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 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 2010 WY, October 1, 2009 through September 30, 2010, was 36.7 cubic feet per second (cfs) or 5.79 inches. During the same period, the minimum and maximum observed average daily discharge values were 0.53 cfs and 369 cfs, respectively. The long-term average daily discharge at the station is 37.7 cfs or 5.96 inches (years 1979-2010). A spreadsheet of the data received in 2010 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)
4/4/79	307	8/1/90	225	4/25/01	875**
3/25/80	199	6/1/91	371	5/11/02	554
6/15/81	44	3/8/92	380	6/28/03	695
4/3/82	471*	6/22/93	315	6/03/04	350
3/9/83	408	4/30/94	669*	10/30/04	118
2/25/84	341	3/17/95	237	10/09/05	295
3/18/85	579*	3/19/96	407	3/17/07	223
3/27/86	812*	4/1/97	511*	5/4/08	205
8/1/87	185	4/5/98	306	3/27/09	119
3/27/88	39	5/15/99	538*	3/17/10	369
3/31/89	159	7/13/00	112		

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

**All-time instantaneous peak discharge. 100-year flood discharge at this site is 2290 cfs.

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U.S. DEPARTMENT OF THE INTERIOR - U.S. GEOLOGICAL SURVEY - WATER RESOURCES
Station No 05287890 Elm Creek Nr Champlin, MN Source Agency USGS State 27 County 053
WATER YEAR OCTOBER 2009 TO SEPTEMBER 2010
Daily Mean Values Discharge, cubic feet per second [e, estimated]

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	0.79	41	6.0	e3.7	e1.6	1.0	82	17	12	120	9.0	16
2	1.9	41	5.7	e3.5	e1.5	0.96	74	16	11	122	7.8	22
3	2.3	39	5.6	e3.5	e1.5	0.94	67	14	11	114	6.9	29
4	2.3	38	e5.3	e3.4	e1.6	0.94	61	13	11	106	5.8	27
5	2.4	38	5.0	e3.3	e2.0	0.96	56	13	11	101	5.9	25
6	7.6	38	4.8	e3.2	e1.9	0.99	51	12	11	106	5.1	24
7	22	38	4.6	e3.2	e1.9	1.1	47	12	11	102	4.4	26
8	40	36	4.8	e3.0	e1.8	1.3	43	16	12	98	4.5	27
9	43	34	e4.6	e3.0	e1.8	e1.7	40	16	15	90	11	25
10	45	31	e4.4	e2.9	1.9	e3.7	37	16	16	81	15	23
11	47	29	e4.4	e2.8	1.7	e28	34	21	22	73	33	23
12	50	28	e4.4	e2.6	1.7	79	31	31	33	64	49	20
13	49	26	e4.3	e2.6	1.7	140	31	42	41	56	54	17
14	46	24	e4.2	e2.7	1.7	208	33	59	42	49	62	14
15	44	20	e4.1	e2.9	1.8	275	34	64	44	42	65	15
16	42	17	e4.0	e3.7	1.6	338	35	62	44	36	64	36
17	38	15	e4.0	e4.0	1.5	357	33	60	43	32	66	45
18	36	14	e4.0	e3.7	1.4	341	31	58	42	40	68	43
19	34	12	e3.9	e3.3	1.4	309	30	54	38	41	65	44
20	31	11	e3.8	e3.0	1.4	274	28	48	35	37	59	44
21	31	10	e3.8	e2.7	1.4	246	26	42	32	32	50	44
22	38	9.1	e3.7	e2.8	1.3	221	24	38	30	29	40	42
23	40	8.2	e3.5	e3.0	1.2	200	22	34	27	26	33	50
24	41	8.1	e3.6	e2.5	1.2	181	23	29	25	25	28	104
25	41	8.9	e4.4	e1.8	1.2	165	24	26	24	22	23	136
26	40	8.8	e5.4	1.6	1.2	151	23	23	42	19	19	143
27	38	7.8	e4.8	1.6	1.2	137	21	20	68	16	16	153
28	35	7.5	e4.4	1.5	1.1	123	19	17	85	15	13	159
29	34	7.3	e4.0	1.6	---	111	18	15	99	14	12	155
30	38	6.3	e3.9	e1.6	---	100	17	14	111	12	13	144
31	41	---	e3.8	e1.6	---	91	---	13	---	10	14	---

