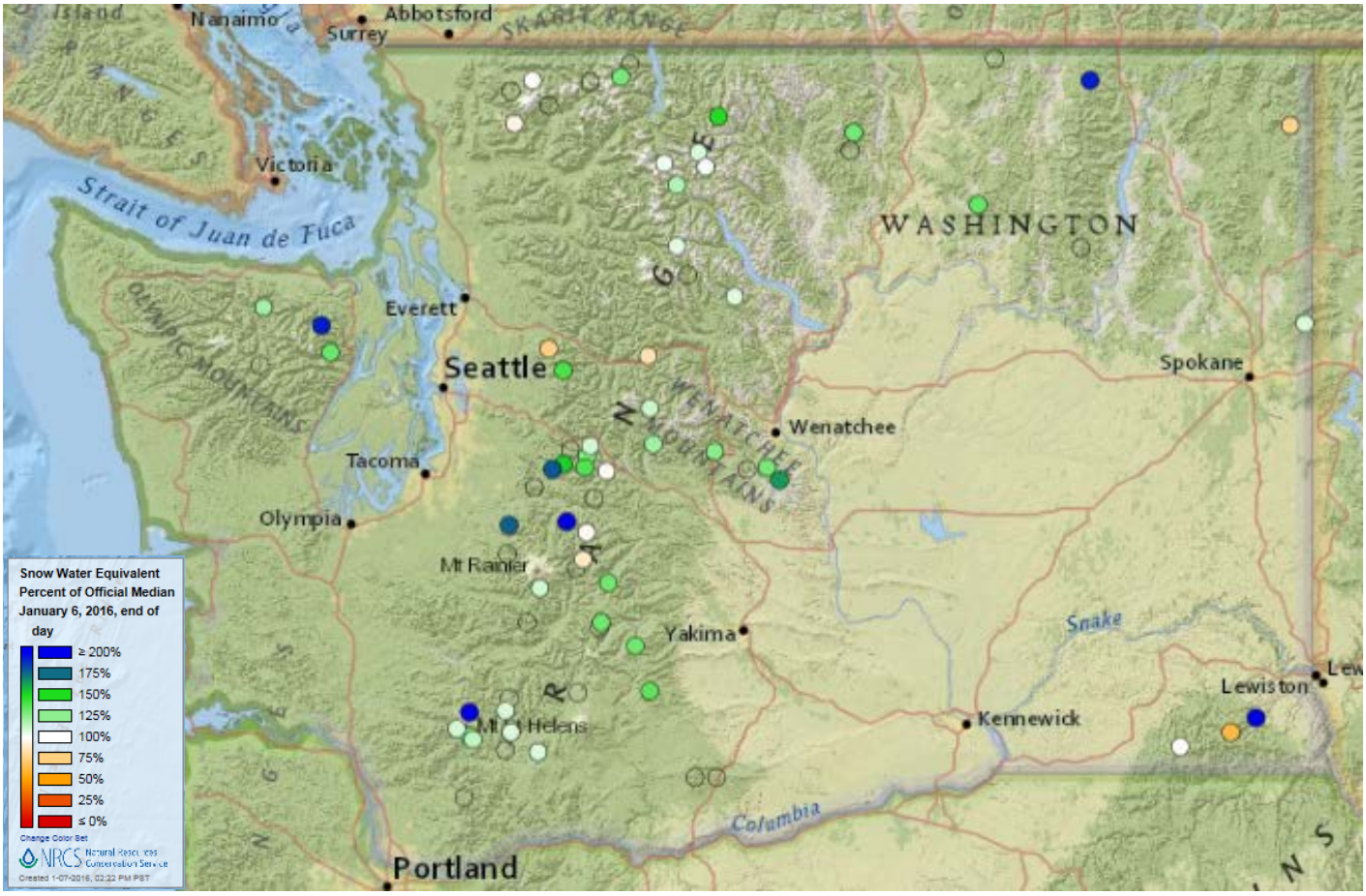
United States Department of Agriculture

NRCS Natural Resources Conservation Service

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.

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.

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

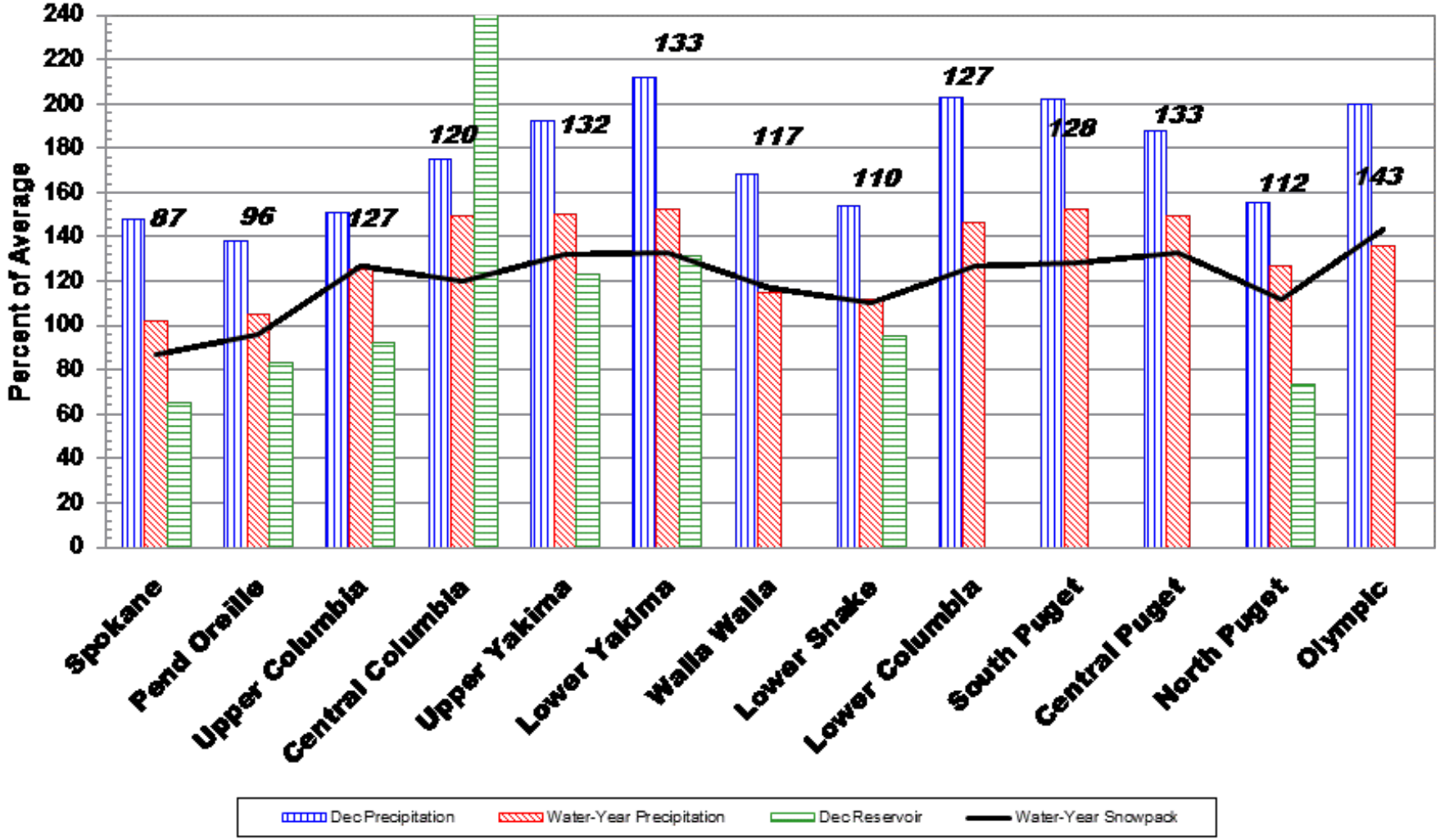
Washington:
http://www.nrcs.usda.gov/wps/portal/nrcs/site/wa/home/

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

NRCS Natural Resources Conservation Service

January 1, 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:

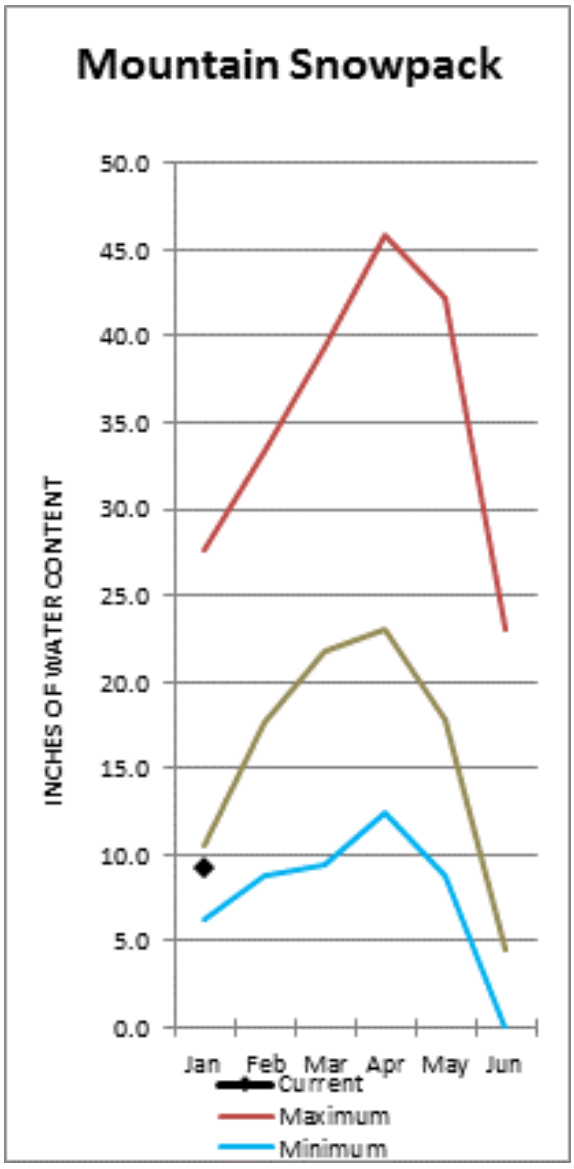
Dates: April 18-21, 2016
Location: Seattle, Washington

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.

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 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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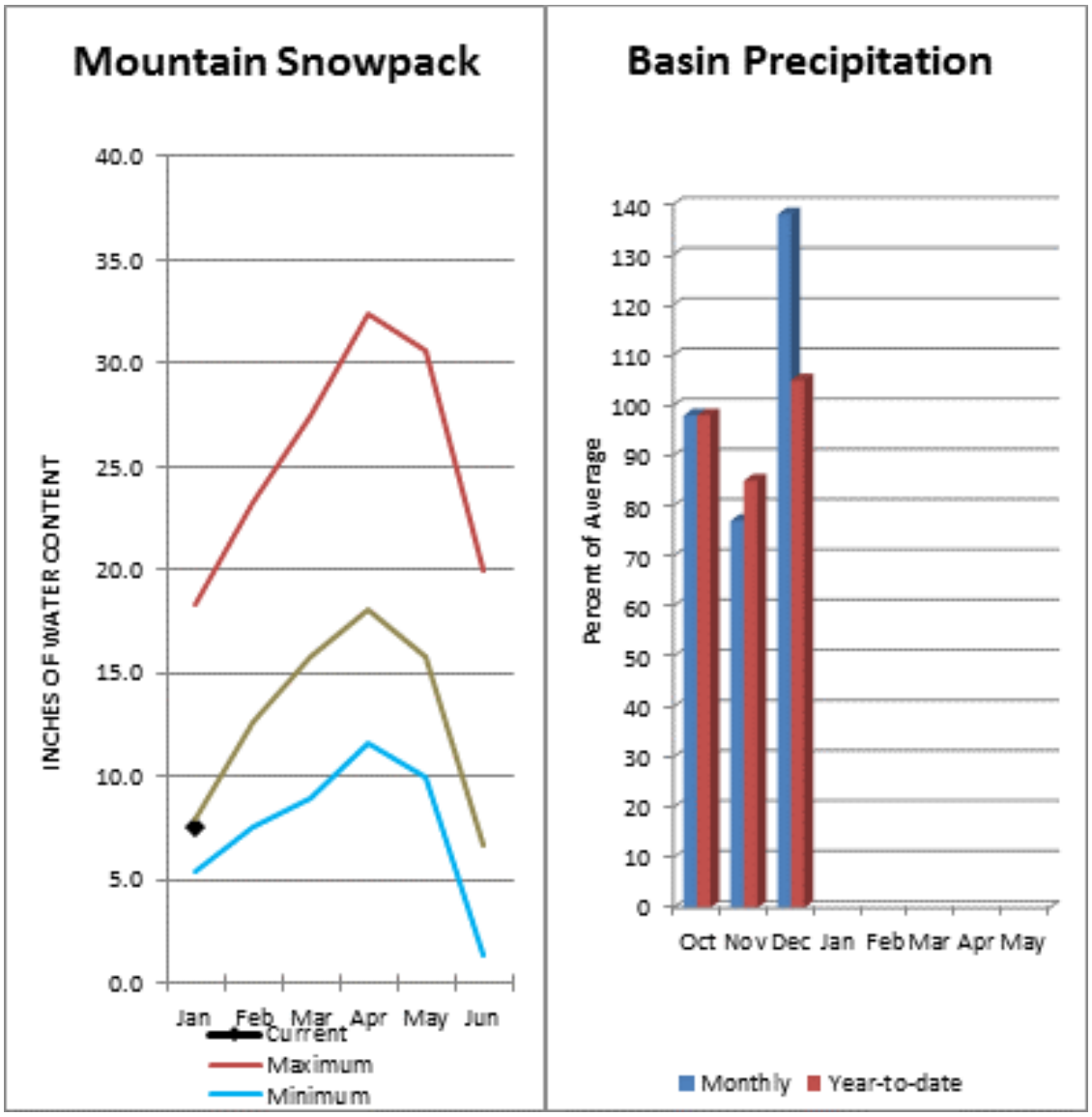
Spokane
Streamflow Forecasts - January 1, 2016

Spokane	Forecast Period	Forecast Exceedance Probabilities for Risk Assessment: Chance that actual volume will exceed forecast — 90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (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 Orielle 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.

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Pend Oreille Basins
Streamflow Forecasts - January 1, 2016

Pend Oreille Basins	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
		Forecast Exceedance Probabilities for Risk Assessment Chance that actual volume will exceed forecast						
Pend Oreille Lake Inflow								
	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

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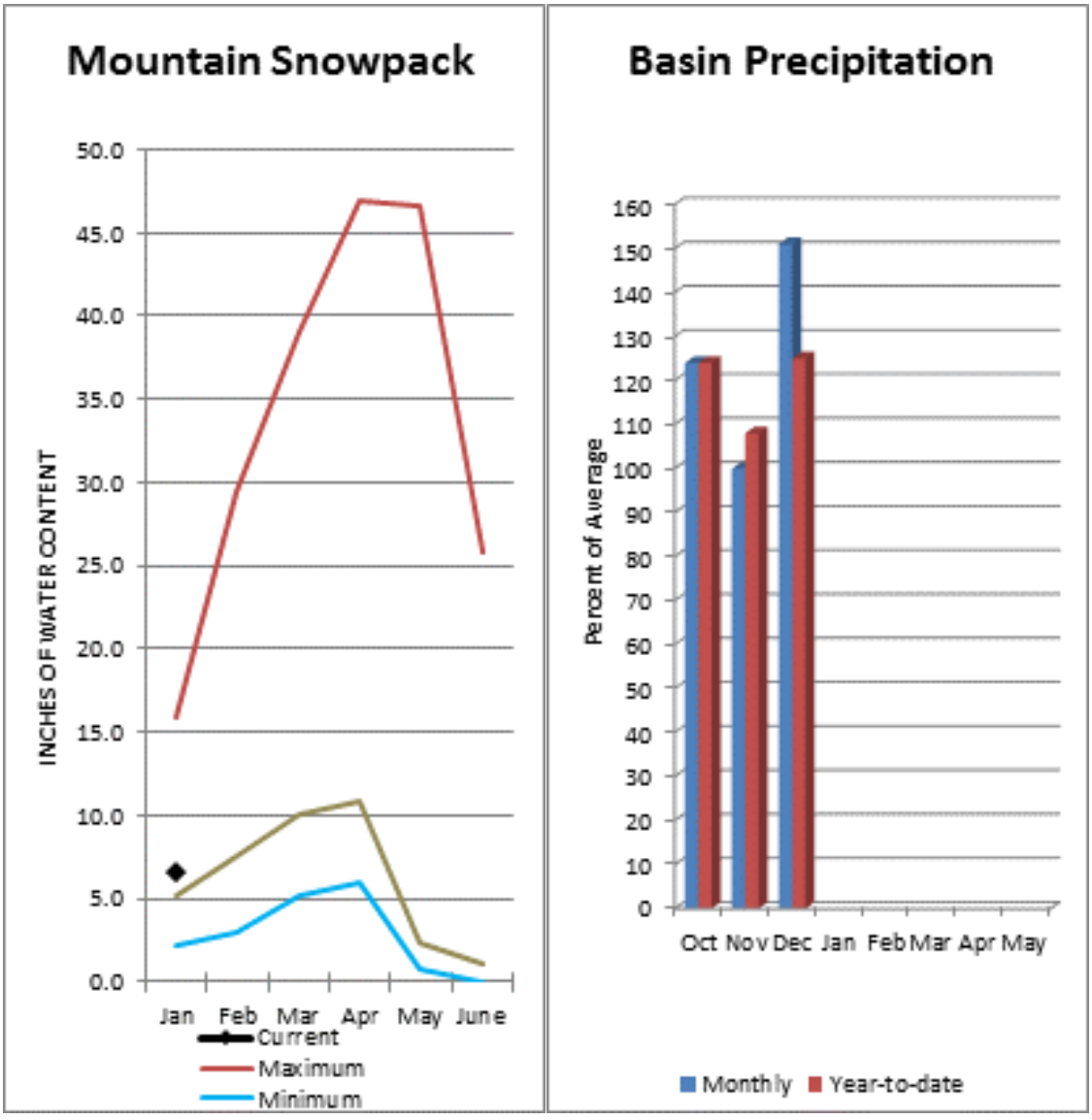
3) Median value used in place of average

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.

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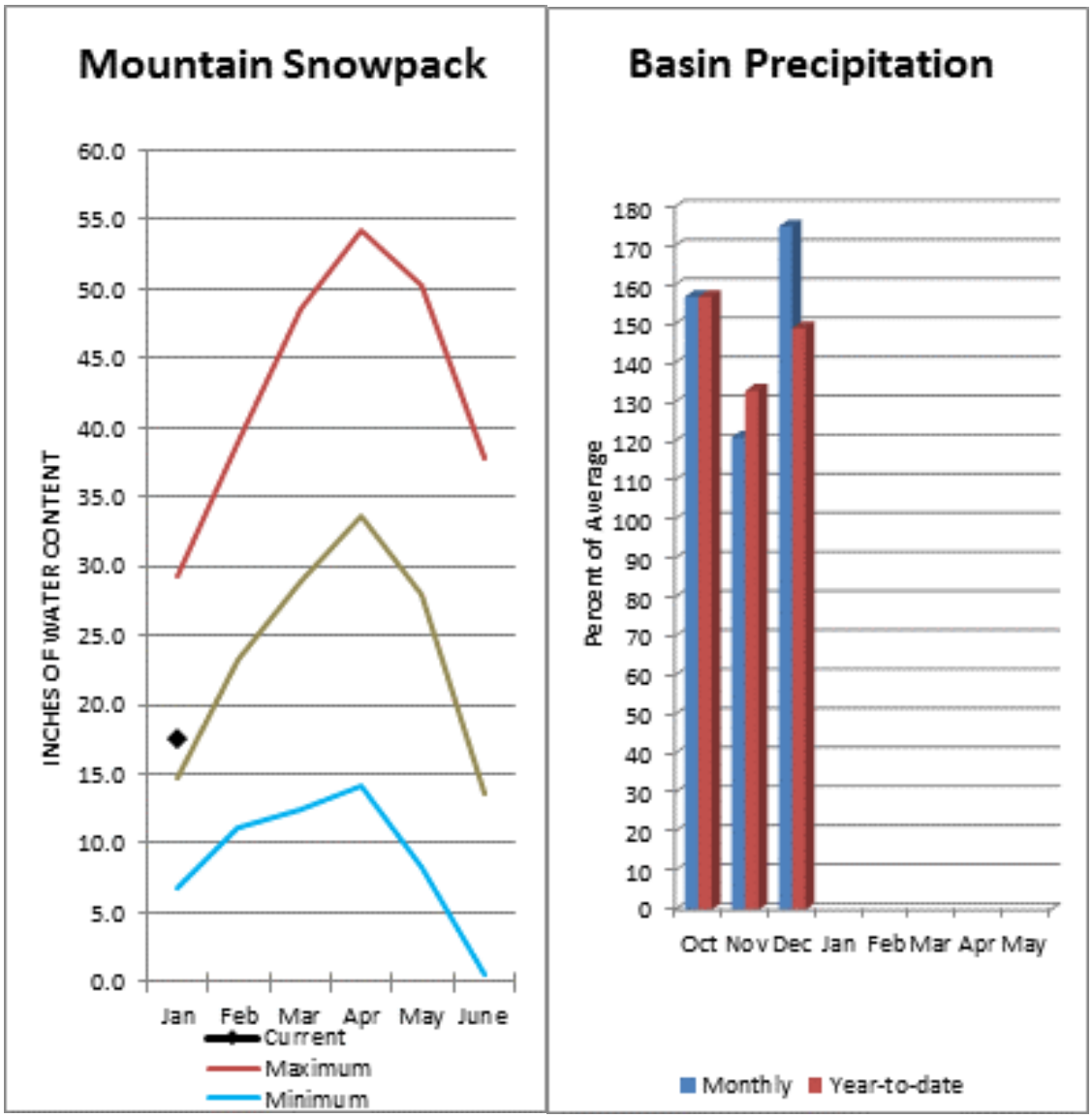
Upper Columbia Basins
Streamflow Forecasts - January 1, 2016

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	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%



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.

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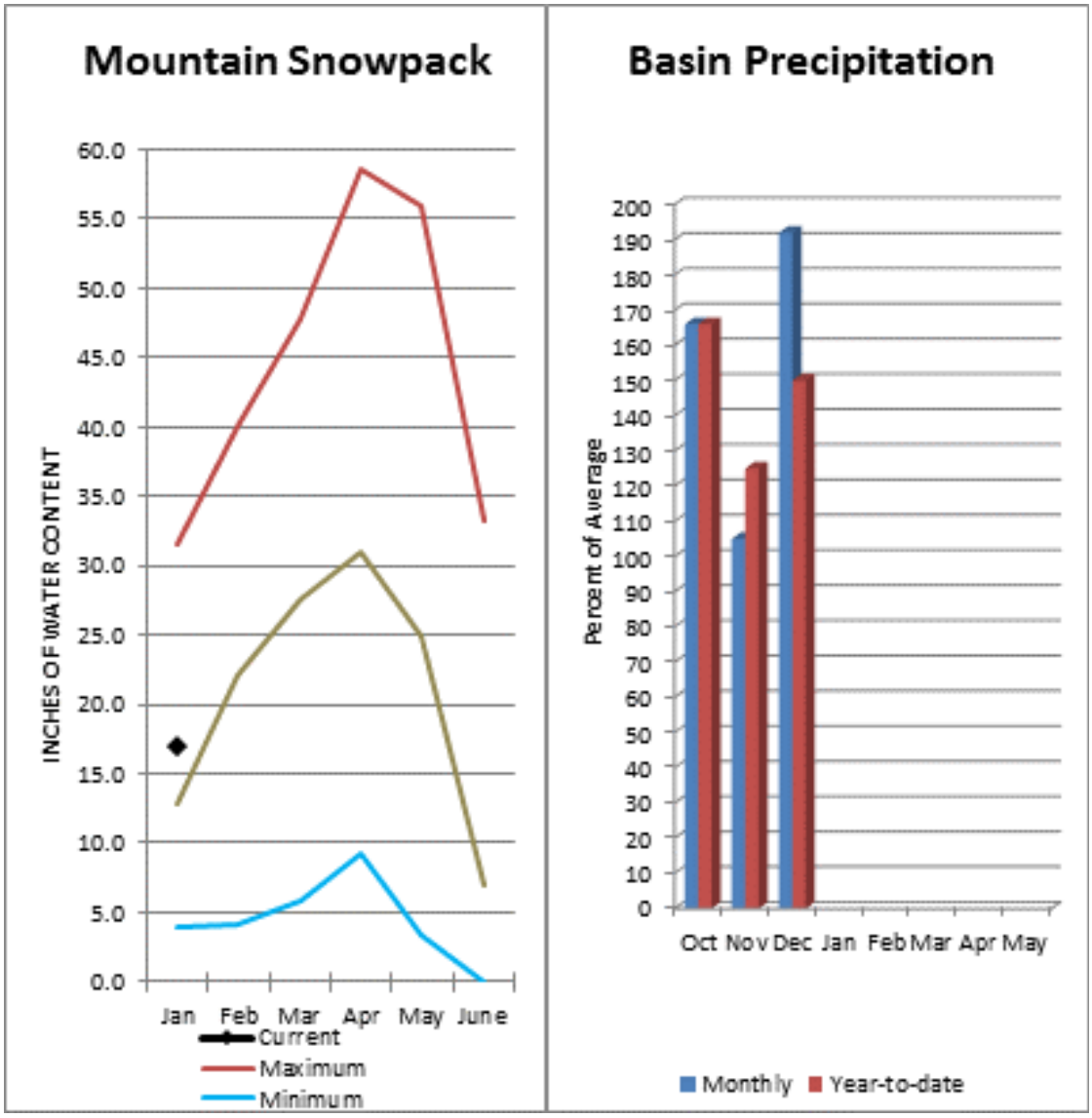
Central Columbia Basins
Streamflow Forecasts - January 1, 2016

Central 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						
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%



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.

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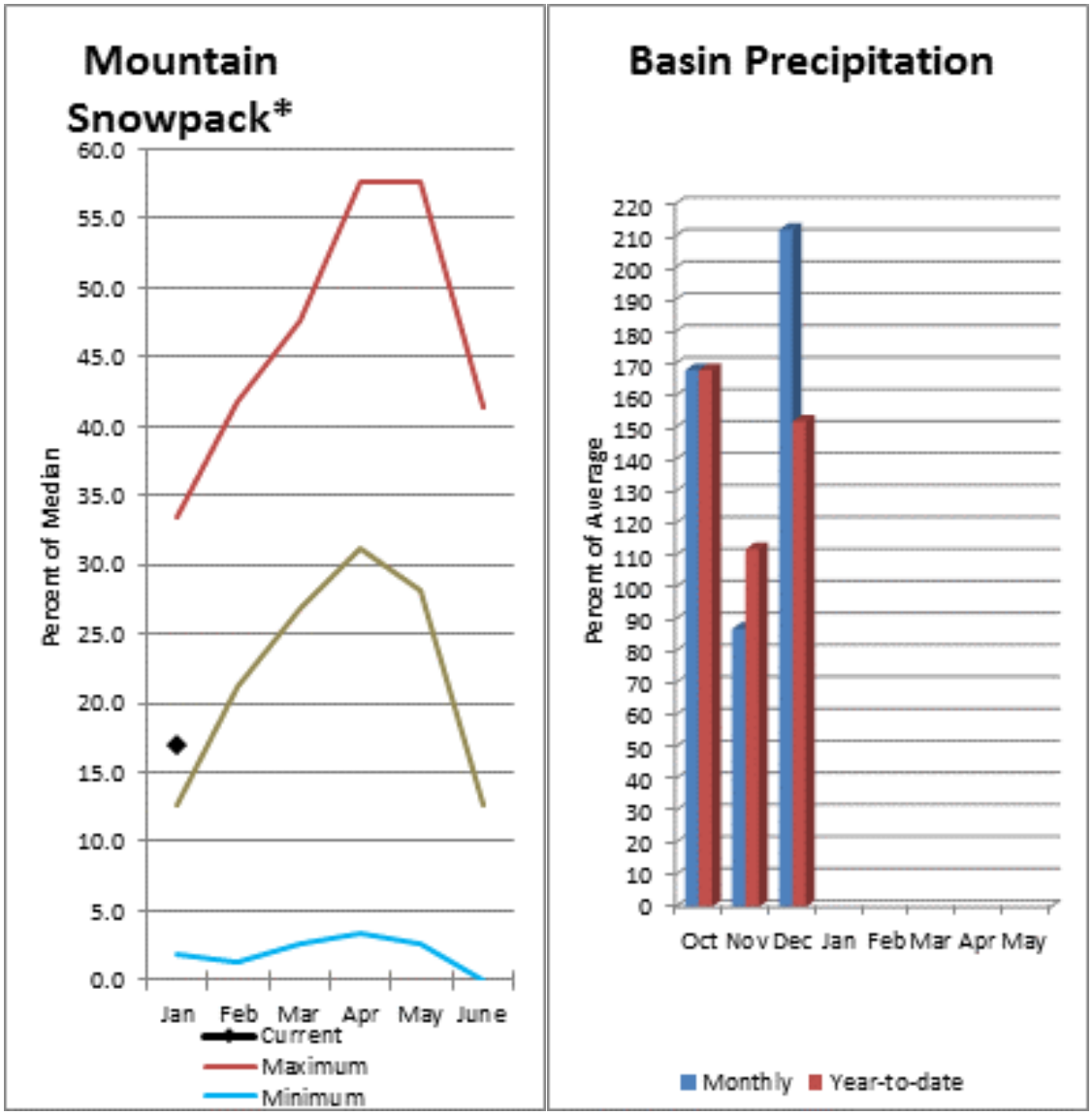
Upper Yakima River
Streamflow Forecasts - January 1, 2016

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								
	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%



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.

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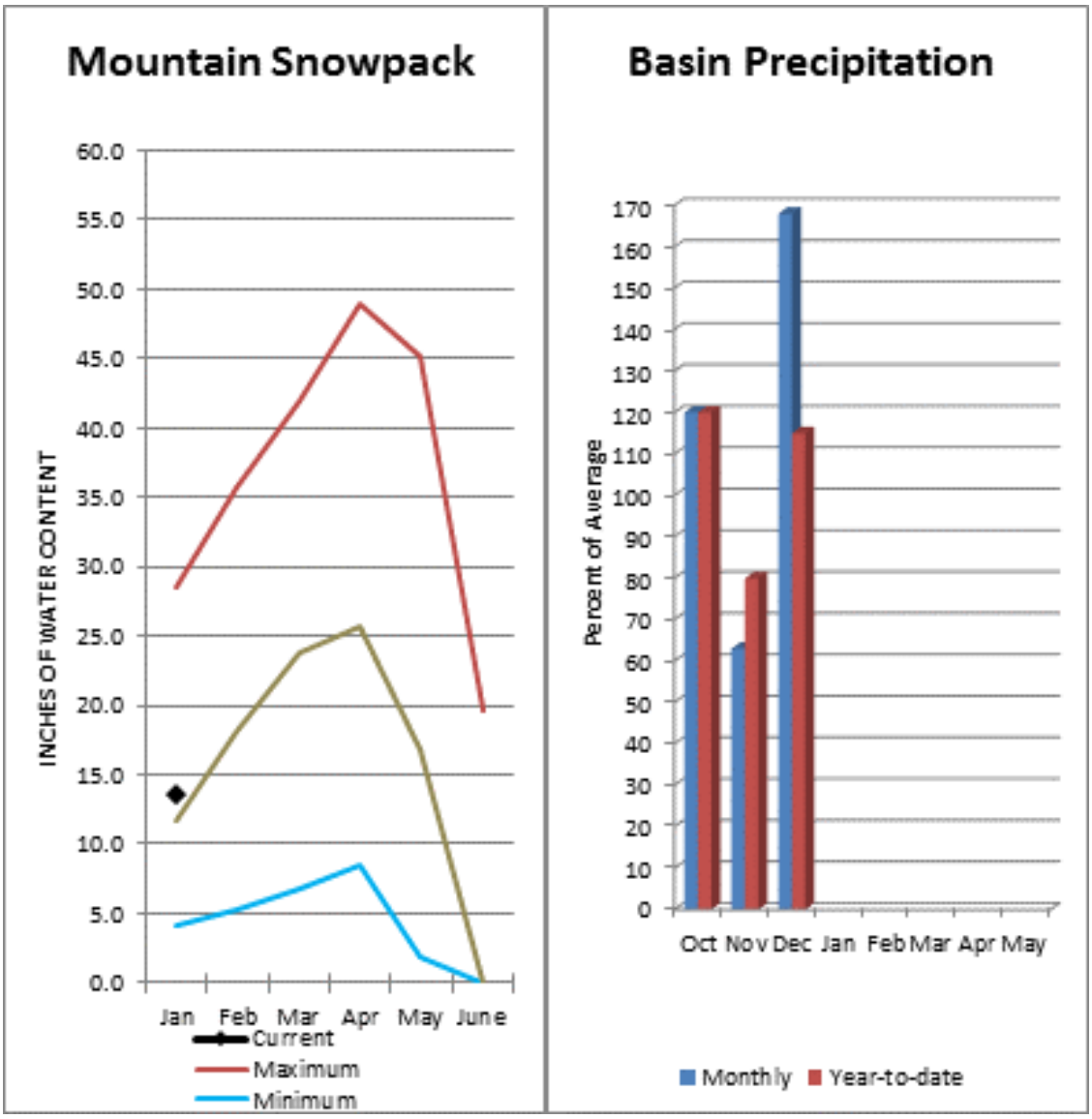
Lower Yakima River
Streamflow Forecasts - January 1, 2016

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								
	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%



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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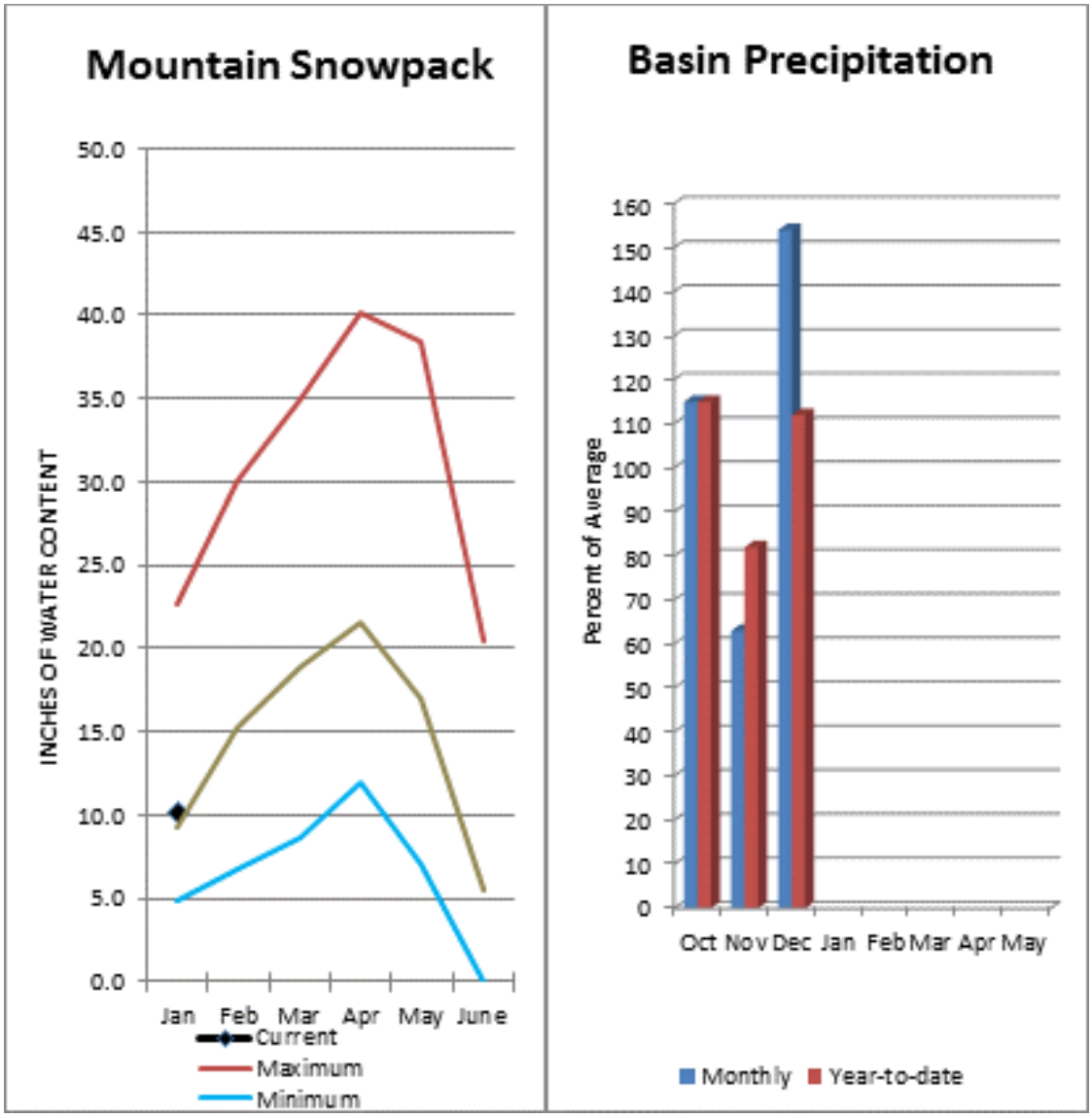
Walla Walla River
Streamflow Forecasts - January 1, 2016

Walla Walla River	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
		Forecast Exceedance Probabilities for Risk Assessment Chance that actual volume will exceed forecast						
SF Walla 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.

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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)
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%
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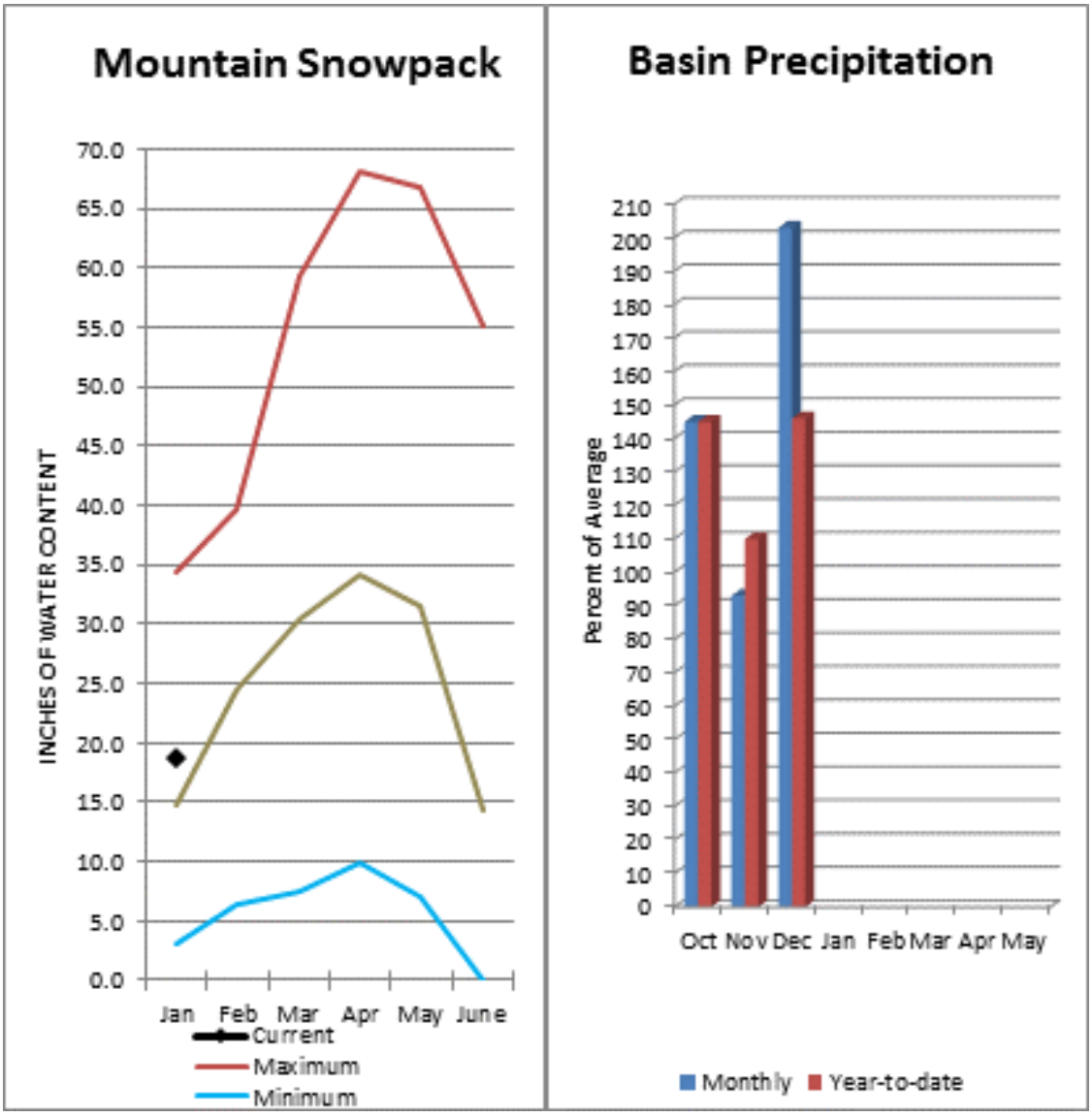
3) Median value used in place of average

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.

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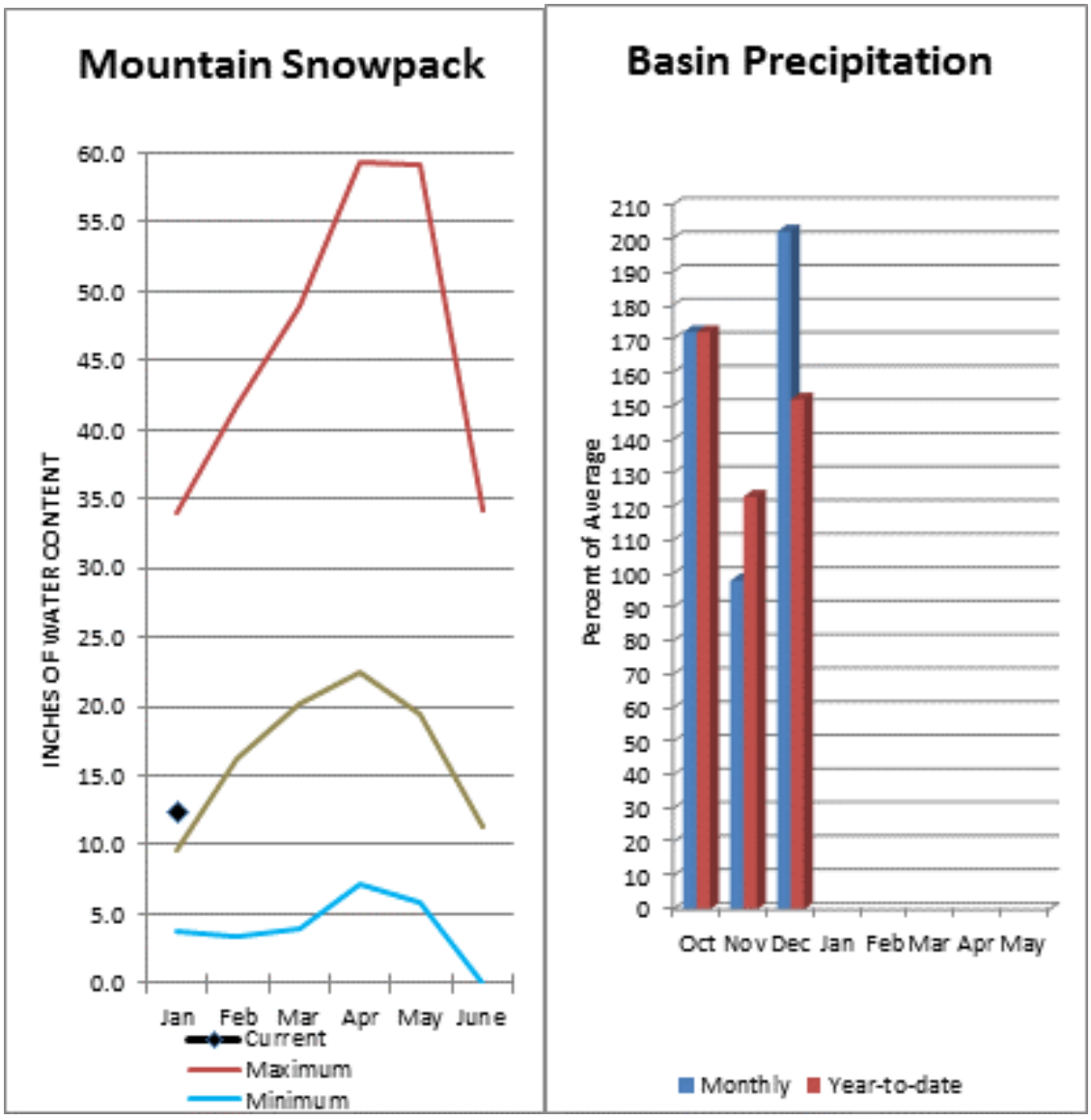
Lower Columbia Basins
Streamflow Forecasts - January 1, 2016

Lower Columbia Basins	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
		Forecast Exceedance Probabilities for Risk Assessment Chance that actual volume will exceed forecast						
Columbia R at The Dalles								
	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 Mayfiled								
	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%



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.

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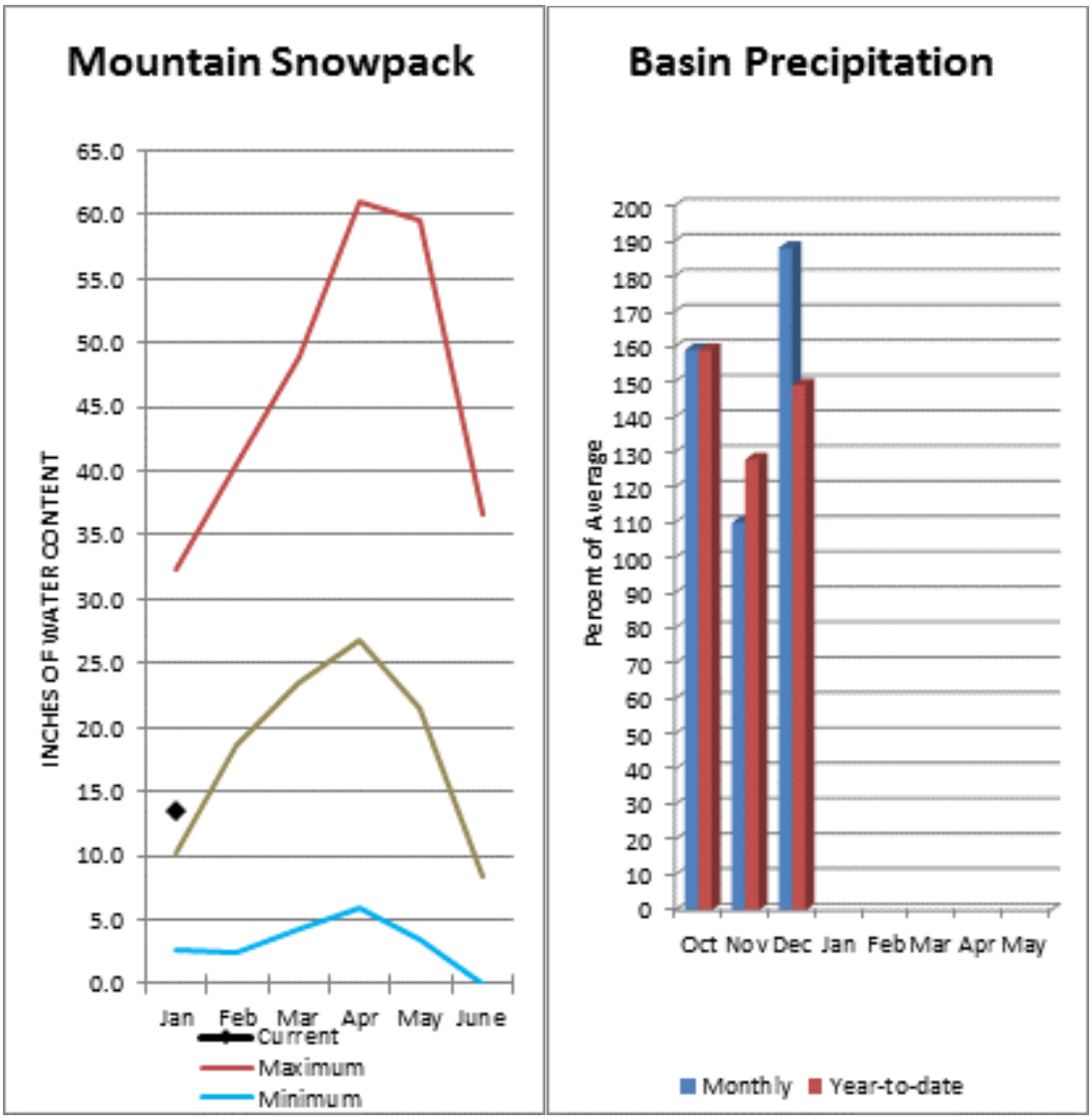
South Puget Sound Basins
Streamflow Forecasts - January 1, 2016

		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%



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.

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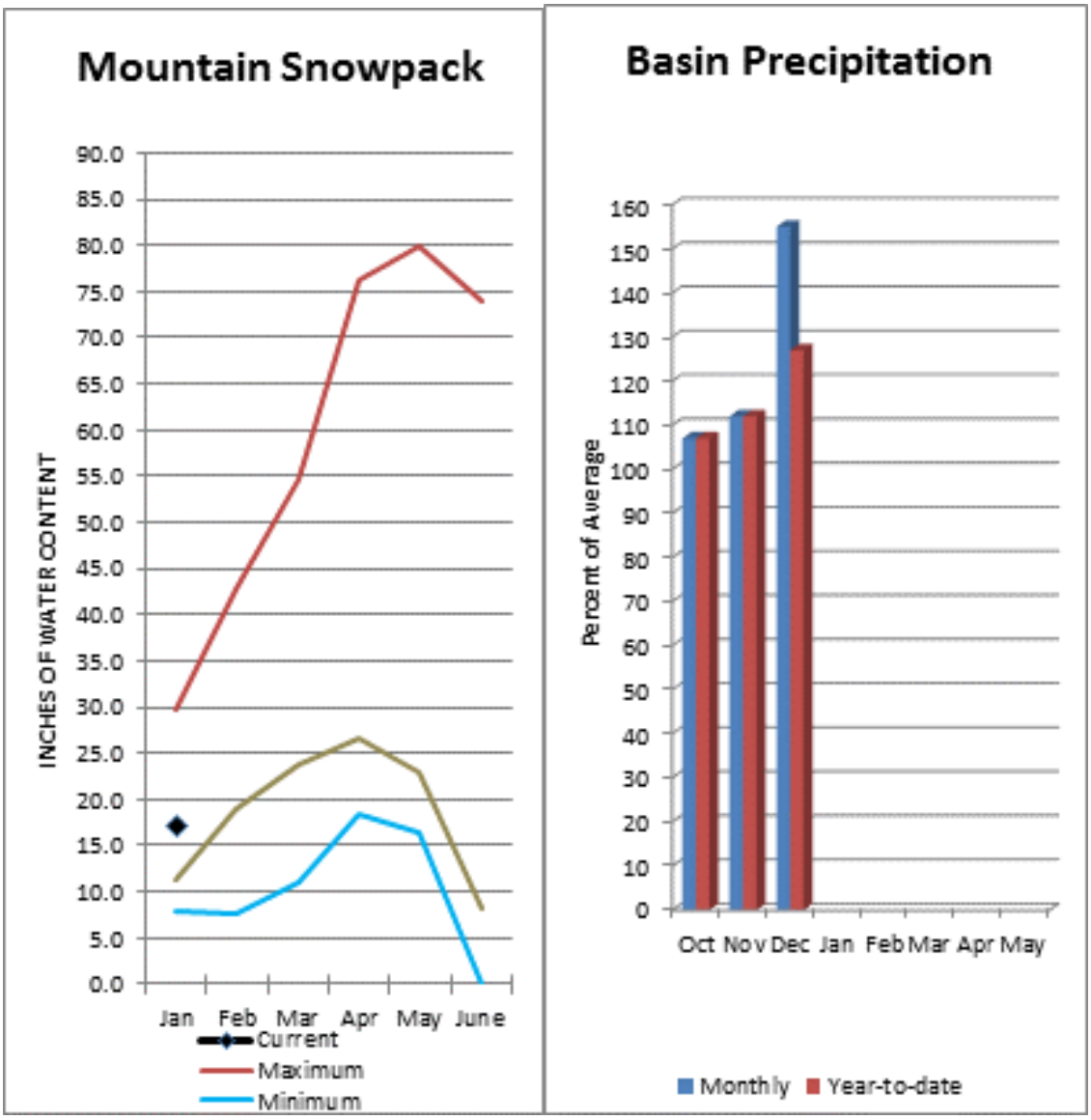
Central Puget Sound Basins
Streamflow Forecasts - January 1, 2016

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%
Snoqualimie River	4	112%	33%
Skykomish River	2	83%	31%



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.

