United States Department of Agriculture

NRCS Natural Resources Conservation Service

Washington
Water Supply Outlook Report
June 1, 2013

Eastern Washington Sunrise

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

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How forecasts are made

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

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

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

Washington
Water Supply Outlook

June 2013

General Outlook

May started out with record high temperatures which threatened an early snow melt however midmonth temperatures dropped back to seasonally normal and the end of the month actually brought some light mountain snow and heavy rains in the south west and central parts of the state. With the recent return to warm temperatures we should see an increased melt rate of 1-2 inches per day as we race towards summer. NOAA- Climate Prediction Center forecasts show a high probability of above normal temperatures and below normal precipitation over the next month. Long temp forecasts indicate a chance of near normal temperatures but will remain drier than normal through the summer. Also included with this issue is the Annual North Cascades National Park Glacier Monitoring Report.

Snowpack

The June 1 statewide SNOTEL readings were 139% of normal. As snow begins to melt basin wide percent of normal can be somewhat misleading. Users should use caution and look closely at actual water content at individual sites for making proper water management decisions. In most cases the seeming increase in snowpack is simply a function of a delayed melt rate as compared to normal. Readings from the Olympic Peninsula reported the highest at 205% of normal. Westside medians from SNOTEL included the North Puget Sound river basins with 125% of normal, the Central Puget Sound 184%, South Puget river basins with 121%, and the Lewis-Cowlitz basins with 131% of normal. Snowpack along the east slopes of the Cascade Mountains included the Yakima area with 108% and the Wenatchee area with 108%. Snowpack in the combined Spokane and Pend Oreille basin reported 102% of the long term median. See map below

BASIN	PERCENT OF LAST YEAR	PERCENT OF MEDIAN
Spokane	49	97
Newman Lake	0	0
Pend Oreille	57	87
Okanogan	71	121
Methow	58	107
Conconully Lake	0	0
Central Columbia	60	108
Upper Yakima	51	119
Lower Yakima	48	88
Ahtanum Creek	6	20
Walla Walla	0	0
Lower Snake	61	77
Cowlitz	72	141
Lewis	62	248
White	66	104
Green	63	100
Puyallup	64	106
Cedar	54	
Snoqualmie	73	141
Skykomish	88	196
Skagit	56	109
Baker	N/A	N/A
Nooksack	78	127
Olympic Peninsula	62	205

Precipitation

During the month of May, the National Weather Service and Natural Resources Conservation Service climate stations reported varied amounts of rain depending on where you were standing. However for the most part we remain near to above average for the water year. The highest percent of average in the state was at Yakima Airport which reported 428% of average for a total of 2.48 inches. Maximum daily accumulation at Yakima was 0.95 inches on May 22. The average for this site is 0.58 inches for the month of May. The driest location was at Spokane Airport which received 0.80 inches which was 49% normal. The wettest spot in the state was reported at Swift Creek SNOTEL near Mt. St. Helens with a May accumulation of 11.2 inches, most of which came in the last 8 days of the month. See map below

RIVER BASIN	MAY PERCENT OF AVERAGE	WATER YEAR PERCENT OF AVERAGE
Spokane	60	99
Pend Oreille	93	113
Upper Columbia	95	107
Central Columbia	117	101
Upper Yakima	87	102
Lower Yakima	129	100
Walla Walla	68	102
Lower Snake	61	94
Lower Columbia	128	108
South Puget Sound	122	109
Central Puget Sound	85	111
North Puget Sound	108	108
Olympic Peninsula	141	109

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. Due to above normal snowpack and precipitation all reservoirs in Washington are in good shape. Reservoir storage in the Yakima Basin was 833,000-acre feet, 115% of average for the Upper Reaches and 232,000-acre feet or 108% of average for Rimrock and Bumping Lakes. Storage at the Okanogan reservoirs was 100% of average for June 1. The power generation reservoirs included the following: Coeur d'Alene Lake, 232,000 acre feet, 87% of average and 97% of capacity, Ross Lake, 703,000 acre feet, 67% of average and 50% of capacity. Recent climate impacts and management procedures may affect these numbers on a daily or weekly basis.

BASIN	PERCENT OF CAPACITY	CURRENT STORAGE AS PERCENT OF AVERAGE
Spokane	97	87
Pend Oreille	83	97
Upper Columbia	100	100
Central Columbia	N/A	N/A
Upper Yakima	100	115
Lower Yakima	100	108
Lower Snake	98	109
North Puget Sound	50	67

Streamflow

Streamflow forecasts vary from 67% of average for Bumping Lake Inflow to 160% of average for S.F. Tolt River near Index. June-September forecasts for some Western Washington streams include the Cedar River near Cedar Falls, 121%; White River, 105%; and Skagit River, 95%. Some Eastern Washington streams include the Yakima River near Parker, 84%: Wenatchee River at Plain, 96%; and Okanogan near Tonasket, 116%. Volumetric forecasts are developed using current, historic and average snowpack, precipitation and streamflow data collected and coordinated by organizations cooperating with NRCS.

Runoff conditions through May depicted both the dry start and wet finish of the month but mostly vary due to natural flow versus reservoir control. The Kettle River had the highest reported natural flows with 132% of average. The Grand Ronde at Troy with 61% of average had the least non-regulated runoff. Other streamflows were the following percentage of average as reported by the River Forecast Center: the Similkameen near Nighthawk, 98%; the Methow near Pateros, 84%; the Priest River, 152% and the Dungeness River, 77%.

BASIN	PERCENT OF AVERAGE (50 PERCENT CHANCE OF EXCEEDENCE)
Spokane	84-85
Pend Oreille	85-109
Upper Columbia	95-132
Central Columbia	82-96
Upper Yakima	88-90
Lower Yakima	67-94
Walla Walla	84-95
Lower Snake	72-97
Lower Columbia	85-110
South Puget Sound	102-105
Central Puget Sound	106-160
North Puget Sound	95-98
Olympic Peninsula	111-113

STREAM	PERCENT OF AVERAGE MAY STREAMFLOWS
Pend Oreille Below Box Canyon	91
Kettle at Laurier	132
Columbia at Birchbank	85
Spokane at Long Lake	74
Similkameen at Nighthawk	98
Okanogan at Tonasket	125
Methow at Pateros	84
Chelan at Chelan	68
Wenatchee at Pashastin	76
Cle Elum near Roslyn	75
Yakima at Parker	97
Naches at Naches	82
Grande Ronde at Troy	61
Snake below Lower Granite Dam	67
SF Walla Walla near Milton-Freewater, OR	70
Columbia River at The Dalles	90
Cowlitz below Mayfield Dam	114
Skagit at Concrete	72
Dungeness near Sequim	77

Soil Moisture

Current soil moisture data is available from a limited number of SNOTEL sites scattered throughout each basin. As the effort continues to install additional sensors and more years of data are acquired this information will become invaluable to the streamflow forecasting community. Warm temperatures and rain-on-snow events of May pushed most soils moisture levels up a few percentage points. With a solid snowpack over most of the mountainous regions of the state these numbers should hold and will help provide maximum runoff come spring.

