

# Washington Water Supply Outlook

June 2009

## General Outlook

May brought above average rain fall for the first part of the month and record breaking high temperatures the last part. The delayed snow melt as previously reported was rectified by temperatures ranging from 5 – 10 degrees above average which brought snow off at near record rates. No flooding was reported however many warnings were issued by authorities for rapid and cold water runoff. The Climate Prediction Center is calling for a slight chance of below average temperatures for the month of June with a summer forecast of warm and dry. This will be the final issue published for the year and will resume January 2010.

## Snowpack

The June 1 statewide SNOTEL readings were 115% of average however rapidly dropping by 10 points in just 4 days. Most smaller mid-elevation basins have lost their snow by now, primarily in the Okanogan and Wenatchee areas. The Cedar River Basin is the highest at 348%. Westside averages from SNOTEL included the North Puget Sound river basins with 50% of average, the Central Puget river basins with 222%, and the Lewis-Cowlitz basins with 141% of average. Snowpack along the east slopes of the Cascade Mountains included the Yakima area with 106% and the Wenatchee area with 72%. Snowpack in the Spokane River Basin was at 66% and the Walla Walla River Basin had 46% of average. Maximum snow cover in Washington was at Paradise SNOTEL near Mt. Rainer, with water content of 81.5 inches. Normally Paradise would have 74.8 inches of snow water on June 1.

BASIN	PERCENT OF LAST YEAR	PERCENT OF AVERAGE
Spokane	37	66
Newman Lake	0	0
Pend Oreille	65	99
Okanogan	86	73
Methow	81	63
Conconully Lake	0	0
Wenatchee	69	74
Chelan	78	71
Upper Yakima	55	101
Lower Yakima	75	110
Ahtanum Creek	159	154
Walla Walla	7	46
Lower Snake	38	80
Cowlitz	71	148
Lewis	36	134
White	72	104
Green	56	131
Puyallup	76	128
Cedar	27	348
Tolt	64	221
Snoqualmie	62	159
Skykomish	70	159
Skagit	58	63
Baker	n/a	n/a
Nooksack	66	38
Olympic Peninsula	24	68

## Precipitation

During the month of May, the National Weather Service and Natural Resources Conservation Service climate stations reported mostly above average precipitation with only 2 basins reporting below average. Rimrock (Tieton Dam) leads the pack with a monthly high of 223% of normal or 2.23 inches. Rimrock would normally receive an inches of precipitation during May. Elbow Lake SNOTEL was the wettest spot in the state last month with 11.6 inches.

RIVER BASIN	MAY PERCENT OF AVERAGE	WATER YEAR PERCENT OF AVERAGE
Spokane .....	114 .....	95
Pend Oreille .....	105 .....	85
Upper Columbia .....	82 .....	80
Central Columbia .....	126 .....	91
Upper Yakima .....	142 .....	103
Lower Yakima .....	192 .....	99
Walla Walla .....	103 .....	110
Lower Snake .....	98 .....	100
Lower Columbia .....	142 .....	89
South Puget Sound .....	125 .....	99
Central Puget Sound .....	148 .....	113
North Puget Sound .....	141 .....	88
Olympic Peninsula .....	117 .....	82

## Reservoir

Seasonal reservoir levels in Washington vary greatly due to specific watershed management practices required in preparation for irrigation season, fisheries management, power generation, municipal demands and flood control. Reservoir storage in the Yakima Basin was 740,000-acre feet, 119% of average for the Upper Reaches and 189,000-acre feet or 112% of average for Rimrock and Bumping Lakes. Storage at the Okanogan reservoirs was 83% of average for June 1. The power generation reservoirs included the following: Coeur d'Alene Lake, 246,000 acre feet, 98% of average and 103% of capacity; Chelan Lake, 266,000-acre feet, 100% of average and 39% of capacity; and the Skagit River reservoirs at 114% of average and 61% of capacity. Current climate impacts, projected snow melt and management procedures may change these numbers on a daily or weekly basis.

BASIN	PERCENT OF CAPACITY	CURRENT STORAGE AS PERCENT OF AVERAGE
Spokane .....	110 .....	97
Pend Oreille .....	88 .....	101
Upper Columbia .....	79 .....	88
Central Columbia .....	70 .....	100
Upper Yakima .....	99 .....	114
Lower Yakima .....	99 .....	113
Lower Snake .....	90 .....	102
North Puget Sound .....	84 .....	112

## Glacier Monitoring

In cooperation with the North Cascades National Park we take this opportunity to provide the annual report on the on-going glacier monitoring program for glaciers in the North Cascades and on Mt. Rainier. The Park Service has provided copies of their report which are attached at the end of this document. Be sure to view their work at the Glacier Monitoring web sites at: <http://www.nps.gov/noca/naturescience/glacial-mass-balance1.htm> and <http://www.nps.gov/archive/mora/ncrd/glacier/index.html>

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

## Streamflow

Forecasts vary from 146% of average for the Rex River to 65% of average for Methow River. June-September forecasts for some Western Washington streams include the Cedar River near Cedar Falls, 141%; White River, 105%; and Skagit River, 80%. Some Eastern Washington streams include the Yakima River near Parker, 92%; Wenatchee River at Plain, 84%; and Spokane River near Post Falls, 89%. Volumetric forecasts are developed using current, historic and average snowpack, precipitation and streamflow data collected and coordinated by organizations cooperating with NRCS.

Statewide streamflows were greatly varied in May due to a plethora of reasons including delayed snow melt, varied precipitation and reservoir operations. The S.F. Walla Walla River had the highest reported flows with 229% of average. The Similkameen River at Nighthawk with 62% of average was the lowest in the state. Other streamflows were the following percentage of average as reported by the River Forecast Center: the Cowlitz at Castle Rock, 134%; the Spokane at Spokane, 118%; the Columbia below Rock Island Dam, 78%; and the Cle Elum near Roslyn, 103%. Record high temperatures in late May and early June really started the full snowmelt runoff which will show on the June reports at the end of the month.

BASIN	PERCENT OF AVERAGE ( 50 PERCENT CHANCE OF EXCEEDENCE )
-------	---

Spokane .....	89-91
Pend Oreille .....	92-94
Upper Columbia .....	65-86
Central Columbia .....	71-92
Upper Yakima .....	85-90
Lower Yakima .....	83-100
Walla Walla .....	100-101
Lower Snake .....	92-96
Lower Columbia .....	83-96
South Puget Sound .....	105-110
Central Puget Sound .....	121-146
North Puget Sound .....	80-84
Olympic Peninsula .....	80-90

STREAM	PERCENT OF AVERAGE MAY STREAMFLOWS
--------	---------------------------------------

Pend Oreille Below Box Canyon .....	98
Kettle at Laurier .....	96
Columbia at Birchbank .....	66
Spokane at Long Lake .....	96
Similkameen at Nighthawk .....	62
Okanogan at Tonasket .....	58
Methow at Pateros .....	70
Chelan at Chelan .....	84
Wenatchee at Pashastin .....	93
Yakima at Cle Elum .....	124
Yakima at Parker .....	122
Naches at Naches .....	141
Grande Ronde at Troy .....	152
Snake below Lower Granite Dam .....	114
SF Walla Walla near Milton Freewater .....	229
Columbia River at The Dalles .....	90
Lewis at Ariel .....	144
Cowlitz below Mayfield Dam .....	134
Skagit at Concrete .....	101
Dungeness near Sequim .....	80

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

BASIN SUMMARY OF  
SNOW COURSE DATA

JUNE 2009

SNOW COURSE	ELEVATION	DATE	SNOW DEPTH	WATER CONTENT	LAST YEAR	AVERAGE 1971-00	SNOW COURSE	ELEVATION	DATE	SNOW DEPTH	WATER CONTENT	LAST YEAR	AVERAGE 1971-00
ALPINE MEADOWS SNTL	3500	6/01/09	90	54.4	70.7	31.4	MORSE LAKE SNOTEL	5410	6/01/09	56	27.0	42.0	33.6
ASHLEY DIVIDE	4820	5/28/09	0	.0	--	--	MOSES MTN SNOTEL	5010	6/01/09	0	.0	.0	.1
BADGER PASS SNOTEL	6900	6/01/09	44	20.9	41.7	22.9	MOSQUITO RDG SNOTEL	5200	6/01/09	---	8.5	27.2	11.0
BARKER LAKES SNOTEL	8250	6/01/09	41	15.2	15.3	9.5	MOUNT CRAG SNOTEL	3960	6/01/09	0	.4	25.3	7.8
BARNES CREEK CAN.	5320	6/01/09	---	13.4	--	--	MT. KOBAU CAN.	5500	5/29/09	5	1.6	.0	5.2
BASIN CREEK SNOTEL	7180	6/01/09	0	.0	.0	4.1	MOWICH SNOTEL	3160	6/01/09	0	.0	.0	.0
BEAVER PASS SNOTEL	3630	6/01/09	26	12.4	26.4	16.8	MOUNT GARDNER SNOTEL	2920	6/01/09	0	.0	13.4	.0
BIG WHITE MTN CAN.	5510	6/01/09	12	4.9	--	8.0	N.F. ELK CR SNOTEL	6250	6/01/09	0	.0	.0	.6
BLACK PINE SNOTEL	7100	6/01/09	0	.0	.0	1.9	NEVADA RIDGE SNOTEL	7020	6/01/09	5	2.4	6.9	3.4
BLACKWALL PILL CAN.	6370	6/01/09	---	13.6	19.8	--	NEZ PERCE CMP SNOTEL	5650	6/01/09	0	.0	.9	.3
BLEWETT PASS#2SNOTEL	4240	6/01/09	0	.0	.0	.0	NOISY BASIN SNOTEL	6040	6/01/09	69	31.0	32.3	30.1
BUMPING LAKE (NEW)	3400	5/29/09	0	.0	.0	--	NORTH FORK JOCKO	6330	5/27/09	63	32.0	30.4	23.3
BUMPING RIDGE SNOTEL	4610	6/01/09	20	10.5	14.5	11.6	OLALLIE MDWS SNOTEL	4030	6/01/09	72	36.2	61.9	31.8
BUNCHGRASS MDWSNOTEL	5000	6/01/09	25	8.9	11.1	9.7	OPHIR PARK	7150	5/31/09	4	2.0	2.8	--
BURNT MOUNTAIN PIL	4170	6/01/09	21	14.3	22.5	.4	PARADISE SNOTEL	5130	6/01/09	120	76.8	90.7	61.6
CAYUSE PASS SNOTEL	5240	6/01/09	78	35.6	58.4	--	PARK CK RIDGE SNOTEL	4600	6/01/09	3	2.7	19.5	11.5
CHICKEN CREEK	4060	5/28/09	0	.0	4.2	.0	PETERSON MDW SNOTEL	7200	6/01/09	20	7.1	3.9	2.7
COMBINATION SNOTEL	5600	6/01/09	0	.0	.0	.0	PIGTAIL PEAK SNOTEL	5800	6/01/09	100	58.2	55.8	39.9
COPPER BOTTOM SNOTEL	5200	6/01/09	0	.0	.0	.0	PIKE CREEK SNOTEL	5930	6/01/09	0	.0	19.2	7.3
CORRAL PASS SNOTEL	5800	6/01/09	---	31.9	31.7	23.1	POPE RIDGE SNOTEL	3590	6/01/09	0	.0	.0	.0
COUGAR MTN. SNOTEL	3200	6/01/09	5	3.0	20.7	1.5	POTATO HILL SNOTEL	4510	6/01/09	23	11.0	22.2	2.7
COYOTE HILL	4200	5/27/09	0	.0	--	--	QUARTZ PEAK SNOTEL	4700	6/01/09	0	.0	4.7	.0
DALY CREEK SNOTEL	5780	6/01/09	0	.0	.0	.0	RAGGED MTN SNOTEL	4210	6/01/09	0	.0	.0	--
DISCOVERY BASIN	7050	5/22/09	28	10.9	2.4	2.4	RAINY PASS SNOTEL	4890	6/01/09	24	12.5	17.1	24.3
DIX HILL	6400	5/31/09	0	.0	.0	--	REX RIVER SNOTEL	3810	6/01/09	34	17.9	51.1	6.1
DUNGENESS SNOTEL	4010	6/01/09	0	.0	.0	.0	ROCKER PEAK SNOTEL	8000	6/01/09	35	14.1	13.5	11.7
ELBOW LAKE SNOTEL	3200	6/01/09	7	4.1	29.5	19.8	SADDLE MTN SNOTEL	7900	6/01/09	40	16.7	20.2	16.3
EMERY CREEK SNOTEL	4350	6/01/09	0	.0	.0	.0	SALMON MDWS SNOTEL	4460	6/01/09	0	.0	.0	.0
EMERBY CAN.	5800	6/01/09	---	34.8e	42.0	37.8	SASSE RIDGE SNOTEL	4340	6/01/09	10	5.0	11.5	5.9
FISH LAKE SNOTEL	3430	6/01/09	0	.0	6.6	7.5	SAVAGE PASS SNOTEL	6170	6/01/09	24	10.6	19.3	10.4
FLATTOP MTN SNOTEL	6300	6/01/09	61	26.9	43.2	36.5	SAMMILL RIDGE SNOTEL	4640	6/01/09	38	26.8	36.0	--
FROHNER MDWS SNOTEL	6480	6/01/09	0	.0	.0	.7	SENTINEL BT SNOTEL	4680	5/31/09	---	.0e	.0	--
GRAVE CRK SNOTEL	4300	6/01/09	0	.0	.0	.0	SHEEP CANYON SNOTEL	3990	6/01/09	59	27.6	65.3	13.7
GREEN LAKE SNOTEL	5920	6/01/09	25	10.5	6.6	6.6	SHERWIN SNOTEL	3200	6/01/09	---	.0	.0	.0
GROUSE CAMP SNOTEL	5390	6/01/09	0	.0	.0	.2	SILVER STAR MTN CAN.	5600	6/01/09	39	18.7	--	18.4
HAND CREEK SNOTEL	5030	6/01/09	0	.0	.0	.0	SKALKAHO SNOTEL	7260	6/01/09	19	7.1	12.9	14.6
HARTS PASS SNOTEL	6490	6/01/09	44	21.4	24.9	29.2	SKOOKUM CREEK SNOTEL	3310	6/01/09	22	18.3	43.0	1.5
HELL ROARING DIVIDE	5770	5/29/09	40	18.7	26.3	10.8	SOURDOUGH GUL SNOTEL	4000	6/01/09	0	.0	.0	--
HERRIG JUNCTION	4850	5/28/09	18	8.7	24.3	5.4	SPENCER MDW SNOTEL	3400	5/31/09	---	.7e	42.4	3.0
HIGH RIDGE SNOTEL	4920	6/01/09	0	1.7	15.4	1.2	SPIRIT LAKE SNOTEL	3520	6/01/09	0	.0	.0	.0
HOODOO BASIN SNOTEL	6050	6/01/09	61	30.3	43.6	28.4	SPRUCE SPGS SNOTEL	5700	6/01/09	0	.0	.0	--
HUCKLEBERRY SNOTEL	2250	6/01/09	0	.0	.0	.0	STAHL PEAK SNOTEL	6030	6/01/09	56	25.7	34.7	28.0
HUMBOLDT GLCH SNOTEL	4250	6/01/09	---	.0	7.9	.0	STAMPEDE PASS SNOTEL	3850	6/01/09	46	23.4	38.3	18.6
JUNE LAKE SNOTEL	3440	6/01/09	29	19.8	74.9	10.1	STEVENS PASS SNOTEL	3950	6/01/09	21	9.9	21.3	9.0
KRAFT CREEK SNOTEL	4750	6/01/09	0	.0	.0	.0	STRYKER BASIN	6180	5/28/09	45	24.5	37.9	19.4
LOLO PASS SNOTEL	5240	6/01/09	1	.5	15.8	4.9	SUNSET SNOTEL	5540	6/01/09	---	3.2	16.0	13.5
LONE PINE SNOTEL	3930	6/01/09	36	21.5	51.9	18.4	SURPRISE LKS SNOTEL	4290	6/01/09	62	25.5	46.2	19.0
LOOKOUT SNOTEL	5140	6/01/09	4	1.6	15.4	8.0	SWAMP CREEK SNOTEL	3930	6/01/09	0	.0	.0	.0
LOST HORSE SNOTEL	5120	6/01/09	0	.0	.0	.2	THUNDER BASIN SNOTEL	4320	6/01/09	0	3.7	18.1	9.3
LOST LAKE SNOTEL	6110	6/01/09	---	35.9	46.9	41.5	TINKHAM CREEK SNOTEL	2990	6/01/09	38	10.8	36.5	2.9
LUBRECHT SNOTEL	4680	6/01/09	0	.0	.0	.0	TOUCHET SNOTEL	5530	6/01/09	0	.0	10.5	2.5
LYMAN LAKE SNOTEL	5980	6/01/09	75	40.0	44.8	50.8	TROUGH #2 SNOTEL	5480	6/01/09	0	.0	.0	.0
MARTEN RIDGE SNOTEL	3520	6/01/09	54	32.5	58.9	--	TUNNEL AVENUE	2450	6/01/09	0	.0	9.3	--
MARTENS PASS SNOTEL	3230	6/01/09	11	5.8	25.8	.9	TV MOUNTAIN	6800	5/27/09	24	9.6	7.1	6.8
M F NOOKSACK SNOTEL	4970	6/01/09	94	59.0	53.1	--	TWELVEMILE SNOTEL	5600	6/01/09	0	.0	.0	.4
MICA CREEK SNOTEL	4510	6/01/09	0	.0	14.6	.0	TWIN LAKES SNOTEL	6400	6/01/09	36	22.0	36.9	22.3
MINERS RIDGE SNOTEL	6110	6/01/09	80	36.2	35.3	42.5	UPPER WHEELER SNOTEL	4330	6/01/09	0	.1	.0	.0
MISSION CREEK CAN.	5840	6/01/09	---	12.0	13.2	13.0	WARM SPRINGS SNOTEL	7800	6/01/09	54	23.3	18.9	17.0
MONASHEE PASS CAN.	4500	6/01/09	---	.0e	--	1.9	WATERHOLE SNOTEL	5010	6/01/09	28	15.2	38.8	15.0
MORRISSEY RIDGE CAN.	6100	6/01/09	---	4.1	9.6	--	WELLS CREEK SNOTEL	4030	6/01/09	12	6.8	23.1	8.9
							WHITE PASS ES SNOTEL	4440	6/01/09	17	8.7	13.5	5.6
							WHITE ROCKS MTN CAN.	7200	5/30/09	5	2.4	3.7	7.4