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North Puget Sound Basins
Streamflow Forecasts - January 1, 2016

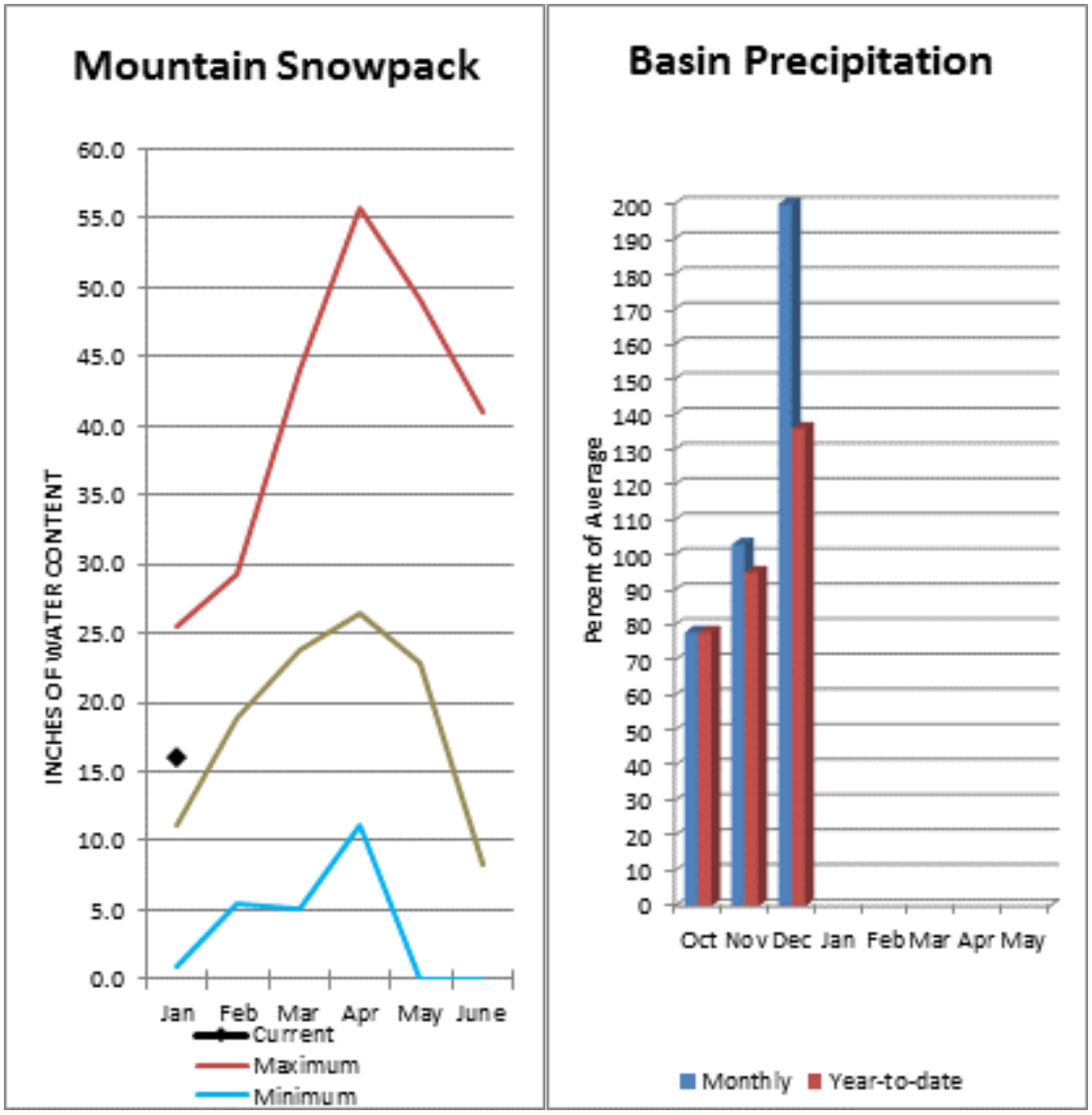
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

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%



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.

Data Current as of: 1/7/2016 11:13:19 AM

Olympic Penninsula
Streamflow Forecasts - January 1, 2016

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	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 Penninsula	3	143%	30%

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.**

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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, 2016

Aaron Erman, Seattle Public Utilities and Toby Rodgers, NRCS, Mt. Vernon, WA learning the ropes at West Wide Snow Survey School, January 14, 2016, Bend, OR. *Photo Tracy Robillard, NRCS*

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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(509) 323-2955

How forecasts are made

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

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

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

Washington
Water Supply Outlook

February 2016

General Outlook

Even with slightly above normal temperatures Washington managed to build on an already great snowpack throughout the month of January. Water year precipitation also remains well above normal for the state. With 70% of our typical winter already past the rest will be a coast as long as the temperatures don't elevate to the point to cause snowmelt. We would rather save that for late March and into April. The most recent NWS 3-month outlook is for above normal temperatures and below normal precipitation however short term forecasts call for continued snow in the mountains and rain in the valleys. http://www.cpc.ncep.noaa.gov/

Snowpack

The February 1 statewide SNOTEL readings were 109% of normal but vary across the state. The Skykomish River Basin reported the lowest readings at 68% of the 30-year median for February 1 and the Okanogan had the most snow with 146%. Most basins are recording near to above normal snowpack. Westside medians from SNOTEL, and February 1 snow surveys, included the North Puget Sound river basins with 107% of normal, the Central and South Puget river basins with 97% and 105% respectively, and the Lower Columbia basins with 107% of normal. Snowpack along the east slopes of the Cascade Mountains included the Yakima area with 111% and the Wenatchee area with 108%. Snowpack in the Spokane River Basin was at 90% and the Walla Walla River Basin had 122% of the long term median.

BASIN	PERCENT OF MEDIAN	LAST YEAR PERCENT MEDIAN
Spokane	90	54
Newman Lake	113	52
Pend Oreille	92	98
Okanogan	146	90
Methow	128	98
Conconully Lake	159	88
Central Columbia	108	60
Upper Yakima	109	37
Lower Yakima	113	42
Ahtanum Creek	123	37
Walla Walla	122	54
Lower Snake	104	68
Cowlitz	104	36
Lewis	111	16
White	105	47
Green	100	16
Puyallup	108	41
Cedar	118	14
Snoqualmie	85	15
Skykomish	68	21
Skagit	114	74
Nooksack	75	15
Olympic Peninsula	101	9

Precipitation

The state received normal too slightly above normal precipitation for the month of January keeping year to date averages above normal at 129%. Only the north east corner of the state fell below 100%. Quillayute State Airport measured 152% of normal rainfall. The wettest SNOTEL in the state was June Lake, located on the South flank of Mt. St. Helens, collected 26 inches of precipitation or 95% of normal during the month of January.

RIVER BASIN	FEBRUARY PERCENT OF AVERAGE	WATER YEAR PERCENT OF AVERAGE
Spokane	90	99
Pend Oreille	78	97
Upper Columbia	127	125
Central Columbia	90	133
Upper Yakima	89	132
Lower Yakima	100	137
Walla Walla	96	110
Lower Snake	97	106
Lower Columbia	97	131
South Puget Sound	89	134
Central Puget Sound	78	128
North Puget Sound	108	122
Olympic Peninsula	122	132

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 454,000-acre feet, 112% of average for the Upper Reaches and 156,000-acre feet or 127% of average for Rimrock and Bumping Lakes. The power generation reservoirs included the following: Coeur d'Alene Lake, 114,000 acre feet, 118% of average and 48% of capacity; and the Skagit River reservoirs at 63% of average and 45% 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	48	118
Pend Oreille	41	84
Upper Columbia	43	71
Central Columbia	N/A	N/A
Upper Yakima	54	112
Lower Yakima	67	127
Lower Snake	68	101
North Puget Sound	45	63

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, 121%; White River, 117%; and Skagit River, 114%. Some Eastern Washington streams include the Yakima River near Parker 123%, Wenatchee River at Plain 109%; 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	92-145
Pend Oreille	93-105
Upper Columbia	95-128
Central Columbia	96-120
Upper Yakima	104-120
Lower Yakima	118-141
Walla Walla	106-107
Lower Snake	97-102
Lower Columbia	94-141
South Puget Sound	112-117
Central Puget Sound	94-121
North Puget Sound	106-114
Olympic Peninsula	110-112

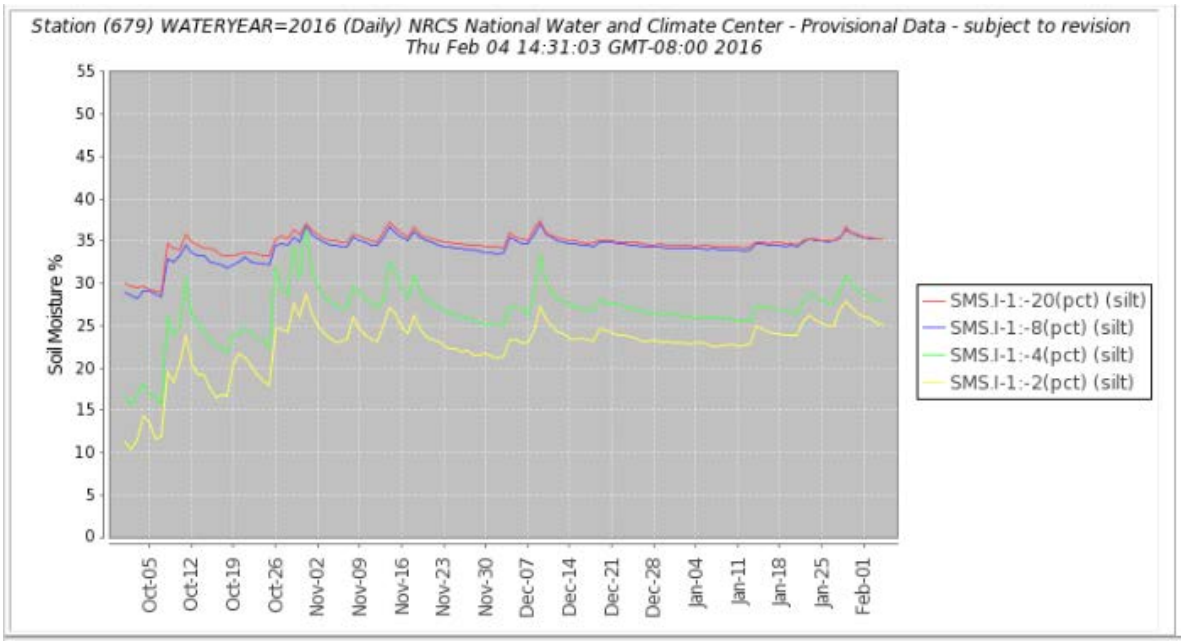
STREAM	PERCENT OF AVERAGE FEBRUARY STREAMFLOWS
Pend Oreille at Albeni Fall Dam	87
Kettle at Laurier	98
Columbia at Birchbank	104
Spokane at Spokane	90
Similkameen at Nighthawk	109
Okanogan at Tonasket	95
Methow at Pateros	114
Chelan at Chelan	110
Wenatchee at Pashastin	88
Cle Elum near Roslyn	67
Yakima at Parker	75
Naches at Naches	85
Grande Ronde at Troy	80
Snake below Lower Granite Dam	76
Columbia River at The Dalles	85
Lewis at Merwin Dam	99
Cowlitz below Mayfield Dam	109
Skagit at Concrete	146
Dungeness near Sequim	134

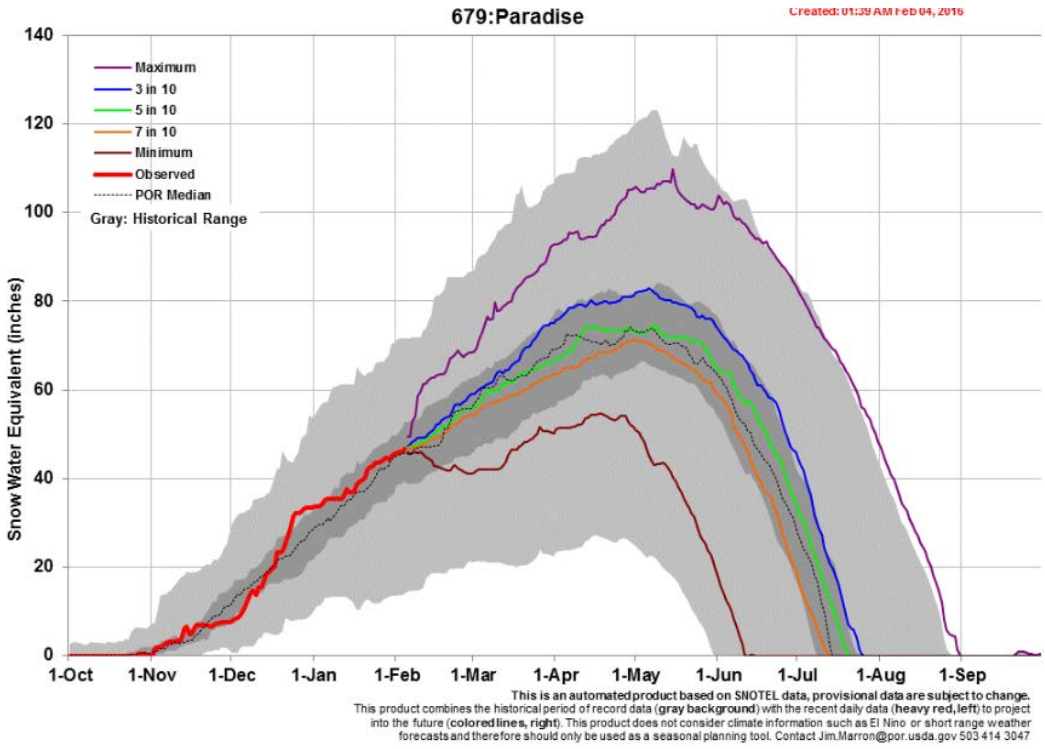
For more information contact your local Natural Resources Conservation Service office.

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.

The following graph shows a very typical winter soil moisture profile at Paradise SNOTEL site. Notice the profile recharge when fall rains began. The additional peaks in the last month or so indicate rain on snow events where the rain percolated through the snow. The second graph is a snowpack projection for the same site.





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

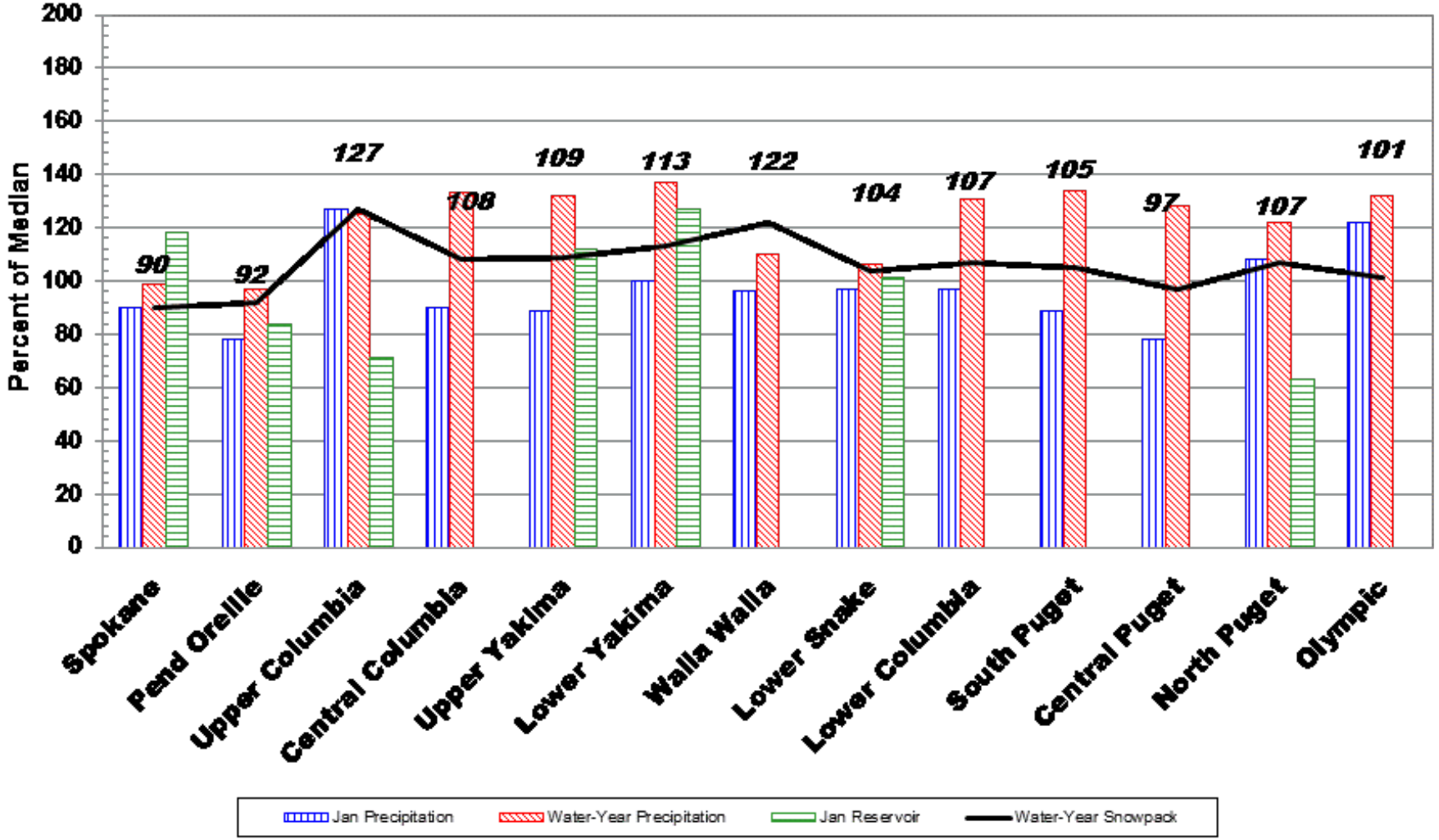
Washington:
http://www.nrcs.usda.gov/wps/portal/nrcs/site/wa/home/

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

NRCS Natural Resources Conservation Service

February 1, 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:

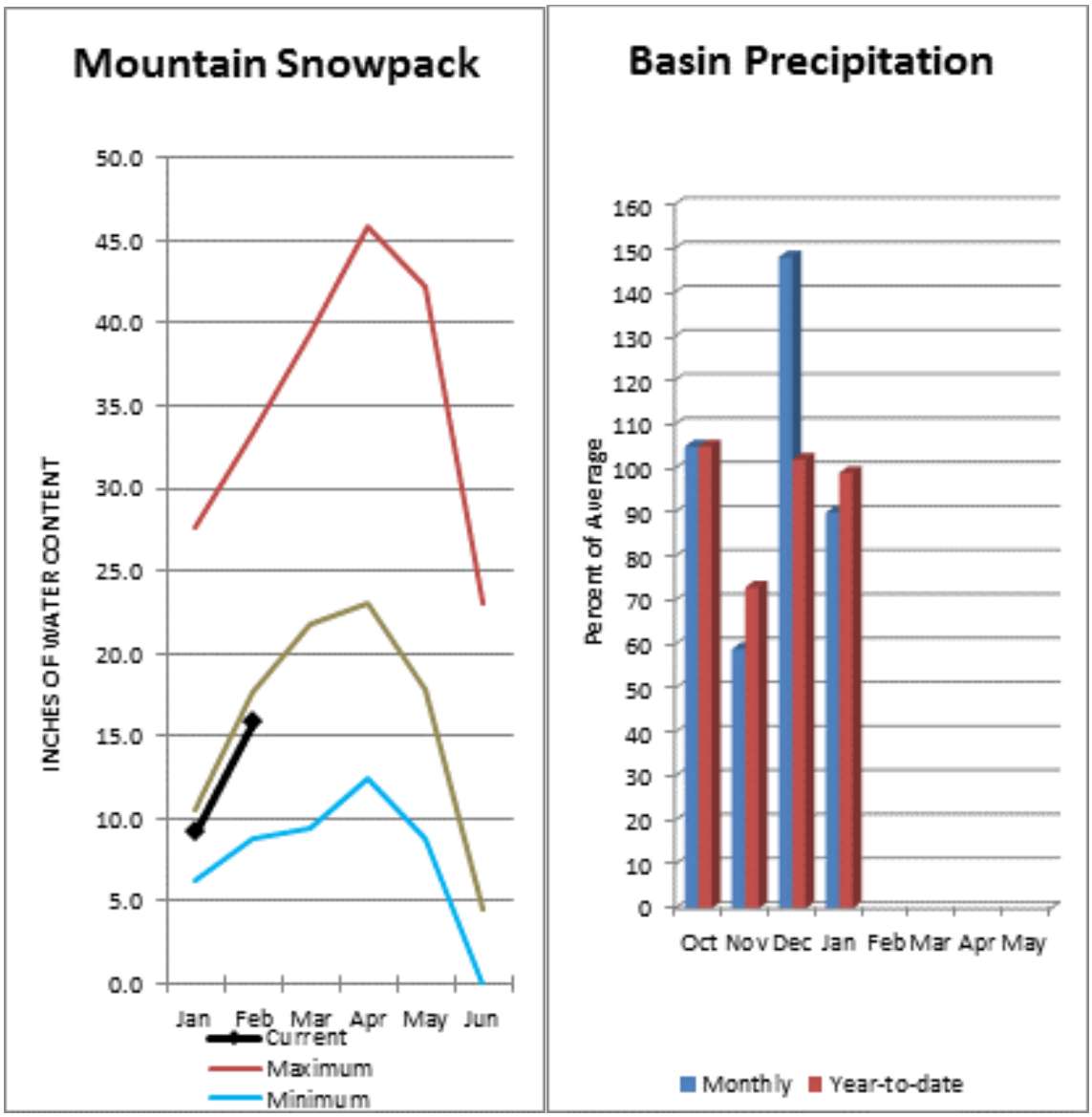
Dates: April 18-21, 2016
Location: Seattle, Washington

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.

Spokane River Basin



The February 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 145% of average flows for the May-August period. The forecast is based on a basin snowpack that is 90% of normal and precipitation that is 99% of average for the water year. Precipitation for February was slightly below normal at 90% of average. Streamflow on the Spokane River at Spokane was 90% of average for February. February 1 storage in Coeur d'Alene Lake was 114,000 acre feet, 118% of average and 48% of capacity. Snowpack at Quartz Peak SNOTEL site was 134% of average with 19.9 inches of water content. Average temperatures in the Spokane basin were 2-4 degrees above normal for February and for the water year.

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

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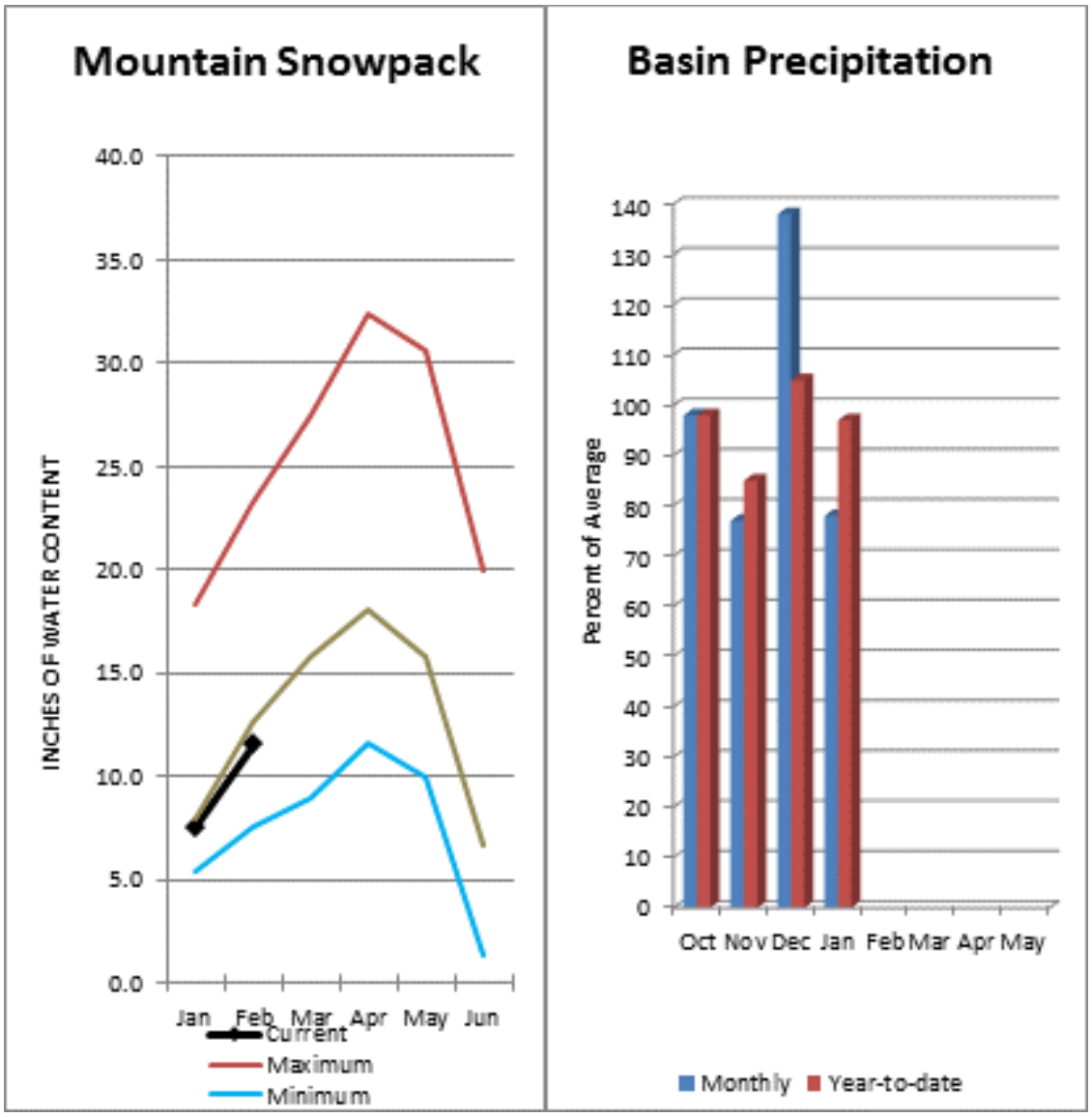
Spokane
Streamflow Forecasts - February 1, 2016

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								
	APR-JUL	1590	1960	2210	92%	2460	2820	2390
	APR-SEP	1670	2030	2280	92%	2530	2900	2480
Spokane R at Long Lake								
	APR-JUL	1800	2210	2490	95%	2760	3170	2620
	APR-SEP	1990	2400	2680	94%	2960	3370	2850
Chamokane Ck nr Long Lake								
	MAY-AUG	7.8	11.2	13.5	145%	15.8	19.2	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 January, 2016	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Lake Coeur d' Alene	114.1	154.1	96.3	238.5
Basin-wide Total	114.1	154.1	96.3	238.5
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis February 1, 2016	# of Sites	% Median	Last Year % Median
Spokane	13	90%	54%
Newman Lake	3	113%	52%



The April – September average forecast for the Priest River near the town of Priest River is 105% and the Pend Orielle below Box Canyon is 94%. February streamflow was 96% of average on the Pend Oreille River and 104% on the Columbia at Birchbank. February 1 snow cover was 92% of normal in the Pend Oreille Basin River Basin. Bunchgrass Meadows SNOTEL site had 17.9 inches of snow water on the snow pillow. Normally Bunchgrass would have 18 inches on February 1. Precipitation during February was 78% of average, dropping the year-to-date precipitation at 97% of average. Reservoir storage in the basin, including Lake Pend Oreille and Priest Lake was 84% of normal. Average temperatures were 2-4 degrees above normal for February and 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, 2016

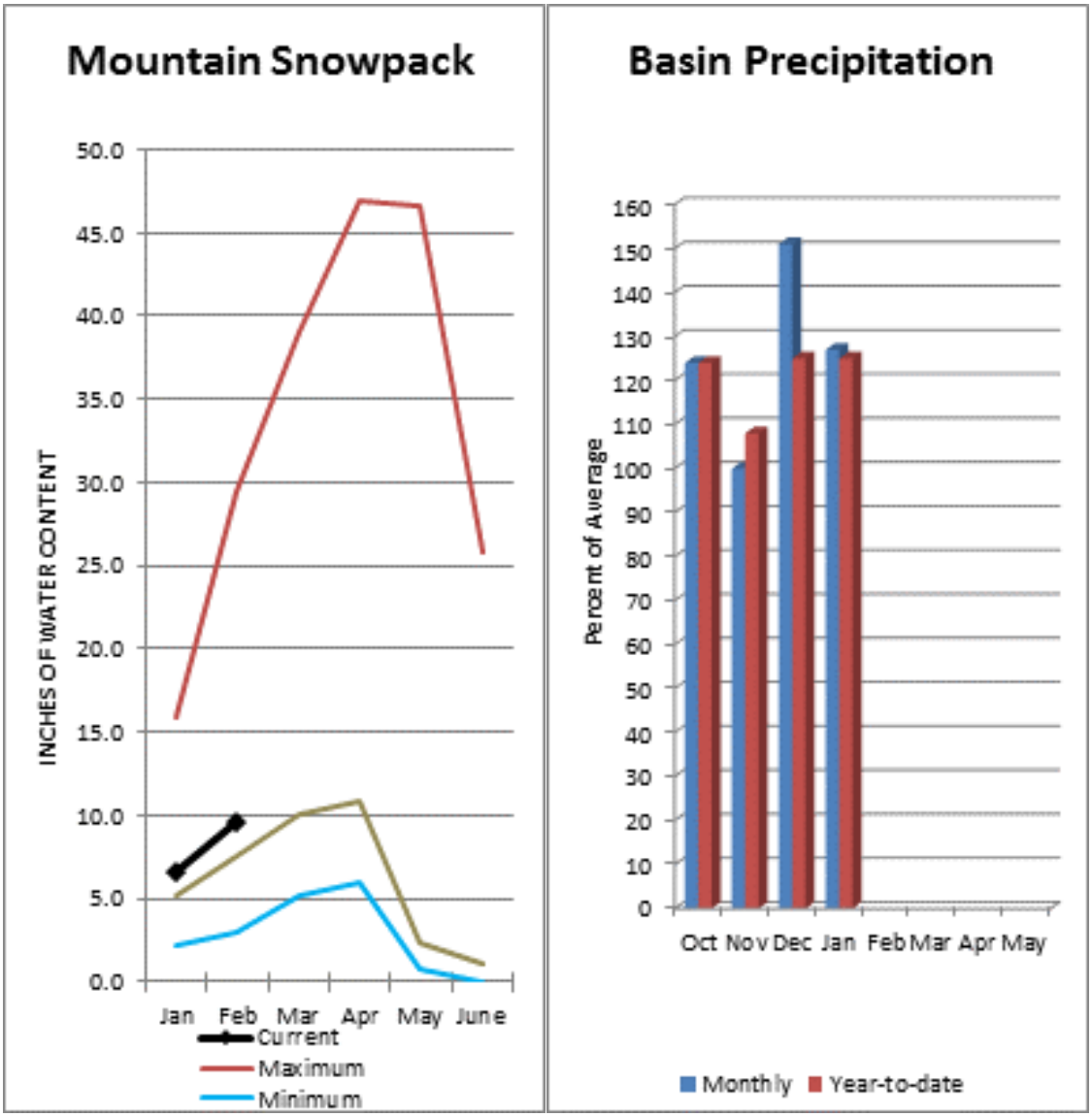
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

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	8930	10200	11000	93%	11800	13100	11800
	APR-SEP	9850	11200	12000	94%	12900	14200	12800
Priest R nr Priest River								
	APR-JUL	655	755	820	105%	885	985	780
	APR-SEP	690	795	870	105%	940	1050	830
Pend Oreille R bl Box Canyon								
	APR-JUL	9030	10300	11100	93%	12000	13300	11900
	APR-SEP	9920	11300	12200	94%	13100	14400	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, 2016	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Lake Pend Oreille	629.3	534.8	753.9	1561.3
Priest Lake	54.2	50.4	56.7	119.3
Basin-wide Total	683.5	585.1	810.6	1680.6
# of reservoirs	2	2	2	2

Watershed Snowpack Analysis February 1, 2016	# of Sites	% Median	Last Year % Median
Pend Oreille Basins	56	92%	97%
Colville River	1	82%	54%
Pend Oreille River	55	92%	98%
Kettle River	4	144%	81%



Summer runoff average forecast for the Okanogan River is 119%, Similkameen River is 105%, and Methow River is 128%. February 1 snow cover on the Okanogan was 146% of normal, Omak Creek was 147% and the Methow was 128%. February precipitation in the Upper Columbia was 127% of average, with precipitation for the water year at 125% of average. February streamflow for the Methow River was 114% of average, 95% for the Okanogan River and 109% for the Similkameen. Snow-water content at Salmon Meadows SNOTEL was 9.8 inches or 148% of normal for February 1. Combined storage in the Conconully Reservoirs was 10,000 acre-feet or 71% of normal. Temperatures were 2-4 degrees above normal for February and for the water year.

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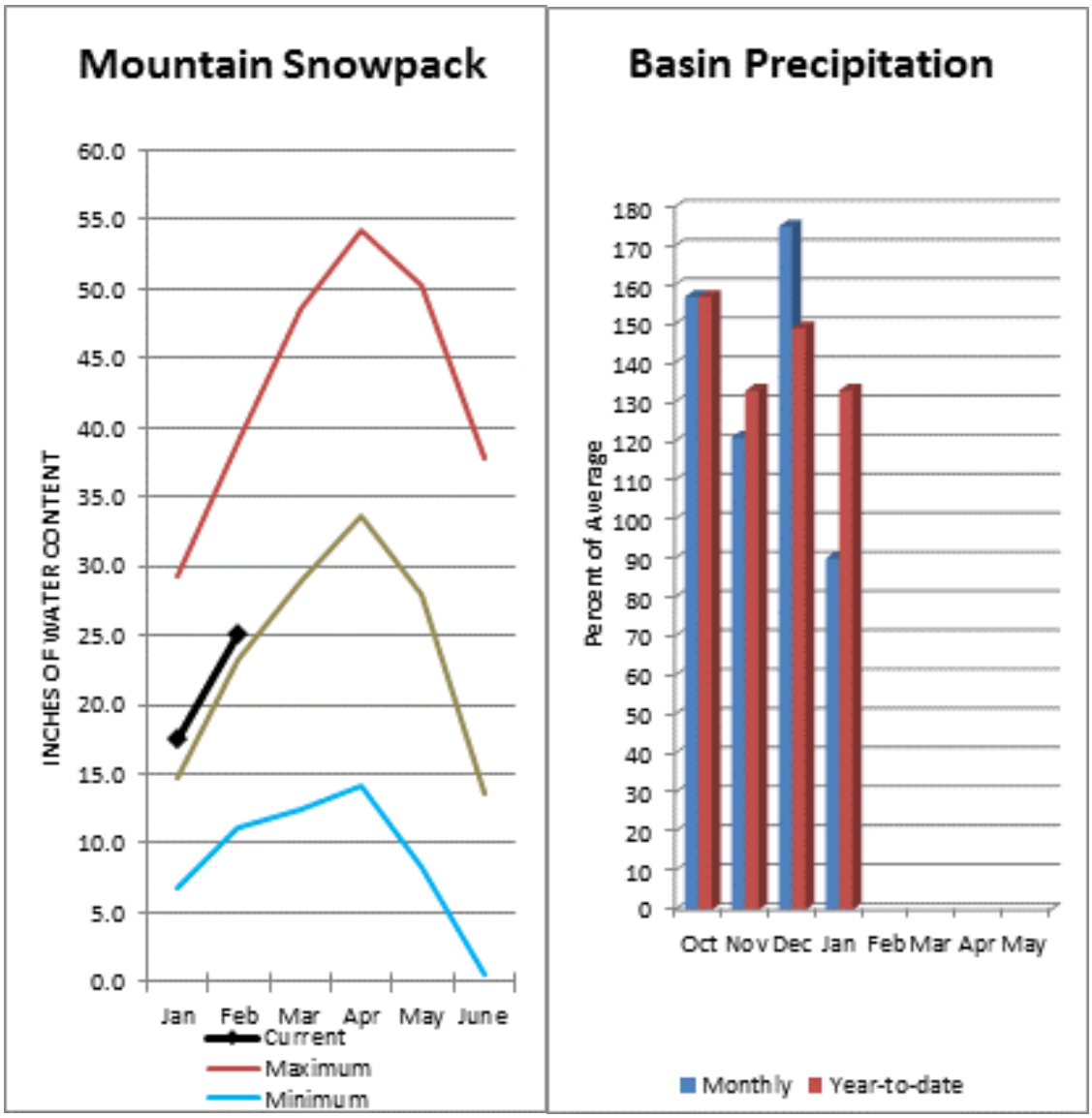
Upper Columbia Basins
Streamflow Forecasts - February 1, 2016

		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	1370	1580	1720	96%	1870	2080	1800
	APR-SEP	1420	1640	1800	96%	1960	2180	1880
Colville R at Kettle Falls								
	APR-JUL	75	116	143	120%	171	210	119
	APR-SEP	81	126	157	120%	187	230	131
Columbia R at Grand Coulee[1]								
	APR-JUL	37800	45000	48200	94%	51500	58700	51015
	APR-SEP	44500	53000	56900	95%	60800	69400	60110
Similkameen R nr Nighthawk[1]								
	APR-JUL	885	1140	1260	105%	1370	1630	1200
	APR-SEP	975	1230	1350	105%	1460	1720	1280
Okanogan R nr Tonasket[1]								
	APR-JUL	1110	1490	1660	112%	1830	2210	1480
	APR-SEP	1260	1670	1860	113%	2050	2460	1650
Okanogan R at Malott[1]								
	APR-JUL	1130	1530	1710	118%	1900	2300	1450
	APR-SEP	1280	1720	1920	119%	2120	2560	1620
Methow R nr Pateros								
	APR-JUL	905	1000	1070	128%	1140	1230	835
	APR-SEP	975	1080	1150	128%	1220	1320	895
Columbia R at Birchbank[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

Reservoir Storage End of January, 2016	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Conconully Lake (Salmon Lake Dam)	3.9	6.9	7.3	10.5
Conconully Reservoir	6.2	9.3	7.0	13.0
Basin-wide Total	10.1	16.2	14.3	23.5
# of reservoirs	2	2	2	2

Watershed Snowpack Analysis February 1, 2016	# of Sites	% Median	Last Year % Median
Upper Columbia Basins	20	126%	87%
Okanogan River	11	146%	90%
Omak Creek	2	145%	48%
Sanpoil River	1	48%	39%
Similkameen River	4	105%	91%
Toats Coulee Creek	3	150%	95%
Conconully Lake	3	159%	88%
Methow River	6	133%	96%



Precipitation during February was 90% of average in the basin and 133% for the year-to-date. Runoff for Entiat River is forecast to be 120% of average for the summer. The April-September average forecast for Chelan River is 113%, Wenatchee River at Plain is 109%, Stehekin River is 113% and Icicle Creek is 110%. February average streamflow on the Chelan River was 110% and on the Wenatchee River 88%. February 1 snowpack in the Wenatchee River Basin was 108% of normal; the Chelan, 110%; the Entiat, 107%; Stemilt Creek, 122% and Colockum Creek, 175%. Reservoir storage in Lake Chelan was not available. Lyman Lake SNOTEL had the most snow water with 43.6 inches of water. This site would normally have 40.1 inches on February 1. Temperatures were slightly above normal for February and 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, 2016

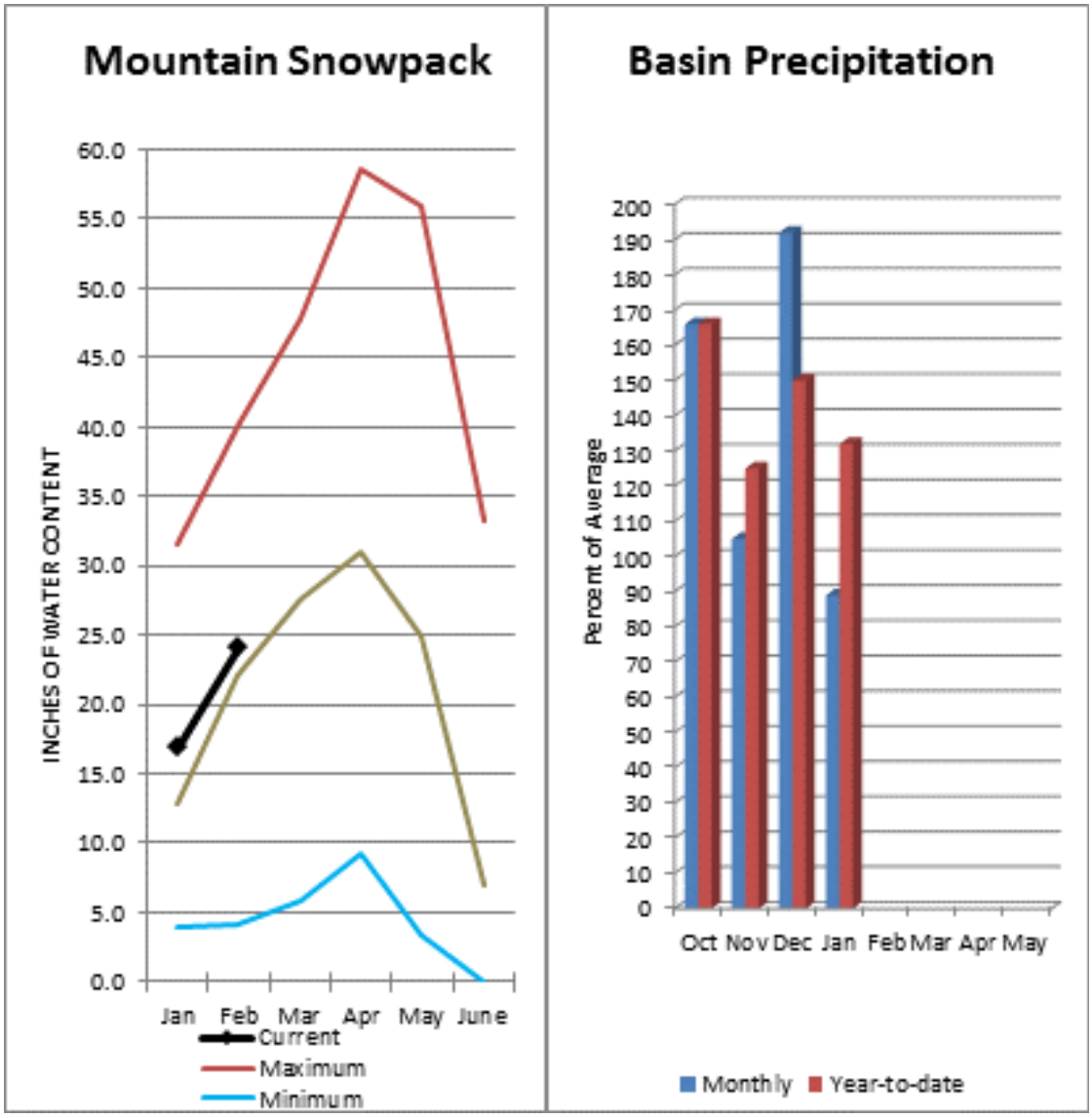
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

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	660	725	770	113%	810	875	680
	APR-SEP	785	850	895	113%	940	1010	790
Chelan R at Chelan								
	APR-JUL	1010	1070	1120	112%	1160	1230	1000
	APR-SEP	1120	1200	1260	113%	1320	1400	1120
Entiat R nr Ardenvoir								
	APR-JUL	210	230	240	120%	255	270	200
	APR-SEP	230	250	265	120%	275	295	220
Wenatchee R at Plain								
	APR-JUL	950	1030	1080	109%	1130	1210	990
	APR-SEP	1030	1120	1180	109%	1240	1330	1080
Icicle Ck nr Leavenworth								
	APR-JUL	270	290	300	109%	315	335	275
	APR-SEP	290	310	330	110%	345	365	300
Wenatchee R at Peshastin								
	APR-JUL	1310	1420	1490	109%	1560	1660	1370
	APR-SEP	1410	1540	1620	109%	1710	1830	1490
Columbia R bl Rock Island Dam								
	APR-JUL	43700	49300	53100	95%	56900	62500	55770
	APR-SEP	51700	58300	62800	96%	67200	73800	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, 2016	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Lake Chelan	357.8	419.1	343.1	676.1
Basin-wide Total	357.8	419.1	343.1	676.1
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis February 1, 2016	# of Sites	% Median	Last Year % Median
Central Columbia Basins	5	110%	89%
Chelan Lake Basin	5	110%	89%
Entiat River	1	107%	70%
Wenatchee River	7	108%	60%
Stemilt Creek	1	122%	68%
Colockum Creek	1	175%	55%



February 1 reservoir storage for the Upper Yakima reservoirs was 454,000-acre feet, 112% of average. Forecasts for the Yakima River at Cle Elum are 102% of average and the Teanaway River near Cle Elum is at 120%. Lake inflows are all forecasted to be slightly above average this summer as well. February streamflows within the basin were Cle Elum River near Roslyn at 67%. February 1 snowpack was 109% based upon 8 snow course and SNOTEL readings within the Upper Yakima Basin. Precipitation was 89% of average for February and 132% 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.

Data Current as of: 2/5/2016 11:23:39 AM

Upper Yakima River
Streamflow Forecasts - February 1, 2016

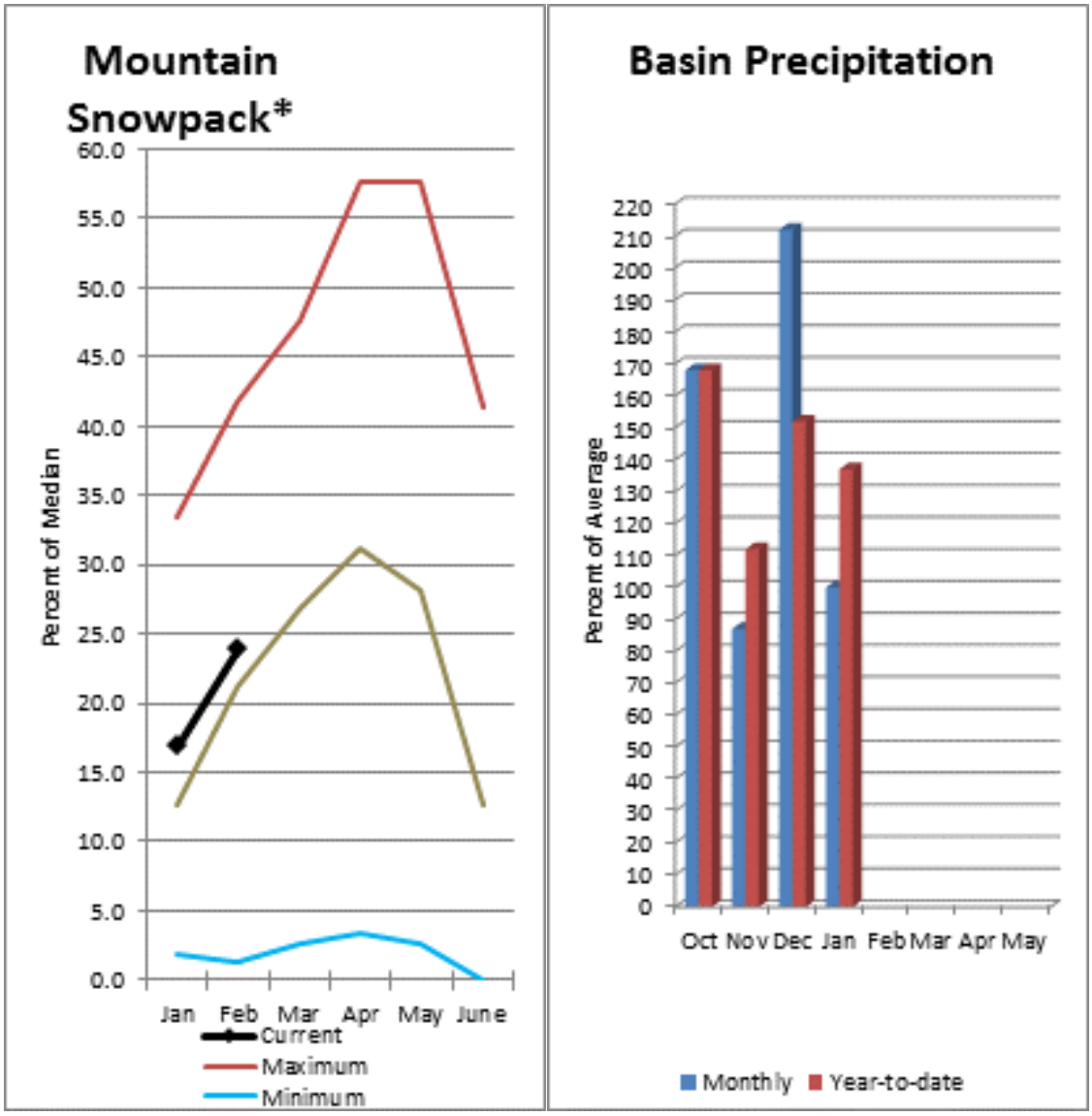
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

Upper Yakima River	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Keechelus Reservoir Inflow								
	APR-JUL	88	108	121	104%	134	154	116
	APR-SEP	97	117	131	104%	145	166	126
Kachess Reservoir Inflow								
	APR-JUL	83	99	110	106%	120	137	104
	APR-SEP	90	106	117	104%	128	145	113
Cle Elum Lake Inflow								
	APR-JUL	330	370	400	104%	430	475	385
	APR-SEP	350	400	435	105%	465	515	415
Yakima R at Cle Elum								
	APR-JUL	575	695	775	103%	855	975	755
	APR-SEP	620	755	845	102%	935	1070	830
Teanaway R bl Forks nr Cle Elum								
	APR-JUL	117	140	156	120%	172	195	130
	APR-SEP	120	143	159	120%	175	198	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, 2016	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Keechelus	101.4	139.6	82.1	157.8
Kachess	119.8	201.2	130.8	239.0
Cle Elum	233.1	337.6	191.5	436.9
Basin-wide Total	454.2	678.4	404.4	833.7
# of reservoirs	3	3	3	3

Watershed Snowpack Analysis February 1, 2016	# of Sites	% Median	Last Year % Median
Upper Yakima River	8	110%	37%



February average streamflows within the basin were: Yakima River near Parker, 75% and the Naches River near Naches, 85%. February 1 reservoir storage for Bumping and Rimrock reservoirs was 156,000-acre feet, 127% of average. Forecast averages for Yakima River near Parker are 123%; American River near Nile, 125%; Ahtanum Creek, 138%; and Klickitat River near Glenwood, 141%. February 1 snowpack was 113% based upon 6 snow course and SNOTEL readings within the Lower Yakima Basin and Ahtanum Creek reported in at 123% of normal. Precipitation was 100% of average for February and 137% for the water-year. Temperatures were near normal for February and for 1-3 degrees above normal for the water year. Volume forecasts for Yakima Basin are for natural flow. As such, they February 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: 2/5/2016 11:23:41 AM

Lower Yakima River
Streamflow Forecasts - February 1, 2016

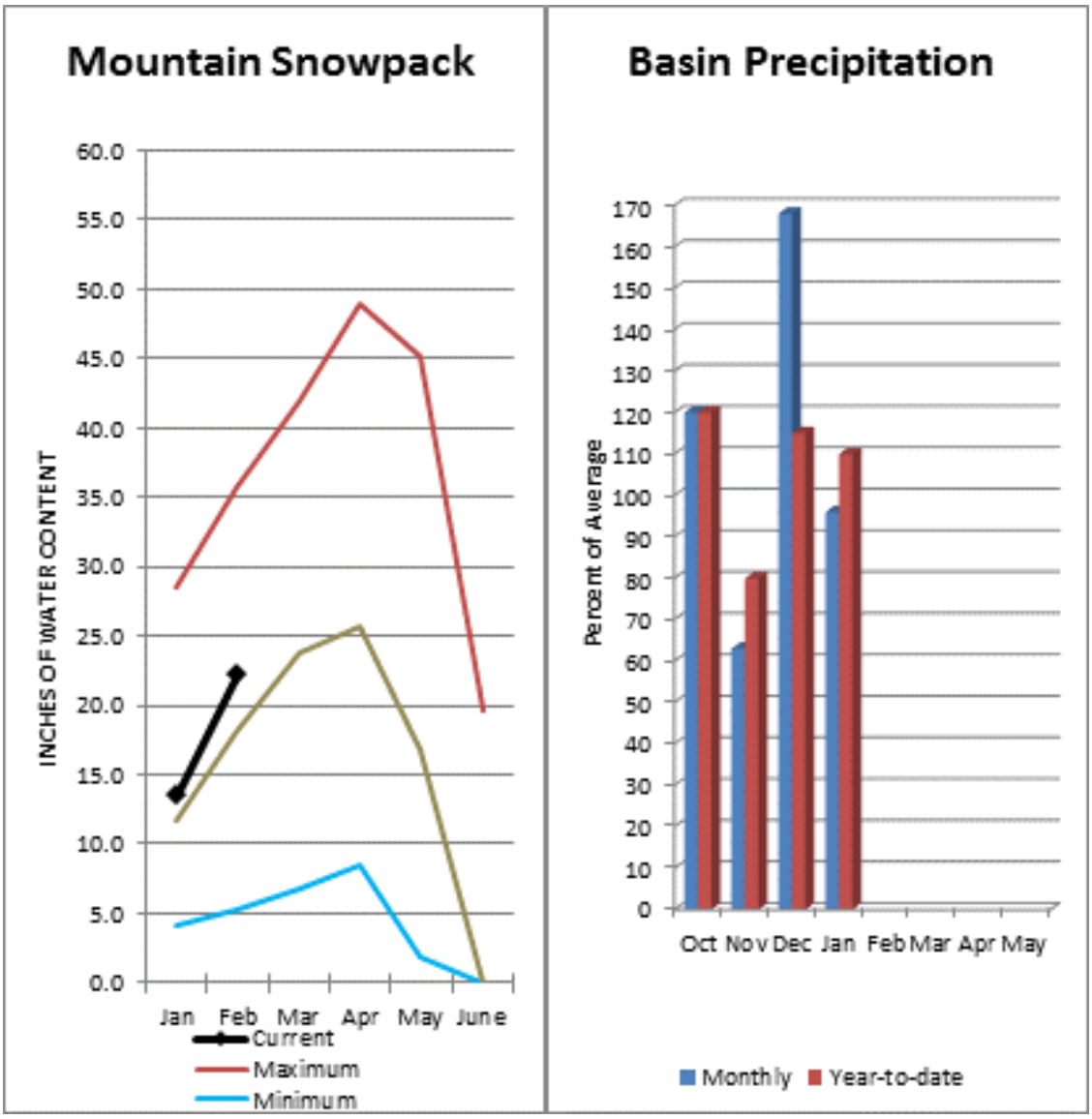
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

Lower Yakima River	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Bumping Lake Inflow								
	APR-JUL	111	125	134	118%	143	157	114
	APR-SEP	120	135	145	118%	156	170	123
American R nr Nile								
	APR-JUL	107	119	127	125%	135	147	102
	APR-SEP	115	129	138	125%	148	162	110
Rimrock Lake Inflow								
	APR-JUL	199	215	225	120%	235	250	187
	APR-SEP	235	250	265	120%	275	295	220
Naches R nr Naches								
	APR-JUL	720	795	850	121%	900	980	700
	APR-SEP	765	855	915	120%	975	1060	760
Ahtanum Ck at Union Gap								
	APR-JUL	28	34	38	141%	42	48	27
	APR-SEP	30	36	40	138%	44	50	29
Yakima R nr Parker								
	APR-JUL	1720	1910	2040	123%	2170	2370	1660
	APR-SEP	1880	2090	2230	123%	2370	2580	1820
Klickitat R nr Glenwood								
	APR-JUL	156	169	178	141%	187	200	126
	APR-SEP	171	186	196	141%	205	220	139
Klickitat R nr Pitt								
	APR-JUL	535	580	615	141%	645	690	435
	APR-SEP	635	690	730	140%	770	825	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, 2016	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Bumping Lake	21.0	26.3	12.7	33.7
Rimrock	134.9	168.2	109.6	198.0
Basin-wide Total	155.9	194.5	122.3	231.7
# of reservoirs	2	2	2	2

Watershed Snowpack Analysis February 1, 2016	# of Sites	% Median	Last Year % Median
Lower Yakima River	7	117%	42%
Ahtanum Creek	2	123%	37%



February precipitation was 96% of average, maintaining the year-to-date precipitation at 110% of average. Snowpack in the basin was 122% of normal. Streamflow forecasts are 107% of average for Mill Creek and 106% for the SF Walla Walla near Milton-Freewater. Average temperatures were 1-3 degrees above normal for February and for the water year.