BASIN	ESTIMATED PERCENT SATURATION
Spokane	69
Pend Oreille	58
Upper Columbia	69
Central Columbia	60
Upper Yakima	79
Lower Yakima	72
Walla Walla	77
Lower Snake	73
Lower Columbia	77
South Puget Sound	82
Central Puget Sound	N/A
North Puget Sound	91
Olympic Peninsula	48

Spring Recreation

As winter turns to spring so does the thought of snow recreation change to water recreation. As the ripening snow pack begins to melt and fill the rivers and streams to bank full we need to remember the power and unforgiving nature of ice cold snow melt water. Every year, whether fly fishing Spring Chinook, rafting the rapids or just cooling off during that first hot spell of the season, folks get caught in the extra swift currents of our mountain fed streams. Many times it’s way too late by the time they realize that they had stepped too far into the current or can’t catch their breath when submerged in the icy cold water and they are gone. The reminder is that it may be 80 or even 100 degrees outside but that water is still ice cold and until the majority of the mountain snow is gone and water levels subside it will remain that way. Keep you and yours safe by always wearing a life preserver when in or near cold and rapid water. Children and pets are especially susceptible since they really know no better.

NORTH CASCADES GLACIER PAGE 2013

North Cascades National Park Glacier Monitoring Program

The National Park Service began monitoring glaciers in North Cascades National Park in 1993 and Mount Rainier glaciers in 2003 (see the Mount Rainier Glacier Page). Goals for this program and additional data can be found at North Cascades National Park home page at http://www.nps.gov/noca/naturescience/glacial-mass-balance1.htm or contact Jon_Riedel@nps.gov or Mike_Larrabee@nps.gov.

The four glaciers monitored are located at the headwaters of four watersheds, each with large hydroelectric dams (Figure 1). The glaciers represent a range in elevation from 8300 to 5600 feet, and a range in climatic conditions from maritime to continental. Methods include three visits annually to each glacier to measure winter accumulation and summer melt. Measurements are taken at a series of points down the centerline of the glacier (Table 1), and then integrated across the entire glacier surface to determine mass balance for the entire glacier. In 2012, positive net balances were recorded at all four index glaciers (Figure 2). This was partially attributed to a large winter snowpack that persisted late into the summer.

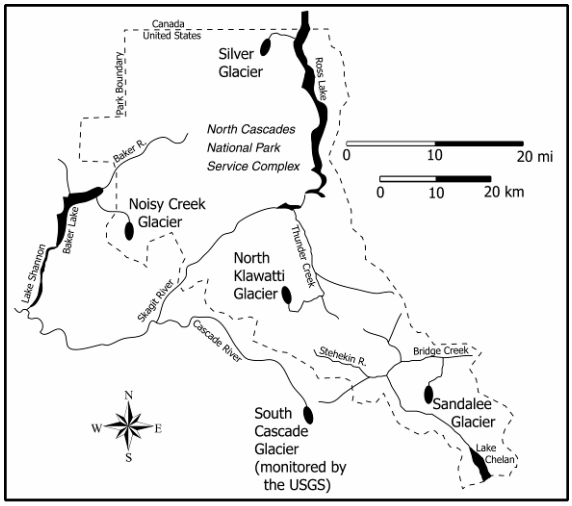

Figure 1. Glaciers monitored in North Cascades N.P.S. Complex.

Table 1 Glacier:	Elev. (feet)	Average Accumulation (inches W.E.)	2013 Accumulation (inches W.E.)	2013 Percent of Average
Noisy Creek Density = 0.46	**Entire Glacier**	**121**	**118**	**97**
	5932	133	122	92
	5925	138	143	103
	5814	122	115	94
	5709	113	111	98
	5591	115	110	96
Silver Density = 0.50	**Entire Glacier**	**87**	**89**	---
	8327	108	---	---
	7881	91	128	141
	7507	112	126	112
	7211	64	74	117
North Klawatti Density = 0.50	**Entire Glacier**	**114**	**114**	**100**
	7585	116	123	106
	7205	121	119	98
	6824	122	123	101
	6286	103	100	97
	5997	93	75	81
Sandalee Density = 0.44	**Entire Glacier**	**108**	**81**	---
	7395	109	104	96
	7146	118	92	78
	6778	109	108	99
	6549	133	---	---

Table 1. Table 1 presents this spring's provisional winter accumulation data, along with average values and percent of the 20-year average. The 2013 snow depths were measured on April 22nd and May 7th on the four glaciers. The provisional data show 2013 winter accumulation as largely near average. However, difficulty in probing the snowpack depth resulted in fewer measurements than normal. These data are tentative and will be revised after mid-summer visits. Snow densities are based on 2013 field measurements for Noisy and Silver glaciers and on historical field measurements for North Klawatti and Sandaee glaciers. The greater densities at Silver and North Klawatti glaciers are reflective snowpack consolidation that occurred between the two measurement periods. Densities are in fraction of water density. Snow density values will be checked against South Cascade Glacier and nearby SNOTEL values.

The 2012 estimates of glacial contribution to runoff for four watersheds are based on the mass balance measurements and GIS analyses to determine glacier area within 165 ft (50-meter) elevation bands (Table 2). Glaciers reduce the variation of flow in these watersheds by providing melt water from firn and ice during summer drought, in dry/warm years, and by storing water in excess snowpack during wet/cool years. Glacial contribution to stream flow in these watersheds varies by as much as 100% annually. Magnitude of glacial contribution to streamflow is large, but varies by the amount of glacial cover in each watershed. Thunder Creek is 13% glacierized; Baker River, 5%; Stehekin River, 3%; and Ross Lake, 0.9% (Post and others, 1971; Granshaw, 2002).

