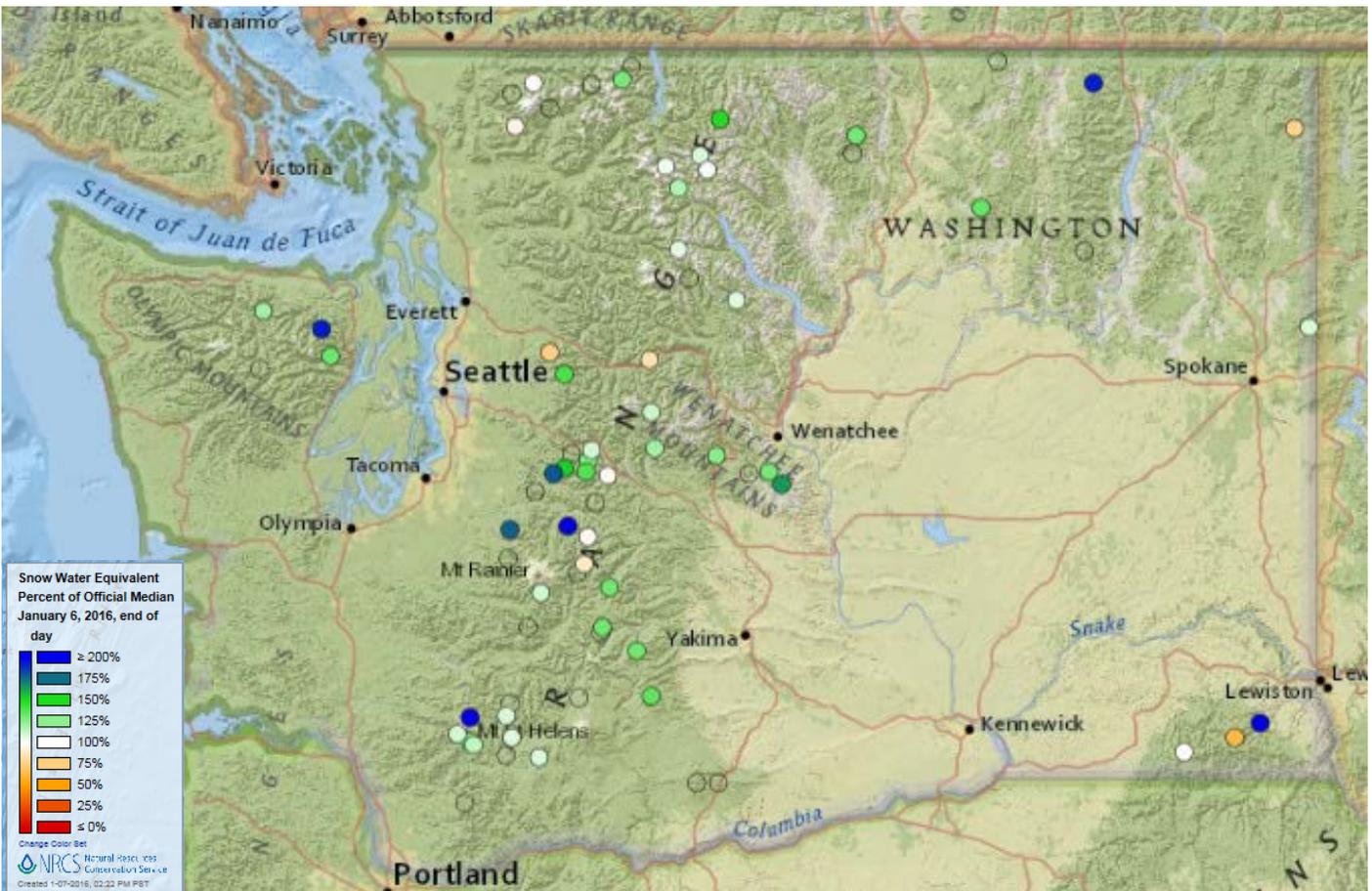


Washington

Water Supply Outlook Report

January 1, 2015



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.

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Washington Water Supply Outlook

January 2016

General Outlook

Following the snow drought and record heat wave of 2015 folks were a little gun shy for the prospect of a warm/dry El Nino heading into winter 2016. October started off wet but warm, a trend mostly duplicated in November. A teaser of snow in the high country promised of limited skiing opportunities for the Thanksgiving holiday. December opened wet and worrisome but went out in a blaze of white and a streak of snow bunny suits gliding down perfectly groomed ski runs but also to closed passes which undoubtedly ruined someone's holiday plans. I was personally privileged to spend several extra hours getting home over Snoqualmie Pass after Christmas. I exclaimed at that crossing that there was more snow than I had ever seen for that time of year and sure enough a new snow fall record was set for December on the pass. Unfortunately reality is setting in as well as El Nino. The most recent NWS 3-month outlook is for above normal temperatures and below normal precipitation which could well mean an end to the big dumps of fresh powder. I'm sure that there will be more snow just not like what we experienced last month. <http://www.cpc.ncep.noaa.gov/>

Snowpack

The January 1 statewide SNOTEL readings were 128% of normal but vary across the state. The Skykomish River Basin reported the lowest readings at 83% of the 30-year median for January 1 and conversely from a year ago the Olympics had the most snow with 143%. 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 112% of normal, the Central and South Puget river basins with 113% and 128% respectively, and the Lower Columbia basins with 127% of normal. Snowpack along the east slopes of the Cascade Mountains included the Yakima area with 132% and the Wenatchee area with 120%. Snowpack in the Spokane River Basin was at 87% and the Walla Walla River Basin had 117% of the long term median.

BASIN	PERCENT OF MEDIAN	LAST YEAR PERCENT MEDIAN
Spokane	87	58
Newman Lake	130	57
Pend Oreille	96	111
Okanogan	130	104
Methow	136	114
Conconully Lake	115	100
Central Columbia	120	68
Upper Yakima	132	47
Lower Yakima	133	56
Ahtanum Creek	143	61
Walla Walla	117	67
Lower Snake	110	80
Cowlitz	131	49
Lewis	122	30
White	118	63
Green	134	37
Puyallup	135	66
Cedar	169	30
Snoqualmie	112	33
Skykomish	83	31
Skagit	130	82
Nooksack	116	30
Olympic Peninsula	143	30

Precipitation

Without exception the state received well above normal precipitation for the month of December keeping year to date averages much above normal. No basin was below 130% of average and many were well over 200% last month. Quillayute State Airport measured 148% of normal rainfall. The wettest SNOTEL in the state was June Lake, located on the South flank of Mt. St. Helens, collected 45.8 inches of precipitation during the month of December but also racked up an impressive 90.2 inches for the water year which is 24 inches above normal.

RIVER BASIN	JANUARY PERCENT OF AVERAGE	WATER YEAR PERCENT OF AVERAGE
Spokane	148	102
Pend Oreille	138	105
Upper Columbia	146	107
Central Columbia	175	149
Upper Yakima	192	150
Lower Yakima	212	152
Walla Walla	168	115
Lower Snake	154	112
Lower Columbia	203	146
South Puget Sound	202	152
Central Puget Sound	188	149
North Puget Sound	156	127
Olympic Peninsula	200	136

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 425,000-acre feet, 123% of average for the Upper Reaches and 136,000-acre feet or 131% of average for Rimrock and Bumping Lakes. The power generation reservoirs included the following: Coeur d'Alene Lake, 61,000 acre feet, 65% of average and 25% of capacity; and the Skagit River reservoirs at 73% of average and 59% 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	25	65
Pend Oreille	38	83
Upper Columbia	54	92
Central Columbia	N/A	N/A
Upper Yakima	51	123
Lower Yakima	59	131
Lower Snake	66	95
North Puget Sound	59	73

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, 139%; White River, 138%; and Skagit River, 122%. Some Eastern Washington streams include the Yakima River near Parker 130%, Wenatchee River at Plain 117%; 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	93-100
Pend Oreille	101-102
Upper Columbia	90-121
Central Columbia	110-117
Upper Yakima	111-134
Lower Yakima	127-152
Walla Walla	104-109
Lower Snake	106-110
Lower Columbia	109-147
South Puget Sound	138-148
Central Puget Sound	121-141
North Puget Sound	106-122
Olympic Peninsula	109-114

STREAM	PERCENT OF AVERAGE JANUARY STREAMFLOWS
Pend Oreille at Albeni Fall Dam	126
Kettle at Laurier	95
Columbia at Birchbank	129
Spokane at Spokane	90
Similkameen at Nighthawk	143
Okanogan at Tonasket	122
Methow at Pateros	145
Chelan at Chelan	205
Wenatchee at Pashastin	200
Cle Elum near Roslyn	204
Yakima at Parker	227
Naches at Naches	364
Grande Ronde at Troy	98
Snake below Lower Granite Dam	89
Columbia River at The Dalles	86
Lewis at Merwin Dam	176
Cowlitz below Mayfield Dam	200
Skagit at Concrete	147
Dungeness near Sequim	191

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.



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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>

