Stream Monitoring

The Elm Creek watershed contains several large depressions and drainageways. Water is generally directed from the south and west to the northeast via four main drainageways – Rush Creek, North Fork Rush Creek, Diamond Creek, and Elm Creek. These drainageways converge in the Elm Creek Park Reserve and enter Hayden Lake. Water is eventually discharged to the Mississippi River near the Mill Pond in Champlin.

The monitoring station in Champlin, located at the Elm Creek Road crossing in the Elm Creek Park Reserve, is operated in cooperation with the United States Geological Survey (USGS). The exact location is: latitude 45°09'48", longitude 93°26'11" referenced to North American Datum of 1927, in NE ¼ NW ¼ Sec.35, T.120 N., R.22 W., Hennepin County, MN, Hydrologic Unit 07010206, on left bank, 33 feet downstream from bridge on Elm Creek Road, 2.5 miles southwest of Champlin. The Commission shares the costs of operating the station, which collects continuous flow data and periodic event and base water quality data. The watershed area above the gauging station is 86 square miles, or 81% of the hydrologic watershed.

Both grab samples and storm runoff samples are collected and analyzed for various parameters. Analyses of the streamflow and water quality monitoring data for Elm Creek and its tributaries are summarized below. Real time data from the monitoring station in Champlin may be viewed on the Internet at http://waterdata.usgs.gov/mn/nwis/uv/?site_no=05287890&PARAmeter_cd=00065,00060.

Flow Monitoring

Storm event samples are collected using an automatic sampler. Routine manual sampling occurs approximately monthly. The average daily discharge for the 2014 WY, October 1, 2013 through September 30, 2014, was 90.0 cubic feet per second (cfs) or 14.2 inches. During the same period, the minimum and maximum observed average daily discharge values were 0.66 cfs and 763 cfs, respectively. The long-term average daily discharge at the station is 40.7 cfs or 6.43 inches (years 1979-2014). A spreadsheet of the data received in 2014 water year (WY), including daily discharge and summary information, long-term flow volumes (calendar and water years), the flow hydrograph and the annual instantaneous peak discharge values at the gauging station for the period of record are also found in this appendix.

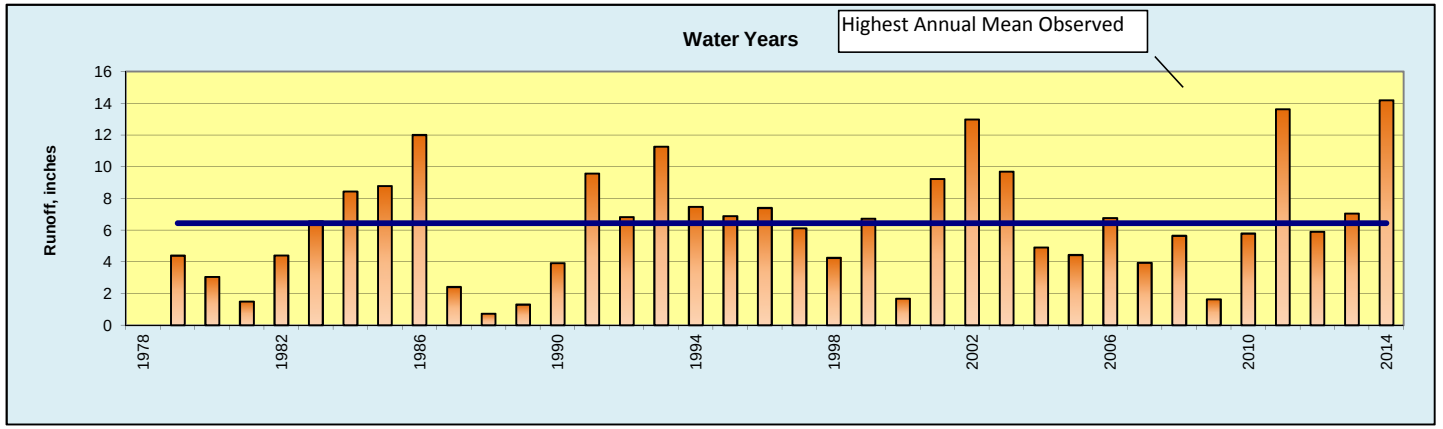
Elm Creek Annual Instantaneous Peak Discharge Rates

