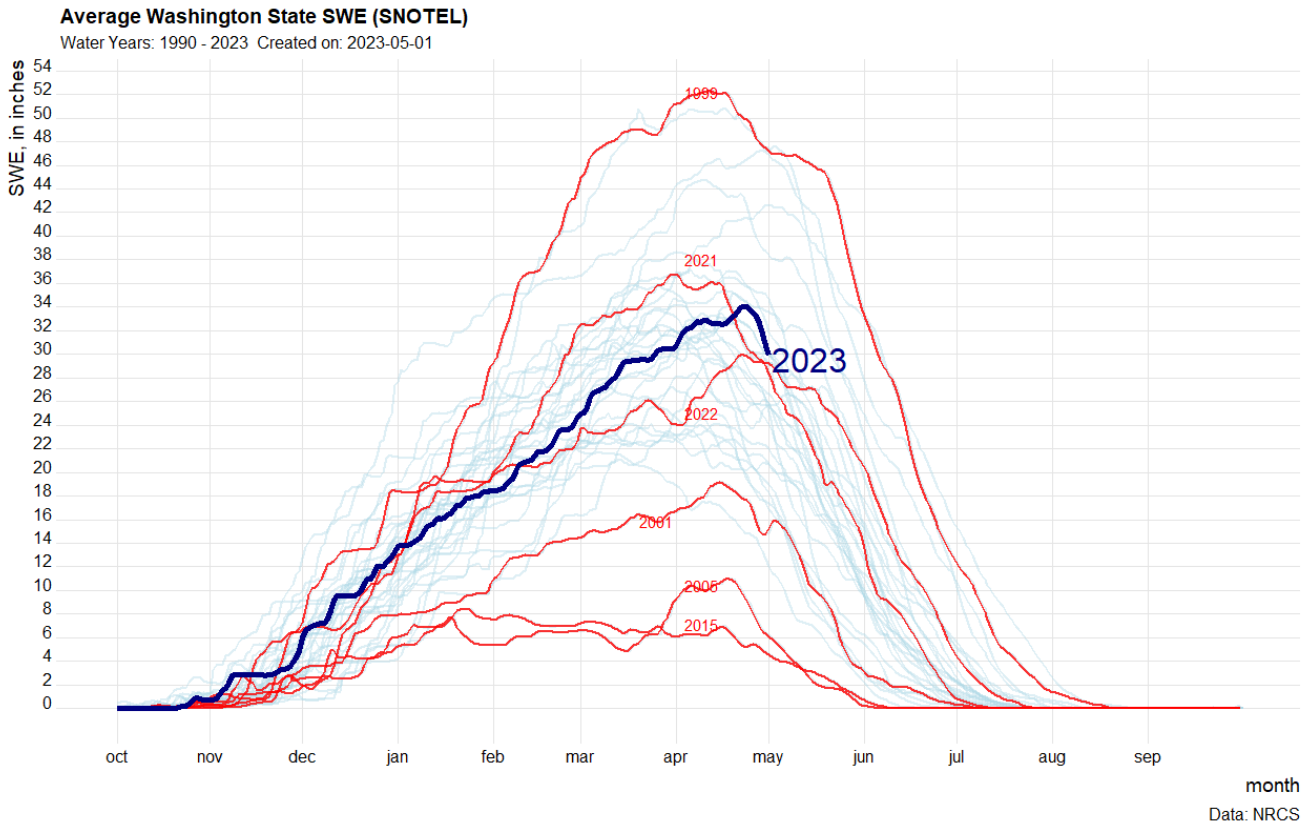
NRCS Natural Resources Conservation Service

United States Department of Agriculture

Washington
Water Supply Outlook Report
May 1, 2023



Plot curtesy of Jeff Marti, WA Department of Ecology, depicting NRCS statewide SNOTEL data as compared to other dominate water years from 1990 thru April 1, 2023. Also notice that 2023 peak Snow Water Equivalent (SWE) was later than normal due to the extended cold season however with the recent warm up the pack is in full melt mode.

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

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How forecasts are made

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

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

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

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Washington
Water Supply Outlook

May 2023

General Outlook

With April temperatures remaining below normal for most of the month snowpack continued to increase. However, by months end, net loss equaled net gain as averaged statewide for the month. The plus side is that median peak snow water equivalent was extended 1-2 weeks later than normal, which should be beneficial to early irrigation as well as fish passage by shifting peak flows a little later into spring.

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

Snowpack

The May 1 statewide SNOTEL readings were 111% of normal, a slight increase since April 1. Reminiscent of water year 2022 the colder than normal spring has extended mountain snow water equivalent beyond the normal melt curve displaying a higher percent of normal without adding new snow. Westside medians from SNOTEL included the North Puget Sound River basins with 89% of normal, the Central and South Puget River basins with 128% and 109% respectively, and the Olympics with 100%. Snowpack along the east slopes of the Cascade Mountains included the Yakima area with 100% and the Wenatchee area with 95%. Snowpack in the Spokane River Basin was at 111% and the Upper Columbia River basins had 121% of the long-term median.

BASIN	PERCENT OF MEDIAN	LAST YEAR PERCENT MEDIAN
Spokane	111	114
Newman Lake	140	119
Lower Pend Oreille	97	100
Kettle	140	112
Omak	158	95
Methow	107	128
Conconully Lake	N/A	N/A
Central Columbia	95	118
Upper Yakima	100	115
Lower Yakima	105	86
Ahtanum Creek	119	107
Walla Walla	141	118
Asotin	135	188
Cowlitz	114	110
Lewis	164	123
White	107	104
Green	121	123
Puyallup	186	166
Cedar	134	141
Snoqualmie	132	130
Skykomish	121	123
Skagit	89	118
Nooksack	97	102
Olympic Peninsula	100	113

Precipitation

Aside from a couple of east side basins the state experienced normal too much above normal precipitation. Statewide Water-year average increased slightly to 86% of normal as of May 1. Sheep Canyon SNOTEL recorded the most total precipitation with 18.7 inches or 138% of normal, 5.0 inches of that was captured as snow-water-equivalent. SNOTEL collects all form of precipitation including, rain, snow, sleet, and hail.

RIVER BASIN	APRIL PERCENT OF AVERAGE	WATER YEAR PERCENT OF AVERAGE
Spokane	95	81
Lower Pend Oreille	126	81
Upper Columbia	131	91
Central Columbia	121	82
Upper Yakima	105	81
Naches	120	84
Lower Yakima	118	98
Klickitat	105	94
Walla Walla	105	92
Lower Snake	113	96
Lower Columbia	144	94
South Puget Sound	116	83
Central Puget Sound	98	78
North Puget Sound	119	81
Olympic Peninsula	156	90

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 449,500-acre feet, 66% of median for the Upper Reaches and 85% of median for Rimrock and Bumping Lakes. The power generation reservoirs included the following: Coeur d'Alene Lake, 176,200-acre feet, 84% of median and 74% of capacity; and Ross Lake within the Skagit River Basin at 75% of average and 37% 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	74	84
Lower Pend Oreille	58	94
Upper Columbia	55	66
Central Columbia	38	88
Upper Yakima	54	70
Naches	69	85
Lower Snake	46	82
North Puget Sound	37	75
South Puget Sound	N/A	114
Lower Columbia	N/A	52

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

Streamflow

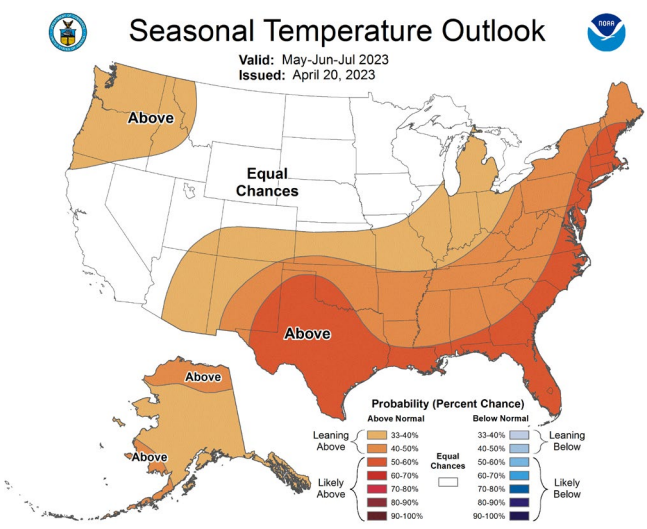
Climatic conditions have been volatile and ever changing to date through the water year, making streamflow forecasting a moving target for water managers one and all. Volumetric forecasts are developed using current, historic, and median snowpack, precipitation and streamflow data collected and coordinated by organizations cooperating with NRCS.

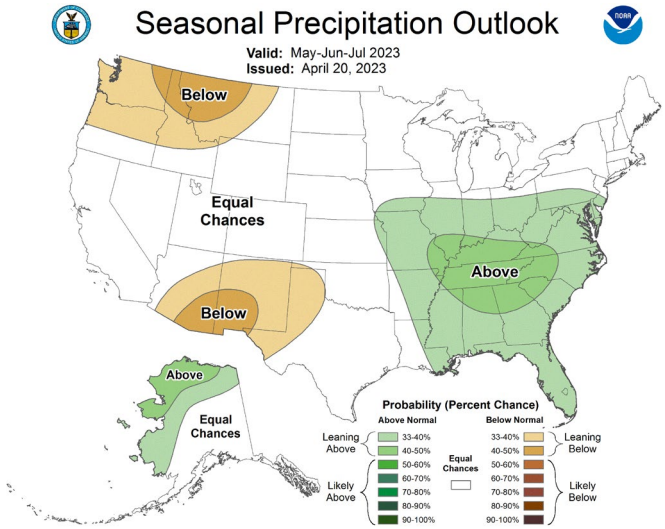
BASIN	PERCENT OF AVERAGE FORCAST (50% CHANCE OF EXCEEDENCE)
Spokane	85-95
Lower Pend Oreille	81-90
Upper Columbia	86-118
Central Columbia	77-95
Upper Yakima	80-90
Lower Yakima	91-135
Naches	95-103
Klickitat	101-102
Lower Snake-Walla Walla	98-127
Lower Columbia	106-131
South Puget Sound	98-102
Central Puget Sound	95-117
North Puget Sound	88-94
Olympic Peninsula	86-108

STREAM	PERCENT OF AVERAGE APRIL RUNOFF
Priest River – near Priest River	58
Kettle at Laurier	48
Columbia at Birchbank	47
Spokane at Spokane	66
Similkameen at Nighthawk	28
Okanogan near Tonasket	32
Methow at Pateros	53
Chelan at Chelan	63
Stehekin near Stehekin	56
Wenatchee at Pashastin	54
Cle Elum near Roslyn	69
Yakima near Parker	81
Naches near Naches	88
Grande Ronde at Troy	94
Snake below Lower Granite Dam	75
Columbia River at The Dalles	64
Lewis at Merwin Dam	150
Cowlitz below Mayfield Dam	90
Skagit at Concrete	75
Dungeness near Sequim	65

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

Climate





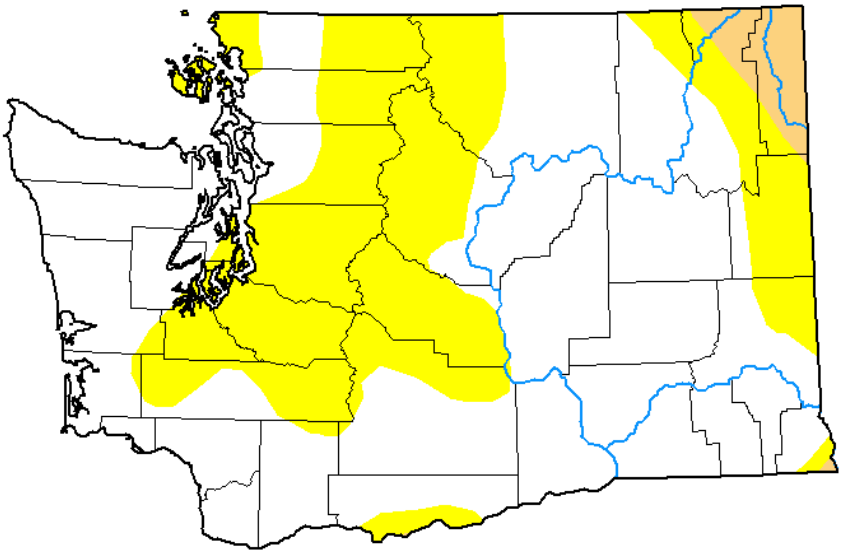
U.S. Drought Monitor

Washington

April 25, 2023

(Released Thursday, Apr. 27, 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 Snow Survey

