

Appendix A: Precipitation Data

Table A1. Summary of 2023 and long-term precipitation data measured at the New Hope, MN station (Station ID: 215838).

Month	2023 Precipitation (inches)	1992-2022 Monthly Average Precipitation (inches)	Departure from Historical Average (inches)
January	1.00	2.86	1.86
February	1.01	2.57	1.56
March	1.94	3.89	1.95
April	3.25	4.15	0.90
May	4.15	1.06	-3.09
June	4.28	1.6	-2.68
July	4.21	2.52	-1.69
August	4.32	3.9	-0.42
September	3.18	6.58	3.40
October	2.92	5.55	2.63
November	1.61	0.18	-1.43
December	1.47	2.94	1.47
TOTAL	33.34	37.80	4.46

Appendix B: 2023 West Mississippi Stream Data

Mattson Brook

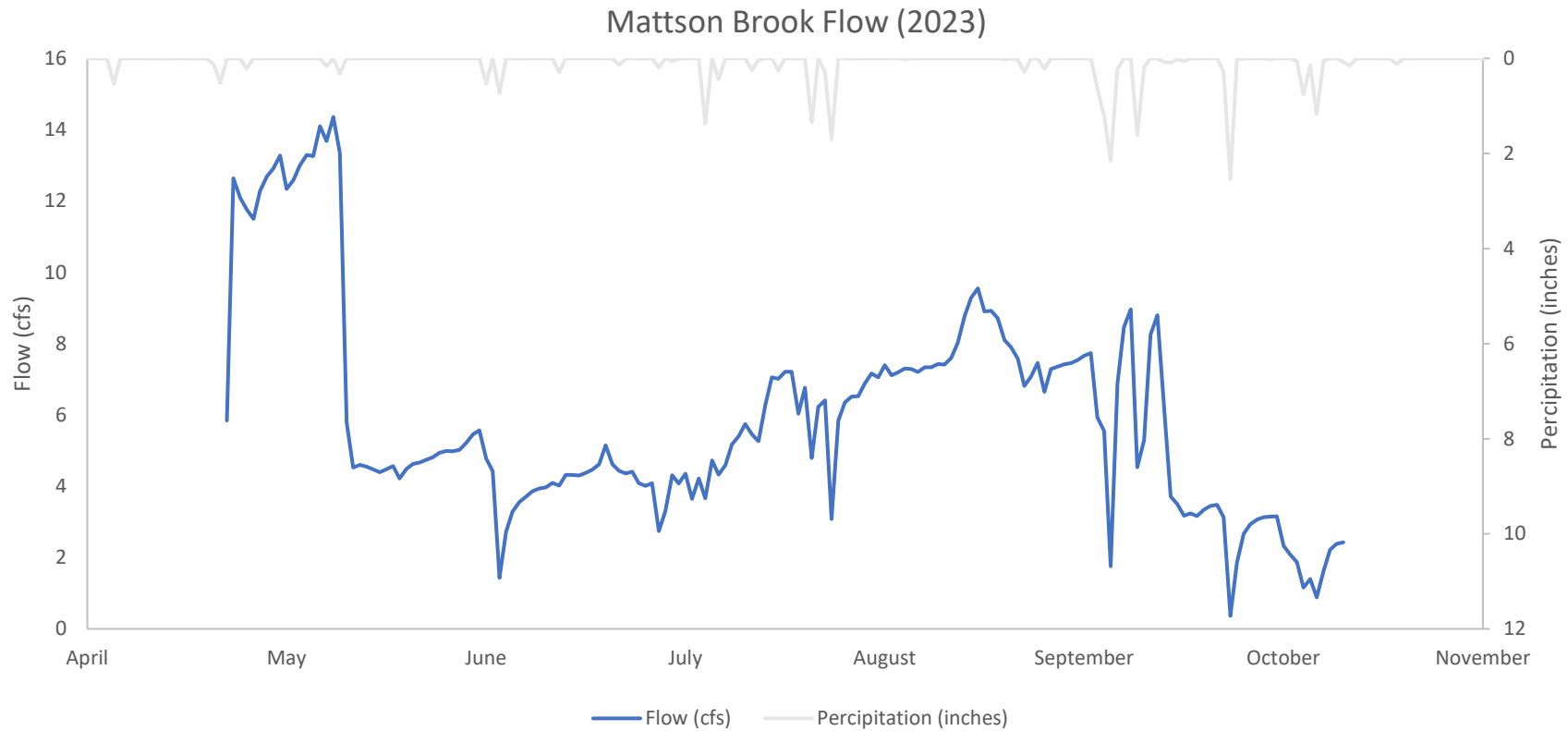


Figure B1. Flow at the Mattson Brook sampling station. The blue line represents flow in cubic ft per second (cfs). Daily precipitation totals in inches are represented in gray on the secondary axis.

Table B1. Water quality data from Mattson Brook stream site measured in 2023. Parameters measured include temperature (temp.), dissolved oxygen (DO), percent saturated dissolved oxygen (DO_{sat}), pH, specific conductivity (sp. cond.), total phosphorus (TP), orthophosphate (orthoP), total suspended solids (TSS) chloride and Escherichia coli (E. coli).

