

HYDROLOGIC DATA COLLECTION AT CROWDERS CREEK AND STEELE CREEK, YORK COUNTY, SOUTH CAROLINA, 1991-92

by John W. Gissendanner

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CONTENTS

	Page
Abstract	1
Introduction	1
Description of study area	1
Hydrologic data collection and analysis	2
Streamflow	2
Water quality	10
Summary	17
References	18

ILLUSTRATIONS

Figure 1. Map showing locations of stations 02145642 (Crowders Creek near Clover, S.C.) and 021467801 (Steele Creek near Fort Mill, S.C.)	3
2. Graph showing relation of daily mean streamflow for station 02145642 (Crowders Creek near Clover, S.C.) and station 021467801 (Steele Creek near Fort Mill, S.C.), 1991 water year	4
3. Graph showing relation of daily mean streamflow for station 02145642 (Crowders Creek near Clover, S.C.) and station 021467801 (Steele Creek near Fort Mill, S.C.), 1992 water year	5

TABLES

Table 1. Streamflow records for station 02145642 (Crowders Creek near Clover, S.C.), 1991 water year	6
2. Streamflow records for station 02145642 (Crowders Creek near Clover, S.C.), 1992 water year	7
3. Streamflow records for station 021467801 (Steele Creek near Fort Mill, S.C.), 1991 water year	8
4. Streamflow records for station 021467801 (Steele Creek near Fort Mill, S.C.), 1992 water year	9
5. High flow and low flow water-quality constituents for station 02145642 (Crowders Creek near Clover, S.C.)	11
6. High flow and low flow water-quality constituents for station 021467801 (Steele Creek near Fort Mill, S.C.)	14

CONVERSION FACTORS, ABBREVIATIONS, AND DEFINITIONS

Multiply	By	To Obtain
acre	4,047	square meter
cubic foot (ft ³)	0.02832	cubic meter
cubic foot per second (ft ³ /s)	0.02832	cubic meter per second
foot (ft)	0.3048	meter
mile (mi)	1.609	kilometer
square mile (mi ²)	2.590	square kilometer

Abbreviated water-quality units and definitions of terms used in report:

Colonies per 100 milliliter—col/mL.

Milligram per liter (mg/L)—A unit for expressing the concentration of dissolved constituents in water as a weight of the constituent in a liter of water.

Millimeter (mm)—A unit of measure equal to 0.03937 inches.

Cubic foot per second (ft³/s)—The rate of streamflow representing a volume of 1 cubic foot passing a given point during 1 second, approximately 7.48 gallons per second or 449 gallons per minute.

Water Year: The 12-month period October 1 through September 30. The water year is designated by the calendar year in which it ends and that includes 9 of the 12 months.

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ABSTRACT

Rapid industrial and urban growth is anticipated in the vicinity of Crowders Creek near Clover, S.C., and Steele Creek near Fort Mill, S.C. These subbasins are in the Catawba River Basin in York County, S.C. To obtain baseline information on these basins prior to urbanization, gaging stations 02145642 (Crowders Creek near Clover, S.C.) and 021467801 (Steele Creek near Fort Mill, S.C.) were established to collect streamflow and water-quality data.

Continuous stream-stage and streamflow data were collected during the periods of March 23, 1991 to September 30, 1992, and May 29, 1991 to September 30, 1992, for stations 02145642 and 021467801, respectively. Average streamflows for stations 02145642 and 021467801 for the study period were 80.5 cubic feet per second and 28.6 cubic feet per second, respectively.

Water-quality data were collected on four separate occasions at each gage site; two samplings during low-flow events and two samplings during high-flow events. Fecal coliform concentrations exceeded minimum standards for freshwater with other physical and chemical constituents meeting South Carolina Department of Health and Environmental Control standards.

INTRODUCTION

Surface water is used for municipal and industrial supplies, dilution and transport of wastes, recreation, irrigation, and electric power. The sound development of surface-water resources for future water-use projects depends on reliable estimates of flow characteristics and water-quality conditions of streams. Streamflow was continuously monitored and used to compute sediment and chemical loads during sampling events, and to provide data necessary for flow-duration analysis. This report presents water-quality data collected during two low-flow and two high-flow events. The hydrologic data were collected by the U.S. Geological Survey (USGS) in cooperation with the York County Planning and Development Board.

DESCRIPTION OF STUDY AREA

The study area is located in the Piedmont physiographic province of North Carolina and South Carolina. The Piedmont Province is primarily composed of fractured crystalline rock and metamorphosed volcanic rock. Alluvial deposits of sand, silt, and clay are present along the valley floors. Streams in the Piedmont Province have more variable flows than those in other provinces of the States.

Crowders Creek flows into Lake Wylie, the oldest lake on the Catawba River (fig. 1). The lake was created in 1904 by construction of a dam on the Catawba River near Fort Mill, S.C. The dam was rebuilt in 1924, and the surface area was expanded to 12,455 acres. The 325-mi shoreline extends into North Carolina. The primary use of the lake is for generation of hydroelectric power. At normal drawdown, usable storage is 2,520,500,000 ft³. Lake Wylie drains an area of 3,020 mi².

Steele Creek is a tributary of Sugar Creek. Sugar Creek flows into the Catawba River downstream of Lake Wylie.

HYDROLOGIC DATA COLLECTION AND ANALYSIS

Gaging stations were established on Crowders Creek and Steele Creek for this study. Station 02145642 (Crowders Creek near Clover, S.C.) is located on State secondary road 1104 (Brandon Road), 1.7 mi downstream from the mouth of Rocky Branch and 8.5 mi northeast of Clover. The drainage area of station 02145642 is 89.0 mi² and is located within the boundaries of York County, S.C., and Gaston and Cleveland Counties, N.C. Station 021467801 (Steele Creek near Fort Mill, S.C.) is located on the U.S. Highway 21 Bypass Bridge, 4 mi upstream from the confluence with Sugar Creek and 2.0 mi north of Fort Mill. The drainage area of station 021467801 is 22.8 mi² and is located in York County, S.C., and Mecklenburg County, N.C. The locations of stations 02145642 and 021467801 are shown in figure 1.