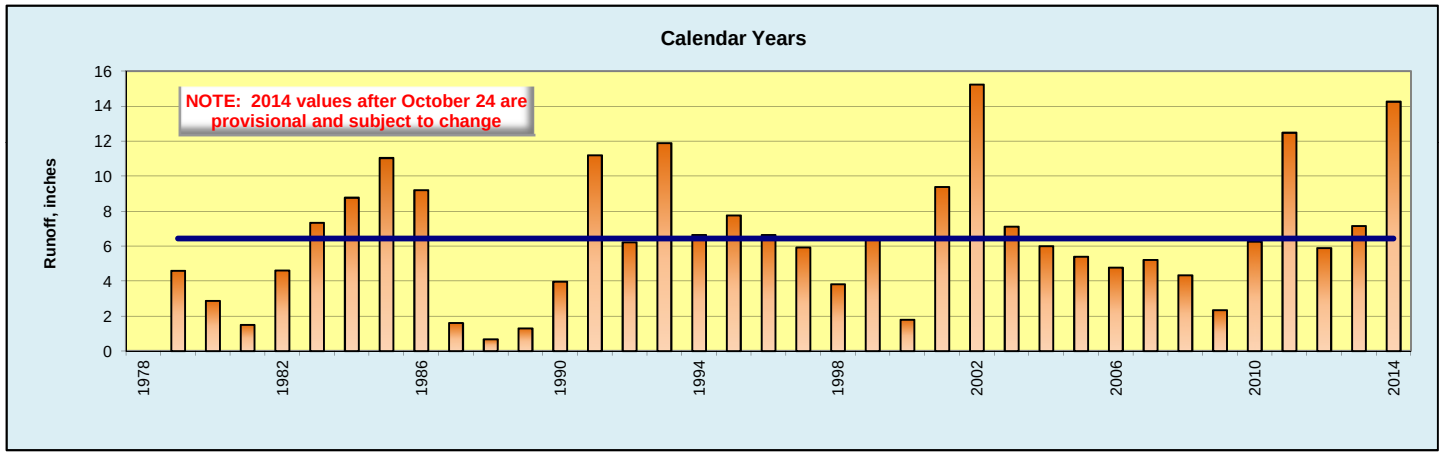
Date	Peak Flow (cfs)	Date	Peak Flow (cfs)	Date	Peak Flow (cfs)	Date	Peak Flow (cfs)
4/4/79	307	3/31/89	159	5/15/99	538*	3/27/09	119
3/25/80	199	8/1/90	225	7/13/00	112	3/17/10	369
6/15/81	44	6/1/91	371	4/25/01	875**	3/24/11	803
4/3/82	471*	3/8/92	380	5/11/02	554	5/29/12	568
3/9/83	408	6/22/93	315	6/28/03	695	6/26/13	389
2/25/84	341	4/30/94	669*	6/03/04	350	5/1/14	803
3/18/85	579*	3/17/95	237	10/30/04	118		
3/27/86	812*	3/19/96	407	10/09/05	295		
8/1/87	185	4/1/97	511*	3/17/07	223		
3/27/88	39	4/5/98	306	5/4/08	205		