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

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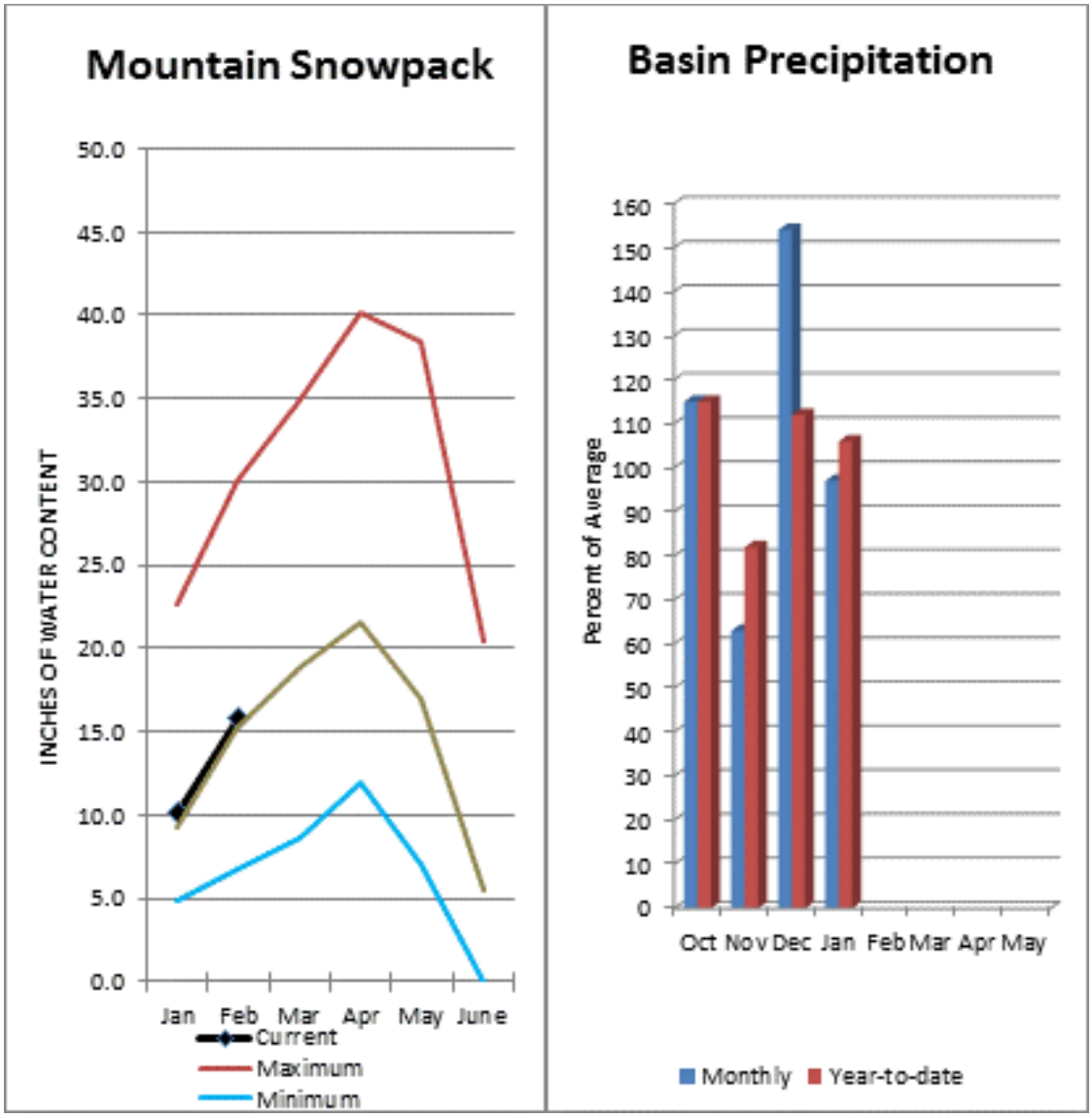
Walla Walla River
Streamflow Forecasts - February 1, 2016

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	70	79	84	105%	90	99	80
	APR-JUL	46	53	57	106%	62	68	54
	APR-SEP	58	65	70	106%	75	83	66
Mill Ck nr Walla Walla								
	APR-JUL	18.8	23	25	104%	28	31	24
	APR-SEP	22	26	29	107%	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 February 1, 2016	# of Sites	% Median	Last Year % Median
Walla Walla River	2	122%	54%



The Grande Ronde River can expect summer flows to be about 105% of normal. The forecast for Asotin Creek at Asotin predicts 100% of average flows for the April – July runoff period. February precipitation was 97% of average, bringing the year-to-date precipitation to 106% of average. February 1 snowpack readings averaged 104% of normal. February streamflow was 76% of average for Snake River below Lower Granite Dam and 80% for Grande Ronde River near Troy. Dworshak Reservoir storage was 101% of average. Average temperatures were 1-3 degrees above normal for February and 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 - February 1, 2016

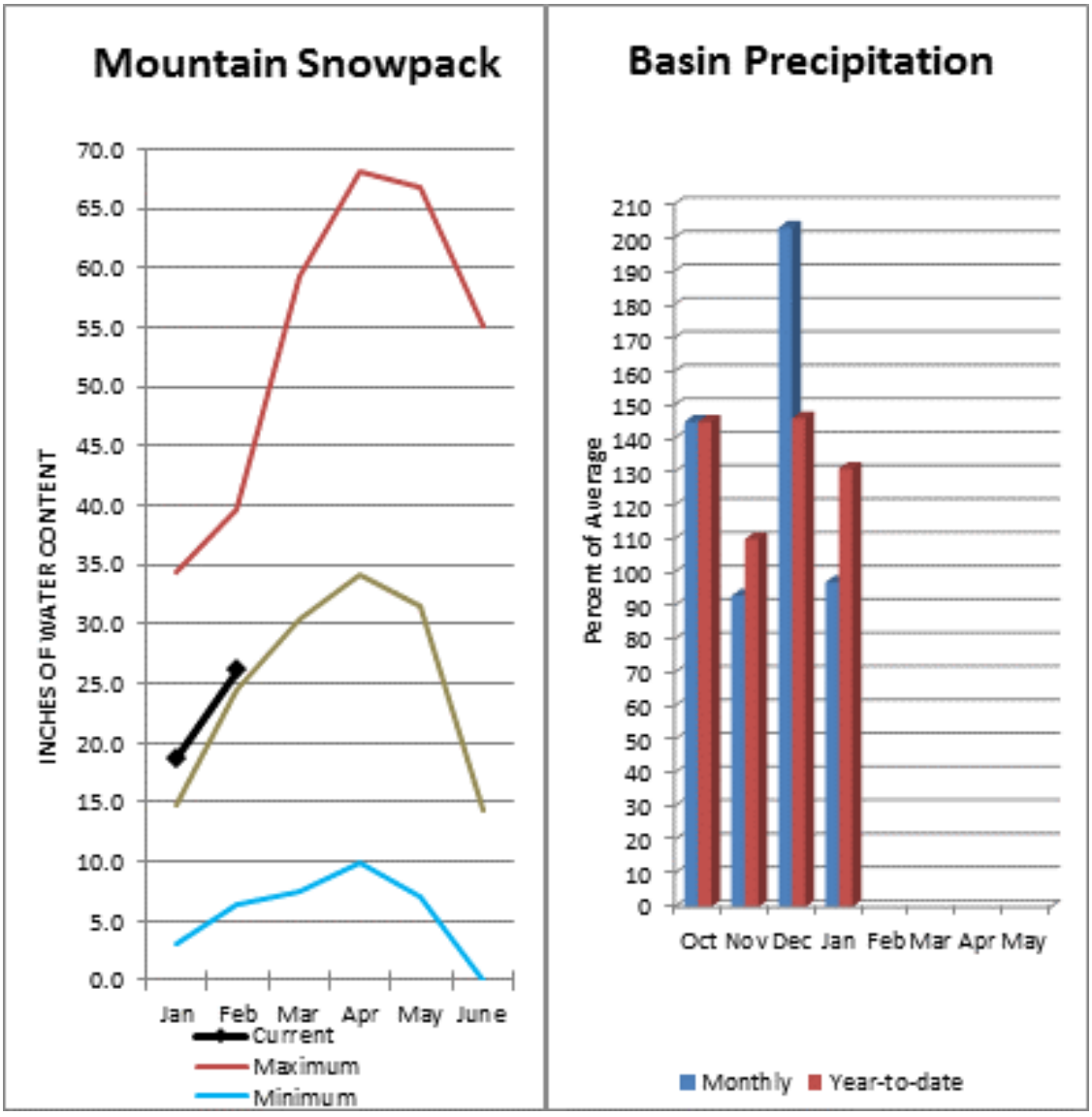
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

Lower Snake, Grande Ronde, Clearwater Basins	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Grande Ronde R at Troy								
	MAR-JUL	1280	1470	1600	106%	1730	1920	1510
	APR-SEP	1060	1250	1380	105%	1510	1700	1310
Asotin Ck at Asotin								
	APR-JUL	19.9	29	35	100%	41	50	35
Clearwater R at Spalding								
	APR-JUL	5490	6420	7050	102%	7680	8610	6890
	APR-SEP	5830	6780	7430	102%	8070	9020	7270
Snake R bl Lower Granite Dam[1]								
	APR-JUL	9700	16100	19000	96%	21900	28300	19848
	APR-SEP	11100	18300	21600	97%	24800	32000	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, 2016	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Dworshak Reservoir	2347.1	2599.9	2335.0	3468.0
Basin-wide Total	2347.1	2599.9	2335.0	3468.0
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis February 1, 2016	# of Sites	% Median	Last Year % Median
Lower Snake, Grande Ronde, Clearwater Basins	14	104%	68%



Forecasts for April – September streamflows within the basin are Lewis River at Ariel, 94% and Cowlitz River at Castle Rock, 104% of average. The Columbia at The Dalles is forecasted to have 95% of average flows this summer according to the River Forecast Center. February average streamflow for Cowlitz River was 117%. The Columbia River at The Dalles was 89% of average. February precipitation was 97% of average and the water-year average was 131%. February 1 snow cover for Cowlitz River was 104%, and Lewis River was 111% of normal. Temperatures were near normal during February and for the water year.

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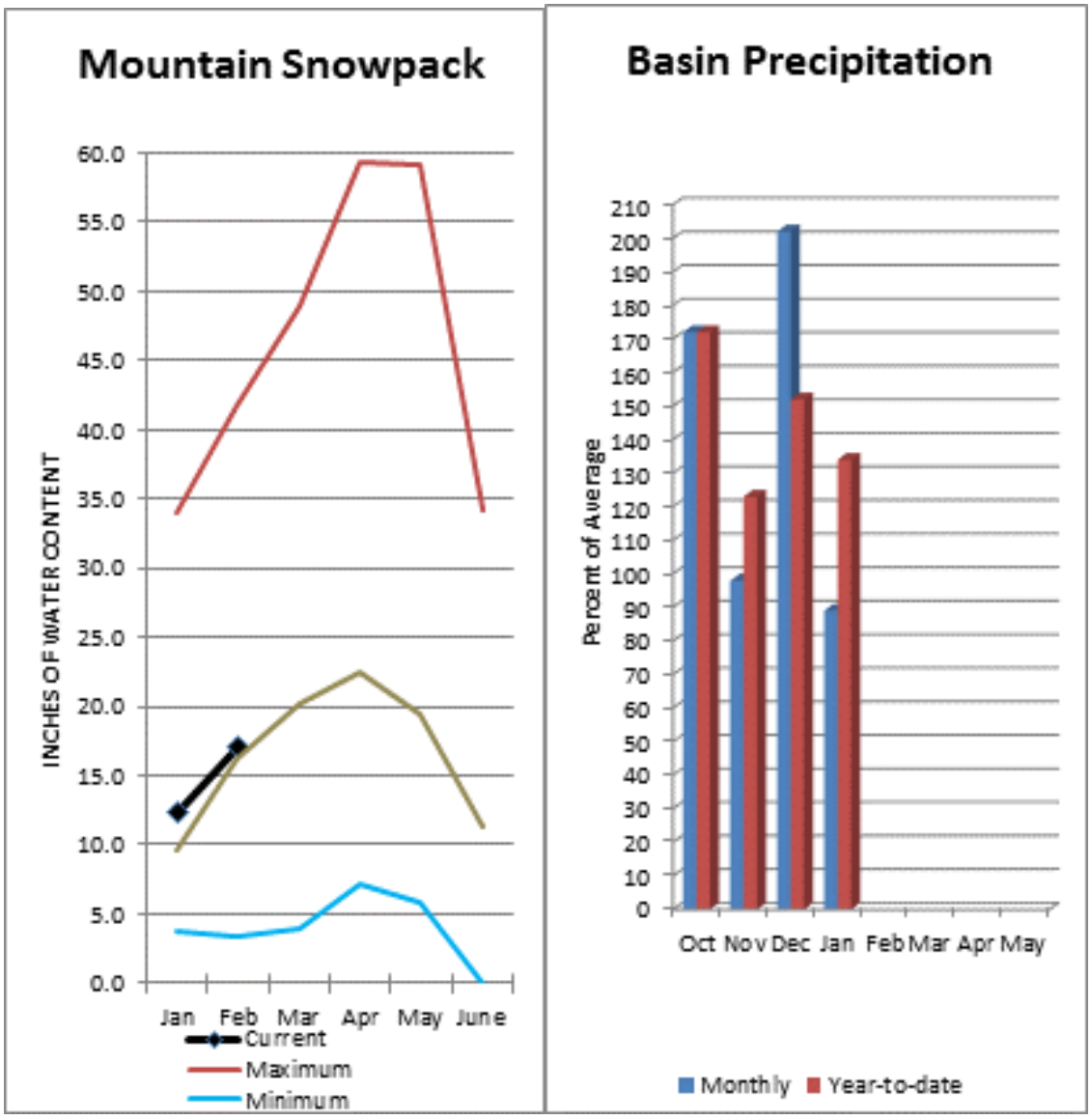
Lower Columbia Basins
Streamflow Forecasts - February 1, 2016

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	60300	69200	75300	94%	81400	90300	79855
	APR-SEP	70500	80900	87900	95%	95000	105000	92704
Klickitat R nr Glenwood								
	APR-JUL	156	169	178	141%	187	200	126
	APR-SEP	171	186	196	141%	205	220	139
Klickitat R nr Pitt								
	APR-JUL	535	580	615	141%	645	690	435
	APR-SEP	635	690	730	140%	770	825	520
Lewis R at Ariel								
	APR-JUL	680	850	965	99%	1080	1260	970
	APR-SEP	745	930	1050	94%	1180	1360	1120
Cowlitz R bl Mayfiled								
	APR-JUL	1260	1460	1590	98%	1730	1930	1620
	APR-SEP	1550	1780	1940	105%	2100	2330	1840
Cowlitz R at Castle Rock								
	APR-JUL	1810	2040	2200	99%	2360	2590	2230
	APR-SEP	2420	2540	2620	104%	2700	2820	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, 2016	# of Sites	% Median	Last Year % Median
Lower Columbia Basins	10	105%	27%
Lewis River	4	106%	15%
Cowlitz River	6	104%	36%



Summer runoff is forecast to be 112% of normal for the Green River below Howard Hanson Dam and 117% for the White River near Buckley. February 1 snowpack was 105% of average for the White River, 108% for Puyallup River and 100% in the Green River Basin. February precipitation was 89% of average, bringing the water year-to-date to 134% of average for the basins. Average temperatures in the area were near normal for February and for the water-year.

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

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South Puget Sound Basins
Streamflow Forecasts - February 1, 2016

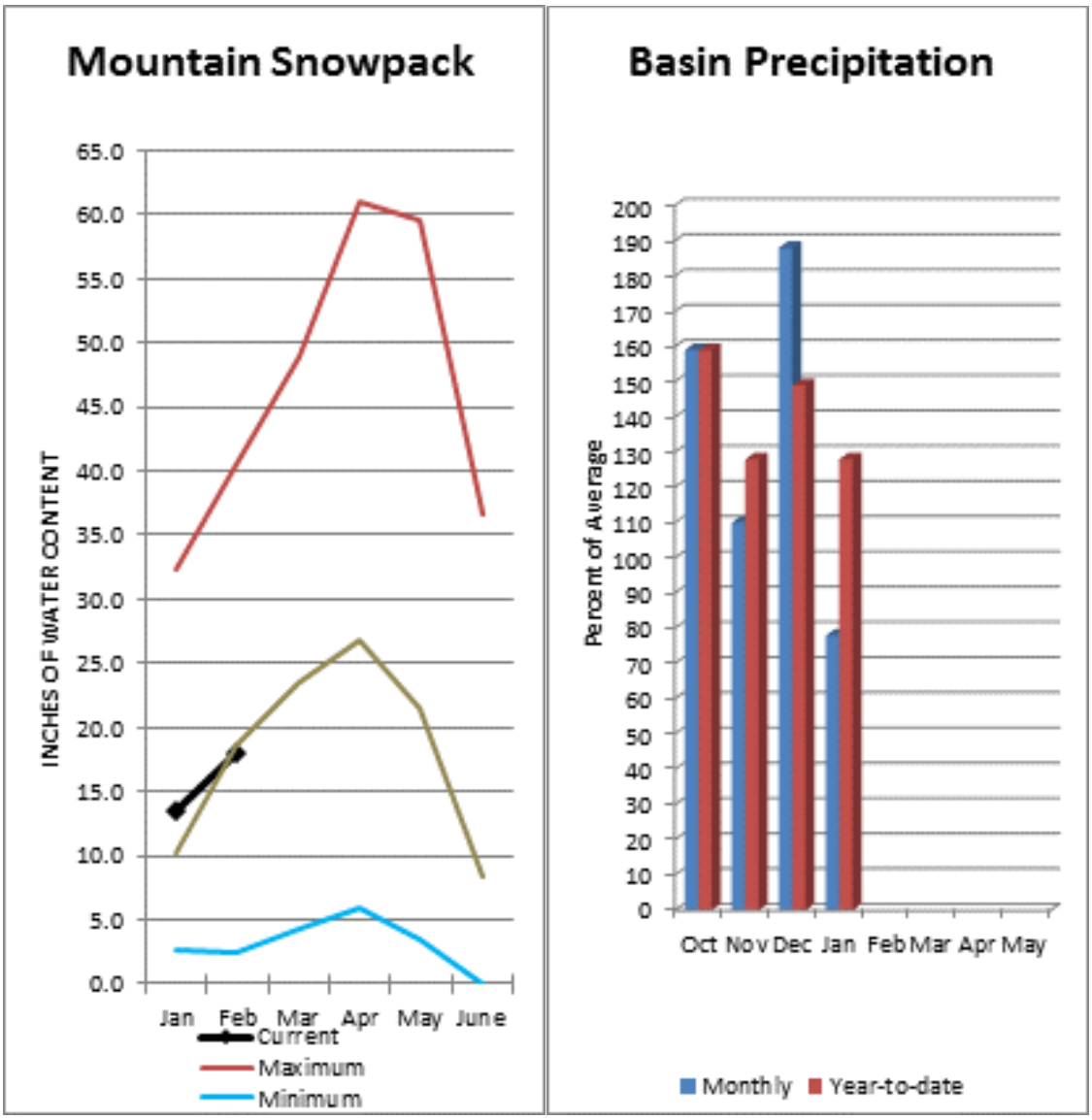
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

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	400	475	510	119%	545	620	430
	APR-SEP	475	565	605	117%	645	735	515
Green R bl Howard A Hanson Dam[1]								
	APR-JUL	173	240	270	115%	300	365	235
	APR-SEP	194	260	290	112%	320	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 February 1, 2016	# of Sites	% Median	Last Year % Median
South Puget Sound Basins	11	107%	34%
White River	3	105%	47%
Green River	3	107%	12%

Central Puget Sound River Basins



Forecast for spring and summer flows are: 121% for Cedar River near Cedar Falls; 119% for Rex River; 94% for South Fork of the Tolt River; and 108% for Taylor Creek near Selleck. Basin-wide precipitation for February was 78% of average, bringing water-year-to-date to 128% of average. February 1 median snow cover in Cedar River Basin was 118%, Tolt River Basin was 66%, Snoqualmie River Basin was 85%, and Skykomish River Basin was 68%. Temperatures were near normal for February and for the water-year.

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

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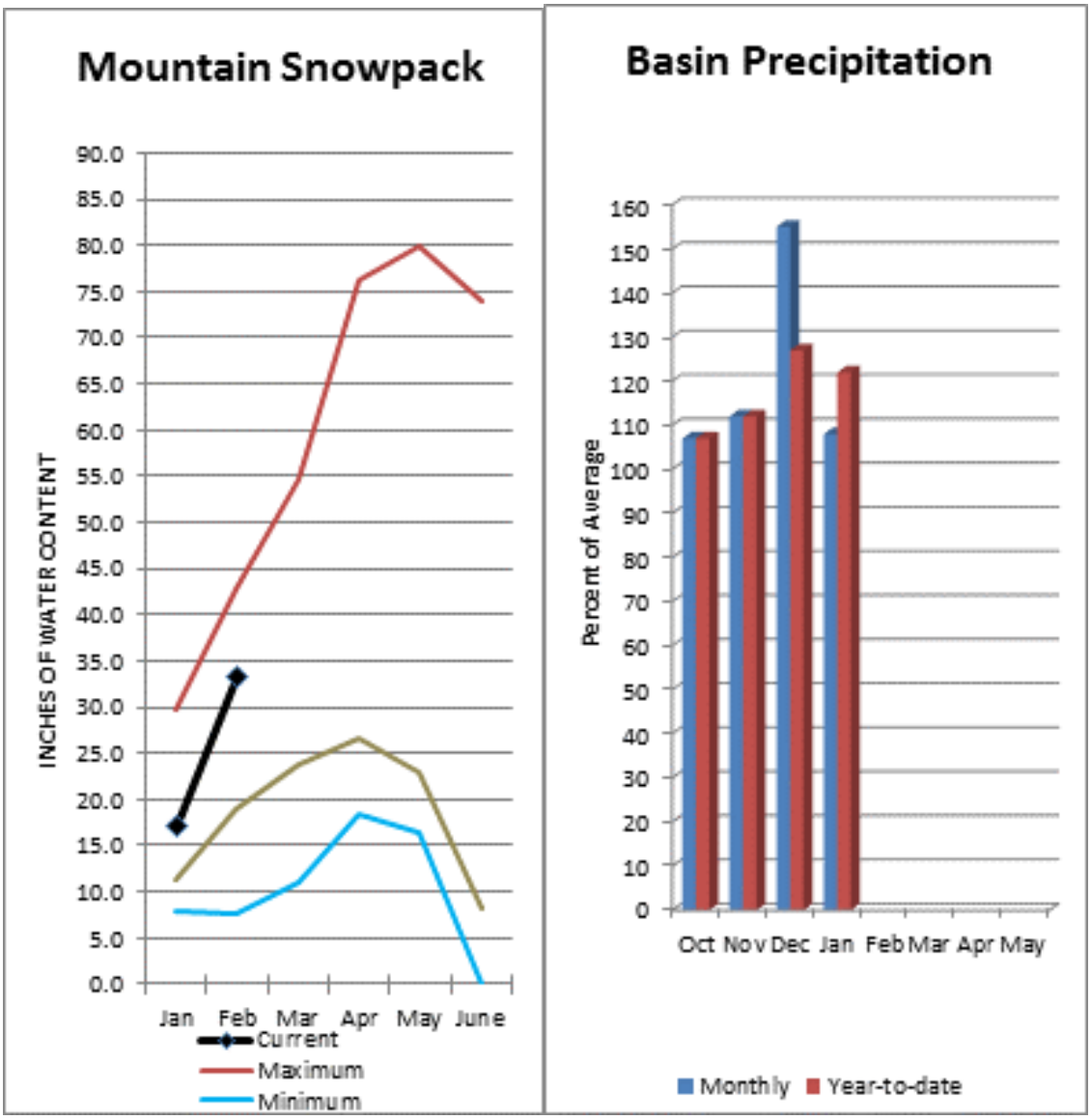
Central Puget Sound Basins
Streamflow Forecasts - February 1, 2016

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	66	77	84	120%	92	103	70
	APR-SEP	73	84	92	121%	100	111	76
Rex R nr Cedar Falls								
	APR-JUL	21	26	30	125%	33	38	24
	APR-SEP	24	29	32	119%	36	41	27
Taylor Ck nr Selleck								
	APR-JUL	17	20	22	110%	24	27	20
	APR-SEP	20	24	26	108%	28	32	24
SF Tolt R nr Index								
	APR-JUL	9.4	11.7	13.3	94%	14.8	17.1	14.2
	APR-SEP	11	13.4	15.1	94%	16.8	19.3	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, 2016	# of Sites	% Median	Last Year % Median
Central Puget Sound Basins	14	99%	23%
Puyallup River	5	108%	41%
Cedar River	4	118%	14%
Tolt River	2	66%	3%
Snoqualimie River	4	86%	15%
Skykomish River	2	68%	21%



Forecast for Skagit River streamflow at Newhalem is 114% of average for the spring and summer period. February streamflow in Skagit River was 119% of average. Other forecast points included Baker River at 109% and Thunder Creek at 106% of average. Basin-wide precipitation for February was 108% of average, bringing water-year-to-date to 122% of average. February 1 average snow cover in Skagit River Basin was 114%, Nooksack River Basin was 75% and Baker River Basin was not available. February 1 Skagit River reservoir storage was 63% of average and 45% of capacity. Average temperatures were slightly 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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North Puget Sound Basins
Streamflow Forecasts - February 1, 2016

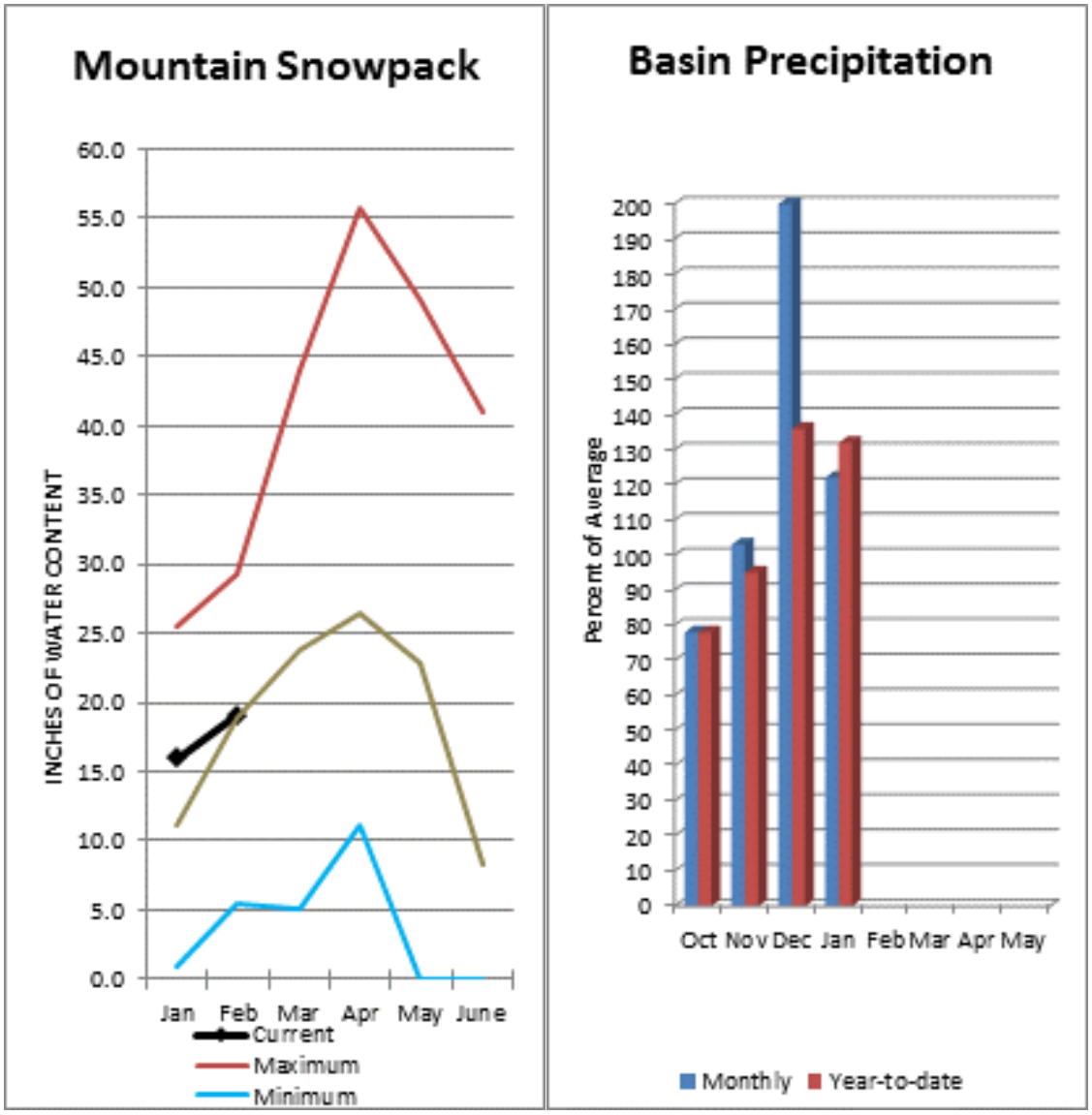
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

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	220	235	245	104%	260	275	235
	APR-SEP	315	335	350	106%	360	380	330
Skagit R at Newhalem								
	APR-JUL	1740	1880	1970	117%	2060	2200	1680
	APR-SEP	2060	2210	2320	114%	2420	2570	2030
Baker R at Concrete								
	APR-JUL	700	780	840	108%	895	975	780
	APR-SEP	915	1010	1070	109%	1130	1220	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, 2016	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Ross	628.6	787.6	996.3	1404.1
Diablo Reservoir			85.8	90.6
Basin-wide Total	628.6	787.6	996.3	1404.1
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis February 1, 2016	# of Sites	% Median	Last Year % Median
North Puget Sound Basins	15	110%	62%
Skagit River	13	116%	71%
Baker River	0		
Nooksack River	2	75%	15%



Forecasted average runoff for streamflow for the Dungeness River is 112% and Elwha River is 110% February runoff in the Dungeness River was 134% of normal. Big Quilcene and Wynoochee rivers may expect near average runoff this summer as well. February precipitation was 122% of average. Precipitation has accumulated at 132% of average for the water year. February precipitation at Quillayute was 152% of normal. Olympic Peninsula snowpack averaged 101% of normal on February 1. Temperatures were 1-2 degrees above average for in the mountains but 2-4 degrees above 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.

Data Current as of: 2/5/2016 11:23:50 AM

Olympic Penninsula
Streamflow Forecasts - February 1, 2016

		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	115	127	135	113%	143	155	120
	APR-SEP	136	151	162	112%	172	187	145
Elwha R at McDonald Bridge nr Port Angeles								
	APR-JUL	375	415	445	111%	475	515	400
	APR-SEP	435	485	515	110%	550	600	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, 2016	# of Sites	% Median	Last Year % Median
Olympic Penninsula	6	101%	9%

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, 2016

Chelan PUD Snow Surveyors, Erik Norland, Scott Buehn and Dave Nelson, chasing snowflakes by helicopter at Park Creek Ridge SNOTEL site in Stehekin River Basin – Photo Chelan PUD

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:

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(509) 323-2955

How forecasts are made

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

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

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

Washington
Water Supply Outlook

March 2016

General Outlook

El Nino did a number on us this past month with temperatures ranging from 5-15 degrees warmer than normal. However rain was plentiful in most areas of the state. This combination not only melted low and mid elevation snow but also led to a decline in snowpack percentages. This was more due to the lack of normal snow accumulation for February and not the melt. These conditions also attributed to the sharp increase in snowpack density, or quantity of water in the snow, which means that we are about a month ahead of where we should be. (See density graphic on page 7) If these trends continue we will see an early start to spring melt and the possibility of rare spring flooding. The latest NWS short term forecasts are calling for cool and wet weather for the first half of March but then falling back into a warmer and possibly dryer second half. Long range forecasts for the spring continue to be warmer and dryer than normal with less certainty on precipitation amounts.
http://www.cpc.ncep.noaa.gov/

Snowpack

The March 1 statewide SNOTEL readings were 100% of normal, down from 109% on February 1 and 120% on January 1. The Skykomish River Basin reported the lowest readings at 62% of the 30-year median for March 1 and the Methow had the most snow with 135%. Most basins reported a net loss from last month primarily due to the lack of fresh snow. Westside medians from SNOTEL, and March 1 snow surveys, included the North Puget Sound river basins with 93% of normal, the Central and South Puget river basins with 84% and 82% respectively, and the Lower Columbia basins with 101% of normal. Snowpack along the east slopes of the Cascade Mountains included the Yakima area with 98% and the Wenatchee area with 108%. Snowpack in the Spokane River Basin was at 83% and the Walla Walla River Basin had 107% of the long term median.

BASIN	PERCENT OF MEDIAN	LAST YEAR PERCENT MEDIAN
Spokane	83	43
Newman Lake	81	20
Pend Oreille	93	89
Okanogan	128	78
Methow	135	90
Conconully Lake	128	58
Central Columbia	108	56
Upper Yakima	97	26
Lower Yakima	99	44
Ahtanum Creek	129	45
Walla Walla	107	46
Lower Snake	93	59
Cowlitz	97	30
Lewis	105	7
White	82	46
Green	81	8
Puyallup	82	38
Cedar	103	0
Snoqualmie	74	7
Skykomish	62	0
Skagit	109	63
Nooksack	80	15
Olympic Peninsula	97	2
Baker	79	21

Precipitation

For the most part the state received above normal precipitation for the month of February keeping year to date statewide SNOTEL averages above normal at 130%. Only north central and south east parts of the state fell below 100%. Quillayute State Airport measured 152% of normal rainfall. The wettest SNOTEL in the state was Skookum Creek, located in the Tolt River Basin, collected 23.5 inches of precipitation or 201% of normal during the month of February.

RIVER BASIN	MARCH PERCENT OF AVERAGE	WATER YEAR PERCENT OF AVERAGE
Spokane	111	101
Pend Oreille	111	100
Upper Columbia	84	118
Central Columbia	117	131
Upper Yakima	116	136
Lower Yakima	113	133
Walla Walla	93	107
Lower Snake	92	102
Lower Columbia	128	131
South Puget Sound	144	137
Central Puget Sound	167	134
North Puget Sound	176	125
Olympic Peninsula	119	130

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 February helped buffer some reservoir levels, supplementing any chance of lower snow levels. March 1 Reservoir storage in the Yakima Basin was 580,000-acre feet, 129% of average for the Upper Reaches and 199,000-acre feet or 145% of average for Rimrock and Bumping Lakes. The power generation reservoirs included the following: Coeur d'Alene Lake, 171,000 acre feet, 129% of average and 72% of capacity; and the Skagit River reservoirs at 43% of average and 73% 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	72	56
Pend Oreille	43	86
Upper Columbia	60	95
Central Columbia	46	112
Upper Yakima	70	129
Lower Yakima	86	145
Lower Snake	77	113
North Puget Sound	43	73

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

Streamflow

March 1 marks a time where we are about 80% through winter thus making streamflow forecasting a much more attainable target. 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, 109%; White River, 111%; and Skagit River, 114%. Some Eastern Washington streams include the Yakima River near Parker 114%, Wenatchee River at Plain 107%; and Spokane River near Post Falls 83%. 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	83-118
Pend Oreille	91-103
Upper Columbia	81-122
Central Columbia	102-111
Upper Yakima	96-113
Lower Yakima	111-145
Walla Walla	98-100
Lower Snake	95-104
Lower Columbia	97-115
South Puget Sound	92-111
Central Puget Sound	104-109
North Puget Sound	103-118
Olympic Peninsula	107-110

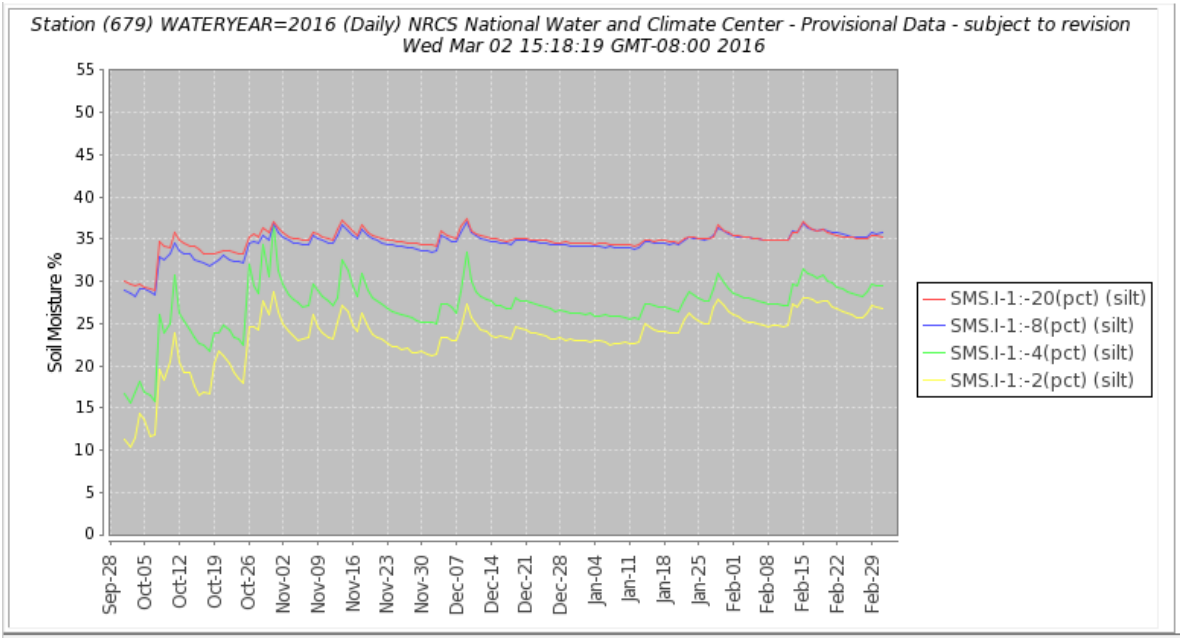
STREAM	PERCENT OF AVERAGE MARCH STREAMFLOWS
Pend Oreille at Albeni Fall Dam	130
Kettle at Laurier	174
Columbia at Birchbank	123
Spokane at Spokane	147
Similkameen at Nighthawk	223
Okanogan at Tonasket	135
Methow at Pateros	149
Chelan at Chelan	176
Wenatchee at Pashastin	213
Cle Elum near Roslyn	127
Yakima at Parker	214
Naches at Naches	227
Grande Ronde at Troy	132
Snake below Lower Granite Dam	104
Columbia River at The Dalles	118
Lewis at Merwin Dam	129
Cowlitz below Mayfield Dam	146
Skagit at Concrete	189
Dungeness near Sequim	156

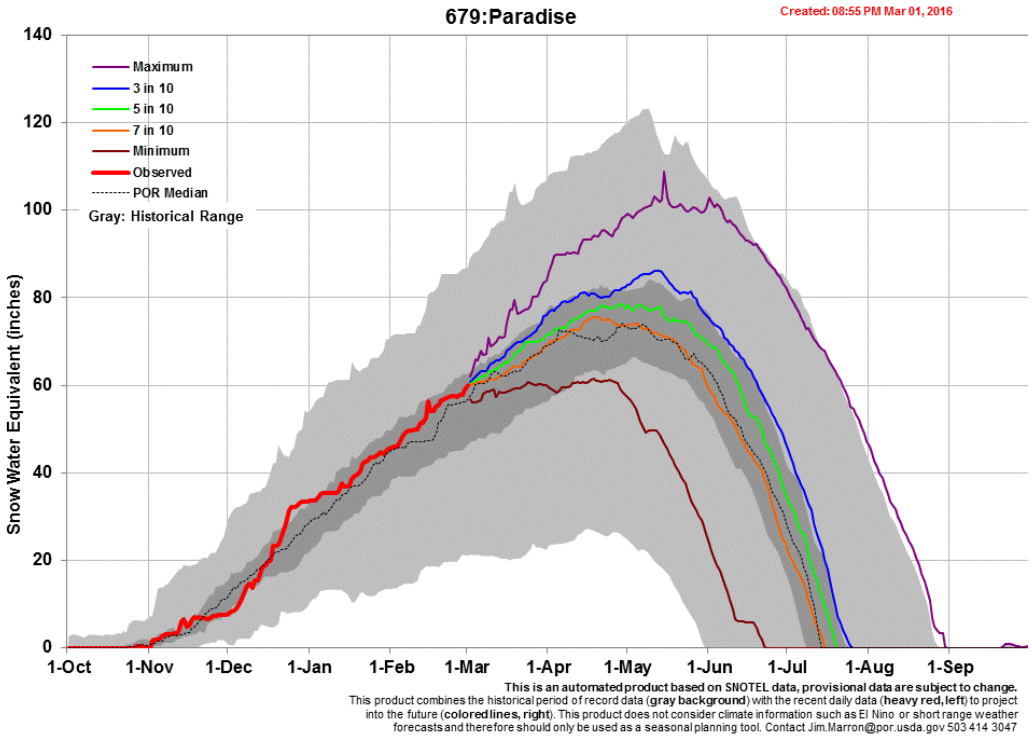
For more information contact your local Natural Resources Conservation Service office.

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.

The following graph shows a very typical winter soil moisture profile at Paradise SNOTEL site. Notice the profile recharge when fall rains began. The additional peaks in the last month or so indicate rain on snow events where the rain percolated through the snow. The second graph is a snowpack projection for the same site.





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

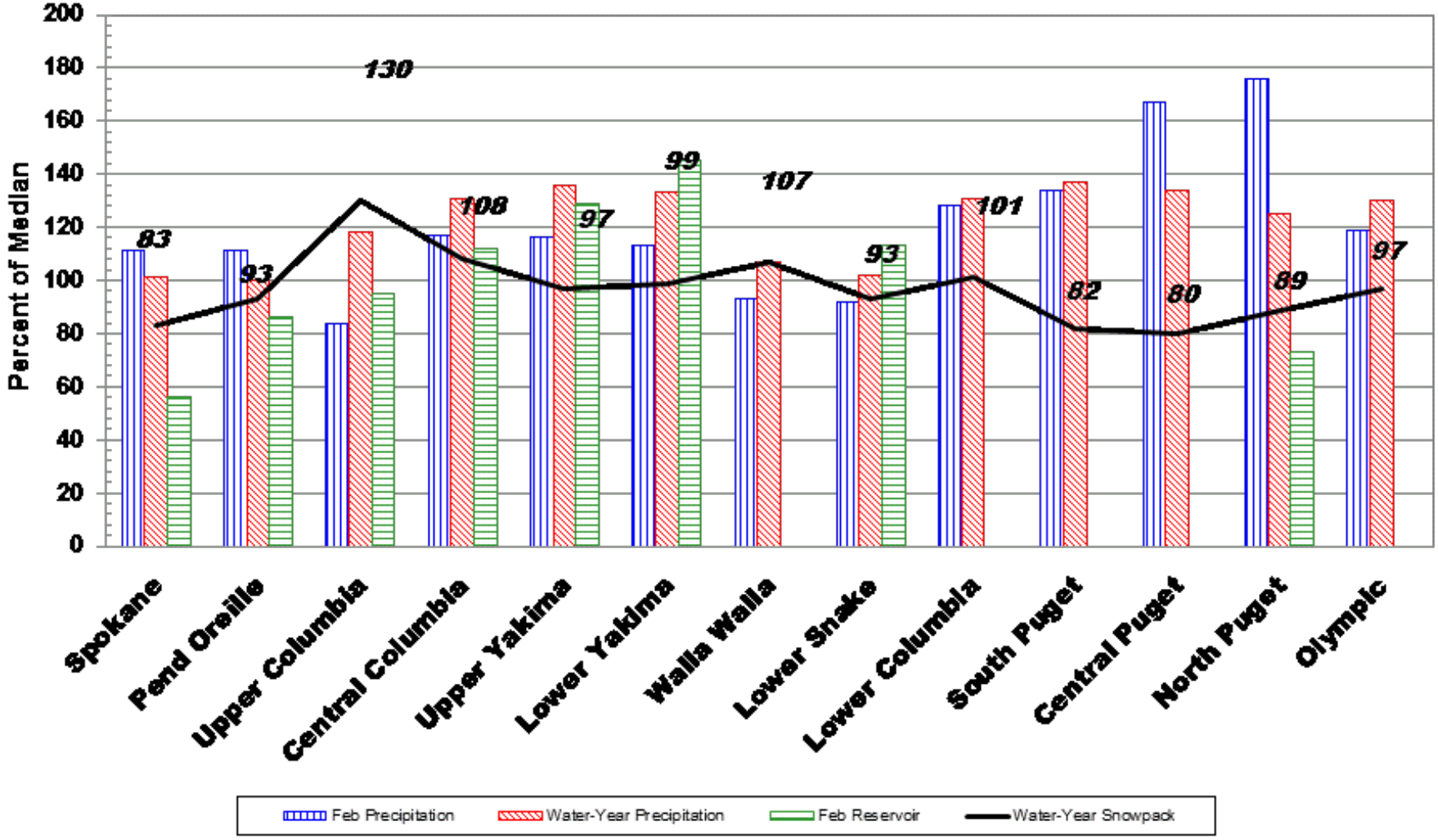
Washington:
http://www.nrcs.usda.gov/wps/portal/nrcs/site/wa/home/

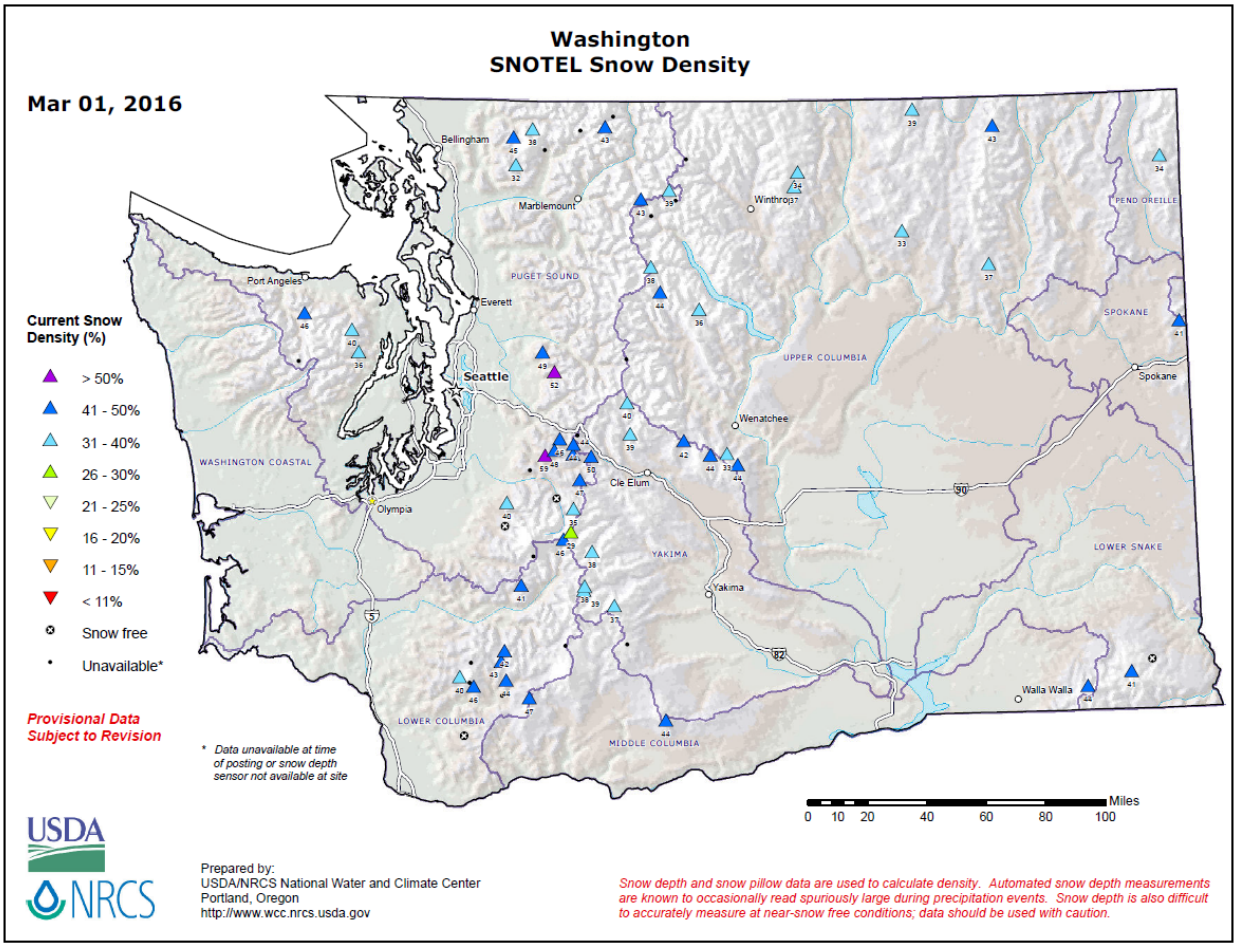
NRCS National:
http://www.nrcs.usda.gov/wps/portal/nrcs/site/national/home/

NRCS Natural Resources Conservation Service

March 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.

