River near Long Lake forecasted to have 134% of average flows for the May-August period. The forecast is based on a basin snowpack that is 114% of normal and precipitation that is 132% of average for the water year. Precipitation for April was much above normal at 135% of average. Streamflow on the Spokane River at Spokane was 141% of average for April. May 1 storage in Coeur d'Alene Lake was 248,000 acre feet, 109% of average and 104% of capacity. Snowpack at Quartz Peak SNOTEL site was 96% of average with 13.8 inches of water content. Average temperatures in the Spokane basin were slightly colder than normal for April but averaged near normal for the water year.

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

Data Current as of: 5/4/2017 11:45:59 AM

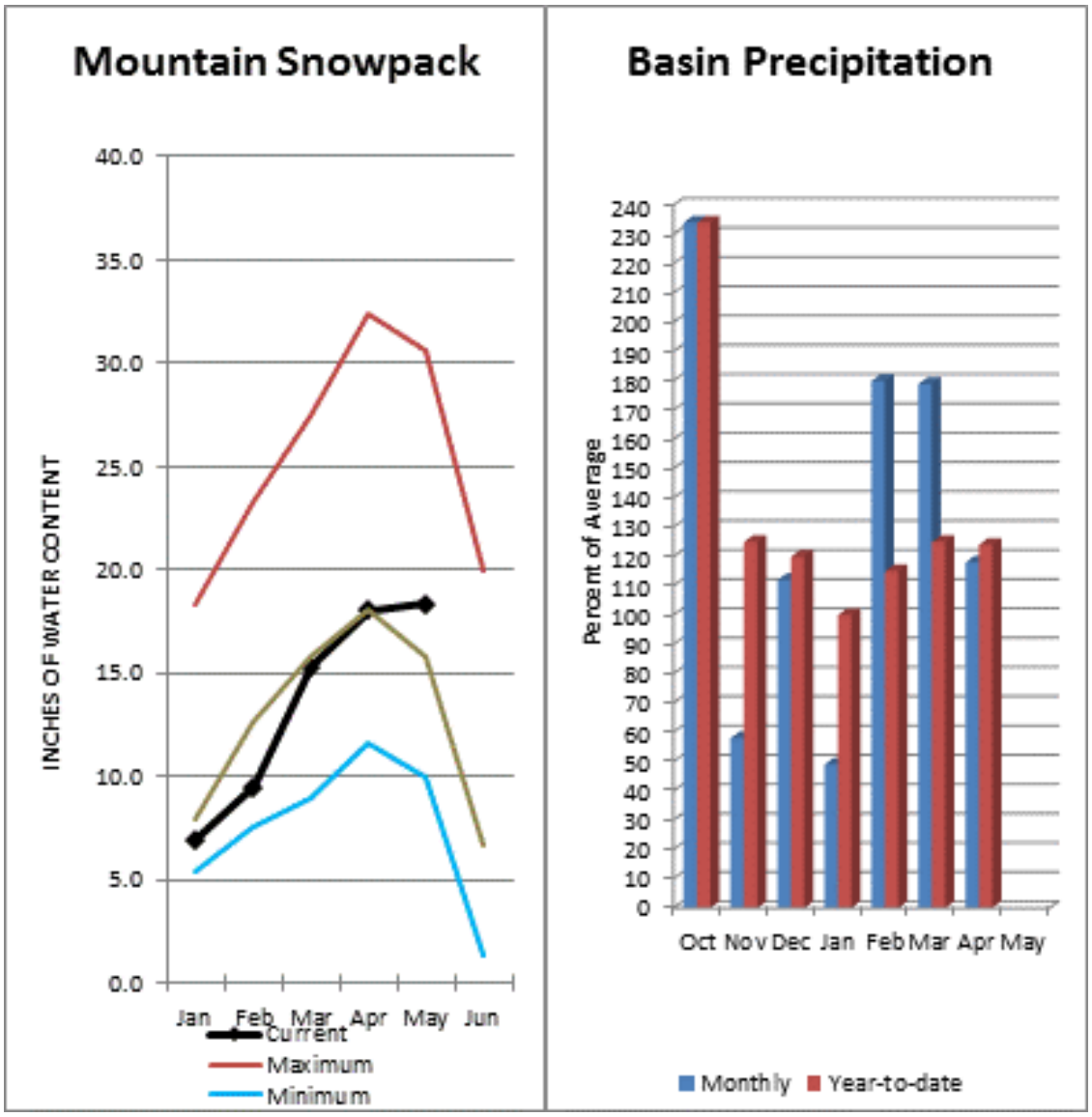
Spokane
Streamflow Forecasts - May 1, 2017

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	1390	1660	1840	120%	2030	2300	1530
	MAY-SEP	1440	1740	1940	120%	2140	2440	1620
Spokane R at Long Lake[2]								
	MAY-JUL	1550	1880	2100	123%	2320	2650	1710
	MAY-SEP	1760	2100	2340	120%	2570	2920	1950
Chamokane Ck nr Long Lake								
	MAY-AUG	8	10.7	12.5	134%	14.4	17.1	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 April, 2017	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Lake Coeur d' Alene	248.0	205.7	228.0	238.5
Basin-wide Total	248.0	205.7	228.0	238.5
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis May 1, 2017	# of Sites	% Median	Last Year % Median
Spokane	11	114%	51%
Newman Lake	1	96%	0%



The May – September average forecast for the Priest River near the town of Priest River is 146% and the Pend Orielle below Box Canyon is 130%. April streamflow was 152% of average on the Pend Oreille River and 123% on the Columbia at Birchbank. May 1 snow cover was 116% of normal in the Pend Oreille Basin River Basin. Bunchgrass Meadows SNOTEL site had 27.5 inches of snow water on the snow pillow. Normally Bunchgrass would have 23.6 inches on May 1. Precipitation during April was 118% of average, boosting the year-to-date precipitation to 124% of average. Reservoir storage in the basin, including Lake Pend Oreille and Priest Lake was 103% of normal. Average temperatures were slightly below normal for April but near normal for the water year.

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

Data Current as of: 5/4/2017 11:46:00 AM

Pend Oreille Basins
Streamflow Forecasts - May 1, 2017

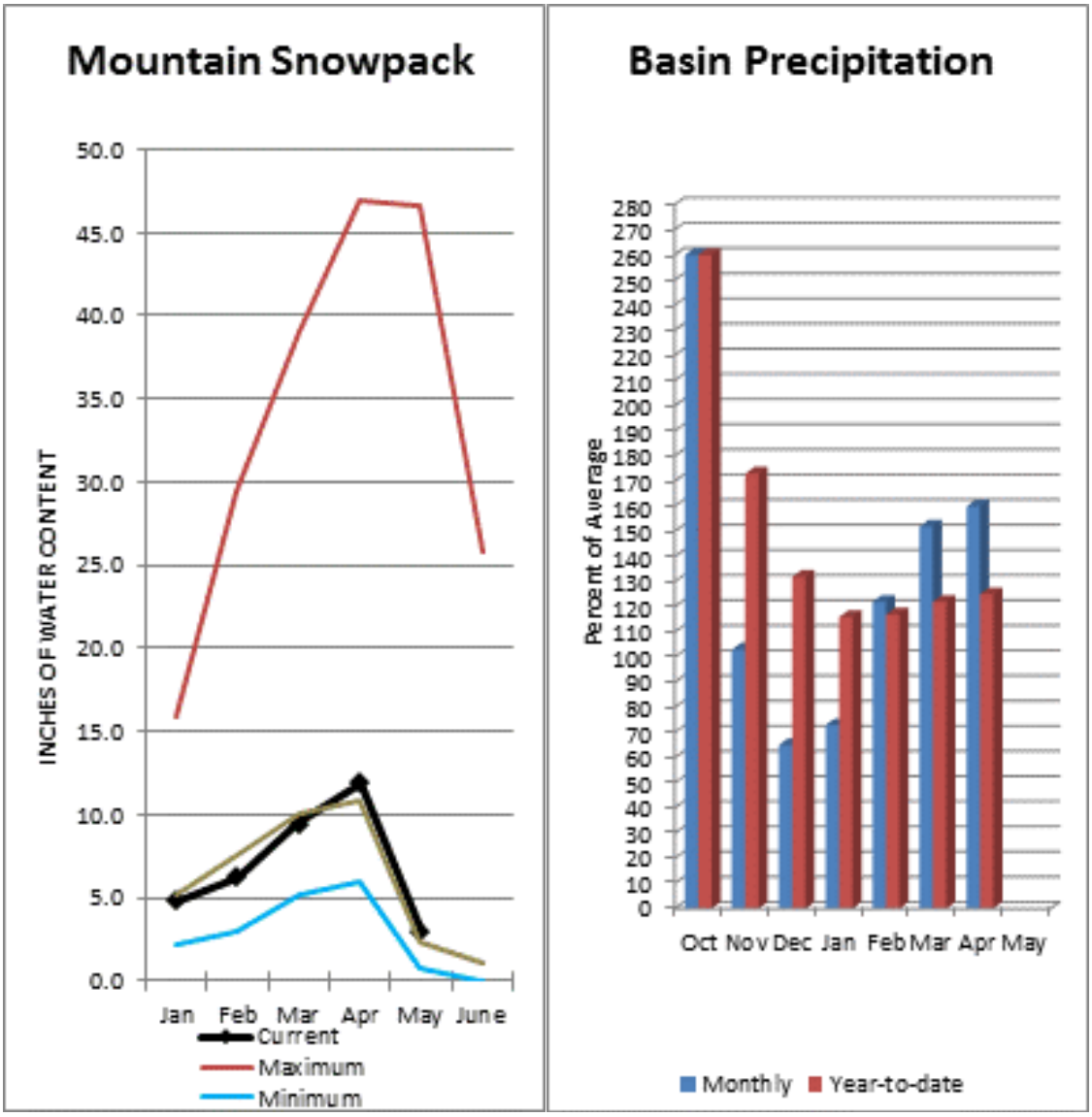
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