Natural Resources Conservation Service

Washington State  
Snow, Water and Climate Services

**Program Contacts**

Roylene Rides At The Door  
State Conservationist  
Spokane State Office  
W. 316 Boone Ave., Suite 450  
Spokane, WA 99201-2348  
phone: 509-323-2961  
fax: 509-323-2979  
[roylene.rides-at-the-door@wa.usda.gov](mailto:roylene.rides-at-the-door@wa.usda.gov)

Jon Lea  
DCO Supervisor  
Oregon Data Collection Office  
101 SW Main St, Suite 1300  
Portland, OR 97204  
Phone: 503-414-3267  
Fax: 503-414-3277  
[jon.lea@or.usda.gov](mailto:jon.lea@or.usda.gov)

Scott Pattee  
Water Supply Specialist  
Washington Snow Survey Office  
2021 E. College Way, Suite 214  
Mount Vernon, WA 98273-2873  
phone: 360-428-7684  
fax: 360-424-6172  
[scott.pattee@wa.usda.gov](mailto:scott.pattee@wa.usda.gov)

James Marron  
Resource Conservationist  
National Water and Climate Center  
101 SW Main St., Suite 1600  
Portland, OR 97204-3224  
phone: 503-414-3047  
fax: 503-414-3101  
[jim.marron@por.usda.gov](mailto:jim.marron@por.usda.gov)

**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>

NWCC Anonymous FTP Server:  
<ftp.wcc.nrcs.usda.gov>

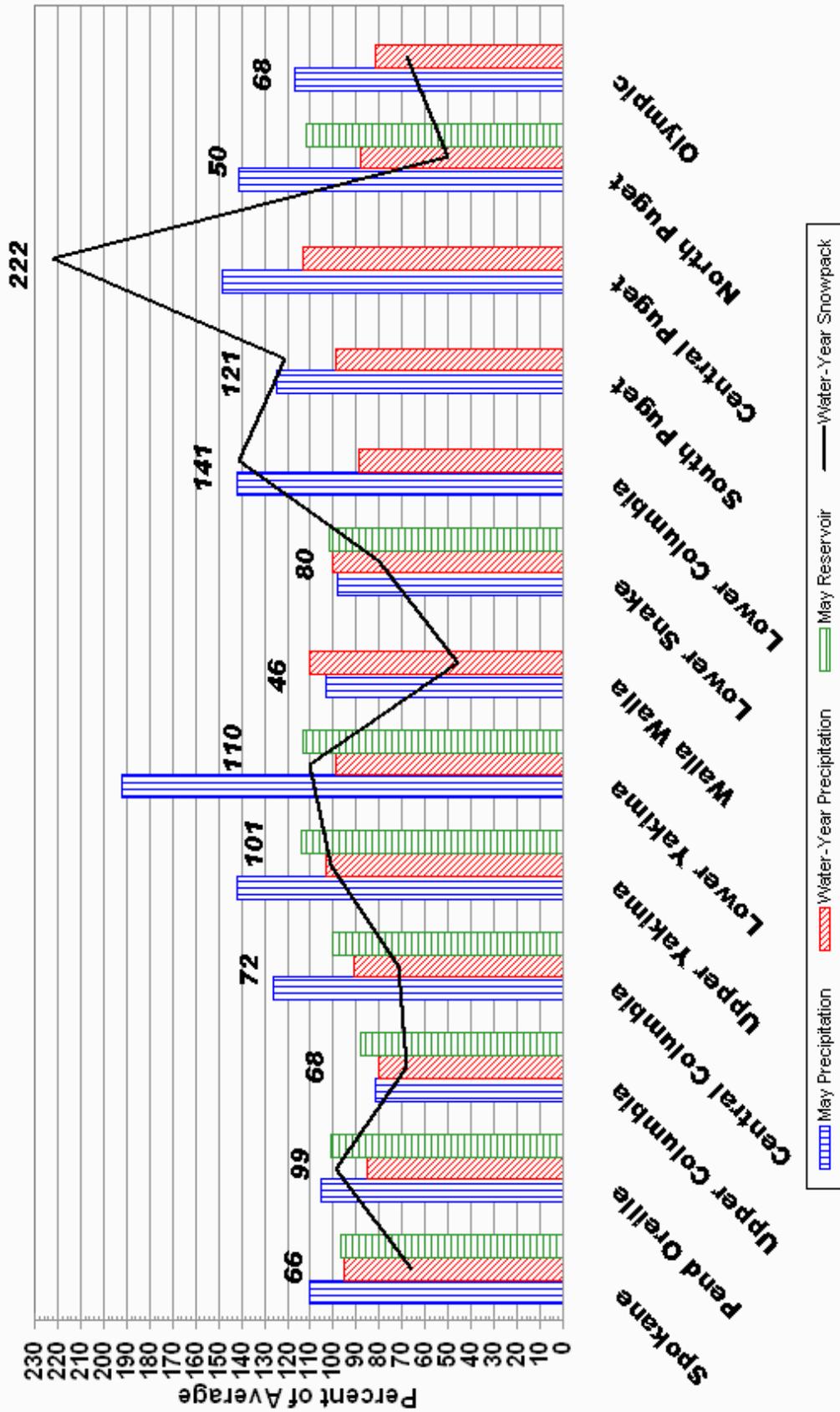
**USDA-NRCS Agency Homepages**

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

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

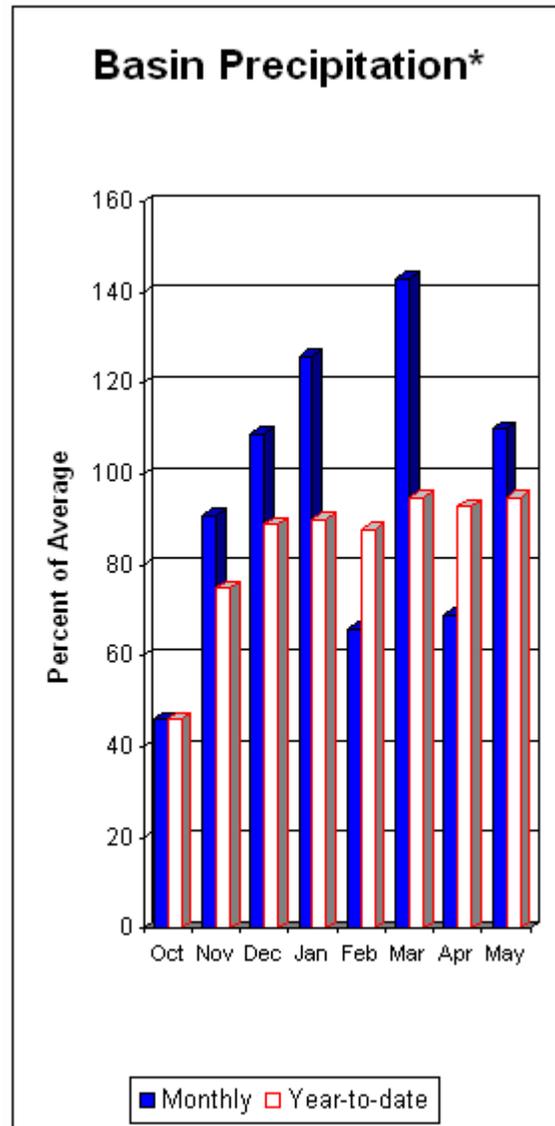
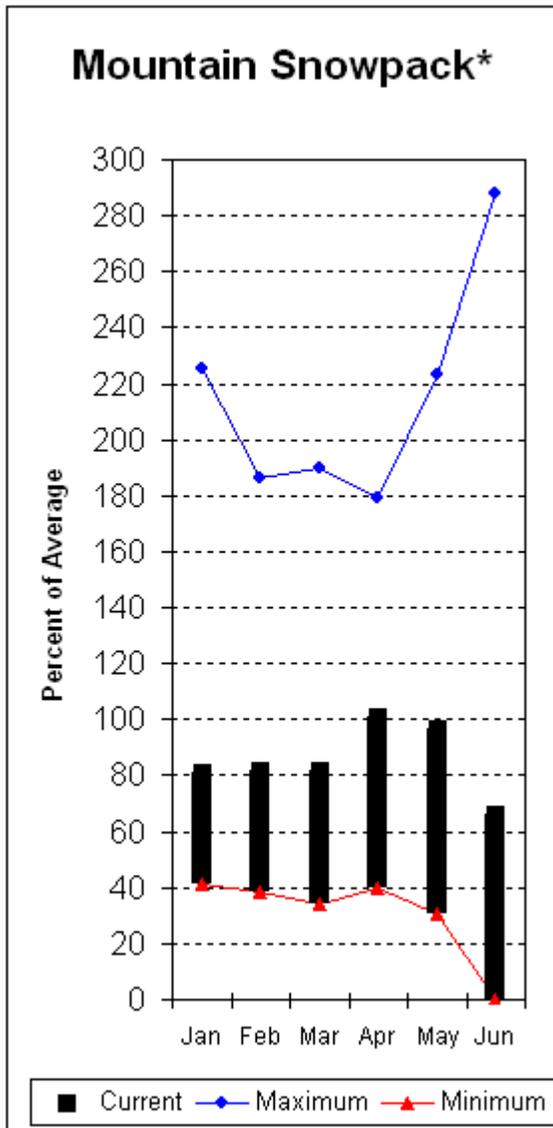
# June 1, 2009 - Snowpack, Precipitation and Reservoir Conditions at a Glance

(Water Year = October 1, 2008 - Current Date)





# Spokane River Basin



\*Based on selected stations

The June 1 forecasts for summer runoff within the Spokane River Basin are 89% of average near Post Falls and at Long Lake. The Chamokane River near Long Lake forecasted to have 89% of average flows for the June-August period. The forecast is based on a basin snowpack that is 66% of average and precipitation that is 95% of average for the water year. Precipitation for May was above normal at 110% of average. Streamflow on the Spokane River at Long Lake was 96% of average for May. June 1 storage in Coeur d'Alene Lake was 263,000 acre feet, 97% of average and 110% of capacity. Quartz Peak SNOTEL site was snow free by the 1<sup>st</sup> of the month. Average temperatures in the Spokane basin were 3 degrees above normal for May and 1 degree below normal for the water year.

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

# Spokane River Basin

## Streamflow Forecasts - June 1, 2009

Forecast Point	Forecast Period	<<===== Drier ===== Future Conditions ===== Wetter =====>>						30-Yr Avg. (1000AF)
		=====		Chance Of Exceeding *		=====		
		90% (1000AF)	70% (1000AF)	(1000AF)	50% (% AVG.)	30% (1000AF)	10% (1000AF)	
SPOKANE near Post Falls (2)	JUN-JUL	500	565	605	90	645	710	675
	JUN-SEP	565	640	690	89	740	815	775
SPOKANE at Long Lake (2)	JUN-JUL	540	675	765	91	855	990	840
	JUN-SEP	725	870	965	91	1060	1210	1060
CHAMOKANE CREEK near Long Lake	JUL-AUG	2.0	2.7	3.1	89	3.5	4.2	3.5

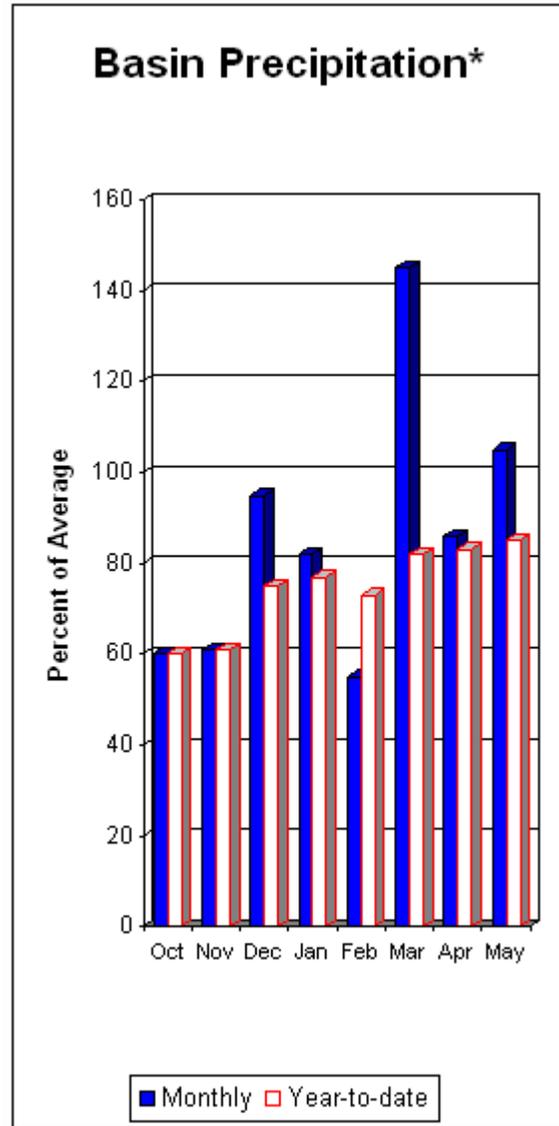
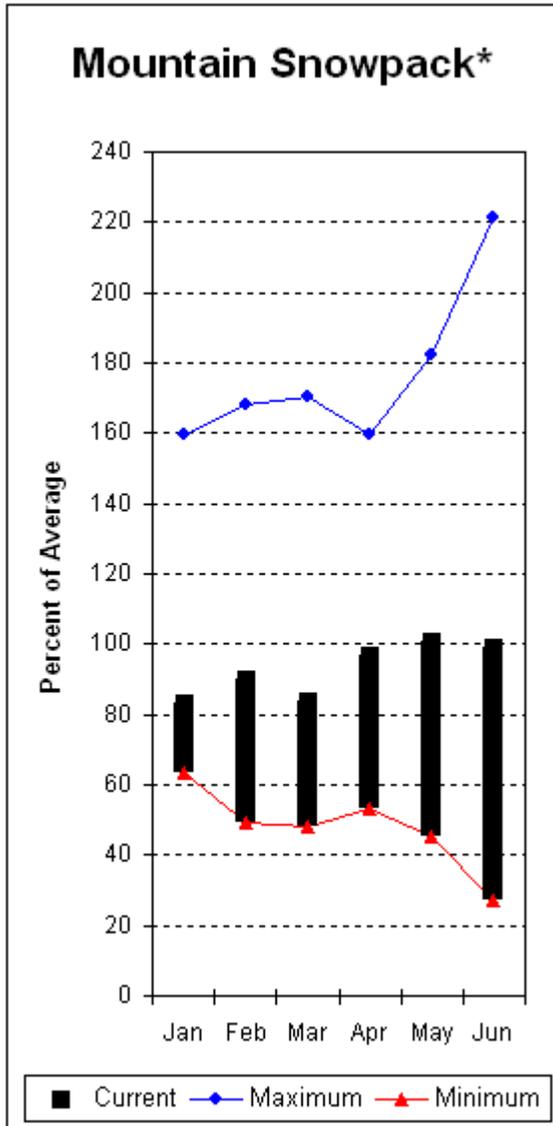
SPOKANE RIVER BASIN Reservoir Storage (1000 AF) - End of May					SPOKANE RIVER BASIN Watershed Snowpack Analysis - June 1, 2009			
Reservoir	Usable Capacity	*** Usable Storage ***			Watershed	Number of Data Sites	This Year as % of	
		This Year	Last Year	Avg			Last Yr	Average
COEUR D'ALENE	238.5	262.7	488.4	270.4	SPOKANE RIVER	8	37	66
					NEWMAN LAKE	1	0	0

\* 90%, 70%, 50%, 30%, and 10% chances of exceeding are the probabilities that the actual volume will exceed the volumes in the table.

