

**COLUMBIA RIVER WATER MANAGEMENT GROUP  
MEETING NO. 500**

**1. ATTENDANCE**

The following met at 7:30 p.m. on Tuesday, July 13, 1999, in the Ramada Inn, Kennewick, WA.

**Members or Alternates Present**

Roger Ross, Corps of Eng-NWD-NP , Chair  
Suzanne Cooper, Bonneville Power Admin  
Ted Day, US Bureau of Reclamation  
Ed Hubbard, US Geological Survey - Portland

**Others Present**

Dušica Jevremović, Fish Passage Center  
Carie Lee, Bonneville Power Admin  
Ken Yokoyama, Corps of Eng-NWD-NP  
Cathy Hlebechuk, Corps of Eng-NWD-NP

**Members Not Present or Represented**

Dan Moore, Nat'l Resources Conservation Svc  
Walter Boyle, Federal Energy Regulatory Comm  
Doug McChesney, WA Dept Ecology  
Harold Opitz, National Weather Svc-RFC  
, Nat'l Marine Fisheries Svc  
Jack Gakstatter, US Environ'l Protection Agy  
Bruce McCammon, US Forest Service  
Marvin Yoshinaka, US Fish and Wildlife Svc  
Bill Brooks, Bureau of Land Management  
Barry Norris, Oregon Dept of Water Res  
Mike Turnipseed, Nevada State Engineer  
Gordon Fassett, Wyoming State Engineer  
Jack Stults, Montana Dept of Nat'l Res/Cons

**2. WEATHER SUMMARY**

Overall, below normal temperature and precipitation prevailed in the basin during April and May. An exception was during May west of the Cascades which had near to above normal rainfall. June was cooler and wetter than normal except during two periods: at mid month a strong pressure ridge produced hot, dry weather which induced snowmelt, and then late in the month a strong low from the Gulf of Alaska brought significant rain and cool weather to the western and northeastern portions of the basin (Encl 1).

**May** precipitation was 70% of normal for the Columbia River above Grand Coulee; 95% of normal for the Snake Basin above Ice Harbor; and 79% for the basin above The Dalles. The Willamette Valley averaged 137% while the Rogue averaged 91%. **Seasonal** precipitation (Oct-May) was 104% of normal for the Columbia River above Grand Coulee; 105% of normal for the Snake Basin above Ice Harbor; and 107% for the basin above The Dalles. The Willamette Valley averaged 125% while the Rogue averaged 121%.

**June** precipitation was 107% of normal for the Columbia River above Grand Coulee; 99% of normal for the Snake Basin above Ice Harbor; and 95% for the basin above The Dalles. The Willamette Valley averaged 86% while the Rogue averaged 22%. **Seasonal** precipitation (Oct-Jun) was 104% of normal for the Columbia River above Grand Coulee; 104% of normal for the Snake Basin above Ice Harbor; and 106% for the basin above The Dalles. The Willamette Valley averaged 124% while the Rogue averaged 118%.

**3. SNOWPACK**

The snowpacks in the Pacific Northwest have been melted except for at the highest elevations. The volume of snow water equivalent at these elevations is not sufficient to produce any significant runoff.

**4. STREAMFLOW**

Streamflows generally increased significantly east of the Cascades and decreased in the coastal basins during the three-month period April through July (Encl 2), according to Ed Hubbard.

**5. SWSI**

The Surface Water Supply Indices for Oregon for May, June and July was above normal due to the heavy snowpacks and above normal spring rainfall as shown at <http://crystal.or.nrcs.usda.gov/snowsveys/>.

**6. RUNOFF VOLUME FORECASTS**

NWRFC reports that seasonal river flow peaks occurred mid June for the Kootenai and Upper Columbia basins (Enc 1).

**7. RESERVOIR OPERATION**

Flow augmentation for irrigation began last week in the upper and middle Snake regions, according to Ted Day. This year's peak flow on the Henrys Fork was greater than that of WY 97. Keechelus Dam on the Yakima River is being held below full pool because of a safety of dams issue. Additional project information will be found in Enclosure 3 and on the USBR web site at: <http://www.pn.usbr.gov/hydromet/>.

Active content available on June 30 at **Franklin D. Roosevelt Lake** (behind **Grand Coulee Dam**) was 4,711,100 af-91% of capacity and **Hungry Horse** was 2,767,500 af-93% of capacity.

The Corps of Engineers projects are being operated within typical limits as reported by Cathy Hlebechuk (Enc 4). Libby is being operated to meet requests for sturgeon, salmon, and bull trout. Dworshak and the Lower Snake Projects are being operated to meet flow requirements for salmon. On the Willamette new flow requirements are being met for the new ESA listings of spring chinook and winter steelhead.

**8. POWER OPERATIONS**

No power report was submitted.

**9. FISHERIES**

In reporting on system operation for fisheries Dušica Jevremović reported that flood control requirements and cool spring weather combined to make it impossible for project operations to meet all the flow requirements at Lower Granite and McNary dams during the April through June period. The voluntary spill for fish at the lower Snake and lower Columbia projects met the total dissolved gas (TDG) waivers (115%-120%) at nearly all locations. Additional fish-related activities can be found in <http://www.fpc.org>.

**10. OTHER**

Beginning in the year 2000 the USGS will no longer be computing the adjusted flows in the Comparative Flow Table they prepare for distribution at the CRWMG meetings.

Notes on the tours of Ice harbor, Lower Monumental, pumping stations, etc are attached as Enclosure 5.

**11. NEXT MEETINGS**

The next scheduled meeting of the CRWMG will be in October with notification by E-mail.