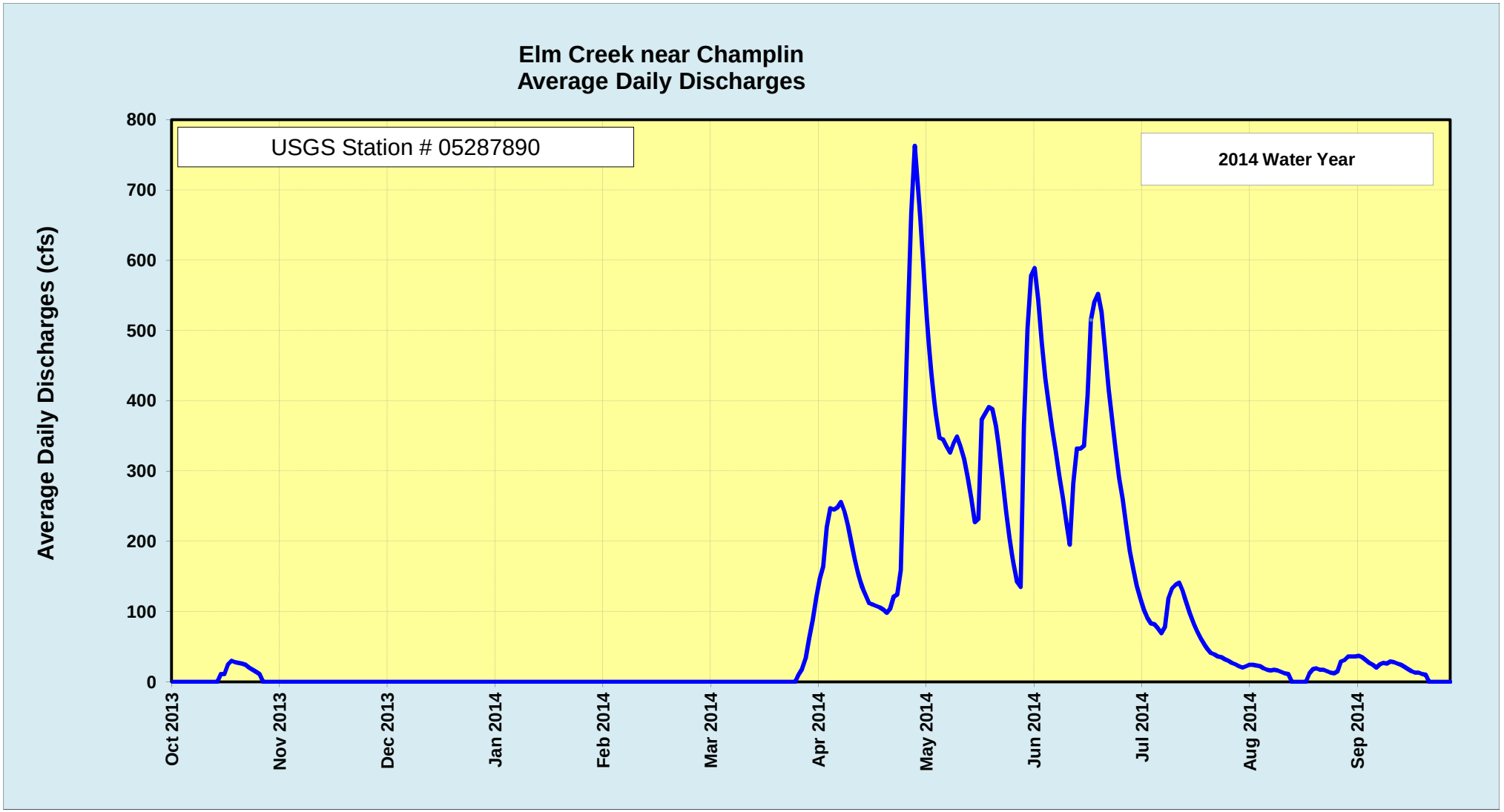
*These values have been revised based on the 2001 rating curve.

**All-time instantaneous peak discharge. The estimated 100-year flood discharge at this site is 2,290 cfs.

Daily Runoff Summary






Elm Creek near Champlin
Average Daily Discharges
USGS Station # 05287890
2014 Water Year
Average Daily Discharges (cfs)
800
700
600
500
400
300
200
100
0
Oct 2013
Nov 2013
Dec 2013
Jan 2014
Feb 2014
Mar 2014
Apr 2014
May 2014
Jun 2014
Jul 2014
Aug 2014
Sep 2014

Elm Creek Near Champlin (USGS Station 05287890)

Manual Water Quality Samples for Water Year 2014

(Selected Parameters)