The average is computed for the 1971-2000 base period.

- (1) - The values listed under the 10% and 90% Chance of Exceeding are actually 5% and 95% exceedance levels.
- (2) - The value is natural volume - actual volume may be affected by upstream water management.
- (3) - Median value used in place of average. The value listed under 30% is actually a 25% exceedance level.  
The value listed under 70% is actually a 75% exceedance level.

# Pend Oreille River Basins



\*Based on selected stations

The June – September average forecast for the Priest River near the town of Priest River is 94% and the Pen Orielle below Box Canyon is 92%. May streamflow was 98% of average on the Pend Oreille River and 66% on the Columbia at the Birchbank. June 1 snow cover was 99% of average in the Pend Oreille Basin River Basin. Bunchgrass Meadows SNOTEL site had 8.9 inches of snow water on the snow pillow. Normally Bunchgrass would have 9.7 inches on June 1. Precipitation during May was 105% of average, bringing the year-to-date precipitation to 85% of average. Reservoir storage in the basin, including Lake Pend Oreille and Priest Lake was 101% of normal. Average temperatures were 3 degrees above normal for May and 1 degree below normal for the water year.

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

# Pend Oreille River Basins

## Streamflow Forecasts - June 1, 2009

Forecast Point	Forecast Period	<<===== Drier ===== Future Conditions ===== Wetter =====>>						30-Yr Avg. (1000AF)
		=====		Chance Of Exceeding *		=====		
		90% (1000AF)	70% (1000AF)	50% (1000AF)	(% AVG.)	30% (1000AF)	10% (1000AF)	
PEND OREILLE Lake Inflow (2)	JUN-JUL	5250	5490	5650	92	5810	6050	6120
	JUN-SEP	6290	6550	6720	92	6890	7150	7280
PRIEST near Priest River (1,2)	JUN-JUL	161	240	275	95	310	390	290
	JUN-SEP	200	285	325	94	365	450	345
PEND OREILLE bl Box Canyon (2)	JUN-JUL	4130	5090	5740	93	6390	7350	6190
	JUN-SEP	5200	6160	6810	92	7460	8420	7370

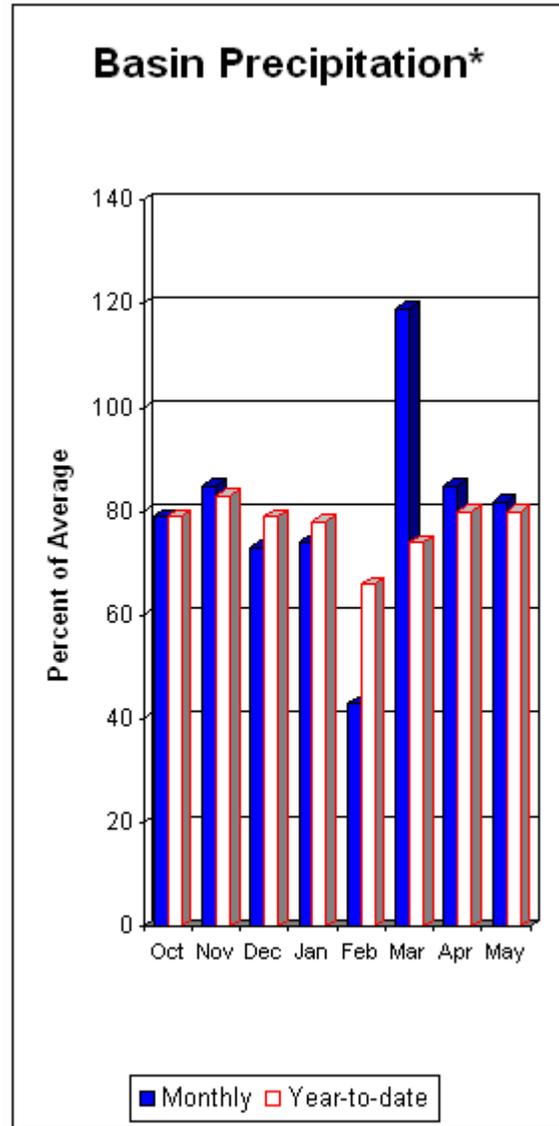
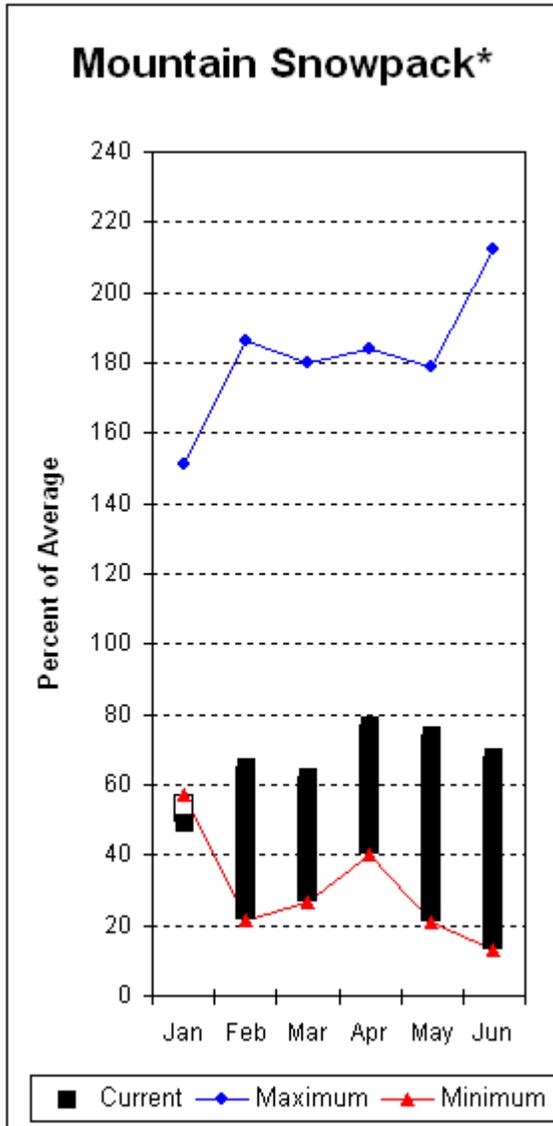
PEND OREILLE RIVER BASINS Reservoir Storage (1000 AF) - End of May					PEND OREILLE RIVER BASINS Watershed Snowpack Analysis - June 1, 2009			
Reservoir	Usable Capacity	*** Usable Storage ***			Watershed	Number of Data Sites	This Year as % of	
		This Year	Last Year	Avg			Last Yr	Average
PEND OREILLE	1561.3	1356.9	518.6	1333.1	PEND OREILLE RIVER	8	31	57
PRIEST LAKE	119.3	129.2	156.9	138.5				

\* 90%, 70%, 50%, 30%, and 10% chances of exceeding are the probabilities that the actual volume will exceed the volumes in the table.

The average is computed for the 1971-2000 base period.

- (1) - The values listed under the 10% and 90% Chance of Exceeding are actually 5% and 95% exceedance levels.
- (2) - The value is natural volume - actual volume may be affected by upstream water management.
- (3) - Median value used in place of average. The value listed under 30% is actually a 25% exceedance level.  
The value listed under 70% is actually a 75% exceedance level.

# Upper Columbia River Basins



\*Based on selected stations

Summer runoff average forecast for the Okanogan River is 72%, Similkameen River is 66%, Kettle River 83% and Methow River is 65%. June 1 snow cover on the Okanogan was 73% of average, Omak Creek was melted out and the Methow was 63%. May precipitation in the Upper Columbia was 82% of average, with precipitation for the water year at 80% of average. May streamflow for the Methow River was 70% of average, 58% for the Okanogan River and 62% for the Similkameen. Salmon Meadows SNOTEL was melted out by the 1<sup>st</sup> of June which is normal. Combined storage in the Conconully Reservoirs was 19,000-acre feet, which is 79% of capacity and 88% of the June 1 average. Temperatures were 2 degrees above normal for May and 1 degree below normal for the water year.

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

# Upper Columbia River Basins

## Streamflow Forecasts - June 1, 2009

Forecast Point	Forecast Period	<<===== Drier ===== Future Conditions ===== Wetter =====>>						30-Yr Avg. (1000AF)
		Chance Of Exceeding *						
		90% (1000AF)	70% (1000AF)	50% (1000AF)	(% AVG.)	30% (1000AF)	10% (1000AF)	
COLVILLE at Kettle Falls	JUN-JUL	6.2	18.6	27	77	35	48	35
	JUN-SEP	11.5	27	37	77	47	62	48
KETTLE near Laurier	JUN-JUL	310	510	645	83	780	980	780
	JUN-SEP	370	585	730	83	875	1090	880
COLUMBIA at Birchbank (1,2)	JUN-JUL	16400	19300	20700	89	22100	25000	23200
	JUN-SEP	22400	26200	28000	86	29800	33600	32400
COLUMBIA at Grand Coulee Dm (1,2)	JUN-JUL	24100	27100	28400	94	29700	32700	30200
	JUN-SEP	32200	35600	37100	92	38600	42000	40300
Similkameen R nr Nighthawk (1)	JUN-JUL	320	430	480	65	530	640	735
	JUN-SEP	335	485	550	66	615	765	835
Okanogan R nr Tonasket (1)	JUN-JUL	335	530	620	72	710	905	860
	JUN-SEP	405	645	755	72	865	1110	1050
Okanogan R at Malott (1)	JUN-JUL	335	545	640	72	735	945	894
	JUN-SEP	415	665	780	72	895	1150	1085
Methow R nr Pateros	JUN-SEP	275	330	365	65	400	455	560
	JUN-JUL	245	290	320	65	350	395	490

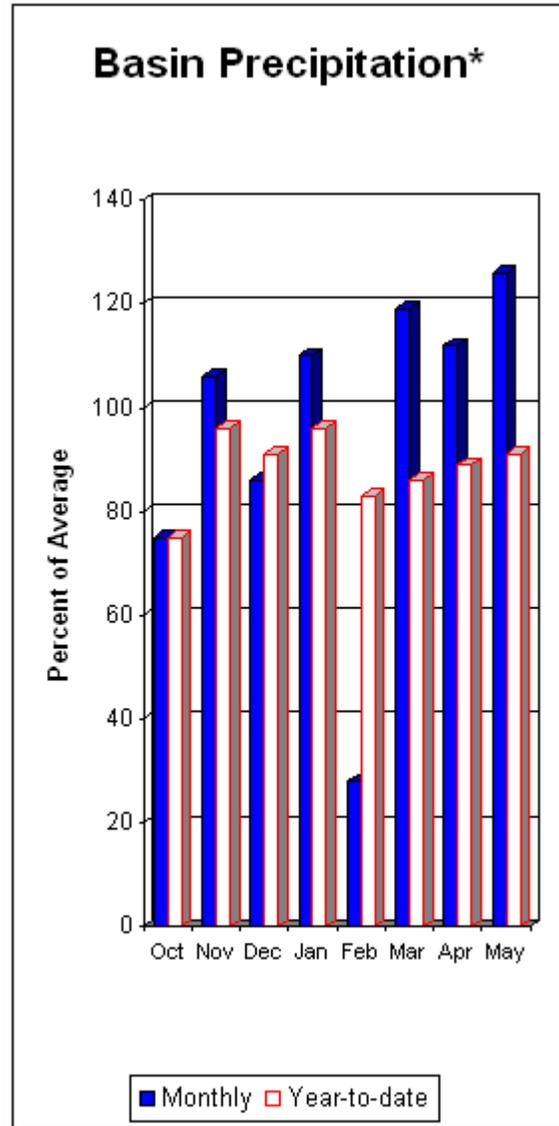
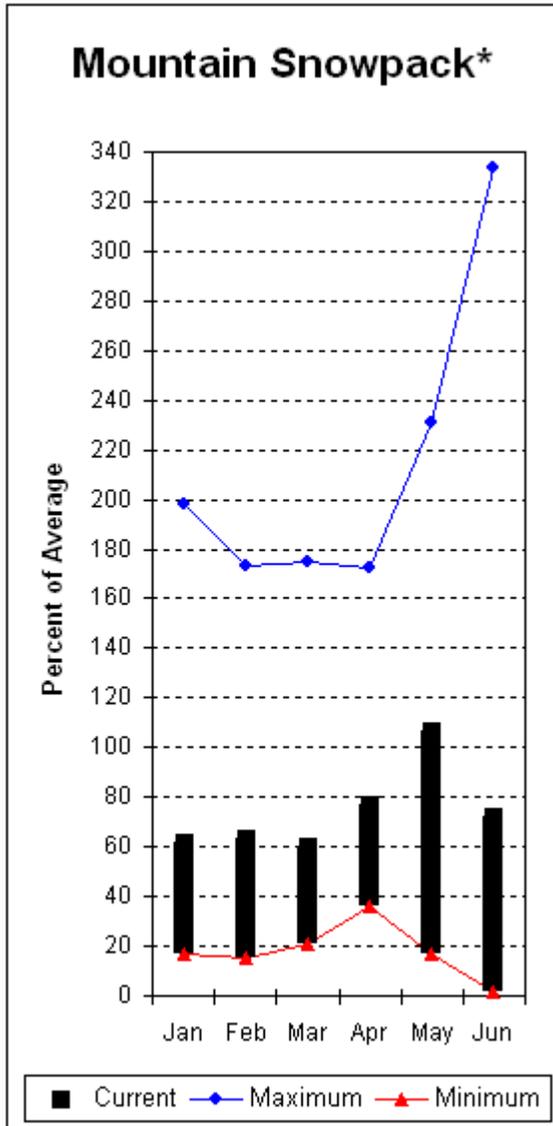
UPPER COLUMBIA RIVER BASINS Reservoir Storage (1000 AF) - End of May					UPPER COLUMBIA RIVER BASINS Watershed Snowpack Analysis - June 1, 2009			
Reservoir	Usable Capacity	*** Usable Storage ***			Watershed	Number of Data Sites	This Year as % of	
		This Year	Last Year	Avg			Last Yr	Average
SALMON LAKE	10.5	9.0	8.2	9.7	OKANOGAN RIVER	8	86	81
CONCONULLY RESERVOIR	13.0	9.6	13.1	11.4	OMAK CREEK	1	0	0
					METHOW RIVER	3	81	63

\* 90%, 70%, 50%, 30%, and 10% chances of exceeding are the probabilities that the actual volume will exceed the volumes in the table.