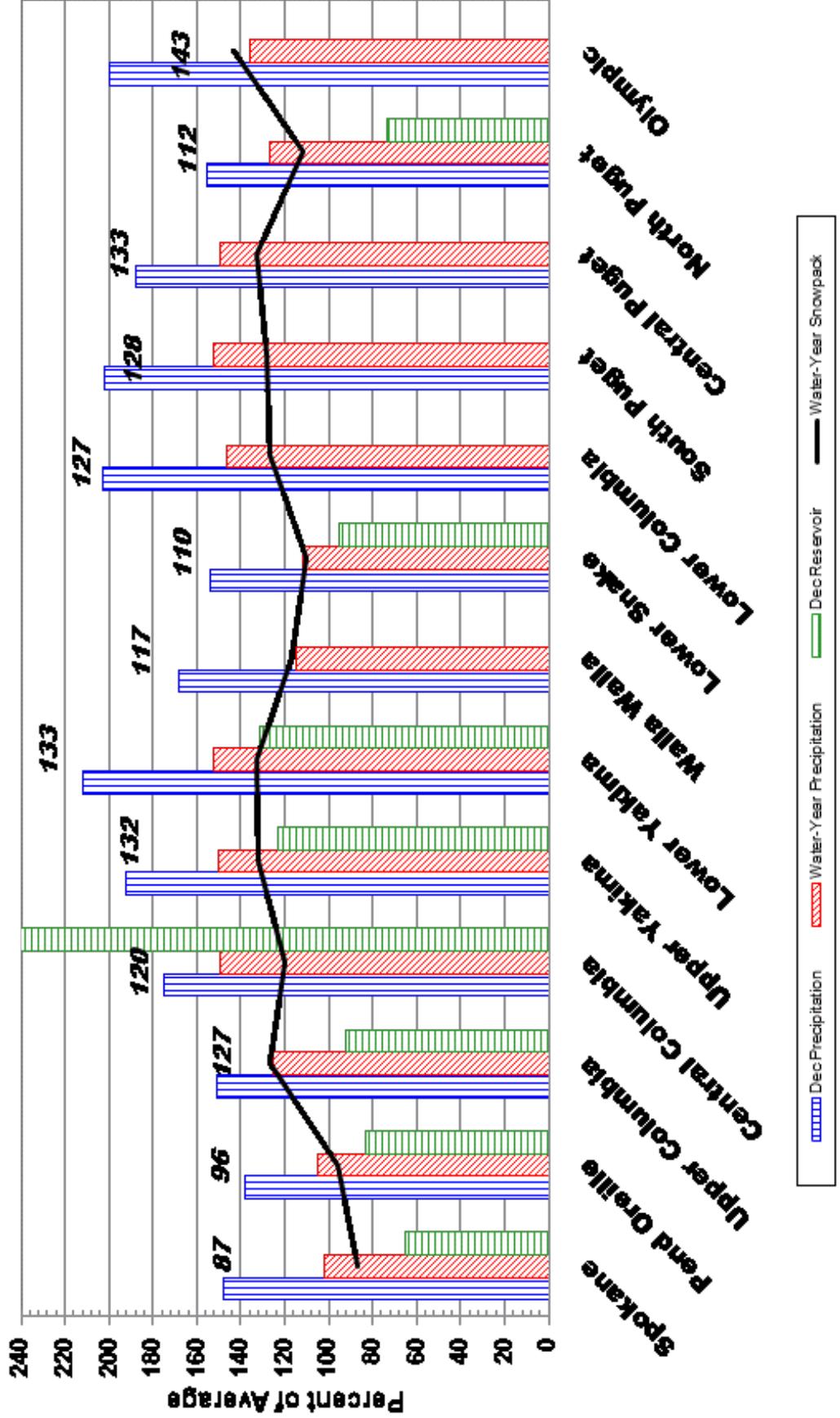
USDA-NRCS Agency Homepages

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/>

January 1, 2016 - Snowpack, Precipitation and Reservoir Conditions at a Glance

(Water Year = October 1, 2015 - Current Date)



Western Snow Conference

The Western Snow Conference is an annual tradition which started in 1932 as an international forum for individuals and organizations to share scientific, management and socio-political information on snow and runoff. The principal aim of the Western Snow Conference is to advance snow and hydrological sciences. The North Pacific Area Committee is making plans for the 84th Annual Western Snow Conference in 2016.

Mark your calendar and start thinking about submitting a paper to attend the 2016 Western Snow Conference:

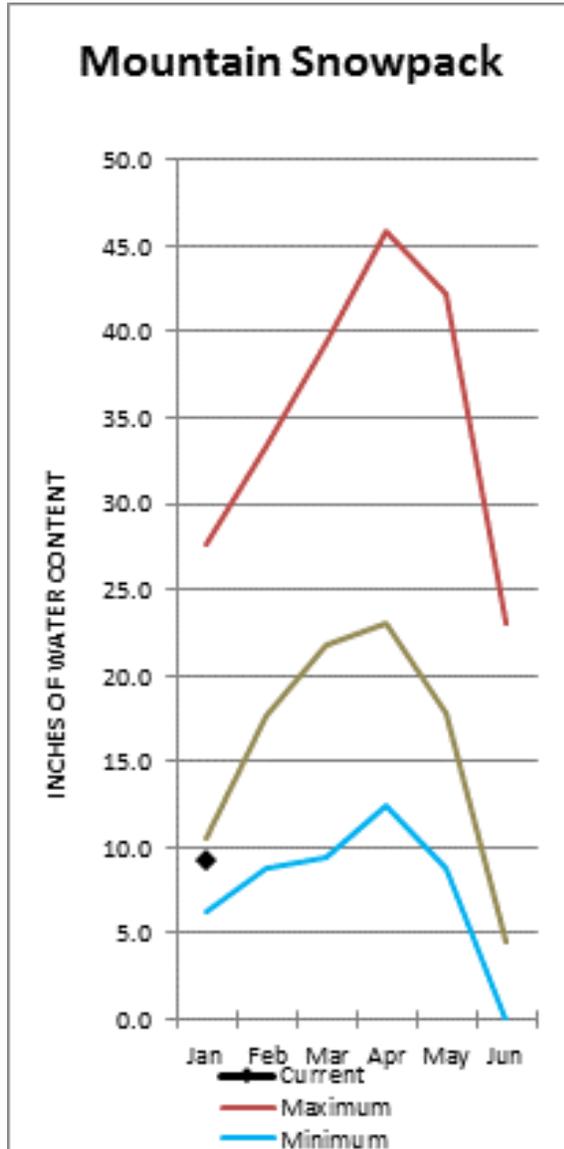
Dates: April 18-21, 2016

Location: Seattle, Washington

The Conference will begin Monday, April 18th with a short course and panel discussion on "Validation of the rain/snow Global Precipitation Measurements (GPM) satellite data in the Olympic Mountains: University of Washington and NASA" with several invited experts in the field. Tuesday and Wednesday will include formal paper and poster presentations on a variety of topics, including snow drought, climatology of drought, forecasting in drought conditions, dichotomy of precipitation and snow conditions, impacts and mitigation of low snow packs and record events in the snow environment. Thursday will include a technical of northwest geology and hydropower complexes in the North Cascade Mountains.

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.



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 100% of average flows for the May-August period. The forecast is based on a basin snowpack that is 87% of normal and precipitation that is 102% of average for the water year. Precipitation for January was above normal at 148% of average. Streamflow on the Spokane River at Spokane was 90% of average for January. January 1 storage in Coeur d'Alene Lake was 61,000 acre feet, 65% of average and 25% of capacity. Snowpack at Quartz Peak SNOTEL site was 130% of average with 12.6 inches of water content. Average temperatures in the Spokane basin were near normal for January and 2-4 degrees above 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, 2016

Spokane	Forecast Period	Forecast Exceedance Probabilities for Risk Assessment Chance that actual volume will exceed forecast						30yr Avg (KAF)
		90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	
Spokane R nr Post Falls	APR-JUL	1320	1850	2220	93%	2590	3120	2390
	APR-SEP	1390	1940	2310	93%	2680	3230	2480
Spokane R at Long Lake	APR-JUL	1480	2090	2500	95%	2910	3520	2620
	APR-SEP	1650	2280	2710	95%	3140	3770	2850
Chamokane Ck nr Long Lake	MAY-AUG	5.9	7.9	9.3	100%	10.6	12.7	9.3

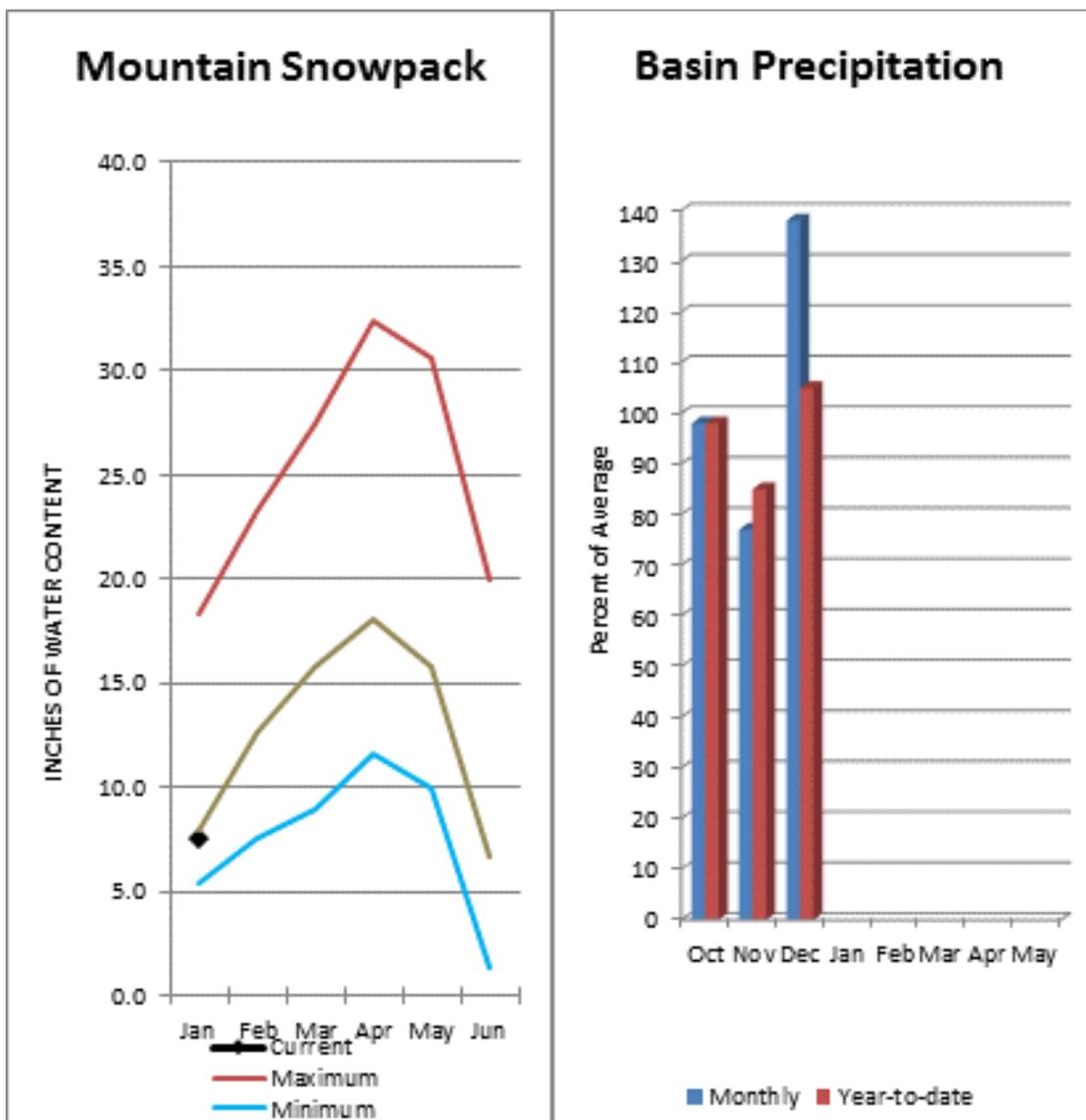
1) 90% and 10% exceedance probabilities are actually 95% and 5%

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, 2015	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Lake Coeur d' Alene	60.7	139.7	93.7	238.5
Basin-wide Total	60.7	139.7	93.7	238.5
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis January 1, 2016	# of Sites	% Median	Last Year % Median
Spokane	12	87%	58%
Newman Lake	1	130%	57%



The April – September average forecast for the Priest River near the town of Priest River is 101% and the Pend Oreille below Box Canyon is 102%. January streamflow was 121% of average on the Pend Oreille River and 129% on the Columbia at Birchbank. January 1 snow cover was 98% of normal in the Pend Oreille Basin River Basin. Bunchgrass Meadows SNOTEL site had 9.9 inches of snow water on the snow pillow. Normally Bunchgrass would have 11.6 inches on January 1. Precipitation during January was 138% of average, dropping the year-to-date precipitation at 105% of average. Reservoir storage in the basin, including Lake Pend Oreille and Priest Lake was 83% of normal. Average temperatures were 2-4 degrees above normal for January and for the water year.

