Water-Quality Data and Estimated Loads of Selected Constituents in Five Tributaries to the Chesapeake Bay at the Fall Line, Virginia, July 1993 through June 1995

By Donna L. Belval and Jean P. Campbell

U.S. GEOLOGICAL SURVEY
Open-File Report 96-220

Prepared in cooperation with the

VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY,
CHESAPEAKE BAY AND COASTAL PROGRAMS

Richmond, Virginia

1996

U.S. DEPARTMENT OF THE INTERIOR
BRUCE BABBITT, Secretary

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CONVERSION FACTORS, WATER-QUALITY UNITS, AND VERTICAL DATUM

Multiply	By	To obtain
	Area	
square mile (mi^2)	259.0	hectare
square mile (mi^2)	2.590	square kilometer
	Volume	
gallon (gal)	3.785	liter
gallon (gal)	0.003785	cubic meter
cubic foot (ft^3)	0.028317	cubic meter
	Flow	
foot per second (ft/s)	0.3048	meter per second
cubic foot per second (ft^3/s)	0.02832	cubic meter per second
	Mass	
pound, avoirdupois (lb)	0.4536	kilogram
	Load	
pound per day (lb/d)	0.4536	kilogram per day (kg/d)

Water-quality units: Temperature in degree Celsius (°C) can be converted to degrees Fahrenheit (°F) by using the following equation:

$$°F = 1.8 \times (°C) + 32.$$

Chemical concentration is reported in milligrams per liter (mg/L) or micrograms per liter (µg/L). Milligrams per liter is a unit expressing the concentration of chemical constituents in solution as weight (milligrams) of solute per unit volume (liter) of water. One thousand micrograms per liter is equivalent to one milligram per liter. For concentrations less than 7,000 mg/L, the numerical value is the same as for concentrations in parts per million. Specific electrical conductance of water is reported in microsiemens per centimeter at 25 degrees Celsius (µS/cm).

Sea level: In this report, "sea level" refers to the National Geodetic Vertical Datum of 1929 (NGVD of 1929)—a geodetic datum derived from a general adjustment of the first-order level nets of both the United States and Canada, formerly called Sea Level Datum of 1929.

Water-Quality Data and Estimated Loads of Selected Constituents in Five Tributaries to the Chesapeake Bay at the Fall Line, Virginia, July 1993 through June 1995

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Abstract

Water-quality data were collected and loads of selected constituents were estimated as part of a U.S. Geological Survey study begun in 1988 in cooperation with the Virginia Department of Environmental Quality. The study was designed to characterize concentrations of nutrients, suspended solids, and other selected constituents in Virginia tributaries to Chesapeake Bay by sampling during base-flow and stormflow conditions. A log-linear-regression model, using constituent-concentration data and daily mean discharge as input variables, was used to estimate monthly constituent loads for each river. This report presents the concentration data, regression results, and estimated monthly loads for the period July 1, 1993 through June 30, 1995. Data collected during the period July 1, 1988 through June 30, 1995 were used to create the regression equation.

Water-quality data were collected at monitoring stations near the Fall Line of the James, Rappahannock, Appomattox, Pamunkey, and Mattaponi Rivers. Monthly loads were estimated for the following constituents: total nitrogen, total Kjeldahl nitrogen, dissolved ammonia nitrogen, dissolved nitrite-plus-nitrate nitrogen, total phosphorus, dissolved orthophosphorus, total suspended solids, total organic carbon, and dissolved silica.

INTRODUCTION

The Chesapeake Bay Program was established in 1978 to restore the water quality and the water-quality resources of the Bay. One of the critical areas of concern identified by the Chesapeake Bay Program was nutrient enrichment (U.S. Environmental Protection Agency, 1982) from nonpoint and point sources, such as agriculture, industrial and urban runoff, and industrial and septic waste-water discharges. Quantification of loads of nutrients and suspended solids entering the Bay are needed to help determine the effects of these constituents on the ecosystems of Chesapeake Bay and to assess the effectiveness of programs aimed at reducing them.

In 1988, the U.S. Geological Survey (USGS), in cooperation with the Virginia Department of Environmental Quality (DEQ), Chesapeake Bay and Coastal Programs, began a study to monitor nutrients and suspended solids in major rivers near the Fall Line in Virginia. The study was designed to characterize concentrations of water-quality constituents in five major rivers in Virginia by sampling during base-flow and stormflow conditions and to estimate nutrient and suspended solids loads using constituent concentrations and daily mean discharge.

Purpose and Scope

The purpose of this report is to present water-quality data, summary statistics, and load estimates of selected nutrients and suspended solids for five major tributaries to Chesapeake Bay in Virginia near the Fall Line. The Fall Line is geographically defined as the boundary between the Piedmont and Coastal Plain Physiographic Provinces, and it generally coincides

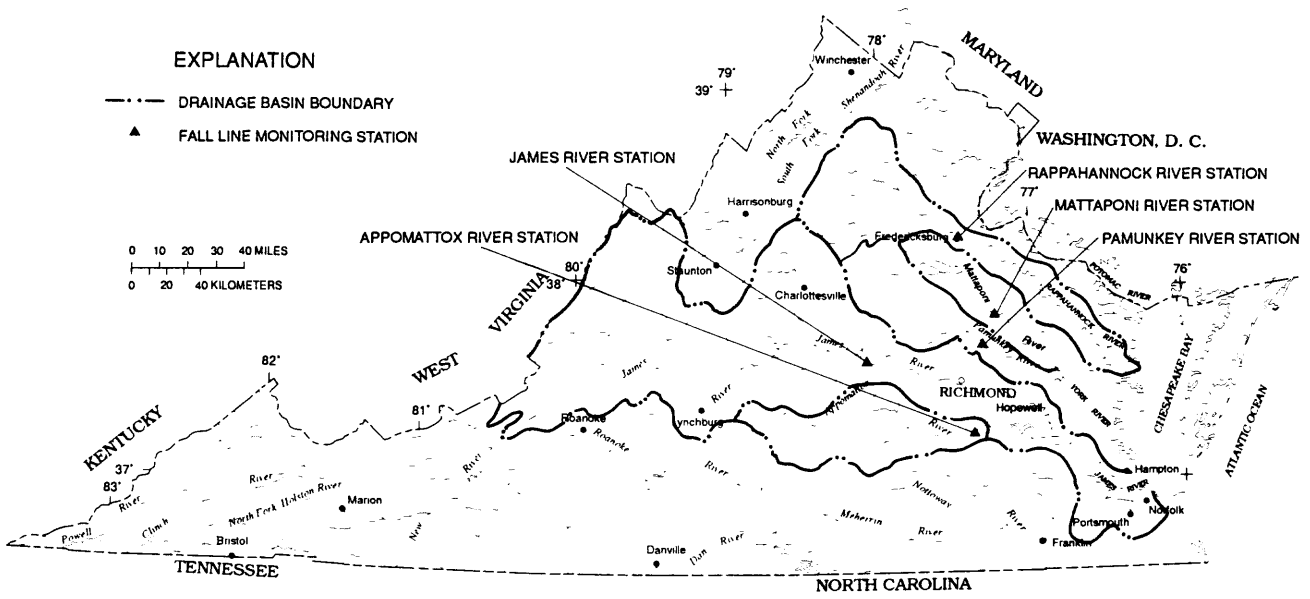

Figure 1. Location of Fall Line monitoring stations in the James, Rappahannock, Appomattox, Pamunkey, and Mattaponi River Basins, Virginia.

with the transitional area between the tidal and nontidal parts of each river. This report provides water-quality data and load estimates for selected nutrients, total suspended solids, and inorganic constituents collected by the USGS in cooperation with the Virginia DEQ.

The Fall Line monitoring stations are the James River at Cartersville, Va., the Rappahannock River near Fredericksburg, Va., the Appomattox River at Matoaca, Va., the Pamunkey River near Hanover, Va., and the Mattaponi River near Beulahville, Va. Water-quality data were collected during base-flow and stormflow conditions for the period July 1, 1993 through June 30, 1995. A seven-parameter log-linear-regression model (Cohn and others, 1992) was used to estimate constituent loads based on constituent-concentration data and daily mean discharge. Loads were computed for total nitrogen, total Kjeldahl nitrogen, dissolved ammonia nitrogen, dissolved nitrite-plus-nitrate nitrogen, total phosphorus, dissolved orthophosphorus, total suspended solids, total organic carbon, and dissolved silica.

Description of Study Area

Drainage basins and locations of the five rivers monitored for the Chesapeake Bay Fall Line Program are shown in figure 1. The station number, location, and drainage area for each basin are listed in table 1. The rivers are referred to throughout this report in decreasing order of basin area.

The total drainage area of all contributing basins in Virginia comprises about 25 percent of the total Chesapeake Bay drainage area. Of the basins monitored for this report, the James and Rappahannock River Basins represent approximately 16 and 4 percent of the total Chesapeake Bay drainage area; the Appomattox River Basin, part of the lower James River Basin, represents 2.5 percent; and the Pamunkey and Mattaponi River Basins represent about 2 and 1 percent of the total Chesapeake Bay drainage area, respectively.

Previous Studies

Belval and others (1994) describes methods used in field-data collection and load estimation, and presents preliminary load estimates of nutrients and suspended solids for the James and Rappahannock Rivers. Belval and others (1995) documents methods used in field-data collection and load estimation, characterizations of constituent concentrations, summary statistics, and loads for the period July 1988 through June 1993 for the James, Rappahannock, Appomattox, Pamunkey, and Mattaponi River monitoring stations. Field-data collection and load-estimation methods similar to those used in previous studies were used to obtain water-quality data presented in this report.

Table 1. Locations, drainage area, and period of data collection for the James, Rappahannock, Appomattox, Pamunkey, and Mattaponi River monitoring stations, Virginia

[mi^2, square miles; USGS, U.S. Geological Survey; VDEQ, Virginia Department of Environmental Quality]

USGS station number	VDEQ station number	Station name	Latitude	Longitude	Total drainage area (mi^2)	Drainage area above station (mi^2)	Data-collection period
02035000	TF-5.1	James River near Cartersville, Va.	37°40'15"	78°05'10"	10,206	6,257	7/88–6/95
01668000	TF-3.1	Rappahannock River near Fredericksburg, Va.	38°19'20"	77°31'05"	2,848	1,596	7/88–6/95
02041650	TF-5.3	Appomattox River at Matoaca, Va.	37°13'28"	77°28'32"	1,600	1,344	7/89–6/95
01673000	TF-4.1	Pamunkey River near Hanover, Va.	37°46'03"	77°19'57"	1,474	1,081	7/89–6/95
01674500	TF-4.3	Mattaponi River near Beulahville, Va.	38°03'42"	77°23'10"	911	601	10/89–6/95

Acknowledgments

The authors wish to acknowledge Frederick Hoffman and Mark Bushing of the Virginia Department of Environmental Quality, Chesapeake Bay and Coastal Programs, for their assistance and guidance of the program. Most analyses for this project were performed by the Virginia Division of Consolidated Laboratories, Bureau of Chemistry, specifically the Nutrients Laboratory and the Non-Metals Laboratory. We thank these people, and especially Norma Roadcap, for their quality work. Field-data collection was provided by numerous personnel from both the Virginia DEQ, Piedmont Field Office, and the USGS, Virginia District Office.

WATER-QUALITY DATA

Water-quality data were collected at five stations during base-flow and stormflow conditions. The sampling criteria used to determine stormflow-conditions are specific to each station and are based on the historical-flow record. The sampling criteria change depending on antecedent flow conditions. The sampling criteria are listed in the Fall Line Monitoring Program Quality Assurance Plan (FLQAP), on file at the USGS, District Office in Richmond, Va. Base-flow water-quality samples were collected on a twice-per-month scheduled basis, which most often occurred during base-flow conditions. Water-quality samples were collected once per month by Virginia DEQ personnel and once per month by USGS personnel at the James River at Cartersville, Va., the Pamunkey River near Hanover, Va., and the Mattaponi River near Beulahville, Va. Water-quality samples were also collected twice per month by USGS personnel at the Rappahannock River near Fredericksburg, Va., and the Appomattox River at Matoaca, Va. Only water-quality data that met the documented sampling criteria and sampling procedures were entered into the USGS data base.

Discharge data at each monitoring station were used to select appropriate sampling equipment as specified in the FLQAP. Depth-integrated, cross-sectional water-quality samples were collected using methods documented in Ward and Harr (1990), Edwards and Glysson (1988), Horowitz and others (1994), and the FLQAP. Field measurements for water temperature, pH, specific conductance, dissolved oxygen, barometric pressure, and air temperature were routinely made on days that nutrient and suspended solids samples were collected.

Water-quality samples were analyzed by the Virginia Division of Consolidated Laboratory Services (VDCLS) in Richmond, Va. Samples were collected, packed on ice and transported to VDCLS the same day when possible. Samples collected on weekends were refrigerated at 4°C and held until they could be accepted by VDCLS the following workday. Prior to January 1, 1994, samples were filtered and analyzed by VDCLS under criteria established by Clesceri, Greenberg, and Trussell (1989) and the U.S. Environmental Protection Agency (1983),

Environmental Monitoring and Support Laboratory. After January 1, 1994, samples were filtered in the field using protocols documented in Horowitz and others (1994). This change in field procedures and new instrumentation permitted VDCLS to analyze filtered constituents to a lower detection level. The results of the constituent analyses are listed in tables 2 through 6. Minimum, maximum, and median concentrations of selected water-quality constituents and values of selected field parameters for each river are summarized in table 7.

ESTIMATED LOADS OF SELECTED WATER-QUALITY CONSTITUENTS

Constituent loads were estimated using a seven-parameter log-linear-regression model that was documented by Cohn and others (1989, 1992) and Gilroy and others (1990). This model uses the Minimum Variance Unbiased Estimator of Bradu and Mundlak (1970) to correct for the retransformation bias associated with log-linear models. The Adjusted Maximum Likelihood Estimator (Cohn, 1988) was employed in the regression analyses to statistically address censored data (values below the analytical reporting limits) and multiple reporting limits within the data base.

The estimation of constituent loads was conducted in two steps (1) daily constituent concentrations were estimated by use of a multivariate log-linear model; and (2) constituent loads were computed as the product of discharge and the estimated constituent concentration. The regression equation used to estimate constituent concentrations is as follows (Cohn and others, 1992):

$$\ln[C] = \beta_0 + \beta_1(\ln[Q/\tilde{Q}]) + \beta_2(\ln[Q/\tilde{Q}])^2 + \beta_3[T-\tilde{T}] + \beta_4[T-\tilde{T}]^2 + \beta_5 \sin[2\pi T] + \beta_6 \cos[2\pi T] + \varepsilon \quad (1)$$

where

ln = the natural logarithm function,
C = the concentration (in mg/L),
Q = the instantaneous discharge (in ft^3/s),
T = time (in years),
sin = the sine function,
cos = the cosine function,
π = 3.14169,
β = coefficient of the regression model,
ε = model errors, and
$\tilde{Q}$ and $\tilde{T}$ = centering variables.

β_0 through β_6 are the coefficients of the regression model that were computed from the concentration data. The model errors (ε) are assumed to be independent and normally distributed with zero mean and variance (σ^2). "Centering variables" simplify the numerical work and have no effect on the load estimates. They are defined so that all predictor variables are statistically independent. This equation results in an estimate of daily constituent concentration.

Daily estimates of constituent concentrations are then multiplied by the daily mean discharge to produce a daily mean load using the following equation:

$$L_d = Q_d \times C_e \times K \quad (2)$$

where for any day (d)

L_d = the daily mean load (in kg/d),
Q_d = the daily mean discharge for that interval (in ft^3/s),
C_e = the estimated (e) daily concentration (in mg/L), and
K = 2.447, the correction factor for unit conversion.

The estimation procedure described above was used to estimate nutrient and suspended solids loads at the five rivers. Although the seven model variables for discharge, season, and time were included in each of the model runs for each constituent and river, not all variables were significant in describing the variability in constituent concentration data. Inclusion of non-significant parameters, however, does not adversely affect the load estimates. Loads for the period July 1993 through June 1995 were computed using water-quality data for the entire period of data collection.

Regression statistics used to predict concentrations for each constituent are presented by river in tables 8 through 12. Regression coefficients from the seven-parameter model also provide information on the relation between concentration and each of the model variables, which include discharge, time, and seasonality.

A variable that has a T value with an absolute value greater than 2 is considered to be significant at the 95-percent confidence level for that constituent (which approximately corresponds to a p-value

of 0.05). This means that there is only a 5-percent probability of incorrectly rejecting the null hypothesis of no relation between that variable for that constituent and the concentration. The r^2, or coefficient of determination, is the percentage of the variance in the data set that is explained by the regression equation. For example, an r^2 of 0.74 indicates that approximately 74 percent of the variance is explained by the variables in the equation. The remaining 26 percent is assumed to be natural variability in the river system. Further explanation of the statistics and results of the model are found in Belval and others (1995). For each regression analysis, residuals were examined to identify any pattern that would be indicative of variability in the data set that is not explained by the seven model variables. No pattern was observed for the constituents monitored.

On the basis of the regression equations, loads were computed for the period July 1993 through June 1995. The minimum, median, and maximum monthly loads for each of the five stations are summarized in table 13. The monthly average of the daily mean loads that were computed using the regression equation is also known as the mean daily load. The mean daily load, the standard error of regression, the standard error of prediction, and the total monthly load for each of the rivers are listed in tables 14 through 58. The standard error of regression is the standard error of the regression analysis, indicating how close the estimated regression model is to the true regression model. On the basis of a comparison of true-load values and predicted-load values, the standard error of prediction is a measure of the ability of the model to predict the true load (Maryland Department of the Environment, 1995).

DATA MANAGEMENT

Field-collection data were recorded on laboratory request forms that were submitted with samples to VDCLS, and on site-specific field forms that served as the record of sampling for the USGS, Virginia District Office. Field data were validated by field and project personnel. Analytical results from VDCLS were forwarded to the Virginia DEQ, Chesapeake Bay and Coastal Programs, where the water-quality data were entered into STORET (Water-Quality Storage and Retrieval System), the repository data base for the U.S. Environmental Protection Agency. Water-quality data were then forwarded to the USGS, Virginia District Office. Water-quality data were reviewed and verified by project and laboratory personnel, then entered into the USGS Quality of Water Data Base (QWDATA). Discharge records from each of the monitoring stations were entered into the USGS Automated Data Processing System (ADAPS). QWDATA and ADAPS are storage and retrieval systems that are part of the USGS National Water Information System (NWIS).

