NRCS Natural Resources Conservation Service

United States Department of Agriculture

Washington
Water Supply Outlook Report
April 1, 2023

Snow Surveyor Bobby Burken observed an adult wolf cross his path while snowmobiling into a snow course in NE WA. He and partner Troy Lloyd stopped to check out the tracks (pictured) when the wolf in question let out a howl and at least two others returned the message from the direction the first had come. "Those howls were so ethereal and haunting, feeling boxed in we didn't hang around much longer". Hand Selfie, Robert Burken, NRCS, Spokane, WA.

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

For more water supply and resource management information, contact:

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or

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How forecasts are made

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

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

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

Washington
Water Supply Outlook

April 2023

General Outlook

Winter has continued its icy grip on the state regardless of what the calendar says. With temperatures ranging 2-6 degrees below normal the mountains have continued to build snowpack, bringing smiles to winter recreationists and water resource managers a like. Most basins have either reached or surpassed normal peak median so additional snow is icing on the cake. Soil moisture deficits continue to be of concern, primarily in the North Puget Sound region. Dry soils could lead to reduced and or delayed spring and summer runoff. (See graph on page 37)

The most recent weather forecast through the end of April shows a probability for below normal temperatures and above normal precipitation. NWS 3-month (Apr-May-June) forecast indicates slightly equal chances of below, above, or normal temperatures and below normal precipitation leading into summer. The US Drought Monitor shows a slight improvement on the west side with the opposite to the east with some D1 creeping into the NE corner. (See maps on page 4)

Snowpack

The April 1 statewide SNOTEL readings were 101% of normal, a slight increase since March 1. The lowest readings in the state were at 70% of the 30-year median for April 1 in the Status Creek Basin. Sanpoil River recorded the highest percentage of snow with 150%, followed closely by the Lewis River at 143%. Westside medians from SNOTEL included the North Puget Sound River basins with 83% of normal, the Central and South Puget River basins with 109% and 98% respectively, and the Olympics with 825. Snowpack along the east slopes of the Cascade Mountains included the Yakima area with 100% and the Wenatchee area with 91%. Snowpack in the Spokane River Basin was at 107% and the Upper Columbia River basins had 108% of the long-term median.

BASIN	PERCENT OF MEDIAN	LAST YEAR PERCENT MEDIAN
Spokane	107	82
Newman Lake	145	70
Lower Pend Oreille	99	84
Kettle	118	79
Omak	139	39
Methow	95	88
Conconully Lake	133	34
Central Columbia	91	81
Upper Yakima	97	79
Lower Yakima	97	36
Ahtanum Creek	113	56
Walla Walla	113	74
Asotin	100	69
Cowlitz	107	82
Lewis	143	82
White	96	80
Green	106	80
Puyallup	134	95
Cedar	111	81
Snoqualmie	113	86
Skykomish	107	95
Skagit	81	89
Nooksack	89	74
Olympic Peninsula	82	71

Precipitation

From the Lower Columbia through the Lower Yakima and the Blue Mountains recorded near to above normal precipitation for the month. Whereas the rest of the state received considerably less than normal. Statewide Water-year average decreased slightly to 83% of normal as of April 1. Swift Creek SNOTEL recorded the most total precipitation with 22.9 inches or 116% of normal, 20.8 inches of that was captured as snow-water-equivalent. SNOTEL collects all form of precipitation including, rain, snow, sleet, and hail.

RIVER BASIN	MARCH PERCENT OF AVERAGE	WATER YEAR PERCENT OF AVERAGE
Spokane	68	78
Lower Pend Oreille	71	76
Upper Columbia	88	88
Central Columbia	84	80
Upper Yakima	78	79
Naches	90	81
Lower Yakima	100	98
Klickitat	96	93
Walla Walla	97	98
Lower Snake	126	93
Lower Columbia	99	89
South Puget Sound	69	81
Central Puget Sound	65	78
North Puget Sound	66	77
Olympic Peninsula	82	86

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 533,000-acre feet, 69% of median for the Upper Reaches and 83% of median for Rimrock and Bumping Lakes. The power generation reservoirs included the following: Coeur d'Alene Lake, 68,800-acre feet, 45% of median and 29% of capacity; and Ross Lake within the Skagit River Basin at 82% of average and 41% 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 MEDIAN
Spokane	29	45
Lower Pend Oreille	38	79
Upper Columbia	57	80
Central Columbia	28	82
Upper Yakima	47	69
Naches	60	83
Lower Snake	46	94
North Puget Sound	41	82
South Puget Sound	N/A	80
Lower Columbia	N/A	34

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

Streamflow

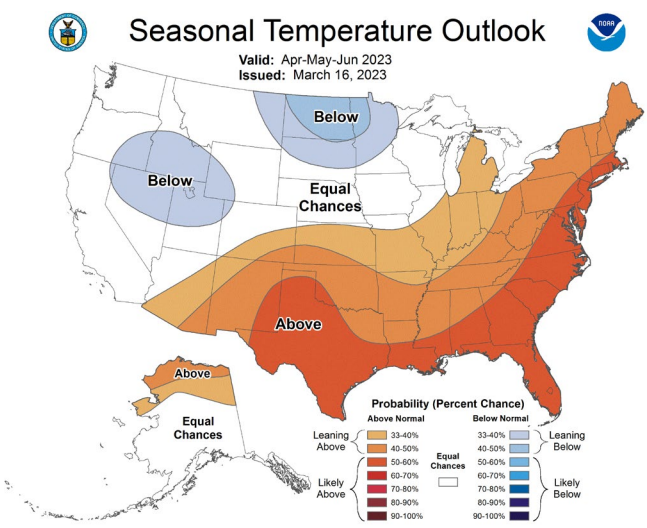
Early winter forecasts for April-September stream flows are never quite as robust as they are later in the season when we know more about the winter climatology. At times only a few degrees warmer or cooler than forecasted can make or break stream flow predictions. Volumetric forecasts are developed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

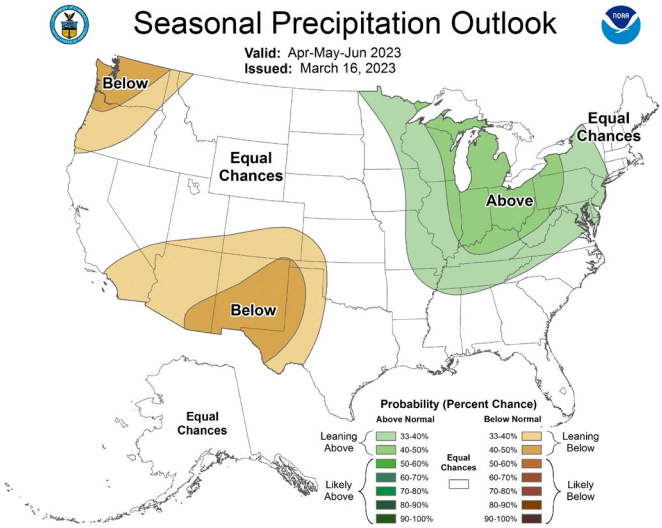
BASIN	PERCENT OF AVERAGE FORCAST (50% CHANCE OF EXCEEDENCE)
Spokane	85-92
Lower Pend Oreille	84-95
Upper Columbia	81-104
Central Columbia	79-84
Upper Yakima	89-94
Lower Yakima	88-125
Naches	85-88
Klickitat	92-97
Lower Snake-Walla Walla	91-110
Lower Columbia	104-113
South Puget Sound	93-108
Central Puget Sound	96-104
North Puget Sound	82-94
Olympic Peninsula	83-109

STREAM	PERCENT OF AVERAGE MARCH RUNOFF
Priest River – near Priest River	29
Kettle at Laurier	24
Columbia at Birchbank	47
Spokane at Spokane	35
Similkameen at Nighthawk	27
Okanogan near Tonasket	65
Methow at Pateros	51
Chelan at Chelan	40
Stehekin near Stehekin	36
Wenatchee at Pashastin	35
Cle Elum near Roslyn	36
Yakima near Parker	43
Naches near Naches	42
Grande Ronde at Troy	38
Snake below Lower Granite Dam	47
Columbia River at The Dalles	46
Lewis at Merwin Dam	64
Cowlitz below Mayfield Dam	49
Skagit at Concrete	44
Dungeness near Sequim	43

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

Climate





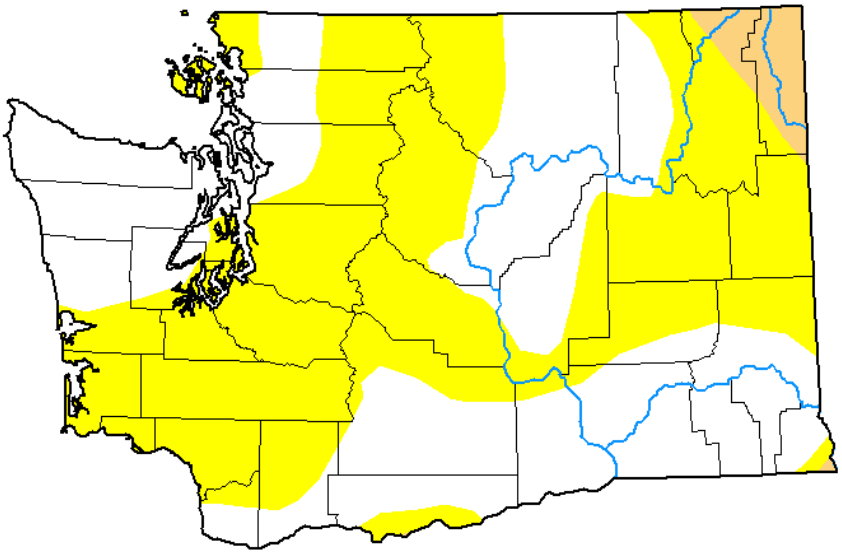
U.S. Drought Monitor

Washington

April 4, 2023

(Released Thursday, Apr. 6, 2023)

Valid 8 a.m. EDT



Intensity:

- None
- 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. For more information on the Drought Monitor, go to https://droughtmonitor.unl.edu/About.aspx

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droughtmonitor.unl.edu

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Helpful Internet Addresses

NRCS Snow Survey and Climate Services Homepages

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

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

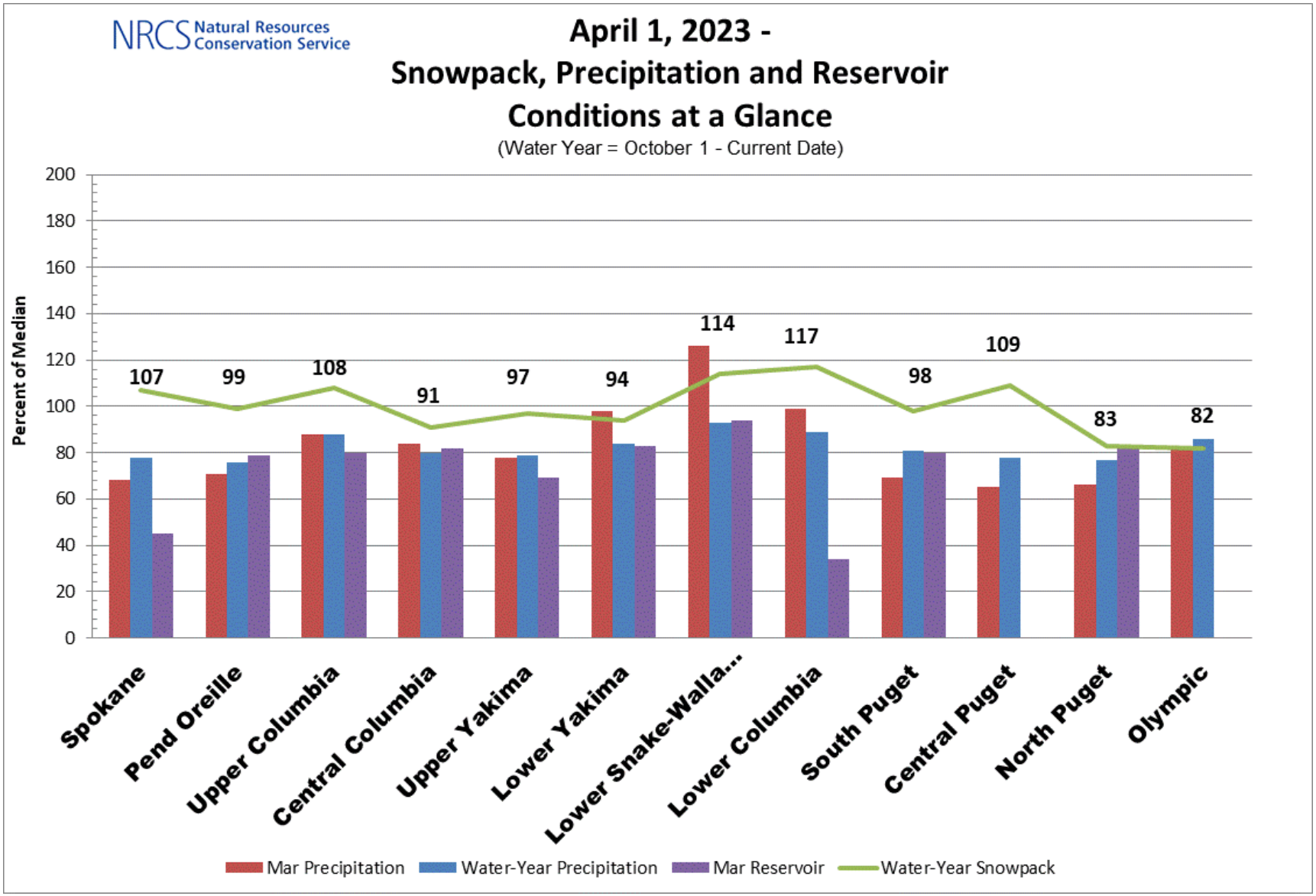
Idaho:
http://www.nrcs.usda.gov/wps/portal/nrcs/main/id/snow/

National Water and Climate Center (NWCC):
https://www.nrcs.usda.gov/wps/portal/wcc/home/

USDA-NRCS Agency Homepages

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

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


NRCS Natural Resources Conservation Service
April 1, 2023 -
Snowpack, Precipitation and Reservoir
Conditions at a Glance
(Water Year = October 1 - Current Date)
Percent of Median
200
180
160
140
120
100
80
60
40
20
0
107
99
108
91
97
94
114
117
98
109
83
82
Spokane
Pend Oreille
Upper Columbia
Central Columbia
Upper Yakima
Lower Yakima
Lower Snake-Walla...
Lower Columbia
South Puget
Central Puget
North Puget
Olympic
Mar Precipitation
Water-Year Precipitation
Mar Reservoir
Water-Year Snowpack

90th Annual Western Snow Conference
April 17-20, 2023
Flagstaff, AZ

Please join us on April 17-20, 2023, for the 90th annual meeting of the Western Snow Conference, to be held in Flagstaff, Arizona on the Northern Arizona University campus. In addition to the in-person conference meeting, a virtual attendance option is being planned to allow for broader participation.