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

Pend Oreille River Basins

Data Current as of: 1/7/2016 11:13:10 AM

Pend Oreille Basins Streamflow Forecasts - January 1, 2016

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	APR-JUL	9190	10900	12000	102%	13200	14900	11800
	APR-SEP	10100	11900	13100	102%	14200	16000	12800
Priest R nr Priest River	APR-JUL	550	690	785	101%	880	1020	780
	APR-SEP	585	735	835	101%	935	1080	830
Pend Oreille R bl Box Canyon	APR-JUL	9270	11000	12200	103%	13300	15000	11900
	APR-SEP	10200	12000	13300	102%	14500	16300	13000

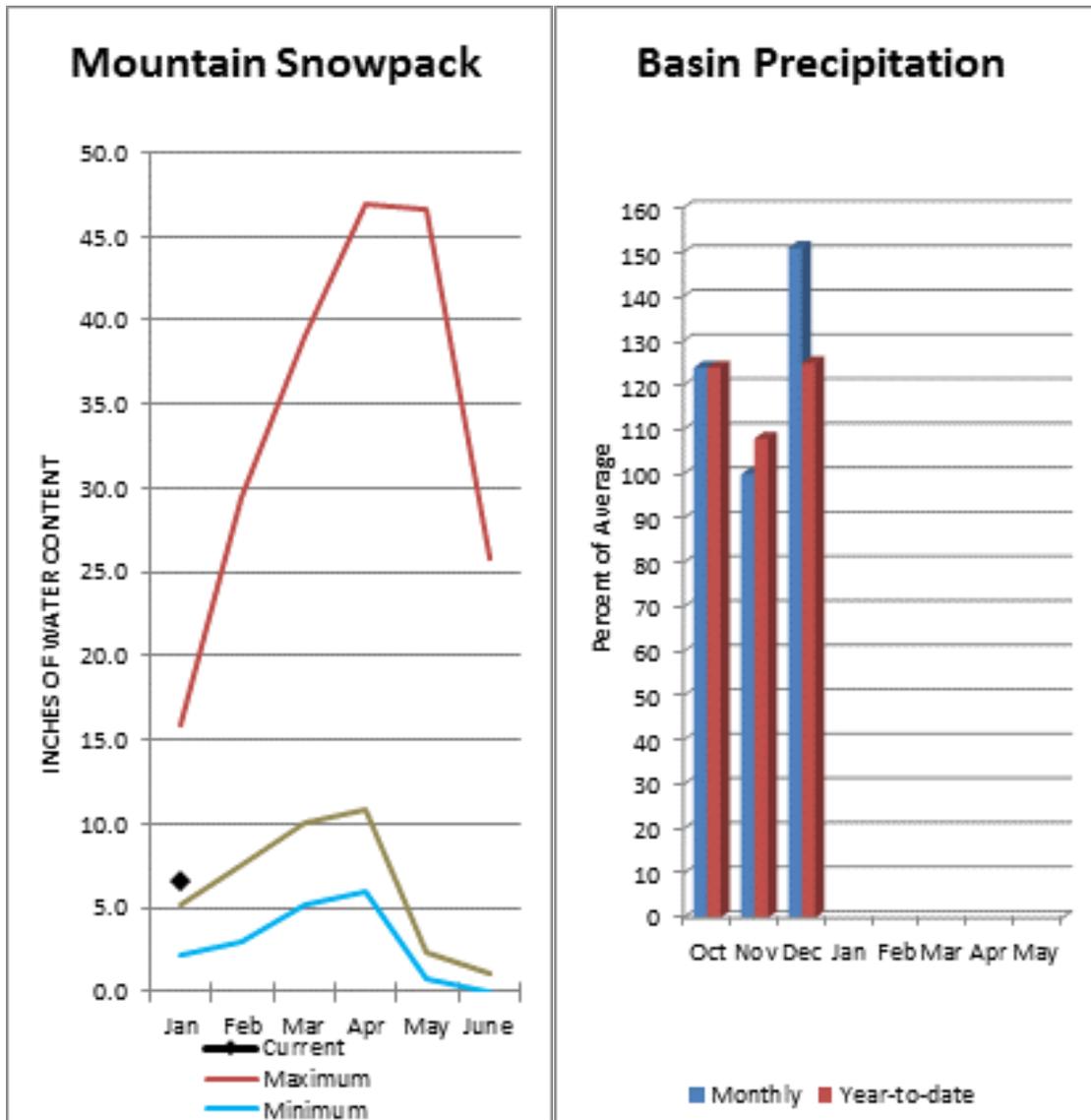
1) 90% and 10% exceedance probabilities are actually 95% and 5%

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 December, 2015	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Lake Pend Oreille	575.8	520.8	708.2	1561.3
Priest Lake	61.1	57.5	56.5	119.3
Basin-wide Total	636.8	578.3	764.7	1680.6
# of reservoirs	2	2	2	2

Watershed Snowpack Analysis January 1, 2016	# of Sites	% Median	Last Year % Median
Pend Oreille Basins	51	98%	111%
Colville River	0		
Pend Oreille River	51	98%	111%
Kettle River	3	123%	70%



Summer runoff average forecast for the Okanogan River is 117%, Similkameen River is 90%, and Methow River is 116%. January 1 snow cover on the Okanogan was 130% of normal, Omak Creek was 121% and the Methow was 136%. January precipitation in the Upper Columbia was 146% of average, with precipitation for the water year at 107% of average. January streamflow for the Methow River was 145% of average, 122% for the Okanogan River and 143% for the Similkameen. Snow-water content at Salmon Meadows SNOTEL was 5.4 inches or 115% of normal for January 1. Combined storage in the Conconully Reservoirs was 13,000 acre-feet or 92% of normal. Temperatures were near normal for January and for the water year.

Upper Columbia River Basins

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Upper Columbia Basins Streamflow Forecasts - January 1, 2016

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	1350	1660	1870	104%	2080	2400	1800
	APR-SEP	1400	1740	1970	105%	2190	2530	1880
Colville R at Kettle Falls	APR-JUL	72	116	146	123%	176	220	119
	APR-SEP	78	126	159	121%	192	240	131
Columbia R at Grand Coulee ¹	APR-SEP	36100	48600	54300	90%	59900	72400	60110
	APR-JUL	31100	41600	46300	91%	51100	61600	51015
Similkameen R nr Nighthawk ¹	APR-JUL	620	930	1070	89%	1210	1520	1200
	APR-SEP	665	995	1150	90%	1300	1630	1280
Okanogan R nr Tonasket ¹	APR-JUL	895	1410	1640	111%	1870	2380	1480
	APR-SEP	980	1560	1830	111%	2090	2680	1650
Okanogan R at Malott ¹	APR-JUL	915	1450	1690	117%	1940	2470	1450
	APR-SEP	1000	1610	1890	117%	2160	2770	1620
Methow R nr Pateros	APR-JUL	690	860	970	116%	1090	1250	835
	APR-SEP	750	925	1040	116%	1160	1340	895
Columbia R at Birchbank ¹	APR-JUL	23400	29100	31700	94%	34300	40000	33840
	APR-SEP	28500	35700	38900	93%	42200	49300	41750

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

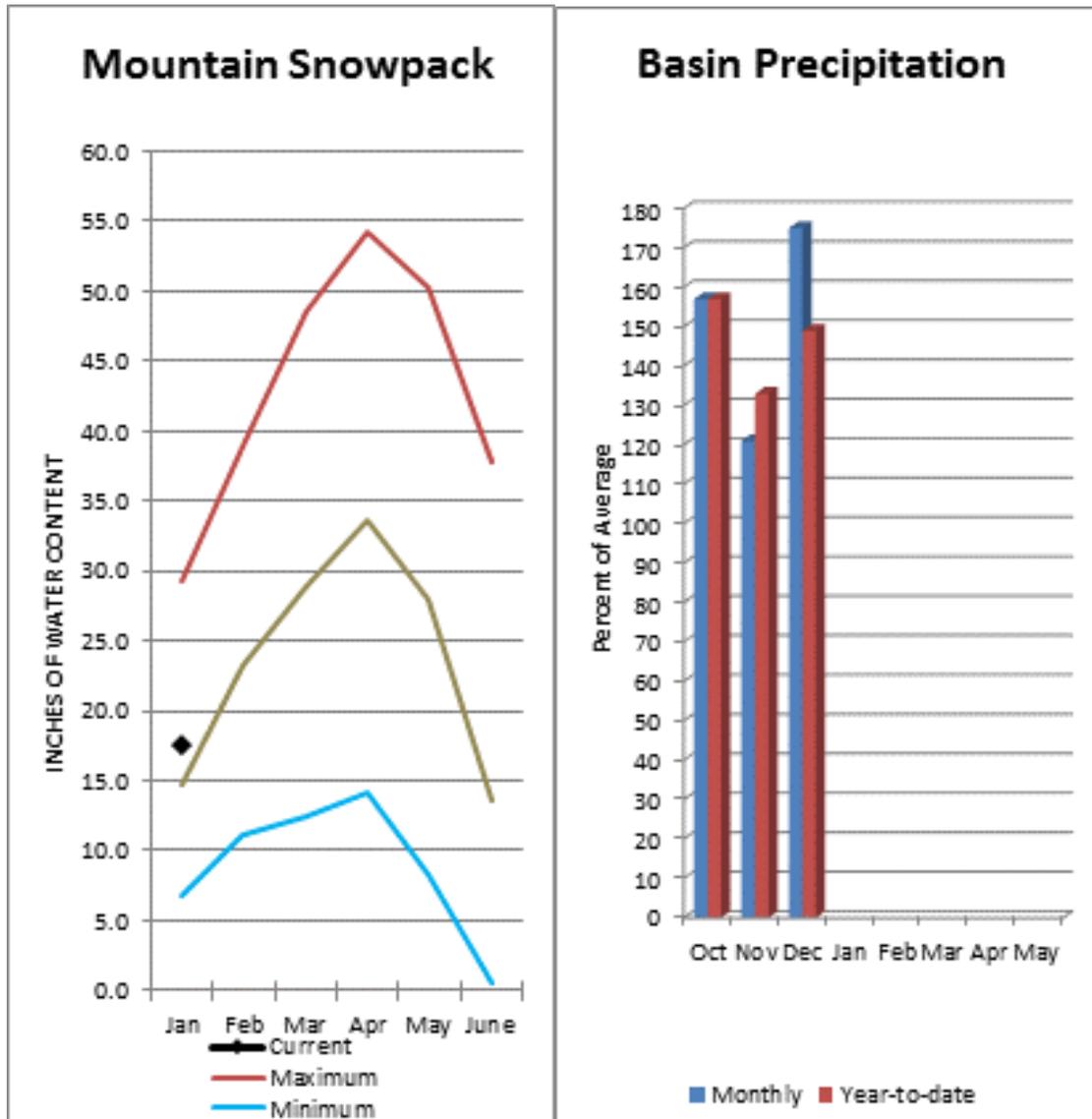
2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions

