

Figure 22. Location of surface-water stations in the Deschutes and Nisqually River Basins.

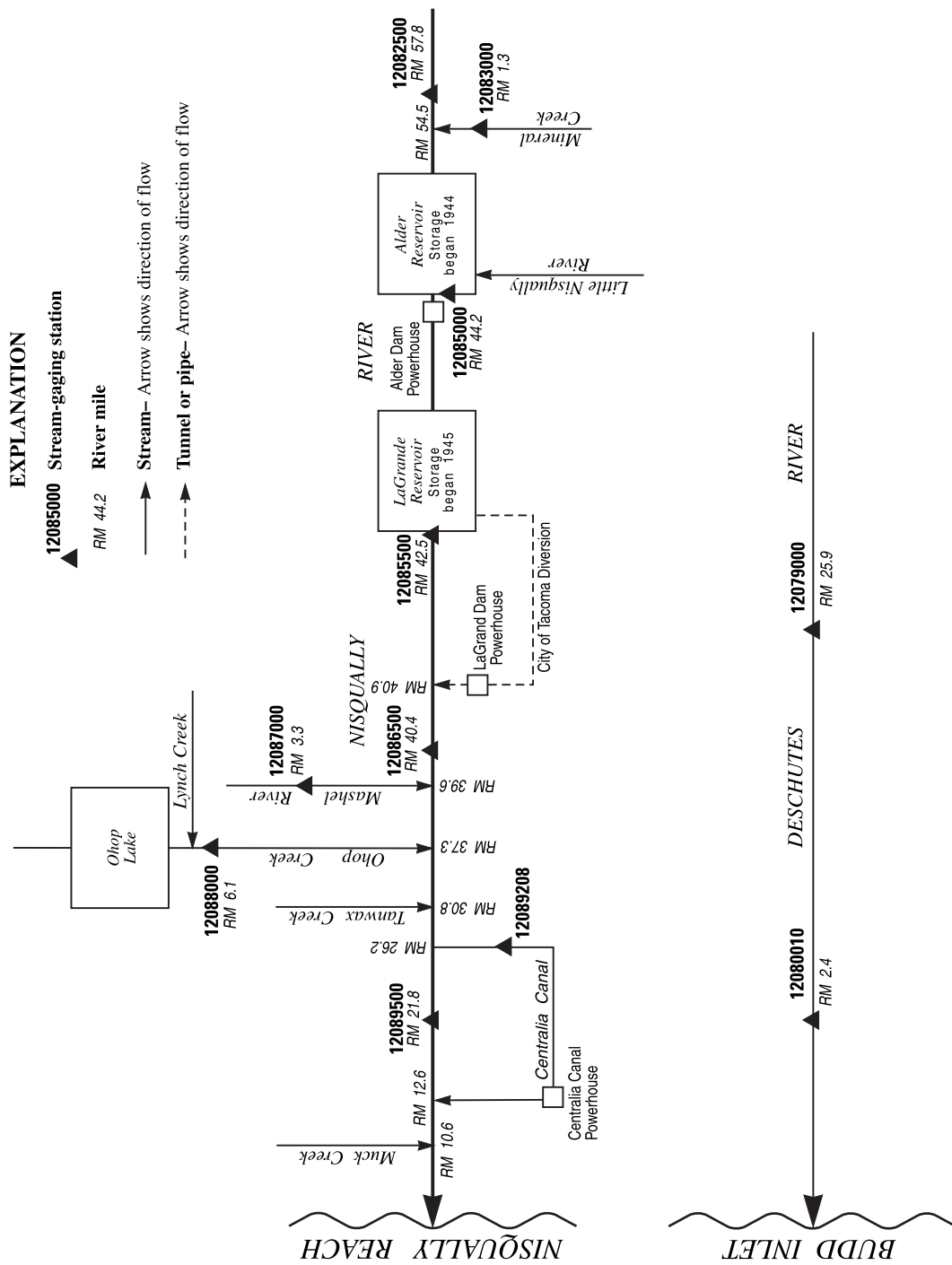


Figure 23. Schematic diagram showing surface-water stations in the Deschutes and Nisqually River Basins.

DESCHUTES RIVER BASIN

12079000 DESCHUTES RIVER NEAR RAINIER, WA

LOCATION.--Lat 46°51'08", long 122°40'03", in SE 1/4 SW 1/4 sec.22, T.16 N., R.1 E., Thurston County, Hydrologic Unit 17110016, on right bank 75 ft upstream from county road crossing, 0.4 mi downstream from outlet of Reichel Lake, 2.7 mi southeast of Rainier, and at mile 25.9.

DRAINAGE AREA.--89.8 mi².

PERIOD OF RECORD.--June 1949 to September 1975; water years 1976-79 (annual maximum); June 1980 to July 1982; June 1983 to October 1987 (seasonal records); October 1987 to September 1998; October 1998 to April 1999 (seasonal record); October 1999 to current year.

REVISED RECORDS.--WSP 1246: Drainage area. WDR WA-83-1: 1978(P).

GAGE.--Water-stage recorder and crest-stage gage. Datum of gage is 348.77 ft above NGVD of 1929.

REMARKS.--Records good except for estimated daily discharge and flows above 700 ft³/s, which are fair. Probably some small diversions for irrigation and domestic use upstream from station. No regulation. U. S. Geological Survey satellite telemeter at station. Chemical analyses July 1959 to July 1960, October 1971 to September 1972. Water temperatures August 1968 to September 1970.

AVERAGE DISCHARGE.--42 years (water years 1950-75, 1981, 1988-98, 2000-03), 260 ft³/s, 39.37 in/yr, 188,500 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 9,600 ft³/s Jan. 9, 1990, gage height, 17.01 ft, from outside high-water mark, from rating curve extended above 3,900 ft³/s; minimum discharge, 16 ft³/s Sept. 7, 1963, gage height, 2.60 ft.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 2,000 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Jan 31	1915	*4,000	*11.14	No other peak greater than base discharge.			

Minimum discharge, 19 ft³/s, Sept. 4, 5, 6, 7, gage height, 2.96 ft.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	22	21	41	543	1,860	152	248	170	68	37	21	20
2	23	21	39	989	918	141	238	157	67	36	22	20
3	26	21	38	1,120	637	141	238	148	65	35	22	20
4	45	21	e36	1,030	480	133	236	146	64	34	22	20
5	34	22	e35	1,080	383	138	224	163	62	33	22	19
6	28	23	33	623	317	258	232	153	60	35	23	19
7	26	25	32	413	271	359	230	143	57	34	23	21
8	24	40	31	305	238	375	291	139	55	33	22	24
9	24	60	31	243	212	636	391	131	55	34	23	27
10	23	61	64	209	195	878	372	127	55	32	24	28
11	21	49	315	180	177	656	322	121	55	30	30	27
12	21	52	432	272	164	917	295	116	54	30	30	28
13	21	121	678	311	153	1,530	312	110	54	30	29	26
14	21	85	583	306	143	1,040	311	105	56	32	27	24
15	21	73	1,010	274	139	727	279	107	52	30	26	24
16	21	66	1,030	231	158	559	245	125	50	29	26	24
17	21	192	703	199	257	455	224	129	49	29	26	27
18	20	125	427	174	325	378	207	131	50	28	26	28
19	21	181	298	158	275	331	188	124	45	27	25	e25
20	21	176	229	143	272	347	174	115	45	25	24	25
21	22	123	188	135	386	502	240	109	46	25	24	24
22	22	94	158	152	431	1,250	324	104	51	25	23	23
23	23	79	137	287	342	1,140	297	99	48	24	23	22
24	21	68	123	349	272	702	291	93	45	24	22	22
25	21	60	117	358	228	512	265	91	43	24	22	21
26	20	54	187	802	203	476	255	87	41	24	22	21
27	21	50	281	799	181	458	228	82	41	24	23	22
28	21	46	353	519	164	394	207	77	39	24	23	21
29	21	44	283	413	---	334	191	75	36	23	22	21
30	21	43	281	509	---	290	176	73	36	22	21	22
31	21	---	556	2,850	---	263	---	71	---	22	21	---
TOTAL	718	2,096	8,749	15,976	9,781	16,472	7,731	3,621	1,544	894	739	695
MEAN	23.2	69.9	282	515	349	531	258	117	51.5	28.8	23.8	23.2
MAX	45	192	1,030	2,850	1,860	1,530	391	170	68	37	30	28
MIN	20	21	31	135	139	133	174	71	36	22	21	19
AC-FT	1,420	4,160	17,350	31,690	19,400	32,670	15,330	7,180	3,060	1,770	1,470	1,380
CFSM	0.26	0.78	3.14	5.74	3.89	5.92	2.87	1.30	0.57	0.32	0.27	0.26
IN.	0.30	0.87	3.62	6.62	4.05	6.82	3.20	1.50	0.64	0.37	0.31	0.29