The average is computed for the 1971-2000 base period.

- (1) - The values listed under the 10% and 90% Chance of Exceeding are actually 5% and 95% exceedance levels.
- (2) - The value is natural volume - actual volume may be affected by upstream water management.
- (3) - Median value used in place of average. The value listed under 30% is actually a 25% exceedance level.  
The value listed under 70% is actually a 75% exceedance level.

# Central Columbia River Basins



\*Based on selected stations

Precipitation during May was 126% of average in the basin and 91% for the year-to-date. Runoff for Entiat River is forecast to be 73% of average for the summer. The June-September average forecast for Chelan River is 71%, Wenatchee River at Plain is 84%, Stehekin River is 73% and Icicle Creek is 87%. May average streamflows on the Chelan River were 84% and on the Wenatchee River 93%. June 1 snowpack in the Wenatchee River Basin was 74% of average; the Chelan, 71%; the Entiat, Stemilt and Colockum were all melted out. Reservoir storage in Lake Chelan was 471,000-acre feet, 100% of June 1 average and 70% of capacity. Miners Ridge SNOTEL had the most snow water with 80 inches of water. This site would normally have 42.5 inches on June 1. Temperatures were 2 degrees above normal for May and 1 degree below normal for the water year.

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

# Central Columbia River Basins

## Streamflow Forecasts - June 1, 2009

Forecast Point	Forecast Period	<<===== Drier ===== Future Conditions ===== Wetter =====>>						30-Yr Avg. (1000AF)
		Chance Of Exceeding *						
		90% (1000AF)	70% (1000AF)	50% (1000AF)	(% AVG.)	30% (1000AF)	10% (1000AF)	
Stehekin R at Stehekin	JUN-JUL	225	270	300	73	330	375	410
	JUN-SEP	315	360	390	73	420	465	535
Chelan R at Chelan (2)	JUN-JUL	370	405	430	73	455	490	590
	JUN-SEP	455	495	520	71	545	585	730
Entiat R nr Ardenvoir	JUN-JUL	78	87	94	74	101	110	127
	JUN-SEP	88	101	109	73	117	130	149
Wenatchee R at Plain	JUN-JUL	400	455	490	86	525	580	570
	JUN-SEP	480	540	580	84	620	680	690
Icicle Ck nr Leavenworth	JUN-JUL	115	133	145	87	157	175	166
	JUN-SEP	134	156	170	87	184	205	195
Wenatchee R at Peshastin	JUN-JUL	555	630	680	87	730	805	785
	JUN-SEP	655	740	800	86	860	945	935
Columbia R bl Rock Island Dam (2)	JUN-JUL	25500	29400	31100	94	32800	36700	33000
	JUN-SEP	32800	37800	40100	92	42400	47400	43500

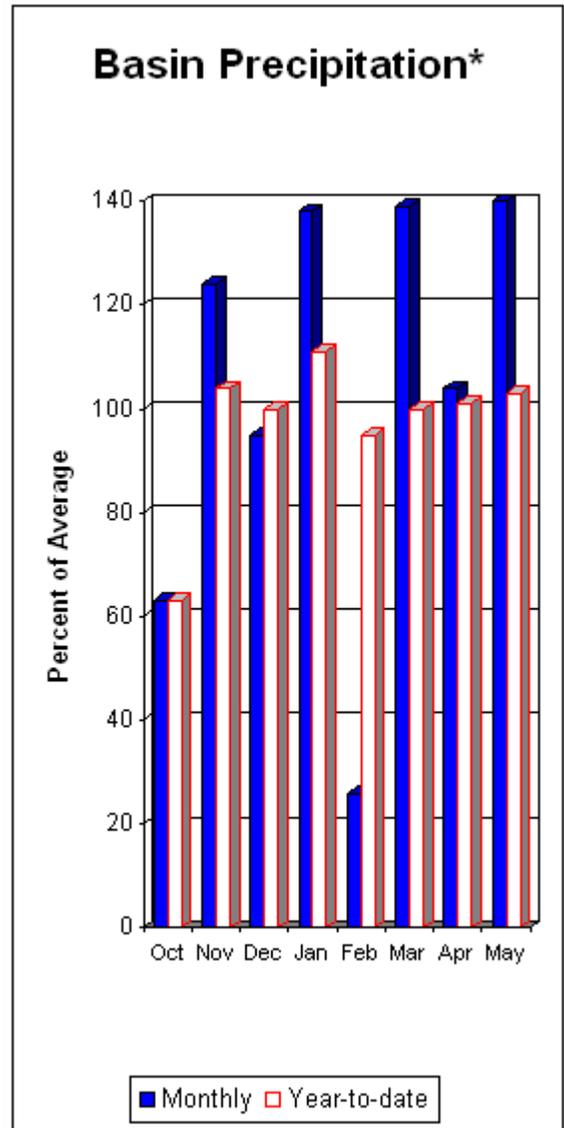
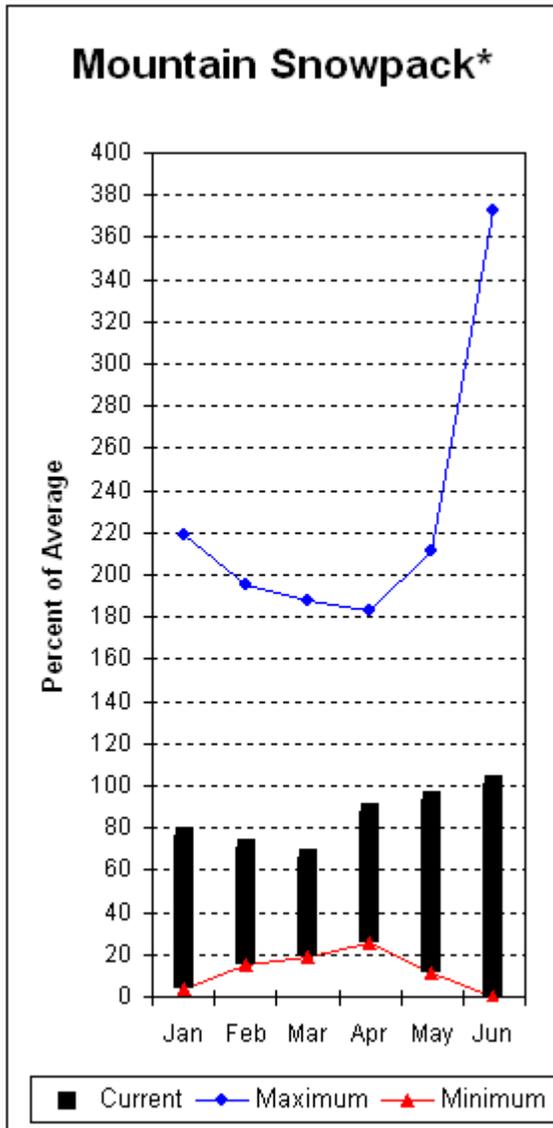
CENTRAL COLUMBIA RIVER BASINS Reservoir Storage (1000 AF) - End of May					CENTRAL COLUMBIA RIVER BASINS Watershed Snowpack Analysis - June 1, 2009			
Reservoir	Usable Capacity	*** Usable Storage ***			Watershed	Number of Data Sites	This Year as % of	
		This Year	Last Year	Avg			Last Yr	Average
CHELAN LAKE	676.1	470.8	471.8	473.0	CHELAN LAKE BASIN	4	78	71
					WENATCHEE RIVER	6	69	74

\* 90%, 70%, 50%, 30%, and 10% chances of exceeding are the probabilities that the actual volume will exceed the volumes in the table.

The average is computed for the 1971-2000 base period.

- (1) - The values listed under the 10% and 90% Chance of Exceeding are actually 5% and 95% exceedance levels.
- (2) - The value is natural volume - actual volume may be affected by upstream water management.
- (3) - Median value used in place of average. The value listed under 30% is actually a 25% exceedance level. The value listed under 70% is actually a 75% exceedance level.

# Upper Yakima River Basin



\*Based on selected stations

June 1 reservoir storage for the Upper Yakima reservoirs was 826,000-acre feet, 114% of average. Forecasts for the Yakima River at Cle Elum are 87% of average and the Teanaway River near Cle Elum is at 85%. Lake inflows are all forecasted to be slightly below normal this summer. May streamflows within the basin were Yakima at Cle Elum at 124% and Cle Elum River near Roslyn at 103%. June 1 snowpack was 101% based upon 7 snow course and SNOTEL readings within the Upper Yakima Basin. Precipitation was 142% of average for May and 103% year-to-date for water. Volume forecasts for the Yakima Basin are for natural flow. As such, they may differ from the U.S. Bureau of Reclamation's forecast for the total water supply available, which includes irrigation return flow.

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

# Upper Yakima River Basin

## Streamflow Forecasts - June 1, 2009

Forecast Point	Forecast Period	<<===== Drier ===== Future Conditions ===== Wetter =====>>						30-Yr Avg. (1000AF)
		=====		Chance Of Exceeding *		=====		
		90% (1000AF)	70% (1000AF)	50% (1000AF)	(% AVG.)	30% (1000AF)	10% (1000AF)	
Keechelus Reservoir Inflow (2)	JUN-JUL	33	39	43	92	47	53	47
	JUN-SEP	40	48	53	90	58	66	59
Kachess Reservoir Inflow (2)	JUN-JUL	32	35	38	88	41	44	43
	JUN-SEP	38	43	46	90	49	54	51
Cle Elum Lake Inflow (2)	JUN-JUL	124	153	173	90	193	220	192
	JUN-SEP	145	181	205	89	230	265	230
Yakima R at Cle Elum (2)	JUN-JUL	205	260	295	87	330	385	340
	JUN-SEP	250	320	365	87	410	480	420
Teanaway R bl Forks nr Cle Elum	JUN-JUL	13.6	24	31	84	38	48	37
	JUN-SEP	16.5	27	34	85	41	52	40

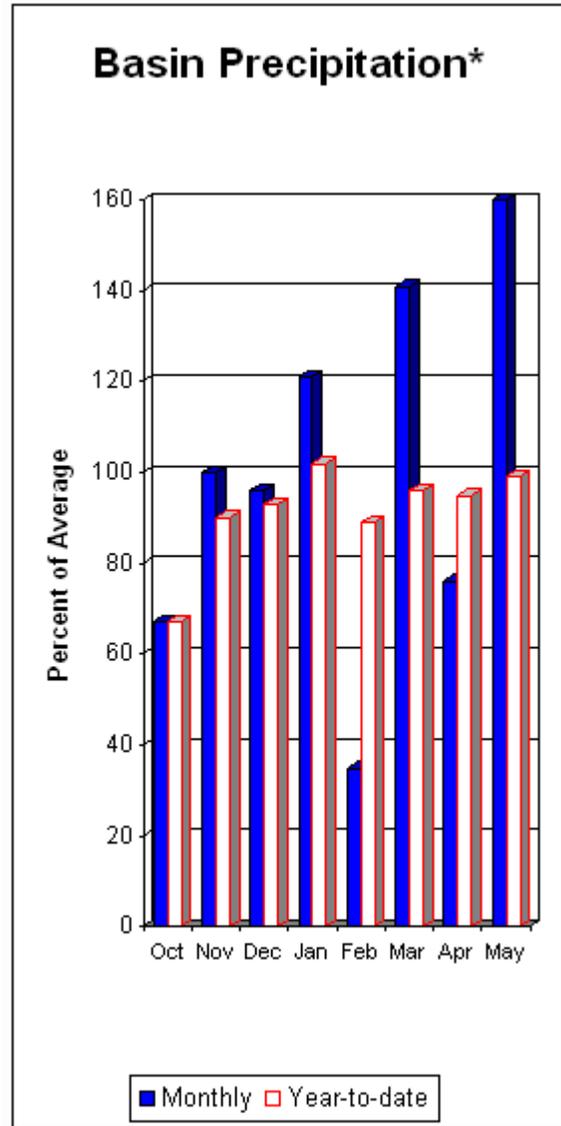
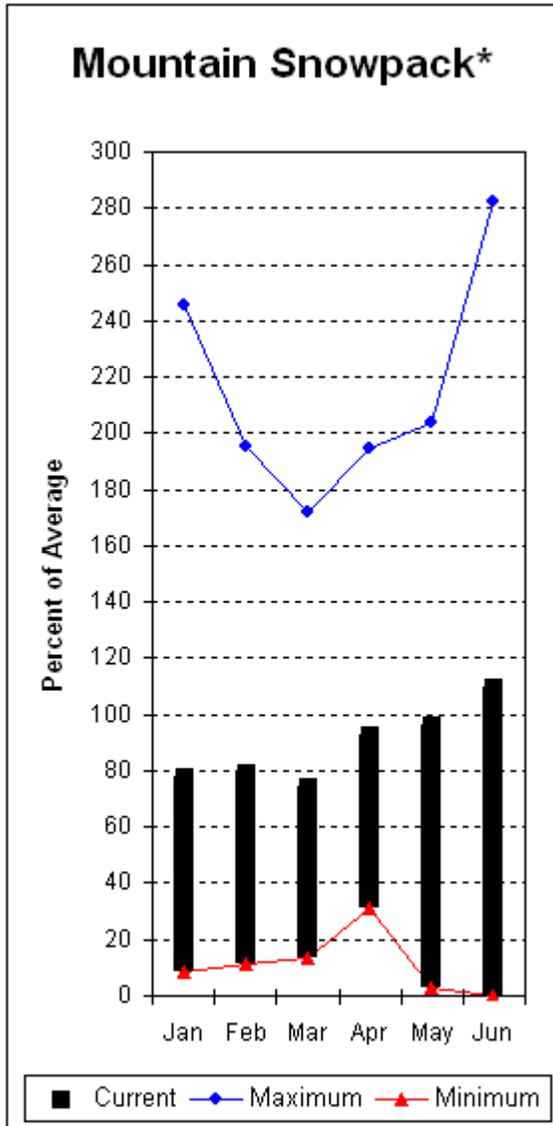
UPPER YAKIMA RIVER BASIN Reservoir Storage (1000 AF) - End of May					UPPER YAKIMA RIVER BASIN Watershed Snowpack Analysis - June 1, 2009			
Reservoir	Usable Capacity	*** Usable Storage ***			Watershed	Number of Data Sites	This Year as % of	
		This Year	Last Year	Avg			Last Yr	Average
KEECHELUS	157.8	155.0	127.2	140.5	UPPER YAKIMA RIVER	6	51	101
KACHESS	239.0	236.9	216.2	207.6				
CLE ELUM	436.9	434.3	341.2	379.3				

\* 90%, 70%, 50%, 30%, and 10% chances of exceeding are the probabilities that the actual volume will exceed the volumes in the table.

The average is computed for the 1971-2000 base period.

- (1) - The values listed under the 10% and 90% Chance of Exceeding are actually 5% and 95% exceedance levels.
- (2) - The value is natural volume - actual volume may be affected by upstream water management.
- (3) - Median value used in place of average. The value listed under 30% is actually a 25% exceedance level.
- The value listed under 70% is actually a 75% exceedance level.

# Lower Yakima River Basin



\*Based on selected stations

May average streamflows within the basin were: Yakima River near Parker, 122%; Naches River near Naches, 114106%; and Yakima River at Kiona, 141%. June 1 reservoir storage for Bumping and Rimrock reservoirs was 230,000-acre feet, 113% of average. Forecast averages for Yakima River near Parker are 92%; American River near Nile, 91%; Ahtanum Creek, 98%; and Klickitat River near Glenwood, 83%. June 1 snowpack was 110% based upon 7 snow course and SNOTEL readings within the Lower Yakima Basin and Ahtanum Creek reported in at 154% of average. Precipitation was 192% of average for May and 99% year-to-date for water. Temperatures were 3 degrees above normal for May and 1 degree below for the water year. Volume forecasts for Yakima Basin are for natural flow. As such, they may differ from the U.S. Bureau of Reclamation’s forecast for the total water supply available, which includes irrigation return flow.