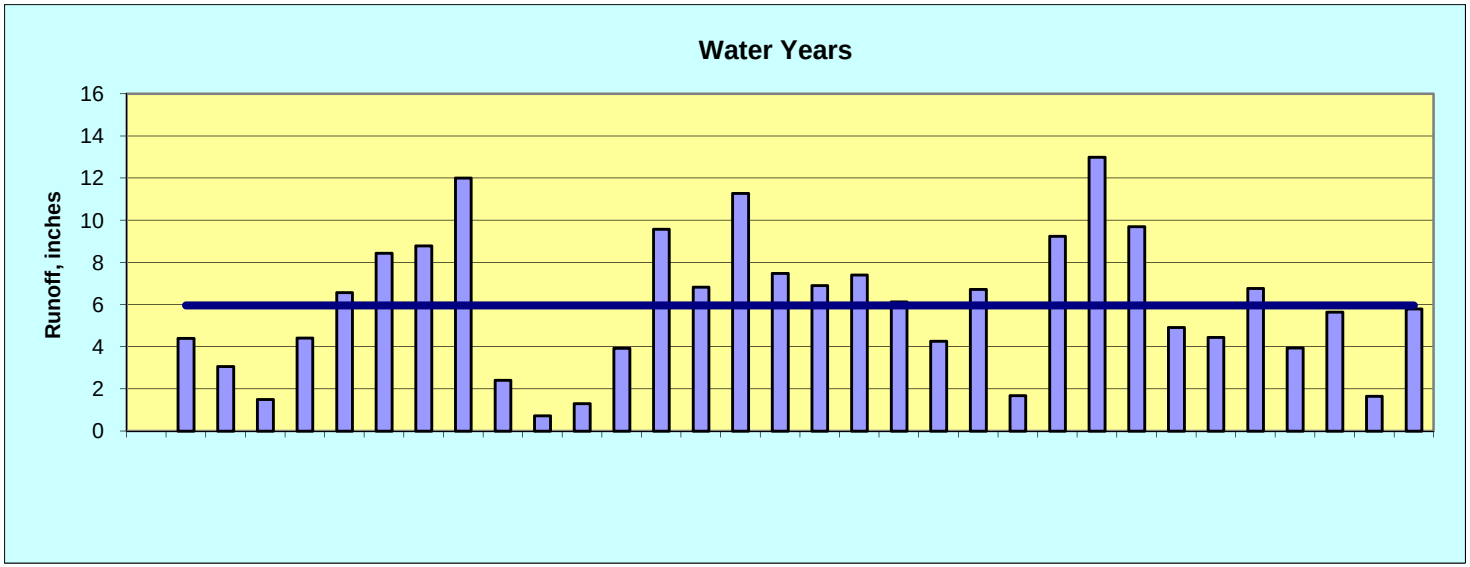
Statistics for Water Year October 2009 to September 2010