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1949 - 2003, BY WATER YEAR (WY)

	101	340	521	578	528	417	307	162	101	54.7	39.5	41.4
MEAN	101	340	521	578	528	417	307	162	101	54.7	39.5	41.4
MAX	385	725	1,063	1,071	1,087	839	659	287	233	110	74.1	89.7
(WY)	(1998)	(1961)	(1956)	(1953)	(1999)	(1972)	(1991)	(1960)	(1990)	(1974)	(1968)	(1968)
MIN	23.1	35.9	163	111	126	116	118	72.2	42.8	28.8	23.8	22.5
(WY)	(1988)	(1953)	(2001)	(2001)	(1993)	(1992)	(1973)	(1994)	(1992)	(2003)	(2003)	(2002)

SUMMARY STATISTICS

FOR 2002 CALENDAR YEAR

FOR 2003 WATER YEAR

WATER YEARS 1949 - 2003

ANNUAL TOTAL	77,928	69,016	
ANNUAL MEAN	214	189	260
HIGHEST ANNUAL MEAN			407
LOWEST ANNUAL MEAN			109
HIGHEST DAILY MEAN	2,500	Jan 8	2,850
LOWEST DAILY MEAN	19	Sep 28	19
ANNUAL SEVEN-DAY MINIMUM	20	Sep 23	20
ANNUAL RUNOFF (AC-FT)	154,600		136,900
ANNUAL RUNOFF (CFSM)	2.38		2.11
ANNUAL RUNOFF (INCHES)	32.28		28.59
10 PERCENT EXCEEDS	501		456
50 PERCENT EXCEEDS	102		68
90 PERCENT EXCEEDS	22		22
			6,000
			19
			20
			188,500
			2.90
			39.37
			617
			139
			34

e Estimated

DESCHUTES RIVER BASIN

12080010 DESCHUTES RIVER AT E STREET BRIDGE, AT TUMWATER, WA

LOCATION.--Lat 47°00'43", long 122°54'07", in NW 1/4 Land Grant parcel 60, T.18 N., R.2 W., Thurston County, Hydrologic Unit 17110016, on left bank at "E" Street bridge, 0.2 mi upstream from Capitol Boulevard, and at mile 2.4.

DRAINAGE AREA.--162 mi².

PERIOD OF RECORD.--April 1945 to November 1954, water years 1955-57 (annual maximum), June 1957 to June 1964, published as "12080000 Deschutes River near Olympia". October 1990 to current year.

REVISED RECORDS.--WDR WA-96-1: 1991(P), 1992(P).

GAGE.--Water-stage recorder. Datum of gage is 62.01 ft above NGVD of 1929. April 1945 to Nov. 1954, water-stage recorder, Nov. 1954 to June 1957, crest-stage gage, June 1957 to June 1964, water-stage recorder, at site 1 mi upstream, at different datum.

REMARKS.--Records good except for estimated daily discharges, which are fair. Some small diversions for irrigation and domestic use upstream from station. No regulation. Miscellaneous discharge measurement site 1971-72, 1975, 1977-90.

AVERAGE DISCHARGE.--28 years (water years 1946-54, 1958-63, 1991-2003), 404 ft³/s, 33.86 in/yr, 292,400 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 10,700 ft³/s Feb. 9, 1996, gage height, 34.17 ft, on basis of slope-area measurement of peak flow; minimum discharge, 46 ft³/s Sept. 29, 30, 2003.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 2,400 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Feb 1	0845	*4,800	*31.16	No other peak greater than base discharge.			

Minimum discharge, 46 ft³/s, Sept. 29, 30, gage height, 24.53 ft.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	71	70	78	647	3,730	293	412	313	161	110	68	e52
2	73	70	77	1,020	1,630	273	408	301	158	110	71	e53
3	82	71	76	1,380	1,050	264	413	291	154	109	67	e53
4	85	72	77	1,090	819	256	409	290	150	107	68	e52
5	96	72	76	1,510	678	249	388	297	146	117	69	52
6	87	80	74	929	590	338	387	292	144	106	71	52
7	82	82	73	623	526	471	387	279	139	101	70	52
8	80	85	71	476	480	539	422	271	138	99	69	52
9	79	104	70	393	439	646	493	260	136	98	68	60
10	78	109	89	341	408	1,100	532	251	136	98	69	61
11	75	110	252	308	378	910	477	243	137	95	70	63
12	74	112	455	323	354	972	458	235	135	93	71	60
13	74	135	683	440	335	1,730	494	228	137	94	73	57
14	74	149	604	416	316	1,510	488	221	137	96	84	55
15	74	130	1,080	402	290	1,070	454	221	134	94	84	55
16	74	124	1,100	356	315	839	417	233	131	91	82	56
17	74	170	1,040	319	380	710	386	240	129	89	81	53
18	74	208	655	289	485	618	364	242	130	87	77	58
19	74	195	475	267	469	e565	340	237	125	85	66	62
20	74	241	379	248	448	562	323	227	123	84	65	54
21	74	185	321	244	520	674	342	219	125	82	61	55
22	75	149	285	268	602	1,250	449	212	129	81	58	53
23	74	127	248	352	548	1,690	458	205	131	81	57	52
24	74	113	218	458	471	1,040	456	197	128	78	e56	52
25	74	103	209	512	411	759	431	193	124	76	e56	51
26	74	94	236	741	369	679	415	187	118	76	e56	51
27	74	90	331	1,210	337	657	390	181	116	76	e56	50
28	71	87	450	817	312	590	361	177	114	75	e56	50
29	66	84	410	651	---	521	343	173	114	73	e55	48
30	68	81	373	714	---	465	325	169	112	71	e54	49
31	72	---	547	1,980	---	431	---	165	---	70	e53	---
TOTAL	2,350	3,502	11,112	19,724	17,690	22,671	12,422	7,250	3,991	2,802	2,061	1,623
MEAN	75.8	117	358	636	632	731	414	234	133	90.4	66.5	54.1
MAX	96	241	1,100	1,980	3,730	1,730	532	313	161	117	84	63
MIN	66	70	70	244	290	249	323	165	112	70	53	48
AC-FT	4,660	6,950	22,040	39,120	35,090	44,970	24,640	14,380	7,920	5,560	4,090	3,220
CFSM	0.47	0.72	2.21	3.93	3.90	4.51	2.56	1.44	0.82	0.56	0.41	0.33
IN.	0.54	0.80	2.55	4.53	4.06	5.21	2.85	1.66	0.92	0.64	0.47	0.37

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1945 - 2003, BY WATER YEAR (WY)

MEAN	160	492	725	761	829	610	469	302	192	130	106	98.3
MAX	463	921	1,480	1,308	1,753	1,176	936	499	300	186	148	162
(WY)	(1998)	(2000)	(1999)	(1953)	(1999)	(1950)	(1991)	(1948)	(1997)	(1997)	(1997)	(1997)
MIN	75.8	84.1	239	195	244	236	283	140	110	77.1	66.5	54.1
(WY)	(2003)	(1994)	(2001)	(2001)	(1993)	(2001)	(2001)	(1994)	(1992)	(1992)	(2003)	(2003)

SUMMARY STATISTICS

FOR 2002 CALENDAR YEAR

FOR 2003 WATER YEAR

WATER YEARS 1945 - 2003

ANNUAL TOTAL	127,601	107,198	
ANNUAL MEAN	350	294	404
HIGHEST ANNUAL MEAN			658
LOWEST ANNUAL MEAN			178
HIGHEST DAILY MEAN	3,080	Jan 8	8,150
LOWEST DAILY MEAN	66	Oct 29	48
ANNUAL SEVEN-DAY MINIMUM	70	Oct 28	50
ANNUAL RUNOFF (AC-FT)	253,100	212,600	292,400
ANNUAL RUNOFF (CFSM)	2.16	1.81	2.49
ANNUAL RUNOFF (INCHES)	29.30	24.62	33.86
10 PERCENT EXCEEDS	785	649	899
50 PERCENT EXCEEDS	187	149	249
90 PERCENT EXCEEDS	74	60	92

e Estimated

NISQUALLY RIVER BASIN

12082500 NISQUALLY RIVER NEAR NATIONAL, WA

LOCATION.--Lat 46°45'10", long 122°04'57", in SW ¼ SW ¼ sec.29, T.15 N., R.6 E., Pierce County, Hydrologic Unit 17110015, on right bank 100 ft downstream from old railroad bridge, 1.2 mi west of National, 3.3 mi upstream from Mineral Creek, and at mile 57.8.