3) Median value used in place of average

Reservoir Storage End of December, 2015	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Conconully Lake (Salmon Lake Dam)	7.1	6.9	7.3	10.5
Conconully Reservoir	5.7	8.3	6.5	13.0
Basin-wide Total	12.7	15.3	13.8	23.5
# of reservoirs	2	2	2	2

Watershed Snowpack Analysis January 1, 2016	# of Sites	% Median	Last Year % Median
Upper Columbia Basins	7	127%	98%
Okanogan River	6	130%	104%
Omak Creek	1	121%	56%
Sanpoil River	0		
Similkameen River	1	130%	95%
Toats Coulee Creek	0		
Conconully Lake	1	115%	100%
Methow River	3	136%	114%

Central Columbia River Basins



Precipitation during January was 175% of average in the basin and 149% for the year-to-date. Runoff for Entiat River is forecast to be 116% of average for the summer. The April-September average forecast for Chelan River is 110%, Wenatchee River at Plain is 117%, Stehekin River is 112% and Icicle Creek is 115%. January average streamflows on the Chelan River were 205% and on the Wenatchee River 200%. January 1 snowpack in the Wenatchee River Basin was 120% of normal; the Chelan, 117%; the Entiat, 103%; Stemilt Creek, 138% and Colockum Creek, 169%. Reservoir storage in Lake Chelan was not available. Lyman Lake SNOTEL had the most snow water with 29.9 inches of water. This site would normally have 26.4 inches on January 1. Temperatures were slightly below normal for January and near normal for the water year.

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

Central Columbia River Basins

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Central Columbia Basins Streamflow Forecasts - January 1, 2016

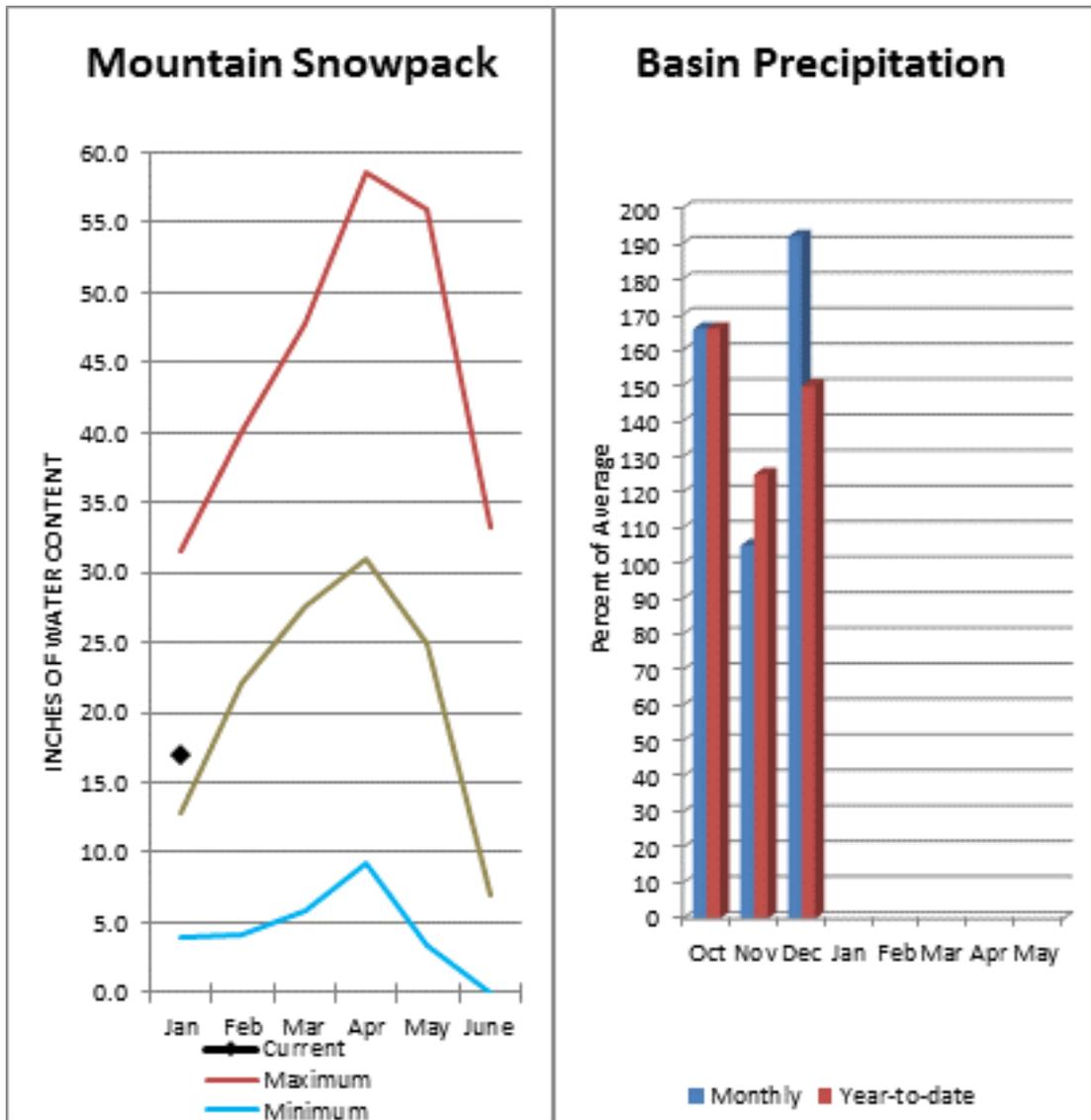
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

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	600	690	755	111%	820	910	680
	APR-SEP	715	815	885	112%	955	1050	790
Chelan R at Chelan	APR-JUL	890	1010	1090	109%	1170	1290	1000
	APR-SEP	990	1140	1230	110%	1330	1470	1120
Entiat R nr Ardenvoir	APR-JUL	176	210	235	118%	255	290	200
	APR-SEP	194	230	255	116%	280	315	220
Wenatchee R at Plain	APR-JUL	900	1050	1150	116%	1250	1390	990
	APR-SEP	990	1150	1260	117%	1370	1530	1080
Icicle Ck nr Leavenworth	APR-JUL	255	295	320	116%	345	385	275
	APR-SEP	275	320	345	115%	375	415	300
Wenatchee R at Peshastin	APR-JUL	1250	1450	1580	115%	1720	1920	1370
	APR-SEP	1350	1580	1730	116%	1880	2100	1490
Columbia R bl Rock Island Dam	APR-JUL	37500	45400	50800	91%	56200	64100	55770
	APR-SEP	43700	53100	59500	91%	65800	75200	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

Watershed Snowpack Analysis January 1, 2016	# of Sites	% Median	Last Year % Median
Central Columbia Basins	3	117%	80%
Chelan Lake Basin	3	117%	80%
Entiat River	1	103%	77%
Wenatchee River	7	120%	68%
Stemilt Creek	1	138%	96%
Colockum Creek	1	169%	90%

Upper Yakima River Basin



January 1 reservoir storage for the Upper Yakima reservoirs was 425,000-acre feet, 123% of average. Forecasts for the Yakima River at Cle Elum are 111% of average and the Teanaway River near Cle Elum is at 134%. Lake inflows are all forecasted to be above average this summer as well. January streamflows within the basin were Cle Elum River near Roslyn at 204%. January 1 snowpack was 132% based upon 8 snow course and SNOTEL readings within the Upper Yakima Basin. Precipitation was 192% of average for January and 150% 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.

Upper Yakima River Basin

Data Current as of: 1/7/2016 11:13:13 AM

Upper Yakima River Streamflow Forecasts - January 1, 2016

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	APR-JUL	94	116	132	114%	147	170	116
	APR-SEP	104	128	143	113%	159	182	126
Kachess Reservoir Inflow	APR-JUL	83	105	119	114%	134	155	104
	APR-SEP	93	114	128	113%	142	163	113
Cle Elum Lake Inflow	APR-JUL	320	385	430	112%	475	540	385
	APR-SEP	350	420	470	113%	515	585	415
Yakima R at Cle Elum	APR-JUL	610	750	845	112%	940	1080	755
	APR-SEP	675	825	925	111%	1030	1170	830
Teanaway R bl Forks nr Cle Elum	APR-JUL	118	151	174	134%	197	230	130
	APR-SEP	121	155	178	134%	200	235	133