Streamflow

Streamflow measurements to develop a stage-streamflow relation were made at approximately 6-week intervals and stage data were recorded at 15-minute intervals at both gaging stations. During the study period, 21 streamflow measurements were made at station 02145642 and 23 streamflow measurements were made at station 021467801. Relation of daily mean streamflow at stations 02145642 and 021467801 during the 1991 and the 1992 water year, are shown in figures 2 and 3, respectively.

Station 02145642 was established on March 23, 1991. Daily mean streamflows for the 1991 and the 1992 water year are listed in tables 1 and 2, respectively. From March 23, 1991 to September 30, 1992, the maximum instantaneous gage height at station 02145642 was 11.43 ft, which was recorded on March 30, 1991. The stage-streamflow relation was not defined above 8.20 ft gage height (2,050 ft³/s). The minimum daily mean streamflow of 23 ft³/s was recorded on September 12, 13, 15, and 17, 1991, and the maximum daily mean streamflow of 2,350 ft³/s was recorded on March 30, 1991. The average streamflow for the study period was 80.5 ft³/s.

Station 021467801 was established on May 29, 1991. Daily mean streamflows for the 1991 and the 1992 water year are listed in tables 3 and 4, respectively. From May 29, 1991 to September 30, 1992, the maximum instantaneous streamflow at station 021467801 was 1,750 ft³/s, which was recorded on September 6, 1992. The minimum daily mean streamflow of 3.2 ft³/s was observed on August 6, 1992, and the maximum daily mean streamflow of 814 ft³/s was observed on August 9, 1991. The average streamflow for the study period was 28.6 ft³/s.

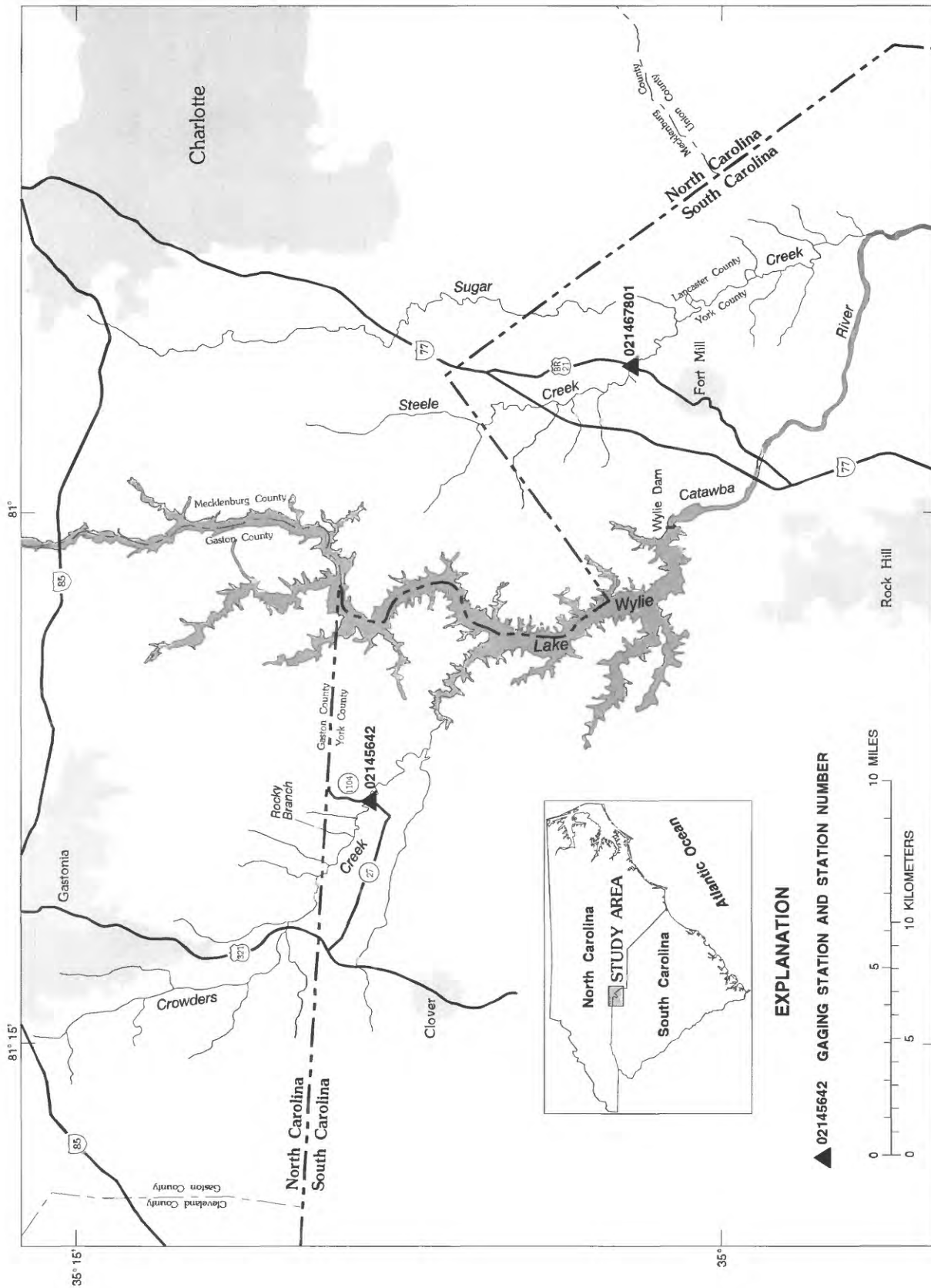


Figure 1.— Locations of stations 02145642 (Crowders Creek near Clover, S.C.) and 021467801 (Steele Creek near Fort Mill, S.C.).

