United States Department of Agriculture

NRCS Natural Resources Conservation Service

Washington
Water Supply Outlook Report
January 1, 2019

June Lake SNOTEL on January 4th depicting current conditions of gloomy, drizzly and warm. June Lake currently has 58% of normal snow water content. Photo by Lauren Austin, NRCS Portland. Shout out to Lauren and Julie Koeberle for skiing in to repair the site.

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
Water Supply Specialist
Natural Resources Conservation Service
2005 E. College Way, Suite 203
Mt. Vernon, WA 98273-2873
(360) 488-4826

or

Larry Johnson
State Conservation Engineer
Natural Resources Conservation Service
W 316 Boone Ave., Suite 450
Spokane, WA 99201
(509) 323-2955

How forecasts are made

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

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

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

Washington
Water Supply Outlook

January 2019

General Outlook

Thus far Water-Year 2019 has brought several surprises including late snow accumulation, large/damaging wind storms and even an EF2 tornado which touched down in Kitsap County causing considerable damage and chaos to a Port Orchard neighborhood. Above normal temperatures over the past few months have hindered normal snow accumulation except at the highest elevations. Continued forecasts of rain on snow at pass level is disappointing to outdoor recreationists and water managers alike. Now is the time that we should be building for maximum snowpack for adequate water supply next summer. The most recent forecast through mid-January shows a high probability for above normal temperatures and above normal precipitation. NWS 3-month (JFM) forecast indicates above normal temperatures and below normal precipitation. (page 4) http://www.cpc.ncep.noaa.gov/

Snowpack

The January 1 statewide SNOTEL readings were 90% of normal, slightly lower than this time last year. The lowest readings in the state were at 61% of the 30-year median for January 1 in both the Tolt River Basin. The Walla Walla Basin had the most snow with 117%. Basins across northern. Westside medians from SNOTEL, and January 1 snow surveys, included the North Puget Sound river basins with 102% of normal, the Central and South Puget river basins with 85% and 93% respectively, and the Lower Columbia basins with 77% of normal. Snowpack along the east slopes of the Cascade Mountains included the Yakima area with 96% and the Wenatchee area with 97%. Snowpack in the Spokane River Basin was at 83% and the Upper Columbia river basins had 92% of the long-term median.

BASIN	PERCENT OF MEDIAN	LAST YEAR PERCENT MEDIAN
Spokane	83	92
Newman Lake	106	77
Pend Oreille	93	125
Okanogan	92	112
Methow	95	124
Conconully Lake	62	100
Central Columbia	95	95
Upper Yakima	96	98
Lower Yakima	95	85
Ahtanum Creek	91	69
Walla Walla	117	64
Lower Snake	95	77
Cowlitz	85	89
Lewis	69	94
White	101	104
Green	69	64
Puyallup	107	11
Cedar	91	87
Snoqualmie	75	86
Skykomish	73	89
Skagit	105	117
Nooksack	96	130
Olympic Peninsula	86	112

Precipitation

December precipitation from SNOTEL was hit and miss across the state but slightly above normal for the statewide average and near normal for the Water-Year starting October 1. The highest was in on the Olympic Peninsula with 129% of average and the driest area was the Spokane River Basin at 85%

RIVER BASIN	DECEMBER PERCENT OF AVERAGE	WATER YEAR PERCENT OF AVERAGE
Spokane	84	88
Pend Oreille	80	95
Upper Columbia	100	78
Central Columbia	124	105
Upper Yakima	121	100
Lower Yakima	113	91
Walla Walla	119	96
Lower Snake	91	93
Lower Columbia	96	89
South Puget Sound	124	99
Central Puget Sound	117	105
North Puget Sound	123	102
Olympic Peninsula	129	97

Reservoir

Water-year 2018 ended with near normal storage levels in Eastern WA and slightly below normal in the western part of the state. Most likely due to management/maintenance practices. Seasonal reservoir levels in Washington can vary greatly due to specific watershed management practices required in preparation for irrigation season, fisheries management, power generation, municipal demands and flood control. January 1 Reservoir storage in the Yakima Basin was 328,000-acre feet, 95% of average for the Upper Reaches and 76,000-acre feet or 74% of average for Rimrock and Bumping Lakes. The power generation reservoirs included the following: Coeur d'Alene Lake, 55,000-acre feet, 59% of average and 23% of capacity; and the Skagit River reservoirs at 96% of average and 76% of capacity. Recent climate impacts and management procedures may affect these numbers on a daily or weekly basis.

BASIN	PERCENT OF CAPACITY	CURRENT STORAGE AS PERCENT OF AVERAGE
Spokane	23	59
Pend Oreille	37	81
Upper Columbia	73	125
Central Columbia	48	79
Upper Yakima	39	95
Lower Yakima	33	74
Lower Snake	65	94
North Puget Sound	76	96

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

Streamflow

Due to current staffing, most official forecasts only will be available February through May. If you rely on the January or June forecasts, please contact Scott Pattee, 360-488-4826 or scott.pattee@usda.gov and Cara McCarthy, cara.s.mccarthy@por.usda.gov

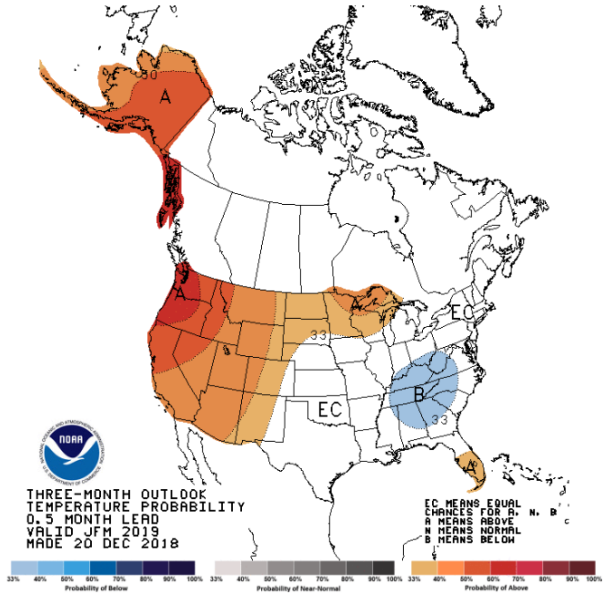
Early winter forecasts for April-September stream flows are never quite as robust as they are later in the season when we know more about the winter climatology. At times only a few degrees warmer or cooler than forecasted can make or break stream flow predictions. Volumetric forecasts are developed 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

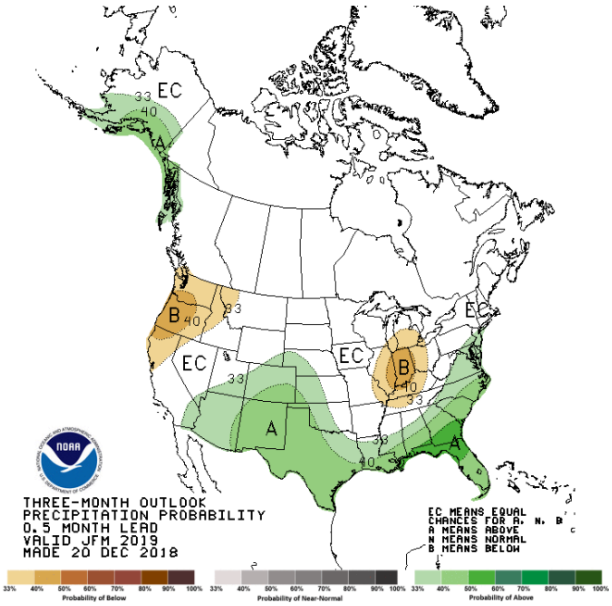
BASIN	PERCENT OF AVERAGE FORCAST (50% CHANCE OF EXCEEDENCE)
Spokane	
Priest River	
Upper Columbia	
Central Columbia	
Upper Yakima	
Lower Yakima	
Walla Walla	
Lower Snake	
Lower Columbia	90-96
South Puget Sound	
Central Puget Sound	
North Puget Sound	
Olympic Peninsula	102-110

STREAM	PERCENT OF AVERAGE DECEMBER STREAMFLOWS
Pend Oreille at Albeni Fall Dam	77
Kettle at Laurier	96
Columbia at Birchbank	95
Spokane at Spokane	71
Similkameen at Nighthawk	90
Okanogan at Tonasket	96
Methow at Pateros	82
Chelan at Chelan	64
Stehekin near Stehekin	74
Wenatchee at Pashastin	67
Cle Elum near Roslyn	91
Yakima at Parker	87
Naches at Naches	76
Grande Ronde at Troy	62
Snake below Lower Granite Dam	73
Columbia River at The Dalles	79
Lewis at Merwin Dam	91
Cowlitz below Mayfield Dam	82
Skagit at Concrete	104
Dungeness near Sequim	112

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

Climate





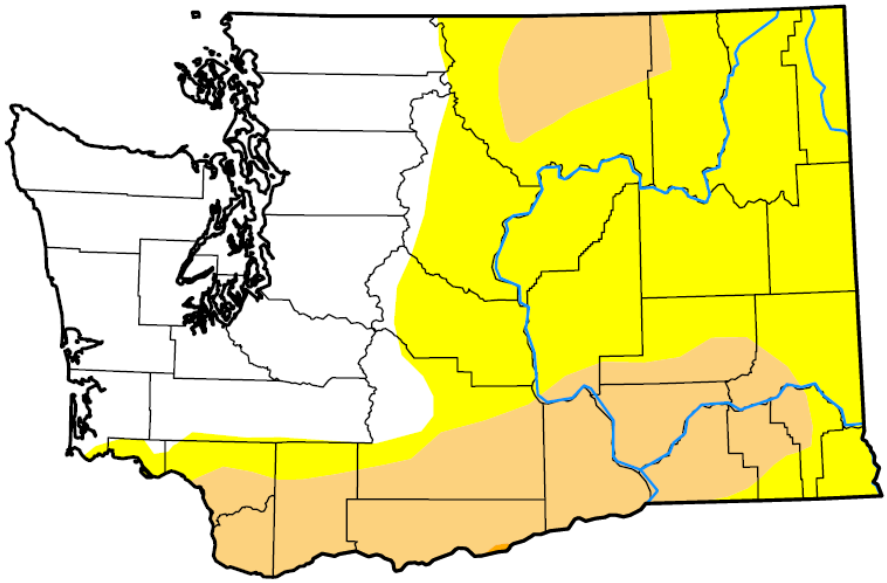
U.S. Drought Monitor

Washington

January 8, 2019

(Released Thursday, Jan. 10, 2019)

Valid 7 a.m. EST



Intensity:

- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

Author:

Brad Pugh
CPC/NOAA

http://droughtmonitor.unl.edu/

Natural Resources Conservation Service

Washington State
Snow, Water and Climate Services

Program Contacts

Washington:

Roylene Rides At The Door
State Conservationist
Spokane State Office
W. 316 Boone Ave., Suite 450
Spokane, WA 99201-2348
phone: 509-323-2961
roylene.rides-at-the-door@wa.usda.gov

Scott Pattee
Water Supply Specialist
Washington Snow Survey Office
2005 E. College Way, Suite 203
Mount Vernon, WA 98273-2873
phone: 360-488-4826
scott.pattee@wa.usda.gov

Oregon:

Scott Oviatt
Supervising Hydrologist
Oregon Data Collection Office
1201 NE Lloyd Blvd., STE 900
Portland, OR 97232
Phone: 503-414-3271
scott.oviatt@or.usda.gov

Gus Goodbody/Jolyne Lea
Forecast Hydrologist
National Water and Climate Center
1201 NE Lloyd Blvd., STE 800
Portland, OR 97232
phone: 503-414-3033/3040
angus.goodbody@por.usda.gov
jolyne.lea@por.usda.gov

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

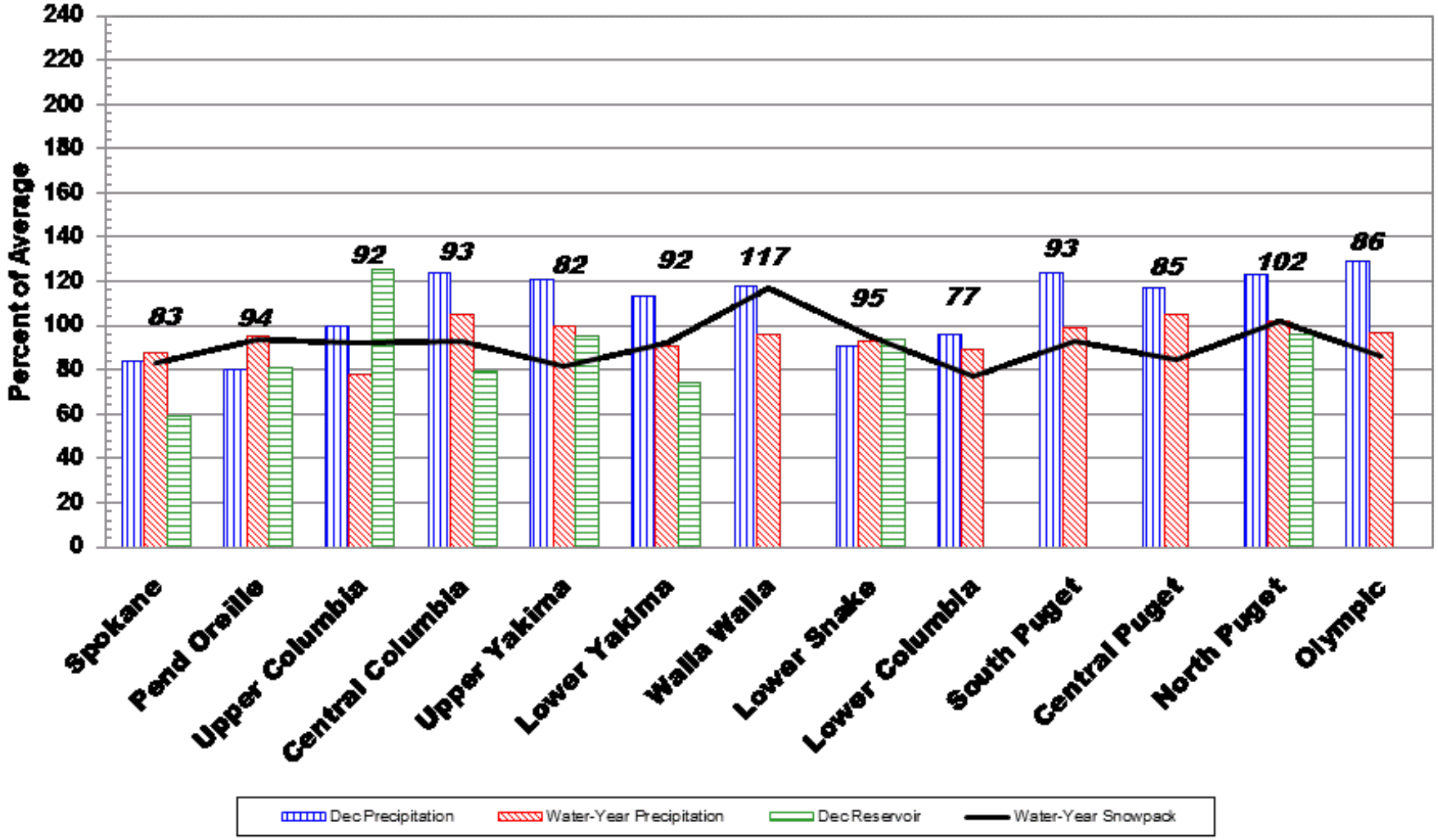
Washington:
http://www.nrcs.usda.gov/wps/portal/nrcs/site/wa/home/

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

NRCS Natural Resources Conservation Service

January 1, 2019 - Snowpack, Precipitation and Reservoir Conditions at a Glance

(Water Year = October 1 - Current Date)



86th Meeting of the Western Snow Conference

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

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

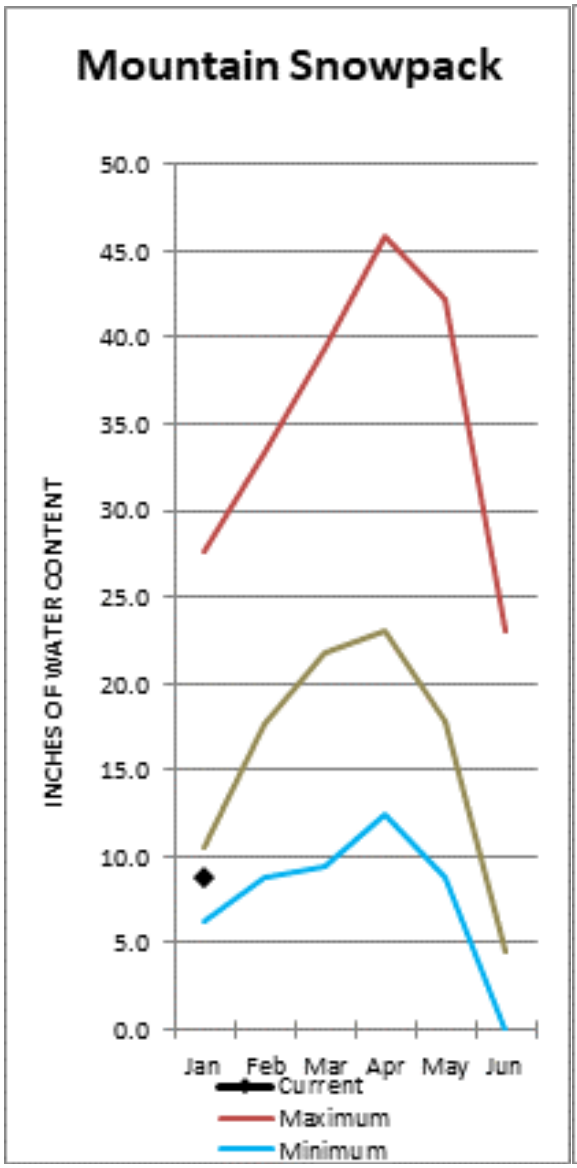
Dates: April 15-18, 2019
Location: Reno, NV

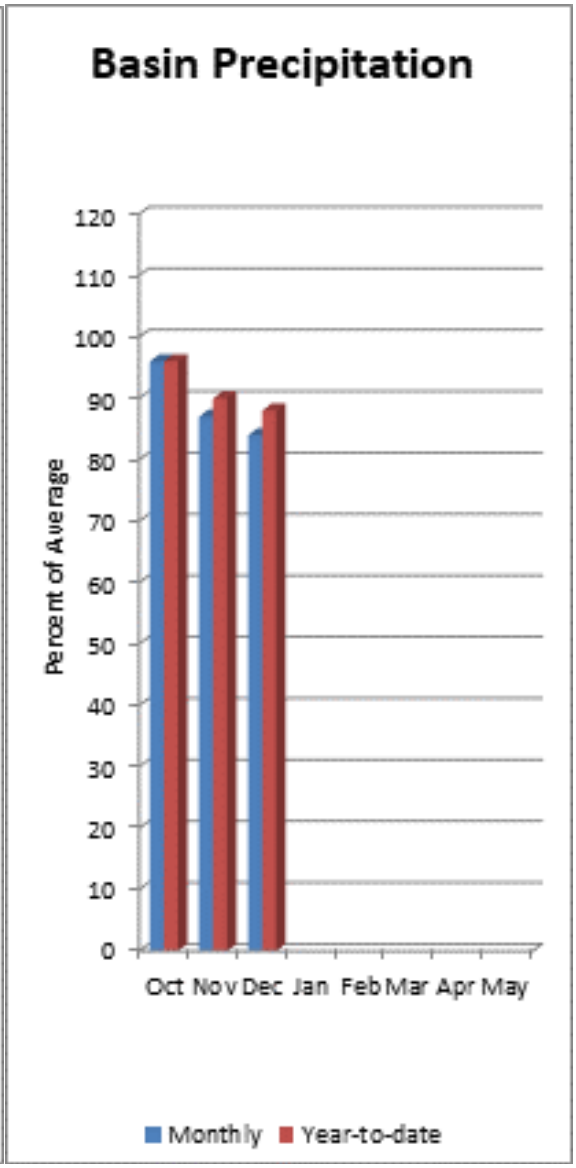
Registration and the call for papers are open for the 87th annual Western Snow Conference in Reno, Nevada, April 15-18, 2019. The conference venue offers the opportunity to interact with other professionals while enjoying the "The Biggest Little City in the World" and is where Dr. Church made the first snow surveys in the west. This provided the initiative and importance to monitor the mountain snowpack and produce streamflow forecasts for wise planning and management of water in the west.

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





Basin snowpack is 83% of normal and precipitation is 88% of average for the water year. Precipitation for December was slightly below normal at 84% of average. Streamflow on the Spokane River at Spokane was 71% of average for December. January 1 storage in Coeur d'Alene Lake was 55,000-acre feet, 59% of average and 23% of capacity. Snowpack at Quartz Peak SNOTEL site was 106% of average with 10.3 inches of water content. Average temperatures in the Spokane basin were much warmer than normal for December and slightly above normal for the water year.

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

Data Current as of: 1/7/2019 3:17:22 PM

Spokane
Streamflow Forecasts - January 1, 2019

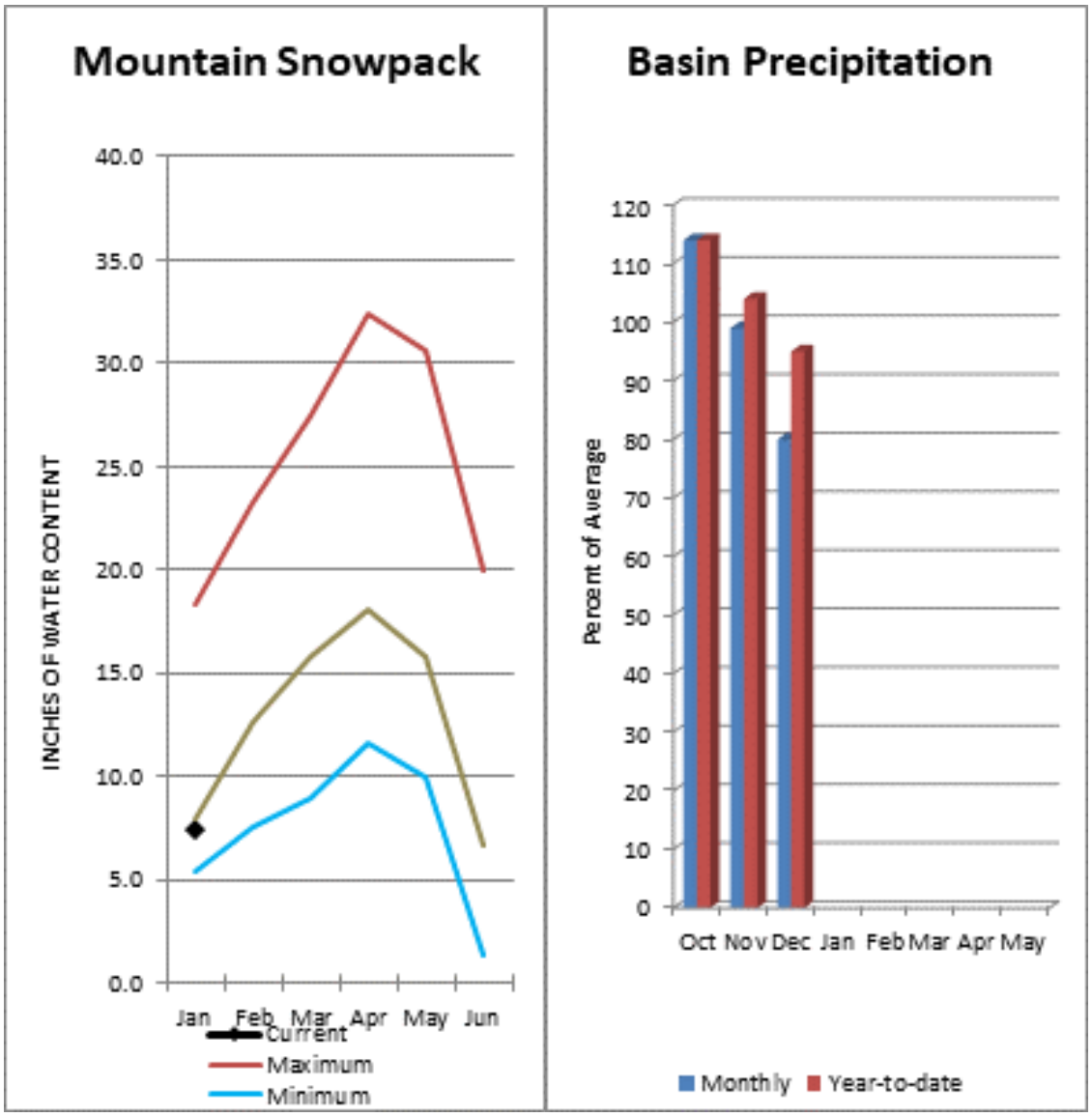
Spokane	Forecast Period	Forecast Exceedance Probabilities for Risk Assessment Chance that actual volume will exceed forecast 90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Spokane R nr Post Falls[2]								
Spokane R at Long Lake[2]								
Chamokane Ck nr Long Lake								

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, 2018	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Lake Coeur d' Alene	55.2	95.0	93.7	238.5
Basin-wide Total	55.2	95.0	93.7	238.5
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis January 1, 2019	# of Sites	% Median	Last Year % Median
Spokane	12	83%	92%
Newman Lake	1	106%	77%

Due to current staffing, most official forecasts only will be available February through May. If you rely on the January or June forecasts, please contact Scott Pattee, 360-488-4826 or scott.pattee@usda.gov and Cara McCarthy, cara.s.mccarthy@por.usda.gov



December streamflow was 77% of average on the Pend Oreille River and 95% on the Columbia at Birchbank. January 1 snow cover was 93% of normal in the Pend Oreille Basin River Basin. Bunchgrass Meadows SNOTEL site had 11.6 inches of snow water on the snow pillow which is normal for January 1. Precipitation during December was 80% of average, dropping the year-to-date precipitation at 95% of average. Reservoir storage in the basin, including Lake Pend Oreille and Priest Lake was 81% of normal. Average temperatures were much above normal for December slightly above normal for the water year.

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

Data Current as of: 1/7/2019 3:17:32 PM

Pend Oreille Basins
Streamflow Forecasts - January 1, 2019

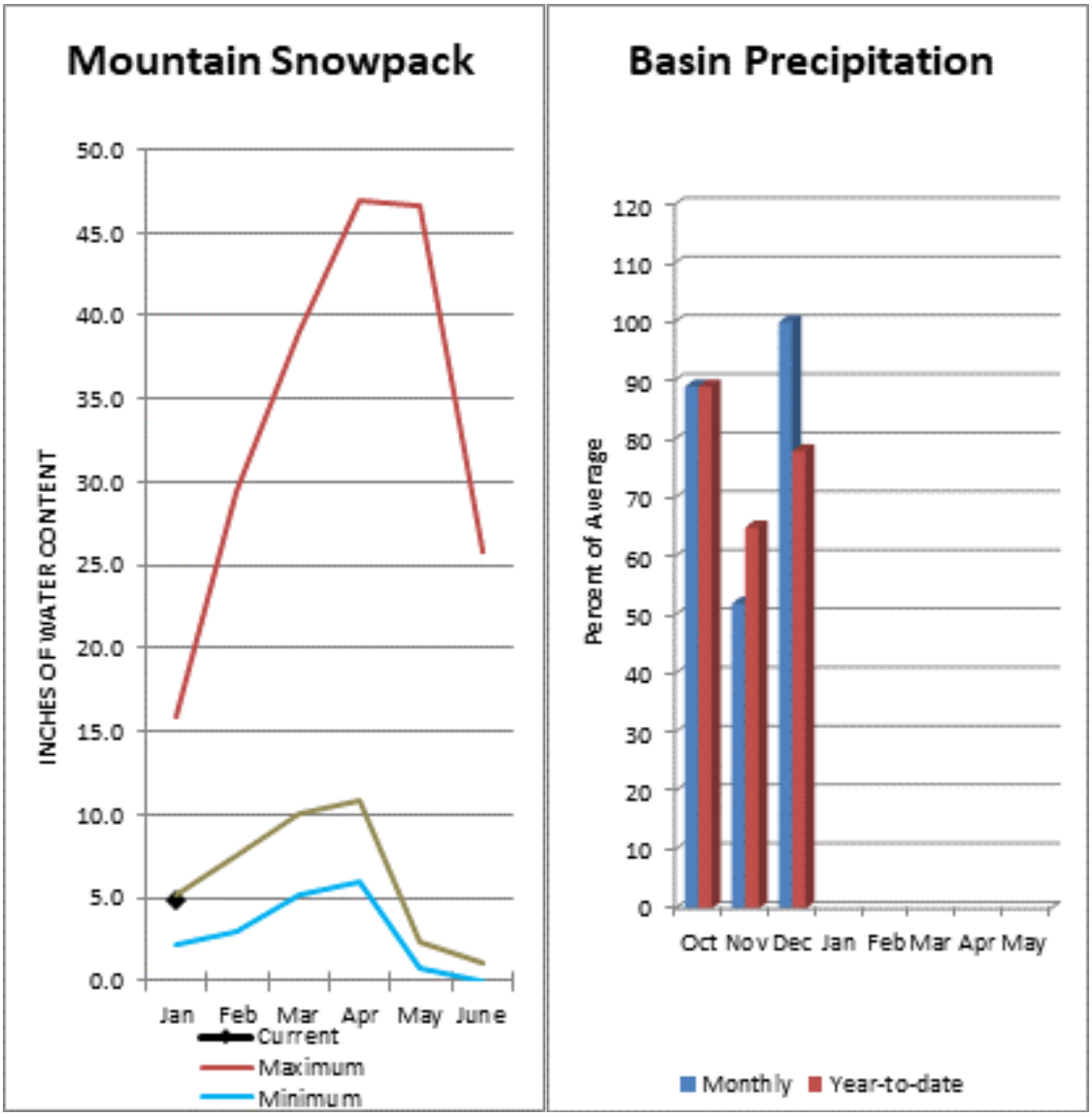
Pend Oreille Basins	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
		Forecast Exceedance Probabilities for Risk Assessment Chance that actual volume will exceed forecast						
Pend Oreille Lake Inflow[2]								
Priest R nr Priest River[2]								
Pend Oreille R bl Box Canyon[2]								

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

Reservoir Storage End of December, 2018	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Lake Pend Oreille	567.4	645.4	708.2	1561.3
Priest Lake	50.6	48.2	56.5	119.3
Basin-wide Total	618.0	693.6	764.7	1680.6
# of reservoirs	2	2	2	2

Watershed Snowpack Analysis January 1, 2019	# of Sites	% Median	Last Year % Median
Pend Oreille Basins	39	93%	125%
Colville River	0		
Kettle River	3	99%	104%

Due to current staffing, most official forecasts only will be available February through May. If you rely on the January or June forecasts, please contact Scott Pattee, 360-488-4826 or scott.pattee@usda.gov and Cara McCarthy, cara.s.mccarthy@por.usda.gov



January 1 snow cover on the Okanogan was 92% of normal, Omak Creek was 68% and the Methow was 95%. December precipitation in the Upper Columbia was 100% of average, with precipitation for the water year at 78% of average. December streamflow for the Methow River was 82% of average, 96% for the Okanogan River and 90% for the Similkameen. Snow-water content at Salmon Meadows SNOTEL was 2.9 inches or 62% of normal for January 1. Combined storage in the Conconully Reservoirs was 17,200 acre-feet or 125% of normal. Temperatures were much above normal for December slightly above normal for the water year.

Data Current as of: 1/7/2019 3:17:42 PM

Upper Columbia Basins
Streamflow Forecasts - January 1, 2019

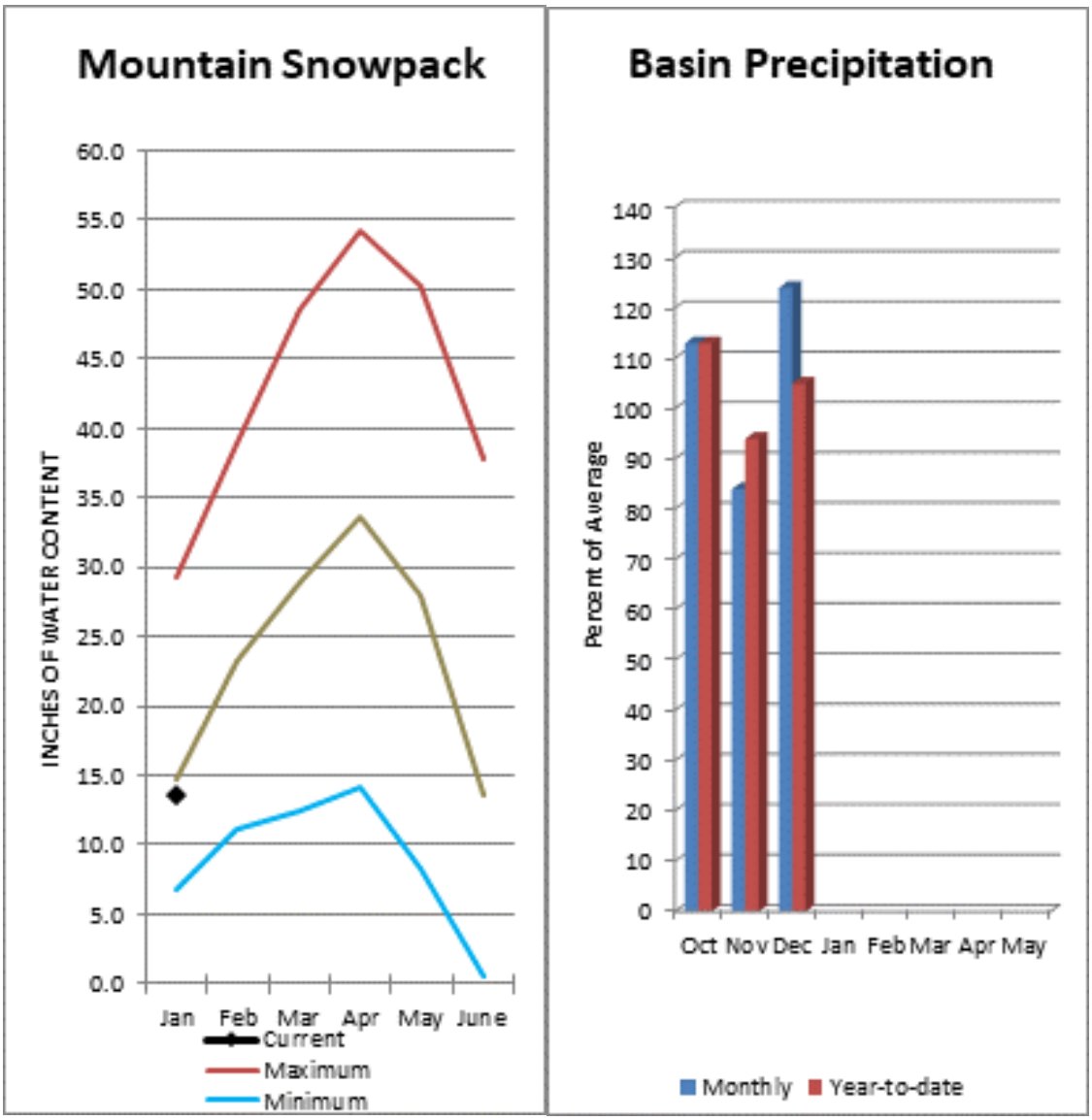
Upper Columbia Basins	Forecast Period	Forecast Exceedance Probabilities for Risk Assessment Chance that actual volume will exceed forecast 90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Kettle R nr Laurier								
Colville R at Kettle Falls								
Columbia R at Grand Coulee-NWS[2]								
Similkameen R nr Nighthawk								
Okanogan R nr Tonasket								
Okanogan R at Malott								
Methow R nr Pateros								

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, 2018	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Conconully Lake (Salmon Lake Dam)	7.4	7.7	7.3	10.5
Conconully Reservoir	9.7	7.6	6.5	13.0
Basin-wide Total	17.2	15.3	13.8	23.5
# of reservoirs	2	2	2	2

Watershed Snowpack Analysis January 1, 2019	# of Sites	% Median	Last Year % Median
Upper Columbia Basins	7	92%	112%
Okanogan River	7	92%	121%
Omak Creek	1	68%	76%
Sanpoil River	0		
Similkameen River	1	93%	113%
Toats Coulee Creek	0		
Conconully Lake	1	62%	100%
Methow River	3	95%	124%

Due to current staffing, most official forecasts only will be available February through May. If you rely on the January or June forecasts, please contact Scott Pattee, 360-488-4826 or scott.pattee@usda.gov and Cara McCarthy, cara.s.mccarthy@por.usda.gov



Precipitation during December was 124% of average in the basin and 125% for the year-to-date. Runoff for Entiat River is forecast to be 88% of average for the summer. December average streamflow on the Chelan River was 64% and on the Wenatchee River 67%. January 1 snowpack in the Wenatchee River Basin was 97% of normal; the Chelan, 92%; the Entiat, 76%; Stemilt Creek, 100% and Colockum Creek, 102%. Reservoir storage in Lake Chelan was 79% of average. Lyman Lake SNOTEL had the most snow water with 23 inches of water. This site would normally have 26.4 inches on January 1. Temperatures were above normal for both December and the water year.

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

Data Current as of: 1/7/2019 3:17:52 PM

Central Columbia Basins
Streamflow Forecasts - January 1, 2019

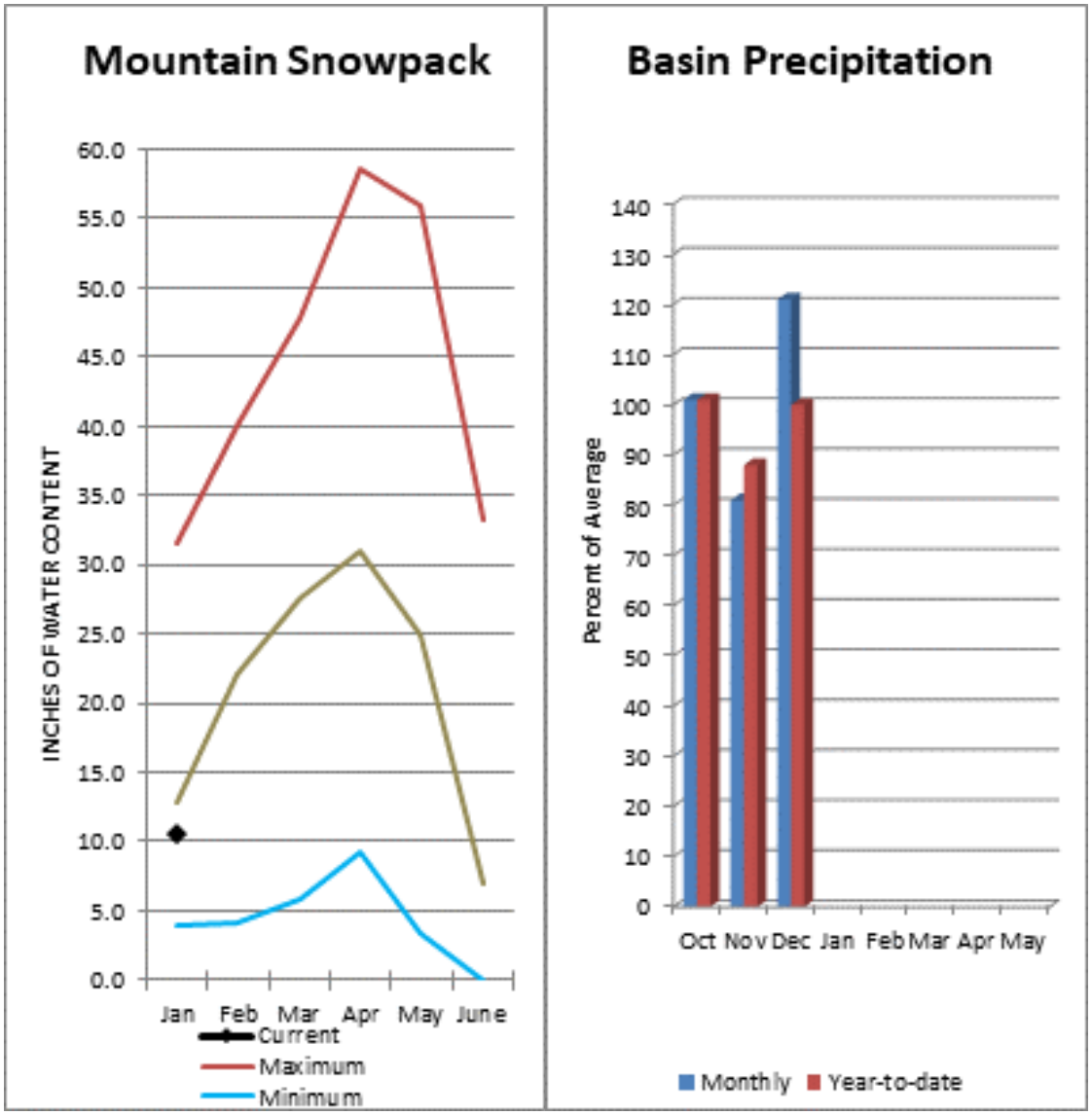
Central Columbia Basins	Forecast Period	Forecast Exceedance Probabilities for Risk Assessment Chance that actual volume will exceed forecast 90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Stehekin R at Stehekin								
Chelan R at Chelan								
Entiat R nr Ardenvoir								
Wenatchee R at Plain								
Icicle Ck nr Leavenworth								
Wenatchee R at Peshastin								
Columbia R bl Rock Island Dam-NWS[2]								

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

Reservoir Storage End of December, 2018	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Lake Chelan	325.6	383.6	411.3	676.1
Basin-wide Total	325.6	383.6	411.3	676.1
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis January 1, 2019	# of Sites	% Median	Last Year % Median
Central Columbia Basins	3	92%	98%
Chelan Lake Basin	3	92%	98%
Entiat River	1	76%	72%
Wenatchee River	7	97%	88%
Stemilt Creek	1	100%	84%
Colockum Creek	1	102%	94%

Due to current staffing, most official forecasts only will be available February through May. If you rely on the January or June forecasts, please contact Scott Pattee, 360-488-4826 or scott.pattee@usda.gov and Cara McCarthy, cara.s.mccarthy@por.usda.gov



January 1 reservoir storage for the Upper Yakima reservoirs was 328,000-acre feet, 95% of average. December streamflow within the basin was Cle Elum River near Roslyn at 91%. January 1 snowpack was 96% based upon 8 snow course and SNOTEL readings within the Upper Yakima Basin. Precipitation was 121% of average for December and 100% 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.

Data Current as of: 1/7/2019 3:18:03 PM

Upper Yakima River
Streamflow Forecasts - January 1, 2019

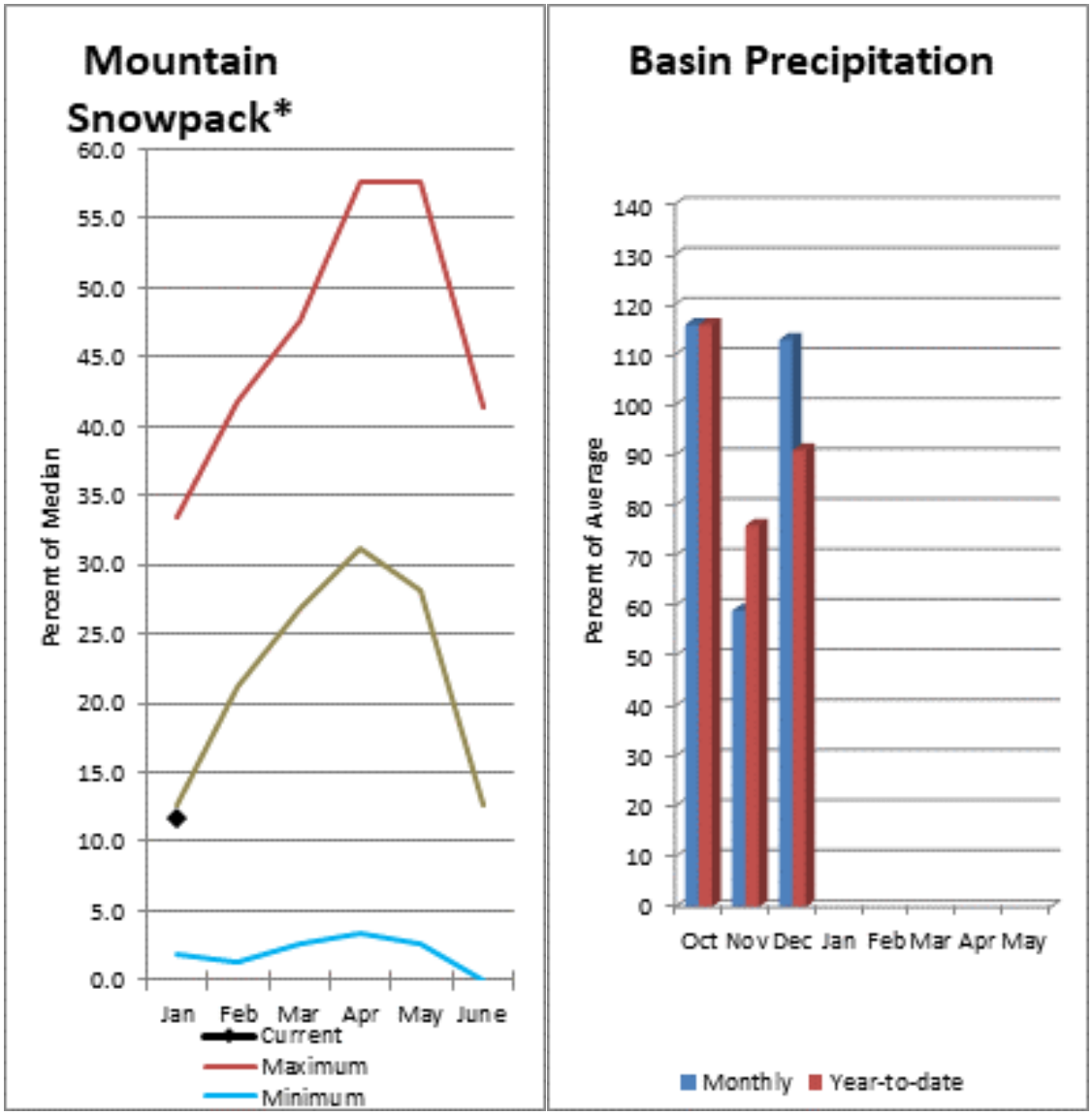
Upper Yakima River	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
		Forecast Exceedance Probabilities for Risk Assessment Chance that actual volume will exceed forecast						
Keechelus Reservoir Inflow[2]								
Kachess Reservoir Inflow [2]								
Cle Elum Lake Inflow [2]								
Teanaway R bl Forks nr Cle Elum								

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, 2018	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Keechelus	70.7	93.7	68.5	157.8
Kachess	128.7	145.7	113.4	239.0
Cle Elum	128.8	212.2	164.0	436.9
Basin-wide Total	328.1	451.6	345.9	833.7
# of reservoirs	3	3	3	3

Watershed Snowpack Analysis January 1, 2019	# of Sites	% Median	Last Year % Median
Upper Yakima River	8	96%	78%

Due to current staffing, most official forecasts only will be available February through May. If you rely on the January or June forecasts, please contact Scott Pattee, 360-488-4826 or scott.pattee@usda.gov and Cara McCarthy, cara.s.mccarthy@por.usda.gov



December average streamflows within the basin were: Yakima River near Parker, 87% and the Naches River near Naches, 76%. January 1 reservoir storage for Bumping and Rimrock reservoirs was 76,000-acre feet, 74% of average. January 1 snowpack was 95% based upon 6 snow course and SNOTEL readings within the Lower Yakima Basin and Ahtanum Creek reported in at 91% of normal. Precipitation was 113% of average for December and 91% for the water-year. Temperatures were above normal for December 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: 1/7/2019 3:18:13 PM

Lower Yakima River
Streamflow Forecasts - January 1, 2019

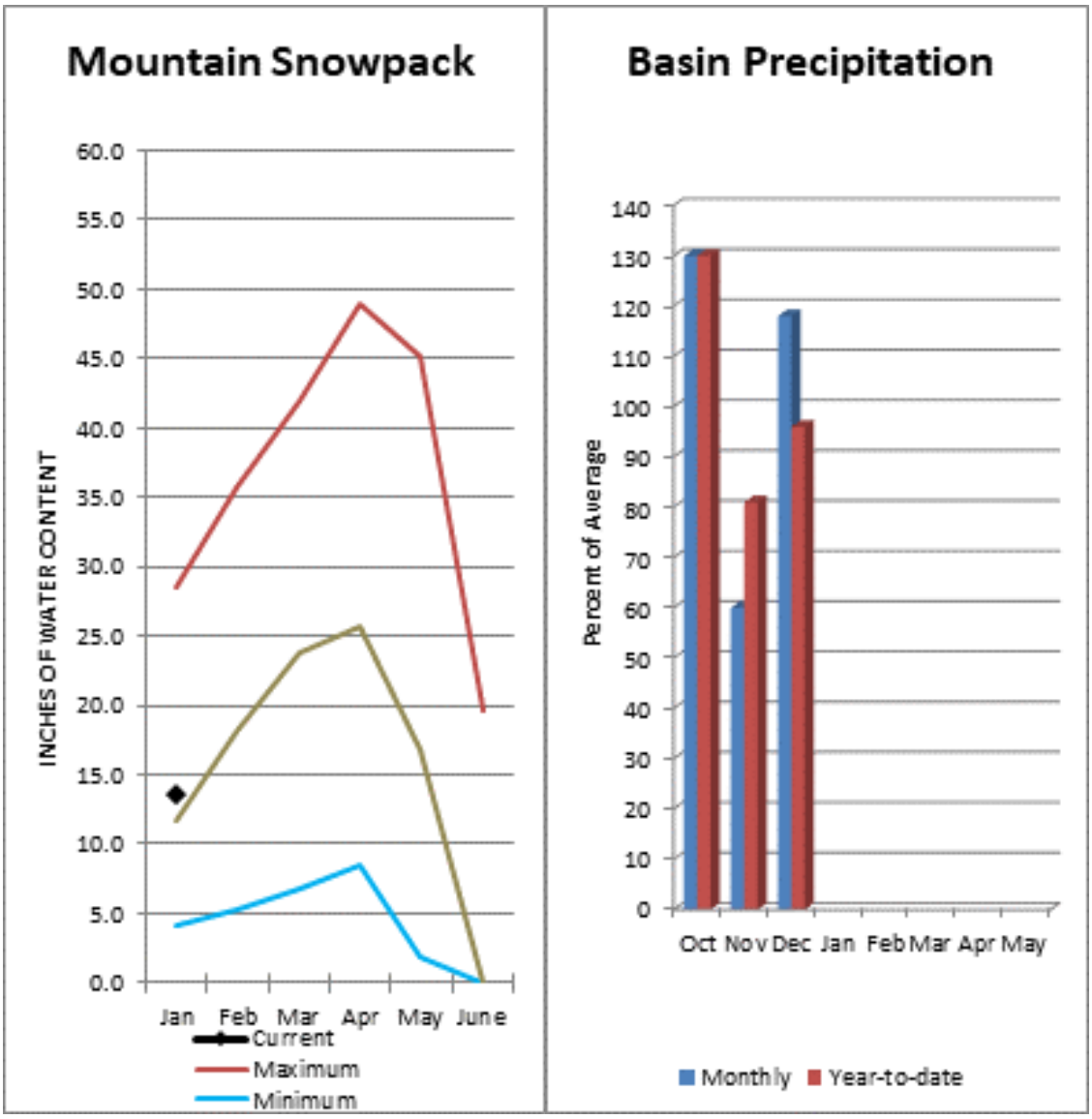
Lower Yakima River	Forecast Period	Forecast Exceedance Probabilities for Risk Assessment Chance that actual volume will exceed forecast 90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Bumping Lake Inflow [2]								
American R nr Nile								
Rimrock Lake Inflow [2]								
Naches R nr Naches								
Ahtanum Ck at Union Gap								
Yakima R nr Parker [2]								
Klickitat R nr Glenwood								
Klickitat R nr Pitt								

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, 2018	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Bumping Lake	7.9	19.3	11.5	33.7
Rimrock	68.5	125.4	92.4	198.0
Basin-wide Total	76.5	144.7	103.9	231.7
# of reservoirs	2	2	2	2

Watershed Snowpack Analysis January 1, 2019	# of Sites	% Median	Last Year % Median
Lower Yakima River	6	95%	85%
Ahtanum Creek	2	91%	69%

Due to current staffing, most official forecasts only will be available February through May. If you rely on the January or June forecasts, please contact Scott Pattee, 360-488-4826 or scott.pattee@usda.gov and Cara McCarthy, cara.s.mccarthy@por.usda.gov



December precipitation was 119% of average, maintaining the year-to-date precipitation at 96% of average. Snowpack in the basin was only 117% of normal. Average temperatures were above normal for December and for the water year.

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

Data Current as of: 1/7/2019 3:18:23 PM

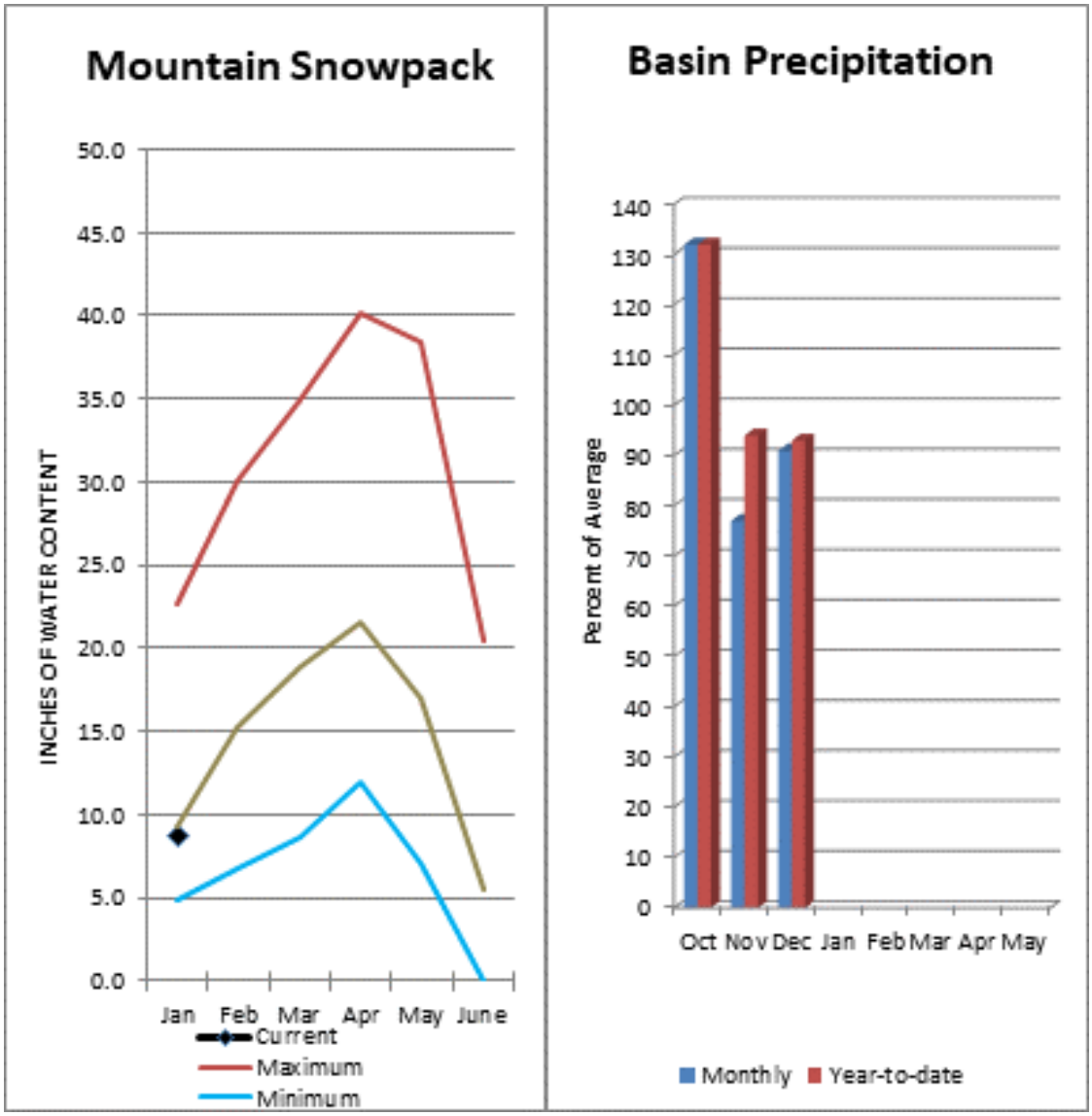
Walla Walla River
Streamflow Forecasts - January 1, 2019

		Forecast Exceedance Probabilities for Risk Assessment Chance that actual volume will exceed forecast						
Walla Walla River	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
SF Walla Walla R nr Milton-Freewater								
Mill Ck nr Walla Walla								

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, 2019	# of Sites	% Median	Last Year % Median
Walla Walla River	2	117%	64%

Due to current staffing, most official forecasts only will be available February through May. If you rely on the January or June forecasts, please contact Scott Pattee, 360-488-4826 or scott.pattee@usda.gov and Cara McCarthy, cara.s.mccarthy@por.usda.gov



December precipitation was 91% of average, bringing the year-to-date precipitation to 93% of average. January 1 snowpack readings averaged 95% of normal. December streamflow was 73% of average for Snake River below Lower Granite Dam and 62% for Grande Ronde River near Troy. Dworshak Reservoir storage was 94% of average. Average temperatures were much below normal for December and above normal for the water year.