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

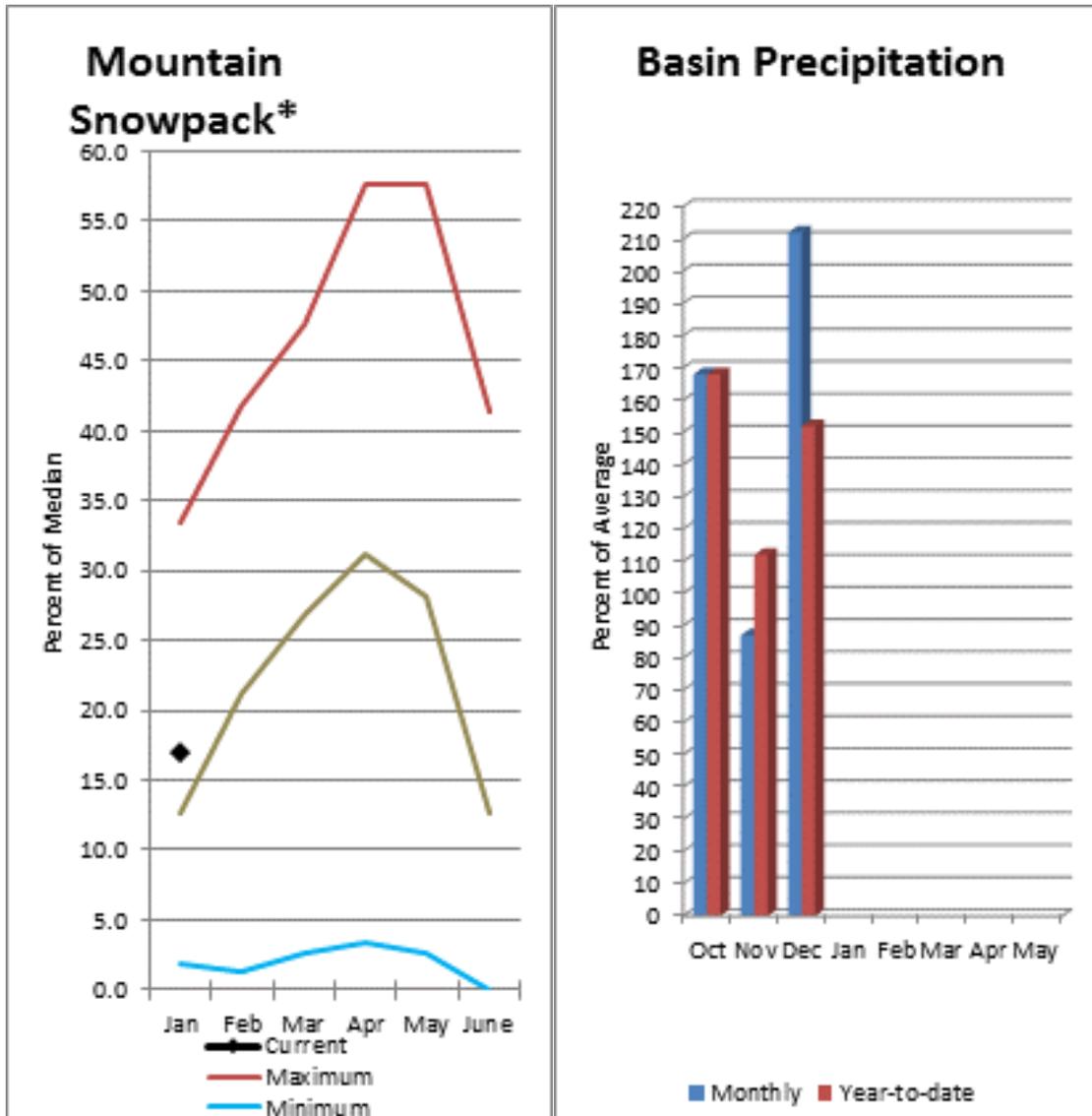
2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions

3) Median value used in place of average

Reservoir Storage End of December, 2015	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Keechelus	96.0	109.1	68.5	157.8
Kachess	110.8	171.8	113.4	239.0
Cle Elum	218.3	277.1	164.0	436.9
Basin-wide Total	425.2	558.1	345.9	833.7
# of reservoirs	3	3	3	3

Watershed Snowpack Analysis January 1, 2016	# of Sites	% Median	Last Year % Median
Upper Yakima River	8	132%	47%

Lower Yakima River Basin



January average streamflows within the basin were: Yakima River near Parker, 227% and the Naches River near Naches, 364%. January 1 reservoir storage for Bumping and Rimrock reservoirs was 136,000-acre feet, 131% of average. Forecast averages for Yakima River near Parker are 130%; American River near Nile, 129%; Ahtanum Creek, 152%; and Klickitat River near Glenwood, 147%. January 1 snowpack was 133% based upon 7 snow course and SNOTEL readings within the Lower Yakima Basin and Ahtanum Creek reported in at 143% of normal. Precipitation was 211% of average for January and 152% for the water-year. Temperatures were near normal for January and for 1-3 degrees below normal for the water year. Volume forecasts for Yakima Basin are for natural flow. As such, they January 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.

Lower Yakima River Basin

Data Current as of: 1/7/2016 11:13:13 AM

Lower Yakima River Streamflow Forecasts - January 1, 2016

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	APR-JUL	117	135	147	129%	160	178	114
	APR-SEP	127	147	161	131%	174	194	123
American R nr Nile	APR-JUL	103	119	130	127%	141	157	102
	APR-SEP	112	130	142	129%	154	172	110
Rimrock Lake Inflow	APR-JUL	190	215	235	126%	250	275	187
	APR-SEP	225	255	280	127%	300	330	220
Naches R nr Naches	APR-JUL	705	820	900	129%	980	1100	700
	APR-SEP	765	895	980	129%	1070	1200	760
Ahtanum Ck at Union Gap	APR-JUL	27	36	42	156%	48	57	27
	APR-SEP	29	38	44	152%	50	60	29
Yakima R nr Parker	APR-JUL	1640	1940	2150	130%	2350	2660	1660
	APR-SEP	1810	2130	2360	130%	2580	2910	1820
Klickitat R nr Glenwood	APR-JUL	148	169	184	146%	199	220	126
	APR-SEP	164	188	205	147%	220	245	139
Klickitat R nr Pitt	APR-JUL	520	585	630	145%	675	740	435
	APR-SEP	630	705	760	146%	810	885	520

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

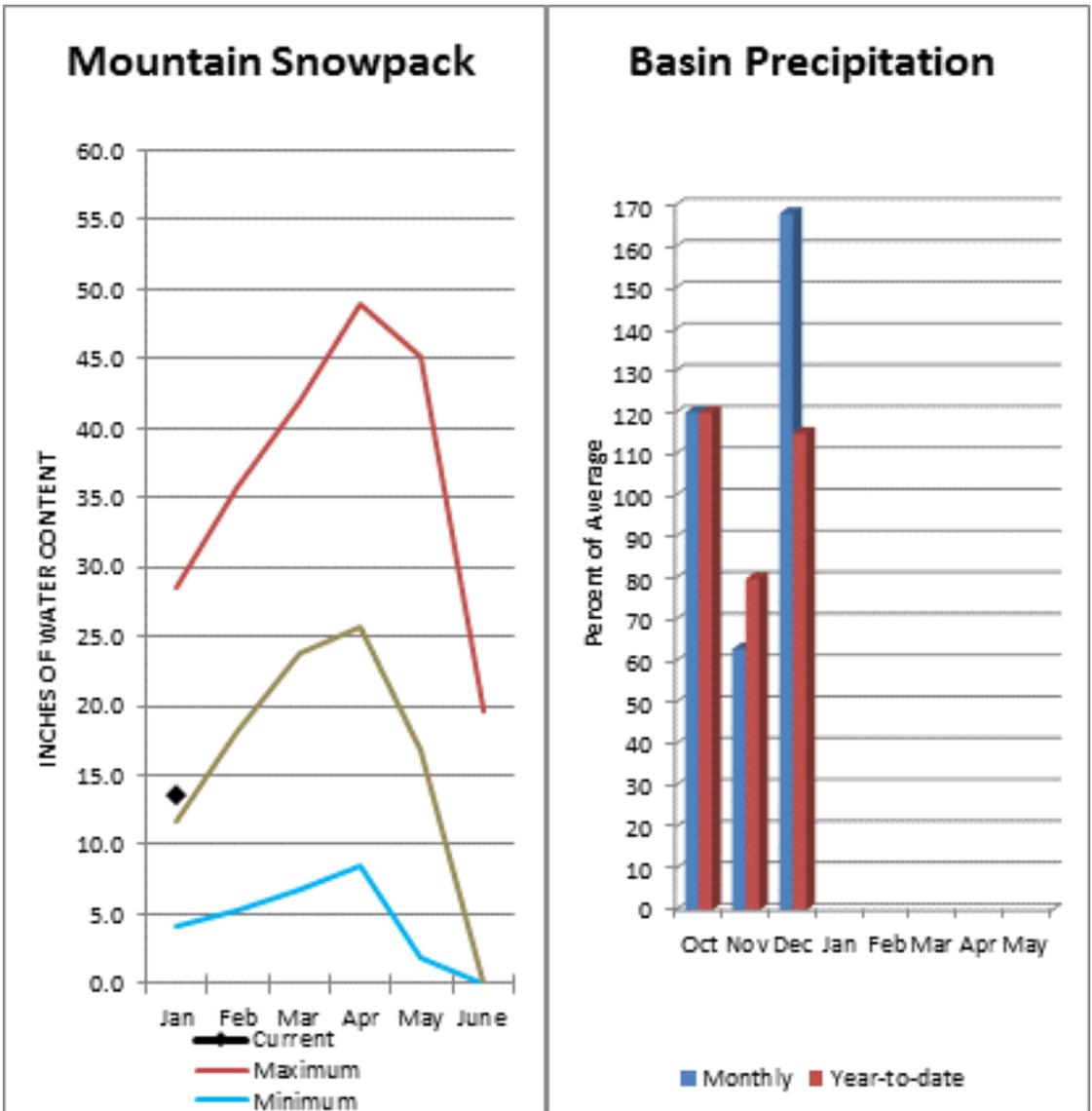
2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions

3) Median value used in place of average

Reservoir Storage End of December, 2015	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Bumping Lake	19.5	19.1	11.5	33.7
Rimrock	116.9	121.1	92.4	198.0
Basin-wide Total	136.4	140.2	103.9	231.7
# of reservoirs	2	2	2	2

Watershed Snowpack Analysis January 1, 2016	# of Sites	% Median	Last Year % Median
Lower Yakima River	7	133%	56%
Ahtanum Creek	2	143%	61%

Walla Walla River Basin



January precipitation was 168% of average, maintaining the year-to-date precipitation at 115% of average. Snowpack in the basin was 117% of normal. Streamflow forecasts are 104% of average for Mill Creek and 109% for the SF Walla Walla near Milton-Freewater. Average temperatures were 1-3 degrees above normal for January and for the water year.