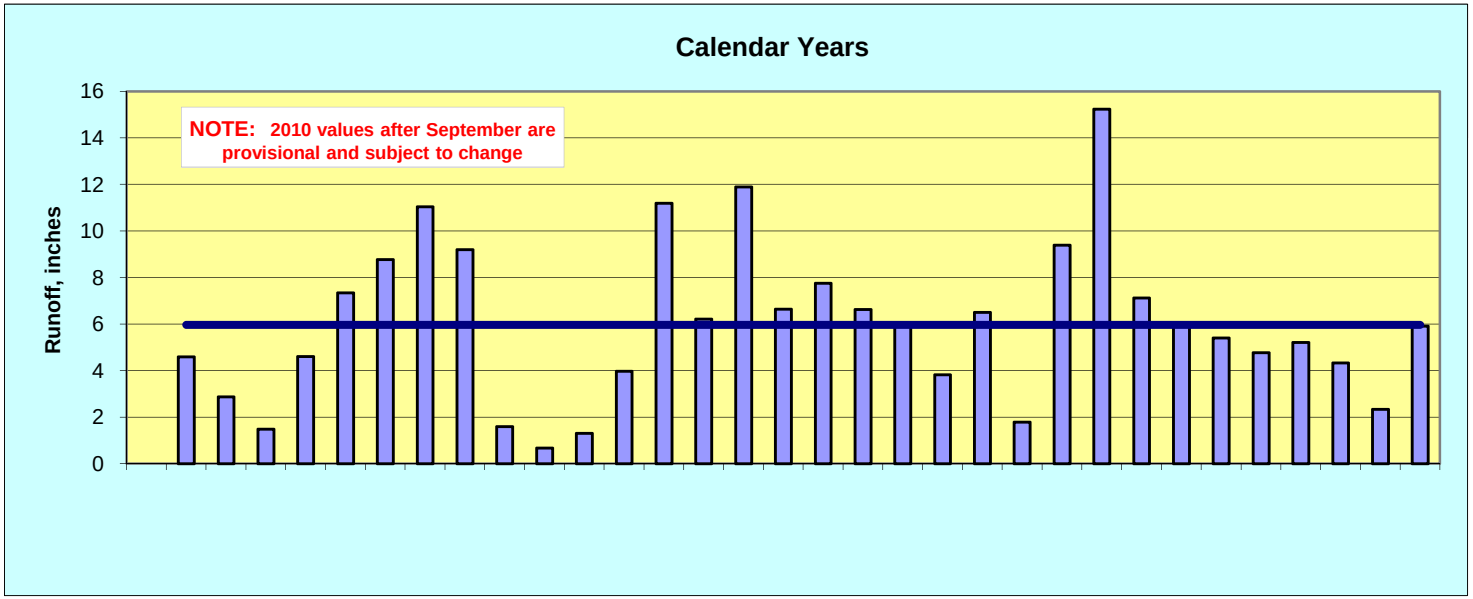
Total	1,001.29	652.0	137.2	86.3	43.2	4,088.59	1,095	915	1,048	1,730	921.4	1,675
Mean	32.3	21.7	4.43	2.78	1.54	132	36.5	29.5	34.9	55.8	29.7	55.8
Max	50	41	6.0	4.0	2.0	357	82	64	111	122	68	159
Min	0.79	6.3	3.5	1.5	1.1	0.94	17	12	11	10	4.4	14
Ac-ft	1,990	1,290	272	171	86	8,110	2,170	1,810	2,080	3,430	1,830	3,320
Cfsm	0.38	0.25	0.05	0.03	0.02	1.53	0.42	0.34	0.41	0.65	0.35	0.65
Inches	0.43	0.28	0.06	0.04	0.02	1.77	0.47	0.40	0.45	0.75	0.40	0.72

Statistics of monthly mean data for 1979 - 2010, by Water Year (WY)

Mean	33.3	21.0	10.1	5.20	8.56	61.3	101	68.8	50.0	37.5	27.7	27.3
Max	240	67.4	41.3	22.0	99.1	183	414	203	196	157	151	170
(WY)	(1986)	(1994)	(1992)	(1992)	(1984)	(1985)	(2001)	(2002)	(2004)	(1993)	(2002)	(1991)
Min	1.13	1.03	0.92	0.74	0.91	3.86	5.31	3.54	1.34	0.76	1.37	1.08
(WY)	(1990)	(1990)	(1990)	(1991)	(1990)	(2001)	(1987)	(2000)	(1988)	(1988)	(2008)	(1988)