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TABLES

Table 2. Selected chemical and physical water-quality characteristics of the James River monitoring station, Virginia

[°C, degrees Celsius; 00010, parameter code; mmHg, millimeters of mercury; ft^3/s, cubic foot per second; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; <, less than; --, no data]

Date	Temperature, water (°C) (00010)	Temperature, air (°C) (00020)	Barometric pressure (mmHg) (00025)	Discharge (ft^3/s) (00061)	Specific conductance (µS/cm) (00095)	Oxygen, dissolved (mg/L) (00300)	pH (00400)	Nitrogen, ammonia + organic, total (mg/L, as N) (00625)	Nitrogen, ammonia, dissolved (mg/L, as N) (00608)
07-06-93	30.0	29.0	762	3,340	225	7.1	7.8	0.40	0.040
07-07-93	32.0	--	--	2,720	197	7.5	7.8	.50	.050
07-22-93	29.0	23.0	762	2,000	195	7.2	8.0	.30	<.040
08-04-93	29.0	--	--	1,360	288	8.6	8.1	.60	.040
08-30-93	30.5	30.0	763	1,270	265	7.3	8.7	.20	<.040
09-02-93	31.5	--	--	1,520	352	8.6	8.8	.20	<.040
09-29-93	19.0	17.0	764	1,720	290	9.5	8.3	.20	<.040
10-05-93	19.5	--	--	1,520	--	10.4	9.1	.40	<.040
10-27-93	14.0	14.0	759	1,100	288	9.2	7.2	.20	<.040
11-17-93	15.5	--	--	1,530	330	9.1	7.7	.20	<.040
11-28-93	12.0	16.0	754	64,200	66	9.5	7.2	1.2	<.040
11-29-93	10.5	7.0	761	38,100	68	9.2	7.1	1.1	<.040
11-30-93	7.0	6.5	776	15,300	114	10.4	6.7	.80	<.040
12-02-93	9.5	5.5	773	7,530	222	11.8	7.2	.30	<.040
12-06-93	9.5	12.5	757	45,200	97	10.8	7.4	1.2	.060
12-09-93	8.0	4.0	766	11,300	86	11.4	7.5	.20	<.040
01-05-94	2.0	2.0	761	9,070	135	13.6	7.7	.20	.070
01-26-94	2.5	8.0	768	7,900	151	13.9	6.8	.30	.037
01-29-94	4.0	3.0	762	40,200	116	13.0	7.1	1.0	.075
01-31-94	4.5	.0	765	28,400	105	12.8	7.6	.60	.061
02-02-94	3.5	.0	766	15,300	110	14.4	7.8	.30	.031
02-03-94	3.5	6.0	763	13,200	117	13.2	7.5	.20	.023
02-15-94	1.0	3.5	767	21,100	112	14.1	7.8	.20	.034
02-16-94	3.0	10.0	761	20,600	114	12.0	7.8	.30	.025
02-17-94	5.0	11.0	773	22,100	119	13.1	7.8	.30	.022
02-19-94	3.5	3.0	774	19,400	126	12.0	7.7	.10	.011
02-24-94	6.0	6.0	750	51,500	76	10.6	8.0	.70	.015
02-26-94	7.0	4.0	762	36,300	97	11.6	7.6	.40	.016
02-28-94	4.0	.0	773	22,400	107	12.4	7.4	.30	.014
03-03-94	.0	5.0	745	43,700	74	12.7	6.7	.60	.025
03-05-94	3.0	13.0	757	31,000	85	11.6	7.9	.30	.010
03-10-94	8.0	3.5	755	29,800	111	11.6	7.7	.30	.020
03-12-94	7.0	4.0	775	30,800	105	12.0	7.6	.40	.014
03-15-94	8.5	16.0	752	18,800	112	11.4	7.7	.20	.017
03-28-94	8.0	13.5	755	43,500	70	11.1	7.2	.90	.014
03-29-94	10.0	7.0	760	81,500	80	10.0	7.2	.90	.014
04-01-94	10.0	5.5	754	36,300	94	10.2	6.3	.40	.014
04-02-94	7.5	15.5	766	28,800	103	12.2	7.1	.30	--
04-05-94	12.5	11.5	761	16,200	118	10.5	8.0	.30	.007
04-27-94	21.0	26.0	761	6,130	148	9.2	8.0	.20	.005
05-17-94	19.0	13.0	754	6,230	133	7.2	6.8	.20	<.004
05-23-94	22.0	--	--	4,200	161	11.2	8.7	--	.025
06-09-94	26.0	--	--	2,890	217	9.0	8.3	--	.017
06-29-94	27.5	26.0	756	3,340	203	6.8	7.9	.40	.020
07-07-94	32.5	--	--	2,080	245	7.9	8.4	--	.035
07-27-94	26.0	23.0	752	5,820	177	5.2	7.5	1.0	.052
08-11-94	29.5	--	--	2,010	212	8.3	8.7	--	.017
08-29-94	27.0	24.0	758	3,640	149	7.9	7.9	.20	.008
09-08-94	24.5	--	--	2,240	232	9.0	8.9	--	.026
09-28-94	21.5	22.5	756	4,490	216	7.7	7.6	.40	.022

Table 2. —Continued

Date	Nitrogen, nitrate, dissolved (mg/L, as N) (00618)	Nitrogen, nitrite, dissolved (mg/L, as N) (00613)	Nitrogen, NO_2+NO_3, dissolved (mg/L, as N) (00631)	Phosphorus, total (mg/L, as P) (00665)	Phosphorus, ortho, dissolved (mg/L, as P) (00671)	Residue, total at 105°C, suspended (mg/L) (00530)	Carbon, organic, total (mg/L, as C (00680)	Silica, dissolved (mg/L, as SiO_2) (00955)
07-06-93	0.330	0.010	0.340	0.080	0.050	5	4.0	8.3
07-07-93	.330	.010	.340	.070	.050	4	4.6	8.8
07-22-93	.080	<.010	.080	.130	100	4	3.0	9.0
08-04-93	.050	<.010	.050	.130	.110	4	4.8	8.0
08-30-93	<.040	<.010	<.040	.090	.080	<3	4.2	6.0
09-02-93	.210	<.010	.210	.120	.070	<3	4.1	5.5
09-29-93	.210	<.010	.210	.120	.090	<3	3.9	5.0
10-05-93	<.040	<.010	<.040	.160	.130	<3	5.2	3.0
10-27-93	<.040	<.010	<.040	.110	.090	<3	3.4	3.7
11-17-93	<.040	.010	<.040	.100	.090	7	4.4	5.2
11-28-93	.180	<.010	.180	.390	.020	278	14	3.8
11-29-93	.250	<.010	.250	.340	.020	152	12	5.5
11-30-93	.340	<.010	.340	.440	.020	89	9.7	5.0
12-02-93	.220	<.010	.220	.100	.030	30	7.8	6.2
12-06-93	.370	.010	.380	.420	.020	323	11	6.6
12-09-93	.320	.010	.330	.060	.020	59	7.4	7.3
01-05-94	.320	<.010	.320	.050	.040	46	4.8	9.1
01-26-94	.447	.003	.450	.100	.060	19	2.9	8.1
01-29-94	.378	.005	.383	.470	.029	372	7.7	6.4
01-31-94	.278	.003	.281	.340	.027	117	5.4	6.4
02-02-94	.351	.003	.354	.160	.020	37	2.9	7.2
02-03-94	.300	.003	.303	.070	.019	23	2.0	6.7
02-15-94	.374	.002	.376	.070	.031	28	3.5	7.8
02-16-94	.363	.003	.366	.090	.034	34	3.3	7.3
02-17-94	.332	.003	.335	.110	.060	25	2.8	7.3
02-19-94	.308	.002	.310	.060	.015	31	1.9	7.8
02-24-94	.259	.003	.262	.320	.014	238	7.6	6.5
02-26-94	.302	.003	.305	.130	.023	104	3.8	6.6
02-28-94	.365	.002	.367	.070	.019	35	--	7.1
03-03-94	.269	.003	.272	.190	.033	176	5.0	5.8
03-05-94	.333	.004	.337	.110	.019	57	3.6	7.0
03-10-94	.339	.002	.341	.070	.030	34	3.7	6.7
03-12-94	.357	<.002	.357	.070	.026	35	2.4	7.3
03-15-94	.341	.002	.343	.070	.024	19	2.6	7.7
03-28-94	.189	.004	.193	.290	.036	344	7.9	6.2
03-29-94	.220	.005	.225	.430	.048	248	7.6	5.7
04-01-94	.270	.002	.272	.140	.024	67	3.4	7.2
04-02-94	.307	.002	.309	.080	.018	48	6.0	7.3
04-05-94	.337	.003	.340	.070	.022	26	2.2	7.5
04-27-94	.077	<.002	.077	.040	.020	8	2.0	6.0
05-17-94	.191	.003	.194	.070	.040	--	--	6.8
05-23-94	.025	.004	.029	--	.010	9	3.9	6.5
06-09-94	.036	.005	.041	--	.011	6	3.2	4.5
06-29-94	.360	.008	.368	.090	.062	11	3.7	8.6
07-07-94	.082	<.002	.082	--	.099	--	4.9	7.1
07-27-94	.533	.007	.540	.400	.056	181	4.6	7.2
08-11-94	.123	.002	.125	--	.050	<3	4.1	6.9
08-29-94	.204	<.002	.204	.070	.049	6	--	8.4
09-08-94	.120	<.002	.120	--	.053	<3	--	5.7
09-28-94	.197	.003	.200	.080	.048	17	--	7.1

Table 2. Selected chemical and physical water-quality characteristics of the James River monitoring station, Virginia—Continued

[°C, degrees Celsius; 00010, parameter code; mmHg, millimeters of mercury; ft^3/s, cubic foot per second; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; <, less than; --, no data]

Date	Temperature, water (°C) (00010)	Temperature, air (°C) (00020)	Barometric pressure (mmHg) (00025)	Discharge (ft^3/s) (00061)	Specific conductance (µS/cm) (00095)	Oxygen, dissolved (mg/L) (00300)	pH (00400)	Nitrogen, ammonia + organic, total (mg/L, as N) (00625)	Nitrogen, ammonia, dissolved (mg/L, as N) (00608)
10-17-94	--	--	--	1,980	--	--	--	--	0.021
10-26-94	14.0	9.5	764	2,120	285	9.4	7.4	.20	.010
11-29-94	7.0	4.5	764	2,380	242	12.0	7.0	.20	.014
11-30-94	8.0	--	--	2,390	278	12.2	8.0	--	.036
12-28-94	5.5	0.0	761	2,070	223	12.8	6.9	.10	<.004
01-17-95	10.0	9.0	757	82,000	102	9.8	7.8	1.3	.046
01-19-95	9.0	7.0	763	19,100	242	9.9	7.4	.60	.028
02-01-95	3.0	6.0	755	5,240	146	13.4	6.6	.10	.054
02-22-95	6.0	3.5	763	8,740	212	12.2	7.7	.10	.030
03-10-95	8.0	2.0	775	14,100	101	11.0	6.5	.40	.021
03-11-95	7.0	16.5	771	13,800	141	11.5	6.8	.30	.033
03-12-95	8.0	14.0	773	12,100	152	11.1	6.8	.30	.028
04-04-95	14.0	16.0	756	3,640	178	10.4	7.1	.80	.015
04-18-95	15.5	--	--	2,840	223	10.3	7.9	--	.023
04-24-95	17.0	9.0	753	2,770	211	9.3	7.1	.20	.018
05-03-95	15.0	12.0	762	8,060	179	9.4	7.0	.40	.034
05-12-95	21.0	22.0	756	11,900	127	8.2	7.0	.50	.070
05-22-95	23.0	20.5	764	6,700	152	8.6	7.1	.30	.018
06-14-95	22.0	25.0	754	20,400	194	7.3	7.1	.70	.041
06-15-95	19.5	22.0	767	13,900	182	7.8	7.4	.50	.056
06-23-95	25.0	26.0	760	11,000	106	7.7	6.8	.60	.028
06-24-95	22.0	23.0	759	54,200	104	7.7	7.0	1.7	.049
06-25-95	21.5	26.0	758	40,600	158	7.7	7.6	1.2	.025
06-28-95	23.0	23.0	764	44,200	84	7.7	7.0	.80	.032
06-29-95	20.0	22.0	763	70,700	120	8.7	6.9	.60	.038
06-30-95	24.0	24.5	756	80,000	115	8.5	7.1	.90	.020

Table 2.—Continued

Date	Nitrogen, nitrate, dissolved (mg/L, as N) (00618)	Nitrogen, nitrite, dissolved (mg/L, as N) (00613)	Nitrogen, NO_2+NO_3, dissolved (mg/L, as N) (00631)	Phosphorus, total (mg/L, as P) (00665)	Phosphorus, ortho, dissolved (mg/L, as P) (00671)	Residue, total at 105°C, suspended (mg/L) (00530)	Carbon, organic, total (mg/L, as C (00680)	Silica, dissolved (mg/L, as SiO_2) (00955)
10-17-94	0.230	0.002	0.232	--	0.172	12	--	5.5
10-26-94	.110	<.002	.110	.100	.096	<3	--	6.0
11-29-94	.146	.003	.149	.090	.083	<3	--	7.6
11-30-94	.080	<.002	.080	-	.087	<3	--	5.1
12-28-94	.091	<.002	.091	.090	.082	<3	--	4.9
01-17-95	.272	.005	.277	.410	.030	358	--	5.9
01-19-95	.376	.003	.379	.130	.028	79	--	7.5
02-01-95	.397	.004	.401	.070	.050	4	--	10
02-22-95	.291	.004	.295	.210	.196	14	--	6.8
03-10-95	.182	.004	.186	.100	.020	84	--	7.7
03-11-95	.228	.003	.231	.060	.026	41	--	7.1
03-12-95	.173	.003	.176	.100	.054	24	--	6.6
04-04-95	.049	.002	.051	.110	.107	3	--	3.7
04-18-95	.120	.005	.125	--	.150	3	--	3.2
04-24-95	.200	.007	.207	.140	.141	3	--	3.8
05-03-95	.247	.005	.252	.140	.084	32	--	8.4
05-12-95	.257	.009	.266	.160	.072	52	--	7.6
05-22-95	.251	.008	.259	.120	.081	13	--	7.8
06-14-95	.244	.014	.258	.370	.090	166	--	7.2
06-15-95	.315	.010	.325	.210	.095	70	--	8.4
06-23-95	.325	.006	.331	.240	.037	125	--	8.6
06-24-95	.208	.008	.216	1.10	.032	632	--	5.4
06-25-95	.250	.005	.255	.500	.047	417	--	6.0
06-28-95	.231	.005	.236	.320	.023	127	--	7.0
06-29-95	.280	.005	.285	.100	.041	428	--	7.5
06-30-95	.272	.004	.276	.470	.034	291	--	7.3

Table 3. Selected chemical and physical water-quality characteristics of the Rappahannock River monitoring station, Virginia

[°C, degrees Celsius; 00010, parameter code; mmHg, millimeters of mercury; ft^3/s, cubic foot per second; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; <, less than; --, no data]

Date	Temperature, water (°C) (00010)	Temperature, air (°C) (00020)	Barometric pressure (mmHg) (00025)	Discharge (ft^3/s) (00061)	Specific conductance (µS/cm) (00095)	Oxygen, dissolved (mg/L) (00300)	pH (00400)	Nitrogen, ammonia + organic, total (mg/L, as N) (00625)	Nitrogen, ammonia, dissolved (mg/L, as N) (00608)
07-16-93	27.0	23.0	766	357	78	6.3	7.2	0.30	0.060
07-23-93	26.0	22.0	767	403	88	7.3	7.5	.30	<.040
08-13-93	26.0	25.0	761	310	73	6.4	7.4	.30	<.040
08-23-93	23.0	25.0	765	228	85	6.1	7.1	.30	<.040
09-14-93	22.5	21.0	768	159	85	6.8	6.3	.30	<.040
09-27-93	21.5	22.0	760	247	87	8.2	7.4	.20	<.040
10-13-93	13.5	9.0	764	195	85	8.9	7.0	.20	<.040
10-27-93	13.5	16.0	759	243	115	8.9	6.7	.20	<.040
11-09-93	6.0	2.0	776	291	98	12.3	7.3	.20	<.040
11-23-93	6.0	2.0	773	326	98	12.2	7.8	.20	<.040
11-30-93	8.0	.5	775	4,890	68	12.0	7.5	.60	.040
12-01-93	6.0	5.0	778	3,070	67	11.9	6.7	.40	<.040
12-07-93	8.0	11.0	762	5,070	66	10.8	7.7	.50	<.040
12-22-93	3.5	.0	759	2,890	85	12.7	6.8	.30	<.040
01-04-94	.5	2.0	744	1,480	82	13.6	7.6	--	<.040
02-01-94	2.5	.0	770	3,350	66	13.8	7.5	.30	.031
03-16-94	8.0	6.0	755	3,980	64	11.2	7.5	.30	.005
04-01-94	10.0	16.0	767	6,590	62	--	7.1	.40	.007
04-28-94	21.0	23.0	771	1,530	71	9.0	7.7	.20	.006
05-10-94	15.0	15.0	760	1,750	71	9.0	6.7	.50	.012
05-23-94	19.5	21.0	760	826	70	8.4	7.9	.30	.018
06-17-94	27.5	28.0	769	421	87	7.7	7.7	.30	.049
06-27-94	26.0	25.5	758	421	85	6.8	7.5	.30	.023
07-08-94	29.5	27.0	767	344	81	6.5	7.6	.30	.008
07-20-94	27.0	24.0	769	1,830	78	6.8	7.2	1.3	.116
07-29-94	22.0	23.0	760	7,760	69	7.4	6.7	.80	.041
08-08-94	23.0	19.0	770	643	87	8.8	7.3	.40	.021
08-23-94	22.0	19.0	770	2,590	65	8.3	7.0	.40	.037
09-07-94	20.5	24.0	764	490	83	8.6	8.1	.20	.013
09-21-94	19.0	16.0	770	374	87	8.7	7.4	.30	.006
10-05-94	15.0	13.0	766	399	89	9.6	7.1	.20	.008
10-18-94	12.0	11.0	768	374	97	9.9	7.1	.20	.007
11-02-94	11.5	12.0	764	410	97	10.4	7.0	.20	.005
11-22-94	10.0	11.5	767	566	89	10.8	7.0	.20	.005
12-09-94	7.0	5.5	774	1,020	84	11.0	7.2	.40	.015
12-22-94	4.0	2.0	772	775	85	12.6	7.0	<.10	.005
01-09-95	3.0	4.0	768	2,140	86	14.0	7.3	.80	.119
01-17-95	10.0	8.0	766	6,380	61	11.0	6.8	.90	.028
01-18-95	8.5	11.0	766	3,910	65	10.2	7.4	.50	.024
02-02-95	3.0	6.0	757	1,470	81	12.8	6.6	<.10	.004
02-16-95	1.0	5.0	765	1,020	78	14.3	7.1	.10	.014
03-10-95	5.0	1.5	--	5,220	70	--	7.0	1.4	.078
03-11-95	5.0	4.0	776	3,130	74	12.8	7.0	.60	.030
03-12-95	6.0	3.0	777	2,460	76	12.6	7.1	.30	.019
03-13-95	7.0	14.0	773	2,090	77	11.8	7.1	.30	.016
03-29-95	10.5	15.0	763	944	78	10.1	7.0	.20	.019
04-14-95	13.0	9.0	762	1,540	82	9.1	6.7	.30	.009
04-21-95	17.5	17.0	762	826	74	8.6	6.8	<.10	.014
05-03-95	13.5	15.5	761	1,380	80	9.8	7.5	.20	.022
05-15-95	19.0	20.0	761	1,930	74	8.8	7.6	.40	.055
05-18-95	20.0	22.0	757	1,050	74	8.5	6.4	.40	.054

Table 3.—Continued

Date	Nitrogen, nitrate, dissolved (mg/L, as N) (00618)	Nitrogen, nitrite, dissolved (mg/L, as N) (00613)	Nitrogen, NO_2+NO_3, dissolved (mg/L, as N) (00631)	Phosphorus, total (mg/L, as P) (00665)	Phosphorus, ortho, dissolved (mg/L, as P) (00671)	Residue, total at 105°C, suspended (mg/L) (00530)	Carbon, organic, total (mg/L, as C (00680)	Silica, dissolved (mg/L, as SiO_2) (00955)
07-16-93	0.080	<0.010	0.080	0.020	<0.010	<3	3.2	10
07-23-93	.060	<.010	.060	.020	.020	<3	2.8	8.8
08-13-93	.280	<.010	.280	.040	.020	<3	4.2	8.3
08-23-93	<.040	<.010	<.040	.030	.010	<3	2.3	6.6
09-14-93	<.040	<.010	<.040	.020	<.010	<3	3.3	7.1
09-27-93	<.040	<.010	<.040	.020	.010	<3	--	6.5
10-13-93	<.040	<.010	<.040	.020	<.010	<3	2.2	4.3
10-27-93	<.040	<.010	<.040	.030	<.010	<3	2.8	6.8
11-09-93	<.040	<.010	<.040	.020	.010	<3	1.8	8.2
11-23-93	<.040	<.010	<.040	.010	<.010	<3	3.0	6.2
11-30-93	.910	<.010	.910	.200	.020	76	5.9	8.5
12-01-93	.900	<.010	.900	.100	.020	30	4.0	9.4
12-07-93	.720	.010	.730	.160	.030	50	6.4	9.2
12-22-93	.840	<.010	.840	.050	.020	22	3.8	12
01-04-94	.950	<.010	.950	--	.020	6	4.2	6.5
02-01-94	.764	.003	.767	.060	014	35	3.4	10
03-16-94	.710	.002	.712	.060	.009	--	2.1	10
04-01-94	.622	.002	.624	.090	.013	46	2.6	10
04-28-94	.259	.002	.261	.020	.003	<3	2.5	8.0
05-10-94	.476	.003	.479	.080	.006	48	3.7	11
05-23-94	.313	.003	.316	.030	.005	16	7.2	9.6
06-17-94	.450	.005	.455	.010	.002	<3	3.3	8.7
06-27-94	.498	.005	.503	.030	.007	<3	2.8	8.9
07-08-94	.372	.005	.377	.040	.003	<3	2.8	9.0
07-20-94	.724	.017	.741	.180	.035	83	6.6	8.9
07-29-94	.547	.008	.555	.100	.047	174	11	9.3
08-08-94	.516	.003	.519	.040	.021	33	2.5	13
08-23-94	.469	.003	.472	.070	.025	88	--	11
09-07-94	.091	<.002	.091	.010	.009	<3	--	11
09-21-94	.005	<.002	.005	.020	.004	<3	--	8.3
10-05-94	.173	.002	.175	.030	.009	<3	--	12
10-18-94	<.004	<.002	<.004	.020	.004	<3	--	9.2
11-02-94	<.004	<.002	<.004	.020	.003	<3	--	8.6
11-22-94	.038	.002	.040	.030	.004	5	--	6.9
12-09-94	.455	.003	.458	.050	.014	5	--	13
12-22-94	.483	.003	.486	.010	.007	<3	--	12
01-09-95	.602	.004	.606	.120	.031	28	--	6.5
01-17-95	.572	.003	.575	.240	.023	134	--	9.6
01-18-95	.607	.002	.609	.120	.017	32	--	10
02-02-95	.710	.004	.714	.020	.009	3	--	12
02-16-95	.729	.003	.732	.040	.014	3	--	18
03-10-95	.552	.005	.557	.490	.031	251	--	9.0
03-11-95	.631	.003	.634	.150	.021	61	--	11
03-12-95	.640	.003	.643	.080	.017	28	--	12
03-13-95	.634	.004	.638	.070	.016	19	--	12
03-29-95	.416	.003	.419	.020	.008	<3	--	12
04-14-95	.289	.002	.291	.040	.009	6	--	8.7
04-21-95	.159	.002	.161	.030	.008	<3	--	7.6
05-03-95	.290	.002	.292	.050	.009	7	--	9.2
05-15-95	.346	.003	.349	.060	.019	21	--	11
05-18-95	.389	.005	.394	.050	.021	9	--	12

Table 3. Selected chemical and physical water-quality characteristics of the Rappahannock River monitoring station, Virginia—Continued