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

Data Current as of: 1/7/2019 3:18:33 PM

Lower Snake, Grande Ronde, Clearwater Basins
Streamflow Forecasts - January 1, 2019

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

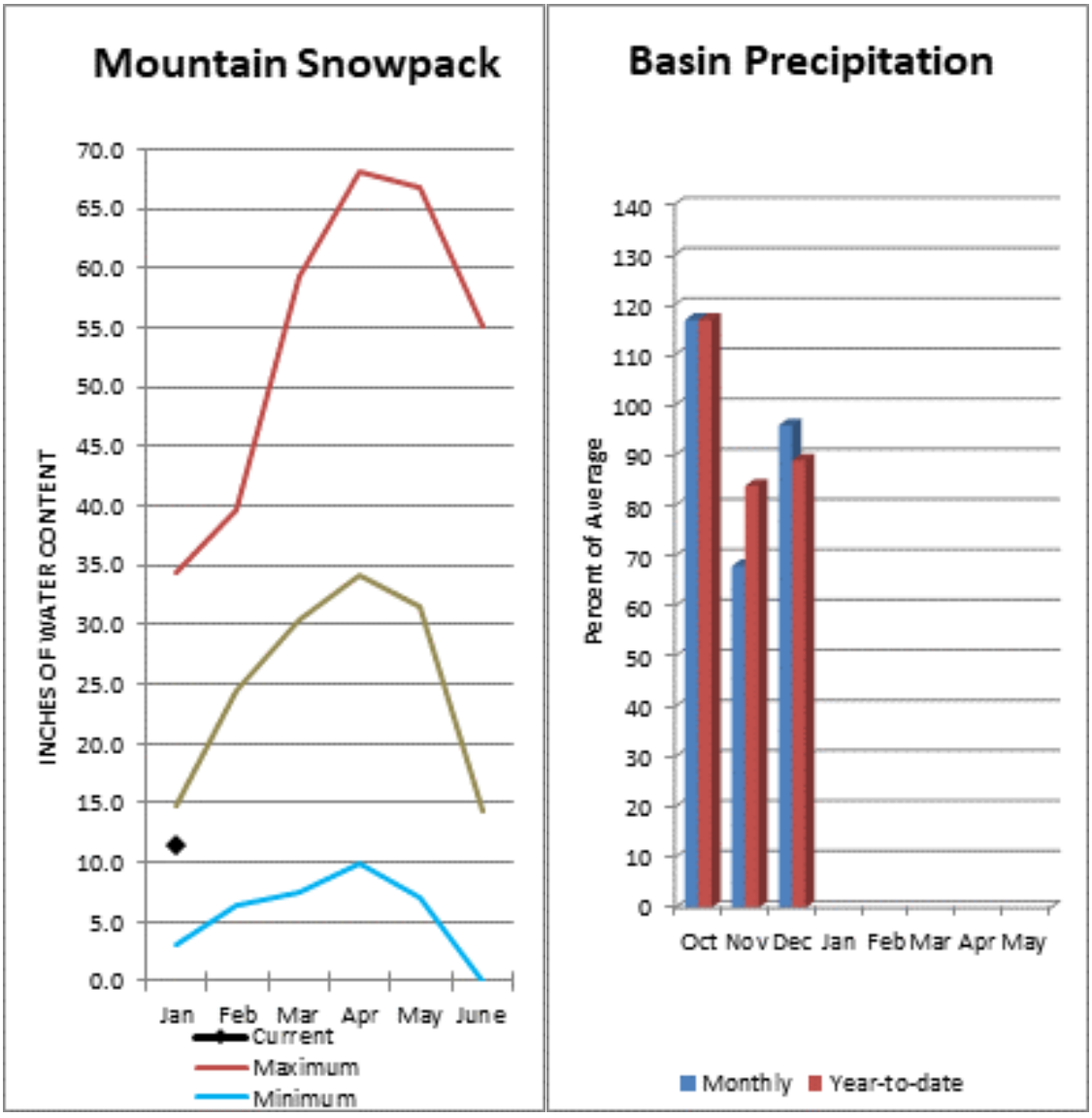
Lower Snake, Grande Ronde, Clearwater Basins	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Grande Ronde R at Troy								
Asotin Ck at Asotin								
Clearwater R at Spalding[2]								
Snake R bl Lower Granite Dam-NWS[2]								

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

Reservoir Storage End of December, 2018	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Dworshak Reservoir	2256.8	2246.0	2403.0	3468.0
Basin-wide Total	2256.8	2246.0	2403.0	3468.0
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis January 1, 2019	# of Sites	% Median	Last Year % Median
Lower Snake, Grande Ronde, Clearwater Basins	10	95%	77%

Due to current staffing, most official forecasts only will be available February through May. If you rely on the January or June forecasts, please contact Scott Pattee, 360-488-4826 or scott.pattee@usda.gov and Cara McCarthy, cara.s.mccarthy@por.usda.gov



Forecasts for April – September streamflows within the basin are Lewis River at Ariel, 90% and Cowlitz River at Castle Rock, 90% of average. The Columbia at The Dalles is forecasted to have 91% of average flows this summer according to the River Forecast Center. December average streamflow for Cowlitz River was 82% and the Columbia River at The Dalles was 79% of average. December precipitation was 96% of average and the water-year average was 89%. January 1 snow cover for Cowlitz River was 85%, and Lewis River was 69% of normal. Temperatures were slightly below normal during December but near average for the water year.

Data Current as of: 1/7/2019 3:18:46 PM

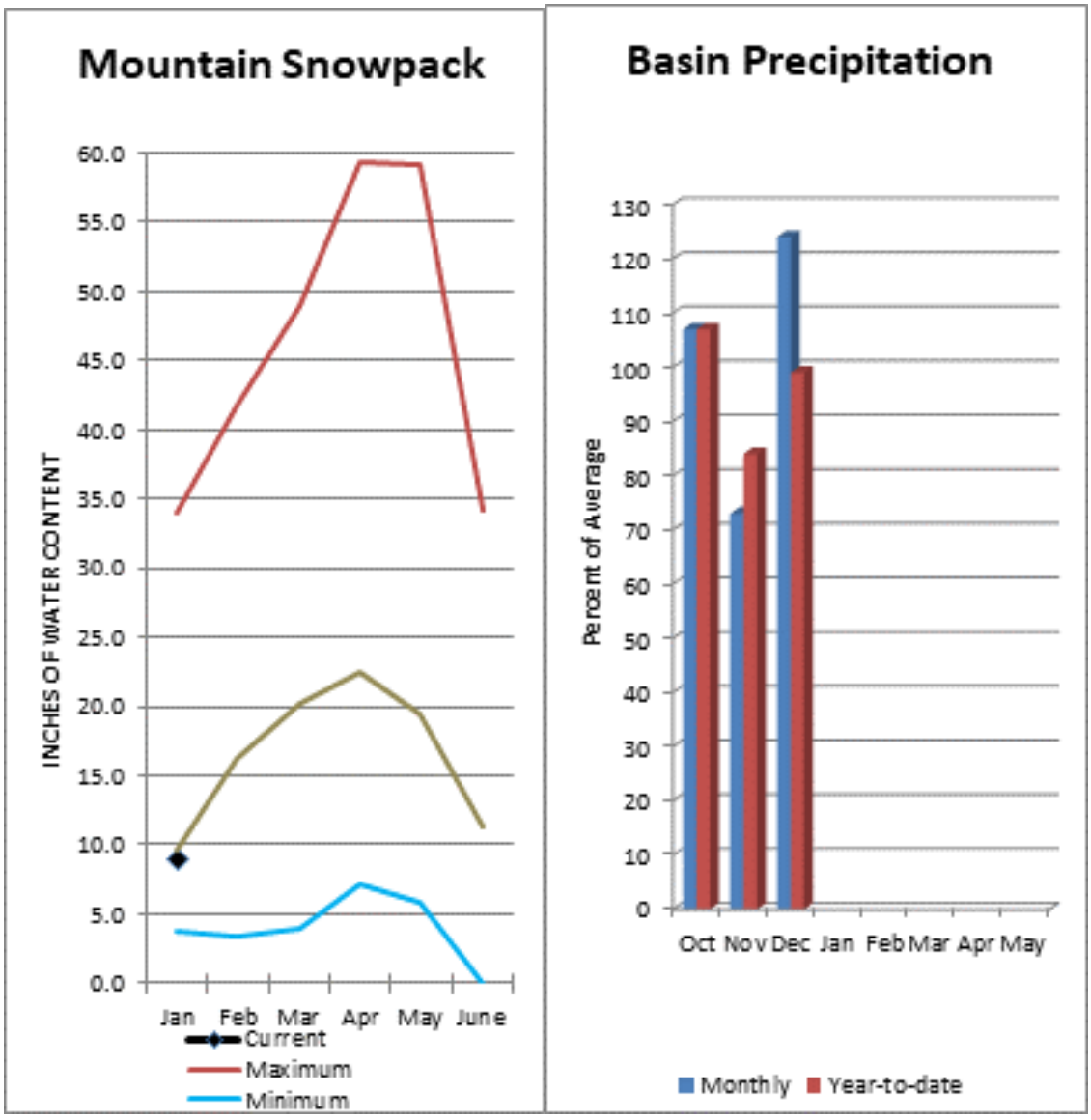
Lower Columbia Basins
Streamflow Forecasts - January 1, 2019

Lower Columbia Basins	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
		Forecast Exceedance Probabilities for Risk Assessment Chance that actual volume will exceed forecast						
Columbia R at The Dalles-NWS[2]								
Klickitat R nr Glenwood								
Klickitat R nr Pitt								
Lewis R at Ariel[2]								
	APR-JUL	605	775	895	92%	1010	1190	970
	APR-SEP	705	890	1010	90%	1140	1320	1120
Cowlitz R bl Mayfiled[2]								
	APR-JUL	940	1250	1450	89%	1660	1960	1630
	APR-SEP	1120	1500	1760	96%	2020	2400	1840
Cowlitz R at Castle Rock[2]								
	APR-JUL	1460	1770	1980	88%	2180	2490	2240
	APR-SEP	1700	2050	2280	90%	2520	2860	2540

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, 2019	# of Sites	% Median	Last Year % Median
Lower Columbia Basins	11	77%	91%
Lewis River	5	69%	94%
Cowlitz River	6	85%	89%

Due to current staffing, most official forecasts only will be available February through May. If you rely on the January or June forecasts, please contact Scott Pattee, 360-488-4826 or scott.pattee@usda.gov and Cara McCarthy, cara.s.mccarthy@por.usda.gov



January 1 snowpack was 101% of average for the White River, 107% for Puyallup River and 69% in the Green River Basin. December precipitation was 124% of average, bringing the water year-to-date to 99% of average for the basins. Average temperatures in the area were above normal for December and for the water-year.

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

Data Current as of: 1/7/2019 3:18:56 PM

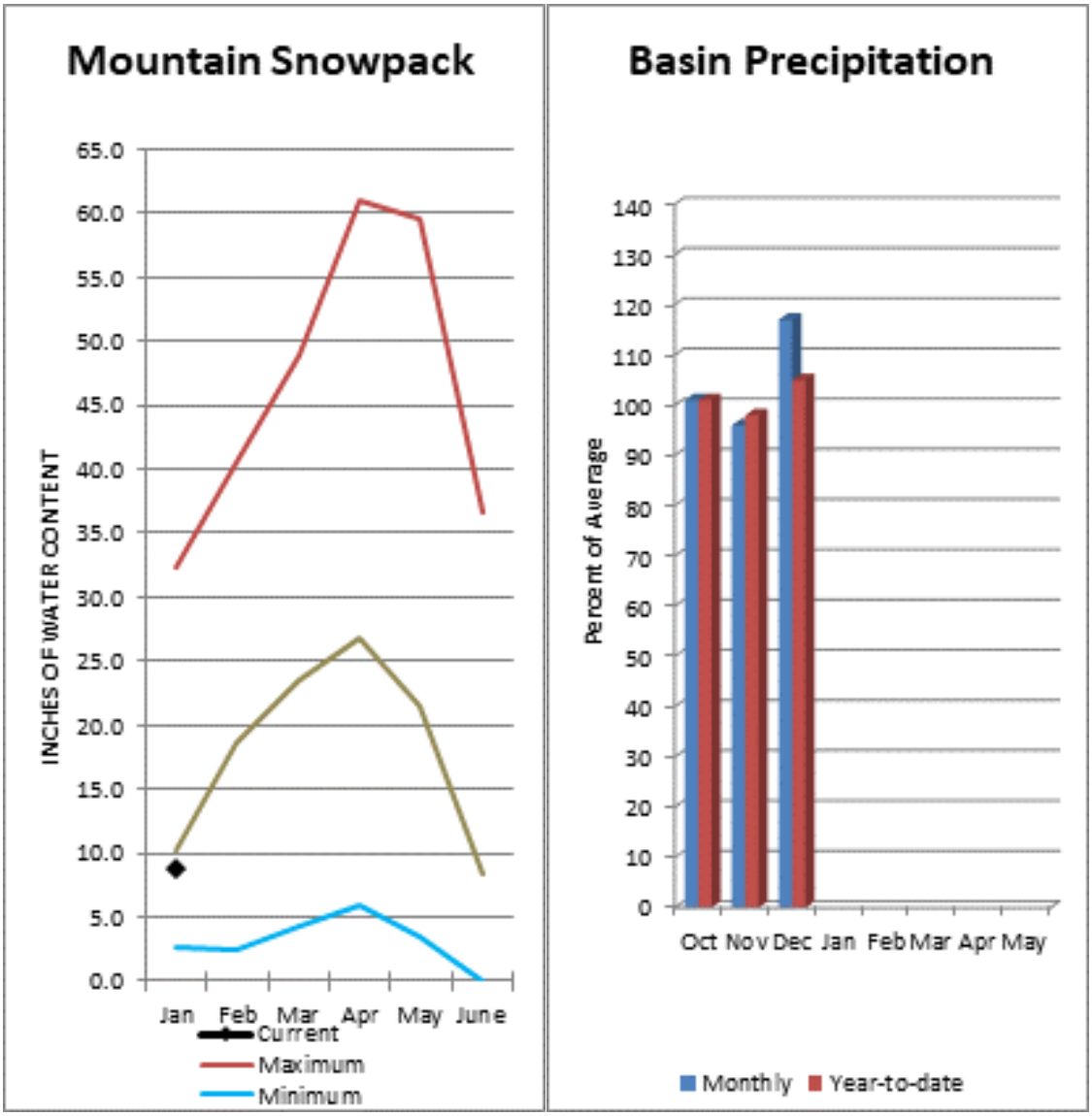
South Puget Sound Basins
Streamflow Forecasts - January 1, 2019

		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]								
Green R bl Howard A Hanson Dam[1,2]								

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

Watershed Snowpack Analysis January 1, 2019	# of Sites	% Median	Last Year % Median
South Puget Sound Basins	8	93%	93%
White River	2	101%	104%
Green River	2	69%	64%

Due to current staffing, most official forecasts only will be available February through May. If you rely on the January or June forecasts, please contact Scott Pattee, 360-488-4826 or scott.pattee@usda.gov and Cara McCarthy, cara.s.mccarthy@por.usda.gov



Basin-wide precipitation for December was 117% of average, bringing water-year-to-date to 105% of average. January 1 median snow cover in Cedar River Basin was 91%, Tolt River Basin was 61%, Snoqualmie River Basin was 75%, and Skykomish River Basin was 73%. Temperatures were above normal for December and for the water-year.

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

Data Current as of: 1/7/2019 3:19:07 PM

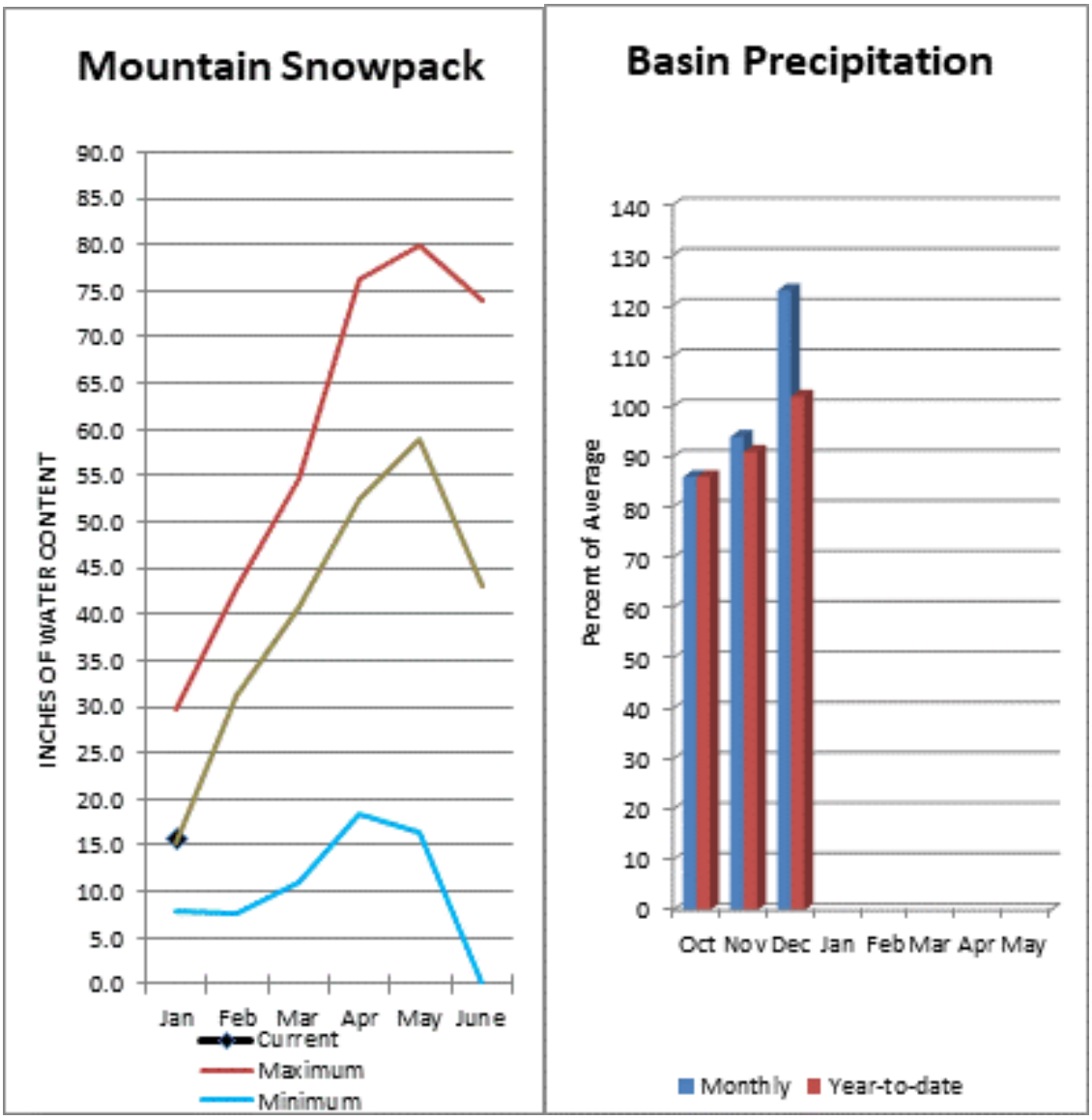
Central Puget Sound Basins
Streamflow Forecasts - January 1, 2019

		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								
Rex R nr Cedar Falls								
Taylor Ck nr Selleck								
SF Tolt R nr Index								

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, 2019	# of Sites	% Median	Last Year % Median
Central Puget Sound Basins	12	85%	90%
Puyallup River	4	107%	110%
Cedar River	4	91%	87%
Tolt River	2	61%	94%
Snoqualimie River	4	75%	86%
Skykomish River	2	73%	89%

Due to current staffing, most official forecasts only will be available February through May. If you rely on the January or June forecasts, please contact Scott Pattee, 360-488-4826 or scott.pattee@usda.gov and Cara McCarthy, cara.s.mccarthy@por.usda.gov



Forecast for Skagit River streamflow at Newhalem is 104% of average for the spring and summer period. December streamflow in Skagit River was 104% of average. Other forecast points included Baker River at 110% and Thunder Creek at 102% of average. Basin-wide precipitation for December was 123% of average, bringing water-year-to-date to 102% of average. January 1 average snow cover in Skagit River Basin was 105% and the Nooksack River Basin was 96%. January 1 Skagit River reservoir storage was 96% of average and 76% of capacity. Average temperatures were above normal for December but near normal for the water year.

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

Data Current as of: 1/7/2019 3:19:17 PM

North Puget Sound Basins
Streamflow Forecasts - January 1, 2019

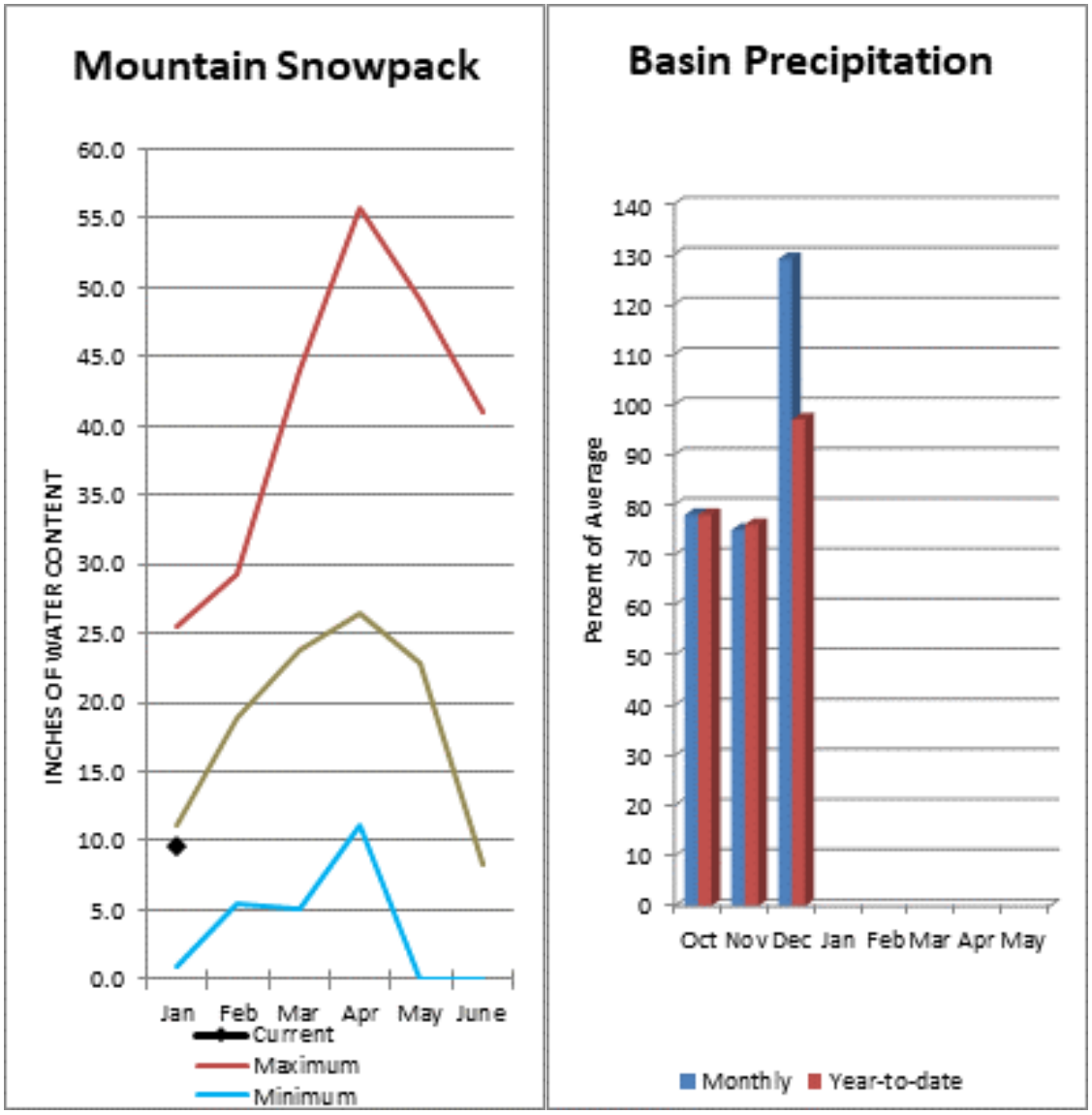
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

North Puget Sound Basins	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Thunder Ck nr Newhalem								
	APR-JUL	205	225	235	100%	250	270	235
	APR-SEP	290	315	335	102%	350	375	330
Skagit R at Newhalem[2]								
	APR-JUL	1510	1700	1830	105%	1960	2150	1750
	APR-SEP	1790	2010	2160	104%	2300	2520	2070
Baker R at Concrete								
	APR-JUL	645	750	820	105%	890	995	780
	APR-SEP	845	985	1080	110%	1170	1310	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, 2018	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Ross		1117.3	1135.0	1404.1
Basin-wide Total		0.0	0.0	0.0
# of reservoirs	0	0	0	0

Watershed Snowpack Analysis January 1, 2019	# of Sites	% Median	Last Year % Median
North Puget Sound Basins	9	102%	122%
Skagit River	6	105%	117%
Baker River	0		
Nooksack River	3	96%	130%



December runoff in the Dungeness River was 112% of normal. December precipitation was 129% of average. Precipitation has accumulated at 97% of average for the water year. December precipitation at Quillayute was 176 % of normal. Olympic Peninsula snowpack averaged 86% of normal on January 1. Temperatures were above average for December and for the water year.

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

Data Current as of: 1/7/2019 3:19:27 PM

Olympic Penninsula
Streamflow Forecasts - January 1, 2019

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								
Elwha R at McDonald Br nr Port Angeles								

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, 2019	# of Sites	% Median	Last Year % Median
Olympic Penninsula	3	86%	112%

Due to current staffing, most official forecasts only will be available February through May. If you rely on the January or June forecasts, please contact Scott Pattee, 360-488-4826 or scott.pattee@usda.gov and Cara McCarthy, cara.s.mccarthy@por.usda.gov

Issued by

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

Released by

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

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

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

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

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

Washington Water Supply Outlook Report

Natural Resources Conservation Service
Spokane, WA

United States Department of Agriculture

NRCS Natural Resources Conservation Service

Washington
Water Supply Outlook Report
February 1, 2019

A spring-like day on the Wolf Creek trail, with glimpses of the Bailey Range in Olympic National Park.
Photo by Olympic National Park Staff, 1/30/2019.

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
Water Supply Specialist
Natural Resources Conservation Service
2005 E. College Way, Suite 203
Mt. Vernon, WA 98273-2873
(360) 488-4826

or

Larry Johnson
State Conservation Engineer
Natural Resources Conservation Service
W 316 Boone Ave., Suite 450
Spokane, WA 99201
(509) 323-2955

How forecasts are made

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

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

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

Washington
Water Supply Outlook

February 2019

General Outlook

Generally, snowpack percentages have declined since the first of the year due to warm and dry conditions statewide. Decreases by as much as 30% were witnessed in basins on the west slopes of the Cascades. Recent statewide snowfall brought little relief to mountain elevations however traffic was a snarl for most of Monday the 4th. January precipitation was also dismal which didn't help with a dwindling snowpack. The current 30-day weather forecast is calling for below normal temperatures and below normal precipitation, however there appears to be several cold wet storms queued up over the next week or so that should bring considerable snow to both the mountains and the low lands of Washington. NWS 3-month (FMA) forecast still indicates above normal temperatures and below normal precipitation. http://www.cpc.ncep.noaa.gov/

Snowpack

The February 1 statewide SNOTEL readings were 75% of normal, 15 points lower than last month. The lowest readings in the state dropped to 39% of the 30-year median for February 1 in the Tolt River Basin. The Walla Walla Basin had the most snow with 109%. Westside medians from SNOTEL, and February 1 snow surveys, included the North Puget Sound river basins with 85% of normal, the Central and South Puget river basins with 56% and 67% respectively, and the Lower Columbia basins with 71% of normal. Snowpack along the east slopes of the Cascade Mountains included the Yakima area with 77% and the Wenatchee area with 83%. Snowpack in the Spokane River Basin was at 79% and the Upper Columbia river basins had 81% of the long-term median.

BASIN	PERCENT OF MEDIAN	LAST YEAR PERCENT MEDIAN
Spokane	79	101
Newman Lake	97	98
Pend Oreille	88	121
Okanogan	85	124
Methow	87	128
Conconully Lake	74	141
Central Columbia	83	102
Upper Yakima	73	95
Lower Yakima	81	90
Ahtanum Creek	89	69
Walla Walla	109	82
Lower Snake	81	74
Cowlitz	78	101
Lewis	64	109
White	84	109
Green	45	73
Puyallup	79	107
Cedar	53	90
Snoqualmie	53	94
Skykomish	56	102
Skagit	88	114
Nooksack	73	118
Olympic Peninsula	76	129

Precipitation

January precipitation from SNOTEL was much below normal statewide, dragging the Water-Year average down to 88%. The highest was on the Olympic Peninsula with 85% of average. The Green River Basin only received about half of normal precipitation.

RIVER BASIN	JANUARY PERCENT OF AVERAGE	WATER YEAR PERCENT OF AVERAGE
Spokane	65	82
Pend Oreille	71	89
Upper Columbia	67	75
Central Columbia	68	94
Upper Yakima	59	88
Lower Yakima	69	85
Walla Walla	64	87
Lower Snake	72	87
Lower Columbia	59	80
South Puget Sound	52	85
Central Puget Sound	56	91
North Puget Sound	67	93
Olympic Peninsula	85	93

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. February 1 Reservoir storage in the Yakima Basin was 386,000-acre feet, 95% of average for the Upper Reaches and 90,000-acre feet or 73% of average for Rimrock and Bumping Lakes. The power generation reservoirs included the following: Coeur d'Alene Lake, 51,000-acre feet, 53% of average and 21% of capacity; and the Skagit River reservoirs at 93% of average and 64% 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	21	53
Pend Oreille	37	76
Upper Columbia	76	124
Central Columbia	34	68
Upper Yakima	46	95
Lower Yakima	39	73
Lower Snake	65	97
North Puget Sound	65	93

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. 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

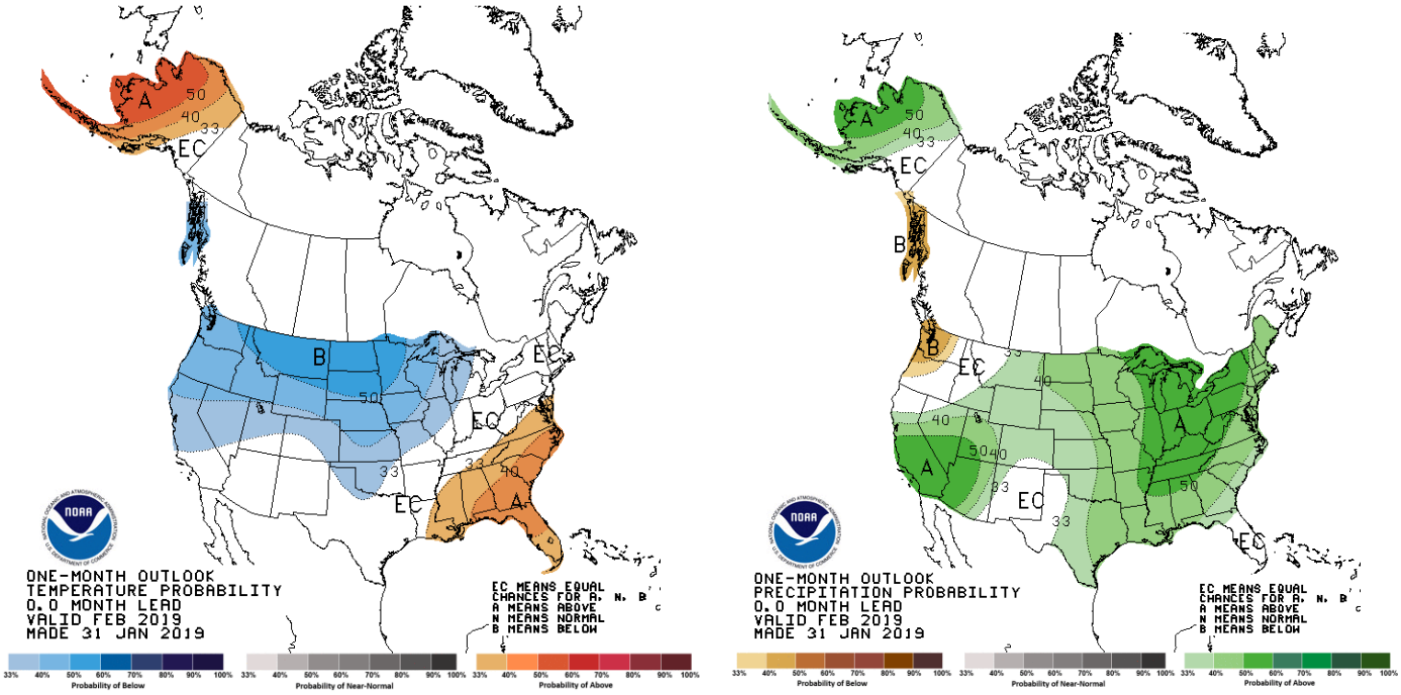
BASIN	PERCENT OF AVERAGE FORCAST (50% CHANCE OF EXCEEDENCE)
Spokane	77-82
Priest River	91-94
Upper Columbia	77-88
Central Columbia	88-94
Upper Yakima	79-88
Lower Yakima	84-90
Walla Walla	
Lower Snake	83-98
Lower Columbia	81-93
South Puget Sound	76-83
Central Puget Sound	75-79
North Puget Sound	91-93
Olympic Peninsula	89-90

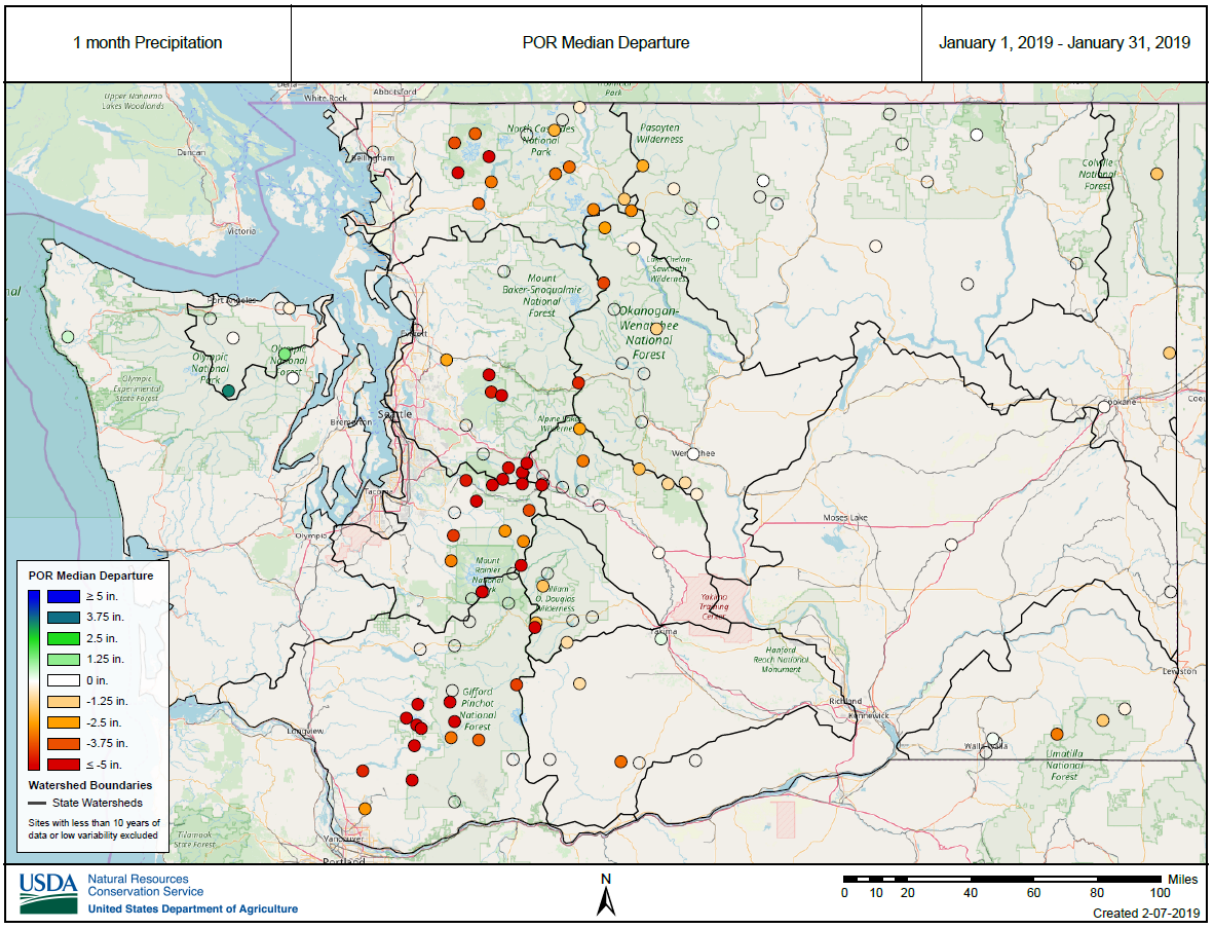
STREAM	PERCENT OF AVERAGE JANUARY STREAMFLOWS
Pend Oreille at Albeni Fall Dam	76
Kettle at Laurier	93
Columbia at Birchbank	97
Spokane at Spokane	70
Similkameen at Nighthawk	94
Okanogan at Tonasket	98
Methow at Pateros	85
Chelan at Chelan	67
Stehekin near Stehekin	83
Wenatchee at Pashastin	90
Cle Elum near Roslyn	103
Yakima at Parker	82
Naches at Naches	65
Grande Ronde at Troy	68
Snake below Lower Granite Dam	65
Columbia River at The Dalles	74
Lewis at Merwin Dam	74
Cowlitz below Mayfield Dam	76
Skagit at Concrete	93
Dungeness near Sequim	111

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

Climate

ONE-MONTH TEMPERATURE AND PRECIPITATION OUTLOOK





Natural Resources Conservation Service

Washington State
Snow, Water and Climate Services

Program Contacts

Washington:

Roylene Rides At The Door
State Conservationist
Spokane State Office
W. 316 Boone Ave., Suite 450
Spokane, WA 99201-2348
phone: 509-323-2961
roylene.rides-at-the-door@wa.usda.gov

Scott Pattee
Water Supply Specialist
Washington Snow Survey Office
2005 E. College Way, Suite 203
Mount Vernon, WA 98273-2873
phone: 360-488-4826
scott.pattee@wa.usda.gov

Oregon:

Scott Oviatt
Supervising Hydrologist
Oregon Data Collection Office
1201 NE Lloyd Blvd., STE 900
Portland, OR 97232
Phone: 503-414-3271
scott.oviatt@or.usda.gov

Gus Goodbody/Jolyne Lea
Forecast Hydrologist
National Water and Climate Center
1201 NE Lloyd Blvd., STE 800
Portland, OR 97232
phone: 503-414-3033/3040
angus.goodbody@por.usda.gov
jolyne.lea@por.usda.gov

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

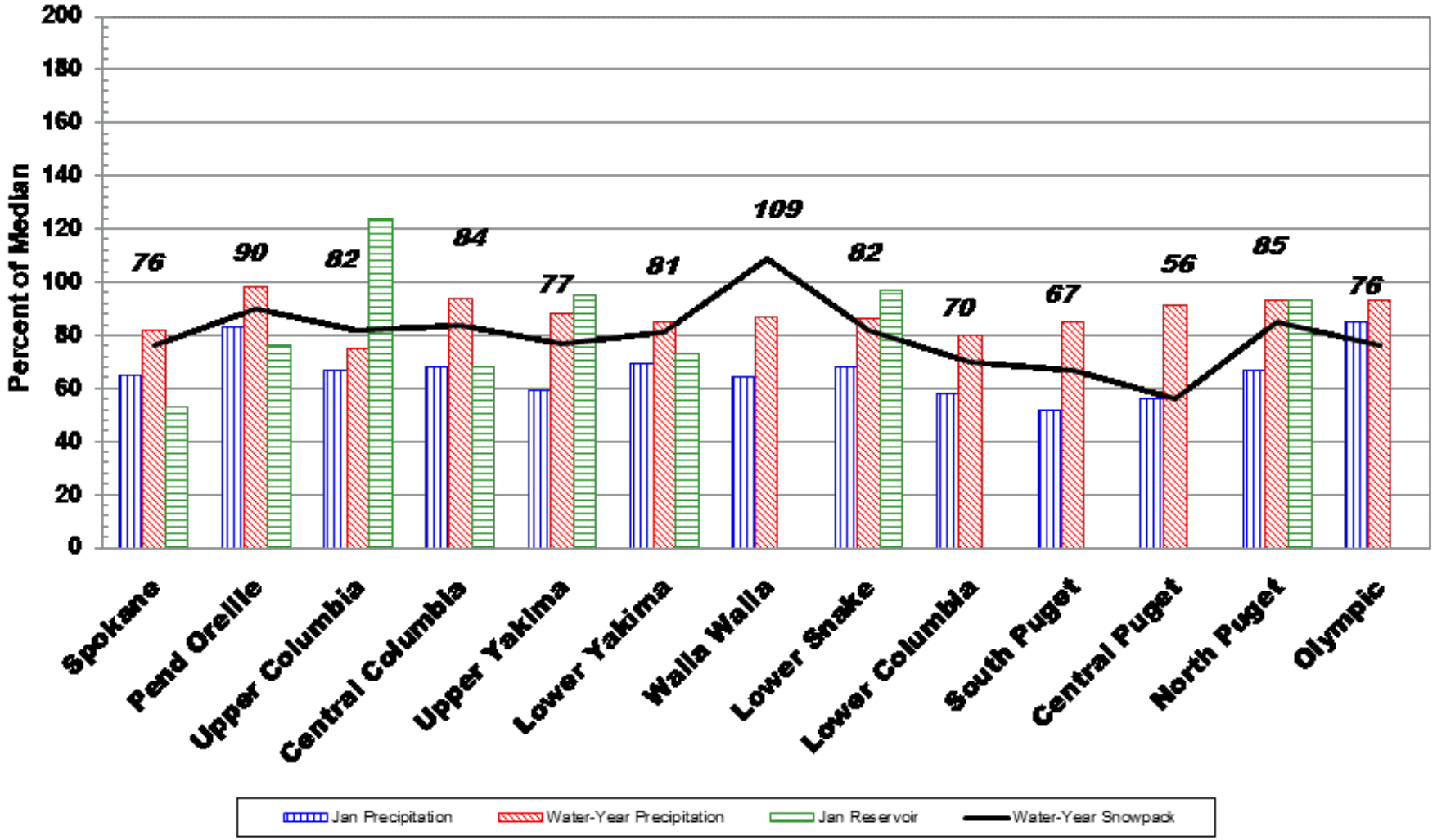
Washington:
http://www.nrcs.usda.gov/wps/portal/nrcs/site/wa/home/

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

NRCS Natural Resources Conservation Service

February 1, 2019 - Snowpack, Precipitation and Reservoir Conditions at a Glance

(Water Year = October 1 - Current Date)



86th Meeting of the Western Snow Conference

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

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

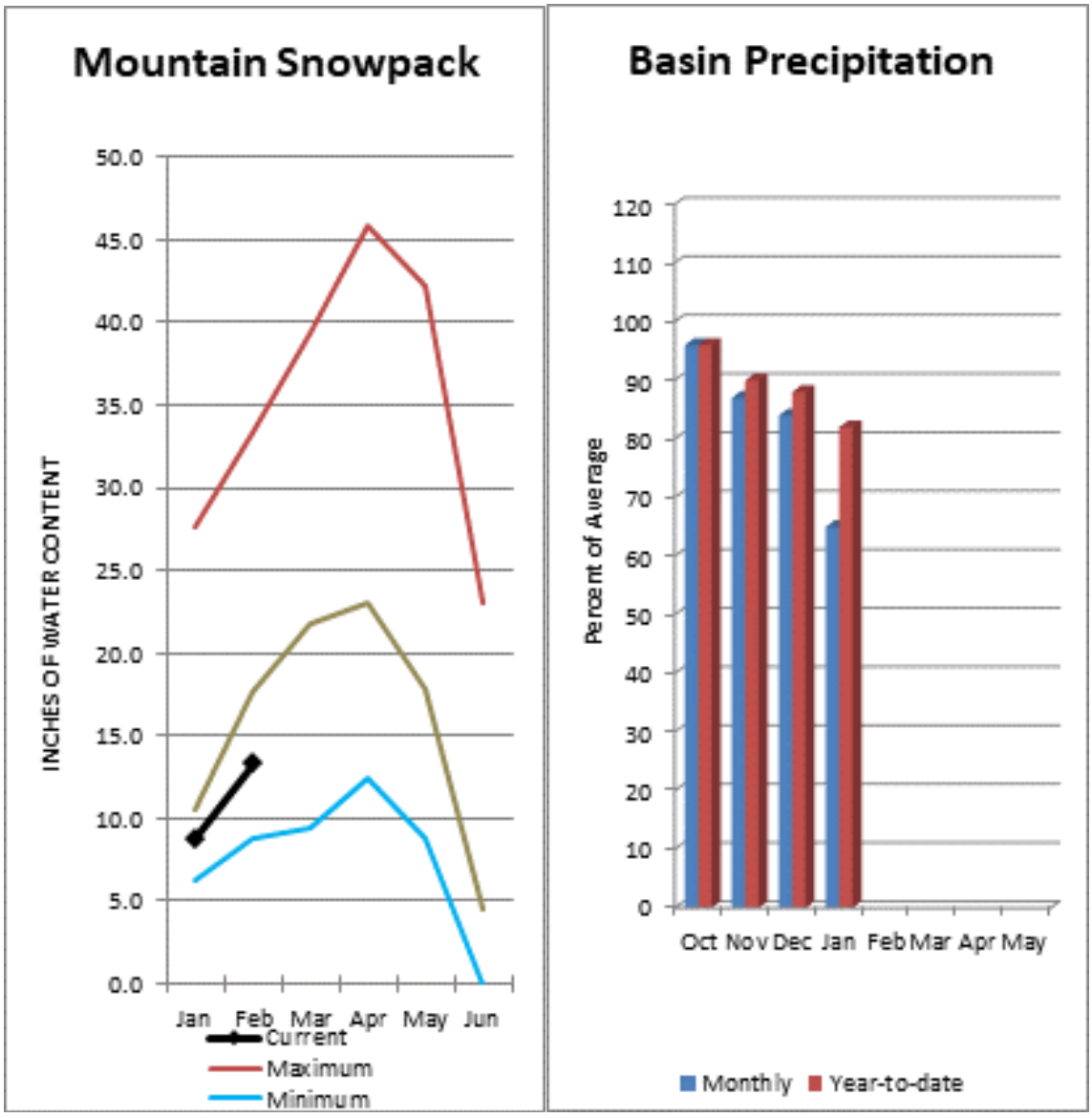
Dates: April 15-18, 2019
Location: Reno, NV

Registration and the call for papers are open for the 87th annual Western Snow Conference in Reno, Nevada, April 15-18, 2019. The conference venue offers the opportunity to interact with other professionals while enjoying the "The Biggest Little City in the World" and is where Dr. Church made the first snow surveys in the west. This provided the initiative and importance to monitor the mountain snowpack and produce streamflow forecasts for wise planning and management of water in the west.

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



Basin snowpack is 76% of normal and precipitation is 82% of average for the water year. Precipitation for January was much below normal at 65% of average. Streamflow's are forecasted for below normal spring and summer runoff. Streamflow on the Spokane River at Spokane was 70% of average for January. February 1 storage in Coeur d'Alene Lake was 51,000-acre feet, 53% of average and 21% of capacity. Snowpack at Quartz Peak SNOTEL site was 97% of average with 14.4 inches of water content. Average temperatures in the Spokane basin were much warmer than normal for January and slightly above normal for the water year.

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

Data Current as of: 2/6/2019 3:06:05 PM

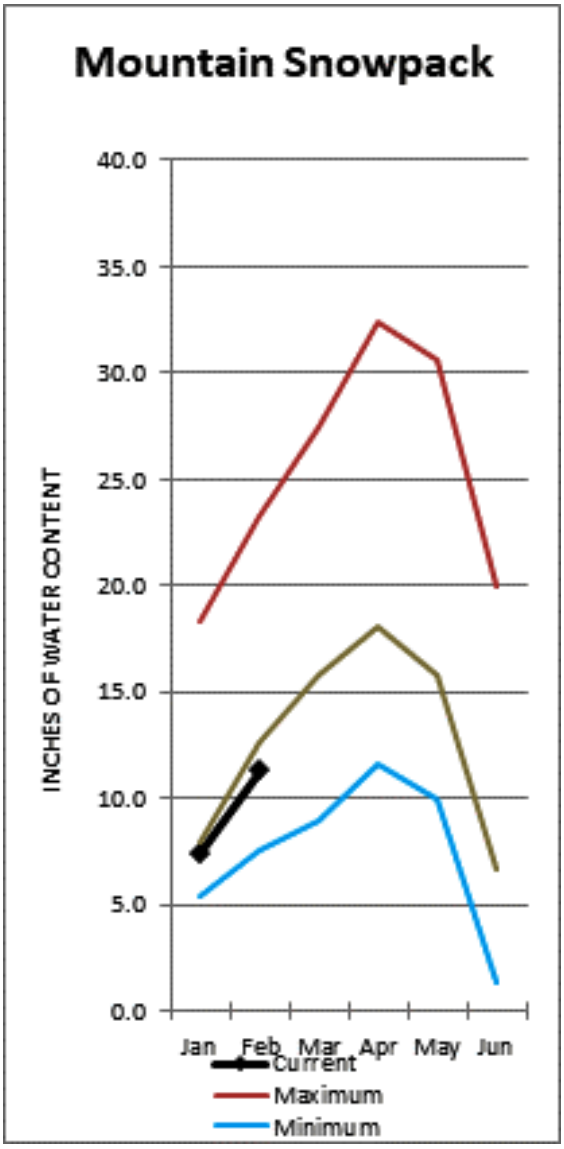
Spokane
Streamflow Forecasts - February 1, 2019

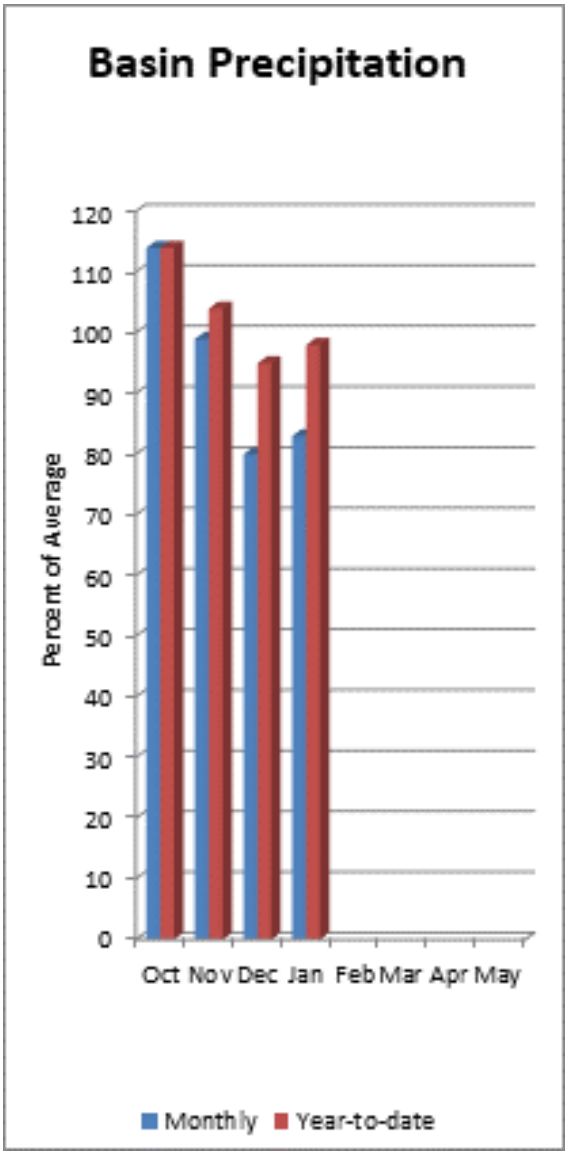
Spokane	Forecast Period	Forecast Exceedance Probabilities for Risk Assessment: Chance that actual volume will exceed forecast — 90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Spokane R nr Post Falls[2]								
	APR-JUL	955	1520	1910	80%	2290	2860	2390
	APR-SEP	1010	1590	1980	80%	2360	2940	2480
Spokane R at Long Lake[2]								
	APR-JUL	1190	1770	2160	82%	2550	3130	2620
	APR-SEP	1340	1930	2330	82%	2740	3330	2850
Chamokane Ck nr Long Lake								
	MAR-JUL	7.7	14.4	20	77%	27	38	26

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, 2019	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Lake Coeur d' Alene	51.2	135.6	96.3	238.5
Basin-wide Total	51.2	135.6	96.3	238.5
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis February 1, 2019	# of Sites	% Median	Last Year % Median
Spokane	11	76%	97%
Newman Lake	1	97%	98%





January streamflow was 76% of average on the Pend Oreille River and 97% on the Columbia at Birchbank. February 1 snow cover was 90% of normal in the Pend Oreille Basin River Basin. Spring and summer runoff are forecasted for slightly below normal flows. Bunchgrass Meadows SNOTEL site had 15.2 inches of snow water on the snow pillow which is below normal for February 1. Precipitation during January was 71% of average, dropping the year-to-date precipitation at 89% of average. Reservoir storage in the basin, including Lake Pend Oreille and Priest Lake was 81% of normal. Average temperatures were much above normal for January slightly above normal for the water year.

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

Data Current as of: 2/6/2019 3:06:10 PM

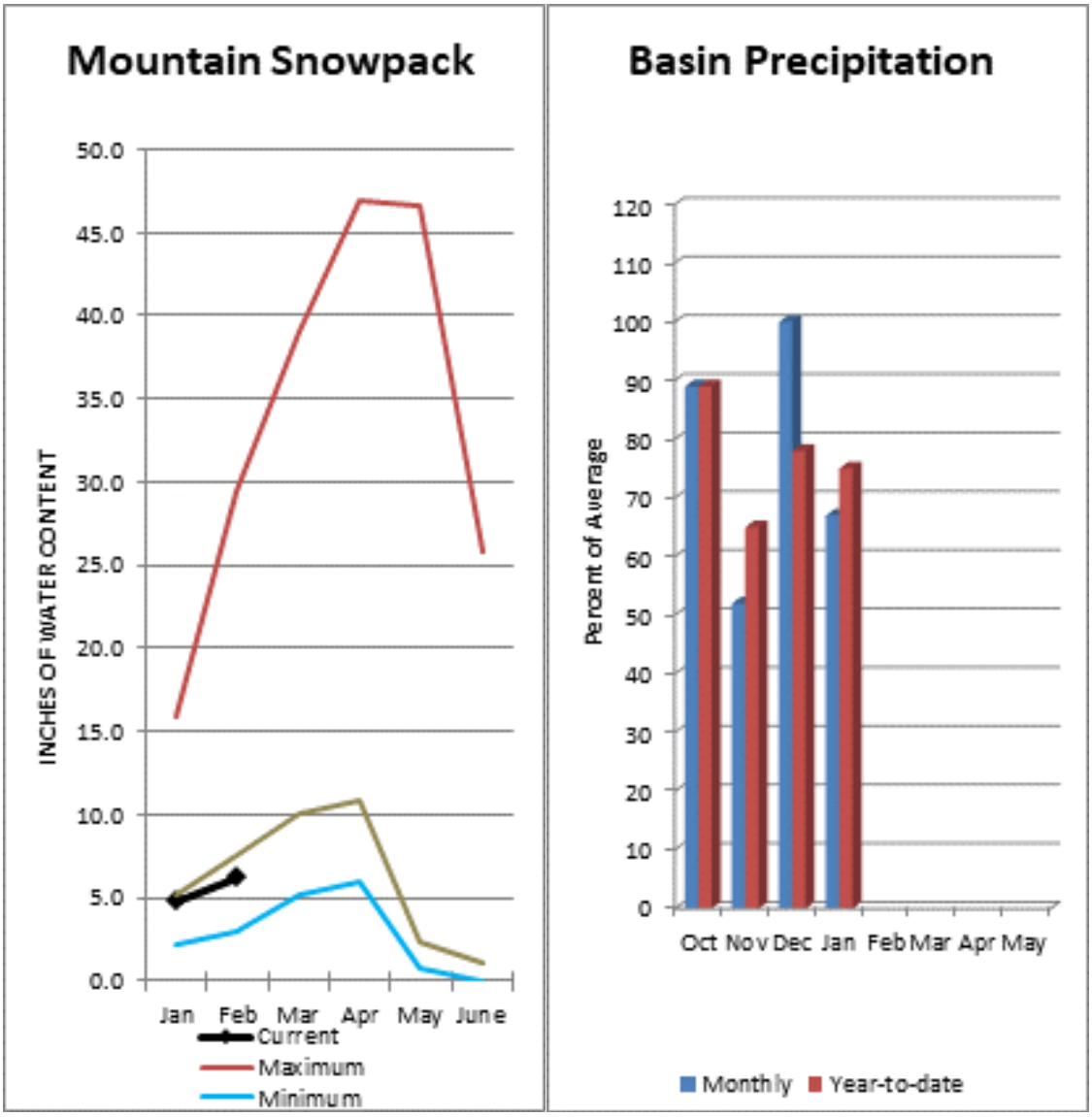
Pend Oreille Basins
Streamflow Forecasts - February 1, 2019

Pend Oreille Basins	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
		Forecast Exceedance Probabilities for Risk Assessment Chance that actual volume will exceed forecast						
Pend Oreille Lake Inflow[2]								
	APR-JUL	7340	9350	10700	91%	12100	14100	11800
	APR-SEP	8170	10300	11700	91%	13100	15200	12800
Priest R nr Priest River[2]								
	APR-JUL	465	625	735	94%	845	1000	780
	APR-SEP	500	665	780	94%	895	1060	830
Pend Oreille R bl Box Canyon[2]								
	APR-JUL	7500	9490	10800	91%	12200	14200	11900
	APR-SEP	8320	10400	11800	91%	13300	15400	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, 2019	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Lake Pend Oreille	566.6	788.7	753.9	1561.3
Priest Lake	52.5	55.6	56.7	119.3
Basin-wide Total	619.1	844.3	810.6	1680.6
# of reservoirs	2	2	2	2

Watershed Snowpack Analysis February 1, 2019	# of Sites	% Median	Last Year % Median
Pend Oreille Basins	51	90%	122%
Colville River	1	87%	108%
Kettle River	6	96%	127%



February 1 snow cover on the Okanogan was 85% of normal, Omak Creek was 90% and the Methow was 87%. January precipitation in the Upper Columbia was 67% of average, with precipitation for the water year at 75% of average. Streamflow's are forecasted for below normal spring and summer runoff. January streamflow for the Methow River was 85% of average, 98% for the Okanogan River and 94% for the Similkameen. Snow-water content at Salmon Meadows SNOTEL was 4.9 inches or 74% of normal for February 1. Combined storage in the Conconully Reservoirs was 17,800 acre-feet or 124% of normal. Temperatures were above normal for January slightly above normal for the water year.