DRAINAGE AREA.--133 mi².

PERIOD OF RECORD.--May 1942 to current year.

REVISED RECORDS.--WSP 1716: 1943(M), 1947(P), 1950-51, 1956(M). WDR WA-74-1: 1968(M), 1969(M), 1972(P).

GAGE.--Water-stage recorder. Elevation of gage is 1,450 ft above NGVD of 1929, from river-profile map.

REMARKS.--No estimated daily discharges. Records good. Small diversions for domestic use. Water temperatures published October 1951 to September 1982. U.S. Geological Survey satellite telemeter at station.

AVERAGE DISCHARGE.--61 years (water years 1943-2003), 771 ft³/s, 78.79 in/yr, 558,700 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 21,200 ft³/s, Feb. 8, 1996, gage height, 12.18 ft; minimum discharge, 100 ft³/s, Nov. 10, 17, 1987.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 2,600 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Jan 26	1415	4,110	6.28	Mar 13	0115	4,660	6.47
Jan 31	0930	*10,800	*9.11				

Minimum discharge, 110 ft³/s, Oct. 30, 31, Nov. 1, 2, gage height, 2.16 ft.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	180	115	223	516	4,210	621	1,170	659	960	612	553	366
2	173	116	211	848	2,520	607	1,010	682	862	528	542	377
3	388	127	198	1,240	1,830	596	920	703	828	514	443	450
4	339	140	200	1,650	1,450	562	815	689	842	522	367	455
5	267	140	186	1,840	1,240	607	748	673	940	544	410	406
6	296	139	174	1,280	1,100	650	726	616	1,080	561	409	385
7	305	142	166	1,030	999	629	676	564	1,180	570	392	339
8	292	173	159	892	910	603	669	524	1,160	548	387	236
9	282	196	154	801	840	827	787	493	994	507	384	185
10	244	189	206	716	786	1,020	794	483	840	570	412	176
11	200	171	299	669	743	1,130	842	531	701	653	322	315
12	199	324	540	878	705	2,260	858	570	706	676	283	327
13	232	383	684	803	678	4,040	984	594	721	637	287	277
14	253	308	915	793	645	3,030	970	669	656	511	345	307
15	275	237	1,130	715	626	2,160	884	706	561	553	411	278
16	311	252	1,100	650	638	1,620	811	678	592	549	400	247
17	314	354	887	599	687	1,270	817	634	720	484	414	247
18	304	294	714	582	643	1,070	766	578	777	509	479	232
19	292	866	595	575	623	937	693	534	697	542	476	283
20	290	740	515	551	668	916	660	530	583	604	394	282
21	248	588	464	559	972	996	691	551	530	642	468	304
22	259	470	410	824	1,090	2,130	698	634	465	594	417	321
23	221	366	368	1,170	954	1,850	701	807	398	635	304	337
24	201	306	340	1,070	840	1,400	743	1,190	395	617	287	358
25	203	269	322	1,030	774	1,200	685	1,200	447	545	379	369
26	202	248	338	3,020	725	1,130	686	1,020	554	517	422	451
27	192	238	431	2,210	678	1,010	636	951	680	508	342	441
28	169	240	403	1,460	658	911	611	1,150	734	527	325	416
29	153	240	374	1,240	---	845	630	1,170	794	528	351	382
30	122	233	402	1,770	---	897	653	1,180	762	523	374	365
31	116	---	483	8,620	---	1,180	---	1,090	---	535	381	---
TOTAL	7,522	8,604	13,591	40,601	29,232	38,704	23,334	23,053	22,159	17,365	12,160	9,914
MEAN	243	287	438	1,310	1,044	1,249	778	744	739	560	392	330
MAX	388	866	1,130	8,620	4,210	4,040	1,170	1,200	1,180	676	553	455
MIN	116	115	154	516	623	562	611	483	395	484	283	176
AC-FT	14,920	17,070	26,960	80,530	57,980	76,770	46,280	45,730	43,950	34,440	24,120	19,660
CFSM	1.82	2.16	3.30	9.85	7.85	9.39	5.85	5.59	5.55	4.21	2.95	2.48
IN.	2.10	2.41	3.80	11.36	8.18	10.83	6.53	6.45	6.20	4.86	3.40	2.77

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1942 - 2003, BY WATER YEAR (WY)

MEAN	462	826	948	873	824	658	786	1,032	1,053	804	560	430
MAX	1,333	2,696	2,344	1,805	2,330	1,784	1,276	1,681	2,010	1,334	952	739
(WY)	(1948)	(1996)	(1976)	(1974)	(1996)	(1972)	(1990)	(1949)	(1974)	(1974)	(1999)	(1959)
MIN	205	140	246	285	318	296	362	596	490	433	333	275
(WY)	(1990)	(1953)	(1953)	(1979)	(1966)	(1955)	(1975)	(1992)	(1992)	(1992)	(1994)	(1985)

SUMMARY STATISTICS

FOR 2002 CALENDAR YEAR

FOR 2003 WATER YEAR

WATER YEARS 1942 - 2003

ANNUAL TOTAL	262,730	246,239	
ANNUAL MEAN	720	675	771
HIGHEST ANNUAL MEAN			1,186
LOWEST ANNUAL MEAN			496
HIGHEST DAILY MEAN	5,910	Jan 8	8,620
LOWEST DAILY MEAN	115	Nov 1	115
ANNUAL SEVEN-DAY MINIMUM	125	Oct 30	125
ANNUAL RUNOFF (AC-FT)	521,100		488,400
ANNUAL RUNOFF (CFSM)	5.41		5.07
ANNUAL RUNOFF (INCHES)	73.49		68.87
10 PERCENT EXCEEDS	1,340	1,130	1,340
50 PERCENT EXCEEDS	586	570	628
90 PERCENT EXCEEDS	233	228	319

12083000 MINERAL CREEK NEAR MINERAL, WA

LOCATION.--Lat 46°44'40", long 122°08'36", in SE ¼ SW ¼ sec.35, T.15 N., R.5 E., Lewis County, Hydrologic Unit 17110015, on right bank 0.3 mi downstream from railroad bridge, 2.3 mi northeast of Mineral, and at mile 1.3.

DRAINAGE AREA.--75.2 mi².

PERIOD OF RECORD.--June 1942 to current year.

REVISED RECORDS.--WSP 1932: Drainage area. WRD WA-74: 1971(P).

GAGE.--Water-stage recorder. Elevation of gage is 1,340 ft above NGVD of 1929, from topographic map. Prior to May 14, 1987, at site 0.25 mi downstream at datum 1.90 ft lower.

REMARKS.--No estimated daily discharges. Records good. No regulation or diversion upstream from station. U.S. Geological Survey satellite telemeter at station.

AVERAGE DISCHARGE.--61 years (water years 1943-2003), 362 ft³/s, 65.33 in/yr, 262,000 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 14,900 ft³/s Feb. 8, 1996, gage height, 12.89 ft, from rating curve extended above 560 ft³/s, based on runoff comparisons with nearby stations; minimum discharge, 13 ft³/s Sept. 23-25, 1989, gage height, 6.93 ft.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 2,700 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Jan 31	1045	*6,690	*13.30	Mar 22	1030	2,710	11.48
Mar 12	2315	3,390	11.87				