[°C, degrees Celsius; 00010, parameter code; mmHg, millimeters of mercury; ft^3/s, cubic foot per second; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; <, less than; --, no data]

Date	Temperature, water (°C) (00010)	Temperature, air (°C) (00020)	Barometric pressure (mmHg) (00025)	Discharge (ft^3/s) (00061)	Specific conductance (µS/cm) (00095)	Oxygen, dissolved (mg/L) (00300)	pH (00400)	Nitrogen, ammonia + organic, total (mg/L, as N) (00625)	Nitrogen, ammonia, dissolved (mg/L, as N) (00608)
06-07-95	23.0	25.0	756	680	159	8.0	7.4	0.40	0.027
06-22-95	26.5	24.0	767	443	81	6.6	6.9	.20	.046
06-26-95	24.0	27.0	764	2,610	81	7.4	6.7	.60	.042
06-27-95	19.0	22.0	769	10,800	149	7.4	6.8	2.2	.060
06-28-95	22.0	26.0	764	44,900	42	8.4	6.5	2.5	.068
06-30-95	17.0	27.5	--	16,800	58	--	6.3	1.4	.014

Table 3.—Continued

Date	Nitrogen, nitrate, dissolved (mg/L, as N) (00618)	Nitrogen, nitrite, dissolved (mg/L, as N) (00613)	Nitrogen, NO_2+NO_3, dissolved (mg/L, as N) (00631)	Phosphorus, total (mg/L, as P) (00665)	Phosphorus, ortho, dissolved (mg/L, as P) (00671)	Residue, total at 105°C, suspended (mg/L) (00530)	Carbon, organic, total (mg/L, as C (00680)	Silica, dissolved (mg/L, as SiO_2) (00955)
06-07-95	0.526	0.006	0.532	0.050	0.022	4	--	11
06-22-95	.121	.002	.123	.030	.018	<3	--	7.6
06-26-95	.592	.008	.600	.140	.032	63	--	12
06-27-95	.385	.008	.393	.700	.026	550	--	8.2
06-28-95	.395	.008	.403	1.50	.022	698	--	4.6
06-30-95	.413	.004	.417	1.10	.029	505	--	10

Table 4. Selected chemical and physical water-quality characteristics of the Appomattox River monitoring station, Virginia

[°C, degrees Celsius; 00010, parameter code; mmHg, millimeters of mercury; ft^3/s, cubic foot per second; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; --, no data]

Date	Temperature, water (°C) (00010)	Temperature, air (°C) (00020)	Barometric pressure (mmHg) (00025)	Discharge (ft^3/s) (00061)	Specific conductance (µS/cm) (00095)	Oxygen, dissolved (mg/L) (00300)	pH (00400)	Nitrogen, ammonia + organic, total (mg/L, as N) (00625)	Nitrogen, ammonia, dissolved (mg/L, as N) (00608)
07-15-93	30.0	29.5	760	135	93	5.8	7.1	0.40	0.050
07-22-93	29.0	32.0	766	128	88	7.2	7.5	.30	<.040
08-12-93	26.0	28.0	763	235	90	6.5	7.2	.30	<.040
08-31-93	26.0	22.0	765	26	113	4.3	6.9	.30	<.040
09-14-93	22.0	29.0	771	65	101	8.2	7.2	.40	<.040
09-27-93	25.5	29.5	756	86	94	8.6	7.1	.30	<.040
10-12-93	15.5	15.5	759	59	113	6.3	6.7	.70	.120
10-25-93	14.0	10.0	767	107	99	9.4	7.2	.30	<.040
11-08-93	12.0	8.0	776	205	100	11.1	7.9	.40	.070
11-23-93	11.0	4.0	767	244	100	10.4	6.4	.20	<.040
11-29-93	12.0	9.0	768	4,420	98	10.8	7.6	.50	.080
11-30-93	9.0	5.5	772	6,440	110	12.0	8.1	.30	.040
12-01-93	9.0	4.0	780	7,530	80	11.0	7.0	.70	<.040
12-02-93	10.0	9.0	776	9,530	61	11.0	7.2	.90	<.040
12-04-93	8.5	10.5	766	10,400	47	12.3	6.8	.70	.060
12-07-93	9.0	9.0	770	5,440	57	11.1	7.2	.50	.040
12-09-93	10.0	14.0	770	5,830	59	11.5	7.5	.60	.060
12-10-93	9.0	12.0	761	6,020	55	11.5	7.1	.60	<.040
12-11-93	9.0	8.0	755	5,440	54	11.7	7.1	.60	<.040
12-20-93	6.0	1.0	766	1,460	63	12.4	7.3	.50	.070
01-06-94	3.0	9.0	767	3,390	71	13.6	7.4	.30	.060
01-25-94	2.5	4.5	765	1,120	76	13.9	6.1	.30	.028
01-31-94	2.0	2.0	768	3,510	82	14.0	7.5	.30	.029
02-01-94	1.0	4.0	769	2,520	79	14.2	5.6	.50	.023
02-09-94	3.5	9.0	756	1,100	76	13.2	7.0	.40	.037
02-15-94	2.0	11.5	720	5,010	--	--	--	.20	.021
02-17-94	3.0	13.0	775	5,320	69	13.8	7.4	.40	.027
02-19-94	2.0	12.0	777	4,340	67	13.6	7.5	.30	.016
02-23-94	6.0	4.0	763	2,170	65	12.4	7.4	.30	.019
02-24-94	8.0	15.0	755	5,810	64	11.6	7.4	.30	.007
02-26-94	8.0	7.0	763	7,600	64	12.2	7.2	.40	.007
02-28-94	6.0	7.0	774	5,980	57	12.5	7.3	.50	.005
03-03-94	3.0	7.0	747	10,500	59	12.8	6.7	.40	--
03-04-94	4.5	12.0	753	11,600	50	13.5	7.1	.40	.014
03-05-94	4.5	1.5	760	11,900	45	13.2	7.0	.50	.016
03-10-94	9.5	10.5	757	5,060	48	11.8	7.2	.50	.005
03-12-94	7.0	5.0	780	5,130	56	12.0	6.9	.20	.010
03-14-94	9.0	11.0	761	4,520	57	11.6	7.2	.40	.014
03-21-94	10.0	9.0	760	1,030	60	11.4	7.5	.30	.015
03-28-94	8.5	17.0	760	5,230	75	--	7.5	.40	.016
03-29-94	12.5	14.0	765	8,430	70	10.6	7.3	.30	.021
04-01-94	13.0	13.0	757	10,500	51	10.1	--	.70	.010
04-02-94	15.0	24.0	767	10,700	50	10.8	6.8	.60	--
04-05-94	12.0	22.0	762	4,250	53	10.7	7.0	.50	.005
04-14-94	18.0	26.0	763	1,500	63	10.2	7.4	.30	.017
04-29-94	19.5	25.0	769	795	77	9.5	7.8	.30	.013
05-16-94	20.5	27.0	758	1,200	72	9.7	7.8	.70	.016
05-24-94	20.0	24.0	762	816	74	8.8	7.6	.40	.030
06-09-94	24.5	25.0	765	289	78	9.2	8.4	.40	.021
06-22-94	28.0	34.0	760	347	85	8.3	7.5	.30	.025
07-07-94	30.0	34.0	765	502	74	7.4	7.6	.40	.028

Table 4.—Continued

Date	Nitrogen, nitrate, dissolved (mg/L, as N) (00618)	Nitrogen, nitrite, dissolved (mg/L, as N) (00613)	Nitrogen, NO_2+NO_3, dissolved (mg/L, as N) (00631)	Phosphorus, total (mg/L, as P) (00665)	Phosphorus, ortho, dissolved (mg/L, as P) (00671)	Residue, total at 105°C, suspended (mg/L) (00530)	Carbon, organic, total (mg/L, as C (00680)	Silica, dissolved (mg/L, as SiO_2) (00955)
07-15-93	0.150	0.010	0.160	0.020	0.020	<3	--	17
07-22-93	<.040	<.010	<.040	.030	.020	<3	4.3	17
08-12-93	.040	<.010	.040	.030	.010	3	4.9	17
08-31-93	.150	<.010	.150	.030	.010	<3	4.7	14
09-14-93	.260	<.010	.260	.050	040	<3	6.7	14
09-27-93	.070	<.010	.070	.030	.010	<3	--	16
10-12-93	.270	.010	.280	.020	<.010	<3	5.8	16
10-25-93	.140	<.010	.140	.020	<.010	<3	4.0	15
11-08-93	.110	.010	.120	.080	.010	<3	3.2	16
11-23-93	.090	<.010	.090	.020	.010	<3	3.8	15
11-29-93	<.040	.010	<.040	.060	.010	29	4.3	16
11-30-93	<.040	<.010	<.040	.030	<.010	18	3.5	17
12-01-93	.230	<.010	.230	.120	.010	70	11	12
12-02-93	.220	<.010	.220	.200	.030	68	16	8.9
12-04-93	.070	.010	.080	.140	.020	43	13	6.9
12-07-93	.080	.010	.090	.100	.030	23	13	9.1
12-09-93	.150	.010	.160	.170	.020	65	12	10
12-10-93	.110	<.010	.110	.150	.020	56	14	9.3
12-11-93	.100	<.010	.100	.130	.020	26	12	9.5
12-20-93	.130	<.010	.130	.090	.020	26	9.4	12
01-06-94	.240	<.010	.240	.030	.020	8	6.2	7.5
01-25-94	.236	.003	.239	.060	.015	8	4.2	15
01-31-94	.252	.003	.255	.040	.008	7	3.6	16
02-01-94	.258	.002	.260	.040	.008	9	3.9	15
02-09-94	.270	.003	.273	.060	.008	23	5.3	8.8
02-15-94	.244	.003	.247	.050	.010	13	4.5	14
02-17-94	.236	.002	.238	.060	.010	15	5.5	12
02-19-94	.239	.002	.241	.070	.013	18	4.5	12
02-23-94	.221	.003	.224	.050	.010	21	4.3	12
02-24-94	.201	.003	.204	.060	.008	14	5.8	10
02-26-94	.177	.003	.180	.070	.012	35	5.1	10
02-28-94	.167	.004	.171	.090	.013	36	--	9.8
03-03-94	.149	.003	.152	.070	.008	24	5.8	10
03-04-94	.153	.003	.156	.080	.017	60	7.5	8.3
03-05-94	.153	.003	.156	.110	.021	41	8.8	7.0
03-10-94	.156	.005	.161	.080	.009	21	6.3	8.7
03-12-94	.160	.003	.163	.070	.010	18	5.8	11
03-14-94	.178	.002	.180	.070	.014	19	6.1	12
03-21-94	.173	.003	.176	.060	.011	13	5.9	11
03-28-94	.140	.003	.143	.050	.017	13	4.3	13
03-29-94	.131	.002	.133	.040	.006	16	4.4	13
04-01-94	.115	.004	.119	.100	.020	28	9.8	8.8
04-02-94	.018	.003	.021	.100	.016	21	8.7	9.0
04-05-94	.092	.003	.095	.070	.014	15	6.8	9.6
04-14-94	.061	.002	.063	.030	.007	10	6.1	12
04-29-94	.040	.002	.042	.020	.004	5	6.1	13
05-16-94	.092	.003	.095	.040	.008	6	7.6	14
05-24-94	.077	.003	.080	.030	.007	--	5.5	15
06-09-94	.083	.004	.087	.020	.009	<3	4.1	15
06-22-94	.142	.007	.149	.020	.007	<3	--	17
07-07-94	.065	.003	.068	.030	.010	<3	4.0	15

Table 4. Selected chemical and physical water-quality characteristics of the Appomattox River monitoring station, Virginia—Continued

[°C, degrees Celsius; 00010, parameter code; mmHg, millimeters of mercury; ft^3/s, cubic foot per second; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; --, no data]

Date	Temperature, water (°C) (00010)	Temperature, air (°C) (00020)	Barometric pressure (mmHg) (00025)	Discharge (ft^3/s) (00061)	Specific conductance (µS/cm) (00095)	Oxygen, dissolved (mg/L) (00300)	pH (00400)	Nitrogen, ammonia + organic, total (mg/L, as N) (00625)	Nitrogen, ammonia, dissolved (mg/L, as N) (00608)
07-19-94	24.0	25.0	766	181	93	7.0	7.2	0.40	0.041
08-11-94	27.5	31.0	770	223	82	7.9	7.5	.30	.021
08-11-94	27.5	31.0	770	223	82	7.9	7.5	--	.024
08-24-94	24.0	22.0	772	518	81	7.6	7.1	.40	.057
09-08-94	24.0	28.0	767	117	83	8.6	7.6	.40	.022
09-08-94	24.0	--	--	117	83	8.6	7.6	--	.024
09-22-94	20.5	17.0	761	111	90	7.8	7.1	.40	.019
10-06-94	18.0	16.0	769	119	86	9.4	7.3	.30	.007
10-06-94	18.0	--	--	119	86	9.4	7.3	--	.007
10-20-94	14.5	18.0	762	238	86	10.3	7.0	.30	.020
11-03-94	13.0	13.0	770	242	89	10.5	7.1	.30	.018
11-30-94	11.5	13.0	768	865	83	11.0	7.0	.60	.076
11-30-94	11.5	--	--	865	83	11.0	7.0	--	.082
12-08-94	11.0	8.0	774	572	78	11.3	7.2	.50	.066
12-08-94	11.0	--	--	572	78	11.3	7.2	--	.072
12-28-94	8.0	14.0	762	363	84	12.2	7.2	.40	.044
01-10-95	5.5	6.0	774	1,990	90	12.8	6.8	.40	.009
01-17-95	7.5	13.0	760	3,790	89	10.7	7.2	.60	.038
01-19-95	10.0	9.0	763	3,080	82	11.2	7.1	.60	.051
01-24-95	8.0	4.0	762	1,540	73	10.6	6.9	.60	.069
02-07-95	5.0	2.0	760	1,110	77	13.3	6.8	.30	.032
02-21-95	5.0	15.0	754	1,440	88	13.0	7.6	.20	.010
03-03-95	7.5	1.0	774	2,050	83	11.8	7.3	.30	.015
03-10-95	9.0	6.5	778	6,150	85	11.9	6.8	.40	.006
03-11-95	9.0	9.5	776	6,460	83	11.6	6.8	.40	.011
03-12-95	9.5	20.0	776	5,100	69	11.2	6.8	.70	.029
03-14-95	10.0	19.0	768	1,960	69	10.8	6.9	.70	.037
03-23-95	12.5	11.0	748	939	70	10.7	6.9	.50	.047
04-05-95	12.5	6.0	768	339	76	11.2	6.7	.30	.020
04-18-95	13.0	15.0	768	577	89	8.8	6.5	.30	.040
05-03-95	18.0	22.5	765	2,550	89	9.6	7.4	.40	.037
05-04-95	17.0	16.0	768	3,510	93	9.4	6.5	.40	.049
05-05-95	17.5	21.0	761	3,350	96	8.8	6.6	.50	.038
05-09-95	17.5	23.0	767	589	81	9.6	6.5	.40	.042
05-15-95	19.5	27.0	761	1,870	77	8.7	6.7	.50	.063
05-23-95	23.0	30.0	771	550	77	9.0	6.6	.30	.030
05-23-95	23.0	--	--	550	77	9.0	6.6	--	.026
06-05-95	25.0	27.0	765	2,650	78	8.0	7.1	.50	.060
06-06-95	24.0	22.0	756	2,400	82	7.8	6.8	.50	.087
06-08-95	24.5	28.0	760	1,330	80	7.8	6.9	.40	.050
06-14-95	22.0	20.0	763	2,960	81	8.2	7.2	2.8	.084
06-15-95	24.0	27.0	765	3,300	79	8.0	7.1	.50	.094
06-16-95	24.0	25.0	774	2,700	79	8.1	6.5	.50	.084
06-20-95	24.0	29.0	761	380	75	8.0	7.3	.50	.029
06-20-95	24.0	--	--	380	--	8.0	7.3	--	.023
06-29-95	24.5	29.0	765	3,200	77	7.4	7.0	.60	.056
06-30-95	26.0	27.0	764	4,880	80	8.1	7.1	.50	.056

Table 4.—Continued

Date	Nitrogen, nitrate, dissolved (mg/L, as N) (00618)	Nitrogen, nitrite, dissolved (mg/L, as N) (00613)	Nitrogen, NO_2+NO_3, dissolved (mg/L, as N) (00631)	Phosphorus, total (mg/L, as P) (00665)	Phosphorus, ortho, dissolved (mg/L, as P) (00671)	Residue, total at 105°C, suspended (mg/L) (00530)	Carbon, organic, total (mg/L, as C (00680)	Silica, dissolved (mg/L, as SiO_2) (00955)
07-19-94	0.207	0.016	0.223	0.030	0.015	<3	4.8	16
08-11-94	.142	.005	.147	.030	.015	<3	3.9	17
08-11-94	.143	.005	.148	--	.015	--	--	19
08-24-94	.135	.005	.140	.050	.012	<3	--	17
09-08-94	.359	.015	.374	.020	.014	<3	--	19
09-08-94	.360	.015	.375	--	.015	--	--	18
09-22-94	.333	.006	.339	.050	.023	<3	--	18
10-06-94	.153	.003	.156	.020	.008	<3	--	17
10-06-94	.160	.003	.163	--	.007	--	--	19
10-20-94	.135	.004	.139	.010	.007	<3	--	16
11-03-94	.116	.003	.119	.010	.005	<3	--	17
11-30-94	.172	.005	.177	.080	.022	9	--	15
11-30-94	.180	.006	.186	--	.024	--	--	15
12-08-94	.188	.006	.194	.050	.023	4	--	15
12-08-94	.190	.006	.196	--	.023	--	--	15
12-28-94	.198	.005	.203	.060	.016	3	--	17
01-10-95	.178	<.002	.178	.050	.008	8	--	19
01-17-95	.254	.003	.257	.080	.013	18	--	17
01-19-95	.264	.004	.268	.090	.026	18	--	16
01-24-95	.213	.005	.218	.100	.025	9	--	15
02-07-95	.205	.003	.208	.060	.015	7	--	16
02-21-95	.234	<.002	.234	.030	.012	6	--	23
03-03-95	.216	.002	.218	.050	.020	9	--	15
03-10-95	.166	.002	.168	.050	.010	15	--	15
03-11-95	.160	<.002	.160	.060	.010	18	--	15
03-12-95	.187	.004	.191	.120	.017	41	--	12
03-14-95	.172	.004	.176	.120	.020	32	--	12
03-23-95	.096	.004	.100	.070	.016	11	--	13
04-05-95	.047	.002	.049	.030	.006	4	--	13
04-18-95	.041	.002	.043	.050	.011	10	--	9.2
05-03-95	.020	<.002	.020	.050	.006	16	--	14
05-04-95	.020	<.002	.020	.050	.005	8	--	13
05-05-95	.042	.002	.044	.040	.007	7	--	15
05-09-95	.162	.005	.167	.050	.014	5	--	14
05-15-95	.090	.004	.094	.040	.009	6	--	14
05-23-95	.121	.006	.127	.040	.016	3	--	15
05-23-95	.120	.006	.126	--	.015	--	--	15
06-05-95	.111	.008	.119	.050	.012	10	--	16
06-06-95	.164	.011	.175	.060	.015	9	--	17
06-08-95	.215	.015	.230	.050	.018	6	--	17
06-14-95	.099	.009	.108	.060	.033	10	--	16
06-15-95	.117	.009	.126	.070	.019	9	--	17
06-16-95	.186	.012	.198	.060	.021	11	--	17
06-20-95	.266	.017	.283	.050	.033	3	--	16
06-20-95	.270	.016	.286	--	.030	--	--	15
06-29-95	.065	.007	.072	.050	.011	12	--	--
06-30-95	.052	.006	.058	.060	.010	13	--	17

Table 5. Selected chemical and physical water-quality characteristics of the Pamunkey River monitoring station, Virginia

[°C, degrees Celsius; 00010, parameter code; mmHg, millimeters of mercury; ft^3/s, cubic foot per second; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; <, less than; --, no data]