Pend Oreille Basins	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Pend Oreille Lake Inflow[2]								
	MAY-JUL	10900	11900	12500	129%	13200	14100	9690
	MAY-SEP	12000	13100	13900	130%	14600	15700	10700
Priest R nr Priest River[2]								
	MAY-JUL	745	815	860	148%	905	970	580
	MAY-SEP	790	870	920	146%	970	1050	630
Pend Oreille R bl Box Canyon[2]								
	MAY-JUL	11000	12000	12600	129%	13300	14200	9750
	MAY-SEP	12200	13300	14000	130%	14800	15900	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, 2017	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Lake Pend Oreille	953.4	920.1	931.7	1561.3
Priest Lake	113.5	127.3	101.9	119.3
Basin-wide Total	1066.9	1047.4	1033.6	1680.6
# of reservoirs	2	2	2	2

Watershed Snowpack Analysis May 1, 2017	# of Sites	% Median	Last Year % Median
Pend Oreille Basins	64	116%	70%
Colville River	0		
Kettle River	5	128%	51%



Summer runoff average forecast for the Okanogan River is 137%, Similkameen River is 114%, and Methow River is 147%. May 1 snow cover on the Okanogan was 146% of normal, Omak Creek was 165% and the Methow was 132%. April precipitation in the Upper Columbia was 160% of average, with precipitation for the water year at 125% of average. April streamflow for the Methow River was 143% of average, 114% for the Okanogan River and 94% for the Similkameen. Snow-water content at Salmon Meadows SNOTEL was 5 inches. Normal this site would be snow free by May 1. Combined storage in the Conconully Reservoirs was 21,400 acre-feet or 130% of normal. Temperatures were much below normal for April and slightly below normal for the water year.

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Upper Columbia Basins
Streamflow Forecasts - May 1, 2017

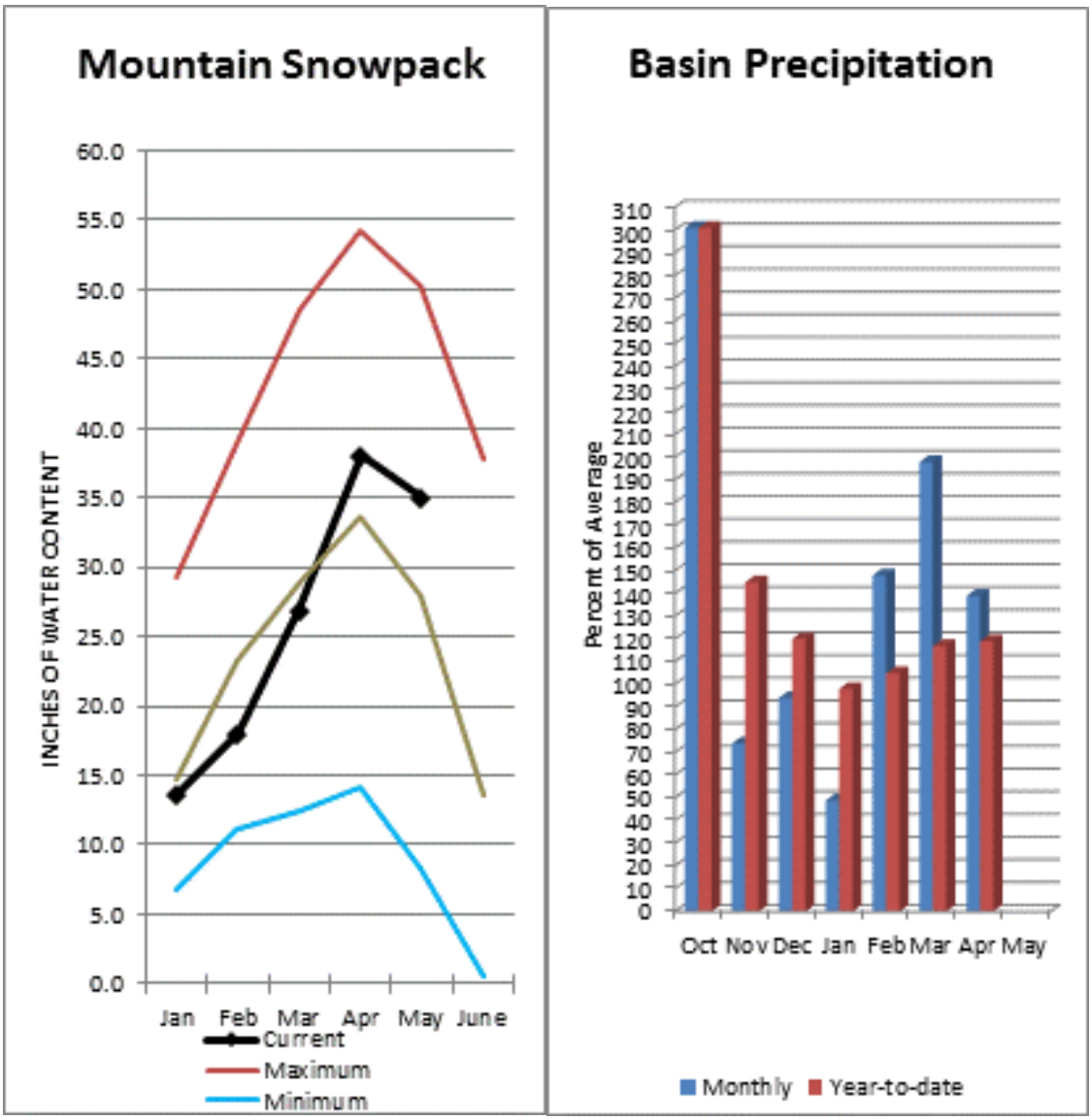
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

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	1500	1710	1850	128%	1990	2200	1450
	MAY-SEP	1550	1780	1940	127%	2100	2330	1530
Colville R at Kettle Falls								
	MAY-JUL	51	76	92	128%	109	134	72
	MAY-SEP	59	87	106	126%	125	153	84
Columbia R at Grand Coulee[1,2]								
	MAY-JUL	47200		50800	116%		56000	43900
	MAY-SEP	57100		61800	117%		66300	53000
Similkameen R nr Nighthawk[1]								
	MAY-JUL	1020	1160	1250	118%	1340	1480	1060
	MAY-SEP	1050	1200	1300	114%	1400	1550	1140
Okanogan R nr Tonasket[1]								
	MAY-JUL	1410	1600	1730	133%	1860	2050	1300
	MAY-SEP	1550	1780	1940	132%	2100	2330	1470
Okanogan R at Malott[1]								
	MAY-JUL	1430	1630	1760	139%	1900	2100	1270
	MAY-SEP	1570	1810	1970	137%	2140	2370	1440
Methow R nr Pateros								
	MAY-JUL	915	1010	1080	148%	1140	1240	730
	MAY-SEP	990	1090	1160	147%	1230	1340	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, 2017	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Conconully Lake (Salmon Lake Dam)	9.6	9.4	7.6	10.5
Conconully Reservoir	11.7	13.0	8.9	13.0
Basin-wide Total	21.4	22.4	16.5	23.5
# of reservoirs	2	2	2	2

