STREAMFLOW AND WATER-QUALITY DATA COLLECTED NEAR THE NOXUBEE NATIONAL WILDLIFE REFUGE, EAST-CENTRAL MISSISSIPPI, JULY 1998 - JUNE 1999

By Michael S. Runner and B. Allen Roberts

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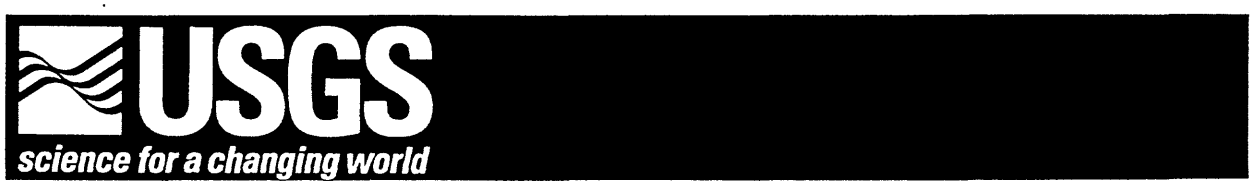

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ABSTRACT

The U.S. Geological Survey collected data at four locations on two streams flowing into the Noxubee National Wildlife Refuge, in east-central Mississippi, during the period July 1998 through June 1999. The purpose of the data collection was to compare streamflow and water-quality data for Hollis Creek, which receives runoff from Starkville and the surrounding area, to data for Jones Creek, which drains a predominantly undeveloped area. Discrete data were collected on stream discharge, suspended-sediment concentration, temperature, pH, specific conductance, dissolved oxygen, 5-day biochemical oxygen demand, fecal-coliform bacteria, turbidity, and nutrients. Continuous data were collected on temperature, pH, specific conductance, and dissolved oxygen at one station for two periods during the study.

INTRODUCTION

The U.S. Geological Survey (USGS), in cooperation with the U.S. Fish & Wildlife Service (USF&WS) collected stream-discharge, suspended-sediment, and water-quality data during the period July 1998 through June 1999 at four locations on two streams that flow into the Noxubee National Wildlife Refuge. Data were collected at three stations on Hollis Creek and one station on Jones Creek. Hollis and Jones Creeks are tributaries of the Noxubee River, which flows through and serves as a water source for the lakes and wetland areas of the refuge. The purpose of the data collection was to compare streamflow and water-quality data for Hollis Creek, which receives runoff from Starkville and the surrounding area, to data for Jones Creek, which drains a predominantly undeveloped area.

DESCRIPTION OF STUDY AREA

The Noxubee Wildlife Refuge is located in east-central Mississippi where Noxubee, Oktibbeha, and Winston Counties meet, near the city of Starkville, Mississippi (fig. 1). The area surounding the refuge is primarily agricultural in use, except for Starkville and the suburban areas surrounding the city. The Noxubee River flows through the refuge from the west, and during high flows, serves as a source of water for the lakes located on the refuge.

Hollis Creek and Jones Creek are tributaries to the Noxubee River (fig. 2). Data were collected at four stations on these streams: Hollis Creek at Starkville, Hollis Creek near Starkville, Hollis Creek near Oktoc, and Jones Creek near Winston, Mississippi.

The Hollis Creek at Starkville data-collection station is located in Starkville, and the entire drainage for the station lies within the developed area of the city. The drainage area is 1.73 square miles (mi^2), the channel is 1.9 miles (mi) long, and the average slope of the channel is 29 feet per mile (ft/mi).

The Hollis Creek near Starkville data-collection station is located 2.7 mi downstream of Hollis Creek at Starkville. The drainage area is 3.62 mi^2, the channel is 4.6 mi long, and the average slope of the channel is 16 ft/mi. Approximately half of the contributing drainage area that is unique to this station is developed; the balance is rural or undeveloped.

The Hollis Creek near Oktoc data-collection station is located approximately 6 mi downstream of Hollis Creek near Starkville. The drainage area is 20.2 mi^2, the channel is 10.6 mi long, and the average slope of the channel is 10 ft/mi. The contributing drainage area that is unique to this station is generally undeveloped except for the headwaters of Skinner Creek. Skinner Creek is a tributary to Hollis Creek and receives some runoff from the urbanized areas of southern Starkville.

Jones Creek flows from the west into the Noxubee River. The data-collection station is located where Jones Creek flows into the Noxubee National Wildlife Refuge. The drainage area is 12.2 mi^2, the channel is 7.6 mi long, and the average slope of the channel is 22 ft/mi. The basin is undeveloped except for some single-family residences. This station was selected to serve as a control or background station for the study.

DATA COLLECTION

During each station visit, stream discharge was measured, and water samples were collected to be analyzed for suspended sediment, 5-day biochemical oxygen demand (BOD), fecal-coliform bacteria, turbidity, and nutrients. In situ measurements of temperature, pH, specific conductance, and dissolved oxygen were made and recorded during each visit. A water-quality monitor was installed at Hollis Creek near Oktoc that continuously recorded temperature, pH, specific conductance, and dissolved oxygen during two periods during the study.

Stream Discharge

Stream discharge was measured by using the techniques described in USGS technical publications and by using standard USGS flow measuring equipment (Rantz, 1982). Tapedowns from a reference point were made prior to and after each measurement to determine the stage of the water relative to a previously established reference point.