Date	Temperature, water (°C) (00010)	Temperature, air (°C) (00020)	Barometric pressure (mmHg) (00025)	Discharge (ft^3/s) (00061)	Specific conductance (µS/cm) (00095)	Oxygen, dissolved (mg/L) (00300)	pH (00400)	Nitrogen, ammonia + organic, total (mg/L, as N) (00625)	Nitrogen, ammonia, dissolved (mg/L, as N) (00608)
07-08-93	27.0	--	--	191	157	5.4	6.8	0.40	0.070
07-13-93	26.0	34.0	755	160	150	5.8	6.9	.40	.060
07-21-93	26.0	28.0	766	119	175	6.3	7.5	.30	.040
08-05-93	25.0	--	--	102	210	6.7	6.9	.30	<.040
08-31-93	26.0	24.0	767	60	240	5.8	7.2	.30	<.040
09-07-93	24.5	--	--	57	263	6.0	6.8	.50	<.040
09-14-93	21.0	21.0	772	82	184	6.7	7.2	.30	<.040
09-27-93	21.0	23.0	760	95	216	7.0	7.2	.30	<.040
10-06-93	15.0	--	--	80	242	9.2	7.3	.40	<.040
10-13-93	12.5	12.0	767	111	208	9.5	7.0	.30	<.040
11-18-93	14.0	11.0	769	157	148	8.8	6.8	.30	<.040
11-23-93	7.0	--	--	179	149	10.7	6.8	.30	<.040
11-29-93	11.5	9.5	769	5,570	62	8.6	6.7	.80	<.040
11-30-93	11.0	4.0	776	10,600	57	8.8	6.9	.60	<.040
12-01-93	9.0	14.0	780	12,800	48	9.0	6.7	.60	<.040
12-03-93	8.0	16.5	772	8,500	54	10.0	6.6	.50	<.040
12-05-93	10.0	7.0	761	1,500	90	10.0	7.4	.50	<.040
12-06-93	11.5	10.5	753	5,340	68	9.6	7.2	.60	<.040
12-07-93	10.0	6.0	771	6,880	54	10.0	7.I	.50	<.040
12-17-93	7.5	5.0	773	1,110	79	11.5	7.3	.30	.070
01-09-94	5.0	.5	778	2,970	72	12.4	6.1	.60	<.040
01-13-94	5.5	5.0	760	2,510	73	10.4	6.6	.40	.050
01-14-94	4.0	7.0	755	4,270	68	13.0	5.7	.60	<.040
01-29-94	2.0	8.5	766	2,550	85	14.0	6.0	.40	.054
01-31-94	3.0	1.0	768	4,310	78	13.4	6.9	.50	.051
02-15-94	2.0	5.5	770	2,690	80	13.9	7.1	.30	.018
02-16-94	3.0	9.0	774	3,000	78	13.8	7.1	.40	.033
02-19-94	3.0	8.5	779	4,610	67	12.9	6.5	.30	.020
02-22-94	7.0	6.0	764	5,650	88	11.2	6.8	.20	.013
02-25-94	7.0	4.0	768	10,700	52	10.9	7.1	.40	.007
02-27-94	3.0	-5.0	767	9,900	41	12.6	6.9	.40	--
03-01-94	6.0	8.0	773	3,960	66	12.5	7.2	.30	.009
03-03-94	4.0	2.0	747	6,630	49	12.0	6.9	.60	.037
03-04-94	4.0	11.0	751	12,600	44	11.8	6.7	.40	.013
03-06-94	6.0	1.5	772	10,800	50	11.4	6.9	.30	.008
03-09-94	10.0	6.0	772	4,240	64	10.6	7.2	.30	.011
03-11-94	8.0	8.0	771	4,700	57	11.6	7.0	.40	.015
03-14-94	9.0	17.0	762	2,580	66	11.0	7.1	.30	<.004
03-28-94	13.5	13.0	761	4,870	62	11.2	7.0	.60	.034
03-29-94	8.0	7.5	770	10,800	52	10.2	6.7	.60	.026
03-31-94	11.5	16.0	769	17,000	45	9.6	6.7	.50	<.004
04-02-94	12.0	19.5	761	12,000	50	9.8	7.4	.50	--
04-04-94	12.0	14.0	767	5,790	63	8.6	7.2	.50	.016
04-26-94	17.5	25.0	764	867	80	8.6	7.4	.30	.009
04-26-94	17.5	--	--	867	90	8.3	7.0	--	.016
04-30-94	19.0	22.0	770	3,940	53	7.6	6.0	--	--
05-01-94	20.0	21.5	760	3,520	65	7.3	5.9	--	--
05-17-94	19.5	15.0	762	842	93	7.6	7.4	.40	.022
05-24-94	19.5	--	--	580	97	7.8	7.0	--	.039
06-14-94	25.0	32.0	767	228	116	6.9	7.4	.30	.039
06-23-94	26.5	--	--	276	148	6.3	7.1	--	.037

Table 5.—Continued

Date	Nitrogen, nitrate, dissolved (mg/L, as N) (00618)	Nitrogen, nitrite, dissolved (mg/L, as N) (00613)	Nitrogen, NO_2+NO_3, dissolved (mg/L, as N) (00631)	Phosphorus, total (mg/L, as P) (00665)	Phosphorus, ortho, dissolved (mg/L, as P) (00671)	Residue, total at 105°C, suspended (mg/L) (00530)	Carbon, organic, total (mg/L, as C (00680)	Silica, dissolved (mg/L, as SiO_2) (00955)
07-08-93	0.290	0.010	0.300	0.050	0.040	<3	9.1	12
07-13-93	.300	.010	.310	.080	.040	<3	--	12
07-21-93	.140	<.010	.140	.050	.030	<3	5.8	9.8
08-05-93	.280	<.010	.280	.070	.030	8	5.1	8.3
08-31-93	--	.010	--	.080	.050	<3	5.5	6.3
09-07-93	.410	<.010	.410	.090	.060	<3	5.9	7.5
09-14-93	.320	<.010	.320	.050	.040	<3	4.4	9.7
09-27-93	.260	<.010	.260	.080	.040	<3	--	8.8
10-06-93	.100	<.010	.100	.030	.010	<3	5.0	7.5
10-13-93	.200	<.010	.200	.040	.020	<3	5.4	6.9
11-18-93	.070	.010	.080	.040	.030	7	6.4	9.4
11-23-93	.050	<.010	.050	.040	.030	10	5.5	12
11-29-93	.160	<.010	.160	.200	.010	97	9.6	8.2
11-30-93	.080	<.010	.080	.120	.010	43	10	7.6
12-01-93	.070	<.010	.070	.100	.010	24	11	6.1
12-03-93	.110	<.010	.110	.080	.020	22	17	7.0
12-05-93	.240	.010	.250	.120	.020	65	7.1	9.5
12-06-93	.150	.010	.160	.160	.030	77	9.8	8.2
12-07-93	.100	.010	.110	.080	.020	32	9.6	8.3
12-17-93	.230	<.010	.230	.040	.010	10	5.5	11
01-09-94	.300	<.010	.300	.080	.020	72	5.0	9.8
01-13-94	.240	<.010	.240	.080	.020	44	4.7	9.5
01-14-94	.220	<.010	.220	.080	.020	52	7.9	11
01-29-94	.272	.004	.276	.090	.015	73	4.7	9.9
01-31-94	.274	.005	.279	.110	.010	73	6.4	8.5
02-15-94	.290	<.002	.290	.050	.010	24	5.5	10
02-16-94	.294	.002	.296	.070	.016	28	5.0	9.6
02-19-94	.230	<.002	.230	.060	.008	18	4.4	8.7
02-22-94	.214	<.002	.214	.060	.006	36	4.5	8.4
02-25-94	.169	.003	.172	.060	.016	33	6.8	6.4
02-27-94	.088	<.002	.088	.040	.007	11	6.5	5.8
03-01-94	.284	.002	.286	.050	.008	17	<5.0	9.2
03-03-94	.258	.003	.261	.140	.024	90	7.6	6.2
03-04-94	.181	.003	.184	.080	.010	38	6.2	5.8
03-06-94	.194	.003	.197	.050	.006	15	5.2	6.6
03-09-94	.282	.002	.284	.040	.007	19	4.2	8.7
03-11-94	.230	.004	.234	.070	.009	47	4.8	8.6
03-14-94	.276	<.002	.276	.050	.007	29	3.9	10
03-28-94	.252	.004	.256	.140	.018	98	7.5	8.2
03-29-94	.208	.004	.212	.100	.020	79	9.1	6.8
03-31-94	.161	.003	.164	.070	.010	24	7.8	6.2
04-02-94	.158	.005	.163	.060	.006	11	6.0	7.2
04-04-94	.223	.003	.226	.060	.011	17	6.2	8.7
04-26-94	.185	<.002	.185	.040	.018	8	5.7	10
04-26-94	.191	.003	.194	--	.020	8	7.7	10
04-30-94	--	--	--	--	--	--	--	--
05-01-94	--	--	--	--	--	--	--	--
05-17-94	.279	.022	.301	.060	.028	14	--	11
05-24-94	.293	.017	.310	--	.026	9	4.2	13
06-14-94	.517	.004	.521	.060	.046	<3	4.9	13
06-23-94	.521	.004	.525	--	.074	8	5.2	13

Table 5. Selected chemical and physical water-quality characteristics of the Pamunkey River monitoring station, Virginia—Continued

[°C, degrees Celsius; 00010, parameter code; mmHg, millimeters of mercury; ft^3/s, cubic foot per second; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; <, less than; --, no data]

Date	Temperature, water (°C) (00010)	Temperature, air (°C) (00020)	Barometric pressure (mmHg) (00025)	Discharge (ft^3/s) (00061)	Specific conductance (µS/cm) (00095)	Oxygen, dissolved (mg/L) (00300)	pH (00400)	Nitrogen, ammonia + organic, total (mg/L, as N) (00625)	Nitrogen, ammonia, dissolved (mg/L, as N) (00608)
07-21-94	27.0	--	--	511	120	6.2	7.1	--	0.049
07-21-94	27.0	28.0	768	505	105	6.3	7.2	.40	.040
08-09-94	23.0	22.0	770	319	122	7.2	7.2	.50	.049
08-22-94	24.0	22.0	760	4,280	65	6.1	6.7	.70	.024
08-23-94	23.5	--	--	1,140	94	6.6	6.6	--	.032
09-13-94	19.5	25.0	770	136	172	8.7	7.1	.30	.014
09-26-94	20.5	--	--	602	83	7.4	6.9	--	.026
10-19-94	12.5	19.5	764	245	127	9.1	6.9	.30	.006
10-20-94	13.0	--	--	223	146	9.2	7.0	--	.010
11-07-94	14.0	16.0	774	251	132	9.6	7.0	.30	.013
11-29-94	7.5	--	--	442	118	10.7	7.0	--	.027
12-13-94	6.0	--	--	523	106	11.4	6.9	--	.013
12-15-94	7.0	7.0	775	508	93	12.0	7.1	.20	.013
01-11-95	3.5	4.0	774	917	76	13.3	7.1	.40	.026
01-16-95	12.0	14.0	761	3,070	65	10.6	7.0	1.2	.021
01-18-95	11.0	12.0	766	5,000	68	9.2	7.0	.70	.018
02-13-95	1.5	--	--	600	117	13.3	7.2	--	.018
02-17-95	4.0	10.0	775	791	92	13.2	7.3	.20	.020
03-07-95	9.0	--	--	610	97	11.2	7.1	--	.014
03-10-95	8.0	5.0	--	6,000	59	--	6.9	.70	.008
03-11-95	8.0	12.0	775	8,570	55	11.6	6.7	.50	.020
03-12-95	8.0	16.0	777	7,580	60	11.6	6.9	.60	.008
03-13-95	9.5	18.0	775	4,630	86	10.0	7.0	.50	.014
03-17-95	13.0	20.0	765	1,080	75	10.2	6.7	.20	.022
04-10-95	17.0	11.0	770	267	105	8.4	7.0	.20	.009
04-20-95	17.0	--	--	471	107	8.0	6.9	--	--
04-26-95	14.5	17.0	771	965	87	9.8	6.6	.30	.022
05-02-95	12.0	14.0	760	820	96	--	6.7	.50	.074
05-03-95	11.0	15.0	770	1,980	86	10.0	6.8	.70	.042
05-04-95	14.0	2.0	769	1,860	71	8.9	7.0	.50	.030
05-09-95	16.0	--	--	516	95	8.3	7.0	--	.035
05-16-95	20.0	26.0	765	1,430	77	8.2	6.6	.50	.039
05-19-95	21.0	20.0	755	630	75	8.2	6.7	.40	.040
06-04-95	21.0	22.5	760	1,310	79	10.1	6.8	.80	.027
06-22-95	25.0	--	--	117	123	6.7	6.9	--	.050
06-22-95	25.0	29.0	767	124	115	6.8	6.8	.30	.038
06-28-95	22.0	24.5	761	3,400	61	7.6	6.7	.60	.058
06-30-95	23.0	24.0	768	9,450	64	6.4	6.6	.50	.037

Table 5.—Continued

Date	Nitrogen, nitrate, dissolved (mg/L, as N) (00618)	Nitrogen, nitrite, dissolved (mg/L, as N) (00613)	Nitrogen, NO_2+NO_3, dissolved (mg/L, as N) (00631)	Phosphorus, total (mg/L, as P) (00665)	Phosphorus, ortho, dissolved (mg/L, as P) (00671)	Residue, total at 105°C, suspended (mg/L) (00530)	Carbon, organic, total (mg/L, as C (00680)	Silica, dissolved (mg/L, as SiO_2) (00955)
07-21-94	0.260	0.005	0.265	--	0.030	10	5.4	12
07-21-94	.260	.005	.265	.060	.029	15	6.7	12
08-09-94	.331	.005	.336	.070	.052	5	5.9	13
08-22-94	.152	.003	.155	.060	.019	29	--	9.0
08-23-94	.247	.002	.249	--	.023	18	7.4	10
09-13-94	.537	.002	.539	.070	.053	<3	--	11
09-26-94	.160	.002	.162	--	.028	28	--	12
10-19-94	.168	<.002	.168	.070	.050	<3	--	13
10-20-94	.180	<.002	.180	--	.052	3	--	15
11-07-94	.149	<.002	.149	.060	.040	<3	--	15
11-29-94	.190	.006	.196	--	.037	7	--	15
12-13-94	.210	.024	.234	--	.019	3	--	13
12-15-94	.216	.082	.298	.040	.021	3	--	--
01-11-95	.309	.010	.319	.050	.022	13	--	12
01-16-95	.224	.006	.230	.290	.021	197	--	11
01-18-95	.201	.003	.204	.130	.013	50	--	9.8
02-13-95	.410	.012	.422	--	.024	6	--	12
02-17-95	.411	.019	.430	.040	.019	8	--	18
03-07-95	.270	.008	.278	--	.024	4	--	11
03-10-95	.204	.005	.209	.120	.015	69	--	9.1
03-11-95	.163	.004	.167	.080	.013	31	--	8.8
03-12-95	.189	.004	.193	.090	.016	30	--	9.0
03-13-95	.256	.005	.261	.080	.015	20	--	10
03-17-95	.260	.018	.278	.050	.022	16	--	12
04-10-95	.133	.010	.143	.050	.027	4	--	8.6
04-20-95	--	--	--	--	--	--	--	--
04-26-95	.124	.003	.127	.060	.026	17	--	13
05-02-95	.480	.010	.490	.100	.025	46	--	12
05-03-95	.206	.004	.210	.150	.026	94	--	12
05-04-95	.138	.003	.141	.130	.022	46	--	13
05-09-95	>.225	.010	.235	--	.037	9	--	13
05-16-95	.194	.007	.201	.080	.025	49	--	13
05-19-95	.221	.004	.225	.060	.024	14	--	12
06-04-95	.337	.011	.348	.200	.056	111	--	15
06-22-95	.420	.004	.424	--	.050	5	--	12
06-22-95	.425	.003	.428	.070	.048	3	--	13
06-28-95	.190	.002	.192	.150	.012	103	--	9.1
06-30-95	.150	.004	.154	.040	.015	8	--	8.9

Table 6. Selected chemical and physical water-quality characteristics of the Mattaponi River monitoring station, Virginia

[°C, degrees Celsius; 00010, parameter code; mmHg, millimeters of mercury; ft^3/s, cubic foot per second; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; <, less than; --, no data]

Date	Temperature, water (°C) (00010)	Temperature, air (°C) (00020)	Barometric pressure (mmHg) (00025)	Discharge (ft^3/s) (00061)	Specific conductance (µS/cm) (00095)	Oxygen, dissolved (mg/L) (00300)	pH (00400)	Nitrogen, ammonia + organic, total (mg/L, as N) (00625)	Nitrogen, ammonia, dissolved (mg/L, as N) (00608)
07-08-93	27.0	--	--	179	63	6.4	6.4	0.50	0.060
07-21-93	25.0	24.0	766	51	62	6.6	7.2	.40	.050
08-05-93	25.0	--	--	28	74	6.5	6.5	.30	<.040
08-31-93	26.0	32.0	766	28	63	7.2	6.7	.40	.040
09-07-93	24.0	--	--	43	65	6.9	6.2	.60	<.040
09-14-93	21.5	22.0	768	56	68	6.8	6.8	.40	<.040
10-06-93	14.0	--	--	57	74	9.4	6.7	.40	<.040
10-14-93	12.5	12.0	770	82	50	8.6	6.9	.30	<.040
11-19-93	12.5	10.0	765	149	56	9.6	6.8	.20	<.040
11-23-93	7.0	--	--	146	72	10.7	6.4	.40	<.040
11-29-93	10.0	5.5	771	1,120	49	8.3	6.4	.60	<.040
11-30-93	9.0	5.0	779	1,540	53	9.4	6.3	.60	<.040
12-01-93	8.0	10.0	780	1,540	54	10.1	6.4	.70	<.040
12-03-93	7.0	12.5	773	2,910	44	9.7	6.4	.70	<.040
12-05-93	7.0	8.5	761	2,440	80	10.0	7.6	.60	<.040
12-07-93	9.0	5.0	761	1,450	51	9.7	7.0	.40	<.040
12-17-93	5.0	6.0	774	556	55	11.6	7.3	.40	.070
01-09-94	2.0	-1.5	778	1,150	56	12.9	5.5	.40	.040
01-12-94	3.0	4.5	767	1,010	56	10.8	7.0	.40	<.040
01-13-94	1.5	--	--	1,730	61	12.8	5.9	--	<.040
01-29-94	.0	7.0	766	931	55	14.2	6.4	.30	.030
01-31-94	3.0	1.0	762	1,070	74	12.8	6.8	.30	.026
02-02-94	1.0	-4.0	772	1,250	57	13.9	7.1	.30	.009
02-03-94	1.0	1.0	768	1,200	57	13.8	7.1	.30	.008
02-04-94	1.0	2.0	774	881	58	14.0	7.1	.30	<.004
02-15-94	.5	-1.0	770	1,650	62	14.0	7.1	.20	.012
02-16-94	1.0	3.0	775	1,730	60	13.6	7.1	.20	.009
02-19-94	.5	6.5	779	1,710	60	13.1	5.4	.20	<.004
02-22-94	7.0	8.0	764	1,870	53	11.4	6.6	.20	.006
02-25-94	6.5	3.0	768	2,930	43	10.3	6.8	.30	.004
02-27-94	3.5	-2.0	775	4,150	52	12.4	7.1	.40	.006
03-01-94	4.0	5.0	775	3,690	41	12.6	6.8	.30	--
03-03-94	4.0	1.5	746	2,840	41	11.9	6.8	.30	.007
03-04-94	3.5	7.5	751	3,160	38	11.2	7.1	.30	.005
03-06-94	2.0	7.0	772	4,750	39	12.8	6.6	.30	--
03-09-94	4.0	9.0	774	3,520	40	10.6	7.0	.30	<.004
03-11-94	3.0	7.0	772	2,240	44	11.0	6.9	.30	.009
03-13-94	6.5	10.0	773	1,830	50	11.8	7.0	.40	.004
03-28-94	11.5	12.0	760	1,490	46	9.8	6.6	.40	.019
03-29-94	9.0	8.0	770	2,500	59	9.8	6.4	.50	.011
03-31-94	10.0	15.0	771	5,630	36	10.2	6.2	.50	--
04-02-94	10.5	15.0	771	7,160	33	9.3	6.4	.50	--
04-04-94	13.5	14.0	767	3,750	49	8.2	7.0	.40	--
04-06-94	15.0	17.0	761	2,420	47	8.1	6.2	.40	--
04-26-94	17.5	--	--	602	55	8.0	6.6	--	.025
04-26-94	18.0	32.0	765	592	49	8.3	6.9	.50	.024
04-30-94	19.5	24.0	765	966	48	6.4	7.6	--	--
05-01-94	20.0	20.0	761	1,390	44	7.0	6.4	--	--
05-17-94	19.0	16.0	763	296	47	7.9	7.0	.70	.025
05-24-94	18.0	--	--	315	48	8.0	6.5	--	.039
06-14-94	23.0	25.0	768	222	49	7.0	7.0	.40	.027