Oregon Snow Survey

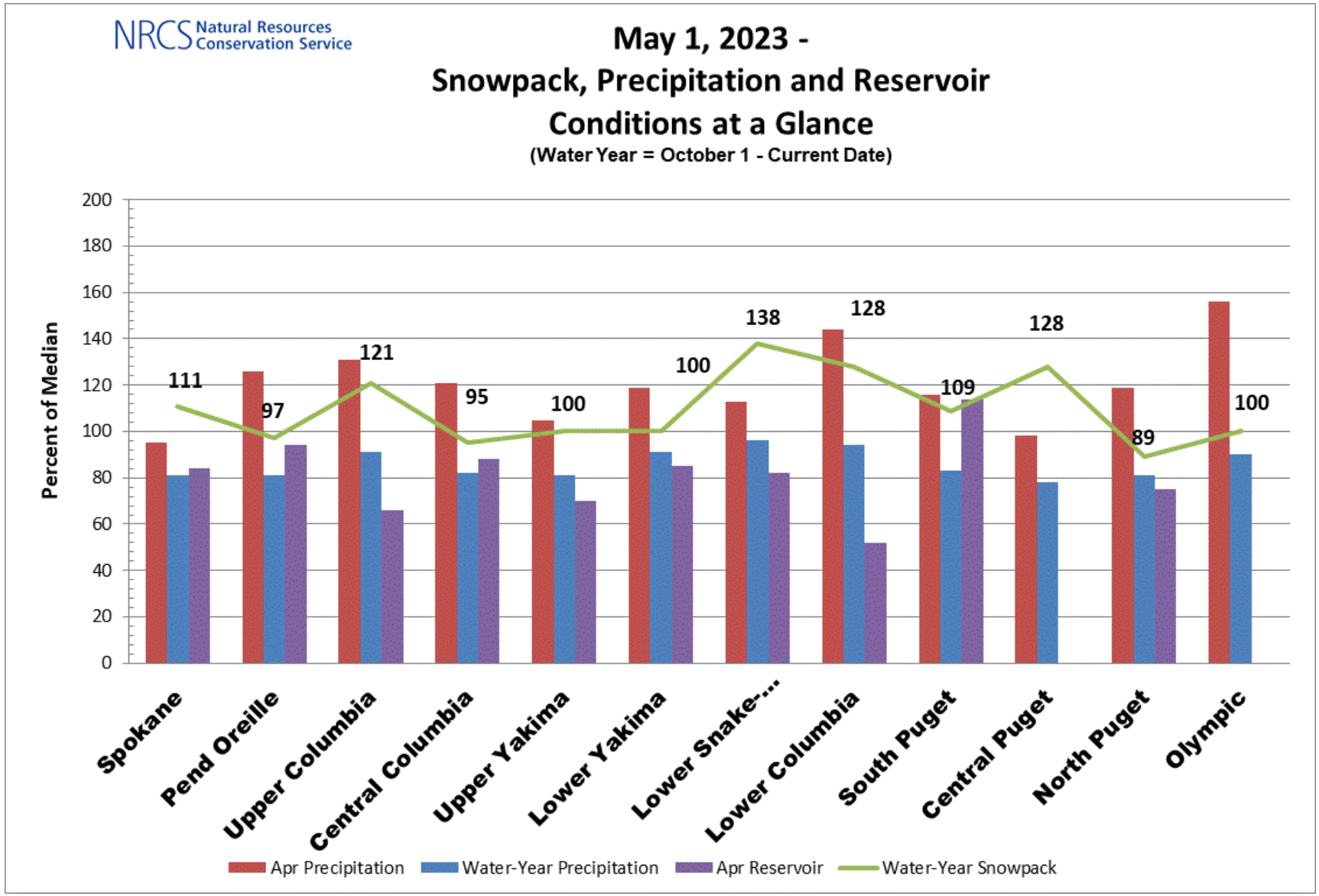
Idaho Snow Survey

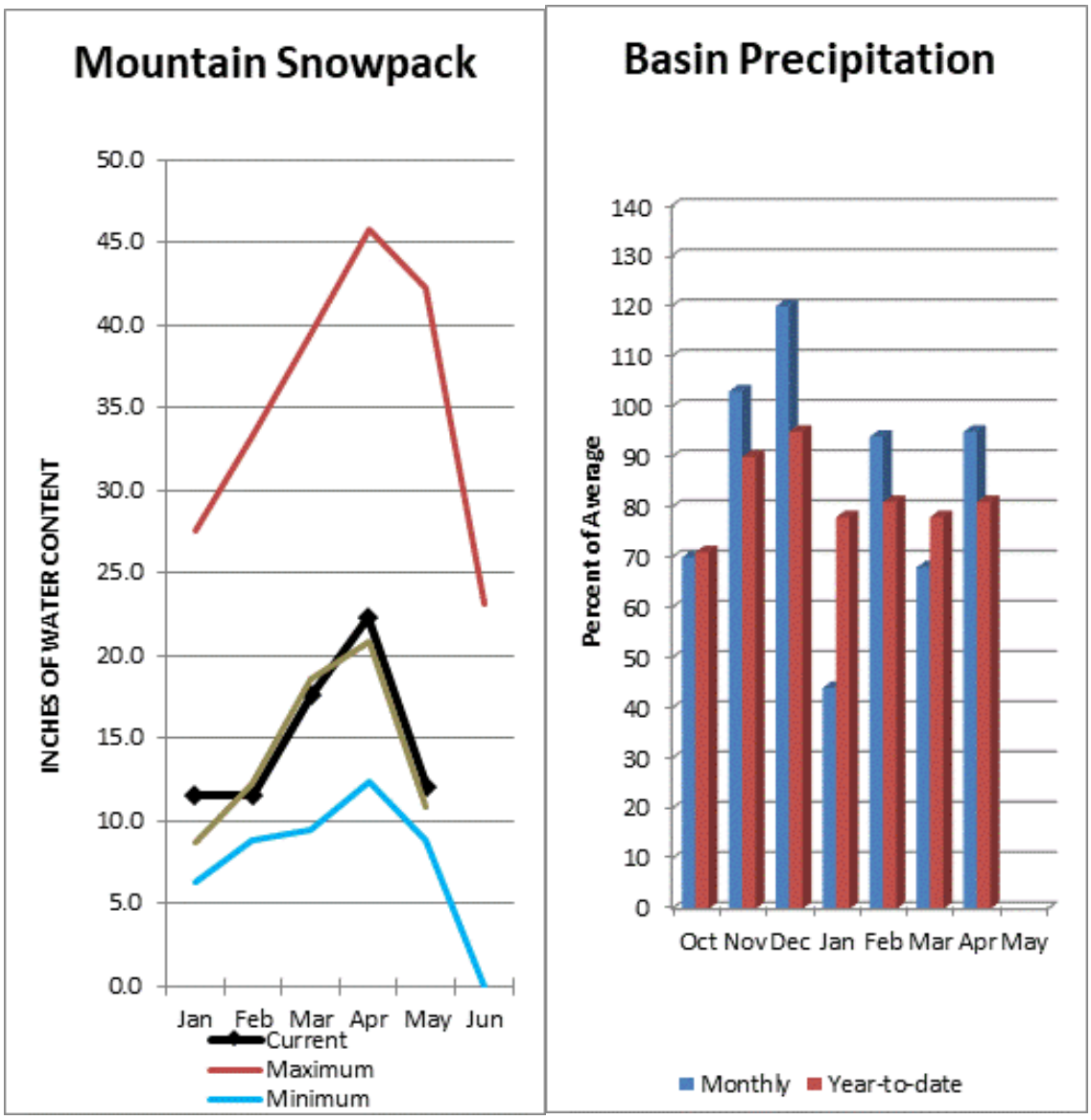
National Water and Climate Center (NWCC)

USDA-NRCS Agency Homepages

NRCS Washington State

NRCS National Office


NRCS Natural Resources Conservation Service
May 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
111
97
121
95
100
100
138
128
109
128
89
100
Spokane
Pend Oreille
Upper Columbia
Central Columbia
Upper Yakima
Lower Yakima
Lower Snake-...
Lower Columbia
South Puget
Central Puget
North Puget
Olympic
Apr Precipitation
Water-Year Precipitation
Apr Reservoir
Water-Year Snowpack



Basin snowpack is 111% of normal and precipitation is 81% of normal for the water year. Precipitation for April was 95% of normal. Reservoir storage is currently at 84% of normal.

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

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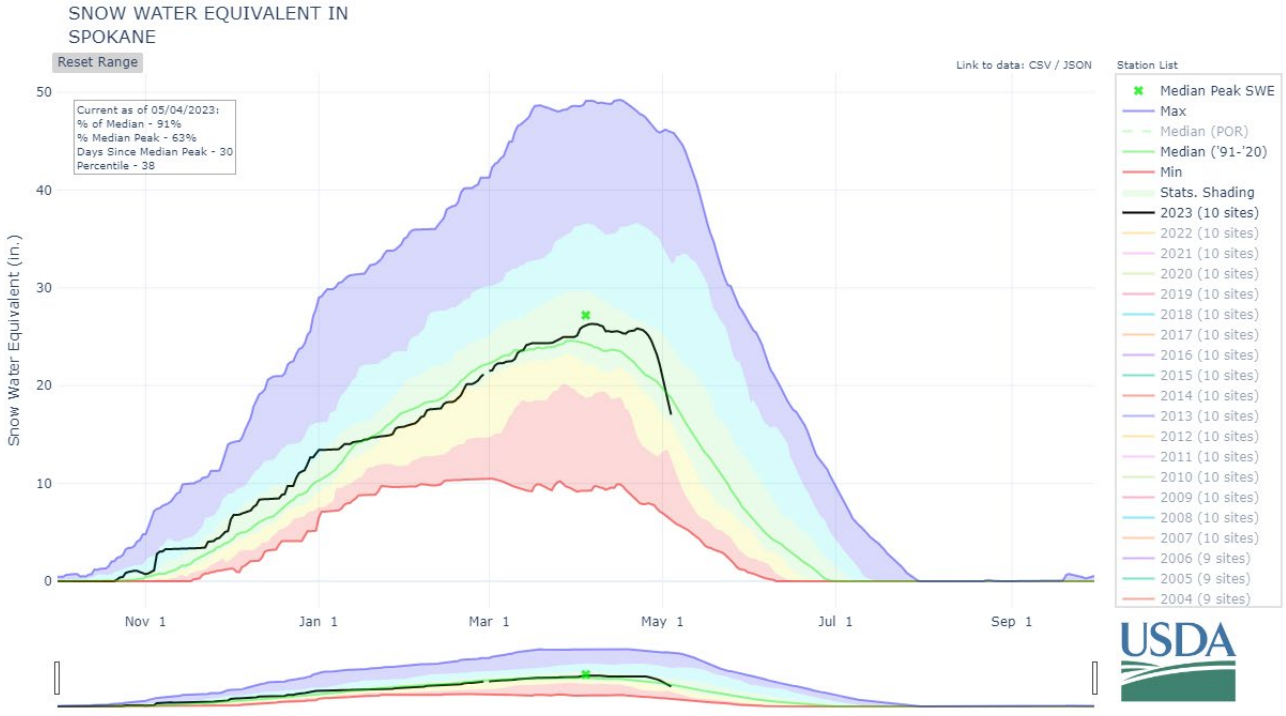
Spokane
Streamflow Forecasts - May 1, 2023

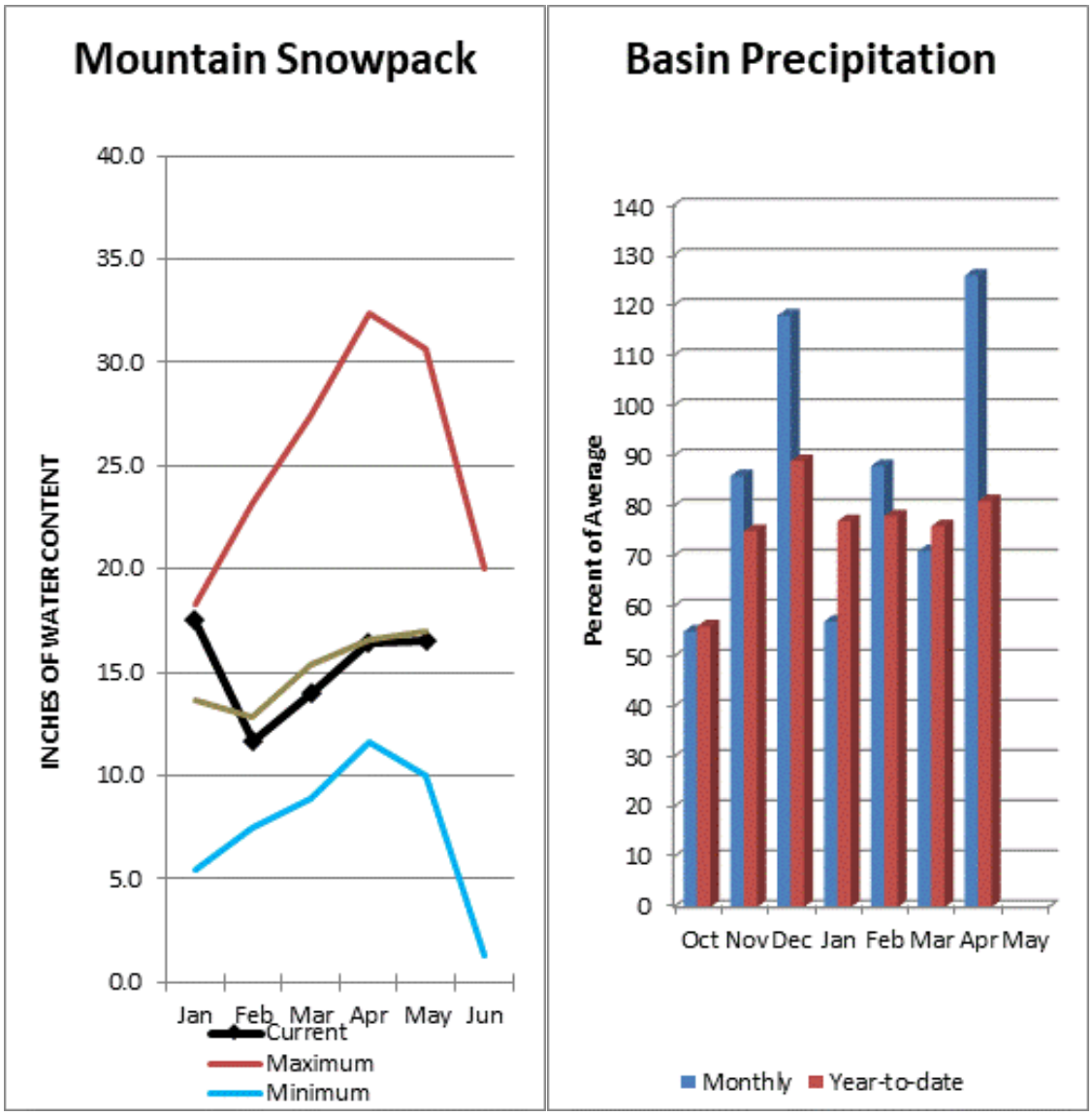
Spokane	Forecast Period	Forecast Exceedance Probabilities For Risk Assessment: Chance that actual volume will exceed forecast — 90% (KAF)	70% (KAF)	50% (KAF)	% Median	30% (KAF)	10% (KAF)	30yr Median (KAF)
NF Coeur dAlene R at Enaville								
	MAY-JUL	220	305	360	95%	415	500	380
	MAY-SEP	250	335	395	95%	455	540	415
Spokane R nr Post Falls[2]								
	MAY-JUL	810	1110	1320	85%	1520	1820	1560
	MAY-SEP	860	1170	1380	84%	1600	1910	1640
St. Joe R at Calder								
	MAY-JUL	400	545	650	88%	750	900	740
	MAY-SEP	445	600	705	87%	810	965	815
Chamokane Ck nr Long Lake								
	MAY-JUL	3.7	5.2	6.4	89%	7.7	9.9	7.2
Spokane R at Long Lake[2]								
	MAY-JUL	1030	1320	1520	86%	1720	2010	1760
	MAY-SEP	1170	1470	1680	85%	1890	2200	1970

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 April, 2023	Current (KAF)	Last Year (KAF)	Median (KAF)	Capacity (KAF)
Lake Coeur d' Alene	176.2	170.1	210.3	238.5

Watershed Snowpack Analysis May 1, 2023	# of Sites	% Median	Last Year % Median
Spokane	13	111%	114%
Newman Lake	2	140%	119%





May 1 snow cover was 97% of normal in the Pend Oreille Basin River Basin and precipitation during April was 126% of normal, bringing the year-to-date precipitation at 81% of normal. Reservoir storage in the basin, including Lake Pend Oreille and Priest Lake was 94% of normal.