Date	Time	Temp. [°C]	DO [mg/L]	DO _{sat} [%]	pH	Sp. Cond. [µS/cm]	ORP [mV]	TP [mg/L]	OrthoP [mg/L]	TSS [mg/L]	Chloride [mg/L]	E. coli [MPN/100mL]
5/4/2023	13:00	14.9	12.6	125.8	8.09	2186	217	0.061	0.007	0.007	7.1	341
6/6/2023	12:15	19.0	5.2	57.9	7.22	2056	299	0.170	0.115	0.129	1.8	NA
7/4/2023	12:00							0.021	0.010	0.011	4.0	NA
7/5/2023	10:00	19.3	5.5	60.4	7.67	2295	298	0.174	0.130	0.132	1.3	378
8/4/2023	13:30	23.6	5.3	63.0	7.62	1719	278	0.181	0.111	0.116	10.0	NA
8/28/2023	12:45	19.4	7.4	80.9	7.82	2299	210	0.148	0.125	0.124	3.0	423
10/3/2023	12:00	19.3	7.2	80.9	7.79	1407	370	0.085	0.025	0.039	4.9	191

Table B2. Storm water quality data from the Mattson Brook stream site measured in 2023. Parameters measured include total phosphorus (TP), orthophosphate (orthoP), total suspended solids (TSS) and Escherichia coli (E. coli).

Start Date	Time	End Date	Time	TP [mg/L]	OrthoP [mg/L]	TSS [mg/L]	E. coli [MPN/100mL]
4/17/2023	9:43	4/17/2023	15:43	0.215	0.112	18.2	44.1
7/22/2023	15:30	7/22/2023	15:30	0.139	0.008	8.0	1732.9
8/11/2023	0:05	8/11/2023	6:05	0.150	0.083	5.8	1986.3
8/11/2023	16:12	8/11/2023	18:12	0.122	0.062	8.3	1553.1
8/13/2023	22:44	8/14/2023	4:44	0.102	0.042	21.3	> 2419.6
9/15/2023	11:30	9/15/2023	11:30	0.154	0.085	3.2	> 2419.6
9/23/2023	18:19	9/23/2023	0:19	0.160	0.067	31.5	980.4
9/25/2023	7:55	9/25/2023	13:55	0.171	0.023	94.9	4884.0
10/13/2023	9:45	10/13/2023	9:45	0.156	0.018	69.6	3441.0
10/25/2023	3:36	10/25/2023	9:36	0.052	0.003	3.1	228.0

Appendix C: 2023 Shingle Creek Stream Data

1.0 Overview

Shingle Creek (AUID 07010206-506) is impaired for chloride, aquatic life (macroinvertebrate IBI, fish IBI), and aquatic use (*E. coli*). Bass Creek (AUID 07010206-784), a headwater stream to Shingle Creek, is impaired for chloride and aquatic life (macroinvertebrate IBI, fish IBI). West Mississippi streams have not been assessed. The Shingle Creek and West Mississippi Fourth Generation Watershed Management Plan includes annual monitoring of four stream locations in the Shingle Creek Watershed, one on Bass Creek (BCP) and three on Shingle Creek (SC-3, SC-0, and USGS), and rotating monitoring of two sites in the West Mississippi Watershed (ENVP, Mattson Brook, Oxbow, and 65th Ave). The primary purpose of the stream monitoring program is to assess progress toward achieving the TMDLs and state water quality standards for the impaired streams and to track water quality of unimpaired streams. Activities included in the stream monitoring program include routine and storm water quality, flow, and specific conductivity monitoring. Three of the Shingle Creek sites (BCP, SC-3, and SC-0) and two rotating West Mississippi sites are monitored routinely during the growing season (April through October) for multiple water quality parameters. Shingle Creek sites are monitored once a month in the winter (November through March) for chloride concentrations. The USGS site is only monitored in the winter for chloride.

In Section 1.0, we provide an overview of the various stream sampling methodologies (Section 1.0) used to collect routine water quality (Section 1.1), storm water quality (Section 1.2), flow and load calculations (Section 1.3), and conductivity (Section 1.4) data at the stream sites. In Sections 2.0 and beyond we summarize activities and results from 2023 monitoring for each of the four sites monitored.

Results and discussions for each Shingle Creek stream can be found in the following order:

- Section 2.0 – BCP
- Section 3.0 – SC-3
- Section 4.0 – SC-0
- Section 5.0 – USGS
- Section 6.0 – Rainfall

See Appendix B for West Mississippi streams data.

2.0 Sampling Methods

ROUTINE WATER QUALITY

Shingle Creek and West Mississippi streams are within highly urban areas but serve as important water features to the cities they flow through. The streams flow through various parks and have many miles of adjacent walking paths. The streams are home to many animals including muskrats, fish, crayfish, and ducks. The Minnesota Pollution Control Agency (MPCA) monitors and assesses streams around the state to determine if they meet water quality standards. The agency relies on local partners, including soil and water conservation districts, watershed districts, tribal entities, nonprofit groups, and citizens to help monitor the thousands of streams in the state. Shingle Creek Watershed Management Commission (Commission) is an active participant in aiding the MPCA in sampling and collecting information on the state of water quality of its streams. The Commission is focused on sampling total suspended solids, total phosphorus, total dissolved phosphorus, soluble reactive phosphorus, chloride, and *E. coli*. In addition to these parameters for water quality standard comparison, the Commission collects certain chemical and physical parameters on its streams.

Routine stream monitoring samples are typically collected twice per month starting in April and ending in October. For three streams (BCP, SC-3, and SC-0), water samples are collected and assessed for total suspended solids (TSS), total phosphorus (TP), total dissolved phosphorus (TDP), soluble reactive phosphorus (ortho-P), chloride, and *E. coli*. In addition to these chemical parameters, *in-situ* readings of physical parameters are also taken. A YSI or similar multimeter water quality sonde is used to collect these measurements. Parameters measured include dissolved oxygen (DO) concentration, water temperature, pH, oxidation-reduction potential (ORP), and specific conductivity. During the late fall, winter, and early spring, chloride samples and physical parameters are taken at the three previously mentioned stream sites and one additional site (USGS).

Stream stage height at BCP, SC-3, SC-0, and West Mississippi monitoring sites is measured using an automated water sampler (ISCO model 6712) which is deployed in early April until late October. The ISCO water sampler is connected to a pressure transducer deployed in the stream (ISCO 720 Submerged Probe Flow Module). Stage height is periodically adjusted throughout the monitoring season using stream tape-down measurements taken in the field. Tape-down measurements are the distance to water from a known, fixed elevation in or near the stream. Stream stage height is converted to flow (discharge) measurements during data processing. The process is described in Section 1.3. Flow data are collected year-round at the USGS gage site 05288705 on Shingle Creek.