The glacierized area of a watershed primarily dictates the glacier contribution to runoff. However, the relative importance of glacial contribution to streamflow also generally increases from west to east. For example, glaciers annually contribute a higher percentage of meltwater to streamflow in the Stehekin watershed than in the Baker, despite the fact that the Baker is more highly glacierized. This is due to lower snowfall east of the hydrologic crest of the North Cascades.

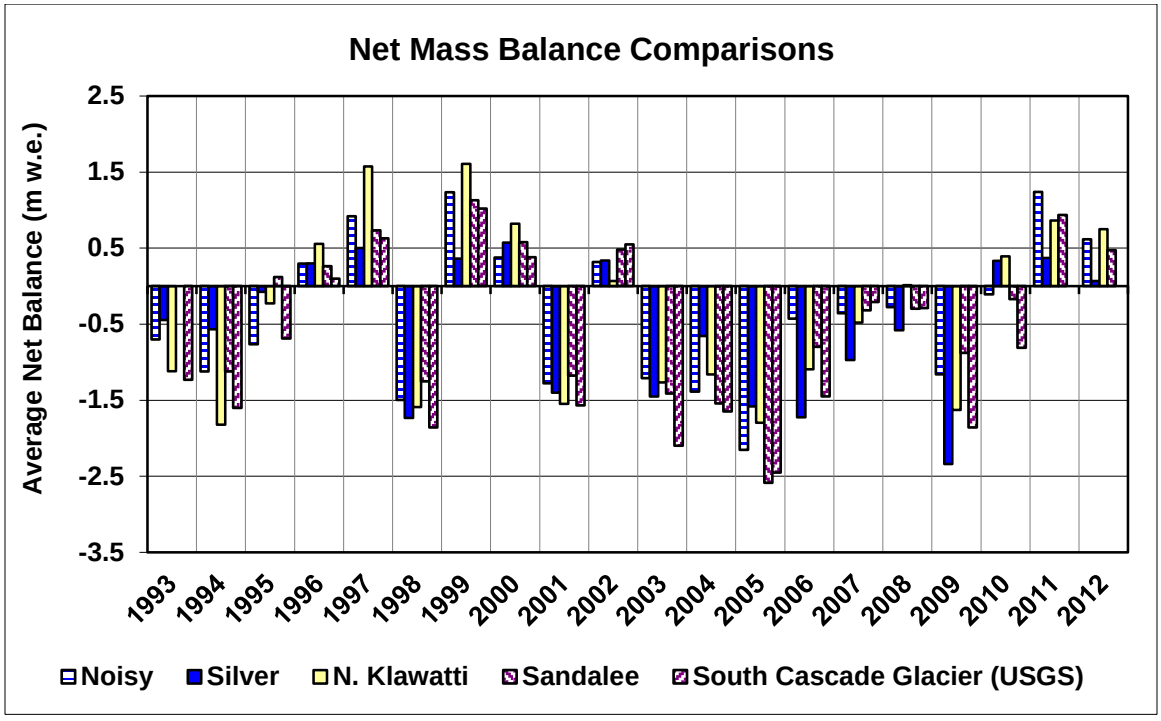

Figure 2. Net annual mass balance for the five glaciers monitored in the North Cascades.

Table 2 *Provisional Data*	May-September Runoff (thousands acre-feet)				Percent Glacial Runoff to Total Summer Runoff		
	2012	mean	min	max	2012	min	max
Noisy Creek Glacier	1.3	1.5	1.2	1.9			
Baker River Watershed	**113.3**	**112.2**	**76.0**	**138.3**	**10.4**	**8.6**	**22.7**
North Klawatti Glacier	3.8	4.0	2.8	5.1			
Thunder Creek Watershed	**94.0**	**95.5**	**65.3**	**117.2**	**26.7**	**20.7**	**46.1**
Sandalee Glacier	0.4	0.5	0.3	0.7			
Stehekin River Watershed	**68.8**	**71.0**	**51.6**	**88.1**	**7.5**	**5.6**	**22.1**
Silver Glacier	0.8	0.9	0.5	1.3			
Ross Lake Watershed	**62.9**	**62.7**	**43.0**	**78.2**	**3.4**	**2.5**	**13.0**

Table 2. Glacial contribution to summer stream flow (May 1 to Sept. 30) for four watersheds. Runoff units are thousands of acre-feet. Data from 1993-2012 except the Sandalee Glacier and Stehekin River Watershed (1995-2012).