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

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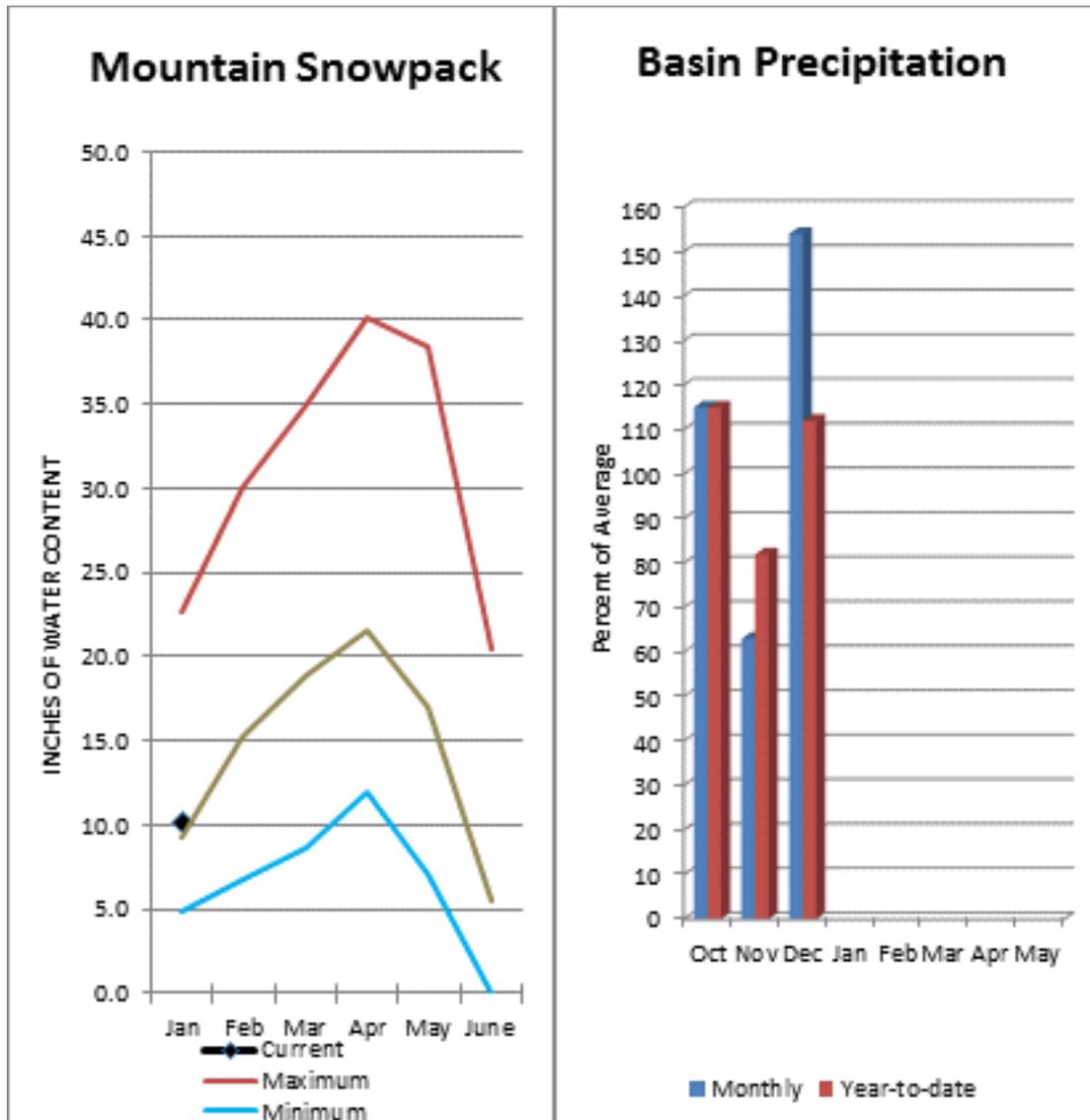
Walla Walla River Streamflow Forecasts - January 1, 2016

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	73	81	86	108%	91	99	80
	APR-JUL	49	55	59	109%	63	69	54
	APR-SEP	60	67	72	109%	76	83	66
Mill Ck nr Walla Walla	APR-JUL	17.9	22	25	104%	27	32	24
	APR-SEP	21	25	28	104%	31	35	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, 2016	# of Sites	% Median	Last Year % Median
Walla Walla River	2	117%	67%



The Grande Ronde River can expect summer flows to be about 110% of normal. The forecast for Asotin Creek at Asotin predicts 106% of average flows for the April – July runoff period. January precipitation was 154% of average, bringing the year-to-date precipitation to 112% of average. January 1 snowpack readings averaged 110% of normal. January streamflow was 89% of average for Snake River below Lower Granite Dam and 98% for Grande Ronde River near Troy. Dworshak Reservoir storage was 95% of average. Average temperatures were 1-3 degrees above normal for January and for the water year.

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

Lower Snake River Basin

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Lower Snake, Grande Ronde, Clearwater Basins Streamflow Forecasts - January 1, 2016

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)
<hr/>								
Grande Ronde R at Troy	MAR-JUL	1250	1500	1670	111%	1840	2090	1510
	APR-SEP	1040	1280	1440	110%	1600	1840	1310
Asotin Ck at Asotin	APR-JUL	20	31	38	109%	46	57	35
Clearwater R at Spalding	APR-JUL	5180	6460	7330	106%	8200	9480	6890
	APR-SEP	5520	6830	7720	106%	8610	9910	7270
Snake R bl Lower Granite Dam ¹	APR-SEP	8680	17100	20900	94%	24700	33100	22280
	APR-JUL	7380	14900	18300	92%	21700	29100	19848

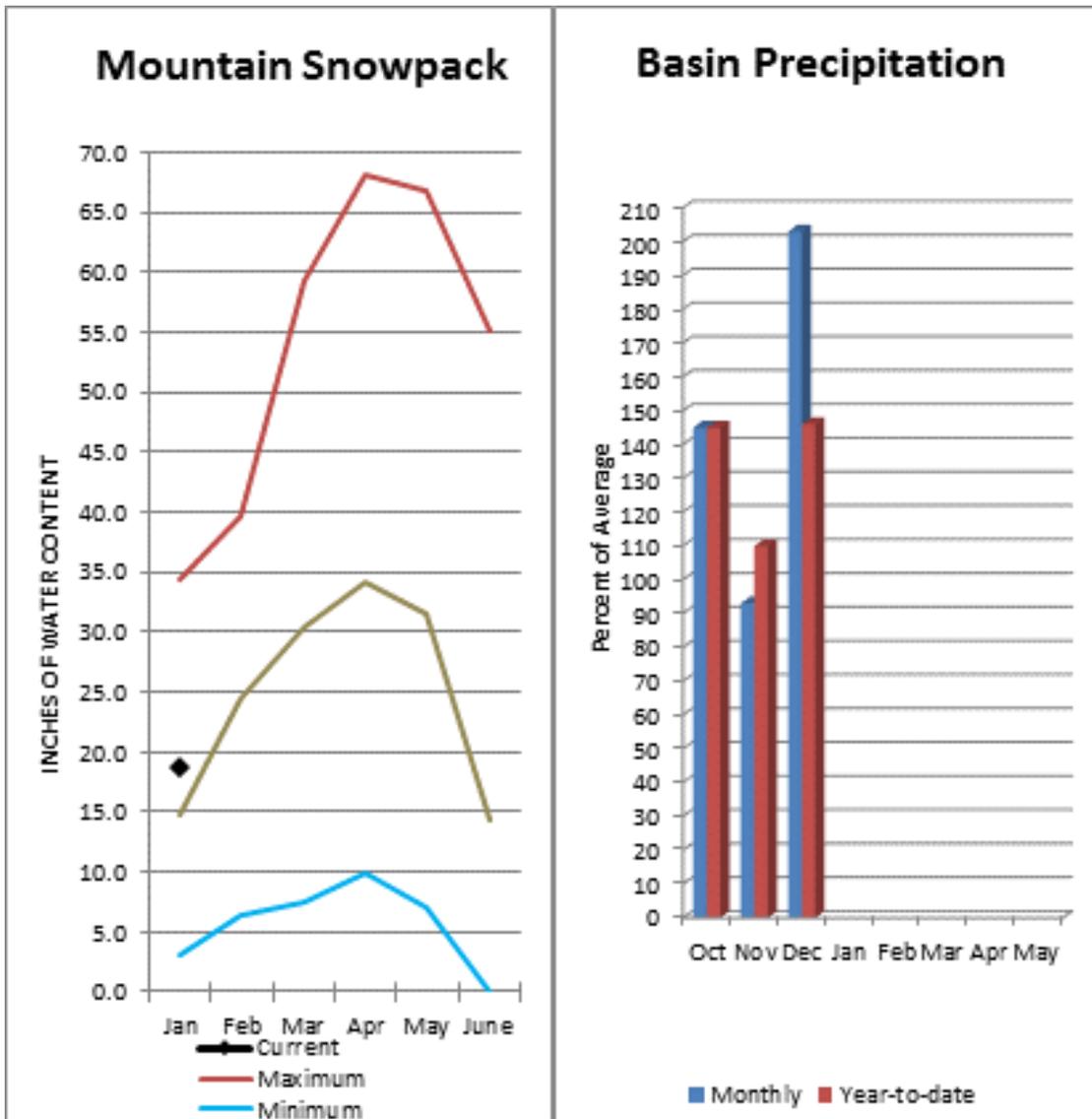
1) 90% and 10% exceedance probabilities are actually 95% and 5%

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, 2015	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Dworshak Reservoir	2274.5	2431.1	2403.0	3468.0
Basin-wide Total	2274.5	2431.1	2403.0	3468.0
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis January 1, 2016	# of Sites	% Median	Last Year % Median
Lower Snake, Grande Ronde, Clearwater Basins	12	110%	79%



Forecasts for April – September streamflows within the basin are Lewis River at Ariel, 109% and Cowlitz River at Castle Rock, 113% of average. The Columbia at The Dalles is forecasted to have 95% of average flows this summer according to the River Forecast Center. January average streamflow for Cowlitz River was 200%. The Columbia River at The Dalles was 86% of average. January precipitation was 203% of average and the water-year average was 146%. January 1 snow cover for Cowlitz River was 131%, and Lewis River was 122% of normal. Temperatures were near normal during January and for the water year.