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

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Lower Pend Oreille
Streamflow Forecasts - May 1, 2023

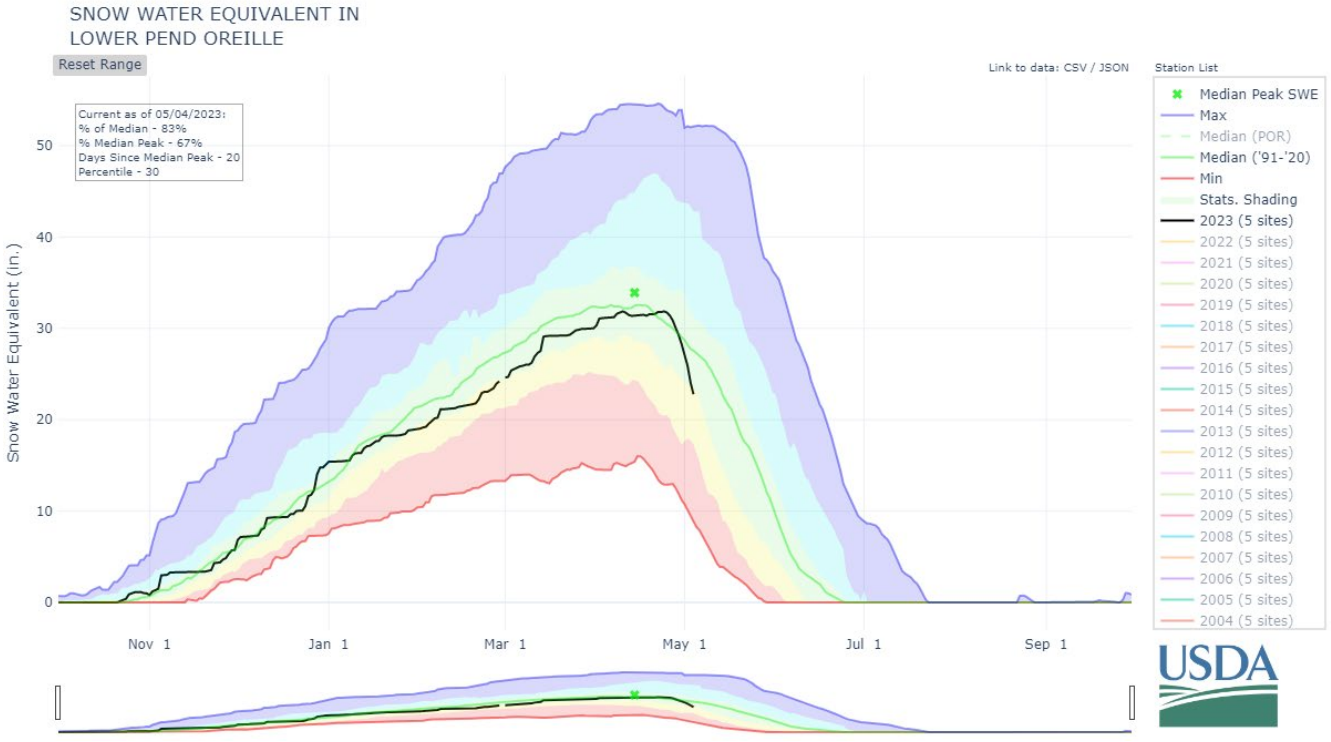
Forecast Exceedance Probabilities For Risk Assessment
Chance that actual volume will exceed forecast

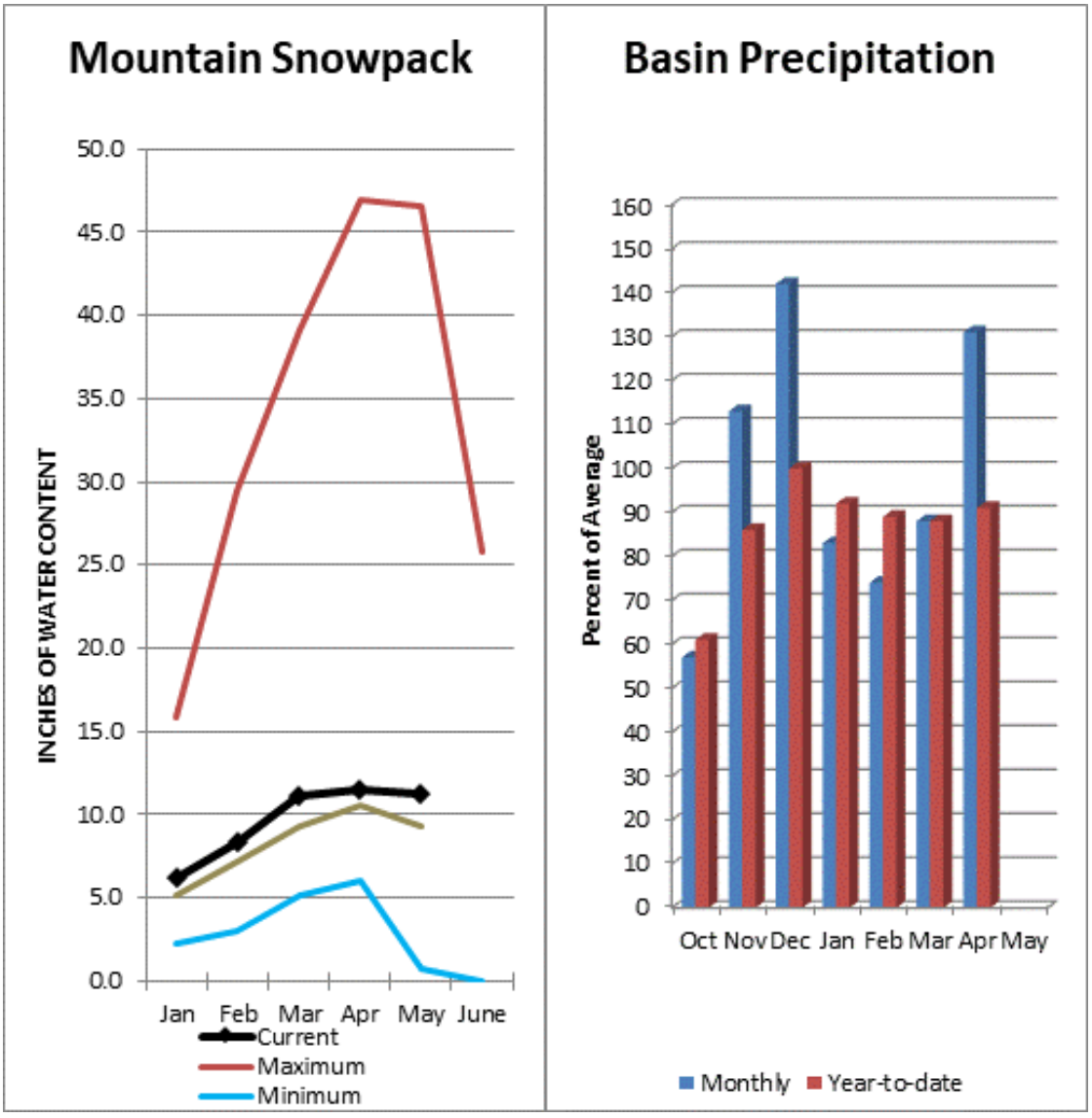
Lower Pend Oreille	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Median	30% (KAF)	10% (KAF)	30yr Median (KAF)
Priest R nr Priest River[2]								
	MAY-JUL	370	450	505	80%	560	640	635
	MAY-SEP	395	480	540	81%	600	690	670
Pend Oreille Lake Inflow[2]								
	MAY-JUL	7030	7980	8640	90%	9290	10200	9640
	MAY-SEP	7670	8790	9550	90%	10300	11400	10600
Pend Oreille R bl Box Canyon[2]								
	MAY-JUL	7140	8110	8760	91%	9420	10400	9600
	MAY-SEP	7760	8900	9680	90%	10500	11600	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

Reservoir Storage End of April, 2023	Current (KAF)	Last Year (KAF)	Median (KAF)	Capacity (KAF)
Lake Pend Oreille	878.8	866.3	925.0	1561.3
Priest Lake	88.6	71.0	99.2	119.3

Watershed Snowpack Analysis May 1, 2023	# of Sites	% Median	Last Year % Median
Lower Pend Oreille	8	97%	106%
Sullivan	1	85%	91%





May 1 snow cover on the Upper Columbia basins was 121% of normal and April precipitation was 131% of normal, with precipitation for the water year at 91% of normal. Combined storage in the Conconully Reservoirs was 66% of normal.

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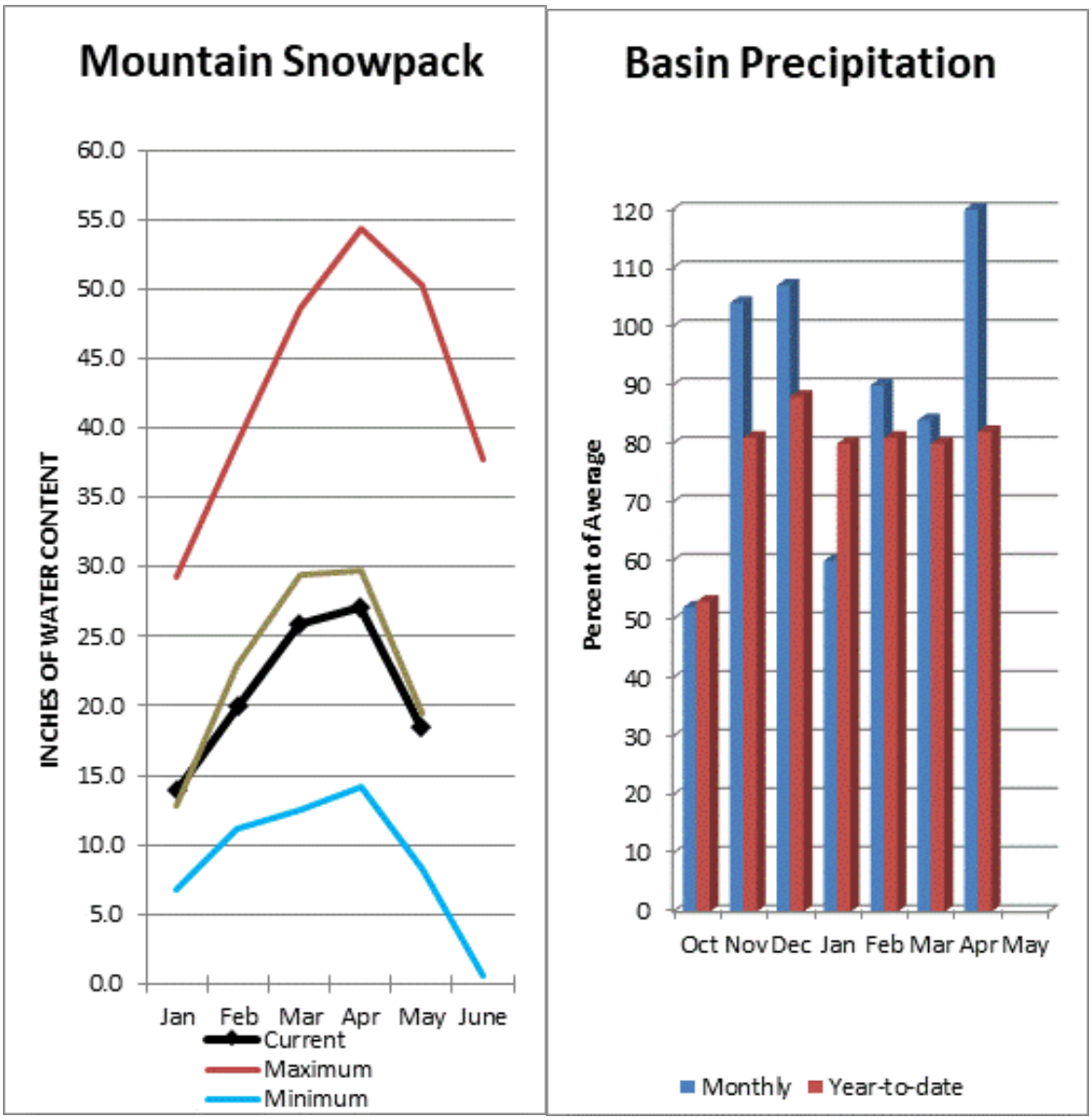
Upper Columbia
Streamflow Forecasts - May 1, 2023

Upper 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						
Columbia R at Grand Coulee-NWS[2]								
	MAY-JUL	37500		41900	94%		48000	44400
	MAY-SEP	44200		50000	96%		58200	52200
Similkameen R nr Nighthawk								
	MAY-JUL	735	860	950	86%	1040	1170	1110
	MAY-SEP	790	925	1020	86%	1110	1250	1190
Kettle R nr Laurier								
	MAY-JUL	1360	1560	1700	117%	1840	2040	1450
	MAY-SEP	1410	1630	1780	118%	1930	2150	1510
Colville R at Kettle Falls								
	MAY-JUL	36	59	75	107%	91	114	70
	MAY-SEP	43	69	87	110%	105	131	79
Okanogan R nr Tonasket								
	MAY-JUL	820	1020	1150	87%	1280	1480	1320
	MAY-SEP	875	1100	1250	86%	1400	1620	1450
Methow R nr Pateros								
	MAY-JUL	535	635	700	90%	765	865	775
	MAY-SEP	575	680	750	90%	820	925	830
Okanogan R at Malott								
	MAY-JUL	840	1040	1170	89%	1310	1510	1320
	MAY-SEP	895	1120	1270	87%	1430	1650	1460

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 April, 2023	Current (KAF)	Last Year (KAF)	Median (KAF)	Capacity (KAF)
Conconully Reservoir	6.0	6.0	10.8	13.0
Conconully Lake (Salmon Lake Dam)	7.0	3.8	9.0	10.5

Watershed Snowpack Analysis May 1, 2023	# of Sites	% Median	Last Year % Median
Upper Columbia	29	121%	108%
Toats Coulee	0		
Sanpoil	1	158%	95%
Omak	1	158%	95%
Methow	4	107%	128%
Kettle	7	140%	112%
Concully Lake	1	4900%	400%
Colville	0		



May 1 snowpack in the Central Columbia River basins was 95% of normal. Precipitation during April was 121% of normal in the basin and 82% for the year-to-date. Reservoir storage in Lake Chelan was 88% of the median.