Suspended Sediment

Equal width, depth-integrated (EWI) samples were collected to determine the suspended-sediment concentration at each station. Samples were collected by using techniques described in the USGS technical publication by Guy and Norman (1970). A grab sample was collected when it was not possible to collect an EWI sample. Samples were analyzed at the USGS sediment laboratory in Baton Rouge, Louisiana.

Suspended-sediment discharge, in tons per day (t/d), was derived mathematically by using the stream discharge and suspended-sediment concentration. Suspended-sediment discharge represents the instantaneous rate of discharge for suspended sediment, which if constant for 24 hours, would be the mass of suspended sediment transported past the sampling station for the day.

In situ Measurements

A four-parameter water-quality probe was used to measure water temperature, pH, specific conductance, and dissolved oxygen. A water-quality probe, installed at Hollis Creek near Oktoc, recorded these field parameters continuously for January 13 through February 20 and April 20 through June 22, 1999.

Biological Indicators

USGS personnel determined 5-day BOD values and fecal-coliform bacteria concentrations by using standard procedures described by Wilde and others (1998).

Nutrients

Water-quality samples collected for laboratory analysis were collected by using techniques described in the USGS technical publications by Wilde and others (1998).

Samples were sent to the USGS laboratory in Ocala, Florida, to be analyzed for concentrations of sulfide, sulfate, nitrogen, phosphorus, total organic carbon, and turbidity.

SAMPLING PROGRAM

Eleven routine sampling trips and one storm-sampling trip were done during the study. During each routine trip, all four stations were visited. Data and samples were collected as previously described. For the storm sampling trip (June 25-26, 1999), samples were collected at each station at low flow before the runoff began. At high flows samples were collected at only the Hollis Creek stations.

DATA RESULTS

A summary of the discharge, sediment, nutrient, and in situ water-quality data, along with results of the water-quality analyses and computed sediment discharge, are contained in table 1. The continuous water-quality data are shown graphically in figures 2 and 3. Extremes for the measured data and laboratory results are described below.

Stream Discharge

The measured stream discharge for all the stations ranged from 0.02 to 269 cubic feet per second (ft^3/s). During three of the sampling runs, the stream discharge of Hollis Creek near Starkville was greater than the discharge of Hollis Creek near Oktoc. This was due to releases from the Starkville wastewater treatment plant, which is located upstream of Hollis Creek near Starkville. For these sampling runs, the measurements were made and samples collected at Hollis Creek near Oktoc before the treatment plant release for that morning had reached the sampling station.

Suspended Sediment

Suspended-sediment concentrations measured during the study ranged from 21 to 252 milligrams per liter (mg/L). The instantaneous suspended-sediment discharge ranged from 0 to 183 t/d.

In Situ Measurements

Water temperature ranged from 6.0 to 33.0 °C during the study. Water temperature varied seasonally, as expected. The measured pH during the study ranged from 6.5 to 8.5. Specific conductance values ranged from 40 to 590 microsiemens per centimeter. The specific conductance for Jones Creek near Winston was consistently less than specific conductance measured at the three Hollis Creek stations. Dissolved oxygen concentrations ranged from 2.4 to 12.5 mg/L.

Biological Indicators

The 5-day BOD values ranged from 0.7 to 7.0 mg/L. Fecal-coliform concentrations ranged from less than 0.2 colonies per 100 milliliters at low flow to 1,200,000 colonies per 100 milliliters during a runoff event.

Nutrients

For all samples collected, laboratory results for total sulfide (in mg/L as S) analyses were below the detection limit of 0.02. Values for dissolved sulfates (mg/L as SO_4) ranged from 6.8 to 52. Values for total nitrogen (NO_2 + NO_3 in mg/L as N) ranged from <0.02 to 16. Values for total phosphorus (in mg/L as P) ranged from <0.02 to 2.4. Values for total organic carbon (in mg/L as C) ranged from 1.1 to 12. For values of other nutrients refer to table 1. Values for turbidity, in nephelometric turbidity units (ntu), ranged from 0.65 to 33.