Summary Statistics	Calendar Year 2009		Water Year 2010		Water Years 1979 - 2010	
Annual total	5,416.62		13,392.98			
Annual mean	14.8		36.7		37.7	
Highest annual mean					82.2	2002
Lowest annual mean					4.54	1988
Highest daily mean	111	Mar 26	357	Mar 17	815	Apr 25, 2001
Lowest daily mean	0.50	Jun 15	0.79	Oct 1	0.31	Jun 30, 1988
Annual seven-day minimum	0.58	Jun 11	0.98	Feb 28	0.35	Jun 26, 1988
Maximum peak flow			369	Mar 17	875	Apr 25, 2001
Maximum peak stage			8.83	Mar 17	10.02	Apr 25, 2001
Instantaneous low flow			0.53	Oct 1	0.29	Jul 9, 1989
Annual runoff (ac-ft)	10,740		26,560		27,330	
Annual runoff (cfsm)	0.173		0.427		0.439	
Annual runoff (inches)	2.34		5.79		5.96	
10 percent exceeds	43		90		105	
50 percent exceeds	5.6		22		11	
90 percent exceeds	0.70		1.7		1.6	


Water Years
Runoff, inches
16
14
12
10
8
6
4
2
0


Calendar Years
Runoff, inches
16
14
12
10
8
6
4
2
0
NOTE: 2010 values after September are provisional and subject to change

Elm Creek Near Champlin (USGS Station 05287890)

Manual Water Quality Samples for Water Year 2010

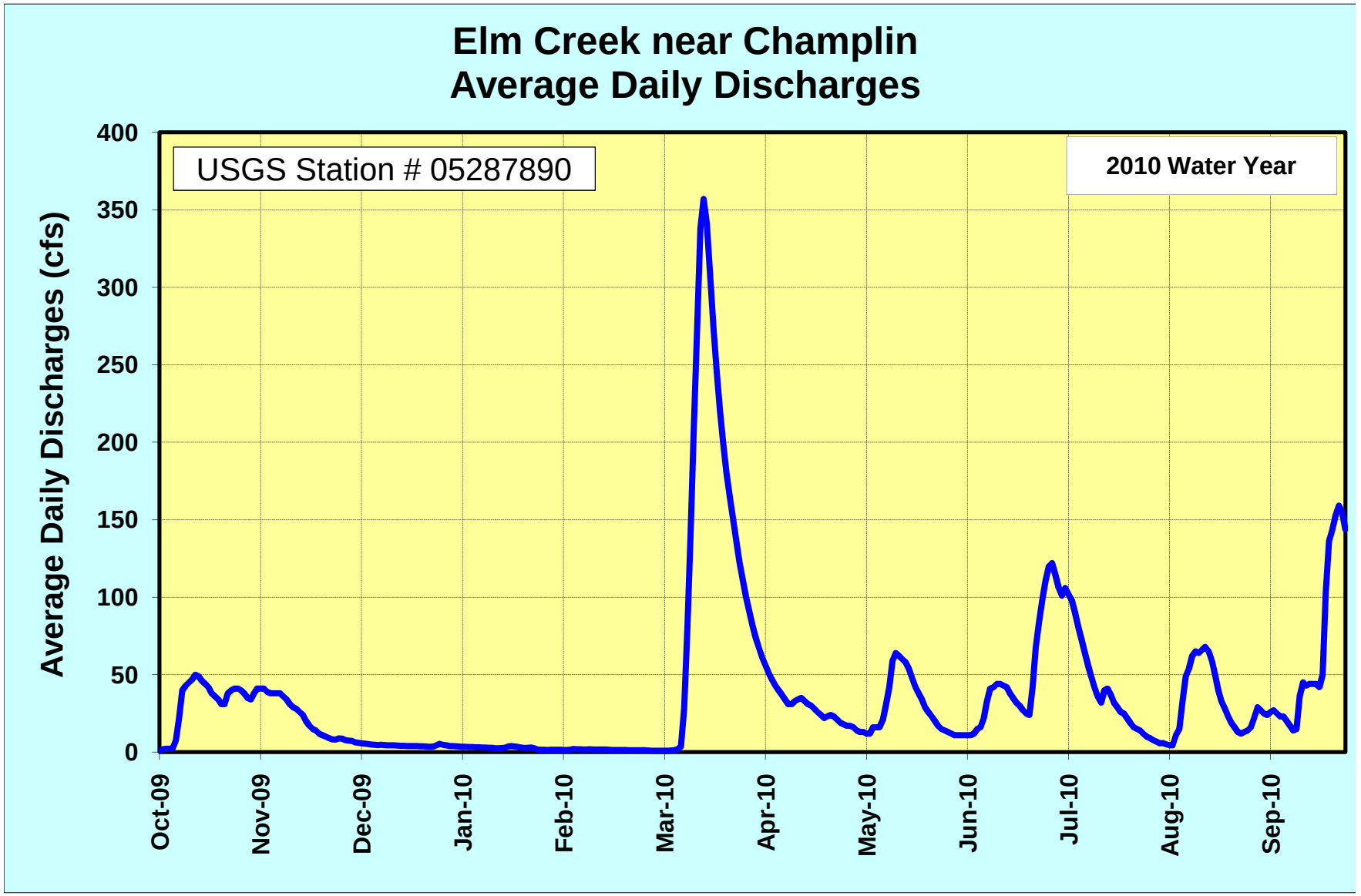
(Selected Parameters)