You are invited to submit an abstract of 150 – 300 words for either oral or poster presentation by April 1, 2023. All snow-related research in the context of measurements, modeling, and water supply are welcome. In order to encourage participation in the Conference, all presenters are required to attend in person.

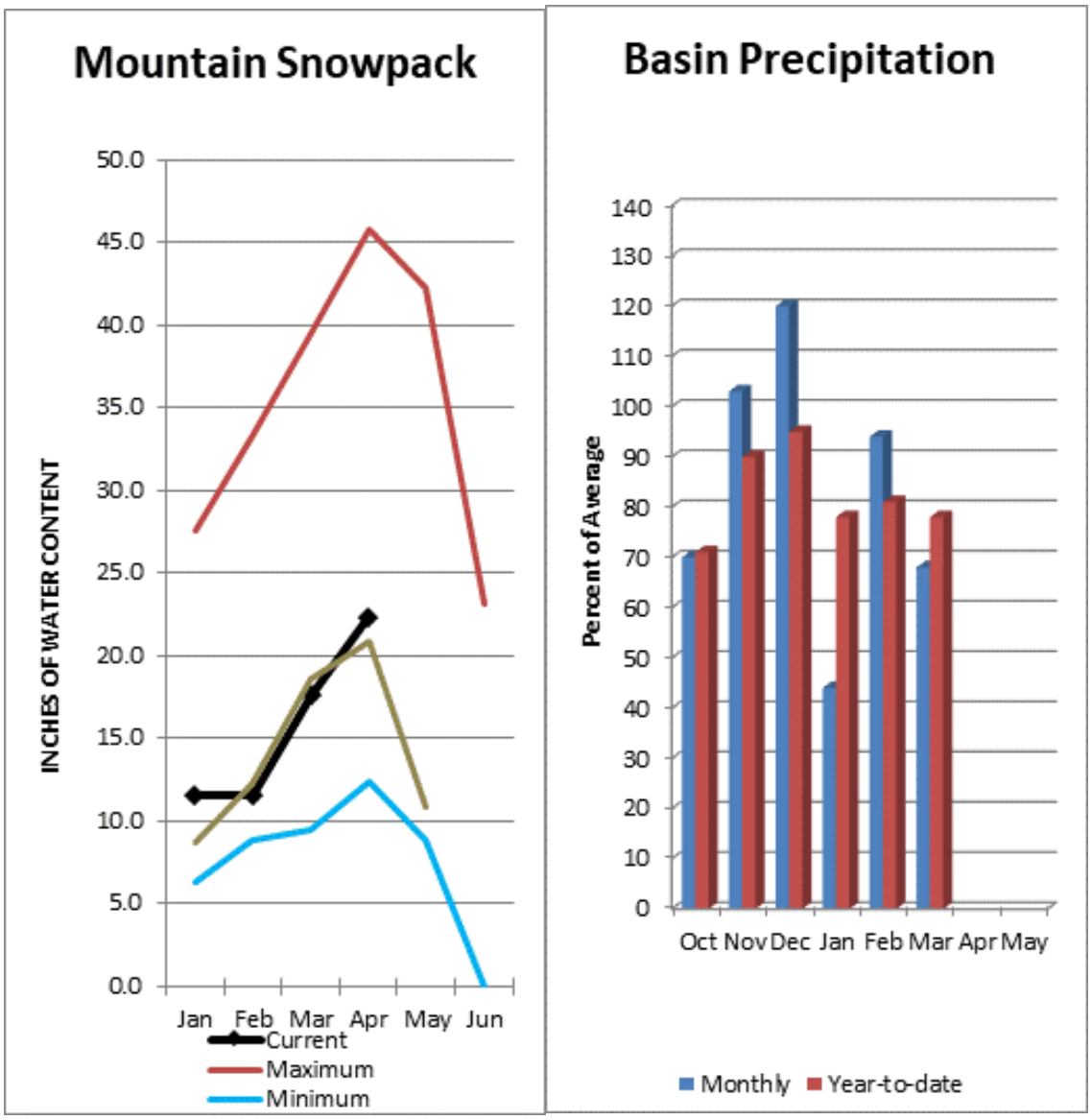
Please see the **Call for Papers** for additional information. Abstracts can be submitted online **HERE.**

Details of this conference are still being finalized, including formats, platforms, and opportunity for vendor participation.

Teri Smyly	Kevin Richards
General Chair, WSC	Conference Chair

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

Also find Western Snow Conference on Facebook



Basin snowpack is 107% of normal and precipitation is 68% of normal for the water year. Precipitation for March was 78% of normal. Reservoir storage is currently at 45% of normal.

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

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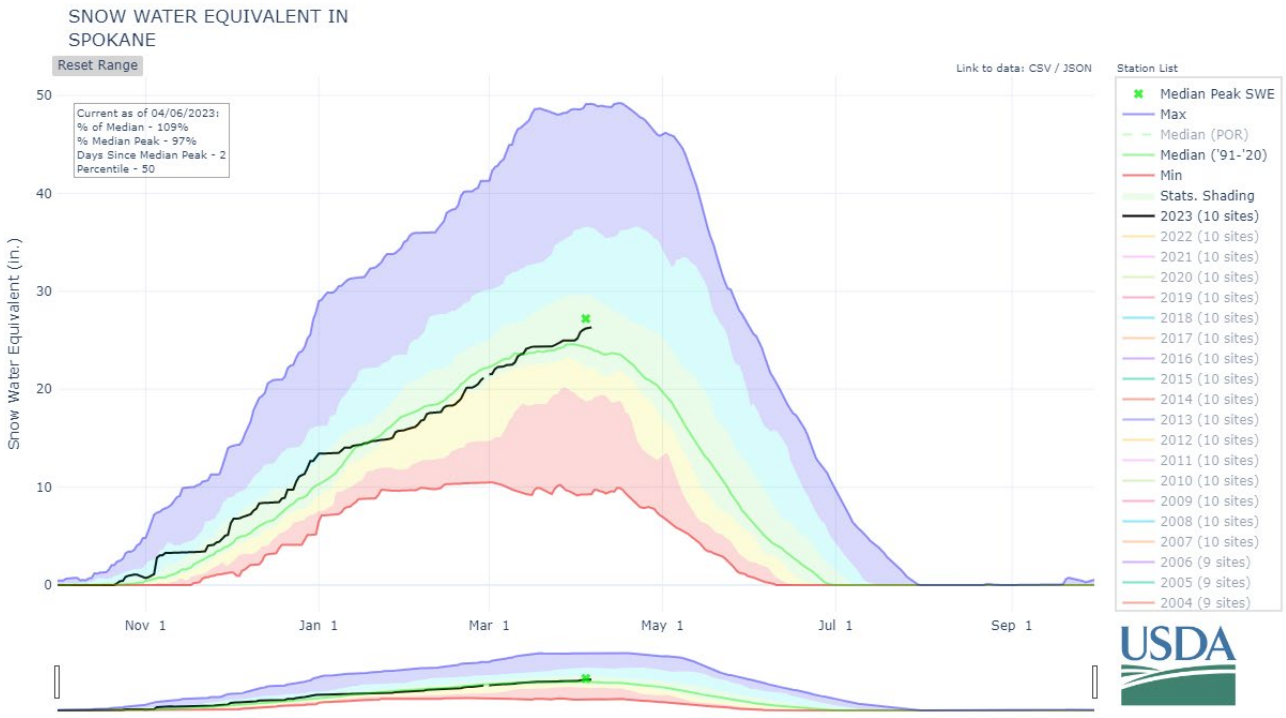
Spokane
Streamflow Forecasts - April 1, 2023

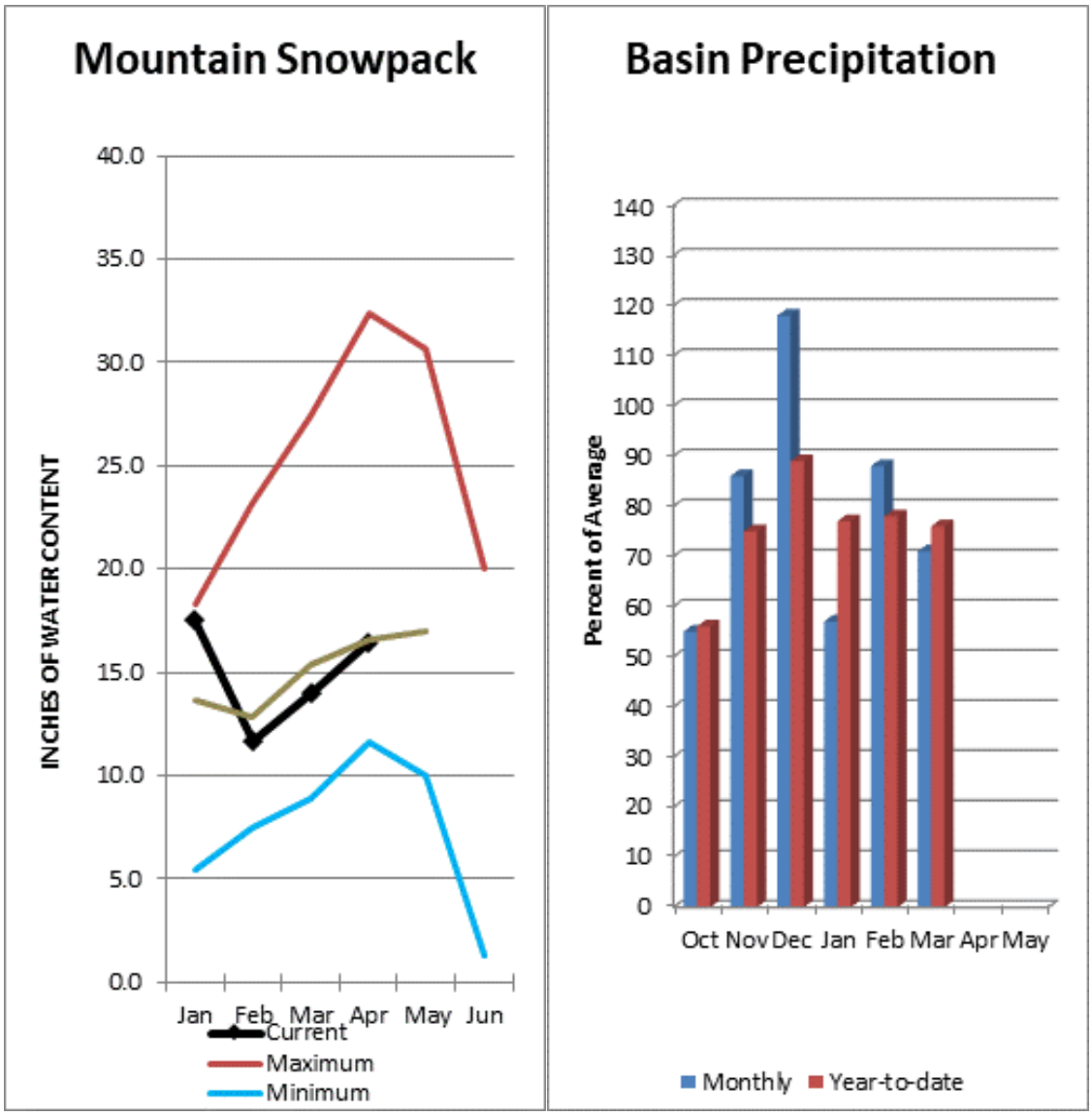
Spokane	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Median	30% (KAF)	10% (KAF)	30yr Median (KAF)
		Forecast Exceedance Probabilities For Risk Assessment Chance that actual volume will exceed forecast						
NF Coeur dAlene R at Enaville								
	APR-JUL	490	590	655	92%	720	820	715
	APR-SEP	520	620	690	92%	760	860	750
Spokane R nr Post Falls[2]								
	APR-JUL	1510	1870	2120	84%	2360	2730	2510
	APR-SEP	1570	1940	2190	85%	2440	2820	2570
St. Joe R at Calder								
	APR-JUL	695	815	895	85%	975	1100	1050
	APR-SEP	745	870	955	85%	1040	1160	1120
Chamokane Ck nr Long Lake								
	APR-JUL	6	9.5	12.4	86%	15.6	21	14.4
Spokane R at Long Lake[2]								
	APR-JUL	1750	2120	2380	88%	2630	3010	2720
	APR-SEP	1890	2280	2550	89%	2820	3210	2870

1) 90% And 10% exceedance probabilities are actually 95% And 5%
2) Forecasts are For unimpaired flows. Actual flow will be dependent On management of upstream reservoirs And diversions

Reservoir Storage End of March, 2023	Current (KAF)	Last Year (KAF)	Median (KAF)	Capacity (KAF)
Lake Coeur d' Alene	68.8	203.1	153.8	238.5

Watershed Snowpack Analysis April 1, 2023	# of Sites	% Median	Last Year % Median
Spokane	21	107%	82%
Newman Lake	5	145%	70%





April 1 snow cover was 99% of normal in the Pend Oreille Basin River Basin and precipitation during March was 76% of normal, bringing the year-to-date precipitation at 71% of normal. Reservoir storage in the basin, including Lake Pend Oreille and Priest Lake was 79% of normal.