Table 6.—Continued

Date	Nitrogen, nitrate, dissolved (mg/L, as N) (00618)	Nitrogen, nitrite, dissolved (mg/L, as N) (00613)	Nitrogen, NO_2+NO_3, dissolved (mg/L, as N) (00631)	Phosphorus, total (mg/L, as P) (00665)	Phosphorus, ortho, dissolved (mg/L, as P) (00671)	Residue, total at 105°C, suspended (mg/L) (00530)	Carbon, organic, total (mg/L, as C (00680)	Silica, dissolved (mg/L, as SiO_2) (00955)
07-08-93	0.190	<0.010	0.190	0.060	0.020	3	8.0	5.9
07-21-93	.070	<.010	.070	.070	.030	<3	7.5	6.3
08-05-93	.230	<.010	.230	.050	<.010	<3	6.2	5.6
08-31-93	--	.010	--	.060	010	<3	6.5	5.9
09-07-93	.110	<.010	.110	.060	.010	<3	7.4	6.1
09-14-93	.100	<.010	.100	.040	.020	6	6.4	6.3
10-06-93	.130	<.010	.130	.040	.010	<3	5.3	8.2
10-14-93	.120	<.010	.120	.030	.010	<3	5.1	6.7
11-19-93	<.040	.010	<.040	.040	.020	10	6.3	7.1
11-23-93	<.040	<.010	<.040	.040	.010	<3	6.0	7.2
11-29-93	.060	<.010	.060	.150	.010	40	12	5.8
11-30-93	.040	<.010	.040	.110	.010	19	11	6.7
12-01-93	.040	<.010	.040	.110	.010	21	13	7.4
12-03-93	<.040	<.010	<.040	.100	.020	18	18	5.8
12-05-93	<.040	<.010	<.040	.070	.020	16	12	7.2
12-07-93	.050	.010	.060	.060	.020	10	8.8	7.4
12-17-93	.150	<.010	.150	.040	.010	7	8.5	9.3
01-09-94	.200	<.010	.200	.040	.010	7	5.4	9.5
01-12-94	.190	<.010	.190	.040	.010	9	5.8	9.5
01-13-94	.190	<.010	.190	--	.020	10	5.3	9.2
01-29-94	.241	.002	.243	.030	.007	11	4.7	8.3
01-31-94	.234	.002	.236	.040	.008	12	4.6	8.1
02-02-94	.212	.002	.214	.030	.009	11	5.0	8.3
02-03-94	.207	.003	.210	.030	.009	8	4.7	8.1
02-04-94	.217	.002	.219	.030	.004	6	4.2	8.4
02-15-94	.228	<.002	.228	.030	.006	7	4.9	7.5
02-16-94	.231	.003	.234	.030	.006	<3	5.1	7.6
02-19-94	.206	<.002	.206	.030	.005	<3	3.2	7.4
02-22-94	.142	<.002	.142	.040	.007	<3	3.9	7.0
02-25-94	.104	<.002	.104	.040	.005	8	5.6	5.9
02-27-94	.191	.003	.194	.060	.007	19	6.7	7.0
03-01-94	.083	<.002	.083	.040	.004	6	6.4	6.3
03-03-94	.167	<.002	.167	.050	.005	14	5.7	5.3
03-04-94	.168	<.002	.168	.040	.005	9	5.4	4.8
03-06-94	.120	<.002	.120	.090	.004	12	6.7	5.2
03-09-94	.090	<.002	.090	.030	.005	4	5.5	5.5
03-11-94	.144	.003	.147	.030	.006	4	5.3	5.3
03-13-94	.139	<.002	.139	.020	.005	5	5.6	5.9
03-28-94	.158	.002	.160	.060	.009	24	8.0	4.1
03-29-94	.143	.002	.145	.050	.010	14	8.4	3.8
03-31-94	.072	.002	.074	.060	.009	12	9.2	4.9
04-02-94	.039	.003	.042	.030	.005	9	7.9	4.9
04-04-94	.052	<.002	.052	.030	.008	<3	7.7	5.2
04-06-94	.063	.001	.064	.030	.007	<3	9.0	4.3
04-26-94	.175	.002	.177	--	.019	9	10	5.9
04-26-94	.174	.002	.176	.050	.019	8	7.4	5.8
04-30-94	--	--	--	--	--	--	--	--
05-01-94	--	--	--	--	--	--	--	--
05-17-94	.216	.004	.220	.060	.026	8	--	6.8
05-24-94	.243	.003	.246	--	.028	7	6.4	7.1
06-14-94	.202	.003	.205	.060	.021	4	8.4	5.4

Table 6. Selected chemical and physical water-quality characteristics of the Mattaponi River monitoring station, Virginia—Continued

[°C, degrees Celsius; 00010, parameter code; mmHg, millimeters of mercury; ft^3/s, cubic foot per second; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; <, less than; --, no data]

Date	Temperature, water (°C) (00010)	Temperature, air (°C) (00020)	Barometric pressure (mmHg) (00025)	Discharge (ft^3/s) (00061)	Specific conductance (µS/cm) (00095)	Oxygen, dissolved (mg/L) (00300)	pH (00400)	Nitrogen, ammonia + organic, total (mg/L, as N) (00625)	Nitrogen, ammonia, dissolved (mg/L, as N) (00608)
06-23-94	26.0	--	--	120	62	6.5	6.8	--	0.035
07-21-94	26.0	26.0	769	151	47	6.3	7.0	.40	.024
07-21-94	26.5	--	--	151	55	6.4	6.6	--	.035
08-10-94	23.0	26.0	770	232	54	7.3	6.8	.50	.044
09-13-94	18.0	14.0	771	56	57	7.7	6.6	.30	.018
09-26-94	20.0	--	--	432	53	7.5	6.5	--	.019
10-19-94	11.5	13.0	764	101	54	8.8	6.4	.40	.008
10-20-94	13.0	--	--	95	64	9.4	6.6	--	.013
11-07-94	13.5	14.5	775	143	53	9.2	6.8	.40	.011
11-29-94	7.0	--	--	310	56	11.0	6.5	--	.015
12-13-94	5.0	--	--	295	63	12.1	6.7	--	.014
12-15-94	6.0	4.0	777	235	52	12.4	7.0	.30	.014
01-17-95	10.0	11.0	765	631	53	10.9	7.0	.50	.017
01-18-95	10.0	11.5	767	865	52	9.4	6.5	.60	.017
01-20-95	9.0	9.0	749	1,300	47	10.4	7.1	.80	.022
02-10-95	.5	5.0	762	438	60	13.4	7.0	.30	.028
02-13-95	.5	--	--	440	76	13.9	6.9	--	.021
03-07-95	8.5	--	--	361	60	11.3	6.7	--	.012
03-10-95	7.5	4.0	--	1,020	50	--	7.0	.50	.010
03-11-95	6.5	9.0	776	1,230	52	12.0	6.5	.60	.078
03-12-95	6.5	15.0	777	1,480	46	11.8	6.5	.60	.067
03-13-95	7.5	17.0	775	1,760	46	10.8	6.9	.60	.004
03-15-95	10.5	10.0	765	1,850	50	10.3	7.0	.70	.017
03-17-95	12.5	15.5	765	587	53	10.0	6.4	.30	.039
04-10-95	16.0	1.0	769	176	56	9.2	6.8	.20	--
04-20-95	17.0	--	--	239	69	8.4	6.6	--	--
04-26-95	14.5	11.0	770	507	55	9.5	6.6	.60	.022
05-03-95	10.0	13.0	770	640	59	9.6	6.5	.60	.051
05-04-95	13.5	11.5	769	768	51	8.8	6.6	.60	.052
05-09-95	15.5	--	--	285	59	8.6	6.6	--	.047
05-16-95	19.0	25.0	766	465	50	8.2	6.9	.50	.060
05-19-95	20.0	20.0	756	358	56	8.5	6.5	.70	.060
06-19-95	21.0	26.0	768	94	59	8.1	6.5	.40	.029
06-22-95	23.5	--	--	52	67	6.9	6.5	--	.037
06-26-95	23.0	24.0	763	1,260	42	7.2	6.0	.50	.043
06-28-95	20.0	22.0	772	568	56	6.5	6.5	.70	.066
06-29-95	22.5	27.0	764	549	52	6.9	6.4	.80	.058
06-30-95	22.0	25.0	768	547	52	7.2	6.6	.60	.050

Table 6.—Continued

Date	Nitrogen, nitrate, dissolved (mg/L, as N) (00618)	Nitrogen, nitrite, dissolved (mg/L, as N) (00613)	Nitrogen, NO_2+NO_3, dissolved (mg/L, as N) (00631)	Phosphorus, total (mg/L, as P) (00665)	Phosphorus, ortho, dissolved (mg/L, as P) (00671)	Residue, total at 105°C, suspended (mg/L) (00530)	Carbon, organic, total (mg/L, as C (00680)	Silica, dissolved (mg/L, as SiO_2) (00955)
06-23-94	0.228	0.003	0.231	--	0.033	6	7.6	7.8
07-21-94	.115	.002	.117	.060	.032	<3	8.6	6.3
07-21-94	.118	.002	.120	--	.031	4	7.8	6.4
08-10-94	.182	.003	.185	.050	.041	<3	10	9.6
09-13-94	.162	<.002	.162	.040	.027	<3	--	9.4
09-26-94	.080	<.002	.080	--	.018	13	--	9.3
10-19-94	.065	<.002	.065	.050	.020	<3	--	8.1
10-20-94	.060	<.002	.060	--	.021	<3	--	8.2
11-07-94	.025	<.002	.025	.050	.021	<3	--	8.9
11-29-94	.070	.003	.073	--	020	6	--	9.9
12-13-94	.090	<.002	.090	--	.022	<3	--	10
12-15-94	.107	<.002	.107	.050	.020	<3	--	9.6
01-17-95	.099	<.002	.099	.050	.016	8	--	8.7
01-18-95	.081	.002	.083	.090	.019	18	--	9.2
01-20-95	.053	<.002	.053	.130	.017	25	--	9.5
02-10-95	.178	.003	.181	.040	.013	5	--	9.6
02-13-95	.190	.003	.193	--	.013	7	--	9.7
03-07-95	.150	<.002	.150	--	.012	4	--	6.2
03-10-95	.100	<.002	.100	.080	.012	21	--	5.7
03-11-95	.112	.002	.114	.090	.016	24	--	6.3
03-12-95	.090	<.002	.090	.090	.013	22	--	7.3
03-13-95	.065	<.002	.065	.080	.012	13	--	8.1
03-15-95	.055	<.002	.055	.060	.013	7	--	8.3
03-17-95	.089	<.002	.089	.050	.021	10	--	8.2
04-10-95	--	--	--	.030	--	<3	--	--
04-20-95	--	--	--	--	--	--	--	--
04-26-95	.080	<.002	.080	.120	.026	16	--	6.0
05-03-95	.115	.002	.117	.080	.029	17	--	7.0
05-04-95	.107	.002	.109	.090	.022	18	--	7.8
05-09-95	.120	.003	.123	--	.028	6	--	9.3
05-16-95	.129	.003	.132	.060	.033	14	--	7.6
05-19-95	.121	.004	.125	.080	.036	8	--	9.5
06-19-95	.155	.002	.157	.070	.039	<3	--	9.8
06-22-95	.130	.002	.132	--	.041	<3	--	8.5
06-26-95	.080	.003	.083	.050	.039	23	--	6.6
06-28-95	.116	.003	.119	.090	.041	11	--	9.3
06-29-95	.169	.004	.173	.090	.041	10	--	11
06-30-95	.189	.004	.193	.070	.034	11	--	10

Table 7. Summary statistics for selected water-quality constituents for the James, Rappahannock, Appomattox, Pamunkey, and Mattaponi River monitoring stations, from the period July 1993 through June 1995, Virginia

[mg/L, milligrams per liter; µS/cm, microsiemens per centimeter at 25 degrees Celsius (°C); <, less than]

Statistic	Oxygen, dissolved (mg/L, as O_2)	Specific conductance (µS/cm)	pH	Nitrogen, total[1] (mg/L, as N)	Total Kjeldahl nitrogen (mg/L, as N)	Nitrogen, ammonia, dissolved[1] (mg/L, as N)	Nitrogen, organic[2] (mg/L)	Nitrogen, NO_2+ NO_3, dissolved[1] (mg/L, as N)	Phosphorus, total (mg/L, as P)	Phosphorus, ortho, dissolved[1] (mg/L, as P)	Total suspended solids, residue at 180°C (mg/L)	Carbon, organic, total (mg/L, as C)	Silica, dissolved (mg/L, as Si)
James River monitoring station													
Minimum	5.2	66	6.3	0.19	0.1	<0.004	0.46	0.029	0.04	0.010	<3	1.9	3.0
Median	10.2	144	7.5	.65	.4	.028	.29	.26	.11	.040	30	4.1	7.0
Maximum	14.4	352	9.1	1.9	1.7	.075	1.65	.54	1.1	.196	632	14	10
Rappahannock River monitoring station													
Minimum	6.1	42	6.3	.20	<.1	.004	.09	<.004	<.01	.002	<3	1.8	4.3
Median	9.0	81	7.1	.80	.3	.030	.28	.42	.04	.014	6	3.2	9.2
Maximum	14.3	159	8.1	2.90	2.5	.119	2.43	.95	1.5	.047	698	11	18
Appomattox River monitoring station													
Minimum	4.3	45	5.6	.29	.2	.005	.16	.02	.01	.004	<3	3.2	6.9
Median	10.7	78	7.2	.57	.4	.032	.38	.16	.05	.013	10	5.8	15
Maximum	14.2	113	8.4	2.91	2.8	.12	2.72	.38	.20	.04	70	16	23
Pamunkey River monitoring station													
Minimum	5.4	41	5.7	.34	.2	<.004	.18	.04	.03	.006	<3	3.9	5.8
Median	9.6	82	6.9	.67	.4	.034	.38	.23	.07	.021	16	5.9	9.8
Maximum	14.0	263	7.5	1.43	1.2	.074	1.18	.54	.29	.074	197	17	18
Mattaponi River monitoring station													
Minimum	6.3	33	5.4	.21	.2	<.004	.16	.02	.02	.004	<3	3.2	3.8
Median	9.6	54	6.7	.55	.4	.028	.38	.12	.05	.013	7	6.4	7.4
Maximum	14.2	80	7.6	.97	.8	.078	.78	.25	.15	.041	40	18	11

[1]Constituents for which the detection limit was lowered during the period of data collection.

[2]Organic nitrogen is computed as the difference between the concentration of total Kjeldahl nitrogen and dissolved ammonia nitrogen.

Table 8. Regression summary for the seven-parameter log-linear model used to estimate concentrations at the James River monitoring station, Virginia

[s, standard deviation of the residuals from ordinary least squares fit; r^2, coefficient of determination; n, number of observations used to fit the model; β_0, constant; β_1, coefficient of natural logarithm of streamflow; β_2, coefficient of natural logarithm of streamflow-squared; β_3, coefficient of time; β_4, coefficient of time-squared; β_5, coefficient of sine (time); β_6, coefficient of cosine (time); shaded areas indicate coefficient is significant at the 95-percent confidence level as determined by the *T* value]

s	r^2	n	β_0	β_1	β_2	β_3	β_4	β_5	β_6
Total nitrogen									
0.35025	38	287	-0.3945	0.2801	0.0484	-0.0135	-0.0045	-0.0927	-0.413
Total Kjeldahl nitrogen									
.52882	33	305	-1.0854	.3180	.1371	-.0276	.0030	-.1723	-.0506
Dissolved ammonia nitrogen									
.61525	24	312	-3.6524	.1132	.0128	-.1400	.0381	-.0098	.1445
Dissolved nitrite-plus-nitrate nitrogen									
.40438	53	313	-1.1373	.3308	-.2066	-.0091	-.0199	-.0565	-.0440
Total phosphorus									
.56476	37	305	-2.3360	.3337	.1684	-.0493	.0406	-.2244	.0606
Dissolved orthophosphorus									
.51696	58	313	-3.6272	-.3621	.0293	-.1181	.1128	-.0802	.1048
Total suspended solids									
.75517	79	305	3.3029	1.4540	-.1191	-.0175	.0178	-.3854	-.2291
Total organic carbon									
.45170	24	272	1.3169	.1793	.0932	.0658	.0002	-.1798	.0171
Dissolved silica									
.19748	26	314	2.0513	.0654	-.0818	-.0010	-.0050	-.0986	-.0836

Table 9. Regression summary for the seven-parameter log-linear model used to estimate concentrations at the Rappahannock River monitoring station, Virginia

[s, standard deviation of residuals from ordinary least squares fit; r^2, coefficient of determination; n, number of observations used to fit the model; β_0, constant; β_1, coefficient of natural logarithm of streamflow; β_2, coefficient of natural logarithm of streamflow- squared; β_3, coefficient of time; β_4, coefficient of time-squared; β_5, coefficient of sine (time); β_6, coefficient of cosine (time); shaded areas indicate coefficient is significant at the 95-percent confidence level as determined by the *T* value]

s	r^2	n	β_0	β_1	β_2	β_3	β_4	β_5	β_6
Total nitrogen									
0.37843	70	258	-0.0779	0.4323	-0.0532	-0.0444	0.0018	0.0306	0.0019
Total Kjeldahl nitrogen									
.53015	55	258	-1.0471	.4673	.0559	-.0485	.0181	-.1708	-.1519
Dissolved ammonia nitrogen									
.67998	34	259	-3.5767	.2628	.0152	-.1497	.0138	.1130	.0166
Dissolved nitrite-plus-nitrate nitrogen									
.70343	65	259	-.6119	.5192	-.2547	-.0483	-.0223	.2919	.1072
Total phosphorus									
.67188	68	259	-2.7508	.7969	.0623	-.0385	.0149	-.1940	-.1422
Dissolved orthophosphorus									
.56699	26	260	-4.4562	.2871	-.0235	-.0194	.0274	-.2536	-.0054
Total suspended solids									
1.01006	78	257	2.8326	1.5629	-.0963	-.0931	.0272	-.2744	-.2955
Total organic carbon									
.50016	37	222	1.2827	.3119	.0405	.0273	.0107	-.1222	-.0726
Dissolved silica									
.19230	40	259	2.3426	.0156	-.0818	.0124	.0011	-.0367	-.0029

Table 10. Regression summary for the seven-parameter log-linear model used to estimate concentrations at the Appomattox River monitoring station, Virginia

[s, standard deviation of residuals from ordinary least squares fir; r^2, coefficient of determination; n, number of observations used to fit the model; β_0, constant; β_1, coefficient of natural logarithm of streamflow; β_2, coefficient of natural logarithm of streamflow- squared; β_3, coefficient of time; β_4, coefficient of time-squared; β_5, coefficient of sine (time); β_6, coefficient of cosine (time); shaded areas indicate coefficient is significant at the 95-percent confidence level as determined by the *T* value]

s	r^2	n	β_0	β_1	β_2	β_3	β_4	β_5	β_6
Total nitrogen									
0.27748	16	260	-0.5738	0.1061	0.0187	0.0095	-0.0016	-0.0838	-0.0346
Total Kjeldahl nitrogen									
.29672	22	266	-.8245	.1531	-.0015	.0241	-.0123	-.1505	-.1180
Dissolved ammonia nitrogen									
.60599	26	271	-2.9235	.1870	-.1313	-.0975	-.0185	-.3328	-.0713
Dissolved nitrite-plus-nitrate nitrogen									
.59241	27	273	-2.2634	-.0691	.0911	-.0366	.0340	.1832	.2770
Total phosphorus									
.43929	49	266	-3.1384	.2975	.0447	.0351	-.0163	.0072	.0449
Dissolved orthophosphorus									
.46643	10	273	-4.6902	-.0002	.0244	-.0342	.0472	-.0975	.0445
Total suspended solids									
.54455	74	265	2.0098	.7210	-.0561	.0278	-.165	-.1881	.0775
Total organic carbon									
.39064	18	221	1.7289	.1485	.0385	.0354	-.0170	-.1044	-.0983
Dissolved silica									
.16145	45	271	2.6450	-.0597	-.0303	.0011	.0159	-.0965	.0178

Table 11. Regression summary for the seven-parameter log-linear model used to estimate concentrations at the Pamunkey River monitoring station, Virginia

[s, standard deviation of the residuals from ordinary least squares fit; r^2, coefficient of determination; n, number of observations used to fit the model; β_0, constant; β_1, coefficient of natural logarithm of streamflow; β_2, coefficient of natural logarithm of streamflow-squared; β_3, coefficient of time; β_4, coefficient of time-squared; β_5, coefficient of sine (time); β_6, coefficient of cosine (time); shaded areas indicate coefficient is significant at the 95-percent confidence level as determined by the *T* value]

s	r^2	n	β_0	β_1	β_2	β_3	β_4	β_5	β_6
Total nitrogen									
0.26981	20	273	-0.2683	0.1245	-0.0242	0.0127	-0.0211	-0.1264	-0.1286
Total Kjeldahl nitrogen									
.33581	30	274	-.6973	.2059	-.0210	.0065	-.0297	-.2126	-.1537
Dissolved ammonia nitrogen									
.56651	28	285	-2.9339	.0839	-.1192	-.1105	-.0587	-.1287	-.1552
Dissolved nitrite-plus-nitrate nitrogen									
.36123	9.4	287	-1.4365	-.0456	-.0249	.0138	-.0038	.0983	-.0807
Total phosphorus									
.46523	29	274	-2.4751	.2652	-.0367	.0643	-.0396	-.2899	-.1404
Dissolved orthophosphorus									
.48911	43	287	-4.2487	-.1586	.0084	.0759	.0516	-.2502	-.1613
Total suspended solids									
.83698	65	285	3.1409	.8934	-.2321	.0528	-.0396	-.3673	-.2620
Total organic carbon									
.27446	42	246	1.8068	.2066	.0162	.0463	-.0334	-.1795	-.1600
Dissolved silica									
.11823	67	285	2.4180	-.0778	-.0626	.0097	.0099	-.0091	.0581

Table 12. Regression summary for the seven-parameter log-linear model used to estimate concentrations at the Mattaponi River monitoring station, Virginia