Watershed Snowpack Analysis May 1, 2017	# of Sites	% Median	Last Year % Median
Upper Columbia Basins	13	131%	79%
Okanogan River	9	146%	90%
Omak Creek	1	165%	46%
Sanpoil River	0		
Similkameen River	5	120%	55%
Toats Coulee Creek	0		
Conconully Lake	1		
Methow River	3	138%	98%



Precipitation during April was 139% of average in the basin and 119% for the year-to-date. Runoff for Entiat River is forecast to be 110% of average for the summer. The May-September average forecast for Chelan River is 111%, Wenatchee River at Pashastin is 106%, Stehekin River is 111% and Icicle Creek is 106%. April average streamflow on the Chelan River was 122% and on the Wenatchee River 111%. May 1 snowpack in the Wenatchee River Basin was 125% of normal; the Chelan, 120%; the Entiat, 94%; Stemilt Creek, 162% and Colockum Creek, 722%. Reservoir storage in Lake Chelan was not available. Lyman Lake SNOTEL had the most snow water with 73.3 inches of water. This site would normally have 61.2 inches on May 1. Temperatures were slightly below 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, 2017

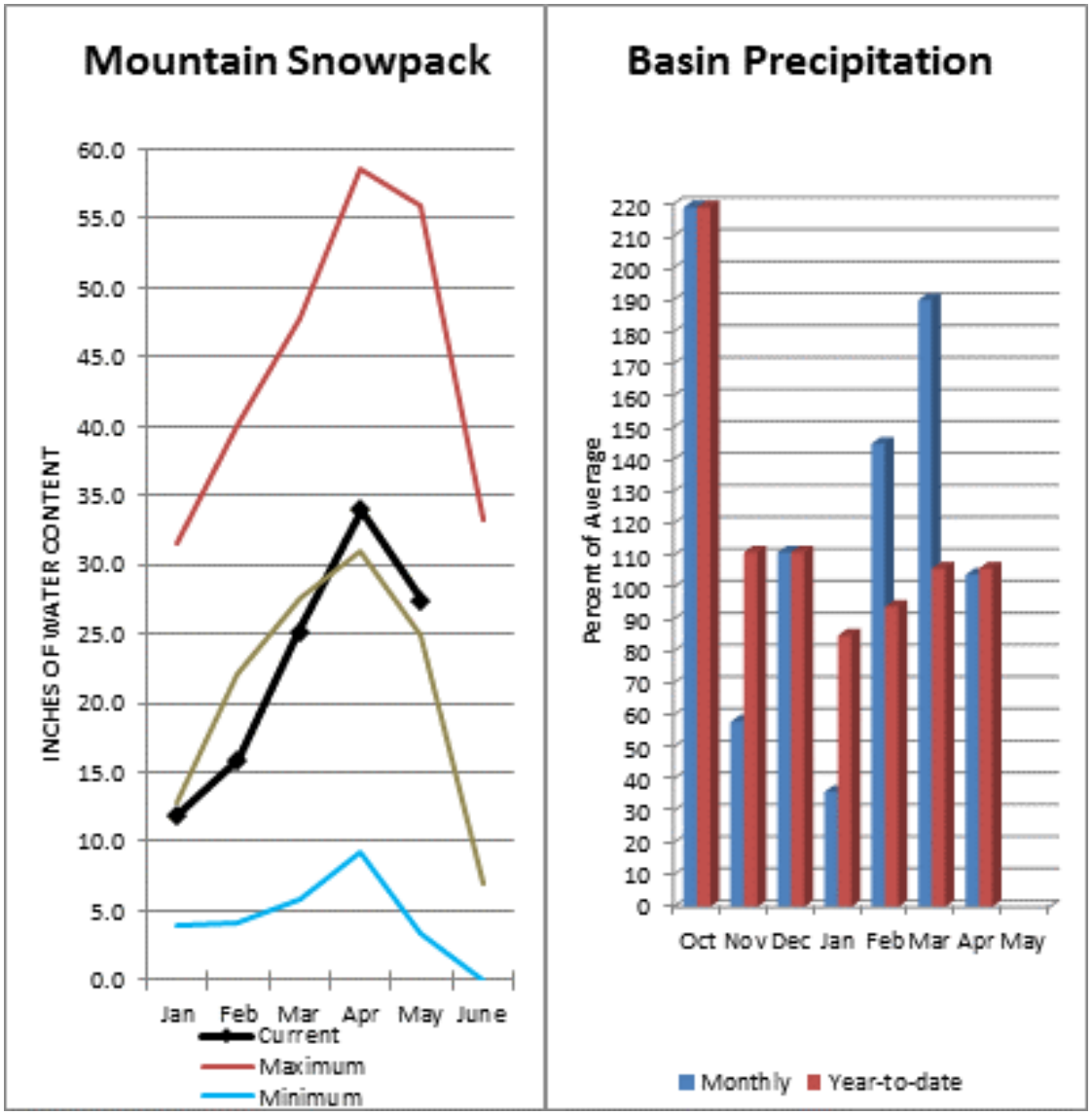
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

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	565	620	660	111%	695	750	595
	MAY-SEP	685	740	780	111%	815	870	705
Chelan R at Chelan								
	MAY-JUL	840	900	945	110%	990	1050	860
	MAY-SEP	955	1030	1080	111%	1130	1200	975
Entiat R nr Ardenvoir								
	MAY-JUL	163	182	195	110%	205	225	178
	MAY-SEP	179	200	215	110%	230	250	196
Wenatchee R at Plain								
	MAY-JUL	765	840	885	107%	935	1010	825
	MAY-SEP	855	930	985	107%	1040	1120	920
Icicle Ck nr Leavenworth								
	MAY-JUL	205	230	250	106%	270	300	235
	MAY-SEP	225	255	275	106%	295	330	260
Wenatchee R at Peshastin								
	MAY-JUL	1050	1140	1210	106%	1270	1360	1140
	MAY-SEP	1160	1270	1340	106%	1410	1520	1260
Columbia R bl Rock Island Dam[2]								
	MAY-JUL	51800		55300	115%		61300	47900
	MAY-SEP	61800		66900	117%		71800	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, 2017	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Lake Chelan		543.3	300.7	676.1
Basin-wide Total		0.0	0.0	0.0
# of reservoirs	0	0	0	0

Watershed Snowpack Analysis May 1, 2017	# of Sites	% Median	Last Year % Median
Central Columbia Basins	3	120%	97%
Chelan Lake Basin	3	120%	97%
Entiat River	1	94%	0%
Wenatchee River	7	125%	74%
Stemilt Creek	1	162%	0%
Colockum Creek	1	722%	0%



May 1 reservoir storage for the Upper Yakima reservoirs was 567,000-acre feet, 93% 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 normal this summer as well. April streamflow within the basin was Cle Elum River near Roslyn at 105%. May 1 snowpack was 110% based upon 8 snow course and SNOTEL readings within the Upper Yakima Basin. Precipitation was 104% of average for April and 106% 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.