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

# Lower Yakima River Basin

## Streamflow Forecasts - June 1, 2009

Forecast Point	Forecast Period	Future Conditions						30-Yr Avg. (1000AF)
		<<===== Drier =====>>		Future Conditions		===== Wetter =====>>		
		90% (1000AF)	70% (1000AF)	Chance Of Exceeding * (1000AF) (% AVG.)		30% (1000AF)	10% (1000AF)	
Bumping Lake Inflow (2)	JUN-JUL	49	56	61	100	66	73	61
	JUN-SEP	60	67	72	100	77	84	72
American R nr Nile	JUN-JUL	38	45	49	91	53	60	54
	JUN-SEP	44	52	57	91	62	70	63
Rimrock Lake Inflow (2)	JUN-JUL	86	95	102	97	109	118	105
	JUN-SEP	123	133	140	97	147	157	144
Naches R nr Naches (2)	JUN-JUL	250	290	315	100	340	380	315
	JUN-SEP	300	345	375	100	405	450	375
Ahtanum Ck at Union Gap	JUN-JUL	7.0	9.1	10.5	98	11.9	14.0	10.7
	JUN-SEP	8.7	11.0	12.5	98	14.0	16.3	12.8
Yakima R nr Parker (2)	JUN-JUL	535	610	660	93	710	785	710
	JUN-SEP	675	765	825	92	885	975	900
Klickitat near Glenwood	JUN-JUL	31	40	45	86	50	59	52
	JUN-SEP	52	61	67	86	73	82	78
Klickitat River near Pitt WA	JUN-JUL	130	145	156	84	167	182	185
	JUN-SEP	197	220	235	83	250	275	282

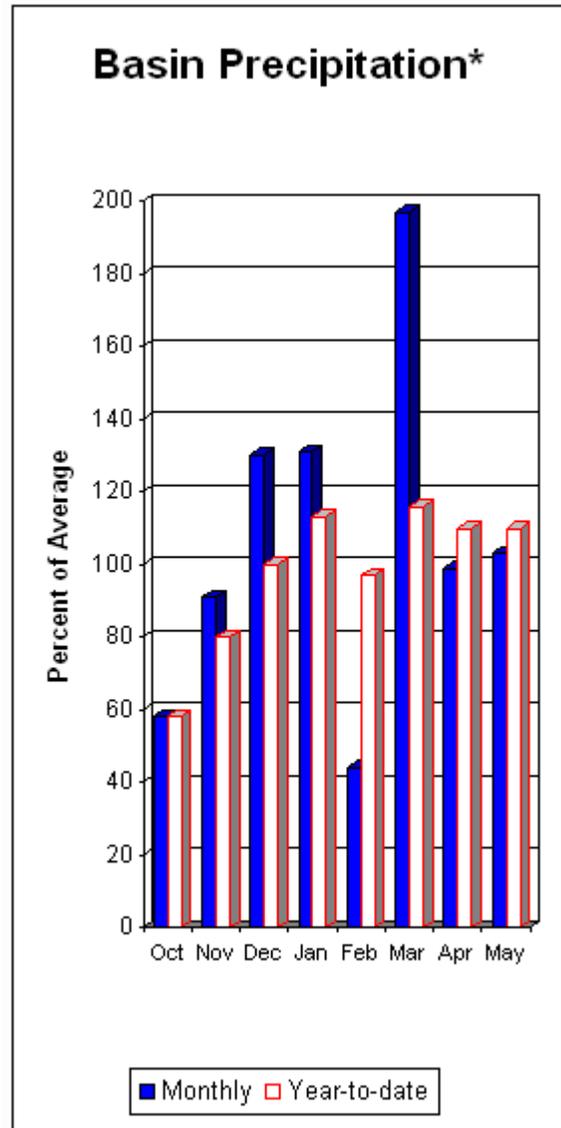
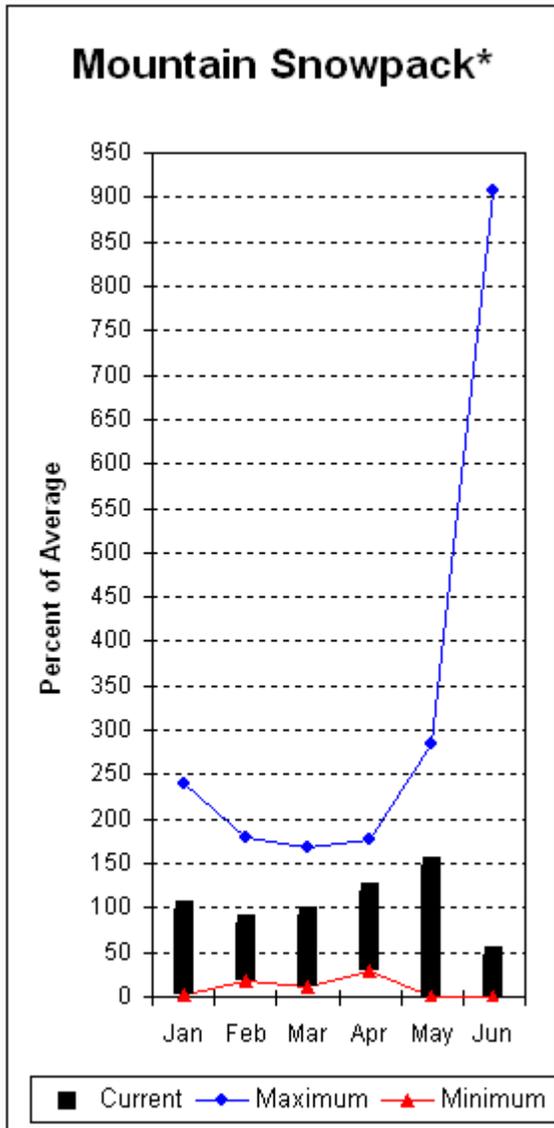
LOWER YAKIMA RIVER BASIN Reservoir Storage (1000 AF) - End of May					LOWER YAKIMA RIVER BASIN Watershed Snowpack Analysis - June 1, 2009			
Reservoir	Usable Capacity	*** This Year	Usable Last Year	Storage *** Avg	Watershed	Number of Data Sites	This Year as % of Last Yr	% of Average
BUMPING LAKE	33.7	33.2	29.6	30.4	LOWER YAKIMA RIVER	6	75	110
RIMROCK	198.0	197.2	176.1	173.5	AHTANUM CREEK	2	159	154

\* 90%, 70%, 50%, 30%, and 10% chances of exceeding are the probabilities that the actual volume will exceed the volumes in the table.

The average is computed for the 1971-2000 base period.

- (1) - The values listed under the 10% and 90% Chance of Exceeding are actually 5% and 95% exceedance levels.
- (2) - The value is natural volume - actual volume may be affected by upstream water management.
- (3) - Median value used in place of average. The value listed under 30% is actually a 25% exceedance level. The value listed under 70% is actually a 75% exceedance level.

# Walla Walla River Basin



\*Based on selected stations

May precipitation was 103% of average, maintaining the year-to-date precipitation at 110% of average. Snowpack in the basin was 46% of average. Streamflow forecasts are 101% of average for Mill Creek and 100% for the SF Walla Walla near Milton-Freewater. May streamflow was 229% of average for the Walla Walla River. Average temperatures were 4 degrees above normal for May and near average for the water year.

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

# Walla Walla River Basin

## Streamflow Forecasts - June 1, 2009

Forecast Point	Forecast Period	<<===== Drier ===== Future Conditions ===== Wetter =====>>						30-Yr Avg. (1000AF)				
		90%		70%		50%			30%		10%	
		(1000AF)	(1000AF)	(1000AF)	(1000AF)	(1000AF)	(1000AF)		(1000AF)	(1000AF)	(1000AF)	(1000AF)
SF Walla Walla R nr Milton-Freewater	JUN-JUL	14.2	17.2	19.2	100	21	24	19.2				
	JUN-SEP	27	30	33	100	36	39	33				
Mill Ck nr Walla Walla	JUN-JUL	4.6	5.9	6.8	101	7.7	9.0	6.8				
	JUN-SEP	8.0	9.5	10.5	101	11.5	13.0	10.4				

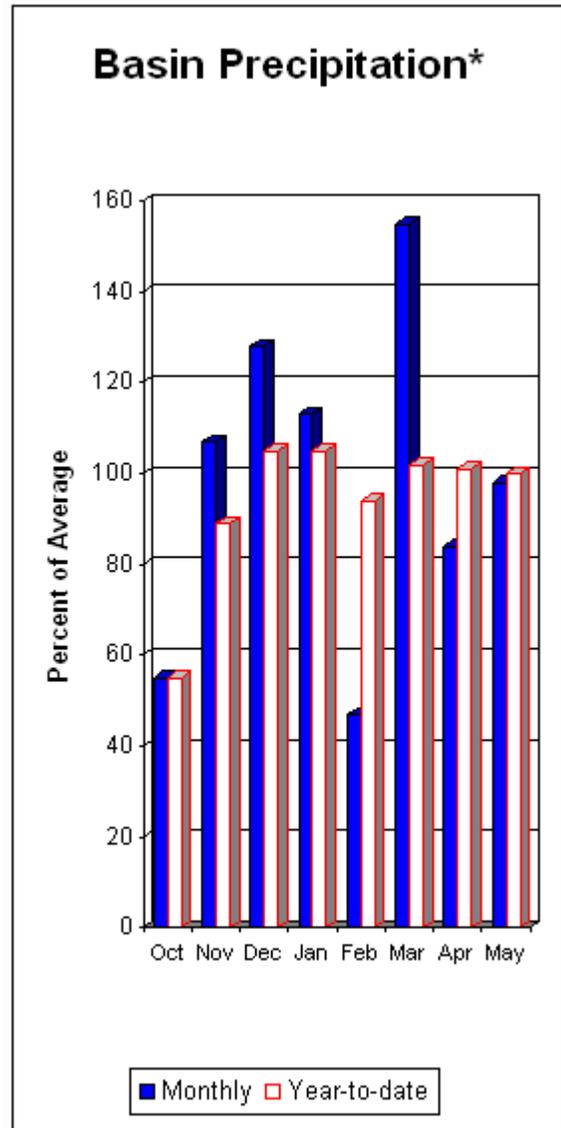
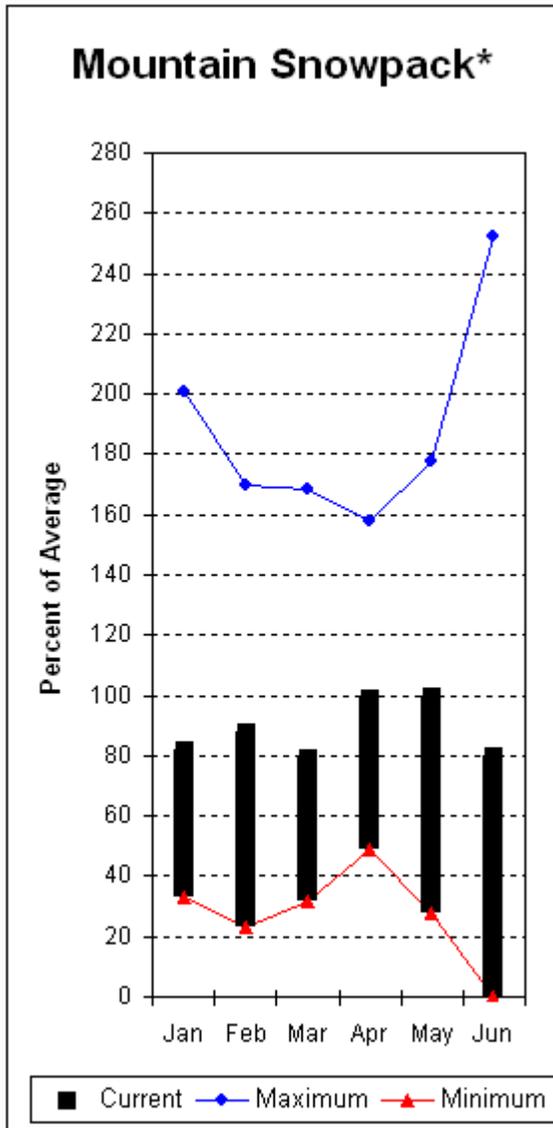
WALLA WALLA RIVER BASIN Reservoir Storage (1000 AF) - End of May					WALLA WALLA RIVER BASIN Watershed Snowpack Analysis - June 1, 2009			
Reservoir	Usable Capacity	*** Usable Storage ***			Watershed	Number of Data Sites	This Year as % of	
		This Year	Last Year	Avg			Last Yr	Average
					WALLA WALLA RIVER	2	7	46

\* 90%, 70%, 50%, 30%, and 10% chances of exceeding are the probabilities that the actual volume will exceed the volumes in the table.

The average is computed for the 1971-2000 base period.

- (1) - The values listed under the 10% and 90% Chance of Exceeding are actually 5% and 95% exceedance levels.
- (2) - The value is natural volume - actual volume may be affected by upstream water management.
- (3) - Median value used in place of average. The value listed under 30% is actually a 25% exceedance level. The value listed under 70% is actually a 75% exceedance level.

# Lower Snake River Basin



\*Based on selected stations

The June - September forecast is for 96% for Clearwater River at Spalding. The Snake and Grande Ronde rivers can both expect summer flows to 92% of normal. May precipitation was 98% of average, bringing the year-to-date precipitation to 100% of average. June 1 snowpack readings averaged 80% of normal. May streamflow was 114% of average for Snake River below Lower Granite Dam and 152% for Grande Ronde River near Troy. Average temperatures were 4 degrees above normal for May and near normal for the water year.

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

# Lower Snake River Basin

## Streamflow Forecasts - June 1, 2009

Forecast Point	Forecast Period	<<===== Drier ===== Future Conditions ===== Wetter =====>>						30-Yr Avg. (1000AF)				
		90% (1000AF)		70% (1000AF)		Chance Of Exceeding * 50% (1000AF) (% AVG.)			30% (1000AF)		10% (1000AF)	
Grande Ronde R at Troy	JUN-JUL	284	374	415	88	456	546	470				
	JUN-SEP	362	471	520	92	569	678	565				
CLEARWATER at Spalding (1,2)	JUN-JUL	1849	2517	2820	95	3123	3791	2960				
	JUN-SEP	2127	2886	3230	96	3574	4333	3370				
SNAKE blw Lower Granite Dam (1,2)	JUN-JUL	6993	8105	8610	92	9115	10227	9340				