SUMMARY

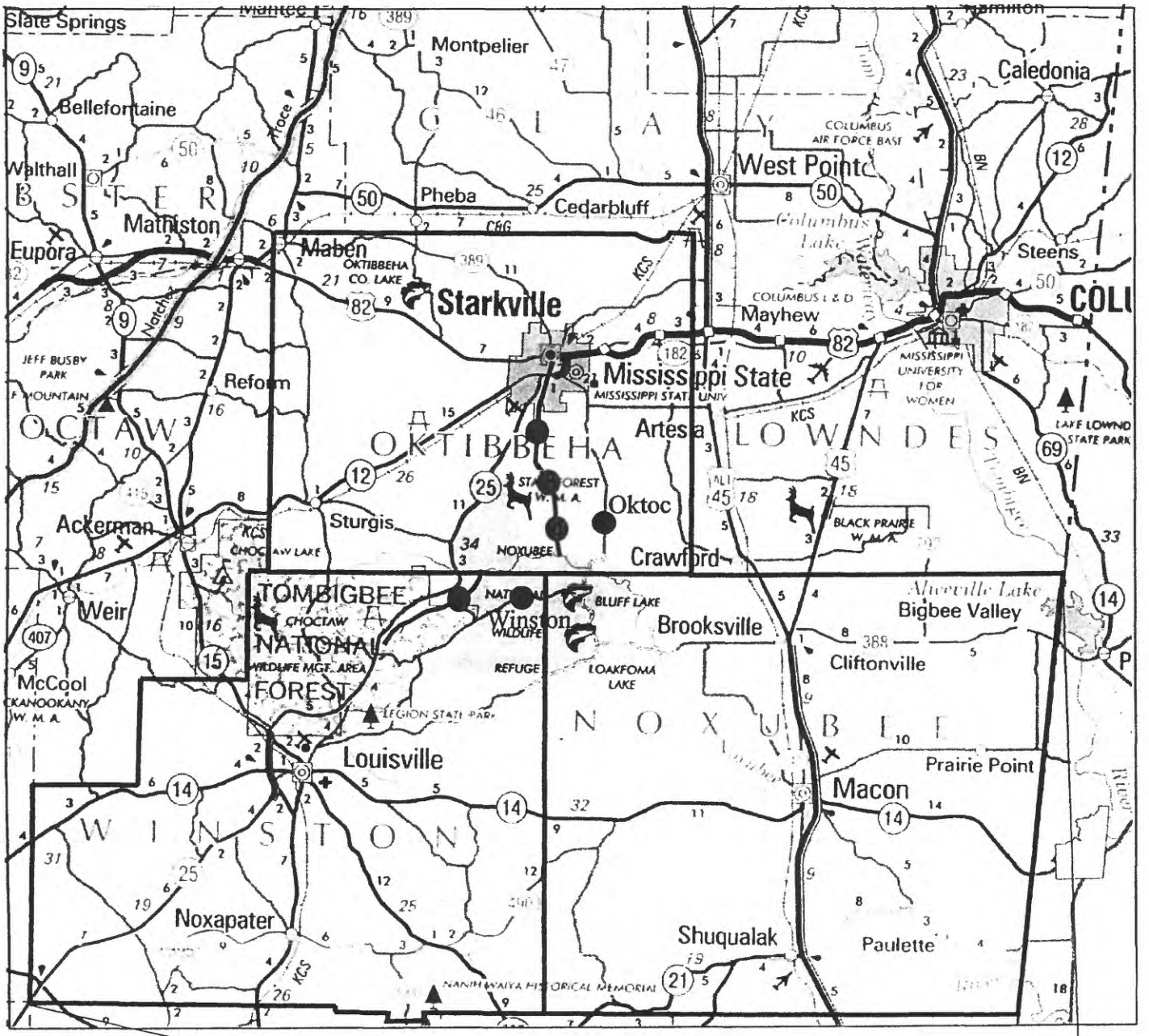
During July 1998 through June 1999, The U.S. Geological Survey, in cooperation with the U.S. Fish & Wildlife Service, collected data on two streams that flow into the Noxubee National Wildlife Refuge, near Starkville, Mississippi. Data were collected at three stations on Hollis Creek and one on Jones Creek. Both streams are tributaries to the Noxubee River, which flows through and serves as a water source for the wetland areas of the Noxubee National Wildlife Refuge. The data were collected to compare streamflow and water-quality data for Hollis Creek, which receives runoff from Starkville and the surrounding area, to data for Jones Creek, which drains a predominantly undeveloped area. Data were collected on stream discharge, suspended-sediment, temperature, pH, specific conductance, dissolved oxygen, 5-day biochemical oxygen demand, fecal-coliform bacteria, turbidity, and nutrients. Continuous in situ data were collected at one of the data-collection stations for two periods during the study.

REFERENCES

Guy, H.P., and Norman, V.W., 1970, Field methods for measurement of fluvial sediment: U.S. Geological Survey Techniques of Water-Resources Investigations, book 3, chapter C2, 59 p.

Rantz, S.E., and others, 1982, Measurement and computation of streamflow: Volume 1. Measurement of stage and discharge: U.S. Geological Survey Water-Supply Paper 2175, 284 p.

Wilde, F.D., and others, 1998, National field manual for the collection of water-quality data: U.S. Geological Survey Techniques of Water-Resources Investigations, book 9, variously paginated.



(Modified from 1999 Mississippi official highway map, Mississippi Dept. of Transportation).

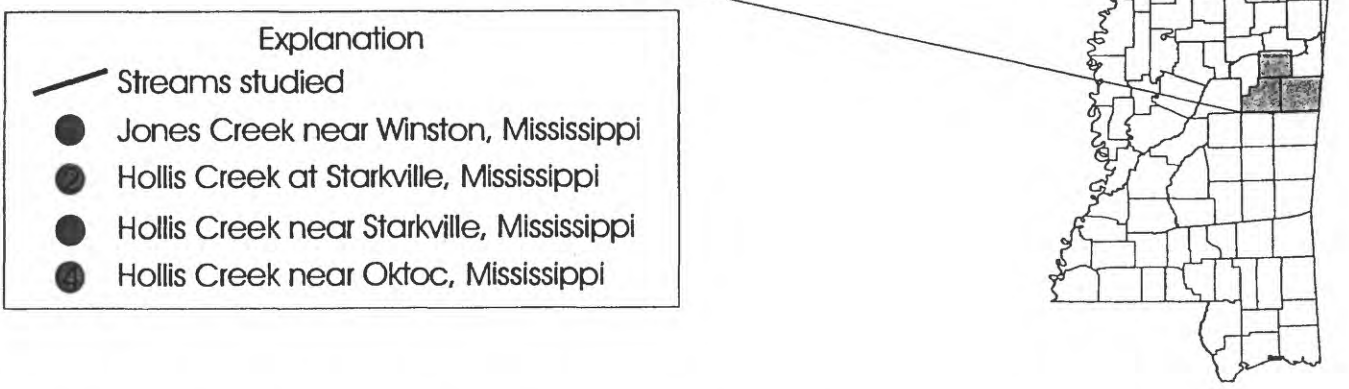


Figure 1.--Location of Hollis Creek and Jones Creek data-collection stations near the Noxubee National Wildlife Refuge, near Starkville, Mississippi.