USGS Parameter #		P00010	P00020	P00025	P00061	P00095	P00300	P00301	P00340	P00400
DATE	Sample Start Time	Water Temp. °C	Air Temp. °C	Barom Press mm Hg	Disch Inst cfs	Sp cond mS/cm	DO mg/L	DO % Satur	COD mg/L	pH
23-Oct-13	11:00	5.3		738	24	538	10.1	82	E 30	7.7
20-Nov-13	12:00	4.1		736	2.7	632	11.8	93	50	7.6
17-Dec-13	11:30	-0.1		736	1.8	711	9.5	67	20	7.5
21-Jan-14	10:30	-0.1		748		772	10.0	70	20	7.5
26-Feb-14	11:00	-0.1		736		820	8.4	59	20	7.5
24-Mar-14	14:30	0.1		743		978	12.1	85	30	7.5
22-Apr-14	12:30	10.0		744	100	618	11.8	107	40	8.2
21-May-14	9:30	13.5		741	400	459	6.1	60	30	7.2
23-Jun-14	11:30	22.6		737	511	356	4.8	58	40	10.1
29-Jul-14	10:00	19.1		741	30	456	5.9	66	40	7.6
27-Aug-14	9:30	18.1		746	13	530	6.8	74	40	7.6
18-Sep-14	12:30	13.9		743	20	507	8.8	88	30	7.8

USGS Parameter #		P00530	P00535	P00608	P00613	P00625	P00631	P00665	P00666	P00940
DATE	Sample Start Time	TSS mg/L	Volatile Residue mg/L	Ammonia mg/L	Nitrite mg/L	Total Nitrogen mg/L	Dissolved NO2+NO3 mg/L	Total P mg/L	Dissolved P mg/L	Dissolved Chloride mg/L
23-Oct-13	11:00	< 15	10	0.06	0.012	1.3	0.271	0.21	0.17	67.0
20-Nov-13	12:00	< 15	< 10	0.03	0.004	0.89	0.186	0.10	0.05	57.8
17-Dec-13	11:30	< 30	< 20	0.25	0.005	0.81	0.104	0.10	0.04	43.0
21-Jan-14	10:30	< 30	< 20	0.33	0.003	0.78	0.138	0.12	0.03	41.4
26-Feb-14	11:00	< 15	< 10	0.44	0.003	1.1	0.195	0.13	0.10	65.9
24-Mar-14	14:30	< 15	< 10	0.57	0.011	1.6	0.287	0.17	0.08	169.0
22-Apr-14	12:30	< 15	11	< 0.01	0.006	1.3	0.345	0.12	0.03	100.0
21-May-14	9:30	< 19	< 12	0.01	0.004	0.96	0.099	0.12	0.11	58.8
23-Jun-14	11:30	< 15	13	0.03	0.007	1.0	0.083	0.36	0.32	30.7
29-Jul-14	10:00	< 21	20	0.21	0.052	1.4	0.224	0.27	0.18	37.1
27-Aug-14	9:30	< 15	< 10	0.10	0.040	1.4	0.291	0.26	0.15	50.0
18-Sep-14	12:30	< 15	< 10	0.07	0.022	1.3	0.189	0.17	0.11	41.2

Data are provisional and are subject to change

E = Estimated

Automatic Event Samples for Water Year 2014

(Selected parameters)