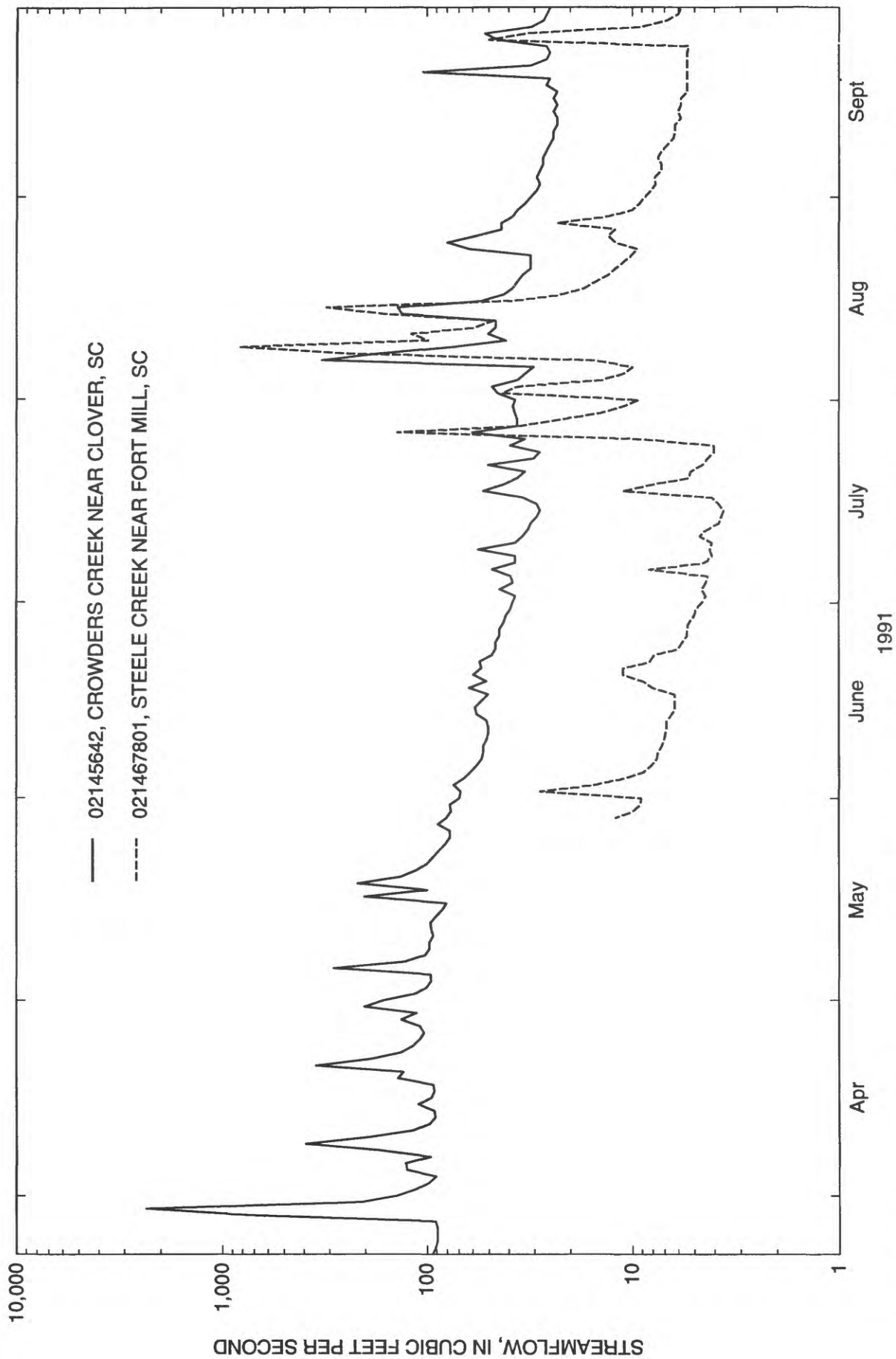


Figure 2.-- Relation of daily mean streamflow for station 02145642 (Crowders Creek near Clover, S.C.) and station 021467801 (Steele Creek near Fort Mill, S.C.), 1991 water year.