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

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Lower Pend Oreille
Streamflow Forecasts - April 1, 2023

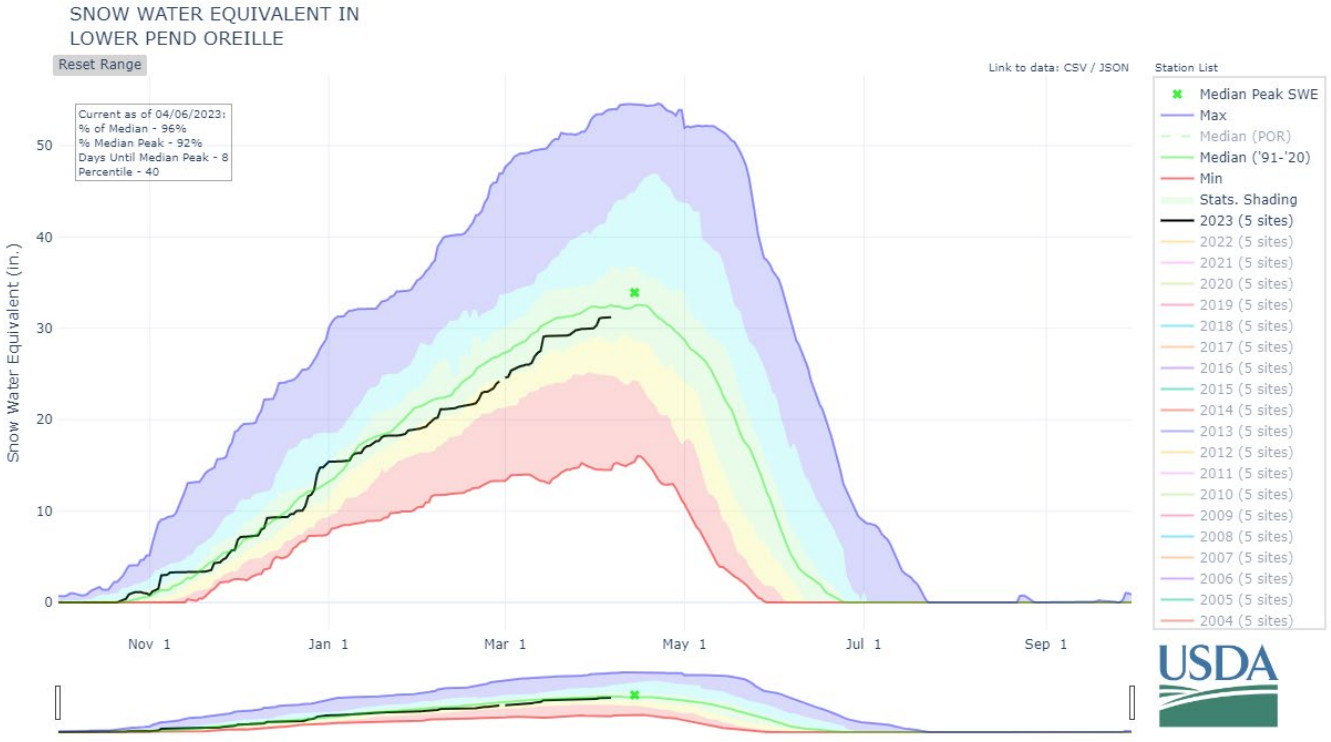
Forecast Exceedance Probabilities For Risk Assessment
Chance that actual volume will exceed forecast

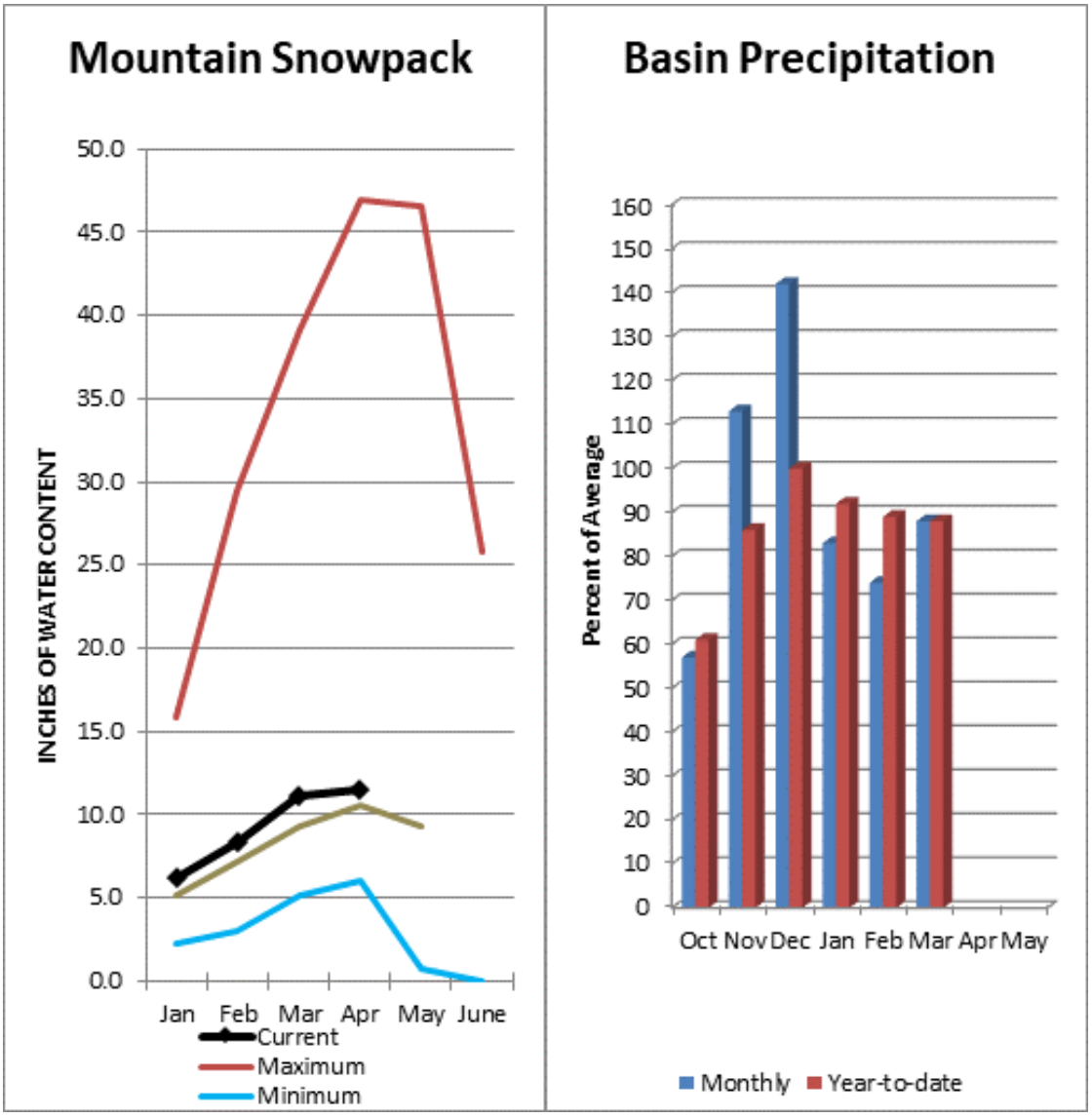
Lower Pend Oreille	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Median	30% (KAF)	10% (KAF)	30yr Median (KAF)
Priest R nr Priest River[2]								
	APR-JUL	520	625	695	83%	765	870	840
	APR-SEP	550	660	735	84%	810	920	880
Pend Oreille Lake Inflow[2]								
	APR-JUL	8880	10100	11000	94%	11800	13000	11700
	APR-SEP	9610	11000	11900	94%	12900	14300	12600
Pend Oreille R bl Box Canyon[2]								
	APR-JUL	9120	10400	11200	96%	12000	13300	11700
	APR-SEP	9750	11200	12100	95%	13100	14500	12700

1) 90% And 10% exceedance probabilities are actually 95% And 5%
2) Forecasts are For unimpaired flows. Actual flow will be dependent On management of upstream reservoirs And diversions

Reservoir Storage End of March, 2023	Current (KAF)	Last Year (KAF)	Median (KAF)	Capacity (KAF)
Lake Pend Oreille	591.0	577.9	755.3	1561.3
Priest Lake	53.9	61.1	64.4	119.3

Watershed Snowpack Analysis April 1, 2023	# of Sites	% Median	Last Year % Median
Lower Pend Oreille	16	99%	84%
Sullivan	1	82%	77%





April 1 snow cover on the Upper Columbia basins was 108% of normal and March precipitation was 88% of normal, with precipitation for the water year at 88% of normal. Combined storage in the Conconully Reservoirs was 80% of normal.

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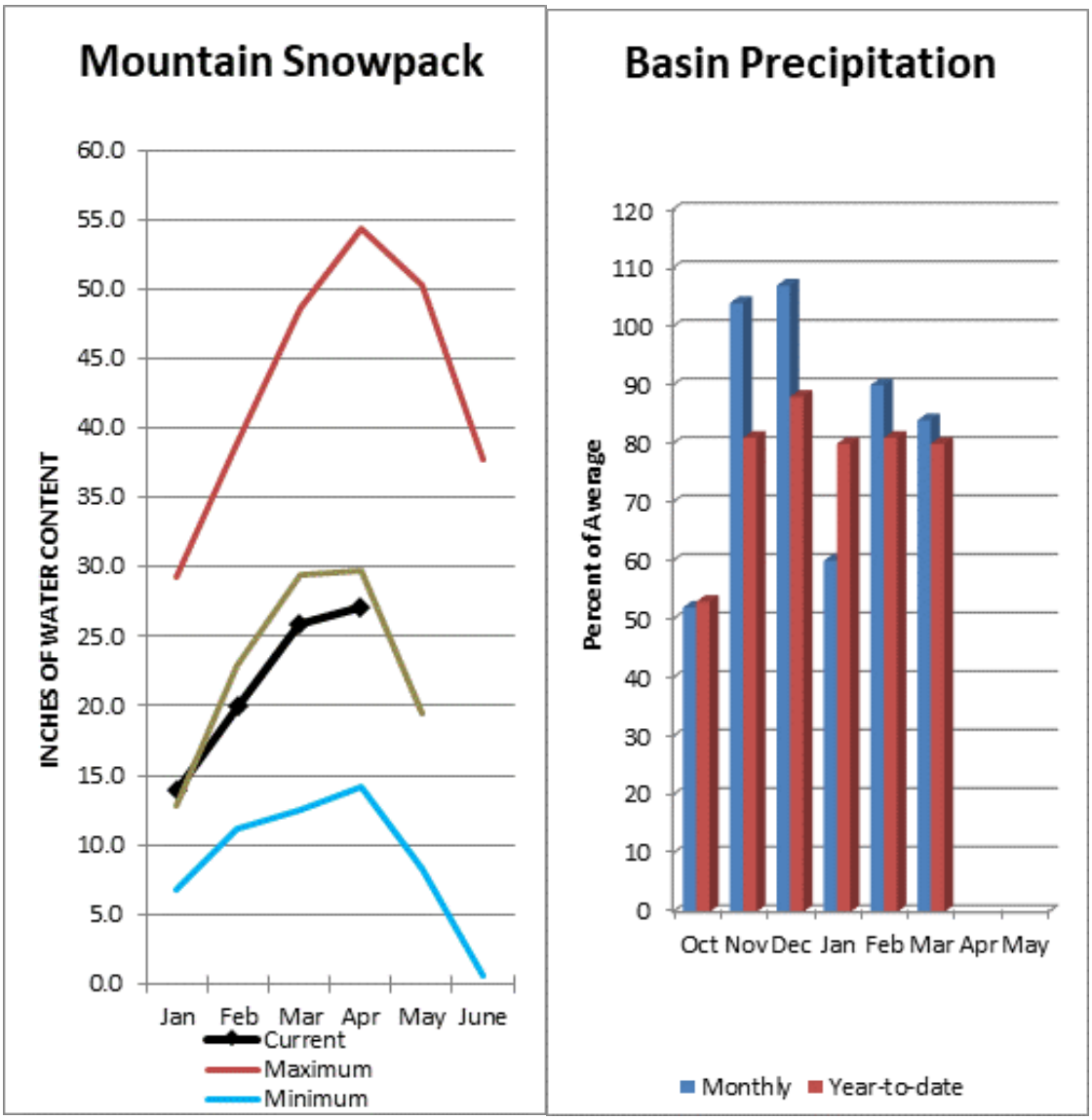
Upper Columbia
Streamflow Forecasts - April 1, 2023

		Forecast Exceedance Probabilities For Risk Assessment Chance that actual volume will exceed forecast						
Upper Columbia	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Median	30% (KAF)	10% (KAF)	30yr Median (KAF)
Columbia R at Grand Coulee-NWS[2]								
	APR-JUL	35800		42900	82%		53400	52600
	APR-SEP	42600		51300	85%		64200	60600
Similkameen R nr Nighthawk								
	APR-JUL	780	925	1020	81%	1120	1260	1260
	APR-SEP	850	1000	1100	82%	1200	1350	1340
Kettle R nr Laurier								
	APR-JUL	1450	1700	1880	102%	2060	2310	1840
	APR-SEP	1570	1850	2030	104%	2210	2490	1950
Colville R at Kettle Falls								
	APR-JUL	45	87	116	101%	145	187	115
	APR-SEP	46	91	122	98%	153	198	124
Okanogan R nr Tonasket								
	APR-JUL	870	1080	1220	80%	1360	1570	1520
	APR-SEP	925	1160	1320	81%	1480	1710	1620
Methow R nr Pateros								
	APR-SEP	680	785	855	89%	925	1030	965
Okanogan R at Malott								
	APR-JUL	880	1100	1240	80%	1390	1610	1550
	APR-SEP	935	1180	1340	80%	1510	1750	1680

1) 90% And 10% exceedance probabilities are actually 95% And 5%
2) Forecasts are For unimpaired flows. Actual flow will be dependent On management of upstream reservoirs And diversions

Reservoir Storage End of March, 2023	Current (KAF)	Last Year (KAF)	Median (KAF)	Capacity (KAF)
Conconully Reservoir	6.8	6.0	8.8	13.0
Conconully Lake (Salmon Lake Dam)	6.6	3.5	7.9	10.5

Watershed Snowpack Analysis April 1, 2023	# of Sites	% Median	Last Year % Median
Upper Columbia	57	108%	81%
Toats Coulee	3	132%	86%
Sanpoil	3	150%	40%
Omak	3	139%	39%
Methow	10	95%	88%
Kettle	14	118%	79%
Concully Lake	1	133%	34%
Colville	2	107%	80%



April 1 snowpack in the Central Columbia River basins was 91% of normal. Precipitation during March was 84% of normal in the basin and 80% for the year-to-date. Reservoir storage in Lake Chelan was 82% of the median.