Flow data, lab samples, and *in-situ* data are used to understand the cycling of chemicals and nutrients in the stream system, identify watershed pollutant loads, and indicate areas of excess chemicals and nutrients.

STORM WATER QUALITY

Storm water quality samples are typically collected from April through October when a storm event of 0.5 inches or greater occurs. Storm samples are taken each year at BCP, SC-3, and SC-0 sites, and at West Mississippi sites chosen for routine monitoring that year. Storm event water samples are collected using the ISCO automated water sampler at 15-minute intervals. Discrete water samples are composited and sent to the lab for analysis of TSS, TP, TDP, OP, and *E. coli*. No physical parameters are measured during storm events.

FLOW AND LOAD CALCULATIONS

ISCO-measured stage height is converted to flow measurements at the end of each field season. Field staff measure streamflow using a FlowTracker Handheld IDV (San Diego, CA) periodically throughout the monitoring season. Field staff developed a relationship between stream stage height and stream flow measured in the field. This relationship is fit with a polynomial equation that relates stage height to flow for the time that the ISCO is deployed (April through October). During winter months when the ISCO is not deployed at field sites, flow at SC-0, SC-3, and BCP is linearly interpolated using data from the USGS gage on Shingle Creek.

Flow and routine water quality samples are used together to generate load calculations for various water quality pollutants. Loads were estimated as the total streamflow volume at each site multiplied by the flow-weighted mean concentration (FWMC) of a given water quality parameter. Flow weighted mean concentrations are calculated as:

$$FWMC = \frac{\sum_i^n c_i * q_i}{\sum_i^n q_i}$$

Where c_i is the pollutant concentration of the i^{th} sample and q_i is the streamflow of the i^{th} sample.

CONTINUOUS SPECIFIC CONDUCTIVITY MONITORING

Specific conductivity and temperature is collected year-round at the USGS monitoring site. Specific conductivity and temperature are measured in 15-minute intervals and uploaded live to the USGS website.

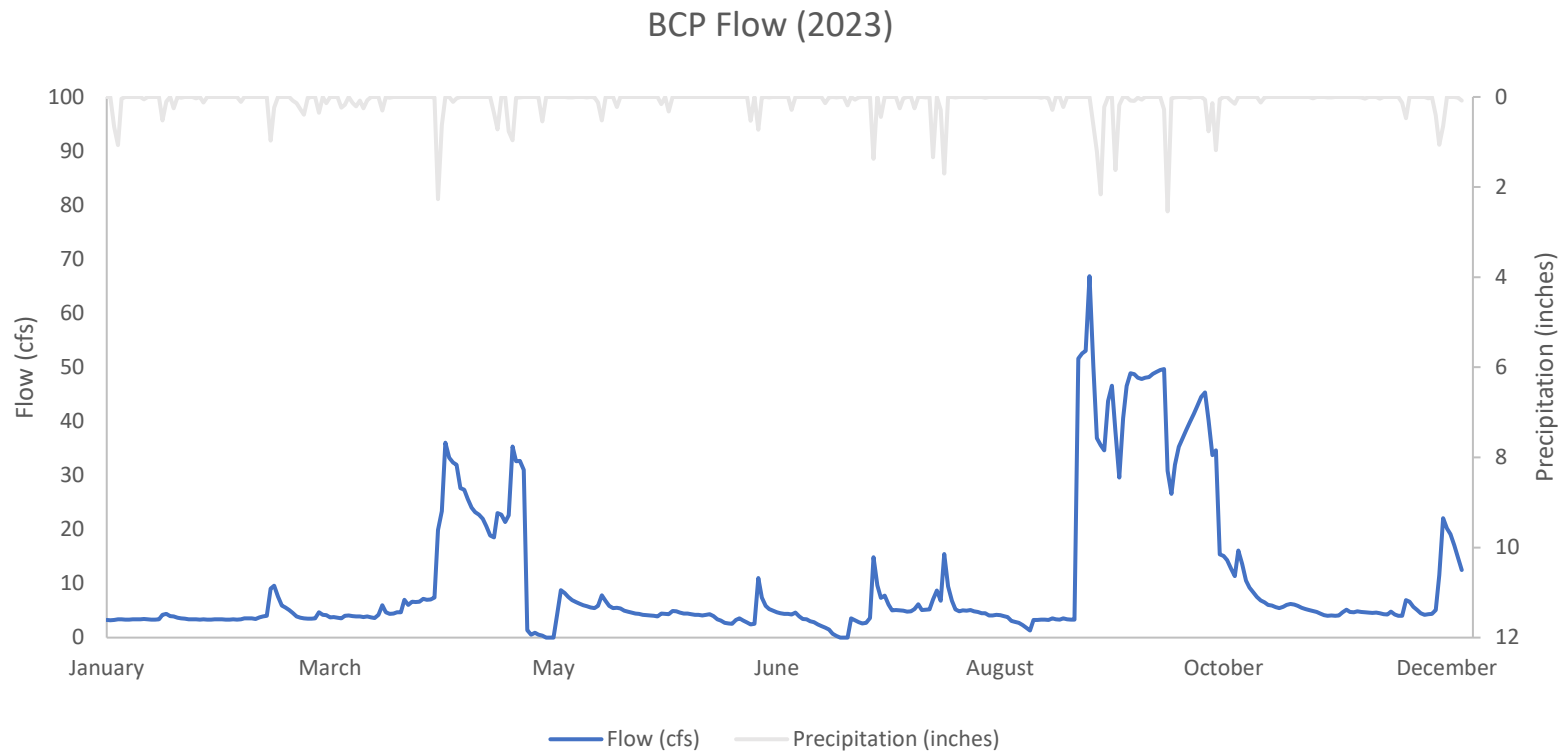


Figure C1. Flow at the BCP sampling station. The blue line represents flow in cubic feet per second (cfs). Daily precipitation totals in inches are represented in gray on the secondary axis.

