Low-Flow, Base-Flow, and Mean-Flow Regression Equations for Pennsylvania Streams

By Marla H. Stuckey

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Conversion Factors

Multiply	By	To obtain
	Length	
inch (in.)	2.54	centimeter (cm)
foot (ft)	0.3048	meter (m)
mile (mi)	1.609	kilometer (km)
	Area	
square mile (mi^2)	2.590	square kilometer (km^2)
	Volume	
gallon (gal)	3.785	liter (L)
gallon (gal)	0.003785	cubic meter (m^3)
million gallons (Mgal)	3,785	cubic meter (m^3)
	Flow rate	
cubic foot per second (ft^3/s)	0.02832	cubic meter per second (m^3/s)
cubic foot per second per square mile [(ft^3/s)/mi^2]	0.01093	cubic meter per second per square kilometer [(m^3/s)/km^2]
million gallons per day (Mgal/d)	0.04381	cubic meter per second (m^3/s)

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By Marla H. Stuckey

Abstract

Low-flow, base-flow, and mean-flow characteristics are an important part of assessing water resources in a watershed. These streamflow characteristics can be used by watershed planners and regulators to determine water availability, water-use allocations, assimilative capacities of streams, and aquatic-habitat needs. Streamflow characteristics are commonly predicted by use of regression equations when a nearby streamflow-gaging station is not available.

Regression equations for predicting low-flow, base-flow, and mean-flow characteristics for Pennsylvania streams were developed from data collected at 293 continuous- and partial-record streamflow-gaging stations with flow unaffected by upstream regulation, diversion, or mining. Continuous-record stations used in the regression analysis had 9 years or more of data, and partial-record stations used had seven or more measurements collected during base-flow conditions. The state was divided into five low-flow regions and regional regression equations were developed for the 7-day, 10-year; 7-day, 2-year; 30-day, 10-year; 30-day, 2-year; and 90-day, 10-year low flows using generalized least-squares regression. Statewide regression equations were developed for the 10-year, 25-year, and 50-year base flows using generalized least-squares regression. Statewide regression equations were developed for harmonic mean and mean annual flow using weighted least-squares regression.

Basin characteristics found to be significant explanatory variables at the 95-percent confidence level for one or more regression equations were drainage area, basin slope, thickness of soil, stream density, mean annual precipitation, mean elevation, and the percentage of glaciation, carbonate bedrock, forested area, and urban area within a basin. Standard errors of prediction ranged from 33 to 66 percent for the n-day, T-year low flows; 21 to 23 percent for the base flows; and 12 to 38 percent for the mean annual flow and harmonic mean, respectively. The regression equations are not valid in watersheds with upstream regulation, diversions, or mining activities. Watersheds with karst features need close examination as to the applicability of the regression-equation results.

Introduction

Low-flow, base-flow, and mean-flow characteristics are an important part of assessing water resources in a watershed. These streamflow characteristics can be used by watershed planners and regulators to determine water availability, water-use allocations, assimilative capacities of streams, and aquatic-habitat needs. It is essential that watershed planners and regulators have access to accurate and easily obtainable low-flow and base-flow characteristics to make informed decisions. Streamflow characteristics commonly are predicted by use of regression equations when a nearby streamflow-gaging station is not available. Low-flow regression equations for Pennsylvania streams were last developed by the U.S. Geological Survey (USGS) in 1982 (Flippo, 1982b), and statewide base-flow and mean-flow regression equations have never been developed. Over 20 years of additional streamflow data have been collected and new methods for obtaining basin characteristics have been developed since the last low-flow regression equations were developed. The USGS and the Pennsylvania Department of Environmental Protection (PaDEP) cooperated in a study to develop new low-flow, base-flow, and mean-flow regression equations for Pennsylvania streams using streamflow-gaging stations with data through climatic year 2002[1]. Streamflow data from 293 stations and basin characteristics derived from Geographic Information System (GIS) methods were used to develop these regression equations.

Low flow typically occurs during the months of August through October, when the streamflow is primarily sustained by ground-water discharge to the stream. Ground-water discharge commonly contributes about 65 to 80 percent of streamflow throughout the year. Low-flow characteristics can be described

[1]Climatic year is the 12-month period April 1 through March 31. The climatic year is designated by the calendar year in which it ends. Thus, the climatic year ending March 31, 2002, is the 2002 climatic year.

as n-day, T-year events, which describe the average flow that can be expected for n-consecutive days, every T-years. For example, the 7-day, 10-year (Q7,10) low-flow characteristic is the minimum average flow for 7 consecutive days, expected to occur once every 10 years, or has a 10-percent chance of occurring each year. Base flow is the part of streamflow attributed to ground-water discharge into a stream, without surface runoff, and is described in this report as the mean annual flow expected to occur every T-years. For example, the 50-year base flow is the average annual base flow expected to occur, on average, once every 50 years, or has a 2-percent chance of occurring each year.

Purpose and Scope

This report presents low-flow, base-flow, and mean-flow regression equations for streams in Pennsylvania and the methodology used to develop these equations. A mix of continuous-record and partial-record stations was used to develop regression equations to estimate the 7-day, 10-year (Q7,10); 7-day, 2-year (Q7,2); 30-day, 10-year (Q30,10); 30-day, 2-year (Q30,2); and 90-day, 10-year (Q90,10) low flows; the 10-, 25-, and 50-year base flows; harmonic mean; and mean annual flow. Low-flow, base-flow, and mean-flow characteristics computed from continuous-record and partial-record streamflow-gaging-station data are presented.

Previous Investigations

Regression equations used to predict low-flow characteristics for streams in Pennsylvania were last published in 1982 (Flippo, 1982b). The equations presented by Flippo (1982b) computed the Q7,10 for 12 low-flow regions in the state. Flippo (1982a) also presented additional regression equations to predict monthly and annual low-flow characteristics using 12 low-flow regions and 2 subregions in the state. Ehlke and Reed (1999) evaluated the low-flow regression equations presented by Flippo (1982b) and presented low-flow characteristics for continuous-record stations through the 1996 climatic year.

Physiography and Drainage

There are six major physiographic provinces in the state, each having distinctive landscape and geology (fig. 1). The Atlantic Coastal Plain, New England, and Central Lowlands Physiographic Provinces make up a small part of Pennsylvania but are part of larger provinces outside the state. The Piedmont Physiographic Province is in the southeast part of the State, the Ridge and Valley is west of the Piedmont in the central part of the state, and the Appalachian Plateaus makes up the largest area in the state and is west of the Ridge and Valley (fig. 1A).

Pennsylvania has five major watersheds in the state, and one small area in the southeast that drains directly to the Chesapeake Bay. These watersheds contain more than 98,100 linear miles of streams in the state. The major basins are the Delaware River Basin, which makes up the boundary between New Jersey and Pennsylvania on the east and flows south into the Delaware Bay; the Susquehanna River Basin, which is in the central part of the State and flows south into the Chesapeake Bay; the Potomac River Basin, which is in the south-central part of the state and also flows into the Chesapeake Bay; the Ohio River Basin, which drains the western part of the State, including the Allegheny and Monongahela Rivers, and flows into the Mississippi River and ultimately the Gulf of Mexico; and the St. Lawrence River Basin, which includes the Genesee Basin and flows north into the Great Lakes (fig. 1B). The Delaware, Susquehanna, and Ohio River Basins include upstream drainage areas that flow into the state.

Development of Regression Equations

Regression equations were developed from streamflow characteristics determined from data at streamflow-gaging stations with flow unaffected by regulation, diversion, or mining. These statistics will be referred to as “observed” in this report. Basin characteristics known to affect streamflow, such as geology, land cover, and precipitation, were determined for the drainage basin or watershed upstream from the gaging stations. The streamflow characteristics (dependent variable) were then related to the basin characteristics (independent or explanatory variables) using various regression techniques to obtain a final regression equation. This equation can then be used to compute streamflow characteristics for streams where no gaging-station data are available. These statistics computed from regression equations will be referred to as “predicted” in this report.

Streamflow-Gaging Stations

Data through the 2002 climatic year from 293 continuous- and partial-record gaging stations on streams with flow unaffected by regulation, diversions, and mining in Pennsylvania and surrounding states (fig. 2) were used in the development of the regression equations. Continuous-record stations operated during the 2002 climatic year were selected on the basis of information about regulation, diversions, and mining published in the USGS Pennsylvania Water-Data Reports for 2002 (Durlin and Schaffstall, 2002a; Durlin and Schaffstall, 2002b; Siwicki, 2002). Discontinued stations were selected on the basis of information about regulation, diversions, and mining published in past USGS Pennsylvania Water-Data Reports and Surface-Water-Supply Reports. Information about regulation, diversions, and mining published by Ehlke and Reed (1999) and Stuckey and Reed (2000) also was used to select gaging stations. If regulation, diversions, and mining occurred within a basin, only the period of record prior to the event was used in the analysis. The stations used in the development of the regression equations are listed in appendix 1.

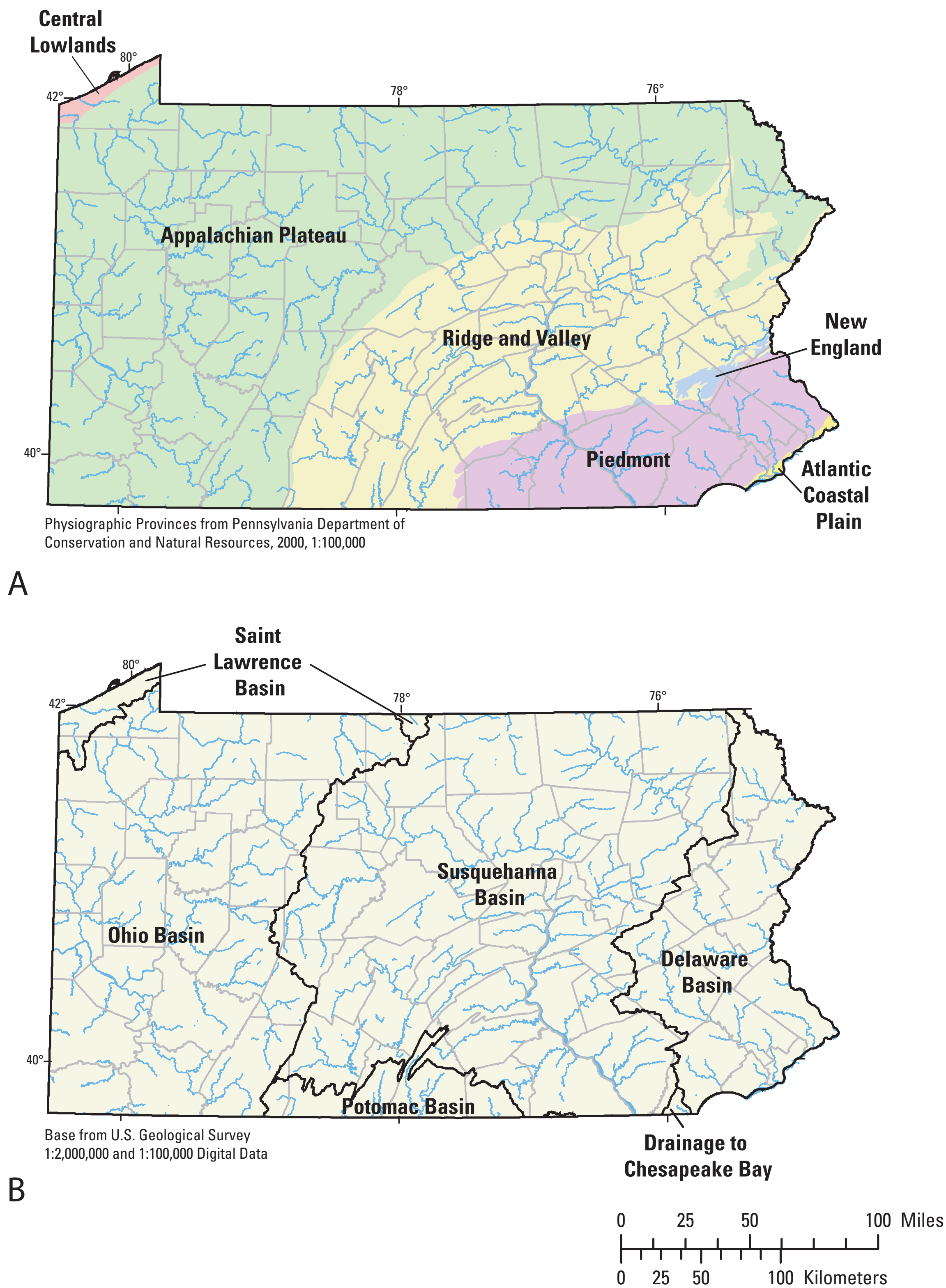

Figure 1. Major physiographic provinces (A) and major river basins (B) of Pennsylvania.

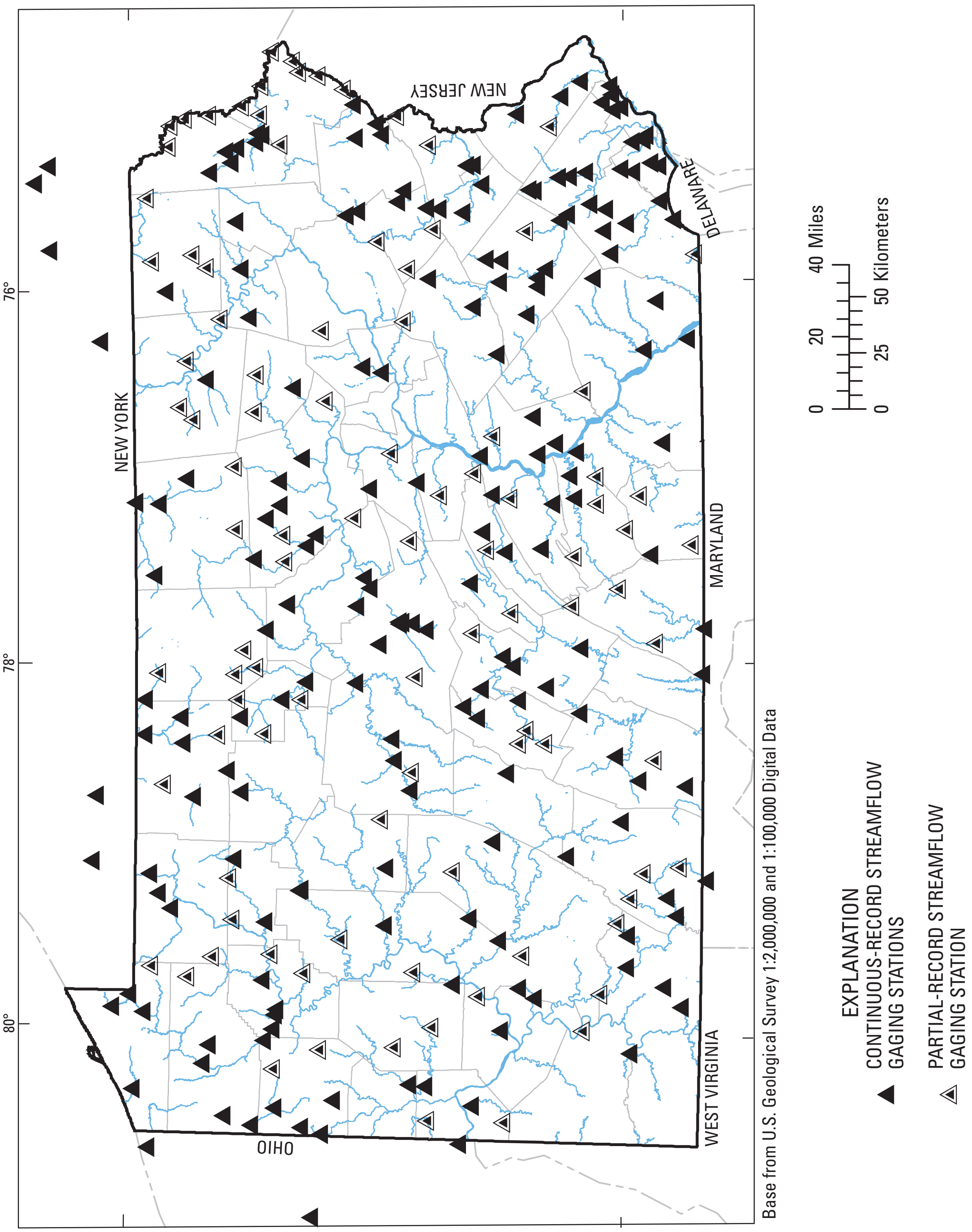

Figure 2. Streamflow-gaging stations used in development of low-flow, base-flow, and mean-flow regression equations for Pennsylvania streams.

Continuous-record stations that had 9 or more years of record through the 2002 climatic year and partial-record stations that had seven or more measurements collected during base-flow conditions were used in the regression analysis. Because many stations are operated on a water-year basis (October 1 to September 30), the first year of record is left off when analyzing the data by climatic year because of incomplete data for the year. Six continuous-record stations used in the regression analysis were operated for 10 water years before being discontinued or becoming regulated. These six stations had 9 years of climatic-year record and were used in the analysis because they provided valuable streamflow data and helped to maintain good geographic distribution of the gaging stations across the state. Five partial-record stations had less than 10 measurements, which was the recommended minimum number of measurements (Stedinger and Thomas, 1985). These stations were used in the low-flow analysis because the measurements were obtained during base-flow conditions at the index stations, exhibited good agreement with the index stations, and provided data where no other data were available.

Streamflow characteristics were determined for continuous-record gaging stations using methods described by Matalas (1963) and Riggs (1972). Low-flow characteristics, particularly the n-day, T-year flows, are influenced by the period and length of record at a station. Consecutive years of abnormally low precipitation during the mid-1930s, mid-1960s, and late 1990s have occurred in Pennsylvania. A gaging station with a short period of record over a dry period will have a lower particular streamflow characteristic than a hydrologically similar station with a longer period of record that includes a mix of dry and wet years. The reverse is also true if the short period of record extends over a period with above-normal precipitation.

Basin Characteristics

A list of 26 possible climatological, geological, hydrological, and physiographical basin characteristics with possible affects on low, base, and mean flow was developed from a variety of GIS sources. The basin characteristics selected for use in the development of regression equations were GIS-derived for consistency, reproducibility, and ease of use. The following basin characteristics were included in the exploratory regression analysis. The basin characteristics that were determined from a Digital Elevation Model (DEM) (U.S. Geological Survey, 2000a) were drainage area, in square miles; ground-water head, in feet; mean elevation, in feet; shape factor; basin slope, in degrees; and channel slope, in feet per mile. Mean annual precipitation, in inches, was determined from Parameter-elevation Regressions on Independent Slopes Model (PRISM) (Daly, 1996). The basin characteristics that were determined from modified geology maps (Pennsylvania Department of Conservation and Natural Resources, 1995, 1997, 2001; Environmental Resources Research Institute, 1996) are dominant rock type, density of sinkhole occurrence, and percentages of dominant rock type, glaciation, and carbonate bedrock within the basin. Percentage of lakes within a basin was determined from digitized USGS 1:24,000 quadrangles. Land cover, including percentages of urban, forest, residential, commercial/industrial/transportation, wetlands, and mining areas within a basin, was determined from National Land Cover Dataset enhanced version (NLCDe) (Price and others, 2003). The basin characteristics that were determined from 24K National Hydrography Dataset (NHD) (U.S. Geological Survey, 2000b) are longest drainage path, in miles, and stream density, in miles per square mile. The basin characteristics that were determined from the State Soil Geographic (STATSGO) database (U.S. Department of Agriculture, 1994) are thickness of soil, in feet; drainage runoff curve; soil infiltration index; available water capacity, in percent; and soil permeability, in inches per hour.

Regression Techniques

Low-flow characteristics for partial-record stations were determined using regression techniques described by Stedinger and Thomas (1985) and Thomas and Stedinger (1991), and incorporated into the USGS software Generalized Least Squares Network Analysis (GLSNET) (Tasker and Stedinger, 1989). Base-flow measurements at partial-record stations were correlated with daily mean flows at one or more hydrologically similar continuous-record index stations. To ensure the partial-record stations were measured during base-flow conditions at index stations, a program developed in the USGS Pennsylvania Water Science Center (Thompson and Cavallo, 2005) was used to compare measurements obtained at partial-record stations with flow conditions at the corresponding index stations.

After the streamflow characteristics were determined, they were related to the basin characteristics using exploratory Ordinary Least Squares (OLS) and Weighted Least Squares (WLS) regression techniques. Length of record, determined by *[(number of years of record at station $\times$ number of stations)/ sum of years of record of all stations]*, was used to weight the stations in WLS for direct comparison with OLS results. Regression iterations were done using a statistical software package, S-PLUS (MathSoft, Inc., 1997), to reduce the number of explanatory variables to those significant at the 95-percent confidence level. Diagnostics were used to further evaluate the adequacy of the regression models, including graphical relations, multicollinearity, Cook’s D, leverage, standard error, and coefficient of determination (R^2)(Helsel and Hirsch, 1993).

The low-flow characteristic and all significant explanatory variables were then related using Generalized Least Squares (GLS) regression to obtain the final regression equation. GLS is considered to be a more accurate regression technique for hydrologic regressions, particularly when using differing record lengths (Tasker and Stedinger, 1989). GLS takes into account differences in record length, variance of flows, and cross-correlation among the stations used in the analysis (Tasker and Stedinger, 1989). This regression technique was incorporated into a USGS software package, GLSNET (Tasker and Stedinger, 1989), which was used in this analysis. GLSNET was developed for use with n-day regressions based on differing recurrence intervals and is best suited for those type of regressions. The harmonic mean and mean annual flow cannot accurately be described in n-day terms with a particular recurrence interval. Therefore, the regression equations for the harmonic mean and mean annual flow were developed using WLS.

Low-Flow Regression Equations

Data from 195 continuous-record stations within Pennsylvania and surrounding states and 98 partial-record stations within Pennsylvania (fig. 2) were used to develop the n-day, T-year low-flow regression equations. Low-flow characteristics for the partial-record stations were extrapolated from index station low-flow characteristics using regression techniques defined by Tasker and Stedinger (1989). The resulting partial-record regressions had an R^2 of 0.70 or greater; the overall average R^2 was 0.87. A complete listing of partial-record measurements, index stations, and resulting regression statistics for the partial-record stations is presented in appendix 2.

Exploratory regression analysis for the n-day, T-year low flows using WLS indicated the need for the state to be regionalized. Using major physiographic provinces, regression residuals, Q7,10 yields, and hydrologic unit codes, five low-flow regions were created for the state (fig. 3). Regions 1 and 2 roughly follow the boundaries of the Piedmont and Ridge and Valley Physiographic Provinces, respectively (figs. 1 and 3). Regions 3, 4, and 5 fall in the Appalachian Plateaus Physiographic Province and were further divided on the basis of regression residuals, Q7,10 yields, and precipitation (figs. 1 and 3). Hydrologic Unit Code (HUC8) boundaries were followed wherever possible to avoid dividing large watersheds into multiple regions. The number of gaging stations used to develop each low-flow region and the area of each region are listed in table 1. Region 2 has the largest area of the regions in the state and includes 98 gaging stations, the most used in the development of the regression equations (table 1). Although region 1 has the smallest area, region 4 included the least number of gaging stations used to develop the regression equations, because the density of gaging-station locations in the southwestern part of the state was less than the density of gaging stations in the southeast.