Roger L. Ross  
Secretary

Enclosures

1. Weather Summary from net
2. SWSI maps
3. Streamflow Summary
4. COE Project Summary
5. Tour notes

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ZCZC PDXRRMPD2 WES  
TTAA00 KPDR DDHHMM

NORTHWEST RIVER FORECAST CENTER - PORTLAND, OREGON  
COLUMBIA BASIN PRECIPITATION (MONTHLY SUMMARY)

NWS PORTLAND RIVER FORECAST CENTER  
COLUMBIA BASIN DIVISION AVERAGES OF SEASONAL PRECIPITATION

DIVISION	..MAY TO DAY 31..			....OCT - MAY....		
	OBSD	DEP	PCT AV	OBSD	DEP	PCT AV
COLUMBIA ABOVE COULEE	1.50	-.63	70.	18.98	.73	104.
SNAKE RV AB ICE HARBOR	1.62	-.09	95.	14.25	.70	105.
COLUMBIA AB THE DALLES	1.44	-.38	79.	18.94	1.19	107.
COLUMBIA AB CASTLEGAR	2.20	.03	101.	28.41	4.14	117.
KOOTENAI	1.65	-.40	80.	18.92	.61	103.
CLARK FORK	.99	-.96	51.	11.57	-.83	93.
FLATHEAD	1.23	-1.17	51.	15.27	-1.14	93.
PEND OREILLE/ SPOKANE	1.43	-.81	64.	27.82	3.72	115.
NORTHEAST WASHINGTON	1.86	.00	100.	16.41	2.41	117.
OKANOGAN	1.37	.07	105.	12.61	1.72	116.
EAST SLOPES WASH CASCADE	1.32	-.14	90.	42.79	8.44	125.
CENTRAL WASHINGTON	.55	-.14	79.	6.85	-.22	97.
UPPER SNAKE	2.57	.39	118.	15.51	.46	103.
SNAKE RIVER PLAIN	1.71	.39	129.	9.41	1.02	112.
OWYHEE/ MALHEUR	.85	-.33	72.	8.14	-.64	93.
SALMON/ BOISE/ PAYETTE	1.16	-.42	74.	16.40	.23	101.
BURNT/ GRANDE RONDE	.93	-.56	62.	12.52	.05	100.
CLEARWATER	1.63	-1.17	58.	24.10	-.11	100.
SOUTHEAST WASHINGTON	1.24	-.32	80.	15.70	.65	104.
UPPER JOHN DAY	.79	-.64	56.	11.00	-.66	94.
UMATILLA/ LWR JOHN DAY	.94	-.39	71.	11.67	-1.43	89.
UPR DESCHUTES/ CROOKED	.62	-.32	66.	14.45	2.33	119.
HOOD/ LOWER DESCHUTES	1.80	.36	125.	30.38	5.18	121.
NW SLOPE WASH CASCADES	4.65	.16	103.	86.24	11.04	115.
SW WA CASCADES/COWLITZ	4.43	.94	127.	76.32	14.90	124.
WILLAMETTE VALLEY	4.26	1.14	137.	65.95	13.30	125.
ROGUE/ UMPQUA	1.54	-.15	91.	39.20	6.69	121.
KLAMATH BASIN	.40	-.59	41.	21.33	5.76	137.
LAKE COUNTY-GOOSE LAKE	.30	-.91	25.	11.54	1.51	115.
HARNEY/ MALHEUR BASIN	.57	-.55	51.	8.84	-.49	95.

DIVISION VALUES ARE COMPUTED BY UTILIZING UN-WEIGHTED PRECIPITATION AMOUNTS FROM KEY STATIONS IN EACH AREA. NORMALS BASED ON 1961-1990. FOR FURTHER INFORMATION CONTACT: NWRFC (503) 326-7291.

ENC 1

OVERALL, BELOW NORMAL TEMPERATURES AND PRECIPITATION PREVAILED IN THE BASIN DURING THE MONTH OF MAY... NEAR TO ABOVE NORMAL PRECIPITATION WEST OF THE CASCADES.

THE BEGINNING OF MAY BEGAN WITH MORE OF APRIL... A SERIES OF GULF OF ALASKA DISTURBANCES DOMINATED THE REGION RESULTING IN WHAT SEEMED LIKE A PERPETUAL BROAD TROUGH OF LOW PRESSURE A LOFT WITH MOIST UNSTABLE AIR CIRCULATING AT THE SURFACE. THIS PATTERN BROUGHT RAIN TO THE VALLEYS AND SNOW TO THE MOUNTAINS. MAY 17TH MARKED A CHANGE... A SHIFT TO WARMER SOUTHWEST FLOW BEGAN TO INFILTRATE THE BASIN. BY LATE MAY A HIGH PRESSURE RIDGE TOOK HOLD OF THE BASIN. ABOVE NORMAL TEMPERATURES ON THE EAST SIDE OF THE CASCADES DURING THE LATTER PART OF MAY HELPED TO SPUR THE MAIN RUNOFF IN THE SNAKE RIVER BASIN. FLOOD STAGES WERE REACHED IN THE UPPER SNAKE AREA AS WELL AS ALONG THE IMNAHA RIVER. ELSEWHERE, MODERATE STREAMFLOW RISES WERE EXPERIENCED LATE MAY IN THE UPPER COLUMBIA... PEND OREILLE... EAST KOOTENAY... SPOKANE... AND OKANOGAN AREAS.

PACIFIC NORTHWEST MEAN TEMPERATURES DEPARTED -2.7 DEGREES FROM NORMAL RELATIVE TO 1961-1990 NORMALS (31 STATIONS). MEAN TEMPERATURE DEPARTURES RANGED FROM -4.9 TO -0.3 DEGREES.

DAILY RECORD MINIMUM TEMPERATURES WERE BROKEN AT MISSOULA (22 DEG ON THE 6TH... 21 DEG ON THE 8TH)... TIED AT EUGENE (32 DEG ON THE 9TH)... TIED AT PORTLAND (37 DEG ON THE 10TH).

DAILY RECORD MAXIMUM TEMPERATURES WERE BROKEN AT ASTORIA (85 DEG ON THE 23RD)... MEDFORD (94 DEG ON THE 23RD).

A DAILY RAINFALL RECORD OF .99 INCHES WAS REPORTED AT ASTORIA ON MAY 2ND.

FOR MAY, PRECIPITATION WAS 70 PERCENT OF NORMAL (1961-1990) AT COLUMBIA ABOVE COULEE; 95 PERCENT OF NORMAL AT THE SNAKE RIVER ABOVE ICE HARBOR; AND 79 PERCENT AT COLUMBIA ABOVE THE DALLES.