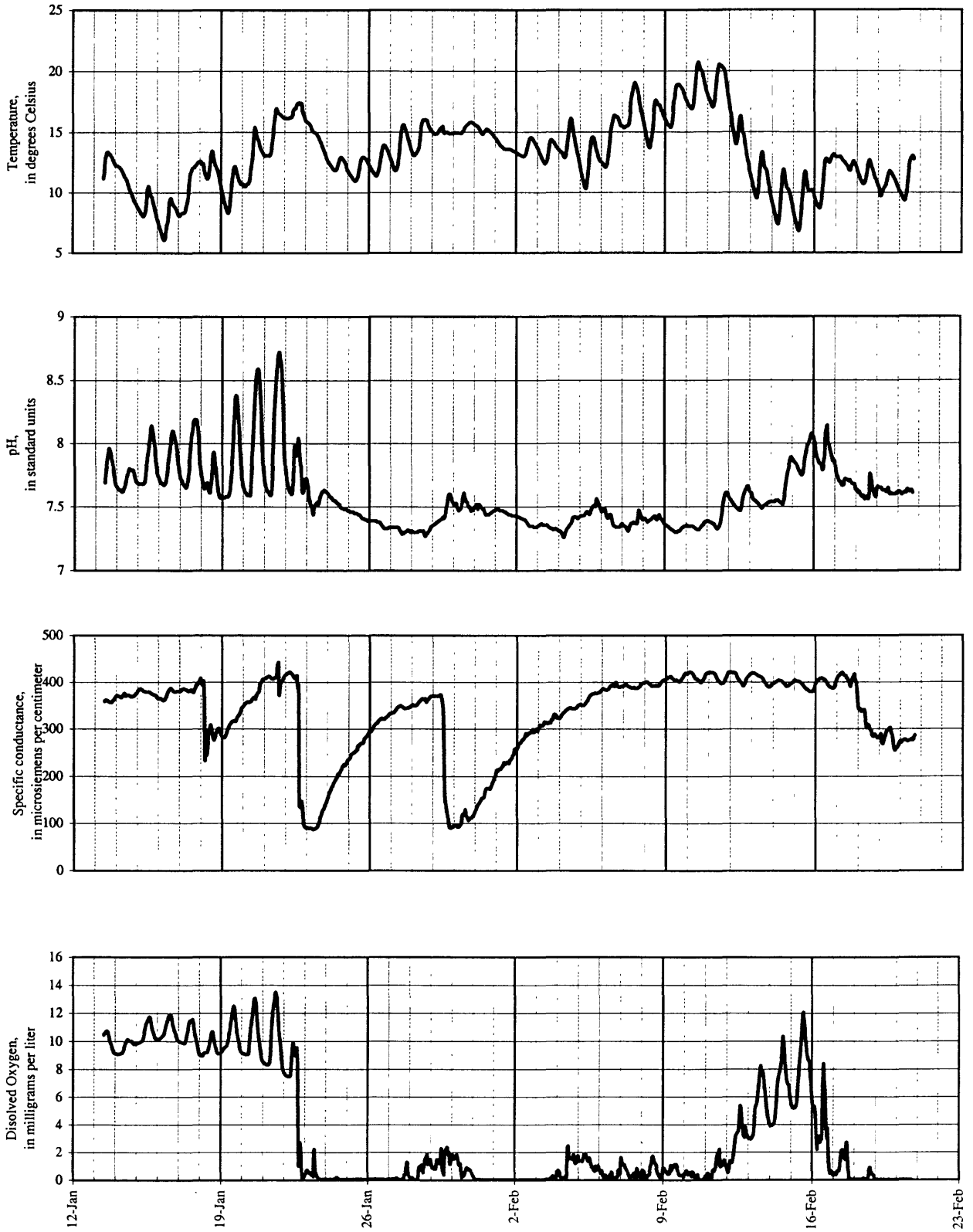


Figure 2.--Temperature, pH, disolved oxygen, and specific conductance data (unedited) plots for Hollis Creek near Oktoc, Mississippi, for the period January 13 through February 20, 1999.