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

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Central Columbia
Streamflow Forecasts - April 1, 2023

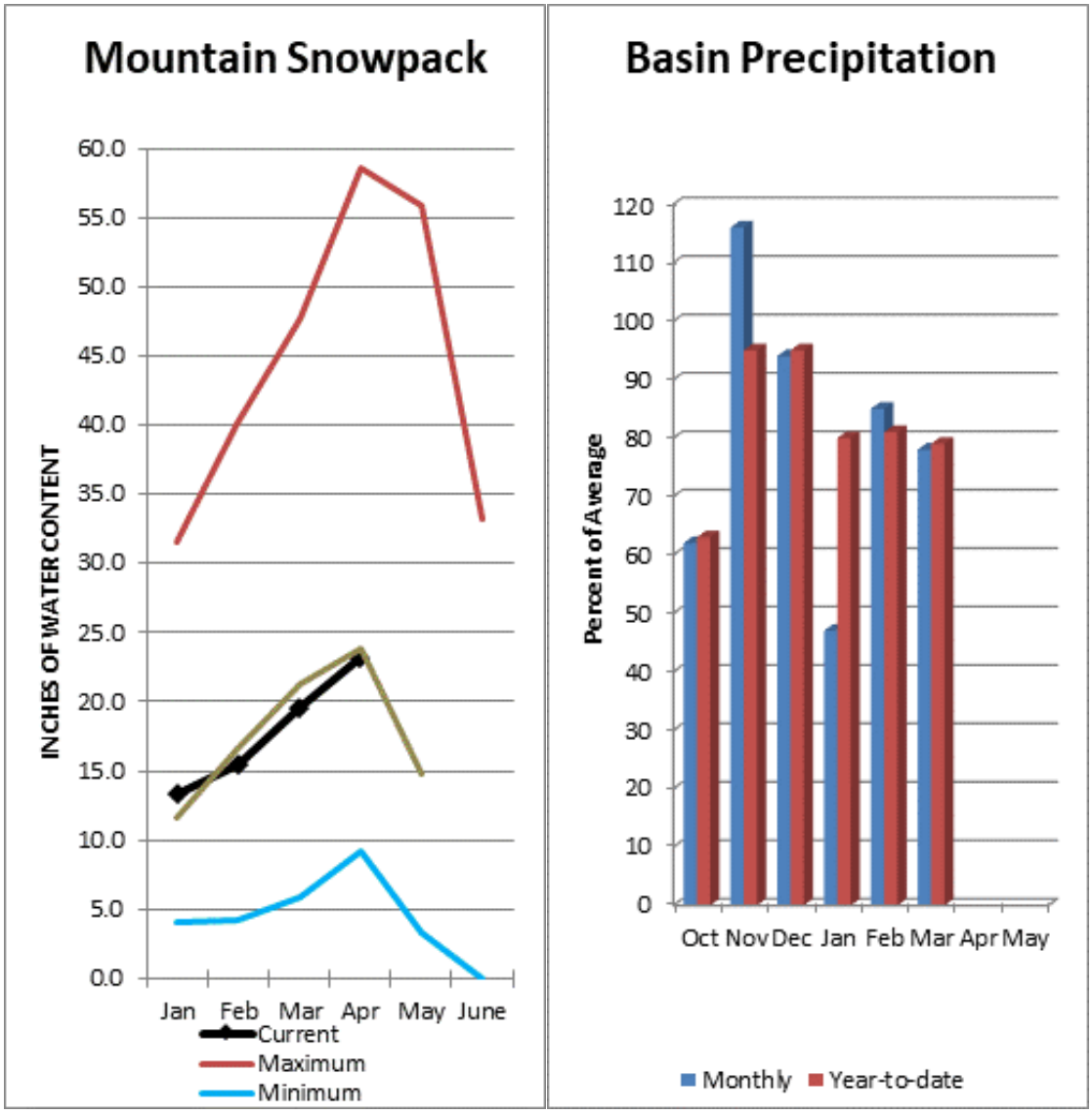
Forecast Exceedance Probabilities For Risk Assessment
Chance that actual volume will exceed forecast

Central Columbia	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Median	30% (KAF)	10% (KAF)	30yr Median (KAF)
Entiat R nr Ardenvoir								
	APR-JUL	131	155	171	78%	187	210	220
	APR-SEP	141	167	185	79%	205	230	235
Columbia R bl Rock Island Dam-NWS[2]								
	APR-JUL	38400		46800	81%		58600	57600
	APR-SEP	45600		55600	84%		69900	65800
Wenatchee R at Peshastin								
	APR-JUL	1000	1100	1170	81%	1240	1350	1440
	APR-SEP	1080	1190	1270	82%	1350	1470	1540
Stehekin R at Stehekin								
	APR-JUL	510	565	605	85%	645	700	715
	APR-SEP	595	655	690	83%	730	785	835
Chelan R at Chelan[2]								
	APR-JUL	740	825	885	85%	940	1030	1040
	APR-SEP	820	915	975	83%	1040	1130	1170
Icicle Ck nr Leavenworth								
	APR-JUL	181	210	230	79%	250	280	290
	APR-SEP	194	225	250	81%	270	305	310
Wenatchee R at Plain								
	APR-JUL	725	810	865	81%	925	1010	1070
	APR-SEP	780	875	940	81%	1000	1100	1160

1) 90% And 10% exceedance probabilities are actually 95% And 5%
2) Forecasts are For unimpaired flows. Actual flow will be dependent On management of upstream reservoirs And diversions

Reservoir Storage End of March, 2023	Current (KAF)	Last Year (KAF)	Median (KAF)	Capacity (KAF)
Lake Chelan	187.1	293.3	228.8	677.4

Watershed Snowpack Analysis April 1, 2023	# of Sites	% Median	Last Year % Median
Central Columbia	13	91%	81%
Wenatchee	8	90%	81%
Stemilt	1	117%	52%
Lake Chelan	4	80%	85%
Entiat	1	130%	60%
Colckum	1	156%	59%



April 1 snowpack was 97% of normal. Precipitation was 78% of normal for March and 79% for the water-year. April 1 reservoir storage for the Upper Yakima reservoirs was 69% of normal.

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Upper Yakima
Streamflow Forecasts - April 1, 2023

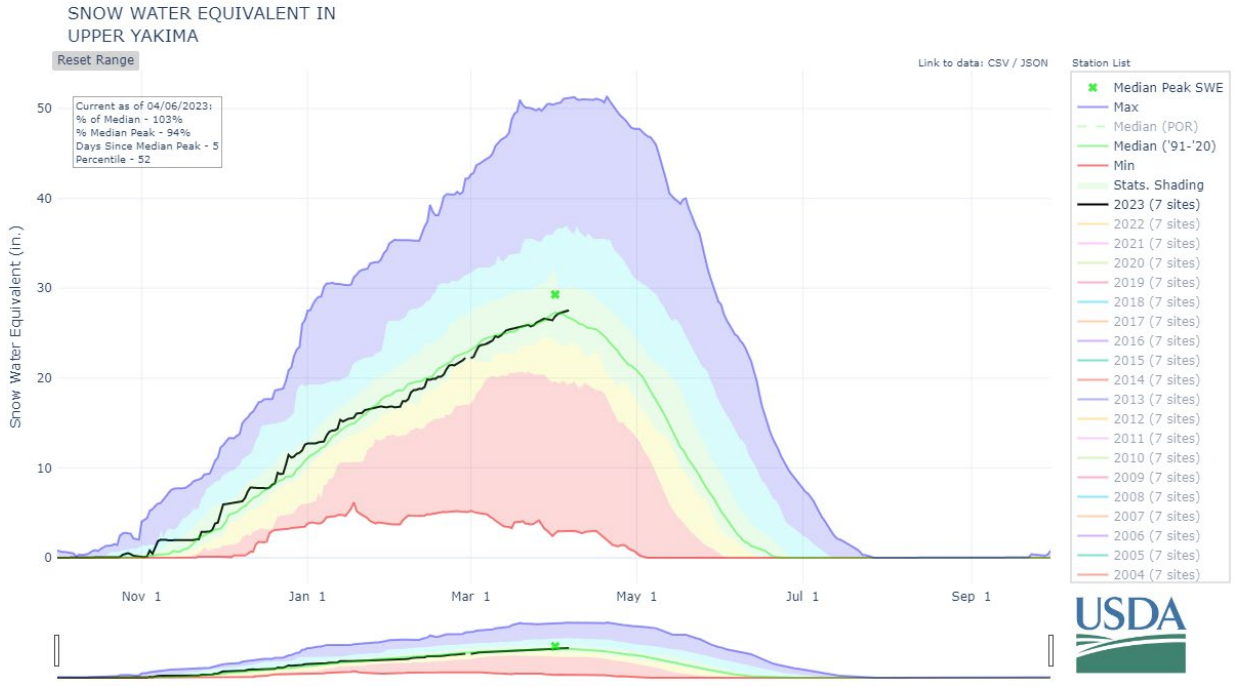
Forecast Exceedance Probabilities For Risk Assessment
Chance that actual volume will exceed forecast

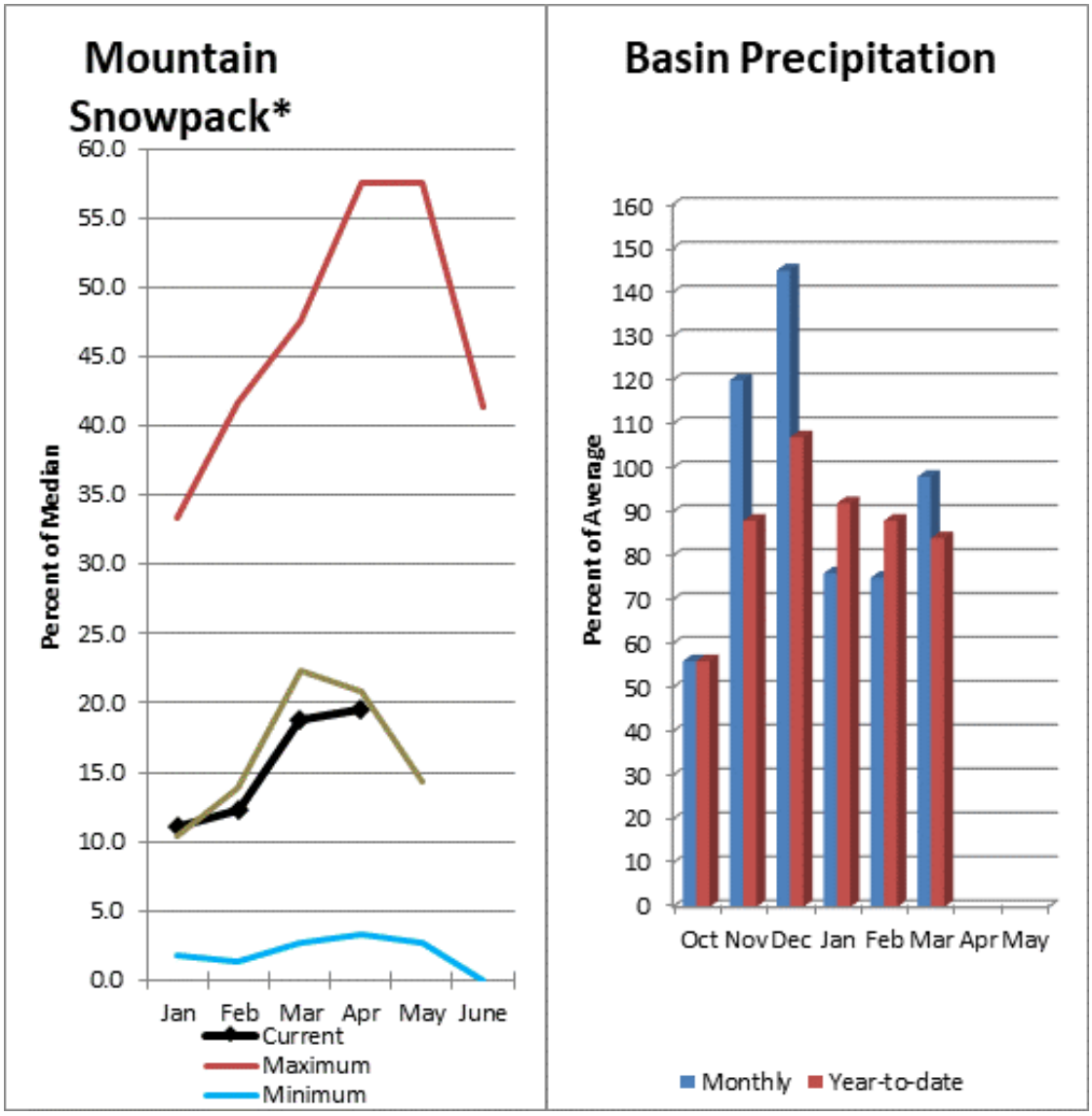
Upper Yakima	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Median	30% (KAF)	10% (KAF)	30yr Median (KAF)
Teanaway R bl Forks nr Cle Elum								
	APR-JUL	82	102	116	89%	130	150	131
	APR-SEP	84	105	119	89%	133	153	134
Kachess Reservoir Inflow [2]								
	APR-JUL	75	85	92	93%	100	110	99
	APR-SEP	83	94	102	94%	109	121	108
Keechelus Reservoir Inflow[2]								
	APR-JUL	82	96	106	95%	116	130	112
	APR-SEP	91	106	117	93%	127	142	126
Cle Elum Lake Inflow [2]								
	APR-JUL	300	330	350	91%	370	395	385
	APR-SEP	325	355	380	90%	400	430	420

1) 90% And 10% exceedance probabilities are actually 95% And 5%
2) Forecasts are For unimpaired flows. Actual flow will be dependent On management of upstream reservoirs And diversions

Reservoir Storage End of March, 2023	Current (KAF)	Last Year (KAF)	Median (KAF)	Capacity (KAF)
Kachess	145.6	217.6	172.4	239.0
Cle Elum	184.5	348.9	277.7	436.9
Keechelus	63.4	148.6	118.1	157.8

Watershed Snowpack Analysis April 1, 2023	# of Sites	% Median	Last Year % Median
Upper Yakima	9	97%	79%
Upper Yakima	9	97%	79%





April 1 basin snowpack in the Lower Yakima was 97% of normal and the Naches was 91%. March precipitation was 95% of normal and 90% for the water-year. April 1 reservoir storage for Bumping and Rimrock reservoirs was 83% of the median.