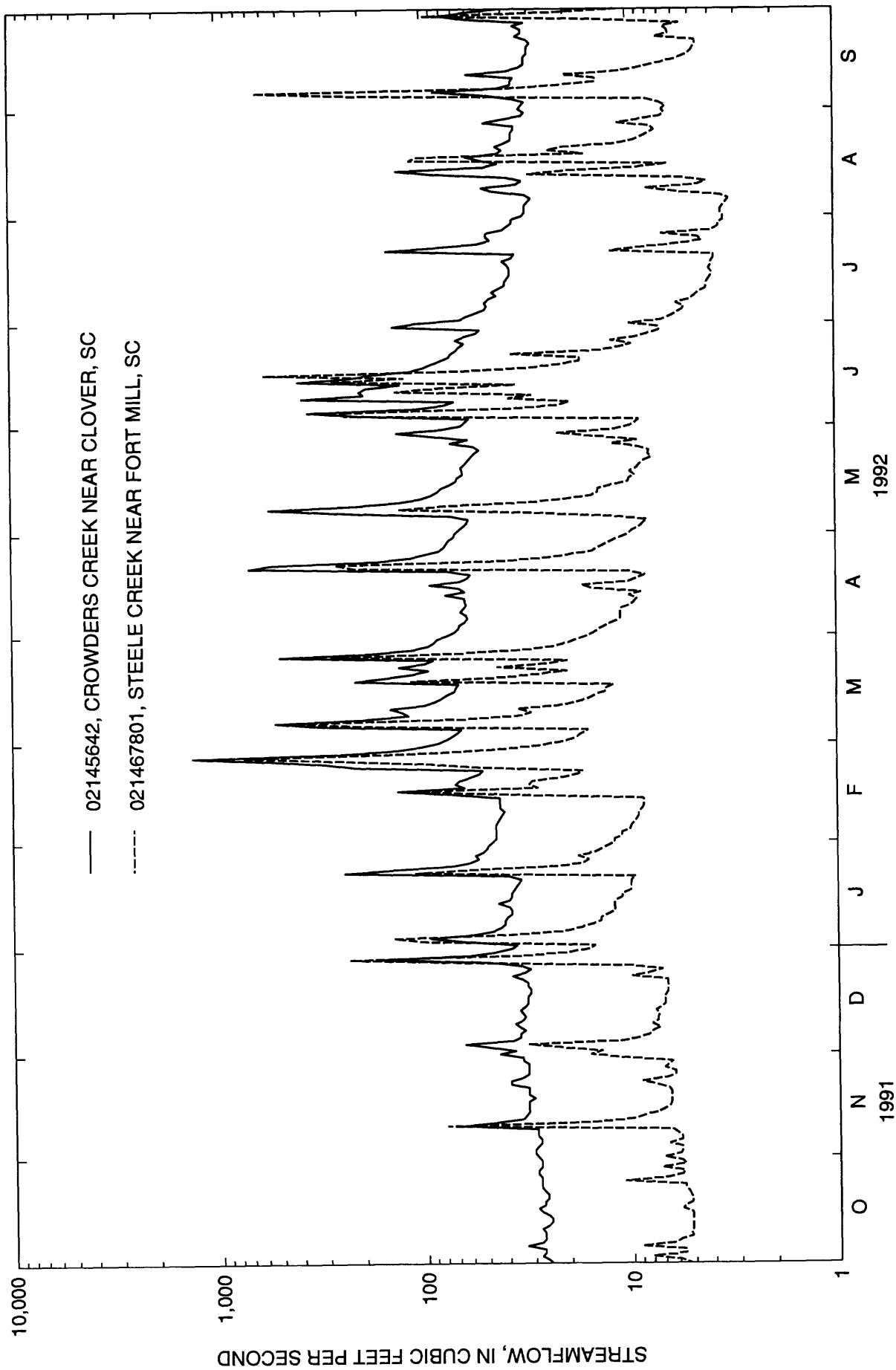


Figure 3.-- Relation of daily mean streamflow for station 02145642 (Crowders Creek near Clover, S.C.) and station 021467801 (Steele Creek near Fort Mill, S.C.), 1992 water year.

Table 1.--Streamflow records for station 02145642 (Crowders Creek near Clover, S.C.), 1991 water year

[—, indicate no data; units in cubic feet per second]

Day	Oct	Nov	Dec	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	—	—	—	—	—	—	140	162	69	38	37	31
2	—	—	—	—	—	—	113	113	68	37	45	29
3	—	—	—	—	—	—	98	100	74	44	48	28
4	—	—	—	—	—	—	90	95	66	38	36	29
5	—	—	—	—	—	—	125	96	61	39	33	28
6	—	—	—	—	—	—	127	285	57	48	30	27
7	—	—	—	—	—	—	96	128	54	37	324	27
8	—	—	—	—	—	—	171	102	53	37	170	26
9	—	—	—	—	—	—	392	97	53	56	76	25
10	—	—	—	—	—	—	192	97	51	37	41	24
11	—	—	—	—	—	—	117	93	50	34	50	24
12	—	—	—	—	—	—	97	95	50	32	46	23
13	—	—	—	—	—	—	91	96	51	31	46	23
14	—	—	—	—	—	—	92	90	57	29	132	24
15	—	—	—	—	—	—	110	84	58	28	138	23
16	—	—	—	—	—	—	95	80	54	29	54	24
17	—	—	—	—	—	—	92	201	50	34	42	23
18	—	—	—	—	—	—	93	99	62	53	38	26
19	—	—	—	—	—	—	138	217	51	42	36	25
20	—	—	—	—	—	—	130	134	59	36	34	104
21	—	—	—	—	—	—	348	112	54	33	31	31
22	—	—	—	—	—	—	187	100	55	50	31	26
23	—	—	—	—	—	94	133	93	48	30	31	25
24	—	—	—	—	—	91	117	87	46	28	62	26
25	—	—	—	—	—	89	108	81	46	39	79	45
26	—	—	—	—	—	89	103	77	44	33	57	52
27	—	—	—	—	—	89	108	77	44	60	43	31
28	—	—	—	—	—	91	133	88	42	36	43	27
29	—	—	—	—	—	743	112	80	41	36	38	26
30	—	—	—	—	—	2,350	201	76	39	37	36	25
31	—	—	—	—	—	209	—	77	—	38	33	—
Mean	—	—	—	—	—	—	138	110	53.6	38.0	62.6	30.2
Maximum	—	—	—	—	—	—	392	285	74	60	324	104
Minimum	—	—	—	—	—	—	90	76	39	28	30	23

Table 2.--Streamflow records for station 02145642 (Crowders Creek near Clover, S.C.), 1992 water year

[—, indicate no data; units in cubic feet per second]