Minimum discharge, 15 ft³/s, Sept 1-7, gage height, 8.07 ft.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	27	22	52	437	3,060	279	566	229	117	45	23	16
2	25	22	50	777	1,670	265	497	221	109	44	23	16
3	52	22	47	955	1,150	260	465	215	103	42	23	16
4	71	22	46	1,260	855	241	410	233	98	41	23	16
5	41	22	45	1,300	683	256	380	264	94	41	23	15
6	33	23	44	818	563	299	381	241	90	41	24	15
7	29	26	43	597	481	296	392	217	86	39	23	16
8	26	38	42	478	423	293	429	206	83	40	23	18
9	26	81	41	401	376	676	547	189	81	39	23	21
10	25	85	90	348	340	962	505	180	81	37	23	21
11	24	60	293	321	311	1,040	479	180	79	35	23	22
12	24	110	454	558	288	2,260	450	196	75	35	22	27
13	23	154	556	482	270	2,640	464	179	77	36	21	21
14	23	136	531	501	253	1,720	435	175	75	35	21	19
15	22	90	641	429	239	1,230	391	183	70	33	20	18
16	21	91	630	375	253	923	355	206	67	33	21	22
17	21	171	499	332	335	735	356	215	64	32	21	44
18	21	138	383	302	320	607	324	229	61	31	20	31
19	21	296	305	277	297	521	296	213	61	30	20	25
20	22	229	256	257	397	524	279	205	62	29	19	24
21	24	153	219	255	868	820	303	200	69	28	19	22
22	22	117	186	373	846	2,230	297	193	73	28	18	20
23	21	98	164	532	619	1,620	290	187	64	27	18	19
24	21	84	149	595	488	1,090	316	187	59	27	18	19
25	21	75	141	568	412	879	289	182	55	26	18	18
26	21	68	158	1,560	361	844	287	165	52	26	17	18
27	21	64	295	1,270	325	765	267	148	50	26	17	17
28	22	60	286	895	301	664	248	141	47	25	18	17
29	23	56	249	839	---	577	244	134	46	24	17	16
30	23	54	275	1,160	---	535	236	128	45	23	17	16
31	22	---	357	5,020	---	572	---	122	---	23	17	---
TOTAL	818	2,667	7,527	24,272	16,784	26,623	11,178	5,963	2,193	1,021	633	605
MEAN	26.4	88.9	243	783	599	859	373	192	73.1	32.9	20.4	20.2
MAX	71	296	641	5,020	3,060	2,640	566	264	117	45	24	44
MIN	21	22	41	255	239	241	236	122	45	23	17	15
AC-FT	1,620	5,290	14,930	48,140	33,290	52,810	22,170	11,830	4,350	2,030	1,260	1,200
CFSM	0.35	1.18	3.23	10.4	7.97	11.4	4.95	2.56	0.97	0.44	0.27	0.27
IN.	0.40	1.32	3.72	12.01	8.30	13.17	5.53	2.95	1.08	0.51	0.31	0.30

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1942 - 2003, BY WATER YEAR (WY)

MEAN	151	506	677	658	614	489	491	382	207	82.2	46.2	54.3
MAX	527	1,219	1,463	1,568	1,443	1,358	873	745	552	195	94.5	192
(WY)	(1956)	(1956)	(1976)	(1953)	(1982)	(1972)	(1991)	(1949)	(1955)	(1983)	(1968)	(1959)
MIN	23.1	35.9	128	138	146	155	226	141	50.9	32.9	20.4	18.3
(WY)	(1953)	(1953)	(1977)	(1977)	(1977)	(1992)	(1973)	(1994)	(1992)	(2003)	(2003)	(1989)

SUMMARY STATISTICS

	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1942 - 2003	
ANNUAL TOTAL	109,175		100,284			
ANNUAL MEAN	299		275		362	
HIGHEST ANNUAL MEAN					527	
LOWEST ANNUAL MEAN					173	
HIGHEST DAILY MEAN	4,410	Jan 8	5,020	Jan 31	9,260	Feb 8, 1996
LOWEST DAILY MEAN	20	Sep 26	15	Sep 5	13	Sep 24, 1989
ANNUAL SEVEN-DAY MINIMUM	21	Sep 22	16	Sep 1	15	Sep 19, 1989
ANNUAL RUNOFF (AC-FT)	216,500		198,900		262,000	
ANNUAL RUNOFF (CFSM)	3.98		3.65		4.81	
ANNUAL RUNOFF (INCHES)	54.01		49.61		65.33	
10 PERCENT EXCEEDS	578		634		782	
50 PERCENT EXCEEDS	182		109		232	
90 PERCENT EXCEEDS	23		21		37	

12085000 ALDER RESERVOIR AT ALDER, WA

LOCATION.--Lat 46°48'09", long 122°18'37", in SE ¼ NW ¼ sec.9, T.15 N., R.4 E., Thurston County, Hydrologic Unit 17110015, near left end of Alder Dam on Nisqually River, 1.0 mi west of Alder, 1.7 mi upstream from La Grande Dam, 4.6 mi upstream from Mashel River, and at mile 44.2.

DRAINAGE AREA.--286 mi².

PERIOD OF RECORD.--November 1944 to current year.

GAGE.--Water-stage recorder. Datum of gage is 7.61 ft above NGVD of 1929 (levels by Tacoma Public Utilities). Prior to July 8, 1946, nonrecording gage at same site and datum.

REMARKS.--Reservoir is formed by concrete-arch dam; storage began Nov. 7, 1944; dam completed in 1945. Usable capacity, 161,457 acre-ft (based on 1985 resurvey) between gage heights 1,114 ft, lower limit of operating range, and 1,207 ft, top of spillway gates. Unused storage below gage height 1,114 ft, 52,110 acre-ft. Crest of spillway is at gage height 1,177 ft. Figures given herein represent total contents. Water is used by City of Tacoma for power generation. Chemical analyses December 1973 to September 1983 (samples were taken near the dam).

EXTREMES FOR PERIOD OF RECORD.--Maximum contents, 233,848 acre-ft Dec. 4, 1975, gage height, 1,207.68 ft; minimum contents since reservoir first filled, 74,200 acre-ft Nov. 26, 2000, gage height, 1,137.36 ft.

EXTREMES FOR CURRENT YEAR.--Maximum contents, 207,500 acre-ft Mar. 24; maximum gage height, 1,205.03 ft Mar. 24; minimum contents 80,400 acre-ft Dec. 10, 11, gage height, 1,142.90 ft.

CAPACITY TABLE
(Based on project resurvey and maps provided by Tacoma Public Utilities in 1985)

Gage height (feet)	Contents (acre-feet)	Gage height (feet)	Contents (acre-feet)	Gage height (feet)	Contents (acre-feet)
1,143	80,474	1,170	120,736	1,200	192,544
1,150	89,003	1,180	141,570	1,207	213,570
1,160	103,084	1,190	164,970		

RESERVOIR STORAGE, ACRE FEET
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY OBSERVATION AT 2400 HOURS

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	140,800	109,400	87,500	117,400	194,900	186,300	199,500	188,600	186,500	175,000	152,600	136,900
2	138,900	108,400	86,600	122,300	197,700	185,900	198,600	188,200	186,500	174,100	152,100	136,200
3	137,800	107,200	85,900	128,400	200,000	185,100	197,500	188,000	186,500	173,300	151,500	135,800
4	136,600	106,000	85,100	136,200	200,900	184,200	195,800	187,900	186,500	172,400	151,100	135,400
5	135,100	104,700	84,300	144,100	200,700	183,800	194,200	187,800	186,400	171,600	150,800	134,900
6	134,000	103,800	83,300	148,200	199,600	183,500	192,500	187,500	186,700	170,900	150,400	134,300
7	133,000	102,800	82,400	151,000	198,300	183,300	190,700	187,400	187,200	170,200	150,000	133,700
8	132,200	101,900	81,400	152,700	197,100	183,000	189,400	186,900	187,600	169,500	149,600	132,900
9	131,500	101,200	80,700	153,400	196,000	185,000	189,500	186,500	187,700	168,900	149,100	132,200
10	130,500	100,400	80,400	153,700	195,100	187,100	189,300	186,000	187,700	168,300	148,700	131,500
11	129,300	99,600	81,500	154,000	193,800	186,500	188,700	185,400	187,300	167,800	148,100	131,000
12	128,200	99,600	84,200	156,000	192,300	189,000	188,500	185,100	186,900	167,300	147,700	130,300
13	127,200	98,500	87,500	157,400	190,900	194,800	189,200	184,700	186,600	166,500	147,200	129,300
14	126,400	97,500	91,600	158,900	189,300	195,700	189,700	184,300	186,200	165,700	146,800	128,300
15	125,500	96,700	96,900	159,500	187,800	195,700	190,000	184,200	185,500	164,900	146,400	127,600
16	124,400	96,200	102,300	159,900	186,400	196,300	190,000	184,200	184,700	164,300	145,900	126,900
17	123,500	95,800	105,500	160,000	185,400	196,400	190,000	184,200	184,400	163,600	145,400	126,300
18	122,900	95,000	107,600	159,900	184,500	196,000	189,900	184,100	184,000	162,700	145,100	125,500
19	121,900	96,000	108,800	159,700	183,500	195,200	189,700	183,700	183,600	162,000	144,600	124,900
20	121,000	96,700	109,700	159,700	182,800	194,500	189,600	183,200	182,800	161,400	144,200	124,300
21	120,200	96,600	110,100	158,900	184,400	195,000	189,800	182,800	182,200	160,600	143,600	123,700
22	119,300	95,900	110,300	159,000	186,500	203,100	190,000	182,500	181,500	159,900	143,200	123,100
23	118,400	95,000	110,500	160,400	187,400	207,200	190,000	182,400	180,500	159,200	142,500	122,500
24	117,400	93,900	110,300	161,600	188,000	207,300	190,100	183,000	179,500	158,600	141,800	122,100
25	116,300	93,000	110,400	162,600	188,000	206,300	190,200	183,900	178,500	157,800	141,300	121,800
26	115,400	91,900	110,500	170,000	187,700	205,000	190,200	184,200	177,700	156,800	140,900	121,400
27	114,600	91,100	111,500	174,400	187,300	203,300	190,000	184,400	177,200	156,000	140,500	121,100
28	113,400	90,100	112,300	176,100	187,000	202,300	189,500	184,700	176,800	155,400	139,700	120,900
29	112,500	89,300	112,900	175,500	---	201,400	189,100	185,200	176,400	154,600	139,000	120,300
30	111,600	88,400	113,700	175,100	---	200,300	189,000	185,900	175,900	153,900	138,300	119,600
31	110,500	---	115,400	191,200	---	199,800	---	186,300	---	153,200	137,600	---
MAX	140,800	109,400	115,400	191,200	200,900	207,300	199,500	188,600	187,700	175,000	152,600	136,900
MIN	110,500	88,400	80,400	117,400	182,800	183,000	188,500	182,400	175,900	153,200	137,600	119,600
†	1,164.37	1,149.53	1,167.26	1,199.55	1,198.06	1,202.43	1,198.78	1,197.81	1,194.09	1,185.13	1,178.27	1,169.41
‡	-32,000	-22,100	+27,000	+75,800	-4,200	+12,800	-10,800	-2,700	-10,400	-22,700	-15,600	-18,000
CAL YR	2002 MAX	210,500	MIN 80,400	AC-FT‡	-55,600							
WTR YR	2003 MAX	207,300	MIN 80,400	AC-FT‡	-22,900							