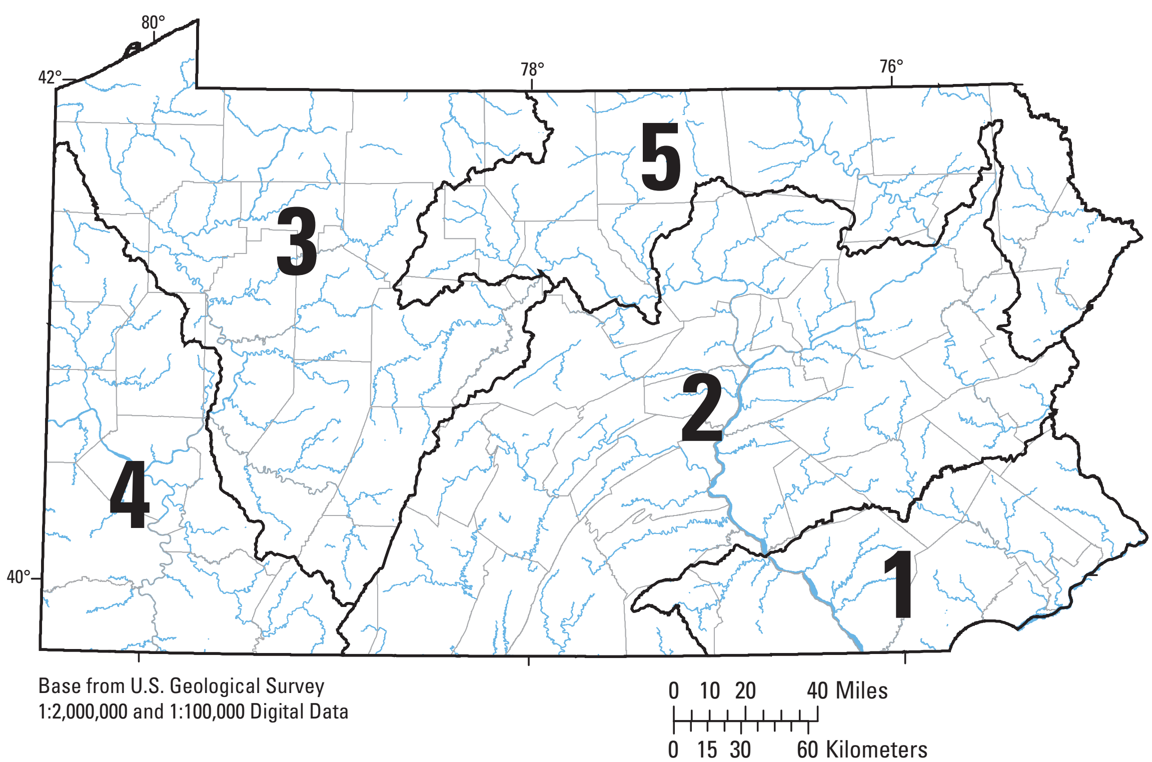

Figure 3. Low-flow regions in Pennsylvania.

Table 1. Number of streamflow-gaging stations and area in low-flow regions of Pennsylvania.

Low-flow region[1]	Area (square miles)	Number of continuous-record stations	Number of partial-record stations	Total number of stations
1	4,658	35	4	39
2	15,120	64	34	98
3	11,410	40	17	57
4	6,307	23	13	36
5	7,807	33	30	63
Total	45,302	195	98	293

[1]Low-flow regions are shown on figure 3.

Regression equations for Q7,10; Q7,2; Q30,10; Q30,2; and Q90,10 were then developed for each low-flow region. The following basin characteristics were significant for one or more regression equations: drainage area, basin slope, mean elevation, mean annual precipitation, stream density, thickness of soil, and the percentage of glaciation, carbonate bedrock, forested area, and urban area within the basin. All independent and dependent variables were log transformed before regression analysis to form a near-linear relation between the low-flow and basin characteristics. Because percentages can have a value of zero, 1.0 was added to the decimal form of the percentages before log transformation. The basin characteristics for the gaging stations used in the analysis are listed in appendix 3.

The regression model took the form in log units:

$$LogQ_{n,T} = A + bLogDA + cLogSl + dLogEl + eLogPpt + fLogDen + gLogThk + hLog(1 + 0.01Gla) + iLog(1 + 0.01C) + jLog(1 + 0.01F) + kLog(1 + 0.01U) \quad (1)$$

Or, in arithmetic space:

$$Q_{n,T} = 10^A (DA)^b (Sl)^c (El)^d (Ppt)^e (Den)^f (Thk)^g (1 + 0.01Gla)^h (1 + 0.01C)^i (1 + 0.01F)^j (1 + 0.01U)^k \quad (2)$$

where *Log* is log to base 10;
$Q_{n,T}$ is the n-day, T-year low flow, in cubic feet per second;
A is the intercept;
DA is drainage area, in square miles;
Sl is basin slope, in degrees;
El is mean elevation, in feet;
Ppt is mean annual precipitation, in inches;
Thk is soil thickness, in feet;
Den is stream density, in miles per square mile;
Gla is percentage of glaciation, in percent;
C is percentage of basin underlain by carbonate bedrock, in percent;
F is percentage of forested area, in percent;
U is percentage of urban area, in percent; and
b, c, d, e, f, g, h, i, j, k are basin-characteristic coefficients of regression.

The resultant low-flow regression coefficients are shown in table 2. The resulting equations developed to predict the Q7,10 low flow had the highest standard errors of prediction, ranging from 51 percent for regions 1 and 2 to 66 percent for region 4 (table 2). The higher error associated with the Q7,10 regression equation for region 4 may be partly attributed to deep mining in that part of the state that may not be reported in USGS Pennsylvania Water-Data Reports. The equations developed to predict the Q30,2 low flow had the lowest standard errors of prediction of the n-day characteristics, ranging from 33 percent for regions 2 and 5 to 38 percent for regions 1, 3, and 4 (table 2). The errors tended to be inversely related to the magnitude of the low-flow characteristic; the errors were higher for lower flows, which have historically been difficult to regionalize because of the wide variability in the statistics. The relations between predicted and observed low-flow characteristics are shown for the Q7,10 for each region in figure 4. A Wilcoxen signed-rank test was used to determine if the predicted and observed low-flow characteristics were significantly different at the 95-percent confidence level (alpha = 0.05). The results of the test for all low-flow characteristics indicated no significant difference between the two data sets. The observed and predicted low-flow characteristics for gaging stations used in the analysis are listed in appendix 4.

Table 2. Regression coefficients for use with low-flow regression equations for Pennsylvania streams.

[ft3/s, cubic feet per second; --, basin characteristic not significant]

n-day, T-year lowflow (ft^3/s)	Basin-characteristic coefficients											Standard error of prediction		90-percent prediction interval (T)
	Intercept	Drainage area[1]	Basin slope[2]	Mean elevation[3]	Mean annual precipi-tation[4]	Stream density[5]	Soil thickness[6]	Percent glaciation[7]	Percent carbonate bedrock[8]	Percent forested area[9]	Percent urban area[10]	Log units	Percent	
[11]**Region 1**														
Q7,10	-5.70201	1.05288	1.62282	--	--	--	5.21302	--	--	--	2.51917	0.21	51	0.3554
Q7,2	-4.44504	1.00716	1.26486	--	--	--	4.27137	--	--	--	1.99733	.19	46	.3216
Q30,10	-4.91436	1.03525	1.38505	--	--	--	4.49335	--	--	--	2.45072	.19	46	.3216
Q30,2	-3.77752	.99956	1.04192	--	--	--	3.68127	--	--	--	1.98542	.16	38	.2708
Q90,10	-3.90411	1.0178	.89939	--	--	--	3.78717	--	--	--	2.31127	.17	41	.2877
Region 2														
Q7,10	-9.60878	1.16210	--	--	3.91978	-1.01269	3.13463	--	1.74497	--	--	.21	51	.3516
Q7,2	-8.16272	1.10202	--	--	3.77376	-.91760	1.85625	--	1.43110	--	--	.16	38	.2679
Q30,10	-8.67823	1.14466	--	--	3.69006	-.96862	2.49124	--	1.54653	--	--	.19	46	.3182
Q30,2	-7.44070	1.08468	--	--	3.5817	-.86063	1.43967	--	1.19191	--	--	.14	33	.2344
Q90,10	-7.14619	1.11420	--	--	3.16473	-.96714	1.8053	--	1.06758	--	--	.15	36	.2512
Region 3														
Q7,10	-10.13371	1.07462	--	0.82334	3.73250	--	--	--	--	--	--	.22	54	.3706
Q7,2	-7.24952	1.02053	--	.76167	2.33858	--	--	--	--	--	--	.18	43	.3032
Q30,10	-8.93856	1.05382	--	.65464	3.43231	--	--	--	--	--	--	.20	49	.3369
Q30,2	-7.26942	1.00313	--	.68218	2.61125	--	--	--	--	--	--	.16	38	.2695
Q90,10	-8.31264	1.04235	--	.64223	3.18259	--	--	--	--	--	--	.17	41	.2863
Region 4														
Q7,10	-3.81524	1.23338	--	.56179	--	--	--	--	--	--	--	.26	66	.4402
Q7,2	-4.11933	1.13926	--	.83386	--	--	--	--	--	--	--	.18	43	.3047
Q30,10	-3.77287	1.15806	--	.65521	--	--	--	--	--	--	--	.22	54	.3725
Q30,2	-4.01786	1.09261	--	.89355	--	--	--	--	--	--	--	.16	38	.2709
Q90,10	-4.15607	1.10944	--	.88085	--	--	--	--	--	--	--	.17	41	.2878
Region 5														
Q7,10	-12.22164	1.27803	--	--	5.43165	--	--	1.83875	--	4.15769	--	.23	57	.3870
Q7,2	-9.58408	1.16411	--	--	4.40038	--	--	1.23470	--	3.29894	--	.16	38	.2692
Q30,10	-11.23671	1.22977	--	--	5.18796	--	--	1.27831	--	3.38638	--	.21	51	.3534
Q30,2	-8.86493	1.13345	--	--	4.16399	--	--	.99296	--	3.02015	--	.14	33	.2356
Q90,10	-9.92625	1.17914	--	--	4.62441	--	--	1.11455	--	3.16956	--	.17	41	.2861

[1]Drainage area, in square miles, determined from 30-meter digital elevation model (DEM).

[2]Basin slope, in degrees, is the change in elevation over distance, determined from 30-meter DEM.

[3]Mean elevation, in feet, is the average elevation in the basin, determined from 30-meter DEM.

[4]Mean annual precipitation, in inches, determined from Parameter-elevation Regressions on Independent Slopes Model (PRISM).

[5]Stream density, in miles per square mile, is the sum of the stream length divided by drainage area, determined from 24K National Hydrography Dataset (NHD) centerline flow.

[6]Soil thickness, in feet, is the depth to bedrock, determined from State Soil Geographic (STATSGO) database.

[7]Percent glaciation is the percent of basin in which the southern limit of glacial advance occurred, determined from modified glacial deposit maps.

[8]Percent carbonate bedrock is the percent of basin underlain by carbonate bedrock, determined by modified geology maps.

[9]Percent forested area is the percent of forested cover, as defined by deciduous trees, evergreen trees, and mixed trees in the basin, determined by National Land Cover Dataset enhanced (NLCDe).

[10]Percent urban area is the percent of urban area, as defined by low-intensity residential, high-intensity residential, commercial/industrial/transportation, residential with trees, and residential without trees in the basin, determined by NLCDe.

[11]Regions are shown on figure 3.

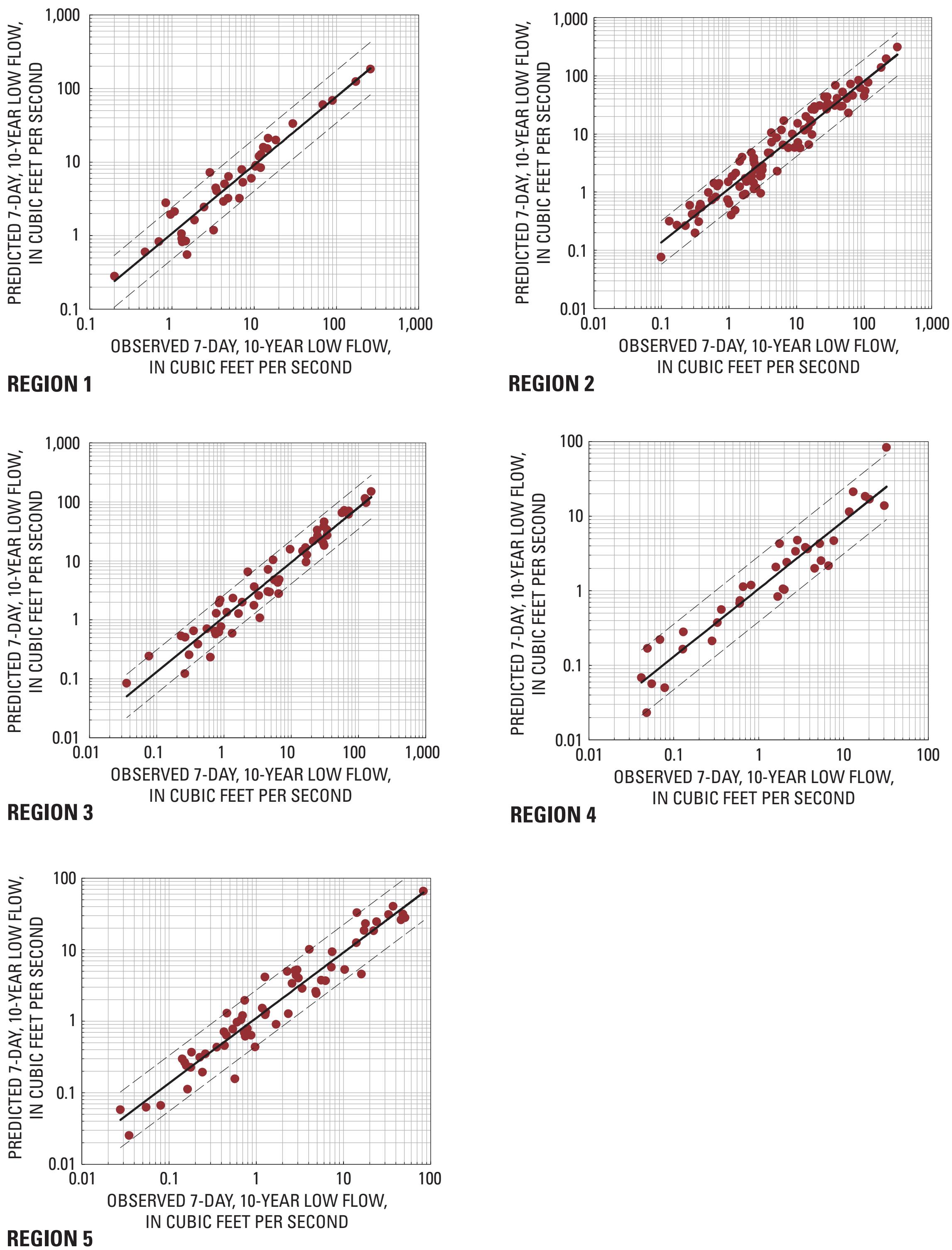

Figure 4. Relation between observed 7-day, 10-year low flow computed from streamflow-gaging-station data and predicted 7-day, 10-year low flow computed from regression equations.

[Dashed lines show 90-percent prediction interval]

A measure of the error associated with a predicted low-flow characteristic is the prediction interval. The prediction interval specifies the range of predicted low-flow characteristics given a confidence level and the standard error of prediction. In the case of the 90-percent prediction interval, the actual low-flow characteristic has a 90-percent probability of falling within the computed range of low-flow characteristics. To compute the 90-percent prediction interval for a predicted low-flow characteristic, the following equation was used:

$$10^{|qo-T|} \leq Q_{n,T} \leq 10^{qo+T} \tag{3}$$

where q_o is the predicted streamflow characteristic at a site, in log units;
T is the 90-percent prediction interval determined from table 2; and
$Q_{n,T}$ is the predicted streamflow characteristic at a site, in cubic feet per second.

An example using the low-flow regression equations is shown below.

Example 1. Calculate the Q7,10 low flow and 90-percent prediction interval for a site near the confluence of Shohola Creek with the Delaware River in Pike County in the northeastern part of the state at latitude 41°25’30” and longitude 74°57’20”. The drainage area is 77.0 mi^2, precipitation is 42.4 in., percentage of glaciation is 100 percent, and percentage of forested area is 82.7 percent. The watershed is unaffected by regulation, diversion, or mining.

1. From figure 3 and the latitude and longitude, the site is in low-flow region 5.
2. Substituting the region 5 coefficients for Q7,10 from table 2 and basin characteristics for the site into equation 1 produces:

   $\log Q_{7,10}$ = -12.22164 + 1.27803log(77.0) + 5.43165log(42.4) + 1.83875log(1 + 0.01(100)) + 4.15769log(1 + 0.01(82.7))

   $\log Q_{7,10}$ = -12.22164 + (2.4110) + (8.8393) + (0.5535) + (1.0882)

   $\log Q_{7,10}$ = 0.67036

   $Q_{7,10}$ = 4.68 ft^3/s

3. To compute the prediction interval, the predicted Q7,10 and the T value for region 5 and Q7,10 from table 2 are substituted into equation 3:

   $10^{0.67036-0.3870} \leq 4.68 \leq 10^{0.67036+0.3870}$

   $10^{0.2834} \leq 4.68 \leq 10^{1.0574}$

   $1.92 \leq 4.68 \leq 11.4$

The predicted Q7,10 for the site is 4.68 ft^3/s with a 90-percent probability that the Q7,10 will fall between 1.92 and 11.4 ft^3/s.

Base-Flow Regression Equations

Data from 195 continuous-record stations within Pennsylvania and surrounding states (fig. 2) were used to develop the base-flow regression equations. Partial-record stations were not used in the regression analysis. The daily values from stream data recorded at the gaging stations were separated into base-flow and surface-runoff components using the local-minimum method in the hydrograph separation computer program HYSEP (Sloto and Crouse, 1996). The base-flow component of streamflow determined through hydrograph separation was considered to be the ground-water discharge to the stream and was used to develop base-flow regression equations for the state.

Exploratory regression analysis for base-flow characteristics indicated regionalization was not necessary. Statewide regression equations for base-flow characteristics were then developed using GLS. The following basin characteristics were significant for all base-flow characteristics: drainage area, mean annual precipitation, and percentage of carbonate bedrock, forested area, and urban area within the basin. The basin characteristics for the gaging stations used in the analysis are listed in appendix 3. All independent and dependent variables were log transformed before regression analysis to form a near-linear relation between the base-flow and basin characteristics. Because land-use percentages can have a value of zero, 1.0 was added to the decimal form of the percentages before log transformation.

The regression model took the form in log units:

$$LogQ_T = A + bLogDA + cLogPpt + dLog(1 + 0.01C) + eLog(1 + 0.01F) + fLog(1 + 0.01U) \tag{4}$$

Or, in arithmetic space:

$$Q_T = 10^A (DA)^b (Ppt)^c (1 + 0.01C)^d (1 + 0.01F)^e (1 + 0.01U)^f \tag{5}$$

where *Log* is log to base 10;
Q_T is the recurrence interval base flow, in cubic feet per second;
A is the intercept;
DA is drainage area, in square miles;
Ppt is mean annual precipitation, in inches;
C is percentage of basin underlain by carbonate bedrock, in percent;
F is percentage of forested area, in percent;
U is percentage of urban area, in percent; and
b, c, d, e, f are basin-characteristic coefficients of regression.

The resultant base-flow regression coefficients are shown in table 3. The standard error of prediction ranged from 21 percent for the 10- and 25-year base flows to 23 percent for the 50-year base flow (table 3). The relation between predicted and observed base-flow characteristics is shown for the 10-year base flow in figure 5. A Wilcoxen signed-rank test was used to determine if the predicted and observed base-flow characteristics were significantly different at the 95-percent confidence level (alpha = 0.05). The results of the test for all base flows indicated no significant difference between the two data sets. The observed and predicted base-flow characteristics for the gaging stations used in the analysis are listed in appendix 5.

To compute the 90-percent prediction interval for a predicted base-flow characteristic, the following equation was used:

$$10^{|qo-T|} \le Q_T \le 10^{qo+T} \qquad (6)$$

where q_o is the predicted streamflow characteristic at a site, in log units;

T is the 90-percent prediction interval determined from table 3; and

Q_T is the predicted streamflow characteristic at a site, in cubic feet per second.

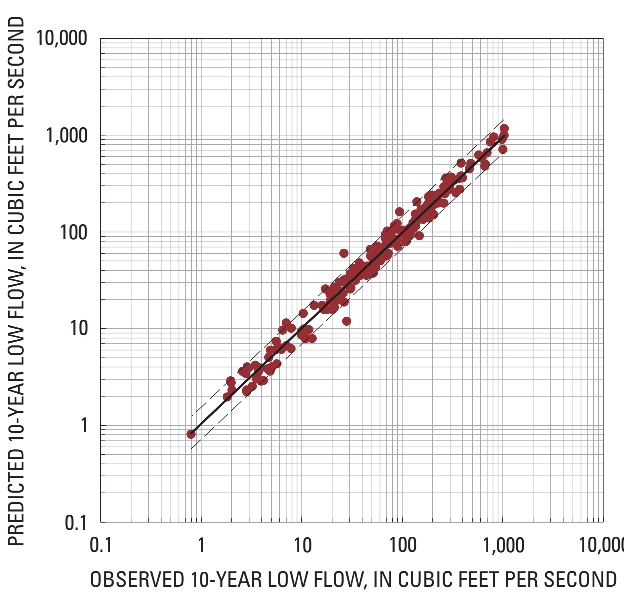

Figure 5. Relation between observed 10-year base flow computed from streamflow-gaging-station data and predicted 10-year base flow computed from regression equation.

[Dashed lines show 90-percent prediction interval]

An example using the base-flow regression equations is shown below.

Example 2. Calculate the 50-year base flow and the 90-percent prediction interval, in million gallons per day (Mgal/d), for the same site in example 1 near the confluence of Shohola Creek with the Delaware River in Pike County with latitude 41°25'30" and longitude 74°57'20". The drainage area is 77.0 mi^2, precipitation is 42.4 in., percentage of forested area is 82.7 percent, and percentage of urban area is 4.84 percent. There is no carbonate bedrock in the basin. The watershed is unaffected by regulation, diversion, or mining.