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

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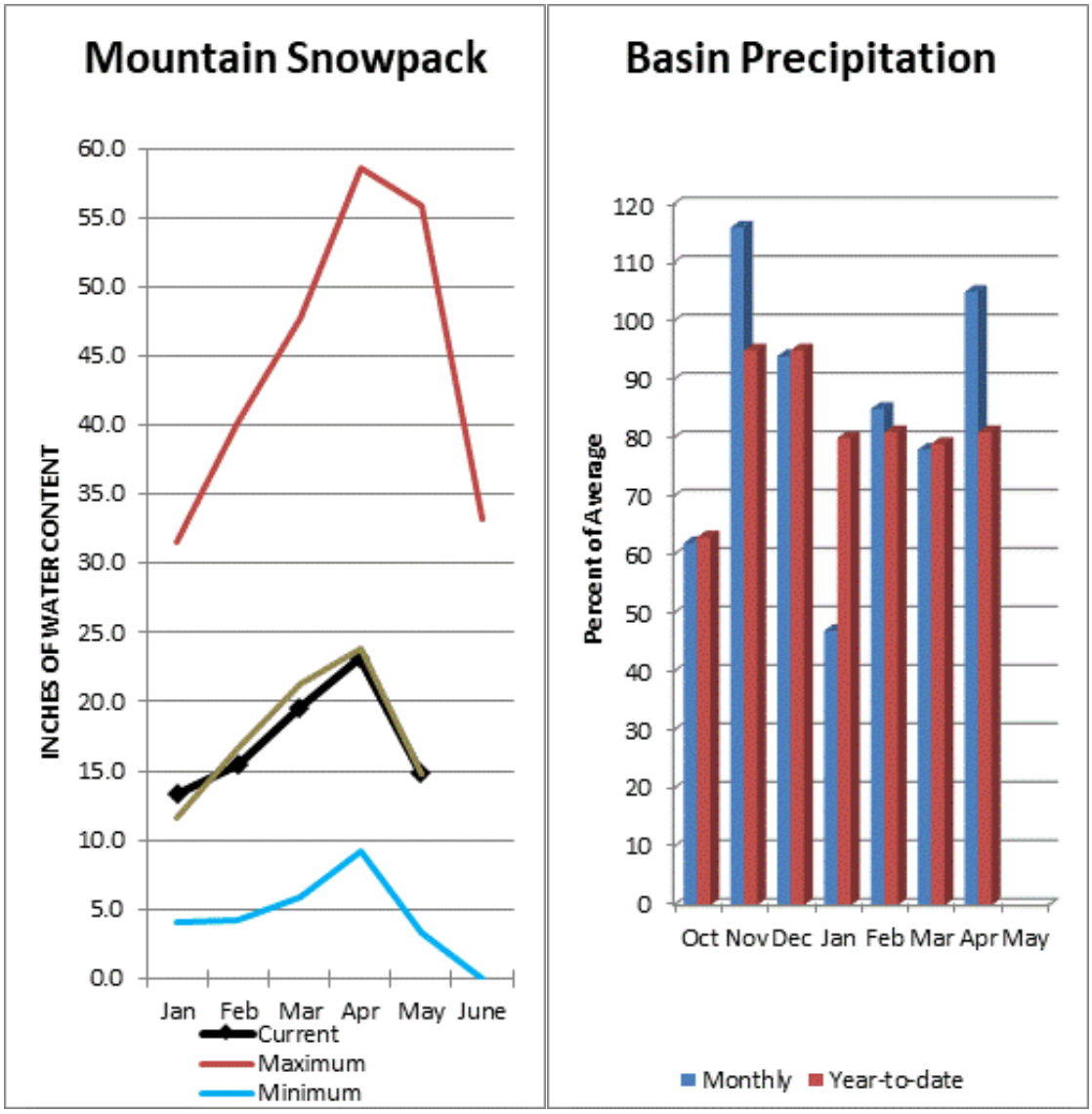
Central Columbia
Streamflow Forecasts - May 1, 2023

Central 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						
Entiat R nr Ardenvoir								
	MAY-JUL	119	141	156	85%	171	193	183
	MAY-SEP	130	154	171	86%	187	210	200
Columbia R bl Rock Island Dam-NWS[2]								
	MAY-JUL	41300		46100	95%		53300	48700
	MAY-SEP	48300		54700	95%		64000	57300
Wenatchee R at Peshastin								
	MAY-JUL	805	895	960	81%	1020	1120	1180
	MAY-SEP	880	985	1060	81%	1130	1230	1310
Stehekin R at Stehekin								
	MAY-JUL	445	500	535	87%	575	625	615
	MAY-SEP	535	590	625	86%	665	715	730
Chelan R at Chelan[2]								
	MAY-JUL	640	720	770	87%	825	900	890
	MAY-SEP	730	815	870	84%	925	1010	1030
Icicle Ck nr Leavenworth								
	MAY-JUL	142	169	188	77%	205	235	245
	MAY-SEP	155	186	205	77%	230	260	265
Wenatchee R at Plain								
	MAY-JUL	580	660	710	81%	765	840	880
	MAY-SEP	645	725	785	80%	840	920	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

Reservoir Storage End of April, 2023	Current (KAF)	Last Year (KAF)	Median (KAF)	Capacity (KAF)
Lake Chelan	257.8	264.3	291.7	677.4

Watershed Snowpack Analysis May 1, 2023	# of Sites	% Median	Last Year % Median
Central Columbia	11	95%	118%
Wenatchee	7	93%	120%
Stemilt	1	170%	183%
Lake Chelan	3	85%	103%
Entiat	1	128%	89%
Colckum	1	223%	220%



May 1 snowpack was 100% of normal. Precipitation was 105% of normal for April and 81% for the water-year. May 1 reservoir storage for the Upper Yakima reservoirs was 70% of normal.

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Upper Yakima
Streamflow Forecasts - May 1, 2023

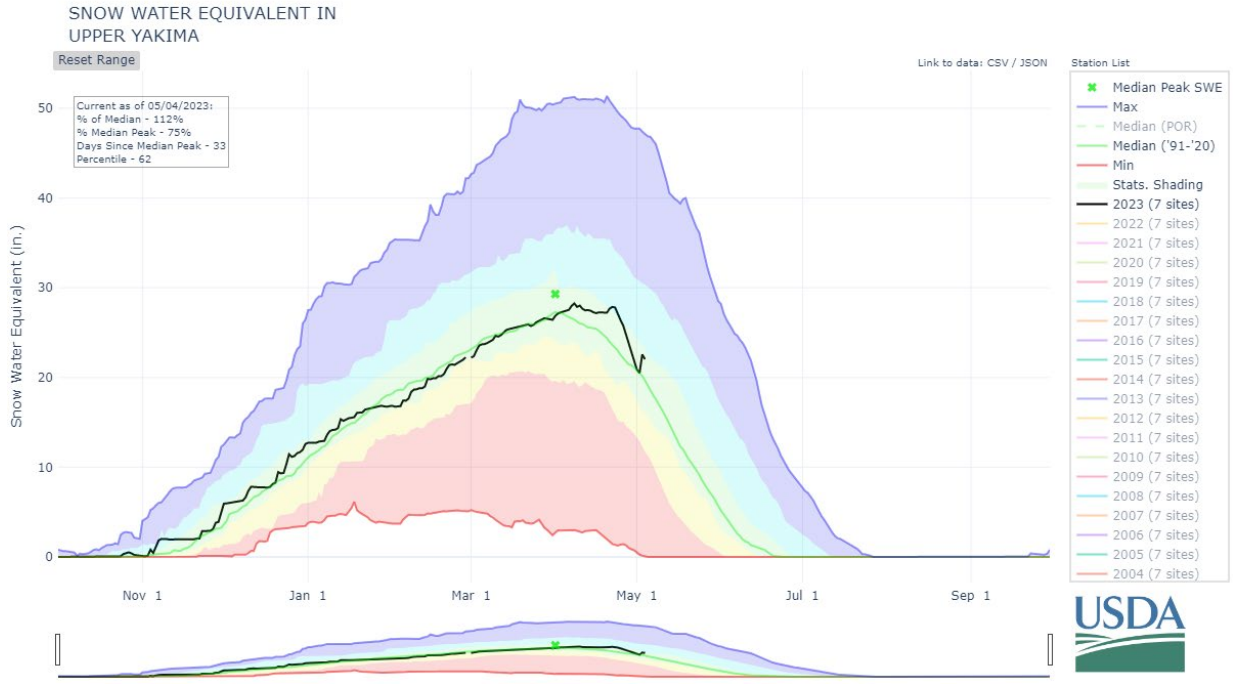
Forecast Exceedance Probabilities For Risk Assessment
Chance that actual volume will exceed forecast

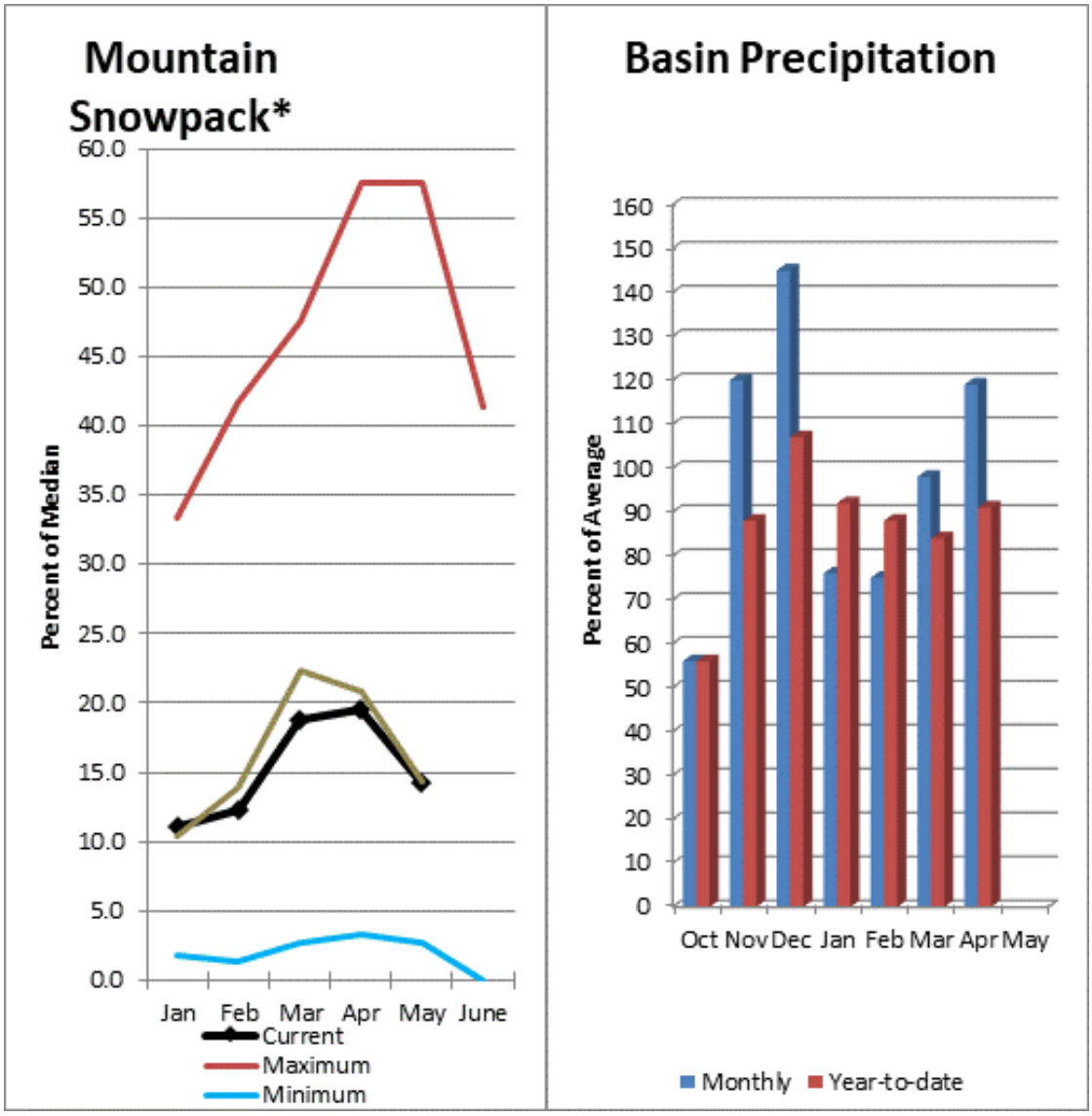
Upper Yakima	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Median	30% (KAF)	10% (KAF)	30yr Median (KAF)
Teanaway R bl Forks nr Cle Elum								
	MAY-JUL	40	53	62	81%	71	85	77
	MAY-SEP	42	56	65	80%	74	88	81
Kachess Reservoir Inflow [2]								
	MAY-JUL	51	58	63	88%	68	74	72
	MAY-SEP	59	67	72	90%	77	85	80
Keechelus Reservoir Inflow[2]								
	MAY-JUL	54	66	73	87%	81	93	84
	MAY-SEP	63	76	84	87%	93	105	97
Cle Elum Lake Inflow [2]								
	MAY-JUL	230	250	265	85%	280	300	310
	MAY-SEP	255	280	295	87%	310	335	340

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 April, 2023	Current (KAF)	Last Year (KAF)	Median (KAF)	Capacity (KAF)
Kachess	157.4	222.8	194.0	239.0
Cle Elum	219.1	371.2	321.4	436.9
Keechelus	73.0	140.7	123.7	157.8

Watershed Snowpack Analysis May 1, 2023	# of Sites	% Median	Last Year % Median
Upper Yakima	7	100%	115%
Upper Yakima	7	100%	115%





May 1 basin snowpack in the Lower Yakima was 105% of normal and the Naches was 96%. April precipitation was 118% of normal and 98% for the water-year. May 1 reservoir storage for Bumping and Rimrock reservoirs was 85% of the median.