B A S I N S U M M A R Y O F
S N O W C O U R S E D A T A

JUNE 2013

SNOW COURSE	ELEVATION	DATE	SNOW DEPTH	WATER CONTENT	LAST YEAR	AVERAGE 1971-00
ALPINE MEADOWS SNTL	3500	6/01/13	83	54.5	53.9	30.7
BADGER PASS SNOTEL	6900	6/01/13	46	18.6	31.6	17.2
BARKER LAKES SNOTEL	8250	6/01/13	25	8.9	8.6	11.0
BASIN CREEK SNOTEL	7180	6/01/13	0	.0	.8	.3
BEAVER PASS SNOTEL	3630	6/01/13	44	24.8	41.3	21.4
BIG WHITE MTN CAN.	5510	6/02/13	12	5.0	10.9	--
BLACK PINE SNOTEL	7100	6/01/13	0	.0	.0	.0
BLACKWALL PILL CAN.	6370	5/30/13	38	19.6	32.5	--
BLEWETT PASS#2SNOTEL	4240	6/01/13	0	.0	.0	.0
BUCKINGHORSE SNOTEL	4870	6/01/13	77	41.4	60.8	--
BUMPING RIDGE SNOTEL	4610	6/01/13	0	.0	12.0	6.5
BUNCHGRASS MDWSNOTEL	5000	6/01/13	13	5.5	15.9	6.4
BURNT MOUNTAIN PIL	4170	6/01/13	0	1.0	5.5	.0
CALAMITY SNOTEL	2500	6/01/13	0	.0	.0	--
CAYUSE PASS SNOTEL	5240	6/01/13	82	38.9	60.8	--
CHICKEN CREEK	4060	5/30/13	0	.0	.0	.0
COMBINATION SNOTEL	5600	6/01/13	0	.0	.0	.0
COPPER BOTTOM SNOTEL	5200	6/01/13	0	.0	.0	--
CORRAL PASS SNOTEL	5800	6/01/13	62	29.8	36.5	26.0
COUGAR MTN. SNOTEL	3200	6/01/13	0	.0	.0	.0
COYOTE HILL	4200	5/31/13	0	.0	--	--
DALY CREEK SNOTEL	5780	6/01/13	0	.0	.0	.0
DUNGENESS SNOTEL	4010	6/01/13	0	.0	.0	.0
ELBOW LAKE SNOTEL	3200	6/01/13	12	6.0	--	.7
EMERY CREEK SNOTEL	4350	6/01/13	0	.0	.0	.0
ENDERBY CAN.	5800	6/03/13	75	39.5	--	--
ESPERON CK. MID CAN.	4250	5/26/13	0	.0	--	--
ESPERON CK. UP CAN.	5050	5/26/13	15	7.0	--	--
FISH LAKE SNOTEL	3430	6/01/13	0	.0	7.7	.0
FLATTOP MTN SNOTEL	6300	6/01/13	71	36.8	46.1	32.3
FROHNER MDWS SNOTEL	6480	6/01/13	0	.0	.0	.0
GRAVE CRK SNOTEL	4300	6/01/13	0	.0	.0	.0
GREEN LAKE SNOTEL	5920	6/01/13	4	.8	13.9	4.0
GROUSE CAMP SNOTEL	5390	6/01/13	0	.0	.0	.0
HAND CREEK SNOTEL	5030	6/01/13	0	.0	.0	.0
HARTS PASS SNOTEL	6490	6/01/13	53	31.8	44.5	24.6
HELL ROARING DIVIDE	5770	5/30/13	28	14.1	21.1	11.3
HERRIG JUNCTION	4850	5/30/13	0	.0	9.6	.3
HIGH RIDGE SNOTEL	4920	6/01/13	0	.0	.0	.0
HOODOO BASIN SNOTEL	6050	6/01/13	60	25.6	39.8	23.5
HUCKLEBERRY SNOTEL	2250	6/01/13	0	.0	.0	.0
HUMBOLDT GLCH SNOTEL	4250	6/01/13	0	.0	.0	.0
INDIAN ROCK SNOTEL	5360	6/01/13	0	.0	.0	--
JUNE LAKE SNOTEL	3440	6/01/13	37	23.0	35.3	.0
KRAFT CREEK SNOTEL	4750	6/01/13	0	.0	.0	--
LOLO PASS SNOTEL	5240	6/01/13	0	.0	.0	.0
LONE PINE SNOTEL	3930	6/01/13	45	28.2	39.3	13.7
LOOKOUT SNOTEL	5140	6/01/13	0	.0	3.2	.0
LOST HORSE SNOTEL	5120	6/01/13	0	.0	.0	.0
LOST LAKE SNOTEL	6110	6/01/13	55	27.2	43.9	31.9
LUBRECHT SNOTEL	4680	6/01/13	0	.0	.0	.0
LYMAN LAKE SNOTEL	5980	6/01/13	79	47.3	57.6	48.9
LYNN LAKE SNOTEL	3900	6/01/13	26	11.4	16.9	--
MARTEN RIDGE SNOTEL	3520	6/01/13	65	39.9	62.7	--
MEADOWS PASS SNOTEL	3230	6/01/13	4	2.4	8.7	.0
M F NOOKSACK SNOTEL	4970	6/01/13	108	65.4	84.0	51.6
MICA CREEK SNOTEL	4510	6/01/13	0	.0	.0	.0
MISSION CREEK CAN.	5840	5/30/13	27	14.2	13.8	--
MORRISSEY R SC CAN.	6100	5/30/13	---	3.1E	--	--
MORSE LAKE SNOTEL	5410	6/01/13	62	31.6	56.2	32.8
MOSES MTN SNOTEL	5010	6/01/13	0	.0	.0	.0
MOSQUITO RDG SNOTEL	5200	6/01/13	19	10.4	22.7	6.4
MOUNT CRAG SNOTEL	3960	6/01/13	24	10.3	26.2	4.1
MT. KOBAU CAN.	5500	5/31/13	15	7.3	3.2	--
N.F. ELK CR SNOTEL	6250	6/01/13	0	.0	.0	.0
NEVADA RIDGE SNOTEL	7020	6/01/13	0	.0	3.1	2.5
NEZ PERCE CMP SNOTEL	5650	6/01/13	0	.0	.0	.0
NOISY BASIN SNOTEL	6040	6/01/13	54	25.4	31.3	28.5
OLALLIE MDWS SNOTEL	4030	6/01/13	69	32.1	53.2	29.0
PARADISE SNOTEL	5130	6/01/13	112	79.0	75.8	61.9
PARK CK RIDGE SNOTEL	4600	6/01/13	0	1.6	28.3	4.6
PEPPER CREEK SNOTEL	2140	5/30/13	---	.0e	.0	--
PETERSON MDW SNOTEL	7200	6/01/13	0	.0	.0	1.3
PIGTAIL PEAK SNOTEL	5800	6/01/13	76	41.1	70.2	36.6
PIKE CREEK SNOTEL	5930	6/01/13	0	.0	.0	.0
POPE RIDGE SNOTEL	3590	6/01/13	0	.0	.0	.0
POTATO HILL SNOTEL	4510	6/01/13	---	6.5	16.7	.6
QUARTZ PEAK SNOTEL	4700	6/01/13	0	.0	.0	.0
RAGGED MTN SNOTEL	4210	6/01/13	0	.0	.0	.0
RAINY PASS SNOTEL	4890	6/01/13	24	14.4	35.1	18.7
REX RIVER SNOTEL	3810	6/01/13	23	13.8	23.5	.0
ROCKER PEAK SNOTEL	8000	6/01/13	16	5.0	9.0	10.6
SADDLE MTN SNOTEL	7900	6/01/13	14	6.5	12.4	13.3
SALMON MDWS SNOTEL	4460	5/30/13	---	.0e	.0	.0
SASSE RIDGE SNOTEL	4340	6/01/13	9	4.9	16.6	.0
SAVAGE PASS SNOTEL	6170	6/01/13	---	2.1	7.9	4.3
SAWMILL RIDGE SNOTEL	4640	6/01/13	0	1.9	23.8	--
SHEEP CANYON SNOTEL	3990	6/01/13	45	23.7	34.9	5.9
SHERWIN SNOTEL	3200	6/01/13	---	.0	.0	.0
SILVER STAR MTN CAN.	5600	5/30/13	44	23.2	20.2	--
SKALKAHO SNOTEL	7260	6/01/13	0	.0	7.5	9.5
SKOOKUM CREEK SNOTEL	3310	6/01/13	6	3.5	13.9	.0
SOURDOUGH GUL SNOTEL	4000	6/01/13	0	.0	.0	.0
SPENCER MDW SNOTEL	3400	6/01/13	0	.0	10.6	.0
SPIRIT LAKE SNOTEL	3520	6/01/13	0	.0	.0	.0
SPRUCE SPGS SNOTEL	5700	6/01/13	0	.0	.0	.0
STAHL PEAK SNOTEL	6030	6/01/13	49	24.1	36.3	25.8
STAMPEDE PASS SNOTEL	3850	6/01/13	27	14.1	22.5	14.1
STEVENS PASS SNOTEL	3950	6/01/13	23	11.6	21.1	3.0
STRYKER BASIN	6180	5/30/13	36	19.4	30.1	20.1
SUNSET SNOTEL	5540	6/01/13	0	.0	7.7	.3
SURPRISE LKS SNOTEL	4290	6/01/13	46	24.6	36.2	16.9
SWIFT CREEK SNOTEL	4440	6/01/13	86	47.2	70.1	40.8
THUNDER BASIN SNOTEL	4320	6/01/13	---	6.7	17.5	6.8
TINKHAM CREEK SNOTEL	2990	6/01/13	24	12.5	20.9	.0
TOUCHET SNOTEL	5530	6/01/13	0	.0	.0	.0
TROUGH #2 SNOTEL	5480	5/29/13	---	.0e	.0	.0
TWELVEMILE SNOTEL	5600	6/01/13	0	.0	.0	.0
TWIN LAKES SNOTEL	6400	6/01/13	16	8.4	24.5	16.5
UPPER WHEELER SNOTEL	4330	5/29/13	---	.0e	.0	.0
WARM SPRINGS SNOTEL	7800	6/01/13	25	11.3	20.6	17.0
WATERHOLE SNOTEL	5010	6/01/13	---	31.0	40.0	16.0
WELLS CREEK SNOTEL	4030	6/01/13	37	20.5	--	7.9
WHITE PASS ES SNOTEL	4440	5/31/13	---	.0e	11.1	1.4
WHITE ROCKS MTN CAN.	7200	5/26/13	21	10.1	8.6	--