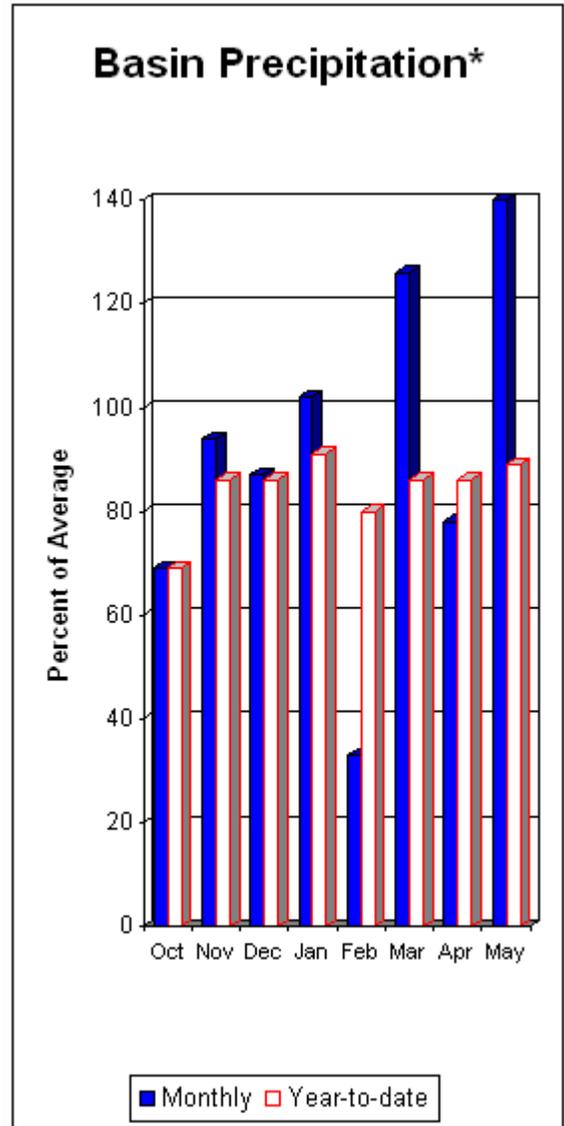
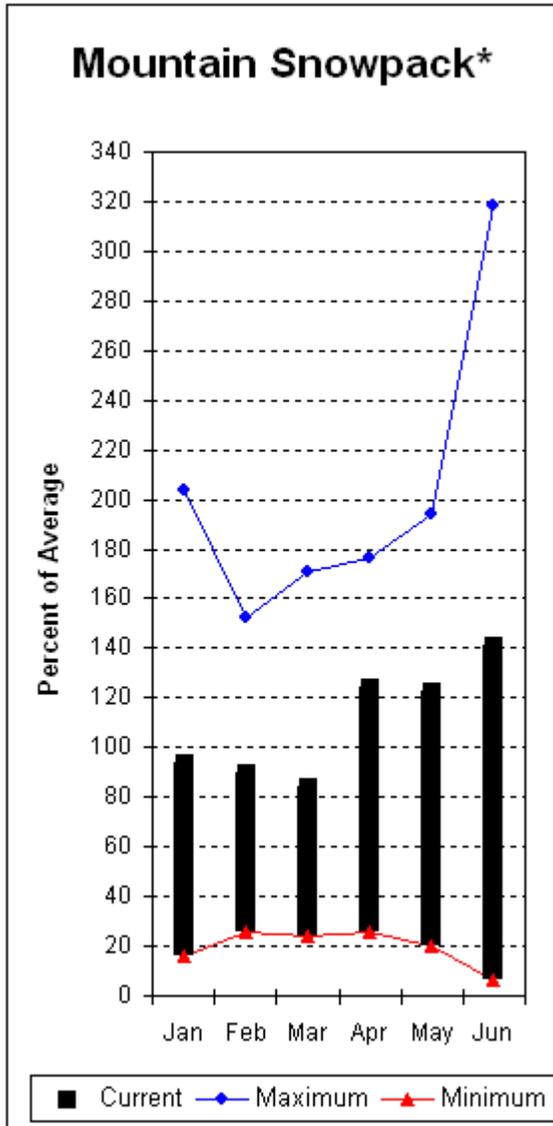
LOWER SNAKE RIVER BASIN Reservoir Storage (1000 AF) - End of May					LOWER SNAKE RIVER BASIN Watershed Snowpack Analysis - June 1, 2009			
Reservoir	Usable Capacity	*** Usable Storage ***			Watershed	Number of Data Sites	This Year as % of	
		This Year	Last Year	Avg			Last Yr	Average
DWORSHAK	3468.0	3113.9	2761.9	3040.7	LOWER SNAKE, GRANDE RONDE	9	38	80

\* 90%, 70%, 50%, 30%, and 10% chances of exceeding are the probabilities that the actual volume will exceed the volumes in the table.

The average is computed for the 1971-2000 base period.

- (1) - The values listed under the 10% and 90% Chance of Exceeding are actually 5% and 95% exceedance levels.
- (2) - The value is natural volume - actual volume may be affected by upstream water management.
- (3) - Median value used in place of average. The value listed under 30% is actually a 25% exceedance level. The value listed under 70% is actually a 75% exceedance level.

# Lower Columbia River Basins



\*Based on selected stations

Forecasts for June – September streamflows within the basin are Lewis River at Ariel, 96% and Cowlitz River at Castle Rock, 95% of average. The Columbia at The Dalles is forecasted to have 88% of average flows this summer. May average streamflow for Cowlitz River was 134% and 144% for Lewis River. The Columbia River at The Dalles was 90% of average. May precipitation was 142% of average and the water-year average was 89%. June 1 snow cover for Cowlitz River was 148%, and Lewis River was 134% of average. Average temperatures were 3-4 degrees above normal during May and near normal for the water year.

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

# Lower Columbia River Basins

## Streamflow Forecasts - June 1, 2009

Forecast Point	Forecast Period	<<===== Drier ===== Future Conditions ===== Wetter =====>>						30-Yr Avg. (1000AF)
		Chance Of Exceeding *						
		90% (1000AF)	70% (1000AF)	50% (1000AF)	(% AVG.)	30% (1000AF)	10% (1000AF)	
Columbia R at The Dalles (2)	JUN-JUL	31400	36300	38600	88	40900	45800	43800
	JUN-SEP	41100	47600	50600	88	53600	60100	57800
Klickitat near Glenwood	JUN-JUL	31	40	45	86	50	59	52
	JUN-SEP	52	61	67	86	73	82	78
Klickitat River near Pitt WA	JUN-JUL	130	145	156	84	167	182	185
	JUN-SEP	197	220	235	83	250	275	282
LEWIS at Ariel (2)	JUN-JUL	260	300	330	98	360	400	338
	JUN-SEP	375	430	465	96	500	555	483
COWLITZ R. bl Mayfield Dam (2)	JUN-JUL	560	630	680	96	730	800	709
COWLITZ R. at Castle Rock (2)	JUN-SEP	940	1090	1190	95	1290	1440	1259

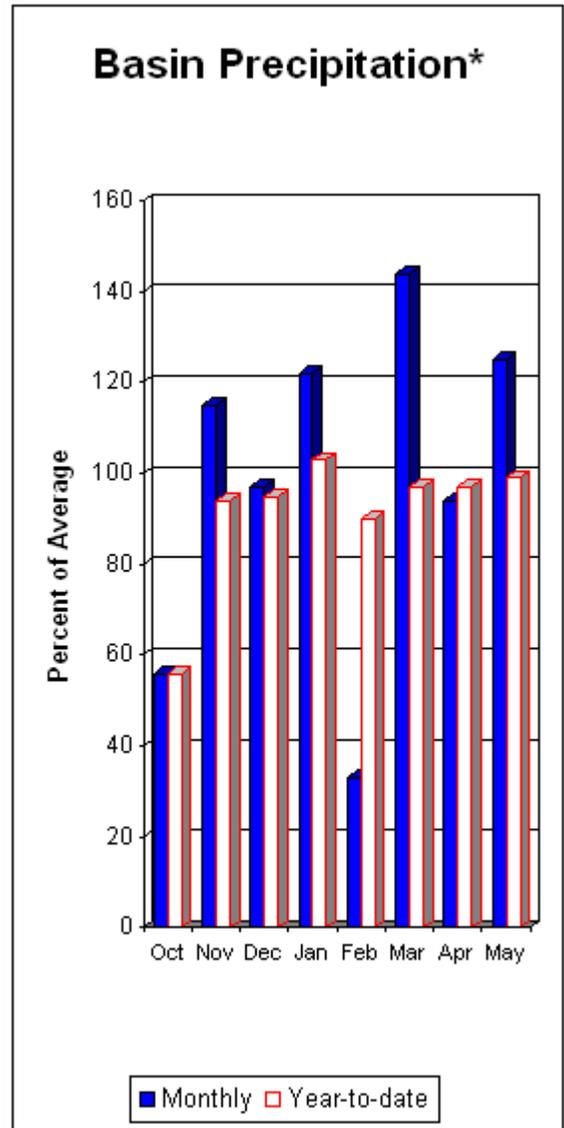
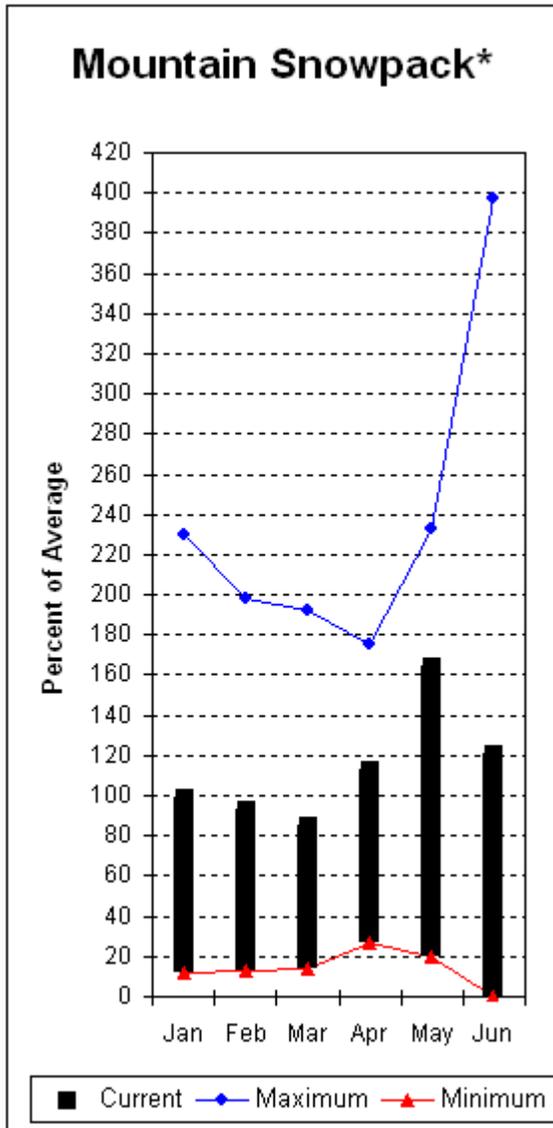
LOWER COLUMBIA RIVER BASINS Reservoir Storage (1000 AF) - End of May					LOWER COLUMBIA RIVER BASINS Watershed Snowpack Analysis - June 1, 2009			
Reservoir	Usable Capacity	*** Usable Storage ***			Watershed	Number of Data Sites	This Year as % of	
		This Year	Last Year	Avg			Last Yr	Average
MOSSYROCK	0.0	1645.1	1499.1	---	LEWIS RIVER	5	36	134
SWIFT	0.0	745.0	730.4	---	COWLITZ RIVER	6	71	148
YALE	0.0	395.0	393.9	---				
MERWIN	0.0	415.0	408.1	---				

\* 90%, 70%, 50%, 30%, and 10% chances of exceeding are the probabilities that the actual volume will exceed the volumes in the table.

The average is computed for the 1971-2000 base period.

- (1) - The values listed under the 10% and 90% Chance of Exceeding are actually 5% and 95% exceedance levels.
- (2) - The value is natural volume - actual volume may be affected by upstream water management.
- (3) - Median value used in place of average. The value listed under 30% is actually a 25% exceedance level. The value listed under 70% is actually a 75% exceedance level.

# South Puget Sound River Basins



\*Based on selected stations

Summer runoff is forecast to be 110% of normal for the Green River below Howard Hanson Dam and 105% for the White River near Buckley. June 1 snowpack was 104% of average for the White River, 128% for Puyallup River and 131% in the Green River Basin. Water content on June 1 at Burnt Mountain SNOTEL, at an elevation of 4170 feet, was 14.3 inches. This site has a June 1 average of 0.4 inches. May precipitation was 125% of average, bringing the water year-to-date to 99% of average for the basins. Average temperatures in the area were 2 degree above normal for May and near normal for the water-year.

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

# South Puget Sound River Basins

## Streamflow Forecasts - June 1, 2009

Forecast Point	Forecast Period	<<===== Drier ===== Future Conditions ===== Wetter =====>>						30-Yr Avg. (1000AF)
		=====		Chance Of Exceeding *		=====		
		90% (1000AF)	70% (1000AF)	(1000AF)	50% (% AVG.)	30% (1000AF)	10% (1000AF)	
WHITE near Buckley (1,2)	JUN-JUL	181	215	230	105	245	280	220
	JUN-SEP	265	310	330	105	350	395	313
GREEN R below Howard Hansen (1,2)	JUN-JUL	59	80	89	110	98	119	81
	JUN-SEP	84	108	119	110	130	154	108

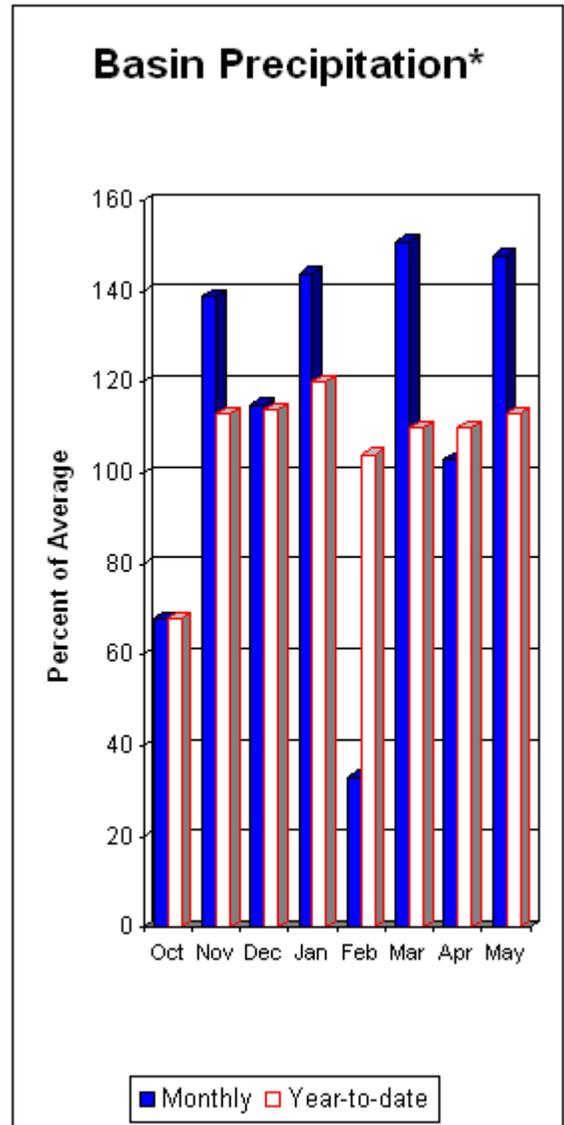
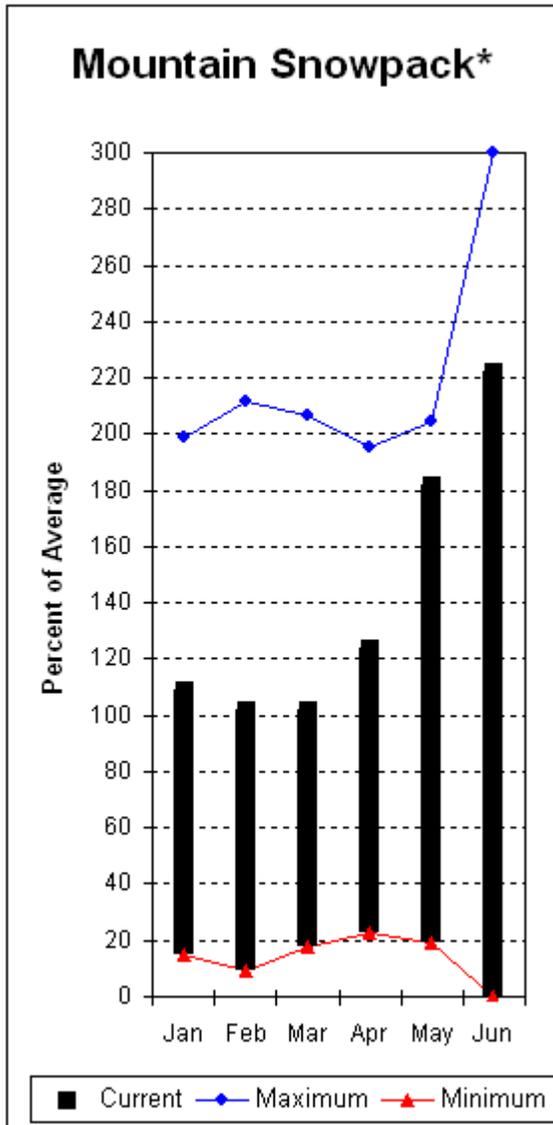
SOUTH PUGET SOUND RIVER BASINS Reservoir Storage (1000 AF) - End of May					SOUTH PUGET SOUND RIVER BASINS Watershed Snowpack Analysis - June 1, 2009			
Reservoir	Usable Capacity	*** Usable Storage ***			Watershed	Number of Data Sites	This Year as % of	
		This Year	Last Year	Avg			Last Yr	Average
					WHITE RIVER	3	72	104
					GREEN RIVER	2	56	131
					PUYALLUP RIVER	5	76	128

\* 90%, 70%, 50%, 30%, and 10% chances of exceeding are the probabilities that the actual volume will exceed the volumes in the table.