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

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Lower Yakima
Streamflow Forecasts - May 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								
	MAY-JUL	14.8	20	24	139%	28	33	17.3
	MAY-SEP	16.9	23	27	135%	30	36	20
Yakima R nr Parker [2]								
	MAY-JUL	950	1050	1120	91%	1190	1290	1230
	MAY-SEP	1090	1200	1270	91%	1340	1450	1400

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 May 1, 2023	# of Sites	% Median	Last Year % Median
Lower Yakima	3	105%	86%
Simcoe-Toppenish	1	130%	120%
Satus	1	71%	37%
Ahtanum	2	119%	107%

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Naches
Streamflow Forecasts - May 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								
	MAY-JUL	65	73	79	101%	85	93	78
	MAY-SEP	70	80	87	102%	94	104	85
Bumping Lake Inflow [2]								
	MAY-JUL	75	83	88	95%	93	101	93
	MAY-SEP	83	91	97	95%	103	111	102
Naches R nr Naches [2]								
	MAY-JUL	415	485	530	104%	575	640	510
	MAY-SEP	460	540	595	103%	650	730	575
Rimrock Lake Inflow [2]								
	MAY-JUL	132	142	149	100%	156	166	149
	MAY-SEP	161	174	183	97%	192	205	188

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 April, 2023	Current (KAF)	Last Year (KAF)	Median (KAF)	Capacity (KAF)
Bumping Lake	17.7	18.8	22.0	33.7
Rimrock	142.5	173.0	166.0	198.0

Watershed Snowpack Analysis May 1, 2023	# of Sites	% Median	Last Year % Median
Naches	9	96%	102%
Naches	9	96%	102%

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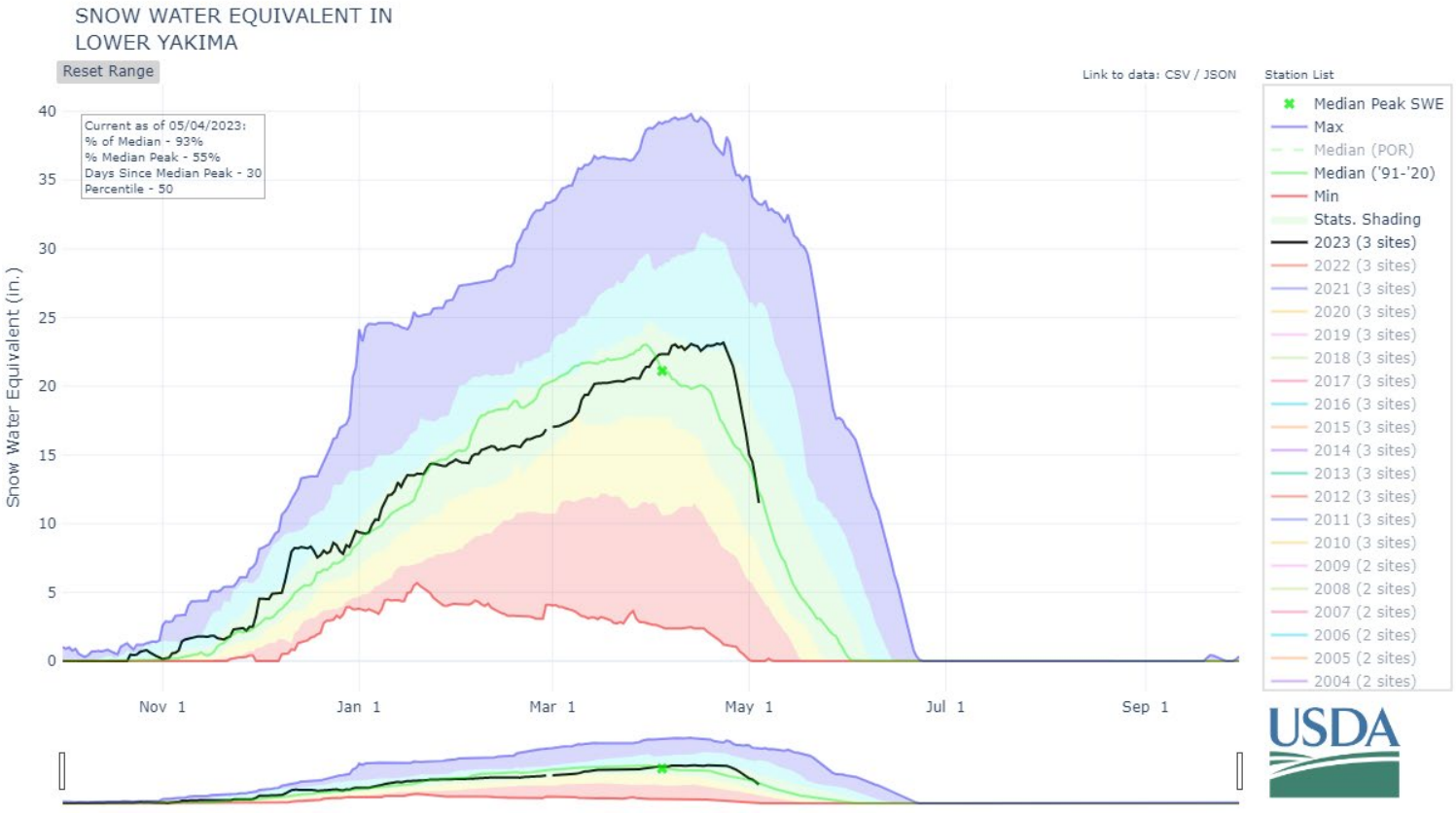
Klickitat
Streamflow Forecasts - May 1, 2023

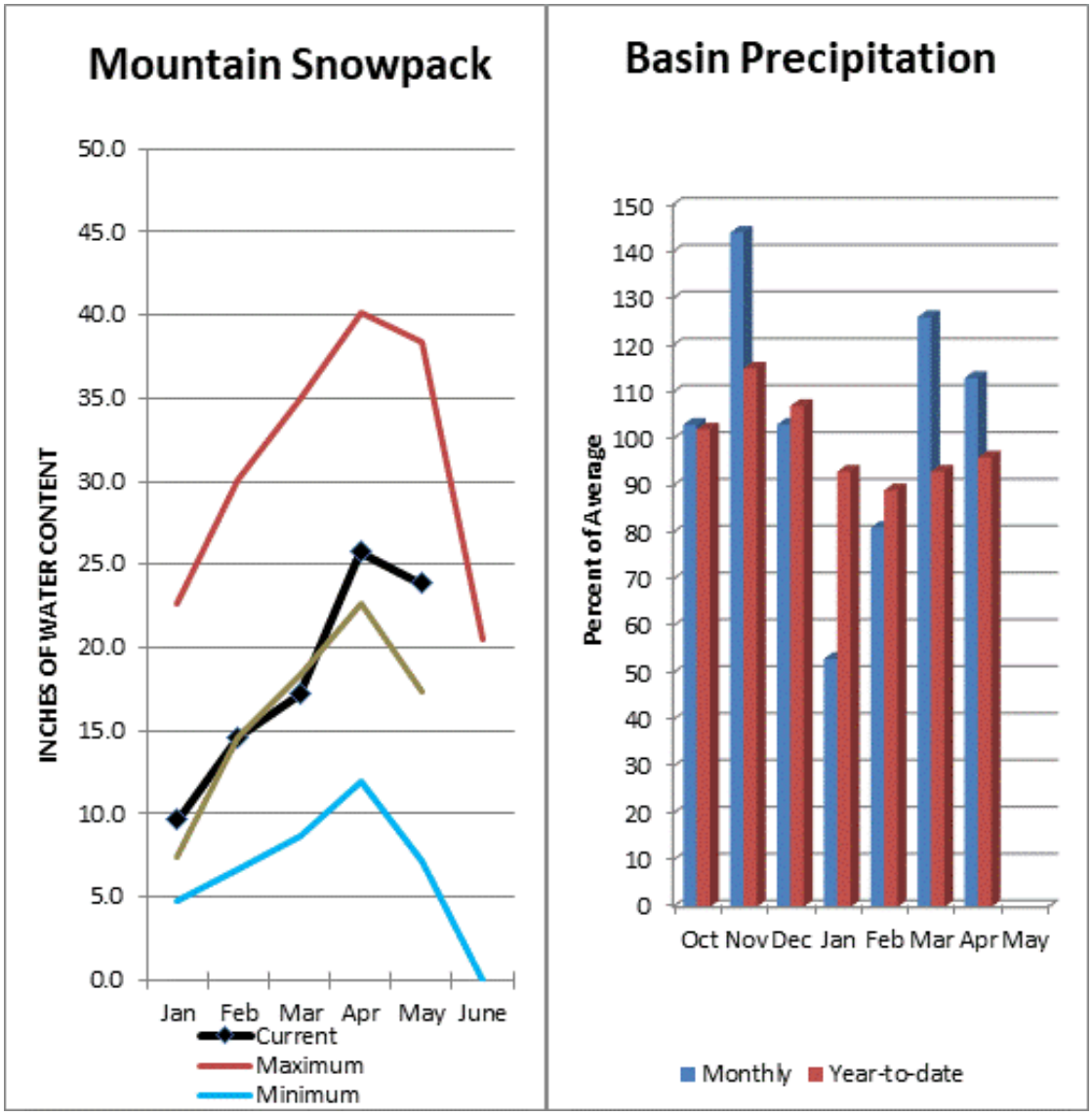
Forecast Exceedance Probabilities For Risk Assessment
Chance that actual volume will exceed forecast

Klickitat	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Median	30% (KAF)	10% (KAF)	30yr Median (KAF)
Klickitat R nr Pitt								
	MAY-JUL	245	285	310	102%	335	375	305
	MAY-SEP	330	375	405	101%	435	480	400
Klickitat R nr Glenwood								
	MAY-JUL	71	84	93	102%	102	115	91
	MAY-SEP	82	96	106	102%	115	129	104

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 May 1, 2023	# of Sites	% Median	Last Year % Median
Klickitat	4	113%	106%
Klickitat	4	113%	106%





May 1 snowpack readings were 138% of normal. April precipitation was 113% of normal, bringing the year-to-date precipitation to 96% of normal. Reservoir storage was 82% of the median.

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

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

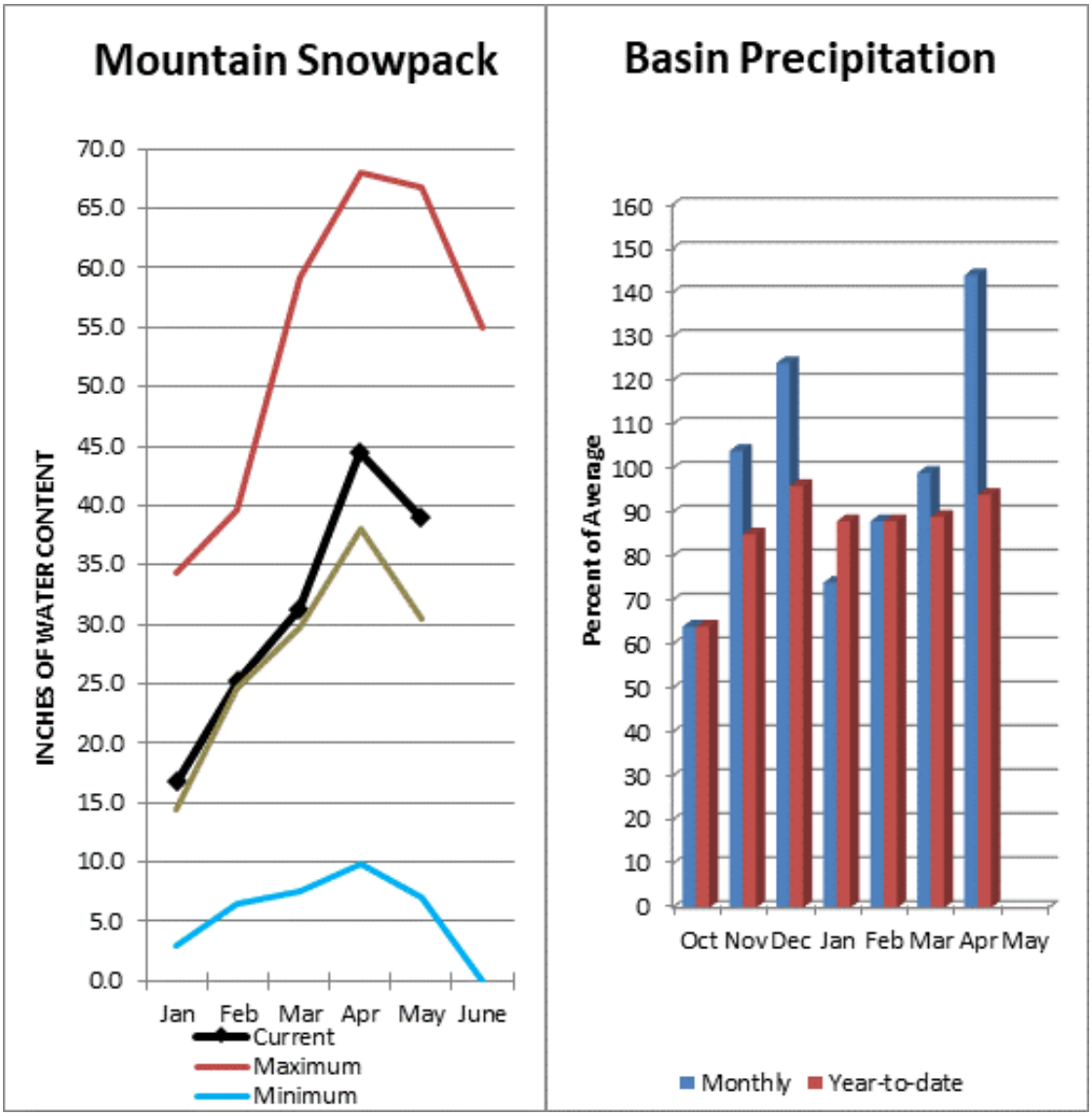
Forecast Exceedance Probabilities For Risk Assessment
Chance that actual volume will exceed forecast