[s, standard deviation of the residuals from ordinary least squares fit; r^2, coefficient of determination; n, number of observations used to fit the model; β_0, constant; β_1, coefficient of natural logarithm of streamflow; β_2, coefficient of natural logarithm of streamflow-squared; β_3, coefficient of time; β_4, coefficient of time-squared; β_5, coefficient of sine (time); β_6, coefficient of cosine (time); shaded areas indicate coefficient is significant at the 95 percent confidence level as determined by the *T* value]

s	r^2	n	β_0	β_1	β_2	β_3	β_4	β_5	β_6
Total nitrogen									
0.21026	21	246	-0.4492	0.0660	-0.0223	0.0050	-0.0070	-0.1056	-0.1721
Total Kjeldahl nitrogen									
.27064	25	257	-.7335	.1158	-.0187	.0180	-.0148	-.1791	-.2367
Dissolved ammonia nitrogen									
.70774	18	262	-3.3306	.0792	-.1141	-.1118	-.0063	-.1558	-.3070
Dissolved nitrite-plus-nitrate nitrogen									
.49884	13	267	-1.9867	-.0717	-.0461	-.0696	.0049	.2170	-.0337
Total phosphorus									
.37617	20	257	-2.7794	.1505	-.0154	.0198	-.0201	-.2412	-.2658
Dissolved orthophosphorus									
.43618	42	269	-4.3884	-.0715	.0442	.0566	.0623	-.2218	-.2746
Total suspended solids									
.77266	36	266	1.8244	.4530	-.1141	-.0193	.0170	-.1040	-.0619
Total organic carbon									
.40406	13	231	1.8202	.1414	.0265	.0237	-.0106	-.1225	-.0775
Dissolved silica									
.17915	48	267	2.0552	-.0024	-.0476	.0011	.0157	-.1656	.1006

Table 13. Summary of load statistics for the James, Rappahannock, Appomattox, Pamunkey, and Mattaponi River monitoring stations, from the period July 1993 through June 1995, Virginia

[kg/d, kilograms per day]

Statistic	Nitrogen, total (kg/d)	Total Kjeldahl nitrogen (kg/d)	Nitrogen, ammonia, dissolved (kg/d)	Nitrogen, organic[1] (kg/d)	Nitrogen, NO_2+NO_3, dissolved (kg/d)	Phosphorus, total (kg/d)	Phosphorus, ortho, dissolved (kg/d)	Total suspended solids, residue at 180°C (kg/d)	Carbon, organic, total (kg/d)	Silica, dissolved (kg/d)
James River monitoring station										
Minimum monthly	54,500	40,800	2,530	26,900	9,220	15,200	8,770	240,000	592,000	585,000
Median monthly	273,000	146,500	12,550	155,500	96,450	56,650	22,700	12,050,000	2,165,000	2,620,000
Maximum monthly	1,920,000	1,300,000	67,000	1,720,000	586,000	477,000	66,900	416,000,000	13,000,000	12,700,000
Rappahannock River monitoring station										
Minimum monthly	4,550	3,630	244	3,510	806	382	142	13,400	51,800	120,000
Median monthly	69,050	28,800	2,265	28,150	44,150	4,995	1,165	1,265,000	394,000	969,000
Maximum monthly	910,000	1,040,000	27,500	941,000	460,000	586,000	10,900	497,000,000	6,750,000	4,810,000
Appomattox River monitoring station										
Minimum monthly	3,480	2,320	140	2,180	1,280	188	89	7,740	38,200	95,600
Median monthly	34,600	24,950	2,530	23,350	8,735	3,280	798	639,000	344,500	831,500
Maximum monthly	278,000	200,000	15,000	189,000	81,200	40,400	4,910	9,260,000	3,160,000	4,340,000
Pamunkey River monitoring station										
Minimum monthly	3,210	1,900	125	1,650	1,290	300	228	6,860	28,600	53,700
Median monthly	40,900	26,000	1,585	23,200	14,000	5,160	1,430	2,205,000	331,500	614,500
Maximum monthly	306,000	216,000	10,000	205,000	91,700	40,300	5,080	17,400,000	3,360,000	3,170,000
Mattaponi River monitoring station										
Minimum monthly	3,610	2,830	196	2,660	658	386	118	21,500	37,600	47,100
Median monthly	15,550	11,600	810	10,700	3,450	1,505	518	215,500	158,000	203,000
Maximum monthly	105,000	82,100	3,730	77,700	22,000	11,100	1,740	2,070,000	1,620,000	1,080,000

[1]Organic nitrogen is computed as the difference between the concentration of total Kjeldahl nitrogen and dissolved ammonia nitrogen.

Table 14. Estimated mean daily load, standard error of regression, standard error of prediction, and total monthly load for total nitrogen at the James River monitoring station, Virginia

[kg/d, kilogram per day; kg/mo, kilogram per month]

Date	Total nitrogen			
	Mean daily load (kg/d)	Standard error of regression (kg/d)	Standard error of prediction (kg/d)	Total monthly load (kg/mo)
07/93	3,260	180	289	101,000
08/93	2,460	148	229	76,200
09/93	2,230	141	206	66,900
10/93	1,760	129	174	54,500
11/93	11,600	622	2,440	347,000
12/93	16,400	732	2,120	507,000
01/94	22,000	893	2,230	681,000
02/94	40,900	1,650	3,850	1,140,000
03/94	62,000	2,940	6,430	1,920,000
04/94	21,400	914	1990	643,000
05/94	11,500	565	1,060	357,000
06/94	3,510	203	310	105,000
07/94	5,570	320	649	173,000
08/94	12,400	794	1,720	384,000
09/94	3,450	214	326	103,000
10/94	2,270	160	218	70,300
11/94	2,560	178	248	76,700
12/94	3,520	234	332	109,000
01/95	25,900	1,680	4,040	804,000
02/95	8,400	546	815	244,000
03/95	10,500	676	1,060	325,000
04/95	3,780	277	375	113,000
05/95	9,740	699	956	302,000
06/95	44,500	3,630	6,520	1,340,000

Table 15. Estimated mean daily load, standard error of regression, standard error of prediction, and total monthly load for total Kjeldahl nitrogen at the James River monitoring station, Virginia

[kg/d, kilogram per day; kg/mo, kilogram per month]

Date	Total Kjeldahl nitrogen			
	Mean daily load (kg/d)	Standard error of regression (kg/d)	Standard error of prediction (kg/d)	Total monthly load (kg/mo)
07/93	2,030	160	269	62,800
08/93	1,680	141	230	52,100
09/93	1,590	136	215	47,700
10/93	1,320	129	187	40,800
11/93	8,610	675	2,980	258,000
12/93	10,500	694	2,350	324,000
01/94	12,900	794	2,180	401,000
02/94	24,700	1,510	3,840	691,000
03/94	41,900	3,110	7,550	1,300,000
04/94	11,800	746	1,780	353,000
05/94	6,160	453	883	191,000
06/94	2,080	174	279	62,400
07/94	3420	288	609	106,000
08/94	8,160	766	1,840	253,000
09/94	2,290	204	324	68,600
10/94	1,620	158	229	50,100
11/94	1,720	169	248	51,600
12/94	2,150	208	307	66,700
01/95	18,600	1,850	5,140	577,000
02/95	4,470	433	666	130,000
03/95	5,610	536	883	174,000
04/95	2,100	223	313	63,000
05/95	5,270	562	790	163,000
06/95	34,600	4,220	8,540	1,040,000

Table 16. Estimated mean daily load, standard error of regression, standard error of prediction, and total monthly load for dissolved ammonia nitrogen at the James River monitoring station, Virginia

[kg/d, kilogram per day; kg/mo, kilogram per month]

Date	Dissolved ammonia nitrogen			
	Mean daily load (kg/d)	Standard error of regression (kg/d)	Standard error of prediction (kg/d)	Total monthly load (kg/mo)
07/93	125	13	21	3,870
08/93	96	11	16	2,980
09/93	94	11	16	2,820
10/93	81	11	14	2,530
11/93	413	39	147	12,400
12/93	689	56	145	21,400
01/94	977	75	173	30,300
02/94	1,660	125	278	46,500
03/94	2,160	179	378	67,000
04/94	855	67	142	25,700
05/94	454	40	75	14,100
06/94	146	15	23	4,370
07/94	204	20	41	6,330
08/94	409	45	94	12,700
09/94	151	16	25	4,520
10/94	113	13	19	3,500
11/94	141	16	24	4,240
12/94	208	24	35	6,450
01/95	1,110	128	278	34,500
02/95	481	55	84	14,000
03/95	553	62	99	17,200
04/95	206	25	36	6,190
05/95	445	55	78	13,800
06/95	1330	183	323	39,800

Table 17. Estimated mean daily load, standard error of regression, standard error of prediction, and total monthly load for dissolved nitrite-plus-nitrate nitrogen at the James River monitoring station, Virginia

[kg/d, kilogram per day; kg/mo, kilogram per month]

Date	Dissolved nitrite-plus-nitrate nitrogen			
	Mean daily load (kg/d)	Standard error of regression (kg/d)	Standard error of prediction (kg/d)	Total monthly load (kg/mo)
07/93	950	54	101	29,400
08/93	582	33	67	18,000
09/93	458	28	47	13,800
10/93	298	20	31	9,220
11/93	3,060	176	733	91,900
12/93	5,980	291	782	185,000
01/94	8,810	406	948	273,000
02/94	15,400	692	1,540	430,000
03/94	18,900	904	1,870	586,000
04/94	9,330	443	939	280000
05/94	5,120	274	547	159,000
06/94	1,050	62	104	31,600
07/94	1,990	126	302	61,600
08/94	4,350	303	667	135,000
09/94	942	60	107	28,300
10/94	453	31	47	14,100
11/94	587	41	64	17,600
12/94	1,030	71	110	31,800
01/95	7,320	491	1,010	227,000
02/95	3,490	246	387	101,000
03/95	4,370	305	501	136,000
04/95	1,200	91	132	36,100
05/95	4,050	313	447	126,000
06/95	11,100	933	1,550	333,000

Table 18. Estimated mean daily load, standard error of regression, standard error of prediction, and total monthly load for total phosphorus at the James River monitoring station, Virginia

[kg/d, kilogram per day; kg/mo, kilogram per month]

Date	Total phosphorus			
	Mean daily load (kg/d)	Standard error of regression (kg/d)	Standard error of prediction (kg/d)	Total monthly load (kg/mo)
07/93	591	50	84	18,300
08/93	532	47	77	16,500
09/93	546	49	79	16,400
10/93	491	51	75	15,200
11/93	3,470	296	1,320	104,000
12/93	4,040	290	1,010	125,000
01/94	4,840	317	897	150,000
02/94	9,050	594	1,550	253,000
03/94	15,400	1,240	3,090	477,000
04/94	3,850	261	643	115,000
05/94	1,920	151	297	59,500
06/94	663	59	95	19,900
07/94	1,140	103	219	35,400
08/94	2,950	296	733	91,400
09/94	884	84	134	26,500
10/94	687	71	104	21,300
11/94	762	80	118	22,900
12/94	954	98	146	29600
01/95	8,900	962	2,780	276,000
02/95	1,860	193	297	53,800
03/95	2,260	231	386	70,100
04/95	816	93	131	24,500
05/95	1,980	227	319	61,400
06/95	15,100	1,980	4,130	452,000

Table 19. Estimated mean daily load, standard error of regression, standard error of prediction, and total monthly load for dissolved orthophosphorus at the James River monitoring station, Virginia

[kg/d, kilogram per day; kg/mo, kilogram per month]

Date	Dissolved orthophosphorus			
	Mean daily load (kg/d)	Standard error of regression (kg/d)	Standard error of prediction (kg/d)	Total monthly load (kg/mo)
07/93	304	22	38	9,430
08/93	283	22	36	8,770
09/93	299	23	38	8,970
10/93	291	27	39	9,010
11/93	523	36	90	15,700
12/93	852	52	112	26,400
01/94	1,060	63	132	32,900
02/94	1,470	85	184	41,200
03/94	1,700	104	214	52,800
04/94	1,010	63	125	30,400
05/94	732	51	91	22,700
06/94	434	33	55	13,000
07/94	526	40	70	16,300
08/94	801	67	116	24,800
09/94	545	44	71	16,400
10/94	502	45	67	15,600
11/94	581	53	79	17,400
12/94	721	65	97	22,300
01/95	1,620	137	246	50,200
02/95	1,140	104	160	33,100
03/95	1,230	111	169	38,100
04/95	758	74	107	22,700
05/95	1,210	121	172	37,600
06/95	2,230	234	368	66,900

Table 20. Estimated mean daily load, standard error of regression, standard error of prediction, and total monthly load for total suspended solids at the James River monitoring station, Virginia

[kg/d, kilogram per day; kg/mo, kilogram per month]

Date	Total suspended solids			
	Mean daily load (kg/d)	Standard error of regression (kg/d)	Standard error of prediction (kg/d)	Total monthly load (kg/mo)
07/93	41,300	4,660	10,700	1,280,000
08/93	24,600	2,800	7,680	763,000
09/93	15,100	1,900	3,340	454,000
10/93	7,750	1,120	1,810	240,000
11/93	2,210,000	279,000	1,440,000	66,200,000
12/93	1,930,000	208,000	986,000	59,900,000
01/94	2,020,000	183,000	691,000	62,500,000
02/94	4,670,000	426,000	1,300,000	131,000,000
03/94	9,880,000	1,150,000	3,140,000	306,000,000
04/94	1,730,000	155,000	522,000	52,000,000
05/94	638,000	66,300	178,000	19,800,000
06/94	44,400	5,250	9,230	1,330,000
07/94	340,000	45,900	164,000	10,600,000
08/94	1,930,000	279,000	988,000	59,800,000
09/94	59,600	7,500	16,800	1,790,000
10/94	16,500	2,310	3,550	511,000
11/94	21,800	3,000	5,170	655,000
12/94	44,000	5,920	10,100	1,360,000
01/95	4,390,000	689,000	2,320,000	136,000,000
02/95	266,000	36,100	64,700	7,710,000
03/95	503,000	66,900	160,000	15,600,000
04/95	49,500	7,300	11,200	1,490,000
05/95	437,000	65,300	101,000	13,500,000
06/95	13,900,000	2,510,000	5,890,000	416,000,000

Table 21. Estimated mean daily load, standard error of regression, standard error of prediction, and total monthly load for total organic carbon at the James River monitoring station, Virginia

[kg/d, kilogram per day; kg/mo, kilogram per month]

Date	Total organic carbon			
	Mean daily load (kg/d)	Standard error of regression (kg/d)	Standard error of prediction (kg/d)	Total monthly load (kg/mo)
07/93	26,400	1,900	3,020	819,000
08/93	22,500	1,710	2,660	698,000
09/93	22,200	1,740	2,620	667,000
10/93	19,100	1,690	2,360	592,000
11/93	93,900	7,210	25,100	2,820,000
12/93	129,000	8,960	22,000	3,990,000
01/94	161,000	11,000	22,200	4,990,000
02/94	282,000	19,500	37,000	7,900,000
03/94	419,000	32,400	60,700	13,000,000
04/94	142,000	11,100	18,900	4,260,000
05/94	78,900	7,030	10,600	2,450,000
06/94	29,200	2,770	3,770	875,000
07/94	45,500	4,790	7,400	1410,000
08/94	99,400	11,700	19,300	3,080,000
09/94	34,500	3,810	4,950	1,030,000
10/94	25,500	2,900	3,630	791,000
11/94	28,100	3,270	4,100	843,000
12/94	35,700	4,240	5,270	1,110,000
01/95	215,000	26,500	48,000	6,660,000
02/95	69,200	8,890	11,000	2,010,000
03/95	81,700	10,800	13,500	2,530,000
04/95	32,500	4,500	5,320	974,000
05/95	75,000	11,300	13,100	2,320,000
06/95	346,000	58,200	80,700	10,400,000

Table 22. Estimated mean daily load, standard error of regression, standard error of prediction, and total monthly load for dissolved silica at the James River monitoring station, Virginia

[kg/d, kilogram per day; kg/mo, kilogram per month]

Date	Dissolved silica			
	Mean daily load (kg/d)	Standard error of regression (kg/d)	Standard error of prediction (kg/d)	Total monthly load (kg/mo)
07/93	40,700	1,130	1,940	1,260,000
08/93	29,200	842	1,450	905,000
09/93	25,600	763	1,230	769,000
10/93	18,900	650	953	585,000
11/93	78,800	2,070	7,710	2,360,000
12/93	147,000	3,430	8,340	4,550,000
01/94	198,000	4,410	9,710	6,120,000
02/94	323,000	7,050	15,300	9,060,000
03/94	409,000	9,560	19,500	12,700,000
04/94	213,000	4,940	9,970	6,400,000
05/94	134,000	3,480	6,480	4,140,000
06/94	45,100	1,300	2,110	1,350,000
07/94	66,900	1,980	4,040	2,080,000
08/94	127,000	4,190	8,200	3,930,000
09/94	42,700	1,320	2,150	1,280,000
10/94	26,200	888	1,300	812,000
11/94	29,700	1,020	1,510	891,000
12/94	42,100	1,430	2,120	1,310,000
01/95	185,000	6,010	11800	5,740,000
02/95	99,300	3,410	5,190	2,880,000
03/95	119,000	4,040	6,260	3,680,000
04/95	48,000	1,780	2,510	1,440,000
05/95	122,000	4,570	6,390	3,770,000
06/95	310,000	12,600	20,500	9,310,000

Table 23. Estimated mean daily load, standard error of regression, standard error of prediction, and total monthly load for total nitrogen at the Rappahannock River monitoring station, Virginia

[kg/d, kilogram per day; kg/mo, kilogram per month]

Date	Total nitrogen			
	Mean daily load (kg/d)	Standard error of regression (kg/d)	Standard error of prediction (kg/d)	Total monthly load (kg/mo)
07/93	660	36	68	20,400
08/93	323	17	40	10,000
09/93	152	9	15	4,550
10/93	158	10	15	4,910
11/93	10,200	986	2,860	306,000
12/93	7,450	385	1,090	231,000
01/94	9,540	472	1,080	296,000
02/94	15,200	815	1,930	424,000
03/94	29,400	1,810	3,360	910,000
04/94	6970	342	681	209,000
05/94	2,050	108	196	63,500
06/94	648	37	63	19,400
07/94	4,670	315	936	145,000
08/94	6,370	464	1,260	197,000
09/94	752	47	82	22,600
10/94	379	23	36	11,700
11/94	592	38	60	17,800
12/94	1,410	93	154	43,800
01/95	7,190	500	1,050	223,000
02/95	2,510	175	262	72,900
03/95	4620	318	738	143,000
04/95	1,270	91	131	38,000
05/95	2,100	154	226	65,200
06/95	21,000	2,610	5,150	631,000

Table 24. Estimated mean daily load, standard error of regression, standard error of prediction, and total monthly load for total Kjeldahl nitrogen at the Rappahannock River monitoring station, Virginia

[kg/d, kilogram per day; kg/mo, kilogram per month]

Date	Total Kjeldahl nitrogen			
	Mean daily load (kg/d)	Standard error of regression (kg/d)	Standard error of prediction (kg/d)	Total monthly load (kg/mo)
07/93	374	29	53	11,600
08/93	217	17	35	6,730
09/93	121	11	17	3,640
10/93	117	10	16	3,630
11/93	10,500	1,490	4,550	315,000
12/93	3,850	294	967	119,000
01/94	3,950	280	742	123,000
02/94	7,000	564	1,590	196,000
03/94	16,000	1,480	3,020	496,000
04/94	2,720	189	392	81,700
05/94	869	64	118	26,900
06/94	356	28	49	10,700
07/94	3,590	352	1,210	111,000
08/94	5460	589	1,910	169,000
09/94	470	41	71	14,100
10/94	248	22	33	7,700
11/94	318	28	45	9,550
12/94	623	58	97	19,300
01/95	3,400	339	852	105000
02/95	924	90	138	26,800
03/95	2,050	200	555	63,600
04/95	538	54	79	16,100
05/95	990	102	152	30,700
06/95	34,700	6,520	13,800	1,040,000

Table 25. Estimated mean daily load, standard error of regression, standard error of prediction, and total monthly load for dissolved ammonia nitrogen at the Rappahannock River monitoring station, Virginia

[kg/d, kilogram per day; kg/mo, kilogram per month]

Date	Dissolved ammonia nitrogen			
	Mean daily load (kg/d)	Standard error of regression (kg/d)	Standard error of prediction (kg/d)	Total monthly load (kg/mo)
07/93	26	3	5	820
08/93	14	1	3	438
09/93	8	1	1	244
10/93	8	1	1	264
11/93	314	59	173	9,430
12/93	212	21	58	6,580
01/94	279	27	61	8,640
02/94	454	47	115	12,700
03/94	888	107	201	27,500
04/94	212	20	39	6,360
05/94	69	7	12	2,160
06/94	26	3	4	780
07/94	127	16	47	3,940
08/94	169	23	64	5,250
09/94	25	3	5	773
10/94	15	2	2	481
11/94	22	2	4	668
12/94	46	5	9	1,440
01/95	204	27	57	6310
02/95	81	10	16	2,370
03/95	141	18	41	4,380
04/95	46	6	9	1,390
05/95	67	9	13	2,100
06/95	652	158	318	19,600

Table 26. Estimated mean daily load, standard error of regression, standard error of prediction, and total monthly load for dissolved nitrite-plus-nitrate nitrogen at the Rappahannock River monitoring station, Virginia
[kg/d, kilogram per day; kg/mo, kilogram per month]

Date	Dissolved nitrite-plus-nitrate nitrogen			
	Mean daily load (kg/d)	Standard error of regression (kg/d)	Standard error of prediction (kg/d)	Total monthly load (kg/mo)
07/93	265	27	62	8,210
08/93	98	10	33	3,040
09/93	26	3	6	806
10/93	28	3	6	896
11/93	1,900	311	956	56,900
12/93	3,710	351	883	115,000
01/94	6,210	582	1,260	192,000
02/94	9,240	897	1,940	259,000
03/94	14,800	1,590	2,920	460,000
04/94	5,200	493	1,010	156,000
05/94	1,290	130	256	40,100
06/94	253	27	51	7,590
07/94	1,610	201	544	49,800
08/94	1,920	253	592	59,600
09/94	245	29	59	7,360
10/94	93	11	17	2,890
11/94	201	24	43	6,030
12/94	687	85	154	21,300
01/95	3,870	501	960	120,000
02/95	1,660	218	344	48,200
03/95	2,720	351	746	84,400
04/95	691	93	142	20,700
05/95	1,130	156	244	35,000
06/95	2,780	525	1,010	83,300