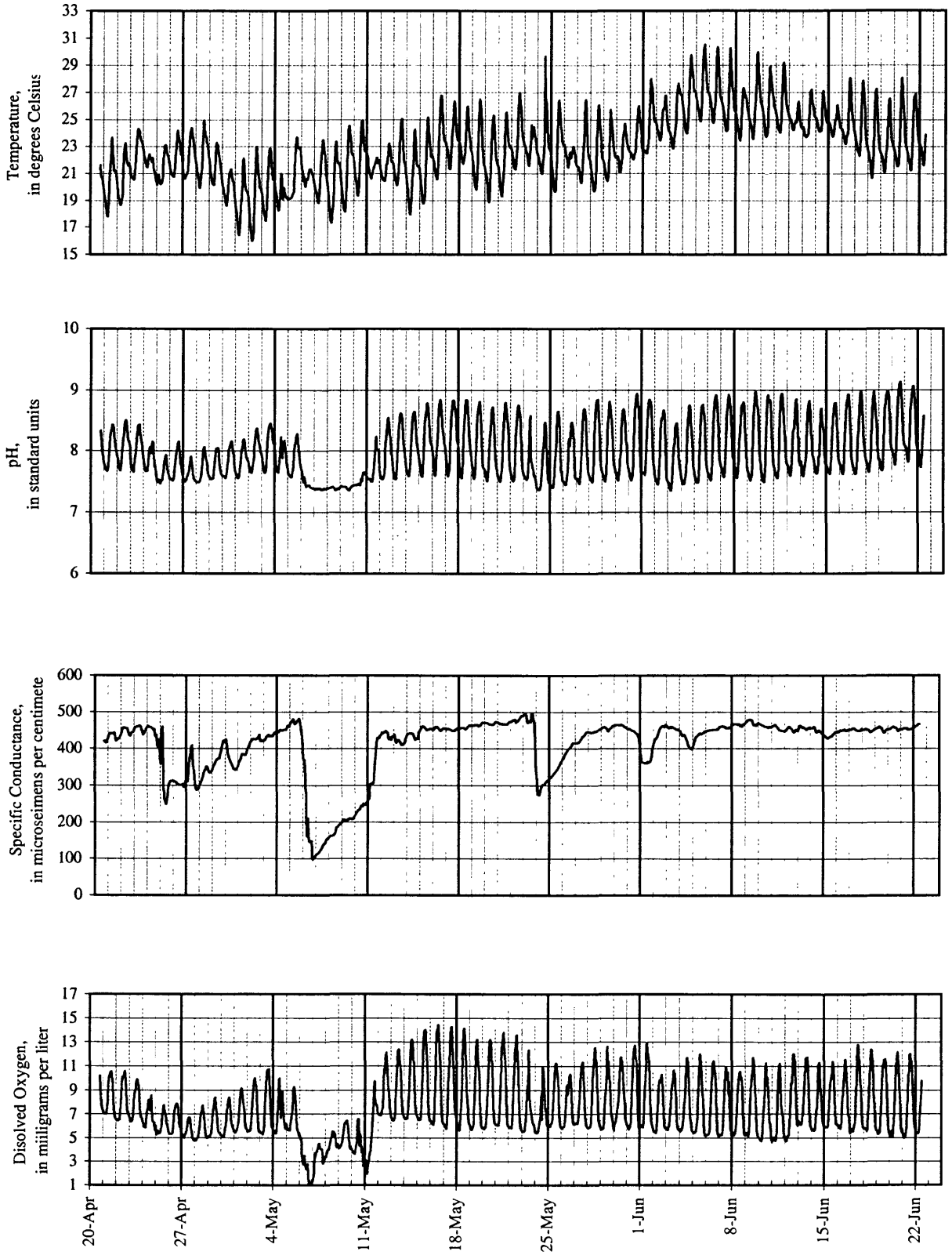


Figure 3.--Temperature, pH, specific conductance, and disolved oxygen data (unedited) for Hollis Creek near Oktoc, Mississippi, for the period April 20 through June 22, 1999.

TABLE 1. Streamflow and water-quality data collected at stations near the Noxubee National Wildlife Refuge, east-central Mississippi

[US/CM, microsiemens per centimeter; DEG C, degrees Celsius; NTU, nephelometric turbidity units; MM, millimeters; COLS./100ML, colonies per 100 milliliters; MG/L, milligrams per liter; T/DAY, tons per day]

02447305 JONES CREEK NEAR WINSTON, MS

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	TEMPER-ATURE WATER (DEG C) (00010)	TUR-BID-ITY (NTU) (00076)	BARO-METRIC PRES-SURE (MM OF HG) (00025)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN DEMAND, BIO-CHEM-ICAL, 5 DAY (MG/L) (00310)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)	SULFIDE TOTAL (MG/L AS S) (00745)	SULFATE DIS-SOLVED (MG/L AS SO4) (00945)
JUL 1998												
22...	1100	1.2	64	6.8	27.0	13	760	7.7	1.2	K200	<1.0	11
28...	1100	--	--	--	--	--	--	--	.7	230	--	--
SEP												
09...	1130	.15	90	6.8	25.5	33	757	2.4	2.0	<2	<1.0	11
OCT												
14...	1100	.12	106	6.8	18.0	22	760	4.1	1.5	<2	<1.0	14
NOV												
18...	1130	.58	51	7.0	13.5	8.7	760	9.3	1.4	170	<1.0	8.2
DEC												
16...	1135	1.4	69	6.9	7.0	7.6	763	11.5	1.6	4100	<1.0	19
JAN 1999												
13...	1215	11	114	6.8	11.0	3.8	757	10.7	--	66	<1.0	39
MAR												
03...	1210	120	76	6.6	12.0	23	760	10.5	2.1	1800	<1.0	26
31...	1100	13	112	6.8	13.5	2.4	760	9.9	.9	360	<1.0	37
APR												
21...	1115	3.2	102	7.0	20.5	2.1	763	9.4	.8	210	<1.0	30
MAY												
11...	1000	1.6	87	6.7	20.5	8.1	763	7.9	1.0	330	<1.0	21
JUN												
22...	0945	.48	80	6.5	23.0	16	767	7.1	1.2	110	<1.0	15
25...	1845	15	40	6.5	24.0	11	760	7.3	1.8	4000	<1.0	6.8