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								
	MAY-JUL	31	37	41	108%	45	51	38
	MAY-SEP	44	50	54	106%	58	64	51
Snake R bl Lower Granite Dam-NWS[2]								
	MAY-JUL	15600		17400	112%		21100	15500
	MAY-SEP	18100		20000	114%		24100	17600
Lostine R nr Lostine								
	MAY-JUL	86	93	99	98%	104	112	101
	MAY-SEP	91	100	106	98%	112	121	108
Mill Ck nr Walla Walla								
	MAY-JUL	9.3	13	15.5	113%	18.1	22	13.7
	MAY-SEP	13	16.7	19.2	110%	22	25	17.4
Catherine Ck nr Union								
	MAY-JUL	51	57	61	130%	65	71	47
	MAY-SEP	55	61	66	127%	70	76	52
Asotin Ck at Asotin								
	MAY-JUL	12.7	16.7	19.7	99%	23	28	20
Imnaha R at Imnaha								
	MAY-JUL	180	210	230	124%	250	280	186
	MAY-SEP	199	230	250	122%	275	305	205
Grande Ronde R at Troy								
	MAY-JUL	680	840	950	109%	1060	1220	870
	MAY-SEP	755	920	1040	109%	1150	1310	950
Bear Ck nr Wallowa								
	MAY-JUL	43	52	58	109%	63	72	53
	MAY-SEP	46	54	60	109%	66	74	55

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 April, 2023	Current (KAF)	Last Year (KAF)	Median (KAF)	Capacity (KAF)
Wallowa Lake	17.1	20.2	21.0	37.5

Watershed Snowpack Analysis May 1, 2023	# of Sites	% Median	Last Year % Median
Lower Snake-Walla Walla	18	138%	103%
Walla Walla	5	141%	118%
Grande Ronde	16	134%	102%
Asotin	2	135%	188%



May 1 snow cover for Lower Columbia was 128% of normal. April precipitation was 144% of normal and the water-year was 19%. Reservoir storage was 52% of normal.

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Lower Columbia
Streamflow Forecasts - May 1, 2023

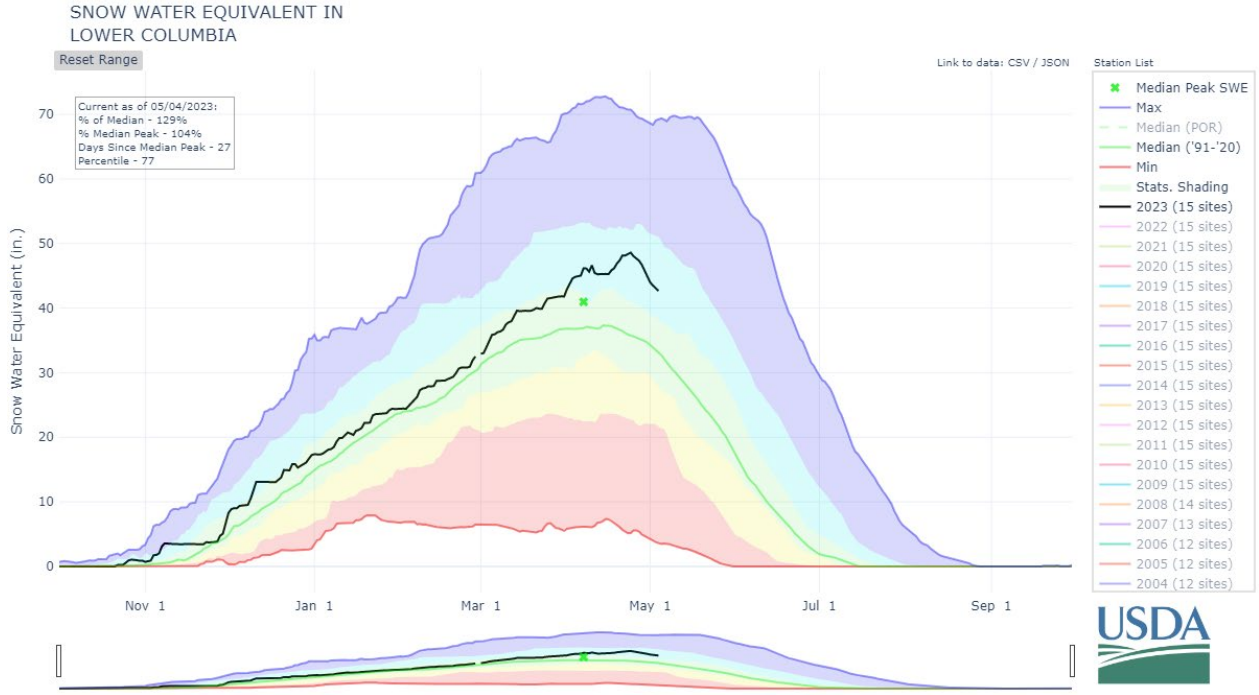
Forecast Exceedance Probabilities For Risk Assessment
Chance that actual volume will exceed forecast

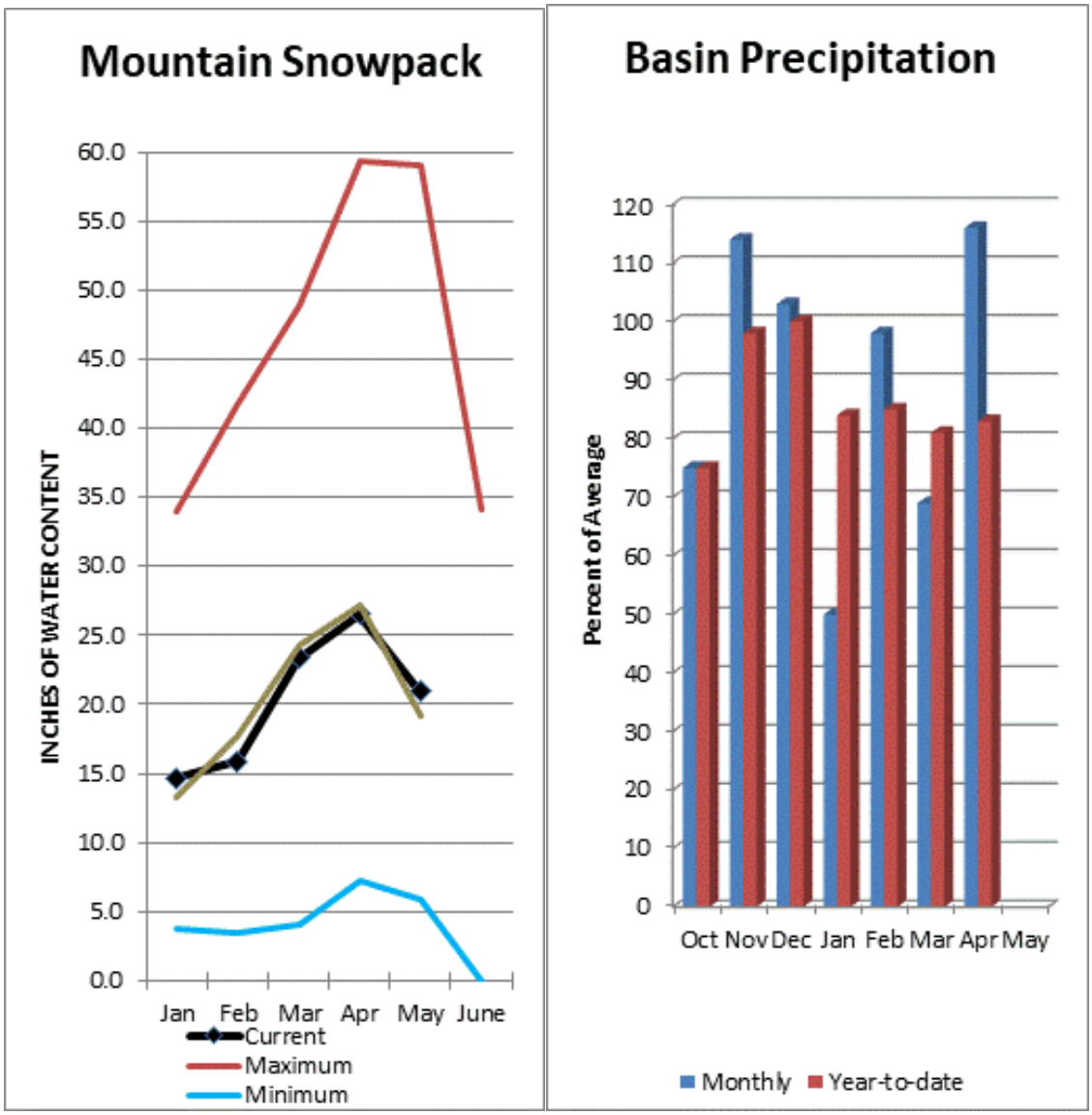
Lower Columbia	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Median	30% (KAF)	10% (KAF)	30yr Median (KAF)
Lewis R at Ariel								
	MAY-JUL	660	755	820	137%	885	980	600
	MAY-SEP	785	895	965	131%	1040	1140	735
Cowlitz R bl Mayfiled[2]								
	MAY-JUL	960	1120	1230	107%	1340	1500	1150
	MAY-SEP	1150	1330	1450	106%	1570	1750	1370
Cowlitz R at Castle Rock[2]								
	MAY-JUL	1140	1430	1620	107%	1810	2100	1510
	MAY-SEP	1390	1700	1910	107%	2120	2430	1780

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 April, 2023	Current (KAF)	Last Year (KAF)	Median (KAF)	Capacity (KAF)
Mayfield		126.7	128.2	
Mossyrock Dam (Riffe Lk)	442.1	639.8	969.0	

Watershed Snowpack Analysis May 1, 2023	# of Sites	% Median	Last Year % Median
Lower Columbia	15	128%	114%
Lewis	8	164%	123%
Cowlitz	9	114%	110%





May 1 snowpack was 109% of normal for the South Puget Sound. April precipitation was 116% of normal, bringing the water year-to-date to 83% of normal for the basins. Reservoir storage was 114% of normal.

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

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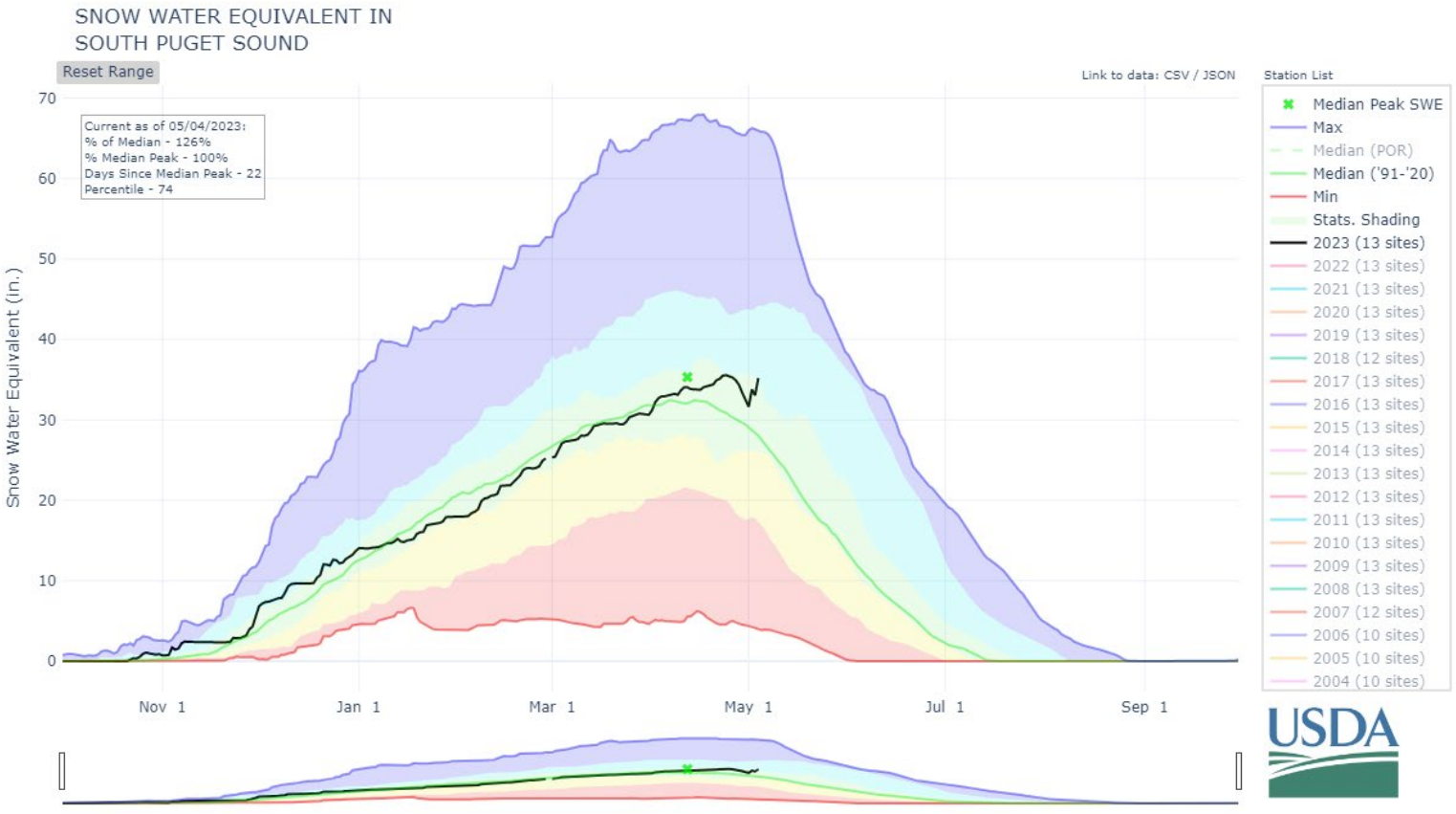
South Puget Sound
Streamflow Forecasts - May 1, 2023