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

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Lower Yakima
Streamflow Forecasts - April 1, 2023

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

Lower Yakima	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Median	30% (KAF)	10% (KAF)	30yr Median (KAF)
Ahtanum Ck at Union Gap								
	APR-JUL	18.1	27	33	127%	39	48	26
	APR-SEP	20	29	35	125%	41	51	28
Yakima R nr Parker [2]								
	APR-JUL	1180	1380	1510	87%	1650	1850	1730
	APR-SEP	1310	1520	1660	88%	1800	2010	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

Watershed Snowpack Analysis April 1, 2023	# of Sites	% Median	Last Year % Median
Lower Yakima	3	97%	36%
Simcoe-Toppenish	1	113%	41%
Satus	1	70%	5%
Ahtanum	2	113%	56%

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Naches
Streamflow Forecasts - April 1, 2023

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

Naches	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Median	30% (KAF)	10% (KAF)	30yr Median (KAF)
American R nr Nile								
	APR-JUL	67	78	86	86%	94	105	100
	APR-SEP	71	84	93	86%	101	114	108
Bumping Lake Inflow [2]								
	APR-JUL	74	87	96	84%	105	117	114
	APR-SEP	80	94	104	85%	113	127	122
Naches R nr Naches [2]								
	APR-JUL	455	550	615	85%	680	780	720
	APR-SEP	500	605	680	88%	755	865	775
Rimrock Lake Inflow [2]								
	APR-JUL	142	159	171	88%	182	199	194
	APR-SEP	169	189	205	87%	215	235	235

1) 90% And 10% exceedance probabilities are actually 95% And 5%
2) Forecasts are For unimpaired flows. Actual flow will be dependent On management of upstream reservoirs And diversions

Reservoir Storage End of March, 2023	Current (KAF)	Last Year (KAF)	Median (KAF)	Capacity (KAF)
Bumping Lake	11.6	21.8	14.6	33.7
Rimrock	127.9	191.5	153.5	198.0

Watershed Snowpack Analysis April 1, 2023	# of Sites	% Median	Last Year % Median
Naches	9	91%	76%
Naches	9	91%	76%

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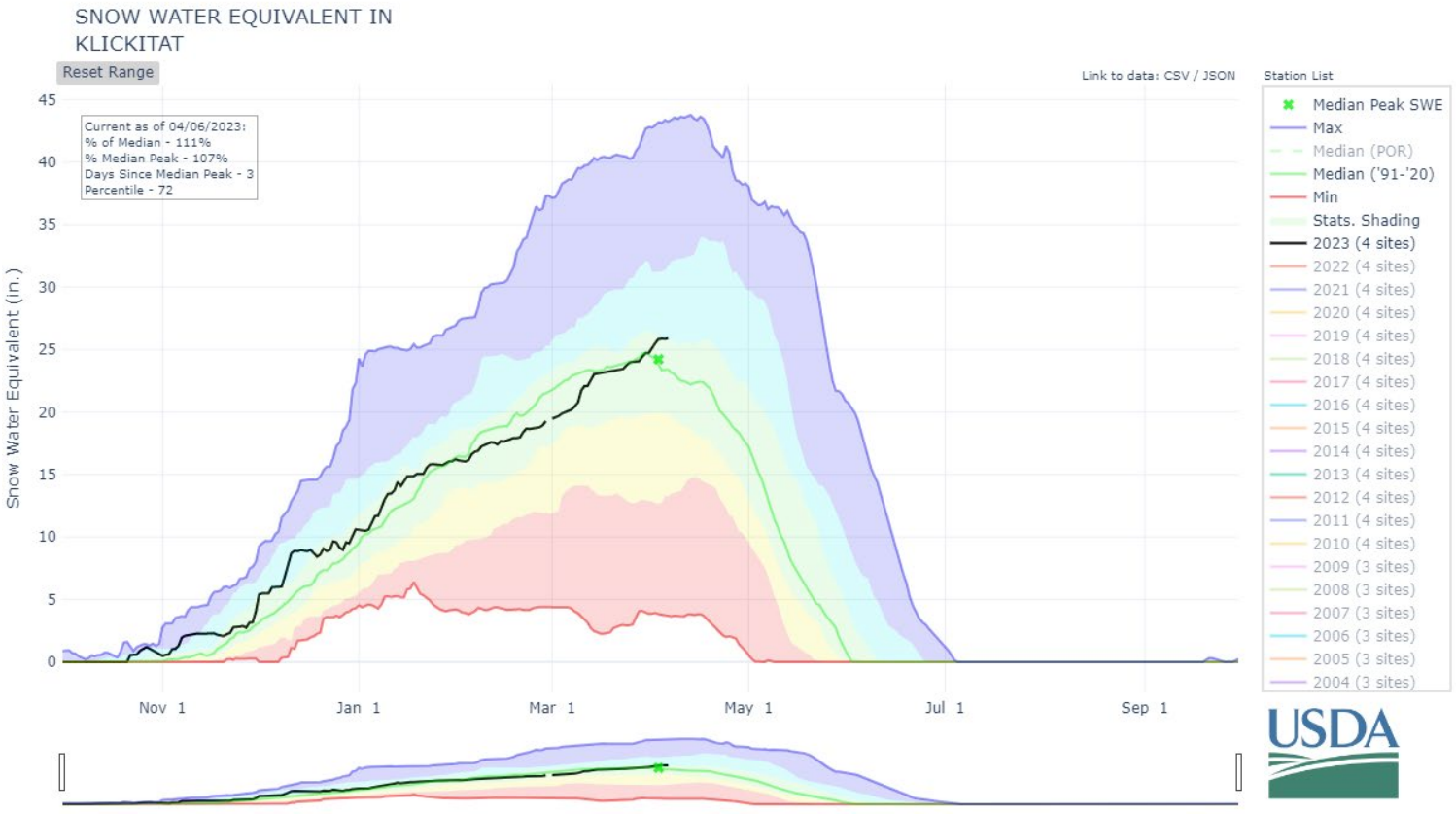
Klickitat
Streamflow Forecasts - April 1, 2023

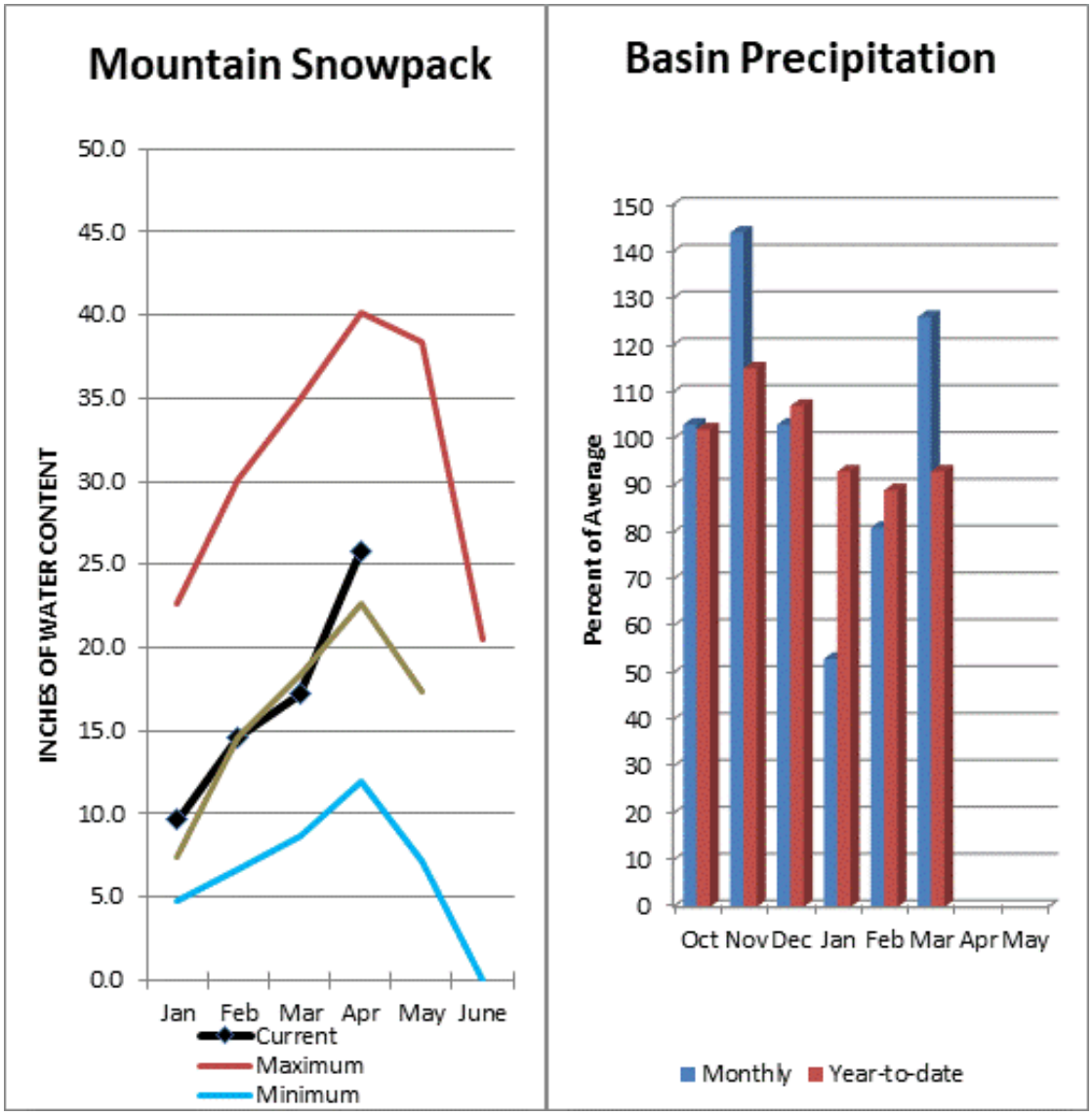
Forecast Exceedance Probabilities For Risk Assessment
Chance that actual volume will exceed forecast

Klickitat	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Median	30% (KAF)	10% (KAF)	30yr Median (KAF)
Klickitat R nr Pitt								
	APR-JUL	325	390	440	97%	485	550	455
	APR-SEP	400	475	530	97%	580	655	545
Klickitat R nr Glenwood								
	APR-JUL	94	110	121	92%	132	147	132
	APR-SEP	104	121	133	92%	144	161	145

1) 90% And 10% exceedance probabilities are actually 95% And 5%
2) Forecasts are For unimpaired flows. Actual flow will be dependent On management of upstream reservoirs And diversions

Watershed Snowpack Analysis April 1, 2023	# of Sites	% Median	Last Year % Median
Klickitat	4	103%	53%
Klickitat	4	103%	53%





April 1 snowpack readings were 114% of normal. March precipitation was 126% of normal, bringing the year-to-date precipitation to 93% of normal. Reservoir storage was 94% of the median.

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

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Lower Snake-Walla Walla
Streamflow Forecasts - April 1, 2023

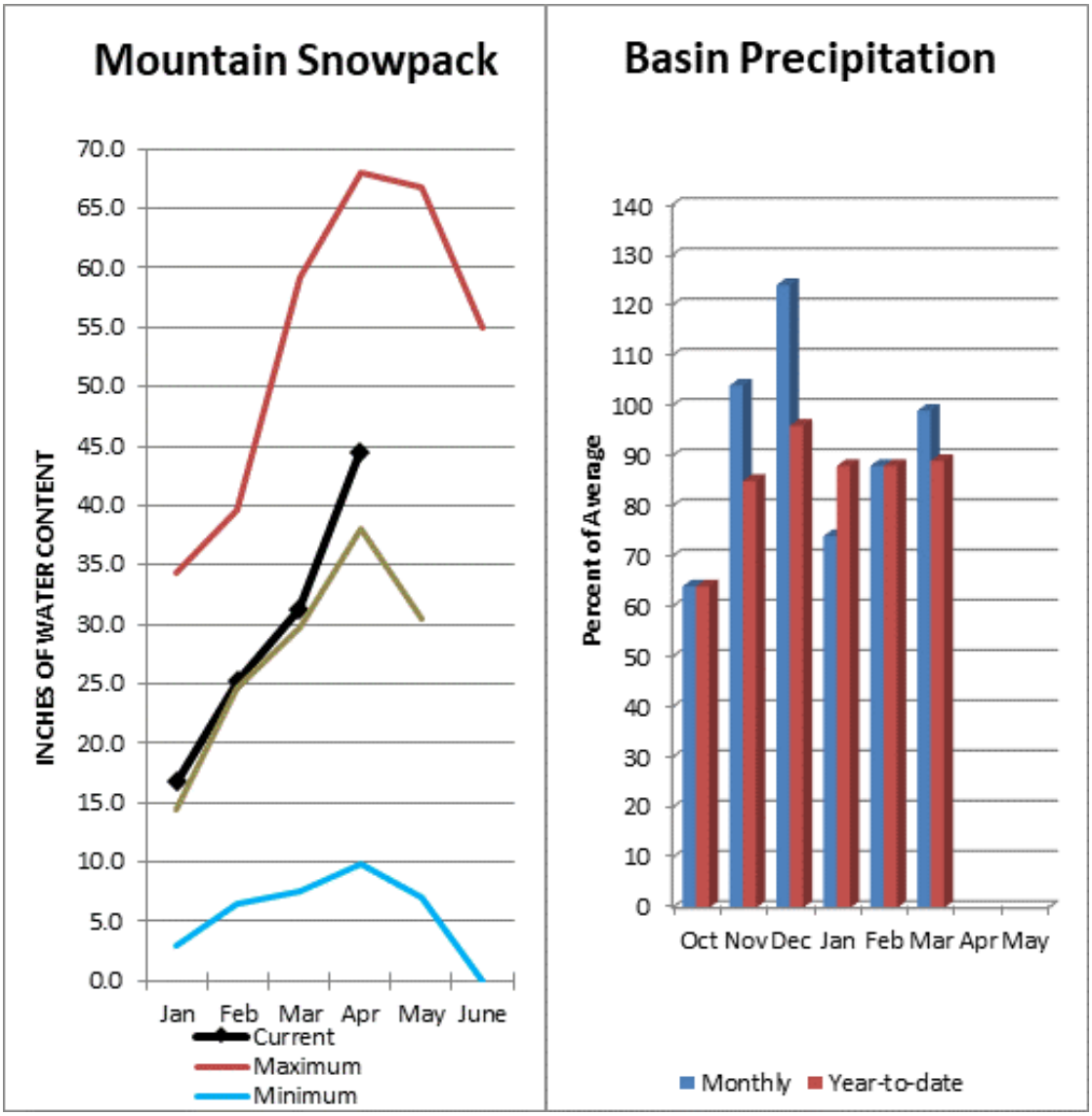
Forecast Exceedance Probabilities For Risk Assessment
Chance that actual volume will exceed forecast