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	25	29	44	38	47	86	77	70	65	107	32	33
2	26	30	37	36	45	78	71	67	62	65	31	32
3	28	30	49	65	45	73	68	64	59	60	31	31
4	27	29	65	95	45	69	67	61	199	54	31	36
5	27	28	38	58	45	66	63	60	361	49	30	49
6	33	28	35	47	45	319	61	73	106	48	29	86
7	28	29	35	43	44	531	62	240	78	49	31	42
8	27	29	33	41	43	198	66	563	70	47	45	36
9	27	29	35	41	42	119	64	220	388	43	50	36
10	27	67	37	40	41	128	62	131	192	45	34	35
11	28	45	34	38	43	146	63	102	202	42	32	59
12	26	34	33	38	43	100	63	91	187	39	38	38
13	25	33	34	39	43	89	78	85	128	39	88	33
14	25	32	35	44	43	82	63	81	402	38	131	31
15	26	32	33	39	71	77	67	74	225	37	49	31
16	28	32	32	38	135	71	93	69	181	37	42	31
17	29	32	32	38	64	70	67	68	113	37	51	30
18	27	30	32	37	71	68	61	64	98	38	60	30
19	27	32	31	36	68	217	59	64	90	40	42	30
20	26	32	31	35	60	153	76	65	81	36	40	29
21	26	32	32	34	54	113	708	62	74	35	43	30
22	27	39	32	39	52	95	545	60	72	147	39	34
23	28	39	34	247	215	132	168	58	68	84	36	32
24	28	34	38	143	303	99	115	56	66	53	36	32
25	28	32	33	74	565	90	98	53	62	46	36	35
26	28	32	31	60	1,350	504	84	56	68	48	35	31
27	29	32	35	55	255	179	79	73	62	48	35	60
28	29	32	50	57	135	113	77	60	54	40	49	79
29	28	34	175	52	103	95	75	90	52	38	40	60
30	28	34	60	50	—	89	71	133	138	36	32	41
31	28	—	45	49	—	86	—	80	—	36	31	—
Mean	27.4	33.4	41.9	56.3	142	140	112	99.8	133	50.4	42.9	39.7
Maximum	33	67	175	247	1,350	531	708	563	402	147	131	86
Minimum	25	28	31	34	41	66	59	53	52	35	29	29

Table 3.—Streamflow records for station 021467801 (Steele Creek near Fort Mill, S.C.), 1991 water year

[—, indicate no data, units in cubic feet per second]

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	—	—	—	—	—	—	—	—	9.0	4.6	9.3	8.7
2	—	—	—	—	—	—	—	—	28	4.4	43	8.1
3	—	—	—	—	—	—	—	—	15	4.6	36	7.7
4	—	—	—	—	—	—	—	—	11	4.4	14	7.8
5	—	—	—	—	—	—	—	—	8.8	4.3	11	7.2
6	—	—	—	—	—	—	—	—	8.1	8.3	9.9	7.2
7	—	—	—	—	—	—	—	—	7.6	4.5	15	7.5
8	—	—	—	—	—	—	—	—	7.5	4.1	243	7.2
9	—	—	—	—	—	—	—	—	7.2	4.2	814	6.7
10	—	—	—	—	—	—	—	—	7.0	4.1	98	6.3
11	—	—	—	—	—	—	—	—	6.9	4.7	119	6.2
12	—	—	—	—	—	—	—	—	6.8	4.4	58	6.2
13	—	—	—	—	—	—	—	—	6.8	3.8	47	5.8
14	—	—	—	—	—	—	—	—	6.4	3.7	161	6.0
15	—	—	—	—	—	—	—	—	6.2	3.6	310	5.8
16	—	—	—	—	—	—	—	—	6.2	3.8	39	5.8
17	—	—	—	—	—	—	—	—	6.2	4.1	22	5.4
18	—	—	—	—	—	—	—	—	7.9	11	17	5.4
19	—	—	—	—	—	—	—	—	8.8	8.1	15	5.4
20	—	—	—	—	—	—	—	—	11	5.3	13	5.4
21	—	—	—	—	—	—	—	—	11	5.2	12	5.4
22	—	—	—	—	—	—	—	—	8.2	4.6	11	5.4
23	—	—	—	—	—	—	—	—	7.9	4.3	10	5.4
24	—	—	—	—	—	—	—	—	6.0	4.0	9.4	5.3
25	—	—	—	—	—	—	—	—	5.7	4.0	12	5.0
26	—	—	—	—	—	—	—	—	5.4	9.0	13	32
27	—	—	—	—	—	—	—	—	5.4	139	12	9.1
28	—	—	—	—	—	—	—	—	5.3	35	23	6.8
29	—	—	—	—	—	—	—	12	5.0	22	13	6.0
30	—	—	—	—	—	—	—	9.9	4.9	14	10	5.8
31	—	—	—	—	—	—	—	9.1	—	11	9.2	—
Mean	—	—	—	—	—	—	—	—	8.24	11.4	71.9	8.77
Maximum	—	—	—	—	—	—	—	—	28	139	814	50
Minimum	—	—	—	—	—	—	—	—	4.9	3.6	9.2	5.3

Table 4.--Streamflow records for station 021467801 (Steele Creek near Fort Mill, S.C.), 1992 water year

[---, indicate no data; units in cubic feet per second]