END/NWRFC/JRS  
NNNN

Columbia Monthly Precipitation Summary

ZCZC PDXRRMPD2 WES  
TTAA00 KPDR DDHHMM

NORTHWEST RIVER FORECAST CENTER - PORTLAND, OREGON  
COLUMBIA BASIN PRECIPITATION (MONTHLY SUMMARY - jun 1999)

NWS PORTLAND RIVER FORECAST CENTER  
COLUMBIA BASIN DIVISION AVERAGES OF SEASONAL PRECIPITATION

DIVISION	..JUN TO DAY 30..			...OCT - JUN....		
	OBSD	DEP	PCT AV	OBSD	DEP	PCT AV
COLUMBIA ABOVE COULEE	2.51	.16	107.	21.48	.88	104.
SNAKE RV AB ICE HARBOR	1.58	-.02	99.	15.83	.68	104.
COLUMBIA AB THE DALLES	1.72	-.09	95.	20.66	1.10	106.
COLUMBIA AB CASTLEGAR	3.32	.56	120.	31.73	4.70	117.
KOOTENAI	2.40	.02	101.	21.33	.64	103.
CLARK FORK	2.20	.25	113.	13.77	-.58	96.
FLATHEAD	2.34	-.30	88.	17.60	-1.45	92.
PEND OREILLE/ SPOKANE	2.37	.34	117.	30.19	4.06	116.
NORTHEAST WASHINGTON	2.13	.43	125.	18.54	2.84	118.
OKANOGAN	1.15	-.23	83.	13.75	1.48	112.
EAST SLOPES WASH CASC.	.71	-.51	58.	43.50	7.93	122.
CENTRAL WASHINGTON	.34	-.22	62.	7.19	-.44	94.
UPPER SNAKE	2.87	.87	143.	18.38	1.33	108.
SNAKE RIVER PLAIN	1.00	-.11	90.	10.41	.91	110.
OWYHEE/ MALHEUR	.89	-.22	80.	9.03	-.86	91.
SALMON/ BOISE/ PAYETTE	1.52	-.03	98.	17.93	.21	101.
BURNT/ GRANDE RONDE	.87	-.54	62.	13.39	-.49	96.
CLEARWATER	2.82	.35	114.	26.92	.24	101.
SOUTHEAST WASHINGTON	1.18	-.02	98.	16.88	.63	104.
UPPER JOHN DAY	.57	-.71	44.	11.57	-1.37	89.
UMATILLA/ LWR JOHN DAY	.53	-.55	49.	12.20	-1.98	86.
UPR DESCHUTES/ CROOKED	.22	-.71	24.	14.68	1.62	112.
HOOD/ LOWER DESCHUTES	.93	-.17	85.	31.31	5.01	119.
NW SLOPE WASH CASCADES	4.09	.66	119.	90.33	11.71	115.
SW WA CASCADES/COWLITZ	2.63	-.20	93.	78.95	14.69	123.
WILLAMETTE VALLEY	1.76	-.28	86.	67.71	13.02	124.
ROGUE/ UMPQUA	.19	-.70	22.	39.40	6.00	118.
KLAMATH BASIN	.17	-.69	20.	21.50	5.07	131.
LAKE COUNTY-GOOSE LAKE	.46	-.70	40.	12.00	.81	107.
HARNEY/ MALHEUR BASIN	.45	-.52	47.	9.30	-1.00	90.

DIVISION VALUES ARE COMPUTED BY UTILIZING UN-WEIGHTED PRECIPITATION AMOUNTS FROM KEY STATIONS IN EACH AREA. NORMALS BASED ON 1961-1990. FOR FURTHER INFORMATION CONTACT: NWRFC (503) 326-7291.

WITH FEW EXCEPTIONS, AN UNSEASONABLY LOW JET STREAM BROUGHT MINOR DISTURBANCES FROM THE GULF OF ALASKA REGION TO THE NORTHERN TIER OF THE PACIFIC MAKING FOR A COOLER, WETTER THAN NORMAL JUNE. THE PREDOMINANT PACIFIC ZONAL WEATHER PATTERN WAS BRIEFLY INTERRUPTED MID JUNE BY A PERIOD OF STRONG HIGH PRESSURE RIDGING FOR THE ENTIRE REGION, AND THEN AGAIN LATE IN THE MONTH WHEN A VIGOROUS LOW PRESSURE FROM THE GULF BROUGHT SIGNIFICANT RAIN TO THE WESTERN AND NORTHEASTERN PORTIONS OF THE BASIN. SEASONAL RIVER FLOW PEAKS OCCURRED MID JUNE FOR THE KOOTENAI AND UPPER COLUMBIA BASINS.

PACIFIC NORTHWEST MEAN TEMPERATURES DEPARTED -2.7 DEGREES FROM NORMAL RELATIVE TO 1961-1990 NORMALS (31 STATIONS). BASIN MEAN TEMPERATURE DEPARTURES RANGED FROM -4.9 TO -0.3 DEGREES.

DAILY RECORD MINIMUM TEMPERATURES WERE BROKEN AT POCATELLO (31 DEG ON THE 9TH... 34 DEG ON THE 10TH)... KALISPELL (26 DEG ON THE 7TH... 29 DEG ON THE 10TH)... GREAT FALLS ( 31 DEG ON THE 10TH... 36 DEG ON THE 26<sup>TH</sup>)... MISSOULA (30 DEG ON THE 30TH)... EUGENE ( 37 DEG ON THE 6TH... 34 DEG ON THE 9TH... 36 DEG ON THE 10TH)... TIED AT PORTLAND (44 DEG ON THE 7TH).

A DAILY RECORD MAXIMUM TEMPERATURE WAS BROKEN AT ASTORIA (77 DEG ON THE 11TH).

NO DAILY RAINFALL RECORDS OCCURRED DURING JUNE.