† Gage Height, in feet, at end of month.

‡ Change in contents, in acre-feet.

12085500 LA GRANDE RESERVOIR AT LA GRANDE, WA

LOCATION.--Lat 46°49'23", long 122°18'13", in SW $\frac{1}{4}$ SE $\frac{1}{4}$ sec.33, T.16 N., R.4 E., Thurston County, Hydrologic Unit 17110015, at left end of gate control structure, 1.1 mi southeast of La Grande, 1.7 mi downstream from Alder Dam, and at mile 42.5.

DRAINAGE AREA.--289 mi².

PERIOD OF RECORD.--January 1945 to current year. January 1945 to September 1951 included in combined adjustment to monthly flow of Nisqually River at La Grande. Month-end contents January 1945 to September 1950, published in WSP 1316.

GAGE.--Water-stage recorder. Datum of gage is 7.61 ft below NGVD of 1929 (levels by City of Tacoma). Prior to June 12, 1947, month-end gage heights furnished by City of Tacoma from temporary gages in pool upstream from dam.

REMARKS.--Reservoir is formed by concrete gravity dam completed in 1944; storage began in February 1945. Useable storage, 1,053 acre-ft between gage heights 910 ft, minimum practical head, and 935 ft, normal reservoir level. Dead storage below gage height 910 ft, 1,629 acre-ft. Figures given herein represent total contents. Water used by Tacoma Public Utilities for power generation.

EXTREMES FOR PERIOD OF RECORD.--Maximum contents, 2,760 acre-ft May 14, 1950, gage height, 936.4 ft; minimum contents observed since reservoir first filled, 1,370 acre-ft Aug. 24, 1956, gage height, 900.0 ft.

EXTREMES FOR CURRENT YEAR.--Maximum contents, 2,672 acre-ft Oct. 27, gage height, 934.81 ft; minimum contents, 1,631 acre-ft Apr. 9, gage height, 910.06 ft.

MONTH-END GAGE HEIGHT AND CONTENTS AT 2400
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

Date	Gage height (feet)	Contents (acre- feet)	Change in contents (acre- feet)
September 30	931.40	2,489	--
October 31	927.59	2,298	-191
November 30	927.00	2,270	-28
December 31	927.00	2,270	0
Calender Year 2002	--	--	-302
January 31	932.00	2,520	+250
February 28	929.11	2,372	-148
March 31	932.84	2,565	+193
April 30	927.58	2,298	-267
May 31	930.10	2,422	+124
June 30	930.45	2,440	+18
July 31	930.35	2,435	-5
August 31	931.04	2,470	+35
September 30	929.73	2,403	-67
Water Year 2003	--	--	-86

12086500 NISQUALLY RIVER AT LA GRANDE, WA

LOCATION.--Lat 46°50'25", long 122°19'38", in NW ¼ SE ¼ sec.29, T.16 N., R.4 E., Pierce County, Hydrologic Unit 17110015, on right bank 0.4 mi downstream from Tacoma Public Utilities powerplant, 0.6 mi northwest of La Grande, 0.8 mi upstream from Mashel River, and at mile 40.4.

DRAINAGE AREA.--292 mi².

PERIOD OF RECORD.--September 1906 to October 1911, November to December 1911 (gage heights only), October 1919 to September 1931, October 1943 to current year. Monthly discharge only for some periods, published in WSP 1316. Published as "below Little Nisqually River, near La Grande" September 1906 to October 1911, and as "near La Grande" November to December 1911 and October 1919 to September 1931.

REVISED RECORDS.--WSP 1216: Drainage area. WSP 1316: 1927-28(M), 1949-50. WRD WA-74: 1956(M), 1959-61(M), 1965.

GAGE.--Water-stage recorder and crest-stage gage. Elevation of gage is 490 ft above NGVD of 1929, from river-profile map. See WSP 1932 for history of changes prior to Feb. 8, 1945.

REMARKS.--No estimated daily discharges. Records good. Flow regulated by Tacoma Public Utilities powerplant at La Grande since December 1943, by Alder Reservoir (station 12085000) since November 1944, and by La Grande Reservoir (station 12085500) since February 1945. All diversions returned to river upstream from gage. U.S. Geological Survey satellite telemeter at station. Chemical analyses October 1972 to September 1985. Water temperatures October 1965 to September 1982.

AVERAGE DISCHARGE.--77 years (water years 1907-11, 1920-31, 1944-2003), 1,433 ft³/s, 66.64 in/yr, 1,038,000 acre-ft/yr, adjusted for storage.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 39,500 ft³/s, Feb. 8, 1996, gage height, 15.30 ft, from rating curve extended above 5,300 ft³/s and computed flow over dam as provided by Tacoma Public Utilities; practically no flow on many occasions at site "near La Grande" (which excluded diversion between 1920 and 1930) as a result of regulation.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 10,900 ft³/s, Jan. 31, gage height, 9.31 ft; minimum discharge, 572 ft³/s Aug. 14; minimum daily discharge, 605 ft³/s, Sept. 24.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1,100	735	801	664	7,150	1,290	2,370	1,310	1,050	1,090	839	810
2	1,110	738	770	670	3,720	1,290	2,370	1,310	1,050	1,050	827	765
3	1,110	739	721	669	2,540	1,300	2,370	1,240	1,040	1,010	798	690
4	1,110	732	701	668	2,420	1,300	2,370	1,230	1,040	993	712	705
5	1,120	737	693	667	2,420	1,300	2,370	1,220	1,060	994	661	757
6	952	735	679	661	2,410	1,320	2,370	1,180	1,060	994	674	751
7	858	735	676	658	2,410	1,350	2,400	1,170	1,060	959	680	746
8	802	733	676	888	2,060	1,360	2,440	1,170	1,050	946	685	715
9	795	731	674	1,050	1,870	1,360	1,950	1,180	1,060	946	689	649
10	795	733	675	1,040	1,780	1,910	1,910	1,180	1,070	925	687	615
11	793	735	673	1,040	1,740	3,320	1,880	1,180	1,060	939	669	678
12	778	734	689	1,050	1,740	4,870	1,870	1,180	1,060	980	654	750
13	779	998	673	1,050	1,740	5,460	1,610	1,180	1,050	1,060	633	770
14	780	1,060	679	1,050	1,750	5,310	1,590	1,180	1,050	1,020	640	769
15	782	908	676	1,040	1,740	4,200	1,490	1,180	1,060	971	688	713
16	791	862	682	1,040	1,740	3,010	1,490	1,170	1,050	966	706	631
17	787	965	675	1,040	1,730	2,560	1,480	1,170	1,060	968	705	607
18	790	994	676	1,040	1,660	2,380	1,500	1,170	1,050	960	706	607
19	791	1,020	674	1,040	1,650	2,370	1,320	1,160	1,040	981	701	608
20	790	980	671	1,040	1,620	2,370	1,310	1,160	1,050	1,010	722	607
21	756	991	669	1,210	1,510	2,370	1,320	1,150	1,040	1,090	713	607
22	736	1,040	671	1,400	1,490	2,380	1,310	1,150	1,010	1,030	703	607
23	736	1,040	670	1,490	1,360	2,640	1,310	1,160	1,010	998	700	606
24	737	999	670	1,630	1,350	3,310	1,320	1,160	1,030	999	697	605
25	734	892	668	1,760	1,350	3,310	1,320	1,160	1,020	1,020	659	606
26	733	853	667	2,230	1,350	3,310	1,320	1,150	1,020	1,020	644	621
27	752	803	669	2,430	1,350	3,260	1,320	1,150	1,030	971	663	632
28	739	800	667	2,350	1,350	2,600	1,310	1,150	1,040	936	699	633
29	742	801	666	3,210	---	2,390	1,310	1,140	1,060	941	738	697
30	738	804	663	4,410	---	2,390	1,310	1,130	1,060	922	757	745
31	731	---	672	7,790	---	2,380	---	1,130	---	889	780	---
TOTAL	25,747	25,627	21,186	47,975	57,000	79,970	51,610	36,550	31,390	30,578	21,829	20,302
MEAN	831	854	683	1,548	2,036	2,580	1,720	1,179	1,046	986	704	677
MAX	1,120	1,060	801	7,790	7,150	5,460	2,440	1,310	1,070	1,090	839	810
MIN	731	731	663	658	1,350	1,290	1,310	1,130	1,010	889	633	605
AC-FT	51,070	50,830	42,020	95,160	113,100	158,600	102,400	72,500	62,260	60,650	43,300	40,270
MEAN†	307	482	1,122	2,784	1,959	2,790	1,535	1,137	872	617	451	373
CFSM†	1.05	1.65	3.84	9.53	6.71	9.55	5.26	3.89	2.99	2.11	1.54	1.28
IN.†	1.21	1.84	4.43	10.99	6.99	11.02	5.86	4.49	3.33	2.44	1.78	1.43
AC-FT†	18,880	28,700	69,020	171,200	108,800	171,600	91,330	69,920	51,880	37,940	27,740	22,200
CAL YR	2002	TOTAL 510,520	MEAN 1,399	MAX 4,480	MIN 663	AC-FT 1,013,000	MEAN† 1,322	CFSM† 4.53	IN.† 61.46	AC-FT† 957,100		
WTR YR	2003	TOTAL 449,764	MEAN 1,232	MAX 7,790	MIN 605	AC-FT 892,100	MEAN† 1,200	CFSM† 4.11	IN.† 55.81	AC-FT† 869,200		