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	5.3	7.1	16	16	12	24	16	10	9.8	9.8	3.4	6.7
2	5.9	5.9	14	15	12	20	15	9.6	9.2	6.8	3.5	6.4
3	8.1	5.8	22	96	11	18	14	8.9	8.8	6.2	3.5	6.9
4	5.6	5.8	32	143	11	17	13	8.5	238	5.8	3.4	8.0
5	5.6	6.7	11	38	10	16	12	8.1	250	5.4	3.3	207
6	9.2	5.8	9.2	22	9.9	170	11	12	37	5.3	3.2	642
7	6.3	5.8	8.2	18	9.6	455	11	30	22	5.8	3.5	38
8	5.9	6.1	7.9	16	9.3	66	11	130	19	5.0	6.0	21
9	5.2	6.4	7.3	14	9.1	34	11	76	38	4.7	8.0	14
10	5.3	8.0	8.0	14	9.1	30	9.9	30	29	4.5	4.5	14
11	5.2	16	7.5	13	8.8	35	9.5	20	135	4.2	4.1	20
12	5.2	10	7.5	12	8.6	22	9.1	15	89	4.1	5.5	11
13	5.2	9.0	7.4	12	8.6	18	10	14	35	4.1	30	8.7
14	5.2	7.6	7.7	12	8.6	16	8.7	14	274	4.0	20	7.4
15	5.2	7.0	7.2	12	37	15	15	12	122	3.9	8.9	6.3
16	5.2	6.6	6.9	11	121	13	17	10	590	3.9	6.3	5.5
17	5.8	6.5	6.9	11	28	13	10	9.9	64	4.0	113	5.0
18	5.6	6.5	7.0	10	31	12	9.2	9.3	29	3.9	103	4.8
19	5.2	6.5	6.8	10	30	116	8.3	9.8	21	3.9	16	4.7
20	5.2	6.5	6.7	10	22	43	10	9.1	17	3.8	24	4.6
21	5.3	6.7	6.7	9.9	18	28	219	8.8	17	3.8	20	4.6
22	5.4	7.7	6.7	9.5	17	20	268	8.4	37	12	11	7.2
23	5.6	9.0	6.7	112	56	44	43	7.7	14	8.6	9.2	6.2
24	5.6	6.8	10	57	95	25	25	8.0	11	5.8	8.4	6.3
25	11	6.2	8.2	22	254	20	19	7.9	9.5	4.3	7.8	6.6
26	7.0	6.2	7.1	17	761	282	15	8.8	12	4.5	7.3	5.5
27	5.8	7.0	9.7	16	126	69	14	12	9.0	6.8	7.6	14
28	5.7	6.7	7.1	18	51	32	13	9.0	7.8	3.9	11	96
29	7.3	6.4	236	15	32	23	12	14	7.0	3.6	8.7	23
30	5.6	11	32	14	---	20	11	22	7.0	3.6	6.8	11
31	5.8	---	20	13	---	18	---	12	---	3.4	6.5	---
Mean	5.98	9.71	20.0	26.1	62.6	55.9	29.0	18.2	72.3	5.14	15.4	40.7
Maximum	11	80	236	143	761	455	268	130	590	12	113	642
Minimum	5.2	5.8	6.7	9.5	8.6	12	8.3	7.7	7.0	3.4	3.2	4.6

Water Quality

Water-quality samples were collected at gaging stations 02145642 and 021467801 during two low-flow and two high-flow events, and were analyzed for a variety of parameters and constituents. Physical analyses included temperature, pH, specific conductance, turbidity, and suspended sediment. Chemical analyses included dissolved oxygen, alkalinity, dissolved solids, total nutrients, total trace metals, and oil and grease. Biological analyses included fecal coliform bacteria, chlorophyll A, and chlorophyll B.

The major goal of water-quality sampling is to obtain a sample that represents the *in situ* quality of the water. To insure this, field measurements of water temperature, specific conductance, pH, and dissolved oxygen were made on site at the time samples were taken. On-site field measurements minimized changes that can occur during sample processing. Procedures for these on-site field measurements and for collecting, treating, and shipping samples were used as outlined by Guy and Norman (1970), Stevens and others (1975), and Fishman and Friedman (1985).

The water-quality constituents measured at stations 02145642 and 021467801 are listed in tables 5 and 6, respectively. Relatively high suspended-sediment and fecal coliform concentrations were observed at both stations during the high-flow events. About 90 percent of the suspended sediment transported during high-flow events are clay and silt size particles (less than 0.062 mm in diameter). Fecal coliform concentrations exceeded minimum standards, based on South Carolina Department of Health and Environmental Control standards (1992) for fresh water. The maximum observed colony counts at stations 02145642 and 021467801 were 12,000 and 17,000 col/mL, respectively, with other water-quality constituents meeting South Carolina Department of Health and Environmental Control standards.

Table 5.--High flow and low flow water-quality constituents for station 02145642 (Crowders Creek near Clover, S.C.)

[ft³/s, cubic feet per second; mmHg, millimeters of mercury; °C, degrees Celsius; cols/100 mL, colonies per 100 milliliters; mg/L, milligrams per liter; % sat., percent saturation; µS/cm, microseimens per centimeter; NTU, National Turbidity Units; µg/L, micrograms per liter; <, less than]

Date	Time (hours)	Streamflow, instantaneous (ft ³ /s)	Barometric pressure (mmHg)	Temperature, water °C	Oxygen, dissolved (mg/L)	Oxygen, dissolved (% sat.)	pH	Specific conductance (µS/cm)
Low flow water-quality constituents								
07/26/91	1230	30	747	25.0	7.4	92	7.6	238
11/25/91	1330	33	749	8.0	10.2	88	7.5	274
High flow water-quality constituents								
01/23/92	1525	520	759	8.0	10.3	87	6.9	134
02/24/93	0010	500	743	11.0	8.8	82	7.0	103

Date	Time (hours)	Alkalinity (mg/L as CaCO ₃)	Turbidity (NTU)	Coliform, fecal (cols/100 mL)	Oxygen demand, biochemical, 5 day (mg/L)	Chlor-A phyto-plankton (µg/L)	Chlor-B phyto-plankton (µg/L)	Residue at 105 °C, dissolved (mg/L)
Low flow water-quality constituents								
07/26/91	1230	39	9.5	310	0.3	0.800	<0.300	151
11/25/91	1330	43	15	78	.7	<.100	<.100	180
High flow water-quality constituents								
01/23/92	1525	21	250	9,500	8.0	5.50	<.300	70
02/24/93	0010	16	230	12,000	5.0	5.50	<.800	79