1. Substituting the coefficients for the 50-year base flow from table 3 and basin characteristics for the site into equation 4 produces:

   $\log Q_{50}$ = -4.93128 + 1.00080log(77.0) + 2.61442log(42.4) + 1.52476log(1 + 0.01(82.7)) + 0.61954log(1 + 0.01(4.84))

   $\log Q_{50}$ = -4.93128 + (1.8880) + (4.2546) + (0.3991) + (0.0127)

   $\log Q_{50}$ = 1.6231

   Q_{50} = 42.0 ft^3/s

2. To compute the prediction interval, the predicted Q_{50} and T value for Q_{50} from table 3 are substituted into equation 6:

   $10^{1.6231-0.1662} \le 42.0 \le 10^{1.6231+0.1662}$

   $10^{1.4569} \le 42.0 \le 10^{1.7893}$

   $28.6 \le 42.0 \le 61.6$

3. To convert the 50-year discharges from ft^3/s to Mgal/d:

   1.0 Mgal/d = ft^3/s* 0.646350

   $18.5 \le 27.1 \le 39.8$

The predicted 50-year base flow for the site is 27.1 Mgal/d with a 90-percent probability that the Q50 will fall between 18.5 and 39.8 Mgal/d.

Table 3. Regression coefficients for use with base-flow regression equations for Pennsylvania streams.
[ft^3/s, cubic feet per second]

Base-flow return interval (ft^3/s)	Basin-characteristic coefficients						Standard error of prediction		90-percent prediction interval (T)
	Intercept (a)	Drainage area[1] (b)	Mean annual precipitation[2] (c)	Percent carbonate bedrock[3] (d)	Percent forested area[4] (e)	Percent urban area[5] (f)	Log units	Percent	
10-year	-4.58210	1.00000	2.47553	0.92276	1.37034	0.49025	0.09	21	0.1495
25-year	-4.79614	1.00075	2.56028	.93566	1.46444	.56776	.09	21	.1495
50-year	-4.93128	1.00080	2.61442	.94480	1.52476	.61954	.10	23	.1662

[1]Drainage area, in square miles, determined from 30-meter digital elevation model (DEM)

[2]Mean annual precipitation, in inches, determined from Parameter-elevation Regressions on Independent Slopes Model (PRISM).

[3]Percent carbonate bedrock is the percent of basin underlain by carbonate bedrock, determined by modified geology maps.

[4]Percent forested area is the percent of forested cover, as defined by deciduous trees, evergreen trees, and mixed trees in the basin, determined by National Land Cover Dataset enhanced (NLCDe).

[5]Percent urban area is the percent of urban area, as defined by low-intensity residential, high-intensity residential, commercial/industrial/transportation, residential with trees, and residential without trees in the basin, determined by NLCDe.

Mean-Flow Regression Equations

Data from 195 continuous-record gaging stations within Pennsylvania and surrounding states (fig. 2) were used to develop the mean-flow regression equations. Partial-record gaging stations were not used in the regression analysis. Exploratory regression analysis for mean-flow characteristics indicated additional regionalization was not necessary. Statewide regression equations for mean-flow characteristics were then developed using WLS. The following basin characteristics were significant for one or more regression equations: drainage area, mean elevation, mean annual precipitation, and the percentage of carbonate bedrock, forested area, and urban area within the basin. The basin characteristics for the gaging stations used in the analysis are listed in appendix 3. All independent and dependent variables were log transformed before regression analysis to form a near-linear relation between the mean-flow and basin characteristics. Because land-use percentages can have a value of zero, 1.0 was added to the decimal form of the percentages before log transformation.

The regression model took the form in log units:

$$LogQ_m = A + bLogDA + cLogEl + dLogPpt + eLog(1 + 0.01C) + fLog(1 + 0.01F) + gLog(1 + 0.01U) \quad (7)$$

Or, in arithmetic space:

$$Q_m = 10^A (DA)^b (El)^c (Ppt)^d (1 + 0.01C)^e (1 + 0.01F)^f (1 + 0.01U)^g \quad (8)$$

where *Log* is log to base 10;
Q_m is the mean flow, in cubic feet per second;
A is the intercept;
DA is drainage area, in square miles;
El is mean elevation, in feet;
Ppt is mean annual precipitation, in inches;
C is percentage of basin underlain by carbonate bedrock, in percent;
F is percentage of forested area, in percent;
U is percentage of urban area, in percent; and
b, c, d, e, f, g are basin-characteristic coefficients of regression.

The resultant mean-flow regression coefficients are shown in table 4. The standard error of prediction ranged from 12 percent for the mean annual flow to 38 percent for the harmonic mean (table 4). The relation between predicted and observed mean-flow characteristics is shown for the mean annual flow in figure 6. A Wilcoxen signed-rank test was used to determine if the predicted and observed mean-flow characteristics were significantly different at the 95-percent confidence level (alpha = 0.05). The results of the test for both mean flows indicated no significant difference between the two data sets. The observed and predicted mean-flow characteristics for the gaging stations used in the analysis are listed in appendix 5.

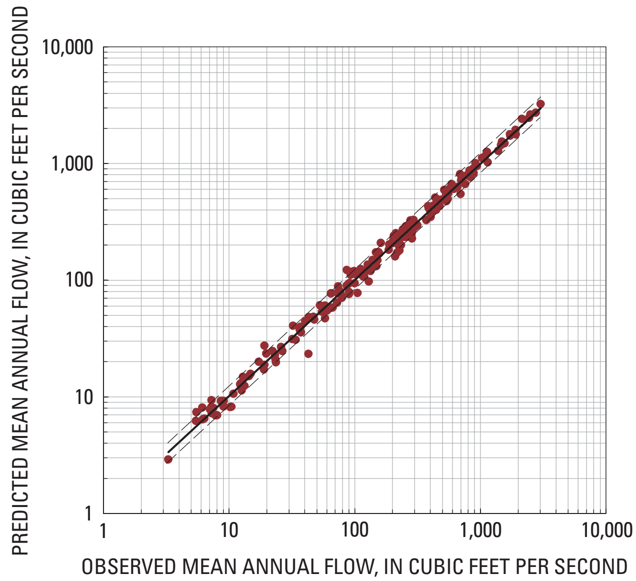

Figure 6. Relation between observed mean annual flow computed from streamflow-gaging-station data and predicted mean annual flow computed from regression equation.

[Dashed lines show 90-percent prediction interval]

To compute the 90-percent prediction interval for a predicted mean-flow characteristic, the following equation was used:

$$10^{|qo-T|} \leq Q_T \leq 10^{qo+T} \quad (9)$$

where q_o is the predicted streamflow characteristic at a site, in log units;
T is the 90-percent prediction interval determined from table 4; and
Q_T is the predicted streamflow characteristic at a site, in cubic feet per second.

Table 4. Regression coefficients for use with mean-flow regression equations for Pennsylvania streams.

[ft^3/s, cubic feet per second; --, basin characteristic not significant]

Mean flow characteristic (ft^3/s)	Basin characteristic coefficients							Standard error of prediction		90-percent prediction interval (T)
	Intercept	Drainage area[1]	Mean elevation[2]	Mean annual precipitation[3]	Percent carbonate bedrock[4]	Percent forested area[5]	Percent urban area[6]	Log units	Percent	
Harmonic mean	-7.2156	1.069	--	3.9629	2.188	0.8717	1.1894	0.16	38	0.2659
Mean annual flow	-3.2363	1.0081	0.1283	1.7949	--	.4136	.4130	.05	12	.0831

[1]Drainage area, in square miles, determined from 30-meter digital elevation model (DEM).

[2]Mean elevation, in feet, is the average elevation in the basin, determined from 30-meter DEM.

[3]Mean annual precipitation, in inches, determined from Parameter-elevation Regressions on Independent Slopes Model (PRISM).

[4]Percent carbonate bedrock is the percent of basin underlain by carbonate bedrock, determined by modified geology maps.

[5]Percent forested area is the percent of forested cover, as defined by deciduous trees, evergreen trees, and mixed trees in the basin, determined by National Land Cover Dataset enhanced (NLCDe).

[6]Percent urban area is the percent of urban area, as defined by low-intensity residential, high-intensity residential, commercial/industrial/transportation, residential with trees, and residential without trees in the basin, determined by NLCDe.

An example using the mean-flow regression equations is shown below.

Example 3. Calculate the mean annual flow and the 90-percent prediction interval for the same site in examples 1 and 2 near the confluence of Shohola Creek with the Delaware River in Pike County with latitude 41°25'30" and longitude 74°57'20". The drainage area is 77.0 mi^2, mean elevation is 1,350 ft, precipitation is 42.4 in., percentage of forested area is 82.7 percent, and percentage of urban area is 4.84 percent. The watershed is unaffected by regulation, diversion, or mining.

1. Substituting the coefficients for the mean annual flow from table 4 and basin characteristics for the site into equation 7 produces:

   $$\log Q_m = -3.2363 + 1.0081\log(77.0) + 0.1283\log(1{,}350) + 1.7949\log(42.4) + 0.4136\log(1 + 0.01(82.7)) + 0.4130\log(1 + 0.01(4.84))$$

   $$\log Q_m = -3.2363 + (1.9018) + (0.4016) + (2.9210) + (0.1083) + (0.0085)$$

   $$\log Q_m = 2.1049$$

   $$Q_m = 127 \text{ ft}^3/\text{s}$$

2. To compute the prediction interval, the predicted Q_m and T value from table 4 are substituted into equation 9:

   $$10^{2.1049-0.0831} \leq 127 \leq 10^{2.1049+0.0831}$$

   $$10^{2.0218} \leq 127 \leq 10^{2.1880}$$

   $$105 \leq 127 \leq 154$$

The predicted mean annual flow for the site is 127 ft^3/s with a 90-percent probability that the mean annual flow will fall between 105 and 154 ft^3/s.

Limitations of Regression Equations

Observed streamflow characteristics computed from streamflow-gaging-station data, on which the regression equations were based, are affected by time, space, and measurement errors. The equations presented in this report were developed for use on streams unaffected by regulation, diversion, and mining, including quarries and deep and surface coal mining. Also, streamflow in carbonate areas may be affected by karst features.

Regulation may produce higher than normal low-flow characteristics, particularly if a dam is required to release a certain flow for conservation or if there is diversion into the basin. For example, the Q7,10 for Tohickon Creek near Pipersville (station 01459500) increased over 200 percent since Nockamixon Reservoir was built in 1973, from 0.83 to 2.63 ft^3/s. Mining, whether it involves dewatering at quarries or surface mining with underflow, can significantly affect streamflow. Effects from coal mining, in particular, are not easily described nor are necessarily transferable downstream. Water may leave a streambed in the upper reaches to enter an adjacent underground mine. Ground-water and surface-water divides may not necessarily coincide, enabling ground water to be diverted to a neighboring watershed (Cravotta and Kirby, 2003). For example, Shamokin Creek near Shamokin (01554500) has an elevated Q7,10 yield of 0.41 $ft^3/s/mi^2$ primarily because of interbasin ground-water transfers from abandoned underground mines.

Predicting accurate low-, base-, and mean-flow characteristics can be difficult in watersheds with areas underlain by carbonate bedrock with karst features. Watersheds with karst features are characterized by depressions, sinkholes, and underflow. For example, Spring Creek in Centre County has developed karst features. Spring Creek near Axemann (station 01546500) is upstream of a large spring with a Q7,10 yield of 0.33 $ft^3/s/mi^2$; Spring Creek at Milesburg (station 01547100) is downstream of the spring and has a yield of 0.73 $ft^3/s/mi^2$. The regression equations presented in this report should be used with caution in watersheds with karst features, and results should be thoroughly checked against stream-gage data or other published data.

The ranges of basin characteristics used in the development of the regression equations are shown in table 5. Predicted streamflow characteristics for watersheds with basin characteristics outside these ranges may not be valid.

Summary

Low-flow, base-flow, and mean-flow characteristics can be used by watershed planners and regulators to determine water availability, water-use allocations, assimilative capacities for streams, and aquatic-habitat needs. Streamflow characteristics commonly are predicted by use of regression equations when data are not available in the basin or a nearby streamflow-gaging station is not available. The USGS and the Pennsylvania Department of Environmental Protection (PaDEP) have cooperated in a study to develop regression equations to predict low-flow, base-flow, and mean-flow characteristics for streams in Pennsylvania using data from 195 continuous-record and 98 partial-record streamflow-gaging stations unaffected by upstream regulation, diversions, and mining activity. The daily values from streamflow data at continuous-record gaging stations were separated into base-flow and surface-runoff components to compute base-flow characteristics.

Five low-flow regions were defined and regression equations were developed for the Q7,10; Q7,2; Q30,10; Q30,2; and Q90,10 low-flow characteristics. Statewide equations were developed for 10-, 25-, and 50-year base flows, harmonic mean, and mean annual flow. The following basin characteristics were

Table 5. Summary of basin characteristics used to develop low-flow, base-flow, and mean-flow regression equations for Pennsylvania streams.

[mi^2, square miles; mi/mi^2, miles per square mile; -- basin characteristic not significant]

Low-flow region[1] or statewide equation	Range of basin characteristic variables									
	Drainage area (mi^2)	Basin slope (degrees)	Mean elevation (feet)	Mean annual precipitation (inches)	Stream density (mi/mi^2)	Soil thickness (feet)	Percent glaciation	Percent carbonate bedrock	Percent forested area	Percent urban area
Region1	4.78 - 1,150	1.7 - 6.4	--	--	--	4.13 - 5.21	--	--	--	0 - 89
Region 2	4.93 - 1,280	--	--	35.0 - 50.4	0.51 - 3.1	3.32 - 5.65	--	0 - 99	--	--
Region 3	2.33 - 1,720	--	898 - 2,700	38.7 - 47.9	--	--	--	--	--	--
Region 4	2.26 - 1,400	--	1,050 - 2,580	--	--	--	--	--	--	--
Region 5	4.84 - 982	--	--	33.1 - 47.1	--	--	0 - 100	--	41 - 100	--
10-year base flow	2.26 - 1,720	--	--	33.1 - 50.4	--	--	--	0 - 99	5.1 - 100	0 - 89
25-year base flow	2.26 - 1,720	--	--	33.1 - 50.4	--	--	--	0 - 99	5.1 - 100	0 - 89
50-year base flow	2.26 - 1,720	--	--	33.1 - 50.4	--	--	--	0 - 99	5.1 - 100	0 - 89
Harmonic mean	2.26 - 1,720	--	--	33.1 - 50.4	--	--	--	0 - 99	5.1 - 100	0 - 89
Mean annual flow	2.26 - 1,720	--	130 - 2,700	33.1 - 50.4	--	--	--	--	5.1 - 100	0 - 89

[1]Regions are shown on figure 3.

significant at the 95-percent confidence level for one or more regression equations: drainage area, basin slope, thickness of soil, stream density, mean annual precipitation, mean elevation, and the percentage of glaciation, carbonate bedrock, forested area, and urban area within the basin. Standard errors of prediction ranged from 33 to 66 percent for the n-day, T-year low flows; 21 to 23 percent for base flows; and 12 to 38 percent for the mean annual flow and harmonic mean, respectively.

Streams affected by regulation, diversions, and mining activity can have significantly altered streamflow characteristics, and regression equations should not be used to predict low- and base-flow characteristics in these watersheds. Watersheds with areas underlain by carbonate bedrock may have karst features, and regression equations should be used with caution in these areas. Predicted streamflow characteristics from regression equations may not be valid for watersheds with basin characteristics outside the range of those used in the development of the equations.

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Appendixes

Appendix 1. Streamflow-gaging stations used in development of low-flow, base-flow, and mean-flow regression equations for Pennsylvania streams.

[C, continuous-record station; P, partial-record station; ddmmss, degrees, minutes, seconds; climatic year, 12-month period April 1 through March 31]

U.S. Geological Survey streamflow-gaging station number	Type	Latitude (ddmmss)	Longitude (ddmmss)	Station name	Period of record used in analysis[1] (climatic year)
01427200	P	415015	751355	Equinunk Creek near Equinunk, Pa.	1947-2003
01427300	P	414934	750715	Little Equinunk Creek at Stalker, Pa.	1959-1970
01427400	P	414605	750506	Hollister Creek near Abrahamsville, Pa.	1959-1969
01427700	P	414010	750410	Calkins Creek at Milanville, Pa.	1959-1992
01428200	P	413215	750140	Masthope Creek at Masthope, Pa.	1959-1970
01428750	C	414028	752235	West Branch Lackawaxen River near Aldenville, Pa.	1988-2002
01429000	C	413514	751938	West Branch Lackawaxen River at Prompton, Pa.	1946-1960
01429500	C	413626	751603	Dyberry Creek near Honesdale, Pa.	1945-1959
01430000	C	413343	751454	Lackawaxen River near Honesdale, Pa.	1950-1959
01431000	C	412905	751320	Middle Creek near Hawley, Pa.	1947-1960
01431500	C	412834	751021	Lackawaxen River at Hawley, Pa.	1910-1959
01431680	P	412315	751420	Mill Brook near Paupack, Pa.	1960-1981
01432000	C	412733	751108	Wallenpaupack Creek at Wilsonville, Pa.	1911-1925
01432100	P	412800	750435	Blooming Grove Creek near Rowland, Pa.	1962-1970
01432500	P	412720	745525	Shohola Creek near Shohola, Pa.	1958-2001
01433700	P	412430	744435	Bush Kill at Millrift, Pa.	1959-1969
01438300	P	411935	744750	Vandermark Creek at Milford, Pa.	1944-1999
01438700	P	411811	745121	Raymondskill Creek near Milford, Pa.	1949-2004
01438900	P	411330	745250	Dingmans Creek at Dingmans Ferry, Pa.	1959-1969
01439400	P	410733	745720	Toms Creek at Egypt Mills, Pa.	1971-2004
01439500	C	410517	750217	Bush Kill at Shoemakers, Pa.	1910-2001
01440400	C	410505	751254	Brodhead Creek near Analomink, Pa.	1959-2002
01441000	C	405845	751205	McMichael Creek near Stroudsburg, Pa.	1913-1938
01442500	C	405955	750835	Brodhead Creek at Minisink Hills, Pa.	1952-2002
01443100	P	405500	750619	Jacoby Creek at Portland, Pa.	1971-1992
01446800	P	404732	751552	Little Bushkill at Edelman, Pa.	1949-1958
01447500	C	410749	753733	Lehigh River at Stoddartsville, Pa.	1945-2002
01447720	C	410505	753621	Tobyhanna Creek near Blakeslee, Pa.	1963-1985
01448100	P	410031	754608	Sandy Run near White Haven, Pa.	1971-1989
01448800	P	405321	755506	Quakake Creek near Hazelton, Pa.	1945-1958
01449360	C	405351	753010	Pohopoco Creek at Kresgeville, Pa.	1968-2002
01449500	C	405522	753332	Wild Creek at Hatchery, Pa.	1942-1958
01450400	P	404656	754241	Lizard Creek at Ashfield, Pa.	1945-1958
01450500	C	404822	753554	Aquashicola Creek at Palmerton, Pa.	1941-2002
01451000	C	404525	753612	Lehigh River at Walnutport, Pa.	1948-1960

Appendix 1. Streamflow-gaging stations used in development of low-flow, base-flow, and mean-flow regression equations for Pennsylvania streams.—Continued

[C, continuous-record station; P, partial-record station; ddmmss, degrees, minutes, seconds; climatic year, 12-month period April 1 through March 31]

U.S. Geological Survey streamflow-gaging station number	Type	Latitude (ddmmss)	Longitude (ddmmss)	Station name	Period of record used in analysis[1] (climatic year)
01451500	C	403456	752900	Little Lehigh Creek near Allentown, Pa.	1947-2002
01451800	C	403942	753738	Jordan Creek near Schnecksville, Pa.	1967-2002
01452500	C	403828	752247	Monocacy Creek at Bethlehem, Pa.	1950-2002
01453000	C	403655	752245	Lehigh River at Bethlehem, Pa.	1904-1927
01459500	C	402601	750701	Tohickon Creek near Pipersville, Pa.	1937-1973
01464700	P	401818	751115	Pine Run near New Britain, Pa.	1960-1970
01465000	C	401518	750159	Neshaminy Creek at Rushland, Pa.	1886-1934
01465500	C	401026	745726	Neshaminy Creek near Langhorne, Pa.	1936-1974
01465798	C	400325	745908	Poquessing Creek at Grant Ave. at Philadelphia, Pa.	1967-2002
01467042	C	400523	750410	PennyPack Creek at Pine Road, at Philadelphia, Pa.	1966-1981
01467048	C	400300	750159	PennyPack Cr at Lower Rhawn St Bdg, Phila., Pa.	1967-2001
01467086	C	400247	750640	Tacony Creek at County Line, Philadelphia, Pa.	1967-1988
01467087	C	400057	750550	Frankford Creek at Castor Ave, Philadelphia, Pa.	1984-2002
01468500	C	403745	760730	Schuylkill River at Landingville, Pa.	1949-2002
01469500	C	404825	755820	Little Schuylkill River at Tamaqua, Pa.	1921-1932
01470500	C	403121	755955	Schuylkill River at Berne, Pa.	1949-2002
01470720	C	403423	755234	Maiden Creek Tributary at Lenhartsville, Pa.	1967-1980
01470756	C	403051	755300	Maiden Creek at Virginville, Pa.	1974-1995
01470779	C	402448	761019	Tulpehocken Creek near Bernville, Pa.	1976-2002
01470960	C	402214	760132	Tulpehocken Cr at Blue Marsh Damsite near Reading, Pa.	1967-1979
01471000	C	402208	755846	Tulpehocken Creek near Reading, Pa.	1952-1979
01471510	C	402005	755612	Schuylkill River at Reading, Pa.	1916-1930
01471800	P	402443	754402	Pine Creek near Manatawny, Pa.	1961-2003
01471980	C	401622	754049	Manatawny Creek near Pottstown, Pa.	1976-2002
01472000	C	401430	753907	Schuylkill River at Pottstown, Pa.	1929-1979
01472157	C	400905	753606	French Creek near Phoenixville, Pa.	1970-2002
01472174	C	400522	753750	Pickering Creek near Chester Springs, Pa.	1968-1983
01472198	C	402338	753057	Perkiomen Creek at East Greenville, Pa.	1983-2002
01472199	C	402226	753122	West Branch Perkiomen Creek at Hillegass, Pa.	1983-2002
01472500	C	401630	752720	Perkiomen Creek near Frederick, Pa.	1886-1913
01473000	C	401346	752707	Perkiomen Creek at Graterford, Pa.	1916-1956
01473120	C	400952	752601	Skippack Creek near Collegeville, Pa.	1968-1994
01475300	C	400121	752520	Darby Creek at Waterloo Mills near Devon, Pa.	1974-1997
01475510	C	395544	751622	Darby Creek near Darby, Pa.	1965-1990
01475530	C	395829	751649	Cobbs Cr at U.S. Hghwy No. 1 at Philadelphia, Pa.	1966-1981

Appendix 1. Streamflow-gaging stations used in development of low-flow, base-flow, and mean-flow regression equations for Pennsylvania streams.—Continued

[C, continuous-record station; P, partial-record station; ddmmss, degrees, minutes, seconds; climatic year, 12-month period April 1 through March 31]