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

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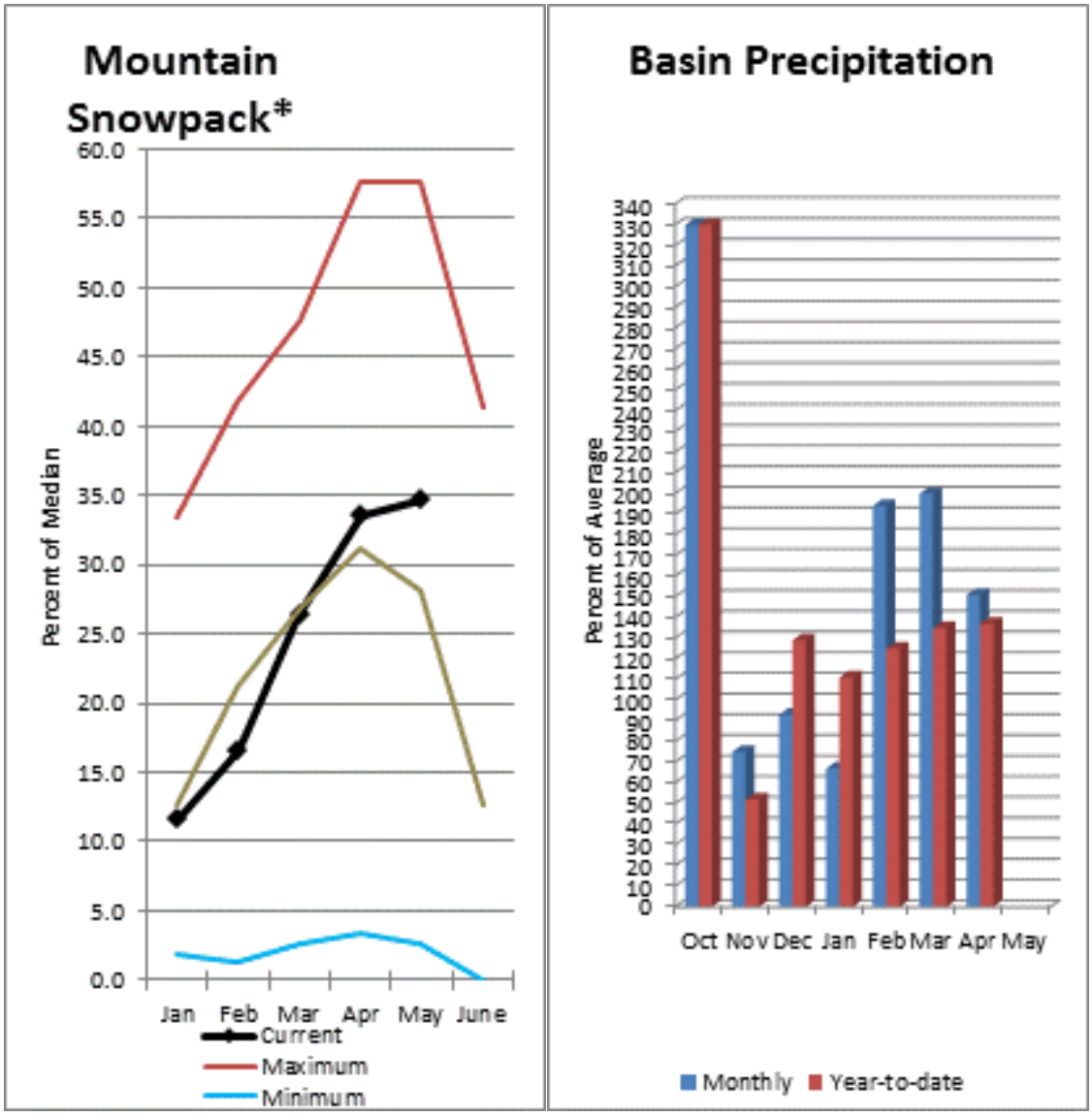
Upper Yakima River
Streamflow Forecasts - May 1, 2017

Upper Yakima 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						
Keechelus Reservoir Inflow[2]								
	MAY-JUL	70	81	89	105%	96	107	85
	MAY-SEP	78	91	99	103%	108	121	96
Kachess Reservoir Inflow [2]								
	MAY-JUL	66	73	78	103%	82	89	76
	MAY-SEP	73	81	86	102%	92	100	84
Cle Elum Lake Inflow [2]								
	MAY-JUL	280	300	310	102%	325	345	305
	MAY-SEP	305	330	345	101%	360	380	340
Yakima R at Cle Elum [2]								
	MAY-JUL	480	530	570	100%	605	660	570
	MAY-SEP	540	600	640	99%	685	745	645
Teanaway R bl Forks nr Cle Elum								
	MAY-JUL	57	71	81	103%	91	106	79
	MAY-SEP	59	74	84	102%	94	109	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, 2017	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Keechelus	117.0	153.1	122.1	157.8
Kachess	177.0	215.6	183.7	239.0
Cle Elum	272.9	408.6	302.6	436.9
Basin-wide Total	566.9	777.3	608.4	833.7
# of reservoirs	3	3	3	3

Watershed Snowpack Analysis May 1, 2017	# of Sites	% Median	Last Year % Median
Upper Yakima River	8	110%	65%



April average streamflows within the basin were: Yakima River near Parker, 160% and the Naches River near Naches, 155%. May 1 reservoir storage for Bumping and Rimrock reservoirs was 198,000-acre feet, 111% of average. Forecast averages for Yakima River near Parker are 114%; American River near Nile, 121%; Ahtanum Creek, 157%; and Klickitat River near Glenwood, 130%. May 1 snowpack was 123% based upon 6 snow course and SNOTEL readings within the Lower Yakima Basin and Ahtanum Creek reported in at 125% of normal. Precipitation was 151% of average for April and 137% for the water-year. Temperatures were below normal for April 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.

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

Data Current as of: 5/4/2017 11:46:11 AM

Lower Yakima River
Streamflow Forecasts - May 1, 2017

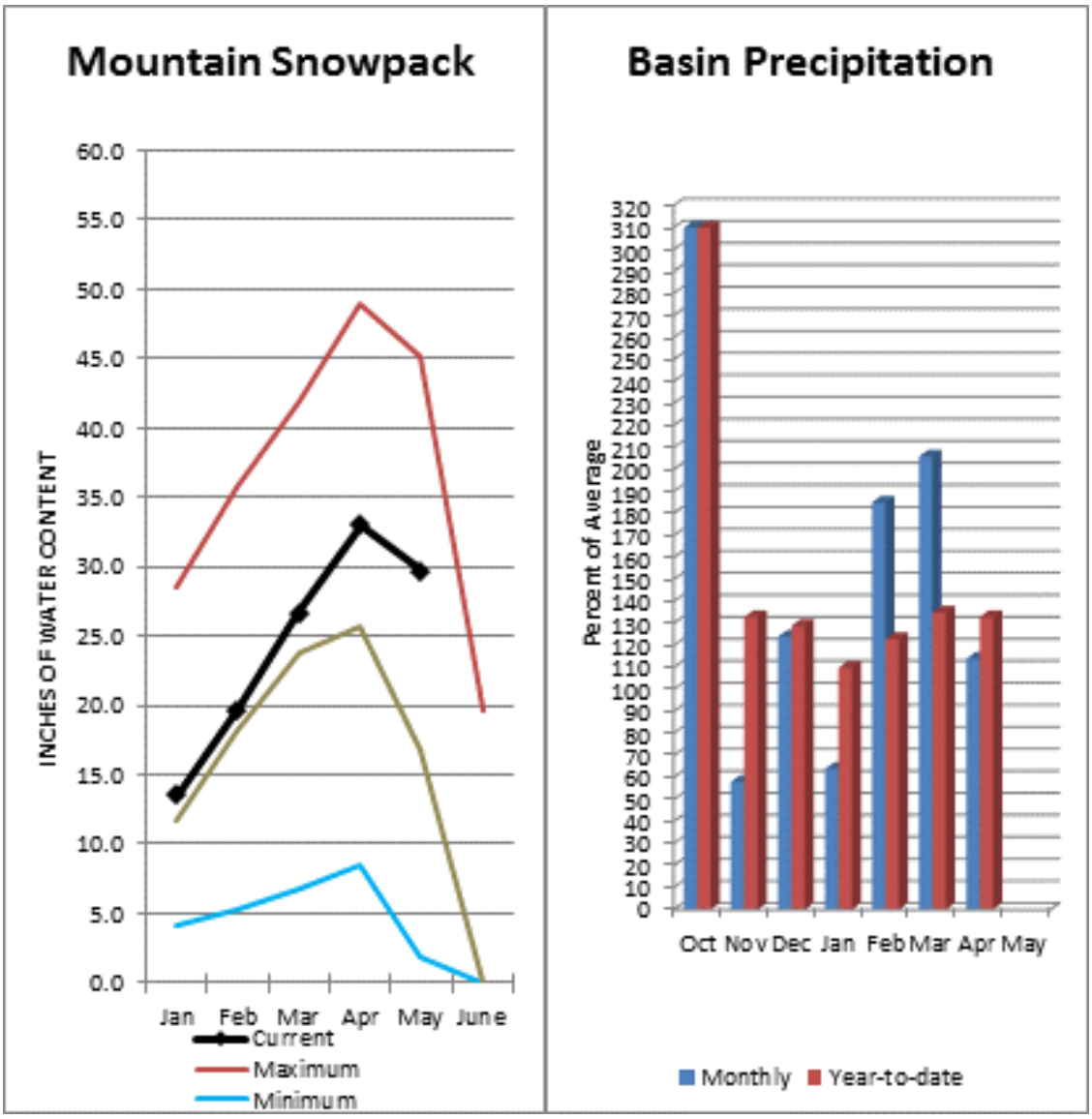
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