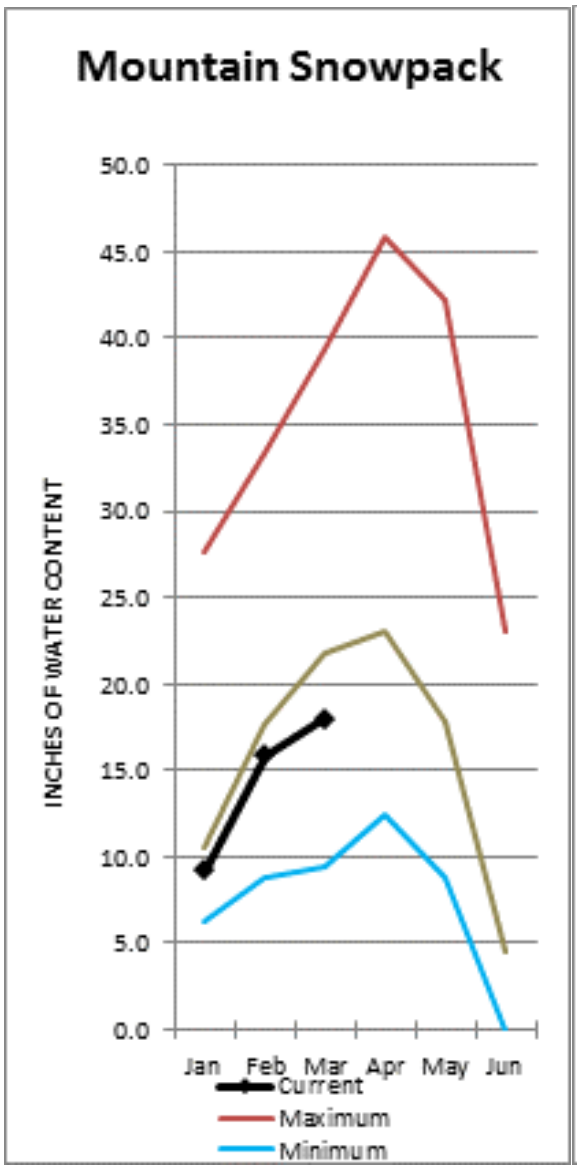
Dates: April 18-21, 2016
Location: Seattle, Washington

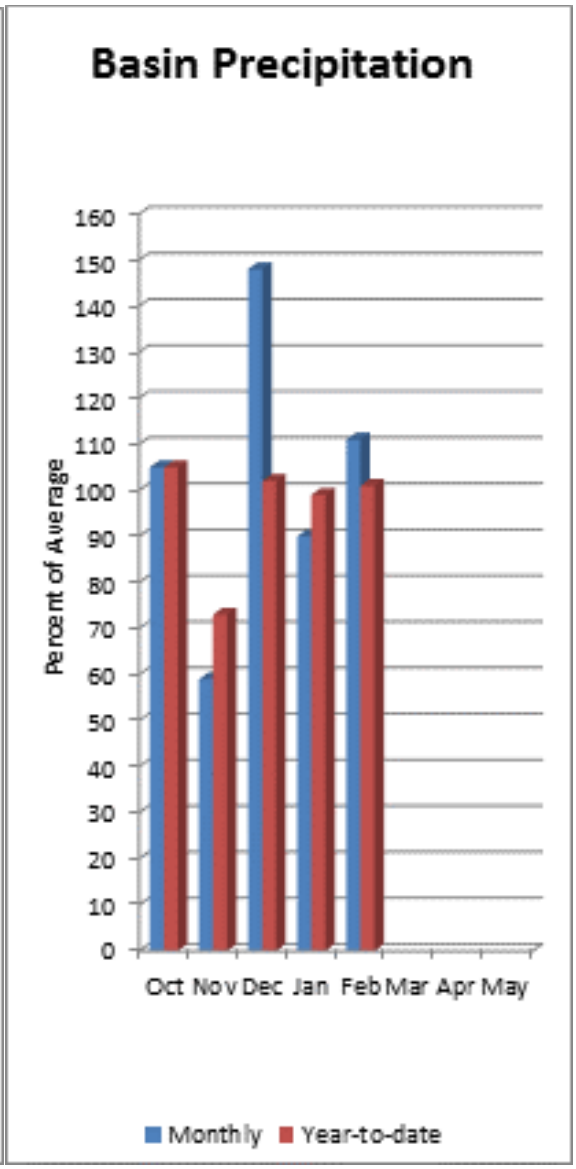
The Conference will begin Monday, April 18th with a short course and panel discussion on "Validation of the rain/snow Global Precipitation Measurements (GPM) satellite data in the Olympic Mountains: University of Washington and NASA" with several invited experts in the field. Tuesday and Wednesday will 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/

We can be found on Facebook and twitter as well.

Spokane River Basin





The March 1 forecasts for summer runoff within the Spokane River Basin are 83% of average near Post Falls and 86% at Long Lake. The Chamokane River near Long Lake forecasted to have 118% 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 101% of average for the water year. Precipitation for February was slightly above normal at 111% of average. Streamflow on the Spokane River at Spokane was 147% of average for February. March 1 storage in Coeur d'Alene Lake was 171,000 acre feet, 129% of average and 72% of capacity. Snowpack at Quartz Peak SNOTEL site was 109% of average with 21.2 inches of water content. Average temperatures in the Spokane basin were 4-6 degrees above normal for February and 2-4 degrees above for the water year.

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

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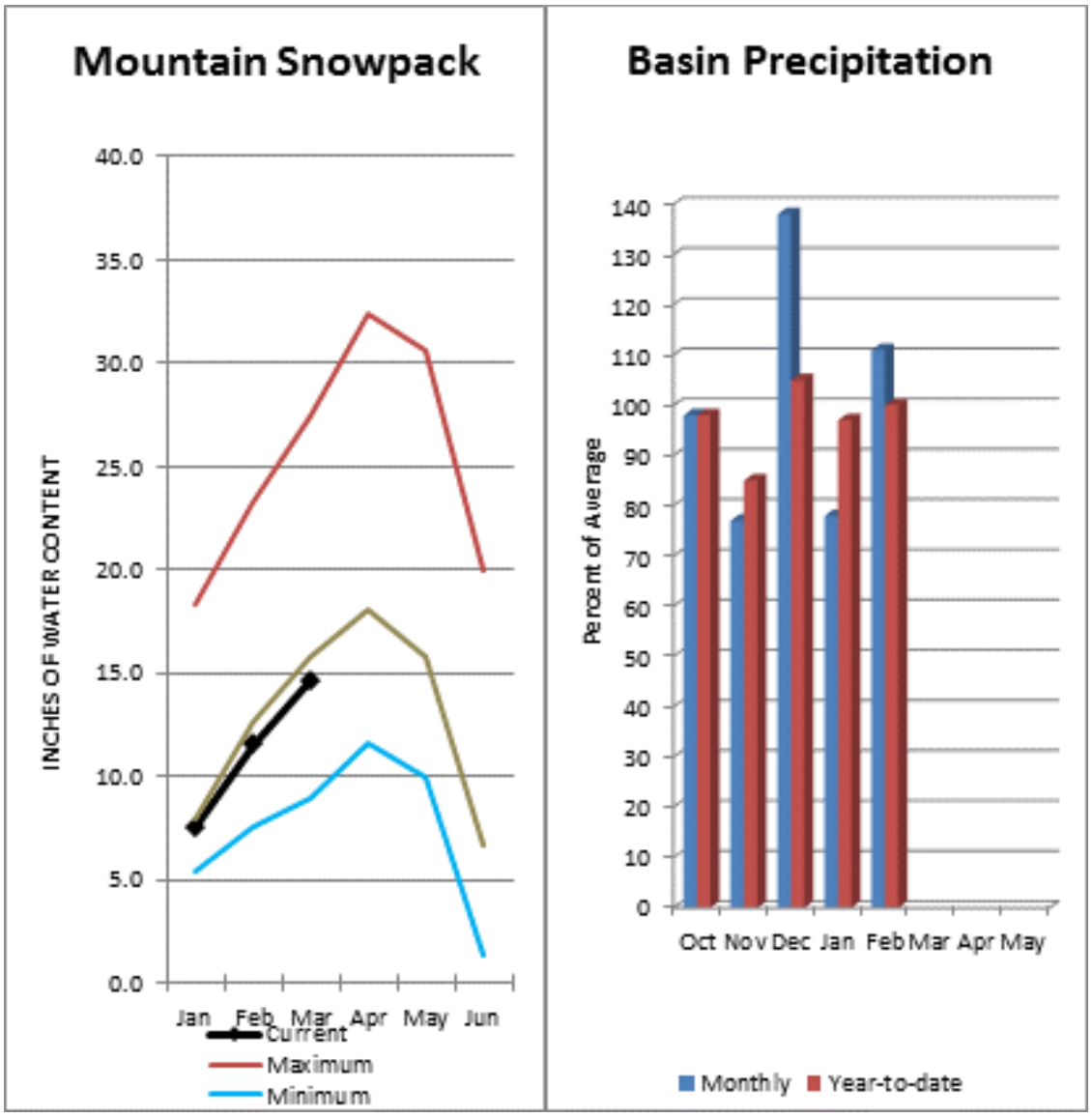
Spokane
Streamflow Forecasts - March 1, 2016

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								
	APR-JUL	1310	1720	2010	84%	2290	2700	2390
	APR-SEP	1370	1790	2070	83%	2360	2780	2480
Spokane R at Long Lake								
	APR-JUL	1510	1960	2270	87%	2580	3030	2620
	APR-SEP	1680	2140	2450	86%	2770	3230	2850
Chamokane Ck nr Long Lake								
	MAY-AUG	5.8	8.9	11	118%	13.1	16.2	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, 2016	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Lake Coeur d' Alene	171.4	144.1	132.8	238.5
Basin-wide Total	171.4	144.1	132.8	238.5
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis March 1, 2016	# of Sites	% Median	Last Year % Median
Spokane	15	83%	43%
Newman Lake	3	81%	20%



The April – September average forecast for the Priest River near the town of Priest River is 103% and the Pend Orielle below Box Canyon is 92%. February streamflow was 103% of average on the Pend Oreille River and 123% on the Columbia at Birchbank. March 1 snow cover was 93% of normal in the Pend Oreille Basin River Basin. Bunchgrass Meadows SNOTEL site had 22.9 inches of snow water on the snow pillow. Normally Bunchgrass would have 22.5 inches on March 1. Precipitation during February was 111% 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 86% of normal. Average temperatures were 4-6 degrees above normal for February and 2-4 degrees above 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, 2016

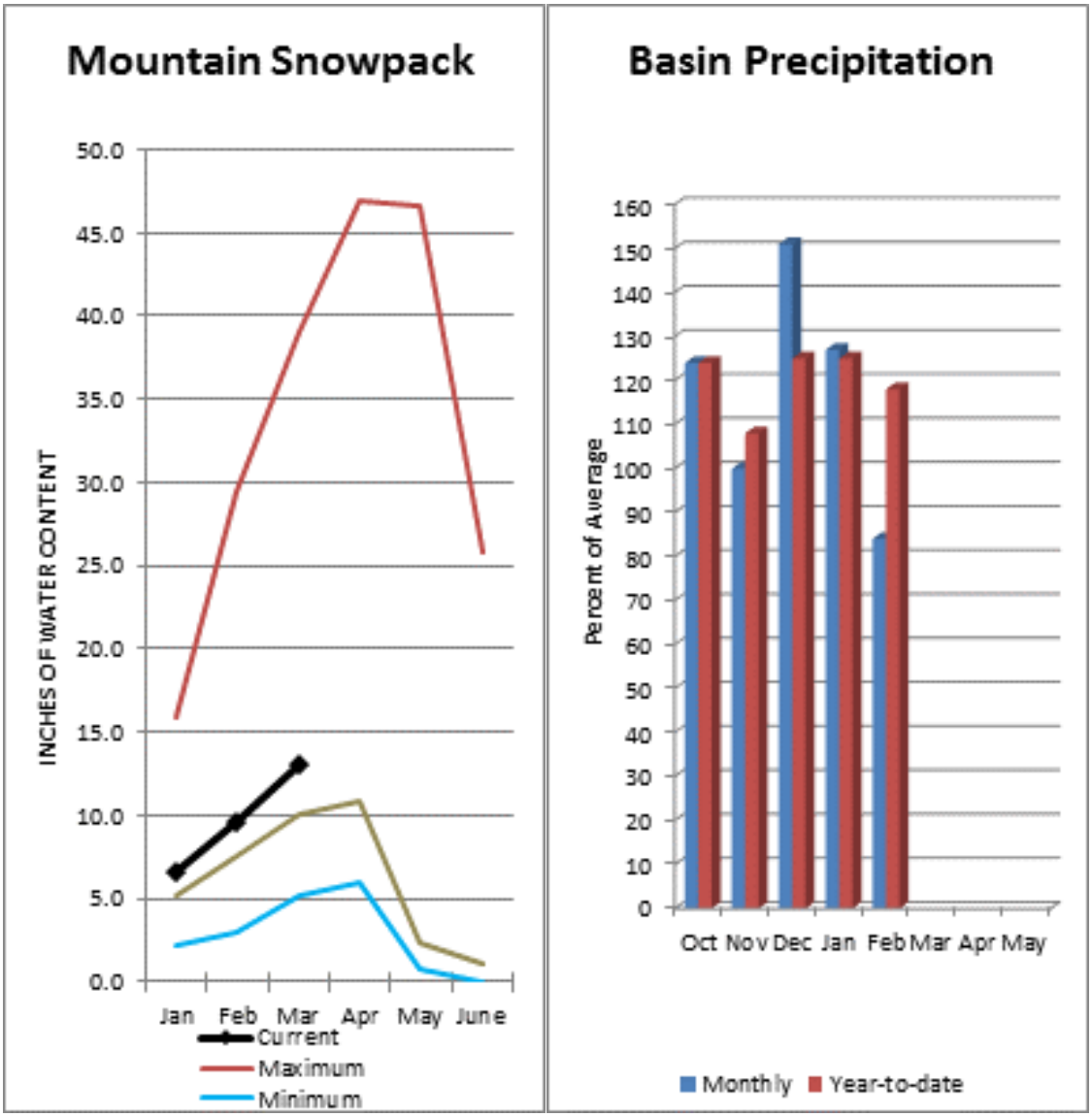
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

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	8730	9950	10800	92%	11600	12800	11800
	APR-SEP	9460	10800	11700	91%	12600	13900	12800
Priest R nr Priest River								
	APR-JUL	665	750	805	103%	865	950	780
	APR-SEP	705	795	855	103%	920	1010	830
Pend Oreille R bl Box Canyon								
	APR-JUL	8870	10100	10900	92%	11800	13000	11900
	APR-SEP	9560	10900	11900	92%	12800	14100	13000

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

Reservoir Storage End of February, 2016	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Lake Pend Oreille	665.3	610.0	792.6	1561.3
Priest Lake	64.1	78.9	57.1	119.3
Basin-wide Total	729.5	688.8	849.7	1680.6
# of reservoirs	2	2	2	2

Watershed Snowpack Analysis March 1, 2016	# of Sites	% Median	Last Year % Median
Pend Oreille Basins	76	93%	88%
Colville River	2	84%	28%
Pend Oreille River	74	93%	89%
Kettle River	5	122%	69%



Summer runoff average forecast for the Okanogan River is 99%, Similkameen River is 81%, and Methow River is 122%. March 1 snow cover on the Okanogan was 128% of normal, Omak Creek was 130% and the Methow was 135%. February precipitation in the Upper Columbia was 84% of average, with precipitation for the water year at 118% of average. February streamflow for the Methow River was 149% of average, 135% for the Okanogan River and 223% for the Similkameen. Snow-water content at Salmon Meadows SNOTEL was 11.2 inches or 129% of normal for March 1. Combined storage in the Conconully Reservoirs was 10,000 acre-feet or 95% of normal. Temperatures were 1-2 degrees above normal for February and for the water year.

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Upper Columbia Basins
Streamflow Forecasts - March 1, 2016

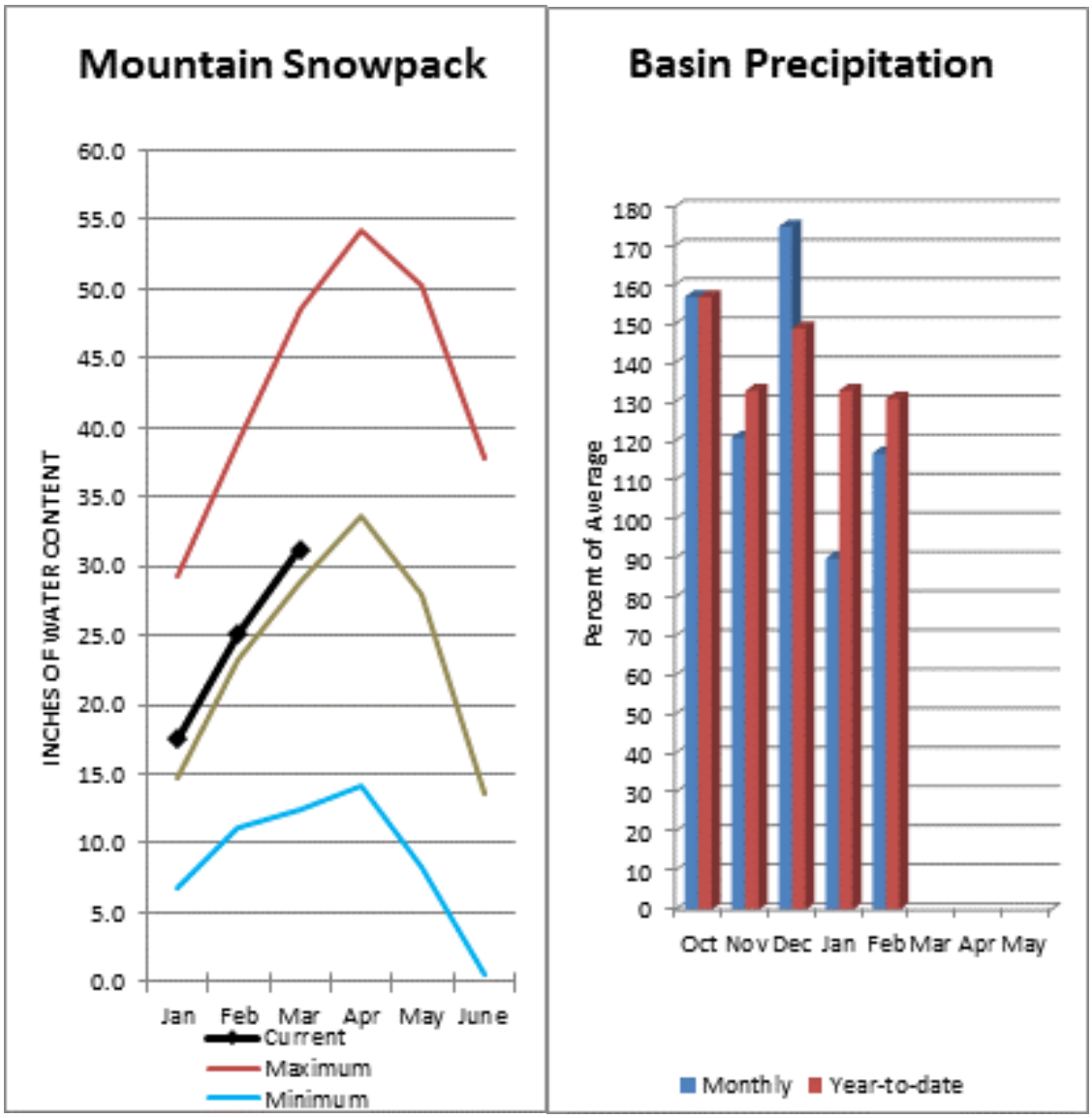
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

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	1710	1920	2070	115%	2220	2430	1800
	APR-SEP	1760	2000	2160	115%	2320	2560	1880
Colville R at Kettle Falls								
	APR-JUL	60	97	122	103%	147	184	119
	APR-SEP	65	105	133	102%	161	200	131
Columbia R at Grand Coulee[1]								
	APR-JUL	41600	47500	50200	98%	52800	58800	51015
	APR-SEP	50100	57200	60400	100%	63600	70600	60110
Similkameen R nr Nighthawk[1]								
	APR-JUL	630	865	970	81%	1080	1320	1200
	APR-SEP	690	930	1040	81%	1150	1390	1280
Okanogan R nr Tonasket[1]								
	APR-JUL	930	1260	1410	95%	1550	1880	1480
	APR-SEP	1040	1400	1560	95%	1730	2090	1650
Okanogan R at Malott[1]								
	APR-JUL	960	1300	1460	101%	1610	1950	1450
	APR-SEP	1060	1440	1610	99%	1780	2160	1620
Methow R nr Pateros								
	APR-JUL	860	950	1010	121%	1080	1170	835
	APR-SEP	930	1020	1090	122%	1150	1250	895
Columbia R at Birchbank[1]								
	APR-JUL	29100	32600	34200	101%	35700	39200	33840
	APR-SEP	36300	40600	42600	102%	44600	48900	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 February, 2016	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Conconully Lake (Salmon Lake Dam)	7.2	6.9	7.3	10.5
Conconully Reservoir	6.8	10.7	7.4	13.0
Basin-wide Total	14.0	17.6	14.7	23.5
# of reservoirs	2	2	2	2

Watershed Snowpack Analysis March 1, 2016	# of Sites	% Median	Last Year % Median
Upper Columbia Basins	25	124%	75%
Okanogan River	14	128%	78%
Omak Creek	3	130%	43%
Sanpoil River	1	0%	0%
Similkameen River	4	103%	82%
Toats Coulee Creek	4	141%	86%
Conconully Lake	3	128%	58%
Methow River	7	134%	84%



Precipitation during February was 123% of average in the basin and 132% for the year-to-date. Runoff for Entiat River is forecast to be 111% of average for the summer. The April-September average forecast for Chelan River is 107%, Wenatchee River at Plain is 107%, Stehekin River is 111% and Icicle Creek is 103%. February average streamflow on the Chelan River was 176% and on the Wenatchee River 213%. March 1 snowpack in the Wenatchee River Basin was 102% of normal; the Chelan, 118%; the Entiat, 90%; Stemilt Creek, 108% and Colockum Creek, 166%. Reservoir storage in Lake Chelan was 112% of average and 46% of capacity. Lyman Lake SNOTEL had the most snow water with 54.1 inches of water. This site would normally have 48.6 inches on March 1. Temperatures were 2-4 degrees above normal for February and 1-2 degrees above for the water year.

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

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Central Columbia Basins
Streamflow Forecasts - March 1, 2016

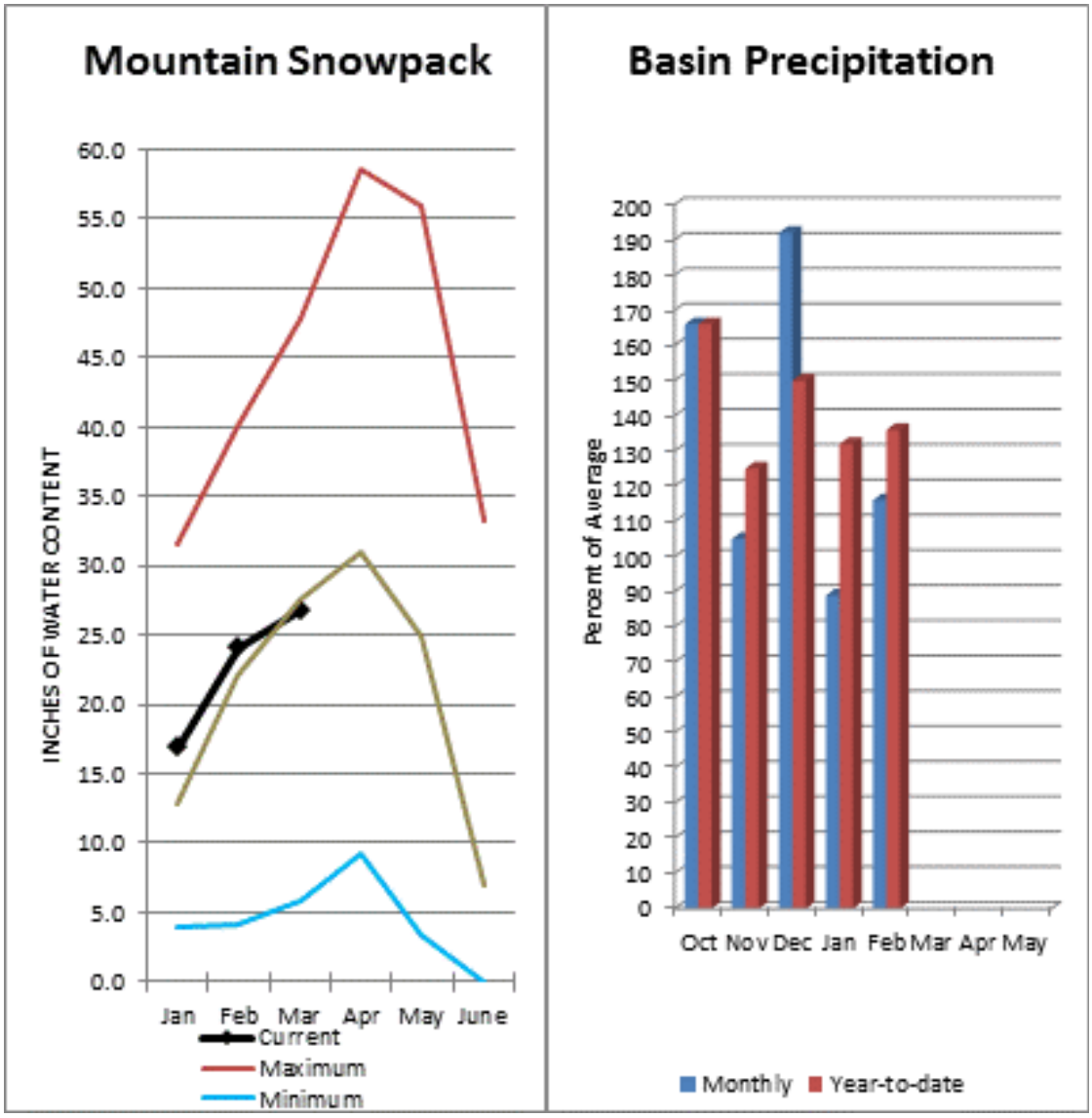
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

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	630	700	750	110%	800	870	680
	APR-SEP	750	825	875	111%	925	1000	790
Chelan R at Chelan								
	APR-JUL	925	1010	1060	106%	1120	1200	1000
	APR-SEP	1040	1130	1200	107%	1260	1350	1120
Entiat R nr Ardenvoir								
	APR-JUL	190	210	220	110%	235	255	200
	APR-SEP	210	230	245	111%	255	275	220
Wenatchee R at Plain								
	APR-JUL	905	1000	1060	107%	1120	1210	990
	APR-SEP	995	1090	1160	107%	1220	1320	1080
Icicle Ck nr Leavenworth								
	APR-JUL	245	270	285	104%	305	325	275
	APR-SEP	265	290	310	103%	330	355	300
Wenatchee R at Peshastin								
	APR-JUL	1250	1370	1460	107%	1540	1660	1370
	APR-SEP	1370	1500	1590	107%	1680	1810	1490
Columbia R bl Rock Island Dam								
	APR-JUL	47800	52500	55600	100%	58700	63400	55770
	APR-SEP	57200	62600	66300	102%	70000	75500	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, 2016	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Lake Chelan	312.7	425.6	279.8	676.1
Basin-wide Total	312.7	425.6	279.8	676.1
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis March 1, 2016	# of Sites	% Median	Last Year % Median
Central Columbia Basins	4	118%	79%
Chelan Lake Basin	4	118%	79%
Entiat River	1	90%	63%
Wenatchee River	7	102%	51%
Stemilt Creek	1	108%	54%
Colockum Creek	1	166%	49%



March 1 reservoir storage for the Upper Yakima reservoirs was 580,000-acre feet, 129% of average. Forecasts for the Yakima River at Cle Elum are 96% of average and the Teanaway River near Cle Elum is at 113%. Lake inflows are all forecasted to be near average this summer as well. February streamflow's within the basin were Cle Elum River near Roslyn at 127%. March 1 snowpack was 97% based upon 8 snow course and SNOTEL readings within the Upper Yakima Basin. Precipitation was 132% of average for February and 133% 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.

Data Current as of: 3/3/2016 4:02:29 PM

Upper Yakima River
Streamflow Forecasts - March 1, 2016

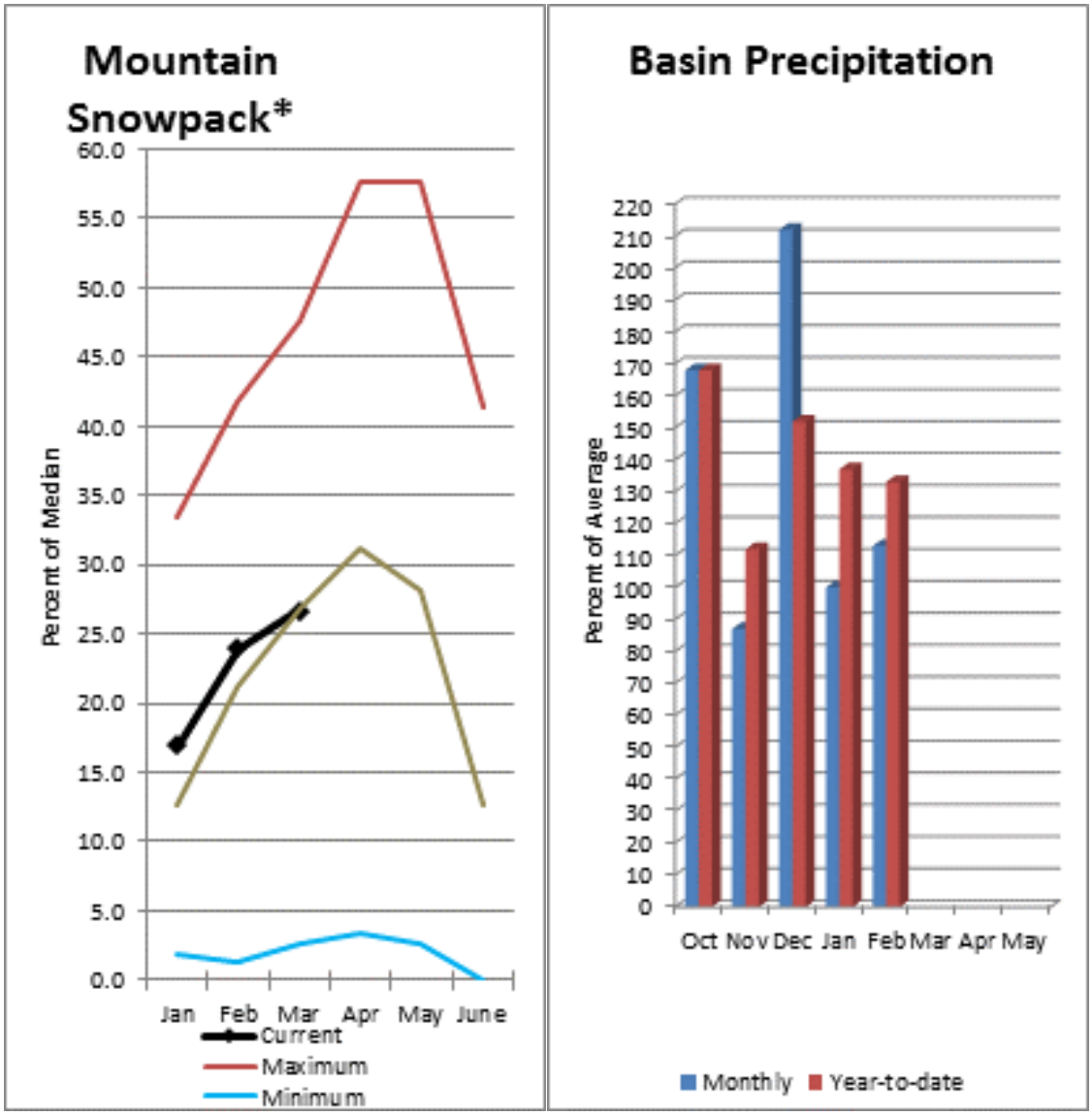
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

Upper Yakima River	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Keechelus Reservoir Inflow								
	APR-JUL	84	101	113	97%	125	143	116
	APR-SEP	93	111	123	98%	135	153	126
Kachess Reservoir Inflow								
	APR-JUL	78	92	102	98%	112	126	104
	APR-SEP	86	100	109	96%	119	133	113
Cle Elum Lake Inflow								
	APR-JUL	315	350	375	97%	400	440	385
	APR-SEP	340	380	405	98%	435	475	415
Yakima R at Cle Elum								
	APR-JUL	545	650	725	96%	800	910	755
	APR-SEP	590	710	795	96%	875	1000	830
Teanaway R bl Forks nr Cle Elum								
	APR-JUL	116	135	147	113%	160	178	130
	APR-SEP	119	137	150	113%	163	181	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, 2016	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Keechelus	128.5	157.8	92.3	157.8
Kachess	150.1	223.4	143.6	239.0
Cle Elum	301.9	394.8	214.4	436.9
Basin-wide Total	580.5	776.0	450.3	833.7
# of reservoirs	3	3	3	3

Watershed Snowpack Analysis March 1, 2016	# of Sites	% Median	Last Year % Median
Upper Yakima River	8	97%	26%



February average streamflow's within the basin were: Yakima River near Parker, 214% and the Naches River near Naches, 227%. March 1 reservoir storage for Bumping and Rimrock reservoirs was 199,000-acre feet, 145% of average. Forecast averages for Yakima River near Parker are 114%; American River near Nile, 113%; Ahtanum Creek, 145%; and Klickitat River near Glenwood, 111%. March 1 snowpack was 114% based upon 7 snow course and SNOTEL readings within the Lower Yakima Basin and Ahtanum Creek reported in at 110% of normal. Precipitation was 113% of average for February and 133% for the water-year. Temperatures were 2-4 degrees above normal for February and for 1-2 degrees above normal for the water year. Volume forecasts for Yakima Basin are for natural flow. As such, they may differ from the U.S. Bureau of Reclamation's forecast for the total water supply available, which includes irrigation return flow.

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

Data Current as of: 3/3/2016 4:02:30 PM

Lower Yakima River
Streamflow Forecasts - March 1, 2016

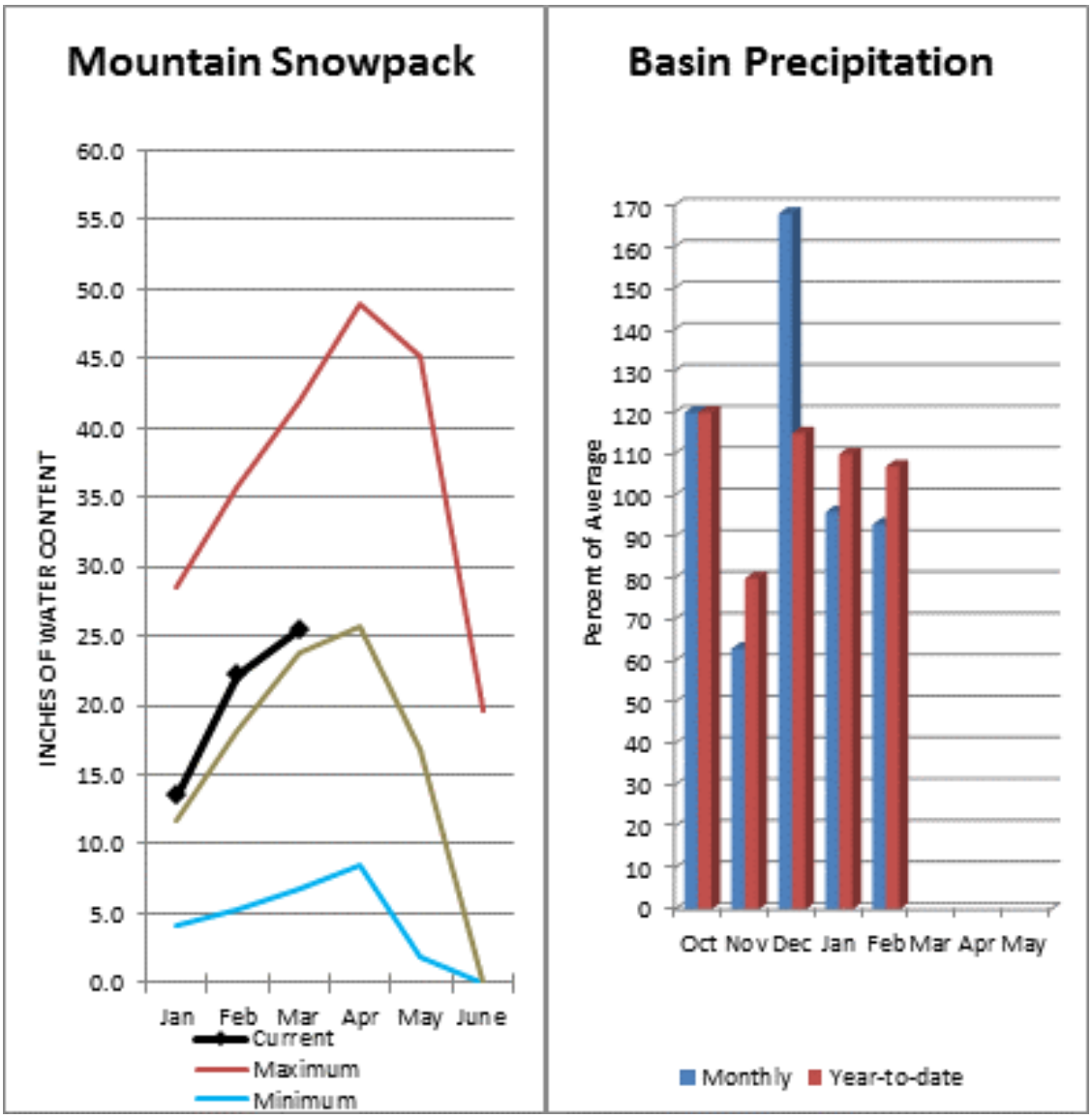
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

Lower Yakima River	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Bumping Lake Inflow								
	APR-JUL	108	122	131	115%	141	155	114
	APR-SEP	119	133	143	116%	153	167	123
American R nr Nile								
	APR-JUL	94	106	114	112%	123	135	102
	APR-SEP	103	116	124	113%	133	146	110
Rimrock Lake Inflow								
	APR-JUL	189	205	215	115%	230	245	187
	APR-SEP	225	245	255	116%	270	290	220
Naches R nr Naches								
	APR-JUL	660	740	795	114%	850	930	700
	APR-SEP	720	805	865	114%	925	1010	760
Ahtanum Ck at Union Gap								
	APR-JUL	31	36	40	148%	44	50	27
	APR-SEP	33	39	42	145%	46	52	29
Yakima R nr Parker								
	APR-JUL	1550	1750	1900	114%	2040	2240	1660
	APR-SEP	1720	1930	2080	114%	2230	2440	1820
Klickitat R nr Glenwood								
	APR-JUL	116	130	140	111%	150	164	126
	APR-SEP	128	144	154	111%	165	180	139
Klickitat R nr Pitt								
	APR-JUL	415	465	500	115%	530	580	435
	APR-SEP	500	560	600	115%	635	695	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, 2016	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Bumping Lake	20.8	33.8	13.3	33.7
Rimrock	177.8	197.8	123.3	198.0
Basin-wide Total	198.6	231.6	136.6	231.7
# of reservoirs	2	2	2	2

Watershed Snowpack Analysis March 1, 2016	# of Sites	% Median	Last Year % Median
Lower Yakima River	7	114%	34%
Ahtanum Creek	2	110%	30%



February precipitation was 93% of average, maintaining the year-to-date precipitation at 107% of average. Snowpack in the basin was 107% of normal. Streamflow forecasts are 100% of average for Mill Creek and 98% for the SF Walla Walla near Milton-Freewater. Average temperatures were 4-6 degrees above normal for February and 2-4 degrees above for the water year.

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

Data Current as of: 3/3/2016 4:02:31 PM

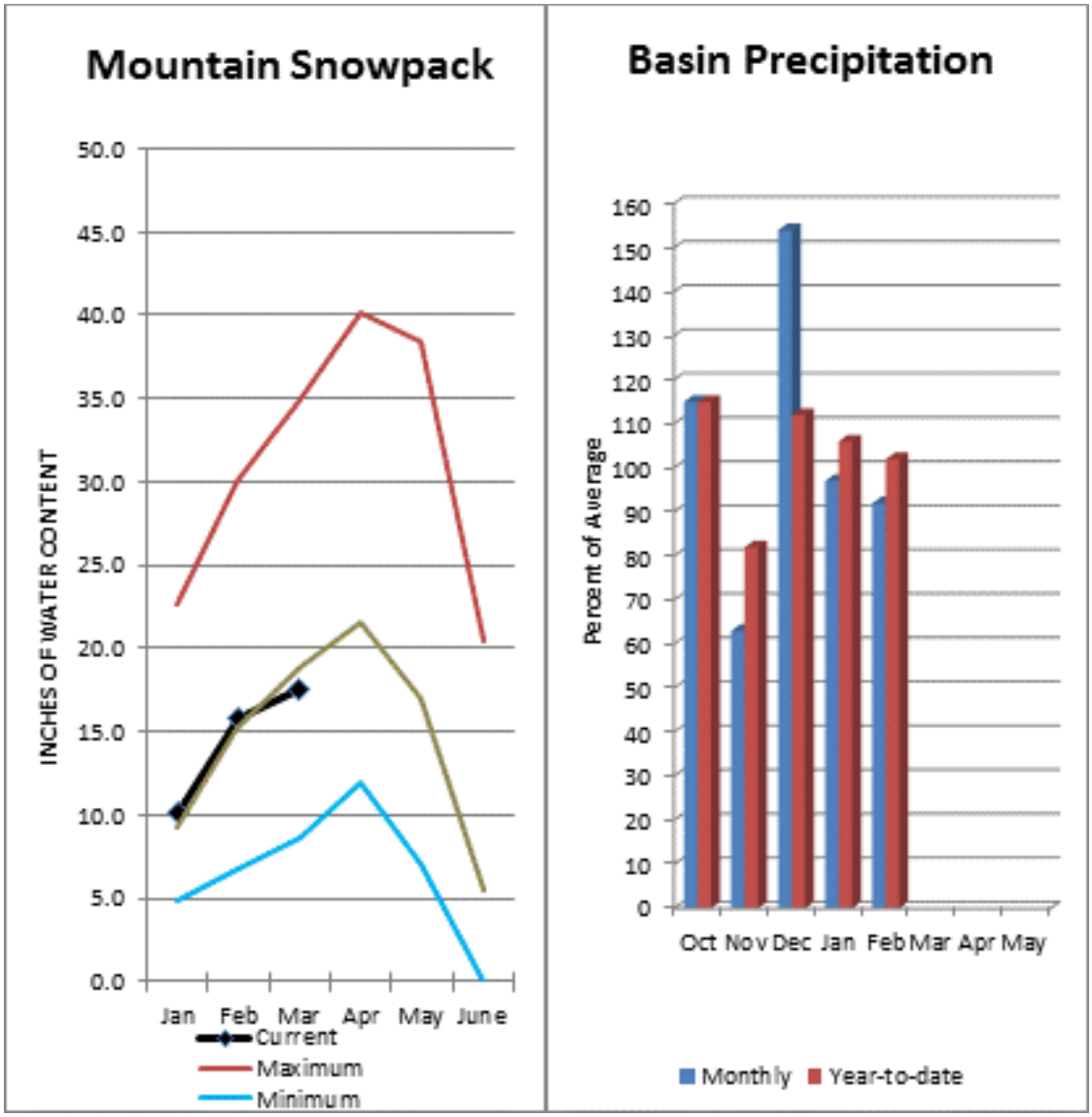
Walla Walla River
Streamflow Forecasts - March 1, 2016

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	66	74	79	99%	84	92	80
	APR-JUL	43	49	53	98%	57	63	54
	APR-SEP	54	60	65	98%	70	76	66
Mill Ck nr Walla Walla								
	APR-JUL	17.2	21	24	100%	27	31	24
	APR-SEP	19.7	24	27	100%	30	34	27

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

Watershed Snowpack Analysis March 1, 2016	# of Sites	% Median	Last Year % Median
Walla Walla River	2	107%	46%



The Grande Ronde River can expect summer flows to be about 104% of normal. The forecast for Asotin Creek at Asotin predicts 97% of average flows for the April – July runoff period. February precipitation was 92% of average, bringing the year-to-date precipitation to 102% of average. March 1 snowpack readings averaged 93% of normal. February streamflow was 104% of average for Snake River below Lower Granite Dam and 132% for Grande Ronde River near Troy. Dworshak Reservoir storage was 113% of average. Average temperatures were 4-6 degrees above normal for February and 2-4 degrees above for the water year.

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

Data Current as of: 3/3/2016 4:02:32 PM

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

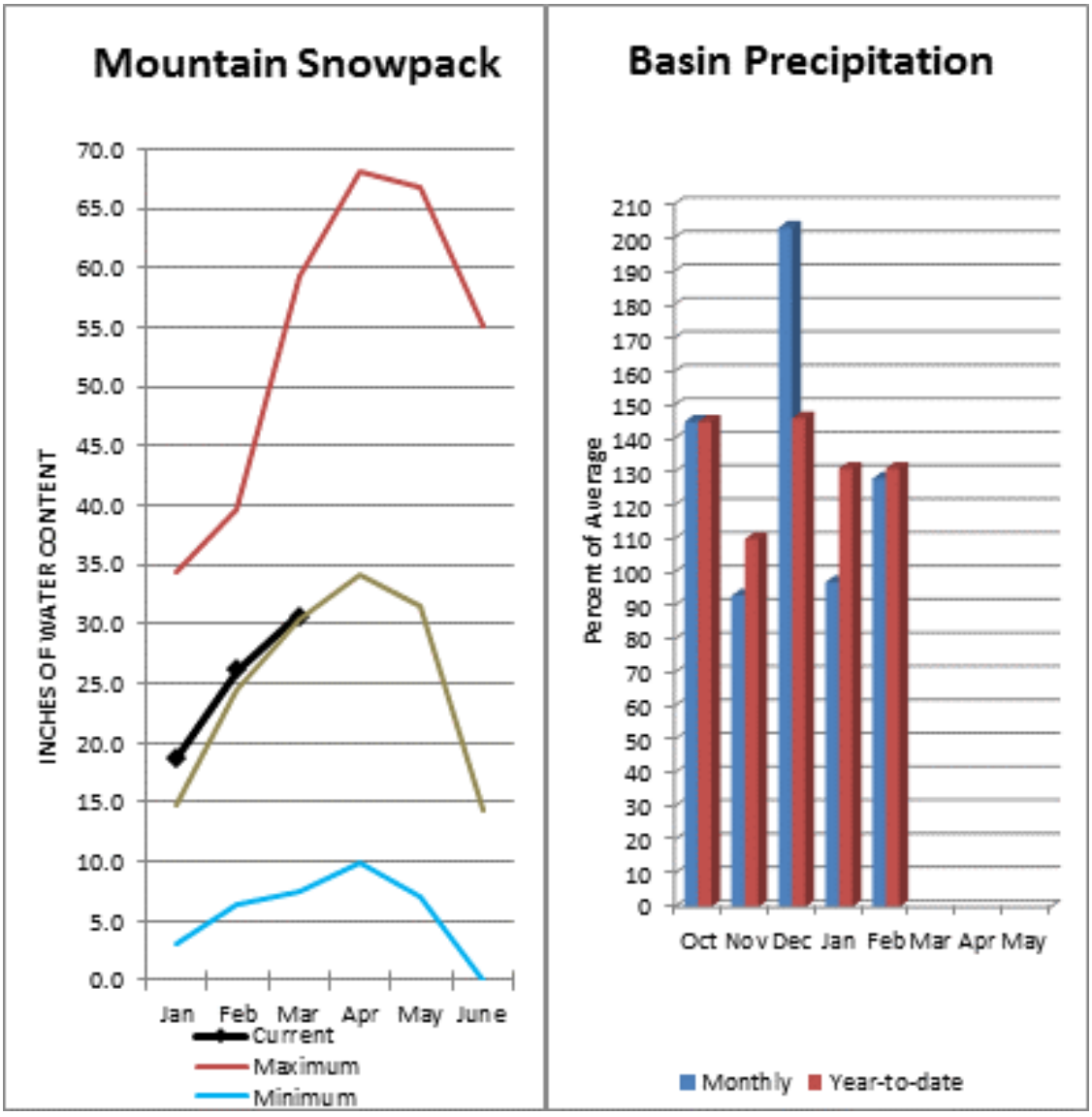
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

Lower Snake, Grande Ronde, Clearwater Basins	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Grande Ronde R at Troy								
	MAR-JUL	1250	1450	1580	105%	1710	1910	1510
	APR-SEP	1030	1220	1360	104%	1500	1690	1310
Asotin Ck at Asotin								
	APR-JUL	19.4	28	34	97%	40	49	35
Clearwater R at Spalding								
	APR-JUL	4990	5910	6540	95%	7180	8100	6890
	APR-SEP	5310	6280	6930	95%	7580	8550	7270
Snake R bl Lower Granite Dam[1]								
	APR-JUL	12000	17000	19300	97%	21600	26600	19848
	APR-SEP	13800	19400	22000	99%	24600	30200	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, 2016	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Dworshak Reservoir	2670.9	2880.4	2358.0	3468.0
Basin-wide Total	2670.9	2880.4	2358.0	3468.0
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis March 1, 2016	# of Sites	% Median	Last Year % Median
Lower Snake, Grande Ronde, Clearwater Basins	14	93%	59%



Forecasts for April – September streamflows within the basin are Lewis River at Ariel, 97% and Cowlitz River at Castle Rock, 104% of average. The Columbia at The Dalles is forecasted to have average flows this summer according to the River Forecast Center. February average streamflow for Cowlitz River was 146%. The Columbia River at The Dalles was 118% of average. February precipitation was 130% of average and the water-year average was 131%. March 1 snow cover for Cowlitz River was 100%, and Lewis River was 105% of normal. Temperatures were 1-3 degrees above normal during February and for the water year.

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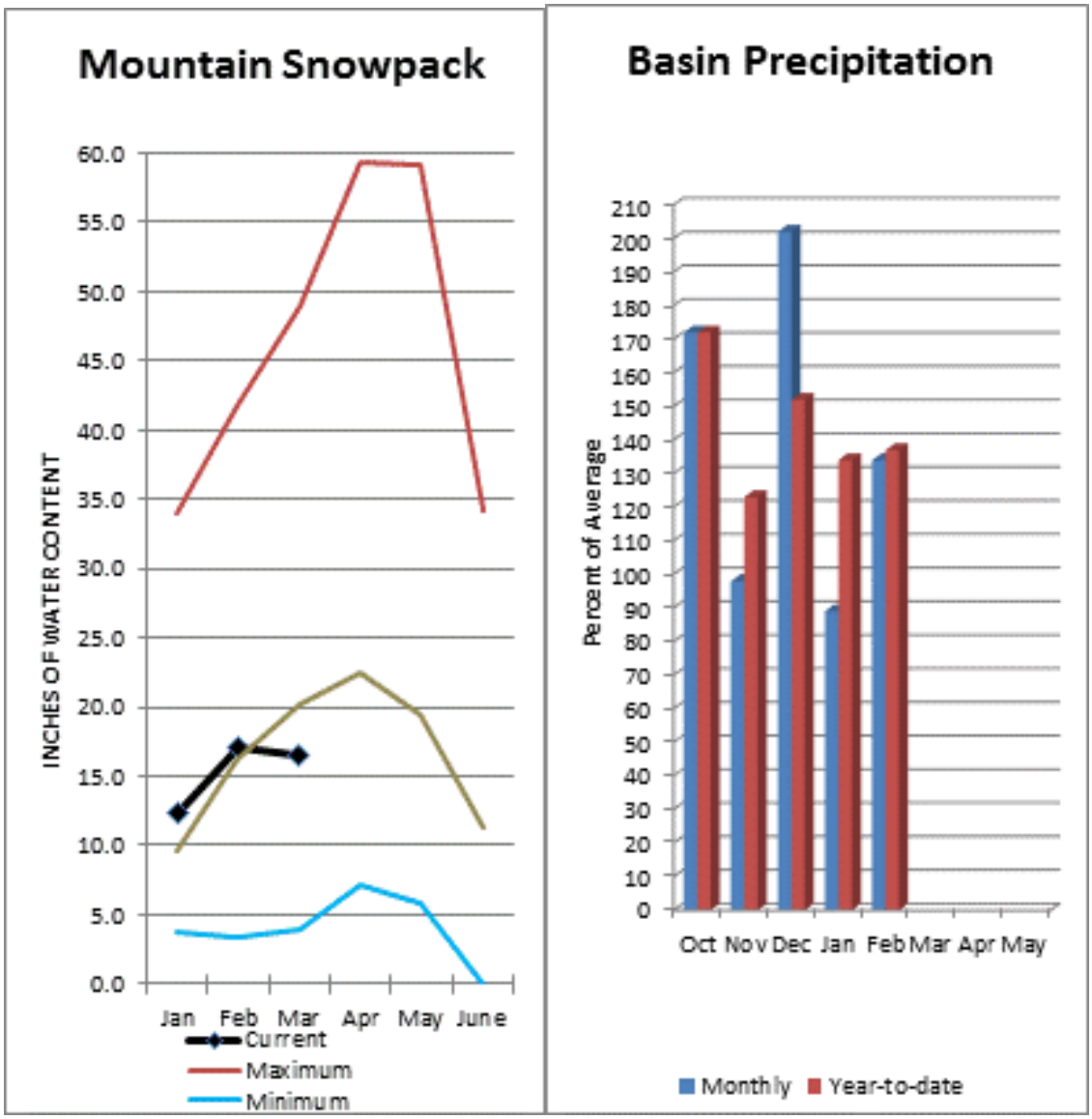
Lower Columbia Basins
Streamflow Forecasts - March 1, 2016

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	67700	74700	79500	100%	84300	91300	79855
	APR-SEP	79400	87600	93100	100%	98700	107000	92704
Klickitat R nr Glenwood								
	APR-JUL	116	130	140	111%	150	164	126
	APR-SEP	128	144	154	111%	165	180	139
Klickitat R nr Pitt								
	APR-JUL	415	465	500	115%	530	580	435
	APR-SEP	500	560	600	115%	635	695	520
Lewis R at Ariel								
	APR-JUL	670	835	950	98%	1060	1230	970
	APR-SEP	795	970	1090	97%	1210	1380	1120
Cowlitz R bl Mayfiled								
	APR-JUL	1200	1450	1620	100%	1790	2040	1620
	APR-SEP	1400	1700	1900	103%	2100	2400	1840
Cowlitz R at Castle Rock								
	APR-JUL	1780	2060	2250	101%	2440	2720	2230
	APR-SEP	2110	2410	2620	104%	2830	3130	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, 2016	# of Sites	% Median	Last Year % Median
Lower Columbia Basins	10	100%	21%
Lewis River	4	100%	7%
Cowlitz River	6	100%	32%



Summer runoff is forecast to be 92% of normal for the Green River below Howard Hanson Dam and 111% for the White River near Buckley. March 1 snowpack was 101% of average for the White River, 98% for Puyallup River and 81% in the Green River Basin. February precipitation was 143% of average, bringing the water year-to-date to 135% of average for the basins. Average temperatures in the area were 2-4 degrees above normal for February and 1-2 degrees above for the water-year.