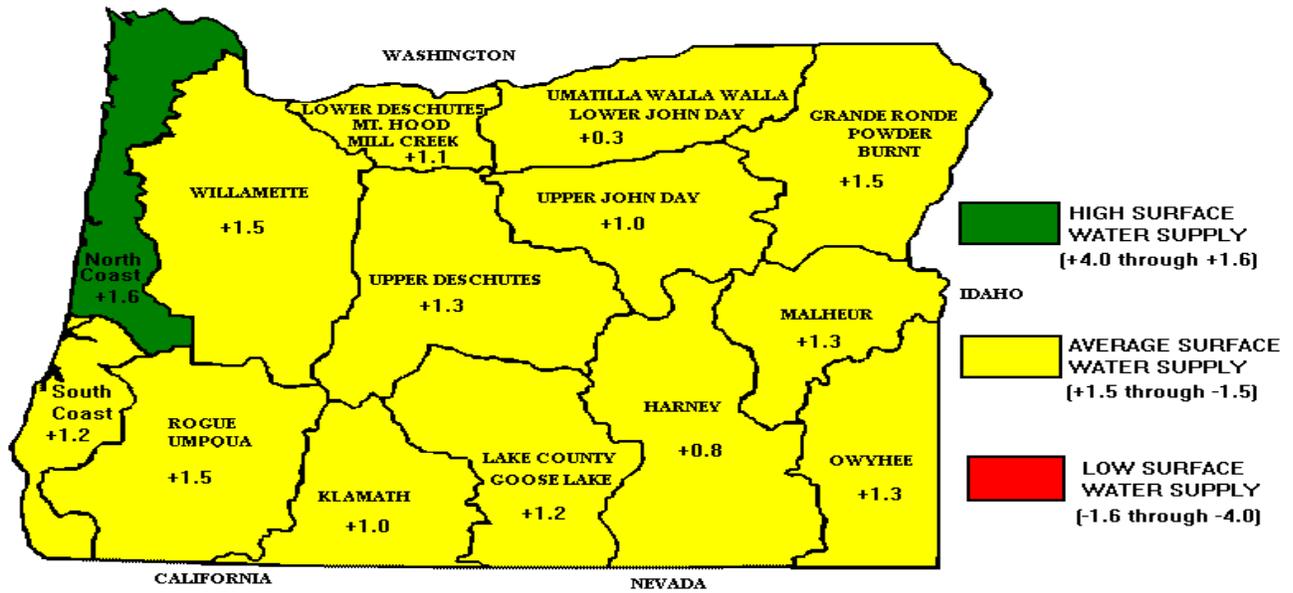
FOR JUNE, PRECIPITATION WAS 107 PERCENT OF NORMAL (1961-1990) AT COLUMBIA ABOVE COULEE; 99 PERCENT OF NORMAL AT THE SNAKE RIVER ABOVE ICE HARBOR; AND 95 PERCENT AT COLUMBIA ABOVE THE DALLES.

END/NWRFC/JRS  
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**SURFACE WATER SUPPLY INDEX**

(SWSI)

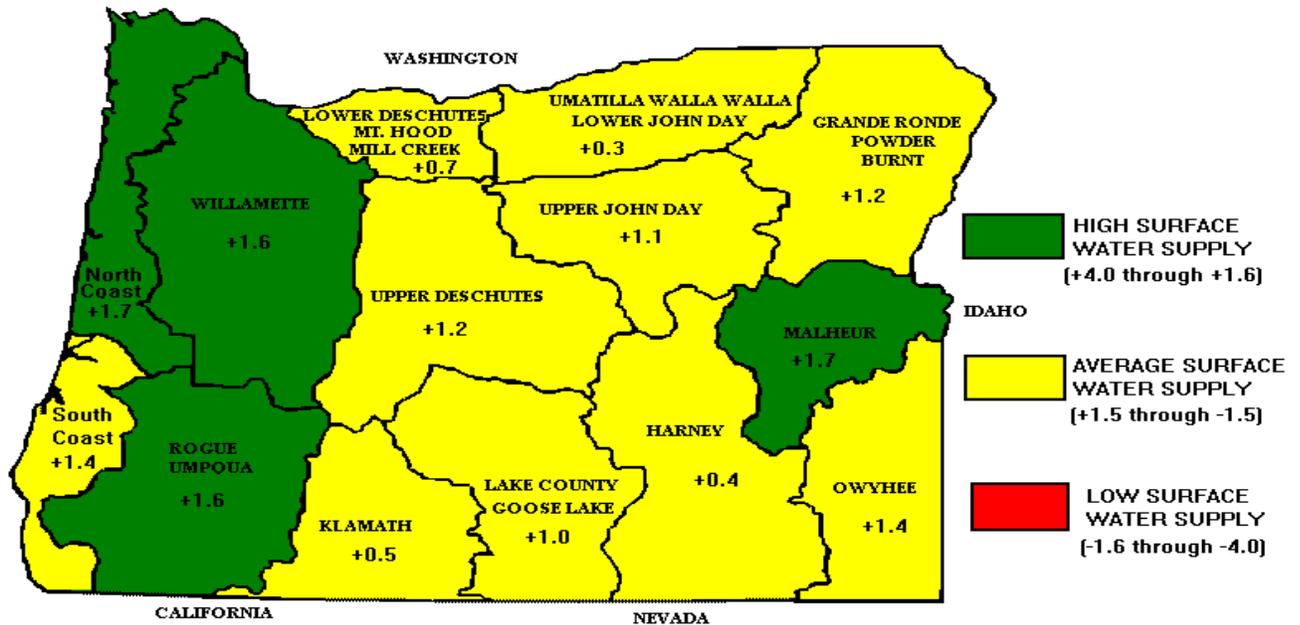
MAY 1, 1999



**SURFACE WATER SUPPLY INDEX**

(SWSI)