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	100	108	112	120%	117	124	93
	MAY-SEP	111	119	124	120%	130	138	103
American R nr Nile								
	MAY-JUL	86	95	101	120%	107	116	84
	MAY-SEP	93	104	111	121%	118	129	92
Rimrock Lake Inflow [2]								
	MAY-JUL	160	170	177	117%	184	194	151
	MAY-SEP	193	205	215	116%	225	240	185
Naches R nr Naches								
	MAY-JUL	555	630	675	125%	725	795	540
	MAY-SEP	615	695	755	126%	810	895	600
Ahtanum Ck at Union Gap								
	MAY-JUL	22	27	31	161%	34	40	19.3
	MAY-SEP	24	29	33	157%	37	43	21
Yakima R nr Parker [2]								
	MAY-JUL	1240	1350	1420	115%	1490	1600	1230
	MAY-SEP	1410	1520	1590	114%	1670	1780	1390
Klickitat R nr Glenwood								
	MAY-JUL	105	118	127	131%	136	150	97
	MAY-SEP	120	134	143	130%	153	167	110
Klickitat R nr Pitt								
	MAY-JUL	340	375	400	131%	425	460	305
	MAY-SEP	435	480	510	129%	535	580	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, 2017	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Bumping Lake	25.7	30.3	21.7	33.7
Rimrock	172.1	191.6	156.9	198.0
Basin-wide Total	197.8	221.9	178.6	231.7
# of reservoirs	2	2	2	2

Watershed Snowpack Analysis May 1, 2017	# of Sites	% Median	Last Year % Median
Lower Yakima River	6	123%	80%
Ahtanum Creek	2	125%	55%



April precipitation was 114% of average, maintaining the year-to-date precipitation at 133% of average. Snowpack in the basin was 177% of normal. Streamflow forecasts are 121% of average for Mill Creek and 133% for the SF Walla Walla near Milton-Freewater. Average temperatures were slightly below normal for April and slightly below normal for the water year.

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

Data Current as of: 5/4/2017 11:46:15 AM

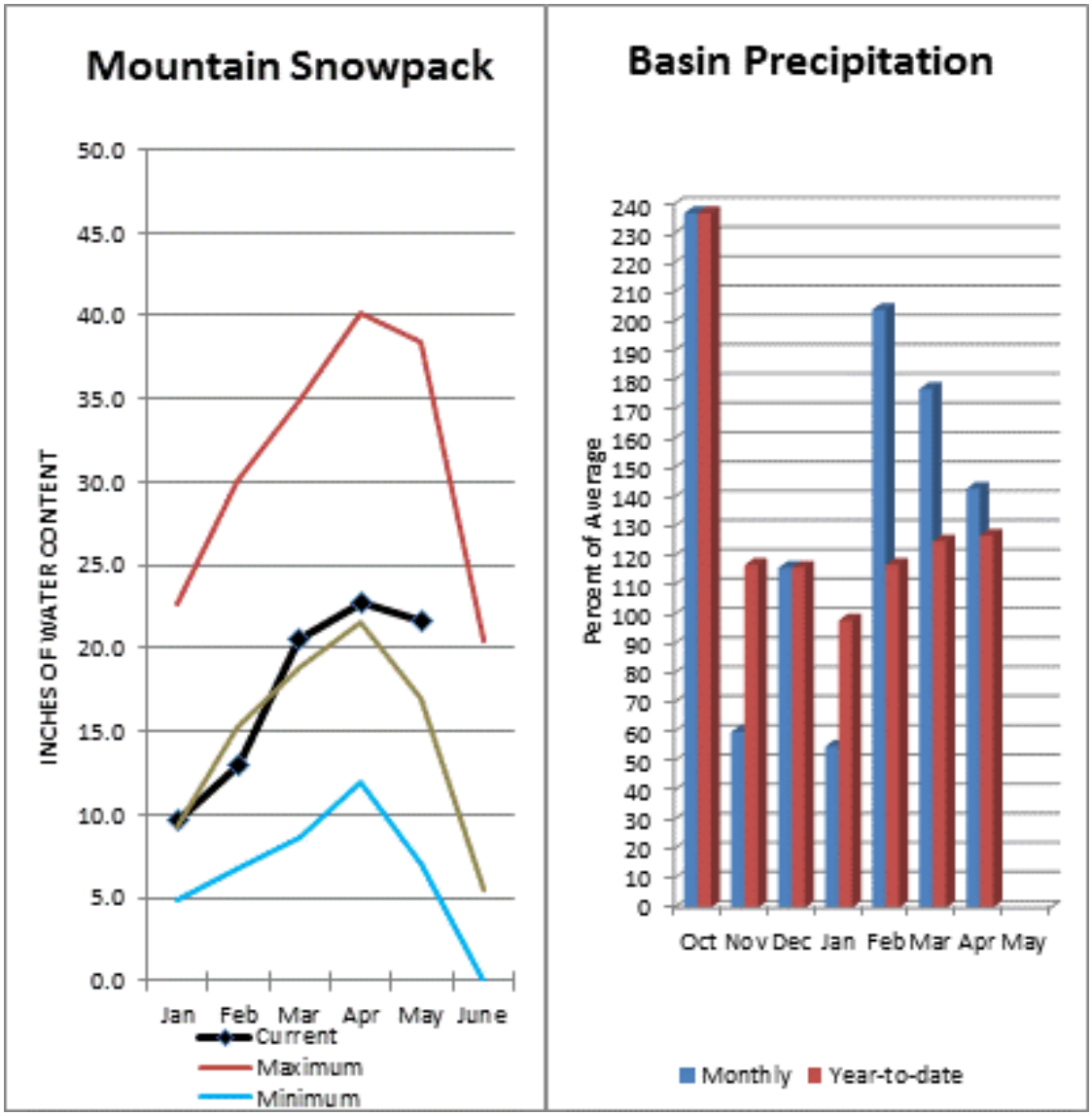
Walla Walla River
Streamflow Forecasts - May 1, 2017

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								
	MAY-JUL	42	47	51	138%	55	61	37
	MAY-SEP	55	61	65	133%	69	75	49
Mill Ck nr Walla Walla								
	MAY-JUL	13.4	15.6	17.2	124%	18.7	21	13.9
	MAY-SEP	16.8	19.2	21	121%	23	25	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, 2017	# of Sites	% Median	Last Year % Median
Walla Walla River	2	177%	76%



The Snake River below Lower Granit Dam can expect summer flows to be about 135% of normal. The forecast for Asotin Creek at Asotin predicts 117% of average flows for the May – July runoff period. April precipitation was 143% of average, bringing the year-to-date precipitation to 127% of average. May 1 snowpack readings averaged 127% of normal. April streamflow was 173% of average for Snake River below Lower Granite Dam and 151% for Grande Ronde River near Troy. Dworshak Reservoir storage was 87% of average. Average temperatures were slightly below normal for April and slightly below 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 - May 1, 2017