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

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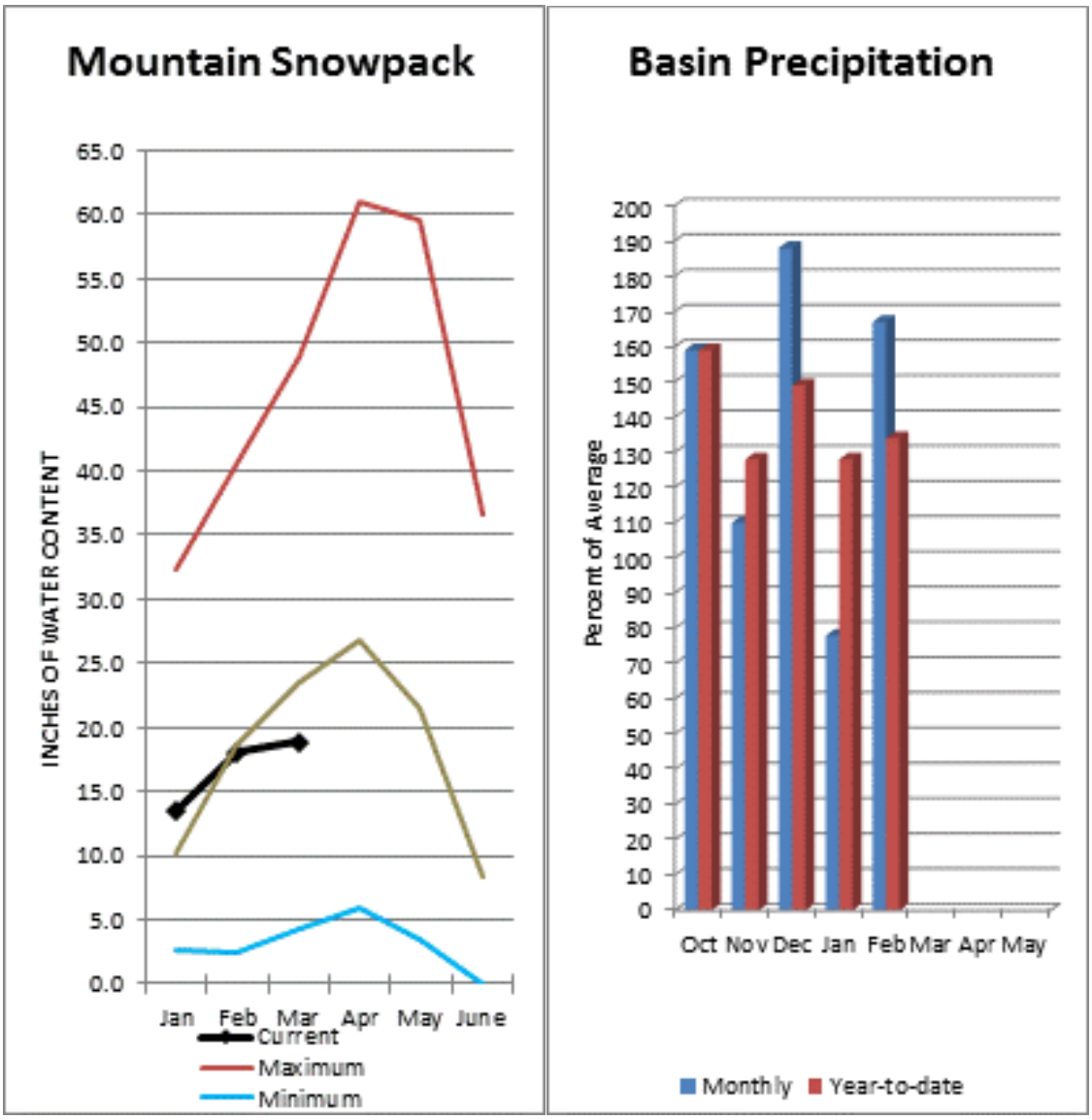
South Puget Sound Basins
Streamflow Forecasts - March 1, 2016

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	365	440	480	112%	515	590	430
	APR-SEP	440	530	570	111%	610	700	515
Green R bl Howard A Hanson Dam[1]								
	APR-JUL	119	186	215	91%	245	315	235
	APR-SEP	138	205	240	92%	270	340	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, 2016	# of Sites	% Median	Last Year % Median
South Puget Sound Basins	10	95%	34%
White River	3	101%	46%
Green River	2	81%	8%



Forecast for spring and summer flows are: 109% for Cedar River near Cedar Falls; 107% for Rex River; 106% for South Fork of the Tolt River; and 104% for Taylor Creek near Selleck. Basin-wide precipitation for February was 162% of average, bringing water-year-to-date to 133% of average. March 1 median snow cover in Cedar River Basin was 103%, Tolt River Basin was 59%, Snoqualmie River Basin was 74%, and Skykomish River Basin was 69%. Temperatures were 2-4 degrees above normal for February and 1-2 degrees above for the water-year.

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

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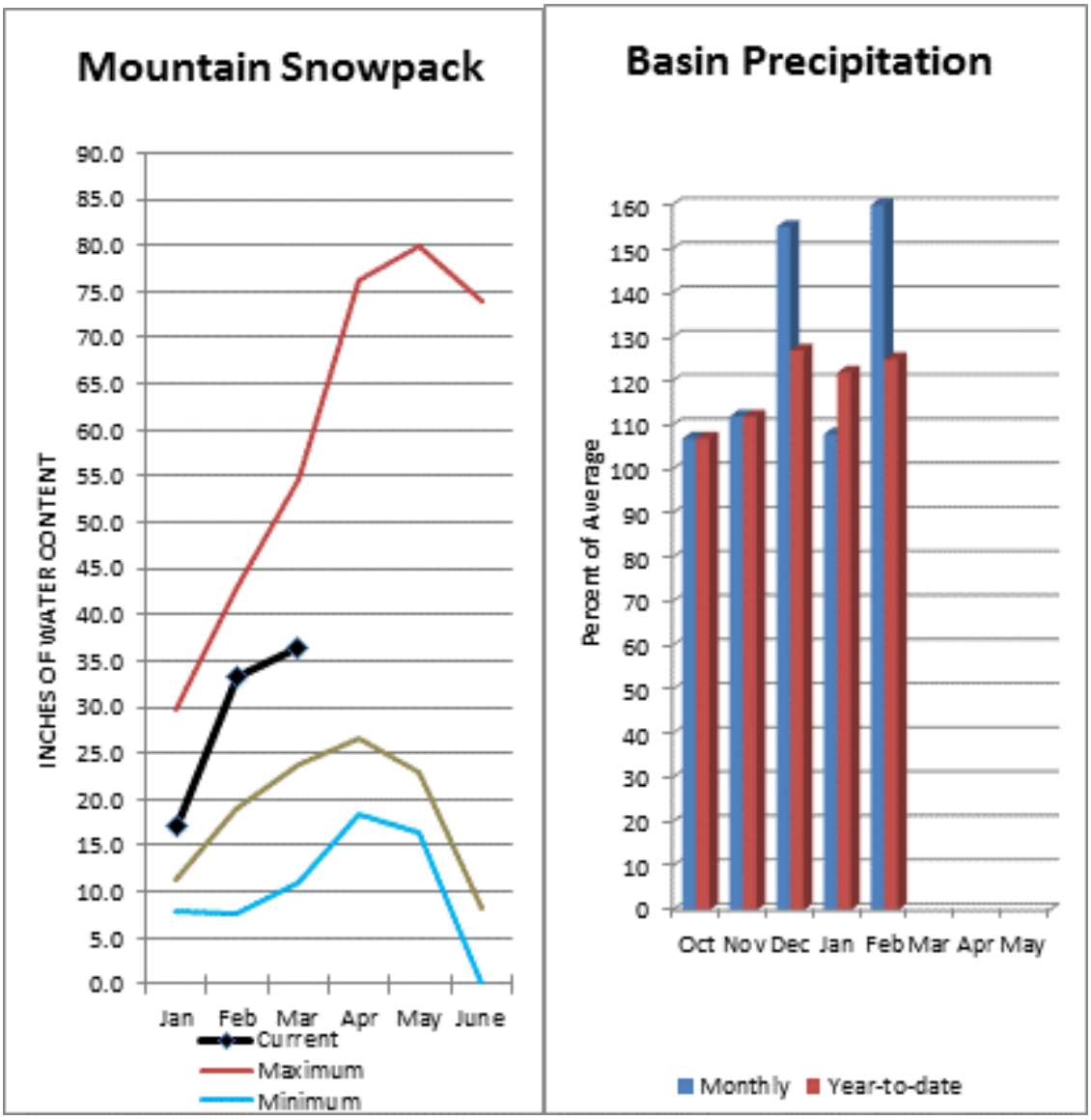
Central Puget Sound Basins
Streamflow Forecasts - March 1, 2016

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	59	70	77	110%	84	94	70
	APR-SEP	65	76	83	109%	90	101	76
Rex R nr Cedar Falls								
	APR-JUL	19	24	27	113%	30	35	24
	APR-SEP	21	26	29	107%	33	38	27
Taylor Ck nr Selleck								
	APR-JUL	16.1	19.2	21	105%	23	26	20
	APR-SEP	19.5	23	25	104%	27	30	24
SF Tolt R nr Index								
	APR-JUL	10.7	13.1	14.7	104%	16.3	18.6	14.2
	APR-SEP	12.5	15.2	17	106%	18.8	21	16.1

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

Watershed Snowpack Analysis March 1, 2016	# of Sites	% Median	Last Year % Median
Central Puget Sound Basins	16	87%	14%
Puyallup River	5	98%	38%
Cedar River	5	103%	0%
Tolt River	3	59%	0%
Snoqualimie River	5	74%	7%
Skykomish River	3	69%	11%



Forecast for Skagit River streamflow at Newhalem is 112% of average for the spring and summer period. February streamflow in Skagit River was 189% of average. Other forecast points included Baker River at 118% and Thunder Creek at 103% of average. Basin-wide precipitation for February was 176% of average, bringing water-year-to-date to 125% of average. March 1 average snow cover in Skagit River Basin was 109%, Nooksack River Basin was 85% and Baker River Basin was 79% of normal. March 1 Skagit River reservoir storage was 73% of average and 43% of capacity. Average temperatures were 2-4 degrees above 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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North Puget Sound Basins
Streamflow Forecasts - March 1, 2016

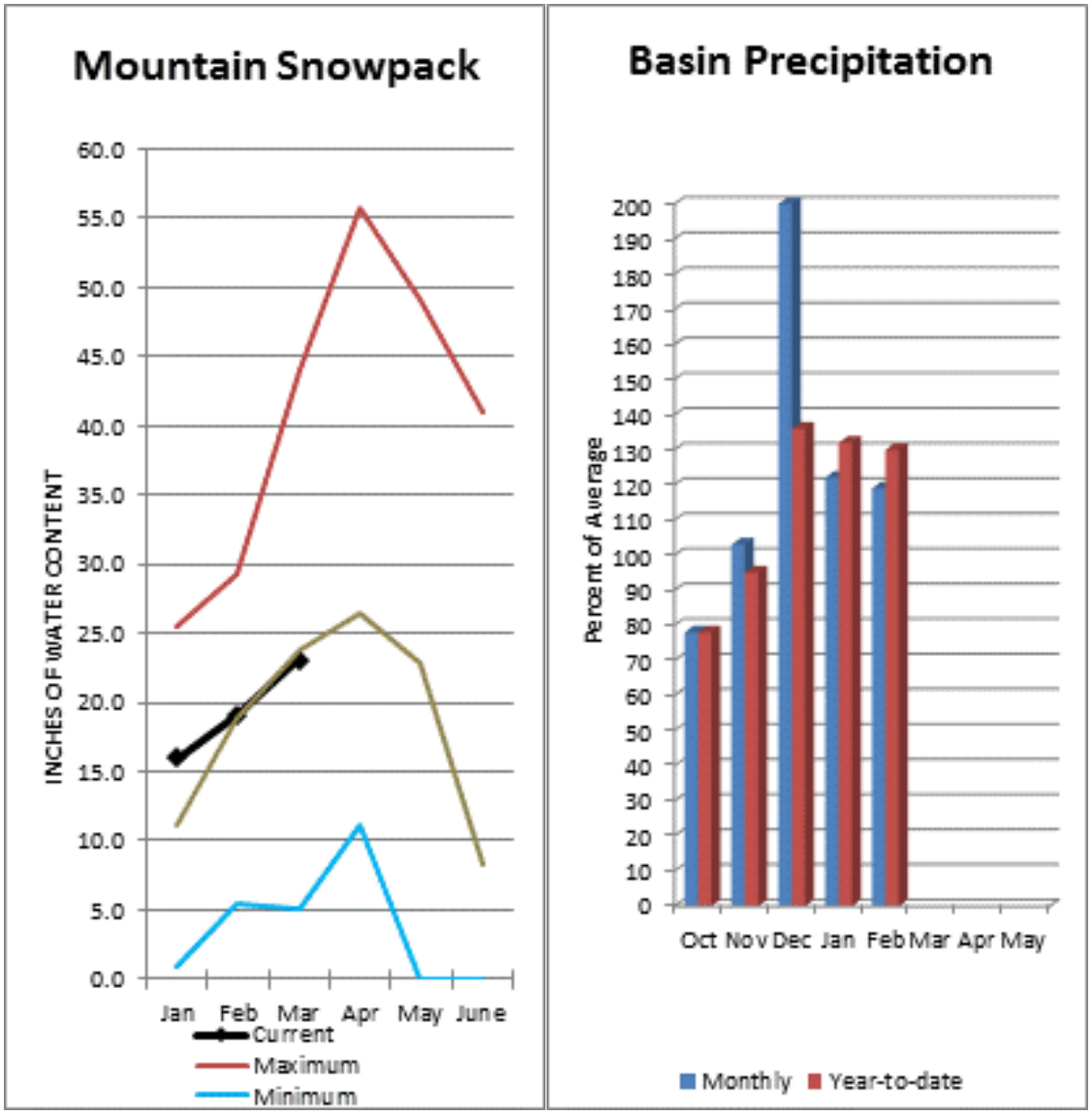
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

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	210	230	245	104%	255	275	235
	APR-SEP	305	325	340	103%	355	380	330
Skagit R at Newhalem								
	APR-JUL	1670	1820	1920	114%	2020	2170	1680
	APR-SEP	1990	2160	2270	112%	2380	2550	2030
Baker R at Concrete								
	APR-JUL	705	800	865	111%	925	1020	780
	APR-SEP	940	1070	1160	118%	1240	1370	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, 2016	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Ross	604.8	798.1	832.4	1404.1
Diablo Reservoir			86.2	90.6
Basin-wide Total	604.8	798.1	832.4	1404.1
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis March 1, 2016	# of Sites	% Median	Last Year % Median
North Puget Sound Basins	23	93%	38%
Skagit River	14	109%	63%
Baker River	6	79%	21%
Nooksack River	3	85%	15%



Forecasted average runoff for streamflow for the Dungeness River is 110% and Elwha River is 107% February runoff in the Dungeness River was 156% of normal. Big Quilcene and Wynoochee rivers may expect near average runoff this summer as well. February precipitation was 119% of average. Precipitation has accumulated at 130% of average for the water year. February precipitation at Quillayute was 152% of normal. Olympic Peninsula snowpack averaged 97% of normal on March 1. Temperatures were 4-6 degrees above average and 1-3 degrees above normal for the water year.

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

Data Current as of: 3/3/2016 4:02:37 PM

Olympic Penninsula
Streamflow Forecasts - March 1, 2016

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	111	124	133	111%	142	155	120
	APR-SEP	132	149	160	110%	171	188	145
Elwha R at McDonald Bridge nr Port Angeles								
	APR-JUL	365	405	435	109%	465	505	400
	APR-SEP	415	470	505	107%	540	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 March 1, 2016	# of Sites	% Median	Last Year % Median
Olympic Penninsula	6	97%	2%

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
April 1, 2016

Pahto (Mt. Adams), Scott Ladd, Yakama Tribal Hydrologist

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

Scott Pattee
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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

April 2016

General Outlook

All basins reported a notable increase in snowpack last month. This, on the heels of a winter that tended to be warm and rainy, was just what we needed to bolster spring and summer runoff. There is still concern that the existing snowpack is further advanced then normal and could begin to melt more rapidly than hoped for. As the weather warms and the snow begins to melt in earnest be aware that streams and rivers will still be very cold and swift. The latest NWS short term forecasts are calling for warmer than normal with some chance of seasonal precipitation. Long range forecasts for the spring continue to be warmer and dryer than normal. http://www.cpc.ncep.noaa.gov/

Snowpack

The April 1 statewide SNOTEL readings were 110% of normal. The Tolt River Basin reported the lowest readings at 77% of the 30-year median for April 1 and Trough SNOTEL near Wenatchee had the highest percentage with 205%. Most basins reported steady or a slight increase from last month with new snow particularly in the north Cascades. Westside medians from SNOTEL, and April 1 snow surveys, included the North Puget Sound river basins with 105% of normal, the Central and South Puget river basins with 95% and 103% respectively, and the Lower Columbia basins with 117% of normal. Snowpack along the east slopes of the Cascade Mountains included the Yakima area with 110% and the Wenatchee area with 108%. Snowpack in the Spokane River Basin was at 95% and the Walla Walla River Basin had 127% of the long term median.

BASIN	PERCENT OF MEDIAN	LAST YEAR PERCENT MEDIAN
Spokane	95	31
Newman Lake	120	1
Pend Oreille	98	69
Okanogan	141	66
Methow	135	78
Conconully Lake	144	11
Central Columbia	108	33
Upper Yakima	103	11
Lower Yakima	117	24
Ahtanum Creek	122	19
Walla Walla	127	27
Lower Snake	105	54
Cowlitz	115	29
Lewis	118	4
White	109	41
Green	87	0
Puyallup	106	35
Cedar	112	2
Snoqualmie	88	3
Skykomish	80	6
Skagit	114	58
Nooksack	91	13
Olympic Peninsula	108	2
Baker	103	21

Precipitation

For the most part the state received above normal precipitation for the month of March keeping year to date statewide SNOTEL averages above normal at 132%. The central and north east areas of the state recorded the highest percentages in the state. Swift Creek SNOTEL near Mt. St. Helens received nearly 1 inch per day for a total of 29.1 inches and precipitation for the month of March.

RIVER BASIN	APRIL PERCENT OF AVERAGE	WATER YEAR PERCENT OF AVERAGE
Spokane	149	108
Pend Oreille	124	104
Upper Columbia	157	124
Central Columbia	141	133
Upper Yakima	119	131
Lower Yakima	153	136
Walla Walla	143	112
Lower Snake	140	108
Lower Columbia	152	134
South Puget Sound	126	134
Central Puget Sound	116	131
North Puget Sound	128	126
Olympic Peninsula	204	141

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 664,000-acre feet, 130% 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, 181,000 acre feet, 110% of average and 76% of capacity; and the Skagit River reservoirs at 64% 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	76	100
Pend Oreille	41	82
Upper Columbia	66	103
Central Columbia	42	111
Upper Yakima	80	130
Lower Yakima	85	130
Lower Snake	84	121
North Puget Sound	33	64

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

Streamflow

Above normal temperatures continue to drive greater than normal daily runoff throughout the state. However a strong snowpack and precipitation accumulation are helping to keep streamflow forecasts near to above normal. April-September forecasts for some Western Washington streams include the Cedar River near Cedar Falls, 116%; White River, 114%; and Skagit River, 116%. Some Eastern Washington streams include the Yakima River near Parker 117%, Wenatchee River at Plain 105%; and Spokane River near Post Falls 98%. 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	98-118
Pend Oreille	98-113
Upper Columbia	96-130
Central Columbia	104-116
Upper Yakima	99-105
Lower Yakima	111-166
Walla Walla	106-111
Lower Snake	102-112
Lower Columbia	103-128
South Puget Sound	90-114
Central Puget Sound	108-116
North Puget Sound	106-116
Olympic Peninsula	99-101

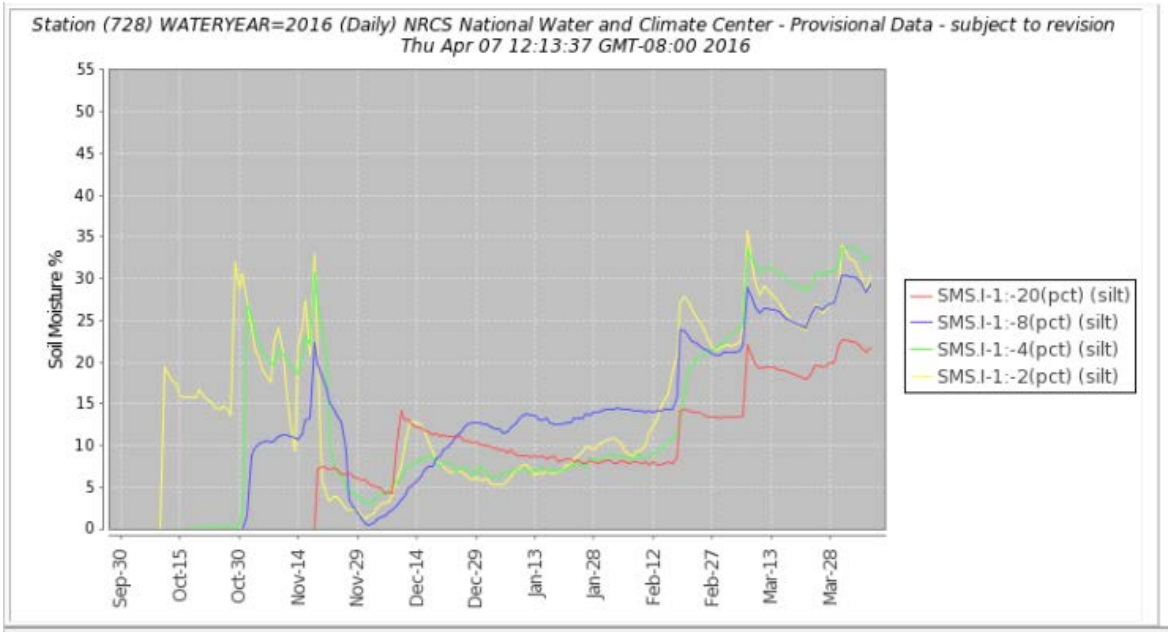
STREAM	PERCENT OF AVERAGE APRIL STREAMFLOWS
Pend Oreille at Albeni Fall Dam	135
Kettle at Laurier	250
Columbia at Birchbank	132
Spokane at Spokane	155
Similkameen at Nighthawk	169
Okanogan at Tonasket	150
Methow at Pateros	230
Chelan at Chelan	175
Wenatchee at Pashastin	163
Cle Elum near Roslyn	130
Yakima at Parker	177
Naches at Naches	199
Grande Ronde at Troy	118
Snake below Lower Granite Dam	109
Columbia River at The Dalles	111
Lewis at Merwin Dam	144
Cowlitz below Mayfield Dam	163
Skagit at Concrete	143
Dungeness near Sequim	176

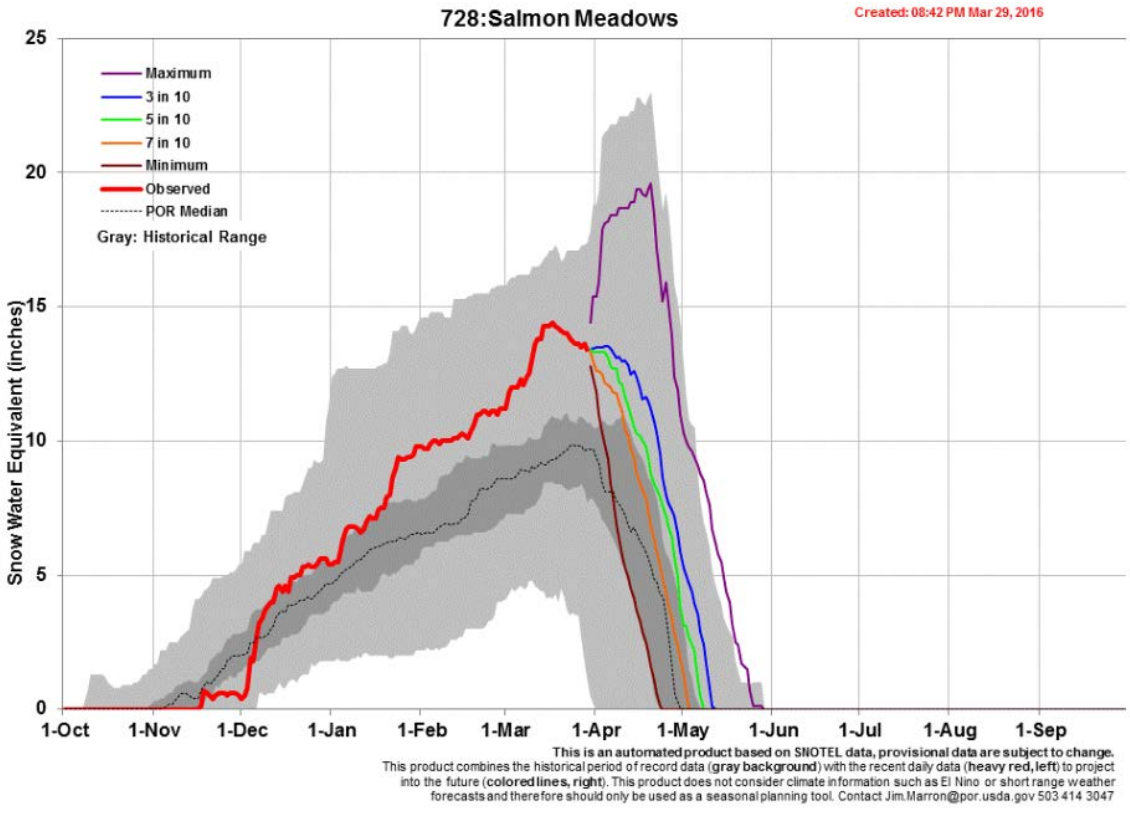
For more information contact your local Natural Resources Conservation Service office.

Soil Moisture

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

The following graph shows a very typical winter soil moisture profile at Salmon Meadows SNOTEL site near Omak, WA. Notice the profile recharge when fall rains began, a decline after, followed by a steady recharge throughout the winter. The second graph is snowpack projection for the same site which shows a normal peak around March 15 and subsequent melt curve. Lining up the dates of noticeable storms will correlate with the spikes in soil moisture. Air temperature and melt rate will determine date of melt out. Best odds appear to be later than normal this year.





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

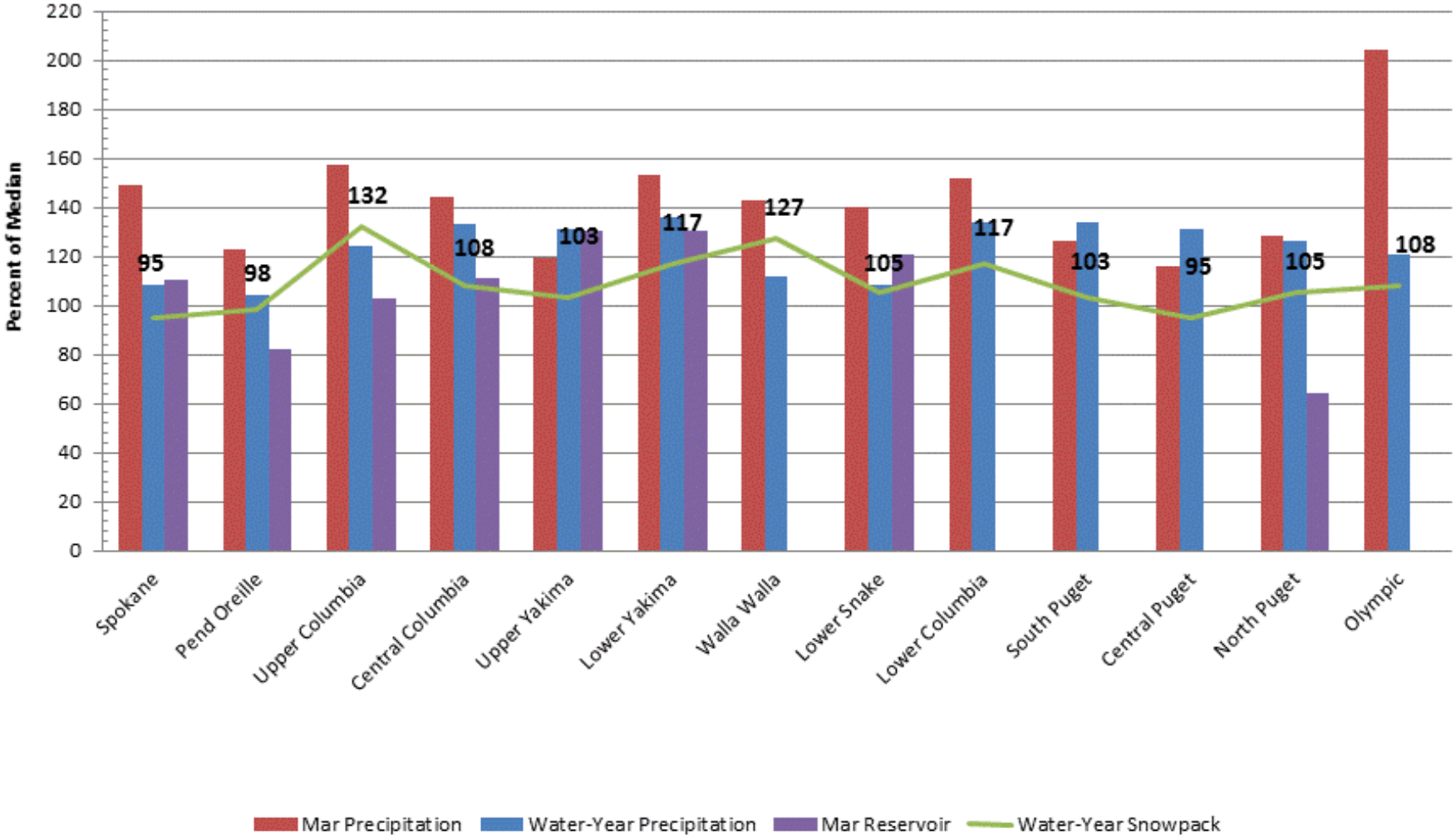
Washington:
http://www.nrcs.usda.gov/wps/portal/nrcs/site/wa/home/

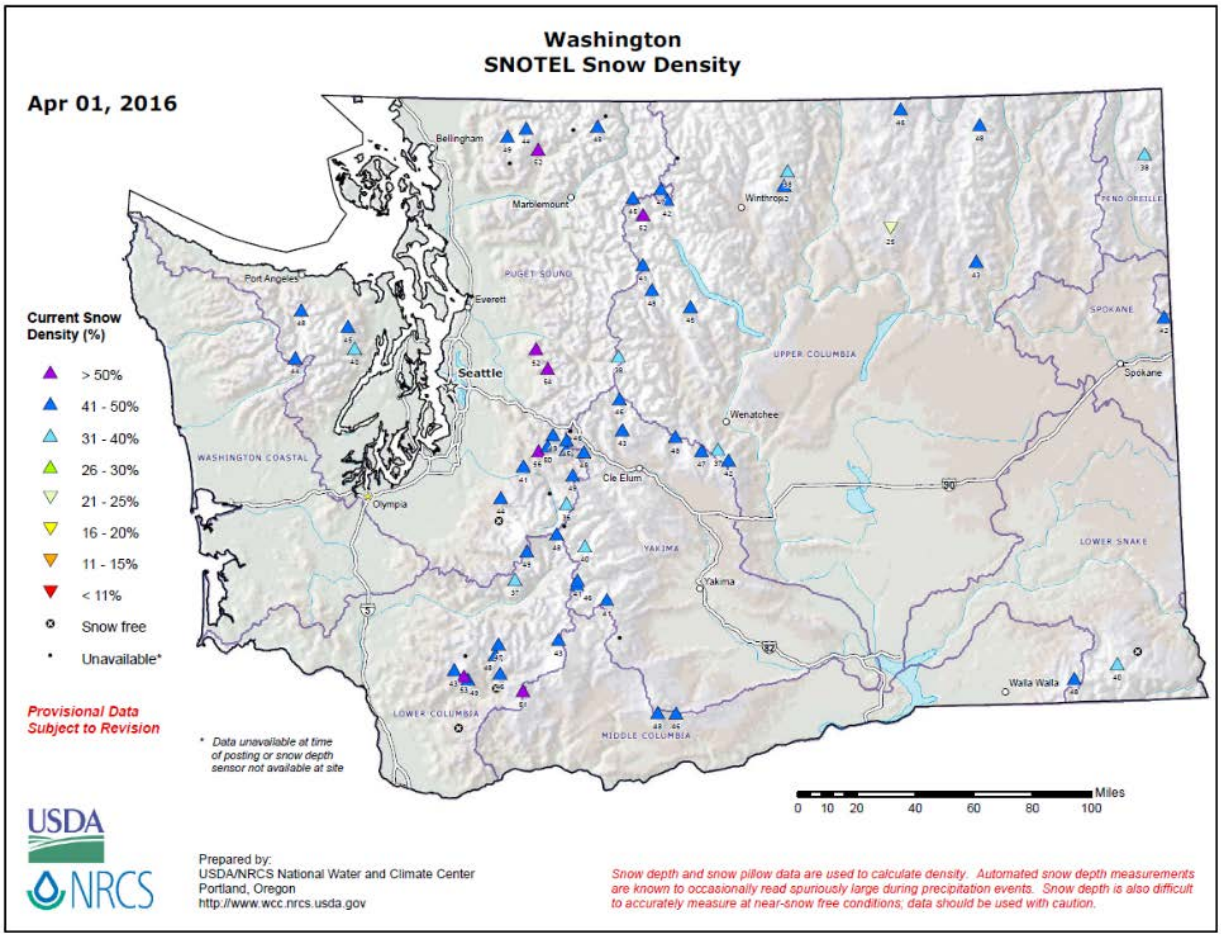
NRCS National:
http://www.nrcs.usda.gov/wps/portal/nrcs/site/national/home/

NRCS Natural Resources Conservation Service

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

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





Western Snow Conference

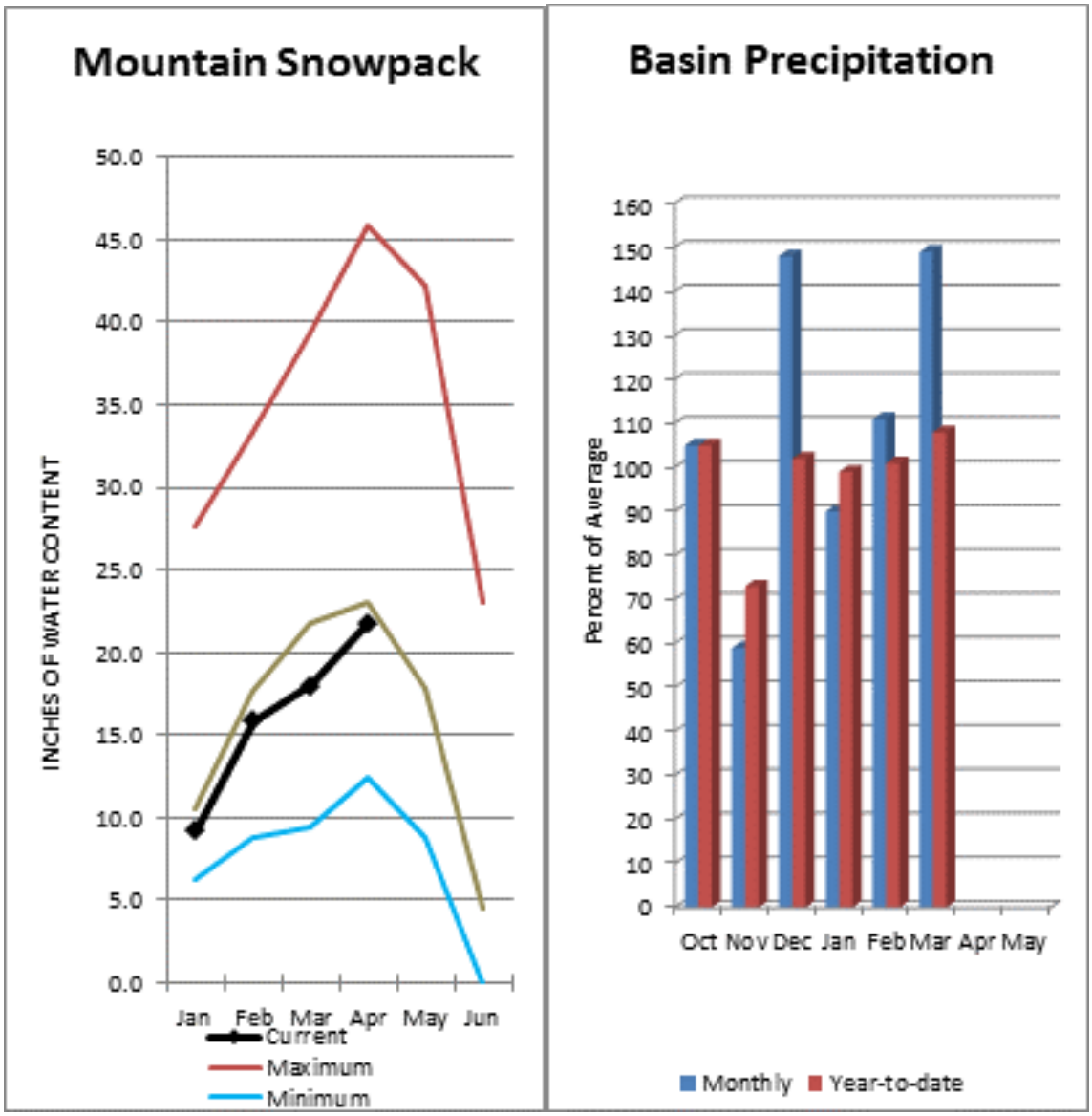
The Western Snow Conference is an annual tradition which started in 1932 as an international forum for individuals and organizations to share scientific, management and socio-political information on snow and runoff. The principal aim of the Western Snow Conference is to advance snow and hydrological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

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/

Spokane River Basin



The April 1 forecasts for summer runoff within the Spokane River Basin are 98% of average near Post Falls and 98% at Long Lake. The Chamokane River near Long Lake forecasted to have 118% of average flows for the May-August period. The forecast is based on a basin snowpack that is 95% of normal and precipitation that is 108% of average for the water year. Precipitation for March was above normal at 149% of average. Streamflow on the Spokane River at Spokane was 147% of average for March. April 1 storage in Coeur d'Alene Lake was 181,000 acre feet, 110% of average and 76% of capacity. Snowpack at Quartz Peak SNOTEL site was 120% of average with 22.7 inches of water content. Average temperatures in the Spokane basin were 1-2 degrees above normal for March and 3-4 degrees above for the water year.

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

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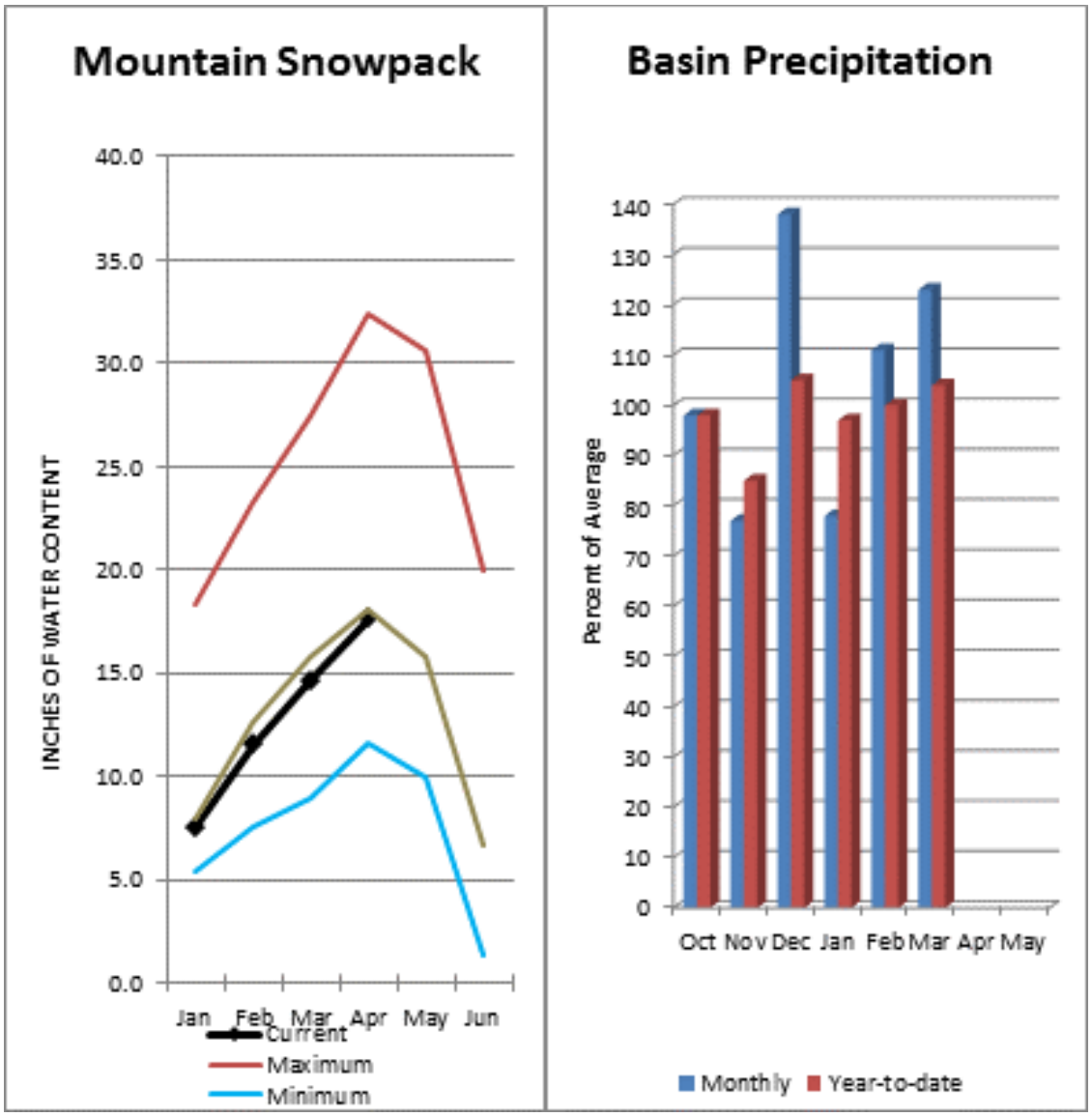
Spokane
Streamflow Forecasts - April 1, 2016

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	1770	2100	2330	97%	2560	2890	2390
	APR-SEP	1840	2190	2420	98%	2650	3000	2480
Spokane R at Long Lake[2]								
	APR-JUL	1920	2290	2540	97%	2790	3150	2620
	APR-SEP	2150	2530	2790	98%	3050	3430	2850
Chamokane Ck nr Long Lake								
	MAY-AUG	7.4	9.5	11	118%	12.5	14.7	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 March, 2016	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Lake Coeur d' Alene	181.3	227.3	165.5	238.5
Basin-wide Total	181.3	227.3	165.5	238.5
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis April 1, 2016	# of Sites	% Median	Last Year % Median
Spokane	16	95%	31%
Newman Lake	3	120%	1%



The April – September average forecast for the Priest River near the town of Priest River is 113% and the Pend Orielle below Box Canyon is 98%. March streamflow was 135% of average on the Pend Oreille River and 132% on the Columbia at Birchbank. April 1 snow cover was 98% of normal in the Pend Oreille Basin River Basin. Bunchgrass Meadows SNOTEL site had 29 inches of snow water on the snow pillow. Normally Bunchgrass would have 26.2 inches on April 1. Precipitation during March was 123% of average, dropping the year-to-date precipitation at 104% of average. Reservoir storage in the basin, including Lake Pend Oreille and Priest Lake was 82% of normal. Average temperatures were 2-3 degrees above normal for March and 3-5 degrees above 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, 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[2]								
	APR-JUL	9720	10800	11500	97%	12200	13200	11800
	APR-SEP	10500	11700	12500	98%	13300	14500	12800
Priest R nr Priest River[2]								
	APR-JUL	755	830	880	113%	935	1010	780
	APR-SEP	795	875	935	113%	990	1080	830
Pend Oreille R bl Box Canyon[2]								
	APR-JUL	9890	10900	11700	98%	12400	13400	11900
	APR-SEP	10600	11800	12700	98%	13500	14700	13000

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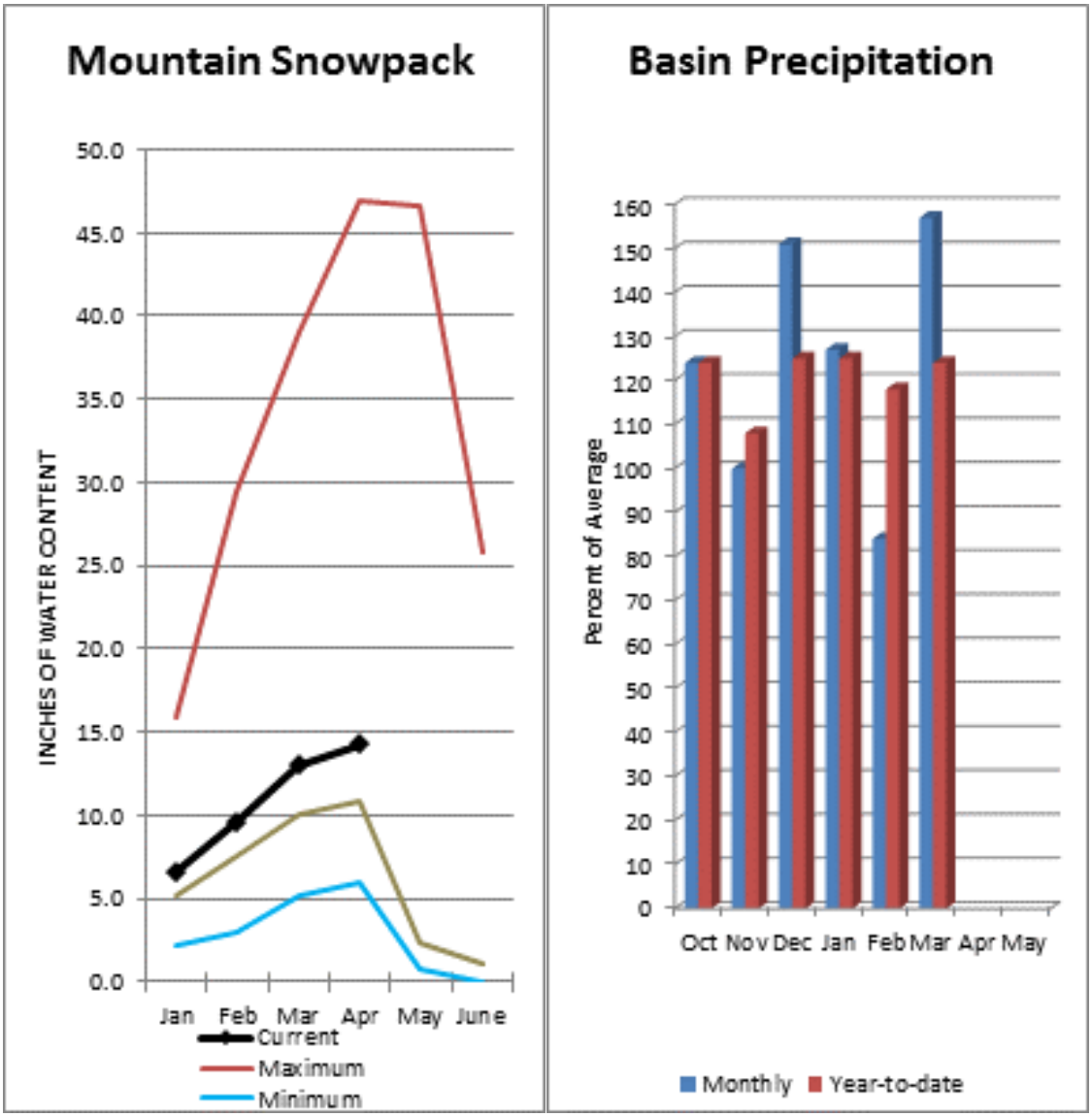
2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions
3) Median value used in place of average

Reservoir Storage End of March, 2016	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Lake Pend Oreille	605.6	754.7	773.0	1561.3
Priest Lake	83.1	100.2	67.6	119.3
Basin-wide Total	688.7	854.9	840.6	1680.6
# of reservoirs	2	2	2	2

Watershed Snowpack Analysis April 1, 2016	# of Sites	% Median	Last Year % Median
Pend Oreille Basins	71	98%	69%
Colville River	3	108%	4%
Kettle River	5	156%	57%



Summer runoff average forecast for the Okanogan River is 105%, Similkameen River is 96%, and Methow River is 130%. April 1 snow cover on the Okanogan was 141% of normal, Omak Creek was 133% and the Methow was 135%. March precipitation in the Upper Columbia was 157% of average, with precipitation for the water year at 124% of average. March streamflow for the Methow River was 230% of average, 150% for the Okanogan River and 169% for the Similkameen. Snow-water content at Salmon Meadows SNOTEL was 11.2 inches or 135% of normal for April 1. Combined storage in the Conconully Reservoirs was 15,500 acre-feet or 103% of normal. Temperatures were 1-3 degrees above normal for March and for the water year.

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Upper Columbia Basins
Streamflow Forecasts - April 1, 2016

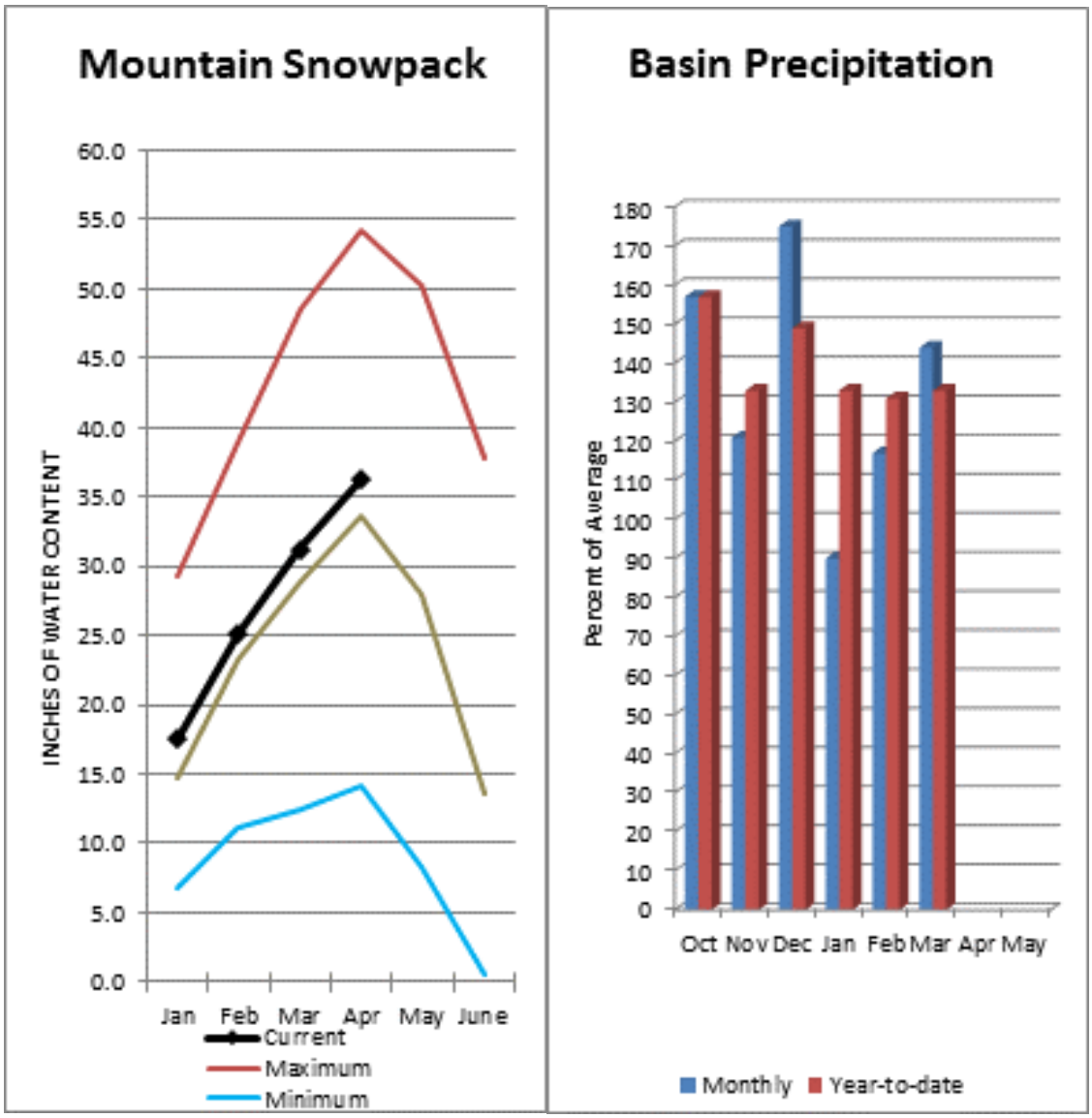
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

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	1890	2070	2200	122%	2330	2510	1800
	APR-SEP	1920	2120	2260	120%	2400	2600	1880
Colville R at Kettle Falls								
	APR-JUL	67	103	128	108%	153	189	119
	APR-SEP	73	113	140	107%	167	205	131
Columbia R at Grand Coulee[1,2]								
	APR-JUL	47300	51000	52600	103%	54200	57900	51015
	APR-SEP	52500	59100	62100	103%	65100	71700	60110
Similkameen R nr Nighthawk[1]								
	APR-JUL	890	1070	1150	96%	1230	1410	1200
	APR-SEP	960	1150	1230	96%	1310	1500	1280
Okanogan R nr Tonasket[1]								
	APR-JUL	1090	1370	1500	101%	1630	1910	1480
	APR-SEP	1180	1500	1650	100%	1800	2120	1650
Okanogan R at Malott[1]								
	APR-JUL	1140	1420	1550	107%	1680	1960	1450
	APR-SEP	1230	1550	1700	105%	1850	2170	1620
Methow R nr Pateros								
	APR-JUL	940	1020	1080	129%	1140	1220	835
	APR-SEP	1010	1100	1160	130%	1220	1310	895
Columbia R at Birchbank[1,2]								
	APR-JUL	28200	32900	35100	104%	37200	41900	33840
	APR-SEP	38000	41700	43400	104%	45000	48700	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 March, 2016	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Conconully Lake (Salmon Lake Dam)	7.5	7.7	7.3	10.5
Conconully Reservoir	8.0	12.8	7.8	13.0
Basin-wide Total	15.5	20.4	15.1	23.5
# of reservoirs	2	2	2	2

Watershed Snowpack Analysis April 1, 2016	# of Sites	% Median	Last Year % Median
Upper Columbia Basins	24	132%	65%
Okanogan River	14	141%	66%
Omak Creek	1	133%	16%
Sanpoil River	1		
Similkameen River	5	106%	70%
Toats Coulee Creek	4	171%	48%
Conconully Lake	3	144%	11%
Methow River	5	135%	78%



Precipitation during March was 141% of average in the basin and 133% 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 113%, Wenatchee River at Plain is 105%, Stehekin River is 115% and Icicle Creek is 105%. March average streamflow on the Chelan River was 175% and on the Wenatchee River 163%. April 1 snowpack in the Wenatchee River Basin was 108% of normal; the Chelan, 119%; the Entiat, 94%; Stemilt Creek, 116% and Colockum Creek, 205%. Reservoir storage in Lake Chelan was 111% of average and 42% of capacity. Lyman Lake SNOTEL had the most snow water with 66.3 inches of water. This site would normally have 57.6 inches on April 1. Temperatures were 1-2 degrees above normal for March and 1-3 degrees above for the water year.