† Adjusted for change in contents in Alder and La Grande Reservoirs.

12087000 MASHEL RIVER NEAR LA GRANDE, WA

LOCATION.--Lat 46°51'25", long 122°18'05", in NW 1/4 SE 1/4 sec.21, T.16 N., R.4 E., Pierce County, Hydrologic Unit 17110015, on left bank, 50 ft downstream from State Highway 7 bridge, 1.8 mi northeast of La Grande, and at mile 3.3.

DRAINAGE AREA.--80.7 mi².

PERIOD OF RECORD.--October 1940 to September 1957, October 1991 to current year.

GAGE.--Water-stage recorder and crest-stage gage. Datum of gage is 619.53 ft above NGVD of 1929. Prior to Oct. 1, 1957, on right bank at same datum.

REMARKS.No estimated daily discharges. Records good. Small diversion for municipal supply for Eatonville. Some regulation at low water by millpond in Eatonville.

AVERAGE DISCHARGE.--29 years (1940-56, 1992-2003), 224 ft³/s, 37.70 in/yr, 162,200 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 7,980 ft³/s Dec. 11, 1946, gage height, 9.30 ft, from rating curve extended above 3,200 ft³/s, present datum; minimum discharge, 2.3 ft³/s Aug. 27, 1992.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 1,500 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Jan 31	1615	*4,240	*7.40	Mar 12	2345	2,320	6.23

Minimum discharge, 3.7 ft³/s, Sept. 5, 6, gage height, 2.84 ft.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	11	10	26	433	1,600	128	337	198	60	19	7.2	4.9
2	11	10	25	771	908	126	290	185	54	17	7.4	4.9
3	48	10	25	856	707	171	273	167	50	15	7.7	4.7
4	79	10	26	858	516	143	243	176	45	15	7.9	4.5
5	29	10	27	804	390	181	225	204	42	14	8.0	4.1
6	18	11	25	454	307	337	255	174	38	15	9.6	4.1
7	14	12	24	317	251	375	254	156	35	14	9.4	4.8
8	11	15	24	244	213	338	265	145	32	14	8.5	8.8
9	11	27	23	196	182	669	399	129	32	17	8.6	10
10	10	29	63	161	163	751	340	119	33	15	9.7	9.1
11	9.6	24	258	138	145	642	321	112	33	14	10	13
12	9.2	40	380	258	130	1,190	291	105	31	13	9.1	18
13	8.9	89	543	223	118	1,700	365	100	32	16	8.5	12
14	8.7	53	608	258	107	1,180	357	98	40	17	7.5	9.4
15	8.6	36	671	207	99	770	290	116	32	15	6.6	8.4
16	8.4	32	847	170	110	561	248	179	28	14	6.8	9.3
17	8.2	105	491	145	166	439	274	203	25	13	6.9	43
18	8.2	67	290	127	180	350	288	221	23	12	6.6	23
19	8.3	260	198	113	155	294	241	181	26	12	6.2	16
20	9.9	165	148	102	205	296	214	162	26	11	5.9	14
21	12	88	125	103	344	317	282	149	28	10	5.6	12
22	11	59	107	177	415	936	276	134	63	10	5.5	11
23	9.8	48	90	291	304	777	253	124	39	9.8	5.4	9.5
24	9.4	42	79	297	231	501	329	118	31	9.4	5.4	8.9
25	9.2	37	73	256	190	390	294	122	27	9.2	5.5	8.5
26	9.1	34	126	504	165	420	301	103	23	9.1	5.4	7.9
27	9.2	32	230	503	144	388	265	90	21	8.9	5.6	7.6
28	9.9	30	218	395	136	366	228	81	19	8.6	5.8	7.3
29	11	29	194	357	---	313	206	76	17	8.0	5.7	6.9
30	11	27	240	573	---	290	222	70	16	7.5	5.5	6.9
31	10	---	507	2,930	---	319	---	67	---	7.1	5.1	---
TOTAL	441.6	1,441	6,711	13,221	8,581	15,658	8,426	4,264	1,001	389.6	218.6	312.5
MEAN	14.2	48.0	216	426	306	505	281	138	33.4	12.6	7.05	10.4
MAX	79	260	847	2,930	1,600	1,700	399	221	63	19	10	43
MIN	8.2	10	23	102	99	126	206	67	16	7.1	5.1	4.1
AC-FT	876	2,860	13,310	26,220	17,020	31,060	16,710	8,460	1,990	773	434	620
CFSM	0.18	0.60	2.68	5.28	3.80	6.26	3.48	1.70	0.41	0.16	0.09	0.13
IN.	0.20	0.66	3.09	6.09	3.96	7.22	3.88	1.97	0.46	0.18	0.10	0.14

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1941 - 2003, BY WATER YEAR (WY)

MEAN	109	321	436	363	392	316	287	213	147	57.7	23.9	33.8
MAX	307	688	890	694	786	567	475	441	329	178	70.6	115
(WY)	(1956)	(1956)	(1947)	(1953)	(1996)	(1950)	(1955)	(1945)	(1946)	(1993)	(1954)	(1954)
MIN	10.0	12.9	83.2	113	98.8	88.2	132	67.2	25.2	12.6	7.05	10.4
(WY)	(1953)	(1953)	(1953)	(2001)	(1941)	(1941)	(1942)	(1947)	(1992)	(2003)	(2003)	(2003)

SUMMARY STATISTICS

FOR 2002 CALENDAR YEAR

FOR 2003 WATER YEAR

WATER YEARS 1941 - 2003

ANNUAL TOTAL	65,633.4	60,665.3	
ANNUAL MEAN	180	166	224
HIGHEST ANNUAL MEAN			337
LOWEST ANNUAL MEAN			125
HIGHEST DAILY MEAN	1,660	2,930	5,570
LOWEST DAILY MEAN	8.1	4.1	4.1
ANNUAL SEVEN-DAY MINIMUM	8.5	4.6	4.6
ANNUAL RUNOFF (AC-FT)	130,200	120,300	162,200
ANNUAL RUNOFF (CFSM)	2.23	2.06	2.77
ANNUAL RUNOFF (INCHES)	30.25	27.96	37.70
10 PERCENT EXCEEDS	444	392	508
50 PERCENT EXCEEDS	87	59	140
90 PERCENT EXCEEDS	10	8.0	16

NISQUALLY RIVER BASIN

12088000 OHOP CREEK NEAR EATONVILLE, WA

LOCATION.--Lat 46°52'52", long 122°16'40", in SE 1/4 SE 1/4 sec.10, T.16 N., R.4 E., Pierce County, Hydrologic Unit 17110015, on left bank, 150 ft downstream from Lynch Creek, 0.2 mi downstream from outlet of Ohop Lake, 0.8 mi northwest of Eatonville, and at mile 6.1.