Natural Resources Conservation Service

Washington State
Snow, Water and Climate Services

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Helpful Internet Addresses

NRCS Snow Survey and Climate Services Homepages

Washington:
http://www.wa.nrcs.usda.gov/snow

Oregon:
http://www.or.nrcs.usda.gov/snow

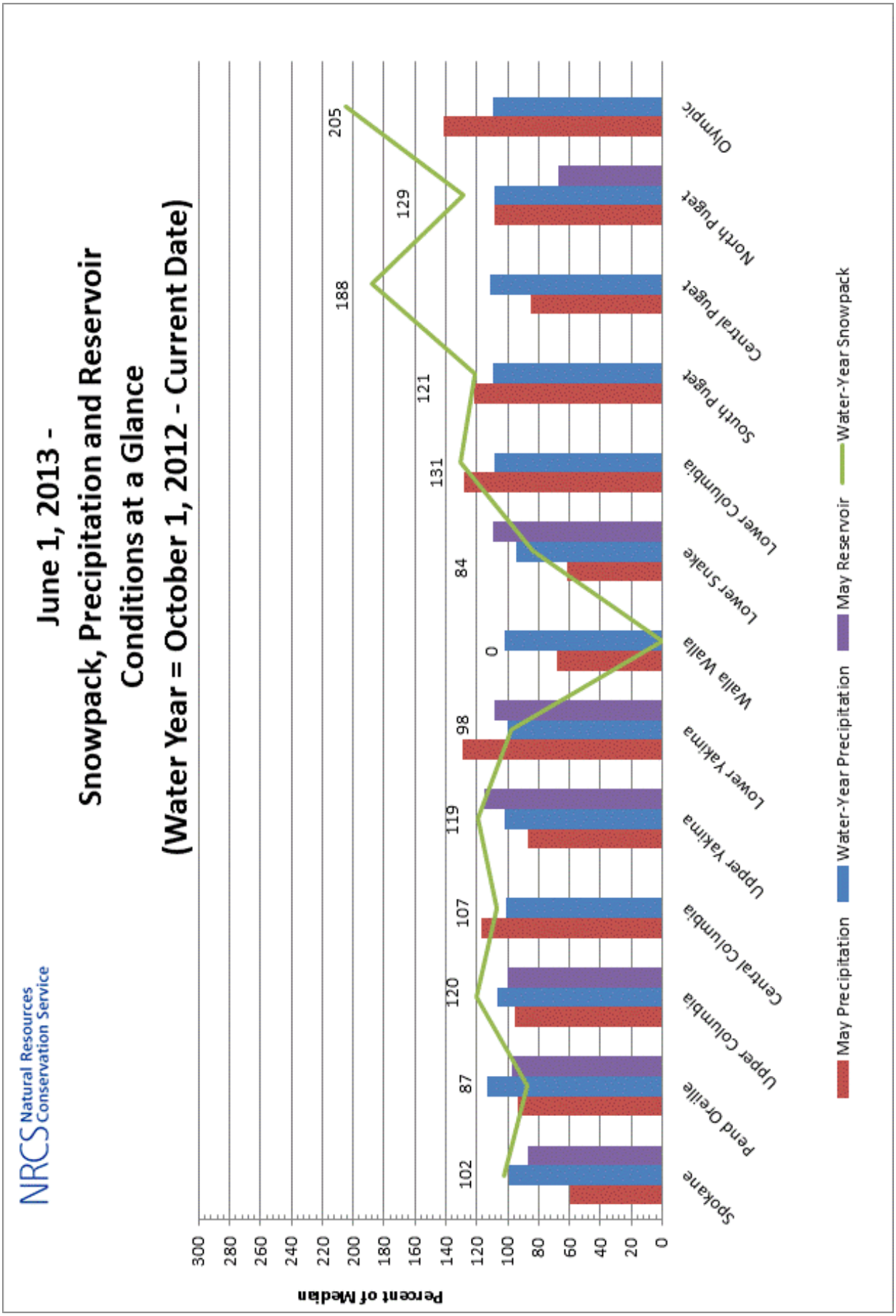
Idaho:
http://www.id.nrcs.usda.gov/snow

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

USDA-NRCS Agency Homepages

Washington:
http://www.wa.nrcs.usda.gov

NRCS National:
http://www.nrcs.usda.gov


June 1, 2013 -
Snowpack, Precipitation and Reservoir
Conditions at a Glance
(Water Year = October 1, 2012 - Current Date)
NRCS Natural Resources Conservation Service
Percent of Median
0
20
40
60
80
100
120
140
160
180
200
220
240
260
280
300
Spokane
Pend Oreille
Upper Columbia
Central Columbia
Upper Yakima
Lower Yakima
Walla Walla
Lower Snake
Lower Columbia
South Puget
Central Puget
North Puget
Olympic
102
87
120
107
119
98
0
84
131
121
188
129
205
May Precipitation
Water-Year Precipitation
May Reservoir
Water-Year Snowpack