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

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Central Columbia Basins
Streamflow Forecasts - April 1, 2016

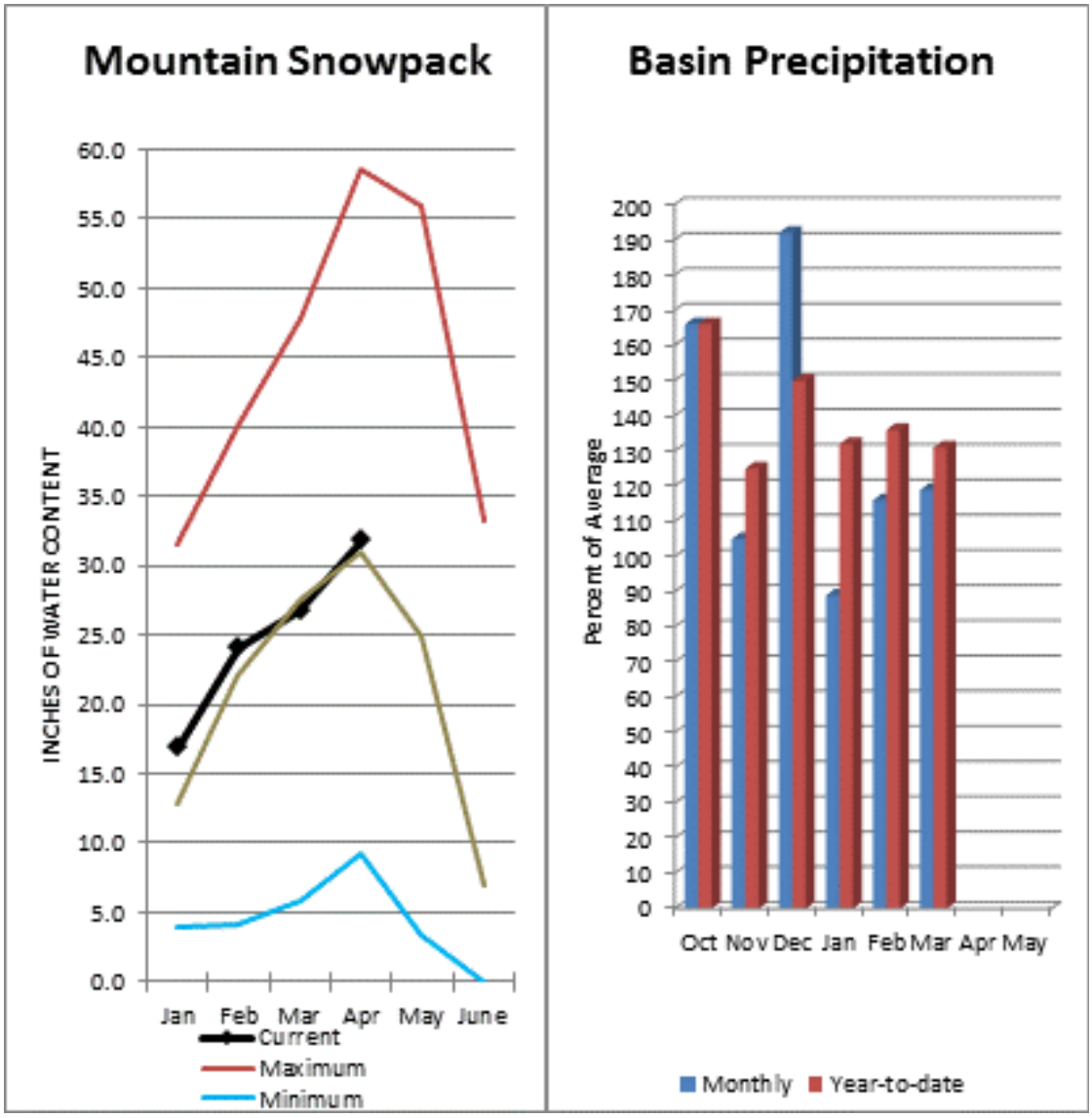
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

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	675	735	775	114%	820	880	680
	APR-SEP	810	870	905	115%	945	1010	790
Chelan R at Chelan								
	APR-JUL	1020	1080	1110	111%	1150	1200	1000
	APR-SEP	1170	1220	1260	113%	1290	1350	1120
Entiat R nr Ardenvoir								
	APR-JUL	210	225	235	118%	245	260	200
	APR-SEP	230	245	255	116%	265	280	220
Wenatchee R at Plain								
	APR-JUL	915	985	1030	104%	1070	1140	990
	APR-SEP	1010	1080	1130	105%	1180	1250	1080
Icicle Ck nr Leavenworth								
	APR-JUL	255	275	290	105%	300	320	275
	APR-SEP	275	300	315	105%	330	350	300
Wenatchee R at Peshastin								
	APR-JUL	1280	1360	1420	104%	1480	1570	1370
	APR-SEP	1390	1490	1550	104%	1620	1720	1490
Columbia R bl Rock Island Dam[2]								
	APR-JUL	52000	55700	58200	104%	60700	64300	55770
	APR-SEP	61200	65500	68400	105%	71400	75700	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, 2016	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Lake Chelan	283.6	435.4	256.1	676.1
Basin-wide Total	283.6	435.4	256.1	676.1
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis April 1, 2016	# of Sites	% Median	Last Year % Median
Central Columbia Basins	3	119%	63%
Chelan Lake Basin	3	119%	63%
Entiat River	1	94%	3%
Wenatchee River	7	108%	33%
Stemilt Creek	1	116%	14%
Colockum Creek	1	205%	5%



April 1 reservoir storage for the Upper Yakima reservoirs was 664,000-acre feet, 130% of average. Forecasts for the Yakima River at Cle Elum are 99% of average and the Teanaway River near Cle Elum is at 105%. Lake inflows are all forecasted to be near average this summer as well. March streamflow's within the basin were Cle Elum River near Roslyn at 130%. April 1 snowpack was 103% based upon 9 snow course and SNOTEL readings within the Upper Yakima Basin. Precipitation was 119% of average for March and 131% 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.

Data Current as of: 4/7/2016 1:05:24 PM

Upper Yakima River
Streamflow Forecasts - April 1, 2016

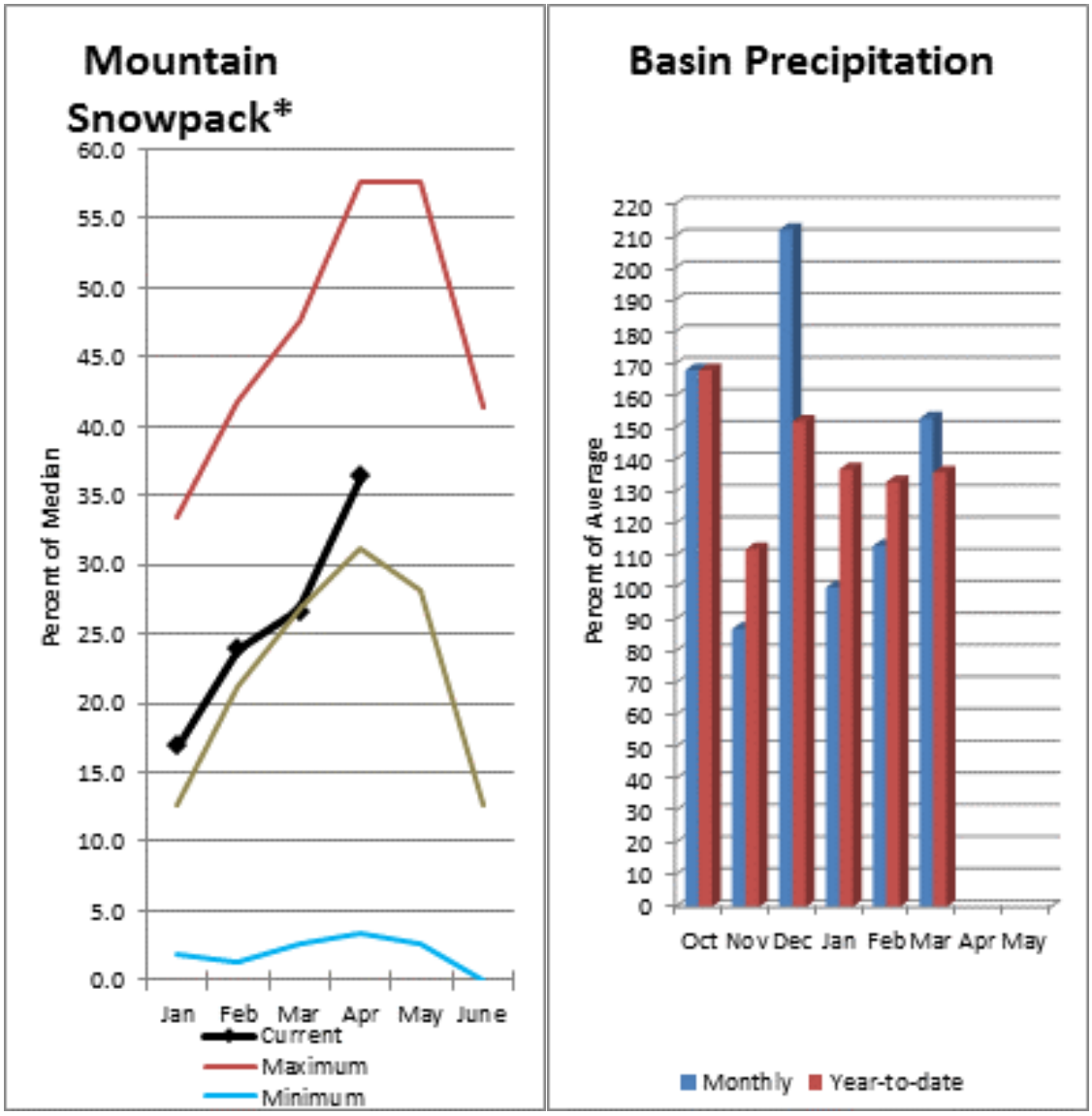
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

Upper Yakima River	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Keechelus Reservoir Inflow[2]								
	APR-JUL	99	111	118	102%	126	137	116
	APR-SEP	108	120	128	102%	136	149	126
Kachess Reservoir Inflow [2]								
	APR-JUL	92	101	107	103%	113	122	104
	APR-SEP	99	108	114	101%	121	130	113
Cle Elum Lake Inflow [2]								
	APR-JUL	355	375	390	101%	405	430	385
	APR-SEP	380	405	425	102%	440	465	415
Yakima R at Cle Elum [2]								
	APR-JUL	635	710	760	101%	810	880	755
	APR-SEP	680	765	825	99%	885	975	830
Teanaway R bl Forks nr Cle Elum								
	APR-JUL	107	124	136	105%	148	165	130
	APR-SEP	111	128	140	105%	152	169	133

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

Reservoir Storage End of March, 2016	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Keechelus	145.0	158.1	106.3	157.8
Kachess	172.9	238.8	159.8	239.0
Cle Elum	346.3	436.3	246.3	436.9
Basin-wide Total	664.2	833.2	512.4	833.7
# of reservoirs	3	3	3	3

Watershed Snowpack Analysis April 1, 2016	# of Sites	% Median	Last Year % Median
Upper Yakima River	9	103%	11%



March average streamflow's within the basin were: Yakima River near Parker, 177% and the Naches River near Naches, 199%. 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 117%; American River near Nile, 111%; Ahtanum Creek, 166%; and Klickitat River near Glenwood, 126%. April 1 snowpack was 117% based upon 7 snow course and SNOTEL readings within the Lower Yakima Basin and Ahtanum Creek reported in at 122% of normal. Precipitation was 153% of average for March and 136% for the water-year. Temperatures were 1-3 degrees above normal for March and for the water year. Volume forecasts for Yakima Basin are for natural flow. As such, they may differ from the U.S. Bureau of Reclamation's forecast for the total water supply available, which includes irrigation return flow.

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

Data Current as of: 4/7/2016 1:05:25 PM

Lower Yakima River
Streamflow Forecasts - April 1, 2016

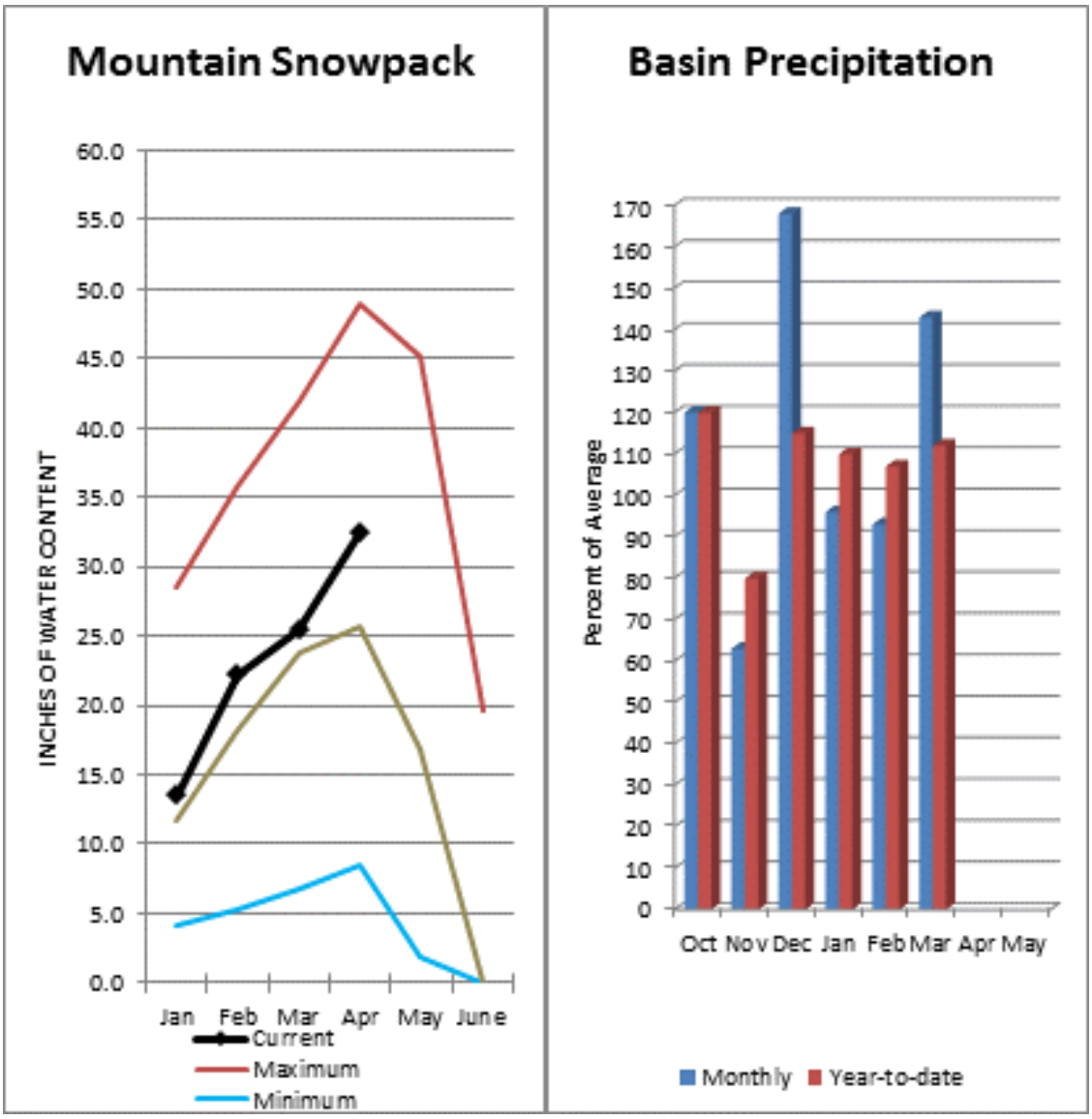
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

Lower Yakima River	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Bumping Lake Inflow [2]								
	APR-JUL	112	123	130	114%	137	148	114
	APR-SEP	121	132	140	114%	148	159	123
American R nr Nile								
	APR-JUL	98	106	112	110%	118	126	102
	APR-SEP	108	116	122	111%	128	136	110
Rimrock Lake Inflow [2]								
	APR-JUL	194	205	215	115%	225	240	187
	APR-SEP	230	245	255	116%	265	280	220
Naches R nr Naches								
	APR-JUL	695	750	790	113%	830	885	700
	APR-SEP	750	815	855	113%	895	960	760
Ahtanum Ck at Union Gap								
	APR-JUL	37	41	44	163%	47	51	27
	APR-SEP	41	45	48	166%	51	55	29
Yakima R nr Parker [2]								
	APR-JUL	1720	1850	1930	116%	2010	2140	1660
	APR-SEP	1910	2040	2130	117%	2220	2350	1820
Klickitat R nr Glenwood								
	APR-JUL	140	152	160	127%	168	180	126
	APR-SEP	152	166	175	126%	184	198	139
Klickitat R nr Pitt								
	APR-JUL	475	525	560	129%	590	640	435
	APR-SEP	565	625	665	128%	705	760	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, 2016	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Bumping Lake	17.5	34.0	14.6	33.7
Rimrock	178.6	197.9	136.6	198.0
Basin-wide Total	196.0	231.9	151.2	231.7
# of reservoirs	2	2	2	2

Watershed Snowpack Analysis April 1, 2016	# of Sites	% Median	Last Year % Median
Lower Yakima River	7	117%	24%
Ahtanum Creek	2	122%	19%



March precipitation was 143% of average, maintaining the year-to-date precipitation at 112% of average. Snowpack in the basin was 127% of normal. Streamflow forecasts are 111% of average for Mill Creek and 106% for the SF Walla Walla near Milton-Freewater. Average temperatures were 1-2 degrees above normal for March and 2-3 degrees above for the water year.

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

Data Current as of: 4/7/2016 1:05:27 PM

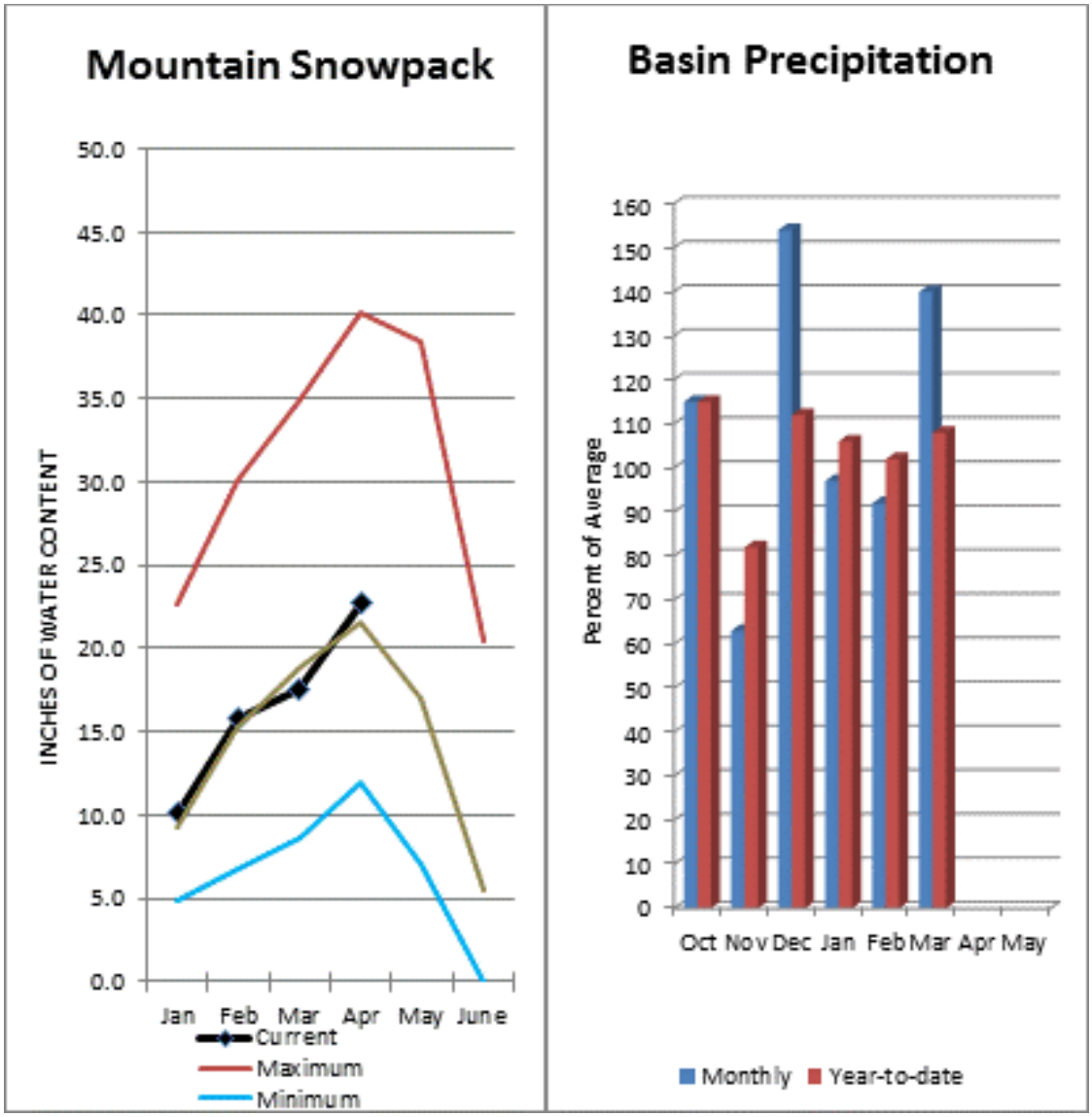
Walla Walla River
Streamflow Forecasts - April 1, 2016

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								
	APR-JUL	47	53	57	106%	61	68	54
	APR-SEP	59	66	70	106%	75	82	66
Mill Ck nr Walla Walla								
	APR-JUL	21	24	26	108%	29	32	24
	APR-SEP	24	27	30	111%	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 April 1, 2016	# of Sites	% Median	Last Year % Median
Walla Walla River	2	127%	27%



The Grande Ronde River can expect summer flows to be about 112% of normal. The forecast for Asotin Creek at Asotin predicts 103% of average flows for the April – July runoff period. March precipitation was 140% of average, bringing the year-to-date precipitation to 108% of average. April 1 snowpack readings averaged 105% of normal. March streamflow was 109% of average for Snake River below Lower Granite Dam and 118% for Grande Ronde River near Troy. Dworshak Reservoir storage was 121% of average. Average temperatures were 1-2 degrees above normal for March and 2-3 degrees above for the water year.

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

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Lower Snake, Grande Ronde, Clearwater Basins
Streamflow Forecasts - April 1, 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)
Grande Ronde R at Troy								
	APR-JUL	1070	1250	1370	112%	1490	1670	1220
	APR-SEP	1160	1340	1470	112%	1590	1770	1310
Asotin Ck at Asotin								
	APR-JUL	24	31	36	103%	42	49	35
Clearwater R at Spalding[2]								
	APR-JUL	6160	6930	7460	108%	7980	8750	6890
	APR-SEP	6480	7290	7840	108%	8390	9210	7270
Snake R bl Lower Granite Dam[12]								
	APR-JUL	15300	18700	20300	102%	21800	25200	19848
	APR-SEP	17300	21100	22800	102%	24500	28300	22280

1) 90% and 10% exceedance probabilities are actually 95% and 5%
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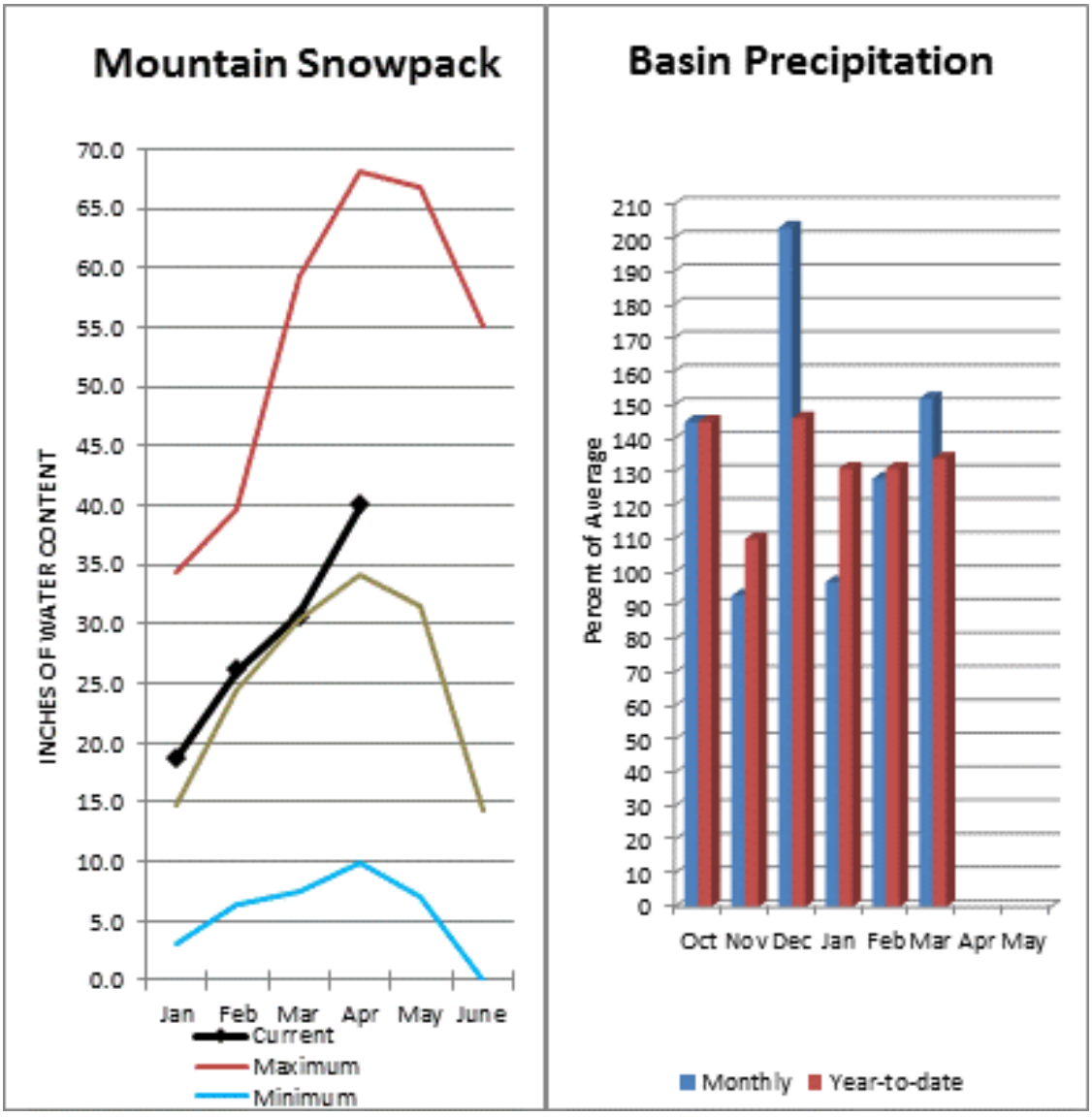
3) Median value used in place of average

Reservoir Storage End of March, 2016	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Dworshak Reservoir	2918.4	3214.1	2417.0	3468.0
Basin-wide Total	2918.4	3214.1	2417.0	3468.0
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis April 1, 2016	# of Sites	% Median	Last Year % Median
Lower Snake, Grande Ronde, Clearwater Basins	16	105%	54%



Forecasts for April – September streamflows within the basin are Lewis River at Ariel, 107% and Cowlitz River at Castle Rock, 112% of average. The Columbia at The Dalles is forecasted to have average flows this summer according to the River Forecast Center. March average streamflow for Cowlitz River was 163%. The Columbia River at The Dalles was 130% of average. March precipitation was 152% of average and the water-year average was 134%. April 1 snow cover for Cowlitz River was 115%, and Lewis River was 118% of normal. Temperatures were near normal during March and 1-2 degrees above for the water year.

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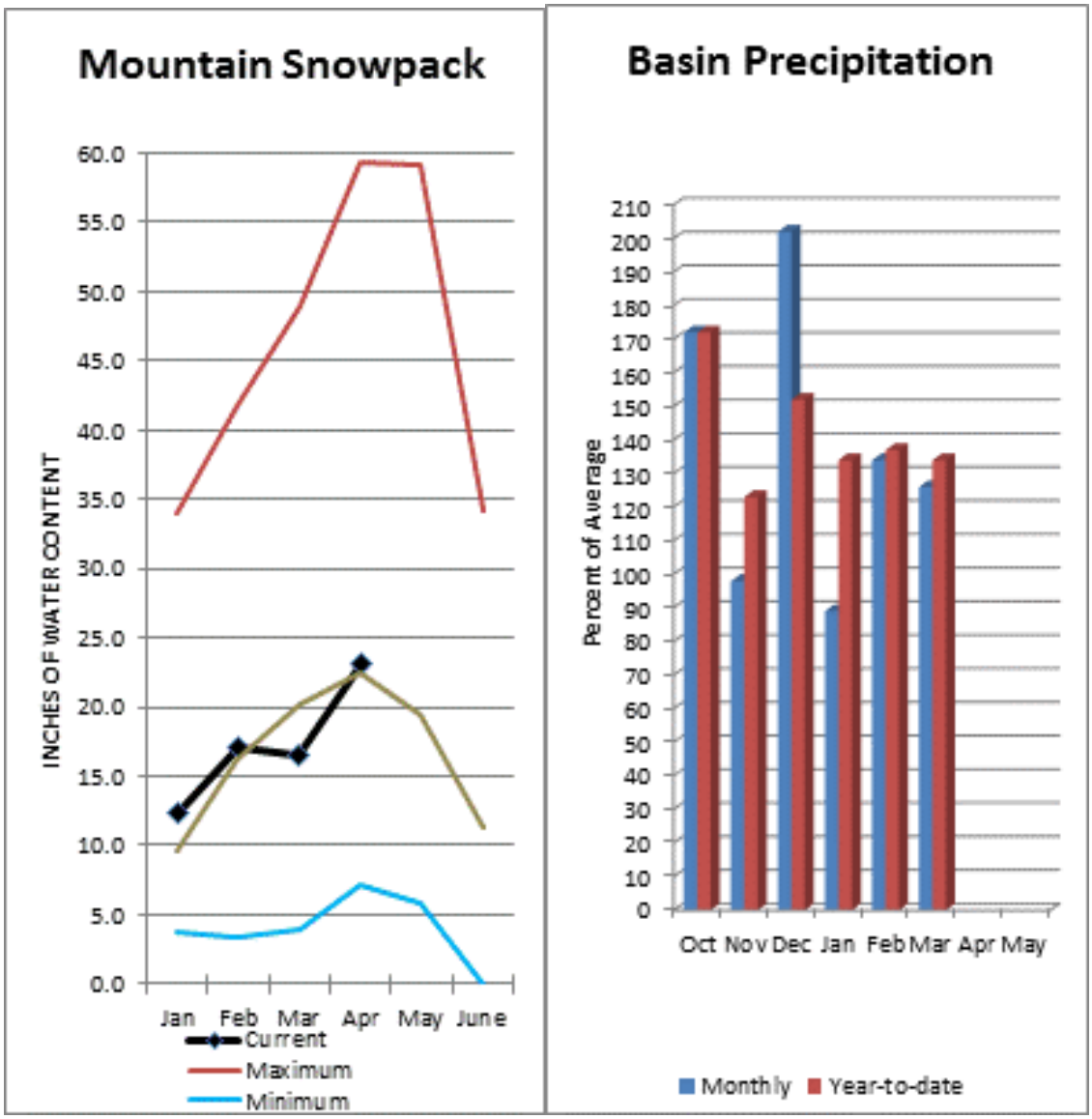
Lower Columbia Basins
Streamflow Forecasts - April 1, 2016

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[2]								
	APR-JUL	72900	78300	82000	103%	85700	91200	79855
	APR-SEP	84600	90900	95200	103%	99500	106000	92704
Klickitat R nr Glenwood								
	APR-JUL	140	152	160	127%	168	180	126
	APR-SEP	152	166	175	126%	184	198	139
Klickitat R nr Pitt								
	APR-JUL	475	525	560	129%	590	640	435
	APR-SEP	565	625	665	128%	705	760	520
Lewis R at Ariel[2]								
	APR-JUL	780	950	1060	109%	1180	1350	970
	APR-SEP	905	1080	1200	107%	1320	1500	1120
Cowlitz R bl Mayfiled[2]								
	APR-JUL	1580	1790	1930	119%	2070	2280	1620
	APR-SEP	1790	2020	2170	118%	2320	2550	1840
Cowlitz R at Castle Rock[2]								
	APR-JUL	2030	2320	2520	113%	2720	3020	2230
	APR-SEP	2290	2610	2820	112%	3030	3340	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, 2016	# of Sites	% Median	Last Year % Median
Lower Columbia Basins	11	117%	16%
Lewis River	5	118%	4%
Cowlitz River	6	115%	29%



Summer runoff is forecast to be 90% of normal for the Green River below Howard Hanson Dam and 114% for the White River near Buckley. April 1 snowpack was 109% of average for the White River, 106% for Puyallup River and 87% in the Green River Basin. March precipitation was 126% of average, bringing the water year-to-date to 134% of average for the basins. Average temperatures in the area were 1-2 degrees above normal for March and for the water-year.

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

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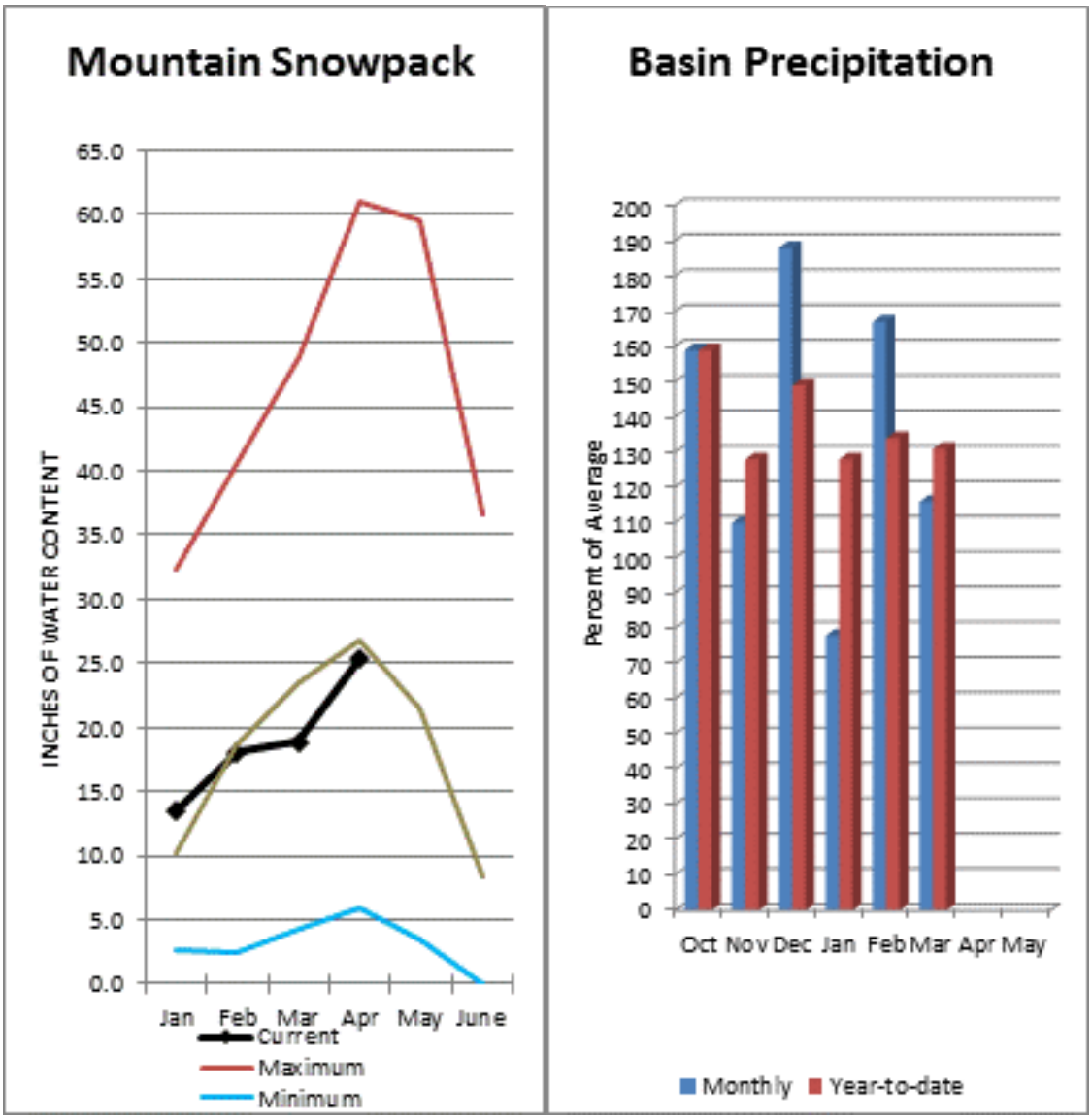
South Puget Sound Basins
Streamflow Forecasts - April 1, 2016

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[1,2]								
	APR-JUL	380	455	490	114%	520	595	430
	APR-SEP	460	545	585	114%	625	710	515
Green R bl Howard A Hanson Dam[1,2]								
	APR-JUL	134	183	205	87%	225	275	235
	APR-SEP	159	210	235	90%	260	310	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, 2016	# of Sites	% Median	Last Year % Median
South Puget Sound Basins	10	103%	29%
White River	3	109%	41%
Green River	2	87%	0%



Forecast for spring and summer flows are: 116% for Cedar River near Cedar Falls; 111% for Rex River; 112% for South Fork of the Tolt River; and 108% for Taylor Creek near Selleck. Basin-wide precipitation for March was 116% of average, bringing water-year-to-date to 131% of average. April 1 median snow cover in Cedar River Basin was 112%, Tolt River Basin was 77%, Snoqualmie River Basin was 88%, and Skykomish River Basin was 80%. Temperatures were 1-3 degrees above normal for March and for the water-year.

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

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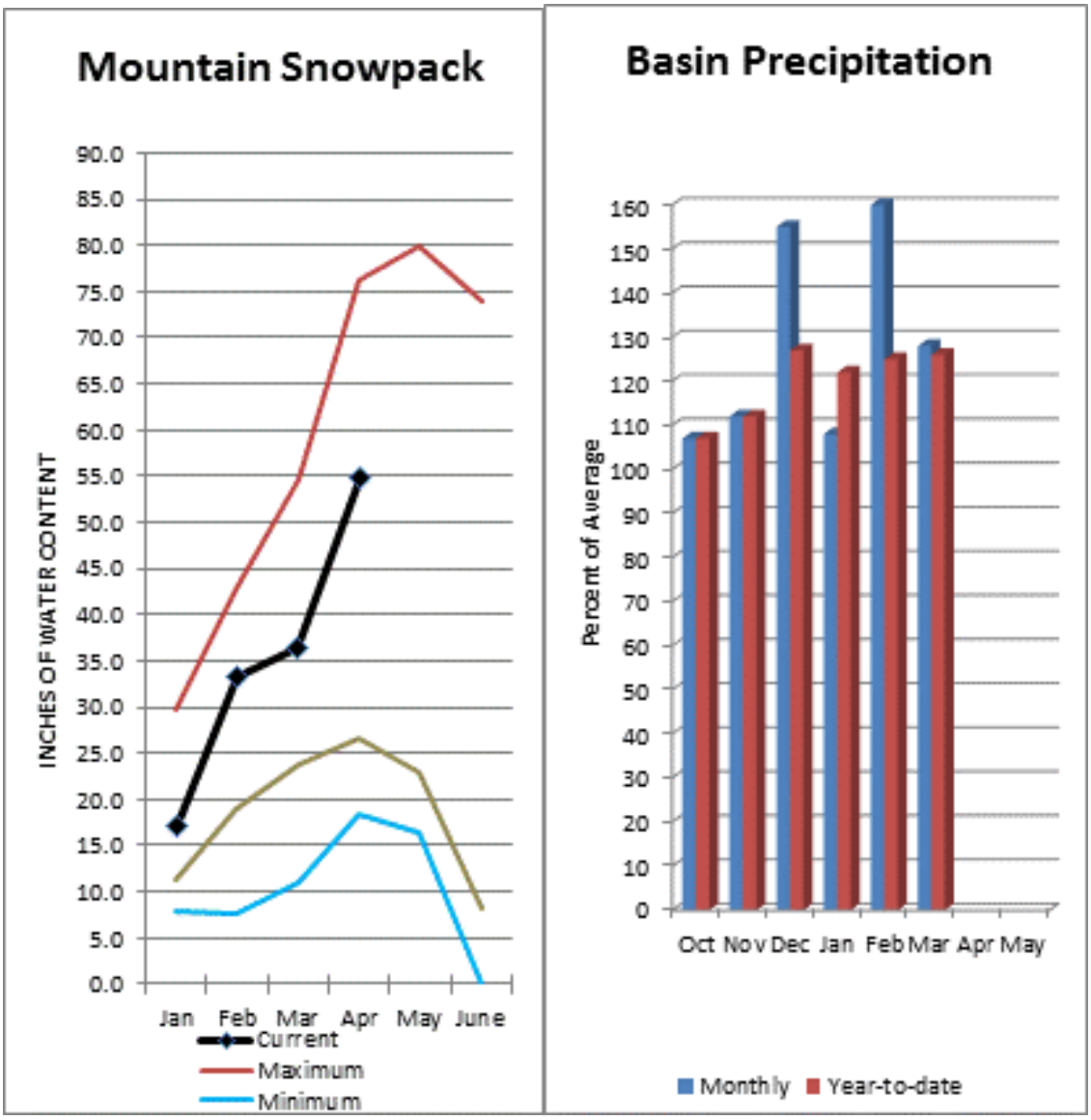
Central Puget Sound Basins
Streamflow Forecasts - April 1, 2016

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	68	76	81	116%	87	95	70
	APR-SEP	73	82	88	116%	94	103	76
Rex R nr Cedar Falls								
	APR-JUL	22	25	28	117%	31	35	24
	APR-SEP	23	28	30	111%	33	37	27
Taylor Ck nr Selleck								
	APR-JUL	17.6	20	22	110%	23	26	20
	APR-SEP	21	24	26	108%	27	30	24
SF Tolt R nr Index								
	APR-JUL	12.2	14.3	15.7	111%	17.1	19.2	14.2
	APR-SEP	13.9	16.3	18	112%	19.7	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 April 1, 2016	# of Sites	% Median	Last Year % Median
Central Puget Sound Basins	14	95%	4%
Puyallup River	5	106%	35%
Cedar River	5	112%	2%
Tolt River	3	77%	1%
Snoqualimie River	5	88%	3%
Skykomish River	3	80%	6%



Forecast for Skagit River streamflow at Newhalem is 116% of average for the spring and summer period. March streamflow in Skagit River was 143% of average. Other forecast points included Baker River at 115% and Thunder Creek at 106% of average. Basin-wide precipitation for March was 128% of average, bringing water-year-to-date to 126% of average. April 1 average snow cover in Skagit River Basin was 114%, Nooksack River Basin was 91% and Baker River Basin was 103% of normal. April 1 Skagit River reservoir storage was 64% of average and 33% of capacity. Average temperatures were 1-3 degrees above normal for March and for the water year.

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

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North Puget Sound Basins
Streamflow Forecasts - April 1, 2016

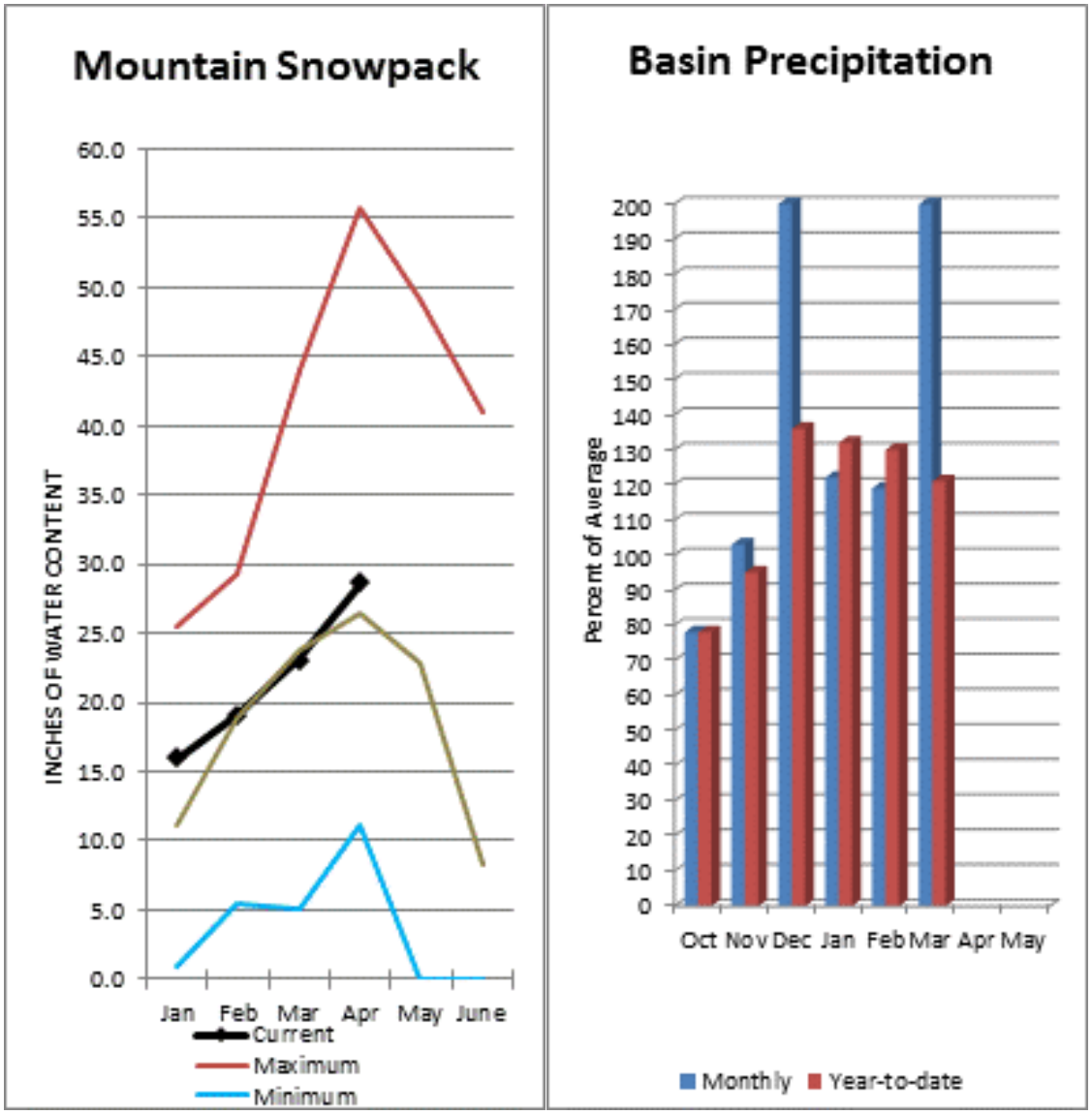
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

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	220	235	250	106%	265	280	235
	APR-SEP	315	335	350	106%	365	385	330
Skagit R at Newhalem[2]								
	APR-JUL	1820	1930	2000	119%	2070	2180	1680
	APR-SEP	2140	2270	2350	116%	2440	2560	2030
Baker R at Concrete								
	APR-JUL	750	835	890	114%	950	1030	780
	APR-SEP	920	1050	1130	115%	1220	1350	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, 2016	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Ross	466.8	712.5	730.5	1404.1
Diablo Reservoir			86.0	90.6
Basin-wide Total	466.8	712.5	730.5	1404.1
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis April 1, 2016	# of Sites	% Median	Last Year % Median
North Puget Sound Basins	22	105%	34%
Skagit River	13	114%	58%
Baker River	6	103%	21%
Nooksack River	3	91%	13%



Forecasted average runoff for streamflow for the Dungeness River is 99% and Elwha River is 101% March runoff in the Dungeness River was 176% of normal. Big Quilcene and Wynoochee rivers may expect near average runoff this summer as well. March precipitation was 204% of average. Precipitation has accumulated at 141% of average for the water year. March precipitation at Quillayute was 146% of normal. Olympic Peninsula snowpack averaged 108% of normal on April 1. Temperatures were 1-2 degrees above average and 1-3 degrees above normal for the water year.

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

Data Current as of: 4/7/2016 1:05:34 PM

Olympic Penninsula
Streamflow Forecasts - April 1, 2016

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	97	111	120	100%	129	143	120
	APR-SEP	115	132	144	99%	156	173	145
Elwha R at McDonald Bridge nr Port Angeles								
	APR-JUL	335	375	400	100%	430	465	400
	APR-SEP	395	445	475	101%	510	560	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, 2016	# of Sites	% Median	Last Year % Median
Olympic Penninsula	6	108%	2%

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
May 1, 2016

Mt. Blum Aerial Marker, Baker River, May 4, 2016, Puget Sound Energy

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:

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(509) 323-2955

How forecasts are made

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

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

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

Washington
Water Supply Outlook

May 2016

General Outlook

Record high temperatures rocked not only Washington but the whole Pacific Northwest. With snowpack already teetering on the verge of melt the blistering heat served as the proverbial "straw that broke the camel's back". Over 80% of all SNOTEL sites with at least 15 years of data set all new melt rate records for April and the rest came in 2nd. During 2 separate high pressure weather systems in April SNOTEL experienced minimum daily temperatures exceeding 20 degrees above normal. Due to the rapid snow melt runoff was above normal however our rivers and streams were able to contain it without flooding. The latest NWS short term forecasts are calling for warmer than normal with some chance of seasonal precipitation. Long range forecasts for the early summer continue to be warmer than normal with equal chances of precipitation. Suffice it say that normal rain fall during this period is only about 13% of the annual total. The leading climate factor this summer will be temperature. http://www.cpc.ncep.noaa.gov/

Snowpack

The May 1 statewide SNOTEL readings were 87% of normal. The Tolt River Basin reported the lowest readings at 44% of the 30-year median among those with remaining snow. Potato Hill SNOTEL near Mt. Adams had the highest percentage with 121%. Most basins reported considerable decreases from last month. Most areas reached peak snowpack by April 1 or before which is 2-3 weeks early. Westside medians from SNOTEL, and May 1 snow surveys, included the North Puget Sound river basins with 83% of normal, the Central and South Puget river basins with 60% and 78% respectively, and the Lower Columbia basins with 93% of normal. Snowpack along the east slopes of the Cascade Mountains included the Yakima area with 72% and the Wenatchee area with 74%. Snowpack in the Spokane River Basin was mostly melted out and the Walla Walla River Basin had 76% remaining.

BASIN	PERCENT OF MEDIAN	LAST YEAR PERCENT MEDIAN
Spokane	51	23
Newman Lake	0	0
Pend Oreille	70	61
Okanogan	92	79
Methow	100	79
Conconully Lake	0	0
Central Columbia	74	29
Upper Yakima	65	2
Lower Yakima	80	20
Ahtanum Creek	55	1
Walla Walla	76	0
Lower Snake	74	32
Cowlitz	96	25
Lewis	89	1
White	87	37
Green	55	0
Puyallup	79	33
Cedar	72	0
Snoqualmie	58	1
Skykomish	59	1
Tolt	44	0
Skagit	93	58
Nooksack	55	14
Olympic Peninsula	75	0

Precipitation

The state received much below normal precipitation for the month of April however year to date statewide SNOTEL averages remain above normal at 124%. The Pend Oreille, which includes parts of Idaho and Montana, recorded the highest percentages in the state at 71%. Sheep Canyon SNOTEL near Mt. St. Helens received the most rain last month with a total of 4.9 inches or 46% of normal.