U.S. Geological Survey streamflow-gaging station number	Type	Latitude (ddmmss)	Longitude (ddmmss)	Station name	Period of record used in analysis[1] (climatic year)
01475550	C	395502	751452	Cobbs Creek at Darby, Pa.	1972-1990
01475850	C	395835	752613	Crum Creek near Newtown Square, Pa.	1983-2002
01476500	C	395410	752335	Ridley Creek at Moylan, Pa.	1933-1954
01477000	C	395208	752431	Chester Creek near Chester, Pa.	1933-1993
01479820	C	394900	754131	Red Clay Creek near Kennett Square, Pa.	1989-2002
01480300	C	400422	755140	West Branch Brandywine Creek near Honey Brook, Pa.	1962-2002
01480675	C	400552	754431	Marsh Creek near Glenmoore, Pa.	1968-2002
01480800	C	400020	754220	East Branch Brandywine Creek at Downingtown, Pa.	1959-1968
01481000	C	395211	753537	Brandywine Creek at Chadds Ford, Pa.	1913-1973
01494980	P	394408	755233	Big Elk Creek at Lewisville, Pa.	1979-1992
01500500	C	421917	751901	Susquehanna River at Unadilla, N.Y.	1940-1995
01502500	C	422240	752423	Unadilla River at Rockdale, N.Y.	1931-2002
01502750	P	415550	753015	Starrucca Creek at Melrose Church, Pa.	1947-1992
01502780	P	415500	755045	Snake Creek near Montrose, Pa.	1960-1992
01507000	C	421928	754618	Chenango River at Greene, N.Y.	1939-1970
01514000	C	420745	761615	Owego Creek near Owego, N.Y.	1932-1978
01516500	C	414727	770054	Corey Creek near Mainesburg, Pa.	1956-2002
01518500	C	415408	770855	Crooked Creek at Tioga, Pa.	1955-1974
01518862	C	415523	773156	Cowanesque River at Westfield, Pa.	1985-2002
01520000	C	415948	770825	Cowanesque River near Lawrenceville, Pa.	1953-1979
01531300	P	414545	764155	Sugar Creek near West Burlington, Pa.	1949-1992
01531420	P	414900	763750	Tomjack Creek near Bourne, Pa.	1966-1971
01532000	C	414225	762906	Towanda Creek near Monroeton, Pa.	1915-2002
01532600	P	414710	762300	Wysox Creek near Wysox, Pa.	1946-1992
01532850	C	415145	760026	MB Wyalusing Creek near Birchardville, Pa.	1967-1979
01533200	P	413847	760946	Little Tuscarora Creek at Laceyville, Pa.	1960-1970
01533300	P	414150	755310	Meshoppen Creek near Springville, Pa.	1949-1992
01533500	C	413150	760922	North Branch Mehoopany Creek near Lovelton, Pa.	1942-1958
01533900	P	414515	754850	Hop Bottom Creek at Brooklyn, Pa.	1959-1970
01533950	C	413429	753832	SB Tunkhannock Creek near Montdale, Pa.	1962-1978
01534000	C	413330	755342	Tunkhannock Creek near Tunkhannock, Pa.	1915-2002
01538000	C	410333	760538	Wapwallopen Creek near Wapwallopen, Pa.	1921-2002
01538900	P	411425	761406	Huntington Creek near Harveyville, Pa.	1948-1992
01539000	C	410441	762553	Fishing Creek near Bloomsburg, Pa.	1940-2002
01540000	C	410010	762750	Fishing Creek at Bloomsburg, Pa.	1915-1928

Appendix 1. Streamflow-gaging stations used in development of low-flow, base-flow, and mean-flow regression equations for Pennsylvania streams.—Continued

[C, continuous-record station; P, partial-record station; ddmmss, degrees, minutes, seconds; climatic year, 12-month period April 1 through March 31]

U.S. Geological Survey streamflow-gaging station number	Type	Latitude (ddmmss)	Longitude (ddmmss)	Station name	Period of record used in analysis[1] (climatic year)
01540300	P	405445	761147	Tomhickon Creek near Zion Grove, Pa.	1960-1992
01541000	C	405349	784038	West Branch Susquehanna River at Bower, Pa.	1915-2002
01541200	C	405741	783110	WB Susquehanna River near Curwensville, Pa.	1956-1965
01541308	C	403033	783502	Bradley Run near Ashville, Pa.	1969-1979
01541400	P	405330	783450	Little Clearfield Creek at Kerrmoor, Pa.	1960-1970
01541500	C	405818	782422	Clearfield Creek at Dimeling, Pa.	1915-1960
01542330	P	405243	780436	Black Moshannon Creek near Philipsburg, Pa.	1971-1992
01542500	C	410703	780633	WB Susquehanna River at Karthaus, Pa.	1941-1964
01542780	P	412010	781153	Mix Run near Driftwood, Pa.	1960-1970
01542810	C	413444	781734	Waldy Run near Emporium, Pa.	1966-2002
01542830	P	412905	782250	West Creek at Beechwood, Pa.	1947-1955
01542900	P	413525	781155	Cowley Run at Sizerville, Pa.	1960-1970
01543000	C	412448	781150	Driftwood Br Sinnemahoning Cr at Sterling Run, Pa.	1915-2002
01543500	C	411902	780612	Sinnemahoning Creek at Sinnemahoning, Pa.	1940-2002
01543600	P	413610	780345	Freeman Run at Costello, Pa.	1947-1955
01543680	P	413354	775603	East Fork Sinnemahoning Creek near Logue, Pa.	1960-1970
01543700	P	413108	780140	First Fork Sinnemahoning Creek at Wharton, Pa.	1969-2005
01544500	C	412833	774934	Kettle Creek at Cross Fork, Pa.	1942-2002
01545600	C	412322	774128	Young Womans Creek near Renovo, Pa.	1966-2002
01546000	C	405630	774740	North Bald Eagle Creek at Milesburg, Pa.	1912-1934
01546400	C	405001	774940	Spring Creek at Houserville, Pa.	1986-2002
01546500	C	405323	774740	Spring Creek near Axemann, Pa.	1942-2002
01547200	C	405635	774712	Bald Eagle Creek bl Spring Creek at Milesburg, Pa.	1957-2002
01547700	C	410334	773622	Marsh Creek at Blanchard, Pa.	1957-2002
01547800	C	410126	775415	South Fork Beech Creek near Snow Shoe, Pa.	1971-1981
01547950	C	410642	774209	Beech Creek at Monument, Pa.	1970-2002
01548005	C	410451	773259	Bald Eagle Creek near Beech Creek Station, Pa.	1912-1970
01548400	P	413550	771723	Babb Creek at Morris, Pa.	1959-1992
01548500	C	413118	772652	Pine Creek at Cedar Run, Pa.	1920-2002
01548800	P	412400	772740	Trout Run at Cammal, Pa.	1960-1970
01549000	C	411845	772245	Pine Creek near Waterville, Pa.	1910-1920
01549500	C	412825	771352	Blockhouse Creek near English Center, Pa.	1942-2002
01549550	P	412426	771919	Little Pine Creek nr English Center, Pa.	1969-1992
01549700	C	411625	771928	Pine Creek bl L Pine Creek near Waterville, Pa.	1959-2002
01549750	P	410720	771400	Antes Creek at Rauchtown, Pa.	1960-1974

Appendix 1. Streamflow-gaging stations used in development of low-flow, base-flow, and mean-flow regression equations for Pennsylvania streams.—Continued

[C, continuous-record station; P, partial-record station; ddmmss, degrees, minutes, seconds; climatic year, 12-month period April 1 through March 31]

U.S. Geological Survey streamflow-gaging station number	Type	Latitude (ddmmss)	Longitude (ddmmss)	Station name	Period of record used in analysis[1] (climatic year)
01549780	C	412504	770946	Larrys Creek at Cogan House, Pa.	1962-1978
01549900	P	413555	765710	Mill Creek at Roaring Branch, Pa.	1959-1970
01550000	C	412506	770159	Lycoming Creek near Trout Run, Pa.	1915-2002
01551850	P	413025	762750	Little Loyalsock Creek near Dushore, Pa.	1959-1970
01551900	P	413100	763945	Elk Creek near Estella, Pa.	1959-1970
01552000	C	411930	765446	Loyalsock Creek at Loyalsockville, Pa.	1927-2002
01552500	C	412125	763206	Muncy Creek near Sonestown, Pa.	1942-2002
01553000	P	411350	763635	Little Muncy Creek at Lairdsville, Pa.	1960-1998
01553130	C	410331	770437	Sand Spring Run near White Deer, Pa.	1969-1981
01553480	P	405819	765330	Buffalo Creek at Lewisburg, Pa.	1971-1992
01554800	P	405400	772125	Pine Creek at Woodward, Pa.	1947-1992
01555000	C	405200	770255	Penns Creek at Penns Creek, Pa.	1931-2002
01555200	P	404640	770705	Middle Creek near Beavertown, Pa.	1959-1986
01555300	P	403820	770010	West Branch Mahantango Creek at Oriental, Pa.	1960-1970
01555500	C	403640	765444	East Mahantango Creek near Dalmatia, Pa.	1931-2002
01555570	P	403340	764830	Wiconisco Ck near Elizabethville, Pa.	1950-1992
01555780	P	402123	782541	Frankstown Branch Juniata River at E. Freedom, Pa.	1971-1992
01555850	P	402746	782539	Sugar Run at Altoona, Pa.	1960-1970
01556000	C	402747	781200	Frankstown Br Juniata River at Williamsburg, Pa.	1918-2002
01556500	C	403740	781738	Little Juniata River at Tipton, Pa.	1947-1962
01557500	C	404101	781402	Bald Eagle Creek at Tyrone, Pa.	1954-2002
01558000	C	403645	780827	Little Juniata River at Spruce Creek, Pa.	1940-2002
01558600	P	402554	782130	Shavers Creek near Petersburg, Pa.	1945-1958
01559000	C	402905	780109	Juniata River at Huntingdon, Pa.	1943-2002
01559200	P	403855	775045	Laurel Run at McAlevys Fort, Pa.	1960-1970
01559500	C	403125	775815	Standing Stone Creek near Huntingdon, Pa.	1931-1958
01559700	C	395840	783708	Sulphur Springs Creek near Manns Choice, Pa.	1963-1978
01560000	C	400418	782934	Dunning Creek at Belden, Pa.	1941-2002
01560800	P	395500	783040	Cove Creek near Rainsburg, Pa.	1960-1970
01562000	C	401257	781556	Raystown Branch Juniata River at Saxton, Pa.	1913-2002
01562500	C	402100	780750	Great Trough Creek near Marklesburg, Pa.	1931-1957
01564500	C	401245	775532	Aughwick Creek near Three Springs, Pa.	1940-2002
01564800	P	402938	774433	Messer Run at McVeytown, Pa.	1960-1970
01565000	C	403917	773500	Kishacoquillas Creek at Reedsville, Pa.	1941-1985
01565700	C	403619	771842	Little Lost Creek at Oakland Mills, Pa.	1965-1981

Appendix 1. Streamflow-gaging stations used in development of low-flow, base-flow, and mean-flow regression equations for Pennsylvania streams.—Continued

[C, continuous-record station; P, partial-record station; ddmmss, degrees, minutes, seconds; climatic year, 12-month period April 1 through March 31]

U.S. Geological Survey streamflow-gaging station number	Type	Latitude (ddmmss)	Longitude (ddmmss)	Station name	Period of record used in analysis[1] (climatic year)
01565800	P	403525	772425	Lost Creek near Mifflintown, Pa.	1959-1970
01565900	P	401454	774220	Narrows Branch Tuscarora Creek at Concord, Pa.	1960-1970
01566000	C	403055	772510	Tuscarora Creek near Port Royal, Pa.	1913-2002
01566500	C	403355	770705	Cocolamus Creek near Millerstown, Pa.	1932-1958
01566900	P	402937	770820	Buffalo Creek near Newport, Pa.	1949-2003
01567500	C	402215	772409	Bixler Run near Loysville, Pa.	1955-2002
01568000	C	401924	771009	Sherman Creek at Shermans Dale, Pa.	1931-2002
01569000	C	402247	765427	Stony Creek nr Dauphin, Pa.	1939-1974
01569300	P	400340	773700	Conodoguinet Creek at Orrstown, Pa.	1944-2003
01569400	P	401417	772643	Doubling Gap Creek at McCrea, Pa.	1960-1970
01569800	C	401405	770823	Letort Spring Run near Carlisle, Pa.	1978-2002
01570000	C	401508	770117	Conodoguinet Creek near Hogestown, Pa.	1913-1969
01571000	C	401830	765100	Paxton Creek near Penbrook, Pa.	1941-1995
01571185	P	400151	771818	Mountain Creek at Pine Grove Furnace, Pa.	1971-2003
01571200	P	400847	771015	Yellow Breeches Creek at Craighead, Pa.	1960-2003
01571300	P	400851	770146	Dogwood Run near Dillsburg, Pa.	1959-2003
01571500	C	401329	765354	Yellow Breeches Creek near Camp Hill, Pa.	1911-2002
01572000	C	403215	762240	Lower Little Swatara Creek at Pine Grove, Pa.	1921-1984
01573500	C	402350	764235	Manada Creek at Manada Gap, Pa.	1939-1958
01573700	P	401140	763440	Conewago Creek at Bellaire, Pa.	1961-1970
01573850	P	395830	770748	Bermudian Creek near York Springs, Pa.	1931-1970
01574500	C	395243	765113	Codorus Creek at Spring Grove, Pa.	1931-1964
01576085	C	400841	755920	Little Conestoga Creek near Churchtown, Pa.	1984-1995
01576754	C	395647	762205	Conestoga River at Conestoga, Pa.	1986-2002
01577500	C	394621	761858	Muddy Creek at Castle Fin, Pa.	1930-1971
01578400	C	395341	760650	Bowery Run near Quarryville, Pa.	1964-1981
01603500	C	394723	783848	Evitts Creek near Centerville, Pa.	1934-1982
01613500	C	394323	780338	Licking Creek near Sylvan, Pa.	1931-1941
01614090	C	395548	772623	Conococheague Creek near Fayetteville, Pa.	1962-1981
01614200	P	395445	775405	Broad Run at Fort Loudon, Pa.	1945-1956
01614500	C	394257	774928	Conococheague Creek at Fairview, Md.	1930-2002
01639300	P	394602	772315	Toms Creek near Fairfield, Pa.	1944-1970
03007800	C	414907	781735	Allegheny River at Port Allegany, Pa.	1976-2002
03009000	P	414015	782311	Potato Creek at Betula, Pa.	1960-1981
03009680	C	414835	782550	Potato Creek at Smethport, Pa.	1976-1995

Appendix 1. Streamflow-gaging stations used in development of low-flow, base-flow, and mean-flow regression equations for Pennsylvania streams.—Continued

[C, continuous-record station; P, partial-record station; ddmmss, degrees, minutes, seconds; climatic year, 12-month period April 1 through March 31]

U.S. Geological Survey streamflow-gaging station number	Type	Latitude (ddmmss)	Longitude (ddmmss)	Station name	Period of record used in analysis[1] (climatic year)
03010500	C	415748	782311	Allegheny River at Eldred, Pa.	1941-2002
03010650	P	415429	780326	Oswayo Creek near Coneville, Pa.	1961-1981
03010655	C	415742	781154	Oswayo Creek at Shinglehouse, Pa.	1976-2002
03010950	P	415312	783918	East Branch Tunungwant Creek near Custer City, Pa.	1947-1958
03011020	C	420923	784256	Allegheny River at Salamanca, N.Y.	1905-2002
03011800	C	414559	784308	Kinzua Creek near Guffey, Pa.	1967-2002
03013000	C	421015	790410	Conewago Creek at Waterboro, N.Y.	1940-1993
03015000	C	415617	790800	Conewango Creek at Russell, Pa.	1940-1949
03015280	C	415410	791418	Jackson Run near North Warren, Pa.	1964-1978
03015400	P	415544	793743	Hare Creek at Corry, Pa.	1945-1958
03015500	C	415109	791903	Brokenstraw Creek at Youngsville, Pa.	1911-2002
03015800	P	413617	792227	East Hickory Creek at Endeavor, Pa.	1961-1970
03017500	C	413607	790301	Tionesta Creek at Lynch, Pa.	1939-1979
03017800	P	413716.05	790911.5	Minister Creek (WQN871) at Truemans, Pa.	1981-2004
03019000	C	412825	792305	Tionesta Creek at Nebraska, Pa.	1911-1940
03020400	P	412700	793327	Hemlock Cr at President, Pa.	1945-1958
03020420	P	414702	794109	Fivemile Creek near Buells Corners, Pa.	1961-1970
03020450	P	414109	793430	Caldwell Creek near Titusville, Pa.	1959-1970
03020500	C	412854	794144	Oil Creek at Rouseville, Pa.	1934-2002
03021350	C	420055	794658	French Creek near Wattsburg, Pa.	1976-2002
03021410	C	420454	795102	West Branch French Creek near Lowville, Pa.	1976-1993
03021500	C	415723	795238	French Creek at Carters Corners, Pa.	1911-1971
03022500	C	414250	800850	French Creek at Saegerstown, Pa.	1923-1939
03022540	C	414126	800254	Woodcock Creek at Blooming Valley, Pa.	1976-1995
03023500	C	412815	800105	French Creek at Carlton, Pa.	1910-1925
03024000	C	412615	795722	French Creek at Utica, Pa.	1934-1970
03025000	C	412543	795248	Sugar Creek at Sugarcreek, Pa.	1934-1979
03025200	C	412520	795059	Patchel Run near Franklin, Pa.	1966-1978
03025800	P	411903	793920	East Sandy Creek at Van, Pa.	1959-1970
03025900	P	412551	801004	Sandy Creek near Sheakleyville, Pa.	1959-1970
03026500	C	413752	783437	Sevenmile Run near Rasselas, Pa.	1953-2002
03028000	C	413431	784133	West Branch Clarion River at Wilcox, Pa.	1955-2002
03029400	C	412016	791250	Toms Run at Cooksburg, Pa.	1961-1978
03029500	C	411950	791233	Clarion River at Cooksburg, Pa.	1940-1952
03030600	P	411012	792822	Piney Creek at Piney, Pa.	1971-1993

Appendix 1. Streamflow-gaging stations used in development of low-flow, base-flow, and mean-flow regression equations for Pennsylvania streams.—Continued

[C, continuous-record station; P, partial-record station; ddmmss, degrees, minutes, seconds; climatic year, 12-month period April 1 through March 31]

U.S. Geological Survey streamflow-gaging station number	Type	Latitude (ddmmss)	Longitude (ddmmss)	Station name	Period of record used in analysis[1] (climatic year)
03031950	C	405930	790526	Big Run nr Sprankle Mills, Pa.	1965-1981
03032500	C	405940	792340	Redbank Creek at St. Charles, Pa.	1920-2002
03033200	P	410049	784953	Stump Creek at Cramer, Pa.	1943-1971
03036800	P	404322	790623	Crooked Creek at Gaibleton, Pa.	1945-1958
03038000	C	403917	792056	Crooked Creek at Idaho, Pa.	1939-1967
03039200	C	400249	784958	Clear Run near Buckstown, Pa.	1966-1978
03039925	C	401558	790101	North Fork Bens Creek at North Fork Reservoir, Pa.	1989-1998
03042200	C	403345	785644	Little Yellow Creek near Strongstown, Pa.	1962-1988
03047500	C	403205	792755	Kiskiminetas River at Avonmore, Pa.	1909-1937
03048300	P	402625	793239	Beaver Run near Slickville, Pa.	1972-1980
03048800	P	405236	793819	Patterson Creek near Worthington, Pa.	1959-1970
03049000	C	404257	794159	Buffalo Creek near Freeport, Pa.	1942-2002
03049610	P	403654	794536	Bull Creek at Tarentum, Pa.	1973-1992
03049800	C	403113	795618	Little Pine Creek near Etna, Pa.	1964-2002
03072590	C	394744	794747	Georges Creek at Smithfield, Pa.	1965-1978
03072840	C	395951	800231	Tenmile Creek near Clarksville, Pa.	1970-1979
03074300	C	395204	794140	Lick Run at Hopwood, Pa.	1968-1978
03075040	P	401126	795550	Pigeon Creek at Monongahela, Pa.	1972-1980
03078000	C	394208	790812	Casselman River at Grantville, Md.	1949-2002
03078700	P	394841	790401	Elklick Creek at Summit Mills, Pa.	1961-1981
03078800	P	395726	790611	Coxes Creek near Rockwood, Pa.	1959-1970
03079000	C	395135	791340	Casselman River at Markleton, Pa.	1922-2002
03079600	P	400032	791404	Laurel Hill Creek near Bakersville, Pa.	1971-1992
03080000	C	394913	791918	Laurel Hill Creek at Ursina, Pa.	1920-2002
03082100	P	400337	792153	Indian Creek at Nebo, Pa.	1959-1969
03082200	C	400059	792533	Poplar Run near Normalville, Pa.	1963-1978
03082500	C	400103	793538	Youghiogheny River at Connellsville, Pa.	1910-1925
03083100	P	400723	794414	Jacobs Creek at Jacobs Creek, Pa.	1967-1993
03084000	C	402701	794250	Abers Creek near Murrysville, Pa.	1950-1993
03084500	C	402309	794555	Turtle Creek at Trafford, Pa.	1922-1952
03093000	C	411540	805716	Eagle Creek at Phalanx Station, Ohio	1928-2002
03100000	C	413045	802815	Shenango River near Turnersville, Pa.	1913-1922
03102000	C	413730	802530	Shenango River near Jamestown, Pa.	1921-1934
03102500	C	412519	802235	Little Shenango River at Greenville, Pa.	1915-2002
03103000	C	411840	802840	Pymatuning Creek near Orangeville, Pa.	1915-1963

Appendix 1. Streamflow-gaging stations used in development of low-flow, base-flow, and mean-flow regression equations for Pennsylvania streams.—Continued

[C, continuous-record station; P, partial-record station; ddmmss, degrees, minutes, seconds; climatic year, 12-month period April 1 through March 31]

U.S. Geological Survey streamflow-gaging station number	Type	Latitude (ddmmss)	Longitude (ddmmss)	Station name	Period of record used in analysis[1] (climatic year)
03104000	C	411355	803035	Shenango River at Sharon, Pa.	1911-1938
03104760	C	411110	801938	Harthegig Run near Greenfield, Pa.	1970-1981
03105800	P	404756	795547	Thorn Creek at McBride, Pa.	1946-1958
03106000	C	404901	801433	Connoquenessing Creek near Zelienople, Pa.	1921-2002
03106100	P	411451	800340	Wolf Creek near Grove City, Pa.	1959-1970
03106200	P	405655	800225	Muddy Creek at Isle, Pa.	1945-1958
03106500	C	405302	801402	Slippery Rock Creek at Wurtemburg, Pa.	1913-1969
03107700	P	403004	802517	Traverse Creek at Raccoon Creek State Park, Pa.	1971-1982
03108000	C	403740	802016	Raccoon Creek at Moffatts Mill, Pa.	1943-1956
03109300	P	404822	802522	North Fork Little Beaver Creek at Darlington, Pa.	1950-1992
03109500	C	404033	803227	Little Beaver Creek near East Liverpool, Ohio	1917-2002
04213000	C	415537	803615	Conneaut Cr at Conneaut, Ohio	1924-2002
04213075	C	415931	801729	Brandy Run near Girard, Pa.	1988-2002

[1]Period of record may contain breaks in record for continuous-record stations; intermittent measurements taken during period of record for partial-record stations

Appendix 2. Partial-record streamflow-gaging-station measurements and correlation results.