DATE	RESIDUE TOTAL AT 105 DEG. C, SUS-PENDED (MG/L) (00530)	NITRO-GEN, NITRITE TOTAL (MG/L AS N) (00615)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N) (00610)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	PHOS-PHORUS TOTAL (MG/L AS P) (00665)	PHOS-PHORUS DIS-SOLVED (MG/L AS P) (00666)	PHOS-PHORUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)	CARBON, ORGANIC TOTAL (MG/L AS C) (00680)	SEDI-MENT, SUS-PENDED (MG/L) (80154)	SEDI-MENT, DIS-CHARGE, SUS-PENDED (T/DAY) (80155)
JUL 1998											
22...	15	<.010	.070	.020	.31	.060	.050	.020	4.3	52	.17
28...	--	--	--	--	--	--	--	--	--	--	--
SEP											
09...	48	.010	<.020	.040	.45	.070	.020	<.010	4.3	75	.03
OCT											
14...	27	.010	<.020	<.010	.39	.040	<.020	<.010	2.7	53	.02
NOV											
18...	10	<.010	<.020	.010	<.20	.050	.030	<.010	3.0	24	.04
DEC											
16...	8	<.010	.090	.020	<.20	.020	<.020	.020	3.3	26	.10
JAN 1999											
13...	6	E.010	E.030	E.020	<.20	<.020	<.020	<.010	1.1	21	.62
MAR											
03...	160	E.010	.030	.040	.46	.110	.020	<.010	6.9	214	69
31...	3	<.010	<.020	.020	<.20	.020	<.020	.010	1.6	26	.91
APR											
21...	6	<.010	<.020	.020	<.20	.040	.030	.020	1.8	28	.24
MAY											
11...	11	<.010	.030	.050	.22	.040	<.020	.020	3.0	26	.11
JUN											
22...	32	<.010	.060	.050	.33	.040	.020	<.010	4.1	56	.07
25...	110	E.010	.090	.050	.77	.050	<.020	.010	3.2	115	4.7

TABLE 1. Streamflow and water-quality data collected at stations near the Noxubee National Wildlife Refuge, east-central Mississippi--continued

02447393 HOLLIS CREEK AT STARKVILLE, MS

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	TEMPER-ATURE WATER (DEG C) (00010)	TUR-BID-ITY (NTU) (00076)	BARO-METRIC PRES-SURE (MM OF HG) (00025)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN DEMAND, BIO-CHEM-ICAL, 5 DAY (MG/L) (00310)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)	SULFIDE TOTAL (MG/L AS S) (00745)	SULFATE DIS-SOLVED (MG/L AS SO4) (00945)
JUL 1998												
22...	0800	.06	480	7.5	26.5	<1.0	760	4.5	2.1	K200	<1.0	22
28...	0955	--	--	--	--	--	--	--	1.5	<2	--	--
SEP												
09...	0800	.02	394	7.8	21.0	6.5	757	4.9	2.5	<2	<1.0	17
OCT												
14...	0730	.05	398	7.4	16.5	2.5	760	7.3	1.5	<2	<1.0	15
NOV												
18...	0800	.10	480	7.3	12.0	2.2	760	7.3	1.3	640	<1.0	35
DEC												
16...	0815	.13	520	7.3	6.0	1.6	763	10.0	1.3	420	<1.0	43
JAN 1999												
13...	0800	.31	520	7.4	10.5	2.6	757	9.2	--	160	<1.0	52
MAR												
03...	0800	2.2	203	7.1	10.5	32	760	10.2	3.2	15000	<1.0	16
31...	0800	1.7	277	7.4	13.5	4.4	760	8.4	4.0	5200	<1.0	20
APR												
21...	0745	.10	590	7.5	17.0	1.2	763	6.4	1.3	1100	<1.0	57
MAY												
11...	1315	.11	525	7.7	26.0	.86	763	12.5	1.9	720	<1.0	42
JUN												
22...	1250	.03	350	7.9	33.0	.65	767	12.2	1.6	1000	<1.0	12
25...	2100	.57	159	7.2	27.0	3.3	760	4.7	4.7	100000	<1.0	10
26...	0815	19	123	7.4	25.0	7.2	762	6.8	5.8	180000	<1.0	8.7
26...	1330	1.1	150	7.3	26.5	3.6	762	6.2	4.0	79000	<1.0	9.4