Data Current as of: 2/6/2019 3:06:20 PM

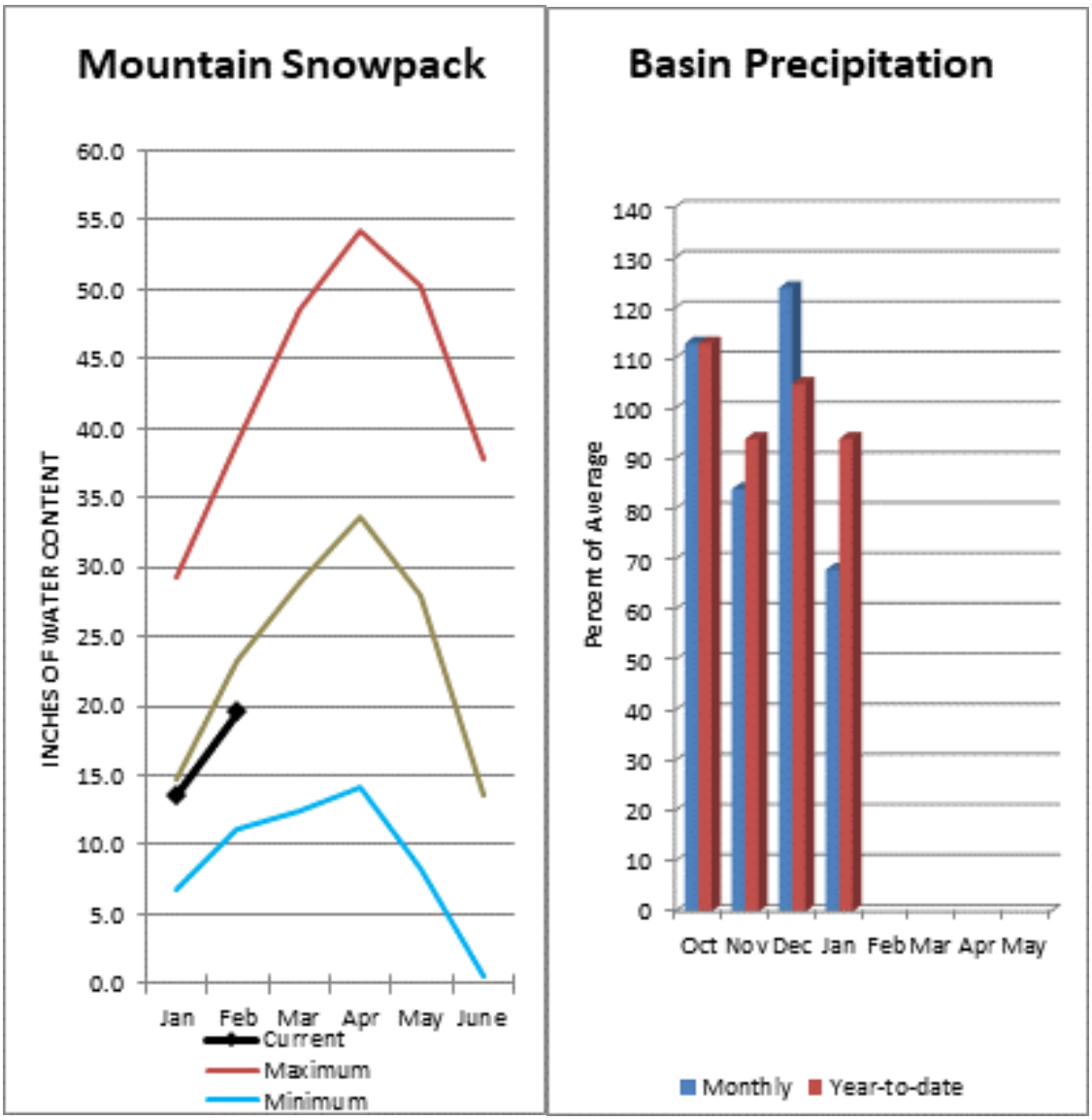
Upper Columbia Basins
Streamflow Forecasts - February 1, 2019

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	1130	1390	1560	87%	1740	1990	1800
	APR-SEP	1170	1440	1620	86%	1800	2070	1880
Colville R at Kettle Falls								
	APR-JUL	24	67	96	81%	126	169	119
	APR-SEP	27	74	106	81%	138	186	131
Columbia R at Grand Coulee-NWS[2]								
	APR-JUL	37800	41200	44300	87%	46300	50500	51015
	APR-SEP	46300	49800	52800	88%	55300	60800	60110
Similkameen R nr Nighthawk								
	APR-JUL	720	915	1050	88%	1180	1370	1200
	APR-SEP	770	975	1110	87%	1250	1450	1280
Okanogan R nr Tonasket								
	APR-JUL	675	960	1160	78%	1350	1640	1480
	APR-SEP	730	1050	1270	77%	1490	1810	1650
Okanogan R at Malott								
	APR-JUL	690	980	1180	81%	1380	1670	1450
	APR-SEP	755	1080	1300	80%	1520	1850	1620
Methow R nr Pateros								
	APR-JUL	465	625	735	88%	845	1010	835
	APR-SEP	500	675	790	88%	910	1080	895

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

Reservoir Storage End of January, 2019	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Conconully Lake (Salmon Lake Dam)	7.4	7.8	7.3	10.5
Conconully Reservoir	10.3	8.5	7.0	13.0
Basin-wide Total	17.8	16.3	14.3	23.5
# of reservoirs	2	2	2	2

Watershed Snowpack Analysis February 1, 2019	# of Sites	% Median	Last Year % Median
Upper Columbia Basins	17	82%	123%
Okanogan River	12	85%	124%
Omak Creek	3	90%	131%
Sanpoil River	1	45%	68%
Similkameen River	4	74%	122%
Toats Coulee Creek	0		
Conconully Lake	1	74%	141%
Methow River	4	87%	128%



Precipitation during January was 68% of average in the basin and 94% for the year-to-date. Runoff for Entiat River is forecast to be 88% of average for the summer. The basin can expect slightly below normal runoff this year. January average streamflow on the Chelan River was 67% and on the Wenatchee River 90%. February 1 snowpack in the Wenatchee River Basin was 85% of normal; the Chelan, 84%; the Entiat, 78%; Stemilt Creek, 83% and Colockum Creek, 100%. Reservoir storage in Lake Chelan was 68% of average. Lyman Lake SNOTEL had the most snow water with 32.7 inches of water. This site would normally have 40.1 inches on February 1. Temperatures were above normal for both January and the water year.

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

Data Current as of: 2/6/2019 3:06:26 PM

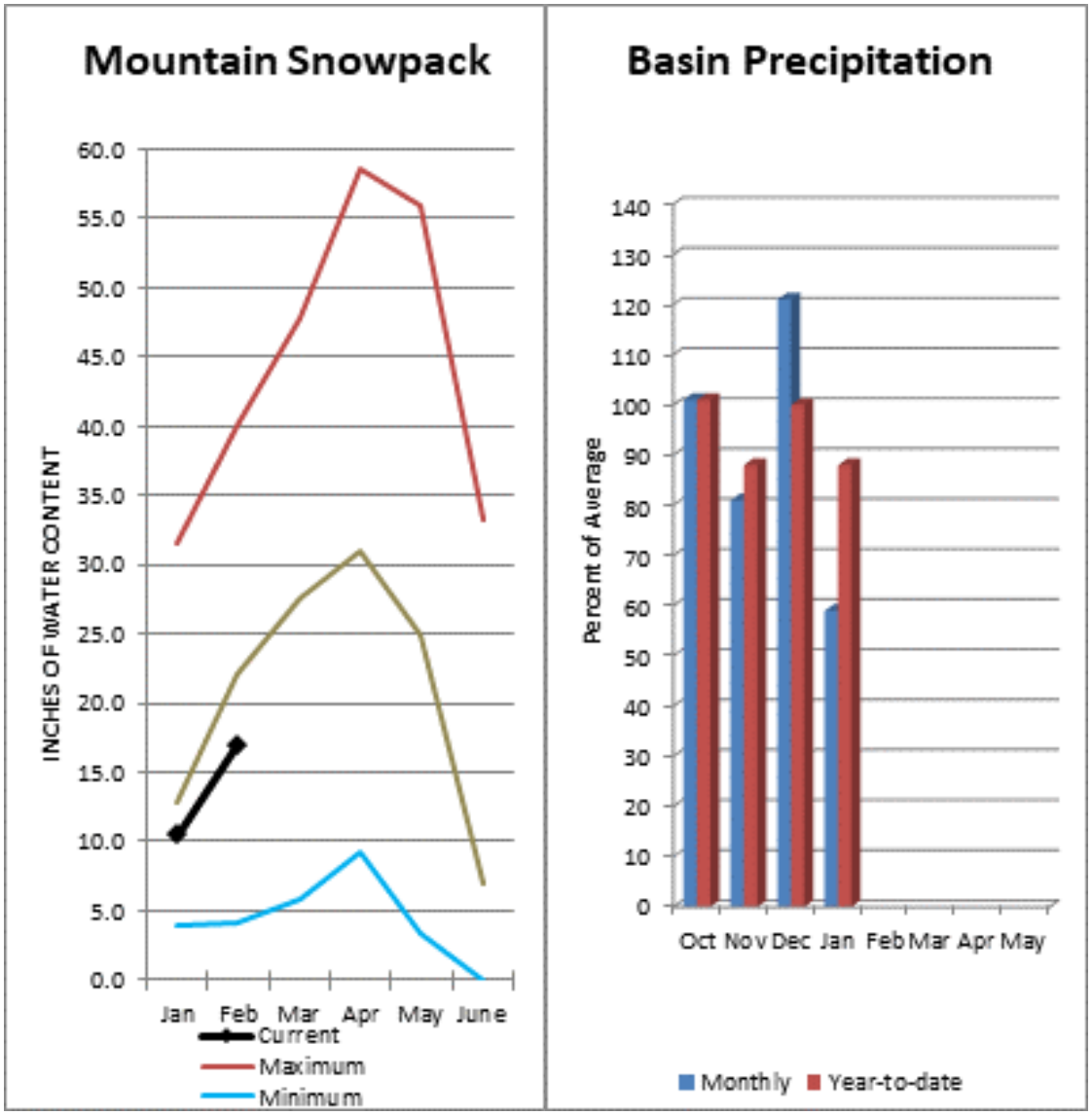
Central Columbia Basins
Streamflow Forecasts - February 1, 2019

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	505	585	645	95%	700	780	680
	APR-SEP	585	680	745	94%	805	900	790
Chelan R at Chelan								
	APR-JUL	725	845	930	93%	1010	1130	1000
	APR-SEP	790	935	1030	92%	1130	1280	1120
Entiat R nr Ardenvoir								
	APR-JUL	124	156	178	89%	199	230	200
	APR-SEP	132	169	193	88%	220	255	220
Wenatchee R at Plain								
	APR-JUL	650	795	890	90%	985	1120	990
	APR-SEP	695	855	965	89%	1080	1240	1080
Icicle Ck nr Leavenworth								
	APR-JUL	181	220	250	91%	280	320	275
	APR-SEP	194	240	270	90%	305	350	300
Wenatchee R at Peshastin								
	APR-JUL	930	1110	1230	90%	1350	1520	1370
	APR-SEP	990	1190	1330	89%	1470	1670	1490
Columbia R bl Rock Island Dam-NWS[2]								
	APR-JUL	40500	44300	47500	85%	50400	55800	55770
	APR-SEP	49600	53900	57200	88%	59400	65500	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, 2019	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Lake Chelan	232.0	290.1	343.1	677.4
Basin-wide Total	232.0	290.1	343.1	677.4
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis February 1, 2019	# of Sites	% Median	Last Year % Median
Central Columbia Basins	3	84%	108%
Chelan Lake Basin	3	84%	108%
Entiat River	1	78%	105%
Wenatchee River	7	85%	102%
Stemilt Creek	1	83%	83%
Colockum Creek	1	100%	118%



February 1 reservoir storage for the Upper Yakima reservoirs was 386,000-acre feet, 95% of average. January streamflow within the basin was Cle Elum River near Roslyn at 103%. February 1 snowpack was 77% based upon 8 snow course and SNOTEL readings within the Upper Yakima Basin. Precipitation was 59% of average for January and 88% for the water-year. Forecasts for spring-summer natural runoff are currently below normal. 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.

Data Current as of: 2/6/2019 3:06:34 PM

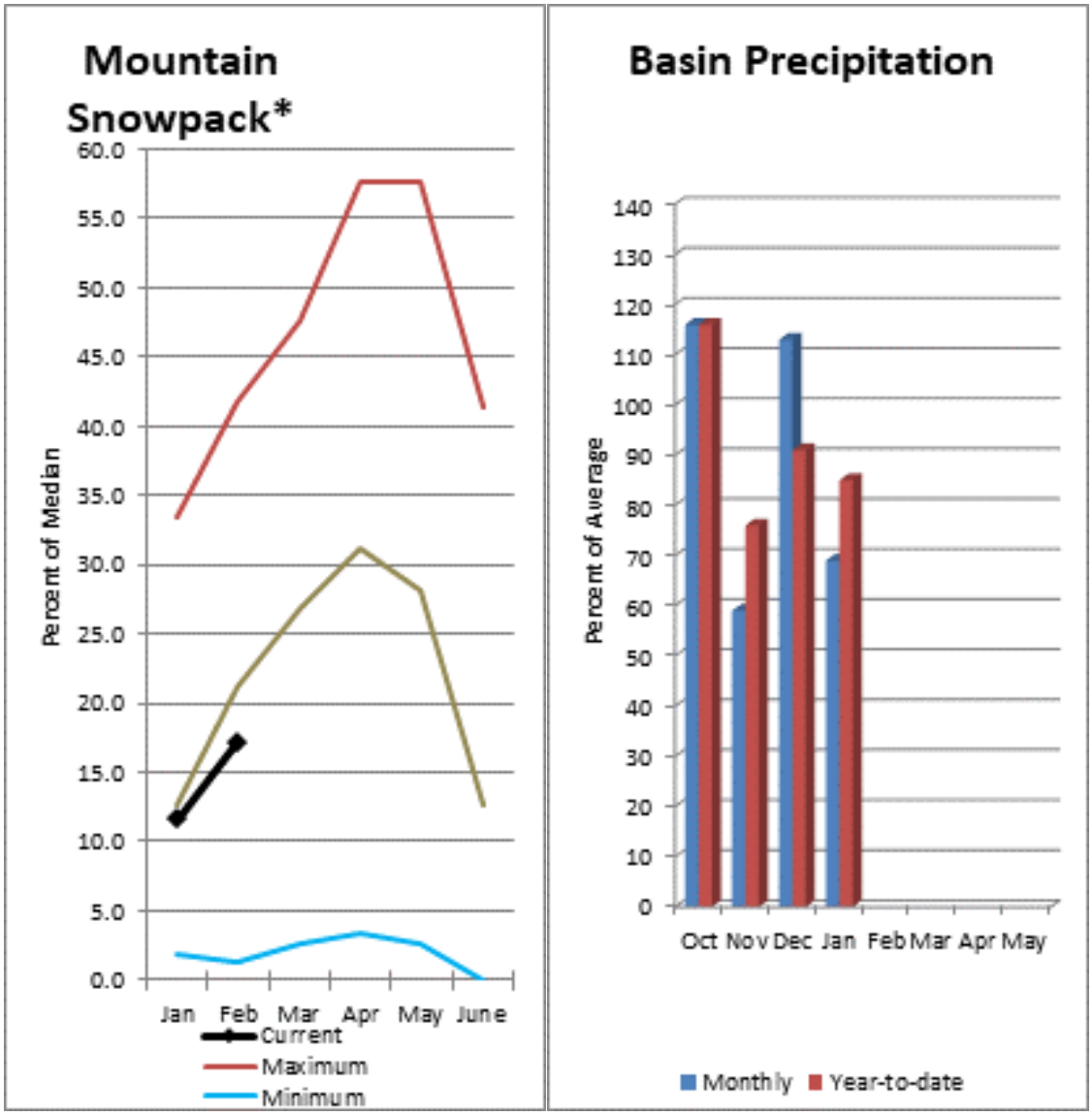
Upper Yakima River
Streamflow Forecasts - February 1, 2019

Upper Yakima River	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
		Forecast Exceedance Probabilities for Risk Assessment Chance that actual volume will exceed forecast						
Keechelus Reservoir Inflow[2]								
	APR-JUL	63	86	101	87%	117	140	116
	APR-SEP	70	95	111	88%	128	152	126
Kachess Reservoir Inflow [2]								
	APR-JUL	56	75	88	85%	102	121	104
	APR-SEP	63	83	97	86%	110	131	113
Cle Elum Lake Inflow [2]								
	APR-JUL	235	295	330	86%	370	425	385
	APR-SEP	255	320	360	87%	400	465	415
Teanaway R bl Forks nr Cle Elum								
	APR-JUL	50	82	103	79%	124	155	130
	APR-SEP	52	84	105	79%	127	159	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, 2019	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Keechelus	85.3	109.0	82.1	157.8
Kachess	144.6	161.4	130.8	239.0
Cle Elum	155.9	232.8	191.5	436.9
Basin-wide Total	385.8	503.2	404.4	833.7
# of reservoirs	3	3	3	3

Watershed Snowpack Analysis February 1, 2019	# of Sites	% Median	Last Year % Median
Upper Yakima River	8	77%	98%



January average streamflow's within the basin were: Yakima River near Parker, 82% and the Naches River near Naches, 65%. Forecasts for spring-summer natural runoff are currently below normal. February 1 reservoir storage for Bumping and Rimrock reservoirs was 89,600-acre feet, 73% of average. February 1 snowpack was 81% based upon 6 snow course and SNOTEL readings within the Lower Yakima Basin and Ahtanum Creek reported in at 89% of normal. Precipitation was 69% of average for January and 85% for the water-year. Temperatures were above normal for January 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: 2/6/2019 3:06:44 PM

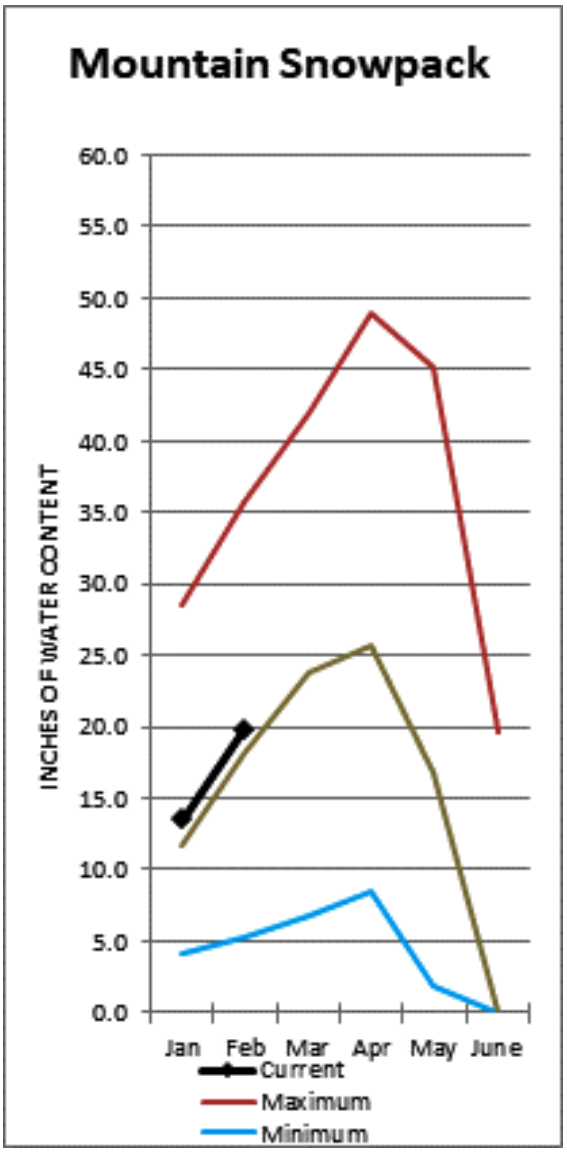
Lower Yakima River
Streamflow Forecasts - February 1, 2019

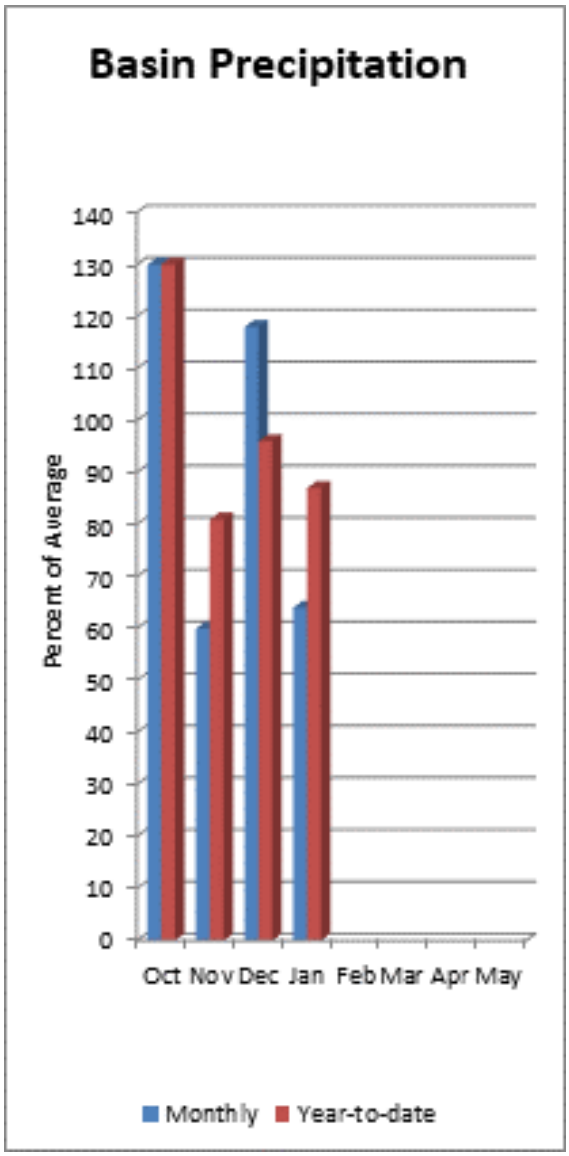
Lower Yakima River	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
		Forecast Exceedance Probabilities for Risk Assessment Chance that actual volume will exceed forecast						
Bumping Lake Inflow [2]								
	APR-JUL	69	86	98	86%	110	127	114
	APR-SEP	73	93	106	86%	120	139	123
American R nr Nile								
	APR-JUL	62	77	87	85%	97	113	102
	APR-SEP	65	82	94	85%	106	123	110
Rimrock Lake Inflow [2]								
	APR-JUL	126	150	167	89%	183	205	187
	APR-SEP	147	177	198	90%	220	250	220
Naches R nr Naches								
	APR-JUL	385	515	605	86%	695	825	700
	APR-SEP	410	560	660	87%	760	910	760
Ahtanum Ck at Union Gap								
	APR-JUL	9	17.8	24	89%	30	39	27
	APR-SEP	10.8	19.8	26	90%	32	41	29
Yakima R nr Parker [2]								
	APR-JUL	900	1200	1400	84%	1600	1900	1660
	APR-SEP	995	1320	1540	85%	1760	2080	1820
Klickitat R nr Glenwood								
	APR-JUL	65	89	105	83%	122	146	126
	APR-SEP	73	99	117	84%	134	160	139
Klickitat R nr Pitt								
	APR-JUL	260	335	385	89%	435	510	435
	APR-SEP	325	415	470	90%	530	615	520

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

Reservoir Storage End of January, 2019	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Bumping Lake	10.5	15.9	12.7	33.7
Rimrock	79.1	151.3	109.6	198.0
Basin-wide Total	89.6	167.2	122.3	231.7
# of reservoirs	2	2	2	2

Watershed Snowpack Analysis February 1, 2019	# of Sites	% Median	Last Year % Median
Lower Yakima River	6	81%	90%
Ahtanum Creek	2	89%	69%





January precipitation was 64% of average, maintaining the year-to-date precipitation at 87% of average. Snowpack in the basin was 109% of normal. Average temperatures were above normal for January and for the water year. April-September runoff is forecasted to be near normal.

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

Data Current as of: 2/7/2019 3:29:03 PM

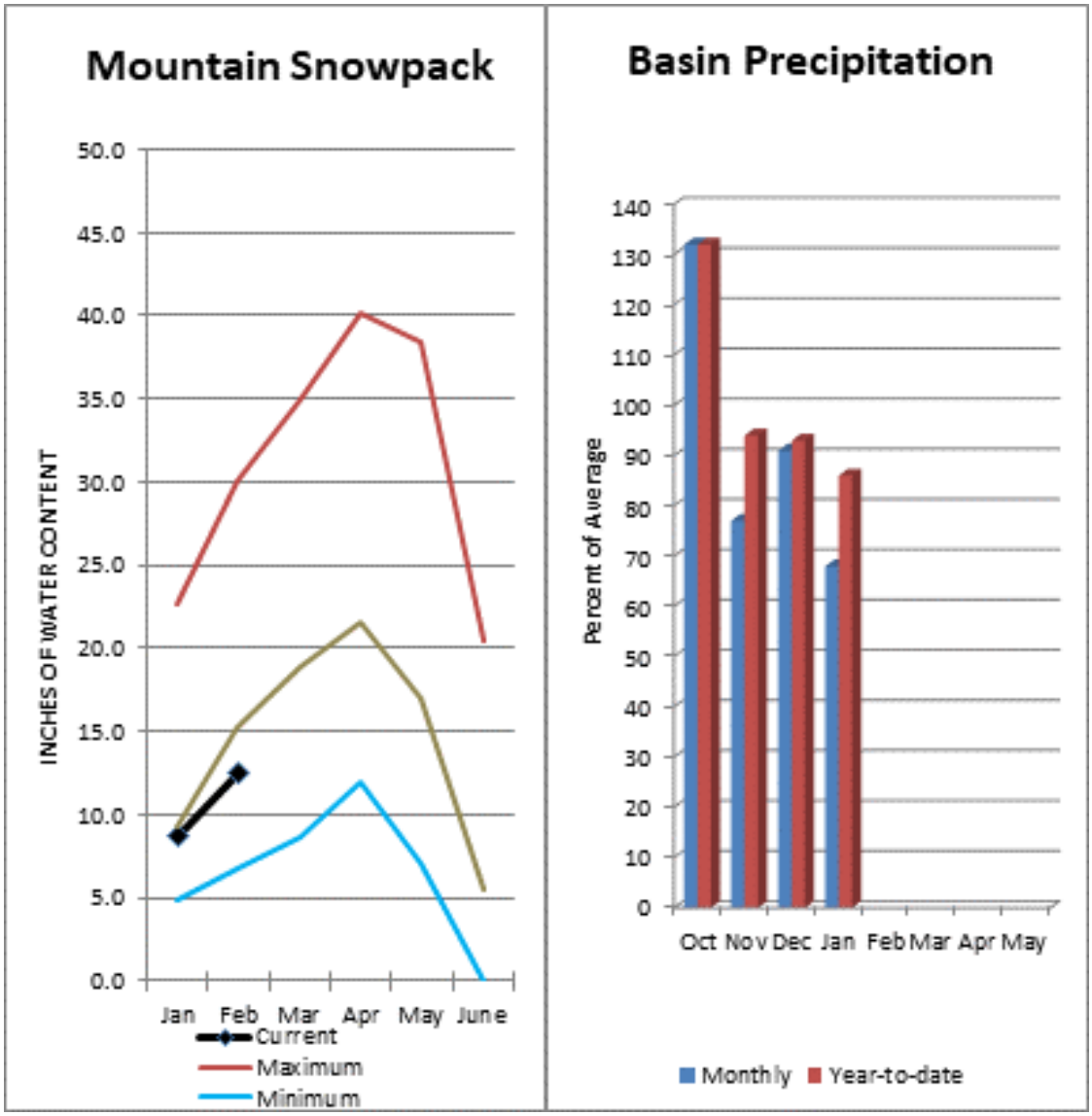
Walla Walla River
Streamflow Forecasts - February 1, 2019

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

Walla Walla River	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
SF Walla Walla R nr Milton-Freewater								
	MAR-JUL	53	62	68	100%	74	84	68
	APR-SEP	51	60	66	100%	72	81	66
Mill Ck nr Walla Walla								
	APR-JUL	16.8	20	23	96%	26	29	24
	APR-SEP	19.4	23	26	96%	29	33	27

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

Watershed Snowpack Analysis February 1, 2019	# of Sites	% Median	Last Year % Median
Walla Walla River	2	109%	82%



January precipitation was 69% of average, bringing the year-to-date precipitation down to 86% of average. February 1 snowpack readings averaged 82% of normal. January streamflow was 65% of average for Snake River below Lower Granite Dam and 68% for Grande Ronde River near Troy. Spring-summer runoff is expected to be near to slightly below normal. Dworshak Reservoir storage was 97% of average. Average temperatures were much below normal for January and above normal for the water year.

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

Data Current as of: 2/6/2019 3:07:02 PM

Lower Snake, Grande Ronde, Clearwater Basins
Streamflow Forecasts - February 1, 2019

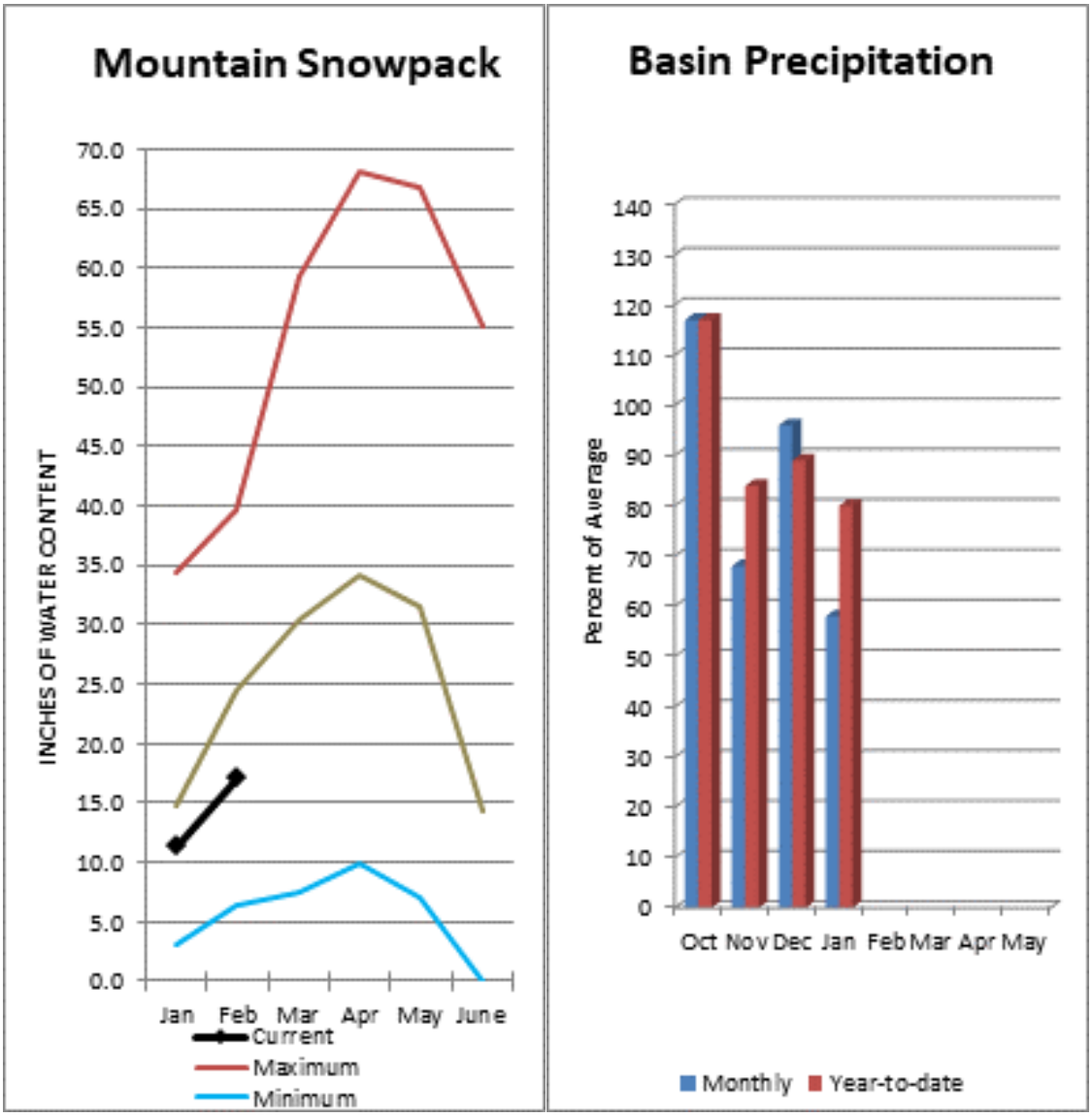
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

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	1070	1320	1490	99%	1650	1900	1510
	APR-SEP	890	1120	1280	98%	1440	1670	1310
Asotin Ck at Asotin								
	APR-JUL	14.2	22	29	83%	36	48	35
Clearwater R at Spalding[2]								
	APR-JUL	4410	5550	6330	92%	7100	8240	6890
	APR-SEP	4720	5880	6670	92%	7470	8630	7270
Snake R bl Lower Granite Dam-NWS[2]								
	APR-JUL	13200		16900	85%		20500	19848
	APR-SEP	15200		19200	86%		23100	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, 2019	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Dworshak Reservoir	2267.7	2357.0	2335.0	3468.0
Basin-wide Total	2267.7	2357.0	2335.0	3468.0
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis February 1, 2019	# of Sites	% Median	Last Year % Median
Lower Snake, Grande Ronde, Clearwater Basins	13	82%	79%



Forecasts for April – September streamflows within the basin are Lewis River at Ariel, 81% and Cowlitz River at Castle Rock, 85% of average. The Columbia at The Dalles is forecasted to have 93% of average flows this summer according to the River Forecast Center. January average streamflow for Cowlitz River was 76% and the Columbia River at The Dalles was 74% of average. January precipitation was 58% of average and the water-year average was 80%. February 1 snow cover for Cowlitz River was 77%, and Lewis River was 64% of normal. Temperatures were above normal during January but near average for the water year.

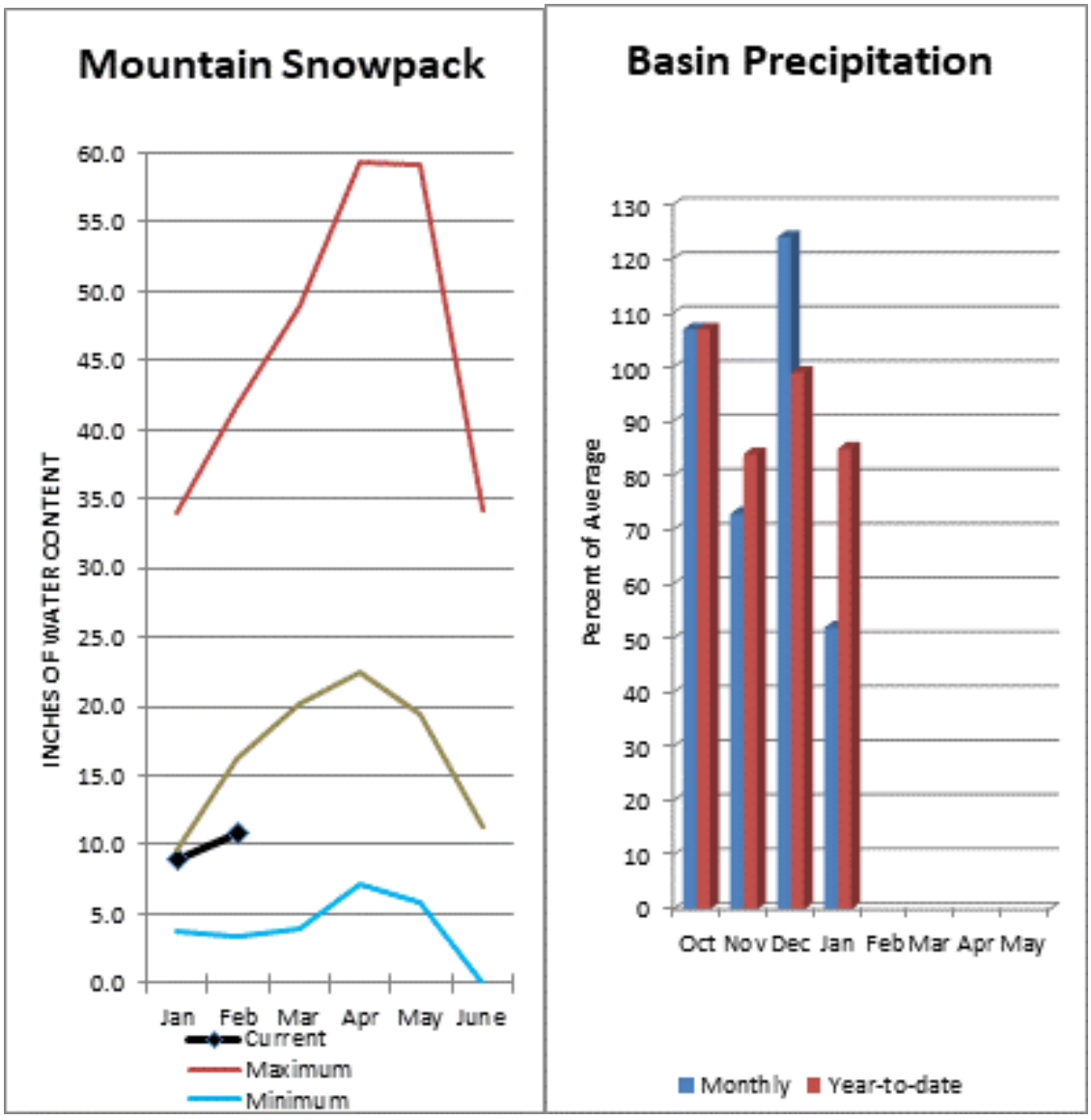
Data Current as of: 2/6/2019 3:07:16 PM

Lower Columbia Basins
Streamflow Forecasts - February 1, 2019

Lower Columbia Basins	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
		Forecast Exceedance Probabilities for Risk Assessment Chance that actual volume will exceed forecast						
Columbia R at The Dalles-NWS[2]								
	APR-JUL	83500		70000	88%		61600	79855
	APR-SEP	76000		86000	93%		97900	92704
Klickitat R nr Glenwood								
	APR-JUL	65	89	105	83%	122	146	126
	APR-SEP	73	99	117	84%	134	160	139
Klickitat R nr Pitt								
	APR-JUL	260	335	385	89%	435	510	435
	APR-SEP	325	415	470	90%	530	615	520
Lewis R at Ariel[2]								
	APR-JUL	510	685	800	82%	915	1090	970
	APR-SEP	600	785	910	81%	1030	1220	1120
Cowlitz R bl Mayfiled[2]								
	APR-JUL	1020	1220	1350	83%	1490	1690	1630
	APR-SEP	1160	1390	1550	84%	1700	1940	1840
Cowlitz R at Castle Rock[2]								
	APR-JUL	1470	1700	1860	83%	2020	2240	2240
	APR-SEP	1960	2080	2160	85%	2240	2360	2540

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, 2019	# of Sites	% Median	Last Year % Median
Lower Columbia Basins	11	70%	104%
Lewis River	5	64%	109%
Cowlitz River	6	77%	100%



February 1 snowpack was 84% of average for the White River, 79% for Puyallup River and 45% in the Green River Basin. January precipitation was 52% of average, bringing the water year-to-date to 85% of average for the basins. Summer runoff is forecasted to be below normal. Average temperatures in the area were above normal for January and for the water-year.

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

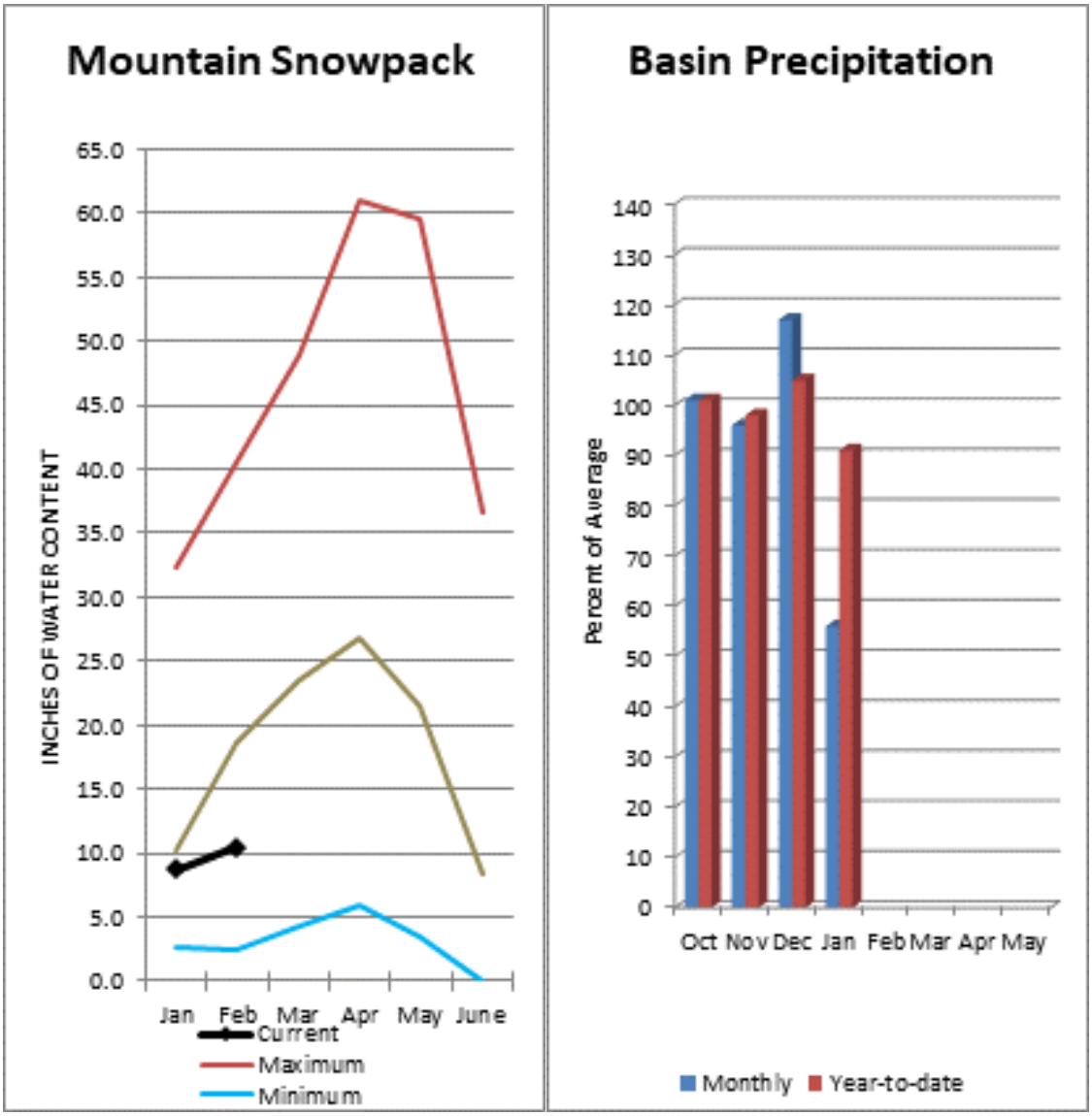
Data Current as of: 2/6/2019 3:07:25 PM

South Puget Sound Basins
Streamflow Forecasts - February 1, 2019

South Puget Sound Basins	Forecast Period	Forecast Exceedance Probabilities for Risk Assessment Chance that actual volume will exceed forecast 90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
White R nr Buckley[1,2]								
	APR-JUL	240	315	350	81%	385	460	430
	APR-SEP	300	390	430	83%	470	560	515
Green R bl Howard A Hanson Dam[1,2]								
	APR-JUL	85	151	181	77%	210	275	235
	APR-SEP	101	168	198	76%	230	295	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, 2019	# of Sites	% Median	Last Year % Median
South Puget Sound Basins	9	67%	94%
White River	2	84%	109%
Green River	3	45%	73%



Basin-wide precipitation for January was 56% of average, bringing water-year-to-date to 91% of average. February 1 median snow cover in Cedar River Basin was 53%, Tolt River Basin was 39%, Snoqualmie River Basin was 53%, and Skykomish River Basin was 56%. Basin runoff is forecasted to be below normal this summer. Temperatures were above normal for January and for the water-year.

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

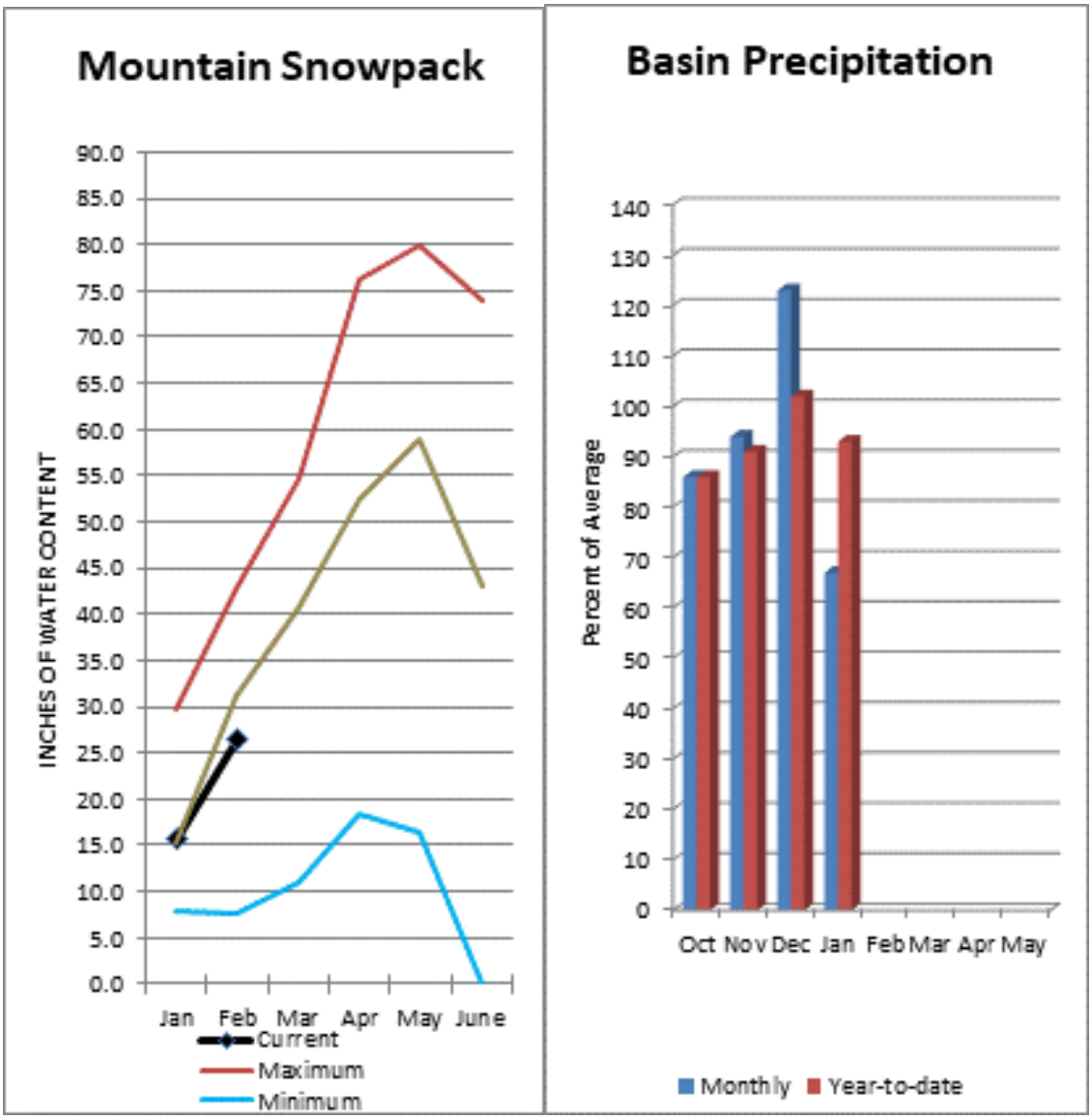
Data Current as of: 2/6/2019 3:07:33 PM

Central Puget Sound Basins
Streamflow Forecasts - February 1, 2019

Central Puget Sound Basins	Forecast Period	Forecast Exceedance Probabilities for Risk Assessment Chance that actual volume will exceed forecast 90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Cedar R nr Cedar Falls								
	APR-JUL	34	45	53	76%	60	71	70
	APR-SEP	40	51	59	78%	66	78	76
Rex R nr Cedar Falls								
	APR-JUL	9.7	14.6	18	75%	21	26	24
	APR-SEP	12.2	17.3	21	78%	24	29	27
Taylor Ck nr Selleck								
	APR-JUL	10.8	13.9	16	80%	18.1	21	20
	APR-SEP	13.4	16.7	19	79%	21	25	24
SF Tolt R nr Index								
	APR-JUL	6.3	8.6	10.2	72%	11.8	14.1	14.2
	APR-SEP	7.8	10.3	12	75%	13.7	16.2	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, 2019	# of Sites	% Median	Last Year % Median
Central Puget Sound Basins	12	56%	95%
Puyallup River	4	79%	107%
Cedar River	4	53%	90%
Tolt River	2	39%	94%
Snoqualimie River	4	53%	94%
Skykomish River	2	56%	102%



Forecast for Skagit River streamflow at Newhalem is 93% of average for the spring and summer period. January streamflow in Skagit River was 93% of average. Other forecast points included Baker River at 92% and Thunder Creek at 91% of average. Basin-wide precipitation for January was 67% of average, bringing water-year-to-date to 93% of average. February 1 average snow cover in Skagit River Basin was 88% and the Nooksack River Basin was 73%. February 1 Skagit River reservoir storage was 93% of average and 65% of capacity. Average temperatures were above normal for January but near normal for the water year.

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

Data Current as of: 2/6/2019 3:07:42 PM

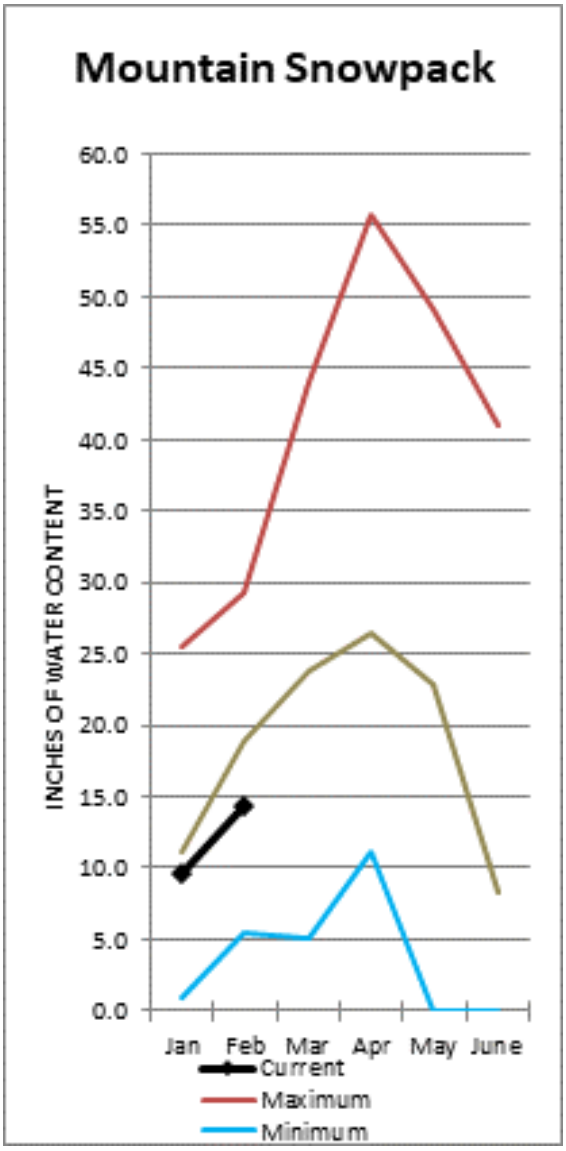
North Puget Sound Basins
Streamflow Forecasts - February 1, 2019

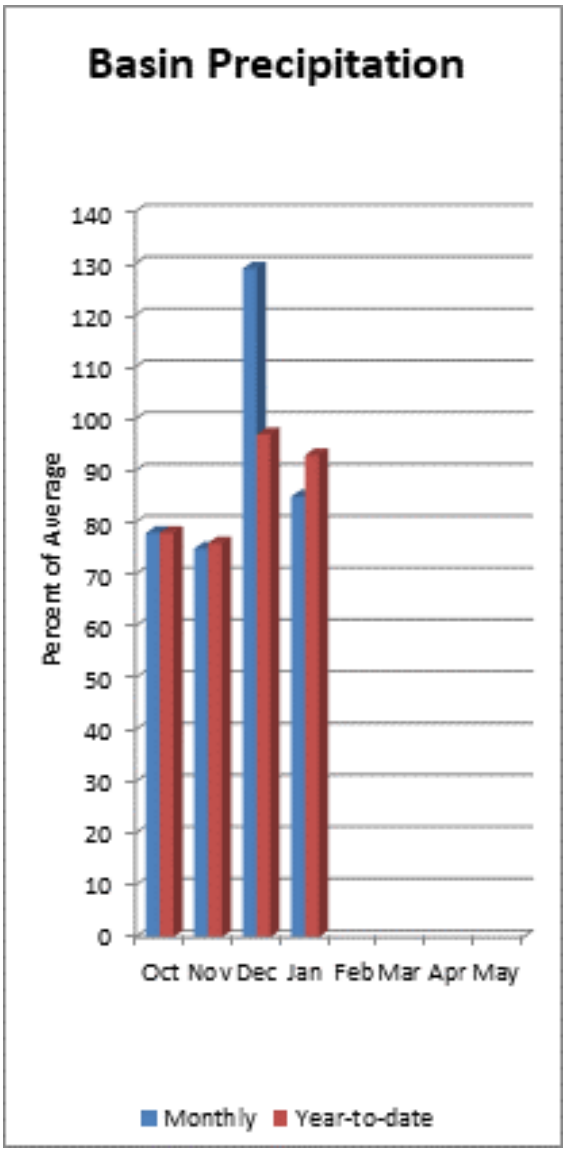
		Forecast Exceedance Probabilities for Risk Assessment Chance that actual volume will exceed forecast						
North Puget Sound Basins	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Thunder Ck nr Newhalem								
	APR-JUL	181	198	210	89%	220	240	235
	APR-SEP	265	285	300	91%	315	335	330
Skagit R at Newhalem[2]								
	APR-JUL	1410	1540	1630	93%	1730	1860	1750
	APR-SEP	1670	1820	1930	93%	2030	2180	2070
Baker R at Concrete								
	APR-JUL	580	665	720	92%	775	860	780
	APR-SEP	745	840	900	92%	960	1050	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, 2019	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Ross	926.0	957.6	996.3	1434.7
Basin-wide Total	926.0	957.6	996.3	1434.7
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis February 1, 2019	# of Sites	% Median	Last Year % Median
North Puget Sound Basins	14	85%	115%
Skagit River	11	88%	114%
Baker River	0		
Nooksack River	3	73%	118%





January Dungeness River runoff was 111% of normal. January precipitation was 85% of average. Precipitation has accumulated at 93% of average for the water year. January precipitation at Quillayute was 103 % of normal but only 76% of normal in Sequim. Olympic Peninsula snowpack averaged 76% of normal on February 1. The Dungeness and Elwha rivers are both forecasted to see below normal runoff this summer. Temperatures were above average for January and for the water year.