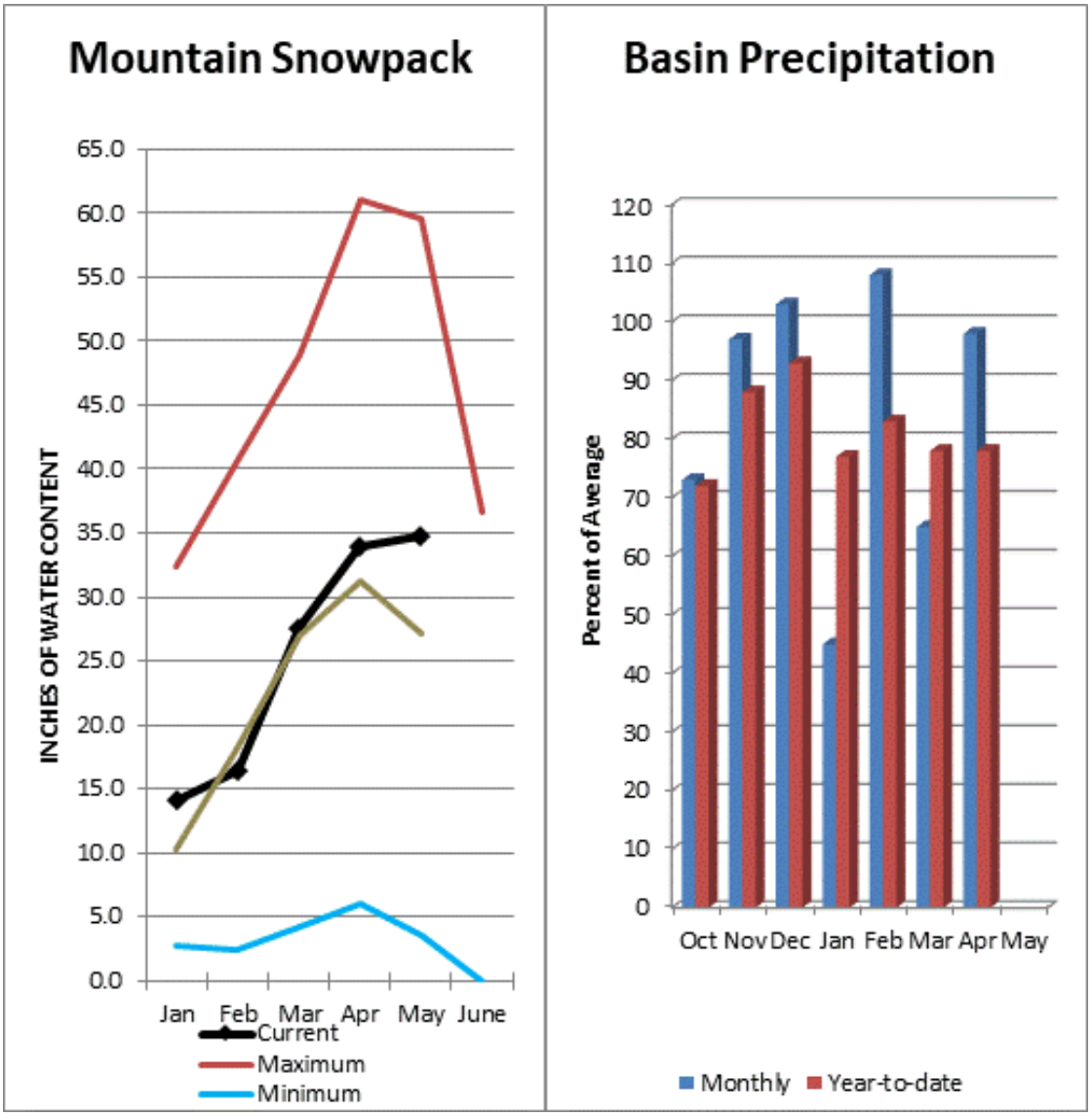
		Forecast Exceedance Probabilities For Risk Assessment Chance that actual volume will exceed forecast						
South Puget Sound	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Median	30% (KAF)	10% (KAF)	30yr Median (KAF)
White R nr Buckley[1]								
	MAY-JUL	230	295	325	103%	355	420	315
	MAY-SEP	300	380	415	102%	450	530	405
Green R bl Howard A Hanson Dam[1,2]								
	MAY-JUL	95	129	145	99%	161	195	147
	MAY-SEP	109	149	167	98%	185	225	170

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 April, 2023	Current (KAF)	Last Year (KAF)	Median (KAF)	Capacity (KAF)
Howard Hansen	35.5	32.9	31.1	

Watershed Snowpack Analysis May 1, 2023	# of Sites	% Median	Last Year % Median
South Puget Sound	13	109%	111%
White	5	107%	104%
Puyallup	2	186%	166%
Green	6	121%	123%





May 1 median snow cover in Central Puget Sound was 128%. Basin-wide precipitation for April was 98% 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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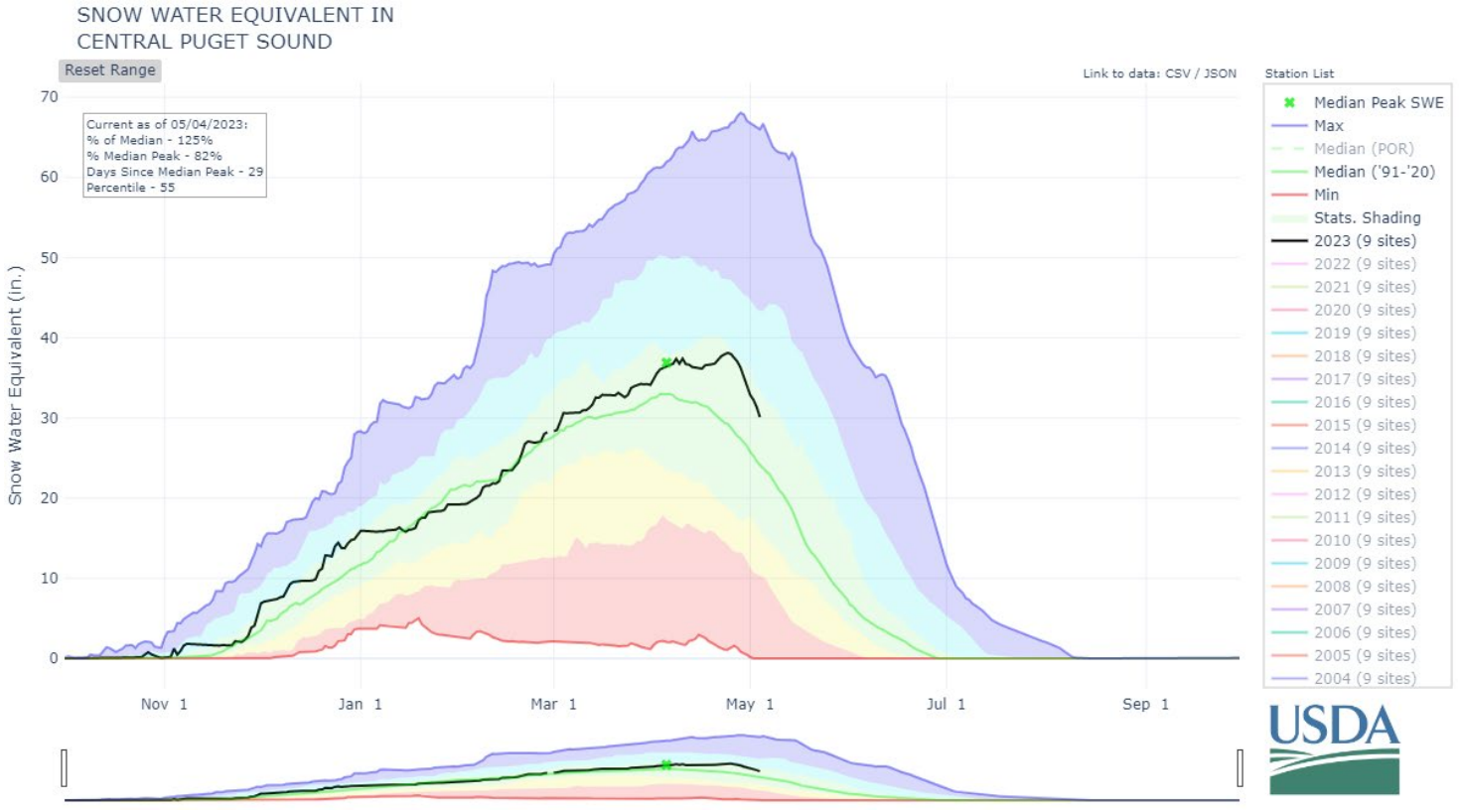
Central Puget Sound
Streamflow Forecasts - May 1, 2023

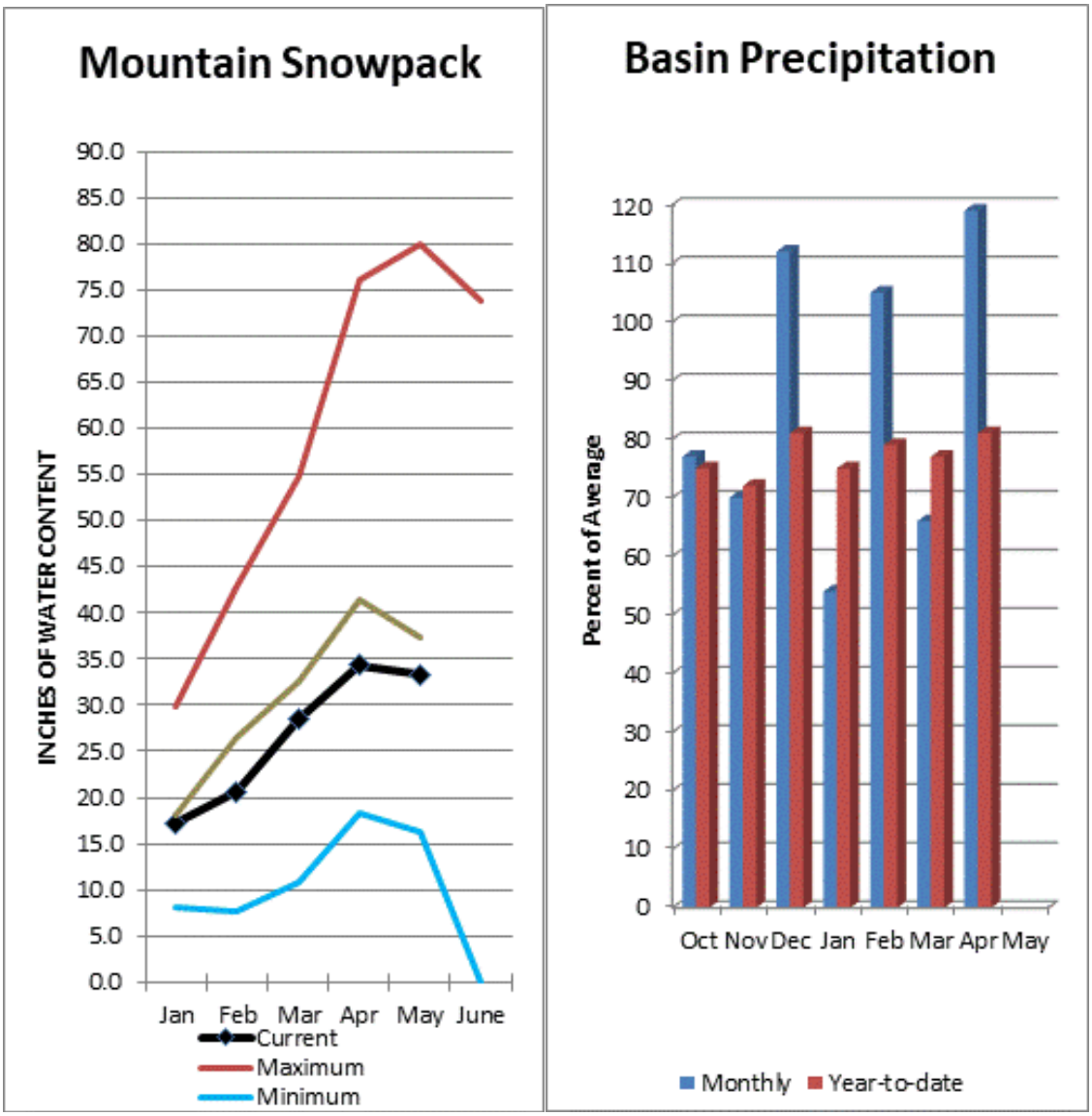
Forecast Exceedance Probabilities For Risk Assessment
Chance that actual volume will exceed forecast

Central Puget Sound	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Median	30% (KAF)	10% (KAF)	30yr Median (KAF)
SF Tolt R nr Index								
	MAY-JUL	5.4	7.9	9.7	103%	11.5	14	9.4
	MAY-SEP	6.3	9.5	11.6	107%	13.7	16.9	10.8
Cedar R nr Cedar Falls								
	MAY-JUL	33	42	48	98%	54	63	49
	MAY-SEP	37	47	54	96%	61	71	56
Taylor Ck nr Selleck								
	MAY-JUL	9.1	11.4	13	95%	14.6	16.9	13.7
	MAY-SEP	11.9	14.6	16.5	95%	18.4	21	17.3
Rex R nr Cedar Falls								
	MAY-JUL	12	15.3	17.5	117%	19.7	23	14.9
	MAY-SEP	12.3	16.6	19.5	117%	22	27	16.7

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

Watershed Snowpack Analysis May 1, 2023	# of Sites	% Median	Last Year % Median
Central Puget Sound	9	128%	132%
Tolt	2	127%	116%
Snoqualmie	4	132%	130%
Skykomish	3	121%	123%
Cedar	6	134%	141%





May 1 median snow cover in North Puget Sound was 89%. Basin-wide precipitation for April was 119% of normal, bringing water-year-to-date to 81% of normal. May 1 Basin-wide reservoir storage was 75% of normal. Soil moisture saturation appears to have recovered to near normal conditions following a record low fall and winter.