DATE	RESIDUE TOTAL AT 105 DEG. C, SUS-PENDED (MG/L) (00530)	NITRO-GEN, NITRITE TOTAL (MG/L AS N) (00615)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N) (00610)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	PHOS-PHORUS TOTAL (MG/L AS P) (00665)	PHOS-PHORUS DIS-SOLVED (MG/L AS P) (00666)	PHOS-PHORUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)	CARBON, ORGANIC TOTAL (MG/L AS C) (00680)	SEDI-MENT, SUS-PENDED (MG/L) (80154)	SEDI-MENT, DIS-CHARGE, SUS-PENDED (T/DAY) (80155)
JUL 1998											
22...	4	<.010	<.020	.030	.36	.060	.040	.020	4.7	73	.01
28...	--	--	--	--	--	--	--	--	--	--	--
SEP											
09...	12	<.010	<.020	.060	.58	.230	.160	.170	7.0	53	.00
OCT											
14...	3	<.010	<.020	<.010	.33	.040	<.020	.020	1.9	56	.01
NOV											
18...	2	.014	.170	.070	.29	.050	.030	<.010	2.6	74	.02
DEC											
16...	2	.019	.560	.130	.40	.040	.030	.020	2.5	56	.05
JAN 1999											
13...	5	E.010	E.560	E.080	.38	.020	<.020	<.010	2.1	68	.02
MAR											
03...	48	E.010	.400	.080	.87	.210	.100	.120	10	93	.55
31...	23	<.010	.650	.060	.48	.110	.040	.040	6.8	50	.23
APR											
21...	4	<.010	.060	.050	.32	.040	.030	.020	3.4	93	.03
MAY											
11...	3	<.010	.030	.040	.40	.030	<.020	.020	3.4	71	.02
JUN											
22...	2	<.010	<.020	.050	.29	.030	<.020	<.010	5.4	40	.00
25...	23	E.010	.240	.050	.74	.140	.070	.060	10	72	.11
26...	110	E.010	.190	.130	1.0	.300	.080	.080	7.6	202	10
26...	20	<.010	.300	.050	.59	.150	.080	.080	8.6	41	.12

TABLE 1. Streamflow and water-quality data collected at stations near the Noxubee National Wildlife Refuge, east-central Mississippi--continued

02447394 HOLLIS CREEK NEAR STARKVILLE, MS

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	TEMPER-ATURE WATER (DEG C) (00010)	TUR-BID-ITY (NTU) (00076)	BARO-METRIC PRES-SURE (MM OF HG) (00025)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN DEMAND, BIO-CHEM-ICAL, 5 DAY (MG/L) (00310)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)	SULFIDE TOTAL (MG/L AS S) (00745)	SULFATE DIS-SOLVED (MG/L AS SO4) (00945)
JUL 1998												
22...	0830	3.7	430	7.4	27.0	<1.0	760	5.7	1.7	420	<1.0	19
28...	1005	--	--	--	--	--	--	--	1.1	K1200	--	--
SEP												
09...	0845	3.7	400	7.3	24.5	2.0	757	6.1	1.1	<2	<1.0	16
OCT												
14...	0815	3.1	419	7.3	20.5	1.9	760	7.1	2.0	K4	<1.0	17
NOV												
18...	0820	3.0	435	7.1	18.0	1.2	760	6.4	4.2	57000	<1.0	25
DEC												
16...	0845	5.1	448	7.5	13.5	3.9	763	7.2	2.9	630	<1.0	31
JAN 1999												
13...	0845	7.4	441	7.4	14.0	1.2	757	8.1	--	260	<1.0	35
MAR												
03...	0840	26	182	7.3	13.0	20	760	9.3	7.0	K1200000	<1.0	13
31...	0845	13	455	7.4	16.0	.91	760	7.3	6.6	K1300	<1.0	29
APR												
21...	0830	3.4	451	7.4	19.5	1.9	763	6.3	3.1	780	<1.0	28
MAY												
11...	1230	7.9	466	7.4	23.0	.83	763	6.2	2.3	42000	E1.0	28
JUN												
22...	1205	6.6	438	7.4	24.5	.96	767	6.5	1.1	K1500	<1.0	21
25...	2025	12	328	7.3	26.0	2.6	760	6.5	2.2	13000	<1.0	15
26...	0855	4.0	326	7.3	25.0	1.6	762	5.6	1.6	3800	<1.0	17
26...	1410	14	304	7.2	25.5	3.1	762	5.5	3.3	2600	<1.0	15

DATE	RESIDUE TOTAL AT 105 DEG. C, SUS-PENDED (MG/L) (00530)	NITRO-GEN, NITRITE TOTAL (MG/L AS N) (00615)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N) (00610)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	PHOS-PHORUS TOTAL (MG/L AS P) (00665)	PHOS-PHORUS DIS-SOLVED (MG/L AS P) (00666)	PHOS-PHORUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)	CARBON, ORGANIC TOTAL (MG/L AS C) (00680)	SEDI-MENT, SUS-PENDED (MG/L) (80154)	SEDI-MENT, DIS-CHARGE, SUS-PENDED (T/DAY) (80155)
JUL 1998											
22...	5	.070	13.0	.130	.94	1.90	1.80	1.80	3.8	53	.53
28...	--	--	--	--	--	--	--	--	--	--	--
SEP											
09...	6	.042	15.0	.080	.74	2.10	2.00	1.90	2.7	71	.71
OCT											
14...	7	.080	13.0	.150	1.1	2.20	2.10	2.00	2.4	70	.59
NOV											
18...	8	.950	15.0	1.50	2.4	2.30	2.20	2.10	4.0	45	.36
DEC											
16...	6	.170	6.30	2.40	3.4	1.40	1.30	1.20	5.2	53	.73
JAN 1999											
13...	11	E.028	7.70	E.760	1.3	1.30	1.20	1.10	3.6	51	1.0
MAR											
03...	47	E.032	1.70	.420	1.7	.570	.330	.340	12	78	5.5
31...	20	E.040	7.30	1.00	2.6	2.00	1.60	1.60	5.4	70	2.5
APR											
21...	17	E.080	13.0	.390	1.3	2.00	1.90	1.60	5.6	65	.60
MAY											
11...	7	.360	10.0	.200	.93	2.10	2.10	2.00	3.9	53	1.1
JUN											
22...	4	<.010	14.0	.110	.58	2.30	2.30	2.20	3.0	45	.80
25...	30	E.010	8.20	.130	1.0	1.60	1.60	1.40	3.5	63	2.0
26...	13	E.020	7.40	.180	.82	1.50	1.50	1.30	3.8	52	.56
26...	19	<.010	3.90	1.90	2.6	1.50	1.40	1.10	8.2	54	2.0