Lower Snake-Walla Walla	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Median	30% (KAF)	10% (KAF)	30yr Median (KAF)
SF Walla Walla R nr Milton-Freewater								
	APR-JUL	46	53	58	102%	63	70	57
	APR-SEP	58	66	71	101%	76	84	70
Snake R bl Lower Granite Dam-NWS[2]								
	APR-JUL	14000		17600	89%		22900	19700
	APR-SEP	16300		20100	92%		25800	21800
Lostine R nr Lostine								
	APR-JUL	92	100	105	94%	111	118	112
	APR-SEP	98	107	113	94%	119	128	120
Mill Ck nr Walla Walla								
	APR-JUL	17.2	23	26	104%	30	35	25
	APR-SEP	21	26	30	103%	34	39	29
Catherine Ck nr Union								
	APR-JUL	59	67	72	111%	77	85	65
	APR-SEP	63	71	76	110%	81	89	69
Asotin Ck at Asotin								
	APR-JUL	20	26	30	91%	34	41	33
Imnaha R at Imnaha								
	APR-JUL	205	240	265	102%	290	330	260
	APR-SEP	220	260	285	104%	310	350	275
Grande Ronde R at Troy								
	APR-JUL	1010	1190	1310	103%	1430	1600	1270
	APR-SEP	1090	1270	1390	103%	1510	1690	1350
Bear Ck nr Wallowa								
	APR-JUL	49	58	65	100%	71	81	65
	APR-SEP	51	61	67	99%	74	83	68

1) 90% And 10% exceedance probabilities are actually 95% And 5%
2) Forecasts are For unimpaired flows. Actual flow will be dependent On management of upstream reservoirs And diversions

Reservoir Storage End of March, 2023	Current (KAF)	Last Year (KAF)	Median (KAF)	Capacity (KAF)
Wallowa Lake	17.3	17.5	18.4	37.5

Watershed Snowpack Analysis April 1, 2023	# of Sites	% Median	Last Year % Median
Lower Snake-Walla Walla	21	114%	66%
Walla Walla	5	113%	74%
Grande Ronde	19	112%	66%
Asotin	2	100%	69%



April 1 snow cover for Lower Columbia was 117% of normal. March precipitation was 99% of normal and the water-year was 89%. Reservoir storage was 34% of normal.

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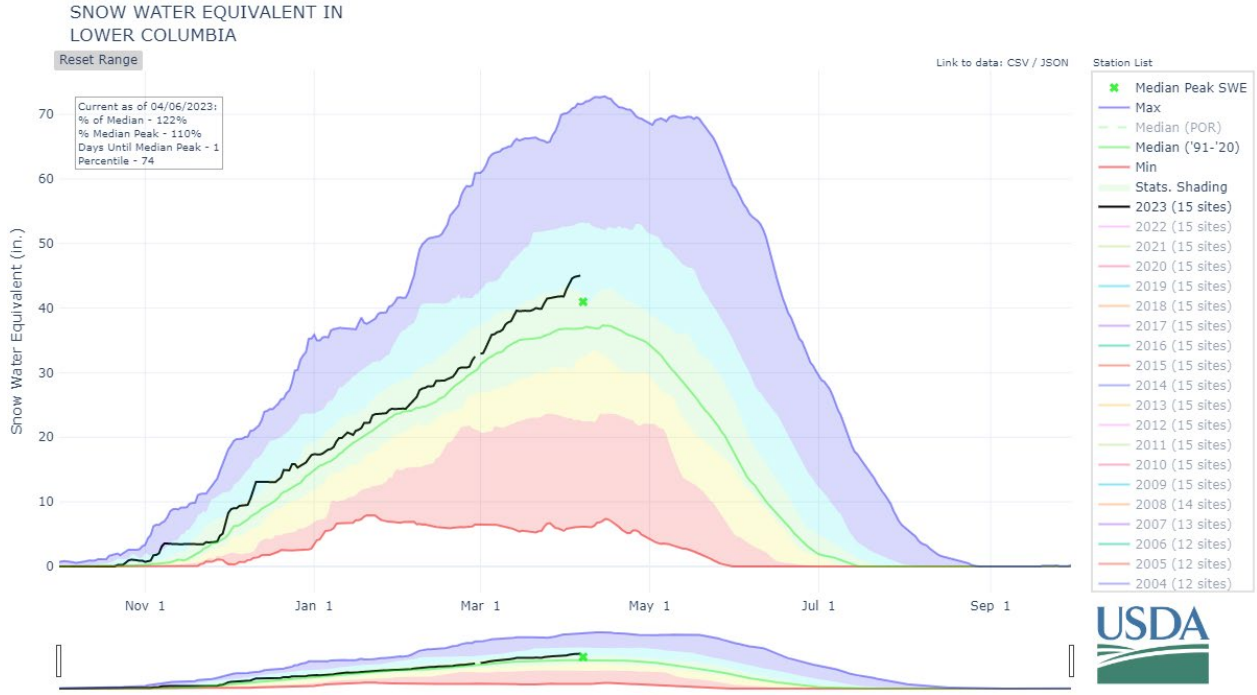
Lower Columbia
Streamflow Forecasts - April 1, 2023

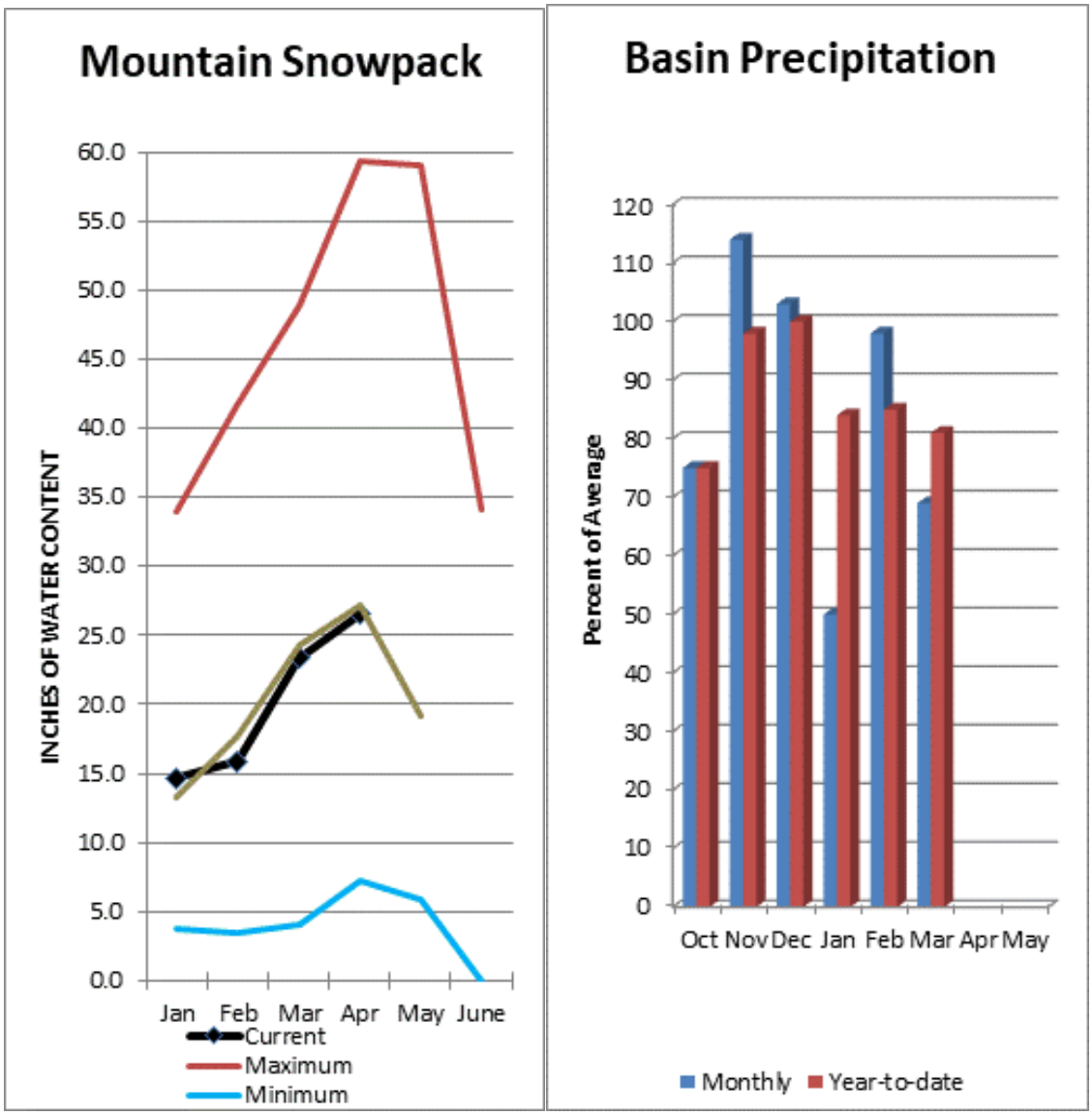
Lower Columbia	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Median	30% (KAF)	10% (KAF)	30yr Median (KAF)
		Forecast Exceedance Probabilities For Risk Assessment Chance that actual volume will exceed forecast						
Lewis R at Ariel								
	APR-JUL	890	1050	1150	112%	1260	1420	1030
	APR-SEP	1020	1180	1300	113%	1410	1570	1150
Cowlitz R bl Mayfiled[2]								
	APR-JUL	1280	1500	1660	104%	1810	2030	1600
	APR-SEP	1470	1710	1870	104%	2030	2270	1790
Cowlitz R at Castle Rock[2]								
	APR-JUL	1650	2030	2290	108%	2540	2920	2120
	APR-SEP	1900	2300	2570	110%	2850	3250	2330

1) 90% And 10% exceedance probabilities are actually 95% And 5%
2) Forecasts are For unimpaired flows. Actual flow will be dependent On management of upstream reservoirs And diversions

Reservoir Storage End of March, 2023	Current (KAF)	Last Year (KAF)	Median (KAF)	Capacity (KAF)
Mayfield		125.9	127.8	
Mossyrock Dam (Riffe Lk)	309.2	818.9	917.0	

Watershed Snowpack Analysis April 1, 2023	# of Sites	% Median	Last Year % Median
Lower Columbia	15	117%	83%
Lewis	8	143%	82%
Cowlitz	9	107%	82%





April 1 snowpack was 98% of normal for the South Puget Sound. March precipitation was 69% of normal, bringing the water year-to-date to 81% of normal for the basins.

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

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South Puget Sound
Streamflow Forecasts - April 1, 2023

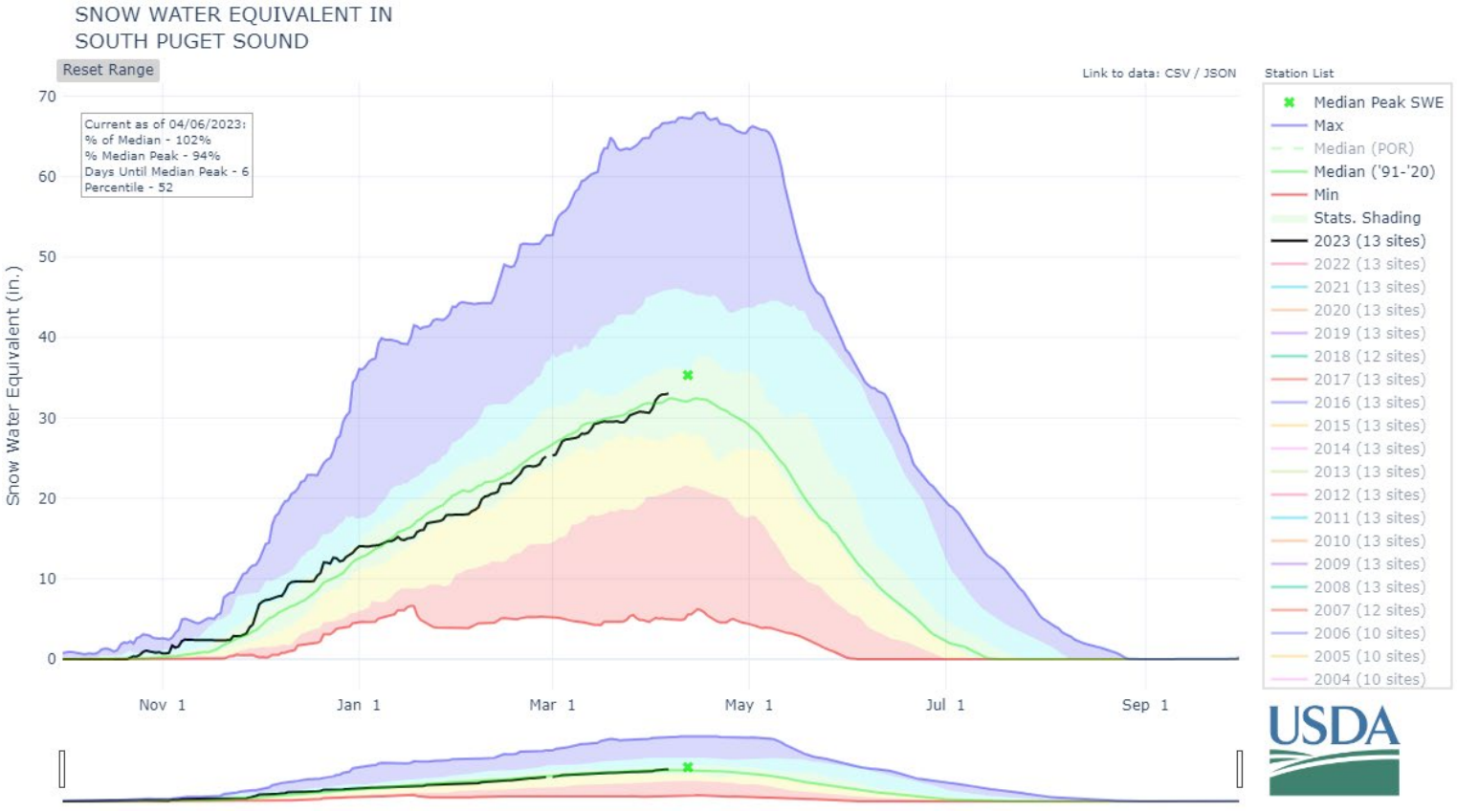
Forecast Exceedance Probabilities For Risk Assessment
Chance that actual volume will exceed forecast