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

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North Puget Sound
Streamflow Forecasts - May 1, 2023

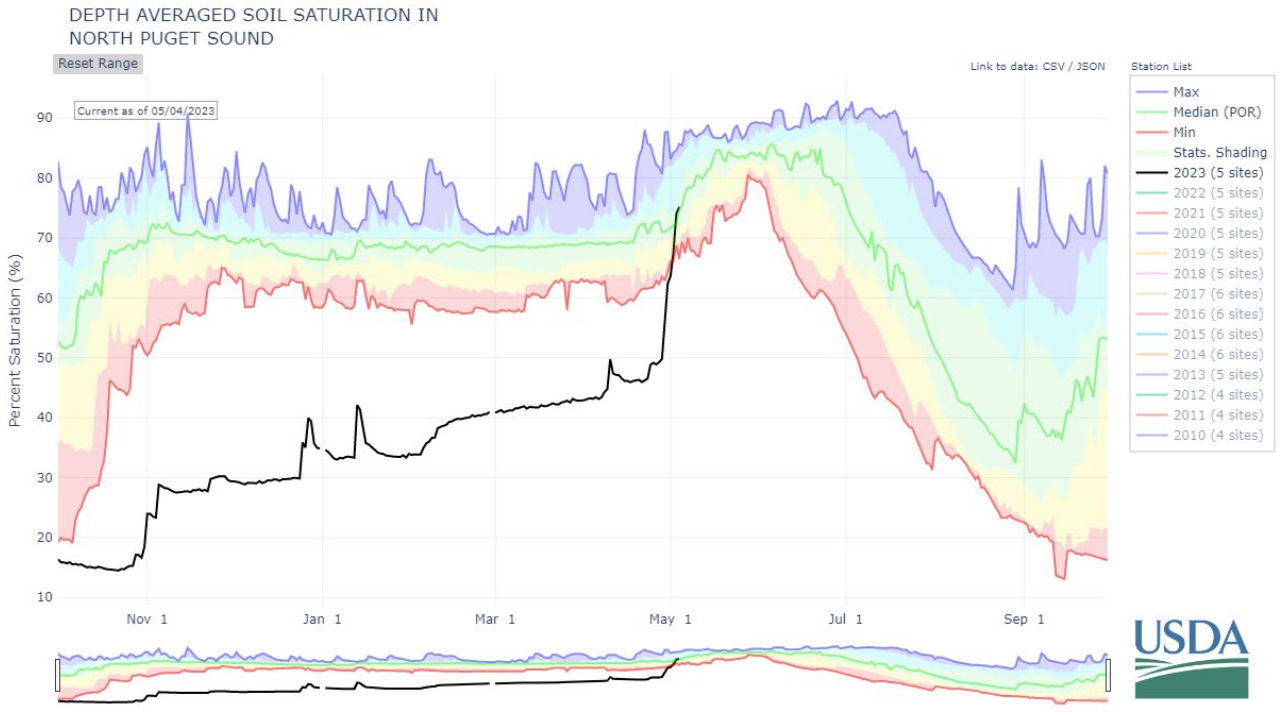
Forecast Exceedance Probabilities For Risk Assessment
Chance that actual volume will exceed forecast

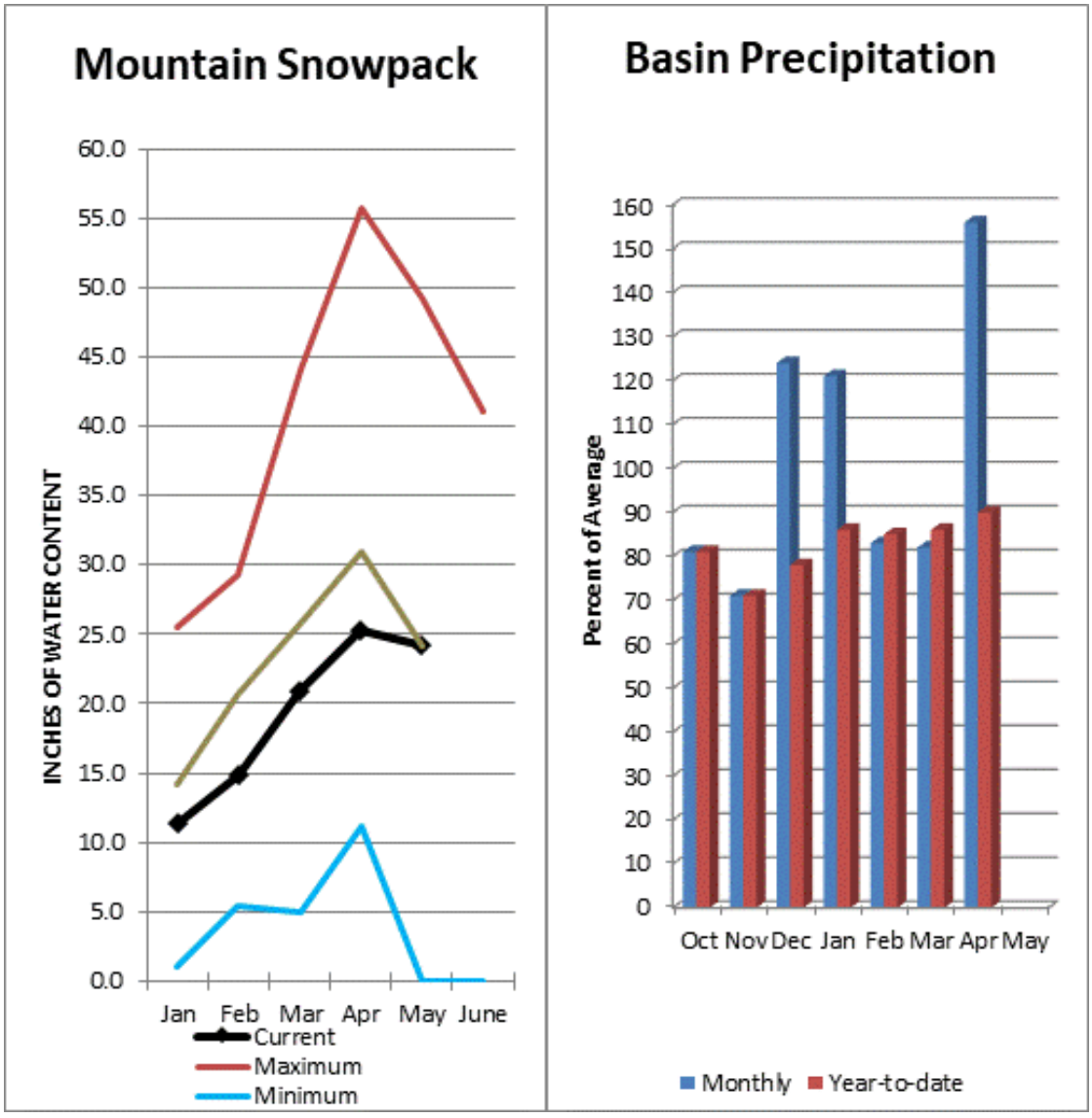
North Puget Sound	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Median	30% (KAF)	10% (KAF)	30yr Median (KAF)
Baker R at Concrete								
	MAY-JUL	480	540	580	90%	620	680	645
	MAY-SEP	630	700	750	90%	800	870	830
Thunder Ck nr Newhalem								
	MAY-JUL	166	186	200	93%	215	235	215
	MAY-SEP	250	275	290	94%	305	330	310
Skagit R at Newhalem								
	MAY-JUL	1160	1260	1320	87%	1380	1480	1510
	MAY-SEP	1430	1540	1610	88%	1680	1790	1820

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 April, 2023	Current (KAF)	Last Year (KAF)	Median (KAF)	Capacity (KAF)
Ross	529.6	670.1	711.5	1434.7
Lake Shannon	42.5	65.5	83.2	
Upper Baker	137.1	147.9	144.6	

Watershed Snowpack Analysis May 1, 2023	# of Sites	% Median	Last Year % Median
North Puget Sound	16	89%	108%
Skagit	9	89%	118%
Nooksack	3	97%	102%
Baker	2	88%	108%





Olympic Peninsula snowpack averaged 100% of normal on May 1. April precipitation was 156% of normal. Precipitation has accumulated at 90% of normal for the water year.

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

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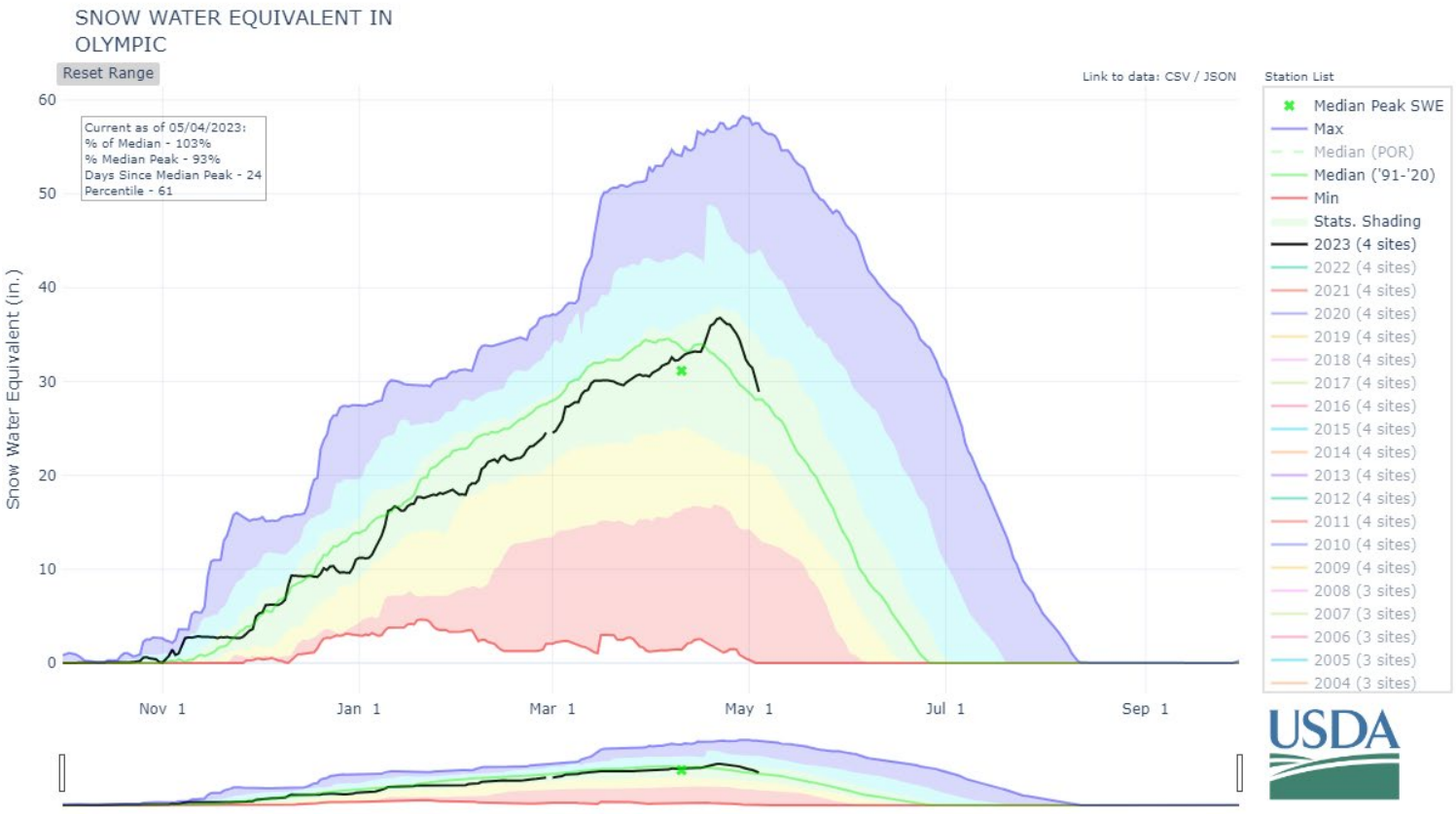
Olympic
Streamflow Forecasts - May 1, 2023

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								
	MAY-JUL	193	235	265	87%	295	335	305
	MAY-SEP	240	280	310	86%	340	380	360
Dungeness R nr Sequim								
	MAY-JUL	87	97	104	106%	111	121	98
	MAY-SEP	108	121	129	108%	137	150	119

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 May 1, 2023	# of Sites	% Median	Last Year % Median
Olympic	7	100%	113%
Olympic	7	100%	113%



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