The average is computed for the 1971-2000 base period.

- (1) - The values listed under the 10% and 90% Chance of Exceeding are actually 5% and 95% exceedance levels.
- (2) - The value is natural volume - actual volume may be affected by upstream water management.
- (3) - Median value used in place of average. The value listed under 30% is actually a 25% exceedance level. The value listed under 70% is actually a 75% exceedance level.

# Central Puget Sound River Basins



\*Based on selected stations

Forecast for spring and summer flows are: 146% for Cedar River near Cedar Falls; 146% for Rex River; 121% for South Fork of the Tolt River; and 143% for Cedar River at Cedar Falls. Basin-wide precipitation for May was 148% of average, bringing water-year-to-date to 113% of average. June 1 average snow cover in Cedar River Basin was 348%, Tolt River Basin was 221%, Snoqualmie River Basin was 159%, and Skykomish River Basin was 159%. Skookum Creek SNOTEL site, at 3920 feet, had 18.3 inches of water content. Average June 1 water content is 1.5 inches at Skookum Creek. Temperatures were 2 degrees above average for May and 1 degree below normal for the water-year.

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

# Central Puget Sound River Basins

## Streamflow Forecasts - June 1, 2009

Forecast Point	Forecast Period	<<===== Drier ===== Future Conditions ===== Wetter =====>>						30-Yr Avg. (1000AF)
		=====		Chance Of Exceeding *		=====		
		90% (1000AF)	70% (1000AF)	(1000AF)	50% (% AVG.)	30% (1000AF)	10% (1000AF)	
CEDAR near Cedar Falls	JUN-JUL	28	34	38	141	42	48	27
	JUN-SEP	37	43	48	141	53	59	34
REX near Cedar Falls	JUN-JUL	7.9	10.3	12.0	146	13.7	16.1	8.2
	JUN-SEP	11.1	13.9	15.8	146	17.7	20	10.8
CEDAR RIVER at Cedar Falls	JUN-JUL	18.1	23	26	143	29	34	18.2
	JUN-SEP	20	23	25	143	27	30	17.5
SOUTH FORK TOLT near Index	JUN-JUL	5.0	6.4	7.3	120	8.2	9.6	6.1
	JUN-SEP	3.8	7.5	10.0	121	12.5	16.2	8.3

### CENTRAL PUGET SOUND RIVER BASINS Reservoir Storage (1000 AF) - End of May

### CENTRAL PUGET SOUND RIVER BASINS Watershed Snowpack Analysis - June 1, 2009

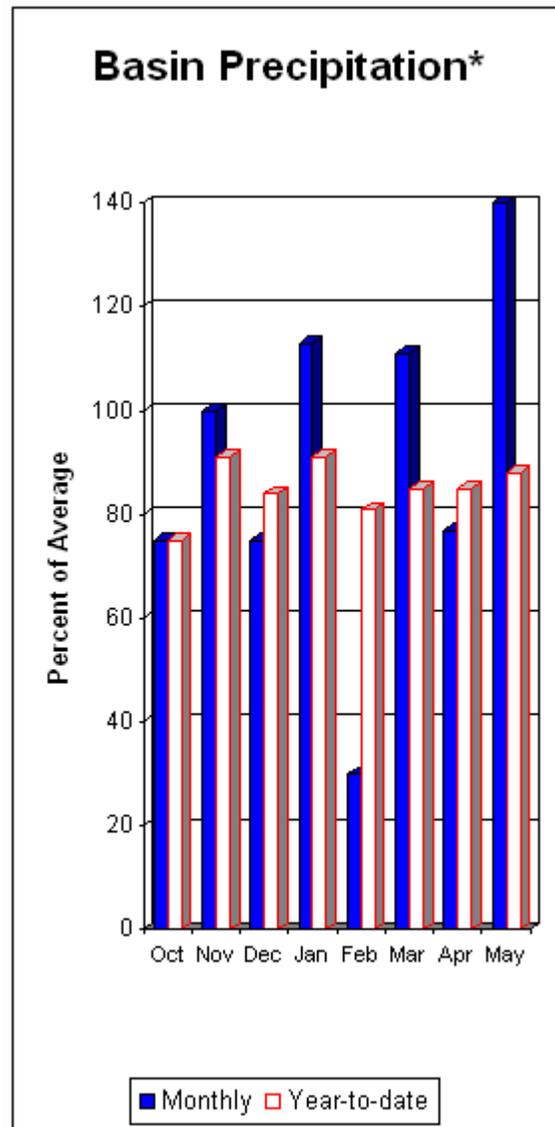
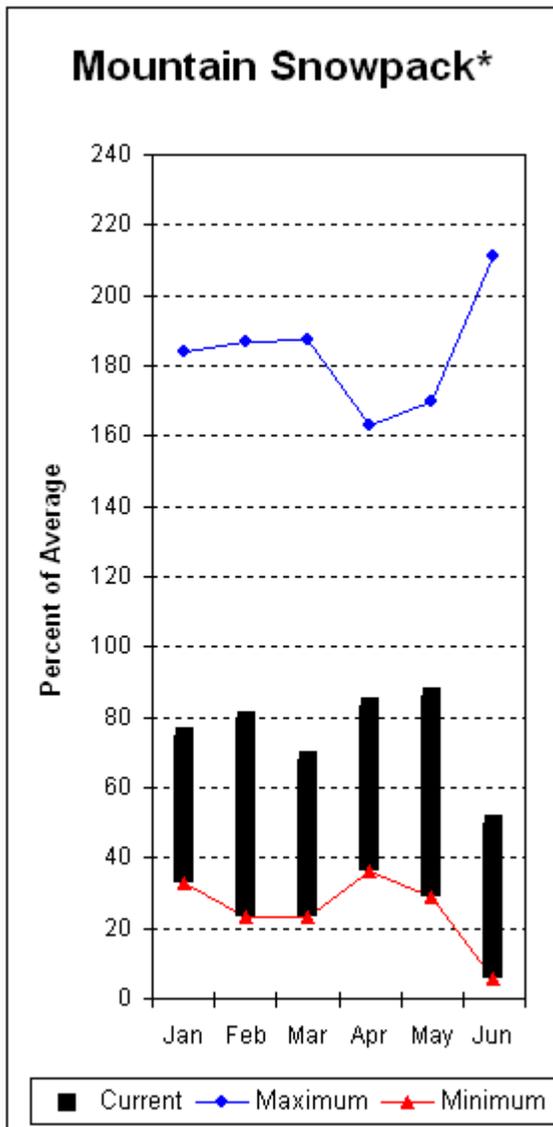
Reservoir	Usable Capacity	*** Usable Storage ***			Watershed	Number of Data Sites	This Year as % of	
		This Year	Last Year	Avg			Last Yr	Average
					CEDAR RIVER	4	27	348
					TOLT RIVER	2	64	221
					SNOQUALMIE RIVER	4	62	159
					SKYKOMISH RIVER	2	70	159

\* 90%, 70%, 50%, 30%, and 10% chances of exceeding are the probabilities that the actual volume will exceed the volumes in the table.

The average is computed for the 1971-2000 base period.

- (1) - The values listed under the 10% and 90% Chance of Exceeding are actually 5% and 95% exceedance levels.
- (2) - The value is natural volume - actual volume may be affected by upstream water management.
- (3) - Median value used in place of average. The value listed under 30% is actually a 25% exceedance level.  
The value listed under 70% is actually a 75% exceedance level.

# North Puget Sound River Basins



\*Based on selected stations

Forecast for Skagit River streamflow at Newhalem is 80% of average for the spring and summer period. May streamflow in Skagit River was 101% of average. Other forecast points included Baker River at 80% and Thunder Creek at 84% of average. Basin-wide precipitation for May was 141% of average, bringing water-year-to-date to 88% of average. June 1 average snow cover in Skagit River Basin was 63%, and Nooksack River Basin was 38%. Data for Baker River Basin was not available. Rainy Pass SNOTEL, at 4,780 feet, had 12.5 inches of water content. Average June 1 water content is 24.3 inches at Rainy Pass. June 1 Skagit River reservoir storage was 112% of average and 84% of capacity. Average temperatures for May were 1 degree above normal for the basin and 1 degree below average for the water year.

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

# North Puget Sound River Basins

## Streamflow Forecasts - June 1, 2009

Forecast Point	Forecast Period	<<===== Drier ===== Future Conditions ===== Wetter =====>>						30-Yr Avg. (1000AF)
		=====		Chance Of Exceeding *		=====		
		90% (1000AF)	70% (1000AF)	(1000AF)	50% (% AVG.)	30% (1000AF)	10% (1000AF)	
THUNDER CREEK near Newhalem	JUN-JUL	103	120	131	83	142	159	158
	JUN-SEP	178	200	215	84	230	250	257
SKAGIT at Newhalem (2)	JUN-JUL	675	775	845	80	915	1020	1054
	JUN-SEP	900	1040	1130	80	1220	1360	1407
BAKER RIVER near Concrete	JUN-JUL	280	335	370	80	405	460	465
	JUN-SEP	345	470	550	80	630	755	687

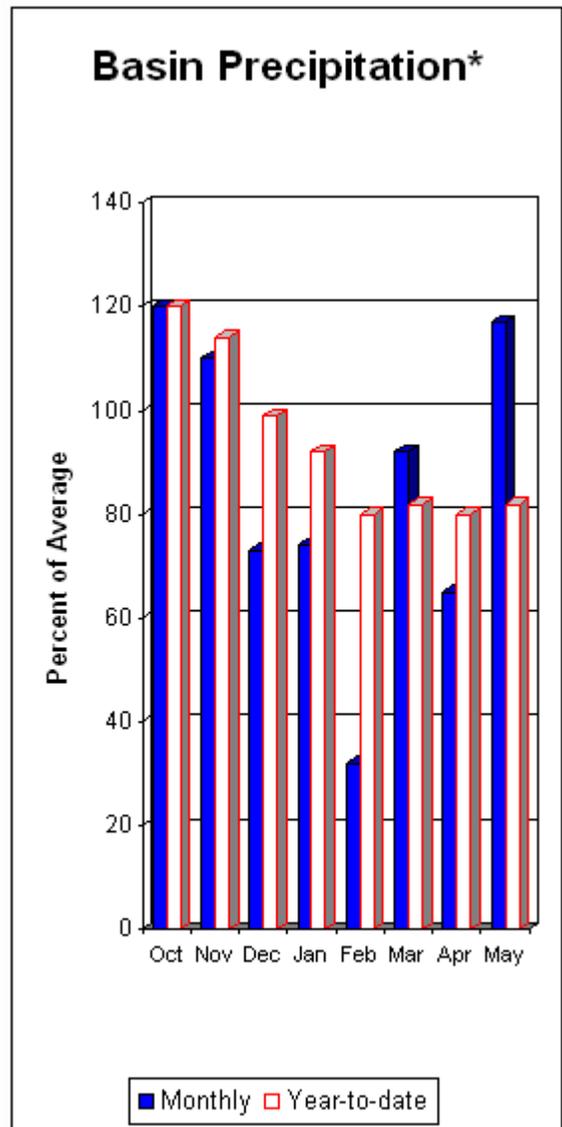
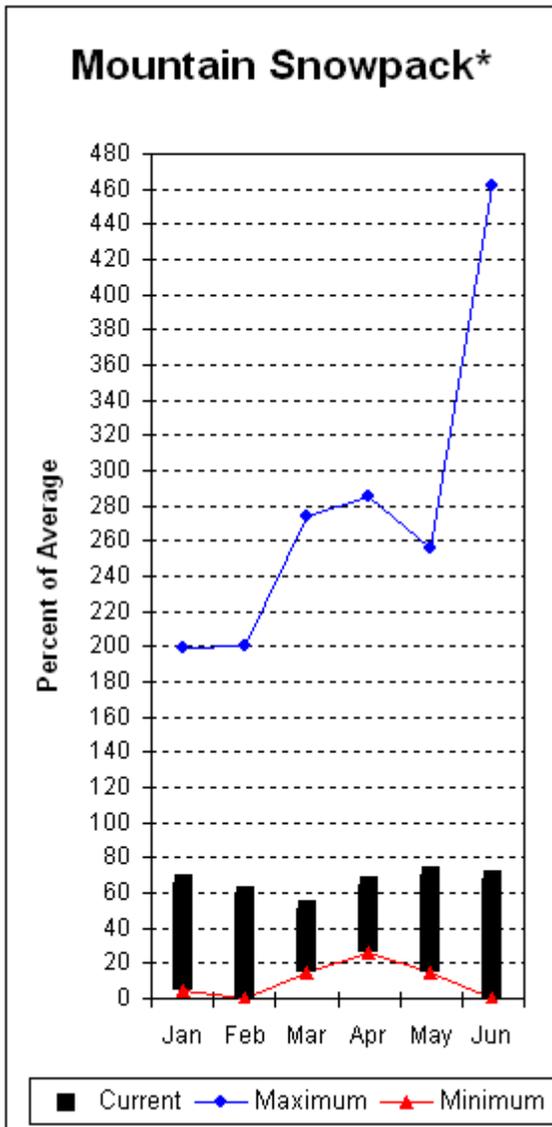
NORTH PUGET SOUND RIVER BASINS Reservoir Storage (1000 AF) - End of May					NORTH PUGET SOUND RIVER BASINS Watershed Snowpack Analysis - June 1, 2009			
Reservoir	Usable Capacity	*** Usable Storage ***			Watershed	Number of Data Sites	This Year as % of	
		This Year	Last Year	Avg			Last Yr	Average
ROSS	1404.1	1161.3	1024.7	1031.4	SKAGIT RIVER	5	58	63
DIABLO RESERVOIR	90.6	87.0	85.3	86.9	NOOKSACK RIVER	2	66	38

\* 90%, 70%, 50%, 30%, and 10% chances of exceeding are the probabilities that the actual volume will exceed the volumes in the table.

The average is computed for the 1971-2000 base period.

- (1) - The values listed under the 10% and 90% Chance of Exceeding are actually 5% and 95% exceedance levels.
- (2) - The value is natural volume - actual volume may be affected by upstream water management.
- (3) - Median value used in place of average. The value listed under 30% is actually a 25% exceedance level.  
The value listed under 70% is actually a 75% exceedance level.

# Olympic Peninsula River Basins



\*Based on selected stations

Forecasted average runoff for streamflow for the Dungeness River is 90% and Elwha River is 80%. May runoff in the Dungeness River was 80% of normal. Big Quilcene and Wynoochee rivers should expect below average runoff this summer as well. May precipitation was 117% of average. Precipitation has accumulated at 82% of average for the water year. May precipitation at Quillayute was 4.32 inches. The thirty-year average for May is 5.51 inches. Olympic Peninsula snowpack averaged 68% of normal on June 1. Temperatures were near average for May and 1 degree below average for the water year.

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

# Olympic Peninsula River Basins

## Streamflow Forecasts - June 1, 2009

Forecast Point	Forecast Period	<<===== Drier ===== Future Conditions ===== Wetter =====>>						30-Yr Avg. (1000AF)
		=====		Chance Of Exceeding *		=====		
		90% (1000AF)	70% (1000AF)	50% (1000AF)	(% AVG.)	30% (1000AF)	10% (1000AF)	
DUNGENESESS near Sequim	JUN-JUL	49	58	64	90	70	79	71
	JUN-SEP	65	79	89	90	99	113	99
ELWHA near Port Angeles	JUN-JUL	150	166	177	80	188	205	222
	JUN-SEP	210	230	245	80	260	280	306

OLYMPIC PENINSULA RIVER BASINS Reservoir Storage (1000 AF) - End of May					OLYMPIC PENINSULA RIVER BASINS Watershed Snowpack Analysis - June 1, 2009			
Reservoir	Usable Capacity	*** Usable Storage ***			Watershed	Number of Data Sites	This Year as % of	
		This Year	Last Year	Avg			Last Yr	Average
					OLYMPIC PENINSULA	3	24	68

\* 90%, 70%, 50%, 30%, and 10% chances of exceeding are the probabilities that the actual volume will exceed the volumes in the table.