RIVER BASIN	MAY PERCENT OF AVERAGE	WATER YEAR PERCENT OF AVERAGE
Spokane	51	103
Pend Oreille	71	99
Upper Columbia	45	116
Central Columbia	43	126
Upper Yakima	27	123
Lower Yakima	37	128
Walla Walla	37	104
Lower Snake	73	104
Lower Columbia	36	125
South Puget Sound	49	126
Central Puget Sound	46	123
North Puget Sound	40	119
Olympic Peninsula	55	134

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 777,000-acre feet, 128% of average for the Upper Reaches and 222,000-acre feet or 124% of average for Rimrock and Bumping Lakes. The power generation reservoirs included the following: Coeur d'Alene Lake, 206,000 acre feet, 90% of average and 86% of capacity; and the Skagit River reservoirs at 93% of average and 50% 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	86	90
Pend Oreille	62	101
Upper Columbia	95	136
Central Columbia	80	181
Upper Yakima	93	128
Lower Yakima	96	124
Lower Snake	84	110
North Puget Sound	50	93

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

Streamflow

Above normal temperatures and below normal April precipitation contributed to a statewide decrease in streamflow forecasts for this summer. May-September forecasts for some Western Washington streams include the Cedar River near Cedar Falls, 96%; White River, 90%; and Skagit River, 99%. Some Eastern Washington streams include the Yakima River near Parker 75%, Wenatchee River at Plain 87%; and Spokane River near Post Falls 78%. Volumetric forecasts are developed using current, historic and average snowpack, precipitation and streamflow data collected and coordinated by organizations cooperating with NRCS.

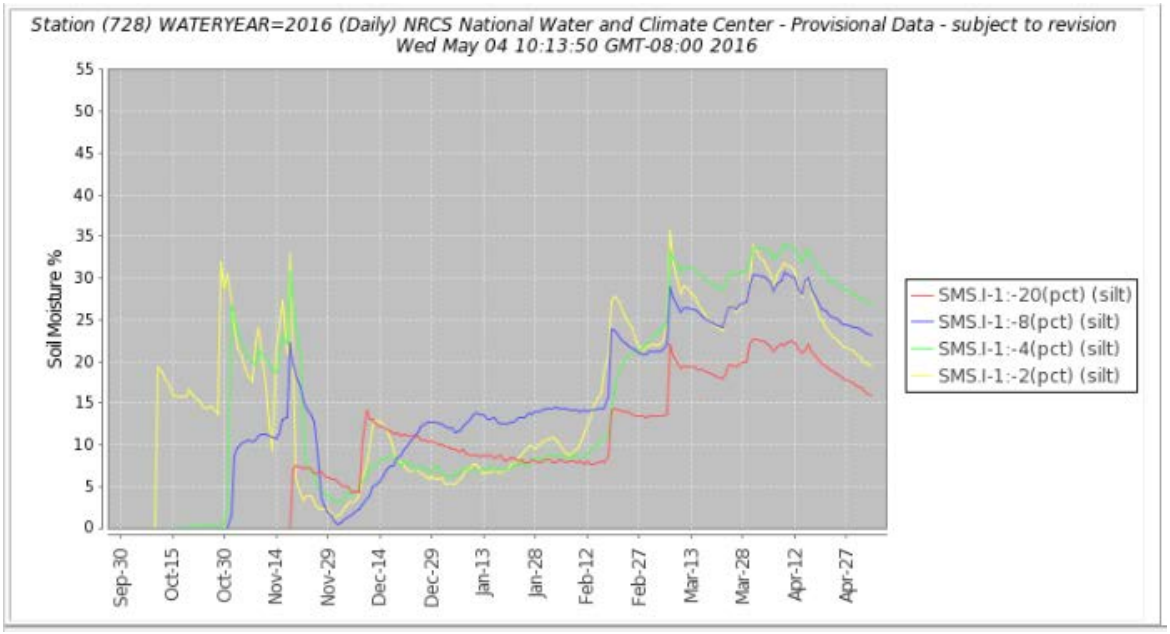
BASIN	PERCENT OF AVERAGE (50 PERCENT CHANCE OF EXCEEDENCE)
Spokane	78-98
Pend Oreille	85-86
Upper Columbia	86-101
Central Columbia	87-103
Upper Yakima	67-74
Lower Yakima	72-94
Walla Walla	94-98
Lower Snake	75-93
Lower Columbia	89-99
South Puget Sound	74-90
Central Puget Sound	87-98
North Puget Sound	98-99
Olympic Peninsula	73-75

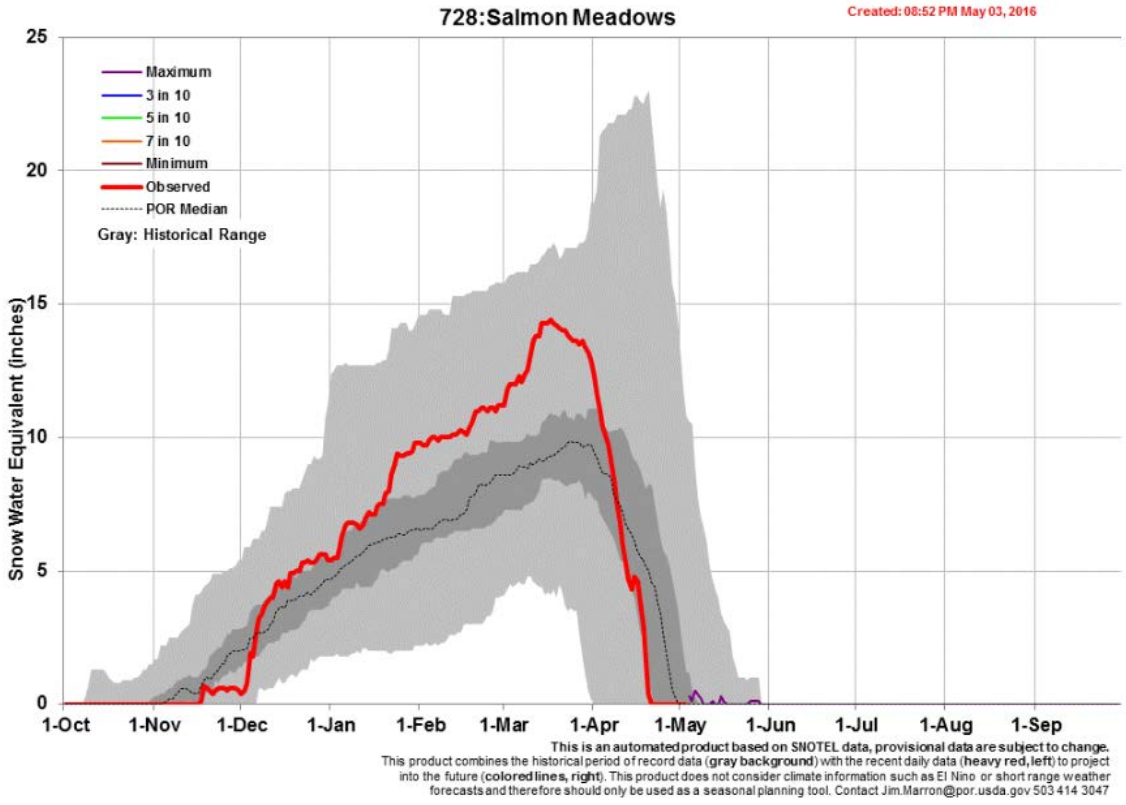
STREAM	PERCENT OF AVERAGE MAY STREAMFLOWS
Pend Oreille at Albeni Fall Dam	145
Kettle at Laurier	245
Columbia at Birchbank	210
Spokane at Spokane	104
Similkameen at Nighthawk	353
Okanogan at Tonasket	328
Methow at Pateros	443
Chelan at Chelan	272
Wenatchee at Pashastin	223
Cle Elum near Roslyn	189
Yakima at Parker	177
Naches at Naches	207
Grande Ronde at Troy	97
Snake below Lower Granite Dam	120
Columbia River at The Dalles	157
Lewis at Merwin Dam	77
Cowlitz below Mayfield Dam	109
Skagit at Concrete	159
Dungeness near Sequim	170

Soil Moisture

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

The following graph shows a very typical spring soil moisture profile at Salmon Meadows SNOTEL site near Omak, WA. Notice the profile recharge when fall rains began, a decline after, followed by a steady recharge throughout the winter with a steady decline after snow melt out. Soil saturation occurred at melt out in mid-April. The second graph is snowpack projection for the same site which shows a normal peak around April 15 and subsequent rapid melt curve. Notice how this site melted out about 2 weeks early. Lining up the dates of noticeable storms will correlate with the spikes in soil moisture.





Natural Resources Conservation Service

Washington State
Snow, Water and Climate Services

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Helpful Internet Addresses

NRCS Snow Survey and Climate Services Homepages

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

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

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

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

USDA-NRCS Agency Homepages

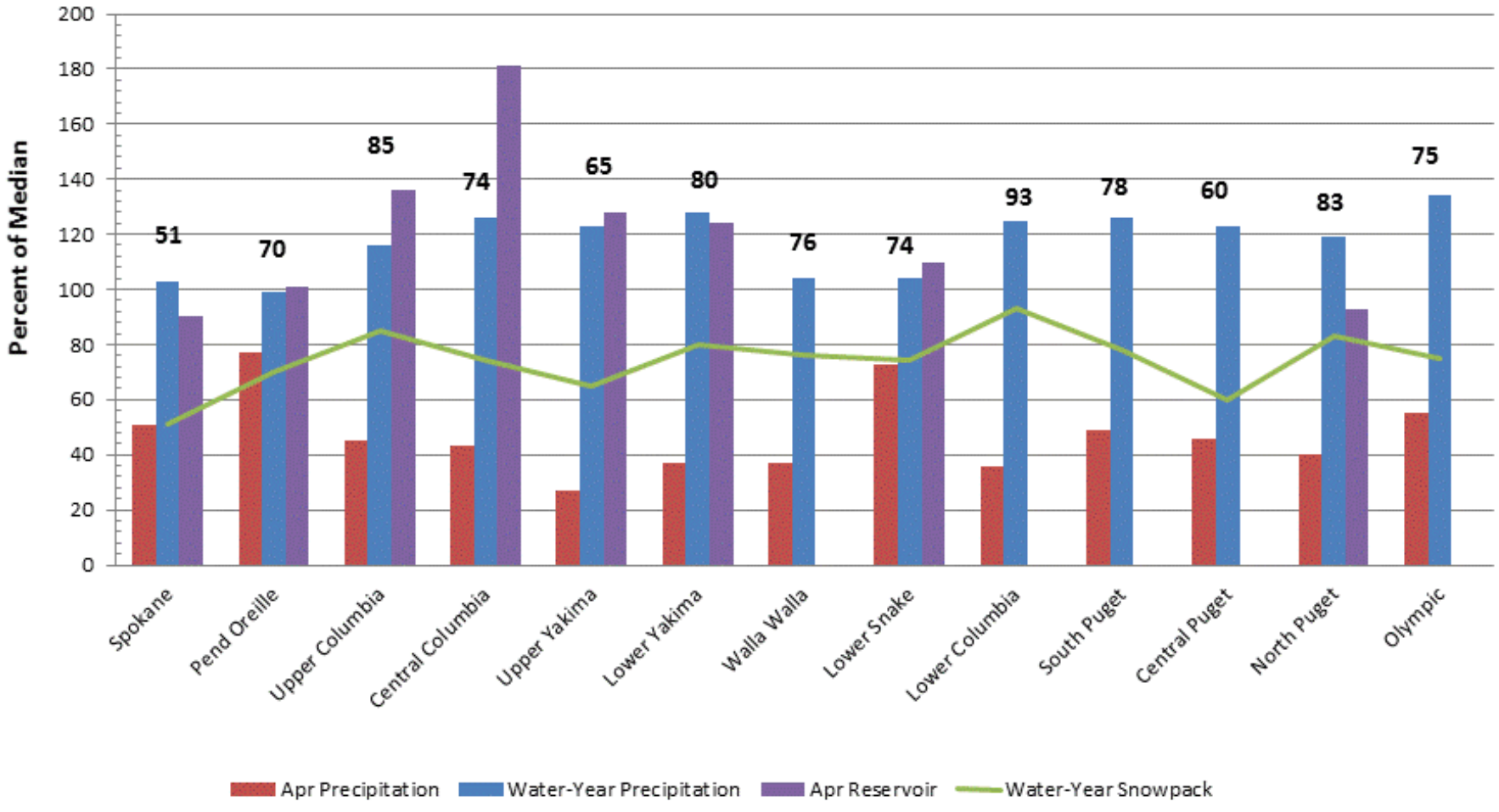
Washington:
http://www.nrcs.usda.gov/wps/portal/nrcs/site/wa/home/

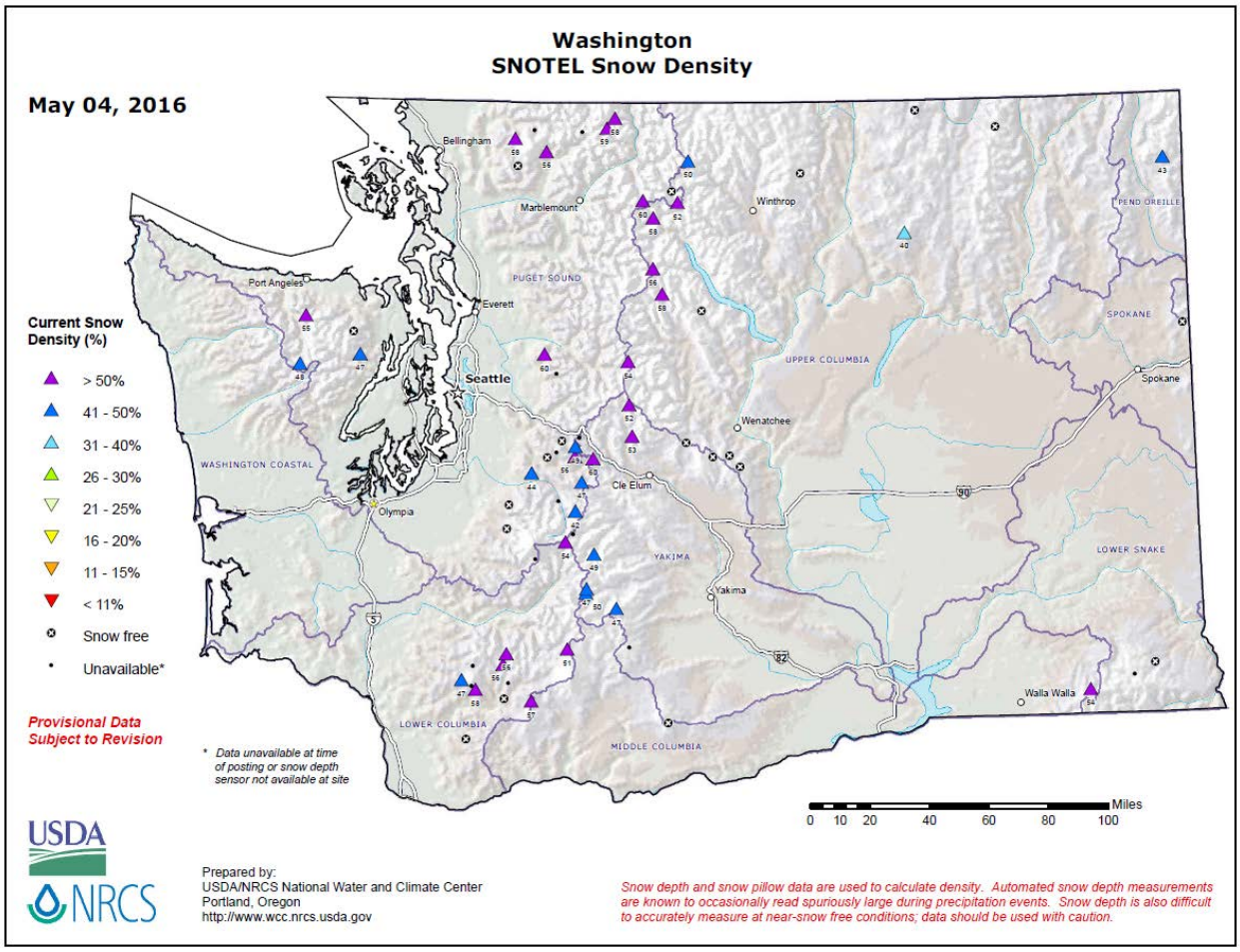
NRCS National:
http://www.nrcs.usda.gov/wps/portal/nrcs/site/national/home/

NRCS Natural Resources Conservation Service

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

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



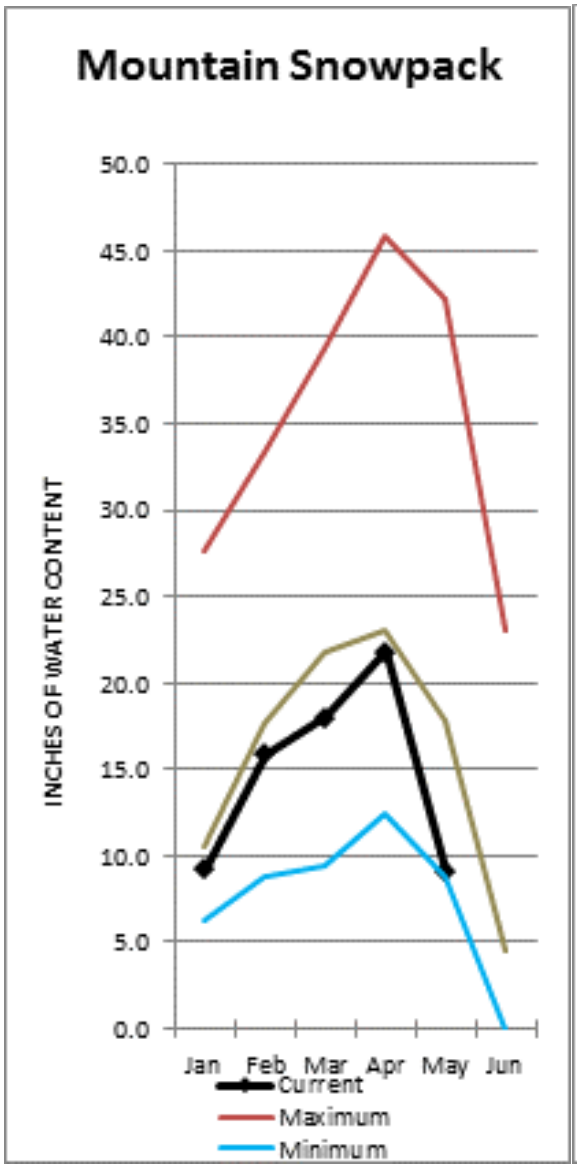


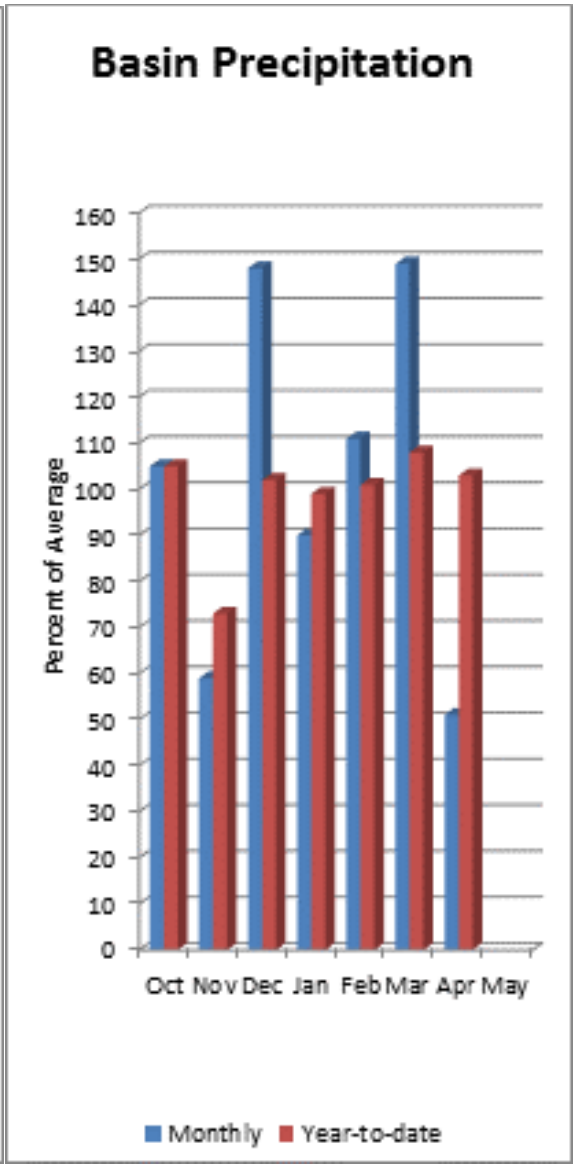
Western Snow Conference

A very successful conference was held in Seattle, WA, April 18-21, 2016. We look forward to the 2017 Western Snow Conference and joint meeting with the Weather Modification Association April 17-20, 2017 in Boise, ID.

Additional information about the conference can be found on the WSC web page at: http://www.westernsnowconference.org/

Spokane River Basin





The May 1 forecasts for summer runoff within the Spokane River Basin are 78% of average near Post Falls and 82% at Long Lake. The Chamokane River near Long Lake forecasted to have 98% of average flows for the May-August period. The forecast is based on a basin snowpack that is 51% of normal and precipitation that is 103% of average for the water year. Precipitation for April was below normal at 51% of average. Streamflow on the Spokane River at Spokane was 104% of average for April. May 1 storage in Coeur d'Alene Lake was 206,000 acre feet, 90% of average and 86% of capacity. Snowpack at Quartz Peak SNOTEL site had melted out by May 1 however it should have had 14.4 inches of water content. Average temperatures in the Spokane basin were 4-6 degrees above normal for April and 2-4 degrees above for the water year.

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

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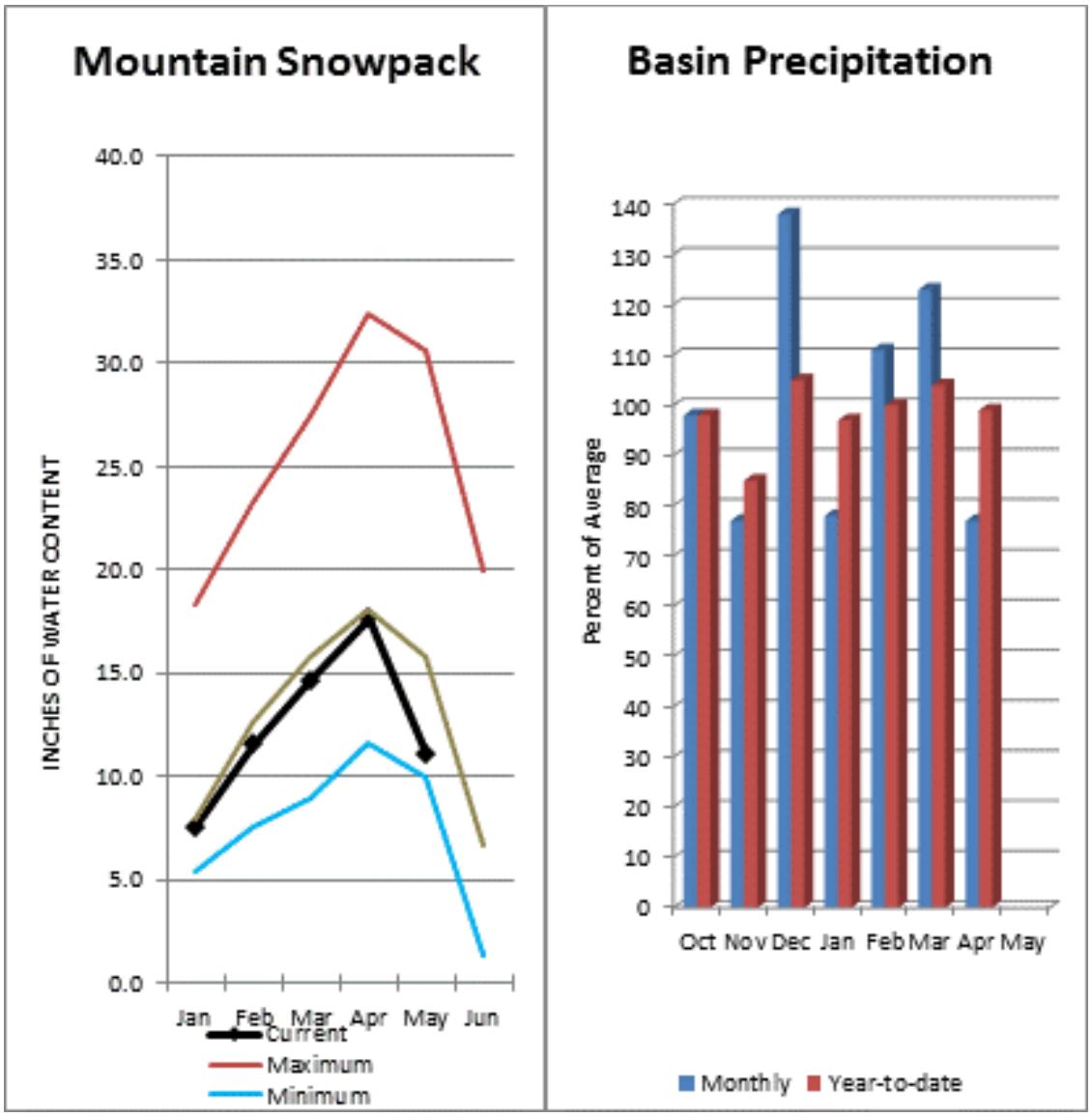
Spokane
Streamflow Forecasts - May 1, 2016

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	740	1010	1200	78%	1380	1650	1530
	MAY-SEP	775	1070	1270	78%	1470	1770	1620
Spokane R at Long Lake[2]								
	MAY-JUL	865	1190	1410	82%	1630	1960	1710
	MAY-SEP	1020	1370	1600	82%	1840	2190	1950
Chamokane Ck nr Long Lake								
	MAY-AUG	4.5	7.2	9.1	98%	10.9	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 April, 2016	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Lake Coeur d' Alene	205.7	209.1	228.0	238.5
Basin-wide Total	205.7	209.1	228.0	238.5
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis May 1, 2016	# of Sites	% Median	Last Year % Median
Spokane	11	51%	23%
Newman Lake	1	0%	0%



The May – September average forecast for the Priest River near the town of Priest River is 86% and the Pend Orielle below Box Canyon is 86%. April streamflow was 145% of average on the Pend Oreille River and 210% on the Columbia at Birchbank. May 1 snow cover was 70% of normal in the Pend Oreille Basin River Basin. Bunchgrass Meadows SNOTEL site had 18.2 inches of snow water on the snow pillow. Normally Bunchgrass would have 23.6 inches on May 1. Precipitation during April was 71% of average, dropping the year-to-date precipitation at 99% of average. Reservoir storage in the basin, including Lake Pend Oreille and Priest Lake was 101% of normal. Average temperatures were 4-6 degrees above normal for April and 2-4 degrees above for the water year.

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

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Pend Oreille Basins
Streamflow Forecasts - May 1, 2016

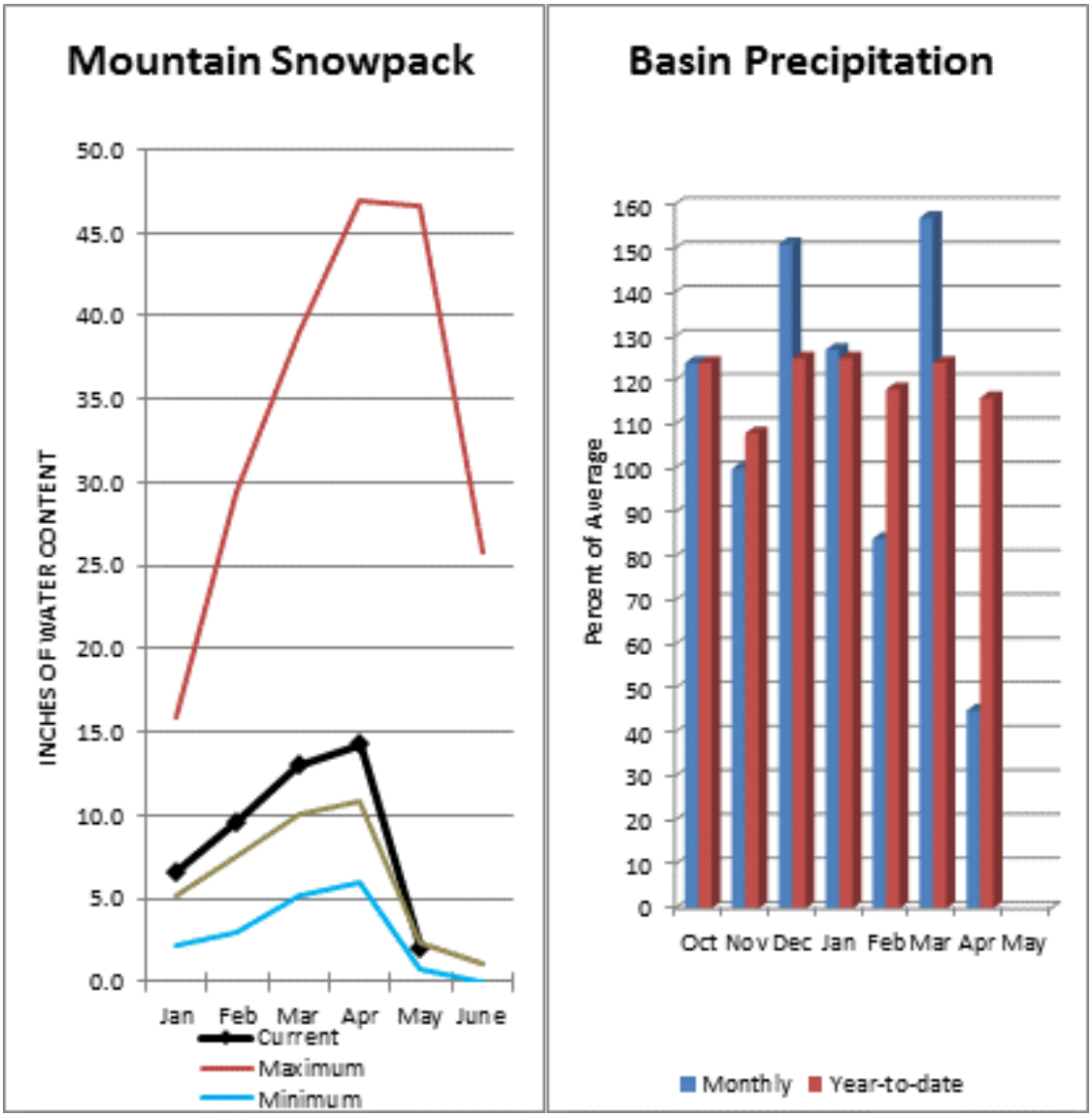
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

Pend Oreille Basins	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Pend Oreille Lake Inflow[2]								
	MAY-JUL	6630	7580	8230	85%	8880	9830	9690
	MAY-SEP	7340	8430	9180	86%	9920	11000	10700
Priest R nr Priest River[2]								
	MAY-JUL	390	455	500	86%	545	610	580
	MAY-SEP	415	490	540	86%	590	665	630
Pend Oreille R bl Box Canyon[2]								
	MAY-JUL	6700	7650	8300	85%	8950	9900	9750
	MAY-SEP	7420	8520	9260	86%	10000	11100	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, 2016	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Lake Pend Oreille	920.1	851.9	931.7	1561.3
Priest Lake	127.3	81.9	101.9	119.3
Basin-wide Total	1047.4	933.8	1033.6	1680.6
# of reservoirs	2	2	2	2

Watershed Snowpack Analysis May 1, 2016	# of Sites	% Median	Last Year % Median
Pend Oreille Basins	65	70%	61%
Colville River	0		
Kettle River	4	52%	44%



Summer runoff average forecast for the Okanogan River is 91%, Similkameen River is 94%, and Methow River is 101%. May 1 snow cover on the Okanogan was 92% of normal, Omak Creek was 46% and the Methow was 100%. April precipitation in the Upper Columbia was 47% of average, with precipitation for the water year at 116% of average. April streamflow for the Methow River was 443% of average, 328% for the Okanogan River and 353% for the Similkameen. Salmon Meadows SNOTEL was void of snow by May 1. Combined storage in the Conconully Reservoirs was 22,400 acre-feet or 136% of normal. Temperatures were 4-6 degrees above normal for April and for the water year.

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Upper Columbia Basins
Streamflow Forecasts - May 1, 2016

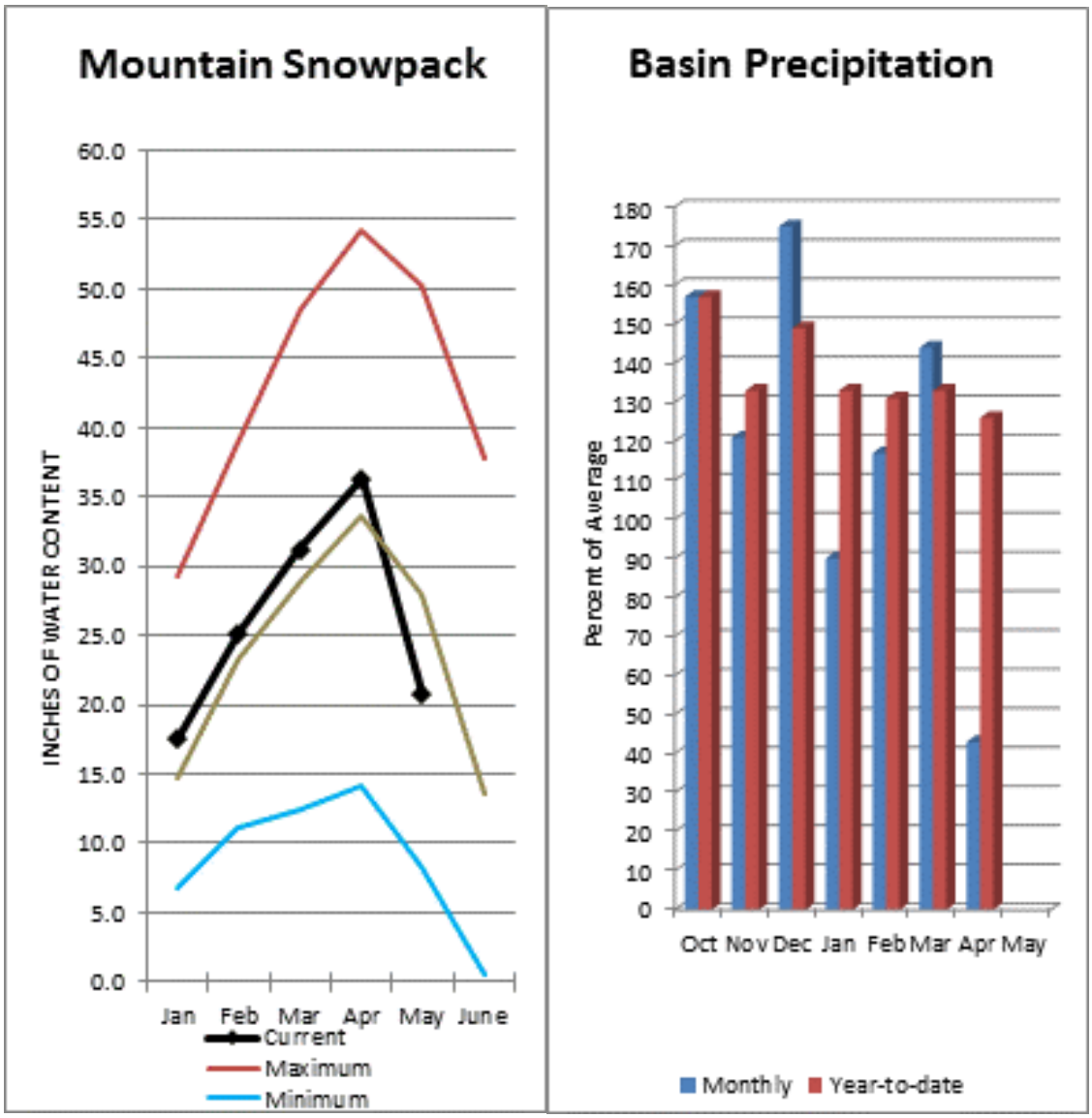
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

Upper Columbia Basins	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Kettle R nr Laurier								
	MAY-JUL	1220	1370	1480	102%	1590	1740	1450
	MAY-SEP	1250	1430	1550	101%	1670	1850	1530
Colville R at Kettle Falls								
	MAY-JUL	30	53	69	96%	85	108	72
	MAY-SEP	34	61	79	94%	98	125	84
Columbia R at Grand Coulee[1,2]								
	MAY-SEP	43600	46600	47900	90%	49200	52200	52970
Similkameen R nr Nighthawk[1]								
	MAY-JUL	750	920	995	94%	1070	1240	1060
	MAY-SEP	795	985	1070	94%	1160	1340	1140
Okanogan R nr Tonasket[1]								
	MAY-JUL	675	985	1120	86%	1260	1570	1300
	MAY-SEP	755	1110	1270	86%	1430	1780	1470
Okanogan R at Malott[1]								
	MAY-JUL	685	1010	1160	91%	1300	1620	1270
	MAY-SEP	775	1140	1310	91%	1470	1840	1440
Methow R nr Pateros								
	MAY-JUL	610	680	730	100%	780	855	730
	MAY-SEP	660	740	795	101%	845	925	790
Columbia R at Birchbank[1,2]								
	MAY-SEP	30100	34000	35800	93%	37600	41500	38390

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, 2016	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Conconully Lake (Salmon Lake Dam)	9.4	9.0	7.6	10.5
Conconully Reservoir	13.0	12.5	8.9	13.0
Basin-wide Total	22.4	21.5	16.5	23.5
# of reservoirs	2	2	2	2

Watershed Snowpack Analysis May 1, 2016	# of Sites	% Median	Last Year % Median
Upper Columbia Basins	13	85%	71%
Okanogan River	8	92%	79%
Omak Creek	1	46%	0%
Sanpoil River	0		
Similkameen River	5	56%	63%
Toats Coulee Creek	0		
Conconully Lake	1		
Methow River	4	100%	79%



Precipitation during April was 44% of average in the basin and 126% for the year-to-date. Runoff for Entiat River is forecast to be 87% of average for the summer. The May-September average forecast for Chelan River is 97%, Wenatchee River at Plain is 87%, Stehekin River is 103% and Icicle Creek is 96%. April average streamflow on the Chelan River was 272% and on the Wenatchee River 223%. May 1 snowpack in the Wenatchee River Basin was 74% of normal; the Chelan, 97%; the Entiat, Stemilt Creek, and Colockum Creek were all melted out by May 1. Reservoir storage in Lake Chelan was 181% of average and 80% of capacity. Lyman Lake SNOTEL had the most snow water with 60.7 inches of water. This site would normally have 61.2 inches on May 1. Temperatures were 4-6 degrees above normal for April and 2-4 degrees above for the water year.

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

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Central Columbia Basins
Streamflow Forecasts - May 1, 2016

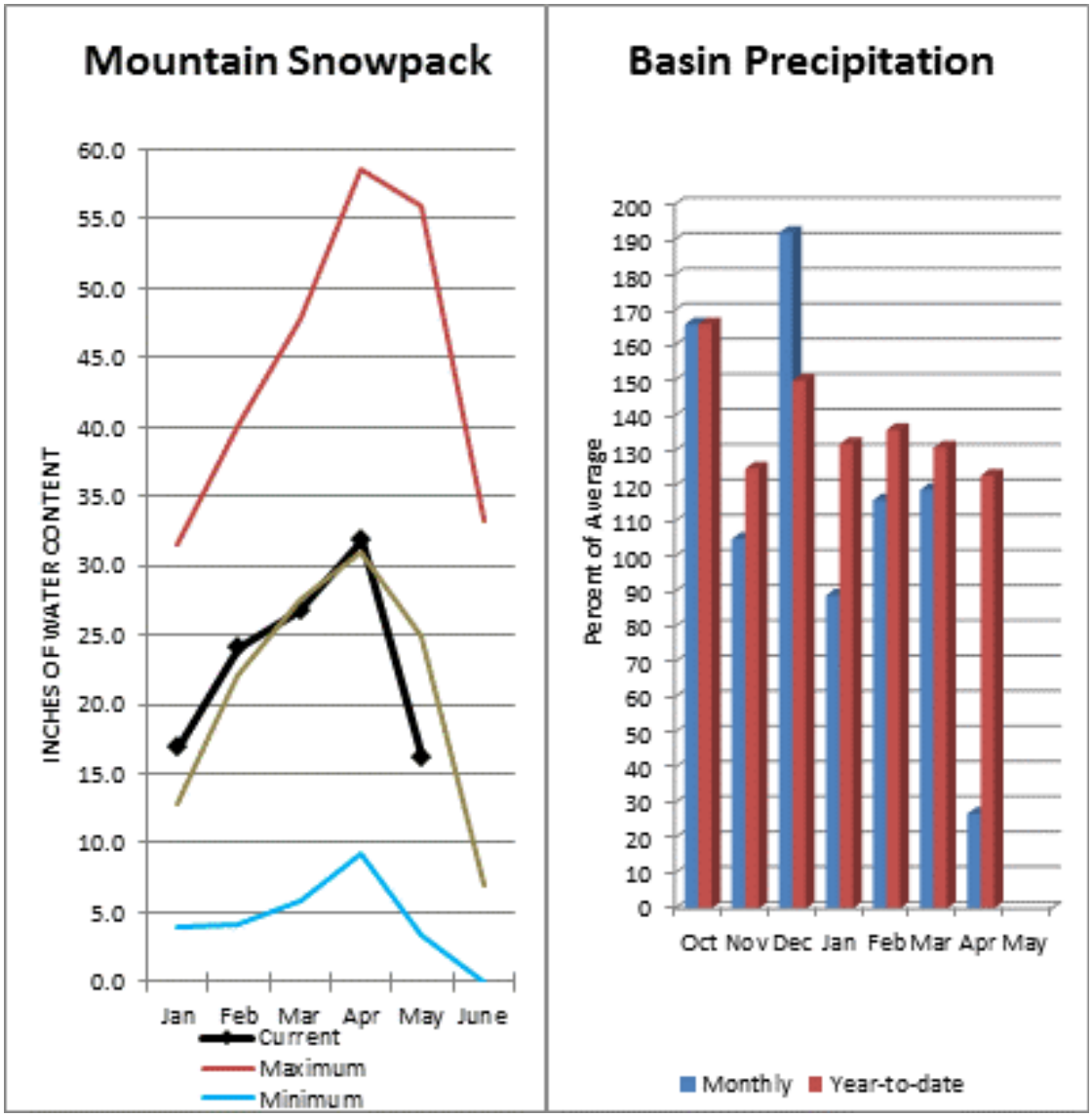
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

Central Columbia Basins	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Stehekin R at Stehekin								
	MAY-JUL	500	565	610	103%	655	720	595
	MAY-SEP	625	685	725	103%	770	830	705
Chelan R at Chelan								
	MAY-JUL	735	790	825	96%	860	910	860
	MAY-SEP	855	905	945	97%	980	1030	975
Entiat R nr Ardenvoir								
	MAY-JUL	132	146	156	88%	166	180	178
	MAY-SEP	146	161	171	87%	181	196	196
Wenatchee R at Plain								
	MAY-JUL	620	685	725	88%	770	835	825
	MAY-SEP	685	755	800	87%	845	915	920
Icicle Ck nr Leavenworth								
	MAY-JUL	188	210	225	96%	240	265	235
	MAY-SEP	205	230	250	96%	265	295	260
Wenatchee R at Peshastin								
	MAY-JUL	875	955	1010	89%	1070	1150	1140
	MAY-SEP	965	1050	1110	88%	1180	1270	1260
Columbia R bl Rock Island Dam[2]								
	MAY-SEP	46600	50200	52600	92%	55000	58600	57360

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, 2016	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Lake Chelan	543.3	425.6	300.7	676.1
Basin-wide Total	543.3	425.6	300.7	676.1
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis May 1, 2016	# of Sites	% Median	Last Year % Median
Central Columbia Basins	3	97%	53%
Chelan Lake Basin	3	97%	53%
Entiat River	1	0%	0%
Wenatchee River	7	74%	29%
Stemilt Creek	1	0%	0%
Colockum Creek	1	0%	0%



May 1 reservoir storage for the Upper Yakima reservoirs was 777,000-acre feet, 128% of average. Forecasts for the Yakima River at Cle Elum are 71% of average and the Teanaway River near Cle Elum is at 67%. Lake inflows are all forecasted to be in that same range this summer as well. April streamflow's within the basin were Cle Elum River near Roslyn at 189%. May 1 snowpack was 65% based upon 8 snow course and SNOTEL readings within the Upper Yakima Basin. Precipitation was 26% of average for April and 123% 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.

Data Current as of: 5/5/2016 3:17:29 PM

Upper Yakima River
Streamflow Forecasts - May 1, 2016

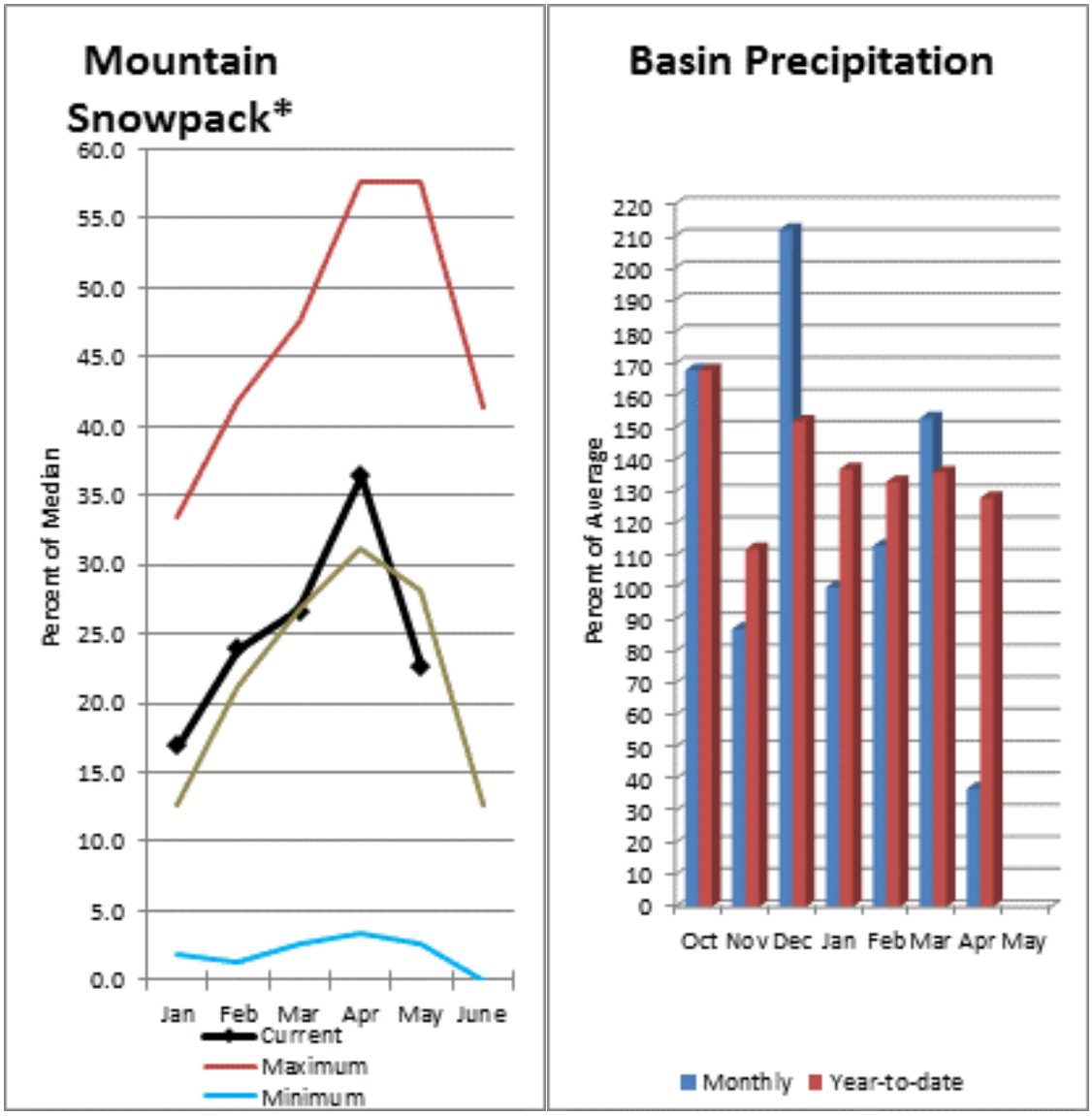
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

Upper Yakima River	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Keechelus Reservoir Inflow[2]								
	MAY-JUL	47	55	60	71%	65	73	85
	MAY-SEP	52	61	68	71%	75	84	96
Kachess Reservoir Inflow [2]								
	MAY-JUL	42	47	51	67%	55	60	76
	MAY-SEP	46	52	57	68%	62	68	84
Cle Elum Lake Inflow [2]								
	MAY-JUL	197	215	225	74%	235	255	305
	MAY-SEP	215	235	250	74%	265	285	340
Yakima R at Cle Elum [2]								
	MAY-JUL	320	360	390	68%	420	460	570
	MAY-SEP	355	415	455	71%	495	555	645
Teanaway R bl Forks nr Cle Elum								
	MAY-JUL	28	43	53	67%	63	78	79
	MAY-SEP	30	45	55	67%	65	80	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, 2016	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Keechelus	153.1	142.1	122.1	157.8
Kachess	215.6	237.3	183.7	239.0
Cle Elum	408.6	425.5	302.6	436.9
Basin-wide Total	777.3	804.8	608.4	833.7
# of reservoirs	3	3	3	3

Watershed Snowpack Analysis May 1, 2016	# of Sites	% Median	Last Year % Median
Upper Yakima River	8	65%	2%



April average streamflow's within the basin were: Yakima River near Parker, 177% and the Naches River near Naches, 207%. May 1 reservoir storage for Bumping and Rimrock reservoirs was 222,000-acre feet, 124% of average. Forecast averages for Yakima River near Parker are 75%; American River near Nile, 76%; Ahtanum Creek, 72%; and Klickitat River near Glenwood, 91%. May 1 snowpack was 80% based upon 6 snow course and SNOTEL readings within the Lower Yakima Basin and Ahtanum Creek reported in at 55% of normal. Precipitation was 37% of average for April and 128% for the water-year. Temperatures were 2-6 degrees above normal for April and for the water year. Volume forecasts for Yakima Basin are for natural flow. As such, they may differ from the U.S. Bureau of Reclamation's forecast for the total water supply available, which includes irrigation return flow.