Table C1. Water quality data from the Bass Creek Park (BCP) stream site measured in 2023. Parameters measured include temperature (temp.), dissolved oxygen (DO), percent saturated dissolved oxygen (DO_{sat}), pH, specific conductivity (sp. cond.), oxidation reduction potential (ORP), total phosphorus (TP), orthophosphate (orthoP), total dissolved phosphorus (TDP), total suspended solids (TSS), chloride, and Escherichia coli (E. coli). Note that there is no data from January and February because water was frozen at this site during sampling events.

Date	Time	Temp. [°C]	DO [mg/L]	DO _{sat} [%]	pH	Sp. Cond. [µS/cm]	ORP [mV]	TP [mg/L]	OrthoP [mg/L]	TDP [mg/L]	TSS [mg/L]	Chloride [mg/L]	E. coli [MPN/100mL]
3/29/2023	13:45	0.6	9.4	65.7	7.09	2328	125					536	
4/17/2023	7:15	2.1	10.0	75.6	7.41	1031	161	0.072	0.029	0.040	1.8	214	64.4
5/2/2023	8:30	7.2	9.3	77.0	7.54	1051	262	0.039	0.004	0.019	2.5	199	44.1
5/15/2023	12:30	16.9	12.1	127.9	7.76	1358	301	0.072	0.024	0.036	3.3	263	39.9
6/21/2023	10:00	21.5	2.3	26.9	7.33	1786	438	0.159	0.050	0.051	2.8	442	133.4
7/5/2023	12:30	23.2	7.6	89.6	7.55	1760	257	0.107	0.049	0.058	2.2	353	248.9
7/18/2023	10:30	19.3	5.0	56.3	7.51	1767	396	0.394	0.063	0.087	42.6		6.3
8/17/2023	11:30	18.6	5.5	60.5	7.48	947	389	0.170	0.089	0.107	3.4		228.2
8/28/2023	11:00	19.6	7.4	83.9	7.69	1357	217	0.097	0.049	0.062	1.0		63.7
9/19/2023	10:00	16.4	4.2	44.8	7.61	959	401	0.123	0.049	0.065	16.6		517.2
10/3/2023	10:30	18.5	5.2	57.0	7.76	941	396	0.178	0.071	0.089	7.9	199	435.2
10/19/2023	11:00	11.4	7.3	69.4	7.76	798	410	0.045	0.016	0.014	1.9		61.3
11/2/2023	10:15											234	> 2419.6
12/28/2023	10:45											126	> 2419.6

Table C2. Storm water quality data from the Bass Creek Park (BCP) stream site measured in 2023. Parameters measured include total phosphorus (TP), orthophosphate (orthoP), total dissolved phosphorus (TDP), total suspended solids (TSS), and Escherichia coli (E. coli).

Start Date	Time	End Date	End Time	TP [mg/L]	OrthoP [mg/L]	TDP [mg/L]	TSS [mg/L]	E. coli [MPN/100mL]
9/15/2023	10:30	9/15/2023	16:47	0.189	0.086	0.129	5.0	2420.6
9/25/2023	10:47	9/25/2023	10:47	0.132	0.100	0.111	2.3	4884.0
9/26/2023	9:12	9/26/2023	15:12	0.125	0.077	0.099	3.3	4884.0
10/13/2023	9:00	10/13/2023	9:00	0.132	0.060	0.084	17.6	7270.0

Table C3. BCP historic load calculations including TP, TSS, and Chloride load calculations for 2023.

Year	Flow	TP		Ortho-P		TSS		VSS		Nitrate		TKN		Chloride	
	Acre-ft	Load (lbs)	Conc (µg/L)	Load (lbs)	Conc (µg/L)	Load (lbs)	Conc (mg/L)	Load (lbs)	Conc (mg/L)	Load (lbs)	Conc (mg/L)	Load (lbs)	Conc (mg/L)	Load (lbs)	Conc (mg/L)
2014	6,837	1,881	101	776	42	106,971	6			4,281	0.23	13,736	0.74		
2015	1,493	792	192	531	129	107,640	23.1			1,856	0.148	5,123	1.14		
2016	4,107	1,024	99	854	82	189,576	18.2					1,707	0.16		
2017	5,537	1,670	119												
2018	2,754	9,701	139												
2019	6,753	2,114	124												
2020	2,562	479	90			231,824	13.9							1,009,950	156
2021	1,566	454	107			58,231	13.7							581,796	137
2022	1,897	548	106			74,347	14.4							1,002,046	194
2023	5,019	1,133	83			56,813	4.1							2,245,847	165