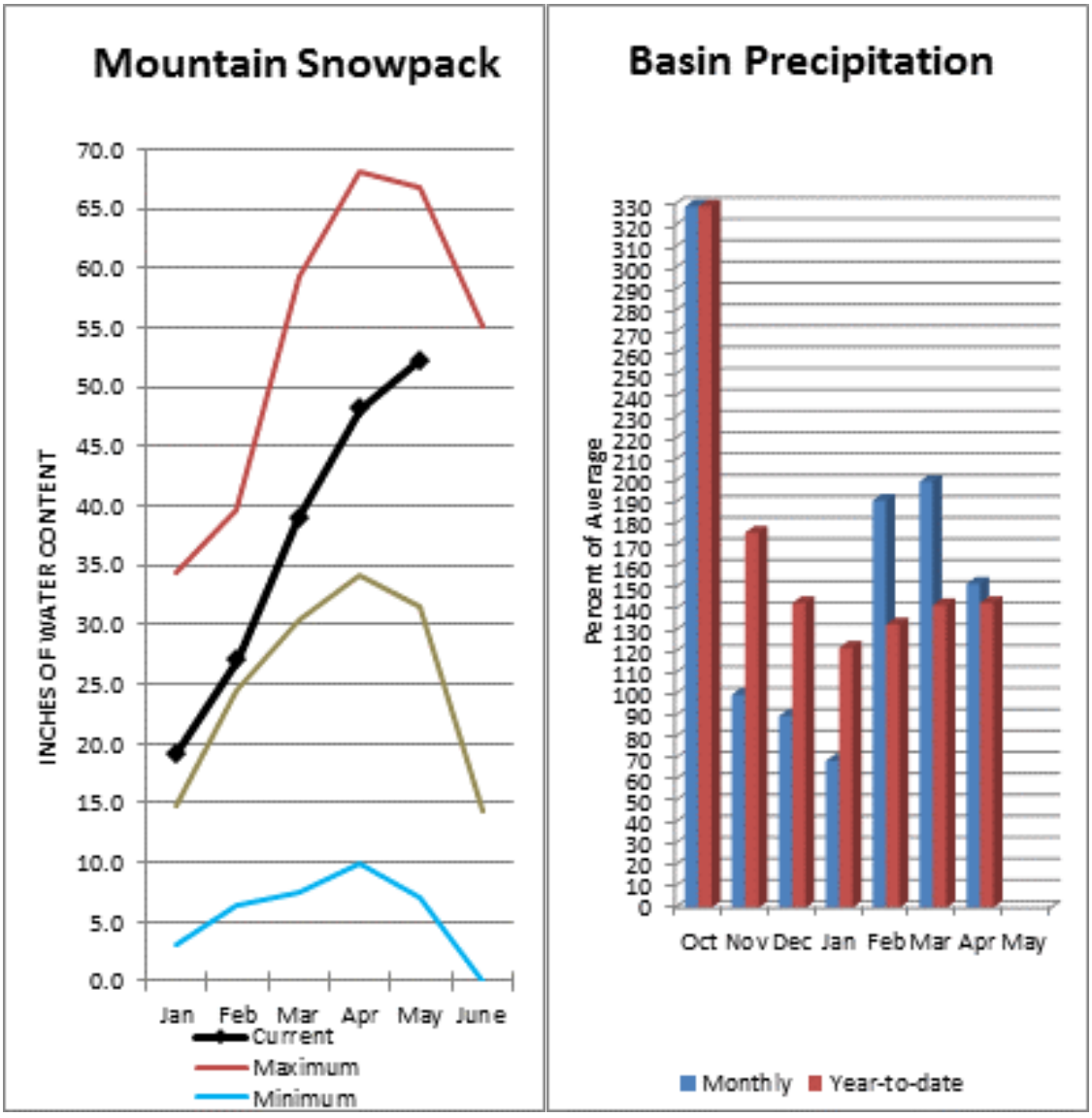
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

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	980	1130	1220	142%	1320	1470	860
	MAY-SEP	1090	1240	1340	142%	1440	1590	945
Asotin Ck at Asotin								
	MAY-JUL	19.8	25	28	117%	32	37	24
Clearwater R at Spalding[2]								
	MAY-JUL	5030	5570	5930	113%	6290	6830	5260
	MAY-SEP	5360	5940	6330	112%	6710	7290	5640
Snake R bl Lower Granite Dam[12]								
	MAY-JUL	19565		20889	137%		24119	15280
	MAY-SEP	22502		23872	135%		27458	17715

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, 2017	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Dworshak Reservoir	2303.2	2897.8	2646.0	3468.0
Basin-wide Total	2303.2	2897.8	2646.0	3468.0
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis May 1, 2017	# of Sites	% Median	Last Year % Median
Lower Snake, Grande Ronde, Clearwater Basins	13	127%	74%



Forecasts for May – September streamflows within the basin are Lewis River at Ariel, 127% and Cowlitz River at Castle Rock, 131% of average. The Columbia at The Dalles is forecasted to have 120% of average flows this summer according to the River Forecast Center. April average streamflow for Cowlitz River was 136%. The Columbia River at The Dalles was 158% of average. April precipitation was 152% of average and the water-year average was 143%. May 1 snow cover for Cowlitz River was 141%, and Lewis River was 192% of normal. Temperatures were below normal during April but near average for the water year.

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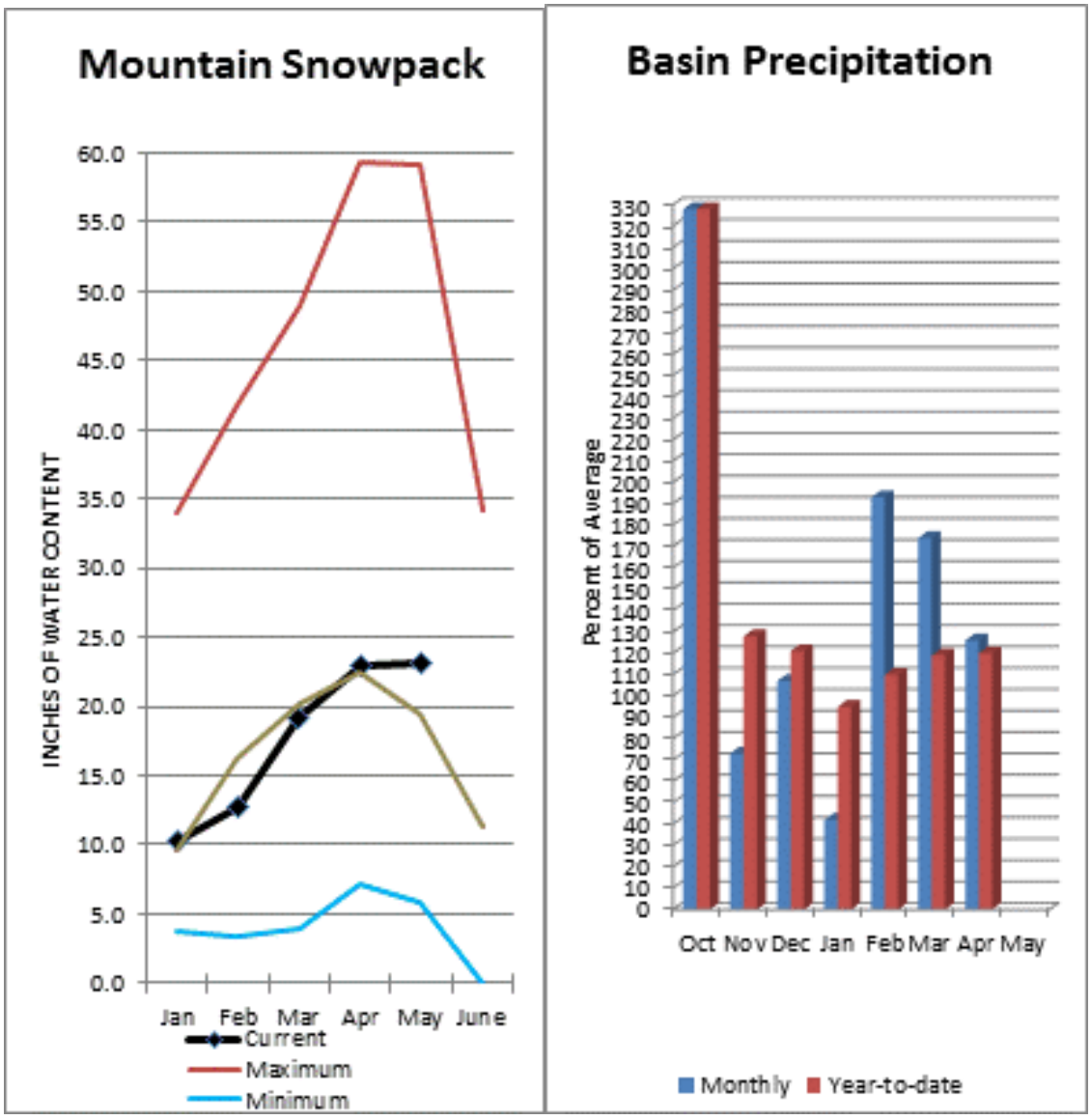
Lower Columbia Basins
Streamflow Forecasts - May 1, 2017

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[2]								
	MAY-JUL	74600		79900	121%		86700	66000
	MAY-SEP	89000		94900	120%		103000	78900
Klickitat R nr Glenwood								
	MAY-JUL	105	118	127	131%	136	150	97
	MAY-SEP	120	134	143	130%	153	167	110
Klickitat R nr Pitt								
	MAY-JUL	340	375	400	131%	425	460	305
	MAY-SEP	435	480	510	129%	535	580	395
Lewis R at Ariel[2]								
	MAY-JUL	680	770	830	135%	885	975	615
	MAY-SEP	820	915	980	127%	1040	1140	770
Cowlitz R bl Mayfiled[2]								
	MAY-JUL	1360	1530	1650	140%	1770	1950	1180
	MAY-SEP	1560	1790	1950	140%	2100	2330	1390
Cowlitz R at Castle Rock[2]								
	MAY-JUL	1760	1960	2090	131%	2230	2430	1600
	MAY-SEP	2120	2340	2480	131%	2630	2840	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, 2017	# of Sites	% Median	Last Year % Median
Lower Columbia Basins	11	166%	92%
Lewis River	5	192%	89%
Cowlitz River	6	141%	95%



Summer runoff is forecast to be 102% of normal for the Green River below Howard Hanson Dam and 112% for the White River near Buckley. May 1 snowpack was 113% of average for the White River, 123% for Puyallup River and 123% in the Green River Basin. April precipitation was 126% of average, bringing the water year-to-date to 120% of average for the basins. Average temperatures in the area were slightly below normal for April but near normal for the water-year.