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

Data Current as of: 2/6/2019 3:07:49 PM

Olympic Penninsula
Streamflow Forecasts - February 1, 2019

		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	88	100	108	90%	116	128	120
	APR-SEP	104	120	130	90%	140	156	145
Elwha R at McDonald Br nr Port Angeles								
	APR-JUL	280	320	350	88%	380	420	400
	APR-SEP	335	385	420	89%	450	500	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, 2019	# of Sites	% Median	Last Year % Median
Olympic Penninsula	6	76%	129%

Issued by

Matthew J. Lohr
Chief
Natural Resources Conservation Service
U.S. Department of Agriculture

Released by

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

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

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

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

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

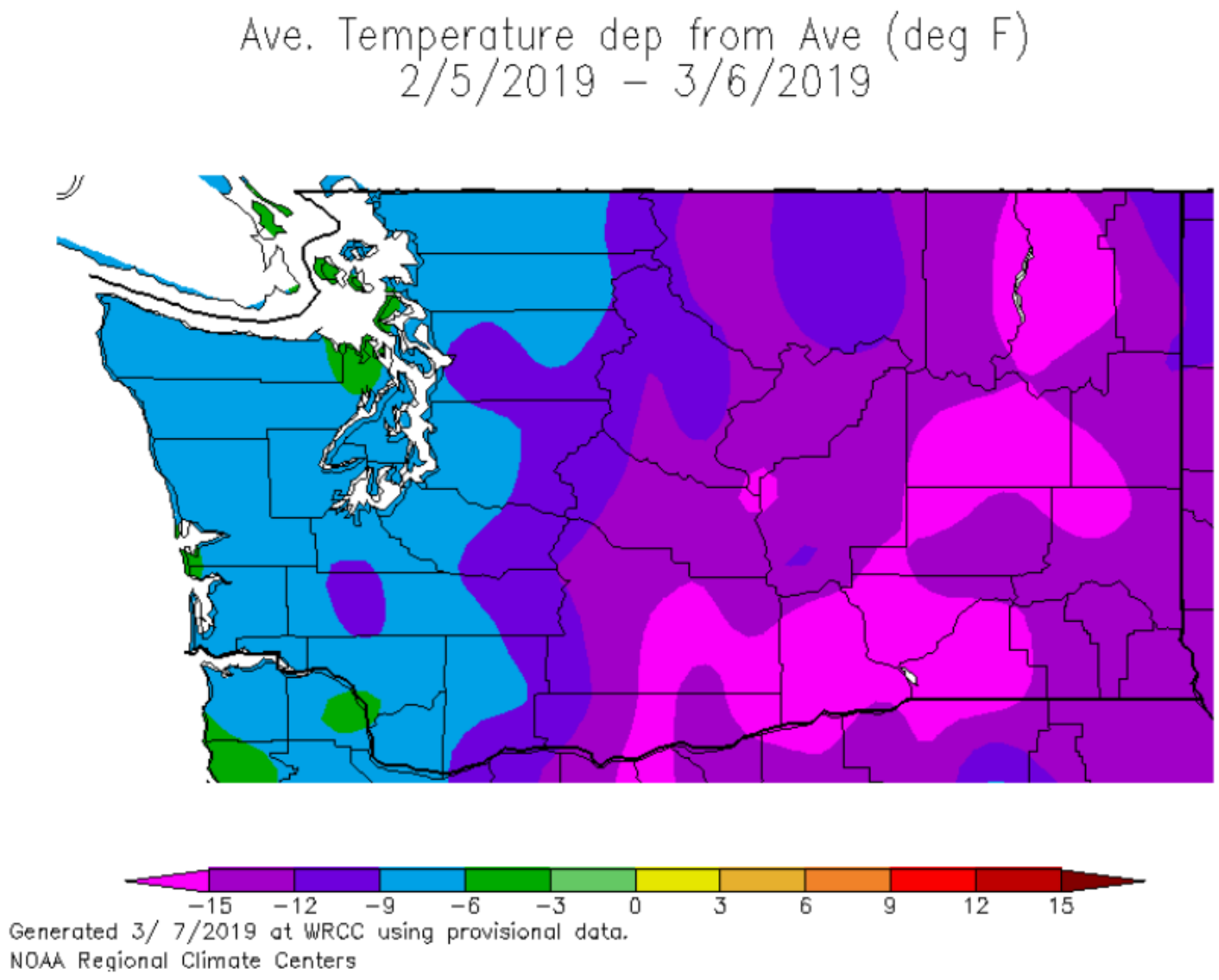
Washington Water Supply Outlook Report

Natural Resources Conservation Service
Spokane, WA

United States Department of Agriculture

NRCS Natural Resources Conservation Service

Washington
Water Supply Outlook Report
March 1, 2019



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
Water Supply Specialist
Natural Resources Conservation Service
2005 E. College Way, Suite 203
Mt. Vernon, WA 98273-2873
(360) 488-4826

or

Larry Johnson
State Conservation Engineer
Natural Resources Conservation Service
W 316 Boone Ave., Suite 450
Spokane, WA 99201
(509) 323-2955

How forecasts are made

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

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

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

Washington
Water Supply Outlook

March 2019

General Outlook

February came on strong with very cold and snowy conditions statewide, however the negative effects of the lowland snow out-weighed the positive results of mountain accumulations. One would think that mountain snowpack must have met or broken accumulation records. To the contrary, most of our SNOTEL network were below the 50-percentile mark for the month, (Figure 2, page 4). The current 30-day weather forecast is calling for below normal temperatures but with equal chances for precipitation, (Figure 1, page 4). NWS 3-month (MAM) forecast still indicates above normal temperatures and equal chances of below, above or normal precipitation with a continuation of El Nino through late spring, early summer. http://www.cpc.ncep.noaa.gov/

Snowpack

The March 1 statewide SNOTEL readings were back up to 90% of normal, 15 points higher than last month. The west slopes of the central and south cascades benefitted the most from the February snow storms, bringing most basins into the near normal range. Colockum Creek had the highest median at 156%. Westside medians from SNOTEL and March 1 snow surveys, included the North Puget Sound river basins with 82% of normal, the Central and South Puget river basins with 79% and 95% respectively, and the Lower Columbia basins with 94% of normal. Snowpack along the east slopes of the Cascade Mountains included the Yakima area with 92% and the Wenatchee area with 93%. Snowpack in the Spokane River Basin was at 90% and the Upper Columbia river basins had 79% of the long-term median.

BASIN	PERCENT OF MEDIAN	LAST YEAR PERCENT MEDIAN
Spokane	90	106
Newman Lake	90	96
Pend Oreille	101	140
Okanogan	85	141
Methow	82	131
Conconully Lake	74	114
Central Columbia	93	105
Upper Yakima	88	96
Lower Yakima	97	91
Ahtanum Creek	110	72
Walla Walla	119	82
Lower Snake	117	84
Cowlitz	98	111
Lewis	90	109
White	102	110
Green	78	85
Puyallup	110	111
Cedar	80	101
Snoqualmie	70	108
Skykomish	71	119
Tolt	68	118
Skagit	83	118
Nooksack	78	127
Olympic Peninsula	88	128

Precipitation

February precipitation from SNOTEL varied considerably across the state but averages out at 106% of normal. Year-to-date precipitation is below normal at 90%. The Upper Columbia and Puget Sound basins north of I-90 collected near to much below normal precipitation where as the rest of the state was above too much above normal. The highest was on the Lower Snake with 202% of average and individual sites reporting well over 200% of normal.

RIVER BASIN	FEBRUARY PERCENT OF AVERAGE	WATER YEAR PERCENT OF AVERAGE
Spokane	101	85
Pend Oreille	129	96
Upper Columbia	54	71
Central Columbia	91	93
Upper Yakima	92	89
Lower Yakima	119	91
Walla Walla	165	100
Lower Snake	202	107
Lower Columbia	115	86
South Puget Sound	115	90
Central Puget Sound	106	93
North Puget Sound	77	91
Olympic Peninsula	101	94

Reservoir

Seasonal reservoir levels in Washington can vary greatly due to specific watershed management practices required in preparation for irrigation season, fisheries management, power generation, municipal demands and flood control. March 1 Reservoir storage in the Yakima Basin was 406,000-acre feet, 90% of average for the Upper Reaches and 98,000-acre feet or 72% of average for Rimrock and Bumping Lakes. The power generation reservoirs included the following: Coeur d'Alene Lake, 38,600-acre feet, 29% of average and 16% of capacity; and the Skagit River reservoirs at 83% of average and 48% 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	16	29
Pend Oreille	36	71
Upper Columbia	78	124
Central Columbia	30	74
Upper Yakima	49	90
Lower Yakima	42	72
Lower Snake	66	97
North Puget Sound	48	83

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. 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.

February streamflow's are compiled by the Northwest River Forecast Center. Cold weather and ice can affect accurate winter runoff measurements.

BASIN	PERCENT OF AVERAGE FORCAST (50% CHANCE OF EXCEEDENCE)
Spokane	81-93
Priest River	93-99
Upper Columbia	71-84
Central Columbia	79-88
Upper Yakima	83-90
Lower Yakima	90-107
Walla Walla	104-111
Lower Snake	102-126
Lower Columbia	93-104
South Puget Sound	92-102
Central Puget Sound	91-93
North Puget Sound	88-95
Olympic Peninsula	95-101

STREAM	PERCENT OF AVERAGE FEBRUARY STREAMFLOWS
Pend Oreille at Albeni Fall Dam	76
Kettle at Laurier	81
Columbia at Birchbank	71
Spokane at Spokane	49
Similkameen at Nighthawk	80
Okanogan at Tonasket	85
Methow at Pateros	76
Chelan at Chelan	47
Stehekin near Stehekin	76
Wenatchee at Pashastin	58
Cle Elum near Roslyn	60
Yakima at Parker	49
Naches at Naches	52
Grande Ronde at Troy	53
Snake below Lower Granite Dam	62
Columbia River at The Dalles	64
Lewis at Merwin Dam	48
Cowlitz below Mayfield Dam	54
Skagit at Concrete	52
Dungeness near Sequim	62

Climate

Figure 1: ONE-MONTH TEMPERATURE AND PRECIPITATION OUTLOOK

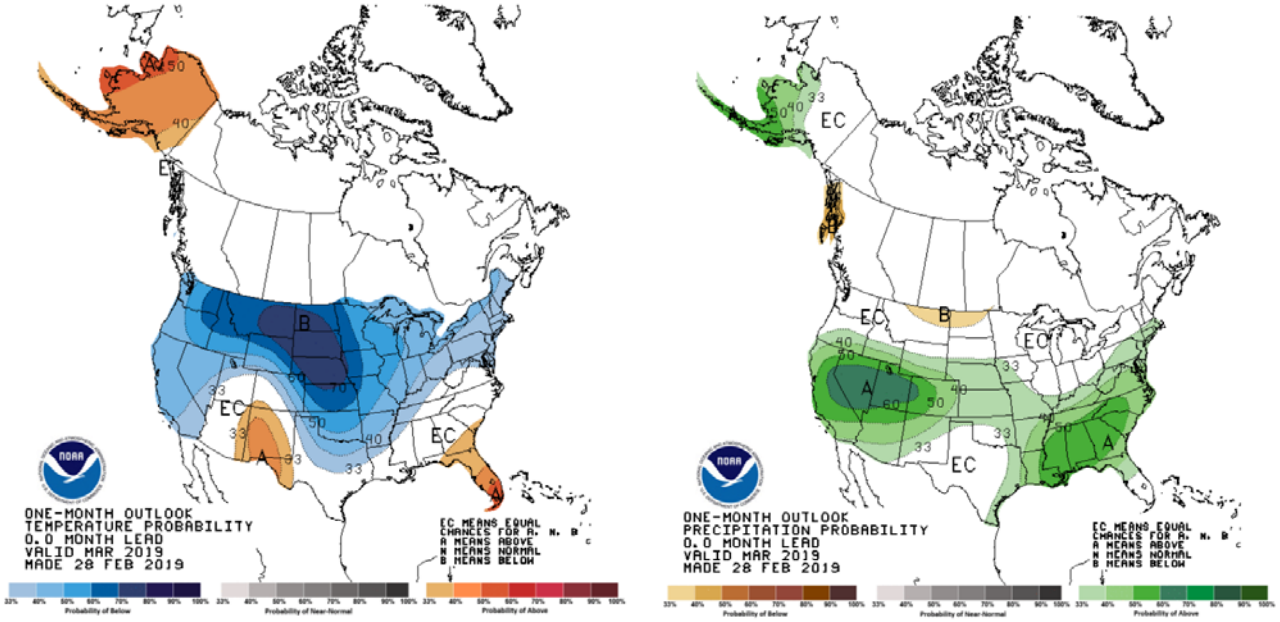
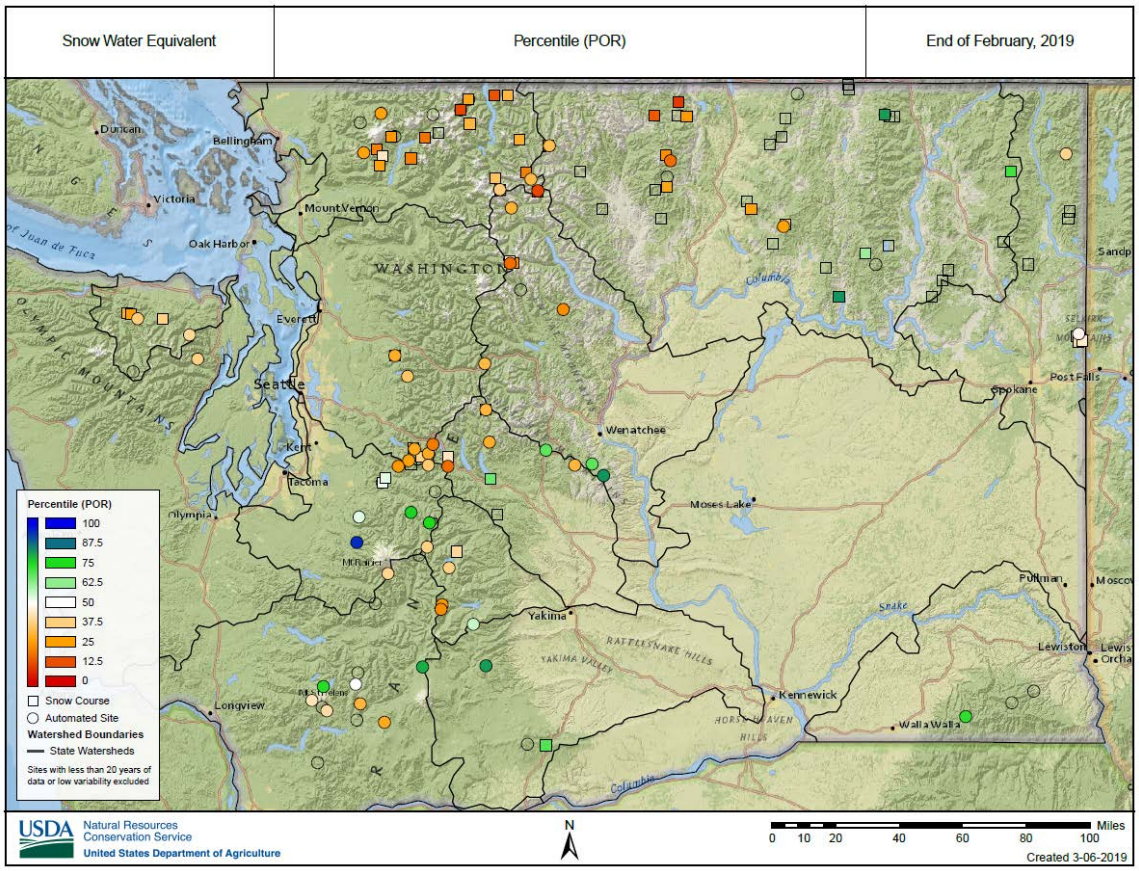


Figure 2: SNOTEL SWE percentile Period of Record February accumulation. No new records set.



Natural Resources Conservation Service

Washington State
Snow, Water and Climate Services

Program Contacts

Washington:

Roylene Rides At The Door
State Conservationist
Spokane State Office
W. 316 Boone Ave., Suite 450
Spokane, WA 99201-2348
phone: 509-323-2961
roylene.rides-at-the-door@wa.usda.gov

Scott Pattee
Water Supply Specialist
Washington Snow Survey Office
2005 E. College Way, Suite 203
Mount Vernon, WA 98273-2873
phone: 360-488-4826
scott.pattee@wa.usda.gov

Oregon:

Scott Oviatt
Supervising Hydrologist
Oregon Data Collection Office
1201 NE Lloyd Blvd., STE 900
Portland, OR 97232
Phone: 503-414-3271
scott.oviatt@or.usda.gov

Gus Goodbody/Jolyne Lea
Forecast Hydrologist
National Water and Climate Center
1201 NE Lloyd Blvd., STE 800
Portland, OR 97232
phone: 503-414-3033/3040
angus.goodbody@por.usda.gov
jolyne.lea@por.usda.gov

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

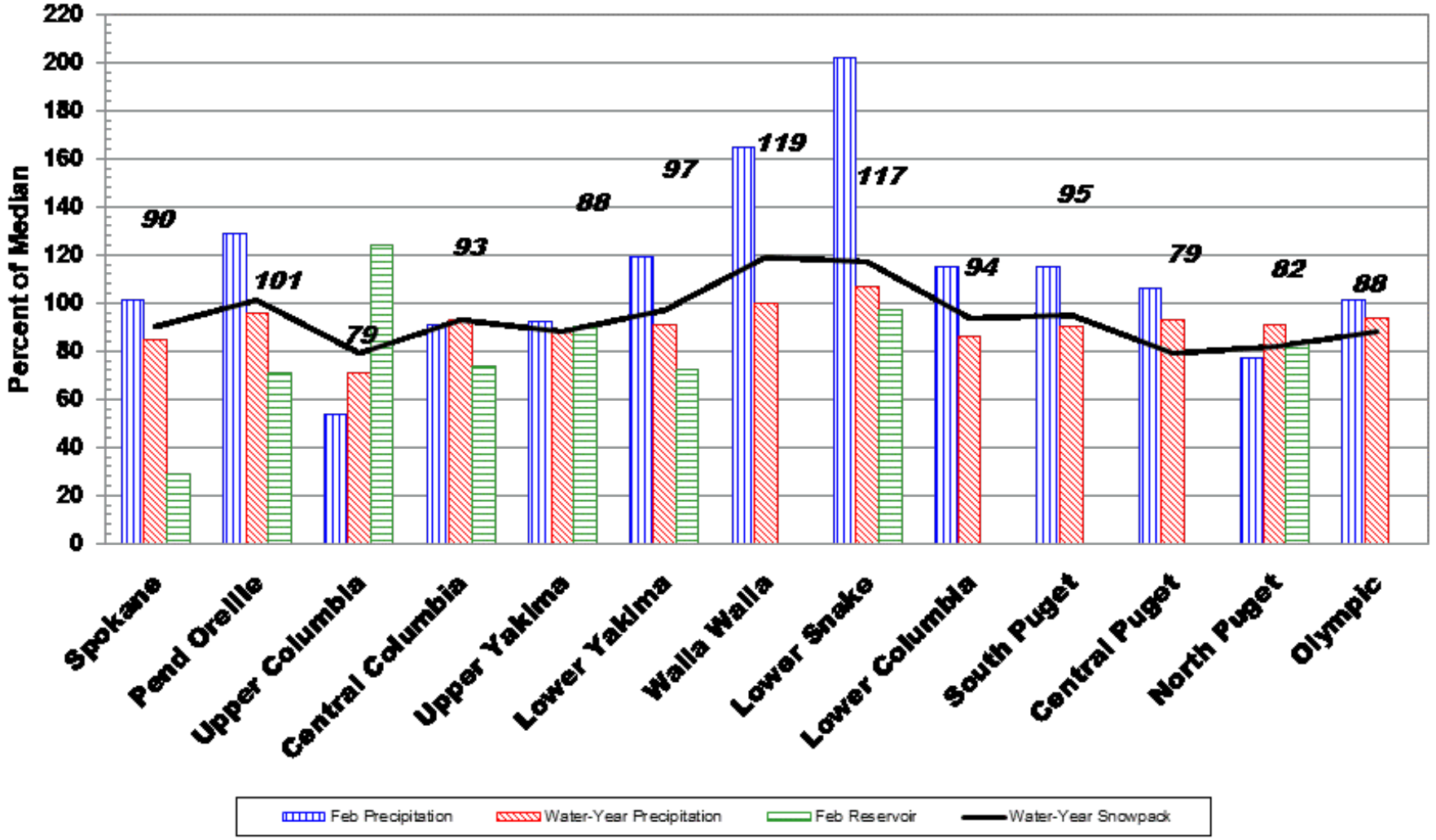
Washington:
http://www.nrcs.usda.gov/wps/portal/nrcs/site/wa/home/

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

NRCS Natural Resources Conservation Service

March 1, 2019 - Snowpack, Precipitation and Reservoir Conditions at a Glance

(Water Year = October 1 - Current Date)



86th Meeting of the Western Snow Conference

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

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

Dates: April 15-18, 2019
Location: Reno, NV

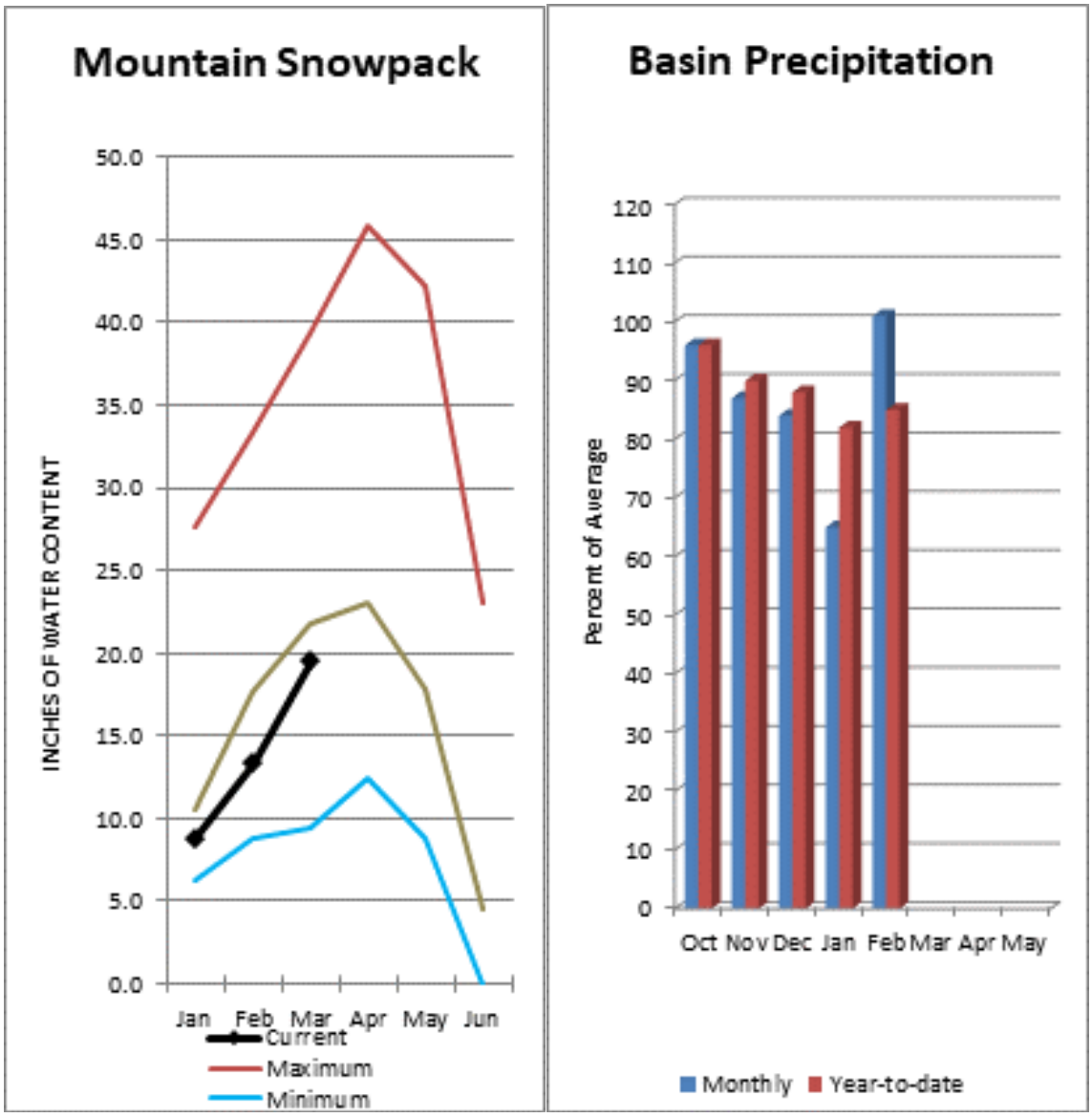
Registration and the call for papers are open for the 87th annual Western Snow Conference in Reno, Nevada, April 15-18, 2019. The conference venue offers the opportunity to interact with other professionals while enjoying the "The Biggest Little City in the World" and is where Dr. Church made the first snow surveys in the west. This provided the initiative and importance to monitor the mountain snowpack and produce streamflow forecasts for wise planning and management of water in the west.

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

Also find Western Snow Conference on Facebook and Twitter.

The dead line for reservations at the Renaissance Reno Downtown Hotel is **March 24** so be sure to reserve your room soon and be sure to ask for the Western Snow Conference block of rooms or use the links posted on the above website.

Spokane River Basin



Basin snowpack is 90% of normal and precipitation is 85% of average for the water year. Precipitation for February was normal at 101% of average. Streamflow's are forecasted for slightly below normal spring and summer runoff. Streamflow on the Spokane River at Spokane was 49% of average for February. March 1 storage in Coeur d'Alene Lake was 38,600-acre feet, 29% of average and 16% of capacity. Snowpack at Quartz Peak SNOTEL site was 96% of average with 18.7 inches of water content. Average temperatures in the Spokane basin were much colder than normal for February and near normal for the water year.

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

Data Current as of: 3/7/2019 12:05:27 PM

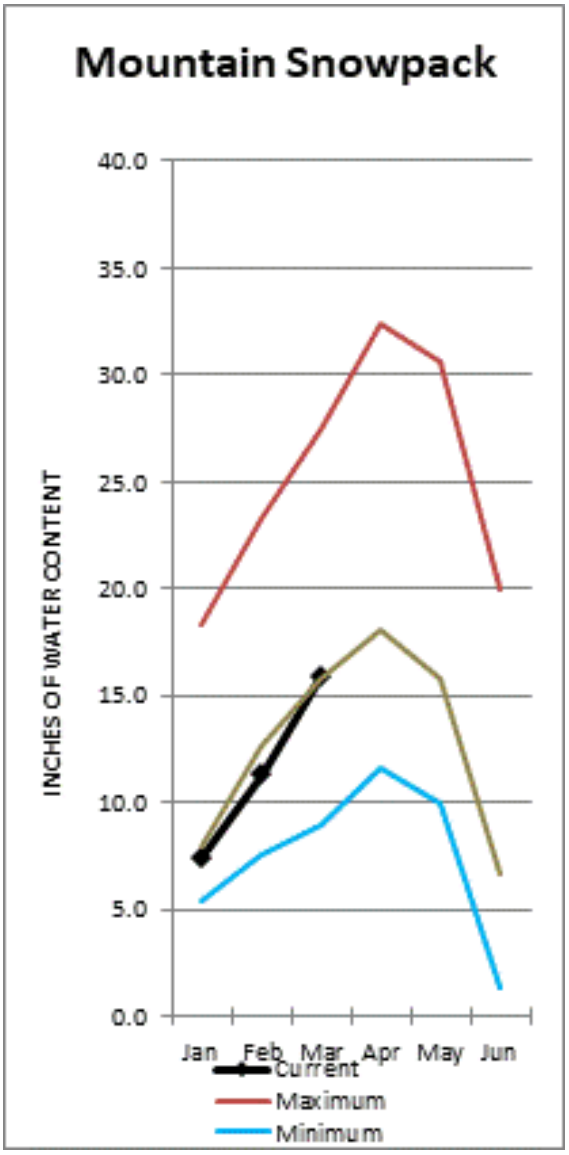
Spokane
Streamflow Forecasts - March 1, 2019

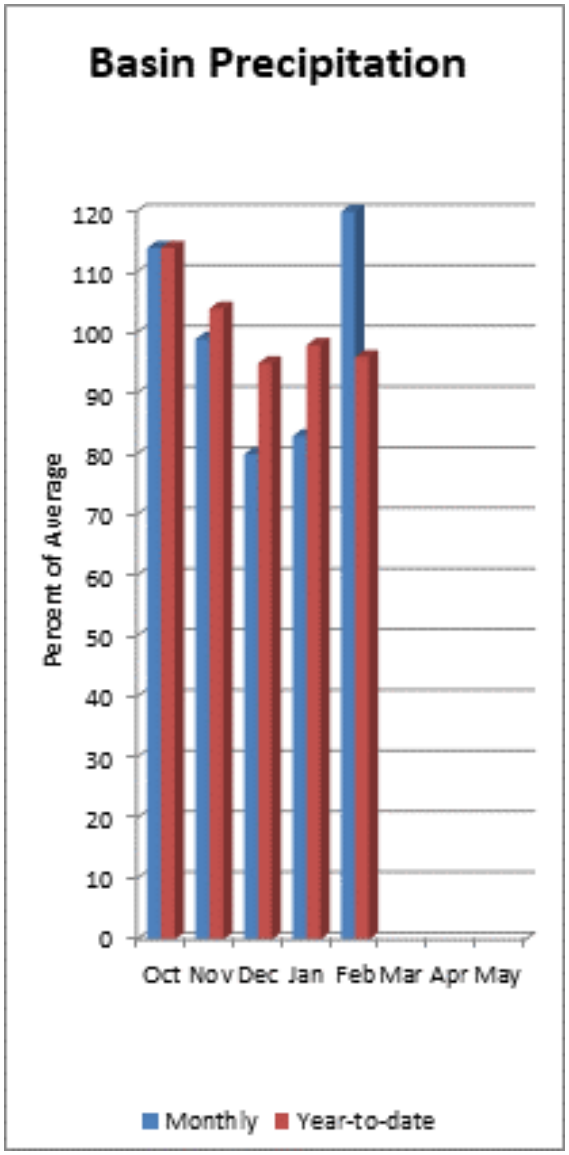
Spokane	Forecast Period	Forecast Exceedance Probabilities for Risk Assessment Chance that actual volume will exceed forecast 90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Spokane R nr Post Falls[2]								
	APR-JUL	1380	1870	2190	92%	2520	3000	2390
	APR-SEP	1450	1940	2270	92%	2600	3090	2480
Spokane R at Long Lake[2]								
	APR-JUL	1630	2120	2460	94%	2790	3280	2620
	APR-SEP	1800	2300	2650	93%	2990	3490	2850
Chamokane Ck nr Long Lake								
	MAR-JUL	10.1	16.4	21	81%	27	37	26

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, 2019	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Lake Coeur d' Alene	38.6	109.2	132.8	238.5
Basin-wide Total	38.6	109.2	132.8	238.5
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis March 1, 2019	# of Sites	% Median	Last Year % Median
Spokane	15	90%	106%
Newman Lake	3	90%	96%





February streamflow was 76% of average on the Pend Oreille River and 71% on the Columbia at Birchbank. March 1 snow cover was 102% of normal in the Pend Oreille Basin River Basin. Spring and summer runoff are forecasted for slightly below normal flows. Bunchgrass Meadows SNOTEL site had 20.2 inches of snow water on the snow pillow which is below normal for March 1. Precipitation during February was 129% of average, raising the year-to-date precipitation to 96% of average. Reservoir storage in the basin, including Lake Pend Oreille and Priest Lake was 71% of normal. Average temperatures were much below normal for February slightly below normal for the water year.

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

Data Current as of: 3/7/2019 12:05:40 PM

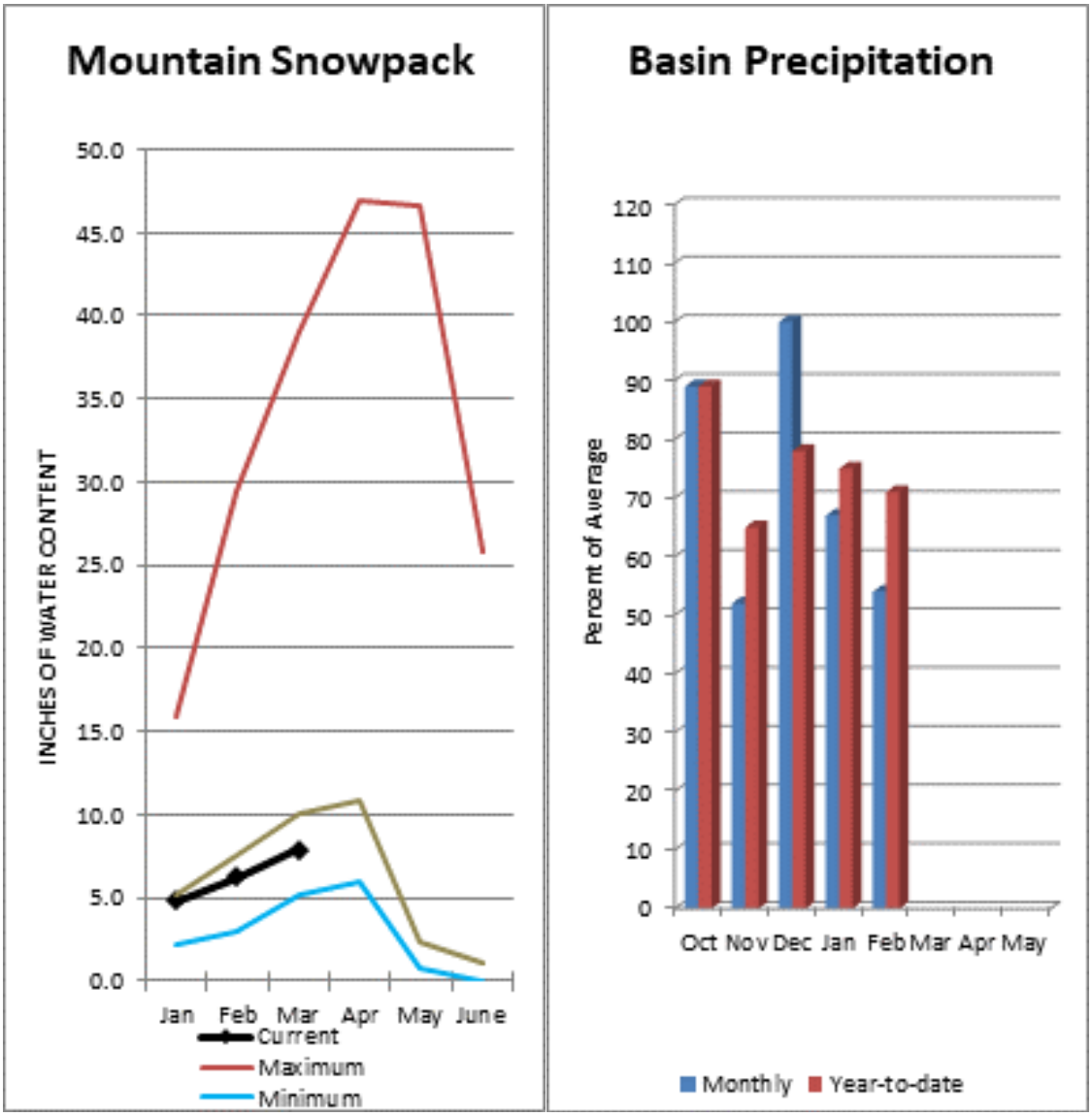
Pend Oreille Basins
Streamflow Forecasts - March 1, 2019

Pend Oreille Basins	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
		Forecast Exceedance Probabilities for Risk Assessment Chance that actual volume will exceed forecast						
Pend Oreille Lake Inflow[2]								
	APR-JUL	8190	9880	11000	93%	12200	13800	11800
	APR-SEP	8970	10800	12000	94%	13300	15100	12800
Priest R nr Priest River[2]								
	APR-JUL	570	695	780	100%	870	995	780
	APR-SEP	605	740	825	99%	915	1050	830
Pend Oreille R bl Box Canyon[2]								
	APR-JUL	8390	10000	11100	93%	12300	13900	11900
	APR-SEP	9110	10900	12100	93%	13400	15200	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, 2019	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Lake Pend Oreille	566.6	668.3	792.6	1561.3
Priest Lake	40.9	49.4	57.1	119.3
Basin-wide Total	607.4	717.7	849.7	1680.6
# of reservoirs	2	2	2	2

Watershed Snowpack Analysis March 1, 2019	# of Sites	% Median	Last Year % Median
Pend Oreille Basins	64	102%	141%
Colville River	1	101%	110%
Kettle River	3	83%	137%



March 1 snow cover on the Okanogan was 85% of normal, Omak Creek was 77% and the Methow was 82%. February precipitation in the Upper Columbia was 54% of average, with precipitation for the water year at 71% of average. Streamflow's are forecasted for below normal spring and summer runoff. February streamflow for the Methow River was 76% of average, 85% for the Okanogan River and 80% for the Similkameen. Snow-water content at Salmon Meadows SNOTEL was 4.9 inches or 74% of normal for March 1. Combined storage in the Conconully Reservoirs was 18,200 acre-feet or 124% of normal. Temperatures were much below normal for February and slightly below normal for the water year.

Data Current as of: 3/7/2019 12:05:51 PM

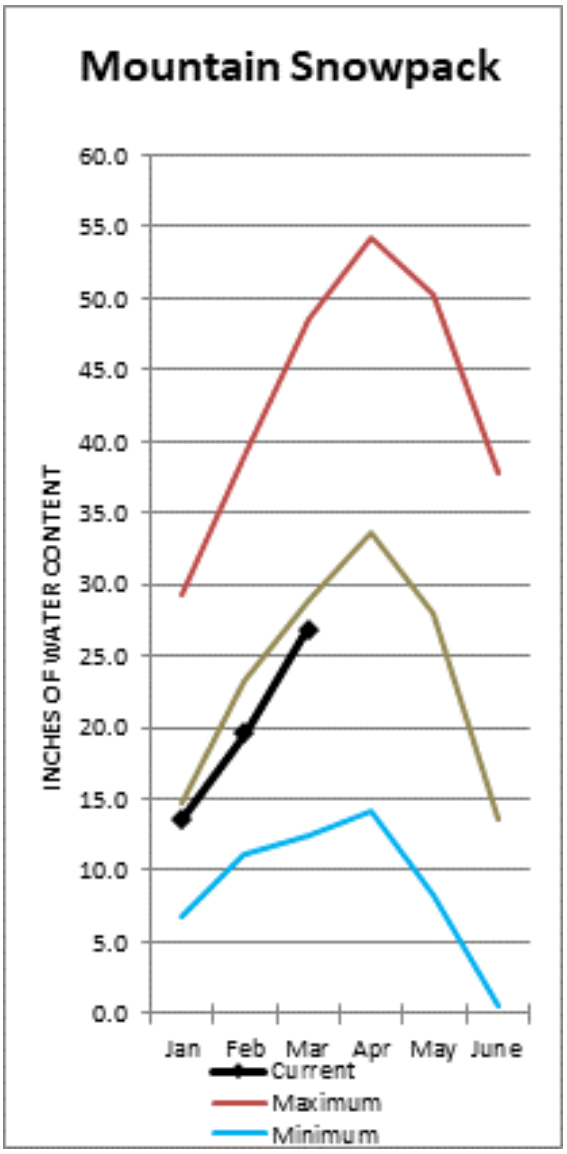
Upper Columbia Basins
Streamflow Forecasts - March 1, 2019

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	1120	1320	1450	81%	1580	1780	1800
	APR-SEP	1190	1400	1540	82%	1680	1890	1880
Colville R at Kettle Falls								
	APR-JUL	33	73	100	84%	127	167	119
	APR-SEP	37	80	110	84%	140	183	131
Columbia R at Grand Coulee-NWS[2]								
	APR-JUL	37600	40200	42000	82%	43800	47600	51015
	APR-SEP	46100	48600	50700	84%	52700	56600	60110
Similkameen R nr Nighthawk								
	APR-JUL	600	760	865	72%	970	1130	1200
	APR-SEP	625	795	910	71%	1030	1200	1280
Okanogan R nr Tonasket								
	APR-JUL	660	920	1100	74%	1270	1530	1480
	APR-SEP	710	1010	1210	73%	1410	1710	1650
Okanogan R at Malott								
	APR-JUL	670	935	1120	77%	1300	1570	1450
	APR-SEP	720	1020	1230	76%	1440	1750	1620
Methow R nr Pateros								
	APR-JUL	395	535	625	75%	720	855	835
	APR-SEP	430	575	675	75%	775	920	895

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

Reservoir Storage End of February, 2019	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Conconully Lake (Salmon Lake Dam)	7.5	7.8	7.3	10.5
Conconully Reservoir	10.8	9.2	7.4	13.0
Basin-wide Total	18.2	17.0	14.7	23.5
# of reservoirs	2	2	2	2

Watershed Snowpack Analysis March 1, 2019	# of Sites	% Median	Last Year % Median
Upper Columbia Basins	14	79%	127%
Okanogan River	7	85%	141%
Omak Creek	3	77%	109%
Sanpoil River	1	138%	138%
Similkameen River	4	72%	128%
Toats Coulee Creek	0		
Conconully Lake	1	74%	114%
Methow River	4	82%	131%



Precipitation during February was 91% of average in the basin and 93% for the year-to-date. Runoff for Entiat River is forecast to be 79% of average for the summer. The Wenatchee Basin can expect slightly below normal runoff this year. February average streamflow on the Chelan River was 47% and on the Wenatchee River 58%. March 1 snowpack in the Wenatchee River Basin was 93% of normal; the Chelan, 84%; the Entiat, 88%; Stemilt Creek, 110% and Colockum Creek, 156%. Reservoir storage in Lake Chelan was 74% of average. Lyman Lake SNOTEL had the most snow water with 38.9 inches of water. This site would normally have 48.6 inches on March 1. Temperatures were much below normal for February and below normal for the water year.

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

Data Current as of: 3/7/2019 12:06:03 PM

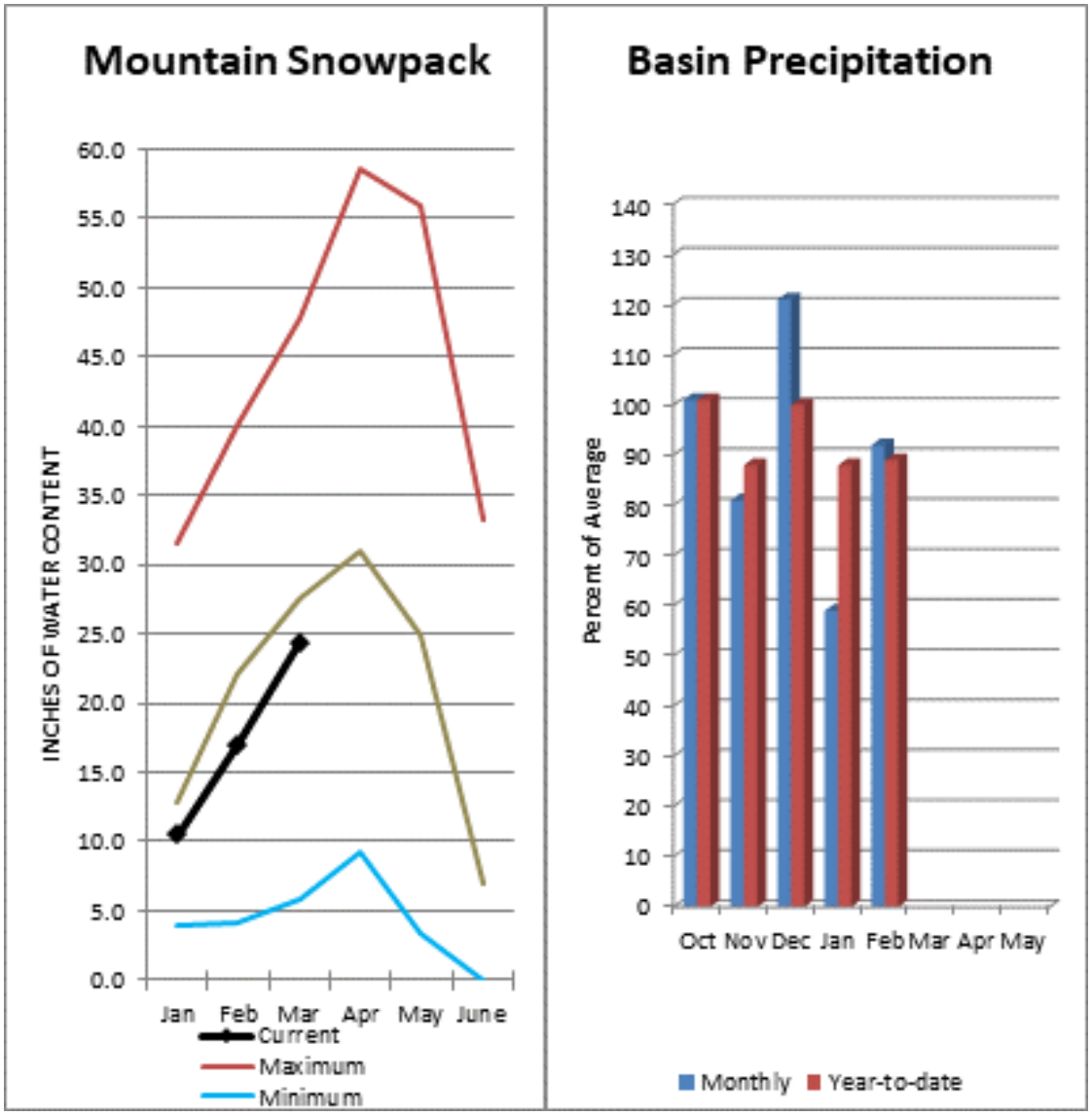
Central Columbia Basins
Streamflow Forecasts - March 1, 2019

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	465	540	595	88%	645	720	680
	APR-SEP	545	625	685	87%	740	820	790
Chelan R at Chelan								
	APR-JUL	680	790	865	87%	935	1040	1000
	APR-SEP	750	875	955	85%	1040	1160	1120
Entiat R nr Ardenvoir								
	APR-JUL	117	142	160	80%	178	205	200
	APR-SEP	125	153	173	79%	193	220	220
Wenatchee R at Plain								
	APR-JUL	665	785	870	88%	950	1070	990
	APR-SEP	715	850	945	88%	1040	1170	1080
Icicle Ck nr Leavenworth								
	APR-JUL	166	205	230	84%	255	295	275
	APR-SEP	179	220	250	83%	280	320	300
Wenatchee R at Peshastin								
	APR-JUL	900	1060	1160	85%	1260	1420	1370
	APR-SEP	965	1140	1260	85%	1380	1550	1490
Columbia R bl Rock Island Dam-NWS[2]								
	APR-JUL	40500	43300	45100	81%	47200	51900	55770
	APR-SEP	49500	52000	54200	83%	56300	61200	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, 2019	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Lake Chelan	206.2	244.9	279.8	677.4
Basin-wide Total	206.2	244.9	279.8	677.4
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis March 1, 2019	# of Sites	% Median	Last Year % Median
Central Columbia Basins	5	84%	111%
Chelan Lake Basin	5	84%	111%
Entiat River	1	88%	90%
Wenatchee River	7	93%	105%
Stemilt Creek	1	110%	82%
Colockum Creek	1	156%	124%



March 1 reservoir storage for the Upper Yakima reservoirs was 406,000-acre feet, 90% of average. February streamflow within the basin was Cle Elum River near Roslyn at 60%. March 1 snowpack was 88% based upon 8 snow course and SNOTEL readings within the Upper Yakima Basin. Precipitation was 92% of average for February and 89% for the water-year. Forecasts for spring-summer natural runoff and lake inflow are slightly below normal. 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.

Data Current as of: 3/7/2019 12:06:15 PM

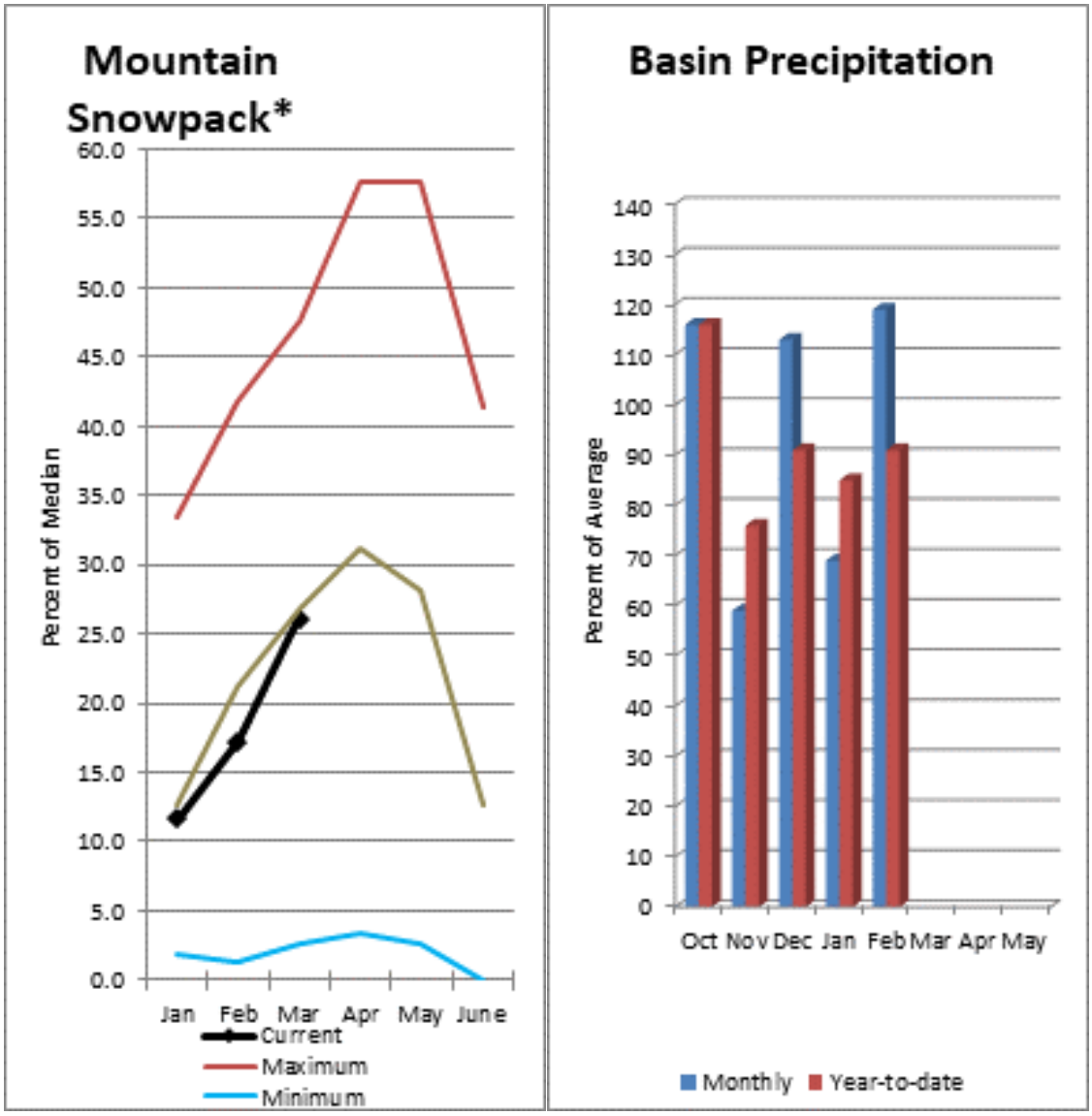
Upper Yakima River
Streamflow Forecasts - March 1, 2019

Upper Yakima River	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
		Forecast Exceedance Probabilities for Risk Assessment Chance that actual volume will exceed forecast						
Keechelus Reservoir Inflow[2]								
	APR-JUL	70	90	104	90%	118	139	116
	APR-SEP	78	100	114	90%	129	151	126
Kachess Reservoir Inflow [2]								
	APR-JUL	64	80	92	88%	103	119	104
	APR-SEP	71	88	100	88%	111	129	113
Cle Elum Lake Inflow [2]								
	APR-JUL	265	310	340	88%	375	420	385
	APR-SEP	285	335	370	89%	405	455	415
Teanaway R bl Forks nr Cle Elum								
	APR-JUL	64	90	108	83%	126	153	130
	APR-SEP	66	93	111	83%	129	156	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, 2019	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Keechelus	89.7	131.1	92.3	157.8
Kachess	152.1	185.9	143.6	239.0
Cle Elum	164.5	278.4	214.4	436.9
Basin-wide Total	406.3	595.4	450.3	833.7
# of reservoirs	3	3	3	3

Watershed Snowpack Analysis March 1, 2019	# of Sites	% Median	Last Year % Median
Upper Yakima River	8	88%	96%



February average streamflow's within the basin were: Yakima River near Parker, 49% and the Naches River near Naches, 52%. Forecasts for spring-summer natural runoff are currently near normal. March 1 reservoir storage for Bumping and Rimrock reservoirs was 98,000-acre feet, 72% of average. March 1 snowpack was 97% based upon 6 snow course and SNOTEL readings within the Lower Yakima Basin and Ahtanum Creek reported in at 110% of normal. Precipitation was 119% of average for February and 91% for the water-year. Temperatures were much below normal for February 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: 3/7/2019 12:06:26 PM

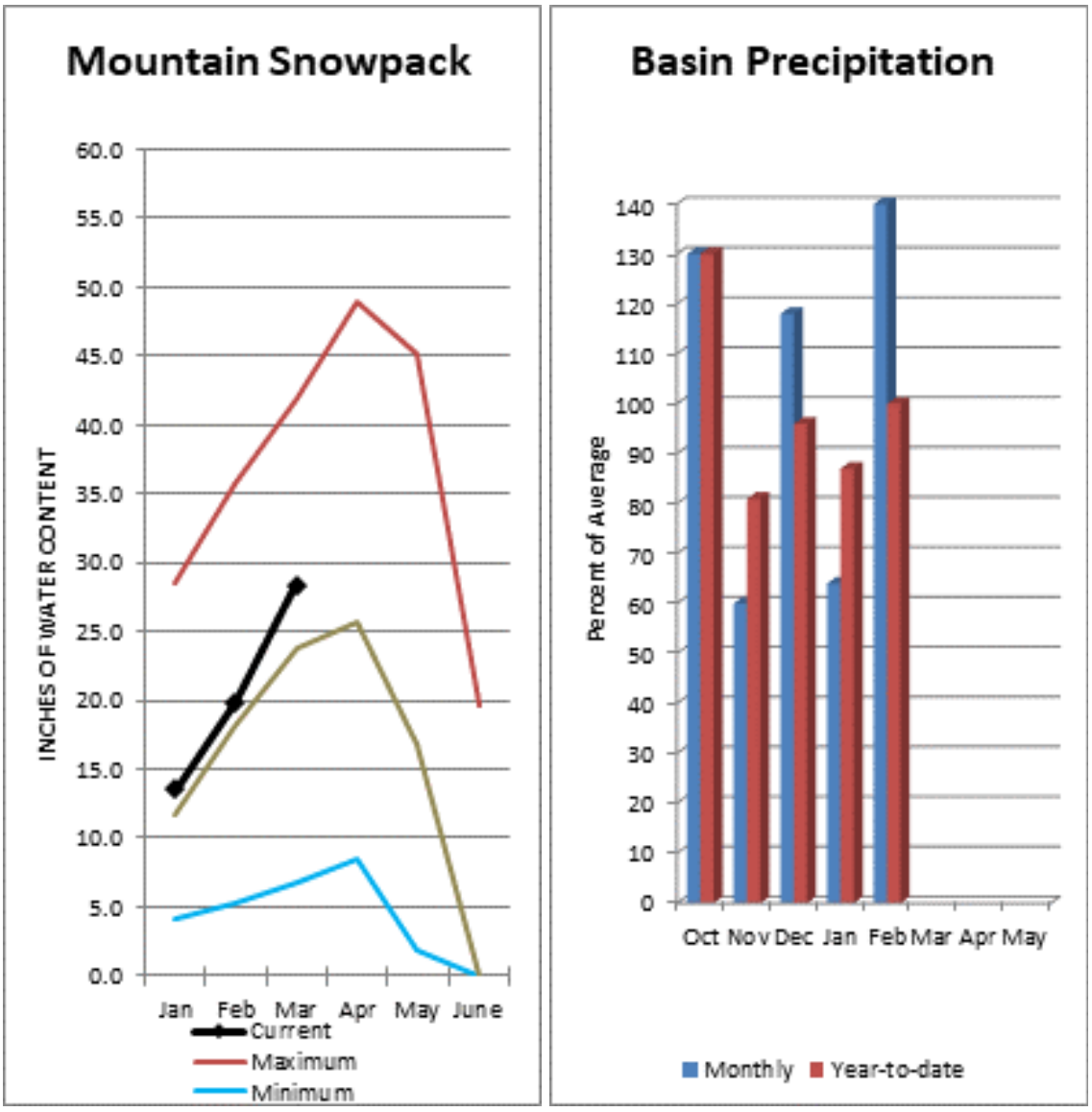
Lower Yakima River
Streamflow Forecasts - March 1, 2019

Lower Yakima River	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
		Forecast Exceedance Probabilities for Risk Assessment Chance that actual volume will exceed forecast						
Bumping Lake Inflow [2]								
	APR-JUL	77	93	103	90%	114	130	114
	APR-SEP	83	100	112	91%	124	141	123
American R nr Nile								
	APR-JUL	69	83	92	90%	102	115	102
	APR-SEP	74	89	99	90%	110	125	110
Rimrock Lake Inflow [2]								
	APR-JUL	141	162	177	95%	192	215	187
	APR-SEP	166	192	210	95%	225	255	220
Naches R nr Naches								
	APR-JUL	440	565	645	92%	730	850	700
	APR-SEP	480	615	705	93%	800	935	760
Ahtanum Ck at Union Gap								
	APR-JUL	15	23	29	107%	35	43	27
	APR-SEP	17	26	31	107%	37	46	29
Yakima R nr Parker [2]								
	APR-JUL	1030	1300	1490	90%	1680	1960	1660
	APR-SEP	1140	1430	1630	90%	1830	2130	1820
Klickitat R nr Glenwood								
	APR-JUL	85	106	120	95%	134	155	126
	APR-SEP	95	117	132	95%	148	170	139
Klickitat R nr Pitt								
	APR-JUL	320	385	435	100%	480	550	435
	APR-SEP	395	470	525	101%	575	655	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, 2019	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Bumping Lake	10.9	18.8	13.3	33.7
Rimrock	87.0	177.9	123.3	198.0
Basin-wide Total	97.9	196.7	136.6	231.7
# of reservoirs	2	2	2	2

Watershed Snowpack Analysis March 1, 2019	# of Sites	% Median	Last Year % Median
Lower Yakima River	6	97%	91%
Ahtanum Creek	2	110%	72%



February precipitation was 165% of average, maintaining the year-to-date precipitation at 100% of average. Snowpack in the basin was 119% of normal. Average temperatures were much below normal for February and slightly below for the water year. April-September runoff is forecasted to be slightly above normal.