Lower Columbia River Basins

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Lower Columbia Basins Streamflow Forecasts - January 1, 2016

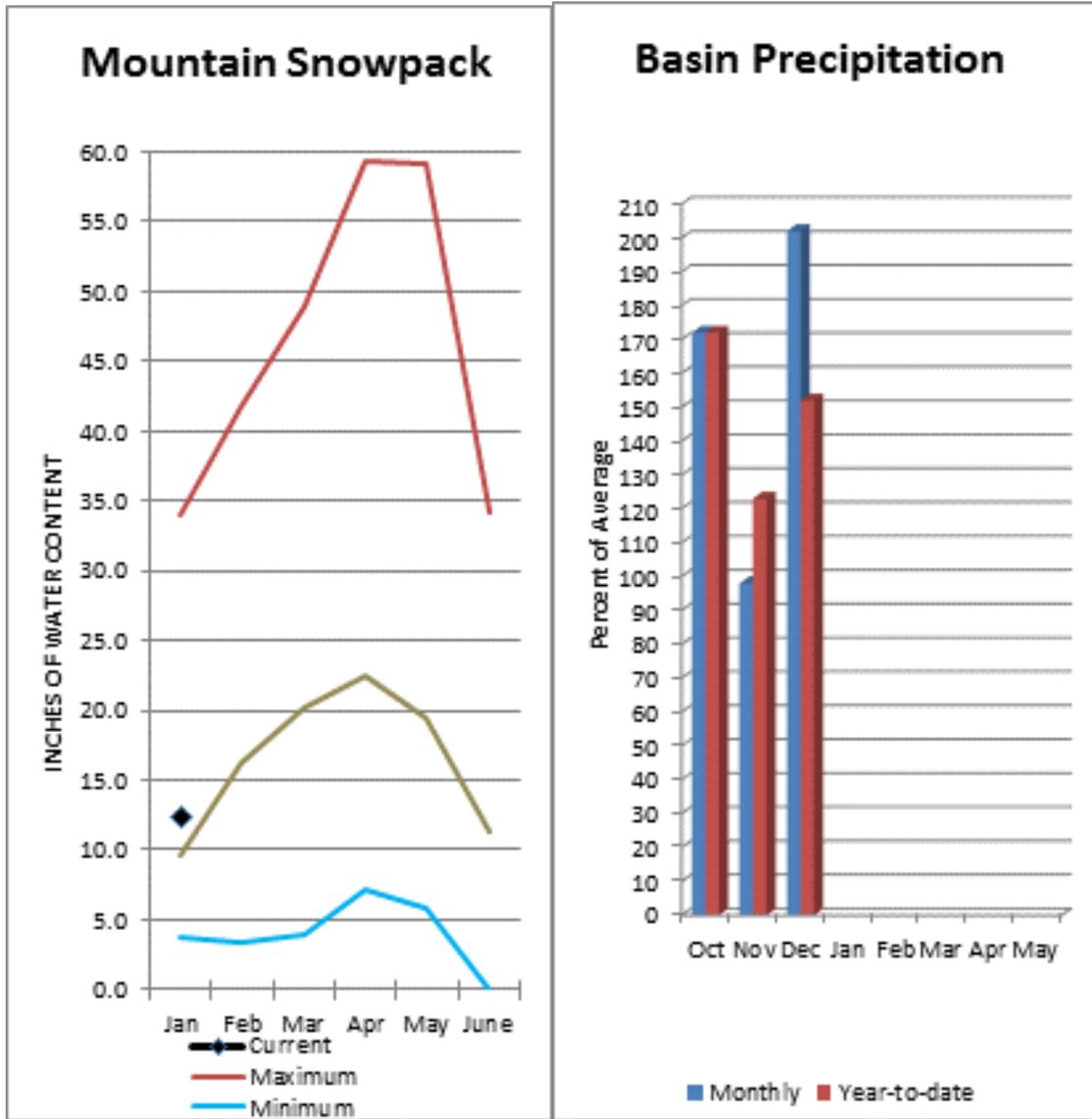
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

Lower Columbia Basins	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Columbia R at The Dalles	APR-JUL	53000	64700	72600	91%	80500	92200	79855
	APR-SEP	62700	76400	85600	92%	94900	109000	92704
Klickitat R nr Glenwood	APR-JUL	148	169	184	146%	199	220	126
	APR-SEP	164	188	205	147%	220	245	139
Klickitat R nr Pitt	APR-JUL	520	585	630	145%	675	740	435
	APR-SEP	630	705	760	146%	810	885	520
Lewis R at Ariel	APR-JUL	785	960	1080	111%	1200	1370	970
	APR-SEP	910	1090	1220	109%	1340	1530	1120
Cowlitz R bl Mayfield	APR-JUL	1380	1680	1890	117%	2100	2400	1620
	APR-SEP	1560	1940	2200	120%	2460	2840	1840
Cowlitz R at Castle Rock	APR-JUL	1970	2270	2480	111%	2690	2990	2230
	APR-SEP	2250	2600	2840	113%	3070	3420	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, 2016	# of Sites	% Median	Last Year % Median
Lower Columbia Basins	10	126%	41%
Lewis River	4	118%	30%
Cowlitz River	6	131%	49%

South Puget Sound River Basins



Summer runoff is forecast to be 148% of normal for the Green River below Howard Hanson Dam and 138% for the White River near Buckley. January 1 snowpack was 118% of average for the White River, 135% for Puyallup River and 134% in the Green River Basin. January precipitation was 202% of average, bringing the water year-to-date to 152% of average for the basins. Average temperatures in the area were slightly below normal for January and for the water-year.

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

South Puget Sound River Basins

Data Current as of: 1/7/2016 11:13:17 AM

South Puget Sound Basins Streamflow Forecasts - January 1, 2016

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	APR-JUL	480	560	595	138%	630	710	430
	APR-SEP	575	665	710	138%	750	840	515
Green R bl Howard A Hanson Dam ¹	APR-JUL	270	330	360	153%	385	445	235
	APR-SEP	295	355	385	148%	410	470	260

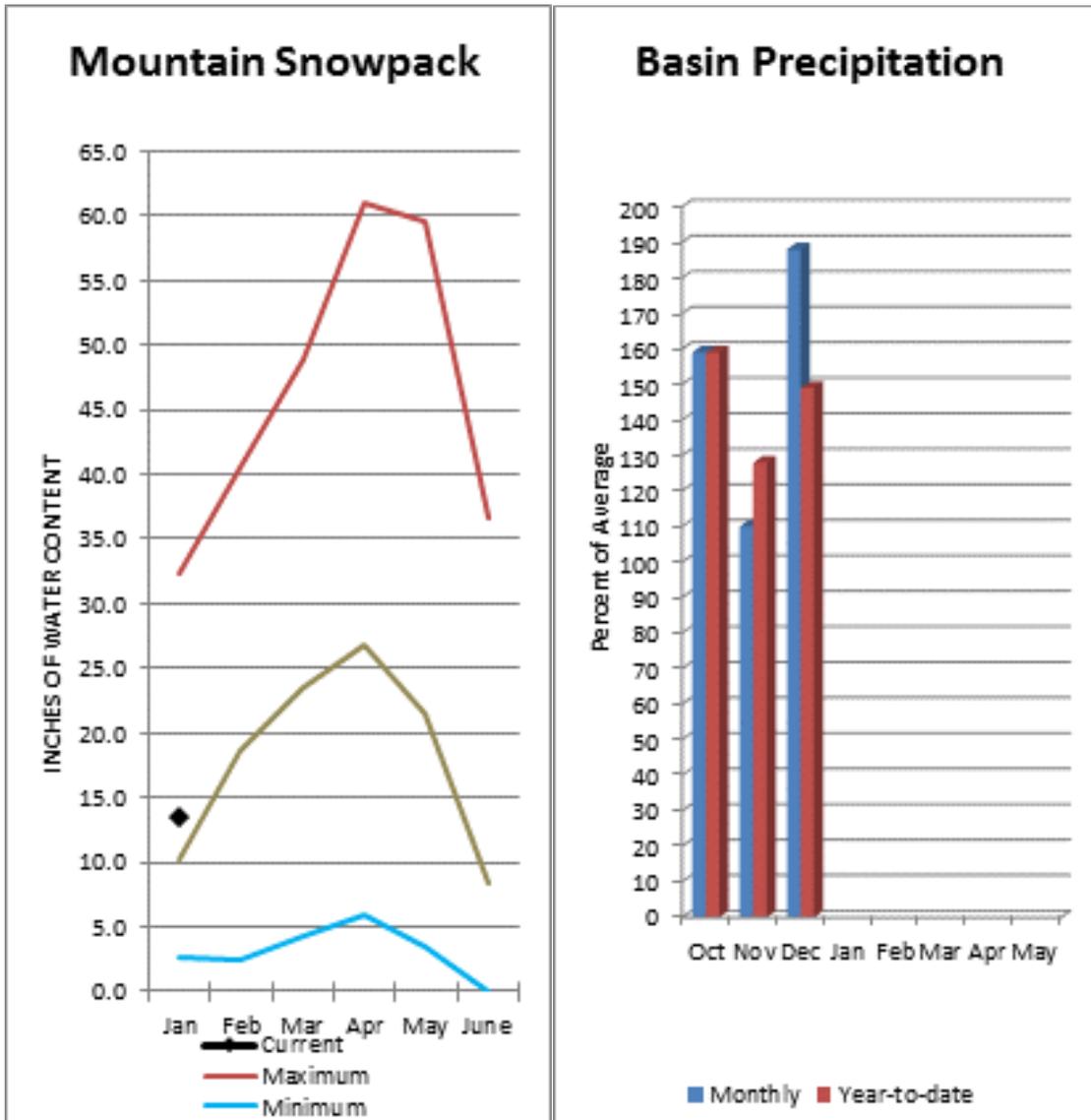
1) 90% and 10% exceedance probabilities are actually 95% and 5%

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, 2016	# of Sites	% Median	Last Year % Median
South Puget Sound Basins	10	128%	58%
White River	3	118%	63%
Green River	2	134%	37%

Central Puget Sound River Basins



Forecast for spring and summer flows are: 139% for Cedar River near Cedar Falls; 141% for Rex River; 124% for South Fork of the Tolt River; and 121% for Taylor Creek near Selleck. Basin-wide precipitation for January was 188% of average, bringing water-year-to-date to 149% of average. January 1 median snow cover in Cedar River Basin was 169%, Tolt River Basin was 105%, Snoqualmie River Basin was 112%, and Skykomish River Basin was 83%. Temperatures were slightly normal for January and for the water-year.