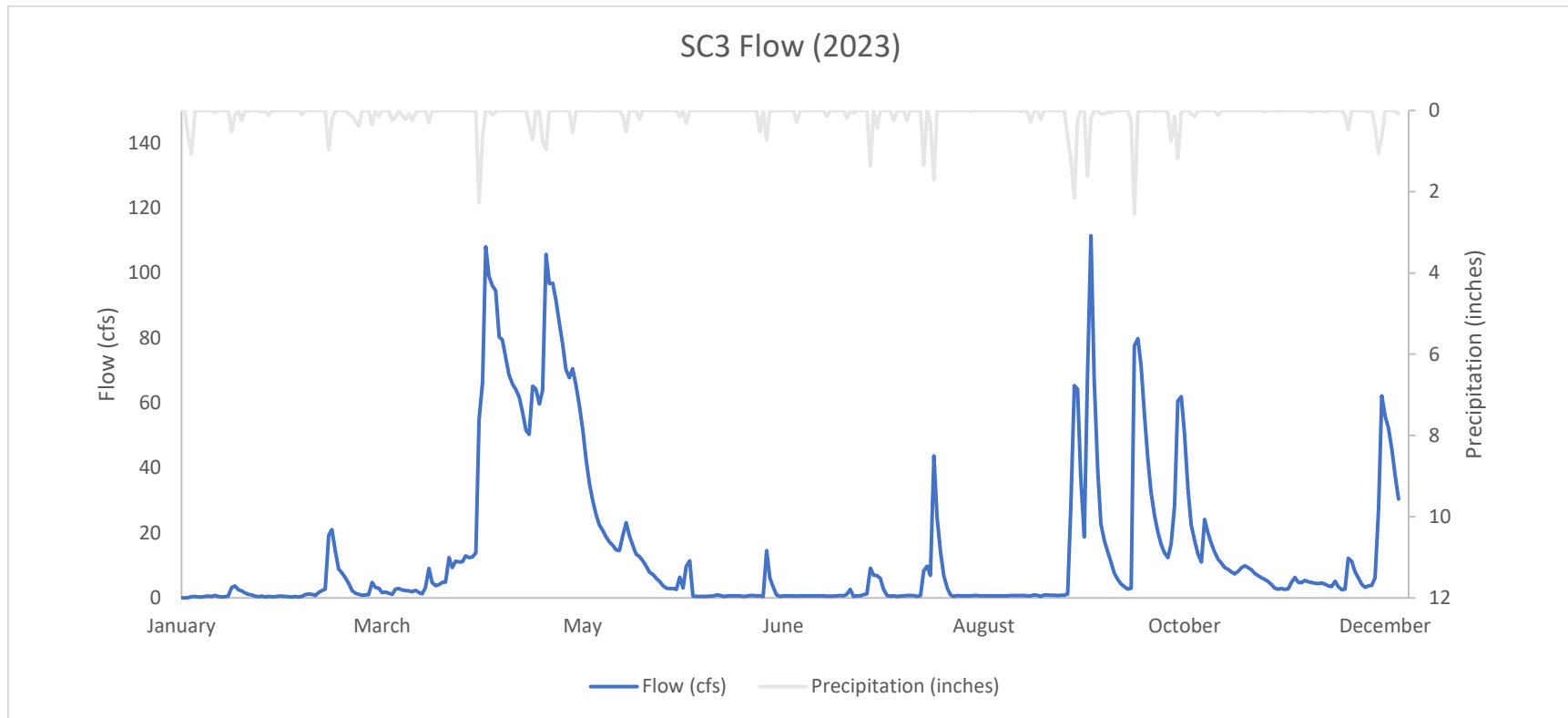


Figure C2. Flow at the SC-3 sampling station. The blue line represents flow in cubic feet per second (cfs). Daily precipitation totals in inches are represented in gray on the secondary axis.

Table C4. Water quality data from the Shingle Creek SC-3 stream site measured in 2023. Parameters measured include temperature (temp.), dissolved oxygen (DO), percent saturated dissolved oxygen (DO_{sat}), pH, specific conductivity (sp. cond.), oxidation reduction potential (ORP), total phosphorus (TP), orthophosphate (orthoP), total dissolved phosphorus (TDP), total suspended solids (TSS), chloride (mg/L) and Escherichia coli (E. coli). Note that there is no data from February because water was frozen at this site during that sample event.

Date	Time	Temp. [°C]	DO [mg/L]	DO _{sat} [%]	pH	Sp. cond. [μS/cm]	ORP [mV]	TP [mg/L]	OrthoP [mg/L]	TDP [mg/L]	TSS [mg/L]	Chloride [mg/L]	E. coli [MPN/100mL]
1/12/2023	14:00	0.1	9.5	67.4	7.65	1760	348					223	
3/29/2023	14:00	0.3	9.2	64.2	7.36	1767	196					411	
4/17/2023	8:30	3.2	9.6	75.0	7.35	972	168	0.059	0.013	0.027	2.5	205	10.7
5/4/2023	10:30	11.4	9.8	90.3	7.57	1106	272	0.031	0.004	0.017	1.5	208	24.3
5/15/2023	13:30	17.1	9.1	93.8	7.54	1276	350	0.085	0.028	0.046	1.9	238	178.9
6/21/2023	10:45	15.8	4.4	46.5	7.16	1293	268	0.128	0.023	< 0.003	5.3	174	410.6
7/5/2023	12:00	14.9	5.6	55.9	7.29	1377	109	0.065	0.013	0.007	5.1	176	248.9
7/18/2023	11:30	18.5	5.2	56.8	7.40	1249	390	0.090	0.018	0.015	3.6	NA	1986.3
8/17/2023	12:00	19.5	5.7	63.3	8.01	672	377	0.180	0.095	0.135	2.9	NA	260.3
8/28/2023	11:45	18.4	8.2	87.4	7.48	1504	222	0.103	0.031	0.031	5.3	NA	161.6
9/19/2023	10:30	16.3	7.1	74.0	7.52	1260	388	0.087	0.021	0.011	9.1	NA	165.8
10/3/2023	11:00	19.5	4.8	54.1	7.97	519	382	0.167	0.064	0.097	4.3	100	365.4
10/19/2023	11:45	10.9	7.0	65.4	7.63	744	349	0.046	0.012	0.027	4.1	NA	131.4
11/2/2023	10:30											182	> 2419.6
12/28/2023	11:00											89	> 2419.6

Table C5. Storm water quality data at the Shingle Creek SC-3 stream site measured in 2023. Parameters include TP (total phosphorus), orthophosphate (orthoP), total dissolved phosphorus (TDP), total suspended solids (TSS) and Escherichia coli (E. coli).