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

Data Current as of: 5/5/2016 3:17:30 PM

Lower Yakima River
Streamflow Forecasts - May 1, 2016

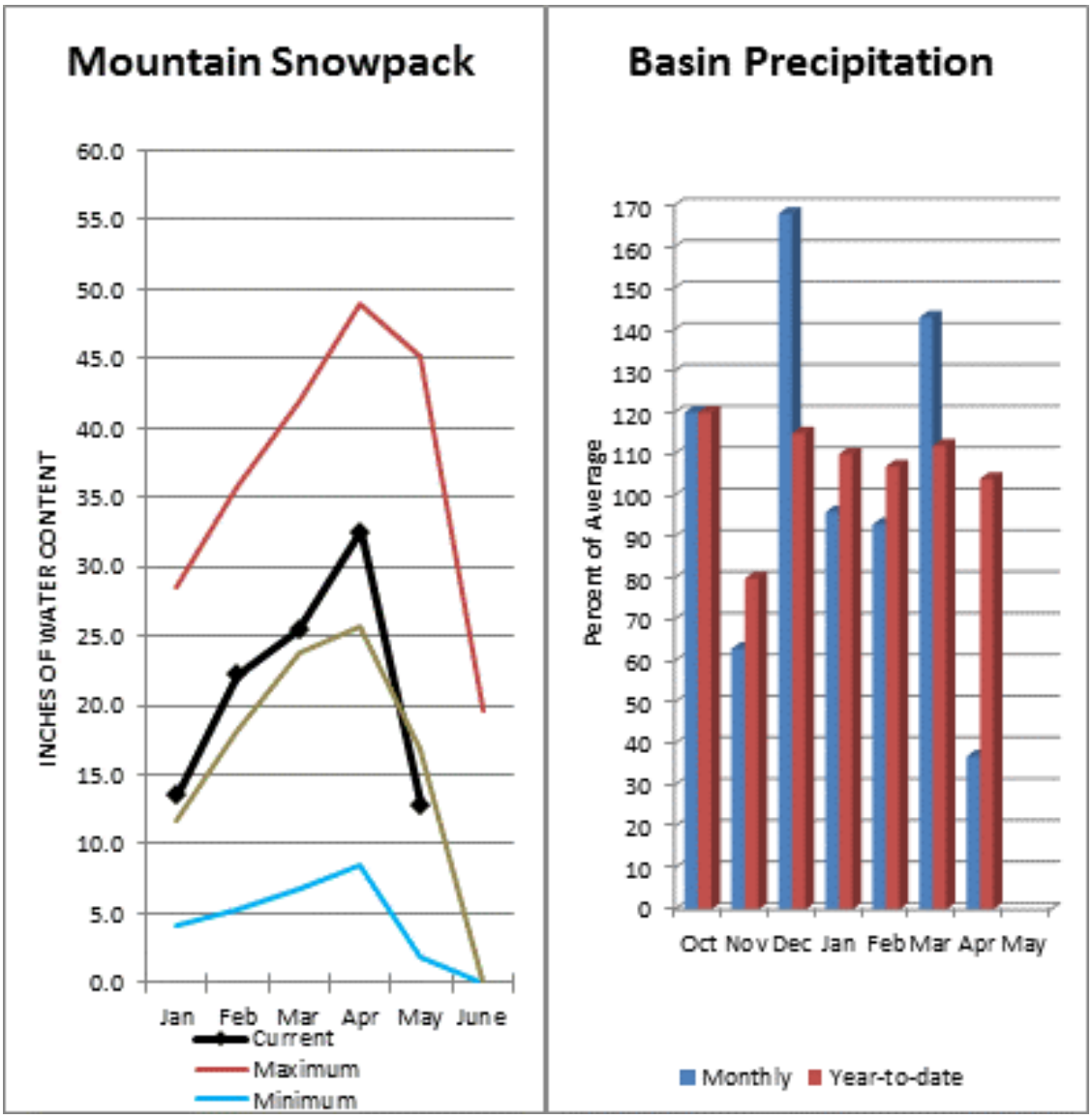
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

Lower Yakima River	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Bumping Lake Inflow [2]								
	MAY-JUL	69	75	80	86%	84	91	93
	MAY-SEP	75	83	88	85%	93	101	103
American R nr Nile								
	MAY-JUL	52	59	64	76%	69	76	84
	MAY-SEP	56	65	70	76%	76	84	92
Rimrock Lake Inflow [2]								
	MAY-JUL	116	126	133	88%	139	149	151
	MAY-SEP	140	154	163	88%	172	186	185
Naches R nr Naches								
	MAY-JUL	320	385	430	80%	475	540	540
	MAY-SEP	355	430	480	80%	530	605	600
Ahtanum Ck at Union Gap								
	MAY-JUL	7.6	11.4	14.3	74%	17.6	23	19.3
	MAY-SEP	8.4	12.1	15.1	72%	18.4	24	21
Yakima R nr Parker [2]								
	MAY-JUL	745	850	920	75%	990	1090	1230
	MAY-SEP	850	960	1040	75%	1120	1230	1390
Klickitat R nr Glenwood								
	MAY-JUL	72	82	88	91%	94	104	97
	MAY-SEP	82	93	100	91%	107	118	110
Klickitat R nr Pitt								
	MAY-JUL	245	275	295	97%	315	345	305
	MAY-SEP	325	360	385	97%	410	445	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, 2016	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Bumping Lake	30.3	33.6	21.7	33.7
Rimrock	191.6	191.2	156.9	198.0
Basin-wide Total	221.9	224.8	178.6	231.7
# of reservoirs	2	2	2	2

Watershed Snowpack Analysis May 1, 2016	# of Sites	% Median	Last Year % Median
Lower Yakima River	6	80%	20%
Ahtanum Creek	2	55%	1%



April precipitation was 37% of average, maintaining the year-to-date precipitation at 104% of average. Snowpack in the basin was 76% of normal. Streamflow forecasts are 94% of average for Mill Creek and 98% for the SF Walla Walla near Milton-Freewater. Average temperatures were 4-6 degrees above normal for April and 2-4 degrees above for the water year.

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

Data Current as of: 5/5/2016 3:17:31 PM

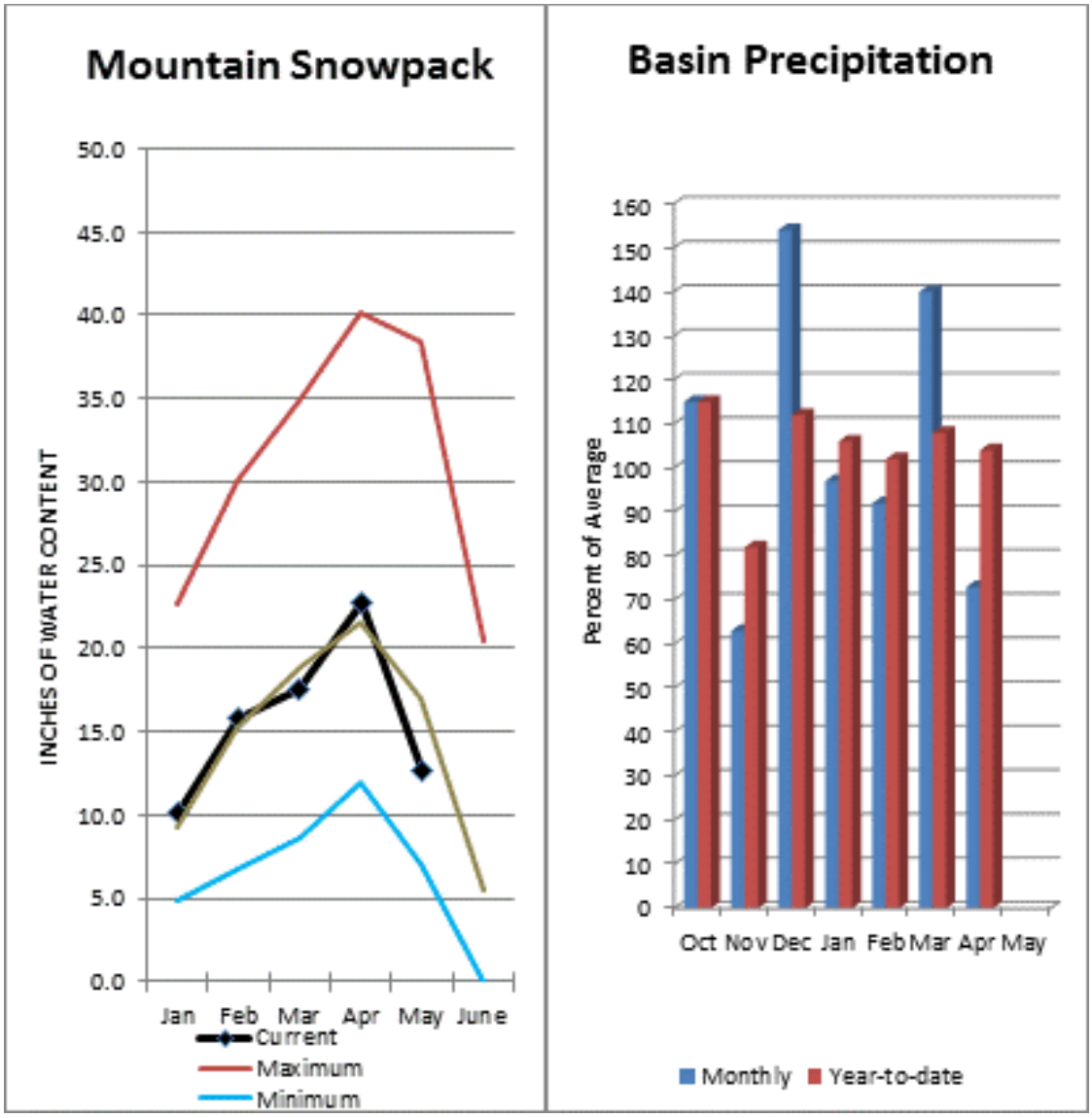
Walla Walla River
Streamflow Forecasts - May 1, 2016

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								
	MAY-JUL	27	33	36	97%	39	45	37
	MAY-SEP	38	44	48	98%	52	58	49
Mill Ck nr Walla Walla								
	MAY-JUL	9.1	11.3	12.9	93%	14.4	16.7	13.9
	MAY-SEP	12.2	14.7	16.3	94%	18	20	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, 2016	# of Sites	% Median	Last Year % Median
Walla Walla River	2	76%	0%



The Grande Ronde River can expect summer flows to be about 93% of normal. The forecast for Asotin Creek at Asotin predicts 73% of average flows for the May – July runoff period. April precipitation was 73% of average, bringing the year-to-date precipitation to 104% of average. May 1 snowpack readings averaged 74% of normal. April streamflow was 120% of average for Snake River below Lower Granite Dam and 97% for Grande Ronde River near Troy. Dworshak Reservoir storage was 110% of average. Average temperatures were 4-6 degrees above normal for April and 2-4 degrees above 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, 2016

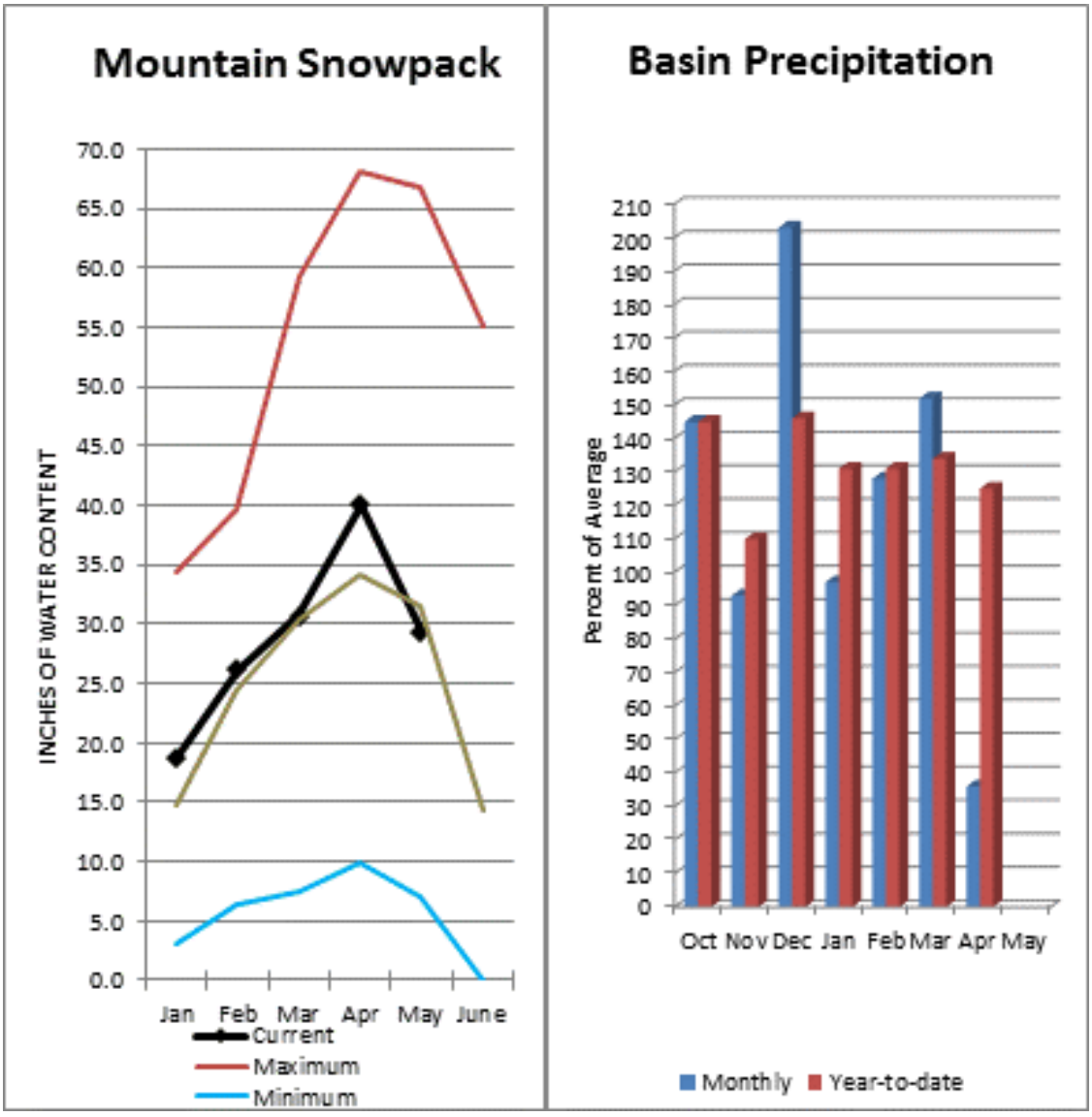
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

Lower Snake, Grande Ronde, Clearwater Basins	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Grande Ronde R at Troy								
	MAY-JUL	560	705	800	93%	895	1040	860
	MAY-SEP	640	780	880	93%	980	1120	945
Asotin Ck at Asotin								
	MAY-JUL	9	14.1	17.6	73%	21	26	24
Clearwater R at Spalding[2]								
	MAY-JUL	3030	3570	3930	75%	4290	4830	5260
	MAY-SEP	3290	3860	4250	75%	4640	5210	5640
Snake R bl Lower Granite Dam[12]								
	MAY-JUL	9030	11300	12300	80%	13300	15600	15280
	MAY-SEP	11000	13600	14800	84%	16000	18600	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, 2016	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Dworshak Reservoir	2897.8	3218.2	2646.0	3468.0
Basin-wide Total	2897.8	3218.2	2646.0	3468.0
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis May 1, 2016	# of Sites	% Median	Last Year % Median
Lower Snake, Grande Ronde, Clearwater Basins	14	74%	32%



Forecasts for May – September streamflow's within the basin are Lewis River at Ariel, 90% and Cowlitz River at Castle Rock, 99% of average. The Columbia at The Dalles is forecasted to have 89% of average flows this summer according to the River Forecast Center. April average streamflow for Cowlitz River was 109%. The Columbia River at The Dalles was 157% of average. April precipitation was 37% of average and the water-year average was 126%. May 1 snow cover for Cowlitz River was 96%, and Lewis River was 89% of normal. Temperatures were 4-6 degrees above normal during April and 2-4 degrees above for the water year.

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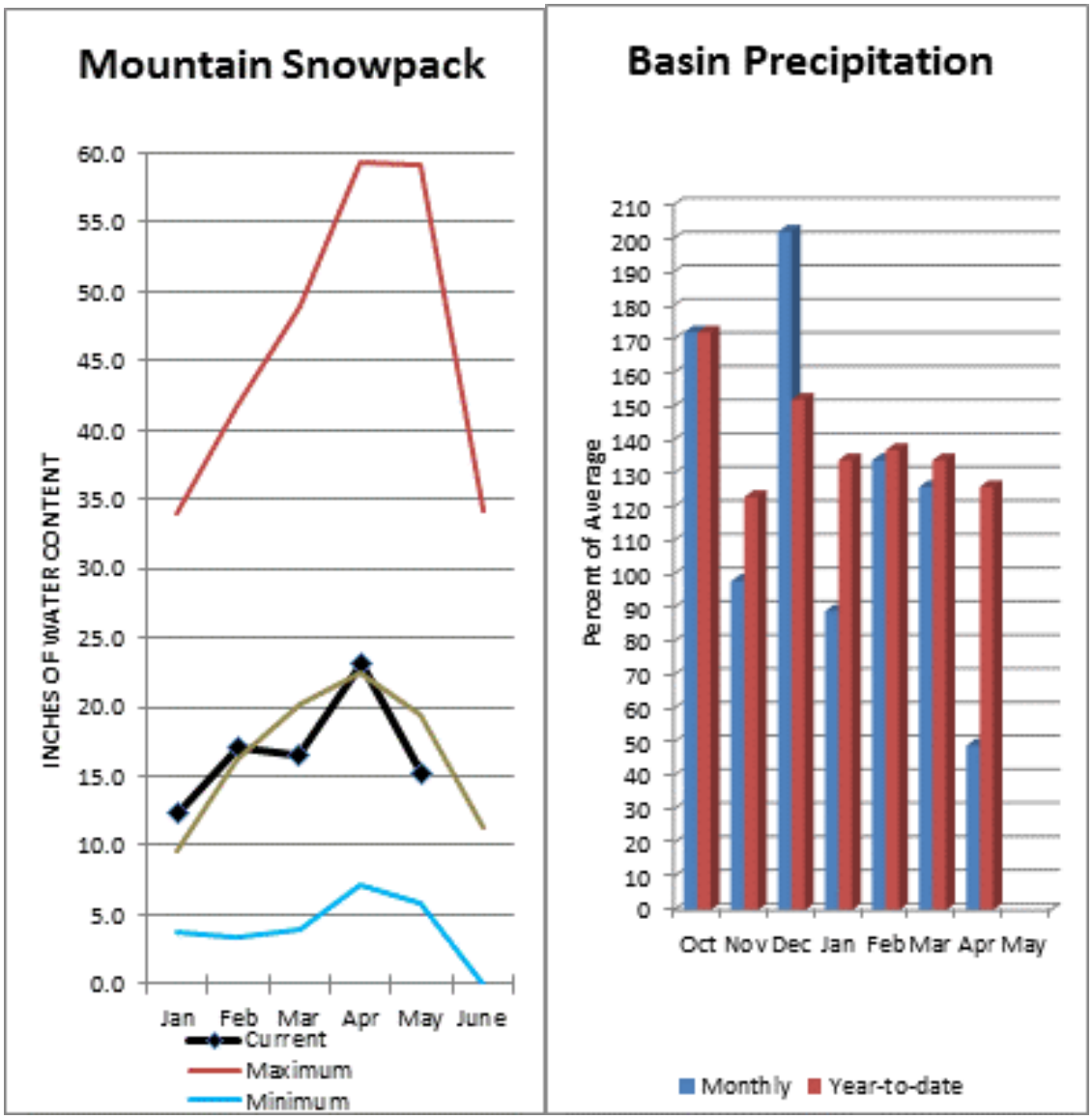
Lower Columbia Basins
Streamflow Forecasts - May 1, 2016

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[2]								
	MAY-SEP	62100	67100	70500	89%	73900	78900	78900
Klickitat R nr Glenwood								
	MAY-JUL	72	82	88	91%	94	104	97
	MAY-SEP	82	93	100	91%	107	118	110
Klickitat R nr Pitt								
	MAY-JUL	245	275	295	97%	315	345	305
	MAY-SEP	325	360	385	97%	410	445	395
Lewis R at Ariel[2]								
	MAY-JUL	425	515	575	93%	630	720	615
	MAY-SEP	535	630	695	90%	760	855	770
Cowlitz R bl Mayfiled[2]								
	MAY-JUL	775	950	1070	91%	1190	1360	1180
	MAY-SEP	890	1120	1280	92%	1440	1670	1390
Cowlitz R at Castle Rock[2]								
	MAY-JUL	1210	1410	1540	96%	1680	1870	1600
	MAY-SEP	1510	1730	1870	99%	2020	2230	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, 2016	# of Sites	% Median	Last Year % Median
Lower Columbia Basins	11	93%	13%
Lewis River	5	89%	1%
Cowlitz River	6	96%	25%



Summer runoff is forecast to be 74% of normal for the Green River below Howard Hanson Dam and 90% for the White River near Buckley. May 1 snowpack was 87% of average for the White River, 79% for Puyallup River and 55% in the Green River Basin. April precipitation was 48% of average, bringing the water year-to-date to 126% of average for the basins. Average temperatures in the area were 4-6 degrees above normal for April and 2-4 degrees above 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, 2016

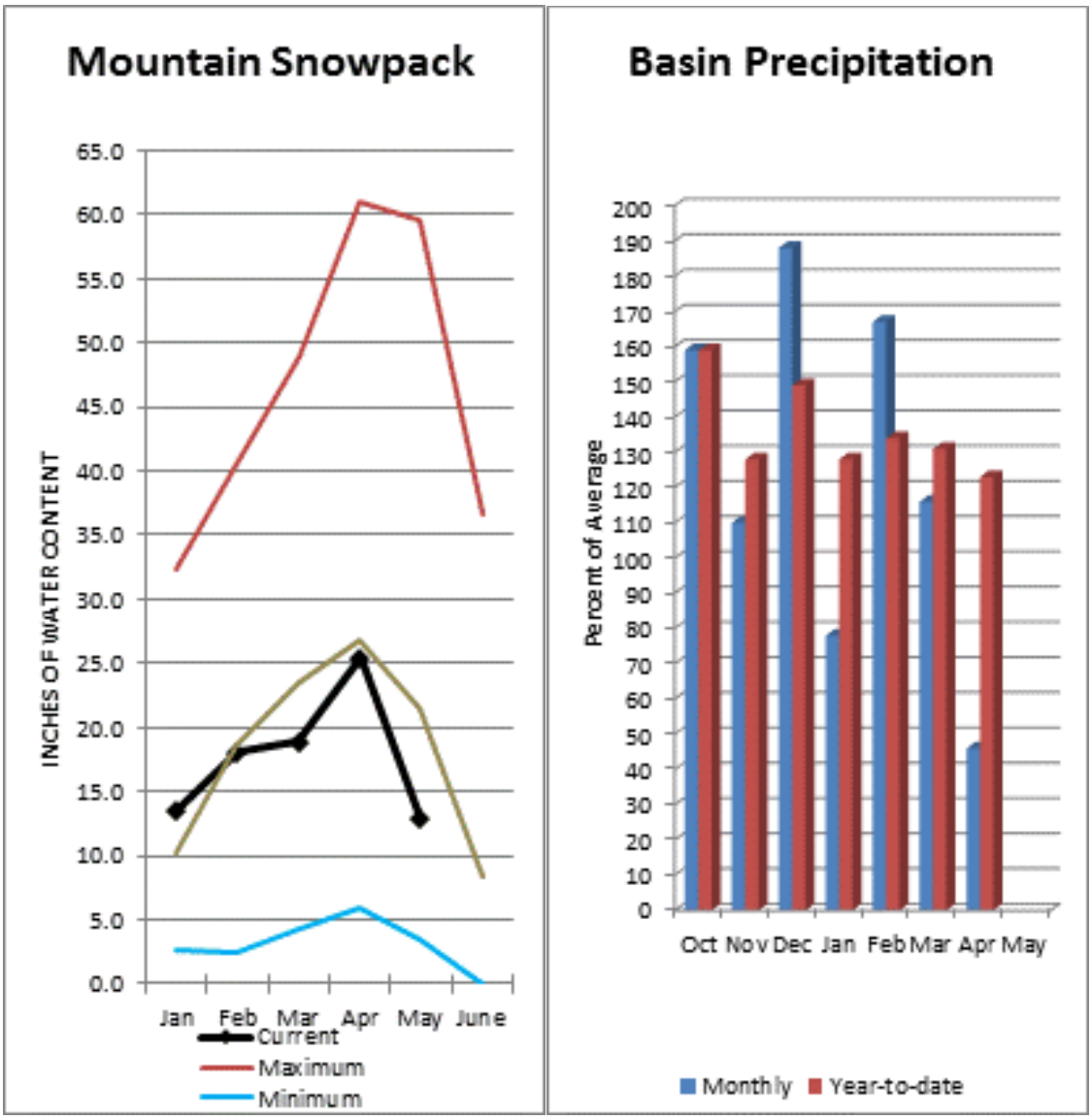
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

South Puget Sound Basins	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
White R nr Buckley[1,2]								
	MAY-JUL	198	265	295	89%	325	390	330
	MAY-SEP	265	345	380	90%	415	495	420
Green R bl Howard A Hanson Dam[1,2]								
	MAY-JUL	56	90	106	70%	122	157	152
	MAY-SEP	73	112	130	74%	148	188	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, 2016	# of Sites	% Median	Last Year % Median
South Puget Sound Basins	10	78%	28%
White River	3	87%	37%
Green River	2	55%	0%

Central Puget Sound River Basins



Forecast for spring and summer flows are: 96% for Cedar River near Cedar Falls; 93% for Rex River; 98% for South Fork of the Tolt River; and 98% for Taylor Creek near Selleck. Basin-wide precipitation for April was 50% of average, bringing water-year-to-date to 124% of average. May 1 median snow cover in Cedar River Basin was 72%, Tolt River Basin was 44%, Snoqualmie River Basin was 58%, and Skykomish River Basin was 59%. Temperatures were 4-6 degrees above normal for April and 2-4 degrees above for the water-year.

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

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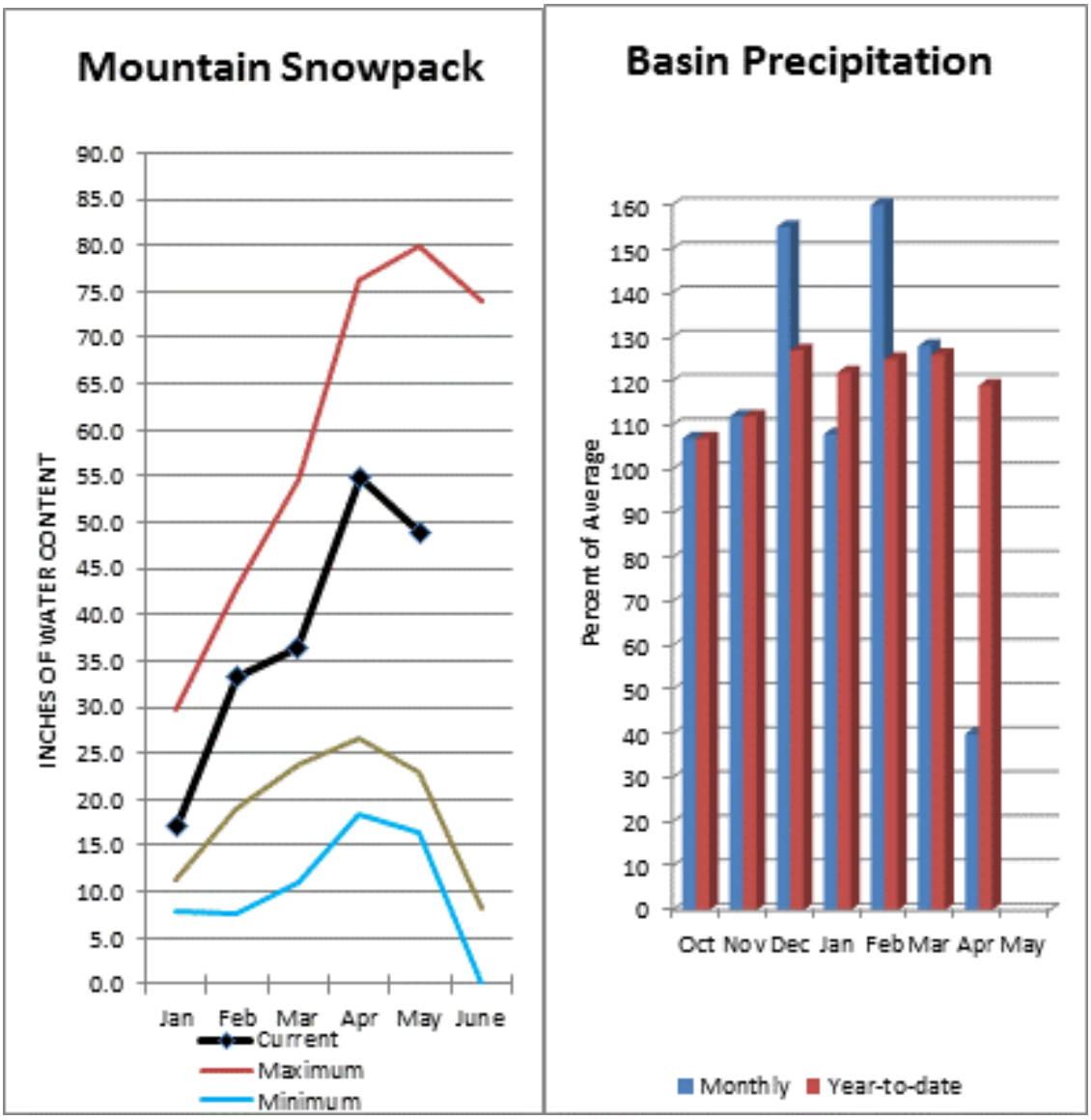
Central Puget Sound Basins
Streamflow Forecasts - May 1, 2016

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								
	MAY-JUL	38	44	48	98%	52	58	49
	MAY-SEP	42	49	54	96%	59	66	56
Rex R nr Cedar Falls								
	MAY-JUL	10.5	13.2	15.1	93%	16.9	19.6	16.2
	MAY-SEP	11.8	15	17.2	93%	19.4	23	18.5
Taylor Ck nr Selleck								
	MAY-JUL	10.7	12.1	13.1	98%	14.1	15.5	13.3
	MAY-SEP	13.5	15.4	16.6	98%	17.9	19.7	16.9
SF Tolt R nr Index								
	MAY-JUL	5.6	7.6	9	87%	10.4	12.4	10.4
	MAY-SEP	6.3	8.9	10.7	87%	12.5	15.2	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, 2016	# of Sites	% Median	Last Year % Median
Central Puget Sound Basins	12	60%	1%
Puyallup River	5	79%	33%
Cedar River	4	72%	0%
Tolt River	2	44%	0%
Snoqualimie River	4	58%	1%
Skykomish River	2	59%	1%



Forecast for Skagit River streamflow at Newhalem is 99% of average for the spring and summer period. April streamflow in Skagit River was 159% of average. Other forecast points included Baker River at 98% and Thunder Creek at 98% of average. Basin-wide precipitation for April was 41% of average, bringing water-year-to-date to 119% of average. May 1 average snow cover in Skagit River Basin was 93%, Nooksack River Basin was 55% and Baker River Basin was 63% of normal. May 1 Skagit River reservoir storage was 93% of average and 50% of capacity. Average temperatures were 4-6 degrees above normal for April and 2-4 degrees above 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, 2016

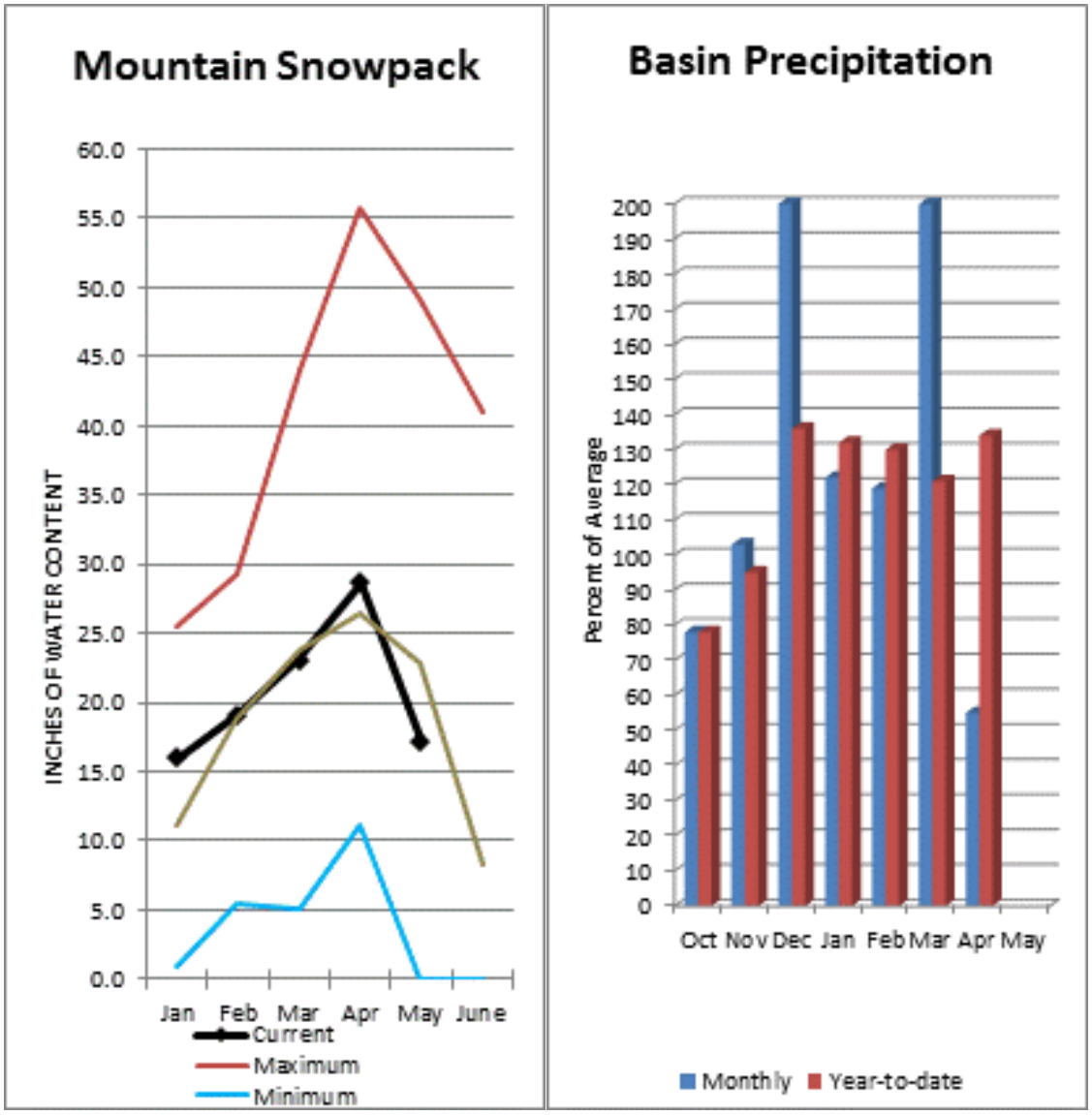
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

North Puget Sound Basins	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Thunder Ck nr Newhalem								
	MAY-JUL	174	192	205	98%	220	235	210
	MAY-SEP	265	285	300	98%	315	335	305
Skagit R at Newhalem[2]								
	MAY-JUL	1240	1340	1410	99%	1480	1580	1420
	MAY-SEP	1560	1680	1760	99%	1840	1970	1770
Baker R at Concrete								
	MAY-JUL	500	570	620	98%	670	740	635
	MAY-SEP	625	740	820	98%	900	1020	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, 2016	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Ross	700.0	710.1	754.4	1404.1
Diablo Reservoir			85.9	90.6
Basin-wide Total	700.0	710.1	754.4	1404.1
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis May 1, 2016	# of Sites	% Median	Last Year % Median
North Puget Sound Basins	23	73%	31%
Skagit River	14	93%	58%
Baker River	6	63%	15%
Nooksack River	3	55%	14%



Forecasted average runoff for streamflow for the Dungeness River is 75% and Elwha River is 73% April runoff in the Dungeness River was 170% of normal. Big Quilcene and Wynoochee rivers may expect near average runoff this summer as well. April precipitation was 56% of average. Precipitation has accumulated at 134% of average for the water year. April precipitation at Quillayute was only 29% of normal. Olympic Peninsula snowpack averaged 75% of normal on May 1. Temperatures were 4-6 degrees above average 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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Olympic Penninsula
Streamflow Forecasts - May 1, 2016

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

Olympic Penninsula	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Dungeness R nr Sequim								
	MAY-JUL	58	69	76	75%	83	94	101
	MAY-SEP	72	85	94	75%	103	116	125
Elwha R at McDonald Bridge nr Port Angeles								
	MAY-JUL	184	210	230	72%	250	275	320
	MAY-SEP	225	260	285	73%	310	345	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, 2016	# of Sites	% Median	Last Year % Median
Olympic Penninsula	6	75%	0%

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

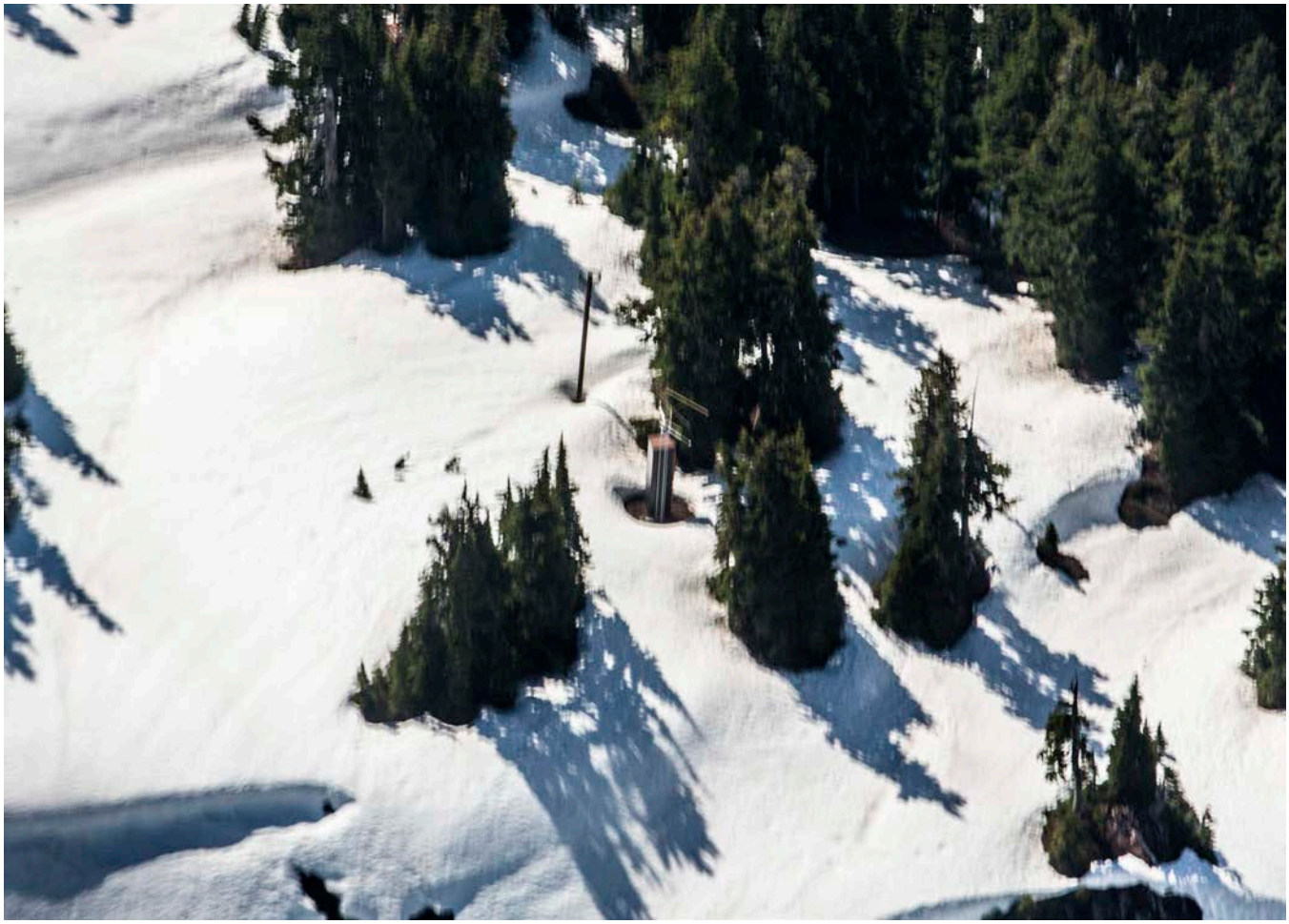
Washington Water Supply Outlook Report

Natural Resources Conservation Service
Spokane, WA

United States Department of Agriculture

NRCS Natural Resources Conservation Service

Washington
Water Supply Outlook Report
June 1, 2016



Easy Pass SNOTEL, Baker River, May 31, 2016, Puget Sound Energy. Easy Pass holds the record for the most snow water content in the entire SNOTEL network, June 3, 2012 with 129.7 inches.

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:

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How forecasts are made

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

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

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

Washington
Water Supply Outlook

June 2016

General Outlook

"A continuing saga" is the only way to describe the rapid snow melt spurred by above normal temperatures. As of June 1 only 25% of the 70 active SNOTEL sites in Washington still have measurable snowpack. Normally only 40% of the total would be snow free by June 1. Most melted out sites did so 2-4 weeks earlier than normal. According to the U.S. Drought Monitor abnormally dry conditions (D0) have taken over Western Washington as well as the southern border. Long range forecasts for the summer continue to be warmer than normal with equal chances of precipitation. Predictions for next winter support a strong probability for an El Nino which typically produces a healthy snowpack for the state. http://www.cpc.ncep.noaa.gov/

This the final report for 2016 and is has been another very interesting and record setting year. Due to time constraints this will be an abbreviated version but all pertinent data and information can be found online.

Snowpack

The June 1 statewide SNOTEL readings were 47% of normal. Many basins completely melted out by June 1. Paradise SNOTEL at 5,130 feet on Mt. Rainer had the highest percentage with 81%. All basins reported considerable decreases from last month. Only basins with high elevation or shaded sites have snow remaining. This late in the season percent of normal can be very misleading. As an example a site which would normally have 2 inches of snow water might have 4 inches or 200%. Time should be spent researching the actual water content when making management or mountain travel decisions. Detailed snowpack analysis can be found online: http://www.wcc.nrcs.usda.gov/basin.html

BASIN	PERCENT OF MEDIAN	LAST YEAR PERCENT MEDIAN
Spokane	50	0
Newman Lake	0	0
Pend Oreille	65	34
Okanogan	54	12
Methow	63	9
Conconully Lake	0	0
Central Columbia	62	23
Upper Yakima	21	0
Lower Yakima	53	2
Ahtanum Creek	0	0
Walla Walla	0	0
Lower Snake	38	3
Cowlitz	67	0
Lewis	51	0
White	63	3
Green	0	0
Puyallup	63	3
Cedar	0	0
Snoqualmie	12	0
Skykomish	0	0
Tolt	0	0
Skagit	52	6
Nooksack	36	0
Olympic Peninsula	1	0
Baker	24	0

Precipitation

The state mostly received below normal precipitation for the month of May however year to date statewide SNOTEL averages remain above normal at 120%. The Pend Oreille, which includes parts of Idaho and Montana, recorded the highest percentages in the state at 107%. Alpine SNOTEL in the Tolt River Basin received the most rain last month with a total of 6.5 inches or 66% of normal. Basin specific information is available at: http://www.wcc.nrcs.usda.gov/basin.html

RIVER BASIN	JUNE PERCENT OF AVERAGE	WATER YEAR PERCENT OF AVERAGE
Spokane	99	102
Pend Oreille	107	100
Upper Columbia	68	112
Central Columbia	78	124
Upper Yakima	77	120
Lower Yakima	76	125
Walla Walla	64	101
Lower Snake	67	100
Lower Columbia	49	121
South Puget Sound	75	122
Central Puget Sound	75	120
North Puget Sound	60	116
Olympic Peninsula	40	129

Reservoir

Seasonal reservoir levels in Washington can vary greatly due to specific watershed management practices required in preparation for irrigation season, fisheries management, power generation, municipal demands and flood control. June 1 Reservoir storage in the Yakima Basin was 830,000-acre feet, 115% of average for the Upper Reaches and 232,000-acre feet or 108% of average for Rimrock and Bumping Lakes. The power generation reservoirs included the following: Coeur d'Alene Lake, 233,000 acre feet, 88% of average and 98% of capacity; and the Skagit River reservoirs at 90% of average and 67% of capacity. Recent climate impacts and management procedures could affect these numbers on a daily or weekly basis.

BASIN	PERCENT OF CAPACITY	CURRENT STORAGE AS PERCENT OF AVERAGE
Spokane	98	88
Pend Oreille	86	98
Upper Columbia	101	129
Central Columbia	91	126
Upper Yakima	100	115
Lower Yakima	100	108
Lower Snake	96	107
North Puget Sound	67	90

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

Streamflow

Above normal temperatures and continued early snow melt contributed to a statewide decrease in streamflow forecasts for this summer. June-September forecasts for some Western Washington streams include the Cedar River near Cedar Falls, 74%; White River, 69%; and Skagit River, 81%. Some Eastern Washington streams include the Yakima River near Parker 60%, Wenatchee River at Plain 68%; and Spokane River near Post Falls 75%. Volumetric forecasts are developed using current, historic and average snowpack, precipitation and streamflow data collected and coordinated by organizations cooperating with NRCS. A complete listing by basin can be found online at: http://www.wcc.nrcs.usda.gov/basin.html

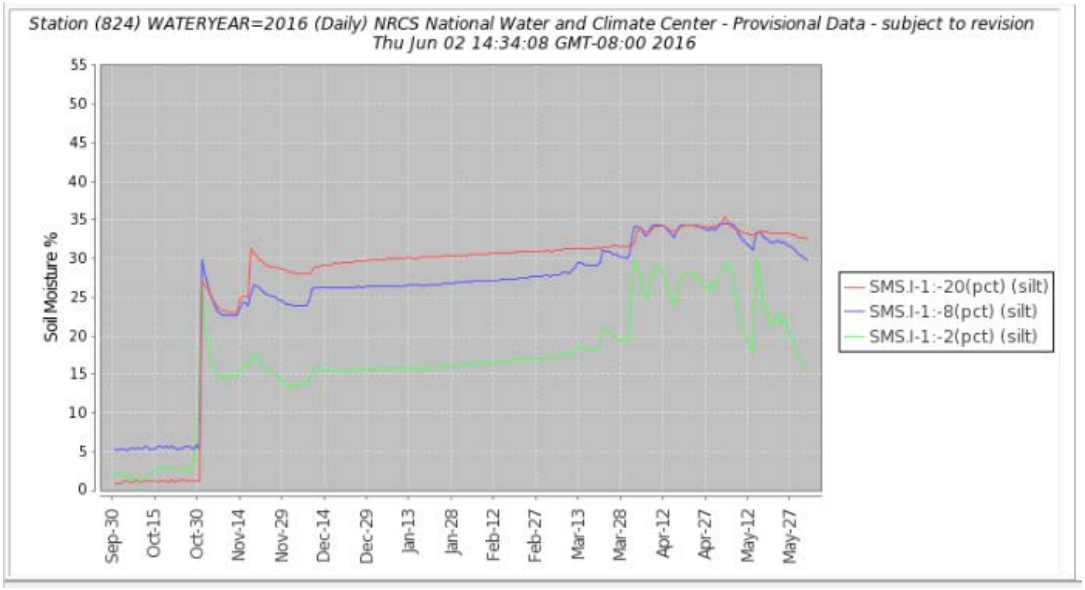
BASIN	PERCENT OF AVERAGE (50 PERCENT CHANCE OF EXCEEDENCE)
Spokane	75-79
Pend Oreille	82-85
Upper Columbia	70-81
Central Columbia	68-87
Upper Yakima	37-53
Lower Yakima	57-80
Walla Walla	71-76
Lower Snake	53-57
Lower Columbia	63-84
South Puget Sound	69-81
Central Puget Sound	73-79
North Puget Sound	72-82
Olympic Peninsula	62-64

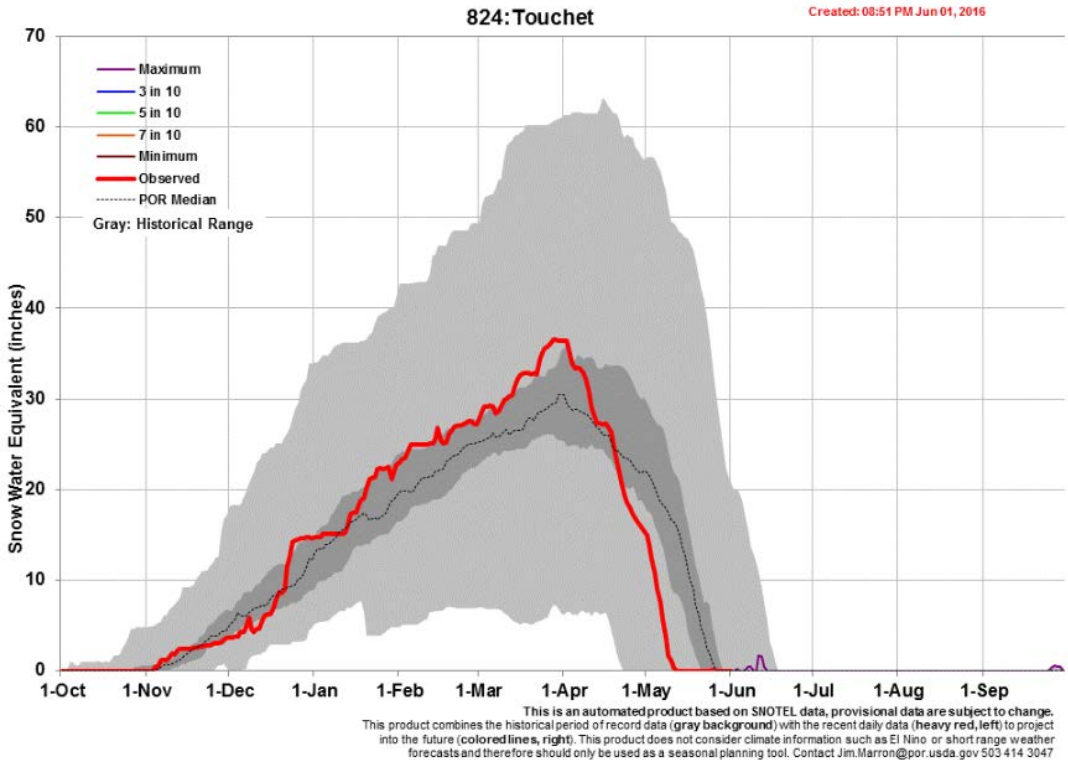
STREAM	PERCENT OF AVERAGE JUNE STREAMFLOWS
Pend Oreille at Albeni Fall Dam	85
Kettle at Laurier	90
Columbia at Birchbank	117
Spokane at Spokane	56
Similkameen at Nighthawk	96
Okanogan at Tonasket	121
Methow at Pateros	146
Chelan at Chelan	130
Wenatchee at Pashastin	111
Cle Elum near Roslyn	101
Yakima at Parker	95
Naches at Naches	98
Grande Ronde at Troy	70
Snake below Lower Granite Dam	90
Columbia River at The Dalles	92
Lewis at Merwin Dam	56
Cowlitz below Mayfield Dam	66
Skagit at Concrete	94
Dungeness near Sequim	104

Soil Moisture

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

The following graph shows a very typical spring soil moisture profile at Touchet SNOTEL site near Dayton, WA. Notice the profile recharge when fall rains began, a decline before snow began, followed by a steady recharge throughout the winter. This particular soil has very good water holding capability in that even after the snow was gone only the surface began to dry out. This will help sustain a healthy forest throughout the spring. The second graph is snowpack projection for the same site which shows a normal peak around April 1 and subsequent rapid melt curve. Notice how this site melted out about 2 weeks early.





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

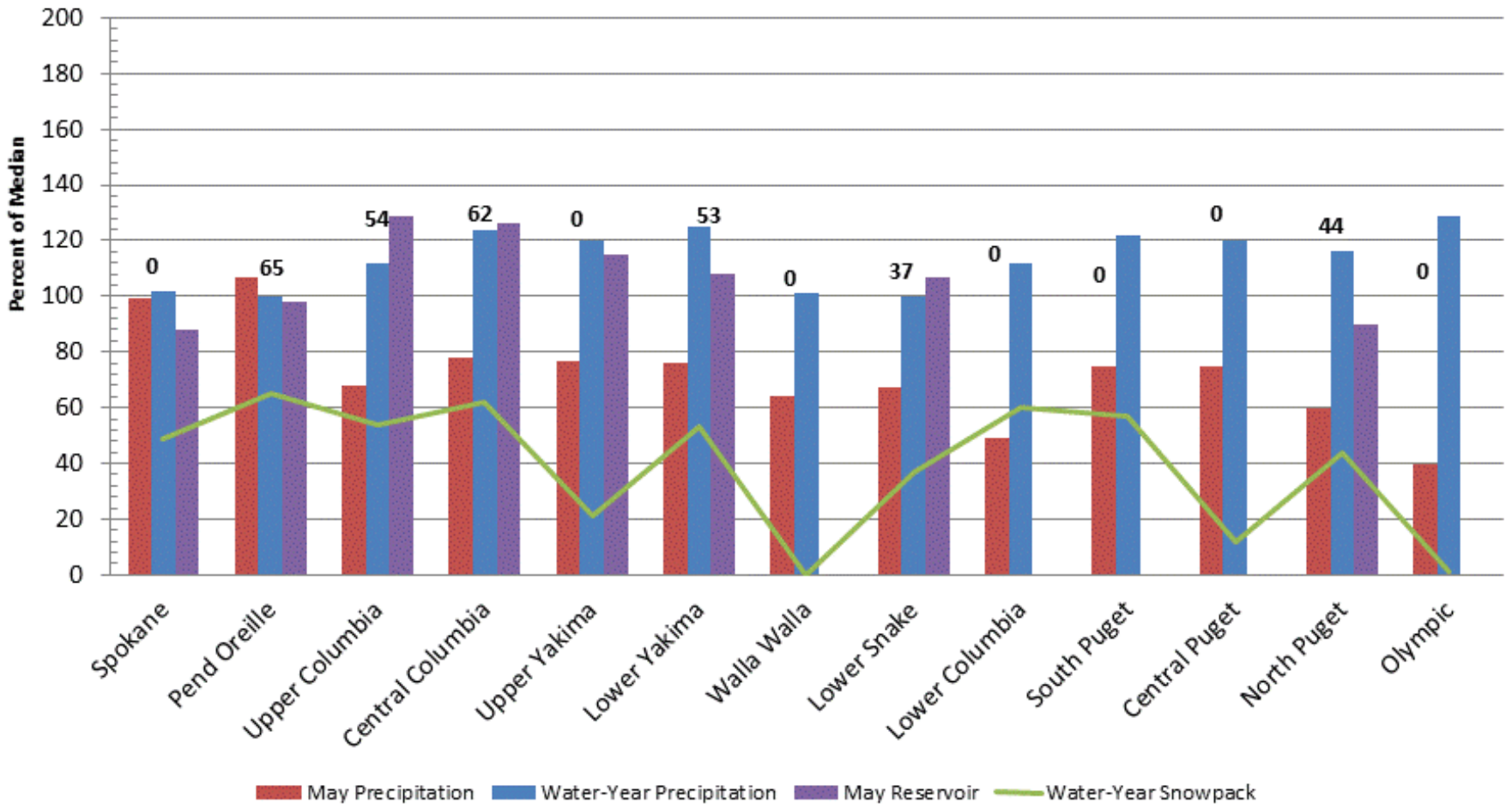
Washington:
http://www.nrcs.usda.gov/wps/portal/nrcs/site/wa/home/

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

NRCS Natural Resources Conservation Service

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

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



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
	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
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