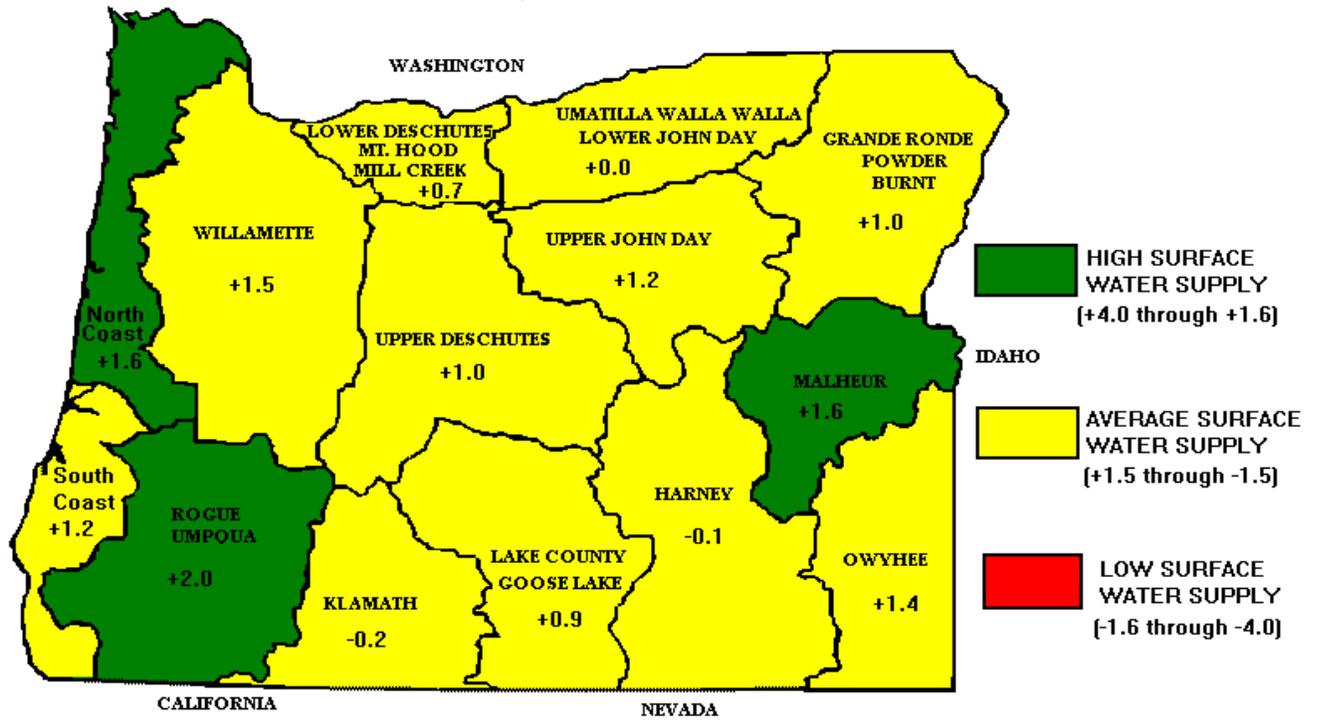
June 1, 1999



# SURFACE WATER SUPPLY INDEX

(SWSI)

July 1, 1999



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**US GEOLOGICAL SURVEY, WATER RESOURCES DIVISION**

Oregon District

COMPARATIVE FLOW TABLE FOR APRIL 1999

Station	Monthly mean discharge		Change in discharge from previous month (percent)	Discharge near end of month		Accumulated Runoff Oct-Apr Percent of Average
	Cubic feet per second	Percent of average		Cubic feet per second	Date	
<b>John Day River</b> at Service Creek, OR	6,553	131	+8	6,690	30	129
<b>Wilson River</b> nr Tillamook, OR	931	88	-53	499	30	159
<b>Umpqua River</b> nr Elkton, OR	11,540	130	-25	10,310	30	146
<b>Columbia River</b> at The Dalles, OR	258,720.(a)	118	+31	320,000	30	116
<b>Willamette River</b> at Salem, OR	27,290.(a)	96	-37	17,500	30	133
<b>Chehalis River</b> nr Grand Mound,	2,366	84	-67	1,390	30	163
<b>Skykomish River</b> nr Gold Bar, WA	3,611	86	+9	4,600	30	119
<b>Spokane River</b> at Spokane, WA	13,605.(a)	91	+7	18,360	30	110
<b>Snake River</b> at Heise, ID	6,496.(a)	102	+82	16,000	30	109
<b>Snake River</b> at Weiser, ID	37,000	132	-6	20,200	30	122
<b>Salmon River</b> at White Bird, ID	13,481	119	+65	20,200	30	111
<b>Clearwater River</b> at Spalding, ID	25,817	94	+19	32,500	30	113
<b>Clark Fork</b> at St. Regis, MT	8,470	94	+64	13,700	30	96
<b>MF Flathead River</b> nr West Glacier, MT	2,940	95	+180	5,140	30	80

Percent of Average computed using 30-year base period, Water Years 1961-90

(a) adjusted for upstream

05/18/99

ENC 3

**US GEOLOGICAL SURVEY, WATER RESOURCES DIVISION**  
Oregon District

COMPARATIVE FLOW TABLE FOR MAY 1999

Station	----- Monthly mean discharge -----		Change in dis- charge from	----- Discharge near end of month -----		----- Accumulated Runoff -----
	Cubic feet per second	Percent of average	previous month (percent)	Cubic feet per second	Date	Oct-May Percent of Average
<b>John Day River</b> at Service Creek, OR	6,605	134	+1	6,210	31	130
<b>Wilson River</b> nr Tillamook, OR	963	166	+3	488	31	159
<b>Umpqua River</b> nr Elkton, OR	8,503	140	-26	8,390	31	146
<b>Columbia River</b> at The Dalles, OR	431,120 (a)	104	+67	342,000	31	112
<b>Willamette River</b> at Salem, OR	30,560 (a)	142	+12	26,100	31	134
<b>Chehalis River</b> nr Grand Mound,	2,016	148	-15	1,020	31	162
<b>Skykomish River</b> nr Gold Bar, WA	6,948	108	+92	9,480	31	117
<b>Spokane River</b> at Spokane, WA	NOT AVAILABLE					
<b>Snake River</b> at Heise, ID	18,607 (a)	109	+186	38,500	31	109
<b>Snake River</b> at Weiser, ID	34,289	127	-7	37,900	31	123
<b>Salmon River</b> at White Bird, ID	34,296	111	+154	72,200	31	111
<b>Clearwater River</b> at Spalding, ID	43,967	96	+70	64,300	31	107
<b>Clark Fork</b> at St. Regis, MT	18,160	89	+114	37,700	31	94
<b>MF Flathead River</b> nr West Glacier, MT	7,340	78	+150	11,000	31	79