Start Date	Start Time	End Date	End Time	TP [mg/L]	OrthoP [mg/L]	TDP [mg/L]	TSS [mg/L]	E. coli [MPN/100mL]
7/4/2023	12:08	7/4/2023	18:08	0.426	0.006	0.045	45.3	> 2419.6
8/10/2023	23:47	8/11/2023	5:47	0.204	0.015	0.022	41.4	547.5
8/11/2023	16:43	8/11/2023	22:43	0.119	0.041	0.043	17.1	1553.1
9/15/2023	11:00	9/15/2023	11:00	0.152	0.069	0.109	9.5	920.8
9/25/2023	9:59	9/25/2023	15:59	0.406	< 0.003	0.014	91.7	4884.0
10/13/2023	9:15	10/13/2023	9:15	0.132	0.014	0.039	30.5	2247.0
10/25/2023	14:52	10/25/2023	14:52	0.101	0.023	0.072	12.2	959.0

Table C6. SC-3 historic load calculations including estimated TP, TSS and chloride loads in 2023.

Year	Flow	TP		Ortho-P		TSS		VSS		Nitrate		TKN		Chloride	
	Acre-ft	Load (lbs)	Conc (µg/L)	Load (lbs)	Conc (µg/L)	Load (lbs)	Conc (mg/L)	Load (lbs)	Conc (mg/L)	Load (lbs)	Conc (mg/L)	Load (lbs)	Conc (mg/L)	Load (lbs)	Conc (mg/L)
2004	7,355	4,189	209	1,543	77	599,657	30	255,736	13	6,173	0.31				
2005	10,616	5,500	191	2,640	92	464,200	16	215,600	7	8,800	0.30	35,200	1.22		
2006	3,843	2,200	211	880	84	451,000	43	138,600	13			20,240	1.94		
2007	6,270	2,200	129	880	52	391,600	23	105,600	6	3,960	0.23	24,200	1.42		
2008	2,962	880	109	220	27	85,800	11	92,400	11	1,540	0.19	8,580	1.07		
2009	961	220	84			33,000	13	15,400	6	440	0.17	1,320	0.51		
2010	4,799	1,980	152	660	51	391,600	30	147,400	11	4,180	0.32	17,820	1.37		
2011	10,099	3,192	116	719	26	591,218	22	211,470	8	3,326	0.12	25,419	0.93		
2012	5,147	2,024	145	615	44	287,380	21	108,114	8			12,572	0.90		
2013	7,033	4,110	215	1,012	53	633,717	33	395,899	21			43,336	2.27		
2014	11,736	5,042	158	1,594	54	983,344	31			8,865	0.28	34,023	1.07		
2015	5,159	2,334	166	1,289	75	293,355	20.9			2,101	0.15	15,950	1.14		
2016	17,247	4,301	149	3,588	108	796,091	54.7					7169	0.201		
2017	13,130	2,928	88												
2018	7,010	2,620	148												
2019	19,593	5,563	112												
2020	6,620	1,501	89			231,824	13.8							2,952,334	177
2021	3,613	1,739	176			373,214	37.9							1,018,485	104
2022	5,101	1,812	131			181,604	13.1							1,135,428	154
2023	10,702	3,655	126			636,527	21.9							3,287,936	113