USGS Parameter #			P00095	P00340	P00400	P00530	P00608	P00613	P00625	P00631	P00665	P00666	P00940
DATE & TIME			Sp Cond µS/cm	COD mg/L	pH	TSS mg/L	Ammonia mg/L	Nitrite mg/L	Total N mg/L	Dissolved NO2+NO3 mg/L	Total P mg/L	Dissolved P mg/L	Dissolved Chloride mg/L
24-Apr-14	12:38	to	645	40	8.1	< 21	< 0.01	0.007	1.1	0.320	0.10	0.03	110
26-Apr-14	09:38												
30-Apr-14	10:14	to	519	30	8.0	15	0.02	0.012	0.93	0.842	0.13	0.09	77.7
2-May-14	10:15												
20-May-14	10:34	to	435	30	7.7	26	< 0.01	0.006	0.96	0.164	0.16	0.10	54.6
21-May-14	07:34												
31-May-14	17:09	to	375	50	7.8	144	0.17	0.032	1.8	0.287	0.46	0.32	40.9
1-Jun-14	20:10												
3-Jun-14	09:29	to	377	40	7.8	54	0.08	0.023	1.2	0.110	0.30	0.26	41.7
6-Jun-14	06:30												
19-Jun-14	08:08	to	372	40	8.1	19	0.04	0.013	1.1	0.205	0.34	0.25	34.1
22-Jun-14	05:10												
11-Jul-14	09:34	to	402	30	8.0	36	0.05	0.017	1.3	0.197	0.33	0.20	34.3
12-Jul-14	15:35												
21-Aug-14	15:00	to	482	30	8.0	< 15	0.12	0.056	1.2	0.309	0.24	0.14	47.8
24-Aug-14	12:02												
29-Aug-14	13:04	to	485	40	8.0	21	0.06	0.021	1.9	0.208	0.29	0.14	51.5
1-Sep-14	10:05												

USGS Parameters

P00010 - Temperature, water, degrees Celsius
P00020 - Temperature, air, degrees Celsius
P00025 - Barometric pressure, millimeters of mercury
P00061 - Discharge, instantaneous, cubic feet per second
P00095 - Specific conductance, water, unfiltered, microsiemens per centimeter at 25 degrees Celsius
P00300 - Dissolved oxygen, water, unfiltered, milligrams per liter
P00301 - Dissolved oxygen, water, unfiltered, percent of saturation
P00340 - Chemical oxygen demand, high level, water, unfiltered, milligrams per liter
P00400 - pH, water, unfiltered, field, standard units
P00530 - Residue, total nonfilterable, milligrams per liter
P00535 - Loss on ignition, from nonfilterable residue, milligrams per liter
P00608 - Ammonia, water, filtered, milligrams per liter as nitrogen
P00613 - Nitrite, water, filtered, milligrams per liter as nitrogen
P00625 - Ammonia plus organic nitrogen, water, unfiltered, milligrams per liter as nitrogen
P00631 - Nitrate plus nitrite, water, filtered, milligrams per liter as nitrogen
P00665 - Phosphorus, water, unfiltered, milligrams per liter
P00666 - Phosphorus, water, filtered, milligrams per liter
P00940 - Chloride, water, filtered, milligrams per liter

U.S. DEPARTMENT OF THE INTERIOR - U.S. GEOLOGICAL SURVEY - WATER RESOURCES
Station No 05287890 Elm Creek Nr Champlin, MN SourceAgencyUSGSState 27 County 053
WATER YEAR OCTOBER 2013 TO SEPTEMBER 2014
Daily Mean Values Discharge, cubic feet per second[e, estimated]