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

Central Puget Sound River Basins

Data Current as of: 1/7/2016 11:13:17 AM

Central Puget Sound Basins Streamflow Forecasts - January 1, 2016

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	74	88	98	140%	108	123	70
	APR-SEP	81	96	106	139%	116	132	76
Rex R nr Cedar Falls	APR-JUL	25	31	36	150%	40	46	24
	APR-SEP	28	34	38	141%	42	49	27
Taylor Ck nr Selleck	APR-JUL	18.7	22	25	125%	27	30	20
	APR-SEP	22	26	29	121%	31	35	24
SF Tolt R nr Index	APR-JUL	13.2	16	17.8	125%	19.7	22	14.2
	APR-SEP	15.2	18	19.9	124%	22	25	16.1

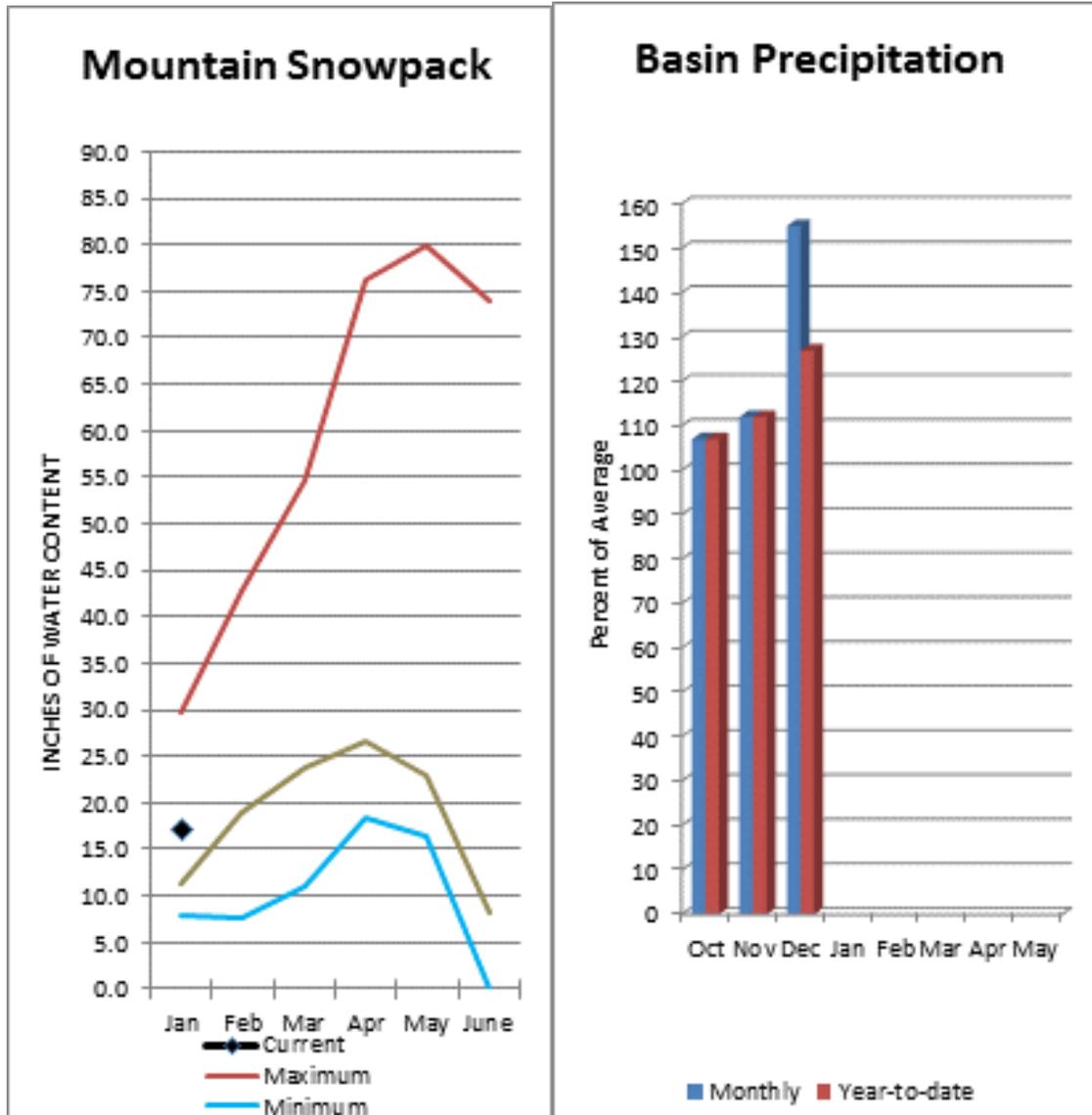
1) 90% and 10% exceedance probabilities are actually 95% and 5%

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

3) Median value used in place of average

Watershed Snowpack Analysis January 1, 2016	# of Sites	% Median	Last Year % Median
Central Puget Sound Basins	14	128%	42%
Puyallup River	5	135%	66%
Cedar River	4	169%	30%
Tolt River	2	105%	26%
Snoqualmie River	4	112%	33%
Skykomish River	2	83%	31%

North Puget Sound River Basins



Forecast for Skagit River streamflow at Newhalem is 122% of average for the spring and summer period. January streamflow in Skagit River was 147% of average. Other forecast points included Baker River at 118% and Thunder Creek at 106% of average. Basin-wide precipitation for January was 153% of average, bringing water-year-to-date to 125% of average. January 1 average snow cover in Skagit River Basin was 130%, Nooksack River Basin was 116% and Baker River Basin was 99%. January 1 Skagit River reservoir storage was 73% of average and 59% of capacity. Average temperatures were slightly below normal for January and near normal for the water year.

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

North Puget Sound River Basins

Data Current as of: 1/7/2016 11:13:18 AM

North Puget Sound Basins Streamflow Forecasts - January 1, 2016

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	215	235	250	106%	265	285	235
	APR-SEP	305	330	350	106%	365	390	330
Skagit R at Newhalem	APR-JUL	1780	1970	2100	125%	2230	2420	1680
	APR-SEP	2110	2320	2470	122%	2620	2840	2030
Baker R at Concrete	APR-JUL	705	810	880	113%	950	1050	780
	APR-SEP	925	1060	1160	118%	1250	1390	980

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

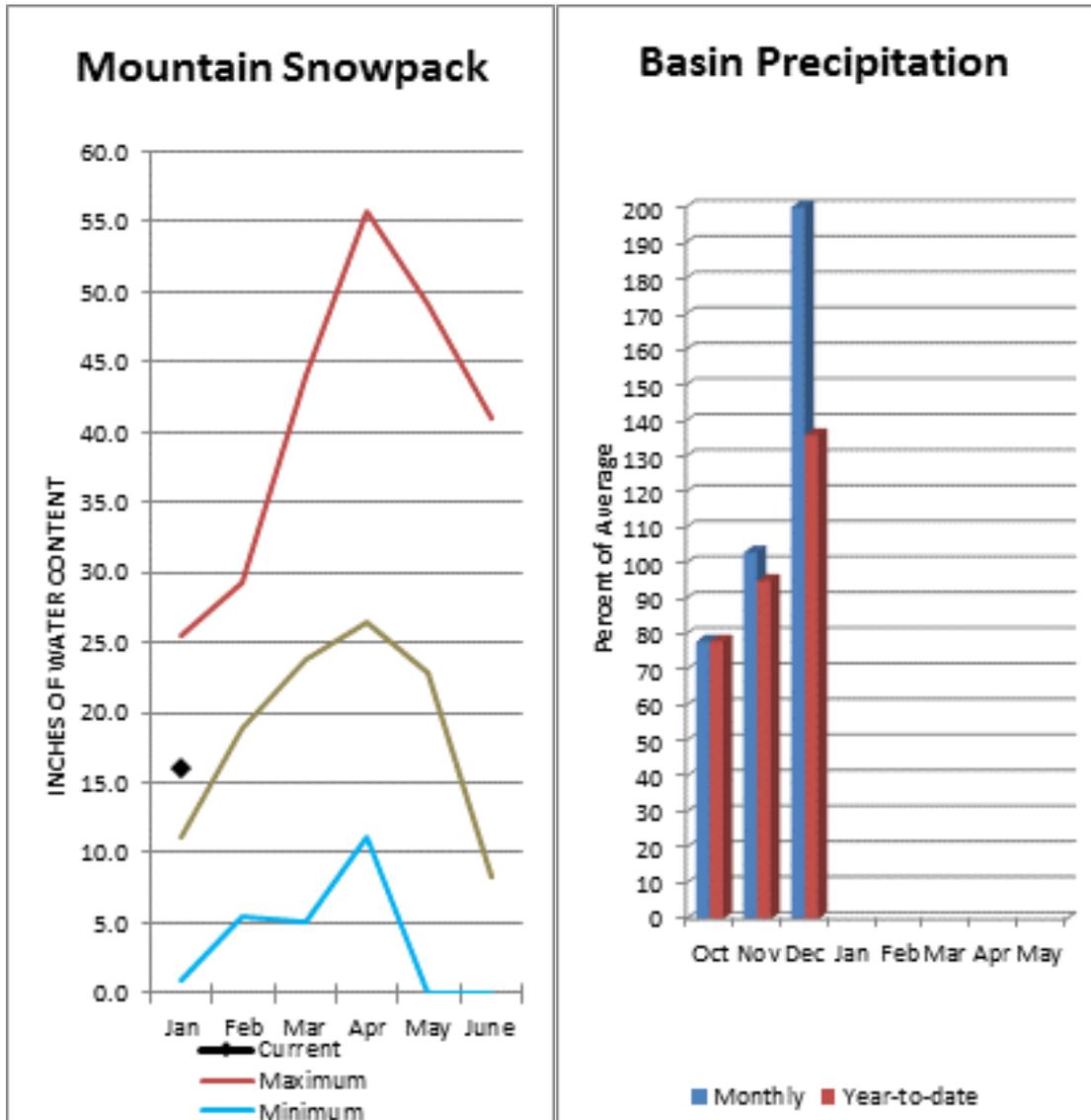
2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions

3) Median value used in place of average

Reservoir Storage End of December, 2015	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Ross	823.0	892.8	1135.0	1404.1
Diablo Reservoir			85.8	90.6
Basin-wide Total	823.0	892.8	1135.0	1404.1
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis January 1, 2016	# of Sites	% Median	Last Year % Median
North Puget Sound Basins	15	112%	47%
Skagit River	7	130%	82%
Baker River	6	99%	27%
Nooksack River	2	116%	30%

Olympic Peninsula River Basins



Forecasted average runoff for streamflow for the Dungeness River is 109% and Elwha River is 114%. January runoff in the Dungeness River was 191% of normal. Big Quilcene and Wynoochee rivers may expect near average runoff this summer as well. January precipitation was 200% of average. Precipitation has accumulated at 136% of average for the water year. January precipitation at Quillayute was 148% of normal. Olympic Peninsula snowpack averaged 143% of normal on January 1. Temperatures were 1-3 degrees above average for in the mountains but 1-2 degrees below normal on the coast and 1-4 degrees above normal for the water year.

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

Olympic Peninsula River Basins

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Olympic Peninsula Streamflow Forecasts - January 1, 2016

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

Olympic Peninsula	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Dungeness R nr Sequim	APR-JUL	105	121	132	110%	143	159	120
	APR-SEP	126	145	158	109%	172	191	145
Elwha R at McDonald Bridge nr Port Angeles	APR-JUL	360	415	450	113%	490	540	400
	APR-SEP	430	490	535	114%	575	635	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, 2016	# of Sites	% Median	Last Year % Median
Olympic Peninsula	3	143%	30%

Issued by

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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.



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Washington Water Supply Outlook Report

Natural Resources Conservation Service
Spokane, WA