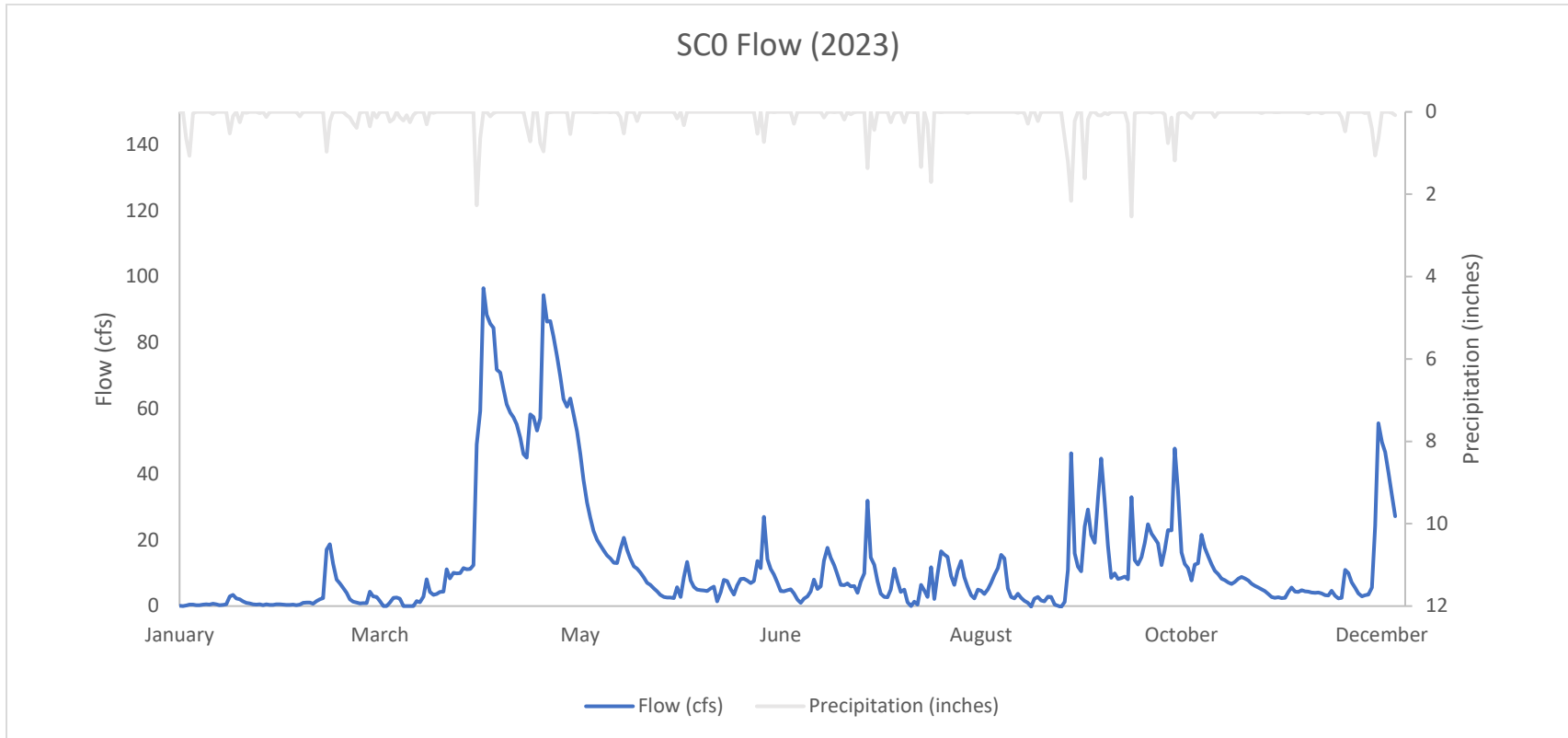


Figure C3. Flow at the SC-0 sampling station. The blue line represents flow in cubic feet per second (cfs). Daily precipitation totals in inches are represented in gray on the secondary axis.

Table C7. Water quality data from the Shingle Creek SC-0 stream site measured in 2023. Parameters measured include temperature (temp.), dissolved oxygen (DO), percent saturated dissolved oxygen (DO_{sat}), pH, specific conductivity (sp. cond.), oxidation reduction potential (ORP), total phosphorus (TP), orthophosphate (orthoP), total dissolved phosphorus (TDP), total suspended solids (TSS), chloride and Escherichia coli (E. coli).

Date	Time	Temp. [°C]	DO [mg/L]	DO _{sat} [%]	pH	Sp. cond. [µS/cm]	ORP [mV]	TP [mg/L]	OrthoP [mg/L]	TDP [mg/L]	TSS [mg/L]	Chloride [mg/L]	E. coli [MPN/100mL]
1/12/2023	14:30	0.1	9.0	63.9	7.35	2026	307					410	
3/29/2023	14:30	2.2	11.8	85.8	7.54	1614	175					346	
4/17/2023	9:15	4.0	11.1	88.0	7.57	906	175	0.073	0.014	0.026	4.0	165	115.3
5/4/2023	12:00	14.1	15.1	147.7	8.13	1248	238	0.059	0.005	0.014	5.6	210	20.3
5/15/2023	14:30	17.8	10.3	109.2	7.65	1175	334	0.069	0.008	0.021	5.2	176	127.4
6/21/2023	11:15	20.4	3.3	37.5	7.45	1277	341	0.079	0.048	0.037	2.0	223	275.5
7/5/2023	11:00	19.7	2.6	29.7	7.41	1338	217	0.106	0.043	0.046	1.7	193	248.9
7/18/2023	12:30	18.7	4.9	54.2	7.59	1228	395	0.066	0.043	0.034	1.9	NA	261.3
8/17/2023	12:30	20.7	4.6	53.6	8.31	598	373	0.112	0.061	0.076	3.3	NA	75.9
8/28/2023	12:30	18.8	5.9	63.7	7.47	1320	207	0.057	0.029	0.025	1.3	NA	410.6
9/19/2023	11:15	16.3	5.5	58.3	7.66	1152	377	0.053	0.036	0.027	2.8	NA	980.4
10/3/2023	11:30	19.9	4.5	50.7	7.87	473	367	0.161	0.080	0.114	4.5	79	133.4
10/19/2023	12:15	11.5	7.6	72.2	7.71	746	337	0.059	0.019	0.034	3.7	NA	146.7
11/2/2023	11:15											151	> 2419.6
12/28/2023	11:20											80	> 2419.6

Table C8. Storm water quality data from the Shingle Creek SC-0 stream site measured in 2023. Parameters include TP (total phosphorus, orthophosphate (orthoP), total dissolved phosphorus (TDP), total suspended solids (TSS) and Escherichia coli (E. coli).

Start Date	Start Time	End Date	End Time	TP [mg/L]	OrthoP [mg/L]	TDP [mg/L]	TSS [mg/L]	E. coli [MPN/100mL]
8/11/2023	17:09	8/12/2023	23:09	0.140	0.052	0.054	19.7	1553.1
9/23/2023	18:01	9/23/2023	0:01	0.132	0.048	0.053	32.2	980.4
9/23/2023	19:19	9/24/2023	1:19	0.117	0.048	0.051	14.6	> 2419.6
9/25/2023	9:34	9/25/2023	15:34	0.372	0.019	0.035	92.6	4884.0
10/13/2023	9:30	10/13/2023	15:30	0.093	0.020	0.046	17.3	5794.0
10/25/2023	17:34	10/25/2023	23:34	0.119	0.011	0.022	21.2	> 2419.6

Table C9. SC-0 historic load calculations including TP, TSS and Chloride load calculations for 2023.