The average is computed for the 1971-2000 base period.

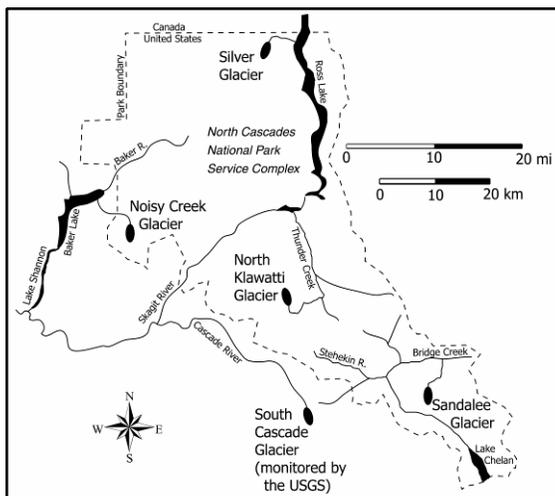
- (1) - The values listed under the 10% and 90% Chance of Exceeding are actually 5% and 95% exceedance levels.
- (2) - The value is natural volume - actual volume may be affected by upstream water management.
- (3) - Median value used in place of average. The value listed under 30% is actually a 25% exceedance level. The value listed under 70% is actually a 75% exceedance level.

# NORTH CASCADES GLACIER PAGE 2009

## 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 Jeanna\_Wenger@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 8800 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. Figure 2 shows 2008 was the sixth consecutive year to have a negative net balance for all but Silver Glacier, which had a positive balance for 2008 due to its high elevation.



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

<b>Table 1</b>		<b>Average</b>	<b>2009</b>	<b>2009</b>
<b>Glacier:</b>	<b>Elev.</b>	<b>Accumulation</b>	<b>Accumulation</b>	<b>Percent of Average</b>
	(feet)	(inches W.E.)	(inches W.E.)	
<b>Noisy Creek</b> Density = 0.5	<b>Entire Glacier</b>	<b>120</b>	<b>124</b>	<b>103</b>
	6061	127	99	78
	6035	133	135	102
	5904	119	*	*
	5756	93	93	100
	5655	111	104	93
<b>Silver</b> Density = 0.50	<b>Entire Glacier</b>	<b>92</b>	<b>79</b>	<b>85</b>
	8420	109	100	92
	8069	89	28	31
	7606	112	109	98
<b>North Klawatti</b> Density = 0.50	<b>Entire Glacier</b>	<b>112</b>	<b>97</b>	<b>86</b>
	7665	112	70	63
	7301	118	117	99
	6901	118	116	98
	6396	101	80	79
<b>Sandalee</b> Density = 0.50	<b>Entire Glacier</b>	<b>115</b>	<b>114</b>	<b>99</b>
	7360	109	109	99
	7124	117	107	92
	6881	110	82	75
	6560	128	157	123

**Table 1.** Table 1 presents this spring's provisional winter accumulation data, along with average values and percent of the 16-year average. The 2009 snow depths were measured on April 20<sup>th</sup> and 21<sup>st</sup> on the four glaciers. The provisional data show 2009 as just below an average snow year. These data are tentative and will be revised after a July visit. Snow density of 0.5 was assumed to calculate water equivalent because no direct snow density measurements were taken. Densities are in fraction of water density.

\* Data at this site on Noisy Glacier are inconclusive but will be re-checked during the July visit.

The 2008 estimates of glacial contribution to runoff for the 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, 3%; Stehekin River, 6%; 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.

Table 2 Provisional Data	May-September Runoff (thousands acre-feet)				Percent Glacial Runoff to Total Summer Runoff		
	2008	mean	min	max	2008	min	max
Noisy Creek Glacier	1.5	1.5	1.2	1.9			
<b>Baker River Watershed</b>	<b>64.3</b>	<b>69.8</b>	<b>50.1</b>	<b>87.2</b>	<b>6.6</b>	<b>5.6</b>	<b>14.6</b>
North Klawatti Glacier	3.7	4.1	2.8	4.8			
<b>Thunder Creek Watershed</b>	<b>94.1</b>	<b>97.1</b>	<b>71.8</b>	<b>118.8</b>	<b>28.6</b>	<b>20.7</b>	<b>47.7</b>
Sandalee Glacier	0.5	0.5	0.4	0.7			
<b>Stehekin River Watershed</b>	<b>68.6</b>	<b>71.0</b>	<b>51.6</b>	<b>88.1</b>	<b>8.5</b>	<b>5.4</b>	<b>22.9</b>
Silver Glacier	1.0	1.0	0.7	1.3			
<b>Ross Lake Watershed</b>	<b>62.2</b>	<b>64.9</b>	<b>47.4</b>	<b>80.5</b>	<b>4.2</b>	<b>2.5</b>	<b>13.5</b>

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 1993-2008 except the Sandalee Glacier and Stehekin River Watershed (1995-2008).

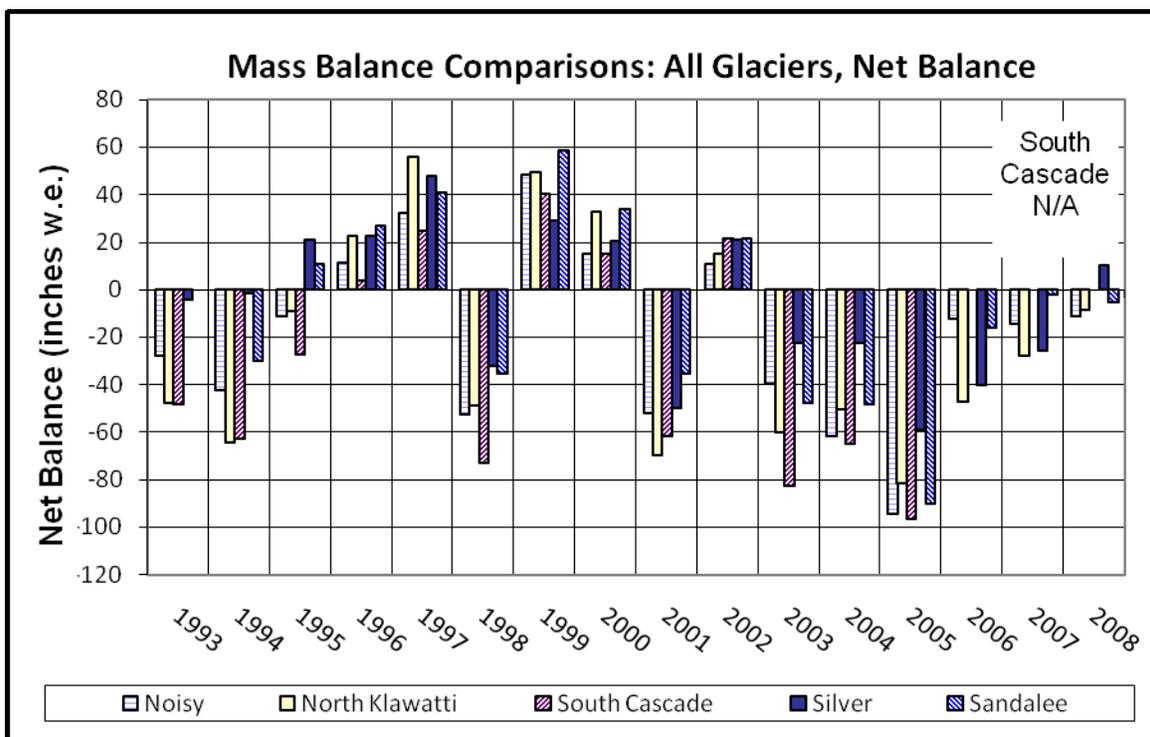


Figure 2. Net annual mass balance for the five glaciers monitored in the North Cascades.

## Mount Rainier Glacier Monitoring 2009

The National Park Service began to monitor annual mass balance on Nisqually and Emmons glaciers in 2003, while tracking area and volume changes of all Mount Rainier glaciers on a 20-year cycle. The annual program includes spring, summer and fall field measurements of snow depth, density, snow and ice melt, and annual terrestrial photography on the Nisqually and

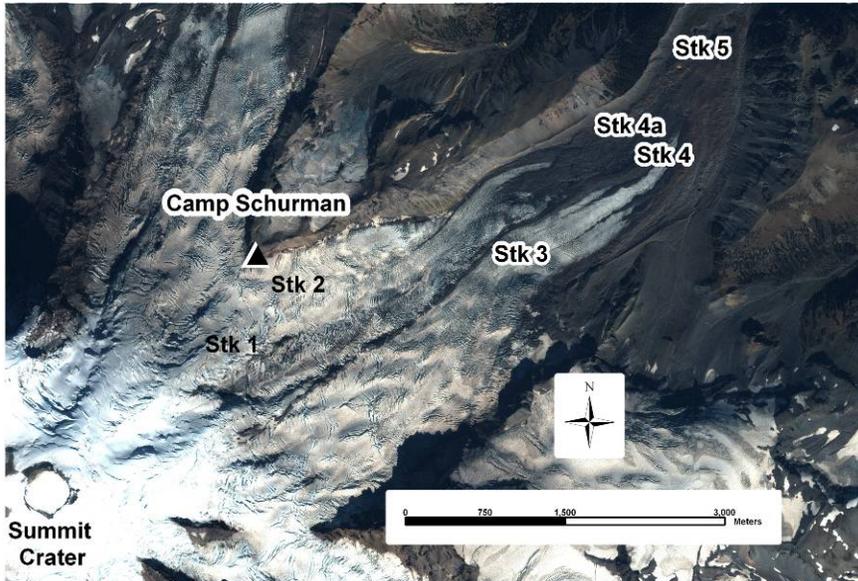


Figure 1. Emmons and surrounding glaciers with stake measurement sites.

Emmons glaciers. This program is a cooperative venture between Mount Rainier National Park and North Cascades National Park.

Between April 15th and May 23 of this year we measured snow density and depth and placed ablation stakes between ~11,000 and 5,000 feet on the Nisqually and Emmons glaciers (Figures 1 and 2).

We placed a total of six stakes per glacier with the lowest two stakes in debris covered ice. Data collected thus far indicate 2009 snow water accumulation was 83 percent of average on the

glaciers. On Mount Rainier, snow accumulation generally increases with altitude but has high spatial variability due to wind effects. The accumulation trend on the south side of the mountain increases with elevation up to ~7100 feet and then decreases above (Table 1). Accumulation on the Emmons Glacier generally peaks at ~10,000', our highest placed stake.

We normally take spring measurements in early April at the lower elevations and in May at higher elevations. The

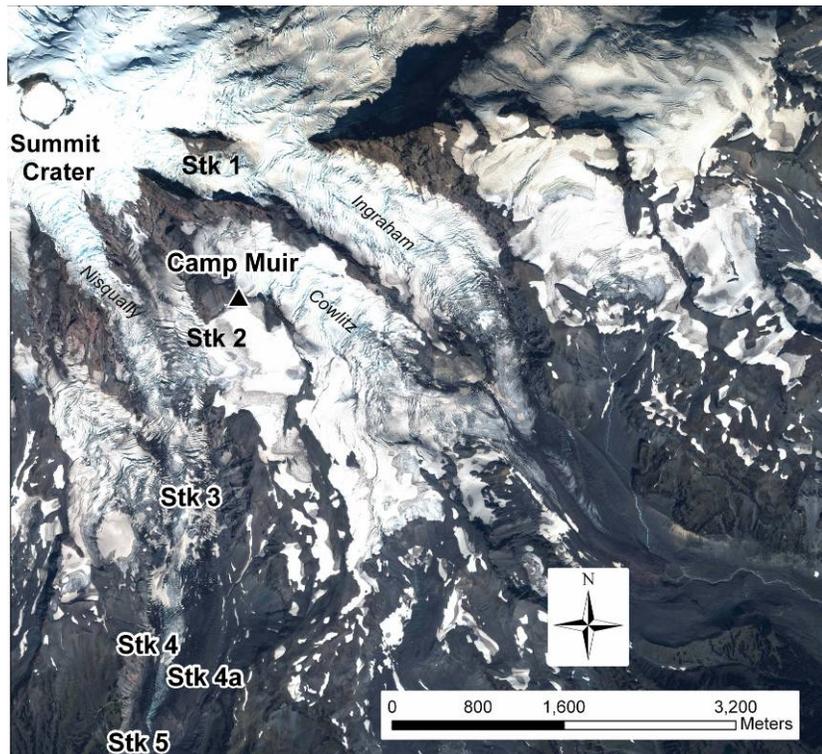


Figure 2. Nisqually and surrounding glaciers with measurement sites.

glaciers at Mount Rainier are unique for the Pacific Northwest in that they span up to a ~10,000' elevation range. In the spring when melt begins on the lower glacier, the upper mountain is still accumulating snow. Likewise in the fall, when snow begins to collect on the upper mountain, snow and ice melt is still occurring on the lower glacier. This program is unique in that we time our visits to capture these seasonal differences and make multiple trips per year. For the second year in a row our spring collection dates have been delayed due to persistent cool temperatures and continual snow accumulation.

Table 1		Altitude	Accumulation (inches w.e.)					Average	
		(feet)	2004	2005	2006	2007	2008	2009	
Muir Snowfield & Nisqually Glacier	11,096	NA	NA	94	NA	NA	78	86	
	9,711	89	59	105	92	90	84	87	
	7,136	151	78	144	165	149	103	132	
	6,201	98	55	118	91	145	84	99	
	6,135	83	39	146	88	124	58	90	
	5,833	67	20	118	75	NA	59	73	
Paradise	5,121	72	35	84	70	106	82	75	
Emmons Glacier	10,205	NA	NA	117	153	NA	71	114	
	9,218	74	104	94	153	122	68	102	
	6,462	65	27	85	57	83	61	63	
	5,577	48	25	66	48	51	33	45	
	5,593	36	32	48	51	52	30	41	
	5,183	32	9	30	31	67	31	33	

Table 1. Maximum accumulation (inches water equivalent) on Mount Rainier glaciers, for the years 2004 through 2009. *Provisional Data.*

We will return to the glaciers in early July to confirm our spring snow depths, take additional density measurements, and record snow melt. On a fall visit (late September/early October) we will record final ablation measurements from the stakes. The end result of these seasonal measurements is the net balance, which is the sum of winter accumulation (always positive) and summer melt (always negative). The cumulative net balance allows us to see the overall trend in glacier health (Figure 3).

If you see our melt stakes sticking out of the glacier, please do not approach or remove them. Several stakes are near climbing routes and should not be confused as route wand markers. For more information contact Jon\_Riedel @nps.gov or Jeanna\_Wenger@nps.gov.

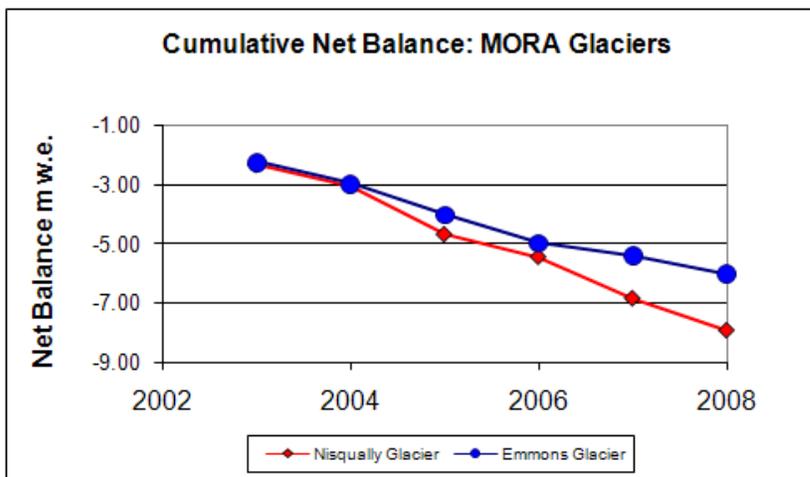


Figure 3. Cumulative net balance for the Nisqually and Emmons glaciers. Units are in meters water equivalent.