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

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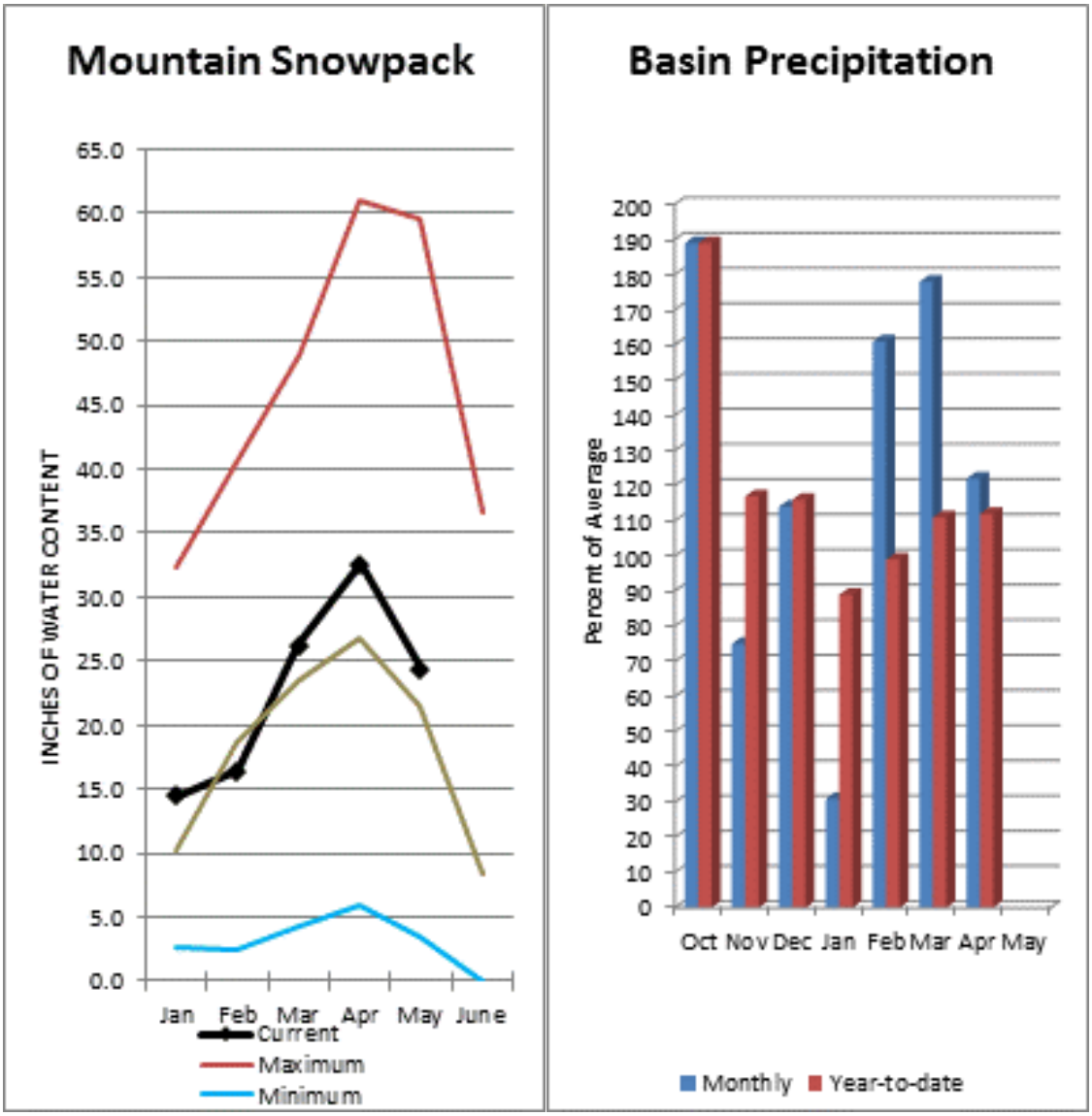
South Puget Sound Basins
Streamflow Forecasts - May 1, 2017

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	275	345	375	114%	405	470	330
	MAY-SEP	350	430	470	112%	505	585	420
Green R bl Howard A Hanson Dam[1,2]								
	MAY-JUL	106	141	156	103%	172	205	152
	MAY-SEP	121	161	179	102%	197	235	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, 2017	# of Sites	% Median	Last Year % Median
South Puget Sound Basins	10	119%	78%
White River	3	113%	87%
Green River	2	123%	55%



Forecast for spring and summer flows are: 113% for Cedar River near Cedar Falls; 114% for Rex River; 128% for South Fork of the Tolt River; and 105% for Taylor Creek near Selleck. Basin-wide precipitation for April was 122% of average, bringing water-year-to-date to 112% of average. May 1 median snow cover in Cedar River Basin was 167%, Tolt River Basin was 167%, Snoqualmie River Basin was 131%, and Skykomish River Basin was 130%. Temperatures were below 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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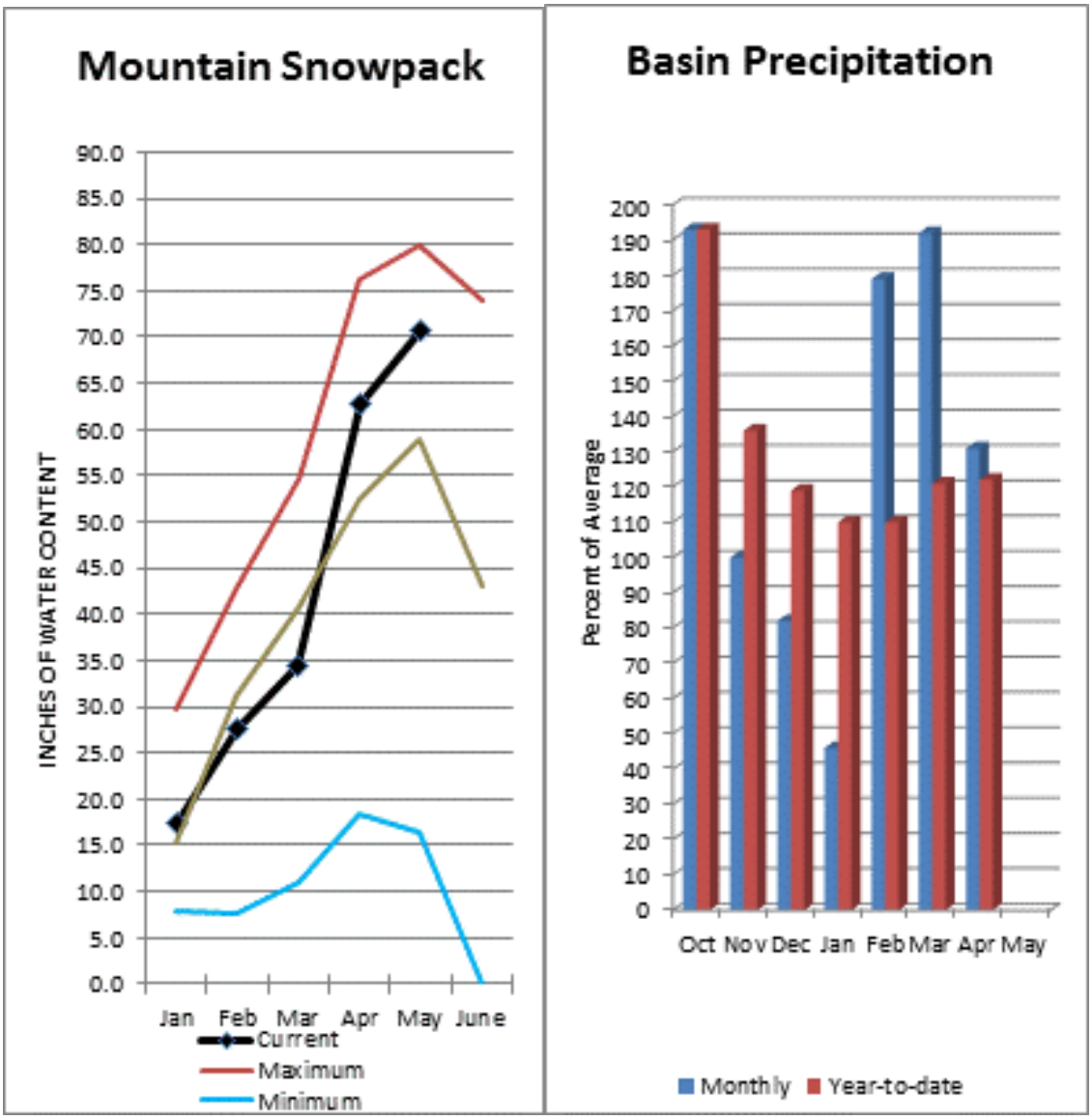
Central Puget Sound Basins
Streamflow Forecasts - May 1, 2017