[Date, year, month, day; Discharges in cubic feet per second; R^2, coefficient of determination; Adj. R^2, adjusted coefficient of determination; Q_P, discharge at partial-record station, in cubic feet per second; Q_I, discharge at index station, in cubic feet per second]

Station Number 01427200

Measurements used in analysis

Date	Discharge	Date	Discharge	Date	Discharge
19460905	5.09	19830919	2.1	19910801	3.49
19481005	3.07	19840615	32.7	19920618	20.7
19501004	14.3	19840802	26.6	19930519	40.1
19510906	6.45	19840921	5.5	19930608	17.3
19520924	17.8	19850423	58.6	19940913	16.1
19550804	0.61	19850516	18.7	19950524	25.6
19780720	9.7	19850814	8.79	19950706	13.2
19781115	24	19850904	9.55	19970613	21.1
19790712	10	19860516	23.2	19971008	4.05
19800424	72	19860911	6.52	19980611	22.8
19800819	2.8	19861103	28.7	20010508	24.4
19810505	79	19870515	32	20010521	12.3
19810630	14	19880617	12.9	20010725	1.84
19810822	2.13	19880921	8.75	20020708	11.9
19810825	3	19880929	3.38	20020816	2.67
19820505	60	19881019	4.11		
19820806	6.3	19890714	40.3		
19830714	10	19900727	16.8		
19830824	3.28	19900921	16.7		
19830909	1.1	19910711	4.11		

Correlated with station 01439500 R^2=0.79 Adj. R^2=0.79 $Q_P=(10^{-0.72721})(Q_I^{1.0423})$

Station Number 01427300

Measurements used in analysis

Date	Discharge	Date	Discharge	Date	Discharge
19580904	4.82	19631025	1.84	19690514	54.5
19590923	2.43	19640603	8.49		
19600422	28.7	19660419	17.2		
19610524	21.4	19670424	38.3		
19611012	2.53	19680508	27.3		

Correlated with station 01439500 R^2=0.94 Adj. R^2=0.92 $Q_P=(10^{-0.81946})(Q_I^{0.44422E-01})$

Station Number 01427400

Measurements used in analysis

Date	Discharge	Date	Discharge	Date	Discharge
19581112	7.3	19610525	8.31	19670919	1.32
19590505	13	19620426	7.73	19680412	6.72
19590921	0.39	19640512	5.26		
19600420	8.92	19660705	0.95		
19600928	8.3	19661014	0.63		

Correlated with station 01439500 R^2=0.95 Adj. R^2=0.94 $Q_P=(10^{-1.8296})(Q_I^{0.74861})$

Station Number 01427700

Measurements used in analysis

Date	Discharge	Date	Discharge	Date	Discharge
19580904	6.9	19670421	86.5	19861103	11
19590922	1.35	19671117	28.7	19910605	7.5
19600421	41.2	19680508	41.6	19910711	3.18
19601005	19.1	19681001	2.56	19910806	0.77
19610524	34.4	19690508	27.3		
19611012	1.68	19810822	1.44		
19631025	2.29	19830824	1.92		
19640604	7.12	19840913	5.38		
19660419	26.2	19850423	30		
19660913	0.89	19860911	3.24		

Correlated with station 01439500 R^2=0.86 Adj. R^2=0.85 $Q_P=(10^{-1.1809})(Q_I^{0.44303})$

Station Number 01428200

Measurements used in analysis

Date	Discharge	Date	Discharge	Date	Discharge	Date	Discharge
19580904	2.26	19610524	34.5	19660913	0.53	19690508	24.2
19590505	59.1	19611012	1.48	19670421	52.6		
19590922	1.14	19631024	1.55	19671117	15.4		
19600421	35	19640604	11.2	19680508	36.6		
19601005	29.5	19660419	17	19681001	5.3		

Correlated with station 01440400 R^2=0.90 Adj. R^2=0.89 $Q_P=(10^{-1.2222})(Q_I^{1.3545})$

Station Number 01431680

Measurements used in analysis

Date	Discharge	Date	Discharge	Date	Discharge
19591006	1.28	19740301	9.61	19790919	1.82
19710414	22.1	19780928	1.79	19791211	5.3
19710708	1.52	19781108	1.65	19800116	4.95
19710819	1.51	19790424	7.25	19800214	1.63
19731114	3.92	19790516	7.98	19800624	2.07

Correlated with station 01440400 R^2=0.83 Adj. R^2=0.82 $Q_P=(10^{-0.84660})(Q_I^{0.79502})$

Station Number 01432100

Measurements used in analysis

Date	Discharge	Date	Discharge
19610525	68.5	19660419	26.7
19611012	3.91	19660913	1.54
19631024	1.77	19671117	30.1
19640604	21.1	19681002	2.51
19640917	0.65	19690924	3.85

Correlated with station 01439500 R^2=0.98 Adj. R^2=0.98 $Q_P=(10^{-0.83991})(Q_I^{1.1108})$

Station Number 01432500

Measurements used in analysis

Date	Discharge	Date	Discharge	Date	Discharge
19570711	11.4	19660829	6.17	19910912	4.74
19570725	7.79	19681004	4.4	19940914	40.4
19580522	152	19700821	5.8	19960905	13.8
19590916	11.9	19720728	67	19970804	4.94
19600505	88.8	19720911	4.6	19971010	8.15
19610615	74.7	19720915	8.2	19980806	6.15
19610706	34.4	19770531	53	20000830	20.2
19610809	19.3	19770603	18		
19610925	15.8	19790716	25		
19611017	11.6	19810822	9.62		
19620504	115	19830824	12.5		
19620621	13.8	19840912	12.7		
19621029	17.3	19841017	4.08		
19630604	60.9	19850423	92.7		
19640630	25.1	19850814	14		
19640708	14	19850905	9.77		
19640827	2.42	19861009	15.2		
19650616	16.7	19861103	14.3		
19650817	5.15	19910605	35.7		
19660616	58	19910806	3.52		

Correlated with station 01439500 R^2=0.90 Adj. R^2=0.89 $Q_P=(10^{-0.40619})(Q_I^{1.0472})$

Station Number 01433700

Measurements used in analysis

Date	Discharge	Date	Discharge	Date	Discharge	Date	Discharge
19580905	0.9	19600928	12.5	19620510	6.73	19670927	1.95
19590505	12	19601114	5.19	19640513	10.7	19680411	9.06
19590921	2.22	19610524	15.3	19650527	4.16		
19600420	14.1	19610808	0.99	19660913	0.29		
19600726	1.87	19610925	0.84	19670414	15.6		

Correlated with station 01439500 R^2=0.87 Adj. R^2=0.86 $Q_P=(10^{-1.6813})(Q_I^{1.1536})$

Station Number 01438300

Measurements used in analysis

Date	Discharge	Date	Discharge	Date	Discharge
19430510	9	19610927	0.96	19720329	12.7
19430614	4.2	19620511	6.15	19730521	26.2
19590619	2.11	19620709	0.86	19740301	12.3
19590921	0.36	19640519	7.74	19800905	0.07
19600415	11.8	19640810	0.27	19801007	0.63
19600726	2.01	19640918	0.09	19830811	1.4
19601005	5.45	19650528	1.76	19910129	7.41
19601010	2.1	19661012	0.72	19980616	58
19610524	10.7	19670414	10.3		
19610808	1.28	19680416	4.58		

Correlated with station 01439500 R^2=0.86 Adj. R^2=0.85 $Q_P=(10^{-1.5272})(Q_I^{1.0331})$

Station Number 01438700

Measurements used in analysis

Date	Discharge	Date	Discharge	Date	Discharge	Date	Discharge
19480903	5.66	19510918	12.6	20020423	30.1	20030401	84.7
19481005	2.07	19530813	2.62	20020604	29.3	20030513	17.5
19491012	1.89	19540728	1.13	20020715	3.46	20030922	24.6
19501003	2.06	19550804	0.8	20020828	1.04	20040330	34.2
19510905	4.89	19570807	1.75	20021007	9.09		

Correlated with station 01439500 R^2=0.95 Adj. R^2=0.94 $Q_P=(10^{-0.97179})(Q_I^{1.0430})$

Station Number 01438900

Measurements used in analysis

Date	Discharge	Date	Discharge	Date	Discharge	Date	Discharge
19580905	0.88	19600909	10.6	19630912	0.55	19670412	33.3
19581107	27.7	19610811	4.08	19640811	1.19	19670921	3.62
19590506	25.9	19610926	2.94	19640918	1.06	19680411	21.1
19590921	1.2	19620412	54.8	19650528	7.57		
19600415	38.8	19620709	0.76	19661012	3.43		

Correlated with station 01442500 R^2=0.90 Adj. R^2=0.89 $Q_P=(10^{-2.2951})(Q_I^{1.3549})$

Station Number 01439400

Measurements used in analysis

Date	Discharge	Date	Discharge	Date	Discharge
19700602	6.4	19770516	7.9	19830906	0.66
19701009	0.21	19780425	11	20020422	18.3
19710512	8.5	19780928	0.67	20020605	11.6
19720906	0.07	19790508	15	20020716	1.85
19730508	17	19790905	0.98	20020828	1.09
19730911	2.4	19800423	19	20021007	1.43
19740426	14.9	19810827	0.67	20030402	41.8
19750522	16	19820512	11	20030514	6.53
19751009	3.7	19820909	1.2	20040331	26.7
19760414	11	19830512	11		

Correlated with station 01439500 R^2=0.87 Adj. R^2=0.87 $Q_P=(10^{-1.8108})(Q_I^{1.2417})$

Station Number 01464700

Measurements used in analysis

Date	Discharge	Date	Discharge	Date	Discharge	Date	Discharge
19590921	4.88	19620427	13.8	19640522	8.12	19690827	5.7
19600421	12.1	19620709	0.77	19650421	9.37		
19601006	7.49	19630514	3.4	19651021	0.38		
19610526	12.4	19630926	0.18	19660419	4.16		
19611012	1.82	19631021	0.17	19670927	2.01		

Correlated with station 01465500 R^2=0.95 Adj. R^2=0.94 $Q_P=(10^{-2.3565})(Q_I^{1.5587})$

Station Number 01471800

Measurements used in analysis

Date	Discharge	Date	Discharge	Date	Discharge	Date	Discharge
19600711	4.18	19750917	6.5	19811209	3.1	19910710	4.66
19700514	13.1	19760421	12	19820210	8.71	19910807	2.01
19700914	1.96	19761118	5.55	19820429	25.3	19910910	2.1
19710504	11.3	19770421	17.7	19820526	12.2	20020911	0.95
19710924	11.5	19771012	3.49	19820830	2.85		
19711119	11.5	19780724	3.85	19840919	4.71		
19720808	8	19780907	2.22	19850924	2.3		
19730301	12	19781004	2.75	19880712	5.5		
19740522	13	19800709	4.14	19881018	2.52		
19750423	18	19801029	3.22	19910604	6.11		

Correlated with station 01451500 R^2=0.75 Adj. R^2=0.74 $Q_P=(10^{-2.1312})(Q_I^{1.5424})$

Station Number 01494980

Measurements used in analysis

Date	Discharge	Date	Discharge	Date	Discharge
19781002	17.3	19840927	26.1	19910909	11
19790925	42.8	19850430	15		
19801023	12.8	19860917	6.91		
19810821	11.8	19880708	14.3		
19820909	11.7	19910604	18.6		

Correlated with station 01480300 R^2=0.78 Adj. R^2=0.75 $Q_P=(10^{0.45415})(Q_I^{0.81283})$

Station Number 01502750

Measurements used in analysis

Date	Discharge	Date	Discharge	Date	Discharge	Date	Discharge
19460904	4.58	19510906	9.22	19570807	5.22	19910605	23
19480914	3.34	19520924	8.75	19821005	9.2	19910710	6.2
19481005	3.51	19530813	4.7	19840924	5.8	19910904	3.2
19490721	4.68	19540729	2.91	19870818	11		
19501004	9.66	19550804	1.71	19890907	6.5		

Correlated with station 01534000 R^2=0.73 Adj. R^2=0.71 $Q_P=(10^{-0.58285})(Q_I^{0.84935})$

Station Number 01502780

Measurements used in analysis

Date	Discharge	Date	Discharge	Date	Discharge
19590923	0.49	19650428	34.4	19850917	2.2
19600422	14.4	19651019	5.26	19870819	1.6
19601006	12.8	19660420	14.9	19890911	3.2
19610524	11.8	19680509	8.99	19910606	3.8
19611011	0.62	19681003	2.55	19910711	0.87
19620709	0.27	19690626	11.2	19910909	0.35
19630515	25.3	19690630	1.81		
19630919	0.84	19690926	1.96		
19640603	3.4	19821006	1.4		
19640916	0.1	19840925	2		

Correlated with station 01534000 R^2=0.85 Adj. R^2=0.85 $Q_P=(10^{-1.6938})(Q_I^{1.1083})$

Station Number 01443100

Measurements used in analysis

Date	Discharge	Date	Discharge	Date	Discharge	Date	Discharge
19700602	5.8	19770516	8.6	19820913	7.31	19881020	4.18
19701009	3	19780425	12	19830512	14	19910603	5.54
19710512	8.6	19780928	5	19830804	5.93	19910710	3.8
19720906	4.7	19790508	11	19830906	3.2	19910808	2.98
19730508	12	19790905	5	19831011	3.44		
19730911	4.9	19800423	15	19840918	5.53		
19740426	15	19810821	6.32	19850424	7.88		
19750522	9.6	19810827	5.6	19860909	5		
19751009	10	19820511	8.8	19861023	4.33		
19760414	13	19820909	7.4	19880712	5.28		

Correlated with station 01449360 R^2=0.78 Adj. R^2=0.77 $Q_P=(10^{-0.25706})(Q_I^{0.65060})$

Station Number 01446800

Measurements used in analysis

Date	Discharge	Date	Discharge
19480901	4.75	19521016	5.33
19481005	2.9	19530826	2.92
19501003	2.84	19531026	2.34
19510926	9.15	19550804	1.68
19511003	7.72	19570806	1.68

Correlated with station 01439500 R^2=0.78 Adj. R^2=0.76 $Q_P=(10^{-0.37859})(Q_I^{0.72151})$

Station Number 01448100

Measurements used in analysis

Date	Discharge	Date	Discharge
19700511	19.8	19730531	38.6
19700917	3.81	19740607	9.51
19710504	13.8	19881020	4.21
19720526	29.2		
19720910	3.93		

Correlated with station 01449360 R^2=0.97 Adj. R^2=0.97 $Q_P=(10^{-1.1179})(Q_I^{1.2467})$

Station Number 01448800

Measurements used in analysis

Date	Discharge	Date	Discharge	Date	Discharge
19440911	0.83	19501002	2.09	19570806	1.57
19460829	2.01	19510904	3.06		
19470925	3.21	19510917	4.08		
19480902	2.5	19520922	5.61		
19481004	2	19540727	1.26		

Correlated with station 01450500$^{(1)}$ and 01447500$^{(2)}$ R^2=0.88 Adj. R^2=0.85 $Q_P=(10^{-1.5902})(Q_{I(1)}{}^{0.42694})(Q_{1(2)}{}^{0.80557})$

Station Number 01450400

Measurements used in analysis

Date	Discharge	Date	Discharge	Date	Discharge
19440911	4.18	19501002	17.6	19570806	6.74
19451101	41.2	19520922	41.6		
19460829	27.4	19531026	6.06		
19480901	19.4	19540727	7.08		
19481004	8.3	19550803	4.08		

Correlated with station 01450500$^{(1)}$ and 01449500$^{(2)}$ R^2=0.92 Adj. R^2=0.90 $Q_P=(10^{-0.65567})(Q_{I(1)}{}^{0.55263})(Q_{I(2)}{}^{0.84387})$

Station Number 01531300

Measurements used in analysis

Date	Discharge	Date	Discharge
19480915	0.92	19531026	2.9
19481005	1.36	19570806	2.18
19501003	7.9	19910603	7.3
19520923	4.02	19910903	0.41
19530825	1.8		

Correlated with station 01532000 R^2=0.79 Adj. R^2=0.77 $Q_P=(10^{-0.60763})(Q_I{}^{0.93128})$

Station Number 01531420

Measurements used in analysis

Date	Discharge	Date	Discharge
19660125	0.84	19680926	1.16
19660712	0.1	19690613	0.51
19670414	8.36	19690924	0.07
19670501	1.94	19700512	2.84
19671004	1.49	19700922	0.26

Correlated with station 01532000 R^2=0.80 Adj. R^2=0.77 $Q_P=(10^{-1.8897})(Q_I{}^{1.0689})$

Station Number 01532600

Measurements used in analysis

Date	Discharge	Date	Discharge	Date	Discharge
19451031	29.5	19520924	2.73	19910903	0.67
19470925	11.1	19530814	1.85		
19480915	2.14	19570807	0.94		
19491014	6.14	19910603	6.53		
19501004	10.1	19910709	1.7		

Correlated with station 01532000 R^2=0.90 Adj. R^2=0.89 $Q_P=(10^{-0.73028})(Q_I{}^{1.0018})$

Station Number 01533200

Measurements used in analysis

Date	Discharge	Date	Discharge
19590924	0.22	19640916	0.02
19600419	3.08	19651201	1.66
19601004	2.61	19660419	1.6
19610712	0.37	19660912	0.21
19611011	0.18	19670417	2.41
19620427	2.36	19671005	0.41
19620709	0.08	19680501	1.3
19630917	0.09	19680930	0.36
19631024	0.01	19690508	2.2
19640624	0.05	19690925	0.13

Correlated with station 01534000 R^2=0.79 Adj. R^2=0.78 $Q_P=(10^{-2.7210})(Q_I^{1.1959})$

Station Number 01533300

Measurements used in analysis

Date	Discharge	Date	Discharge	Date	Discharge	Date	Discharge
19480914	0.97	19520924	4.12	19681003	1.87	19890911	1.8
19481005	1.17	19550804	0.76	19690926	1.35	19910606	6.2
19490721	0.83	19570807	0.93	19840924	1.5	19910711	1.9
19501004	6.38	19660420	16	19850917	2.6	19910909	0.23
19510919	1.43	19680509	13.8	19870819	1.7		

Correlated with station 01534000 R^2=0.83 Adj. R^2=0.82 $Q_P=(10^{-1.7688})(Q_I^{1.2138})$

Station Number 01533900

Measurements used in analysis

Date	Discharge	Date	Discharge	Date	Discharge	Date	Discharge
19580915	3.77	19620709	0.43	19650428	14.1	19690926	1.34
19590923	0.19	19630919	0.52	19651019	2.1		
19600422	7.28	19631025	2.97	19660420	7.06		
19610524	9.28	19640603	2.68	19680509	5.92		
19611011	0.48	19640916	0.06	19681003	1.58		

Correlated with station 01534000 R^2=0.85 Adj. R^2=0.84 $Q_P=(10^{-1.8467})(Q_I^{1.1072})$

Station Number 01538900

Measurements used in analysis

Date	Discharge	Date	Discharge	Date	Discharge
19470926	8.87	19540730	2.57	19870819	5.6
19471007	2.91	19570808	1.8	19890906	2.8
19471024	5	19820922	9	19910606	8.5
19480913	1.8	19840925	4.1	19910712	3
19520925	8.36	19850919	26.7		

Correlated with station 01539000 R^2=0.72 Adj. R^2=0.69 $Q_P=(10^{-1.2007})(Q_I^{1.1133})$

Station Number 01540300

Measurements used in analysis

Date	Discharge	Date	Discharge	Date	Discharge
19590922	4.44	19650430	26	19870818	6.1
19600419	37.4	19651021	6.44	19890911	5.2
19610526	27.7	19660421	19.1	19910606	15
19611010	4.86	19670417	33	19910708	8.2
19620426	27.3	19680510	21.7		
19630513	25.8	19680927	7.04		
19630920	3.43	19690506	32.6		
19631024	2.52	19690919	6.52		
19640619	9.53	19820921	6.1		
19640922	2.7	19830902	7		

Correlated with station 01538000 R^2=0.92 Adj. R^2=0.92 $Q_P=(10^{-0.72032E-01})(Q_I^{0.86077})$

Station Number 01541400

Measurements used in analysis

Date	Discharge	Date	Discharge	Date	Discharge
19590915	0.84	19630514	7.05	19660913	1.9
19600421	9.48	19631024	0.79	19671012	7.34
19601005	2.03	19640716	4.03	19680501	5.47
19610712	3.18	19651019	4.41	19681125	18.7
19611012	0.95	19660419	11	19690925	1.33

Correlated with station 01541000 R^2=0.90 Adj. R^2=0.89 $Q_P=(10^{-1.5512})(Q_I^{1.0253})$

Station Number 01542330

Measurements used in analysis

Date	Discharge	Date	Discharge	Date	Discharge
19700520	4.98	19760421	2.3	19910604	1.05
19700916	0.61	19760901	0.37	19910917	0.03
19710504	2.84	19771101	4.1		
19711013	1	19790508	3		
19720518	10.9	19791121	2		
19720906	0.2	19800912	0.13		
19730522	4.53	19820513	1.6		
19730806	0.8	19850926	0.06		
19740521	4.59	19870820	0.21		
19750417	3.4	19890821	0.78		

Correlated with station 01542000 R^2=0.81 Adj. R^2=0.80 $Q_P=(10^{-3.0073})(Q_I^{1.7705})$

Station Number 01543700

Measurements used in analysis

Date	Discharge	Date	Discharge	Date	Discharge
19680327	736	19781113	41.8	19901128	201
19680710	38.5	19790501	193	19910719	10.3
19680716	40.2	19791120	181	19911002	10.3
19690114	86.2	19800911	22.1	19930629	58.6
19691017	15.7	19820914	7.4	19930811	27
19700611	68	19830915	12.4	19950717	46.1
19700807	67.6	19840110	77.6	19950824	22.2
19711014	21	19840301	284	19960729	39.1
19720501	217	19840411	532	19980706	78.8
19720515	532	19851210	269	19980805	14.1
19730417	271	19860212	225	20000823	21.4
19730516	487	19860527	115	20001004	25
19730627	96.2	19870819	17	20010514	83.7
19740522	223	19871209	217	20010813	14.3
19740814	29.7	19880323	193	20020114	87.4
19750416	196	19880615	47.8	20020225	237
19760421	116	19880726	27.7	20041006	78.8
19760901	49	19881004	20.2		
19770516	126	19890906	13.4		
19771102	153	19900426	198		

Correlated with station 01544500$^{(1)}$ and 01543000$^{(2)}$ R^2=0.97 Adj. R^2=0.97 $Q_P=(10^{0.10224})(Q_{I(1)}^{0.67909})(Q_{I(2)}^{0.30489})$

Station Number 01548400

Measurements used in analysis

Date	Discharge	Date	Discharge	Date	Discharge
19580916	4.33	19631024	1.87	19820512	40
19590915	1.68	19640624	5.73	19820914	2.3
19600420	53.3	19650506	89.7	19830930	2.5
19601005	2.16	19651026	6.97	19850926	4.3
19610713	7.78	19660420	7.35	19870820	3
19611012	2.53	19670420	72.5	19910603	6.89
19620427	63.1	19671006	4.43		
19620710	2	19680924	10.1		
19630515	68.7	19690630	5.74		
19630918	1.74	19690924	1.33		