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

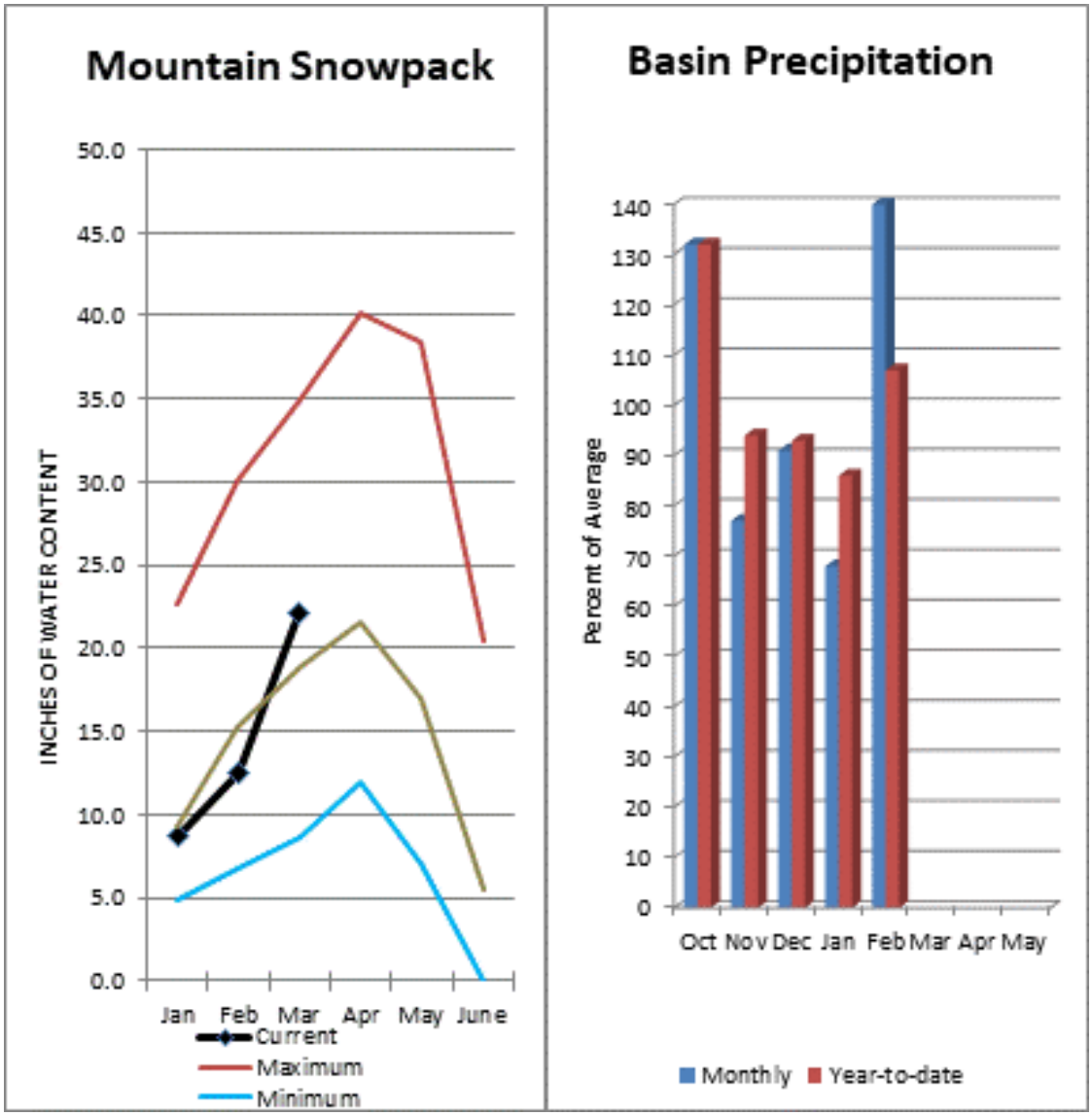
Data Current as of: 3/7/2019 12:06:38 PM

Walla Walla River
Streamflow Forecasts - March 1, 2019

		Forecast Exceedance Probabilities for Risk Assessment Chance that actual volume will exceed forecast						
Walla Walla River	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
SF Walla Walla R nr Milton-Freewater								
	MAR-JUL	60	69	75	110%	81	90	68
	APR-SEP	58	67	73	111%	79	87	66
Mill Ck nr Walla Walla								
	APR-JUL	17.5	22	24	100%	27	31	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 March 1, 2019	# of Sites	% Median	Last Year % Median
Walla Walla River	2	119%	82%



February precipitation was 184% of average, bringing the year-to-date precipitation down to 104% of average. March 1 snowpack readings averaged 115% of normal. February streamflow was 62% of average for Snake River below Lower Granite Dam and 53% for Grande Ronde River near Troy. Spring-summer runoff is expected to be near to above normal. Dworshak Reservoir storage was 97% of average. Average temperatures were much below normal for February and below normal for the water year.

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

Data Current as of: 3/7/2019 12:06:50 PM

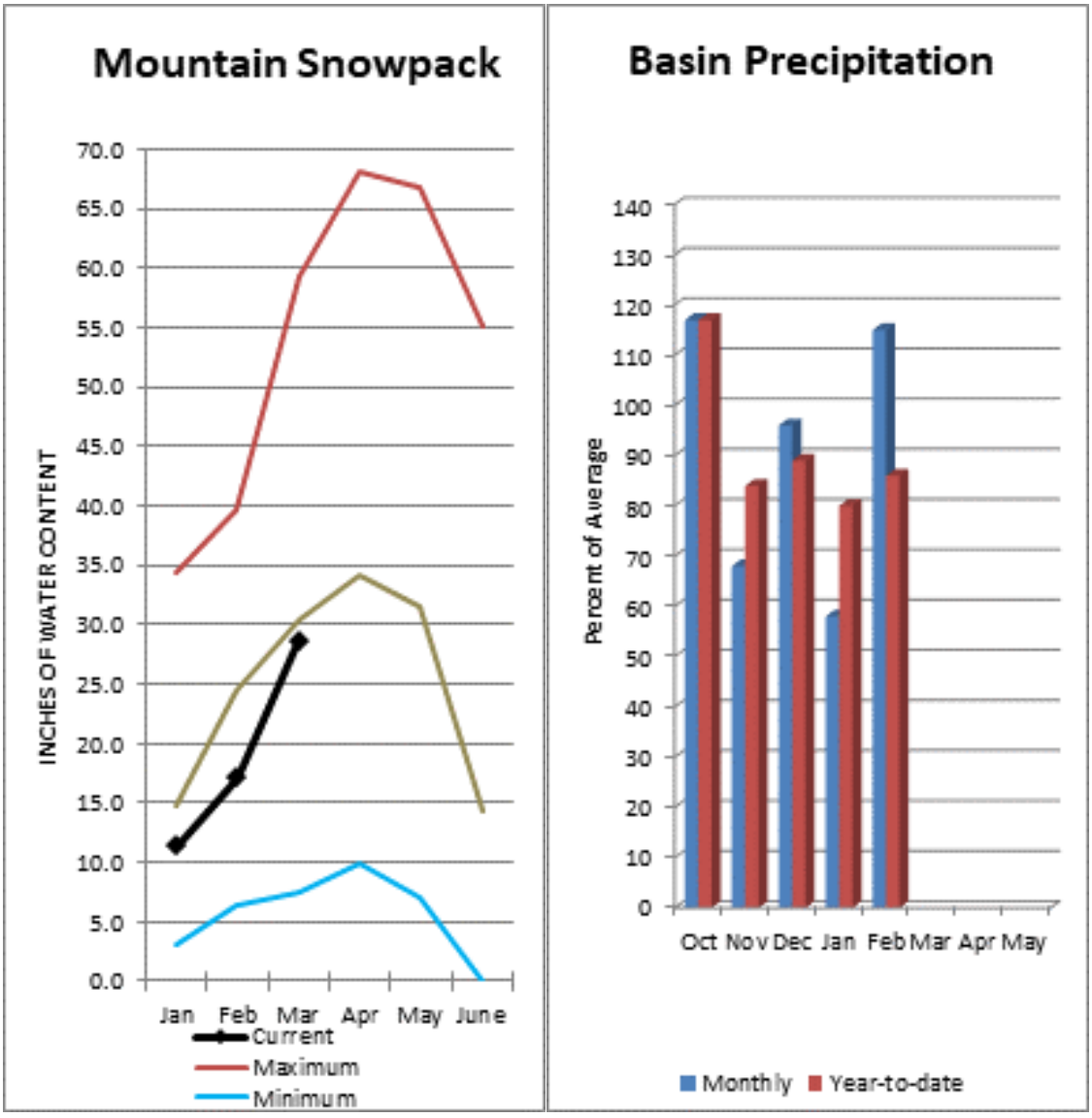
Lower Snake, Grande Ronde, Clearwater Basins
Streamflow Forecasts - March 1, 2019

		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	1510	1760	1930	128%	2100	2340	1510
	APR-SEP	1240	1490	1650	126%	1820	2070	1310
Asotin Ck at Asotin								
	APR-JUL	24	34	41	117%	50	63	35
Clearwater R at Spalding[2]								
	APR-JUL	5220	6230	6910	100%	7600	8610	6890
	APR-SEP	5530	6570	7280	100%	7990	9030	7270
Snake R bl Lower Granite Dam-NWS[2]								
	APR-JUL	17500	19700	21500	108%	23400	26800	19848
	APR-SEP	18600	20900	22800	102%	24900	28200	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, 2019	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Dworshak Reservoir	2294.7	2064.0	2358.0	3468.0
Basin-wide Total	2294.7	2064.0	2358.0	3468.0
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis March 1, 2019	# of Sites	% Median	Last Year % Median
Lower Snake, Grande Ronde, Clearwater Basins	14	115%	89%



Forecasts for April – September streamflows within the basin are Lewis River at Ariel, 98% and Cowlitz River at Castle Rock, 102% of average. The Columbia at The Dalles is forecasted to have 93% of average flows this summer according to the River Forecast Center. February average streamflow for Cowlitz River was 54% and the Columbia River at The Dalles was 64% of average. February precipitation was 115% of average and the water-year average was 86%. March 1 snow cover for Cowlitz River was 98%, and Lewis River was 90% of normal. Temperatures were much below normal during February but near average for the water year.

Data Current as of: 3/7/2019 12:07:00 PM

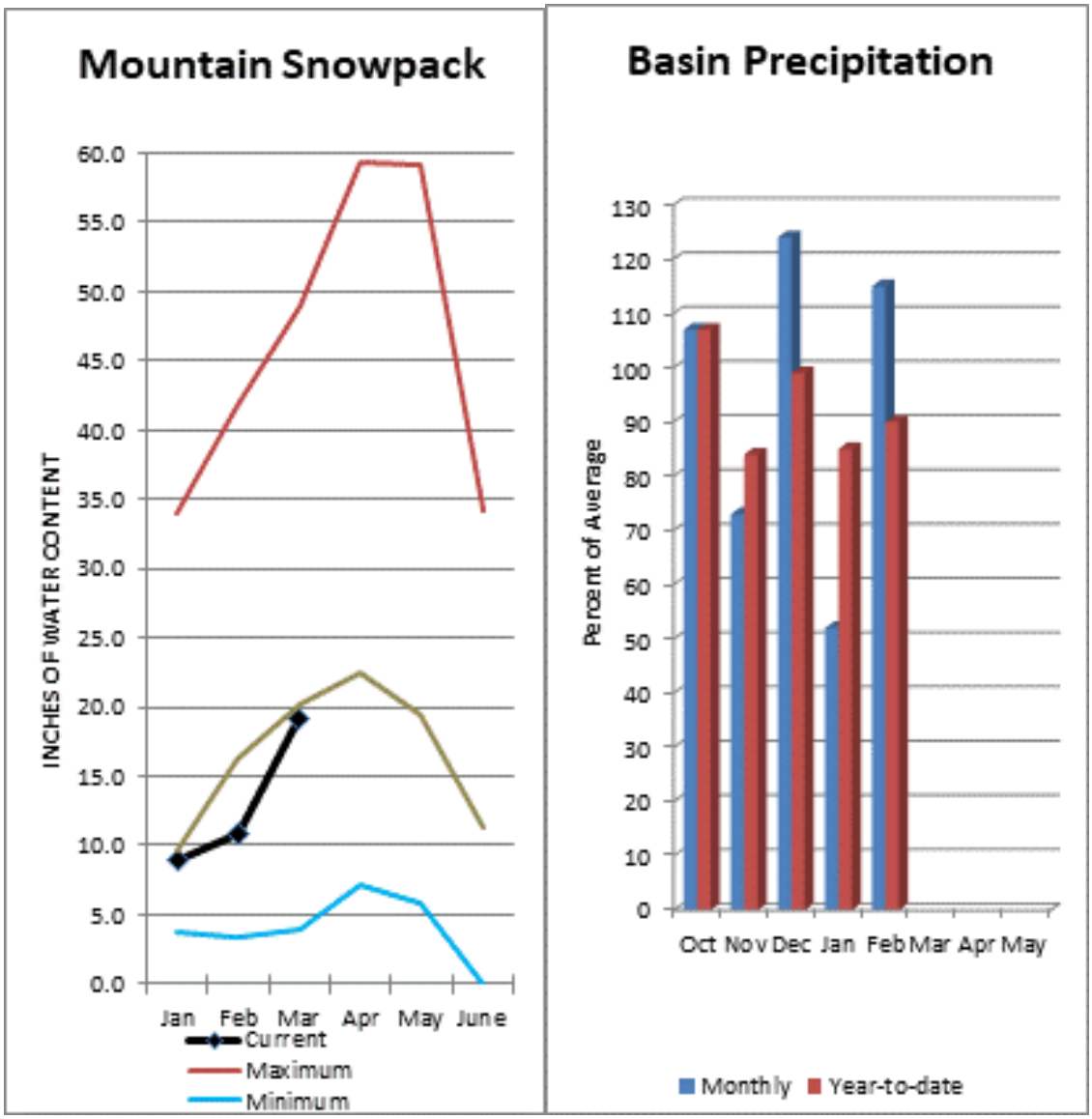
Lower Columbia Basins
Streamflow Forecasts - March 1, 2019

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

Lower Columbia Basins	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Columbia R at The Dalles-NWS[2]								
	APR-JUL	63100	68200	70800	89%	75600	81200	79855
	APR-SEP	77500	83100	86600	93%	90700	96900	92704
Klickitat R nr Glenwood								
	APR-JUL	85	106	120	95%	134	155	126
	APR-SEP	95	117	132	95%	148	170	139
Klickitat R nr Pitt								
	APR-JUL	320	385	435	100%	480	550	435
	APR-SEP	395	470	525	101%	575	655	520
Lewis R at Ariel[2]								
	APR-JUL	670	840	950	98%	1060	1230	970
	APR-SEP	805	980	1100	98%	1220	1390	1120
Cowlitz R bl Mayfiled[2]								
	APR-JUL	1190	1440	1610	99%	1780	2030	1630
	APR-SEP	1410	1710	1920	104%	2120	2420	1840
Cowlitz R at Castle Rock[2]								
	APR-JUL	1770	2050	2240	100%	2430	2710	2240
	APR-SEP	2090	2400	2600	102%	2810	3120	2540

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, 2019	# of Sites	% Median	Last Year % Median
Lower Columbia Basins	11	94%	110%
Lewis River	5	90%	109%
Cowlitz River	6	98%	111%



March 1 snowpack was 102% of average for the White River, 110% for Puyallup River and 78% in the Green River Basin. February precipitation was 115% of average, bringing the water year-to-date to 90% of average for the basins. Summer runoff is forecasted to be near normal. Average temperatures in the area were much below normal for February and near normal for the water-year.

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

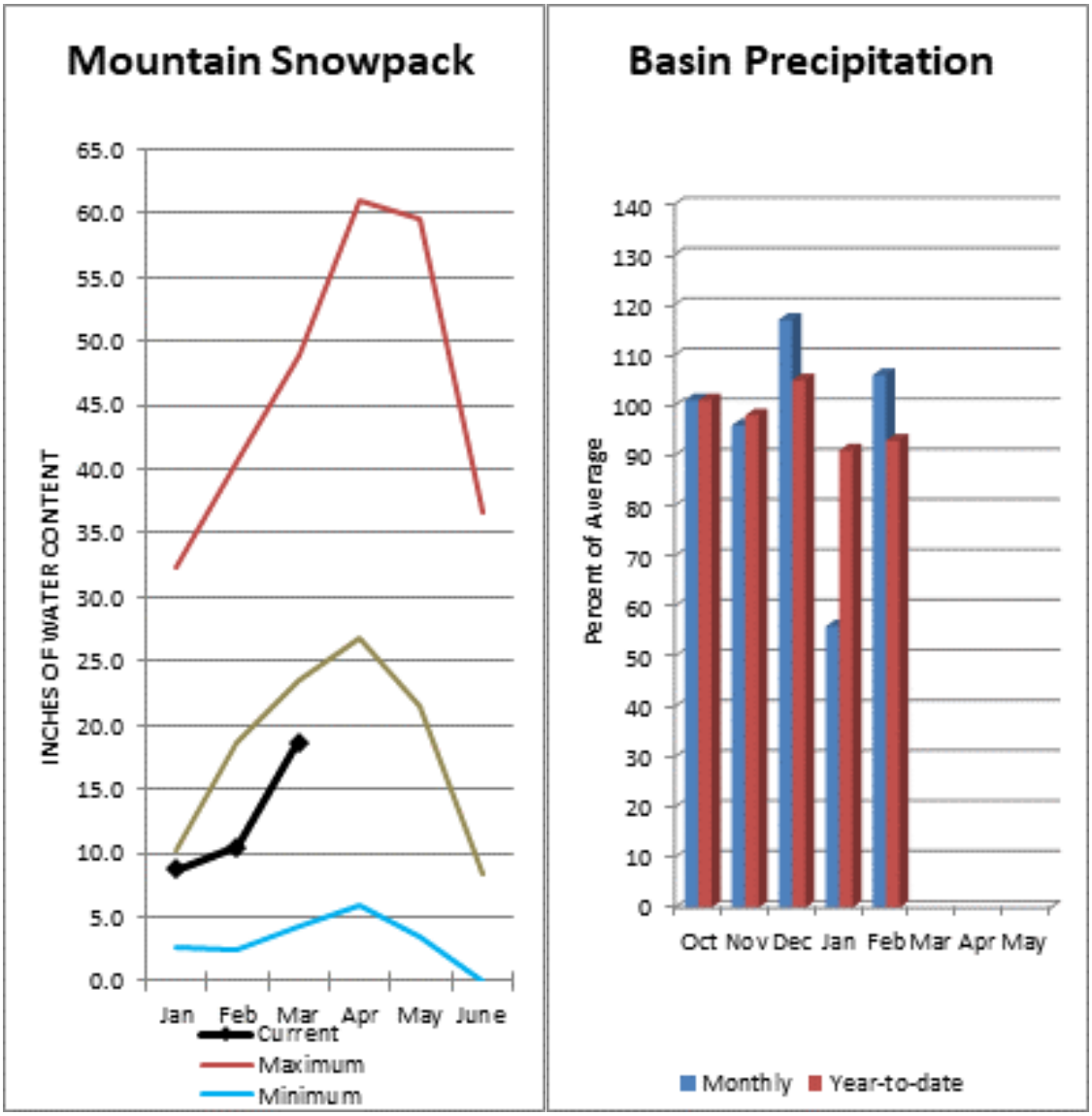
Data Current as of: 3/7/2019 12:07:11 PM

South Puget Sound Basins
Streamflow Forecasts - March 1, 2019

		Forecast Exceedance Probabilities for Risk Assessment Chance that actual volume will exceed forecast						
South Puget Sound Basins	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
White R nr Buckley[1,2]								
	APR-JUL	325	405	440	102%	475	555	430
	APR-SEP	395	485	525	102%	565	655	515
Green R bl Howard A Hanson Dam[1,2]								
	APR-JUL	117	184	215	91%	245	315	235
	APR-SEP	139	210	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, 2019	# of Sites	% Median	Last Year % Median
South Puget Sound Basins	10	95%	100%
White River	2	102%	110%
Green River	4	78%	85%



Basin-wide precipitation for February was 106% of average, bringing water-year-to-date to 93% of average. March 1 median snow cover in Cedar River Basin was 80%, Tolt River Basin was 68%, Snoqualmie River Basin was 70%, and Skykomish River Basin was 71%. Basin runoff is forecasted to be slightly below normal this summer. Temperatures were much below normal for February and near normal for the water-year.

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

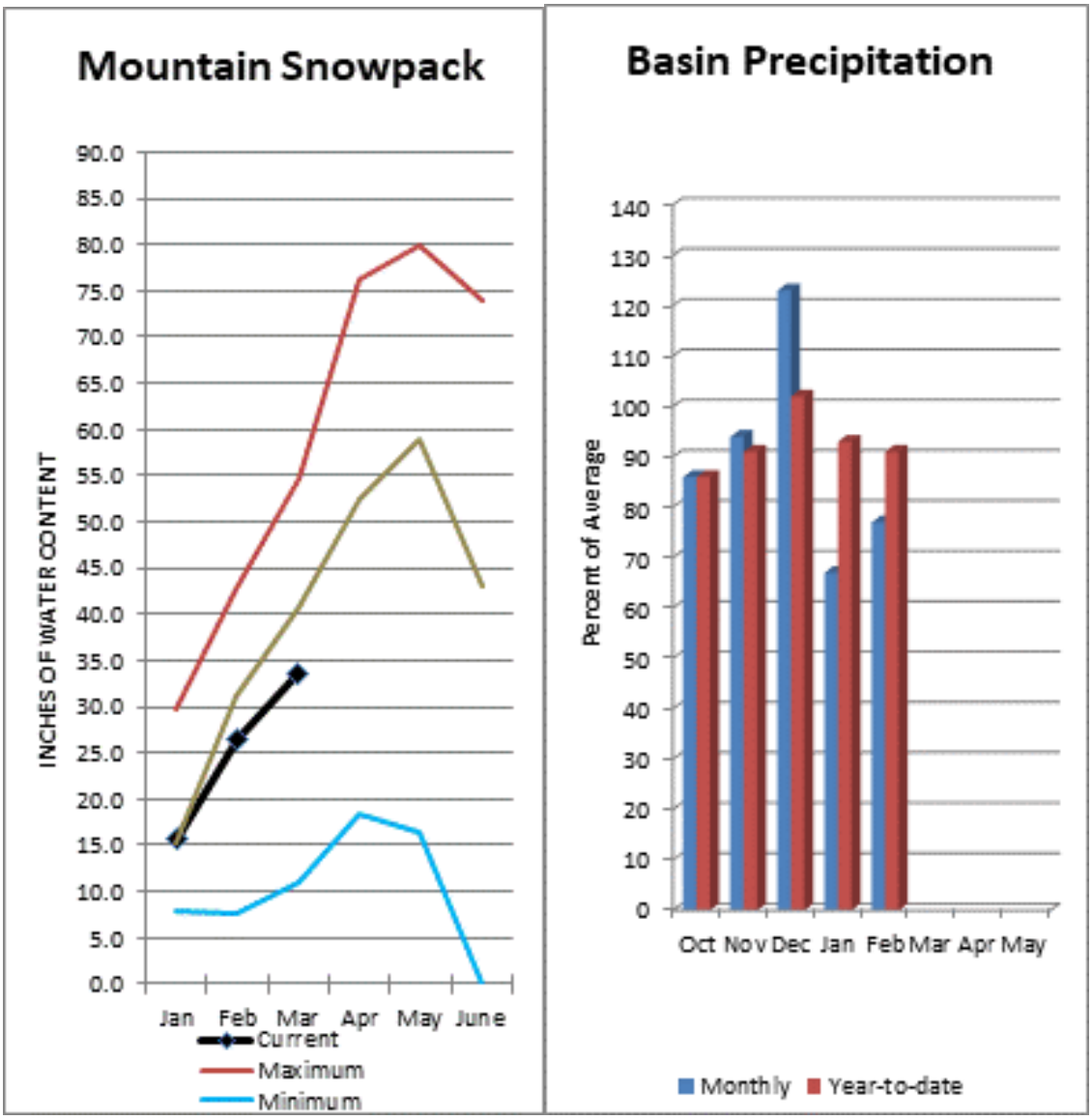
Data Current as of: 3/7/2019 12:07:23 PM

Central Puget Sound Basins
Streamflow Forecasts - March 1, 2019

		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	45	55	62	89%	69	79	70
	APR-SEP	51	61	69	91%	76	86	76
Rex R nr Cedar Falls								
	APR-JUL	14	18.8	22	92%	25	30	24
	APR-SEP	16.4	21	25	93%	28	33	27
Taylor Ck nr Selleck								
	APR-JUL	13.3	16.3	18.4	92%	20	23	20
	APR-SEP	16.6	19.9	22	92%	24	28	24
SF Tolt R nr Index								
	APR-JUL	8.6	10.9	12.5	88%	14.1	16.5	14.2
	APR-SEP	10.2	12.8	14.6	91%	16.4	19.1	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, 2019	# of Sites	% Median	Last Year % Median
Central Puget Sound Basins	15	79%	107%
Puyallup River	4	110%	111%
Cedar River	6	80%	101%
Tolt River	3	68%	118%
Snoqualimie River	5	70%	108%
Skykomish River	3	71%	119%



Forecast for Skagit River streamflow at Newhalem is 88% of average for the spring and summer period. February streamflow in Skagit River was 52% of average. Other forecast points included Baker River at 95% and Thunder Creek at 89% of average. Basin-wide precipitation for February was 77% of average, bringing water-year-to-date to 91% of average. March 1 average snow cover in Skagit River Basin was 83% and the Nooksack River Basin was 78% and the Baker River Basin was 80%. March 1 Skagit River reservoir storage was 83% of average and 48% of capacity. Average temperatures were much below normal for February but near normal for the water year.

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

Data Current as of: 3/7/2019 12:07:35 PM

North Puget Sound Basins
Streamflow Forecasts - March 1, 2019

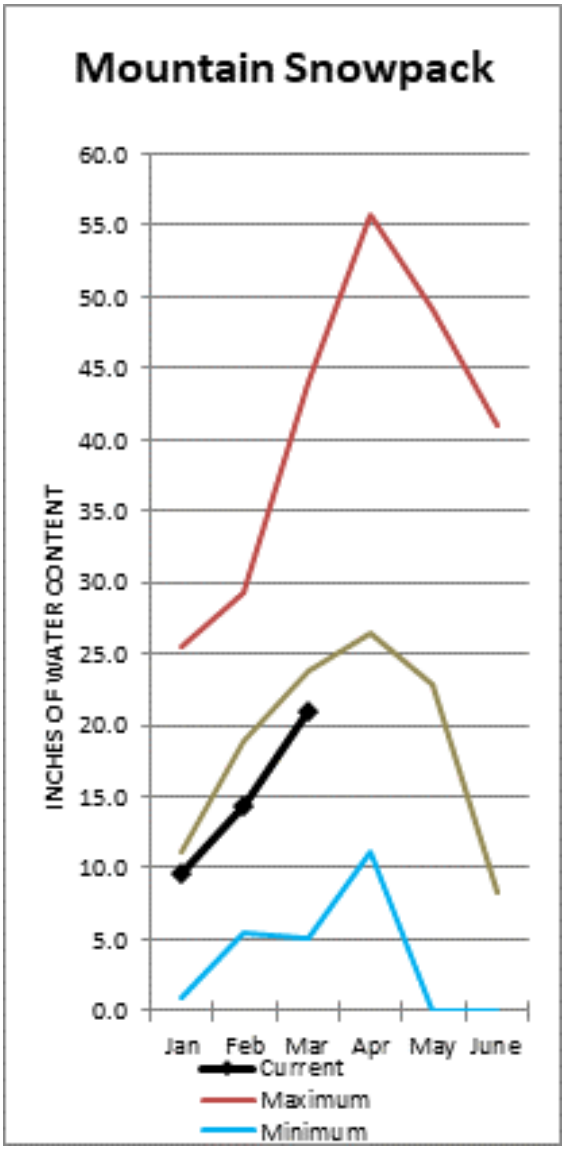
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

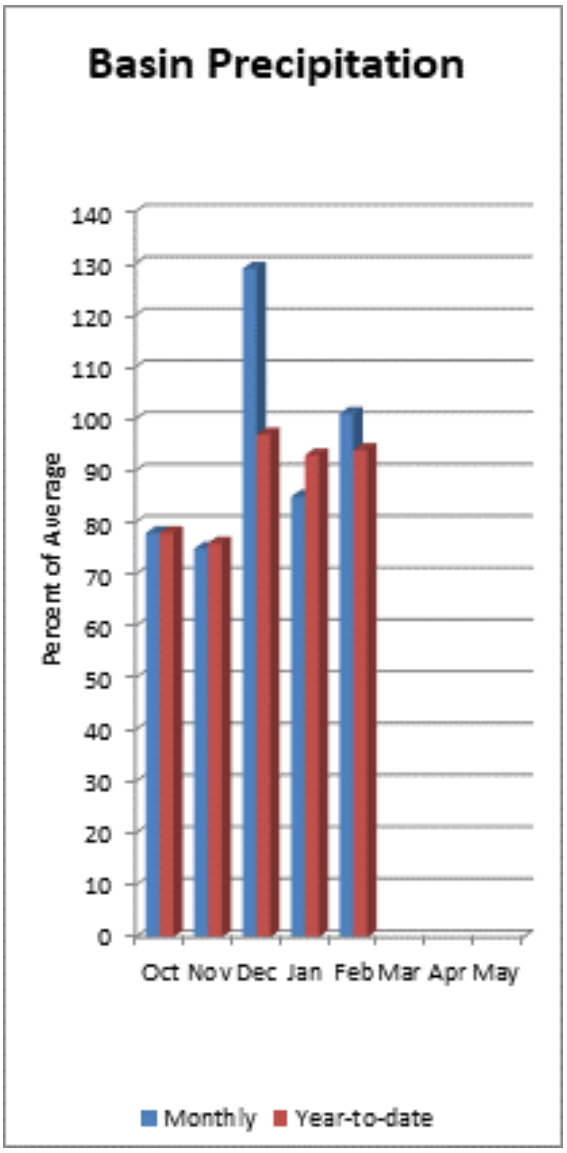
North Puget Sound Basins	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Thunder Ck nr Newhalem								
	APR-JUL	179	199	210	89%	225	245	235
	APR-SEP	260	280	295	89%	315	335	330
Skagit R at Newhalem[2]								
	APR-JUL	1300	1450	1550	89%	1650	1800	1750
	APR-SEP	1560	1720	1830	88%	1950	2110	2070
Baker R at Concrete								
	APR-JUL	560	655	720	92%	780	875	780
	APR-SEP	715	845	930	95%	1020	1150	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, 2019	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Ross	692.6	740.4	832.4	1434.7
Basin-wide Total	692.6	740.4	832.4	1434.7
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis March 1, 2019	# of Sites	% Median	Last Year % Median
North Puget Sound Basins	17	82%	120%
Skagit River	14	83%	118%
Baker River	0		
Nooksack River	3	78%	127%





February Dungeness River runoff was 62% of normal. February precipitation was 101% of average. Precipitation has accumulated at 94% of average for the water year. February precipitation at Quillayute was 103 % of normal but only 76% of normal in Sequim. Olympic Peninsula snowpack averaged 88% of normal on March 1 with the North and East sides doing much better than the South and West sides. The Dungeness and Elwha rivers are respectively forecasted to see 101% and 95% normal runoff this summer. Temperatures were much below average for February and near normal for the water year.

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

Data Current as of: 3/7/2019 12:07:46 PM

Olympic Penninsula
Streamflow Forecasts - March 1, 2019

		Forecast Exceedance Probabilities for Risk Assessment Chance that actual volume will exceed forecast						
Olympic Penninsula	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Dungeness R nr Sequim								
	APR-JUL	99	112	121	101%	130	143	120
	APR-SEP	118	134	146	101%	157	174	145
Elwha R at McDonald Br nr Port Angeles								
	APR-JUL	315	355	385	96%	415	455	400
	APR-SEP	355	410	445	95%	480	535	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, 2019	# of Sites	% Median	Last Year % Median
Olympic Penninsula	6	88%	128%

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

Washington Water Supply Outlook Report

Natural Resources Conservation Service
Spokane, WA

Issued by

Matthew J. Lohr
Chief
Natural Resources Conservation Service
U.S. Department of Agriculture

Released by

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

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

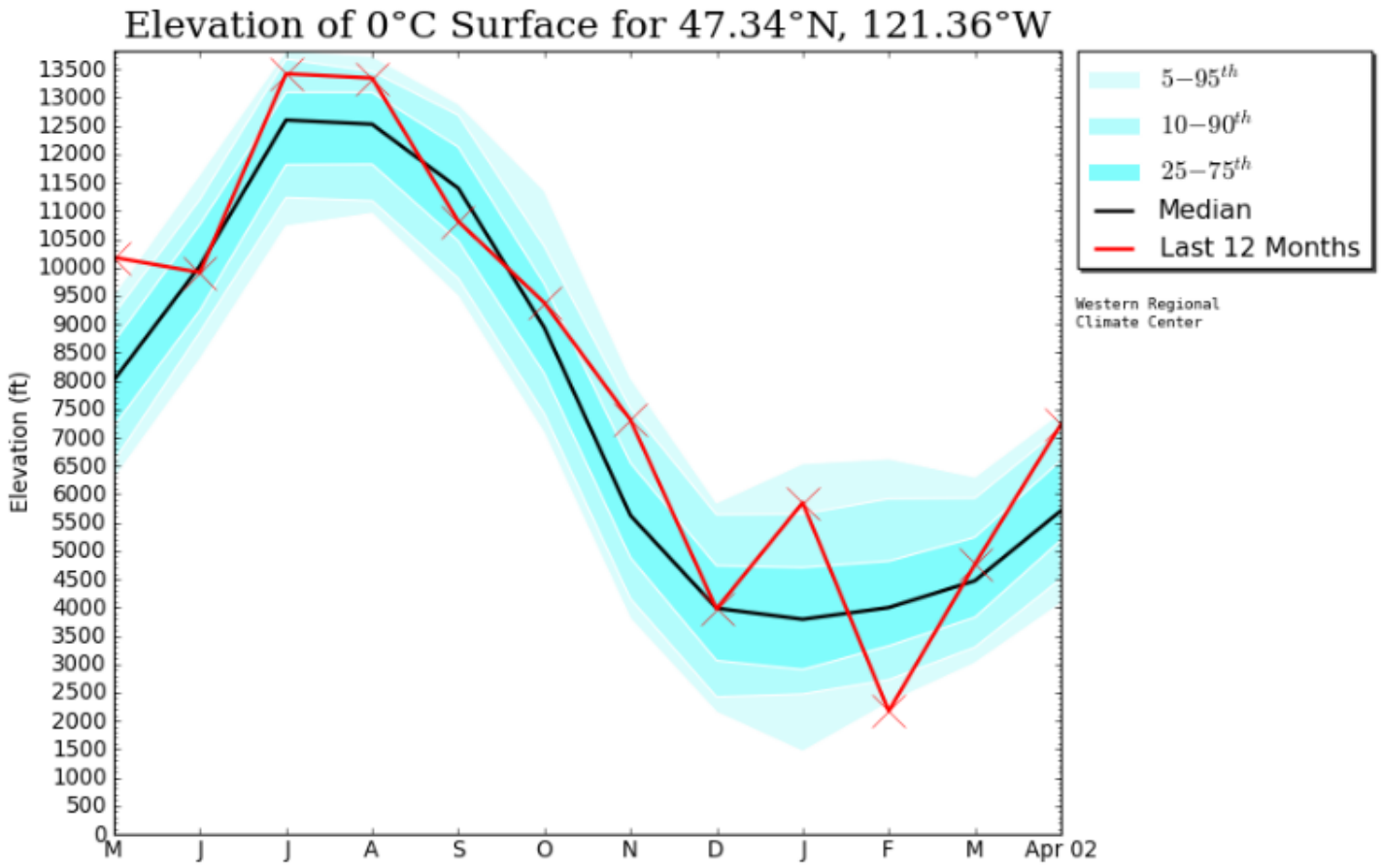
Canada	Snow Survey Network Program – British Columbia Ministry of Environment
	River Forecast Center – British Columbia Ministry of Forests, Lands and Natural Resource Operations
State	Washington State Department of Ecology
	Washington State Department of Natural Resources
Federal	Department of the Army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

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

United States Department of Agriculture

NRCS Natural Resources Conservation Service

Washington
Water Supply Outlook Report
April 1, 2019



The above chart depicts the daily freeze elevation as compared to the 1981-2010 median freezing level near Stampede Pass, WA. Freezing levels still above normal for the year, February and early March notwithstanding. The warm/dry summer coupled with the warm/dry winter is having adverse effects on predicted spring-summer runoff.

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
Water Supply Specialist
Natural Resources Conservation Service
2005 E. College Way, Suite 203
Mt. Vernon, WA 98273-2873
(360) 488-4826

or

Larry Johnson
State Conservation Engineer
Natural Resources Conservation Service
W 316 Boone Ave., Suite 450
Spokane, WA 99201
(509) 323-2955

How forecasts are made

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

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

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

Washington
Water Supply Outlook

April 2019

General Outlook

March started off promising with reasonable snowfall in the mountains and even a rare shot of snow in the low lands during week 2. The rest of the month suddenly dried up, receiving less than 20% of normal precipitation and setting records statewide. Normal snowmelt has been observed at mid-low elevations however snow above about 4000-4500' seems to be holding, for now. Governor Jay Inslee has declared drought in the Okanogan, Methow and Upper Yakima basins. Additional basins are under careful watch and may be included later. The Washington Drought Monitor shows spreading D0-D1 drought conditions for most of the state. (Figure 2, Page 4) The current 30-day weather forecast is calling for Above normal temperatures and above normal precipitation, (Figure 1, page 4). NWS 3-month (AMJ) forecast still indicates above normal temperatures but below normal precipitation. http://www.cpc.ncep.noaa.gov/

Snowpack

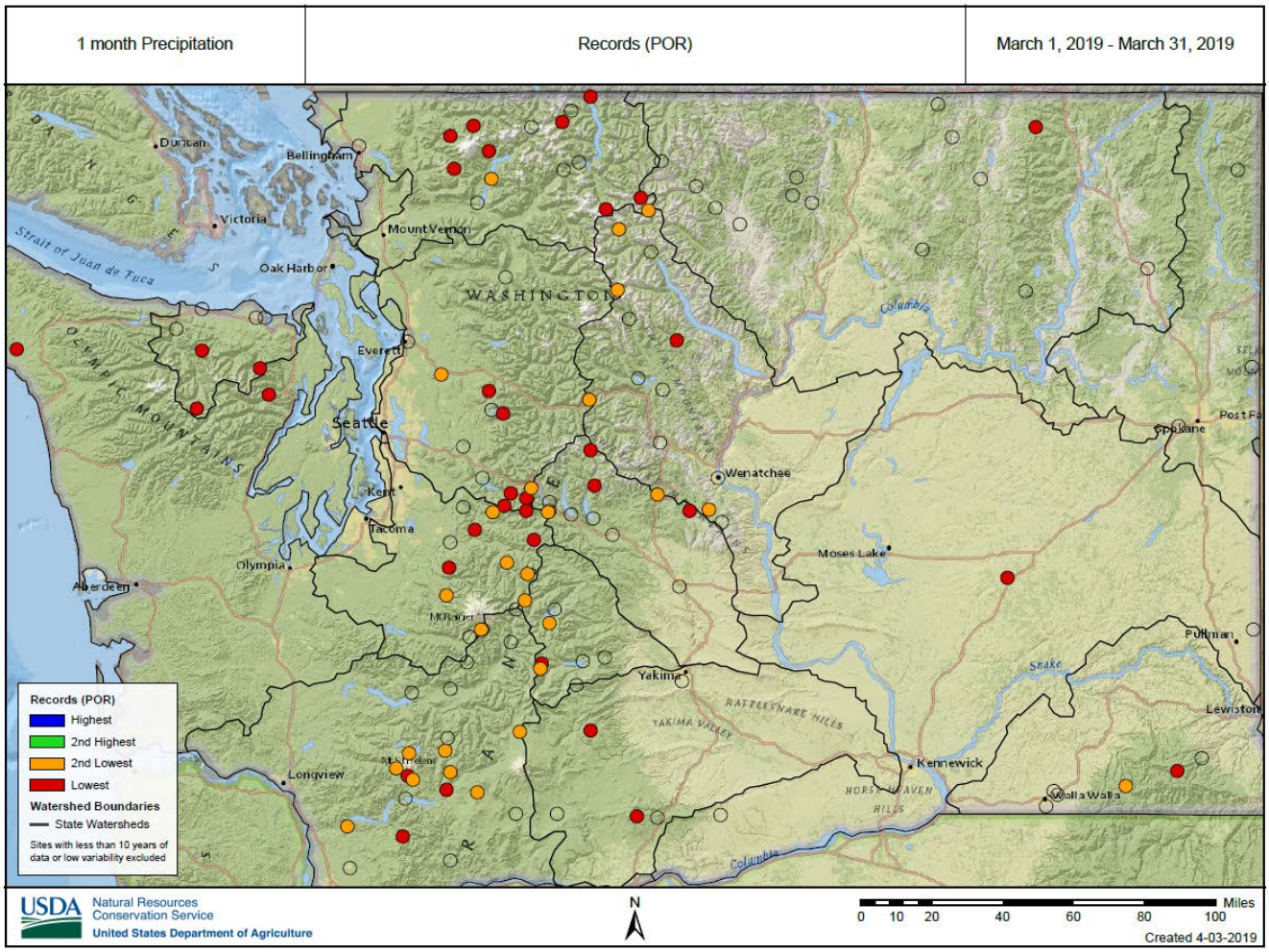
The April 1 statewide SNOTEL readings were back up to 80% of normal, 10 points lower than last month. The lack of precipitation equated to the lack of adequate snowfall to keep us near normal. For every day that went by without mountain snow accumulation we lost ground. Colockum Creek maintained the highest median at 177%. Westside medians from SNOTEL and April 1 snow surveys, included the North Puget Sound river basins with 69% of normal, the Central and South Puget river basins with 65% and 78% respectively, and the Lower Columbia basins with 88% of normal. Snowpack along the east slopes of the Cascade Mountains included the Yakima area with 82% and the Wenatchee area with 81%. Snowpack in the Spokane River Basin was at 89% and the Upper Columbia river basins had 69% of the long-term median.

BASIN	PERCENT OF MEDIAN	LAST YEAR PERCENT MEDIAN
Spokane	89	116
Newman Lake	86	113
Pend Oreille	94	141
Okanogan	70	141
Methow	77	129
Conconully Lake	54	160
Central Columbia	81	107
Upper Yakima	76	98
Lower Yakima	87	92
Ahtanum Creek	103	79
Walla Walla	121	96
Lower Snake	108	94
Cowlitz	91	111
Lewis	85	115
White	85	103
Green	62	93
Puyallup	90	107
Cedar	60	103
Snoqualmie	63	112
Skykomish	64	119
Tolt	62	123
Skagit	71	121
Nooksack	68	130
Baker	59	106
Olympic Peninsula	70	117

Precipitation

March precipitation varied little across the state as evidenced in the image below where many long-term records were broken. March statewide SNOTEL precipitation was only 27% of normal. Year-to-date precipitation dropped to 81%. The Olympic Peninsula only received 10% of normal precipitation. The Lower Snake faired the best capturing 48% of normal, primarily from sites located in Oregon and Idaho.

RIVER BASIN	MARCH PERCENT OF AVERAGE	WATER YEAR PERCENT OF AVERAGE
Spokane	33	77
Pend Oreille	39	87
Upper Columbia	36	66
Central Columbia	25	85
Upper Yakima	20	80
Lower Yakima	31	83
Walla Walla	38	91
Lower Snake	56	96
Lower Columbia	29	77
South Puget Sound	34	82
Central Puget Sound	27	83
North Puget Sound	19	81
Olympic Peninsula	10	82

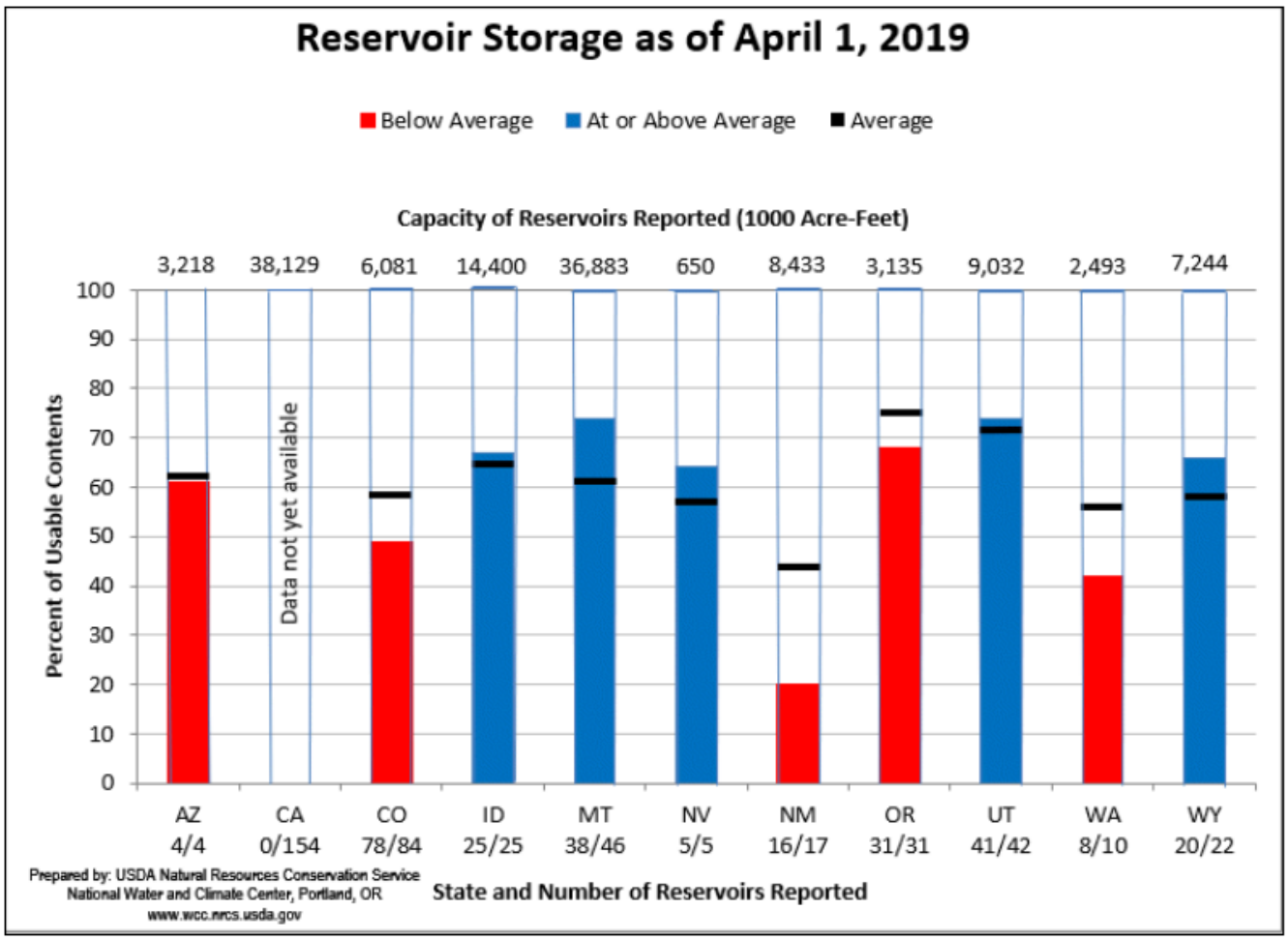


For more information contact your local Natural Resources Conservation Service office.

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 416,500-acre feet, 81% of average for the Upper Reaches and 99,000-acre feet or 66% of average for Rimrock and Bumping Lakes. The power generation reservoirs included the following: Coeur d'Alene Lake, 133,100-acre feet, 80% of average and 56% of capacity; and the Skagit River reservoirs at 69% of average and 36% 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	56	80
Pend Oreille	38	76
Upper Columbia	80	125
Central Columbia	28	73
Upper Yakima	50	81
Lower Yakima	43	66
Lower Snake	69	99
North Puget Sound	36	69



Streamflow

Due to the extremely dry March all forecasts have dropped by at least 10% from last month, putting many of them near or below the current state drought declaration authority of 75% of normal for the April – September runoff period. The Walla Walla and Lower Snake basins are the only areas to retain above normal runoff forecasts. Volumetric forecasts are developed using current, historic and average snowpack, precipitation and streamflow data collected and coordinated by organizations cooperating with NRCS.

March streamflow's are compiled by the Northwest River Forecast Center. The lack of March precipitation brought all reported streamflow's to below or much below normal.

BASIN	PERCENT OF AVERAGE FORCAST (50% CHANCE OF EXCEEDENCE)
Spokane	70-78
Priest River	78-82
Upper Columbia	56-84
Central Columbia	70-83
Upper Yakima	64-76
Lower Yakima	77-93
Walla Walla	100-111
Lower Snake	83-121
Lower Columbia	83-94
South Puget Sound	79-89
Central Puget Sound	75-79
North Puget Sound	79-82
Olympic Peninsula	84-85

STREAM	PERCENT OF AVERAGE MARCH STREAMFLOWS
Pend Oreille at Albeni Fall Dam	62
Kettle at Laurier	66
Columbia at International Bndry	62
Spokane at Spokane	56
Similkameen at Nighthawk	68
Okanogan at Tonasket	79
Methow at Pateros	63
Chelan at Chelan	62
Stehekin near Stehekin	60
Wenatchee at Pashastin	58
Cle Elum near Roslyn	52
Yakima at Parker	60
Naches at Naches	60
Grande Ronde at Troy	89
Snake below Lower Granite Dam	91
Columbia River at The Dalles	79
Lewis at Merwin Dam	46
Cowlitz below Mayfield Dam	54
Skagit at Concrete	48
Dungeness near Sequim	75

Climate

Figure 1: ONE-MONTH TEMPERATURE AND PRECIPITATION OUTLOOK

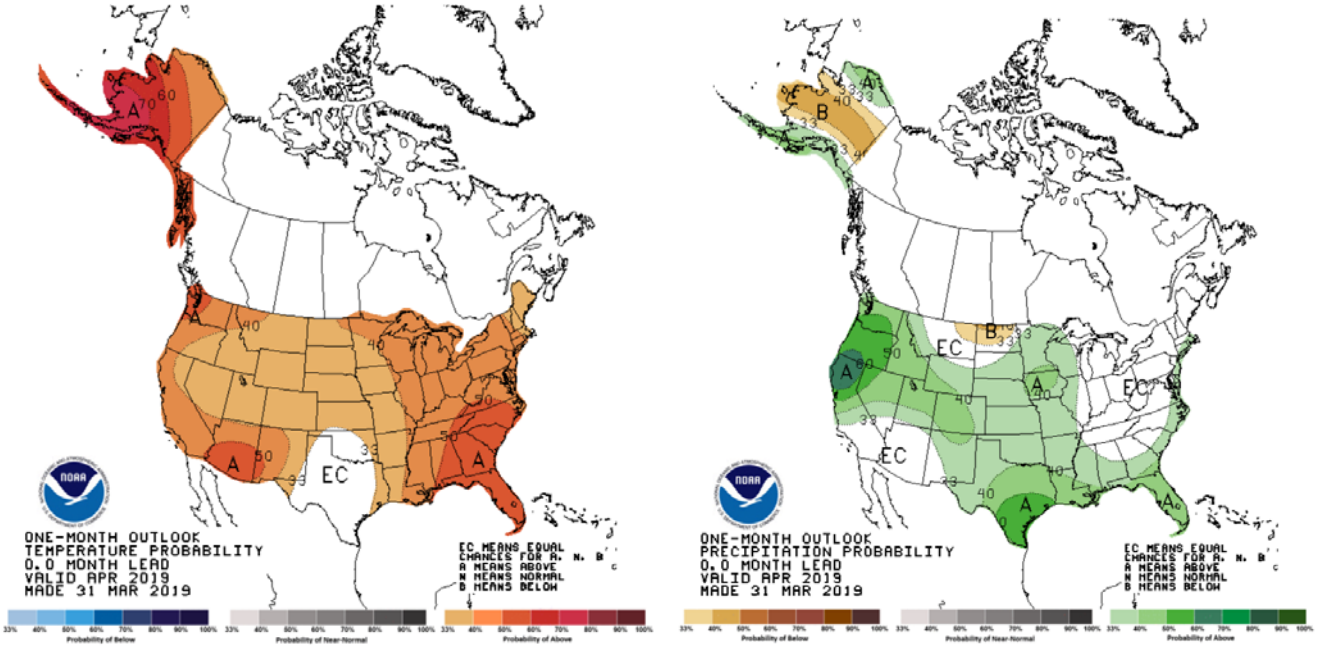
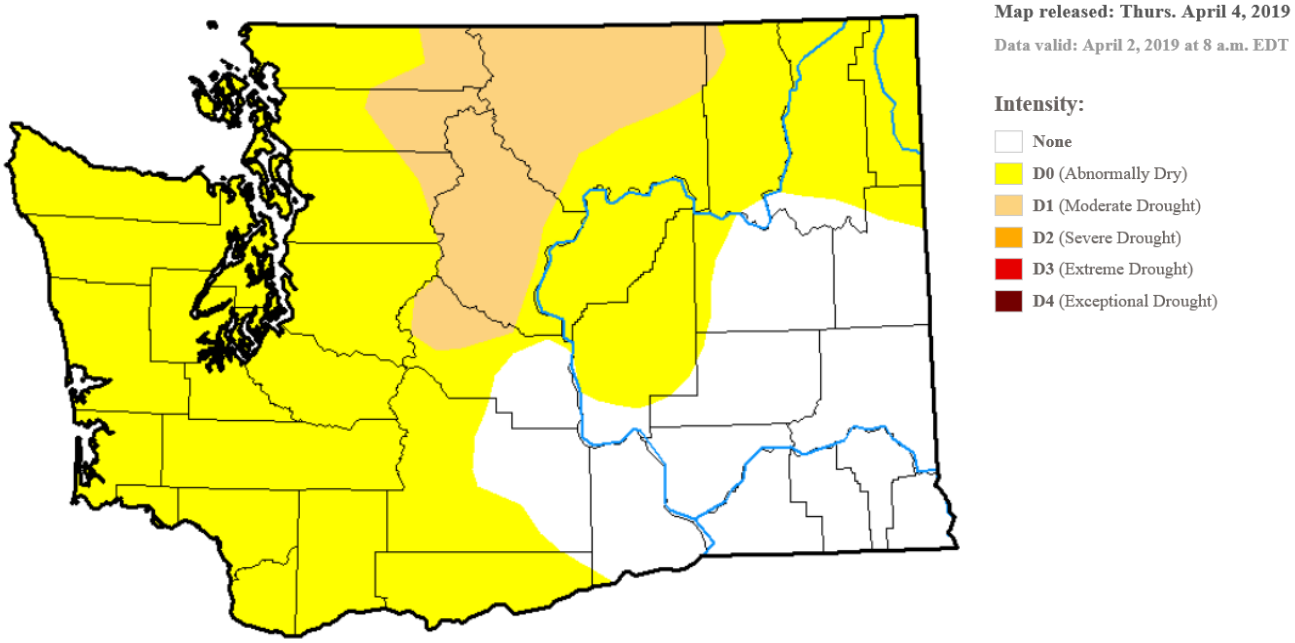


Figure 2: Washington State Drought Monitor



Natural Resources Conservation Service

Washington State
Snow, Water and Climate Services

Program Contacts

Washington:

Roylene Rides At The Door
State Conservationist
Spokane State Office
W. 316 Boone Ave., Suite 450
Spokane, WA 99201-2348
phone: 509-323-2961
roylene.rides-at-the-door@wa.usda.gov

Scott Pattee
Water Supply Specialist
Washington Snow Survey Office
2005 E. College Way, Suite 203
Mount Vernon, WA 98273-2873
phone: 360-488-4826
scott.pattee@wa.usda.gov

Oregon:

Scott Oviatt
Supervising Hydrologist
Oregon Data Collection Office
1201 NE Lloyd Blvd., STE 900
Portland, OR 97232
Phone: 503-414-3271
scott.oviatt@or.usda.gov

Gus Goodbody/Jolyne Lea
Forecast Hydrologist
National Water and Climate Center
1201 NE Lloyd Blvd., STE 800
Portland, OR 97232
phone: 503-414-3033/3040
angus.goodbody@por.usda.gov
jolyne.lea@por.usda.gov

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

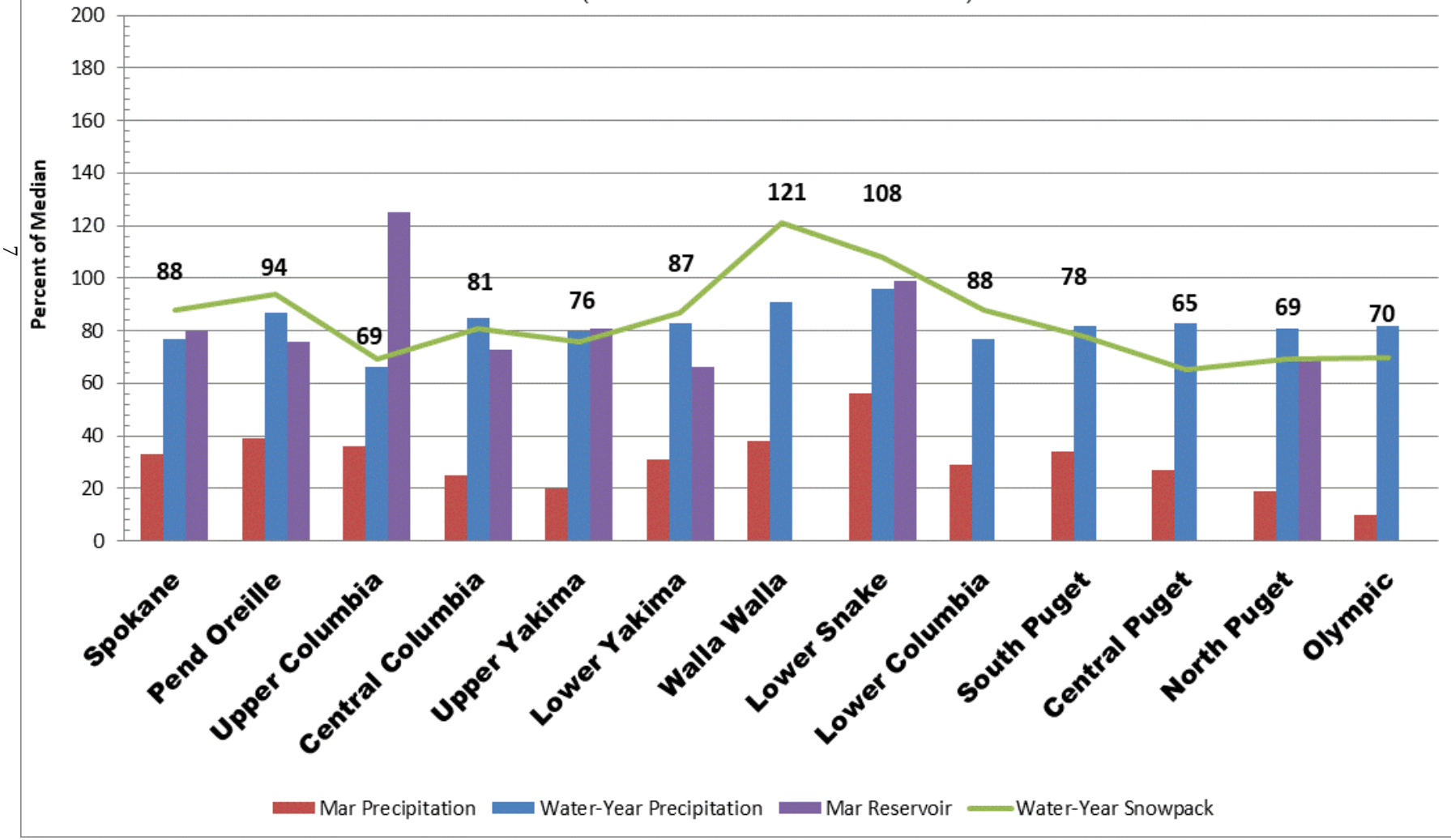
Washington:
http://www.nrcs.usda.gov/wps/portal/nrcs/site/wa/home/

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

NRCS Natural Resources Conservation Service

April 1, 2019 - Snowpack, Precipitation and Reservoir Conditions at a Glance

(Water Year = October 1 - Current Date)



86th Meeting of the Western Snow Conference

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

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

Dates: April 15-18, 2019
Location: Reno, NV

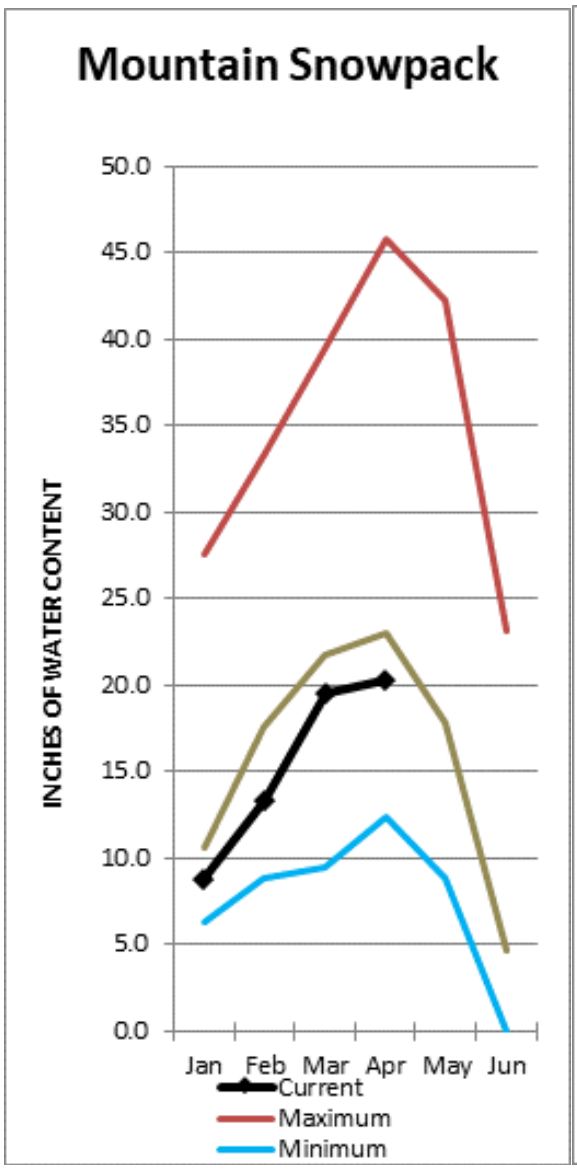
Registration and the call for papers are open for the 87th annual Western Snow Conference in Reno, Nevada, April 15-18, 2019. The conference venue offers the opportunity to interact with other professionals while enjoying the "The Biggest Little City in the World" and is where Dr. Church made the first snow surveys in the west. This provided the initiative and importance to monitor the mountain snowpack and produce streamflow forecasts for wise planning and management of water in the west.