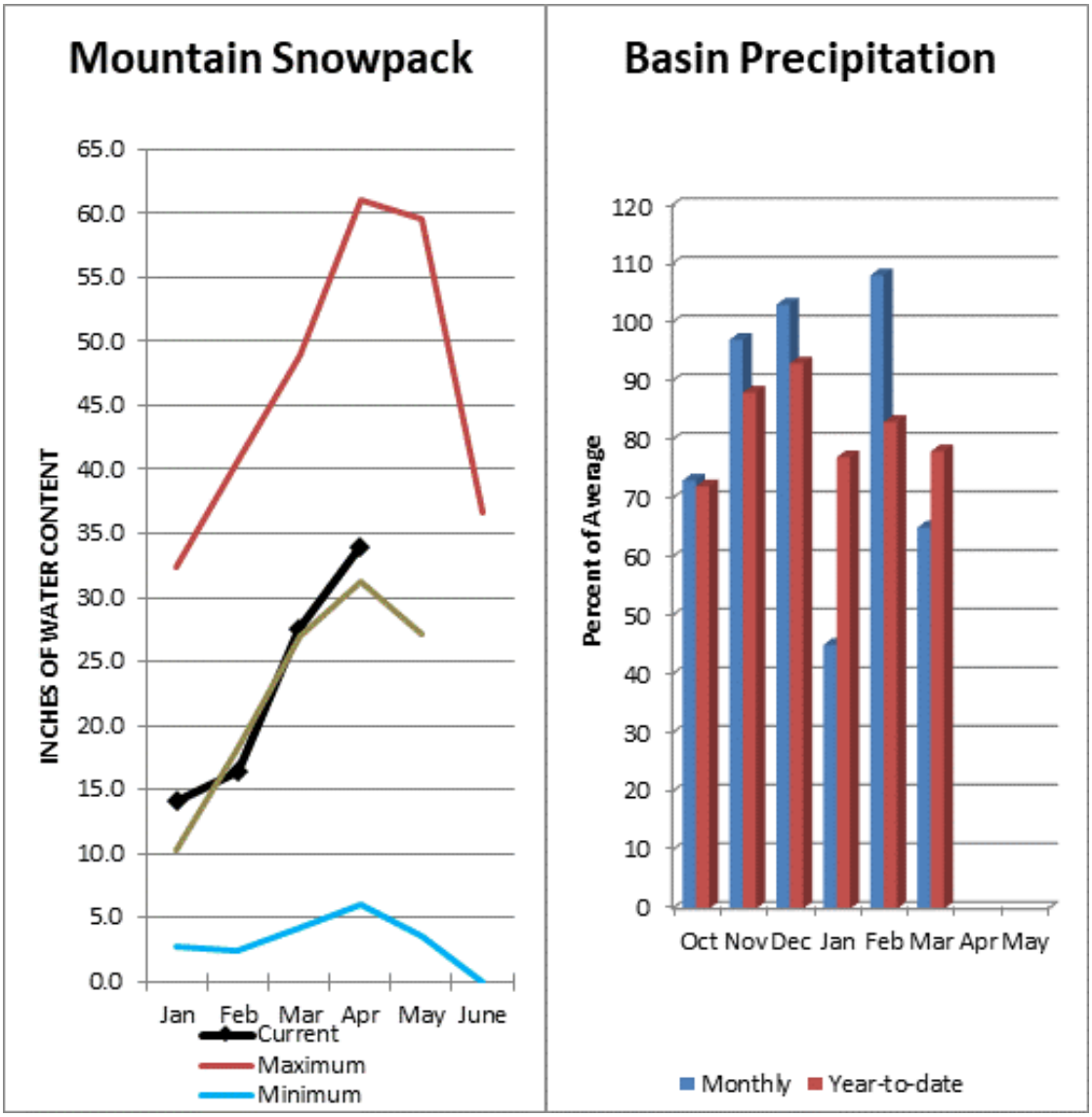
South Puget Sound	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Median	30% (KAF)	10% (KAF)	30yr Median (KAF)
White R nr Buckley[1]								
	APR-JUL	295	370	405	94%	440	510	430
	APR-SEP	360	445	485	93%	525	610	520
Green R bl Howard A Hanson Dam								
	APR-JUL	172	230	255	109%	280	335	235
	APR-SEP	191	250	275	108%	300	360	255

1) 90% And 10% exceedance probabilities are actually 95% And 5%
2) Forecasts are For unimpaired flows. Actual flow will be dependent On management of upstream reservoirs And diversions

Reservoir Storage End of March, 2023	Current (KAF)	Last Year (KAF)	Median (KAF)	Capacity (KAF)
Howard Hansen	11.1	16.5	13.9	

Watershed Snowpack Analysis April 1, 2023	# of Sites	% Median	Last Year % Median
South Puget Sound	13	98%	82%
White	5	96%	80%
Puyallup	2	134%	95%
Green	6	106%	80%





April 1 median snow cover in Central Puget Sound was 109%. Basin-wide precipitation for March was 65% of normal, bringing water-year-to-date to 78% of normal.

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

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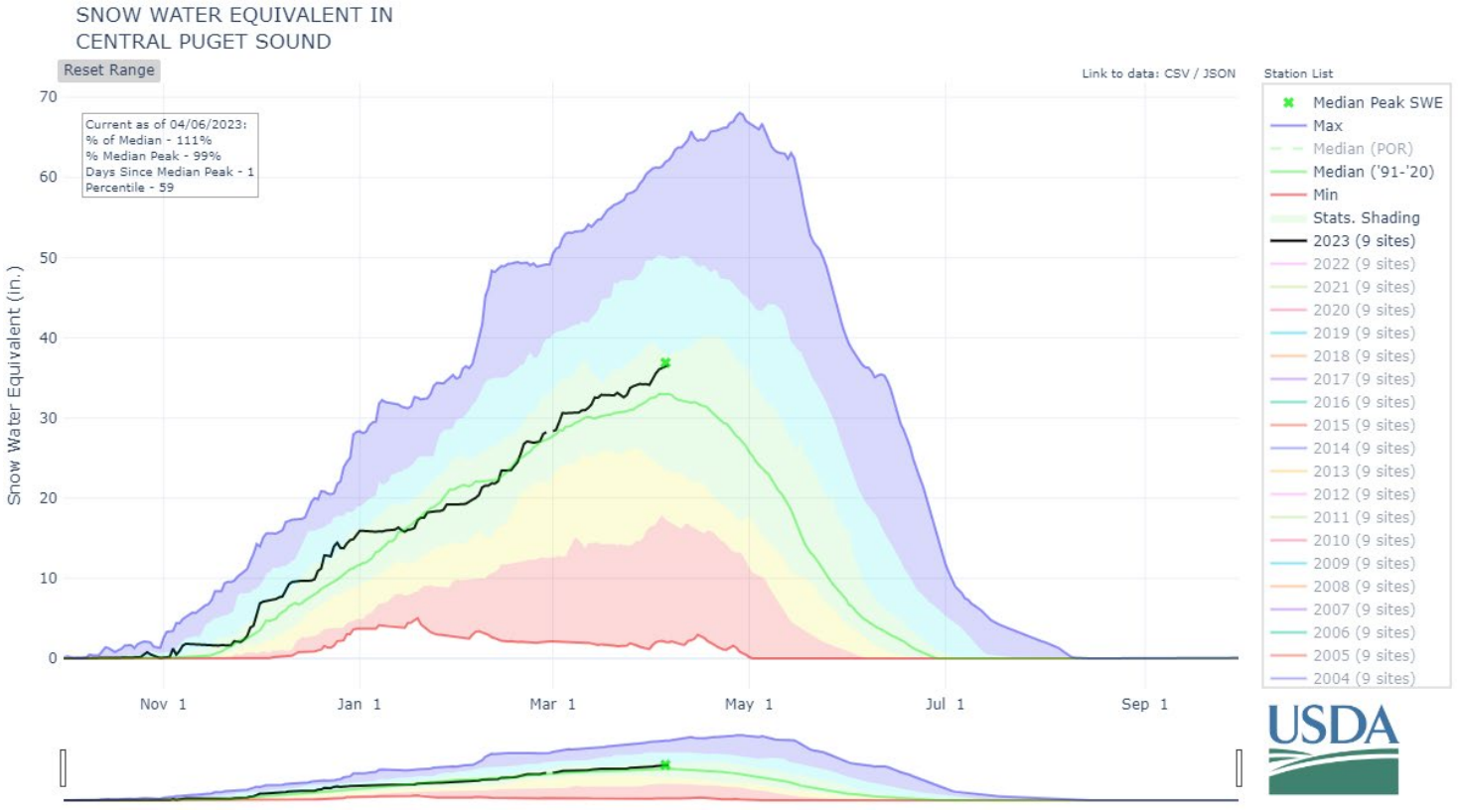
Central Puget Sound
Streamflow Forecasts - April 1, 2023

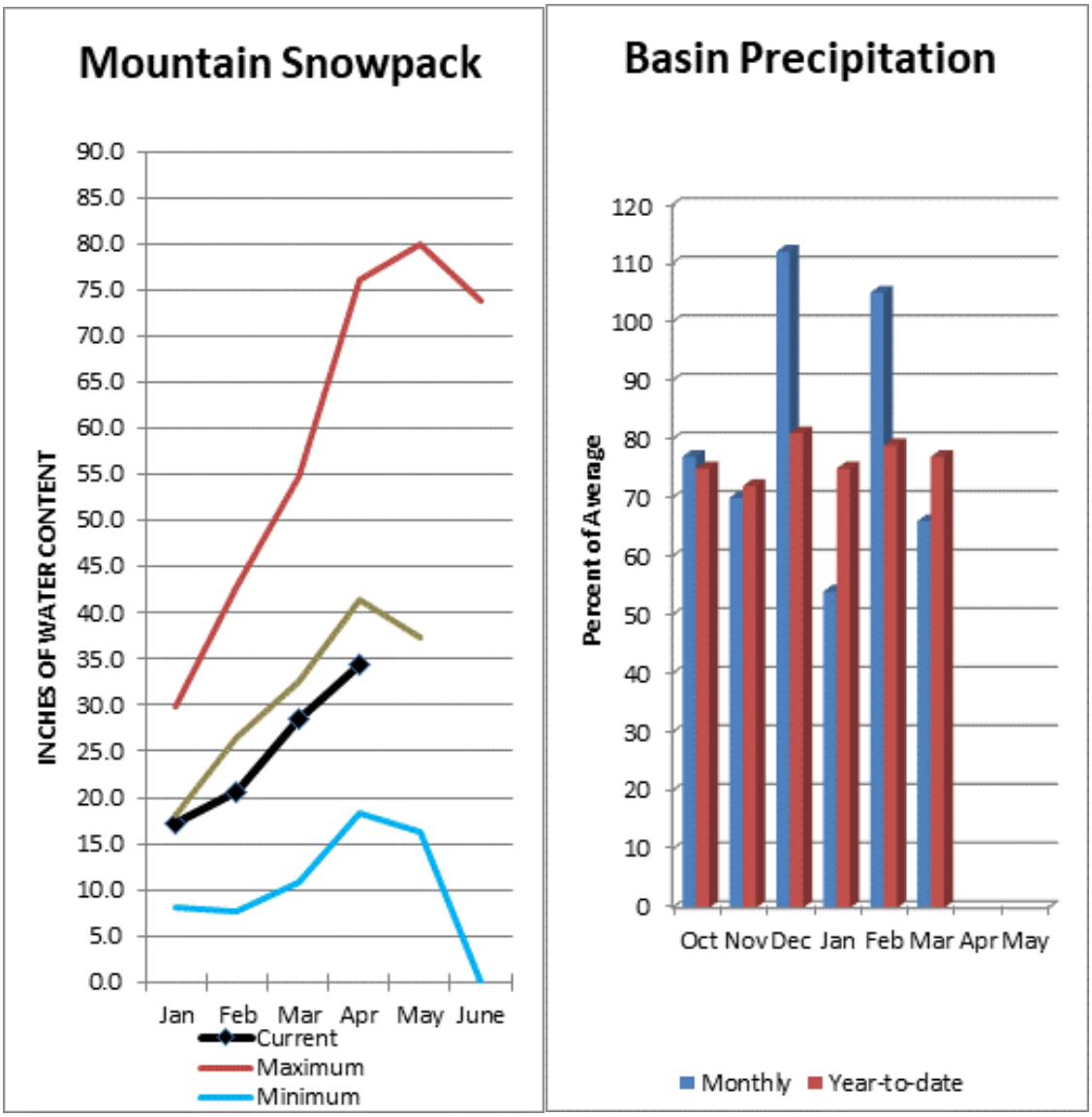
Forecast Exceedance Probabilities For Risk Assessment
Chance that actual volume will exceed forecast

Central Puget Sound	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Median	30% (KAF)	10% (KAF)	30yr Median (KAF)
SF Tolt R nr Index								
	APR-JUL	9	11.3	12.9	96%	14.5	16.8	13.4
	APR-SEP	10.2	12.9	14.8	96%	16.7	19.4	15.4
Cedar R nr Cedar Falls								
	APR-JUL	49	60	68	94%	75	86	72
	APR-SEP	54	66	74	96%	82	94	77
Taylor Ck nr Selleck								
	APR-JUL	15.3	18.1	20	95%	22	25	21
	APR-SEP	18.5	21	23	96%	26	29	24
Rex R nr Cedar Falls								
	APR-JUL	18.7	23	25	109%	28	32	23
	APR-SEP	19.8	24	27	104%	31	35	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

Watershed Snowpack Analysis April 1, 2023	# of Sites	% Median	Last Year % Median
Central Puget Sound	12	109%	88%
Tolt	3	109%	93%
Snoqualmie	5	113%	86%
Skykomish	4	107%	95%
Cedar	8	111%	81%





April 1 median snow cover in North Puget Sound was 83%. Basin-wide precipitation for March was 66% of normal, bringing water-year-to-date to 77% of normal. April 1 Basin-wide reservoir storage was 82% of normal.