Correlated with station 01548500 R^2=0.88 Adj. R^2=0.87 $Q_P=(10^{-1.3830})(Q_I^{1.0284})$

Station Number 01548800

Measurements used in analysis

Date	Discharge	Date	Discharge	Date	Discharge	Date	Discharge
19590915	0.64	19620710	1.45	19640918	0.009	19670926	0.55
19600421	23.3	19630516	9.34	19650511	49.9	19680506	36.3
19601007	1.14	19630918	0.67	19651026	2.73	19690630	7.19
19610713	4.79	19631024	0.69	19660420	15.6	19690925	1.25
19611012	1.48	19640625	2.39	19670420	23.1		

Correlated with station 01548500 R^2=0.82 Adj. R^2=0.81 $Q_P=(10^{-2.3554})(Q_I^{1.2945})$

Station Number 01549550

Measurements used in analysis

Date	Discharge	Date	Discharge
19680918	17.8	19691222	148
19681101	28.4	19700513	92
19681212	198	19700923	14
19690123	64.2	19710524	179
19690225	46.1	19711014	49.3
19690410	353	19720525	121
19690527	67.2	19720907	12.5
19690703	22.6	19730720	31.7
19690812	51.2	19740521	165
19691114	135	19910603	36.5

Correlated with station 01549500 R^2=0.96 Adj. R^2=0.96 $Q_P=(10^{0.66528})(Q_I^{0.90865})$

Station Number 01549750

Measurements used in analysis

Date	Discharge	Date	Discharge	Date	Discharge	Date	Discharge
19590917	0.99	19620428	19.2	19640626	3.51	19670926	3.62
19600421	17.7	19620711	2.41	19640918	0.34	19680506	10.8
19601007	2.29	19630516	10	19650512	36.8	19690929	2.17
19610712	4.55	19631015	0.87	19660421	12.4	19740212	14.9
19611013	1.2	19631024	0.85	19670420	21.2		

Correlated with station 01548500 R^2=0.95 Adj. R^2=0.94 $Q_P=(10^{-1.2855})(Q_I^{0.86472})$

Station Number 01549900

Measurements used in analysis

Date	Discharge	Date	Discharge	Date	Discharge
19580916	1.28	19640624	1.53	19690922	0.89
19590827	0.5	19640918	0.05		
19590915	0.25	19650504	18.4		
19600420	10.7	19651029	1.43		
19611012	0.44	19660421	7.3		
19620427	13.9	19670420	16.5		
19620710	0.29	19671006	2.35		
19630515	12.1	19680502	6.29		
19630917	0.38	19680927	1.82		
19631023	0.36	19690626	6.57		

Correlated with station 01550000 R^2=0.91 Adj. R^2=0.91 $Q_P=(10^{-1.8535})(Q_I^{1.2038})$

Station Number 01551850

Measurements used in analysis

Date	Discharge	Date	Discharge
19580916	5.69	19631024	0.68
19590914	5.21	19640623	1.09
19590924	1.77	19640915	0.22
19600419	2.34	19660418	15.2
19610712	2.34	19660912	0.53
19611011	0.67	19671005	4.29
19620427	18.9	19680502	7.22
19620709	0.69	19680930	1.81
19630514	28.7	19690508	15.4
19630916	0.71	19690922	1.67

Correlated with station 01552000 R^2=0.83 Adj. R^2=0.82 $Q_P=(10^{-1.6489})(Q_I^{1.0078})$

Station Number 01551900

Measurements used in analysis

Date	Discharge	Date	Discharge	Date	Discharge	Date	Discharge
19580916	3.72	19611011	1.39	19640915	0.13	19680930	1.77
19590827	0.75	19620426	18.5	19660418	11.2	19690508	16.3
19600419	16.1	19620709	0.7	19660912	0.45	19690922	0.93
19601009	11.6	19630917	2.01	19671005	6.53		
19610712	3.28	19640623	1.31	19680502	10		

Correlated with station 01552000 R^2=0.91 Adj. R^2=0.91 $Q_P=(10^{-1.9274})(Q_I^{1.1567})$

Station Number 01553000

Measurements used in analysis

Date	Discharge	Date	Discharge	Date	Discharge
19590914	5.21	19651130	53.3	19690922	4.28
19601004	27	19660912	3.92	19970424	148
19610712	9.29	19670925	13.1		
19631023	2.06	19680430	30.4		
19640623	7.31	19681001	7.18		

Correlated with station 01552500 R^2=0.81 Adj. R^2=0.79 $Q_P=(10^{0.31976E-01})(Q_I^{1.0691})$

Station Number 01542780

Measurements used in analysis

Date	Discharge	Date	Discharge	Date	Discharge	Date	Discharge
19590916	0.8	19630919	1.22	19660420	29.8	19690923	0.53
19600421	41.7	19631025	1.22	19670413	77.3		
19610713	16.1	19640917	0.7	19671003	55.3		
19620428	51.3	19650506	42.8	19680507	26.4		
19630515	42.8	19651027	4.9	19690528	50.7		

Correlated with station 01543000 R^2=0.87 Adj. R^2=0.86 $Q_P=(10^{-0.81450})(Q_I^{0.95287})$

Station Number 01542830

Measurements used in analysis

Date	Discharge	Date	Discharge
19460905	2.53	19520924	1.35
19470923	12.4	19530827	1.47
19480922	2.48	19531027	1.96
19491013	4.24	19540729	1.89
19501004	6.9	19540902	1.14

Correlated with station 01543000 R^2=0.93 Adj. R^2=0.93 $Q_P=(10^{-0.64918})(Q_I^{0.80633})$

Station Number 01542900

Measurements used in analysis

Date	Discharge	Date	Discharge	Date	Discharge	Date	Discharge
19590916	0.27	19630919	0.66	19660420	18.5	19690923	1.41
19600422	21.5	19631025	0.75	19660914	0.6		
19610713	3.02	19640917	0.14	19671003	30.2		
19620428	30.6	19650506	40.4	19680507	26.4		
19630515	35.6	19651027	8.86	19690529	13.3		

Correlated with station 01543000 R^2=0.98 Adj. R^2=0.98 $Q_P=(10^{-1.2864})(Q_I^{1.0843})$

Station Number 01543600

Measurements used in analysis

Date	Discharge	Date	Discharge
19460906	3.99	19530826	1.15
19470923	24.7	19531027	1.02
19491013	6.17	19540728	2.13
19501004	3.38		
19520924	1.92		

Correlated with station 01543000 R^2=0.89 Adj. R^2=0.87 $Q_P=(10^{-0.95702})(Q_I^{1.0420})$

Station Number 01543680

Measurements used in analysis

Date	Discharge	Date	Discharge	Date	Discharge	Date	Discharge
19590916	1.29	19630919	1.51	19651027	14	19690529	34.8
19601006	1.48	19631025	1.58	19660420	35.6	19690923	3.68
19610713	5.48	19640625	8.16	19670412	93.7		
19620428	70.1	19640917	1.37	19670927	3.52		
19630515	65.4	19650506	93.2	19680507	38.1		

Correlated with station 01544500 R^2=0.97 Adj. R^2=0.96 $Q_P=(10^{-0.66733})(Q_I^{1.0163})$

Station Number 01555780

Measurements used in analysis

Date	Discharge	Date	Discharge	Date	Discharge
19700520	106	19781108	7.2	19890825	14
19710505	27.6	19790426	48	19910605	11
19711019	13.9	19791022	50		
19720906	9.21	19800421	102		
19730628	21	19800912	6.5		
19740610	28.8	19821006	4.5		
19741009	6.8	19830831	5.2		
19760415	40	19840927	7.1		
19770519	22	19850921	3.1		
19780504	41	19870818	5.6		

Correlated with station 01556000 R^2=0.95 Adj. R^2=0.95 $Q_P=(10^{-1.9540})(Q_I^{1.4612})$

Station Number 01555850

Measurements used in analysis

Date	Discharge	Date	Discharge	Date	Discharge	Date	Discharge
19590916	1.22	19620709	2.47	19640923	1.81	19670420	19.1
19600421	10.9	19630515	7.08	19650428	13.2	19680430	7.8
19601005	1.96	19630903	2.51	19651019	2.78	19690923	1.35
19610713	5.21	19631024	1.86	19660420	14.3		
19611011	1.2	19640716	8.5	19660913	1.09		

Correlated with station 01556000 R^2=0.90 Adj. R^2=0.89 $Q_P=(10^{-1.8067})(Q_I^{1.1781})$

Station Number 01558600

Measurements used in analysis

Date	Discharge	Date	Discharge	Date	Discharge
19440912	2.83	19481004	2.73	19530825	6.27
19451011	61.6	19491013	7.3	19531023	1.82
19460829	8.3	19501003	15.7	19570806	5.87
19470925	9.3	19510919	4.14		
19480831	3.82	19520922	10.4		

Correlated with station 01556000 R^2=0.80 Adj. R^2=0.78 $Q_P=(10^{-2.9671})(Q_I^{1.9636})$

Station Number 01559200

Measurements used in analysis

Date	Discharge	Date	Discharge	Date	Discharge
19590915	1.7	19640922	0.78	19690924	1.62
19600420	17	19650428	22.2		
19601005	4.37	19651020	4.54		
19610712	3.08	19660419	9.3		
19611012	1.82	19661102	1.6		
19620710	1.47	19670421	21.4		
19630514	12.5	19671013	5.06		
19630905	1.87	19680521	17.1		
19631024	1.26	19681101	2.85		
19640717	3.91	19690507	13		

Correlated with station 01565000 R^2=0.90 Adj. R^2=0.90 $Q_P=(10^{-1.4314})(Q_I^{1.1642})$

Station Number 01560800

Measurements used in analysis

Date	Discharge	Date	Discharge	Date	Discharge	Date	Discharge
19590916	0.72	19620709	2.49	19651019	0.93	19690508	6.57
19600420	12.2	19630515	4.44	19660420	23.6		
19601004	1.64	19631025	0.55	19660912	0.5		
19610713	3.06	19640716	5.35	19671017	4.88		
19611011	0.71	19640917	0.98	19680430	6.83		

Correlated with station 01560000 R^2=0.90 Adj. R^2=0.89 $Q_P=(10^{-1.1120})(Q_I^{0.77529})$

Station Number 01553480

Measurements used in analysis

Date	Discharge	Date	Discharge
19700511	137	19770527	56
19700923	28.4	19771101	169
19710503	132	19780710	65
19720526	119	19790509	119
19720909	41	19820513	92
19731121	92.4	19820914	23
19740521	152	19870820	23
19750423	120	19890822	93
19751029	204	19910605	44.4
19760420	106	19910918	6.74

Correlated with station 01555000 R^2=0.88 Adj. R^2=0.87 $Q_P=(10^{-0.61799})(Q_I^{1.0734})$

Station Number 01554800

Measurements used in analysis

Date	Discharge	Date	Discharge	Date	Discharge	Date	Discharge
19460905	5.23	19510921	3.17	19830830	5.3	19910607	9.3
19470926	4.24	19530826	4.42	19840919	10	19910711	5
19480921	3.51	19531027	2.68	19850919	3.5	19910904	3
19491013	4.17	19550805	4.49	19870820	3.7		
19501005	3.95	19570807	5.63	19890908	7.7		

Correlated with station 01555000 R^2=0.82 Adj. R^2=0.81 $Q_P=(10^{-0.99145})(Q_I^{0.89141})$

Station Number 01555200

Measurements used in analysis

Date	Discharge	Date	Discharge	Date	Discharge
19580916	9.24	19650430	99.9	19840919	23
19590917	9.51	19651021	18.1	19850919	13
19600419	116	19660418	60.3		
19601006	24.1	19661101	11.6		
19610712	27.3	19670421	110		
19611010	10.6	19671013	37.1		
19620427	118	19680510	58.4		
19620711	12.6	19681031	29.9		
19630513	105	19690507	78.6		
19640717	14.2	19690923	20.8		

Correlated with station 01555000$^{(1)}$ and 01555500$^{(2)}$ R^2=0.94 Adj. R^2=0.93 $Q_P=(10^{-0.51763})(Q_{I(1)}^{0.60376})(Q_{I(2)}^{0.44045})$

Station Number 01555300

Measurements used in analysis

Date	Discharge	Date	Discharge	Date	Discharge	Date	Discharge
19590918	2.54	19620427	24.8	19650429	23.8	19671011	6.87
19600419	26.4	19620711	2	19651021	10.1	19680510	12.8
19601006	6.51	19630513	9.07	19660418	15.2	19690507	15.5
19610712	5.04	19640611	7.16	19661101	4.84	19690923	3.72
19611010	2.49	19640918	1.61	19670501	53		

Correlated with station 01555500 R^2=0.81 Adj. R^2=0.80 $Q_P=(10^{-0.55589})(Q_I^{0.84640})$

Station Number 01555570

Measurements used in analysis

Date	Discharge	Date	Discharge	Date	Discharge	Date	Discharge
19490616	50.9	19720911	22.2	19780504	84	19850917	17
19490826	19.3	19730601	21.6	19781012	29	19890908	30
19500921	29	19741008	47	19790423	144	19910603	56
19590422	141	19750415	137	19791022	97	20020911	9.52
19700512	152	19760419	104	19800422	233		

Correlated with station 01555500 R^2=0.72 Adj. R^2=0.70 $Q_P=(10^{0.30863})(Q_I^{0.74751})$

Station Number 01564800

Measurements used in analysis

Date	Discharge	Date	Discharge	Date	Discharge	Date	Discharge
19590915	1.41	19620427	8.64	19640922	1.7	19680521	5.12
19600420	9.03	19620710	2.08	19650429	5.8	19681101	2.14
19601006	2.8	19630514	3.1	19651020	1.63	19690507	4.31
19610712	2.84	19630918	0.99	19660419	3.38	19690924	1.12
19611011	2.06	19631024	1.17	19661102	1.18		

Correlated with station 01565000 R^2=0.87 Adj. R^2=0.86 $Q_P=(10^{-0.81544})(Q_I^{0.68901})$

Station Number 01565800

Measurements used in analysis

Date	Discharge	Date	Discharge	Date	Discharge
19580917	4.01	19640918	2.66	19690923	8.2
19590915	3.2	19650429	33.8		
19600419	35.1	19651020	6.97		
19601006	4.79	19660418	21.3		
19610712	13	19661101	4.57		
19611011	5.71	19670502	62		
19620427	40.5	19671011	11.8		
19620710	4.84	19680510	17.6		
19630513	22.5	19681031	8.49		
19640612	11.5	19690507	33.7		

Correlated with station 01555000 R^2=0.89 Adj. R^2=0.89 $Q_P=(10^{-0.89079})(Q_I^{0.91852})$

Station Number 01565900

Measurements used in analysis

Date	Discharge	Date	Discharge	Date	Discharge	Date	Discharge
19590918	1.12	19620426	18.8	19640729	0.21	19680520	14.1
19600420	19	19620710	0.72	19640923	0.43	19681101	1.51
19601004	1.56	19630515	6.07	19651018	2.64	19690506	9.01
19610713	5.38	19630905	0.47	19660420	6.47	19690929	1.98
19611011	0.39	19631025	0.36	19660912	0.13		

Correlated with station 01564500 R^2=0.91 Adj. R^2=0.91 $Q_P=(10^{-1.1413})(Q_I^{1.0775})$

Station Number 01566900

Measurements used in analysis

Date	Discharge	Date	Discharge	Date	Discharge
19480818	5.56	19770419	54	20020911	0.24
19700512	56.3	19780501	43		
19700917	3.73	19821005	5.8		
19720530	46.9	19840924	7.9		
19720911	8.07	19850917	3.8		
19730601	170	19870820	2		
19740520	59	19890824	30		
19741007	5.2	19910607	14		
19750417	54	19910711	5.6		
19760419	42	19910904	4.3		

Correlated with station 01568000 R^2=0.92 Adj. R^2=0.92 $Q_P=(10^{-1.3654})(Q_I^{1.3360})$

Station Number 01569300

Measurements used in analysis

Date	Discharge	Date	Discharge
19431014	3.65	19481005	5.35
19440911	4.37	19491012	8.34
19460829	7.03	20020910	3.75
19470924	7.26		
19480901	5.36		

Correlated with station 01570000 R^2=0.57 Adj. R^2=0.50 $Q_P=(10^{-0.42769})(Q_I^{0.57998})$

Station Number 01569400

Measurements used in analysis

Date	Discharge	Date	Discharge	Date	Discharge	Date	Discharge
19590914	1.51	19620710	0.43	19650427	12.8	19680521	10.8
19600420	10.9	19630516	4.33	19651020	0.97	19680917	2.25
19601004	0.96	19631025	0.19	19660421	3.01	19690506	8.47
19611010	0.46	19640729	0.49	19660912	0.15	19690929	0.55
19620426	12.7	19640923	0.23	19670818	0.97		

Correlated with station 01568000 R^2=0.96 Adj. R^2=0.95 $Q_P=(10^{-2.3862})(Q_I^{1.4858})$

Station Number 01571185

Measurements used in analysis

Date	Discharge	Date	Discharge	Date	Discharge
19700508	35.2	19760903	4.6	19850917	2.88
19700914	4.61	19770518	15	19870819	2.63
19710428	17.6	19780822	4.7	19890908	6.21
19720525	35.8	19790424	27	19910604	10
19720906	5.76	19791022	25	19910710	3.45
19730515	27.4	19800422	41	19910905	2.49
19740521	21.8	19800912	2.9	20020909	1.3
19740926	4.63	19821006	4.3		
19750905	5.3	19830901	4.6		
19760420	18	19840922	8.9		

Correlated with station 01571500 R^2=0.93 Adj. R^2=0.93 $Q_P=(10^{-3.3770})(Q_I^{1.8953})$

Station Number 01571200

Measurements used in analysis

Date	Discharge	Date	Discharge	Date	Discharge	Date	Discharge
19590817	54.9	19621003	45.2	19820921	50	20020909	29.8
19610817	56.7	19621028	49.1	19830908	46		
19620405	190	19630207	109	19840920	72		
19620422	203	19630420	122	19850920	51		
19620427	159	19630601	77.1	19870819	45		
19620519	95.6	19630712	54.1	19890906	61		
19620604	72.4	19630810	51.4	19900614	115		
19620706	54.6	19630828	46.7	19910605	77		
19620728	47.2	19630919	42.8	19910711	55		
19620909	46.2	19631013	42.2	19910905	48		

Correlated with station 01571500 R^2=0.97 Adj. R^2=0.97 $Q_P=(10^{-0.46988})(Q_I^{1.0600})$

Station Number 01571300

Measurements used in analysis

Date	Discharge	Date	Discharge	Date	Discharge
19580917	4.72	19631016	3.19	19680905	3.5
19590914	3.81	19640527	7.47	19690513	4.27
19600419	13	19640922	2.94	19690926	3.3
19601004	5.17	19650420	8.84	19821007	4.7
19610524	29.2	19651021	3.24	19830831	2.9
19611011	3.92	19660420	5.54	19840925	4.7
19620430	9.76	19660912	2.84	19850917	3.4
19620711	3.67	19670419	9.74	19890906	6.7
19630513	5.88	19671016	3.61	19900613	13
19630916	2.91	19680517	9.85	20020909	3.25

Correlated with station 01571500 R^2=0.79 Adj. R^2=0.79 $Q_P=(10^{-1.7259})(Q_I^{1.1297})$

Station Number 03010650

Measurements used in analysis

Date	Discharge	Date	Discharge	Date	Discharge
19600419	63.3	19630910	2.5	19670420	85.1
19601006	2.57	19640909	2.44	19670927	9.45
19611012	2.02	19651103	8.13	19680501	23.9
19620718	5.12	19660412	43	19690417	65.9
19630506	29.1	19660914	2.25	19800619	20.6

Correlated with station 03010500 R^2=0.95 Adj. R^2=0.95 $Q_P=(10^{-1.1264})(Q_I^{0.93598})$

Station Number 03010950

Measurements used in analysis

Date	Discharge	Date	Discharge
19460425	37	19520806	9.85
19460825	13.4	19530828	8.56
19471002	14.4	19550809	9.96
19501003	11.5	19551109	25.8
19510821	11.5	19570827	6.89

Correlated with station 03010500 R^2=0.84 Adj. R^2=0.82 $Q_P=(10^{0.92697E-01})(Q_I^{0.51129})$

Station Number 03015400

Measurements used in analysis

Date	Discharge	Date	Discharge	Date	Discharge
19440825	0.64	19490916	3.86	19540915	1.2
19451214	18.1	19501003	4.16	19550909	1.12
19460822	2.67	19510820	2.92	19561109	6.2
19471002	2.1	19520806	1.29	19570827	0.95
19480909	2.02	19530827	1.3		

Correlated with station 03015500 R^2=0.86 Adj. R^2=0.84 $Q_P=(10^{-2.0621})(Q_I^{1.3076})$

Station Number 03015800

Measurements used in analysis

Date	Discharge	Date	Discharge	Date	Discharge
19601005	1.49	19640513	42.4	19660914	1.05
19611013	1.39	19640903	9.46	19680430	20.9
19620717	1.18	19650519	43.9	19680905	2
19630507	44.4	19651102	14.7	19690416	55.1
19630910	0.97	19660412	110		

Correlated with station 03020500 R^2=0.96 Adj. R^2=0.95 $Q_P=(10^{-2.3866})(Q_I^{1.6123})$

Station Number 03017800

Measurements used in analysis

Date	Discharge	Date	Discharge
19800821	9.49	20020822	1.59
20020123	7.68	20020912	0.67
20020522	37.4	20021125	13.2
20020625	7.83	20030416	18.8
20020718	3.53		

Correlated with station 03015500 R^2=0.86 Adj. R^2=0.84 $Q_P=(10^{-1.6606})(Q_I^{1.0866})$

Station Number 03020400

Measurements used in analysis

Date	Discharge	Date	Discharge	Date	Discharge
19440826	4.88	19480909	11.5	19561108	17.4
19440920	8.92	19490916	6.63	19570828	5.18
19460328	105	19501002	11.1		
19460822	7.9	19510820	6.83		
19471002	5.92	19530827	6.6		

Correlated with station 03025000 R^2=0.78 Adj. R^2=0.76 $Q_P=(10^{-0.68166})(Q_I^{1.0578})$

Station Number 01573700

Measurements used in analysis

Date	Discharge	Date	Discharge
19600419	18.8	19640922	1.04
19601004	8.32	19650414	17.7
19610524	15	19651021	2.73
19611013	3.04	19660418	7.11
19620426	15.4	19660913	0.12
19620711	2.72	19670414	10.8
19630513	6.05	19680515	13.1
19630903	0.8	19680904	3.18
19631021	1.61	19690519	9.08
19640528	7.12	19690924	4.98

Correlated with station 01574000 R^2=0.86 Adj. R^2=0.85 $Q_P=(10^{-1.0785})(Q_I^{0.92493})$

Station Number 01573850

Measurements used in analysis

Date	Discharge	Date	Discharge	Date	Discharge	Date	Discharge
19300906	1.4	19620430	13.2	19631023	1.63	19660912	0.51
19590914	2.22	19620711	1.82	19640527	9.15	19680905	1.81
19600419	16.2	19630513	5.21	19640916	1.06	19690515	4.97
19601004	4.77	19630904	1.38	19651021	1.88	19690925	4.13
19610524	12.8	19631015	1.67	19660420	7.82		