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
21-Oct-09	09:25	8.2	7.4	742	29.0	625	7.5	63	40	7.6
18-Nov-09	11:00	1.6	4.7	744	13.0	655	12.1	87	20	7.9
28-Dec-09	09:20	0.0	-7.9	745	4.4	799	8	54	40	7.4
21-Jan-10	10:20	0.1	-3.7	738	E 2.5	752	9.2	64	10	7.5
9-Feb-10	09:30	0.1	-5.9	745	1.8	787	10.2	70	20	7.5
12-Mar-10	09:15	0.1	3.0	731	70.0	701	11.3	78	40	7.6
20-Apr-10	09:30	12.4	12.3	743	27.0	621	8.5	80	40	7.6
20-May-10	09:35	16.7	16.7	744	50.0	651	6.5	66	40	7.4
3-Jun-10	11:10	17.2	19.1	744	11.0	655	7.7	80	50	7.8
13-Jul-10	10:40	21.2	23.0	740	52.0	543	3.6	40	60	7.3
21-Sep-10	07:55	15.4	14.7	736	45.0	535	6.5	65	30	7.2

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
21-Oct-09	09:25	< 15	< 10	0.159	0.037	1.40	0.58	0.21	0.18	93.4
18-Nov-09	11:00	< 15	< 10	0.035	0.008	1.10	0.48	0.14	0.10	85.6
28-Dec-09	09:20	< 15	< 10	0.277	0.007	1.20	0.43	0.24	0.05	84.1
21-Jan-10	10:20	< 15	< 10	0.283	0.006	0.72	0.41	0.08	E 0.03	57.8
9-Feb-10	09:30	< 15	< 10	0.307	0.006	0.90	0.42	0.09	E 0.03	72.5
12-Mar-10	09:15	17	< 10	0.582	0.029	1.80	1.12	0.37	0.24	131.0
20-Apr-10	09:30	< 15	< 10	E 0.016	0.006	1.10	0.05	0.19	0.14	81.6
20-May-10	09:35	< 15	< 10	< 0.020	E 0.001	1.20	< 0.04	0.19	0.17	89.6
3-Jun-10	11:10	< 15	< 10	0.037	0.006	1.10	0.04	0.30	0.25	73.8
13-Jul-10	10:40	< 30	24	0.72	0.013	2.50	E 0.04	0.80	0.49	54.9
21-Sep-10	07:55	< 15	14	0.024	0.003	1.10	0.04	0.17	0.13	68.1

Data are provisional and are subject to change

E = Estimated


Elm Creek near Champlin
Average Daily Discharges
USGS Station # 05287890
2010 Water Year
Average Daily Discharges (cfs)
400
350
300
250
200
150
100
50
0
Oct-09
Nov-09
Dec-09
Jan-10
Feb-10
Mar-10
Apr-10
May-10
Jun-10
Jul-10
Aug-10
Sep-10