DRAINAGE AREA.--34.5 mi².

PERIOD OF RECORD.--June 1927 to September 1932, September 1941 to September 1971, June 1993 to current year.

REVISED RECORDS.--WSP 1286: 1946. WSP 1932: Drainage area.

GAGE.--Water-stage recorder and crest-stage gage. Datum of gage is 517.76 ft above NGVD of 1929 (stadia traverse). June 1, 1927 to Sept. 30, 1932, water-stage recorder at datum 4.83 ft higher; Sept. 6, 1941, to Mar. 17, 1942, nonrecording gage and Mar. 18, 1942, to June 15, 1964, water-stage recorder at datum 2.04 ft higher; all at site 250 ft downstream. June 15, 1964, to Aug. 26, 1966, water-stage recorder at site on left bank across stream at datum 2.04 ft higher. Aug. 27, 1966, to Sept. 30, 1971, water-stage recorder at site on right bank at same datum.

REMARKS.--Records fair except for estimated daily discharges, which are poor. Flow affected by natural storage in Ohop Lake.

AVERAGE DISCHARGE.--45 years (water years 1928-32, 1942-71, 1994-2003), 65.9 ft³/s, 25.96 in/yr, 47,750 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,620 ft³/s Feb. 8, 1996, gage height, 8.76 ft; minimum discharge, 2.2 ft³/s Sept. 2, 1994, Sept. 1, 2, 2002, and Aug. 25, 2003.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 400 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Jan 31	1645	*1,030	*5.70	No other peak greater than base discharge.			

Minimum discharge, 2.2 ft³/s, Aug. 25, gage height, 1.11 ft.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	5.3	8.8	8.6	148	540	46	99	e72	19	e9.0	4.7	3.7
2	4.5	6.9	8.3	156	338	45	96	e65	18	e8.3	7.2	3.4
3	16	8.8	7.3	131	254	64	89	e55	17	e8.0	6.7	3.3
4	24	10	7.8	126	195	58	85	e60	16	e7.6	6.1	3.2
5	14	8.2	8.2	130	147	69	79	e80	15	e7.3	6.0	3.0
6	19	9.9	8.3	98	114	145	84	e76	15	e7.6	6.3	3.0
7	36	11	7.6	76	93	170	87	e72	14	e7.3	5.8	3.6
8	24	10	7.6	61	80	161	86	63	e12	e7.3	5.4	4.0
9	19	9.1	7.5	50	69	213	112	57	e11	e8.4	5.8	3.9
10	14	7.9	14	43	63	199	98	53	e11	e7.6	6.5	3.8
11	11	7.9	39	38	57	165	91	49	e12	e7.3	6.3	5.1
12	8.1	15	68	38	52	198	85	45	e11	e7.0	5.9	5.9
13	5.6	25	150	36	47	265	115	42	e12	e8.0	5.5	8.8
14	4.8	19	158	48	44	205	131	40	e17	e8.6	4.6	12
15	4.5	15	141	43	40	161	107	43	e13	e7.8	4.4	10
16	4.3	17	201	38	38	130	98	60	e12	e7.2	4.6	9.9
17	4.3	40	156	34	45	114	103	75	e11	e7.0	4.6	22
18	4.1	40	108	32	51	102	111	70	e10	e6.7	4.0	15
19	4.5	72	75	29	49	92	96	54	e11	e6.5	3.6	13
20	14	51	57	27	69	87	86	45	e11	e6.3	3.3	12
21	23	35	47	28	108	85	105	40	e12	e6.1	3.1	11
22	18	26	40	47	125	123	123	36	e22	e5.9	2.8	8.8
23	14	22	34	60	102	146	124	33	e13	e5.7	2.6	6.8
24	12	18	30	57	83	121	142	30	e11	5.5	2.7	6.1
25	12	16	28	55	70	105	143	31	e10	5.3	3.6	5.4
26	9.7	13	37	139	61	122	141	28	e9.0	5.1	6.8	4.5
27	8.9	12	54	142	53	130	127	26	e8.5	4.9	5.8	4.1
28	11	11	56	122	49	114	e103	24	e8.0	4.5	5.1	3.9
29	9.0	9.4	57	117	---	97	90	22	e7.8	4.3	4.8	3.8
30	9.3	9.1	62	169	---	85	e84	21	e7.5	4.2	4.2	7.3
31	10	---	172	762	---	87	---	20	---	4.0	4.1	---
TOTAL	377.9	564.0	1,855.2	3,080	3,036	3,904	3,120	1,487	376.8	206.3	152.9	210.3
MEAN	12.2	18.8	59.8	99.4	108	126	104	48.0	12.6	6.65	4.93	7.01
MAX	36	72	201	762	540	265	143	80	22	9.0	7.2	22
MIN	4.1	6.9	7.3	27	38	45	79	20	7.5	4.0	2.6	3.0
AC-FT	750	1,120	3,680	6,110	6,020	7,740	6,190	2,950	747	409	303	417
CFSM	0.35	0.54	1.73	2.88	3.14	3.65	3.01	1.39	0.36	0.19	0.14	0.20
IN.	0.41	0.61	2.00	3.32	3.27	4.21	3.36	1.60	0.41	0.22	0.16	0.23

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1927 - 2003, BY WATER YEAR (WY)

	34.7	84.7	120	121	115	96.5	83.4	54.8	40.3	19.9	11.0	15.0
MEAN	34.7	84.7	120	121	115	96.5	83.4	54.8	40.3	19.9	11.0	15.0
MAX	90.8	235	268	258	305	191	141	138	114	64.5	59.6	70.9
(WY)	(1928)	(1961)	(1947)	(1971)	(1996)	(1932)	(1928)	(1960)	(1942)	(1993)	(1968)	(1968)
MIN	7.69	8.76	24.6	32.8	36.1	46.4	39.4	19.2	12.2	6.04	4.93	4.44
(WY)	(1930)	(1953)	(1953)	(2001)	(2001)	(2001)	(1998)	(1947)	(1932)	(1944)	(2003)	(1952)

SUMMARY STATISTICS

FOR 2002 CALENDAR YEAR

FOR 2003 WATER YEAR

WATER YEARS 1927 - 2003

ANNUAL TOTAL	21,376.4	18,370.4	
ANNUAL MEAN	58.6	50.3	65.9
HIGHEST ANNUAL MEAN			98.4
LOWEST ANNUAL MEAN			32.4
HIGHEST DAILY MEAN	337	Mar 20	762
LOWEST DAILY MEAN	2.5	Sep 1	2.6
ANNUAL SEVEN-DAY MINIMUM	3.0	Aug 26	3.1
ANNUAL RUNOFF (AC-FT)	42,400		36,440
ANNUAL RUNOFF (CFSM)	1.70		1.46
ANNUAL RUNOFF (INCHES)	23.05		19.81
10 PERCENT EXCEEDS	160		128
50 PERCENT EXCEEDS	29		22
			47,750
			1.91
			25.96
			149
			43

e Estimated

12089208 CENTRALIA POWER CANAL NEAR MCKENNA, WA

LOCATION.--Lat 46°54'01", long 122°29'50", in NE ¼ SW ¼ sec.1, T.16 N., R.2 E., Thurston County, Hydrologic Unit 17110015, on left bank 1,000 ft downstream from headworks at dam, and 3.7 mi southeast of McKenna.

PERIOD OF RECORD.--March 1979 to current year.

GAGE.--Water-stage recorder. Elevation of gage is 330 ft above NGVD of 1929, from topographic map. Prior to Oct. 20, 1999, at site 500 ft upstream at datum 10.00 ft lower.