Correlated with station 01574000 R^2=0.94 Adj. R^2=0.93 $Q_P=(10^{-0.75360})(Q_I^{0.73606})$

Station Number 01614200

Measurements used in analysis

Date	Discharge	Date	Discharge	Date	Discharge
19440911	0.5	19501003	3.12	19550803	0.9
19460829	1.93	19510918	1.11		
19470923	1.82	19520926	1.36		
19480831	0.69	19530825	1.13		
19491012	1.19	19540830	2.23		

Correlated with station 01603500 R^2=0.89 Adj. R^2=0.88 $Q_P=(10^{-0.88306})(Q_I^{1.7087})$

Station Number 01639300

Measurements used in analysis

Date	Discharge	Date	Discharge	Date	Discharge	Date	Discharge
19431013	1.33	19510917	2.12	19550803	0.81	19690313	6.12
19440911	0.77	19520926	7.26	19570805	2.76		
19480831	2.86	19521015	4.59	19680326	28.5		
19491012	6.6	19530824	1.84	19680517	7.95		
19501002	3.21	19531022	1.63	19680925	7.35		

Correlated with station 01574500 R^2=0.84 Adj. R^2=0.83 $Q_P=(10^{-1.6158})(Q_I^{1.6824})$

Station Number 03009000

Measurements used in analysis

Date	Discharge	Date	Discharge	Date	Discharge	Date	Discharge
19590827	1.88	19630506	39.9	19660914	1.56	19800619	23.2
19600419	43.7	19630909	2.93	19670420	93.5		
19601006	1.82	19640909	1.22	19670927	3.5		
19610801	16	19651102	18.2	19680501	23.8		
19611012	2.39	19660412	48.6	19690417	64.5		

Correlated with station 03028000 R^2=0.92 Adj. R^2=0.91 $Q_P=(10^{-1.0602})(Q_I^{1.3034})$

Station Number 03020420

Measurements used in analysis

Date	Discharge	Date	Discharge	Date	Discharge	Date	Discharge
19600420	16.6	19630507	7.61	19651102	3.8	19680905	1.28
19601005	1.27	19630910	1.04	19660411	33.9	19690416	13.4
19610809	1.28	19640513	8.95	19660913	1.17		
19611013	1.02	19640903	3.71	19671206	31.1		
19620717	1.32	19650518	8.8	19680430	6.05		

Correlated with station 03020500 R^2=0.99 Adj. R^2=0.98 $Q_P=(10^{-1.6328})(Q_I^{1.0625})$

Station Number 03020450

Measurements used in analysis

Date	Discharge	Date	Discharge	Date	Discharge	Date	Discharge
19581015	13.3	19620717	2.21	19651102	15.3	19690416	47.8
19600420	43	19630507	26.8	19660411	97.2		
19601005	3.2	19630910	1.82	19660913	2.55		
19610809	3.45	19640513	31.7	19680430	17.1		
19611013	2.29	19640903	9.52	19680905	3.93		

Correlated with station 03020500 R^2=0.96 Adj. R^2=0.96 $Q_P=(10^{-1.4455})(Q_I^{1.1833})$

Station Number 03025800

Measurements used in analysis

Date	Discharge	Date	Discharge	Date	Discharge	Date	Discharge
19581015	22.5	19630508	54.2	19651102	16.5	19690416	83.7
19600420	71.5	19630910	5.43	19660915	5.79		
19601005	5.38	19640513	65.8	19670927	8.41		
19611013	5.29	19640904	15.1	19680430	33.6		
19620717	8.69	19650518	90.7	19680909	11.8		

Correlated with station 03025000 R^2=0.96 Adj. R^2=0.95 $Q_P=(10^{-0.65202})(Q_I^{1.0966})$

Station Number 03025900

Measurements used in analysis

Date	Discharge	Date	Discharge	Date	Discharge	Date	Discharge
19581016	7.29	19611012	1.76	19640904	4.64	19670926	1.78
19590814	4.48	19620716	1.53	19650510	61.4	19680429	13.2
19600419	37.6	19630503	30.3	19651101	12.5	19680909	4.48
19601004	1.89	19630909	1.31	19660411	96.1	19690415	30.5
19610808	3.66	19640513	17.1	19660912	1.47		

Correlated with station 03025000 R^2=0.92 Adj. R^2=0.92 $Q_P=(10^{-1.3840})(Q_I^{1.2310})$

Station Number 03030600

Measurements used in analysis

Date	Discharge	Date	Discharge	Date	Discharge	Date	Discharge
19700914	20.1	19750417	70.9	19830511	102	19900430	66.8
19710831	12	19760420	39.8	19840919	22.6	19910607	23.3
19720526	45.6	19760910	22.4	19850501	47.4	19920403	220
19720804	27.3	19770504	59.4	19850919	24.2		
19720816	19.6	19780911	22.7	19860519	46		
19721113	92.5	19790517	66.4	19870507	83.9		
19730503	151	19790926	19.1	19870819	15.7		
19730917	15.1	19800822	64.4	19880413	73.8		
19740426	74.5	19810814	19.2	19880908	16.9		
19740927	28.4	19820423	63	19890817	17.9		

Correlated with station 03032500 R^2=0.92 Adj. R^2=0.91 $Q_P=(10^{-0.38004})(Q_I^{0.78754})$

Station Number 03033200

Measurements used in analysis

Date	Discharge	Date	Discharge	Date	Discharge	Date	Discharge	Date	Discharge
19420715	6.7	19450628	17.8	19480914	7.84	19510816	9.77	19540401	75.5
19420902	11.5	19450923	29.2	19481030	4.56	19511005	4.18	19540610	25.8
19421218	31.6	19451218	26.1	19490120	32.7	19511202	24.5	19540924	7.31
19430128	61.7	19460129	21.2	19490311	61.2	19520223	37	19700520	67.4
19430310	32.1	19460317	103	19490419	47.6	19520502	26.8	19700915	13.7
19430407	31.6	19460426	17.2	19490706	8.03	19520603	46		
19430812	6.62	19460727	23.1	19490822	7.55	19520714	8.06		
19430919	8.71	19460829	15	19491005	5.48	19520813	3.89		
19431020	11	19461003	8.51	19491107	5.34	19520929	4.58		
19431202	10.1	19461115	8.03	19491222	27.6	19521028	9.22		
19440113	26.7	19461218	22.8	19500315	73.5	19521125	10.8		
19440407	53.7	19470318	43.3	19500607	47.8	19530107	13.4		
19440518	51.1	19470501	57.8	19500610	58.9	19530206	40.3		
19440601	43.1	19470612	45.5	19500825	7.57	19530310	40.2		
19440629	11.9	19470722	11.2	19501018	11	19530415	63.8		
19440804	4.94	19471016	10.9	19501031	10.7	19530623	23.8		
19440910	9.63	19471122	8.97	19501215	57.3	19530902	7.1		
19441019	10.4	19480109	27.6	19510227	107	19531013	5.35		
19450112	34.6	19480629	20.5	19510418	71.9	19531112	5.23		
19450221	54.9	19480727	25.6	19510521	28.4	19540226	91.1		

Correlated with station 01541000 R^2=0.82 Adj. R^2=0.81 $Q_P=(10^{-0.47873})(Q_I^{0.77201})$

Station Number 03036800

Measurements used in analysis

Date	Discharge	Date	Discharge
19440804	5.64	19501002	9.98
19460115	72.5	19510921	3.49
19460822	43.2	19530828	4.77
19471001	2.94	19561108	9.42
19490915	2.33	19570827	2.44

Correlated with station 03038000 R^2=0.95 Adj. R^2=0.95 $Q_P=(10^{-0.52101})(Q_I^{0.95690})$

Station Number 03048300

Measurements used in analysis

Date	Discharge	Date	Discharge	Date	Discharge
19710504	5.32	19750417	8.08	19790925	6.93
19720607	7.74	19750916	6.66		
19730912	0.89	19760420	5.52		
19740417	21.2	19760909	0.5		
19740925	17.2	19790516	6.74		

Correlated with station 03049000 R^2=0.73 Adj. R^2=0.70 $Q_P=(10^{-0.80345})(Q_I^{0.86700})$

Station Number 03048800

Measurements used in analysis

Date	Discharge	Date	Discharge	Date	Discharge
19581015	3.75	19620710	1.08	19660408	22.8
19590812	1.74	19630503	12.2	19660901	0.24
19600420	8.3	19630909	0.44	19670919	0.32
19601014	0.37	19640908	0.4	19680430	14.9
19611013	0.6	19651101	2.57	19690919	0.6

Correlated with station 03049000 R^2=0.96 Adj. R^2=0.96 $Q_P=(10^{-1.0926})(Q_I^{1.0195})$

Station Number 03082100

Measurements used in analysis

Date	Discharge	Date	Discharge	Date	Discharge
19581017	9.74	19640520	31.9	19680501	32.7
19600414	70.8	19640903	5.28		
19611013	4.18	19650511	41.5		
19630503	43.5	19651103	6.23		
19630909	4	19660928	3.42		

Correlated with station 03080000 R^2=0.93 Adj. R^2=0.92 $Q_P=(10^{-0.35814})(Q_I^{0.87853})$

Station Number 03083100

Measurements used in analysis

Date	Discharge	Date	Discharge	Date	Discharge	Date	Discharge
19660517	126	19720816	16.5	19790925	99.7	19890906	19.8
19660525	49.3	19730913	4.65	19810810	13.5	19900502	40.9
19660603	27.7	19740416	203	19820511	34.5	19900919	115
19660613	11.9	19750417	96.8	19840924	11.9	19920409	94
19660719	3.22	19750916	112	19850514	59.7		
19661218	101	19760421	33.4	19850829	35.5		
19670512	706	19760909	5.16	19860929	23.2		
19670518	267	19770503	156	19870506	119		
19670608	37.4	19780911	14.5	19880412	123		
19700915	10	19790516	106	19880908	15.2		

Correlated with station 03074500$^{(1)}$ and 03080000$^{(2)}$ R^2=0.95 Adj. R^2=0.95 $Q_P=(10^{-0.57452})(Q_{I(1)}^{0.32558})(Q_{I(2)}^{0.83612})$

Station Number 03105800

Measurements used in analysis

Date	Discharge	Date	Discharge	Date	Discharge
19451210	39.3	19490915	1.03	19561108	5.75
19460823	5.38	19501002	8.3	19570828	0.32
19460925	3.35	19510821	1.35		
19471001	3.48	19520806	1.76		
19480908	2.33	19530828	1.4		

Correlated with station 03106000 R^2=0.85 Adj. R^2=0.84 $Q_P=(10^{-1.4401})(Q_I^{1.2219})$

Station Number 03106100

Measurements used in analysis

Date	Discharge	Date	Discharge	Date	Discharge	Date	Discharge
19581016	1.2	19620716	0.33	19660411	15.2	19690916	0.15
19600419	12.4	19630909	0.15	19660912	0.27		
19601013	0.26	19640513	6.97	19670926	0.21		
19610808	0.5	19640904	0.61	19680429	2.88		
19611012	0.25	19651101	3.27	19690415	6.59		

Correlated with station 03025000 R^2=0.91 Adj. R^2=0.91 $Q_P=(10^{-2.6043})(Q_I^{1.4876})$

Station Number 03106200

Measurements used in analysis

Date	Discharge	Date	Discharge	Date	Discharge
19440920	0.44	19510821	2.42	19570828	0.63
19471001	1.35	19520806	1.84		
19480908	2.58	19530828	0.51		
19490915	0.77	19540915	0.9		
19501002	5.31	19561108	6.02		

Correlated with station 03106500 R^2=0.89 Adj. R^2=0.88 $Q_P=(10^{-3.6132})(Q_I^{2.1650})$

Station Number 03049610

Measurements used in analysis

Date	Discharge	Date	Discharge
19720814	3.13	19790517	41.6
19730501	98.2	19790618	11
19730912	1.4	19790926	3.58
19740418	40.8	19800328	51.2
19740924	29.4	19810813	5.48
19750417	15.7	19810825	2.61
19750916	13.1	19880413	35.9
19760420	15	19890817	1.57
19760909	1.65	19910606	3
19780908	5.51	19910906	1.49

Correlated with station 03049000 R^2=0.92 Adj. R^2=0.92 $Q_P=(10^{-0.74665})(Q_I^{1.0108})$

Station Number 03075040

Measurements used in analysis

Date	Discharge	Date	Discharge
19710831	13.9	19750916	47.4
19730501	177	19770503	55.8
19740416	94	19780911	7.2
19740925	47.7	19790516	108
19750417	43.3	19790925	25.2

Correlated with station 03073000 R^2=0.97 Adj. R^2=0.96 $Q_P=(10^{0.22679})(Q_I^{0.72659})$

Station Number 03078700

Measurements used in analysis

Date	Discharge	Date	Discharge	Date	Discharge	Date	Discharge
19600414	38.8	19640904	0.25	19670926	3.55	19800620	20.3
19611012	0.73	19650512	13.5	19680503	13.9		
19630502	17.1	19651103	1.42	19680905	1.61		
19630909	0.93	19660414	42.6	19690415	12.3		
19640519	9.36	19660927	2.42	19690917	4.62		

Correlated with station 03080000 R^2=0.84 Adj. R^2=0.83 $Q_P=(10^{-1.0795})(Q_I^{1.0258})$

Station Number 03078800

Measurements used in analysis

Date	Discharge	Date	Discharge	Date	Discharge	Date	Discharge
19581017	5.08	19640520	17	19660927	6.7	19690917	31.2
19600414	64.4	19640904	4.29	19670926	5.85		
19611012	3.13	19650513	23.2	19680503	17.8		
19630502	33.6	19651102	4.89	19680905	8.57		
19630909	7.28	19660414	117	19690417	54.2		

Correlated with station 03080000 R^2=0.79 Adj. R^2=0.78 $Q_P=(10^{-0.80579E-01})(Q_I^{0.72204})$

Station Number 03079600

Measurements used in analysis

Date	Discharge	Date	Discharge	Date	Discharge	Date	Discharge
19700915	7.42	19740417	88.8	19770503	74.3	19880908	21.5
19710505	27.8	19740923	22.8	19780906	8.54	19900516	56
19720522	34.3	19750417	54.7	19790516	54	19910607	13.7
19730502	130	19760419	35.7	19810826	3.27		
19730913	4.79	19760909	4.19	19880413	66.9		

Correlated with station 03080000 R^2=0.96 Adj. R^2=0.96 $Q_P=(10^{-0.34747})(Q_I^{0.91657})$

Station Number 03107700

Measurements used in analysis

Date	Discharge	Date	Discharge	Date	Discharge
19700914	0.15	19740417	26	19790621	17
19710505	1.93	19740925	9.48	19810326	12.8
19710831	0.78	19750418	8.95	19810814	1.52
19720814	1.7	19750917	9.97		
19730912	0.54	19780907	2.05		

Correlated with station 03106000 R^2=0.91 Adj. R^2=0.89 $Q_P=(10^{-2.2469})(Q_I^{-0.56226E-04})$

Station Number 03109300

Measurements used in analysis

Date	Discharge	Date	Discharge	Date	Discharge
19490509	30	19740925	46.9	19910606	18.8
19490624	12.6	19750418	72.1		
19490810	11.9	19750917	45.4		
19490912	7.24	19780907	17.7		
19500711	13.2	19790926	15.8		
19500911	24.5	19810825	10.6		
19510820	6.02	19880414	73.9		
19710505	32.7	19880822	7.13		
19720814	19.9	19890825	13.6		
19730912	15.5	19900503	43.5		

Correlated with station 03106000 R^2=0.87 Adj. R^2=0.86 $Q_P=(10^{-0.88580E-01})(Q_I^{0.74345})$

Appendix 3. Basin characteristics for gaging stations used in the development of low-flow, base-flow, and mean-flow regression equations for Pennsylvania streams.

[mi^2, square miles; ft, feet; in., inches; mi/mi^2, miles per square mile]

U.S. Geological Survey streamflow-gaging station	Drainage area (mi^2)	Basin slope (degrees)	Mean elevation (ft)	Mean annual precipitation (in.)	Stream density (mi/mi^2)	Soil thickness (ft)	Percent glaciation	Percent carbonate bedrock	Percent forested area	Percent urban area
01427200	56.3	6.51	1,536	44.3	2.00	4.55	100	0	85	0.5
01427300	24.6	6.54	1,417	42.9	1.98	4.43	100	0	85	1.1
01427400	9.11	6.87	1,292	42.7	2.12	4.43	100	0	80	.1
01427700	44.0	6.87	1,281	42.3	2.08	4.43	100	0	76	.2
01428200	32.2	4.71	1,212	41.0	1.92	4.44	100	0	80	2.5
01428750	40.6	6.04	1,745	45.4	1.64	4.46	100	0	74	.3
01429000	59.7	5.99	1,648	44.8	1.55	4.57	100	0	74	.4
01429500	64.6	6.43	1,468	43.6	1.65	4.51	100	0	83	.2
01430000	164	6.30	1,512	43.9	1.56	4.54	100	0	75	1.4
01431000	78.4	4.70	1,403	42.9	1.57	4.65	100	0	73	.7
01431500	290	5.76	1,444	43.2	1.63	4.60	100	0	74	1.5
01431680	4.84	5.12	1,541	41.7	1.80	4.41	100	0	93	2.1
01432000	228	4.63	1,573	43.5	1.79	4.57	100	0	76	4.5
01432100	29.3	4.63	1,452	41.4	1.46	5.05	100	0	88	.8
01432500	83.6	4.54	1,347	42.5	1.67	5.28	100	0	82	5.3
01433700	6.84	4.94	1,172	44.4	1.77	4.88	100	0	97	.5
01438300	5.36	6.40	1,054	43.7	1.78	4.93	100	0	92	5.3
01438700	20.4	3.99	1,277	43.0	1.75	5.31	100	0	76	8.1
01438900	15.2	4.53	1,172	43.0	1.53	5.23	100	0	81	7.2
01439400	9.34	6.36	998	43.0	1.74	5.06	100	0	72	25
01439500	117	4.40	1,270	43.4	1.34	5.05	100	0	84	3.7
01440400	65.9	5.30	1,382	44.5	1.52	4.66	100	0	89	3.7
01441000	65.3	5.96	952	47.1	1.69	4.83	81	.2	74	3.2
01442500	259	5.62	1,133	46.3	1.61	4.81	95	.1	80	8.3
01443100	6.17	2.90	599	47.0	1.39	4.83	100	16	63	5.6

Appendix 3. Basin characteristics for gaging stations used in the development of low-flow, base-flow, and mean-flow regression equations for Pennsylvania streams.—Continued

[mi^2, square miles; ft, feet; in., inches; mi/mi^2, miles per square mile]

U.S. Geological Survey streamflow-gaging station	Drainage area (mi^2)	Basin slope (degrees)	Mean elevation (ft)	Mean annual precipitation (in.)	Stream density (mi/mi^2)	Soil thickness (ft)	Percent glaciation	Percent carbonate bedrock	Percent forested area	Percent urban area
01446800	13.1	4.70	708	46.2	1.01	3.67	0	0	35	9.2
01447500	91.7	3.10	1,825	46.0	1.97	4.88	100	0	77	7.5
01447720	118	2.26	1,853	47.6	1.49	5.07	100	0	68	9.9
01448100	10.9	5.31	1,522	46.4	.92	4.71	27	0	83	2.7
01448800	7.28	6.93	1,511	49.3	1.19	4.86	0	0	81	1.0
01449360	49.9	5.06	1,060	47.4	1.50	4.55	1	0	64	7.3
01449500	16.8	5.22	1,387	48.9	1.43	4.62	0	0	93	.6
01450400	46.5	6.86	872	46.6	1.46	4.21	0	3.3	67	.3
01450500	76.7	8.76	867	45.8	1.54	4.51	0	4.9	69	2.0
01451000	889	5.54	1,400	46.9	1.48	4.64	43	.7	75	5.5
01451500	80.8	3.72	532	45.2	1.16	5.11	0	64	31	13
01451800	53.0	6.53	675	45.6	2.30	3.38	0	0	33	1.8
01452500	44.5	3.19	494	44.6	1.29	4.50	0	63	18	13
01453000	1,279	5.39	1,170	46.3	1.47	4.51	31	11	63	8.4
01459500	97.4	2.46	509	45.0	1.61	4.43	0	0	58	4.9
01464700	10.5	2.28	373	45.0	1.63	4.40	0	0	35	14
01465000	134	2.39	346	44.9	1.78	4.17	0	0	33	27
01465500	210	2.49	305	45.3	1.76	4.29	0	1.8	32	27
01465798	21.4	1.67	133	47.0	1.27	4.18	0	1.0	8.9	76
01467042	37.9	2.74	260	45.5	1.37	4.72	0	1.9	15	72
01467048	49.8	2.64	233	45.6	1.34	4.79	0	1.4	15	74
01467086	16.6	2.86	254	45.0	1.24	5.12	0	0	6.3	87
01467087	30.4	2.46	220	45.0	.81	5.05	0	0	5.8	89
01468500	133	8.13	1,107	48.7	1.05	4.45	0	0	73	8.6
01469500	42.9	7.10	1,376	50.4	1.41	4.78	0	0	76	4.0

Appendix 3. Basin characteristics for gaging stations used in the development of low-flow, base-flow, and mean-flow regression equations for Pennsylvania streams.—Continued

[mi^2, square miles; ft, feet; in., inches; mi/mi^2, miles per square mile]

U.S. Geological Survey streamflow-gaging station	Drainage area (mi^2)	Basin slope (degrees)	Mean elevation (ft)	Mean annual precipitation (in.)	Stream density (mi/mi^2)	Soil thickness (ft)	Percent glaciation	Percent carbonate bedrock	Percent forested area	Percent urban area
01470500	355	8.05	1,021	48.7	1.21	4.47	0	.1	71	5.7
01470720	7.46	7.24	642	47.0	1.80	3.33	0	0	29	.9
01470756	159	6.60	665	46.8	1.51	3.84	0	11	41	1.3
01470779	66.5	3.12	311	43.3	.99	5.01	0	83	13	4.5
01470960	175	4.83	544	44.6	1.28	4.33	0	42	26	3.1
01471000	211	4.91	529	44.7	1.30	4.40	0	41	27	3.9
01471510	880	6.44	740	46.9	1.28	4.34	0	19	48	5.6
01471800	9.61	6.39	841	47.0	1.29	5.09	0	6.3	85	.1
01471980	85.5	5.79	588	46.0	1.36	5.13	0	26	55	2.2
01472000	1,147	6.34	684	46.6	1.33	4.43	0	19	49	6.6
01472157	59.1	5.29	530	44.9	1.46	4.90	0	.6	63	1.8
01472174	5.98	4.43	439	45.0	1.75	5.09	0	0	31	7.3
01472198	38.0	5.21	623	45.3	1.44	4.83	0	3.4	51	3.0
01472199	23.0	4.98	685	46.2	1.44	4.85	0	4.8	59	2.5
01472500	152	4.16	538	45.0	1.55	4.78	0	1.6	57	3.8
01473000	279	3.80	468	44.7	1.67	4.57	0	1.3	49	6.7
01473120	53.7	2.47	289	43.1	1.89	4.13	0	0	33	25
01475300	5.10	3.03	435	45.0	1.68	4.99	0	0	25	67
01475510	37.4	3.77	325	44.7	1.54	4.85	0	0	15	75
01475530	4.78	2.34	319	45.0	.83	5.03	0	0	5.1	88
01475550	22.0	2.23	208	44.1	1.08	4.78	0	0	5.1	87
01475850	15.8	3.70	420	45.0	1.95	4.93	0	0	48	31
01476500	31.9	4.45	368	44.8	2.05	4.93	0	0	48	27
01477000	61.1	4.33	339	44.7	1.90	4.98	0	0	37	38
01479820	28.3	3.60	371	45.0	1.75	5.13	0	11	30	18