Table 5.--High flow and low flow water-quality constituents for station 02145642 (Crowders Creek near Clover, S.C.)--Continued

[ft³/s, cubic feet per second; mmHg, millimeters of mercury; °C, degrees Celsius; cols/100 mL, colonies per 100 milliliters; mg/L, milligrams per liter; % sat., percent saturation; µS/cm, microseimens per centimeter; NTU, National Turbidity Units; µg/L, micrograms per liter; <, less than]

Date	Time (hours)	Copper, total recoverable (µg/L as CU)	Iron, total recoverable (µg/L as FE)	Lead, total recoverable (µg/L as PB)	Lithium, total recoverable (µg/L as LI)	Manganese, total recoverable (µg/L as MN)	Mercury, total recoverable (µg/L as HG)	Molybdenum, total recoverable (µg/L as MO)
Low flow water-quality constituents								
07/26/91	1230	<1	710	<1	<10	160	<0.10	1
11/25/91	1330		570	3	940	180	.10	3
High flow water-quality constituents								
01/23/92	1525	28	22,000	40	370	1,700	.20	1
02/24/93	0010	12	11,000	20	400	1,500	<.10	1

Date	Time (hours)	Nickel, total recoverable (µg/L as NI)	Selenium, total (µg/L as SE)	Zinc, total recoverable (µg/L as ZN)	Oil and grease, total recoverable gravimetric (mg/L)	Sediment, suspended (mg/L)	Sediment, discharge, suspended (Tons/day)	Sediment, suspended sieve diameter percent finer than 0.063 mm
Low flow water-quality constituents								
07/26/91	1230	2	<1	<10	<1	14	1.1	94
11/25/91	1330	1	<1	<10	<1	1	0.09	100
High flow water-quality constituents								
01/23/92	1525	13	<1	130	<1	1,200	1,680	86
02/24/93	0010	7	<1	60	<1	483	652	100

Table 5.--*High flow and low flow water-quality constituents for station 02145642 (Crowders Creek near Clover, S.C.)--Continued*

[ft³/s, cubic feet per second; mmHg, millimeters of mercury; °C, degrees Celsius; cols/100 mL, colonies per 100 milliliters; mg/L, milligrams per liter; % sat., percent saturation; µS/cm, microseimens per centimeter; NTU, National Turbidity Units; µg/L, micrograms per liter; <, less than]

Date	Time (hours)	Copper, total recoverable (µg/L as CU)	Iron, total recoverable (µg/L as FE)	Lead, total recoverable (µg/L as PB)	Lithium, total recoverable (µg/L as LI)	Manganese, total recoverable (µg/L as MN)	Mercury, total recoverable (µg/L as HG)	Molybdenum, total recoverable (µg/L as MO)
Low flow water-quality constituents								
07/26/91	1230	<1	710	<1	<10	160	<0.10	1
11/25/91	1330		570	3	940	180	.10	3
High flow water-quality constituents								
01/23/92	1525	28	22,000	40	370	1,700	.20	1
02/24/93	0010	12	11,000	20	400	1,500	<.10	1

Date	Time (hours)	Nickel, total recoverable (µg/L as NI)	Selenium, total (µg/L as SE)	Zinc, total recoverable (µg/L as ZN)	Oil and grease, total recoverable gravimetric (mg/L)	Sediment, suspended (mg/L)	Sediment, discharge, suspended (Tons/day)	Sediment, suspended sieve diameter percent finer than 0.063 mm
Low flow water-quality constituents								
07/26/91	1230	2	<1	<10	<1	14	1.1	94
11/25/91	1330	1	<1	<10	<1	1	0.09	100
High flow water-quality constituents								
01/23/92	1525	13	<1	130	<1	1,200	1,680	86
02/24/93	0010	7	<1	60	<1	483	652	100

Table 6.--High flow and low flow water-quality constituents for station 021467801 (Steele Creek near Fort Mill, S.C.)

[ft³/s, cubic feet per second; mmHg, millimeters of mercury; °C, degrees Celsius; cols/100 mL, colonies per 100 milliliters; mg/L, milligrams per liter; % sat., percent saturation; µS/cm, microseimens per centimeter; NTU, National Turbidity Units; µg/L, micrograms per liter; <, less than; >, greater than]

Date	Time (hours)	Streamflow, instantaneous (ft ³ /s)	Barometric pressure (mmHg)	Temperature, water (°C)	Oxygen, dissolved (mg/L)	Oxygen, dissolved (% sat.)	pH	Specific conductance (µS/cm)
Low flow water-quality constituents								
07/26/91	0900	4.4	749	24.0	7.4	90	7.5	156
11/25/91	1000	8.1	752	7.0	11.6	97	7.6	166
High flow water-quality constituents								
09/25/91	1250	52	760	20.0	7.9	87	7.1	100
01/23/92	1050	67	762	10.5	10.1	90	7.1	87

Date	Time (hours)	Alkalinity (mg/L as CaCO ₃)	Turbidity (NTU)	Coliform, fecal (cols/100 mL)	Oxygen demand, biochemical, 5 day (mg/L)	Chlor-A phyto-plankton (µg/L)	Chlor-B phyto-plankton (µg/L)	Residue at 105 °C, dissolved (µg/L)
Low flow water-quality constituents								
07/26/91	0900	51	4.8	380	0.1	0.600	<0.300	105
11/25/91	1000	63	19.2	200	.3	.600	<100	125
High flow water-quality constituents								
09/25/91	1250	17		17,000	>8.1	1.60	<100	68
01/23/92	1050	25	8.6	3,300	6.0	2.50	<1.30	61