Table 27. Estimated mean daily load, standard error of regression, standard error of prediction, and total monthly load for total phosphorus at the Rappahannock River monitoring station, Virginia

[kg/d, kilogram per day; kg/mo, kilogram per month]

Date	Total phosphorus			
	Mean daily load (kg/d)	Standard error of regression (kg/d)	Standard error of prediction (kg/d)	Total monthly load (kg/mo)
07/93	51	5	10	1,610
08/93	27	2	6	856
09/93	12	1	2	382
10/93	12	1	2	383
11/93	5,480	1,030	3,280	165,000
12/93	1,220	128	486	37,800
01/94	1,120	105	339	34,800
02/94	2,350	260	865	65,700
03/94	6,040	751	1,670	187,000
04/94	628	57	129	18,800
05/94	148	14	27	4,580
06/94	47	4	8	1,430
07/94	1,180	155	618	36,400
08/94	1,970	288	1,090	61,100
09/94	69	7	14	2,080
10/94	30	3	5	953
11/94	43	5	8	1,310
12/94	104	12	23	3,230
01/95	1,010	133	415	31,300
02/95	164	20	32	4,740
03/95	547	70	249	16,900
04/95	80	10	15	2,410
05/95	169	22	35	5,250
06/95	19,500	4,850	10,700	586,000

Table 28. Estimated mean daily load, standard error of regression, standard error of prediction, and total monthly load for dissolved orthophosphorus at the Rappahannock River monitoring station, Virginia

[kg/d, kilogram per day; kg/mo, kilogram per month]

Date	Dissolved orthophosphorus			
	Mean daily load (kg/d)	Standard error of regression (kg/d)	Standard error of prediction (kg/d)	Total monthly load (kg/mo)
07/93	12	1	2	401
08/93	7	0	1	244
09/93	4	0	0	142
10/93	4	0	0	153
11/93	159	23	68	4,780
12/93	119	9	26	3,700
01/94	127	9	21	3,940
02/94	176	14	33	4,920
03/94	316	30	55	9,790
04/94	82	6	12	2,490
05/94	29	2	4	925
06/94	12	1	1	383
07/94	83	8	24	2,580
08/94	125	14	36	3,860
09/94	20	2	3	628
10/94	11	1	1	370
11/94	16	1	2	488
12/94	31	3	5	968
01/95	114	12	24	3,520
02/95	41	4	6	1,190
03/95	65	6	15	2,020
04/95	21	2	3	647
05/95	36	4	6	1,140
06/95	362	69	137	10,900

Table 29. Estimated mean daily load, standard error of regression, standard error of prediction, and total monthly load for total suspended solids at the Rappahannock River monitoring station, Virginia
[kg/d, kilogram per day; kg/mo, kilogram per month]

Date	Total suspended solids			
	Mean daily load (kg/d)	Standard error of regression (kg/d)	Standard error of prediction (kg/d)	Total monthly load (kg/mo)
07/93	7,760	1,280	3,520	241,000
08/93	3,480	576	2,620	108,000
09/93	503	118	211	15,100
10/93	434	106	164	13,400
11/93	3,930,000	1,140,000	4,090,000	118,000,000
12/93	739,000	127,000	596,000	22,900,000
01/94	574,000	87,000	372,000	17,800,000
02/94	1,410,000	253,000	1,030,000	39,500,000
03/94	4,130,000	808,000	2,080,000	128,000,000
04/94	277,000	39,700	115,000	8,310,000
05/94	36,700	5,560	13,500	1,140,000
06/94	5,900	1,010	2,280	177,000
07/94	983,000	209,000	1,010,000	30,500,000
08/94	1,690,000	397,000	1,800,000	52,500,000
09/94	11,300	2,130	5,410	340,000
10/94	2,170	443	702	67,400
11/94	4,350	833	1,640	131,000
12/94	20,100	3,840	10,900	624,000
01/95	550,000	117,000	474,000	17,100,000
02/95	35,600	7,040	12,500	1,030,000
03/95	287,000	59,900	289,000	8,910,000
04/95	12,700	2,600	4,450	382,000
05/95	45,000	9,490	17,500	1,390,000
06/95	16,600,000	6,340,000	15,600,000	497,000,000

Table 30. Estimated mean daily load, standard error of regression, standard error of prediction, and total monthly load for total organic carbon at the Rappahannock River monitoring station, Virginia

[kg/d, kilogram per day; kg/mo, kilogram per month]

Date	Total organic carbon			
	Mean daily load (kg/d)	Standard error of regression (kg/d)	Standard error of prediction (kg/d)	Total monthly load (kg/mo)
07/93	4,670	391	643	145,000
08/93	2,810	247	432	87,200
09/93	1,730	174	249	51,800
10/93	1,740	177	247	54,100
11/93	77,500	11,700	31,000	2,330,000
12/93	39,900	3,840	8,700	1,240,000
01/94	44,400	4,380	7,770	1,370,000
02/94	71,600	7,620	14,600	2,000,000
03/94	148,000	17,400	27,200	4,590,000
04/94	31,800	3,380	4,940	954,000
05/94	11,100	1,240	1,700	345,000
06/94	4,820	567	753	145,000
07/94	32,100	4,410	9,620	996,000
08/94	47,000	6,930	14,500	1,460,000
09/94	6,260	874	1,120	188,000
10/94	3,670	525	633	114,000
11/94	4,790	726	877	144,000
12/94	9,020	1,450	1,770	279,000
01/95	39,000	6,680	9,850	1,210,000
02/95	13,300	2,340	2,720	386,000
03/95	24,500	4,380	6,570	759,000
04/95	7,810	1,440	1,640	234,000
05/95	13,000	2,490	2,840	402,000
06/95	225,000	56,700	90,100	6,750,000

Table 31. Estimated mean daily load, standard error of regression, standard error of prediction, and total monthly load for dissolved silica at the Rappahannock River monitoring station, Virginia

[kg/d, kilogram per day; kg/mo, kilogram per month]

Date	Dissolved silica			
	Mean daily load (kg/d)	Standard error of regression (kg/d)	Standard error of prediction (kg/d)	Total monthly load (kg/mo)
07/93	12,000	335	582	372,000
08/93	6,760	193	368	210,000
09/93	3,980	131	202	120,000
10/93	4,180	136	204	130,000
11/93	39,800	1,640	4,480	1,190,000
12/93	63,100	1,560	3,340	1,960,000
01/94	79,100	1,930	3,730	2,450,000
02/94	102,000	2,590	5,140	2,860,000
03/94	155,000	4,450	7,650	4,810,000
04/94	65,700	1,630	2,990	1,970,000
05/94	28,300	757	1,300	876,000
06/94	12,400	360	585	371,000
07/94	39,400	1,250	2,780	1,220,000
08/94	52,300	1,780	3,480	1,620,000
09/94	14,700	465	751	440,000
10/94	8,940	285	424	277,000
11/94	12,300	400	611	370,000
12/94	23,100	773	1,170	716,000
01/95	63,200	2,170	3,610	1,960,000
02/95	34,500	1,210	1,780	1,000,000
03/95	45,400	1,570	2,650	1,410,000
04/95	20,700	757	1,060	622,000
05/95	30,200	1,120	1,590	938,000
06/95	80,600	4,170	7,380	2,420,000

Table 32. Estimated mean daily load, standard error of regression, standard error of prediction, and total monthly load for total nitrogen at the Appomattox River monitoring station, Virginia

[kg/d, kilogram per day; kg/mo, kilogram per month]

Date	Total nitrogen			
	Mean daily load (kg/d)	Standard error of regression (kg/d)	Standard error of prediction (kg/d)	Total monthly load (kg/mo)
07/93	273	11	20	8,480
08/93	208	8	16	6,460
09/93	116	6	9	3,480
10/93	118	6	9	3,650
11/93	1,080	41	149	32,300
12/93	6,830	288	545	212,000
01/94	2,520	87	167	78,200
02/94	5360	154	378	150,000
03/94	8,960	327	665	278,000
04/94	4,440	148	404	133,000
05/94	1,670	60	127	51,900
06/94	795	31	64	23,800
07/94	549	23	42	17,000
08/94	926	47	87	28,700
09/94	390	17	34	11,700
10/94	397	18	29	12,300
11/94	1,230	59	118	36,900
12/94	652	33	47	20,200
01/95	1,980	92	159	61,500
02/95	1,310	67	101	38,000
03/95	2,500	114	215	77,600
04/95	730	39	55	21,900
05/95	1,860	89	144	57,700
06/95	2,370	126	200	71,200

Table 33. Estimated mean daily load, standard error of regression, standard error of prediction, and total monthly load for total Kjeldahl nitrogen at the Appomattox River monitoring station, Virginia

[kg/d, kilogram per day; kg/mo, kilogram per month]

Date	Total Kjeldahl nitrogen			
	Mean daily load (kg/d)	Standard error of regression (kg/d)	Standard error of prediction (kg/d)	Total monthly load (kg/mo)
07/93	209	9	17	6,480
08/93	157	7	14	4,880
09/93	77	4	6	2,320
10/93	76	4	6	2,360
11/93	807	33	122	24,200
12/93	5,140	230	439	159,000
01/94	1,820	65	128	56,300
02/94	3,840	117	290	107,000
03/94	6,440	250	510	200,000
04/94	3,280	116	317	98,300
05/94	1,300	49	106	40,400
06/94	633	26	55	19,000
07/94	440	19	37	13,600
08/94	776	42	80	24,100
09/94	300	14	28	8,990
10/94	288	14	22	8,940
11/94	911	46	94	27,300
12/94	445	23	34	13,800
01/95	1,380	66	118	42,700
02/95	887	47	72	25,700
03/95	1,740	82	160	54,100
04/95	505	28	40	15,100
05/95	1,410	71	116	43,700
06/95	1,900	107	173	57,100

Table 34. Estimated mean daily load, standard error of regression, standard error of prediction, and total monthly load for dissolved ammonia nitrogen at the Appomattox River monitoring station, Virginia

[kg/d, kilogram per day; kg/mo, kilogram per month]

Date	Dissolved ammonia nitrogen			
	Mean daily load (kg/d)	Standard error of regression (kg/d)	Standard error of prediction (kg/d)	Total monthly load (kg/mo)
07/93	18	1	3	570
08/93	14	1	3	437
09/93	4	0	1	140
10/93	4	0	1	155
11/93	83	7	26	2,500
12/93	483	45	84	15,000
01/94	201	15	30	6,230
02/94	316	20	49	8,840
03/94	409	33	66	12,700
04/94	224	16	40	6,710
05/94	114	9	19	3,540
06/94	57	5	11	1,720
07/94	41	4	8	1,290
08/94	82	9	19	2,560
09/94	30	3	7	928
10/94	28	2	5	892
11/94	97	10	21	2,920
12/94	44	4	7	1,390
01/95	128	12	23	3,950
02/95	78	8	13	2,280
03/95	128	12	23	3,960
04/95	37	4	6	1,130
05/95	109	11	19	3,380
06/95	150	17	28	4,510

Table 35. Estimated mean daily load, standard error of regression, standard error of prediction, and total monthly load for dissolved nitrite-plus-nitrate nitrogen at the Appomattox River monitoring station, Virginia
[kg/d, kilogram per day; kg/mo, kilogram per month]

Date	Dissolved nitrite-plus-nitrate nitrogen			
	Mean daily load (kg/d)	Standard error of regression (kg/d)	Standard error of prediction (kg/d)	Total monthly load (kg/mo)
07/93	64	5	10	1,990
08/93	52	4	8	1,620
09/93	42	5	7	1,280
10/93	50	6	8	1,560
11/93	268	21	75	8,040
12/93	1,650	147	292	51,200
01/94	729	52	107	22,600
02/94	1,590	98	253	44,500
03/94	2,620	208	446	81,200
04/94	1,170	85	249	35,100
05/94	365	27	60	11,300
06/94	160	13	26	4,790
07/94	107	9	16	3,310
08/94	152	15	28	4,720
09/94	89	7	15	2,690
10/94	108	9	16	3,360
11/94	314	30	62	9,430
12/94	227	23	35	7,020
01/95	652	61	112	20,200
02/95	473	49	78	13,700
03/95	816	75	153	25,300
04/95	244	26	39	7,330
05/95	445	43	75	13,800
06/95	452	49	81	13,600

Table 36. Estimated mean daily load, standard error of regression, standard error of prediction, and total monthly load for total phosphorus at the Appomattox River monitoring station, Virginia

[kg/d, kilogram per day; kg/mo, kilogram per month]

Date	Total phosphorus			
	Mean daily load (kg/d)	Standard error of regression (kg/d)	Standard error of prediction (kg/d)	Total monthly load (kg/mo)
07/93	16	1	2	515
08/93	12	0	1	374
09/93	6	0	0	188
10/93	6	0	0	208
11/93	112	7	29	3,370
12/93	866	59	119	26,800
01/94	258	13	28	8,000
02/94	681	31	81	19,100
03/94	1,300	79	167	40,400
04/94	579	33	98	17,400
05/94	152	8	20	4,720
06/94	58	3	8	1,760
07/94	35	2	4	1,100
08/94	67	5	11	2,080
09/94	24	1	3	736
10/94	24	1	2	765
11/94	106	8	18	3,190
12/94	47	3	5	1,470
01/95	196	14	26	6,070
02/95	116	9	14	3,370
03/95	270	18	41	8,370
04/95	54	4	6	1,650
05/95	160	12	20	4,960
06/95	200	16	28	6,010

Table 37. Estimated mean daily load, standard error of regression, standard error of prediction, and total monthly load for dissolved orthophosphorus at the Appomattox River monitoring station, Virginia

[kg/d, kilogram per day; kg/mo, kilogram per month

Date	Dissolved orthophosphorus			
	Mean daily load (kg/d)	Standard error of regression (kg/d)	Standard error of prediction (kg/d)	Total monthly load (kg/mo)
07/93	5	0	0	175
08/93	4	0	0	143
09/93	2	0	0	89
10/93	3	0	0	98
11/93	21	1	4	652
12/93	126	9	17	3,920
01/94	51	3	5	1,610
02/94	101	5	12	2,830
03/94	159	10	20	4,910
04/94	79	4	12	2,400
05/94	32	2	4	1,020
06/94	16	1	2	505
07/94	12	0	1	389
08/94	20	1	3	634
09/94	10	0	1	306
10/94	11	0	1	346
11/94	31	2	4	945
12/94	18	1	2	586
01/95	51	3	6	1,590
02/95	35	2	4	1,030
03/95	61	4	8	1,920
04/95	20	1	2	612
05/95	46	3	6	1,450
06/95	58	5	8	1,760

Table 38. Estimated mean daily load, standard error of regression, standard error of prediction, and total monthly load for total suspended solids at the Appomattox River monitoring station, Virginia

[kg/d, kilogram per day; kg/mo, kilogram per month]

Date	Total suspended solids			
	Mean daily load (kg/d)	Standard error of regression (kg/d)	Standard error of prediction (kg/d)	Total monthly load (kg/mo)
07/93	1,410	129	284	43,600
08/93	1,010	95	235	31,200
09/93	258	43	55	7,740
10/93	319	48	69	9,870
11/93	3,0200	2,630	11,700	905,000
12/93	256,000	22,700	46,500	7,940,000
01/94	56,000	3,850	8,260	1,740,000
02/94	157,000	9,150	24,600	4,390,000
03/94	299,000	24,100	50,000	9,260,000
04/94	123,000	9,590	28,500	3,680,000
05/94	26,500	1,940	5,110	821,000
06/94	8,480	720	1,920	254,000
07/94	4,580	424	1,010	142,000
08/94	13,500	1,530	3,430	420,000
09/94	3,510	353	835	105,000
10/94	2,870	281	478	88,900
11/94	24,800	2,450	6,350	744,000
12/94	6,280	637	957	195,000
01/95	41,400	3,760	7,690	128,0000
02/95	18,400	1,840	3,060	534,000
03/95	53,200	4,760	11,400	1,650,000
04/95	5,980	646	948	180,000
05/95	27,600	2,670	4,950	856,000
06/95	40,700	4,450	7,970	1,220,000

Table 39. Estimated mean daily load, standard error of regression, standard error of prediction, and total monthly load for total organic carbon at the Appomattox River monitoring station, Virginia

[kg/d, kilogram per day; kg/mo, kilogram per month]

Date	Total organic carbon			
	Mean daily load (kg/d)	Standard error of regression (kg/d)	Standard error of prediction (kg/d)	Total monthly load (kg/mo)
07/93	3,010	197	334	93,300
08/93	2,290	155	270	71,100
09/93	1,270	119	155	38,200
10/93	1,240	118	154	38,500
11/93	11,500	725	2,390	345,000
12/93	75,500	5,020	9,100	2,340,000
01/94	25,000	1,640	2,620	774,000
02/94	56,900	3,310	6,300	1,590,000
03/94	102,000	6,660	11,800	3,160,000
04/94	50,100	3,340	7,220	1,500,000
05/94	17,700	1,420	2,250	550,000
06/94	8,420	749	1,140	253,000
07/94	5,790	548	771	179,000
08/94	9,890	1,040	1,550	307,000
09/94	3,950	405	583	119,000
10/94	3,840	414	519	119,000
11/94	11,900	1,340	1,980	358,000
12/94	5,890	727	850	183,000
01/95	18,500	2,270	2,870	575,000
02/95	11,900	1,600	1,880	344,000
03/95	24,400	3,150	4,110	755,000
04/95	6,760	1,010	1,130	203,000
05/95	18,400	2,680	3,130	570,000
06/95	24,300	3,720	4,390	729,000

Table 40. Estimated mean daily load, standard error of regression, standard error of prediction, and total monthly load for dissolved silica at the Appomattox River monitoring station, Virginia

[kg/d, kilogram per day; kg/mo, kilogram per month]

Date	Dissolved silica			
	Mean daily load (kg/d)	Standard error of regression (kg/d)	Standard error of prediction (kg/d)	Total monthly load (kg/mo)
07/93	7,210	170	309	223,000
08/93	5,590	133	253	173,000
09/93	3,190	105	146	95,600
10/93	3,340	109	155	104,000
11/93	23,100	483	1,530	692,000
12/93	121,000	2,800	5,100	3,750,000
01/94	59,000	1,140	2,170	1,830,000
02/94	100,000	1,630	3,850	2,810,000
03/94	140,000	2,790	5,550	4,340,000
04/94	76,800	1,380	3,420	2,300,000
05/94	37,800	778	1,540	1,170,000
06/94	19,900	448	867	598,000
07/94	14,700	349	627	455,000
08/94	22,900	654	1,160	710,000
09/94	11,100	276	538	332,000
10/94	12,000	301	494	372,000
11/94	31,800	837	1,580	953,000
12/94	20,100	551	812	622,000
01/95	49,600	1,270	2,150	1,540,000
02/95	36,100	1,010	1,550	1,050,000
03/95	56,600	1,430	2,530	1,760,000
04/95	21,000	624	892	630,000
05/95	45,500	1,230	1,930	1,410,000
06/95	54,800	1,640	2,530	1,640,000

Table 41. Estimated mean daily load, standard error of regression, standard error of prediction, and total monthly load for total nitrogen at the Pamunkey River monitoring station, Virginia

[kg/d, kilogram per day; kg/mo, kilogram per month]

Date	Total nitrogen			
	Mean daily load (kg/d)	Standard error of regression (kg/d)	Standard error of prediction (kg/d)	Total monthly load (kg/mo)
07/93	230	9	15	7,130
08/93	189	7	15	5,870
09/93	107	5	7	3,210
10/93	147	6	10	4,540
11/93	1,540	63	249	46,100
12/93	5,170	202	468	160,000
01/94	3,060	95	201	94,800
02/94	6,880	215	503	193,000
03/94	9,860	404	792	306,000
04/94	5,130	177	459	154,000
05/94	1,980	75	142	61,300
06/94	604	25	40	18,100
07/94	1,480	74	149	45,800
08/94	2,600	146	273	80,700
09/94	980	52	100	29,400
10/94	456	22	33	14,100
11/94	555	28	43	16,700
12/94	659	34	48	20,400
01/95	2,090	101	179	64,800
02/95	1,070	59	84	31,000
03/95	2,410	119	244	74,700
04/95	670	39	54	20,100
05/95	1,160	65	94	36,000
06/95	2,110	127	267	63,400

Table 42. Estimated mean daily load, standard error of regression, standard error of prediction, and total monthly load for total Kjeldahl nitrogen at the Pamunkey River monitoring station, Virginia

[kg/d, kilogram per day; kg/mo, kilogram per month]