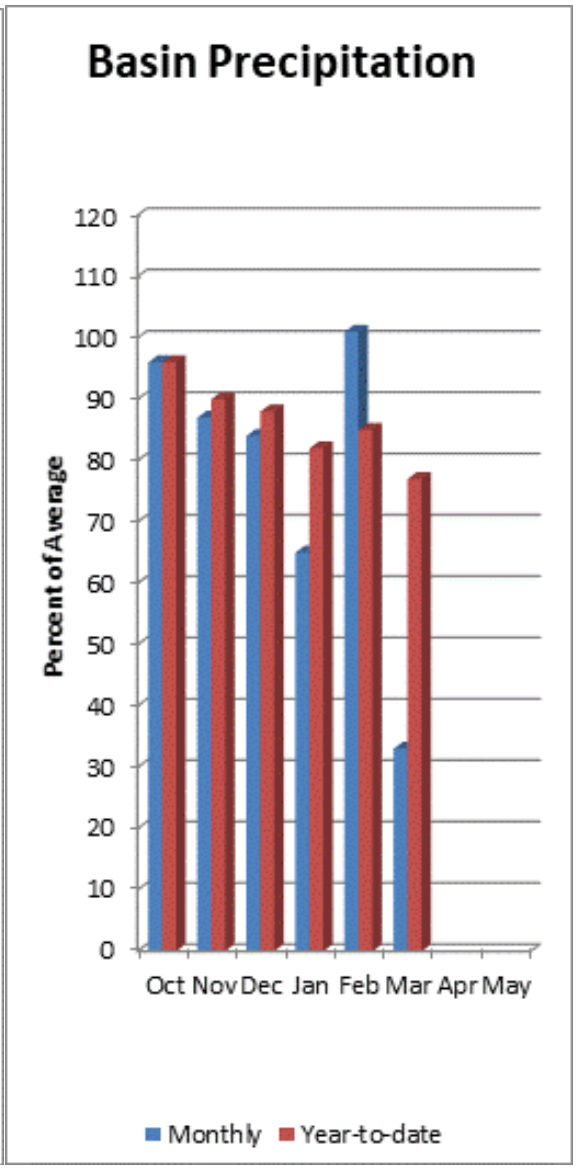
Additional information about the conference and the Call for Papers will be posted on the WSC web page at http://www.westernsnowconference.org/

Also find Western Snow Conference on Facebook and Twitter.

The dead line for reservations at the Renaissance Reno Downtown Hotel is **April 24** so be sure to reserve your room soon and be sure to ask for the Western Snow Conference block of rooms or use the links posted on the above website.

Spokane River Basin





Basin snowpack is 88% of normal and precipitation is 77% of average for the water year. Precipitation for March was below normal at 33% of average. Streamflow's are forecasted for slightly below normal spring and summer runoff. Streamflow on the Spokane River at Spokane was 56% of average for March. April 1 storage in Coeur d'Alene Lake was 133,100-acre feet, 80% of average and 56% of capacity. Snowpack at Quartz Peak SNOTEL site was 86% of average with 16.2 inches of water content. Average temperatures in the Spokane basin were colder than normal for March and near normal for the water year.

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

Data Current as of: 4/4/2019 1:40:40 PM

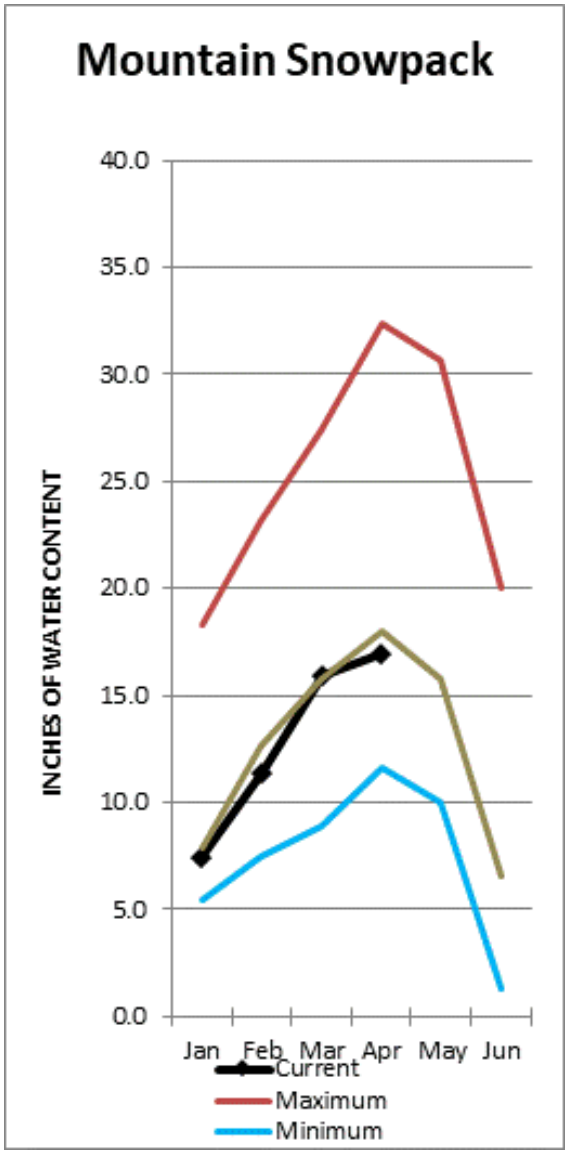
Spokane
Streamflow Forecasts - April 1, 2019

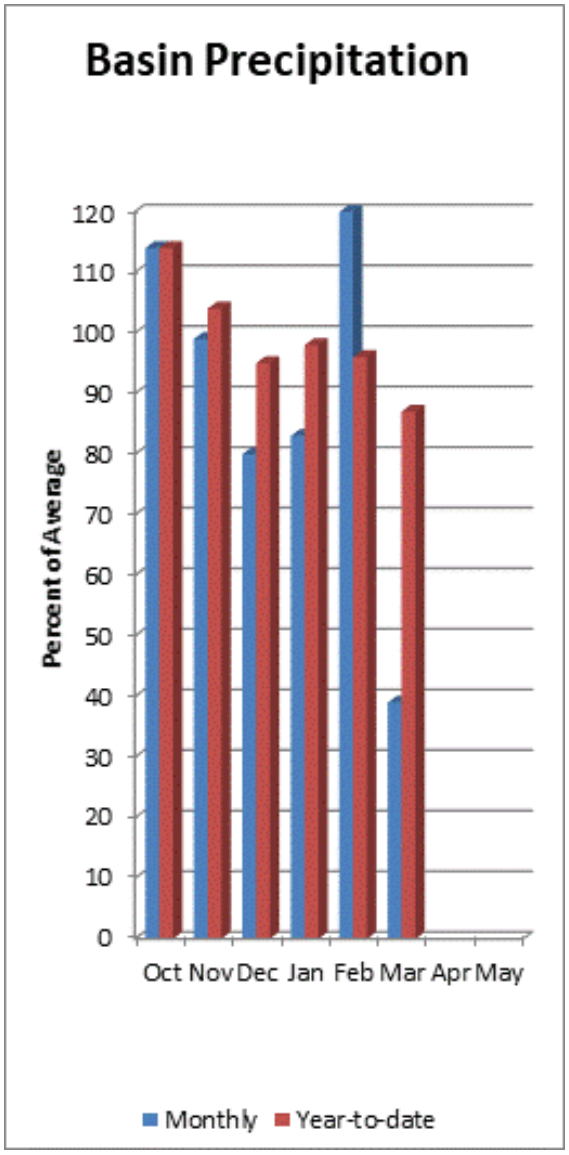
Spokane	Forecast Period	Forecast Exceedance Probabilities for Risk Assessment Chance that actual volume will exceed forecast 90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Spokane R nr Post Falls[2]								
	APR-JUL	1220	1570	1810	76%	2040	2390	2390
	APR-SEP	1280	1630	1880	76%	2120	2470	2480
Spokane R at Long Lake[2]								
	APR-JUL	1450	1810	2050	78%	2300	2660	2620
	APR-SEP	1600	1970	2230	78%	2480	2860	2850
Chamokane Ck nr Long Lake								
	APR-JUL	4.9	7.9	10.3	70%	13.1	17.8	14.8

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

Reservoir Storage End of March, 2019	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Lake Coeur d' Alene	133.1	133.4	165.5	238.5
Basin-wide Total	133.1	133.4	165.5	238.5
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis April 1, 2019	# of Sites	% Median	Last Year % Median
Spokane	16	88%	116%
Newman Lake	1	86%	113%





March streamflow was 62% of average on the Pend Oreille River and 62% on the Columbia at the International Boundary. April 1 snow cover was 94% of normal in the Pend Oreille Basin River Basin. Spring and summer runoff are forecasted for slightly below normal flows. Bunchgrass Meadows SNOTEL site had 21.7 inches of snow water on the snow pillow which is below normal for April 1. Precipitation during March was 39% of average, dropping the year-to-date precipitation to 87% of average. Reservoir storage in the basin, including Lake Pend Oreille and Priest Lake was 76% of normal. Average temperatures were below normal for March and slightly below normal for the water year.

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

Data Current as of: 4/4/2019 1:40:54 PM

Pend Oreille Basins
Streamflow Forecasts - April 1, 2019

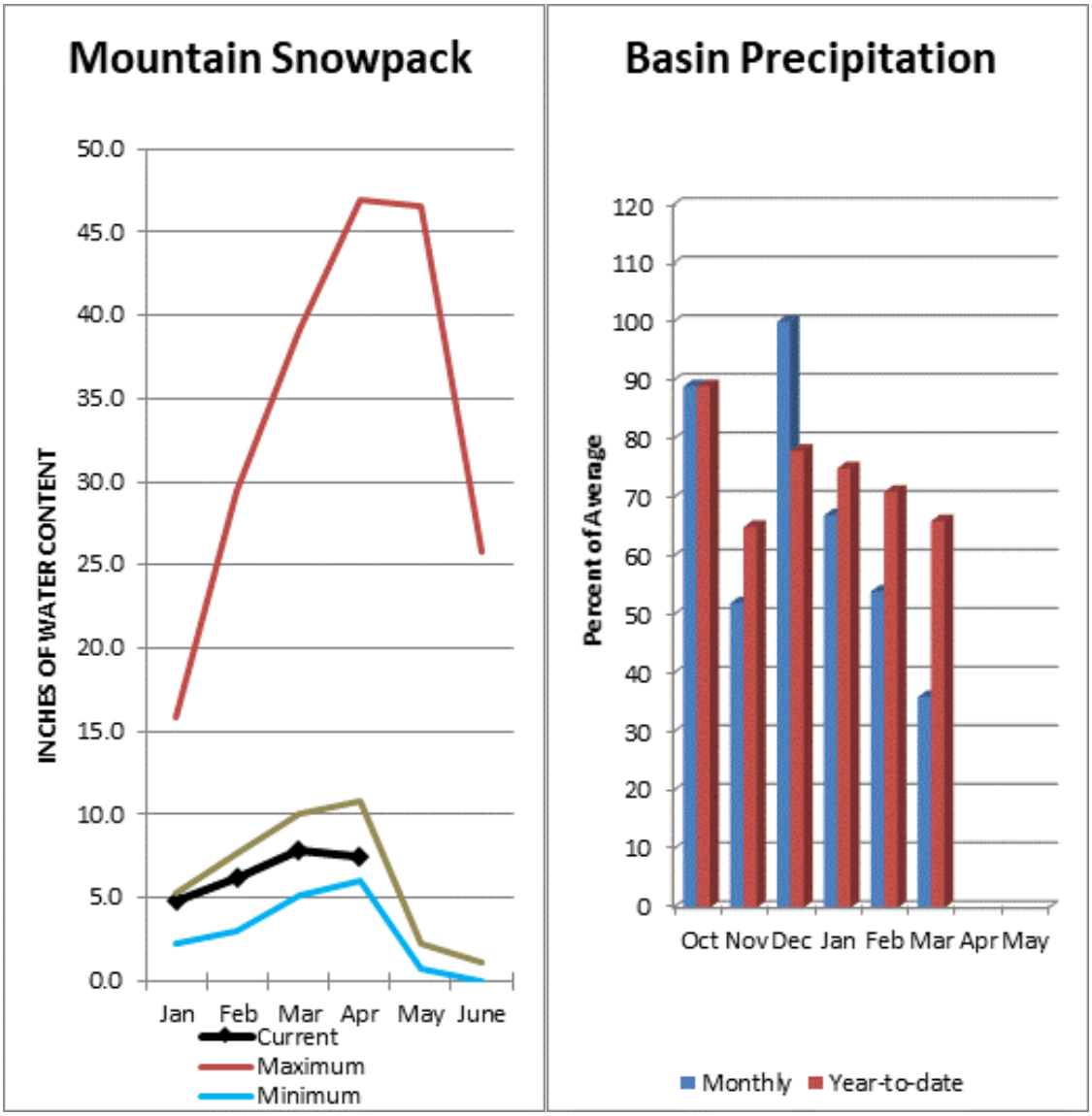
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

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	7670	8860	9670	82%	10500	11700	11800
	APR-SEP	8270	9600	10500	82%	11400	12700	12800
Priest R nr Priest River[2]								
	APR-JUL	435	540	610	78%	680	785	780
	APR-SEP	470	575	650	78%	725	830	830
Pend Oreille R bl Box Canyon[2]								
	APR-JUL	7820	9000	9810	82%	10600	11800	11900
	APR-SEP	8350	9690	10600	82%	11500	12800	13000

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

Reservoir Storage End of March, 2019	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Lake Pend Oreille	594.5	586.6	773.0	1561.3
Priest Lake	46.1	53.0	67.6	119.3
Basin-wide Total	640.6	639.6	840.6	1680.6
# of reservoirs	2	2	2	2

Watershed Snowpack Analysis April 1, 2019	# of Sites	% Median	Last Year % Median
Pend Oreille Basins	71	94%	141%
Colville River	1	100%	138%
Kettle River	7	89%	157%



April 1 snow cover on the Okanogan was 70% of normal, Omak Creek was 71% and the Methow was 77%. March precipitation in the Upper Columbia was 36% of average, with precipitation for the water year at 66% of average. Streamflow's are forecasted for below normal spring and summer runoff. **An official drought declaration has been issued for the Okanogan and Methow river basins.** March streamflow for the Methow River was 63% of average, 79% for the Okanogan River and 68% for the Similkameen. Snow-water content at Salmon Meadows SNOTEL was 5.3 inches or 58% of normal for April 1. Combined storage in the Conconully Reservoirs was 18,800 acre-feet or 125% of normal. Temperatures were much below normal for March and slightly below normal for the water year.

Data Current as of: 4/4/2019 1:41:04 PM

Upper Columbia Basins
Streamflow Forecasts - April 1, 2019

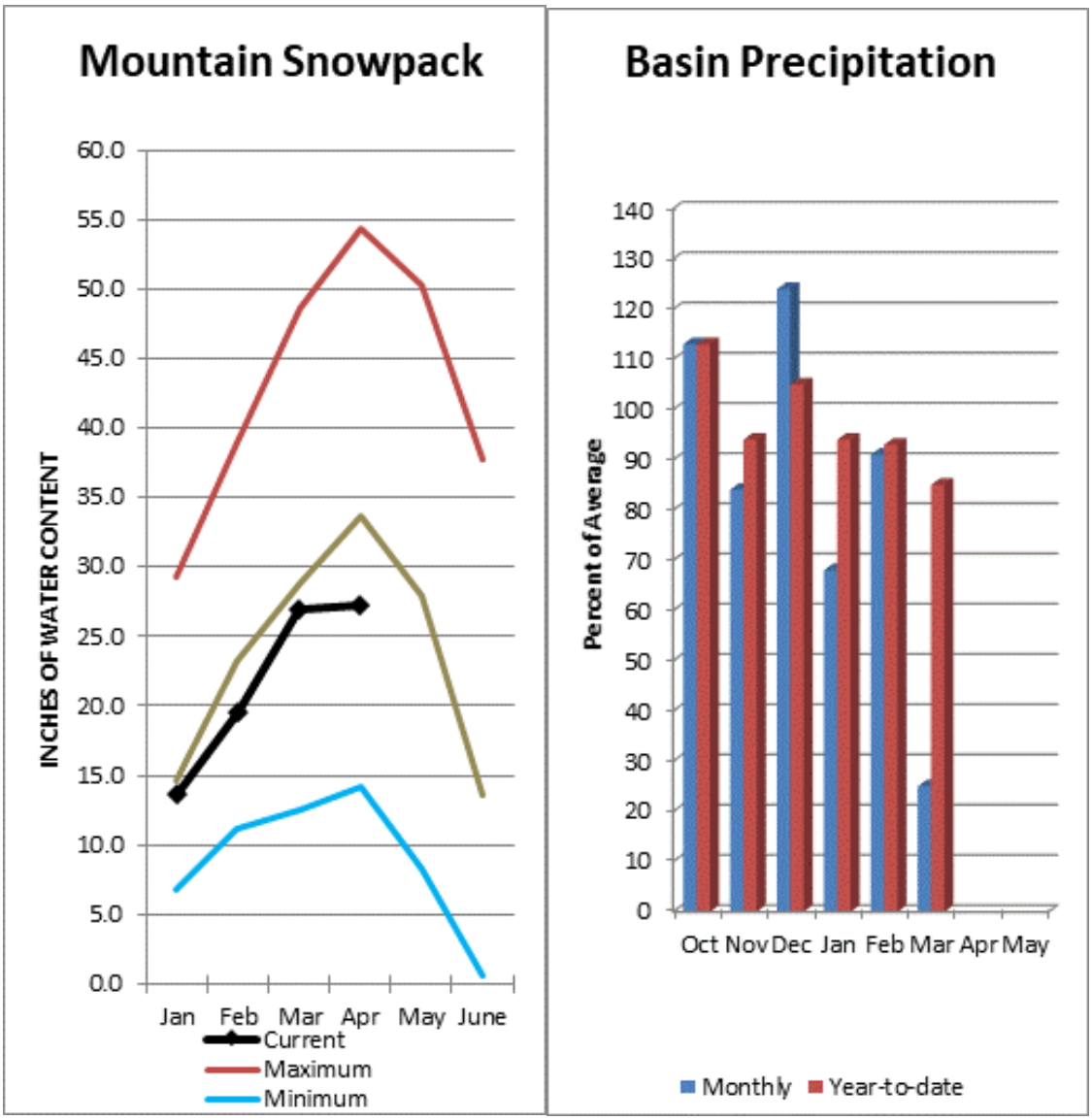
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

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	995	1200	1330	74%	1460	1660	1800
	APR-SEP	1010	1230	1370	73%	1520	1730	1880
Colville R at Kettle Falls								
	APR-JUL	28	68	95	80%	122	162	119
	APR-SEP	32	76	105	80%	134	178	131
Columbia R at Grand Coulee-NWS[2]								
	APR-JUL	38300	40300	42100	83%	43300	47000	51015
	APR-SEP	46800	48600	50400	84%	52000	55300	60110
Similkameen R nr Nighthawk								
	APR-JUL	525	670	765	64%	860	1000	1200
	APR-SEP	550	700	805	63%	910	1060	1280
Okanogan R nr Tonasket								
	APR-JUL	510	705	840	57%	975	1170	1480
	APR-SEP	545	775	930	56%	1090	1310	1650
Okanogan R at Malott								
	APR-JUL	510	715	850	59%	990	1190	1450
	APR-SEP	540	775	935	58%	1100	1330	1620
Methow R nr Pateros								
	APR-JUL	385	485	555	66%	625	725	835
	APR-SEP	410	515	590	66%	665	770	895

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

Reservoir Storage End of March, 2019	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Conconully Lake (Salmon Lake Dam)	7.5	8.1	7.3	10.5
Conconully Reservoir	11.3	5.2	7.8	13.0
Basin-wide Total	18.8	13.3	15.1	23.5
# of reservoirs	2	2	2	2

Watershed Snowpack Analysis April 1, 2019	# of Sites	% Median	Last Year % Median
Upper Columbia Basins	25	69%	138%
Okanogan River	16	70%	141%
Omak Creek	1	71%	130%
Sanpoil River	1		
Similkameen River	5	64%	134%
Toats Coulee Creek	4	67%	203%
Conconully Lake	3	54%	160%
Methow River	5	77%	129%



Precipitation during March was 25% of average in the basin and 85% for the year-to-date. Runoff for Entiat River is forecast to be 70% of average for the summer. The Wenatchee Basin can expect below normal runoff this year as well. March average streamflow on the Chelan River was 62% and on the Wenatchee River 58%. April 1 snowpack in the Wenatchee River Basin was 81% of normal; the Chelan, 75%; the Entiat, 75%; Stemilt Creek, 99% and Colockum Creek, 177%. Reservoir storage in Lake Chelan was 73% of average. Lyman Lake SNOTEL had the most snow water with 39.6 inches of water. This site would normally have 57.6 inches on April 1. Temperatures were much below normal for March and below normal for the water year.

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

Data Current as of: 4/4/2019 1:41:14 PM

Central Columbia Basins
Streamflow Forecasts - April 1, 2019

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

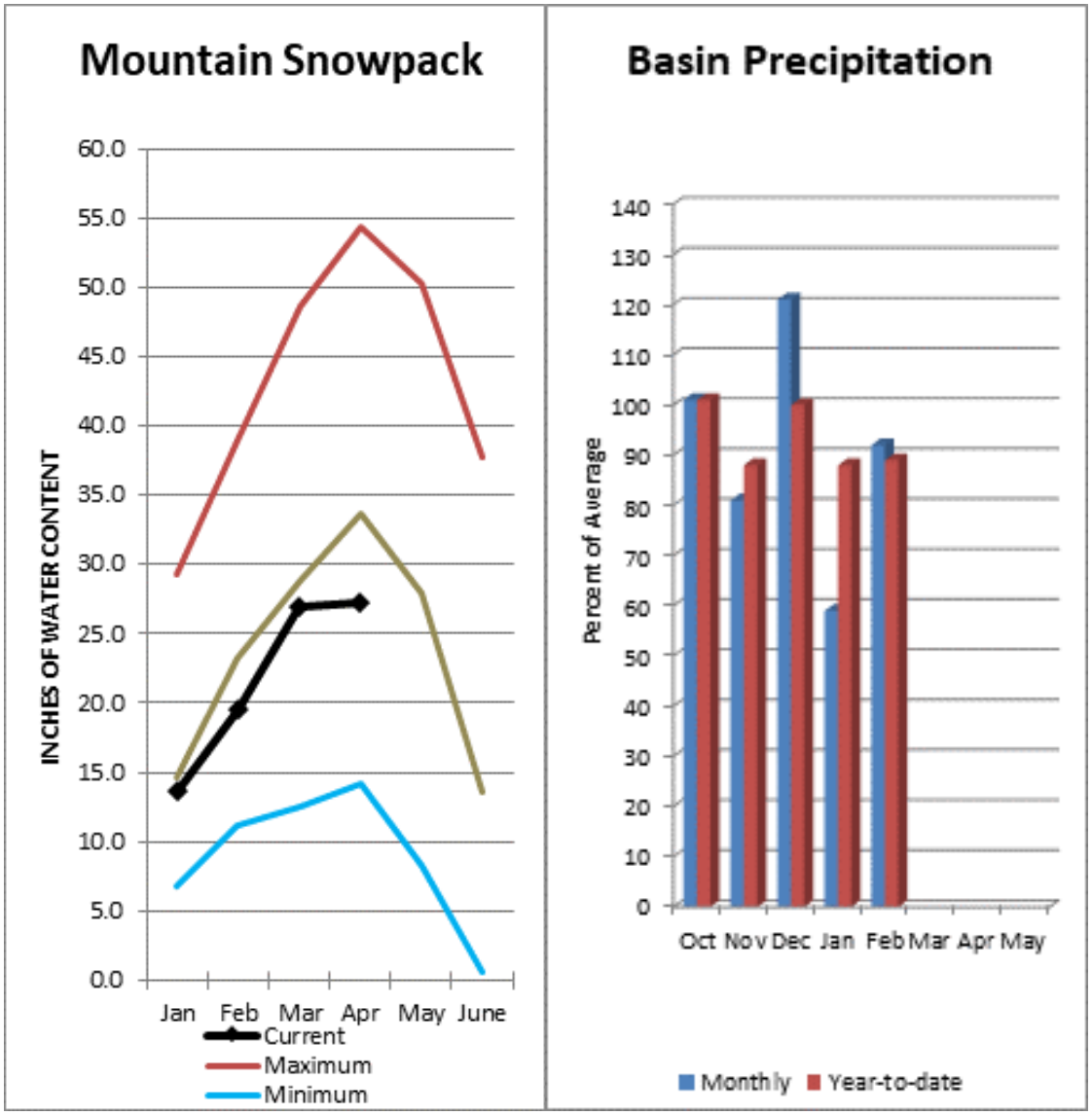
Central Columbia Basins	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Stehekin R at Stehekin								
	APR-JUL	425	480	520	76%	560	615	680
	APR-SEP	495	555	595	75%	635	695	790
Chelan R at Chelan								
	APR-JUL	625	700	750	75%	800	875	1000
	APR-SEP	680	765	820	73%	875	960	1120
Entiat R nr Ardenvoir								
	APR-JUL	109	130	144	72%	158	179	200
	APR-SEP	116	139	155	70%	171	194	220
Wenatchee R at Plain								
	APR-JUL	620	700	755	76%	810	890	990
	APR-SEP	660	750	815	75%	875	970	1080
Icicle Ck nr Leavenworth								
	APR-JUL	146	175	195	71%	215	245	275
	APR-SEP	155	188	210	70%	230	265	300
Wenatchee R at Peshastin								
	APR-JUL	830	930	1000	73%	1070	1170	1370
	APR-SEP	880	1000	1080	72%	1160	1280	1490
Columbia R bl Rock Island Dam-NWS[2]								
	APR-JUL	41600	43500	45600	82%	46700	50900	55770
	APR-SEP	50200	52300	54200	83%	56100	59600	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, 2019	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Lake Chelan	187.1	212.7	256.1	677.4
Basin-wide Total	187.1	212.7	256.1	677.4
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis April 1, 2019	# of Sites	% Median	Last Year % Median
Central Columbia Basins	5	75%	115%
Chelan Lake Basin	5	75%	115%
Entiat River	1	75%	89%
Wenatchee River	7	81%	107%
Stemilt Creek	1	99%	80%
Colockum Creek	1	177%	148%

Upper Yakima River Basin



An official drought declaration has been issued for the Upper Yakima River Basin. April 1 reservoir storage for the Upper Yakima reservoirs was 416,500-acre feet, 81% of average. March streamflow within the basin was Cle Elum River near Roslyn at 52%. April 1 snowpack was 76% based upon 8 snow course and SNOTEL readings within the Upper Yakima Basin. Precipitation was 20% of average for March and 80% for the water-year. Forecasts for spring-summer natural runoff and lake inflow are much below normal. 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.

Data Current as of: 4/4/2019 1:41:22 PM

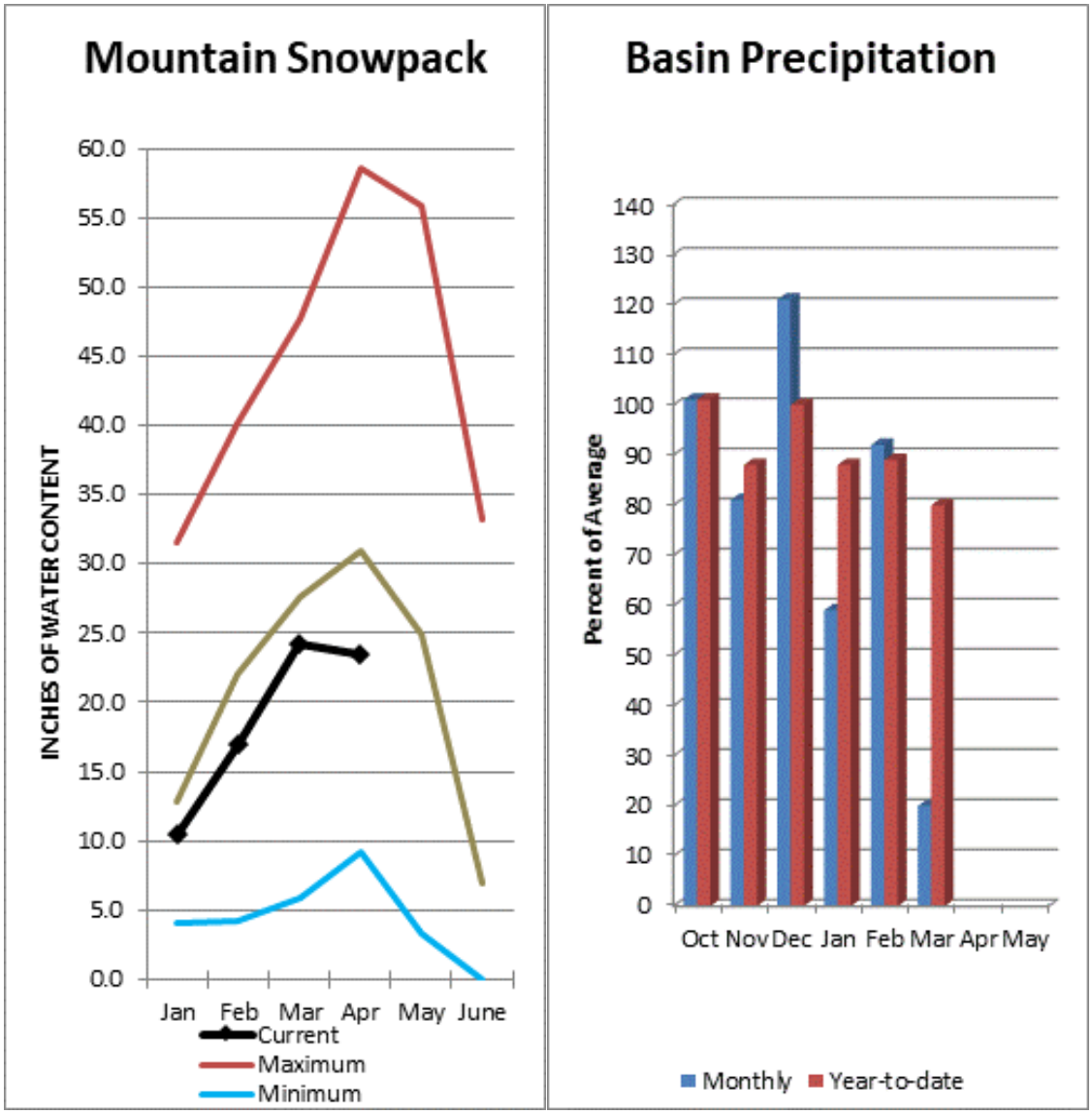
Upper Yakima River
Streamflow Forecasts - April 1, 2019

Upper Yakima River	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
		Forecast Exceedance Probabilities for Risk Assessment Chance that actual volume will exceed forecast						
Keechelus Reservoir Inflow[2]								
	APR-JUL	64	78	87	75%	96	109	116
	APR-SEP	72	86	96	76%	106	120	126
Kachess Reservoir Inflow [2]								
	APR-JUL	59	69	75	72%	82	92	104
	APR-SEP	66	76	83	73%	90	101	113
Cle Elum Lake Inflow [2]								
	APR-JUL	245	275	290	75%	310	335	385
	APR-SEP	265	295	315	76%	335	365	415
Teanaway R bl Forks nr Cle Elum								
	APR-JUL	50	70	83	64%	96	116	130
	APR-SEP	52	72	85	64%	99	119	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, 2019	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Keechelus	88.5	128.6	106.3	157.8
Kachess	157.2	184.2	159.8	239.0
Cle Elum	170.8	290.1	246.3	436.9
Basin-wide Total	416.5	602.9	512.4	833.7
# of reservoirs	3	3	3	3

Watershed Snowpack Analysis April 1, 2019	# of Sites	% Median	Last Year % Median
Upper Yakima River	8	76%	98%



March average streamflow's within the basin were: Yakima River near Parker, 60% and the Naches River near Naches, 60%. Forecasts for spring-summer natural runoff are for below normal flows. April 1 reservoir storage for Bumping and Rimrock reservoirs was 99,200-acre feet, 66% of average. April 1 snowpack was 87% based upon 6 snow course and SNOTEL readings within the Lower Yakima Basin and Ahtanum Creek reported in at 103% of normal. Precipitation was 31% of average for March and 83% for the water-year. Temperatures were much below normal for March and slightly below 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: 4/4/2019 1:41:31 PM

Lower Yakima River
Streamflow Forecasts - April 1, 2019

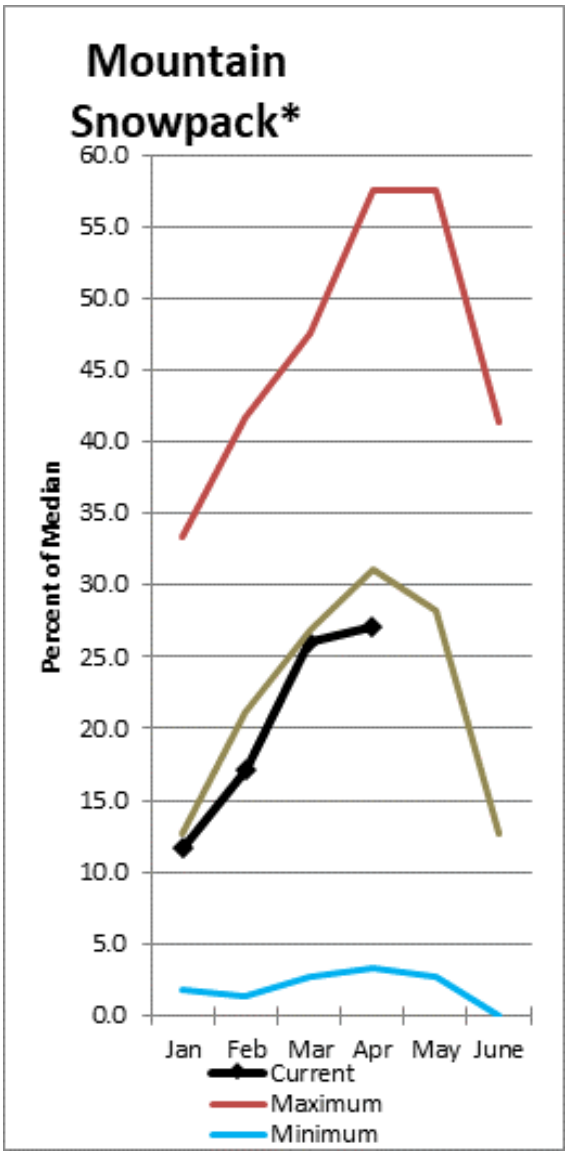
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

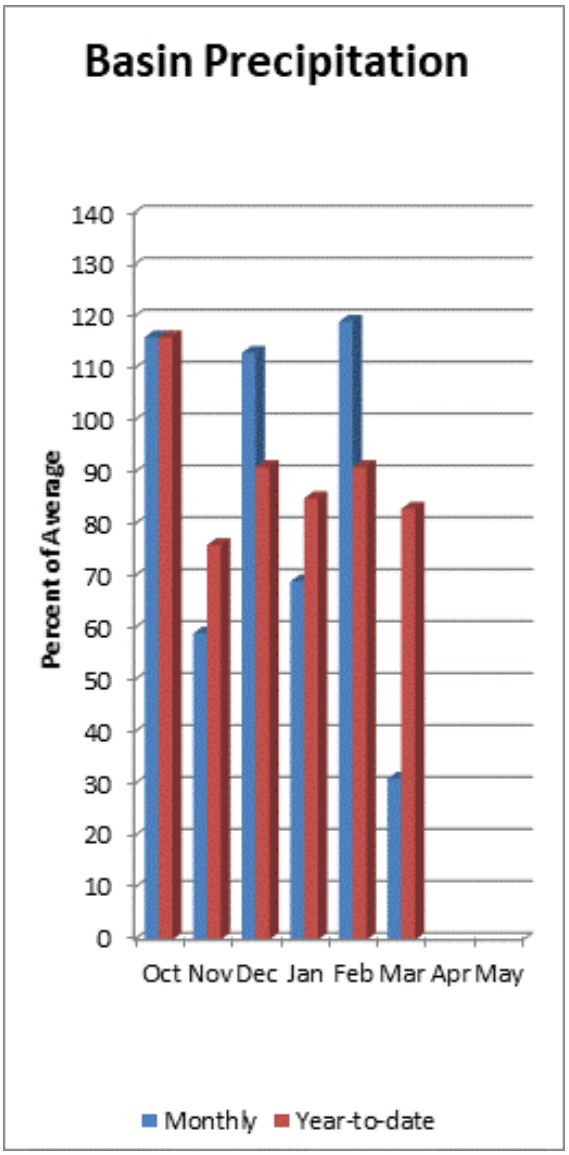
Lower Yakima River	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Bumping Lake Inflow [2]								
	APR-JUL	70	81	89	78%	96	108	114
	APR-SEP	75	87	96	78%	104	116	123
American R nr Nile								
	APR-JUL	62	72	79	77%	86	96	102
	APR-SEP	65	76	85	77%	93	104	110
Rimrock Lake Inflow [2]								
	APR-JUL	133	147	157	84%	166	181	187
	APR-SEP	157	174	186	85%	198	215	220
Naches R nr Naches								
	APR-JUL	395	485	545	78%	605	695	700
	APR-SEP	425	525	595	78%	665	770	760
Ahtanum Ck at Union Gap								
	APR-JUL	13	20	25	93%	30	37	27
	APR-SEP	14.9	22	27	93%	32	40	29
Yakima R nr Parker [2]								
	APR-JUL	955	1120	1230	74%	1350	1520	1660
	APR-SEP	1050	1230	1350	74%	1470	1650	1820
Klickitat R nr Glenwood								
	APR-JUL	79	94	104	83%	114	129	126
	APR-SEP	89	104	115	83%	126	142	139
Klickitat R nr Pitt								
	APR-JUL	290	345	385	89%	420	475	435
	APR-SEP	360	425	465	89%	510	570	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, 2019	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Bumping Lake	7.3	17.0	14.6	33.7
Rimrock	91.9	177.2	136.6	198.0
Basin-wide Total	99.2	194.2	151.2	231.7
# of reservoirs	2	2	2	2

Watershed Snowpack Analysis April 1, 2019	# of Sites	% Median	Last Year % Median
Lower Yakima River	6	87%	92%
Ahtanum Creek	2	103%	79%





March precipitation was 38% of average, maintaining the year-to-date precipitation at 91% of average. Snowpack in the basin was 121% of normal. Average temperatures were much below normal for March and slightly below for the water year. April-September runoff is forecasted to be slightly above normal.

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

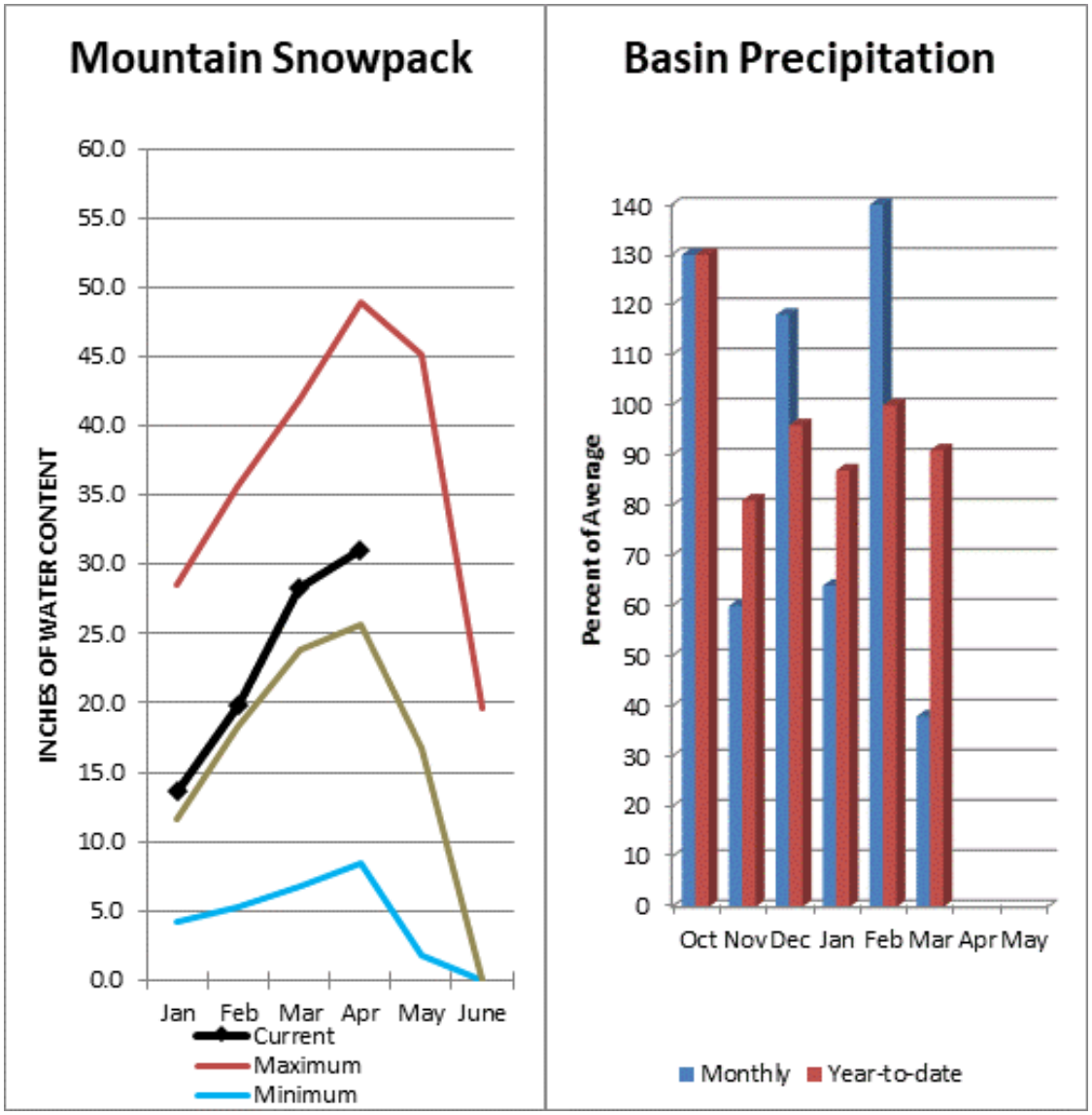
Data Current as of: 4/4/2019 1:41:41 PM

Walla Walla River
Streamflow Forecasts - April 1, 2019

		Forecast Exceedance Probabilities for Risk Assessment Chance that actual volume will exceed forecast						
Walla Walla River	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
SF Walla Walla R nr Milton-Freewater								
	APR-JUL	47	54	59	109%	64	71	54
	APR-SEP	60	68	73	111%	78	86	66
Mill Ck nr Walla Walla								
	APR-JUL	17.7	21	23	96%	26	29	24
	APR-SEP	21	24	27	100%	29	33	27

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

Watershed Snowpack Analysis April 1, 2019	# of Sites	% Median	Last Year % Median
Walla Walla River	2	121%	96%



March precipitation was 56% of average, bringing the year-to-date precipitation down to 96% of average. April 1 snowpack readings averaged 108% of normal. March streamflow was 91% of average for Snake River below Lower Granite Dam and 89% for Grande Ronde River near Troy. Spring-summer runoff is expected to be near to above normal. Dworshak Reservoir storage was 99% of average. Average temperatures were much below normal for March and below normal for the water year.

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

Data Current as of: 4/4/2019 1:41:50 PM

Lower Snake, Grande Ronde, Clearwater Basins
Streamflow Forecasts - April 1, 2019

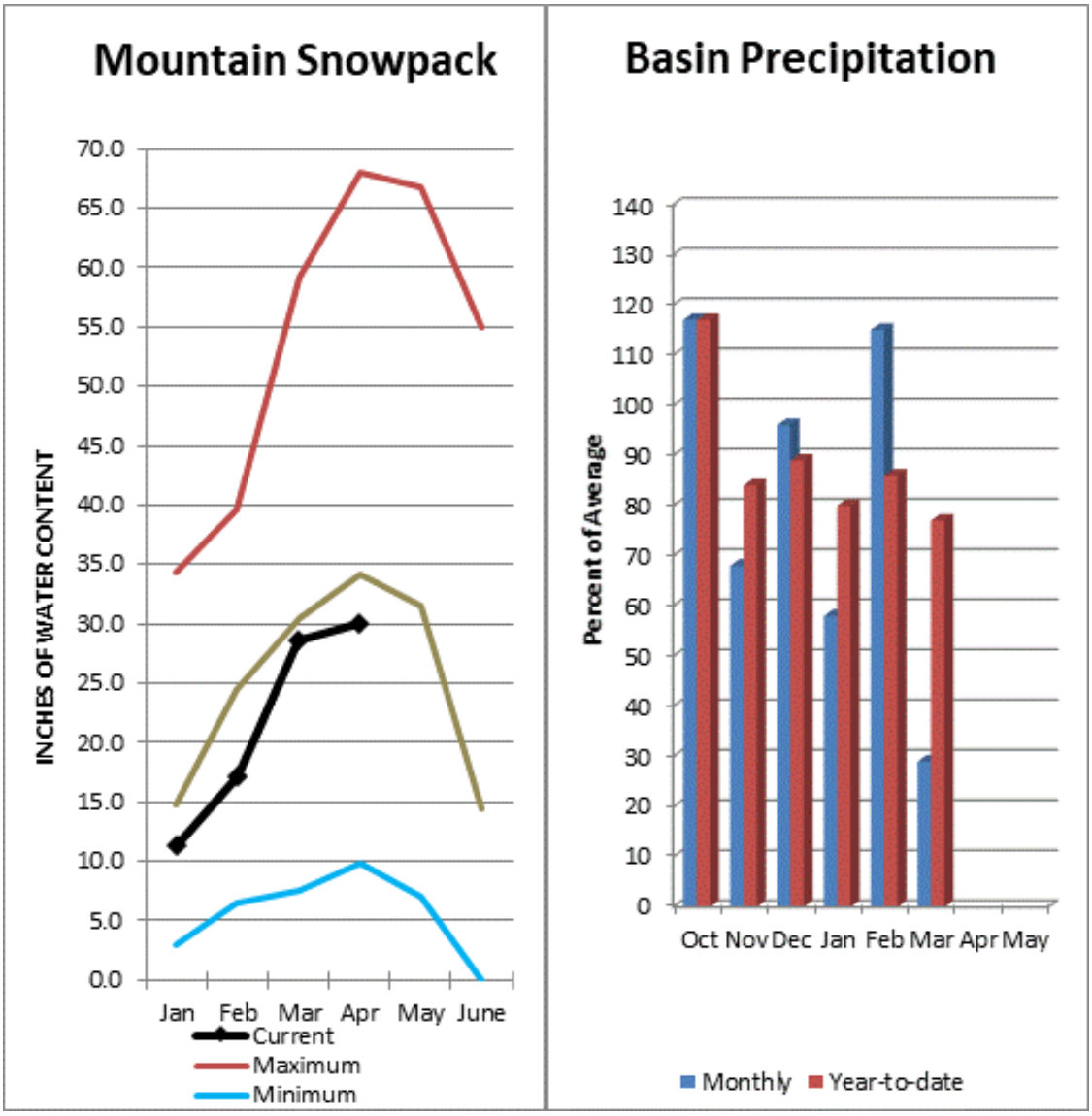
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

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	1170	1360	1490	122%	1620	1800	1220
	APR-SEP	1270	1460	1590	121%	1720	1910	1310
Asotin Ck at Asotin								
	APR-JUL	18.9	24	29	83%	33	40	35
Clearwater R at Spalding[2]								
	APR-JUL	4790	5590	6130	89%	6670	7460	6890
	APR-SEP	5060	5900	6470	89%	7050	7890	7270
Snake R bl Lower Granite Dam-NWS[2]								
	APR-JUL	18500	19500	20700	104%	22400	25200	19848
	APR-SEP	19600	20800	21900	98%	23500	26500	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 March, 2019	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Dworshak Reservoir	2387.7	1553.0	2417.0	3468.0
Basin-wide Total	2387.7	1553.0	2417.0	3468.0
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis April 1, 2019	# of Sites	% Median	Last Year % Median
Lower Snake, Grande Ronde, Clearwater Basins	15	108%	94%



Forecasts for April – September streamflows within the basin are Lewis River at Ariel, 90% and Cowlitz River at Castle Rock, 92% of average. The Columbia at The Dalles is forecasted to have 87% of average flows this summer according to the River Forecast Center. March average streamflow for Cowlitz River was 54% and the Columbia River at The Dalles was 79% of average. March precipitation was 29% of average and the water-year average was 77%. April 1 snow cover for Cowlitz River was 91%, and Lewis River was 85% of normal. Temperatures were near normal during March and for the water year.