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

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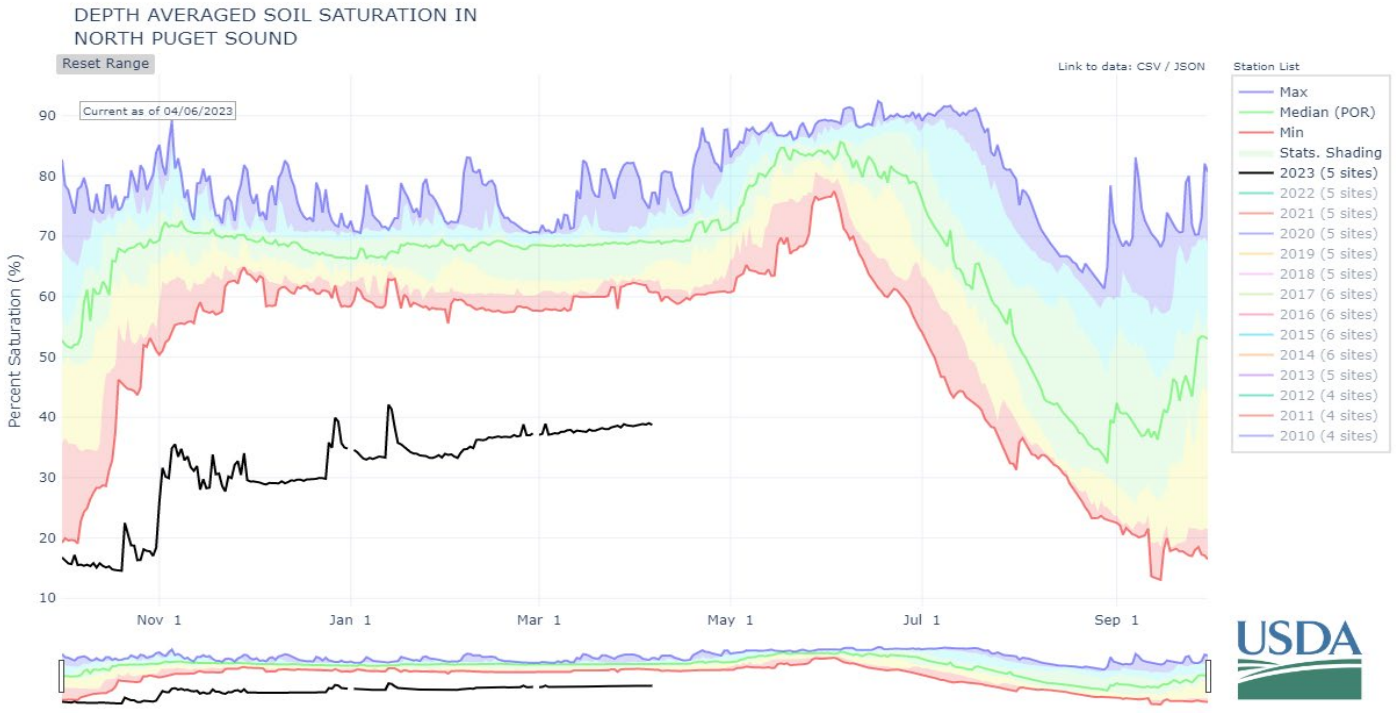
North Puget Sound
Streamflow Forecasts - April 1, 2023

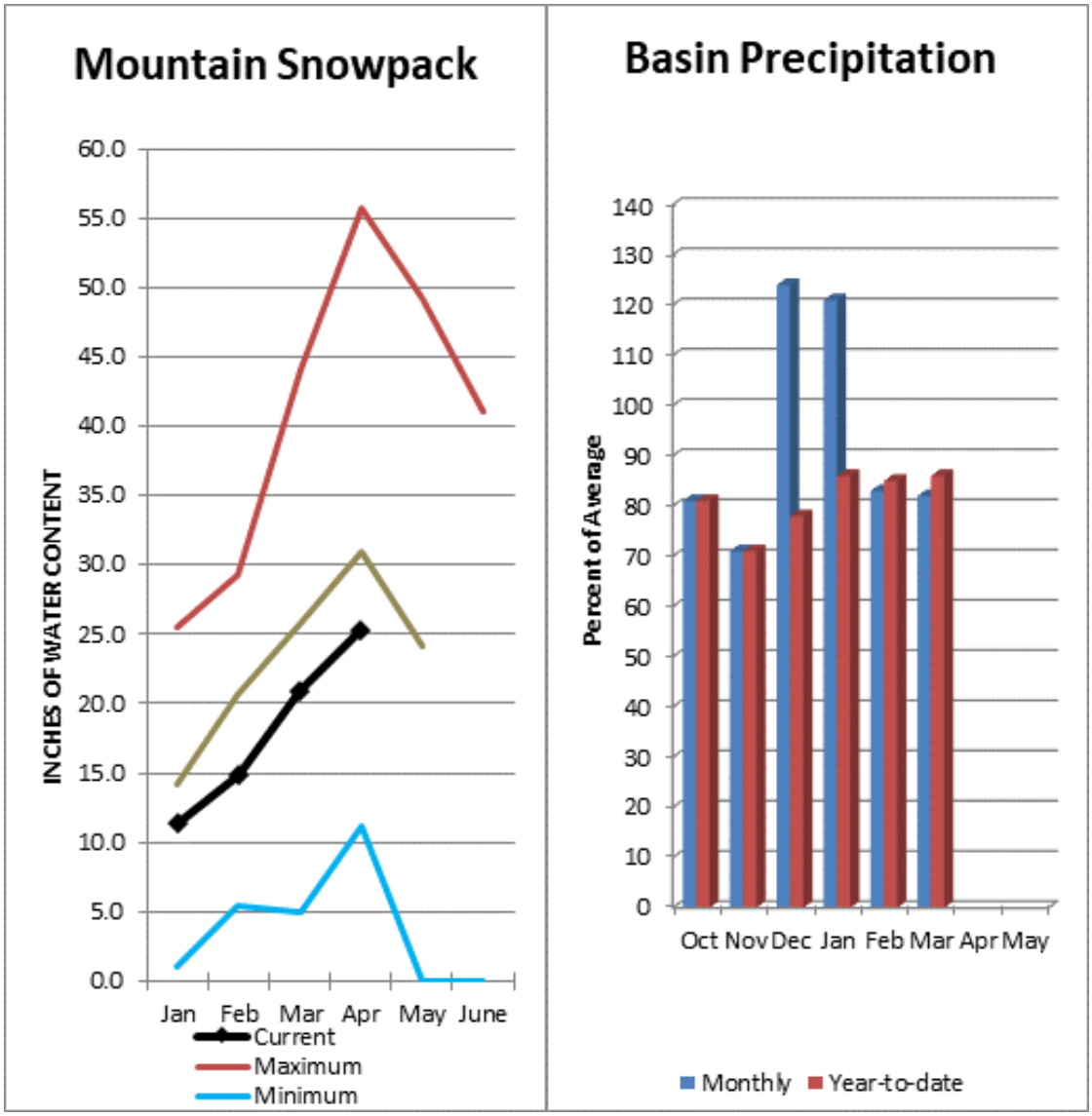
		Forecast Exceedance Probabilities For Risk Assessment Chance that actual volume will exceed forecast						
North Puget Sound	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Median	30% (KAF)	10% (KAF)	30yr Median (KAF)
Baker R at Concrete								
	APR-JUL	520	585	630	82%	675	740	770
	APR-SEP	680	755	810	82%	865	940	990
Thunder Ck nr Newhalem								
	APR-JUL	192	210	225	94%	240	260	240
	APR-SEP	275	295	310	94%	325	345	330
Skagit R at Newhalem								
	APR-JUL	1290	1380	1450	83%	1520	1610	1740
	APR-SEP	1480	1600	1680	83%	1760	1880	2020

1) 90% And 10% exceedance probabilities are actually 95% And 5%
2) Forecasts are For unimpaired flows. Actual flow will be dependent On management of upstream reservoirs And diversions

Reservoir Storage End of March, 2023	Current (KAF)	Last Year (KAF)	Median (KAF)	Capacity (KAF)
Ross	585.0	718.9	703.5	1434.7
Lake Shannon	42.8	92.2	63.3	
Upper Baker	87.8	104.6	104.6	

Watershed Snowpack Analysis April 1, 2023	# of Sites	% Median	Last Year % Median
North Puget Sound	24	83%	87%
Skagit	16	81%	89%
Nooksack	3	89%	74%
Baker	2	81%	90%





Olympic Peninsula snowpack averaged 82% of normal on April 1. March precipitation was 82% of normal. Precipitation has accumulated at 86% of normal for the water year.

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

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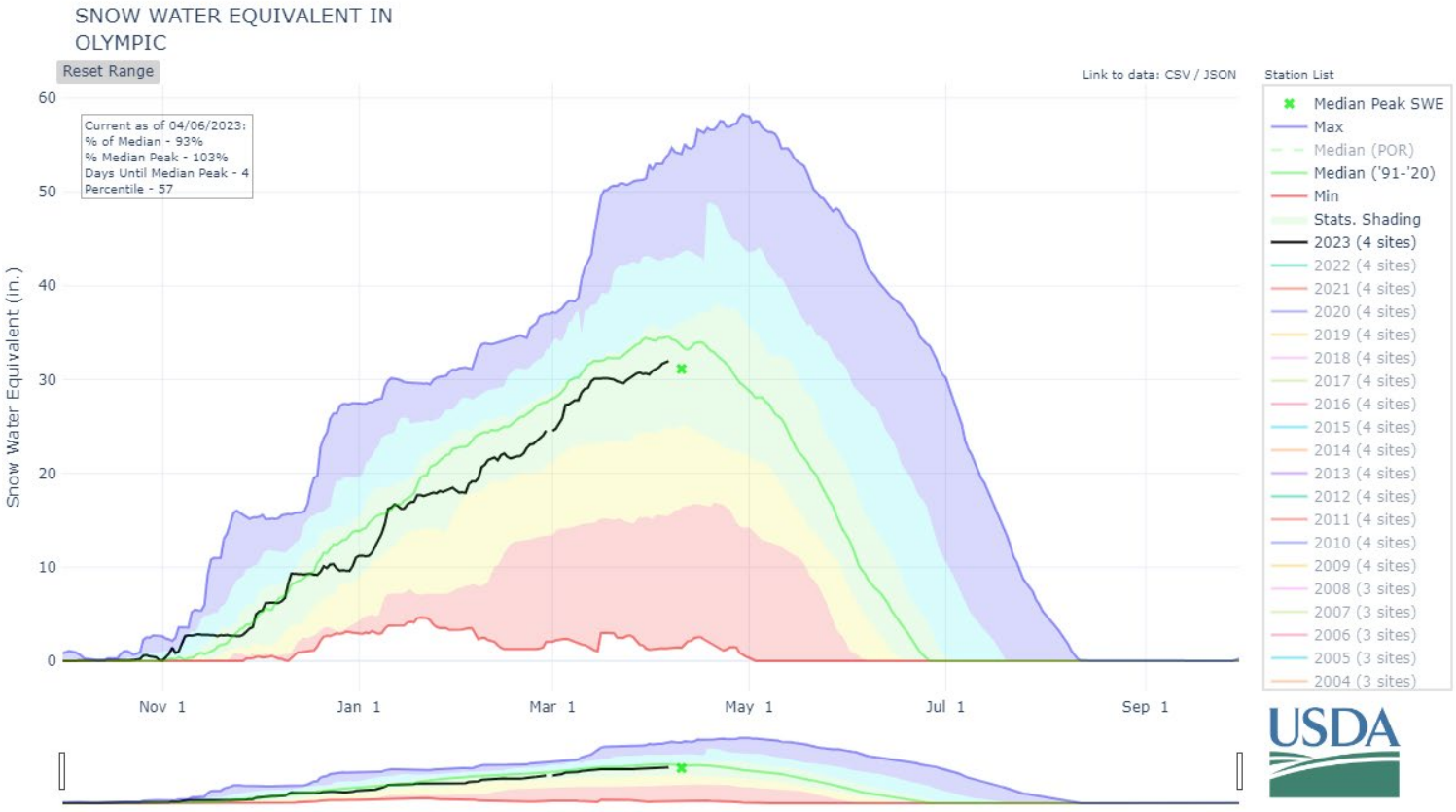
Olympic
Streamflow Forecasts - April 1, 2023

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

Olympic	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Median	30% (KAF)	10% (KAF)	30yr Median (KAF)
Elwha R at McDonald Br nr Port Angeles								
	APR-JUL	250	285	310	84%	335	370	370
	APR-SEP	305	345	370	83%	395	435	445
Dungeness R nr Sequim								
	APR-JUL	109	119	125	105%	132	142	119
	APR-SEP	129	142	151	109%	160	174	139

1) 90% And 10% exceedance probabilities are actually 95% And 5%
2) Forecasts are For unimpaired flows. Actual flow will be dependent On management of upstream reservoirs And diversions

Watershed Snowpack Analysis April 1, 2023	# of Sites	% Median	Last Year % Median
Olympic	7	82%	71%
Olympic	7	82%	71%



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
	Washington State Fish and Wildlife
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
	U.S. Fish and Wildlife Service
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
	Sauk-Suiattle Tribe of Indians
	Stillaguamish Tribe
Private	Okanogan Irrigation District
	Wenatchee Heights Irrigation District
	Newman Lake Homeowners Association
	Whitestone Reclamation District
	Kinross Mining

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

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Mount Vernon, WA 98273-2873

Washington Water Supply Outlook Report

Natural Resources Conservation Service
Spokane, WA