REMARKS.--No estimated daily discharges. Records good. Flow regulated by headworks 1,000 ft upstream from station. U.S. Geological Survey satellite telemeter at station.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 900 ft³/s Nov. 11, 1990, gage height, 7.72 ft at datum then in use; minimum discharge, no flow on many days most years.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 715 ft³/s May 7-8, gage height, 15.48 ft; minimum discharge, 97 ft³/s Mar. 27.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	400	224	335	449	330	446	450	650	585	590	424	450
2	450	212	316	447	443	449	449	648	603	563	471	422
3	452	201	235	449	546	448	446	643	602	515	446	344
4	456	199	148	449	595	446	448	641	592	501	376	333
5	453	204	164	448	597	446	449	637	598	500	307	388
6	436	216	165	552	594	443	449	648	609	499	314	390
7	391	229	167	588	537	441	546	674	601	474	332	391
8	319	231	164	555	445	444	593	691	598	436	335	376
9	309	235	165	530	442	436	593	662	606	444	344	329
10	304	242	188	451	449	441	593	626	619	415	345	288
11	300	244	337	451	446	441	591	625	616	408	332	313
12	281	251	450	447	445	443	593	615	613	464	312	397
13	277	402	441	445	430	441	597	609	615	540	299	419
14	274	573	440	447	446	442	597	606	624	555	288	426
15	274	500	439	442	450	444	592	617	613	466	321	393
16	275	395	440	479	447	441	583	684	584	459	350	305
17	274	561	444	482	448	439	590	696	595	458	354	299
18	272	627	447	448	447	446	595	698	596	444	355	299
19	276	526	447	451	449	450	582	696	593	439	346	286
20	279	428	419	451	490	448	576	695	594	474	351	282
21	275	422	372	445	412	449	588	694	607	552	355	279
22	239	432	355	427	445	441	594	695	613	524	341	275
23	228	431	328	408	447	441	593	691	593	466	337	269
24	224	431	307	442	435	445	597	685	593	465	339	265
25	220	432	293	451	448	444	600	684	587	483	318	260
26	215	410	330	442	449	448	589	664	583	502	291	263
27	210	354	394	441	450	215	582	642	567	443	297	278
28	210	345	432	448	449	357	620	618	550	421	337	281
29	214	342	431	415	---	447	629	606	568	402	360	312
30	207	340	435	445	---	449	642	584	560	412	392	338
31	211	---	450	338	---	448	---	577	---	361	405	---
TOTAL	9,205	10,639	10,478	14,163	13,011	13,459	16,946	20,201	17,877	14,675	10,774	9,950
MEAN	297	355	338	457	465	434	565	652	596	473	348	332
MAX	456	627	450	588	597	450	642	698	624	590	471	450
MIN	207	199	148	338	330	215	446	577	550	361	288	260
AC-FT	18,260	21,100	20,780	28,090	25,810	26,700	33,610	40,070	35,460	29,110	21,370	19,740
CAL YR	2002	TOTAL 221,030	MEAN 606	MAX 783	MIN 97	AC-FT 438,400						
WTR YR	2003	TOTAL 161,378	MEAN 442	MAX 698	MIN 148	AC-FT 320,100						

NISQUALLY RIVER BASIN

12089500 NISQUALLY RIVER AT MCKENNA, WA

LOCATION.--Lat 46°56'01", long 122°33'35", in SE ¼ NW ¼ sec.28, T.17 N., R.2 E., Thurston County, Hydrologic Unit 17110015, on left bank at downstream side of State Highway 507 bridge at McKenna, and at mile 21.8.

DRAINAGE AREA.--517 mi².

PERIOD OF RECORD.--October 1947 to September 1968, May 1977 to current year.

GAGE.--Water-stage recorder. Datum of gage is 285.47 ft above NGVD of 1929. Oct.1, 1947 to Sept. 30, 1968, water-stage recorder at site 80 ft downstream at present datum, and Oct. 1, 1968 to Oct. 11, 1985, water-stage recorder at site 20 ft upstream at present datum.

REMARKS.--No estimated daily discharges. Records good. Flow regulated by Alder Reservoir (station 12085000) at mile 44.2 and La Grande Reservoir (station 12085500) at mile 42.5. Centralia Power Canal (station 12089208) diverts water 4.4 mi upstream from station, which is returned to river at powerplant 9.2 mi downstream from station. Centralia Power Canal was built in 1929 and put into operation in 1930. Minor diversions for irrigation upstream from station. U.S. Geological Survey satellite telemeter at station.

AVERAGE DISCHARGE.--47 years (water years 1948-68, 1978-2003), 1,304 ft³/s, 944,500 acre-ft/yr, unadjusted.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 50,000 ft³/s Feb. 8 or 9, 1996, gage height, 17.13 ft, estimated based on comparison with upstream gaging stations; minimum discharge, 20 ft³/s Sept. 10, 11, 1965, Aug. 31, 1966.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 16,200 ft³/s Jan. 31, gage height 10.58 ft; minimum discharge, 360 ft³/s Aug. 8, 13, 19.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	705	558	521	929	11,600	1,070	2,470	993	554	520	441	381
2	712	565	519	1,290	5,530	1,030	2,420	956	514	517	387	384
3	729	576	532	1,480	3,500	1,110	2,390	865	510	513	385	390
4	837	581	584	1,290	2,950	1,100	2,350	837	510	506	384	382
5	761	579	576	1,520	2,680	1,090	2,310	879	509	507	381	389
6	637	569	572	920	2,500	1,410	2,330	808	507	507	375	384
7	583	565	567	655	2,430	1,580	2,260	745	510	509	370	384
8	571	565	567	727	2,170	1,600	2,260	680	509	515	369	382
9	563	566	565	949	1,900	1,890	2,080	682	504	511	372	379
10	563	567	566	976	1,760	2,530	1,920	701	501	520	372	376
11	562	566	574	934	1,640	3,500	1,850	688	500	526	369	379
12	561	566	669	1,030	1,600	5,480	1,780	679	499	508	367	383
13	561	643	1,050	1,060	1,590	7,170	1,660	675	499	503	367	388
14	562	671	951	1,090	1,550	6,570	1,670	673	497	501	370	385
15	565	563	1,280	1,060	1,530	4,960	1,470	669	493	502	375	387
16	564	577	1,320	949	1,540	3,600	1,380	687	509	503	375	390
17	561	561	1,160	900	1,600	2,910	1,350	713	495	504	371	384
18	560	567	788	909	1,580	2,580	1,400	775	493	511	370	383
19	561	808	618	882	1,510	2,460	1,190	714	493	516	369	380
20	563	870	563	863	1,510	2,430	1,090	675	492	516	373	381
21	561	728	566	1,010	1,630	2,450	1,180	653	491	518	374	379
22	562	739	560	1,390	1,730	2,970	1,240	633	491	521	374	380
23	564	721	559	1,750	1,480	3,230	1,220	632	489	521	376	381
24	560	686	560	1,800	1,330	3,640	1,300	625	485	524	376	379
25	559	562	560	1,940	1,240	3,480	1,310	622	485	520	374	378
26	560	531	568	2,370	1,180	3,500	1,300	620	482	517	379	384
27	563	530	603	2,850	1,150	3,740	1,260	617	498	518	381	384
28	569	524	625	2,660	1,130	2,950	1,130	622	511	520	384	381
29	564	521	586	3,030	---	2,530	1,060	615	512	519	384	385
30	571	522	601	4,480	---	2,450	1,030	613	514	517	385	424
31	571	---	1,010	9,650	---	2,440	---	610	---	540	382	---
TOTAL	18,485	18,147	21,340	53,343	63,540	89,450	49,660	21,956	15,056	15,950	11,711	11,526
MEAN	596	605	688	1,721	2,269	2,885	1,655	708	502	515	378	384
MAX	837	870	1,320	9,650	11,600	7,170	2,470	993	554	540	441	424
MIN	559	521	519	655	1,130	1,030	1,030	610	482	501	367	376
AC-FT	36,660	35,990	42,330	105,800	126,000	177,400	98,500	43,550	29,860	31,640	23,230	22,860

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1948 - 2003, BY WATER YEAR (WY)

MEAN	831	1,639	2,318	2,145	2,218	1,617	1,360	1,155	897	572	435	519
MAX	1,693	4,071	5,516	4,397	6,198	3,398	2,714	2,659	1,894	1,419	1,104	1,167
(WY)	(1956)	(1956)	(1978)	(1997)	(1996)	(1950)	(1991)	(1949)	(1950)	(1999)	(1999)	(1977)
MIN	298	272	595	620	593	405	553	499	254	85.5	137	148
(WY)	(1962)	(1953)	(2001)	(2001)	(2001)	(1962)	(1978)	(1978)	(1965)	(1965)	(1963)	(1965)

SUMMARY STATISTICS

	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1948 - 2003	
ANNUAL TOTAL	402,491		390,164			
ANNUAL MEAN	1,103		1,069		1,304	
HIGHEST ANNUAL MEAN					2,238	
LOWEST ANNUAL MEAN					590	
HIGHEST DAILY MEAN	5,450		11,600		27,300	
LOWEST DAILY MEAN	370		367		22	
ANNUAL SEVEN-DAY MINIMUM	372		369		27	
ANNUAL RUNOFF (AC-FT)	798,300		773,900		944,500	
10 PERCENT EXCEEDS	2,100		2,400		2,320	
50 PERCENT EXCEEDS	721		577		920	
90 PERCENT EXCEEDS	381		382		385	

THIS PAGE IS INTENTIONALLY BLANK