Data Current as of: 4/4/2019 1:41:59 PM

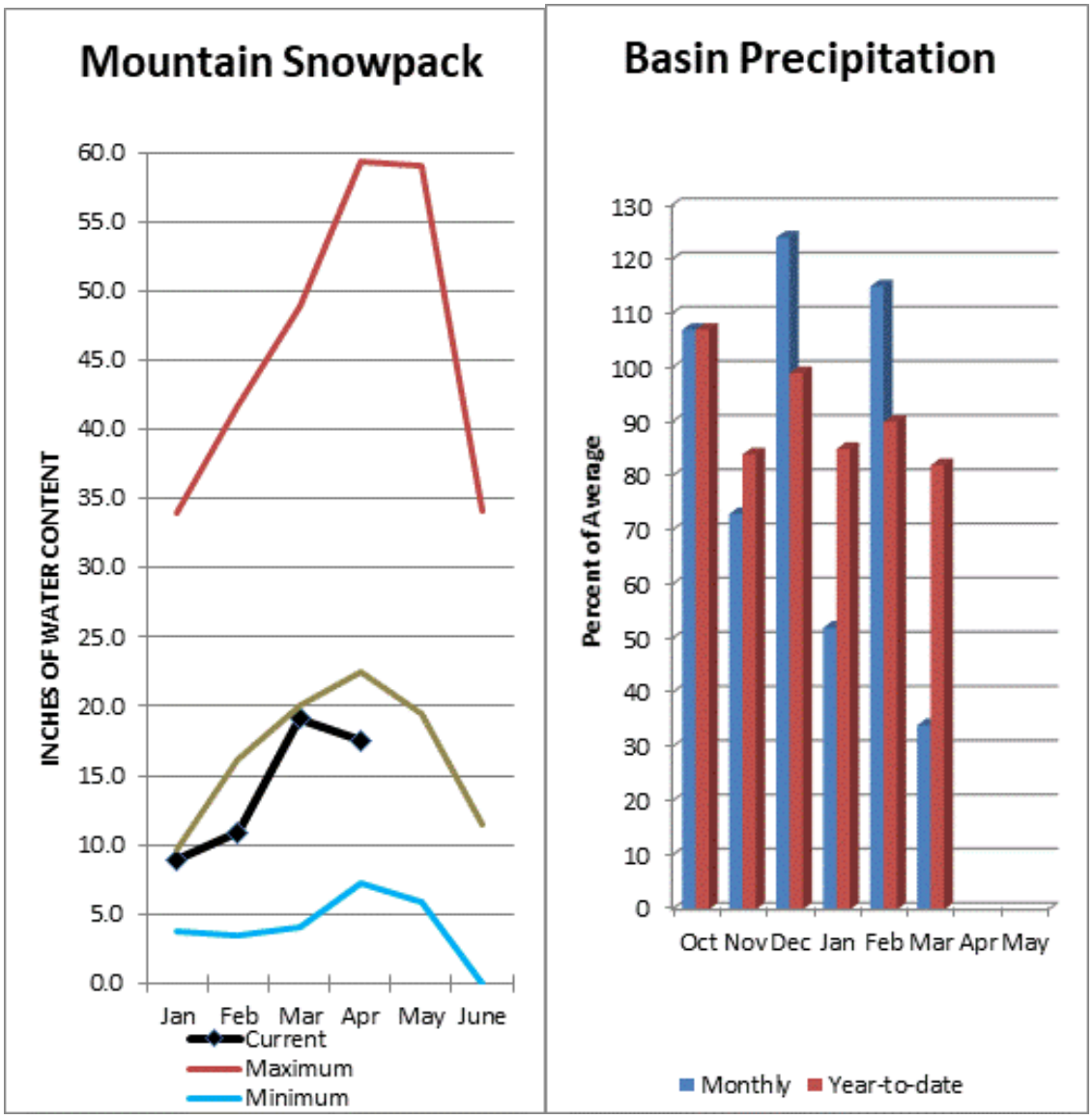
Lower Columbia Basins
Streamflow Forecasts - April 1, 2019

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

Lower Columbia Basins	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Columbia R at The Dalles-NWS[2]								
	APR-JUL	59700	64400	66100	83%	69600	75700	79855
	APR-SEP	73300	78200	81100	87%	84900	90700	92704
Klickitat R nr Glenwood								
	APR-JUL	79	94	104	83%	114	129	126
	APR-SEP	89	104	115	83%	126	142	139
Klickitat R nr Pitt								
	APR-JUL	290	345	385	89%	420	475	435
	APR-SEP	360	425	465	89%	510	570	520
Lewis R at Ariel[2]								
	APR-JUL	600	770	885	91%	1000	1170	970
	APR-SEP	715	890	1010	90%	1130	1310	1120
Cowlitz R bl Mayfiled[2]								
	APR-JUL	1150	1360	1500	92%	1640	1850	1630
	APR-SEP	1350	1580	1730	94%	1880	2110	1840
Cowlitz R at Castle Rock[2]								
	APR-JUL	1580	1870	2080	93%	2280	2570	2240
	APR-SEP	1820	2130	2340	92%	2560	2870	2540

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, 2019	# of Sites	% Median	Last Year % Median
Lower Columbia Basins	11	88%	113%
Lewis River	5	85%	115%
Cowlitz River	6	91%	111%



April 1 snowpack was 85% of average for the White River, 90% for Puyallup River and 62% in the Green River Basin. March precipitation was 34% of average, bringing the water year-to-date to 82% of average for the basins. Summer runoff is forecasted to be below normal. Average temperatures in the area were slightly above normal for March and near normal for the water-year.

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

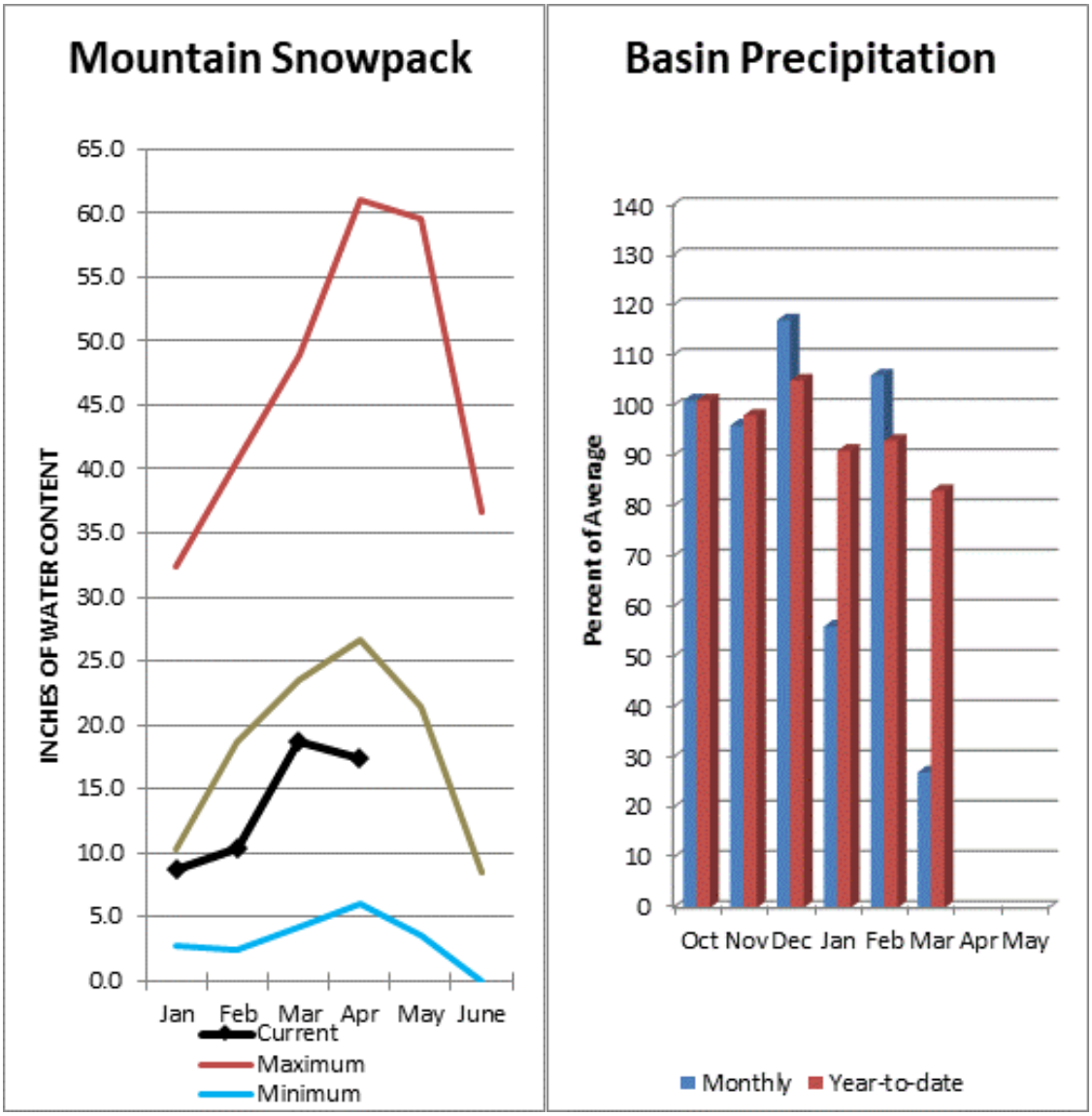
Data Current as of: 4/4/2019 1:42:09 PM

South Puget Sound Basins
Streamflow Forecasts - April 1, 2019

		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	275	345	380	88%	415	485	430
	APR-SEP	335	420	460	89%	495	580	515
Green R bl Howard A Hanson Dam[1,2]								
	APR-JUL	119	168	190	81%	210	260	235
	APR-SEP	129	181	205	79%	230	280	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, 2019	# of Sites	% Median	Last Year % Median
South Puget Sound Basins	9	78%	101%
White River	2	85%	103%
Green River	3	62%	93%



Basin-wide precipitation for March was 27% of average, bringing water-year-to-date to 83% of average. April 1 median snow cover in Cedar River Basin was 60%, Tolt River Basin was 62%, Snoqualmie River Basin was 63%, and Skykomish River Basin was 64%. Basin runoff is forecasted to be much below normal this summer. Temperatures were slightly above normal for March and near normal for the water-year.

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

Data Current as of: 4/4/2019 1:42:20 PM

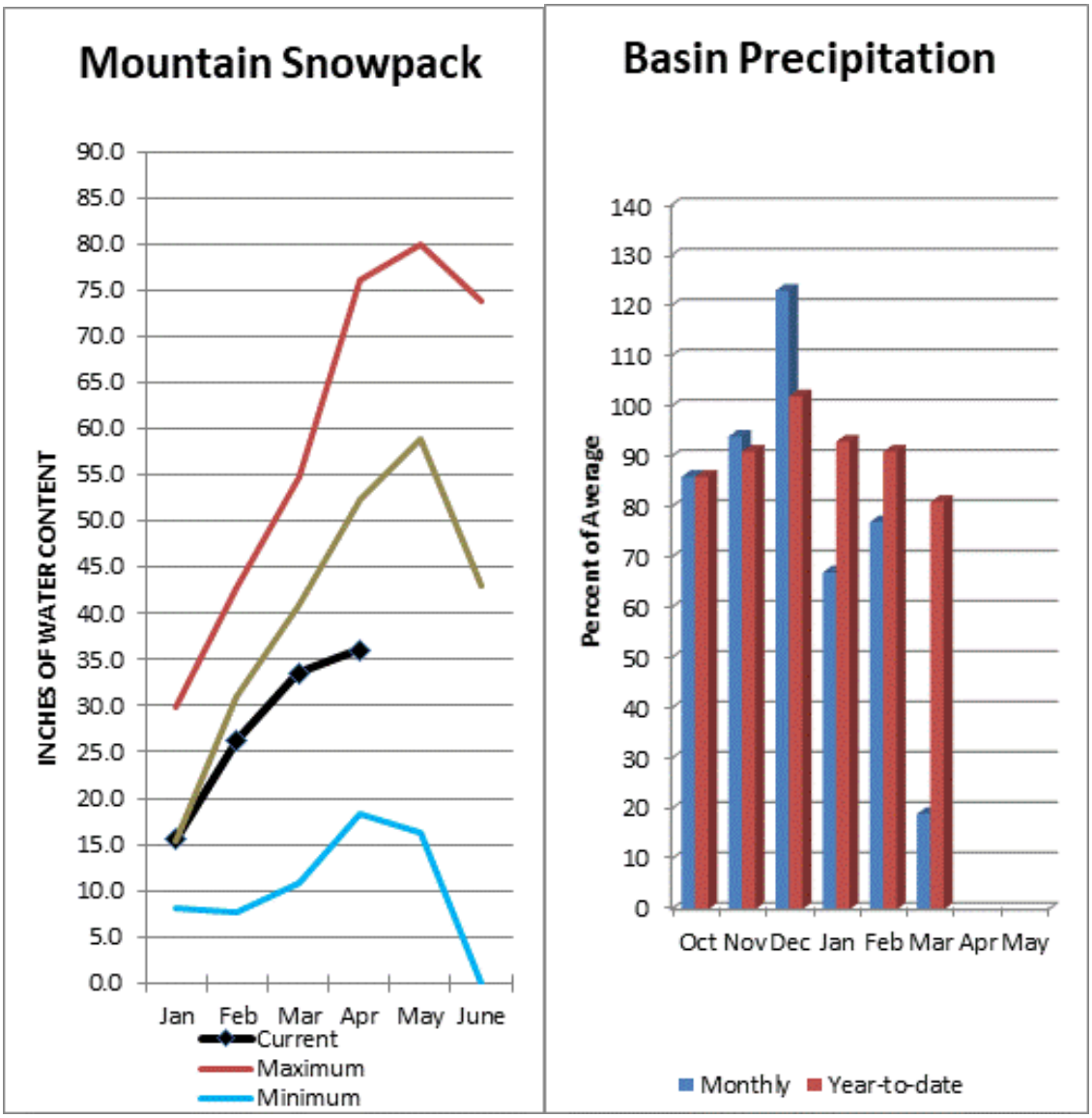
Central Puget Sound Basins
Streamflow Forecasts - April 1, 2019

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	38	46	52	74%	57	65	70
	APR-SEP	43	52	58	76%	64	73	76
Rex R nr Cedar Falls								
	APR-JUL	11.5	15.4	18	75%	21	24	24
	APR-SEP	13.8	17.9	21	78%	24	28	27
Taylor Ck nr Selleck								
	APR-JUL	11.8	14.3	16	80%	17.7	20	20
	APR-SEP	14.3	17.1	19	79%	21	24	24
SF Tolt R nr Index								
	APR-JUL	7.1	9.2	10.6	75%	12	14.1	14.2
	APR-SEP	7.8	10.3	12	75%	13.7	16.2	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, 2019	# of Sites	% Median	Last Year % Median
Central Puget Sound Basins	15	65%	111%
Puyallup River	4	90%	107%
Cedar River	6	60%	103%
Tolt River	3	62%	123%
Snoqualimie River	5	63%	112%
Skykomish River	3	64%	119%



Forecast for Skagit River streamflow at Newhalem is 79% of average for the spring and summer period. March streamflow in Skagit River was 48% of average. Other forecast points included Baker River at 82% and Thunder Creek at 82% of average. Basin-wide precipitation for March was 19% of average, bringing water-year-to-date to 81% of average. April 1 average snow cover in Skagit River Basin was 71% and the Nooksack River Basin was 68% and the Baker River Basin was 59%. April 1 Skagit River reservoir storage was 69% of average and 36% of capacity. Average temperatures were near normal for March and for the water year.

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

Data Current as of: 4/4/2019 1:42:29 PM

North Puget Sound Basins
Streamflow Forecasts - April 1, 2019

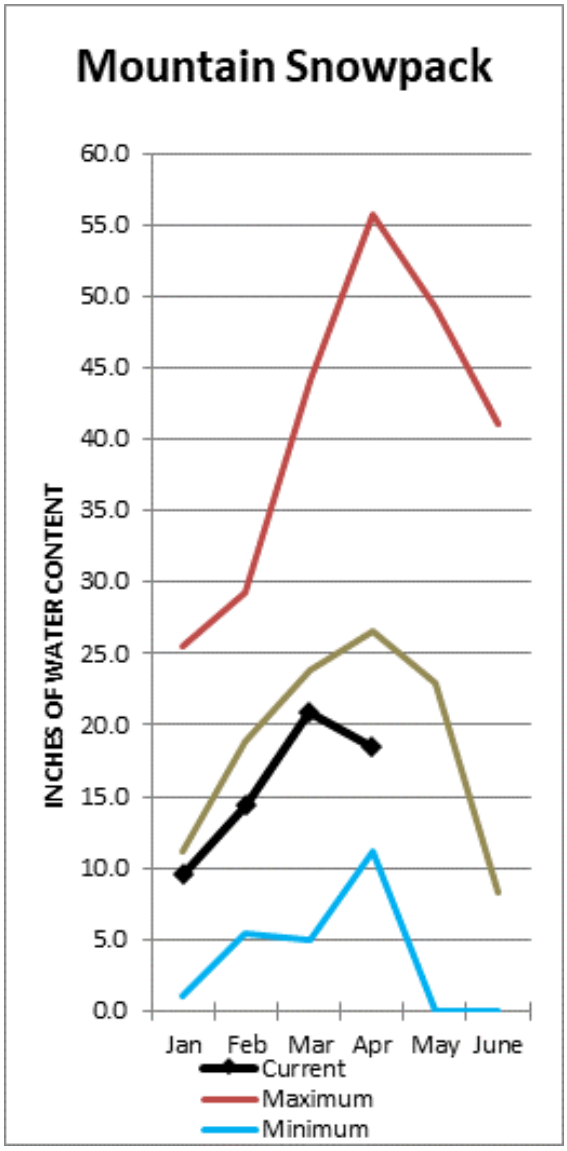
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

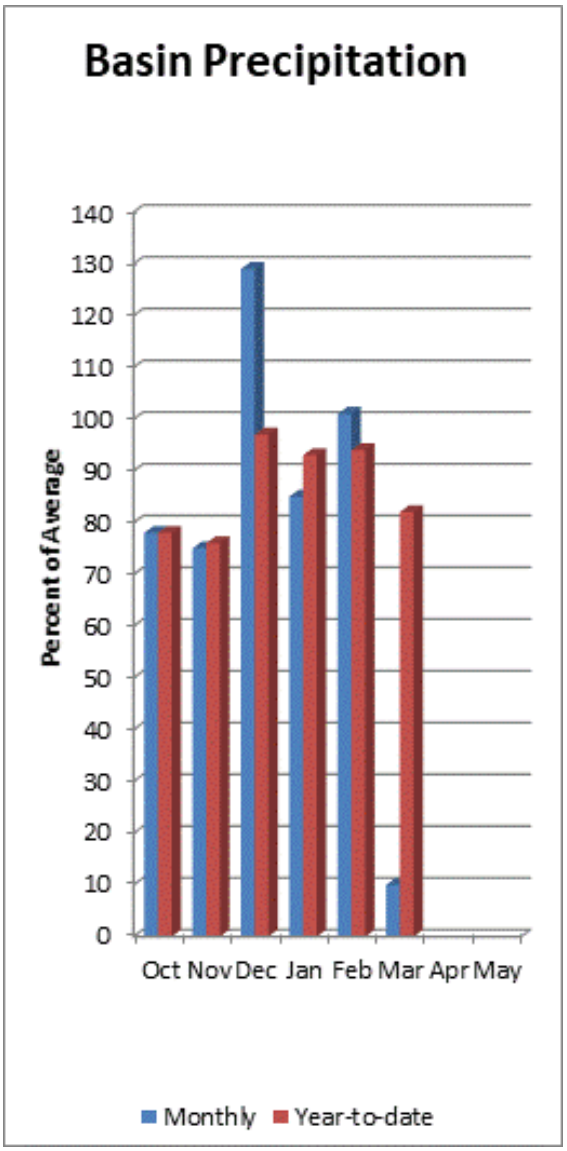
North Puget Sound Basins	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Thunder Ck nr Newhalem								
	APR-JUL	159	177	190	81%	205	220	235
	APR-SEP	235	255	270	82%	285	305	330
Skagit R at Newhalem[2]								
	APR-JUL	1200	1310	1380	79%	1460	1560	1750
	APR-SEP	1430	1550	1640	79%	1720	1850	2070
Baker R at Concrete								
	APR-JUL	500	585	640	82%	695	780	780
	APR-SEP	585	715	800	82%	885	1010	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, 2019	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Ross	504.6	431.7	730.5	1434.7
Basin-wide Total	504.6	431.7	730.5	1434.7
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis April 1, 2019	# of Sites	% Median	Last Year % Median
North Puget Sound Basins	17	69%	121%
Skagit River	13	71%	121%
Baker River	1	59%	106%
Nooksack River	3	68%	130%





March Dungeness River runoff was 75% of normal. March precipitation was 10% of average. Precipitation has accumulated at 82% of average for the water year. March precipitation at Quillayute was only 1.51 inches or 14% of normal. The Elwha Ranger Station, with records back to 1942, only received .69" of rain, the lowest amount in the 77-year record. (1965 was the only other year on record with less than 1") Olympic Peninsula snowpack averaged 70% of normal on April 1 with the North and East sides doing much better than the South and West sides. The Dungeness and Elwha rivers are respectively forecasted to see 84% and 85% normal runoff this summer but are on the watch list for potential water shortages. Temperatures were slightly above average for March and near normal for the water year.

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

Data Current as of: 4/4/2019 1:42:39 PM

Olympic Penninsula
Streamflow Forecasts - April 1, 2019

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	79	93	102	85%	111	125	120
	APR-SEP	93	110	122	84%	134	151	145
Elwha R at McDonald Br nr Port Angeles								
	APR-JUL	275	315	340	85%	365	405	400
	APR-SEP	320	365	400	85%	435	480	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, 2019	# of Sites	% Median	Last Year % Median
Olympic Penninsula	6	70%	117%

Issued by

Matthew J. Lohr
Chief
Natural Resources Conservation Service
U.S. Department of Agriculture

Released by

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

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

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

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

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

Washington Water Supply Outlook Report

Natural Resources Conservation Service
Spokane, WA

United States Department of Agriculture

NRCS Natural Resources Conservation Service

Washington
Water Supply Outlook Report
May 1, 2019

Upper Ross Lake dry lake bed and stump field looking south, Jack Mtn in the background Photo by Chase Kingslien

Due to a decline in snow pack and rainfall in the Skagit basin, Seattle City Light is predicting water levels in the Ross reservoir at the utility's Skagit Hydroelectric Project will be significantly lower than normal during the upcoming summer months. Ross reservoir and the surrounding Ross Lake National Recreation Area, administered by the National Park Service, will be open to visitors. However, the lower level of the reservoir will impact the availability of some visitor facilities, services, and recreational opportunities. Lake levels and recreation on Diablo and Gorge Lakes should not be impacted - North Cascades National Park and Seattle City Light.

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
Water Supply Specialist
Natural Resources Conservation Service
2005 E. College Way, Suite 203
Mt. Vernon, WA 98273-2873
(360) 488-4826

or

Larry Johnson
State Conservation Engineer
Natural Resources Conservation Service
W 316 Boone Ave., Suite 450
Spokane, WA 99201
(509) 323-2955

How forecasts are made

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

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

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

Washington
Water Supply Outlook

May 2019

General Outlook

After a cool and dry March, April brought bountiful precipitation to most of the state and even a little more mountain snow early in the month. Temperatures remained near normal throughout the month which helped our meager snowpack to stay in place a wee bit longer, reaching normal peak dates before the inevitable melt cycle began. Even then melt rates remained low. The Washington Drought Monitor shows spreading D0-D1 drought conditions for most of the state. (Figure 2, Page 4) Additionally western Washington is forecasted to have an above normal chance of significant wildland fire potential. The current 30-day weather forecast is calling for Above normal temperatures and below normal precipitation, (Figure 1, page 4). So far this month we have seen little to no rain. NWS 3-month (MJJ) forecast still indicates above normal temperatures and below normal precipitation for the west side but equal chances of rain east of the cascades. http://www.cpc.ncep.noaa.gov/

Snowpack

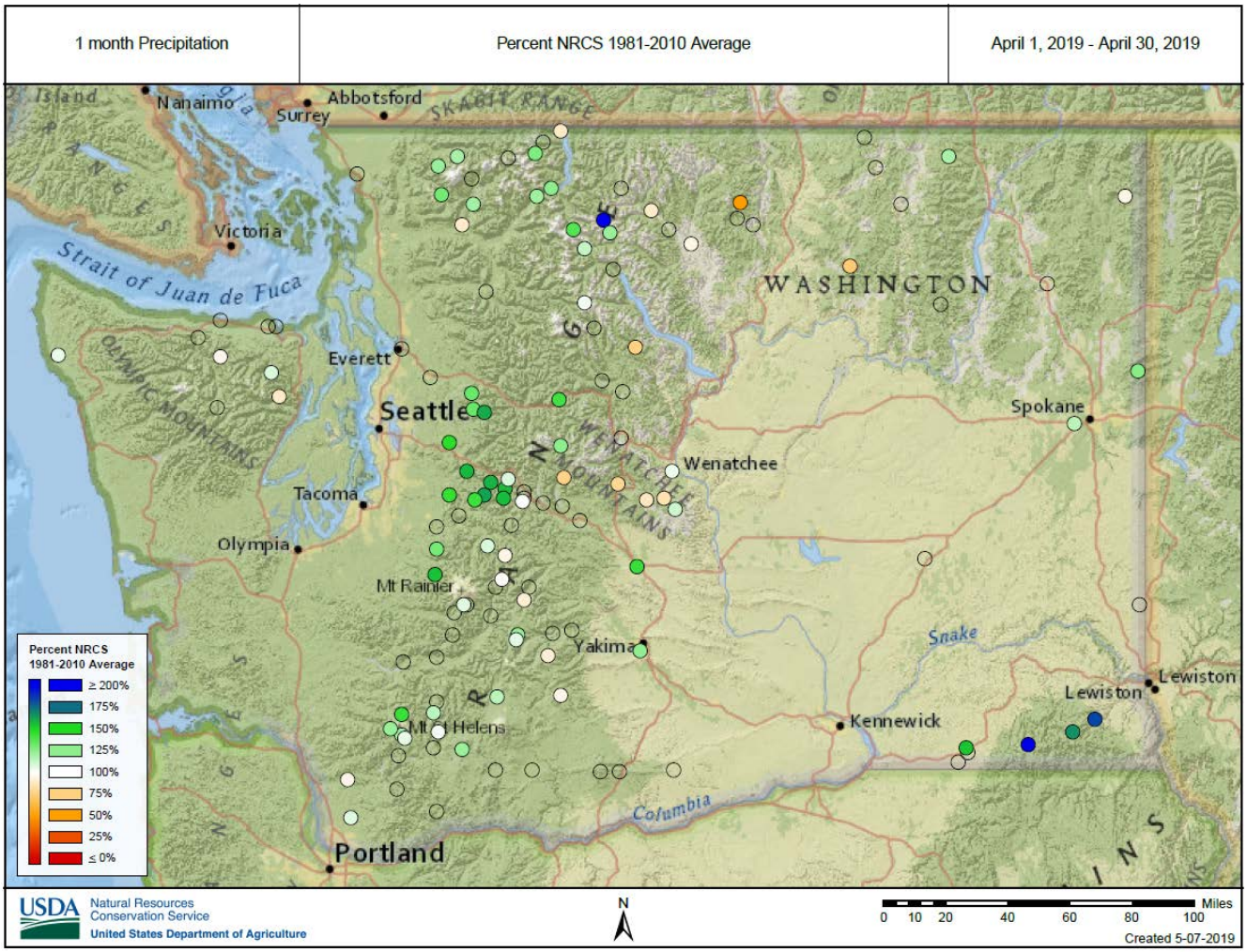
The May 1 statewide SNOTEL readings dropped to 73% of normal, 7 points lower than last month. On average, Washington's snowpack peaks about April 1. Westside medians from SNOTEL and May 1 snow surveys, included the North Puget Sound river basins with 65% of normal, the Central and South Puget river basins with 63% and 80% respectively, and the Lower Columbia basins with 85% of normal. Snowpack along the east slopes of the Cascade Mountains included the Yakima area and the Wenatchee area both with 68%. Snowpack in the Spokane River Basin was at 83% and the Upper Columbia river basins had 69% of the long-term median.

BASIN	PERCENT OF MEDIAN	LAST YEAR PERCENT MEDIAN
Spokane	83	145
Newman Lake	4	112
Pend Oreille	102	166
Okanogan	75	160
Methow	76	129
Conconully Lake	0	0
Central Columbia	68	116
Upper Yakima	61	104
Lower Yakima	74	90
Ahtanum Creek	71	56
Walla Walla	159	116
Lower Snake	112	96
Cowlitz	91	119
Lewis	79	131
White	87	111
Green	49	92
Puyallup	94	122
Cedar	62	142
Snoqualmie	60	135
57	141	119
Tolt	61	179
Skagit	67	131
Nooksack	60	136
Baker	61	N/A
Olympic Peninsula	61	136

Precipitation

April precipitation varied little across the state as evidenced in the image below, excluding a hand full of sites in the north and central part of the state. April statewide SNOTEL precipitation was 123% of normal. Year-to-date precipitation remains below normal at 85%. The Walla Walla area received 216% of normal precipitation and the Conconully Basin drew the short straw at only 50% of normal rainfall.

RIVER BASIN	APRIL PERCENT OF AVERAGE	WATER YEAR PERCENT OF AVERAGE
Spokane	135	83
Pend Oreille	135	93
Upper Columbia	91	69
Central Columbia	114	87
Upper Yakima	100	81
Lower Yakima	99	84
Walla Walla	216	103
Lower Snake	168	104
Lower Columbia	116	81
South Puget Sound	118	85
Central Puget Sound	140	88
North Puget Sound	130	84
Olympic Peninsula	96	83

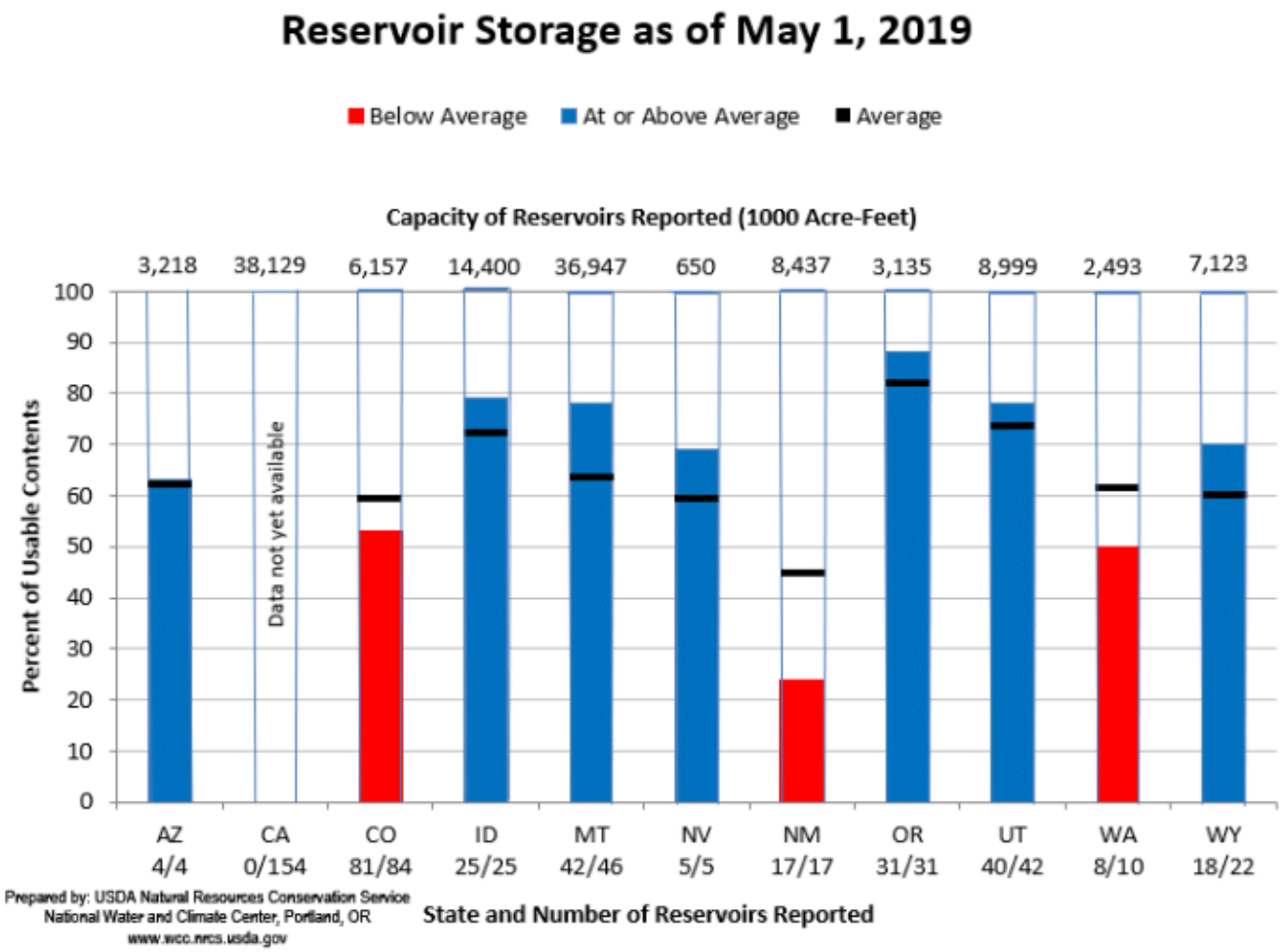


For more information contact your local Natural Resources Conservation Service office.

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 544,400-acre feet, 89% of average for the Upper Reaches and 133,000-acre feet or 74% of average for Rimrock and Bumping Lakes. The power generation reservoirs included the following: Coeur d'Alene Lake, 309,400-acre feet, 103% of average and 46% of capacity; and the Skagit River reservoirs at 72% of average and 39% 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	88	92
Pend Oreille	62	100
Upper Columbia	84	119
Central Columbia	46	103
Upper Yakima	65	89
Lower Yakima	57	74
Lower Snake	84	111
North Puget Sound	39	72



Streamflow

Near to much above average rainfall in April brought most all steams to near or above average runoff. However, it didn't do much to help-out streamflow forecasts in most basins. The Walla Walla and Lower Snake basins are the only areas to retain above normal runoff forecasts. Volumetric forecasts are developed using current, historic and average snowpack, precipitation and streamflow data collected and coordinated by organizations cooperating with NRCS.

April streamflow's are compiled by the Northwest River Forecast Center and are primarily collected at USGS stream gages.

BASIN	PERCENT OF AVERAGE FORCAST (50% CHANCE OF EXCEEDENCE)
Spokane	61-74
Priest River	79-88
Upper Columbia	62-86
Central Columbia	64-85
Upper Yakima	51-71
Lower Yakima	69-87
Walla Walla	107-114
Lower Snake	83-130
Lower Columbia	78-87
South Puget Sound	70-76
Central Puget Sound	72-77
North Puget Sound	77-81
Olympic Peninsula	80-81

STREAM	PERCENT OF AVERAGE APRIL STREAMFLOWS
Pend Oreille at Albeni Fall Dam	125
Kettle at Laurier	111
Columbia at International Bndry	102
Spokane at Spokane	126
Similkameen at Nighthawk	116
Okanogan at Tonasket	101
Methow at Pateros	103
Chelan at Chelan	119
Stehekin near Stehekin	131
Wenatchee at Pashastin	109
Cle Elum near Roslyn	118
Yakima at Parker	126
Naches at Naches	138
Grande Ronde at Troy	245
Snake below Lower Granite Dam	177
Columbia River at The Dalles	119
Lewis at Merwin Dam	120
Cowlitz below Mayfield Dam	114
Skagit at Concrete	110
Dungeness near Sequim	92

Climate

Figure 1: ONE-MONTH TEMPERATURE AND PRECIPITATION OUTLOOK

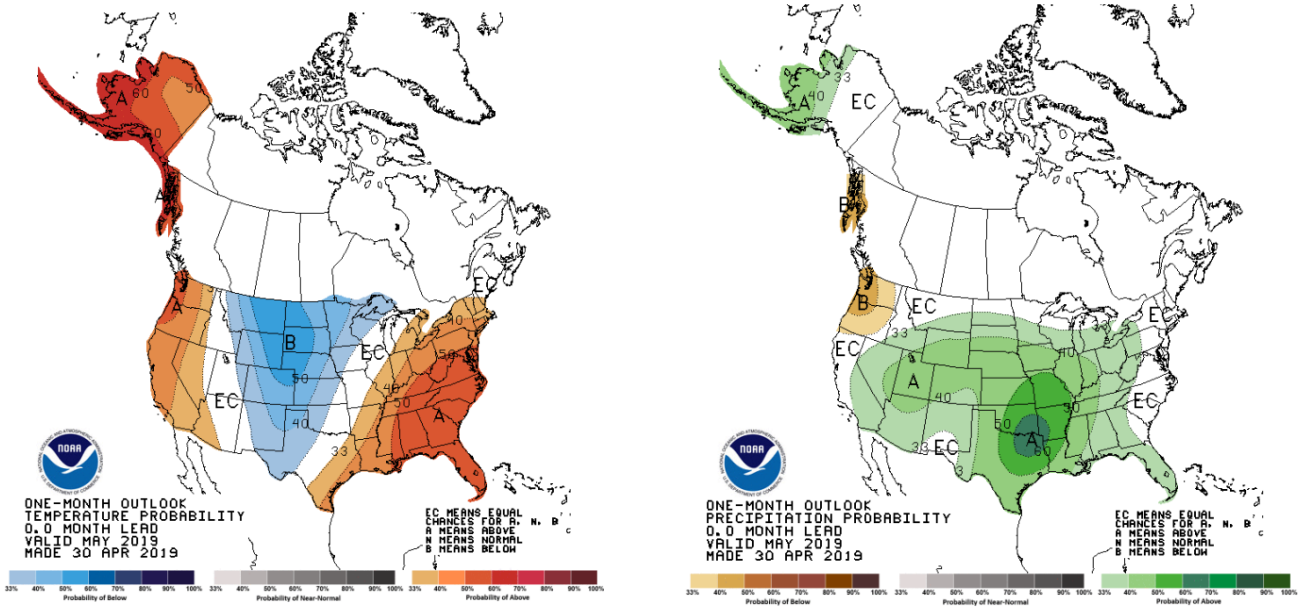
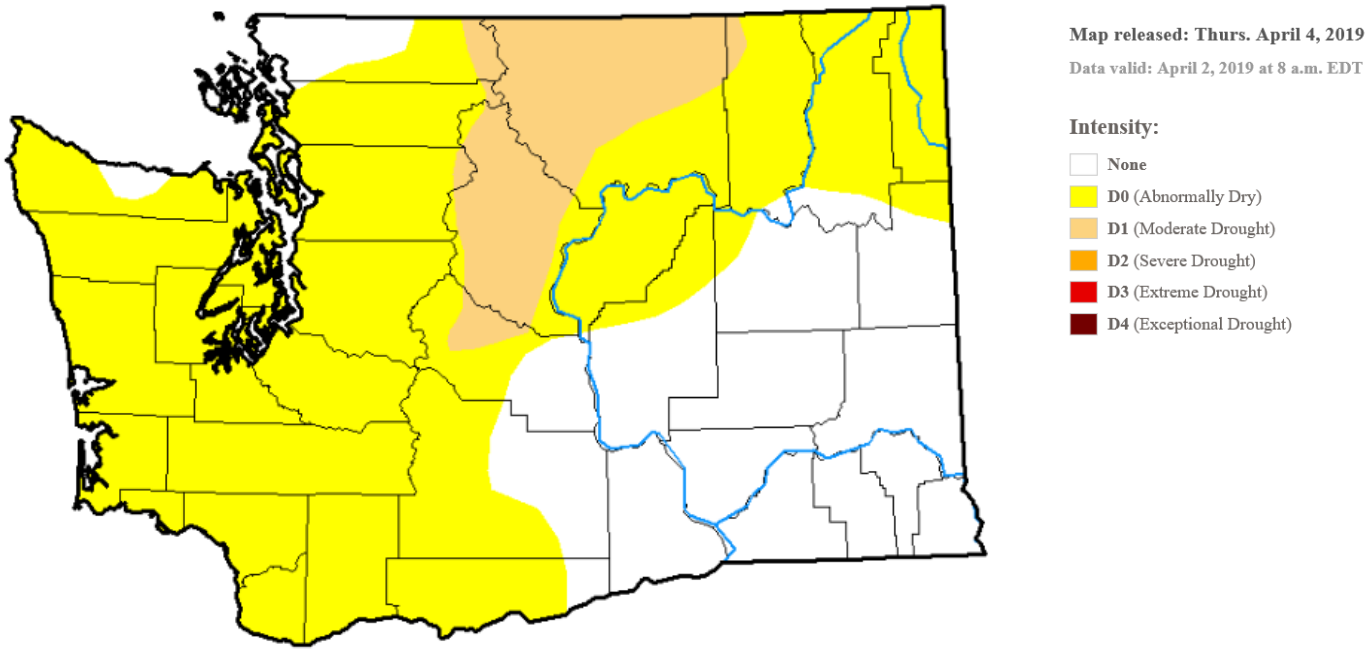


Figure 2: Washington State Drought Monitor



Natural Resources Conservation Service

Washington State
Snow, Water and Climate Services

Program Contacts

Washington:

Roylene Rides At The Door
State Conservationist
Spokane State Office
W. 316 Boone Ave., Suite 450
Spokane, WA 99201-2348
phone: 509-323-2961
roylene.rides-at-the-door@wa.usda.gov

Scott Pattee
Water Supply Specialist
Washington Snow Survey Office
2005 E. College Way, Suite 203
Mount Vernon, WA 98273-2873
phone: 360-488-4826
scott.pattee@wa.usda.gov

Oregon:

Scott Oviatt
Supervising Hydrologist
Oregon Data Collection Office
1201 NE Lloyd Blvd., STE 900
Portland, OR 97232
Phone: 503-414-3271
scott.oviatt@or.usda.gov

Gus Goodbody/Jolyne Lea
Forecast Hydrologist
National Water and Climate Center
1201 NE Lloyd Blvd., STE 800
Portland, OR 97232
phone: 503-414-3033/3040
angus.goodbody@por.usda.gov
jolyne.lea@por.usda.gov

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

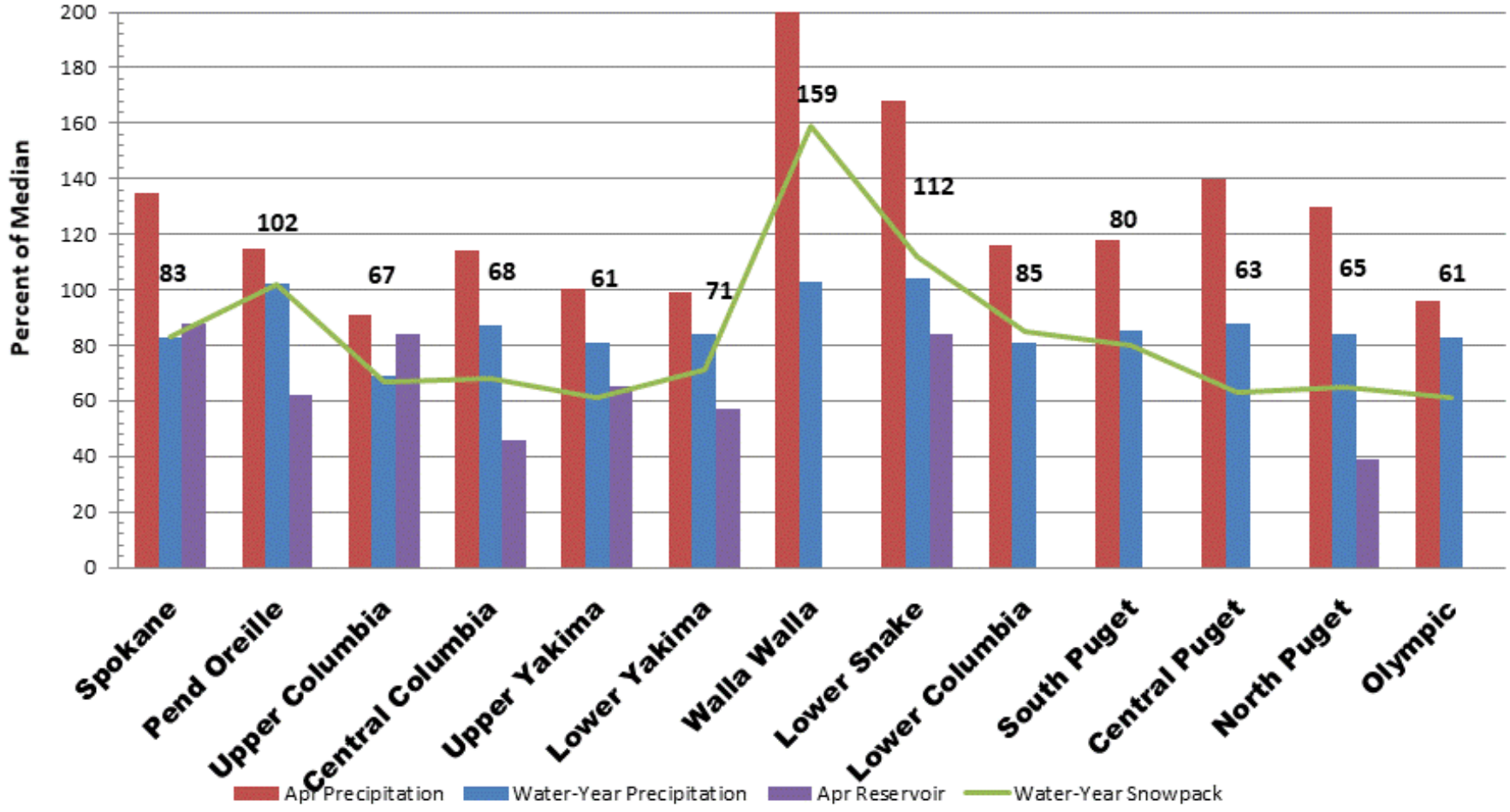
Washington:
http://www.nrcs.usda.gov/wps/portal/nrcs/site/wa/home/

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

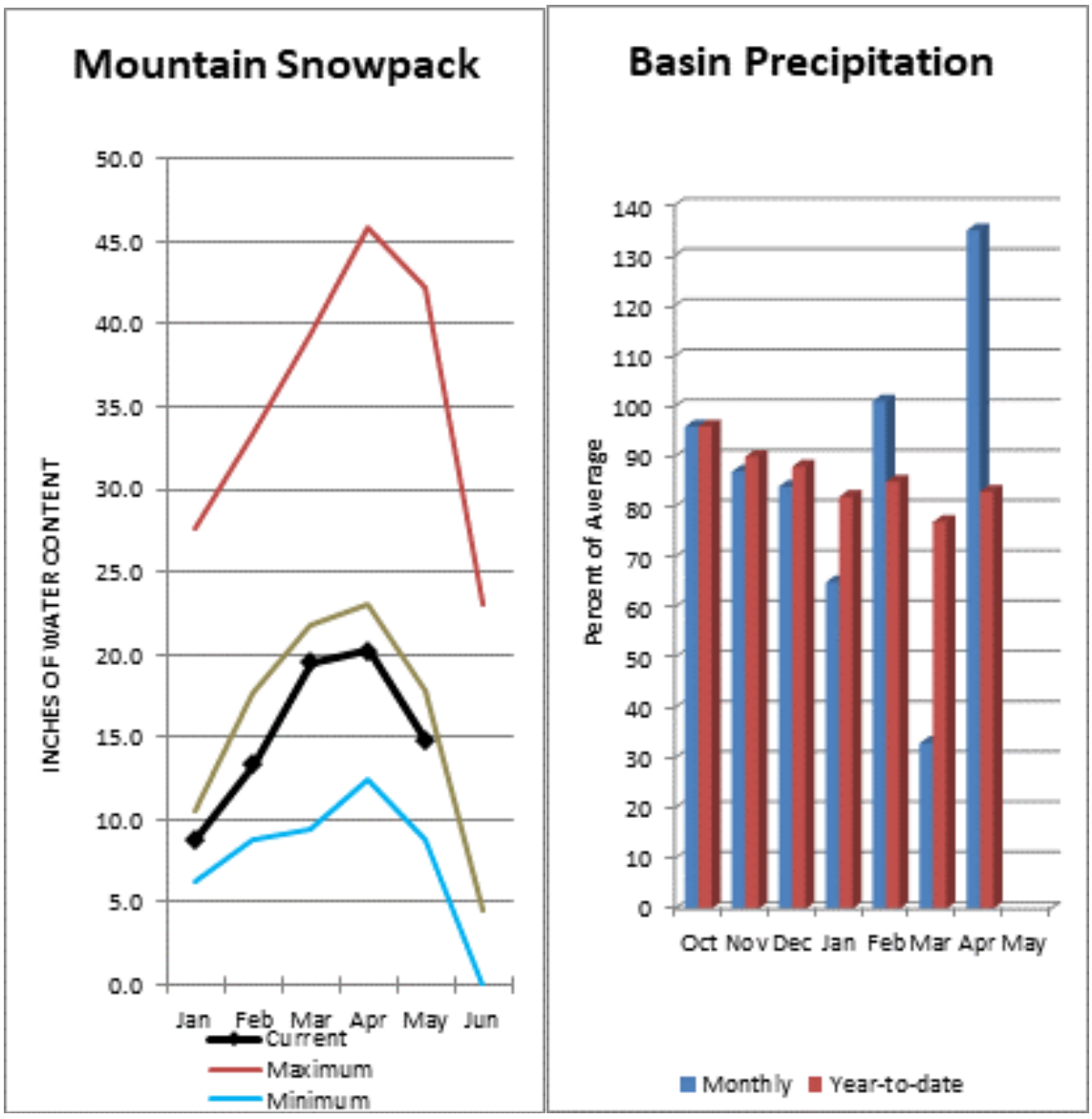
NRCS Natural Resources Conservation Service

May 1, 2019 - Snowpack, Precipitation and Reservoir Conditions at a Glance

(Water Year = October 1 - Current Date)



Spokane River Basin



Basin snowpack is 83% of normal and precipitation is 83% of average for the water year. Precipitation for April was below normal at 135% of average. Streamflow's are forecasted for 71-74% of normal for the Spokane River and 61% for the May-July flows on Chamokane Creek. Streamflow on the Spokane River at Spokane was 126% of average for April. May 1 storage in Coeur d'Alene Lake was 209,900-acre feet, 88% of average and 92% of capacity. Snowpack at Quartz Peak SNOTEL site was all but gone at only 4% of normal. Average temperatures in the Spokane basin were near normal for April and for the water year.

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

Data Current as of: 5/3/2019 4:46:06 PM

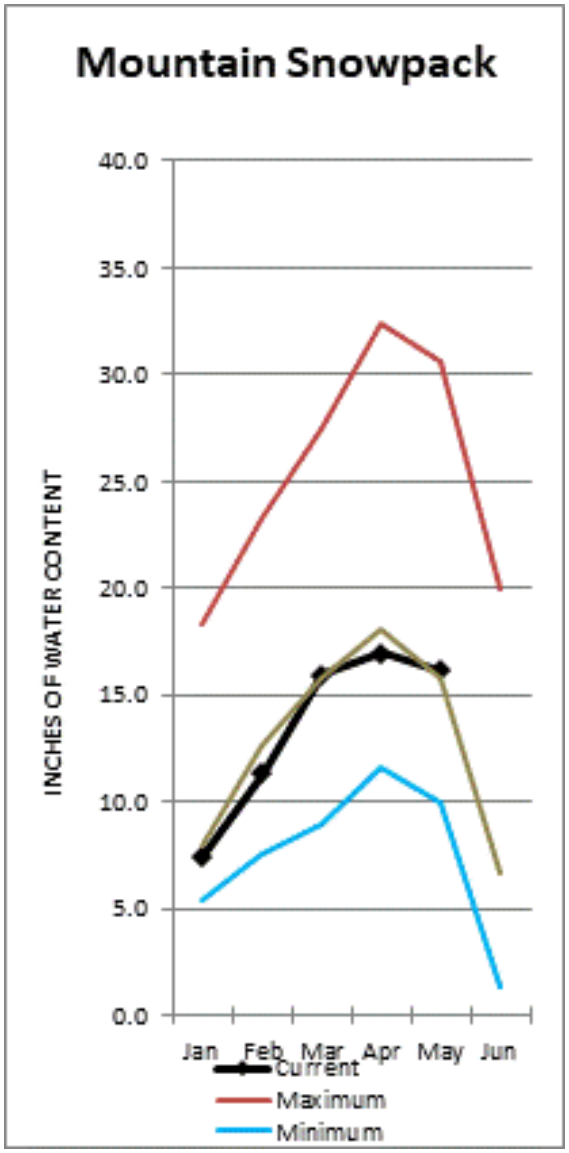
Spokane
Streamflow Forecasts - May 1, 2019

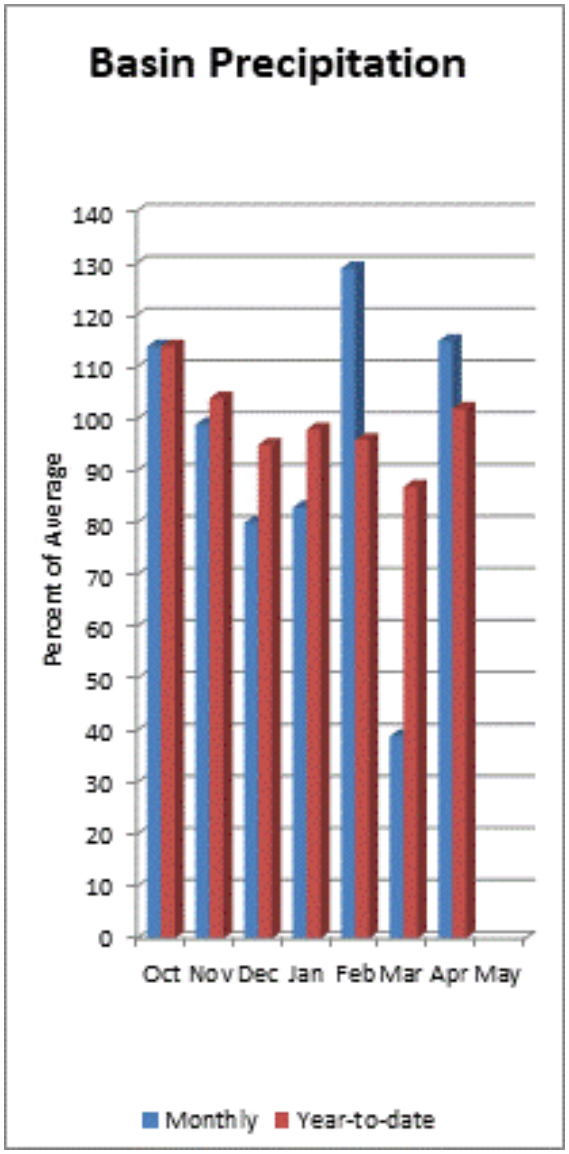
Spokane	Forecast Period	Forecast Exceedance Probabilities for Risk Assessment Chance that actual volume will exceed forecast 90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Spokane R nr Post Falls[2]								
	MAY-JUL	700	930	1090	71%	1240	1470	1530
	MAY-SEP	745	985	1150	71%	1310	1550	1620
Spokane R at Long Lake[2]								
	MAY-JUL	890	1120	1280	75%	1440	1680	1710
	MAY-SEP	1030	1280	1450	74%	1620	1870	1950
Chamokane Ck nr Long Lake								
	MAY-JUL	2.4	3.7	4.7	61%	5.9	7.8	7.7

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, 2019	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Lake Coeur d' Alene	209.9	306.2	228.0	238.5
Basin-wide Total	209.9	306.2	228.0	238.5
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis May 1, 2019	# of Sites	% Median	Last Year % Median
Spokane	11	83%	145%
Newman Lake	1	4%	112%





April streamflow was 125% of average on the Pend Oreille River and 102% on the Columbia at the International Boundary. May 1 snow cover was 102% of normal in the Pend Oreille Basin River Basin. Spring and summer runoff are forecasted for slightly below normal flows. Bunchgrass Meadows SNOTEL site had 19.7 inches of snow water on the snow pillow which is below normal for May 1. Precipitation during April was 135% of average, bringing the year-to-date precipitation up to 93% of average. Reservoir storage in the basin, including Lake Pend Oreille and Priest Lake was 100% of normal. Average temperatures were near normal for April and for the water year.

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

Data Current as of: 5/3/2019 4:46:19 PM

Pend Oreille Basins
Streamflow Forecasts - May 1, 2019

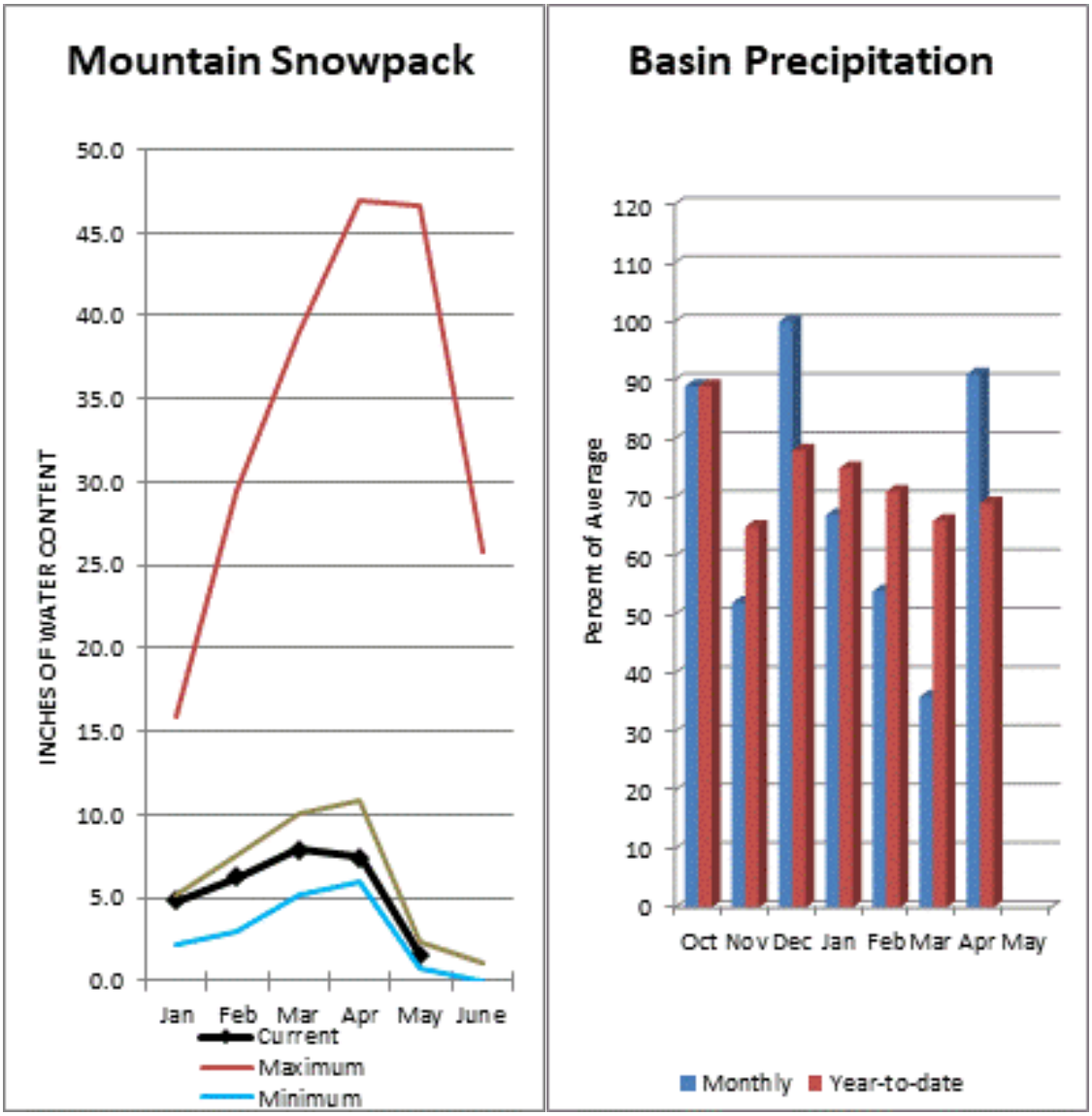
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

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	7230	8080	8460	87%	9240	10100	9690
	MAY-SEP	7840	8830	9410	88%	10200	11200	10700
Priest R nr Priest River[2]								
	MAY-JUL	325	400	455	78%	510	585	580
	MAY-SEP	355	435	495	79%	550	635	630
Pend Oreille R bl Box Canyon[2]								
	MAY-JUL	7070	7940	8540	88%	9140	10000	9750
	MAY-SEP	7730	8770	9480	88%	10200	11200	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, 2019	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Lake Pend Oreille	947.1	959.7	931.7	1561.3
Priest Lake	91.2	105.0	101.9	119.3
Basin-wide Total	1038.3	1064.7	1033.6	1680.6
# of reservoirs	2	2	2	2

Watershed Snowpack Analysis May 1, 2019	# of Sites	% Median	Last Year % Median
Pend Oreille Basins	57	102%	165%
Colville River	0		
Kettle River	4	69%	182%



May 1 snow cover on the Okanogan was 75% of normal, Omak Creek was 67% and the Methow was 76%. April precipitation in the Upper Columbia was 91% of average, with precipitation for the water year at 69% of average. Streamflow's are forecasted for much below normal spring and summer runoff. **An official drought declaration has been issued for the Okanogan and Methow river basins.** April streamflow for the Methow River was 103% of average, 101% for the Okanogan River and 116% for the Similkameen. Salmon Meadows SNOTEL melted out almost 2 weeks early. Combined storage in the Conconully Reservoirs was 19,700 acre-feet or 119% of normal. Temperatures were near normal for April and for the water year.