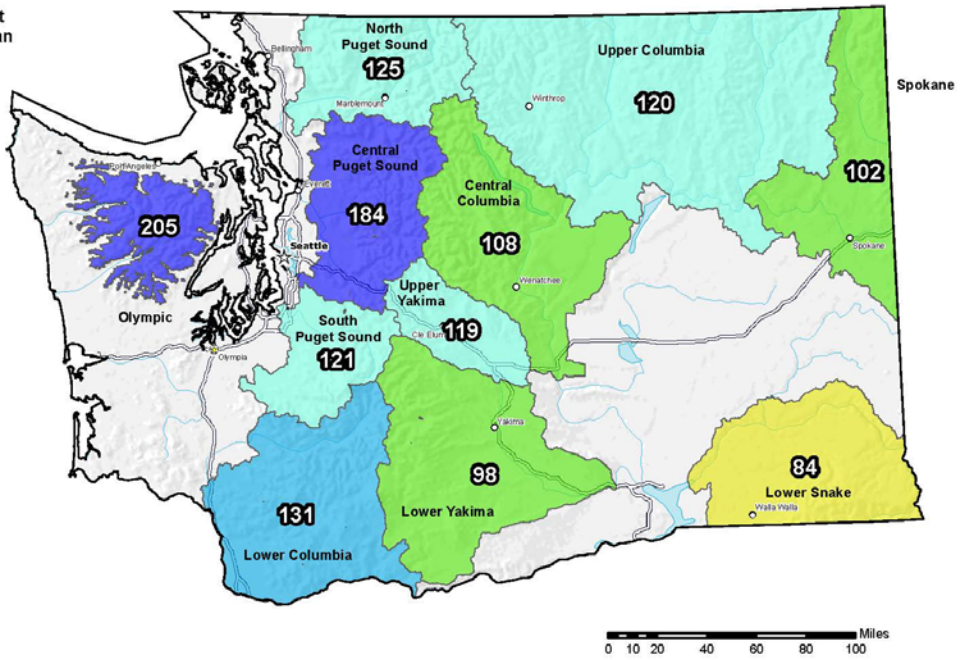
Washington SNOTEL Current Snow Water Equivalent (SWE) % of Normal

Jun 01, 2013

Current Snow Water Equivalent (SWE) Basin-wide Percent of 1981-2010 Median

- unavailable *
- <50%
- 50 - 69%
- 70 - 89%
- 90 - 109%
- 110 - 129%
- 130 - 149%
- >=150%

* *Data unavailable at time of posting or measurement is not representative at this time of year*



Provisional Data Subject to Revision

USDA NRCS

The snow water equivalent percent of normal represents the current snow water equivalent found at selected SNOTEL sites in or near the basin compared to the average value for those sites on this day. Data based on the first reading of the day (typically 00:00).

Prepared by the USDA/NRCS National Water and Climate Center
Portland, Oregon http://www.wcc.nrcs.usda.gov/gis/
Based on data from http://www.wcc.nrcs.usda.gov/reports/
Science contact: Jim.Marron@por.usda.gov 503 414 3047

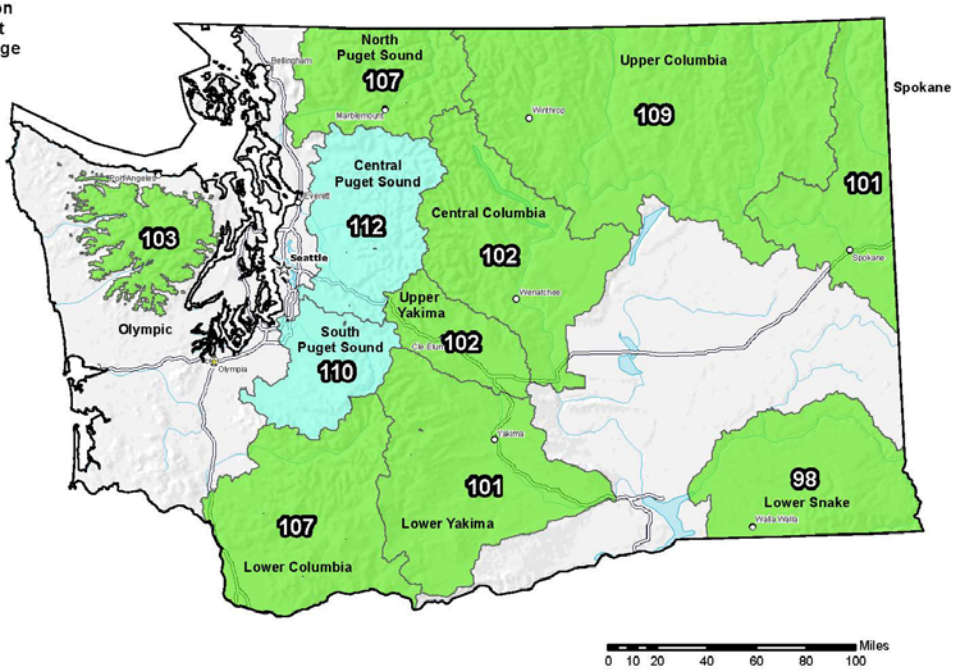
Washington SNOTEL Water Year (Oct 1) to Date Precipitation % of Normal

Jun 01, 2013

Water Year (Oct 1) to Date Precipitation Basin-wide Percent of 1981-2010 Average

- unavailable *
- <50%
- 50 - 69%
- 70 - 89%
- 90 - 109%
- 110 - 129%
- 130 - 149%
- >=150%

* *Data unavailable at time of posting or measurement is not representative at this time of year*



Provisional Data Subject to Revision

USDA NRCS

The water year to date precipitation percent of normal represents the accumulated precipitation found at selected SNOTEL sites in or near the basin compared to the average value for those sites on this day. Data based on the first reading of the day (typically 00:00).