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
	2013	2013	2013	2014	2014	2014	2014	2014	2014	2014	2014	2014
1	1.1	6,0	2.1	e1.1	e0.84	e1.0	62	763	366	186	22	36
2	1.1	5,8	1.9	e1.1	e0.82	e0.96	88	697	503	160	20	36
3	1.3	5,8	2.2	e1.1	e0.81	e0.93	120	625	578	137	22	36
4	1.2	5,0	2.2	e1.1	e0.80	e1.1	147	545	589	119	24	37
5	1.9	4,0	e2.1	e1.1	e0.79	e1.1	164	478	544	103	24	35
6	2.2	4,5	e2.0	e1.0	e0.79	e1.1	220	421	483	91	23	31
7	2.9	4,6	e1.9	e1.0	e0.77	e1.1	247	380	432	83	22	27
8	2.4	4,3	e1.9	e1.0	e0.76	e1.1	245	347	396	82	19	24
9	2.2	4,4	e2.0	e0.99	e0.74	e1.2	248	345	360	76	17	20
10	1.7	4,1	e2.0	e0.99	e0.72	e1.2	256	335	328	69	16	25
11	1.5	3,7	e2.0	e0.99	e0.71	e1.1	243	326	293	78	17	27
12	1.5	3,4	e1.9	e0.99	e0.71	e1.1	223	340	262	119	16	26
13	1.4	3,3	e1.8	e0.99	e0.71	e1.1	197	349	226	133	14	29
14	1.3	3,2	e1.8	e0.99	e0.71	e1.1	173	335	195	138	12	28
15	4.0	3,0	e1.8	e0.99	e0.68	e1.1	152	317	283	141	11	26
16	11	2,9	e1.8	e0.98	e0.68	e1.2	135	291	332	130	9.5	24
17	11	3,2	e1.7	e0.96	e0.67	e1.2	123	261	332	114	9.2	21
18	25	3,0	e1.7	e0.94	e0.67	e1.3	112	227	336	98	8.9	18
19	30	2,7	e1.6	e0.93	e0.66	e1.4	110	232	407	85	8.4	15
20	28	2,9	e1.5	e0.91	e0.91	e1.6	108	373	515	73	7.6	13
21	27	2,8	e1.4	e0.90	e1.2	e1.8	106	382	541	63	12	13
22	26	2,5	e1.3	e0.90	e1.2	e1.9	103	391	552	55	18	11
23	24	2,2	e1.2	e0.89	e1.1	e2.0	98	388	526	47	19	10
24	20	2,5	e1.2	e0.89	e1.1	e2.3	104	364	472	41	17	9.3
25	17	2,1	e1.2	e0.88	e1.1	e2.6	121	327	416	39	17	8.3
26	14	1,9	e1.2	e0.88	e1.1	e3.1	124	283	372	36	15	7.3
27	11	1,8	e1.1	e0.87	e1.0	e4.2	159	239	331	35	13	6.4
28	8.5	1,8	e1.1	e0.86	e1.00	e6.1	346	201	290	32	12	5.7
29	6.9	2,0	e1.1	e0.87	---	e10	520	168	260	30	15	5.5
30	5.9	2,2	e1.1	e0.85	---	18	667	142	222	27	29	4.8
31	6.0	---	e1.1	e0.85	---	33	---	135	---	25	31	---
Statistics for Water Year October 2013 to September 2014												
Total	299	102	50.9	29.8	23.8	108	5,721	11,01	11,74	2,645	521	615
Mean	9.65	3,39	1.64	.96	.85	3.48	191	355	391	85.3	16.8	20.5
Max	30.0	6,00	2.20	1.10	1.20	33.0	667	763	589	186	31.0	37.0
Min	1.10	1,80	1.10	.85	.66	.93	62.0	135	195	25.0	7.60	4.80
Ac-ft	593	202	101	59.1	47.1	214	11,35	21,83	23,29	5,246	1,033	1,22

Statistics of monthly mean data for 1979-2014, by Water Year (WY)

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Mean	31.2	19.7	9.70	5.33	8.73	60.8	105	87.0	66.7	41.7	26.6	25.1
Max	240	67.4	41.3	22.0	99.1	189	414	355	391	157	151	170
(WY)	(1986)	(1994)	(1992)	(1992)	(1984)	(2011)	(2001)	(2014)	(2014)	(1993)	(2002)	(1991)
Min	1.13	1.03	.92	.74	.85	3.48	5.31	3.54	1.34	.76	1.37	1.03
(WY)	(1990)	(1990)	(1990)	(1991)	(2014)	(2014)	(1987)	(2000)	(1988)	(1988)	(2008)	(2013)

Summary Statistics	Water Year 2014		Water Years 1979 - 2014	
Annual total	32,860			
Annual mean	90.0		40.7	
Highest annual mean			90.3	2014
Lowest annual mean			4.54	1988
Highest daily mean	763.0	May 01	815.0	Apr 25, 2001
Lowest daily mean	0.660	Feb 19	0.310	Jun 30, 1988
Annual seven-day minimum	0.683	Feb 13	0.347	Aug 04, 2007
Maximum peak flow	803	May 01	875	Apr 25, 2001
Maximum peak stage	9.79	May 01	10.02	Apr 25, 2001
Annual runoff (cfsm)	1.05		0.473	
Annual runoff (inches)	14.2		6.43	
10 percent exceeds	337.6		115.0	
50 percent exceeds	11.0		11.0	
90 percent exceeds	0.960		1.50	