Percent of Average computed using 30-year base period, Wtr Yrs 1961-90

(a) adjusted for upstream storage

06/09/99

**US GEOLOGICAL SURVEY, WATER RESOURCES DIVISION**  
**Oregon District**  
**COMPARATIVE FLOW TABLE FOR June, 1999**

Station	Cubic feet per second	Percent of average	Change in discharge from previous month (percent)	Discharge near end of month	Date	Accumulated Runoff	Oct-Jun Percent of Average	
John Day River at Service Creek, OR	3,063		118	-54	1,290	30		129
Wilson River nr Tillamook, OR	308		91	-68	211	30		157
Umpqua River nr Elkton, OR	NOT AVAILABLE							
Columbia River at The Dalles, OR	606,200(a)		123	+41	344,000	30		115
Willamette River at Salem, OR	18,897(a)		141	-38	14,300	30		134
Chehalis River nr Grand Mound,	882		109	-56	697	30		161
Skykomish River nr Gold Bar, WA	10,390		149	+50	7,610	30		122
Spokane River at Spokane, WA	NOT AVAILABLE							
Snake River at Heise, ID	31,024(a)		138	+67	20,800	30		119
Snake River at Weiser, ID	36,984		156	+8	27,900	30		127
Salmon River at White Bird, ID	53,756		129	+57	31,800	30		118
Clearwater River at Spalding, ID	52,557		129	+20	31,400	30		112
Clark Fork at St. Regis, MT	28,790		123	+59	17,100	30		103
MF Flathead River nr West Glacier, MT	10,760		101	+47	8,780	30		87

Percent of Average computed using 30-year base period, Wtr Yrs 1961-90  
(a) adjusted for upstream storage 07/09/99

**CORPS OF ENGINEERS, NORTH PACIFIC DIVISION**  
**REPORT OF MAY RESERVOIR OPERATION**

During the month of April the Columbia basin had slightly below normal mean temperatures and most stations reported below average precipitation (most were between 30 and 60% of normal for the month).

**Libby.**

The reservoir began April at 2323.46 ft. Outflows have been 4 kcfs since March 11 to target the 95% confidence sturgeon refill curve. Flows are expected to increase in May when requested by the USFWS to provide a sturgeon “pulse” of water. Peak outflows will be 25 kcfs (full load, five units) for 3 days, and then an incubation flow for 21 days. The end of April elevation was 2338.56 ft. The April inflow was 9.38 kcfs, 117 % of normal. The May 1 final volume forecast for April – August was 6.73 maf, 105.6% of normal, down from the April 1 final forecast of 6.96 maf, 109% of normal.

**Albeni Falls.**

The project has been operating between 2055 ft and 2056 ft since January 1 and will continue to do so until sometime in May when the project will start to refill for flood control. Outflows averaged 27.7 kcfs in April. The unregulated inflow to Lake Pend Oreille was 30.7 kcfs, 88% of normal in April.

**Dworshak.**

The project was operated at full powerplant load (about 10 kcfs) between January 19 and March 3. Between March 4 and April 2, outflows were increased to about 14 kcfs (including about 4 kcfs spill) to target the end of March flood control elevation. On April 3, outflows were reduced to full load (about 10 kcfs) to transition the project minimum pool (1445 ft) which it reached on April 15. From April 15 – 30, outflow was adjusted to slightly fill the reservoir. The elevation at the beginning of April was 1456.2 ft. The end of April elevation was 1453.2 ft. Inflow in April was 10.4 kcfs, 93 % of normal. The May 1 final volume forecast for April – July was 3.3 maf, 120.8% of normal. This was a reduction of 538 kaf (140.8% of normal) from the April 1 final volume forecast. In May, Dworshak was drafted to try to achieve target flows of 100 kcfs at Lower Granite.

**Lower Snake Projects.**

Lower Granite April inflow was 91 kcfs, 116% of normal. Target Lower Granite flows are 100 kcfs (seasonal average) between April 3 and June 20. Lower Granite flows were between 72 and 100 kcfs between April 3 and April 19. Flows exceeded 100 kcfs between April 19 and 30. Between May 1 – 10, Lower Granite inflows ranged between 93 and 107 kcfs. The Lower Snake Projects starting night time voluntary spill for fish passage at the request of the Salmon Managers through the Technical Management Team Process. Spill started on April 2 at Lower Granite, Little Goose, and Lower Monumental and on April 3 at Ice Harbor started. The Lower Snake projects starting operating at Minimum Operating Pool (MOP) on April 3 in accordance with the 1998 Supplemental Biological Opinion. The May 1 final volume forecast for April – July at Lower Granite was 25.5 maf, 118% of normal.

**Willamette Basin Projects.**

The Willamette projects continued to fill during April while maintaining minimum flows at Salem. The power projects (Hills Creek, Lookout Point, Cougar, Green Peter, Detroit) continued to remain 3-7 days behind their respective refill schedules while the other projects remained at their rule curves. In mid-April an official request for higher flows at Salem was made by Oregon Water Resources Department (OWRD). With the two new ESA listings in March for Willamette spring chinook and winter steelhead, increased focus has been placed on Willamette flows. In addition to meeting the higher flows requested by OWRD, a fish operation at Foster Dam started in mid-April. Foster Dam pool is being held at 614.0 ft from April 15 to May 23 to facilitate the downstream passage of native winter steelhead smolts.

**CORPS OF ENGINEERS, NORTH PACIFIC DIVISION**  
**REPORT OF MAY RESERVOIR OPERATIONS**

**Libby.**

The reservoir began May at elevation 2338.56 ft. Outflows have been 4 kcfs since March 11 to target the 95% confidence sturgeon refill curve. The sturgeon pulse was not requested in May as had been expected. Bonners Ferry flows peaked at about 38 kcfs on May 25 but water temperatures in the reservoir were low and there was not any egg laying activity. Flows are expected to increase in June when requested by the USFWS to provide a sturgeon “pulse” of water. Peak outflows will be 25 kcfs (full load, five units) for 3 days, and then an incubation flow for 21 days. The end of May pool elevation was 2386.56 ft. The May inflow was 23.9 kcfs, 88 % of average. The June 1 final volume forecast for April – August was 6.58 maf, 103.2% of normal, down from the April final forecast of 6.73 maf, 105.6% of normal.