Prepared by the USDA/NRCS National Water and Climate Center
Portland, Oregon http://www.wcc.nrcs.usda.gov/gis/
Based on data from http://www.wcc.nrcs.usda.gov/reports/
Science contact: Jim.Marron@por.usda.gov 503 414 3047

* DATA CURRENT AS OF: 6/06/13 13:24:58

SPOKANE RIVER BASIN

Forecast Point	period	50% (KAF)	% of avg	max (KAF)	30% (KAF)	70% (KAF)	min (KAF)	30-yr avg
Spokane R nr Post Falls (2)	JUN-JUL	515	83	660	575	455	370	620
	JUN-SEP	595	84	790	675	515	400	705
Spokane R at Long Lake (2)	JUN-JUL	670	84	830	735	605	510	795
	JUN-SEP	875	85	1100	965	785	650	1030
Chamokane Ck nr Long Lake	JUN-AUG	5.10	88	6.70	5.80	4.40	3.50	5.80

PEND OREILLE RIVER BASINS

Forecast Point	period	50% (KAF)	% of avg	max (KAF)	30% (KAF)	70% (KAF)	min (KAF)	30-yr avg
Pend Oreille Lake Inflow (2)	JUN-JUL	4780	87	5760	5170	4390	3800	5480
	JUN-SEP	5560	85	6730	6030	5090	4390	6520
Priest R nr Priest River (1,2)	JUN-JUL	305	111	385	335	275	225	275
	JUN-SEP	355	109	450	395	315	260	325
Pend Oreille R bl Box Canyon (2)	JUN-JUL	4830	87	5820	5230	4430	3840	5540
	JUN-SEP	5610	85	6810	6090	5130	4410	6600

UPPER COLUMBIA RIVER BASINS

Forecast Point	period	50% (KAF)	% of avg	max (KAF)	30% (KAF)	70% (KAF)	min (KAF)	30-yr avg
Colville R at Kettle Falls	JUN-JUL	34.0	100	48.0	40.0	28.0	20.0	34.0
	JUN-SEP	46.0	100	63.0	53.0	39.0	29.0	46.0
Kettle R nr Laurier	JUN-JUL	960	132	1200	1060	865	720	730
	JUN-SEP	1070	132	1340	1180	960	800	810
Similkameen R nr Nighthawk (1)	JUN-JUL	750	123	910	800	700	590	610
	JUN-SEP	855	123	1070	920	790	640	695
Okanogan R nr Tonasket (1)	JUN-JUL	905	117	1190	995	815	620	775
	JUN-SEP	1100	116	1450	1210	990	750	945
Okanogan R at Malott (1)	JUN-JUL	935	123	1240	1030	840	630	760
	JUN-SEP	1140	123	1510	1250	1030	775	925
Methow R nr Pateros	JUN-SEP	460	95	550	495	425	370	485
	JUN-JUL	405	95	480	435	375	330	425

CENTRAL COLUMBIA RIVER BASINS

Forecast Point	period	50% (KAF)	% of avg	max (KAF)	30% (KAF)	70% (KAF)	min (KAF)	30-yr avg
Stehekin R at Stehekin	JUN-JUL	325	86	400	355	295	250	380
	JUN-SEP	420	86	495	450	390	345	490
Chelan R at Chelan (2)	JUN-JUL	440	82	500	465	415	380	540
	JUN-SEP	540	82	605	565	515	475	660
Entiat R nr Ardenvoir	JUN-JUL	92	81	108	99.0	85.0	76.0	113
	JUN-SEP	107	82	128	115	99.0	86.0	131
Wenatchee R at Plain	JUN-JUL	485	96	575	520	450	395	505

	JUN-SEP	570	96	670	610	530	470	595
Icicle Ck nr Leavenworth	JUN-JUL	121	87	151	133	109	91.0	139
	JUN-SEP	143	88	179	157	129	107	163
Wenatchee R at Peshastin	JUN-JUL	650	95	775	700	600	525	685
	JUN-SEP	765	94	910	825	705	620	810

UPPER YAKIMA RIVER BASIN

Forecast Point	period	50% (KAF)	% of avg	max (KAF)	30% (KAF)	70% (KAF)	min (KAF)	30-yr avg
Keechelus Reservoir Inflow (2)	JUN-JUL	37.0	88	47.0	41.0	33.0	27.0	42.0
	JUN-SEP	47.0	90	60.0	52.0	42.0	34.0	52.0
Kachess Reservoir Inflow (2)	JUN-JUL	33.0	92	39.0	36.0	30.0	27.0	36.0
	JUN-SEP	41.0	91	49.0	44.0	38.0	33.0	45.0
Cle Elum Lake Inflow (2)	JUN-JUL	153	90	200	173	133	104	170
	JUN-SEP	183	89	245	205	159	123	205
Yakima R at Cle Elum (2)	JUN-JUL	260	90	350	295	225	171	290
	JUN-SEP	325	89	440	370	280	210	365
Teanaway R bl Forks nr Cle Elum	JUN-JUL	26.0	87	43.0	33.0	19.0	8.60	30.0
	JUN-SEP	28.0	88	46.0	35.0	21.0	10.5	32.0

LOWER YAKIMA RIVER BASIN

Forecast Point	period	50% (KAF)	% of avg	max (KAF)	30% (KAF)	70% (KAF)	min (KAF)	30-yr avg
Bumping Lake Inflow (2)	JUN-JUL	34.0	65	46.0	39.0	29.0	22.0	52.0
	JUN-SEP	41.0	67	53.0	46.0	36.0	29.0	61.0
American R nr Nile	JUN-JUL	34.0	71	45.0	38.0	30.0	23.0	48.0
	JUN-SEP	40.0	71	53.0	45.0	35.0	27.0	56.0
Rimrock Lake Inflow (2)	JUN-JUL	70.0	77	86.0	77.0	63.0	54.0	91.0
	JUN-SEP	99	80	116	106	92.0	82.0	124
Naches R nr Naches (2)	JUN-JUL	192	67	255	215	167	129	285
	JUN-SEP	235	68	310	265	205	160	345
Ahtanum Ck at Union Gap	JUN-JUL	7.60	84	11.1	9.00	6.20	4.10	9.00
	JUN-SEP	9.6	85	13.4	11.1	8.10	5.80	11.3
Yakima R nr Parker (2)	JUN-JUL	505	83	630	555	455	380	610
	JUN-SEP	650	84	800	710	590	500	770
Klickitat R nr Glenwood	JUN-JUL	39.0	83	50.0	43.0	35.0	28.0	47.0
	JUN-SEP	51.0	85	64.0	56.0	46.0	38.0	60.0
Klickitat R nr Pitt	JUN-JUL	155	92	185	167	143	125	168
	JUN-SEP	240	94	285	255	225	197	255