TABLE 1. Streamflow and water-quality data collected at stations near the Noxubee National Wildlife Refuge, east-central Mississippi--continued

02447397 HOLLIS CREEK NEAR OKTOC, MS

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	TEMPER-ATURE WATER (DEG C) (00010)	TUR-BID-ITY (NTU) (00076)	BARO-METRIC PRES-SURE (MM OF HG) (00025)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN DEMAND, BIO-CHEM-ICAL, 5 DAY (MG/L) (00310)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)	SULFIDE TOTAL (MG/L AS S) (00745)	SULFATE DIS-SOLVED (MG/L AS SO4) (00945)
JUL 1998												
22...	0930	6.3	408	8.1	26.5	<1.0	760	8.8	1.4	K69	<1.0	21
28...	1025	6.6	--	--	--	--	--	--	1.1	120	--	--
SEP												
09...	0930	6.6	400	7.8	23.0	2.4	757	8.4	1.1	<2	<1.0	15
OCT												
14...	0900	6.5	367	7.7	16.5	1.9	760	9.8	1.3	<2	<1.0	18
NOV												
18...	0930	7.2	365	7.6	14.0	.85	760	10.3	1.7	44	<1.0	29
DEC												
16...	0935	8.0	382	7.8	8.0	2.2	763	10.8	3.8	330	<1.0	32
JAN 1999												
13...	0940	13	345	7.8	11.0	4.7	757	10.6	--	170	<1.0	30
MAR												
03...	0950	269	128	7.3	12.0	25	760	9.3	4.9	570000	<1.0	9.6
31...	0940	14	388	7.8	14.0	1.1	760	9.7	2.3	470	<1.0	27
APR												
21...	0930	7.9	402	7.9	18.5	.96	763	9.4	1.7	290	<1.0	27
MAY												
11...	1115	6.8	417	8.3	21.5	1.8	763	11.0	1.9	120	<1.0	27
JUN												
22...	1045	4.7	442	8.5	24.0	2.6	767	11.7	1.4	76	<1.0	19
25...	1945	28	385	7.5	25.0	2.7	760	7.2	2.3	K710	<1.0	17
26...	0940	10	293	7.6	24.5	6.2	762	7.3	1.8	K690	<1.0	7.0
26...	1450	7.7	298	8.3	26.5	5.5	762	9.6	1.7	K550	<1.0	8.5

DATE	RESIDUE TOTAL AT 105 DEG. C, SUS-PENDED (MG/L) (00530)	NITRO-GEN, NITRITE TOTAL (MG/L AS N) (00615)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N) (00610)	NITRO-GEN,AM-MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	PHOS-PHORUS TOTAL (MG/L AS P) (00665)	PHOS-PHORUS DIS-SOLVED (MG/L AS P) (00666)	PHOS-PHORUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)	CARBON, ORGANIC TOTAL (MG/L AS C) (00680)	SEDI-MENT, SUS-PENDED (MG/L) (80154)	SEDI-MENT, DIS-CHARGE, SUS-PENDED (T/DAY) (80155)
JUL 1998											
22...	4	.039	10.0	.030	.84	1.50	1.50	1.50	4.7	56	.95
28...	--	--	--	--	--	--	--	--	--	--	--
SEP											
09...	3	.050	13.0	.040	.78	2.10	2.00	1.90	3.1	62	1.1
OCT											
14...	3	.044	16.0	.020	.68	2.40	2.30	2.30	3.0	57	1.0
NOV											
18...	1	.099	12.0	.090	.78	1.50	1.40	1.40	3.6	46	.89
DEC											
16...	6	.210	3.20	4.20	4.1	.970	.840	.810	5.5	50	1.1
JAN 1999											
13...	8	.020	E5.00	.450	1.1	.780	.720	.690	3.7	48	1.7
MAR											
03...	180	E.010	.580	.290	1.6	.460	.230	.110	12	252	183
31...	6	E.020	6.60	.090	.80	1.00	.940	.900	4.4	55	2.1
APR											
21...	5	E.040	9.00	.060	.98	1.10	1.10	1.00	5.3	54	1.2
MAY											
11...	4	<.010	9.90	.050	.84	1.40	1.40	1.10	4.1	46	.84
JUN											
22...	5	<.010	8.70	.070	.85	1.60	1.60	1.50	4.1	57	.72
25...	57	E.010	8.30	.100	1.1	1.80	1.70	1.40	5.6	97	7.3
26...	11	E.010	2.00	.120	.62	.630	.500	.460	5.8	50	1.4
26...	12	<.010	2.20	.100	.54	.640	.530	.500	5.5	43	.67

Codes have been assigned to qualify each determined value, if necessary. The remark codes given in this table are as follows:

< Actual value is known to be less than the value shown
E Estimated value
K Results based on colony count outside the acceptance range (non-ideal colony count).