**Albeni Falls.**

The project was between operated 2055 – 2056 ft from January 1 to May 19, then project refill started at a very slow rate because of concerns of flooding. The lake at the end of May was 2058.61 ft. Outflows averaged 41.2 kcfs in May. The project went to free flow on May 27 and did not generate power again until June 7. The unregulated inflow to Lake Pend Oreille was 62.7 kcfs, 84% of normal in May.

**Dworshak.**

The powerhouse was at full load (about 10 kcfs) between May 1 – 4 and May 8 – 16 to try to maintain 100 kcfs target flows at Lower Granite during these cold and dry periods. The project drafted 3.35 ft between May 9 and 19 to try to achieve target flows of 100 kcfs at Lower Granite. This brought a flood of telephone calls from offices of the governor of Idaho and the two Idaho senators. On May 17, Lower Granite flows were still below 100 kcfs but the Dworshak flows were gradually decreased to 1.3 kcfs (minimum flow) by May 19 to start refill of the project. Temperatures and precipitation increased and by May 22, Lower Granite flows were again above 100 kcfs. The lake elevation at the beginning of May was 1453.2 ft and at month’s end it was 1505.5 ft. Inflow in May averaged 16.8 kcfs, 100 % of normal.

**Lower Snake Projects.**

Lower Granite May inflow averaged 128 kcfs, 109% of normal. Target Lower Granite outflows are 100 kcfs (seasonal average) between April 3 and June 20. Lower Granite outflows were above 100 kfs on May 2 – 5 and on 22 – 31. The Lower Snake projects started night time voluntary spill for fish passage at the request of the Salmon Managers through the Technical Management Team Process. Spill started on April 2 at Lower Granite, Little Goose, and Lower Monumental and on April 3 at Ice Harbor. The Lower Snake projects starting operating at Minimum Operating Pool (MOP) on April 3 in accordance with the 1998 Supplemental Biological Opinion.

**Willamette Basin Projects.**

All of the Willamette projects filled to maximum conservation pool levels during May. Fern Ridge reservoir reached its summer level at the beginning of May while the remaining projects delayed their refills into the middle of May. Above normal precipitation and snowpack persisted through May. All projects with a significant snow component were operated at or a foot below maximum conservation pool to account for the possibility of higher than normal inflows. Foster Dam was held at 614.0 ft through May 23 to facilitate the downstream passage of native winter steelhead smolts. Foster Dam began filling on the evening of the 23rd and was full before the Memorial Day weekend. The Salem minimum flow for May was 15.0 kcfs for the entire month. This flow was met and exceeded throughout the month with a monthly average flow of 27.8 kcfs.

**CORPS OF ENGINEERS, NORTH PACIFIC DIVISION**  
**REPORT OF JUNE RESERVOIR OPERATION**

**Libby.**

The reservoir began June at 2386.56 ft . Outflows were maintained at 4 kcfs from March 11 through June 13 at which time the sturgeon pulse was requested. The pulse was much later than normal because of the low water temperatures at Bonners Ferry. The pulse outflow was 25 kcfs during June 15 – 18. The incubation flows were 30 kcfs at Bonners Ferry for 18 days following the pulse. This ended July 5 and Libby outflows are being gradually ramped down to 8 kcfs. Around August 1 the Salmon Managers are expected to request Libby flow augmentation for salmon. Outflows of about 18 or 19 kcfs are expected for the entire month of August in the absence of a Libby/Arrow swap agreement with Canada. There were numerous conference calls between USFWS, State of Montana and COE about the sturgeon incubation flows. At the request of the COE, the USFWS sent a letter to COE requesting the 30 kcfs incubation flows and a gradual ramp down to 8 kcfs at Libby after the incubation flows. The State of Montana (Brian Marotz, Montan Fish, Wildlife and Parks) is not in agreement with this operation as it creates a “double peak” in the river which he feels is bad for bull trout. The end of June lake elevation was 2432.38 ft and the June inflow averaged 41 kcfs, 103 % of normal.

**Albeni Falls.**

The project started refilling on May 20 at a very slow because of concerns of a late runoff and flooding because of the cold weather this year. The lake filled to within 0.5 ft of full on June 22 and has been operating between 2062.0 – 2062.5 ft since then. Outflows averaged 71.2 kcfs in June. The unregulated inflow to Lake Pend Oreille was 89.9 kcfs, 114% of the June normal.

**Dworshak.**

Dworshak has been on minimum flow (about 1.3 kcfs) since May 19. Flows have adjusted between 1.3 and 1.5 kcfs to maintain total dissolved gas at about 110%. The project filled from 1505.5 ft at the beginning of June to 1580.6 ft at the end of June. Inflow in June aveerged 19.2 kcfs, 148% of normal.

**Lower Snake Projects.**

Lower Granite June inflow was 158.7 kcfs, 134% of normal. Lower Granite target outflows were 100 kcfs (seasonal average) between April 3 and June 20. Target flows decreased to 54 kcfs between June 20 and August 29. Lower Granite outflows exceeded target outflows for the entire month of June, ranging between 86 and 174 kcfs. Once Lower Granite flows drop below target flows, Brownlee (first) and Dworshak will be drafted to achieve target flows, if possible. All Lower Snake projects are still operating at Minimum Operating Pool (MOP) in a one foot range in accordance with the 1998 Supplemental Biological Opinion.

**Willamette Basin Projects.**

Higher than normal inflows in June kept the Willamette projects at or near their maximum conservation pools throughout the month. Snow contributions kept inflows and releases higher than normal, resulting in a Salem flow that was well above the requested minimum. June minimum flows at Salem were 12.5 kcfs for the first half of the month and 8.5 kcfs for the second half of the month. Actual observed values for the bimonthly periods were 20.2 kcfs and 17.7 kcfs.

## **Trip Log: July 13-14, 1999**

### **Ice Harbor and Lower Monumental Dams Plus N Reactor Off-Loading Site**

The purpose of visiting these sites was to obtain first-hand information on the unique characteristics on each of these sites and how they affect the operation of the Northwest reservoir system in managing the water resources of the Pacific Northwest.