WALLA WALLA RIVER BASIN

Forecast Point	period	50% (KAF)	% of avg	max (KAF)	30% (KAF)	70% (KAF)	min (KAF)	30-yr avg
SF Walla Walla R nr Milton-Freewate	JUN-JUL	14.8	81	19.8	16.8	12.8	9.8	18.2
	JUN-SEP	26.0	84	32.5	28.6	23.4	19.5	31.0
Mill Ck nr Walla Walla	JUN-JUL	5.60	90	7.75	6.47	4.73	3.45	6.20
	JUN-SEP	9.10	95	11.6	10.1	8.07	6.56	9.60

LOWER SNAKE RIVER BASIN

Forecast Point	period	50% (KAF)	% of avg	max (KAF)	30% (KAF)	70% (KAF)	min (KAF)	30-yr avg
Grande Ronde R at Troy (1)	JUN-JUL	365	85	515	410	320	215	430
	JUN-SEP	445	86	600	495	395	290	520
Asotin Ck at Asotin	JUN-JUL	5.5	50	9.2	7.00	4.00	1.70	11.0
Clearwater R at Spalding (1,2)	JUN-JUL	2200	84	3170	2500	1900	1230	2610
	JUN-SEP	2580	86	3680	2920	2240	1480	2990

LOWER COLUMBIA RIVER BASINS

Forecast Point	period	50% (KAF)	% of avg	max (KAF)	30% (KAF)	70% (KAF)	min (KAF)	30-yr avg
Columbia R at The Dalles (2)	JUN-JUL	32900	81	38500	35200	30600	27300	40700
	JUN-SEP	46300	87	53700	49300	43300	38900	53500
Klickitat R nr Glenwood	JUN-JUL	39.0	83	50.0	43.0	35.0	28.0	47.0
	JUN-SEP	51.0	85	64.0	56.0	46.0	38.0	60.0
Klickitat R nr Pitt	JUN-JUL	155	92	185	167	143	125	168
	JUN-SEP	240	94	285	255	225	197	255
Lewis R at Ariel (2)	JUN-JUL	330	107	400	360	300	260	310
	JUN-SEP	500	109	625	550	450	375	460
Cowlitz R bl Mayfield Dam (2)	JUN-JUL	710	108	885	780	640	535	655
	JUN-SEP	950	109	1150	1030	865	745	870
Cowlitz R at Castle Rock (2)	JUN-JUL	960	108	1120	1020	895	805	890
	JUN-SEP	1300	110	1470	1370	1230	1130	1180

SOUTH PUGET SOUND RIVER BASINS

Forecast Point	period	50% (KAF)	% of avg	max (KAF)	30% (KAF)	70% (KAF)	min (KAF)	30-yr avg
White R nr Buckley (1)	JUN-JUL	220	107	280	240	200	159	205
	JUN-SEP	310	105	390	335	285	230	295
Green R bl Howard Hanson Dam (1,2)	JUN-JUL	70.0	103	101	80.0	60.0	39.0	68.0
	JUN-SEP	93.0	102	132	105	81.0	54.0	91.0

CENTRAL PUGET SOUND RIVER BASINS

Forecast Point	period	50% (KAF)	% of avg	max (KAF)	30% (KAF)	70% (KAF)	min (KAF)	30-yr avg
Cedar R nr Cedar Falls	JUN-JUL	31.0	124	39.0	34.0	28.0	23.0	25.0
	JUN-SEP	37.0	119	47.0	41.0	33.0	27.0	31.0
Rex R nr Cedar Falls	JUN-JUL	8.50	116	11.4	9.7	7.30	5.60	7.30
	JUN-SEP	11.00	115	13.9	12.2	9.8	8.10	9.60
Taylor Creek Near Selleck	JUN-JUL	8.10	108	10.1	8.90	7.30	6.10	7.50
	JUN-SEP	11.8	106	14.6	12.9	10.7	9.00	11.1
SF Tolt R nr Index	JUN-JUL	9.00	164	11.1	9.8	8.20	6.90	5.50
	JUN-SEP	12.00	160	14.4	13.0	11.0	9.6	7.50

NORTH PUGET SOUND RIVER BASINS

Forecast Point	period	50% (KAF)	% of avg	max (KAF)	30% (KAF)	70% (KAF)	min (KAF)	30-yr avg
Thunder Ck Nr Newhalem	JUN-JUL	149	96	175	160	138	123	155
	JUN-SEP	240	96	275	255	225	205	250
Skagit R At Newhalem	JUN-JUL	885	98	1020	940	830	745	900
	JUN-SEP	1190	95	1370	1260	1120	1010	1250
Baker R nr Concrete (2)	JUN-JUL	415	99	530	460	370	300	420
	JUN-SEP	610	98	810	690	530	410	620

OLYMPIC PENINSULA RIVER BASINS

Forecast Point	period	50% (KAF)	% of avg	max (KAF)	30% (KAF)	70% (KAF)	min (KAF)	30-yr avg
Dungeness R Nr Sequim	JUN-JUL	74.0	109	89.0	80.0	68.0	59.0	68.0
	JUN-SEP	102.0	111	122	110	94.0	82.0	92.0
Elwha R At Mcdonald Bridge	JUN-JUL	230	112	260	245	215	198	205
	JUN-SEP	310	113	355	330	290	265	275

Max is 90 percentile and min is 10 percentile except with footnote 1 below.
Averages are for the 1971-2000 period.
All volumes are in KAF.

footnotes:
1) max is 95 percentile and min is 5 percentile
2) streamflow is adjusted for upstream storage

Issued by

Jason Weller
Chief
Natural Resources Conservation Service
U.S. Department of Agriculture

Released by

Roylene Rides At The Door
State Conservationist
Natural Resources Conservation Service
Spokane, Washington

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

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

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

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Washington Water Supply Outlook Report

Natural Resources Conservation Service
Spokane, WA