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	47	53	57	116%	61	67	49
	MAY-SEP	51	58	63	113%	68	75	56
Rex R nr Cedar Falls								
	MAY-JUL	14.7	17.4	19.3	119%	21	24	16.2
	MAY-SEP	16	19.3	21	114%	24	27	18.5
Taylor Ck nr Selleck								
	MAY-JUL	11.8	13.2	14.2	107%	15.2	16.6	13.3
	MAY-SEP	14.6	16.5	17.7	105%	19	21	16.9
SF Tolt R nr Index								
	MAY-JUL	10.3	12.3	13.7	132%	15	17	10.4
	MAY-SEP	11.2	13.9	15.7	128%	17.5	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, 2017	# of Sites	% Median	Last Year % Median
Central Puget Sound Basins	12	141%	60%
Puyallup River	5	123%	79%
Cedar River	4	167%	72%
Tolt River	2	167%	44%
Snoqualimie River	4	131%	58%
Skykomish River	2	130%	59%



Forecast for Skagit River streamflow at Newhalem is 111% of average for the spring and summer period. April streamflow in Skagit River was 117% of average. Other forecast points included Baker River at 107% and Thunder Creek at 102% of average. Basin-wide precipitation for April was 131% of average, bringing water-year-to-date to 122% of average. May 1 average snow cover in Skagit River Basin was 119%, the Nooksack River Basin was 116% and the Baker River Basin was 116%. May 1 Skagit River reservoir storage was 57% of average and 31% of capacity. Average temperatures were below normal for May and slightly below normal 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 - May 1, 2017

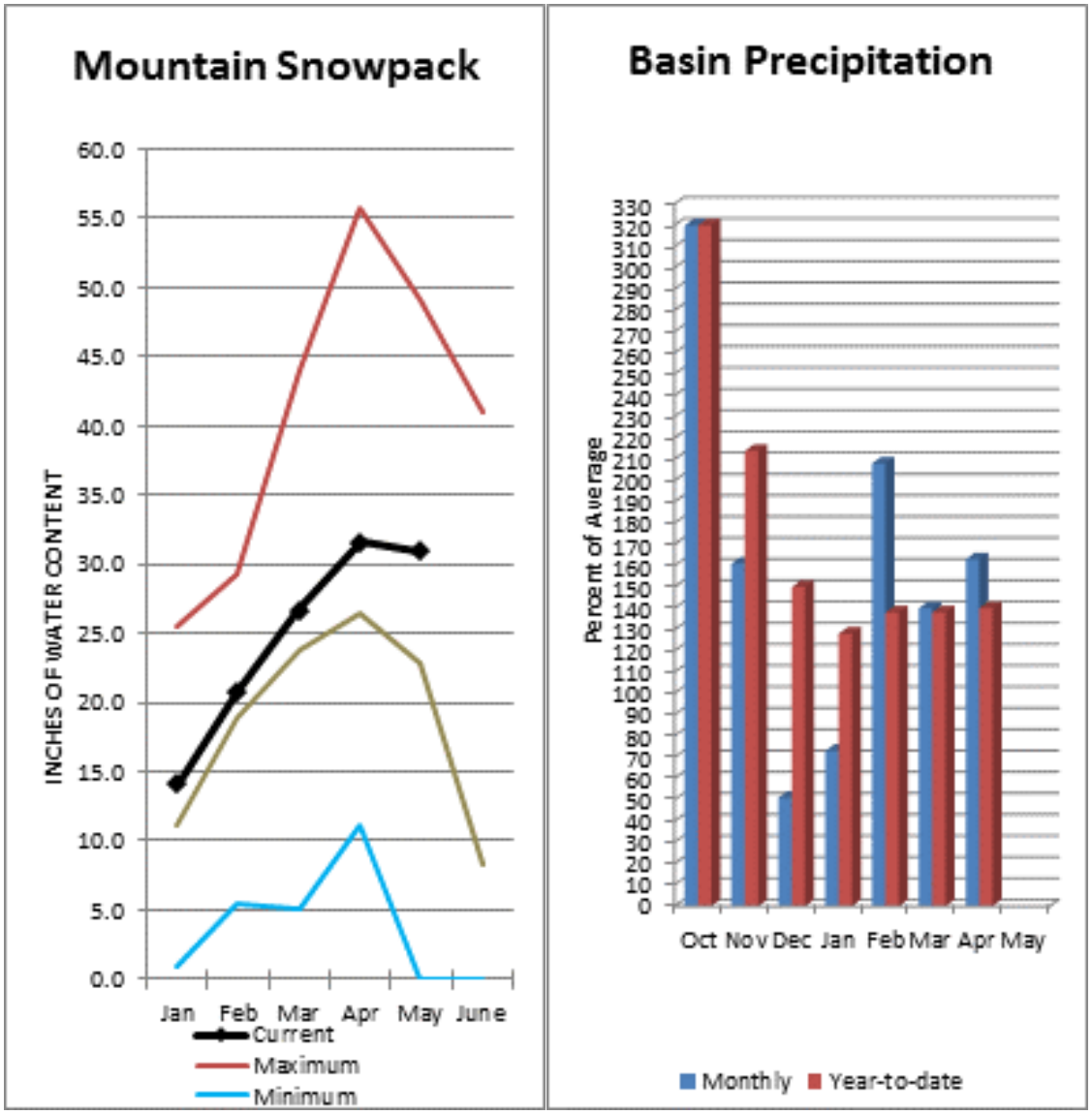
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

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	183	200	215	102%	225	245	210
	MAY-SEP	275	295	310	102%	325	345	305
Skagit R at Newhalem[2]								
	MAY-JUL	1450	1550	1620	114%	1690	1790	1420
	MAY-SEP	1750	1870	1960	111%	2040	2160	1770
Baker R at Concrete								
	MAY-JUL	545	615	665	105%	715	785	635
	MAY-SEP	695	815	895	107%	975	1090	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, 2017	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Ross	433.0	700.0	754.4	1404.1
Diablo Reservoir			85.9	90.6
Basin-wide Total	433.0	700.0	754.4	1404.1
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis May 1, 2017	# of Sites	% Median	Last Year % Median
North Puget Sound Basins	10	120%	76%
Skagit River	7	123%	92%
Baker River	0		
Nooksack River	3	116%	55%



Forecasted average runoff for streamflow for the Dungeness River is 111% and Elwha River is 113% April runoff in the Dungeness River was 120% of normal. Big Quilcene and Wynoochee rivers may expect near average runoff this summer as well. April precipitation was 163% of average. Precipitation has accumulated at 140% of average for the water year. April precipitation at Quillayute was 177% of normal. Olympic Peninsula snowpack averaged 135% of normal on May 1. Temperatures were slightly below average for April and near normal for the water year.

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

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Olympic Penninsula
Streamflow Forecasts - May 1, 2017

Olympic Penninsula	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						
Dungeness R nr Sequim								
	MAY-JUL	93	103	110	109%	118	128	101
	MAY-SEP	116	130	139	111%	148	161	125
Elwha R at McDonald Bridge nr Port Angeles								
	MAY-JUL	315	340	360	113%	380	405	320
	MAY-SEP	380	415	440	113%	460	495	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, 2017	# of Sites	% Median	Last Year % Median
Olympic Penninsula	6	135%	75%

Issued by

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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.**

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Washington Water Supply Outlook Report

Natural Resources Conservation Service
Spokane, WA