Year	Flow	TP		Ortho-P		TSS		VSS		Nitrate		TKN		Chloride	
	Acre-ft	Load (lbs)	Conc (µg/L)	Load (lbs)	Conc (µg/L)	Load (lbs)	Conc (mg/L)	Load (lbs)	Conc (mg/L)	Load (lbs)	Conc (mg/L)	Load (lbs)	Conc (mg/L)	Load (lbs)	Conc (mg/L)
2004	8,612	3,748	160	882	38	749,572	32	308,647	13	4,409	0.19	--	--		
2005	15,367	6,820	163	1,320	32	1,577,400	38	1,031,800	25	13,420	0.32	52,800	1.26		
2006	13,255	5,060	140	1,540	43	1,095,600	30	459,800	13	--	--	39,600	1.10		
2007	11,239	3,960	130	880	29	811,800	27	431,200	14	9,240	0.30	38,720	1.27		
2008	7,950	3,080	142	660	31	367,400	17	248,600	12	6,380	0.30	25,080	1.16		
2009	3,917	880	83	220	21	231,000	22	92,400	9	1,320	0.12	5,720	0.54		
2010	7,634	3,300	159	660	32	561,000	27	233,200	11	3,740	0.18	22,000	1.06		
2011	18,023	5,814	119	1,255	26	1,098,478	22	465,297	9	14,807	0.30	54,294	1.11		
2012	7,943	3,384	157	579	27	648,520	30	286,019	13			21,219	0.98		
2013	9,916	4,382	163	511	19	660,628	24	583,448	22			36,177	1.34		
2014	17,483	5,945	125	1,131	24	1,239,189	26					55,102	1.16		
2015	8,630	2,187	113	1,679	71	683,057	29.1			4,680	0.073	23,688	1.01		
2016	17,007	4,241	148	3,538	72	785,013	58					7,069	0.31		
2017	16,149	3,601	88												
2018	9,886	2,850	114												
2019	24,763	7,001	112												
2020	14,340	3,047	84			438,045	12.1							4,726,436	131
2021	8,482	2,552	111			509,224	22.1							2,570,757	111
2022	5,060	1,872	136			237,535	17.3							1,720,104	125
2023	9,773	2,890	109			444,631	16.7							2,667,528	100

Note: Annual flows presented in acre-feet/year, pollutant loads in pounds/year, and pollutant flow weighted mean concentrations in mg/L

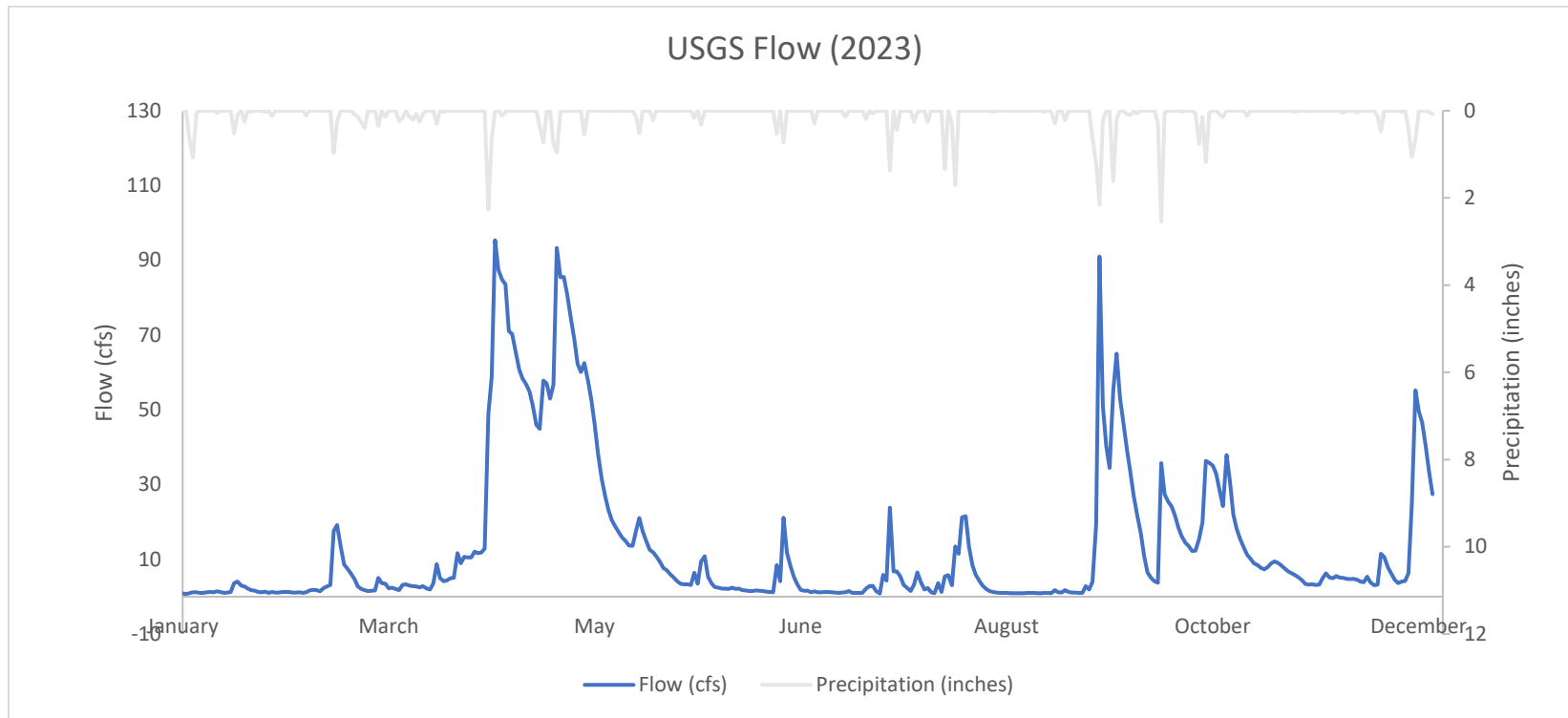


Figure C4. Flow at the USGS sampling station. The blue line represents flow in cubic feet per second (cfs). Daily precipitation totals in inches are represented in gray on the secondary axis.

Table C10. Water quality data from the United States Geological Survey (USGS) stream site measured in 2023.

Date	Time	Chloride [mg/L]
1/12/2023	14:15	415
3/29/2023	14:15	313
11/2/2023	11:45	156
12/28/2023	11:15	83.6

Figure C5. Historic Annual Runoff Depth and Precipitation over the subwatershed area for each stream site including: BCP, SC3, USGS and SC0 (2000 - 2022).