Data Current as of: 5/3/2019 4:46:28 PM

Upper Columbia Basins
Streamflow Forecasts - May 1, 2019

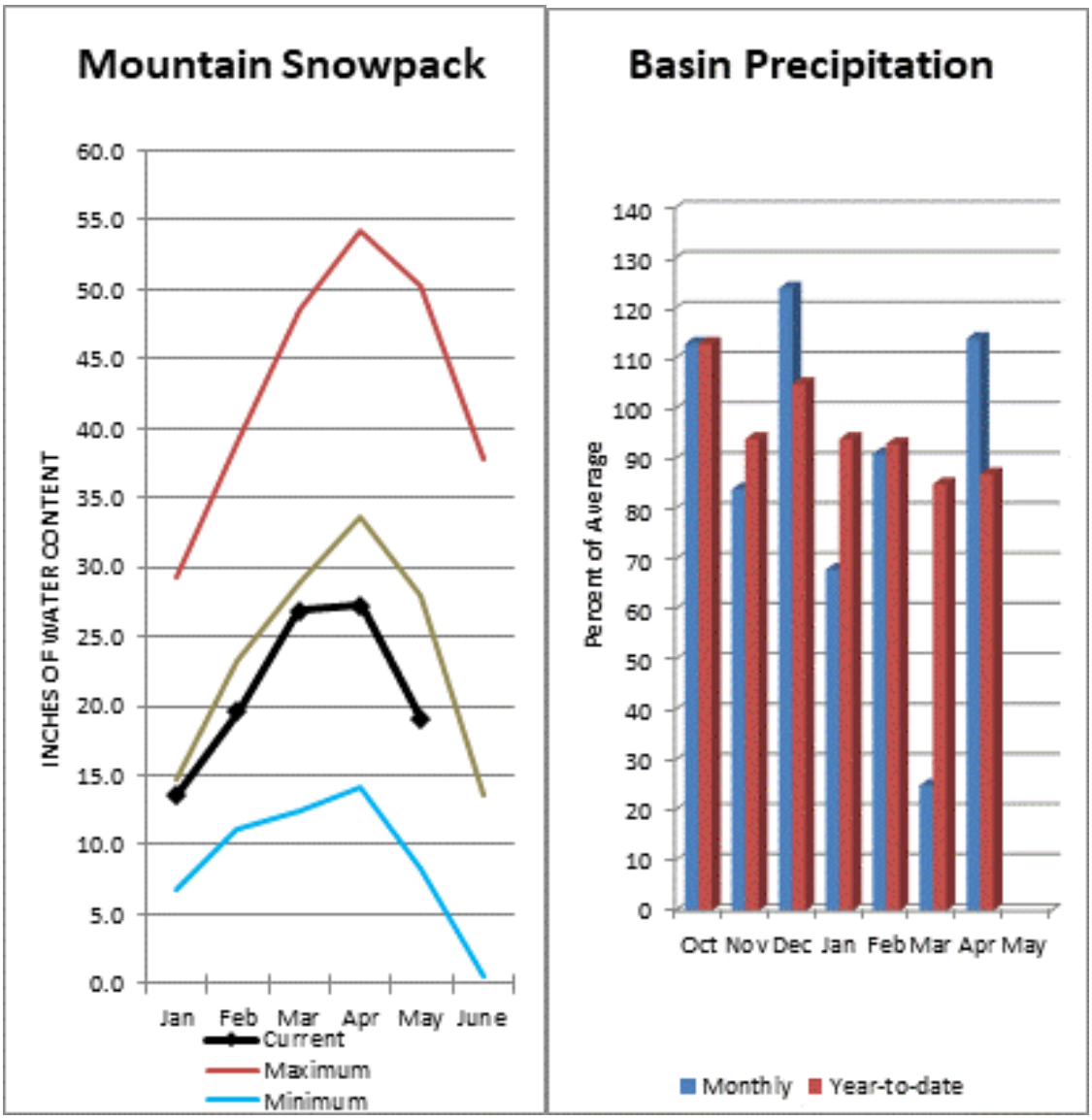
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

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	870	1080	1220	84%	1360	1570	1450
	MAY-SEP	885	1120	1270	83%	1430	1660	1530
Colville R at Kettle Falls								
	MAY-JUL	2.4	27	44	61%	61	86	72
	MAY-SEP	5.3	33	52	62%	71	99	84
Columbia R at Grand Coulee-NWS[2]								
	MAY-JUL	33700		36800	84%		41100	43870
	MAY-SEP	41800		45700	86%		49600	52970
Similkameen R nr Nighthawk								
	MAY-JUL	460	600	690	65%	780	920	1060
	MAY-SEP	505	650	750	66%	850	995	1140
Okanogan R nr Tonasket								
	MAY-JUL	550	740	870	67%	1000	1190	1300
	MAY-SEP	590	825	980	67%	1140	1370	1470
Okanogan R at Malott								
	MAY-JUL	555	750	885	70%	1020	1220	1270
	MAY-SEP	590	830	995	69%	1160	1390	1440
Methow R nr Pateros								
	MAY-JUL	340	435	500	68%	565	660	730
	MAY-SEP	380	480	550	70%	620	720	790

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

Reservoir Storage End of April, 2019	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Conconully Lake (Salmon Lake Dam)	8.2	9.1	7.6	10.5
Conconully Reservoir	11.5	10.7	8.9	13.0
Basin-wide Total	19.7	19.9	16.5	23.5
# of reservoirs	2	2	2	2

Watershed Snowpack Analysis May 1, 2019	# of Sites	% Median	Last Year % Median
Upper Columbia Basins	11	67%	153%
Okanogan River	11	76%	164%
Omak Creek	1	67%	153%
Sanpoil River	0		
Similkameen River	2	0%	183%
Toats Coulee Creek	0		
Conconully Lake	1		
Methow River	3	74%	134%



Precipitation during April was 114% of average in the basin and 87% for the year-to-date. Runoff for Entiat River is forecast to be 64% of average for the summer. The Wenatchee Basin can expect below normal runoff this year as well. April average streamflow on the Chelan River was 119% and on the Wenatchee River 109%. May 1 snowpack in the Wenatchee River Basin was 68% of normal; the Chelan, 61%; the Entiat, 0%; Stemilt Creek, 97% and Colockum Creek, 428%. Reservoir storage in Lake Chelan was 103% of average. Lyman Lake SNOTEL had the most snow water with 39.6 inches of water. This site would normally have 61.2 inches on May 1. Temperatures were near normal for April and for the water year.

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

Data Current as of: 5/3/2019 4:46:37 PM

Central Columbia Basins
Streamflow Forecasts - May 1, 2019

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

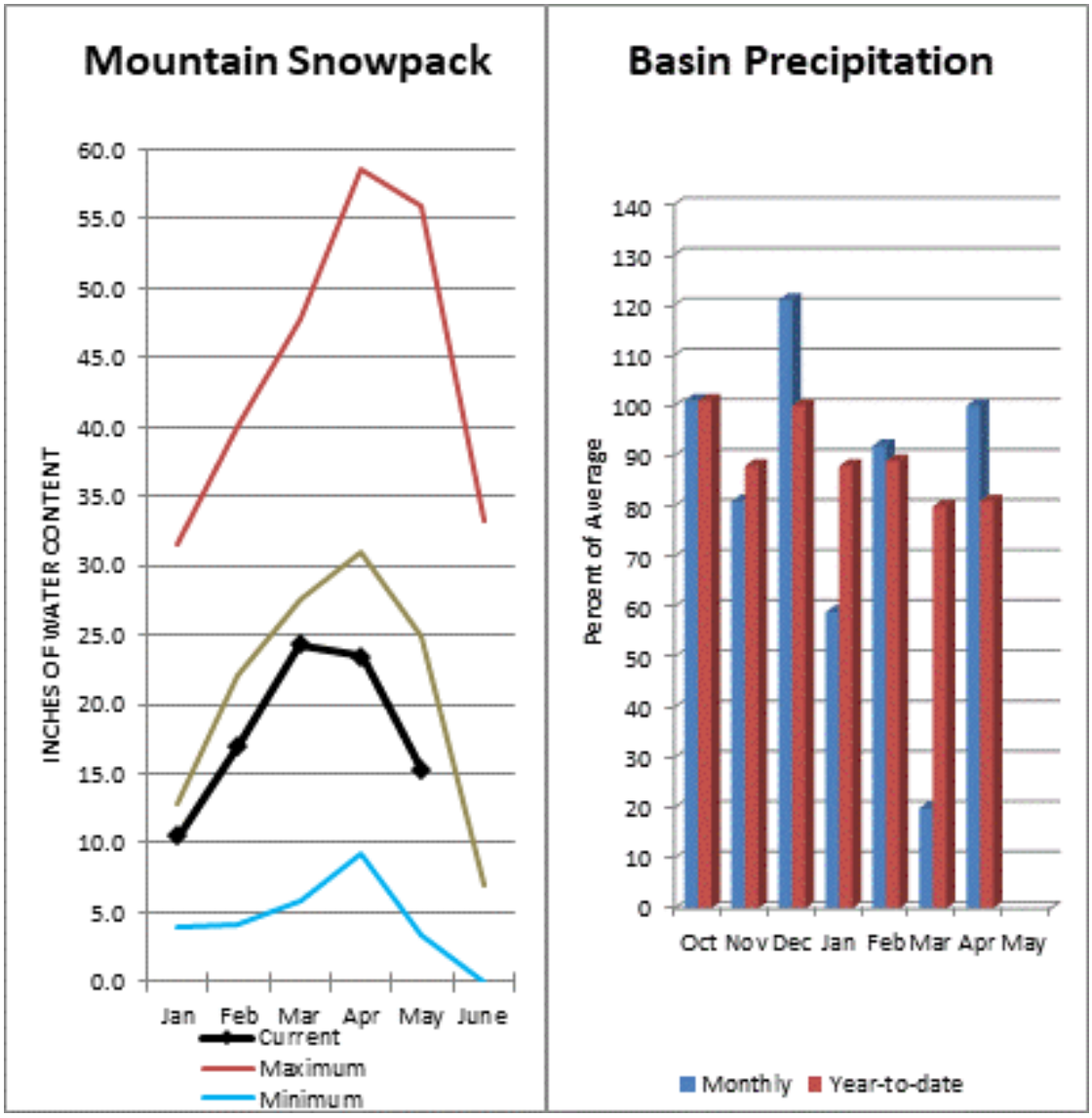
Central Columbia Basins	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Stehekin R at Stehekin								
	MAY-JUL	330	385	420	71%	455	510	595
	MAY-SEP	410	465	500	71%	535	590	705
Chelan R at Chelan								
	MAY-JUL	490	555	600	70%	645	710	860
	MAY-SEP	560	630	680	70%	730	800	975
Entiat R nr Ardenvoir								
	MAY-JUL	85	103	116	65%	129	147	178
	MAY-SEP	91	112	126	64%	141	162	196
Wenatchee R at Plain								
	MAY-JUL	460	530	580	70%	630	700	825
	MAY-SEP	500	580	635	69%	690	770	920
Icicle Ck nr Leavenworth								
	MAY-JUL	127	155	174	74%	193	220	235
	MAY-SEP	139	170	191	73%	210	245	260
Wenatchee R at Peshastin								
	MAY-JUL	665	760	825	72%	890	980	1140
	MAY-SEP	725	830	900	71%	975	1080	1260
Columbia R bl Rock Island Dam-NWS[2]								
	MAY-JUL	36600		39600	83%		44500	47930
	MAY-SEP	44600		48600	85%		53200	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, 2019	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Lake Chelan	309.4	303.0	300.7	677.4
Basin-wide Total	309.4	303.0	300.7	677.4
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis May 1, 2019	# of Sites	% Median	Last Year % Median
Central Columbia Basins	3	61%	121%
Chelan Lake Basin	3	61%	121%
Entiat River	1	0%	0%
Wenatchee River	6	68%	116%
Stemilt Creek	1	97%	44%
Colockum Creek	1	428%	322%

Upper Yakima River Basin



An official drought declaration has been issued for the Upper Yakima River Basin. May 1 reservoir storage for the Upper Yakima reservoirs was 544,400-acre feet, 89% of average. April streamflow within the basin was Cle Elum River near Roslyn at 118%. May 1 snowpack was 61% based upon 5 snow course and SNOTEL readings within the Upper Yakima Basin. Precipitation was 100% of average for April and 81% for the water-year. Forecasts for spring-summer natural runoff and lake inflow are much below normal. 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.

Data Current as of: 5/3/2019 4:46:47 PM

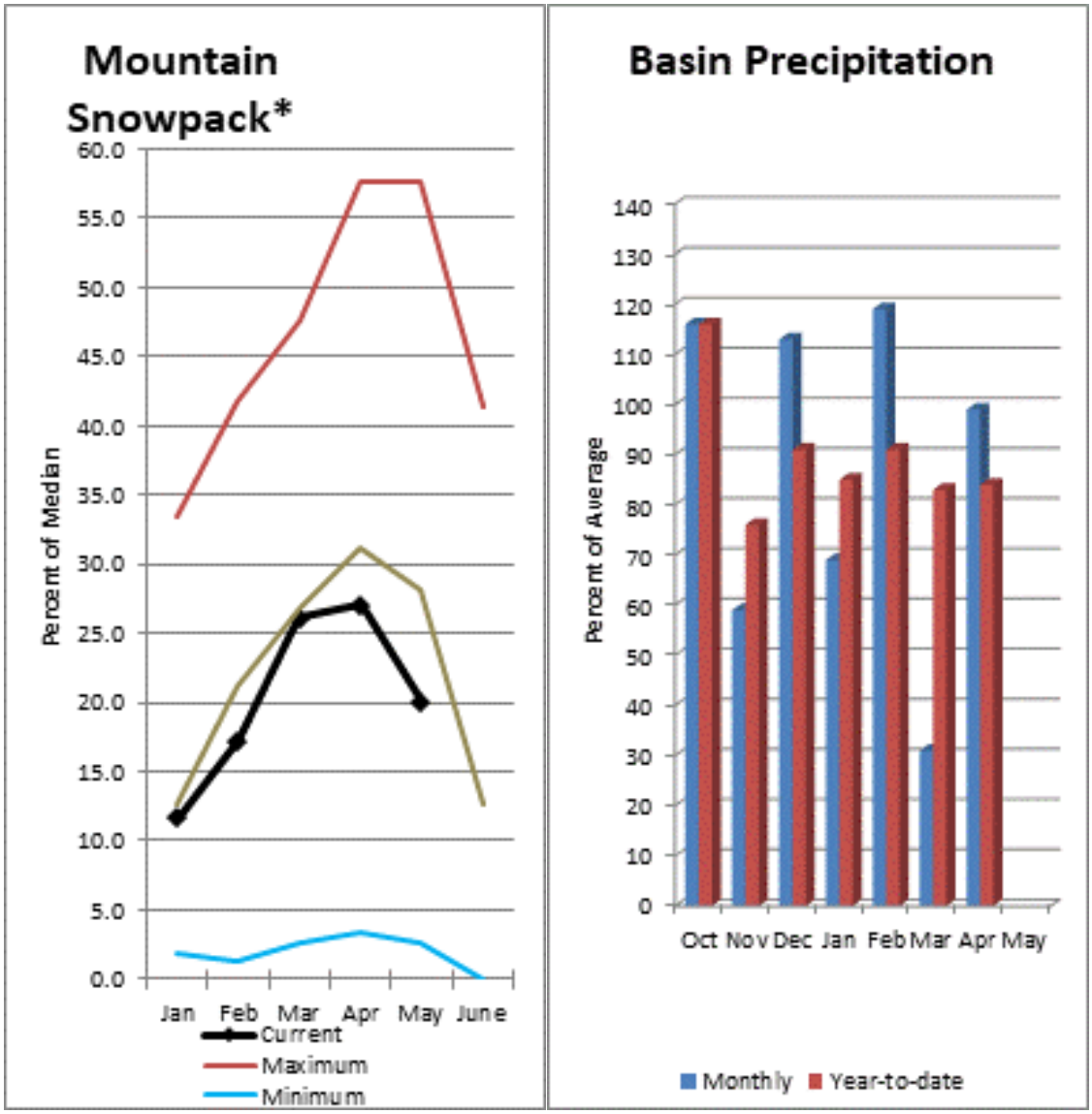
Upper Yakima River
Streamflow Forecasts - May 1, 2019

Upper Yakima River	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
		Forecast Exceedance Probabilities for Risk Assessment Chance that actual volume will exceed forecast						
Keechelus Reservoir Inflow[2]								
	MAY-JUL	37	48	56	66%	64	75	85
	MAY-SEP	44	57	65	68%	74	87	96
Kachess Reservoir Inflow [2]								
	MAY-JUL	36	43	48	63%	53	60	76
	MAY-SEP	42	50	56	67%	61	70	84
Cle Elum Lake Inflow [2]								
	MAY-JUL	184	205	215	70%	230	250	305
	MAY-SEP	200	225	240	71%	255	280	340
Teanaway R bl Forks nr Cle Elum								
	MAY-JUL	15.6	30	40	51%	50	64	79
	MAY-SEP	17.3	32	42	51%	52	67	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, 2019	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Keechelus	118.4	150.9	122.1	157.8
Kachess	187.5	216.5	183.7	239.0
Cle Elum	238.5	354.1	302.6	436.9
Basin-wide Total	544.4	721.6	608.4	833.7
# of reservoirs	3	3	3	3

Watershed Snowpack Analysis May 1, 2019	# of Sites	% Median	Last Year % Median
Upper Yakima River	5	61%	104%



April average streamflow's within the basin were: Yakima River near Parker, 126% and the Naches River near Naches, 138%. Forecasts for spring-summer natural runoff are for much below normal flows. May 1 reservoir storage for Bumping and Rimrock reservoirs was 133,000-acre feet, 74% of average. May 1 snowpack was 74% based upon 6 snow course and SNOTEL readings within the Lower Yakima Basin and Ahtanum Creek reported in at 71% of normal. Precipitation was 99% of average for April and 84% for the water-year. Temperatures were slightly above normal for April and slightly below 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: 5/3/2019 4:46:56 PM

Lower Yakima River
Streamflow Forecasts - May 1, 2019

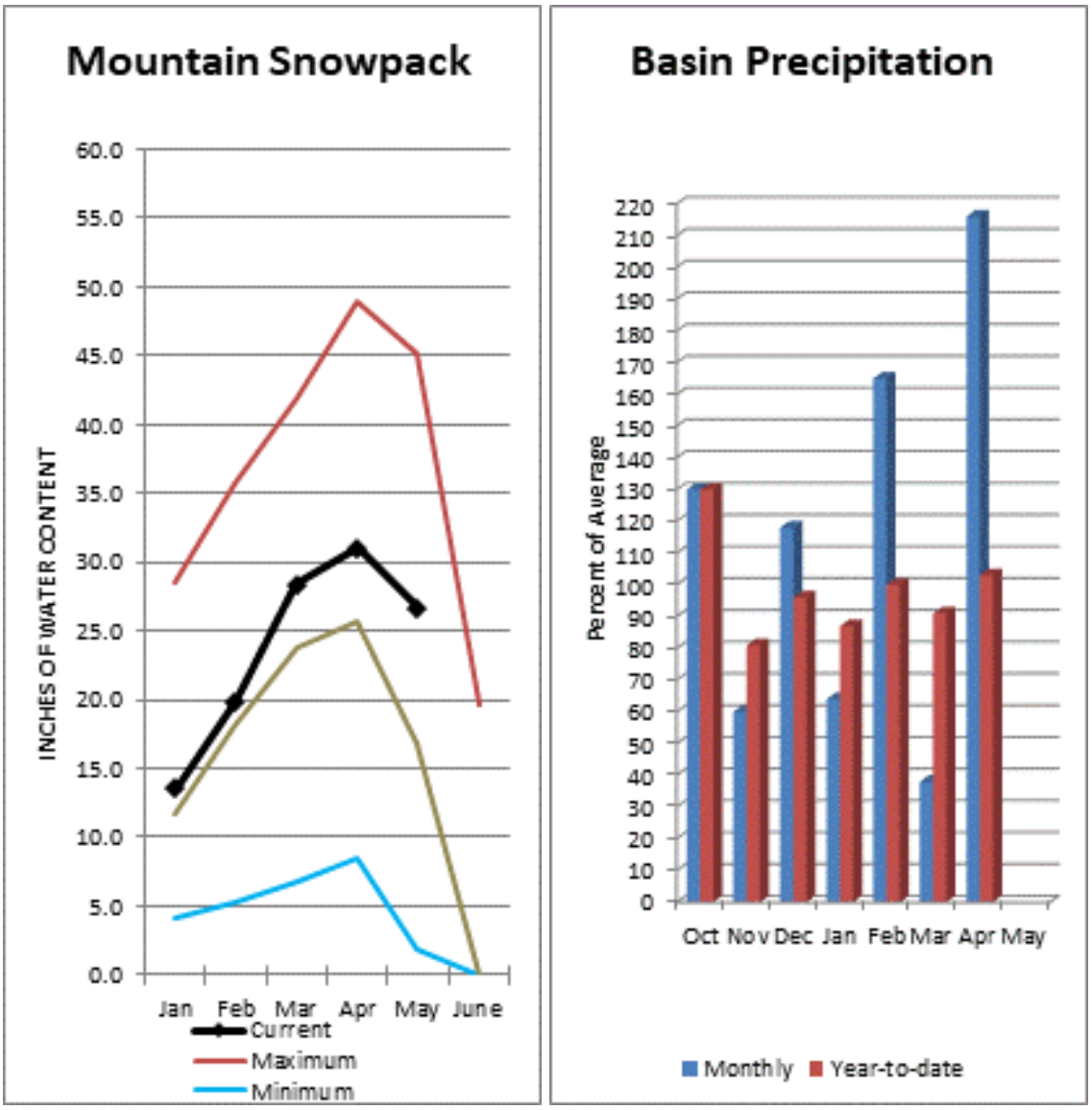
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

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	57	64	69	74%	74	81	93
	MAY-SEP	63	71	76	74%	82	90	103
American R nr Nile								
	MAY-JUL	47	56	62	74%	68	77	84
	MAY-SEP	50	61	68	74%	75	86	92
Rimrock Lake Inflow [2]								
	MAY-JUL	105	115	122	81%	129	139	151
	MAY-SEP	128	142	151	82%	160	173	185
Naches R nr Naches								
	MAY-JUL	280	350	400	74%	450	520	540
	MAY-SEP	310	395	450	75%	510	595	600
Ahtanum Ck at Union Gap								
	MAY-JUL	6.2	11.6	15.3	79%	19	24	19.3
	MAY-SEP	7.9	13.6	17.5	83%	21	27	21
Yakima R nr Parker [2]								
	MAY-JUL	660	765	835	68%	905	1010	1230
	MAY-SEP	765	875	955	69%	1030	1140	1390
Klickitat R nr Glenwood								
	MAY-JUL	53	66	75	77%	85	98	97
	MAY-SEP	63	77	86	78%	96	110	110
Klickitat R nr Pitt								
	MAY-JUL	200	240	265	87%	290	325	305
	MAY-SEP	270	315	345	87%	375	420	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, 2019	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Bumping Lake	19.5	19.6	21.7	33.7
Rimrock	113.5	174.0	156.9	198.0
Basin-wide Total	133.0	193.6	178.6	231.7
# of reservoirs	2	2	2	2

Watershed Snowpack Analysis May 1, 2019	# of Sites	% Median	Last Year % Median
Lower Yakima River	6	74%	90%
Ahtanum Creek	2	71%	56%



April precipitation was 216% of average, maintaining the year-to-date precipitation at 103% of average. Snowpack in the basin was holding strong at 159% of normal. May-September runoff is forecasted to be slightly above normal. Temperatures were near normal for April but slightly below normal for the water year.

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

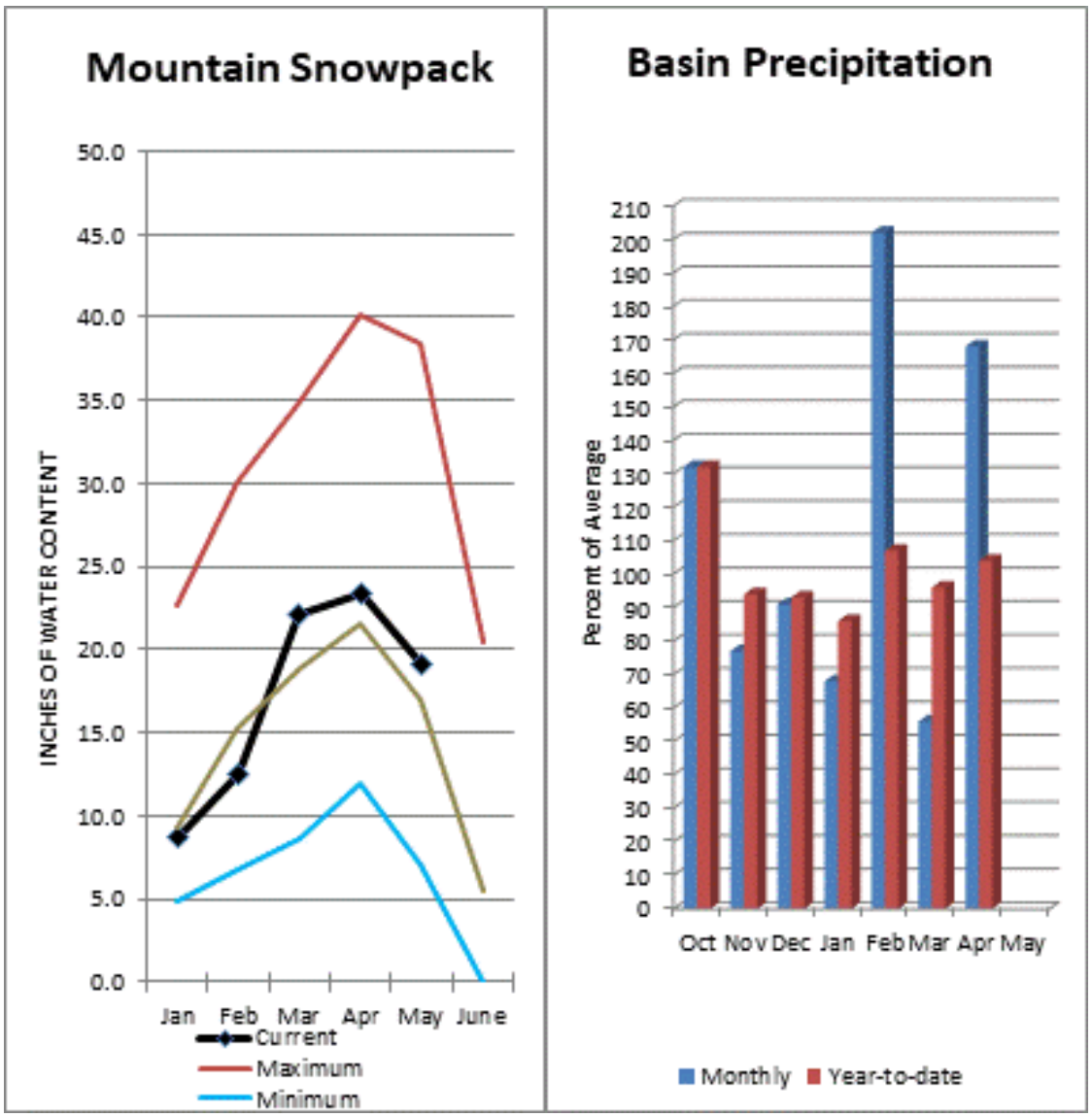
Data Current as of: 5/3/2019 4:47:06 PM

Walla Walla River
Streamflow Forecasts - May 1, 2019

		Forecast Exceedance Probabilities for Risk Assessment Chance that actual volume will exceed forecast						
Walla Walla River	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
SF Walla Walla R nr Milton-Freewater								
	MAY-JUL	34	39	43	116%	47	52	37
	MAY-SEP	46	52	56	114%	60	66	49
Mill Ck nr Walla Walla								
	MAY-JUL	11.1	13.4	14.9	107%	16.5	18.8	13.9
	MAY-SEP	14.4	16.8	18.5	107%	20	23	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, 2019	# of Sites	% Median	Last Year % Median
Walla Walla River	2	159%	116%



April precipitation was 168% of average, bringing the year-to-date precipitation to 104% of average. May 1 snowpack readings averaged 112% of normal. April streamflow was 177% of average for Snake River below Lower Granite Dam and 245% for Grande Ronde River near Troy. Spring-summer runoff is expected to be near to above normal. Dworshak Reservoir storage was 111% of average. Average temperatures were slightly normal for April and below normal for the water year.

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

Data Current as of: 5/3/2019 4:47:15 PM

Lower Snake, Grande Ronde, Clearwater Basins
Streamflow Forecasts - May 1, 2019

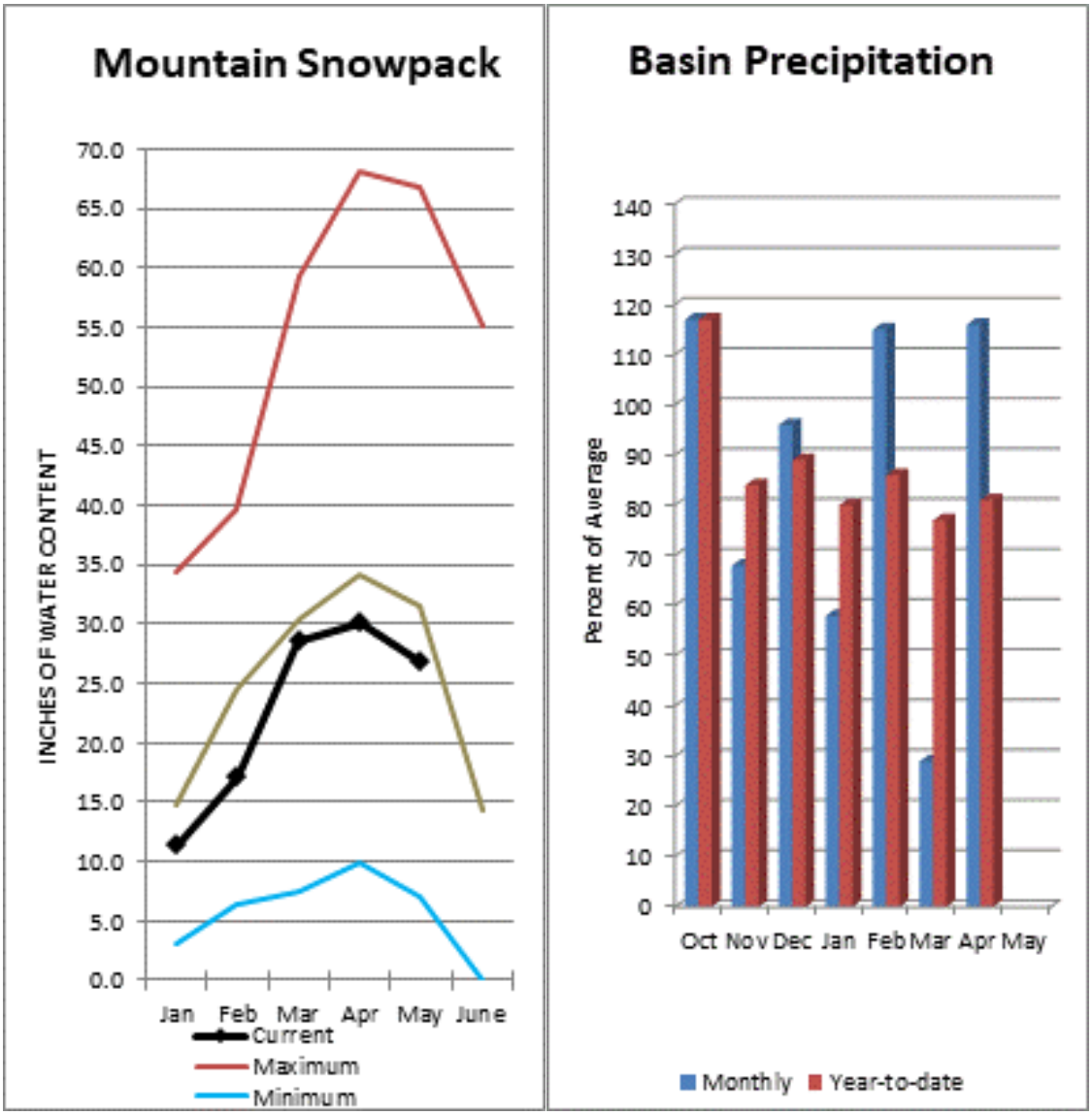
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

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	880	1020	1120	130%	1220	1370	860
	MAY-SEP	985	1130	1230	130%	1330	1480	945
Asotin Ck at Asotin								
	MAY-JUL	13.8	17.5	20	83%	23	28	24
Clearwater R at Spalding[2]								
	MAY-JUL	4150	4740	5150	98%	5550	6140	5260
	MAY-SEP	4340	4990	5430	96%	5870	6520	5640
Snake R bl Lower Granite Dam-NWS[2]								
	MAY-JUL	13800	14500	15100	99%	16000	17500	15280
	MAY-SEP	16300	17100	17700	100%	19500	20300	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, 2019	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Dworshak Reservoir	2924.0	1896.0	2646.0	3468.0
Basin-wide Total	2924.0	1896.0	2646.0	3468.0
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis May 1, 2019	# of Sites	% Median	Last Year % Median
Lower Snake, Grande Ronde, Clearwater Basins	14	112%	96%



Forecasts for May – September streamflows within the basin are Lewis River at Ariel, 79% and Cowlitz River at Castle Rock, 81% of average. The Columbia at The Dalles is forecasted to have 87% of average flows this summer according to the River Forecast Center. April average streamflow for Cowlitz River was 114% and the Columbia River at The Dalles was 119% of average. April precipitation was 116% of average and the water-year average was 81%. May 1 snow cover for Cowlitz River was 91%, and Lewis River was 79% of normal. Temperatures were above normal during April and near normal for the water year.

Data Current as of: 5/3/2019 4:47:25 PM

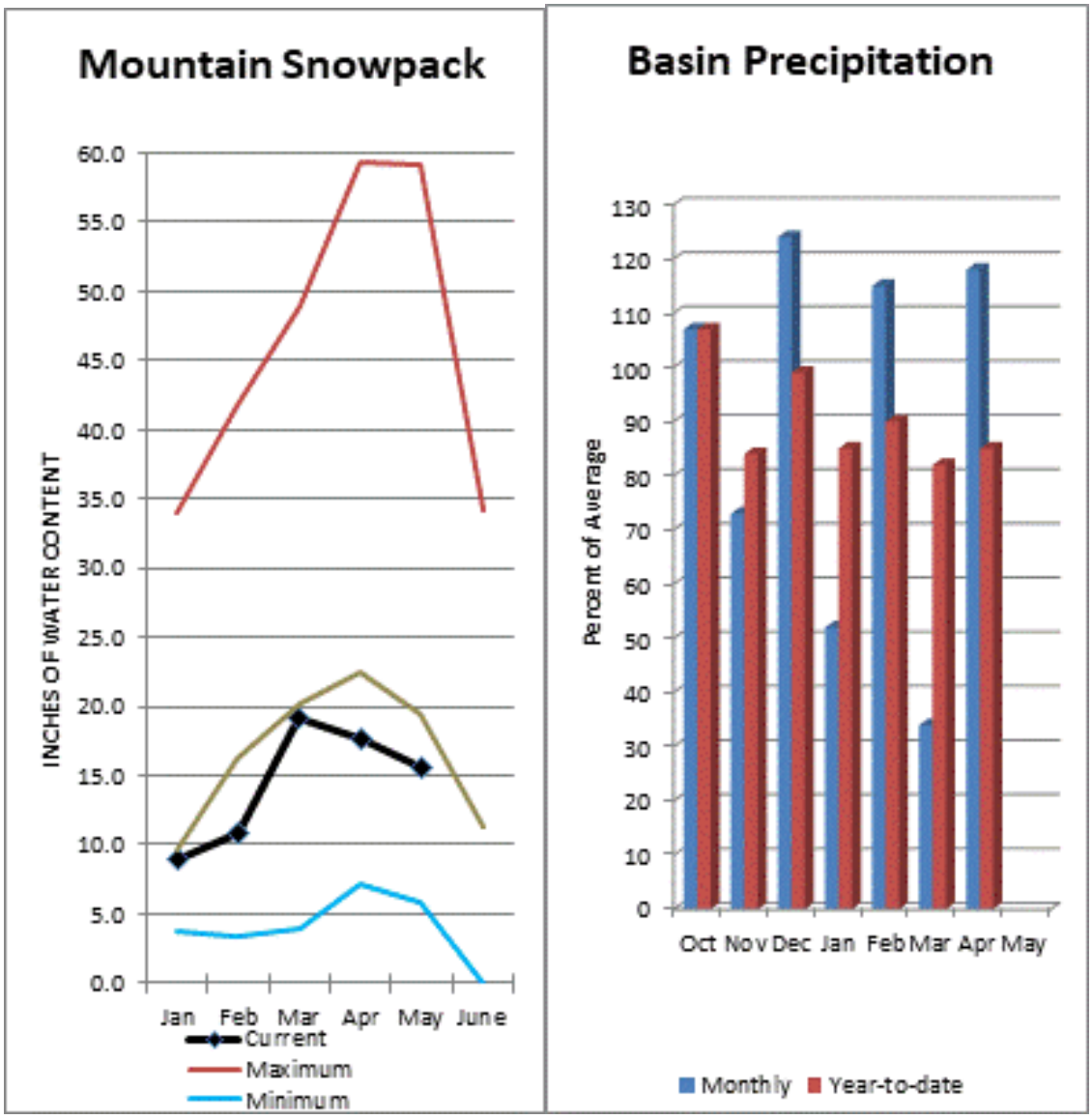
Lower Columbia Basins
Streamflow Forecasts - May 1, 2019

Lower Columbia Basins	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
		Forecast Exceedance Probabilities for Risk Assessment Chance that actual volume will exceed forecast						
Columbia R at The Dalles-NWS[2]								
	MAY-JUL	52600	54700	56700	86%	61200	63300	66050
	MAY-SEP	65000	67100	69000	87%	73400	75500	78900
Klickitat R nr Glenwood								
	MAY-JUL	53	66	75	77%	85	98	97
	MAY-SEP	63	77	86	78%	96	110	110
Klickitat R nr Pitt								
	MAY-JUL	200	240	265	87%	290	325	305
	MAY-SEP	270	315	345	87%	375	420	395
Lewis R at Ariel[2]								
	MAY-JUL	345	435	490	80%	550	640	615
	MAY-SEP	445	540	605	79%	670	765	770
Cowlitz R bl Mayfiled[2]								
	MAY-JUL	680	855	975	83%	1090	1270	1180
	MAY-SEP	810	1040	1200	86%	1360	1590	1390
Cowlitz R at Castle Rock[2]								
	MAY-JUL	930	1120	1250	78%	1380	1570	1600
	MAY-SEP	1140	1380	1540	81%	1710	1940	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, 2019	# of Sites	% Median	Last Year % Median
Lower Columbia Basins	11	85%	125%
Lewis River	5	79%	131%
Cowlitz River	6	91%	119%

South Puget Sound River Basins



May 1 snowpack was 87% of average for the White River, 94% for Puyallup River and 49% in the Green River Basin. April precipitation was 118% of average, bringing the water year-to-date to 85% of average for the basins. Summer runoff is forecasted to be slightly below normal this year. Average temperatures in the area were near normal for April and near normal for the water-year.

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

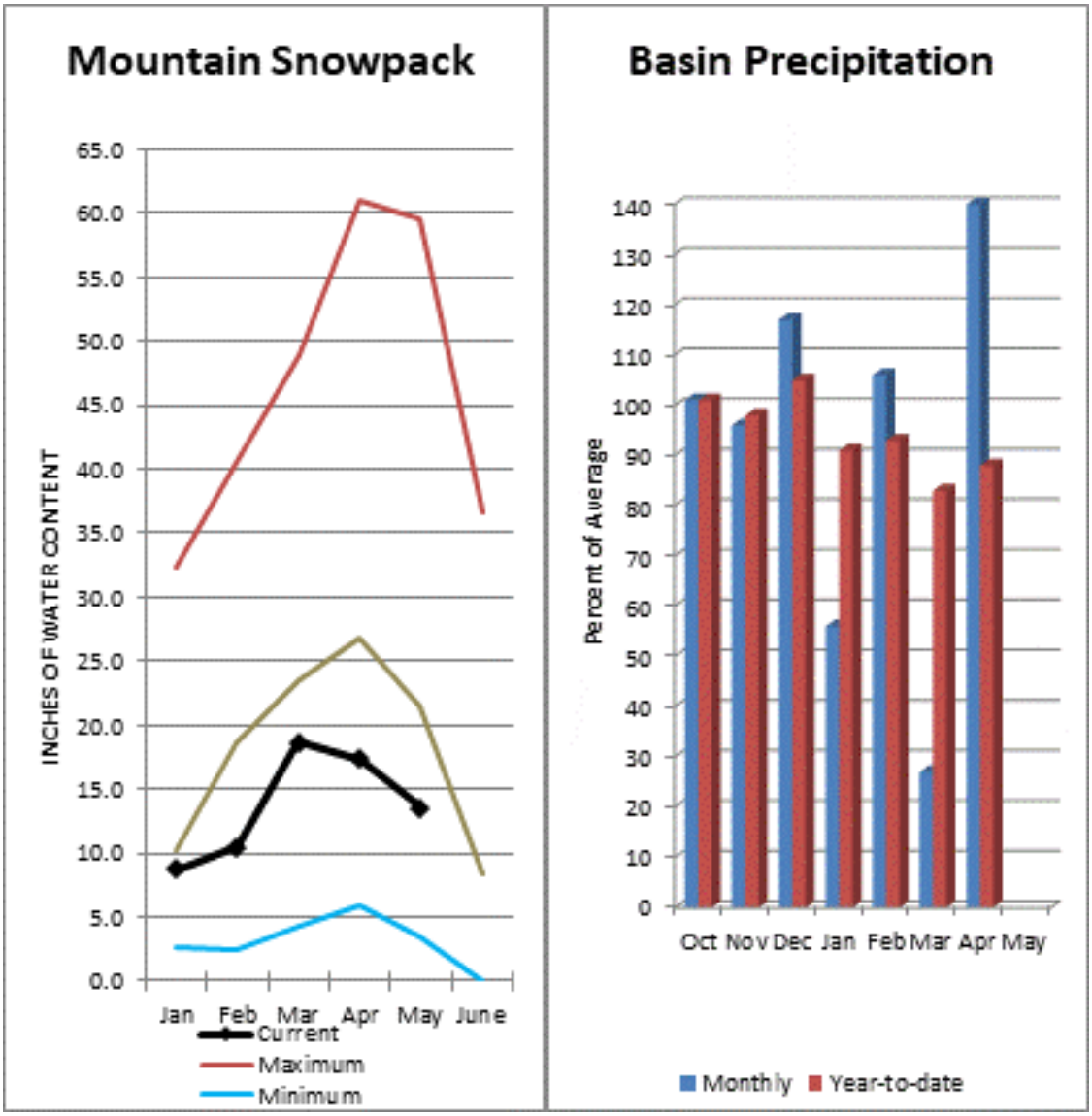
Data Current as of: 5/3/2019 4:47:34 PM

South Puget Sound Basins
Streamflow Forecasts - May 1, 2019

		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	148	215	245	74%	275	340	330
	MAY-SEP	205	285	320	76%	355	435	420
Green R bl Howard A Hanson Dam[1,2]								
	MAY-JUL	48	83	98	64%	114	149	152
	MAY-SEP	65	105	123	70%	141	180	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, 2019	# of Sites	% Median	Last Year % Median
South Puget Sound Basins	8	80%	110%
White River	2	87%	111%
Green River	2	49%	92%



Basin-wide precipitation for April was 140% of average, bringing water-year-to-date to 88% of average. May 1 median snow cover in Cedar River Basin was 62%, Tolt River Basin was 61%, Snoqualmie River Basin was 60%, and Skykomish River Basin was 57%. Basin runoff is forecasted to be much below normal this summer. Temperatures were slightly above normal for April and for the water-year.

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

Data Current as of: 5/3/2019 4:47:44 PM

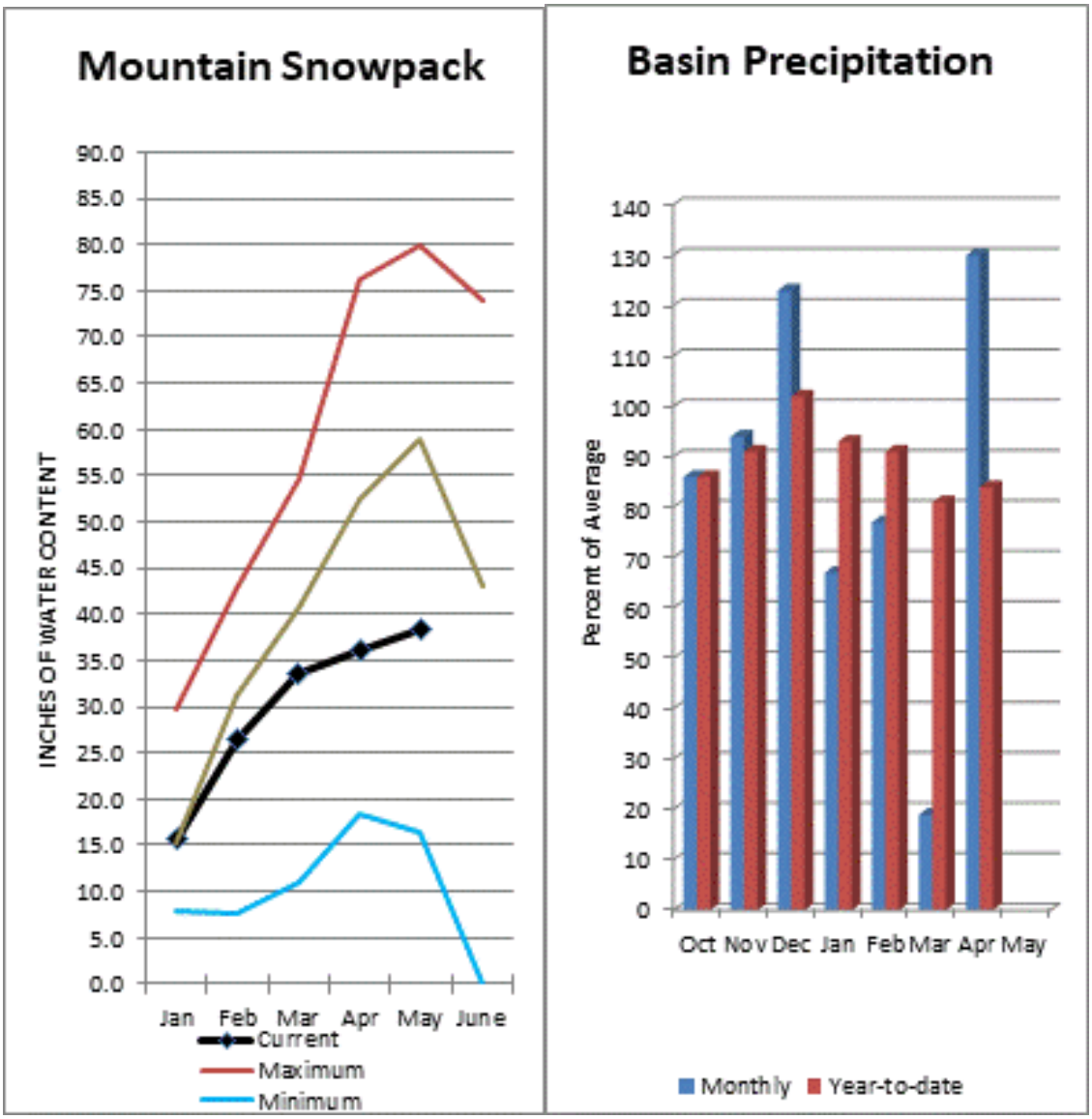
Central Puget Sound Basins
Streamflow Forecasts - May 1, 2019

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	25	31	35	71%	39	45	49
	MAY-SEP	29	37	41	73%	46	54	56
Rex R nr Cedar Falls								
	MAY-JUL	6.5	9.2	11	68%	12.8	15.5	16.2
	MAY-SEP	8.1	11.3	13.5	73%	15.7	18.9	18.5
Taylor Ck nr Selleck								
	MAY-JUL	7.6	9	10	75%	11	12.4	13.3
	MAY-SEP	9.9	11.8	13	77%	14.2	16.1	16.9
SF Tolt R nr Index								
	MAY-JUL	3.3	5.3	6.7	64%	8	10	10.4
	MAY-SEP	4.3	7	8.8	72%	10.6	13.2	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, 2019	# of Sites	% Median	Last Year % Median
Central Puget Sound Basins	12	63%	140%
Puyallup River	4	94%	122%
Cedar River	4	62%	142%
Tolt River	2	61%	179%
Snoqualimie River	4	60%	135%
Skykomish River	2	57%	141%



Forecast for Skagit River streamflow at Newhalem is 77% of average for the spring and summer period. April streamflow in Skagit River was 110% of average. Other forecast points included Baker River at 81% and Thunder Creek at 80% of average. Basin-wide precipitation for April was 130% of average, bringing water-year-to-date to 84% of average. May 1 average snow cover in Skagit River Basin was 67% and the Nooksack River Basin was 60% and the Baker River Basin was 61%. May 1 Skagit River reservoir storage was 72% of average and 39% of capacity. Average temperatures were slightly below normal for April and for the water year.

Ross Reservoir is not expected to fill this year due to a lack of snow. Lake levels are expected to remain 25 feet below full pool which will strand many camping and boating areas for the summer. Minimum required down stream flows will be met by releasing water from Ross Lake throughout the summer.

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

Data Current as of: 5/3/2019 4:47:54 PM

North Puget Sound Basins
Streamflow Forecasts - May 1, 2019

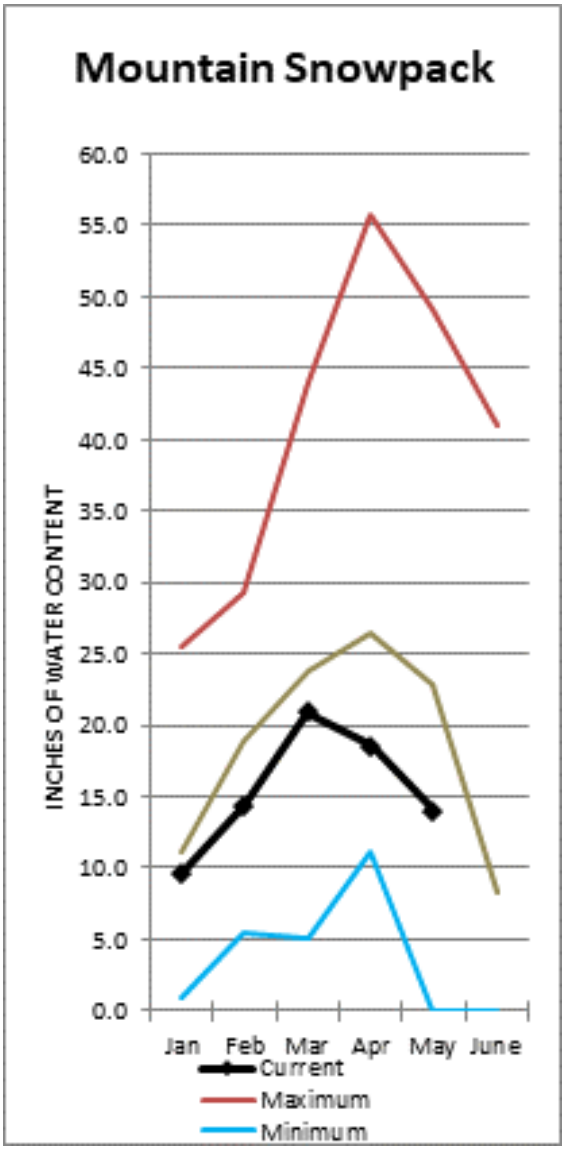
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

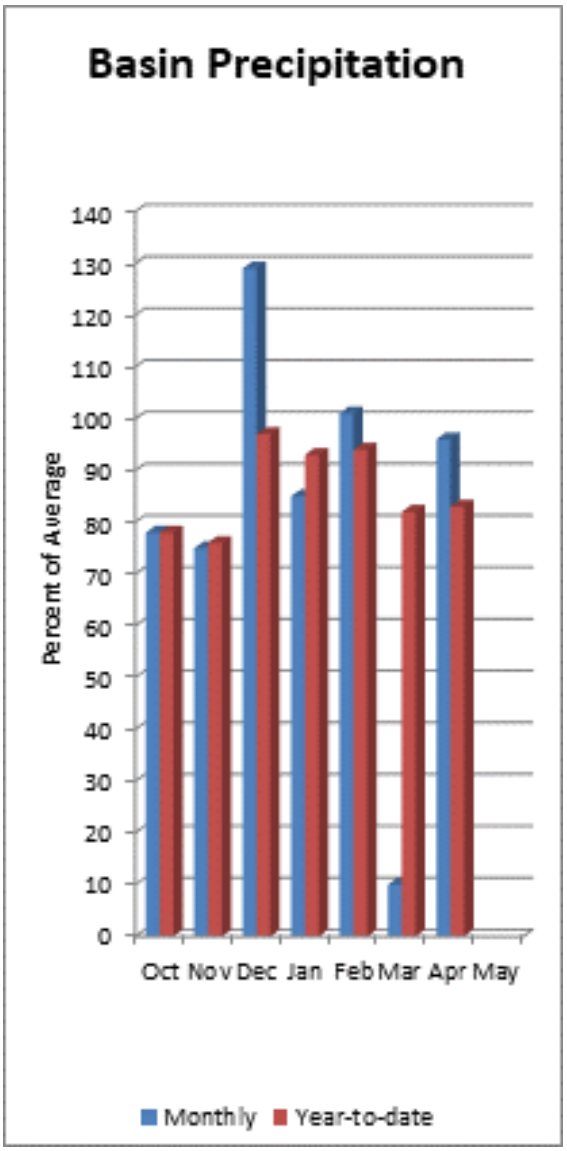
North Puget Sound Basins	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Thunder Ck nr Newhalem								
	MAY-JUL	134	152	165	79%	178	196	210
	MAY-SEP	210	230	245	80%	260	280	305
Skagit R at Newhalem[2]								
	MAY-JUL	940	1060	1130	76%	1210	1320	1490
	MAY-SEP	1160	1300	1390	77%	1490	1630	1810
Baker R at Concrete								
	MAY-JUL	390	460	510	80%	560	630	635
	MAY-SEP	480	595	675	81%	755	875	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, 2019	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Ross	545.0	493.0	754.4	1434.7
Basin-wide Total	545.0	493.0	754.4	1434.7
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis May 1, 2019	# of Sites	% Median	Last Year % Median
North Puget Sound Basins	10	62%	134%
Skagit River	7	63%	133%
Baker River	0		
Nooksack River	3	60%	136%





April Dungeness River runoff was 92% of normal. April precipitation was 96% of average. Precipitation has accumulated at 83% of average for the water year. April precipitation at Quillayute was only 8.27 inches or 105% of average. Olympic Peninsula snowpack averaged 61% of normal on May 1 with Dungeness SNOTEL melting out about a week early. The Dungeness and Elwha rivers are respectively forecasted to see 80% and 81% normal runoff this summer but are on the watch list for potential water shortages. Temperatures were slightly above average for April and for the water year.

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

Data Current as of: 5/3/2019 4:48:04 PM

Olympic Penninsula
Streamflow Forecasts - May 1, 2019

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	62	73	80	79%	87	98	101
	MAY-SEP	78	91	100	80%	109	122	125
Elwha R at McDonald Br nr Port Angeles								
	MAY-JUL	210	240	255	80%	275	305	320
	MAY-SEP	260	295	315	81%	340	375	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, 2019	# of Sites	% Median	Last Year % Median
Olympic Penninsula	5	61%	136%

Issued by

Matthew J. Lohr
Chief
Natural Resources Conservation Service
U.S. Department of Agriculture

Released by

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

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

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

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

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

Washington Water Supply Outlook Report

Natural Resources Conservation Service
Spokane, WA