**Ice Harbor Dam.** Ice Harbor, a run-of-river project constructed in 1956 at river mile 9.7, is the most downstream dam on the Snake River in southeastern Washington. Between 1996 and 1998 flip-lips were installed on the ten spillways to reduce the dissolved gas concentrations below the project. During this trip all the spillways were in operation and, therefore, the flip-lips were not visible, although the high surface velocities were evident. During the flip-lip design, model tests showed that the higher velocities from these flip-lips would cause dangerous currents for vessels exiting the navigation lock so the Corps installed four coffer cells downstream of the guide wall to defuse these currents. These cells are each 80 ft in diameter, are made of sheet piling and filled with pit-run gravel. The navigation locks have a maximum lift of 103 ft, one of the highest single lock lifts in the world. Two fish ladders were in operation, one on the left bank and the other near the right bank, between the navigation lock and the spillway. The left bank ladder has two entrances, one on either end of the powerhouse.

Matthew Allen lead the group on a tour through the powerhouse with its six generators: three rated at 90,000 kW and three at 111,000 kW for a total powerhouse capacity of 603,000 kW. He also explained the cutaway display model of the fish passage facilities including the fish screens and the bypass and collector channels.

Frank Godfrey described the features of the control room. Unique to this project were two computers, one dedicated to operating the fish bypass system and the other to monitoring the Tri-Cities levee pumping system. The fish bypass computer used icons and mouse action to control the use of the features of the system. The “pumping“ computer displayed a map of the levee pumping system that uses clickable icons to display that operational status and entrance alarm status of each station. It was also noticed that the powerhouse operators continue to use the old CBT printer in lieu of the paperless system recently installed.

Mark Plummer lead a tour of the fish bypass and examination facility. There are no juvenile fish transport facilities at Ice Harbor since there are no significant redds or hatcheries between this project and Lower Monumental Dam, the next upstream project which has juvenile transport capabilities. Since the juvenile out-migration is completed for this year the fish facilities were not in operation.

**Other Tri-Cities Sites.** Lanell Adams described the activities regarding the Kennewick Man, the skeletal remains discovered in 1996 on the banks of McNary pool in Kennewick, WA. The remains have been tentatively dated (carbon and other dating methods) around 9200 years old. The remains are currently residing in the Burke Museum at the University of Washington in Seattle until the legal aspects of the disposition of the remains is resolved. The Native American Graves Protection and Repatriation Act of 1990 (NAGPRA) assumes that antiquities older than 500 years (prior to Columbus discovery of the ‘new’ world and the documented settlement by Europeans) are of native American origin and are required to be returned to native Americans, provided a link to modern tribes can be established. The legal rub is that numerous scientists that have examined the remains say that the skeleton has many defining characteristics of a caucasoid, not of the classic mongoloid stock to which modern native

Americans belong. Information on Kennewick man and his relationship to other anthropological discoveries in the western US can be found on the web by searching under Kennewick man.

Decommissioned nuclear reactors from naval vessels are barged to Hanford Nuclear Reservation for burial. The facilities for unloading these reactors is located on the north end of Richland, WA, consists of a gently sloping ramp to the edge of the Columbia River. At the site are stockpiles of concrete barriers for blocking the roads, several 176-wheel trailers, two very, very large trucks to pull the loads, and other equipment. The need for maintaining constant river levels during offloading was evident because of a sandbar above water near the ramp.

A pumping plant visited in Richland was in a residential area and was within a block of one of the main traffic arterials through town. This plant was designed to remove water that accumulate behind the adjacent levee by pumping it over the levees into the Columbia River. Some of the drainage channels leading to the plant were open-ditch but within a block of the plant the channel was under ground, ending in sumps under the pumphouse. The pumps were old and in need of upgrading. Two of the pumps were directly connected to emergency generators.

Columbia Park, located along the Columbia River in Kennewick, has been developed and improved by local interests. One of the main features of the park is the hydroplane pit located immediately upstream of the "blue bridge" (US 395). Unlimited hydroplane races on the river at the end of each July are a major event in the Tri-Cities and the Chamber of Commerce regularly requests controlled flows on the days the hydroplanes are on the water. The shallow water in the boat pits and the beachless nature of the river's edge emphasize the need for flow control during the races.

At the request of local interests a one mile stretch of the Corps-built levees in Pasco were lower between 5 and 6 ft. The locals insisted that the degree of flood control provided by the levees was no longer needed because of additional flood storage at upstream projects that was not built or considered when the levees were constructed. After due study and with reservation, the Corps consented to the left bank levees being lowered, at the expense of the local interests. One of the reasons given for wanting the levees lowered was to provide wider room for a serpentine bicycle/jogging/walking path on the levee crest. One other undocumented but obvious benefit was that the lower levees provided the riverside homes an unobstructed view of the river, Columbia Park, the boat pits and hydroplane race course.

**Lower Monumental.** This project is part of the Lower Snake Project of four dams (including Ice Harbor) authorized by Congress in 1945. Located 22.2 river miles upstream of Ice Harbor Dam, "Lower Mon" has six generators, each with a nameplate rating of 135,000 kW, for a project total of 810,000 kW. The navigation lock, with a vertical lift gate downstream and a lowered radial gate on the upstream end, has a 103 ft vertical lift. The locks are 675 ft long, 86 ft wide and have a draft threshold of 16 ft. An up-bound barge and tug navigated the lock during this visit. The total time for the tug and barge to enter the lock, the lock to fill and then exit the lock was on the order of 40 minutes. Lock drainage is through conduits that discharges the water into the river below the stilling basin. The turbulence from this discharge extends most of the way across the river. The fish examination/transportation facility is located on the right bank, across the river from the navigation lock, and below the stilling basin. The fish bypass system to move juvenile salmon around the dam and powerhouse is similar to that at Ice Harbor. Lower Mon has eight spillway bays, the middle six of which are equipped with flip-lips. Although there was no spilling the tailwater was high enough to obscure the flip-lips. It was also noticed that the powerhouse operators continue to use the old CBT printer in lieu of the paperless system recently installed.