Date	Total Kjeldahl nitrogen			
	Mean daily load (kg/d)	Standard error of regression (kg/d)	Standard error of prediction (kg/d)	Total monthly load (kg/mo)
07/93	136	6	11	4,220
08/93	116	5	12	3,600
09/93	63	4	5	1,900
10/93	87	4	7	2,700
11/93	1,170	62	251	35,200
12/93	3,900	195	467	121,000
01/94	2,000	77	167	62,000
02/94	4,700	185	443	132,000
03/94	6,970	366	730	216,000
04/94	3,470	154	415	104,000
05/94	1,220	58	112	38,000
06/94	353	18	29	10,600
07/94	1,010	64	136	31,400
08/94	1,920	135	262	59,400
09/94	672	45	89	20,100
10/94	281	17	26	8,720
11/94	336	21	33	10,100
12/94	385	25	35	11,900
01/95	1,310	78	144	40,500
02/95	598	41	59	17,400
03/95	1,490	91	199	46,300
04/95	359	26	36	10,800
05/95	663	46	68	20,600
06/95	1,420	107	240	42,600

Table 43. Estimated mean daily load, standard error of regression, standard error of prediction, and total monthly load for dissolved ammonia nitrogen at the Pamunkey River monitoring station, Virginia

[kg/d, kilogram per day; kg/mo, kilogram per month]

Date	Dissolved ammonia nitrogen			
	Mean daily load (kg/d)	Standard error of regression (kg/d)	Standard error of prediction (kg/d)	Total monthly load (kg/mo)
07/93	12	1	1	374
08/93	9	0	1	296
09/93	4	0	0	125
10/93	6	0	1	194
11/93	58	5	19	1,750
12/93	209	17	36	6,480
01/94	156	10	22	4,850
02/94	270	18	40	7,560
03/94	324	26	49	10,000
04/94	200	14	32	5,990
05/94	103	8	15	3,180
06/94	31	2	4	929
07/94	69	7	14	2,140
08/94	109	12	23	3,370
09/94	44	4	9	1,320
10/94	20	2	3	619
11/94	24	2	4	719
12/94	28	3	4	885
01/95	78	7	13	2,440
02/95	44	4	7	1,300
03/95	77	7	15	2,390
04/95	26	3	4	804
05/95	45	5	7	1,420
06/95	63	7	15	1,890

Table 44. Estimated mean daily load, standard error of regression, standard error of prediction, and total monthly load for dissolved nitrite-plus-nitrate nitrogen at the Pamunkey River monitoring station, Virginia

[kg/d, kilogram per day; kg/mo, kilogram per month]

Date	Dissolved nitrite-plus-nitrate nitrogen			
	Mean daily load (kg/d)	Standard error of regression (kg/d)	Standard error of prediction (kg/d)	Total monthly load (kg/mo)
07/93	94	5	8	2,940
08/93	71	3	7	2,220
09/93	43	2	4	1,290
10/93	57	3	5	1,790
11/93	375	19	72	11,200
12/93	1,280	62	140	39,700
01/94	1,010	40	86	31,500
02/94	2,160	87	204	60,400
03/94	2,960	152	298	91,700
04/94	1,680	72	181	50,500
05/94	751	36	68	23,300
06/94	254	13	21	7,610
07/94	444	27	52	13,800
08/94	659	45	83	20,400
09/94	281	17	34	8,420
10/94	161	9	15	5,000
11/94	205	12	20	6,160
12/94	265	16	24	8,200
01/95	759	44	80	23,500
02/95	488	32	48	14,200
03/95	933	56	114	28,900
04/95	341	23	34	10,200
05/95	513	34	52	15,900
06/95	679	49	98	20,400

Table 45. Estimated mean daily load, standard error of regression, standard error of prediction, and total monthly load for total phosphorus at the Pamunkey River monitoring station, Virginia

[kg/d, kilogram per day; kg/mo, kilogram per month]

Date	Total phosphorus			
	Mean daily load (kg/d)	Standard error of regression (kg/d)	Standard error of prediction (kg/d)	Total monthly load (kg/mo)
07/93	21	1	2	673
08/93	19	1	2	599
09/93	10	0	1	300
10/93	14	1	1	449
11/93	242	18	75	7,260
12/93	808	56	139	25,000
01/94	390	21	46	12,100
02/94	897	49	120	25,100
03/94	1,300	94	192	40,300
04/94	640	39	109	19,200
05/94	222	14	29	6,890
06/94	60	4	7	1,820
07/94	199	17	39	6,170
08/94	397	39	78	12,300
09/94	138	13	26	4,150
10/94	53	4	7	1,660
11/94	64	5	9	1,940
12/94	73	6	9	2,270
01/95	257	21	40	7,970
02/95	110	10	15	3,180
03/95	279	23	53	8,640
04/95	61	6	8	1,850
05/95	119	11	17	3,680
06/95	276	29	67	8,280

Table 46. Estimated mean daily load, standard error of regression, standard error of prediction, and total monthly load for dissolved orthophosphorus at the Pamunkey River monitoring station, Virginia

[kg/d, kilogram per day; kg/mo, kilogram per month]

Date	Dissolved orthophosphorus			
	Mean daily load (kg/d)	Standard error of regression (kg/d)	Standard error of prediction (kg/d)	Total monthly load (kg/mo)
07/93	11	0	1	346
08/93	10	0	1	316
09/93	7	0	1	228
10/93	9	0	1	284
11/93	34	2	8	1,030
12/93	101	6	15	3,130
01/94	65	3	7	2,030
02/94	121	6	15	3,380
03/94	164	11	23	5,080
04/94	98	5	14	2,950
05/94	52	3	6	1,640
06/94	25	1	3	777
07/94	51	4	8	1,600
08/94	83	7	14	2,570
09/94	41	3	6	1,260
10/94	26	2	3	827
11/94	29	2	3	871
12/94	31	2	4	981
01/95	67	5	9	2,090
02/95	41	3	5	1,220
03/95	73	6	11	2,270
04/95	32	3	4	981
05/95	53	4	7	1,640
06/95	87	8	17	2,630

Table 47. Estimated mean daily load, standard error of regression, standard error of prediction, and total monthly load for total suspended solids at the Pamunkey River monitoring station, Virginia

[kg/d, kilogram per day; kg/mo, kilogram per month]

Date	Total suspended solids			
	Mean daily load (kg/d)	Standard error of regression (kg/d)	Standard error of prediction (kg/d)	Total monthly load (kg/mo)
07/93	1,400	206	376	43,200
08/93	1,820	246	1,080	56,600
09/93	229	49	69	6,860
10/93	500	91	138	15,500
11/93	109,000	15,700	73,800	3,270,000
12/93	367,000	48,500	132,000	11,400,000
01/94	162,000	15,800	41,600	5,020,000
02/94	411,000	41,900	111,000	11,500,000
03/94	560,000	72,900	158,000	17,400,000
04/94	281,000	31,900	96,300	8,420,000
05/94	88,900	10,500	26,800	2,760,000
06/94	9,930	1,250	2,310	298,000
07/94	91,500	15,400	46,200	2,840,000
08/94	215,000	38,900	95,800	6,660,000
09/94	55,000	9,540	26,700	1,650,000
10/94	7,550	1,100	2,300	234,000
11/94	11,800	1,750	4,310	354,000
12/94	13,200	2,030	3,480	411,000
01/95	103,000	14,600	36,100	3,190,000
02/95	28,900	4,580	8,220	837,000
03/95	117,000	17,500	50,000	3,630,000
04/95	12,900	2,160	3,840	387,000
05/95	38,500	6,320	12,000	1,190,000
06/95	140,000	26,700	78,400	4,190,000

Table 48. Estimated mean daily load, standard error of regression, standard error of prediction, and total monthly load for total organic carbon at the Pamunkey River monitoring station, Virginia

[kg/d, kilogram per day; kg/mo, kilogram per month]

Date	Total organic carbon			
	Mean daily load (kg/d)	Standard error of regression (kg/d)	Standard error of prediction (kg/d)	Total monthly load (kg/mo)
07/93	1,910	86	133	59,100
08/93	1,620	73	133	50,300
09/93	955	55	74	28,600
10/93	1,240	66	91	38,500
11/93	16,600	778	2,990	498,000
12/93	54,400	2,450	5,620	1,690,000
01/94	25,600	1,080	1,900	792,000
02/94	67,200	2,840	5,620	1,880,000
03/94	109,000	5,650	10,200	3,360,000
04/94	51300	2,470	5,630	1,540,000
05/94	15,800	876	1,340	491,000
06/94	4,590	283	370	138,000
07/94	12,900	843	1,510	401,000
08/94	24,900	1,730	2,980	773,000
09/94	8,290	595	973	249,000
10/94	3,540	265	330	110,000
11/94	4,170	341	426	125,000
12/94	4,770	421	490	148,000
01/95	16,900	1,440	1,940	524,000
02/95	7,530	741	858	218,000
03/95	20,900	1,880	2,810	647,000
04/95	4,640	498	563	139,000
05/95	8,460	888	1,030	262,000
06/95	19,600	1,990	3,220	589,000

Table 49. Estimated mean daily load, standard error of regression, standard error of prediction, and total monthly load for dissolved silica at the Pamunkey River monitoring station, Virginia

[kg/d, kilogram per day; kg/mo, kilogram per month]

Date	Dissolved silica			
	Mean daily load (kg/d)	Standard error of regression (kg/d)	Standard error of prediction (kg/d)	Total monthly load (kg/mo)
07/93	3,540	61	101	110,000
08/93	2,860	49	94	88,600
09/93	1,790	39	56	53,700
10/93	2,710	52	79	83,900
11/93	17,000	274	979	509,000
12/93	59,300	911	1,940	1,840,000
01/94	48,900	646	1,310	1,520,000
02/94	85,400	1,100	2,460	2,390,000
03/94	102,000	1,600	3,050	3,170,000
04/94	59,300	807	1,870	1,780,000
05/94	28,800	452	837	894,000
06/94	10,000	168	277	301,000
07/94	18,300	365	681	567,000
08/94	28,100	631	1,110	870,000
09/94	14,100	297	560	422,000
10/94	8,650	169	260	268,000
11/94	11,600	235	371	348,000
12/94	15,000	318	459	465,000
01/95	38,500	755	1,290	1,190,000
02/95	24,500	538	789	710,000
03/95	38,900	778	1,450	1,210,000
04/95	14,700	339	481	441,000
05/95	21,400	474	703	662,000
06/95	26,300	617	1,150	789,000

Table 50. Estimated mean daily load, standard error of regression, standard error of prediction, and total monthly load for total nitrogen at the Mattaponi River monitoring station, Virginia

[kg/d, kilogram per day; kg/mo, kilogram per month]

Date	Total nitrogen			
	Mean daily load (kg/d)	Standard error of regression (kg/d)	Standard error of prediction (kg/d)	Total monthly load (kg/mo)
07/93	169	5	9	5,230
08/93	206	7	14	6,390
09/93	120	4	6	3,610
10/93	125	4	6	3,890
11/93	355	10	25	10,700
12/93	1,550	46	86	47,900
01/94	1,190	29	54	36,800
02/94	2,270	56	120	63,600
03/94	3,370	101	178	105,000
04/94	2,710	83	166	81,300
05/94	1,050	30	56	32,600
06/94	307	10	16	9,200
07/94	432	16	27	13,400
08/94	1,190	55	82	37,000
09/94	338	14	24	10,100
10/94	297	11	17	9,220
11/94	323	13	18	9,690
12/94	387	15	21	12,000
01/95	906	34	51	28,100
02/95	610	26	36	17,700
03/95	829	33	53	25,700
04/95	416	19	26	12,500
05/95	603	27	37	18,700
06/95	603	28	44	18,100

Table 51. Estimated mean daily load, standard error of regression, standard error of prediction, and total monthly load for total Kjeldahl nitrogen at the Mattaponi River monitoring station, Virginia

[kg/d, kilogram per day; kg/mo, kilogram per month]

Date	Total Kjeldahl nitrogen			
	Mean daily load (kg/d)	Standard error of regression (kg/d)	Standard error of prediction (kg/d)	Total monthly load (kg/mo)
07/93	133	5	10	4,130
08/93	170	7	15	5,280
09/93	94	3	6	2,830
10/93	95	3	6	2,960
11/93	274	10	26	8,230
12/93	1,230	46	90	38,200
01/94	879	27	52	27,200
02/94	1,730	55	120	48,500
03/94	2,650	101	183	82,100
04/94	2,170	86	176	65,000
05/94	819	30	57	25,400
06/94	236	10	15	7,070
07/94	355	17	29	11,000
08/94	1,050	60	93	32,400
09/94	277	14	25	8,300
10/94	232	11	17	7,200
11/94	240	12	17	7,190
12/94	277	14	19	8,580
01/95	652	31	47	20,200
02/95	421	22	31	12,200
03/95	592	29	49	18,400
04/95	292	16	23	8,770
05/95	447	25	35	13,800
06/95	479	28	46	14,400

Table 52. Estimated mean daily load, standard error of regression, standard error of prediction, and total monthly load for dissolved ammonia nitrogen at the Mattaponi River monitoring station, Virginia

[kg/d, kilogram per day; kg/mo, kilogram per month]

Date	Dissolved ammonia nitrogen			
	Mean daily load (kg/d)	Standard error of regression (kg/d)	Standard error of prediction (kg/d)	Total monthly load (kg/mo)
07/93	10	1	2	333
08/93	13	1	3	413
09/93	6	0	1	196
10/93	6	0	1	201
11/93	18	1	4	540
12/93	68	7	13	2,120
01/94	56	5	9	1,740
02/94	88	8	16	2,470
03/94	120	14	23	3,730
04/94	105	11	20	3,140
05/94	57	5	11	1,790
06/94	18	2	3	558
07/94	26	3	6	817
08/94	66	10	16	2,060
09/94	18	2	4	555
10/94	15	2	3	487
11/94	15	2	3	476
12/94	18	2	3	566
01/95	38	4	7	1,190
02/95	27	3	5	802
03/95	35	4	7	1,090
04/95	20	3	4	619
05/95	31	4	6	981
06/95	31	5	8	947

Table 53. Estimated mean daily load, standard error of regression, standard error of prediction, and total monthly load for dissolved nitrite-plus-nitrate nitrogen at the Mattaponi River monitoring station, Virginia

[kg/d, kilogram per day; kg/mo, kilogram per month]

Date	Dissolved nitrite-plus-nitrate nitrogen			
	Mean daily load (kg/d)	Standard error of regression (kg/d)	Standard error of prediction (kg/d)	Total monthly load (kg/mo)
07/93	35	2	4	1,090
08/93	35	2	5	1,100
09/93	21	1	2	658
10/93	24	1	3	754
11/93	68	4	11	2,050
12/93	278	18	35	8,620
01/94	280	15	31	8,690
02/94	510	28	63	14,300
03/94	711	47	87	22,000
04/94	556	37	75	16,700
05/94	237	15	30	7,350
06/94	69	5	8	2,070
07/94	74	6	10	2,320
08/94	162	16	25	5,030
09/94	51	4	8	1,550
10/94	51	4	6	1,590
11/94	64	5	8	1,930
12/94	88	7	11	2,740
01/95	214	17	28	6,630
02/95	171	15	23	4,970
03/95	218	19	31	6,770
04/95	117	11	16	3,520
05/95	144	13	20	4,480
06/95	113	11	18	3,380

Table 54. Estimated mean daily load, standard error of regression, standard error of prediction, and total monthly load for total phosphorus at the Mattaponi River monitoring station, Virginia

[kg/d, kilogram per day; kg/mo, kilogram per month]

Date	Total phosphorus			
	Mean daily load (kg/d)	Standard error of regression (kg/d)	Standard error of prediction (kg/d)	Total monthly load (kg/mo)
07/93	17	1	1	553
08/93	23	1	3	735
09/93	12	0	1	386
10/93	12	0	1	398
11/93	37	1	5	1,120
12/93	171	9	18	5,320
01/94	115	5	9	3,570
02/94	230	10	22	6,450
03/94	357	19	35	11,100
04/94	293	16	34	8,800
05/94	108	5	10	3,340
06/94	30	1	2	917
07/94	48	3	5	1,510
08/94	151	12	19	4,680
09/94	38	2	5	1,160
10/94	31	2	3	975
11/94	31	2	3	943
12/94	35	2	3	1,100
01/95	83	5	8	2,580
02/95	51	3	5	1,500
03/95	73	5	8	2,290
04/95	35	2	4	1,070
05/95	56	4	6	1,740
06/95	63	5	8	1,900

Table 55. Estimated mean daily load, standard error of regression, standard error of prediction, and total monthly load for dissolved orthophosphorus at the Mattaponi River monitoring station, Virginia

[kg/d, kilogram per day; kg/mo, kilogram per month]

Date	Dissolved orthophosphorus			
	Mean daily load (kg/d)	Standard error of regression (kg/d)	Standard error of prediction (kg/d)	Total monthly load (kg/mo)
07/93	5	0	0	156
08/93	6	0	0	190
09/93	3	0	0	118
10/93	3	0	0	122
11/93	8	0	1	265
12/93	30	1	3	941
01/94	24	1	2	745
02/94	39	2	4	1,100
03/94	56	3	6	1,740
04/94	49	2	5	1,480
05/94	26	1	2	821
06/94	10	0	1	319
07/94	15	1	1	479
08/94	38	3	5	1,180
09/94	12	1	1	380
10/94	11	0	1	360
11/94	11	0	1	356
12/94	13	1	1	412
01/95	26	1	3	810
02/95	19	1	2	556
03/95	24	1	3	772
04/95	15	1	2	477
05/95	24	2	3	763
06/95	27	2	3	812

Table 56. Estimated mean daily load, standard error of regression, standard error of prediction, and total monthly load for total suspended solids at the Mattaponi River monitoring station, Virginia

[kg/d, kilogram per day; kg/mo, kilogram per month]

Date	Total suspended solids			
	Mean daily load (kg/d)	Standard error of regression (kg/d)	Standard error of prediction (kg/d)	Total monthly load (kg/mo)
07/93	1,190	149	325	37,000
08/93	1,910	274	677	59,200
09/93	717	94	177	21,500
10/93	821	106	186	25,500
11/93	5,000	534	1,940	150,000
12/93	30,300	3,380	7,240	941,000
01/94	22,500	2,040	4,300	698,000
02/94	45,900	4,310	10,200	1,290,000
03/94	66,900	7,580	14,600	2,070,000
04/94	49,100	5,740	12,600	1,470,000
05/94	16,200	1,720	3,810	501,000
06/94	2,710	326	566	81,400
07/94	4,850	691	1,460	150,000
08/94	18,500	3,200	5,470	574,000
09/94	4,280	663	1,430	128,000
10/94	3,290	459	846	102,000
11/94	4,040	550	935	121,000
12/94	5,450	749	1,180	169,000
01/95	17,700	2,290	4,060	547,000
02/95	10,200	1,470	2,320	297,000
03/95	15,100	2,020	4,140	469,000
04/95	5,490	833	1,370	165,000
05/95	8,460	1,280	2,060	262,000
06/95	8,750	1,480	2,860	262,000

Table 57. Estimated mean daily load, standard error of regression, standard error of prediction, and total monthly load for total organic carbon at the Mattaponi River monitoring station, Virginia

[kg/d, kilogram per day; kg/mo, kilogram per month]

Date	Total organic carbon			
	Mean daily load (kg/d)	Standard error regression (kg/d)	Standard error of prediction (kg/d)	Total monthly load (kg/mo)
07/93	1,600	105	183	49,500
08/93	2,050	147	286	63,500
09/93	1,250	85	136	37,600
10/93	1,350	94	143	42,000
11/93	4,310	271	671	129,000
12/93	21,900	1,360	2,590	679,000
01/94	15,100	931	1,500	468,000
02/94	33,300	2,020	3,870	933,000
03/94	52,200	3,590	6,010	1,620,000
04/94	40,600	3,060	5,920	1,220,000
05/94	11,300	899	1,400	352,000
06/94	2,830	272	351	84,800
07/94	4,200	421	610	130,000
08/94	13,400	1,450	2,050	416,000
09/94	3,610	399	583	108,000
10/94	3,160	362	457	97,900
11/94	3,570	436	526	107,000
12/94	4,350	564	656	135,000
01/95	11,300	1,440	1,740	349,000
02/95	6,840	990	1,130	198,000
03/95	9,840	1,380	1,740	305,000
04/95	4,100	662	750	123,000
05/95	5,860	941	1,060	182,000
06/95	6,030	987	1,210	181,000

Table 58. Estimated mean daily load, standard error of regression, standard error of prediction, and total monthly load for dissolved silica at the Mattaponi River monitoring station, Virginia

[kg/d, kilogram per day; kg/mo, kilogram per month]

Date	Dissolved silica			
	Mean daily load (kg/d)	Standard error of regression (kg/d)	Standard error of prediction (kg/d)	Total monthly load (kg/mo)
07/93	1,670	44	80	51,900
08/93	2,200	63	128	68,200
09/93	1,570	41	71	47,100
10/93	1,870	47	80	58100
11/93	5,540	127	316	166,000
12/93	22,400	527	1,010	694,000
01/94	17,800	349	684	551,000
02/94	27,600	551	1,180	772,000
03/94	34,900	847	1,510	1,080,000
04/94	25,200	613	1,210	756,000
05/94	10,300	238	456	319,000
06/94	3,170	84	136	95,200
07/94	4,520	134	234	140,000
08/94	12,400	451	683	386,000
09/94	4,590	147	268	138,000
10/94	4,660	142	221	144,000
11/94	5,740	174	265	172,000
12/94	7,130	220	322	221,000
01/95	15,000	437	689	464,000
02/95	9,810	319	466	284,000
03/95	11,100	343	569	345,000
04/95	5,270	185	265	158,000
05/95	6,880	233	337	213,000
06/95	6,430	234	376	193,000