Table 6.--High flow and low flow water-quality constituents for station 021467801 (Steele Creek near Fort Mill, S.C.)--Continued

[ft³/s, cubic feet per second; mmHg, millimeters of mercury; °C, degrees Celsius; cols/100 mL, colonies per 100 milliliters; mg/L, milligrams per liter; % sat., percent saturation; µS/cm, microseimens per centimeter; NTU, National Turbidity Units; µg/L, micrograms per liter; <, less than; >, greater than]

Date	Time (hours)	Nitrogen, nitrate total (mg/L as N)	Nitrogen, nitrate total (mg/L as N)	Nitrogen, NO ₂ +NO ₃ total (mg/L as N)	Nitrogen, ammonia total (mg/L as N)	Nitrogen, organic total (mg/L as N)	Nitrogen, ammonia + organic total (mg/L as N)	Phosphorus, ortho total (mg/L as P)
Low flow water-quality constituents								
07/26/91	0900	0.500	0.020	0.520	0.040	0.5	0.60	0.050
11/25/91	1000		<.010	.350	.010		<.20	.050
High flow water-quality constituents								
09/25/91	1250	.190	.020	.210	.070	1.0	1.1	.060
01/23/92	1050	.230	.020	.250	.060	1.0	1.1	.020

Date	Time (hours)	Phosphorus, dissolved (mg/L as P)	Phosphorus, total (mg/L as P)	Aluminum, total recoverable (µg/L as AL)	Arsenic, total (µg/L as AS)	Beryllium, total recoverable (µg/L as BE)	Cadmium, total recoverable (µg/L as CD)	Chromium, total recoverable (µg/L ad CD)
Low flow water-quality constituents								
07/26/91	0900	0.050	0.080	390	<1	<10	<1	2
11/25/91	1000	.030	.050	80	<1	<10	<1	<1
High flow water-quality constituents								
09/25/91	1250	.050	.810	26,000	<1	<10	<1	56
01/23/92	1050	.030	.550	9,700	<1	<10	<1	18

Table 6.--High flow and low flow water-quality constituents for station 021467801 (Steele Creek near Fort Mill, S.C.)--Continued

[ft³/s, cubic feet per second; mmHg, millimeters of mercury; °C, degrees Celsius; cols/100 mL, colonies per 100 milliliters; mg/L, milligrams per liter; % sat., percent saturation; µS/cm, microseimens per centimeter; NTU, National Turbidity Units; µg/L, micrograms per liter; <, less than; >, greater than]

Date	Time (hours)	Copper, total recoverable (µg/L as CU)	Iron, total recoverable (µg/L as FE)	Lead, total recoverable (µg/L as PB)	Lithium, total recoverable (µg/L as LI)	Manganese, total recoverable (µg/L as MN)	Mercury, total recoverable (µg/L as HG)	Molybdenum, total recoverable (µg/L as MO)
Low flow water-quality constituents								
07/26/91	0900	3	880	2	690	170	<0.10	3
11/25/91	1000	<1	850	2	<10	200	<.10	<1
High flow water-quality constituents								
09/25/91	1250	40	46,000	32	<10	2,100	.20	<1
01/23/92	1050	13	21,000	18	<10	610	.20	<1

Date	Time (hours)	Nickel, total recoverable (µg/L as NI)	Selenium, total (µg/L as SE)	Zinc, total recoverable (µg/L as ZN)	Oil and grease, total recoverable gravimetric (mg/L)	Sediment, suspended (mg/L)	Sediment, discharge, suspended (Tons/day)	Sediment, suspended sieve diameter percent finer than 0.063 mm
Low flow water-quality constituents								
07/26/91	0900	3	<1	<10	<1	6	0.07	96
11/25/91	1000	2	<1	20	<1	2		100
High flow water-quality constituents								
09/25/91	1250	31	<1	80	<1	1,330		90
01/23/92	1050	11	<1	50	<1	552	100	98

SUMMARY

Crowders Creek flows into Lake Wylie, the oldest lake on the Catawba River. Lake Wylie was created in 1904 by the construction of a dam on the Catawba River near Fort Mill, S.C. The dam was rebuilt in 1924, and the surface area was expanded to 12,455 acres. The drainage area of station 02145642 (Crowders Creek near Clover, S.C.) is 89.0 mi², located within the boundaries of York County, S.C., and Gaston and Cleveland Counties, N.C.

Steele Creek is a tributary of Sugar Creek. Sugar Creek flows into the Catawba River downstream of Lake Wylie. The drainage area of station 021467801 (Steele Creek near Fort Mill, S.C.) is 22.8 mi², located in York County, S.C., and Mecklenburg County, N.C.

From March 23, 1991 to September 30, 1992, the maximum instantaneous gage height at station 02145642 was 11.43 ft, which was recorded on March 30, 1991. The stage-streamflow relation was not defined above 8.20 ft gage height (2,050 ft³/s). The minimum daily mean streamflow of 23 ft³/s was recorded on September 12, 13, 15, and 17, 1991; the maximum daily mean streamflow of 2,350 ft³/s was recorded on March 30, 1991. The average daily streamflow for the study period at station 02145642 was 80.5 ft³/s.

From May 29, 1991 to September 30, 1992, the maximum instantaneous streamflow at station 021467801 was 1,750 ft³/s on September 6, 1992. The minimum daily mean streamflow of 3.2 ft³/s was recorded on August 6, 1992; the maximum daily mean streamflow of 814 ft³/s was recorded on August 9, 1991. The average daily streamflow for the study period at station 021467801 was 28.6 ft³/s.

Fecal coliform concentrations exceeded minimum standards for freshwater with other water-quality constituents meeting South Carolina Department of Health and Environmental Control standards.

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