Appendix 3. Basin characteristics for gaging stations used in the development of low-flow, base-flow, and mean-flow regression equations for Pennsylvania streams.—Continued

[mi^2, square miles; ft, feet; in., inches; mi/mi^2, miles per square mile]

U.S. Geological Survey streamflow-gaging station	Drainage area (mi^2)	Basin slope (degrees)	Mean elevation (ft)	Mean annual precipitation (in.)	Stream density (mi/mi^2)	Soil thickness (ft)	Percent glaciation	Percent carbonate bedrock	Percent forested area	Percent urban area
01480300	18.7	2.82	726	45.0	1.04	5.08	0	3.4	25	2.6
01480675	8.57	3.77	599	45.0	1.25	5.09	0	.4	53	1.5
01480800	81.6	4.14	531	45.0	1.56	5.12	0	6.7	43	9.0
01481000	287	4.64	490	45.0	1.70	5.11	0	7.6	40	12
01494980	31.2	3.63	487	44.8	1.72	5.09	0	0	23	4.1
01500500	982	10.3	1,628	40.3	1.87	4.23	99	0	69	1.4
01502500	520	8.99	1,476	40.4	1.87	4.75	100	0	64	.6
01502750	47.0	6.72	1,812	45.5	1.89	4.59	100	0	79	.4
01502780	18.5	7.49	1,558	41.1	2.07	4.85	100	0	67	1.2
01507000	593	8.31	1,441	39.1	1.95	4.61	99	0	67	1.4
01514000	185	10.6	1,396	37.0	2.09	4.44	97	0	73	.8
01516500	12.2	7.63	1,766	34.8	1.48	4.64	100	0	47	.1
01518500	122	9.46	1,665	33.1	1.41	4.38	100	0	60	.5
01518862	90.6	9.33	1,964	36.3	1.48	4.50	100	0	63	.8
01520000	298	9.46	1,776	34.1	1.38	4.53	100	0	62	.5
01531300	88.3	7.82	1,462	35.1	1.48	4.55	100	0	45	1.1
01531420	13.0	5.61	1,348	35.0	1.44	4.94	100	0	41	.8
01532000	215	8.08	1,596	36.2	1.98	4.54	100	0	67	.6
01532600	98.8	6.92	1,293	35.2	1.95	4.95	100	0	59	.3
01532850	5.67	7.28	1,483	40.1	1.77	4.87	100	0	78	.1
01533200	6.22	6.68	1,140	35.0	1.45	4.47	100	0	45	1.8
01533300	26.7	7.39	1,407	40.3	1.82	4.43	100	0	67	.2
01533500	35.2	10.6	1,663	38.4	1.44	4.45	100	0	81	.1
01533900	11.7	7.35	1,413	40.9	2.06	4.55	100	0	59	1.2
01533950	12.6	6.50	1,505	42.3	1.36	3.98	100	0	71	2.1

Appendix 3. Basin characteristics for gaging stations used in the development of low-flow, base-flow, and mean-flow regression equations for Pennsylvania streams.—Continued

[mi^2, square miles; ft, feet; in., inches; mi/mi^2, miles per square mile]

U.S. Geological Survey streamflow-gaging station	Drainage area (mi^2)	Basin slope (degrees)	Mean elevation (ft)	Mean annual precipitation (in.)	Stream density (mi/mi^2)	Soil thickness (ft)	Percent glaciation	Percent carbonate bedrock	Percent forested area	Percent urban area
01534000	383	7.02	1,326	40.3	1.61	4.47	100	0	66	3.1
01538000	43.8	5.28	1,382	43.7	1.37	4.47	100	0	75	11
01538900	29.9	8.94	1,453	42.0	1.53	4.48	100	0	94	.1
01539000	274	8.55	1,321	42.1	1.64	4.50	77	0	72	.3
01540000	355	8.56	1,232	41.8	1.66	4.33	59	.1	68	.7
01540300	20.4	7.26	1,463	46.3	1.07	4.81	0	0	79	3.5
01541000	315	7.67	1,719	44.3	1.92	4.50	0	0	77	1.8
01541200	367	7.83	1,703	44.1	1.90	4.50	0	0	78	1.6
01541308	6.77	5.79	2,194	47.7	1.75	4.79	0	0	84	12
01541400	13.3	7.32	1,643	42.7	1.66	4.02	0	0	78	.8
01541500	371	6.79	1,710	41.7	1.73	4.46	0	0	80	1.4
01542330	2.33	3.70	2,041	39.0	1.89	4.69	0	0	100	0
01542500	1462	7.02	1,712	41.9	1.67	4.52	0	0	81	1.9
01542780	33.2	11.8	1,882	43.2	1.59	4.66	0	0	99	0
01542810	5.24	13.6	1,848	43.1	2.11	4.68	0	0	99	0
01542830	43.0	10.1	1,779	45.0	2.06	4.63	0	0	91	.3
01542900	21.6	15.3	1,852	41.5	2.22	4.69	0	0	97	0
01543000	272	13.8	1,741	43.4	2.06	4.66	0	0	97	.6
01543500	685	12.3	1,715	43.4	1.89	4.60	0	0	96	.4
01543600	32.0	14.1	1,905	40.9	2.16	4.65	0	0	94	.6
01543680	32.8	15.5	1,988	39.7	1.87	4.67	0	0	98	.4
01543700	182	15.5	1,904	40.0	2.05	4.67	0	0	95	.3
01544500	136	14.2	1,894	39.9	1.92	4.58	0	0	96	.1
01545600	46.2	11.7	1,820	41.8	1.46	4.77	0	0	100	.1
01546000	119	11.2	1,396	37.9	1.73	3.98	0	7.5	85	.7

Appendix 3. Basin characteristics for gaging stations used in the development of low-flow, base-flow, and mean-flow regression equations for Pennsylvania streams.—Continued

[mi^2, square miles; ft, feet; in., inches; mi/mi^2, miles per square mile]

U.S. Geological Survey streamflow-gaging station	Drainage area (mi^2)	Basin slope (degrees)	Mean elevation (ft)	Mean annual precipitation (in.)	Stream density (mi/mi^2)	Soil thickness (ft)	Percent glaciation	Percent carbonate bedrock	Percent forested area	Percent urban area
01546400	58.5	6.06	1,338	39.4	1.27	5.25	0	75	37	11
01546500	87.2	5.34	1,276	38.8	1.35	5.39	0	83	35	12
01547100	142	6.12	1,255	38.5	1.36	5.40	0	78	39	9.2
01547200	265	8.51	1,316	38.2	1.52	4.75	0	46	60	5.5
01547700	44.1	11.5	1,303	39.0	1.89	4.01	0	.4	78	.5
01547800	12.2	5.90	1,959	40.7	1.36	4.78	0	0	97	2.6
01547950	152	7.96	1,666	40.1	1.69	4.75	0	0	92	.7
01548005	562	8.85	1,362	39.0	1.65	4.63	0	27	71	3.2
01548400	42.0	6.47	1,847	33.1	1.78	4.81	100	0	88	.3
01548500	604	11.3	1,877	36.3	1.66	4.40	75	0	87	.5
01548800	16.7	12.8	1,728	41.5	1.24	4.78	0	0	100	.1
01549000	750	11.9	1,827	36.9	1.63	4.47	59	0	90	.4
01549500	37.7	11.2	1,770	36.2	1.76	4.38	98	0	78	.8
01549550	135	9.92	1,717	35.6	1.71	4.43	74	0	82	.4
01549700	944	11.8	1,792	36.9	1.63	4.47	58	0	89	.4
01549750	12.6	8.04	1,669	45.2	1.41	4.79	0	.5	94	1.6
01549780	6.80	6.64	1,612	41.9	1.38	4.50	21	0	73	.3
01549900	11.8	8.84	1,754	35.0	2.21	4.79	100	0	70	.2
01550000	173	10.7	1,729	36.7	2.01	4.14	100	0	85	.2
01551850	19.5	7.25	1,738	38.0	2.07	4.41	100	0	62	.8
01551900	16.0	6.60	1,644	37.0	1.75	4.41	100	0	82	0
01552000	435	8.70	1,669	39.8	1.76	4.36	95	0	88	.3
01552500	23.8	10.3	1,853	45.4	1.70	4.42	100	0	92	.2
01553000	39.1	9.45	1,255	41.9	2.02	4.02	15	0	71	.3
01553130	4.93	10.4	1,605	45.0	1.60	4.78	0	0	95	3.0

Appendix 3. Basin characteristics for gaging stations used in the development of low-flow, base-flow, and mean-flow regression equations for Pennsylvania streams.—Continued

[mi², square miles; ft, feet; in., inches; mi/mi², miles per square mile]

U.S. Geological Survey streamflow-gaging station	Drainage area (mi²)	Basin slope (degrees)	Mean elevation (ft)	Mean annual precipitation (in.)	Stream density (mi/mi²)	Soil thickness (ft)	Percent glaciation	Percent carbonate bedrock	Percent forested area	Percent urban area
01553480	134	6.76	994	42.8	1.76	4.59	0	13	58	0.9
01554800	19.8	9.60	1,599	46.4	1.32	4.58	0	.8	88	0
01555000	301	9.27	1,392	43.8	1.57	4.86	0	24	69	.6
01555200	110	8.40	995	43.4	1.92	4.54	0	14	63	.7
01555300	35.5	8.59	838	42.5	1.89	4.04	0	11	58	.4
01555500	162	8.40	915	42.7	1.61	4.62	0	0	53	1.6
01555570	79.2	7.37	1,057	43.6	1.42	4.82	0	0	75	3.0
01555780	47.4	11.3	1,681	38.9	2.34	4.31	0	11	66	3.1
01555850	9.25	9.58	1,916	43.4	1.75	4.36	0	0	90	6.0
01556000	291	9.43	1,525	39.6	1.99	4.69	0	21	65	7.6
01556500	93.7	9.08	1,726	40.5	1.92	4.40	0	5.1	79	9.8
01557500	44.1	9.68	1,634	38.9	1.62	4.11	0	5.0	92	1.2
01558000	220	9.26	1,572	39.7	1.75	4.58	0	20	76	5.5
01558600	56.5	9.26	1,107	37.8	1.89	3.92	0	6.6	71	.1
01559000	816	8.78	1,419	39.2	1.75	4.79	0	33	67	4.4
01559200	17.2	10.3	1,438	39.0	1.57	4.35	0	0	98	0
01559500	128	9.72	1,213	38.4	1.65	4.28	0	5.1	84	.1
01559700	5.28	13.1	1,694	39.0	3.13	4.04	0	1.7	80	0
01560000	172	10.2	1,593	38.7	2.32	4.01	0	4.3	63	1.2
01560800	16.7	10.6	1,709	38.2	2.74	5.03	0	30	63	0
01562000	756	9.80	1,504	38.0	2.30	4.30	0	14	65	1.7
01562500	84.6	6.45	1,489	39.0	2.36	4.66	0	0	76	.5
01564500	205	9.77	1,178	38.3	2.08	3.93	0	4.5	76	.8
01564800	10.0	8.98	895	37.0	1.37	4.76	0	15	67	.4
01565000	164	9.63	1,219	41.2	1.48	4.90	0	25	63	1.4

Appendix 3. Basin characteristics for gaging stations used in the development of low-flow, base-flow, and mean-flow regression equations for Pennsylvania streams.—Continued

[mi^2, square miles; ft, feet; in., inches; mi/mi^2, miles per square mile]

U.S. Geological Survey streamflow-gaging station	Drainage area (mi^2)	Basin slope (degrees)	Mean elevation (ft)	Mean annual precipitation (in.)	Stream density (mi/mi^2)	Soil thickness (ft)	Percent glaciation	Percent carbonate bedrock	Percent forested area	Percent urban area
01565700	6.52	6.08	758	41.3	1.59	4.26	0	48	30	1.8
01565800	39.2	7.72	978	41.9	1.57	4.07	0	9.5	60	.6
01565900	19.7	8.47	1,241	39.5	3.06	4.01	0	8.9	57	.1
01566000	214	10.3	1,005	39.4	2.07	4.22	0	10.9	74	.1
01566500	57.2	8.04	813	41.8	1.89	4.18	0	5.7	63	.2
01566900	69.5	8.34	843	40.6	2.03	4.24	0	4.9	64	.3
01567500	15.0	7.54	907	39.9	2.01	5.40	0	22	48	.2
01568000	207	9.29	1,006	39.7	1.85	4.83	0	11.4	69	.4
01569000	33.2	10.9	1,020	43.2	1.09	4.79	0	0	96	.4
01569300	53.4	10.3	1,307	40.5	2.01	4.51	0	0	82	.4
01569400	9.55	12.2	1,055	39.4	2.25	4.31	0	0	82	0
01569800	21.6	1.82	498	39.0	.46	5.65	0	99	8	25
01570000	470	5.09	754	39.1	1.64	4.61	0	38	33	4.0
01571000	11.2	4.61	518	41.0	1.77	3.45	0	12	32	36
01571185	13.9	7.45	1,411	43.2	1.50	4.94	0	8.0	99	0
01571200	110	6.74	1,009	40.5	1.11	5.27	0	30	69	1.4
01571300	8.78	6.82	782	41.0	1.18	4.80	0	29	58	4.8
01571500	216	5.79	809	40.5	1.28	5.23	0	34	55	6.2
01572000	34.3	5.85	840	46.6	1.19	4.22	0	0	59	.7
01573500	13.5	7.10	803	43.0	1.47	4.84	0	0	89	.8
01573700	20.8	3.88	582	41.6	1.97	4.18	0	0	60	1.7
01573850	14.8	4.55	820	39.3	1.98	5.07	0	0	21	1.2
01574500	75.5	5.48	703	39.8	1.48	4.46	0	17	28	3.7
01576085	5.82	3.70	625	45.0	1.46	5.21	0	51	28	1.3
01576754	470	3.85	479	42.4	1.30	5.02	0	59	24	12

Appendix 3. Basin characteristics for gaging stations used in the development of low-flow, base-flow, and mean-flow regression equations for Pennsylvania streams.—Continued

[mi², square miles; ft, feet; in., inches; mi/mi², miles per square mile]

U.S. Geological Survey streamflow-gaging station	Drainage area (mi²)	Basin slope (degrees)	Mean elevation (ft)	Mean annual precipitation (in.)	Stream density (mi/mi²)	Soil thickness (ft)	Percent glaciation	Percent carbonate bedrock	Percent forested area	Percent urban area
01577500	133	6.31	650	41.6	1.75	5.09	0	.3	33	0.7
01578400	5.98	3.80	655	41.0	1.41	5.09	0	25	22	0
01603500	30.2	10.7	1,618	38.0	2.46	4.68	0	22	79	.2
01613500	158	9.21	1,039	39.2	2.65	4.12	0	16	66	.7
01614090	5.05	7.69	1,546	45.0	1.29	5.00	0	0	99	0
01614200	6.51	14.4	1,394	41.0	1.81	4.59	0	1.5	95	0
01614500	494	5.67	878	40.3	2.08	4.67	0	0	38	3.5
01639300	10.0	9.54	1,189	43.1	1.98	5.00	0	0	91	.4
03007800	248	10.8	2,059	40.4	2.00	4.71	4	0	88	.9
03009000	27.6	7.50	2,035	44.4	1.78	4.64	0	0	98	0
03009680	160	8.35	1,985	44.5	1.85	4.65	0	0	92	.8
03010500	550	9.84	1,978	42.0	2.02	4.69	2	0	87	.9
03010650	28.7	11.6	2,154	38.7	2.07	4.61	79	0	89	.1
03010655	98.7	10.6	2,034	39.1	2.15	4.54	34	0	85	.2
03010950	36.9	6.84	2,041	44.9	1.90	4.63	0	0	96	1.2
03011020	1608	9.61	1,910	41.6	2.18	4.51	37	0	83	1.4
03011800	38.8	5.27	2,050	45.0	2.00	4.63	0	0	96	1.1
03013000	290	3.96	1,538	43.8	2.09	4.73	98	0	50	.7
03015000	816	3.79	1,515	45.1	1.93	4.80	99	0	52	2.6
03015280	12.8	6.16	1,653	45.2	2.07	5.86	87	0	69	.9
03015400	17.4	3.95	1,598	47.9	2.04	5.50	100	0	55	7.4
03015500	321	5.26	1,597	46.8	1.62	5.65	80	0	70	1.1
03015800	37.2	7.76	1,596	44.3	1.82	4.61	0	0	99	0
03017500	233	7.61	1,762	44.1	1.76	4.69	0	0	96	1.3
03017800	10.2	7.38	1,726	44.3	1.86	4.66	0	0	100	0

Appendix 3. Basin characteristics for gaging stations used in the development of low-flow, base-flow, and mean-flow regression equations for Pennsylvania streams.—Continued

[mi^2, square miles; ft, feet; in., inches; mi/mi^2, miles per square mile]

U.S. Geological Survey streamflow-gaging station	Drainage area (mi^2)	Basin slope (degrees)	Mean elevation (ft)	Mean annual precipitation (in.)	Stream density (mi/mi^2)	Soil thickness (ft)	Percent glaciation	Percent carbonate bedrock	Percent forested area	Percent urban area
03019000	469	7.35	1,690	43.8	1.80	4.67	0	0	96	0.8
03020400	49.5	5.27	1,509	43.3	1.69	4.77	0	0	85	1.1
03020420	10.4	2.87	1,607	45.6	2.78	6.02	100	0	78	.2
03020450	32.8	5.73	1,583	45.0	1.80	5.92	7	0	89	.4
03020500	300	4.56	1,515	44.5	2.20	5.87	55	0	75	1.2
03021350	92.0	3.85	1,595	47.0	.26	5.18	100	0	54	.5
03021410	52.3	2.93	1,472	46.9	1.26	5.26	100	0	59	1.1
03021500	208	3.61	1,514	46.5	1.25	5.29	100	0	56	.8
03022500	629	3.29	1,425	45.6	2.25	5.56	100	0	53	1.4
03022540	31.1	2.95	1,453	45.0	2.84	6.08	100	0	61	.2
03023500	998	3.15	1,373	45.0	2.27	5.74	100	0	52	2.4
03024000	1,028	3.17	1,372	45.0	2.27	5.76	100	0	52	2.3
03025000	166	4.14	1,436	43.8	2.31	5.94	72	0	71	.3
03025200	5.67	6.32	1,404	43.0	1.62	5.93	0	0	78	.8
03025800	54.5	5.23	1,509	43.9	1.96	4.74	0	0	80	.4
03025900	34.1	2.32	1,312	41.8	1.52	6.06	100	0	51	1.5
03026500	7.84	4.78	2,070	45.0	2.11	4.63	0	0	94	.2
03028000	63.0	7.39	1,957	45.0	1.91	4.63	0	0	90	1.2
03029400	12.6	5.06	1,567	45.0	1.48	4.72	0	0	93	1.0
03029500	807	6.49	1,779	44.4	1.85	4.62	0	0	92	1.4
03030600	72.2	6.37	1,449	44.9	2.10	4.36	0	0	63	1.8
03031950	7.38	6.77	1,512	45.0	1.80	4.61	0	0	54	.5
03032500	528	6.94	1,559	43.2	1.96	4.31	0	0	70	2.8
03033200	22.1	7.13	1,540	43.0	2.02	4.06	0	0	67	2.8
03036800	37.3	8.63	1,372	46.7	2.44	3.47	0	0	64	.8

Appendix 3. Basin characteristics for gaging stations used in the development of low-flow, base-flow, and mean-flow regression equations for Pennsylvania streams.—Continued

[mi^2, square miles; ft, feet; in., inches; mi/mi^2, miles per square mile]

U.S. Geological Survey streamflow-gaging station	Drainage area (mi^2)	Basin slope (degrees)	Mean elevation (ft)	Mean annual precipitation (in.)	Stream density (mi/mi^2)	Soil thickness (ft)	Percent glaciation	Percent carbonate bedrock	Percent forested area	Percent urban area
03038000	191	9.08	1,273	44.3	2.50	3.40	0	0	68	1.2
03039200	3.68	5.18	2,697	42.7	1.38	4.69	0	0	79	.4
03039925	3.45	8.06	2,245	45.9	2.26	4.69	0	0	100	0
03042200	7.36	6.13	1,840	46.3	2.22	4.66	0	0	88	.2
03047500	1723	7.18	1,752	44.7	1.99	4.46	0	0	71	4.3
03048300	19.1	7.59	1,255	41.0	2.30	4.48	0	0	48	5.6
03048800	13.2	6.18	1,350	41.0	2.24	3.63	0	0	65	.4
03049000	137	7.38	1,249	41.0	2.05	3.71	0	0	67	1.7
03049610	36.8	7.93	1,119	39.0	1.87	3.83	0	0	67	2.7
03049800	5.78	9.57	1,108	39.0	1.61	3.95	0	0	64	26
03072590	16.3	7.13	1,390	44.1	1.37	4.29	0	0	56	9.5
03072840	133	9.66	1,166	39.0	2.38	4.78	0	0	55	3.3
03074300	3.80	14.8	1,990	46.8	.95	4.53	0	0	97	.8
03075040	58.4	7.70	1,116	38.8	2.38	4.75	0	0	45	9.4
03078000	62.5	7.93	2,583	42.2	1.58	3.67	0	0	75	.6
03078700	16.0	6.14	2,438	42.2	1.95	4.46	0	0	63	.7
03078800	38.1	4.64	2,231	43.0	1.94	4.41	0	0	41	11
03079000	382	6.39	2,363	41.7	1.83	4.22	0	0	61	2.1
03079600	38.2	6.60	2,307	45.8	2.18	4.51	0	0	67	1.5
03080000	121	8.15	2,212	46.2	2.11	4.47	0	0	80	.7
03082100	32.6	8.53	2,120	47.1	1.85	4.52	0	0	85	1.5
03082200	9.27	7.02	1,940	45.0	1.89	4.60	0	0	79	.2
03082500	1326	7.85	2,264	45.5	1.19	4.17	0	2.0	73	1.7
03083100	94.9	6.59	1,345	42.7	1.87	4.51	0	0	48	7.2
03084000	4.39	7.29	1,158	39.0	2.26	3.69	0	0	44	45

Appendix 3. Basin characteristics for gaging stations used in the development of low-flow, base-flow, and mean-flow regression equations for Pennsylvania streams.—Continued

[mi^2, square miles; ft, feet; in., inches; mi/mi^2, miles per square mile]

U.S. Geological Survey streamflow-gaging station	Drainage area (mi^2)	Basin slope (degrees)	Mean elevation (ft)	Mean annual precipitation (in.)	Stream density (mi/mi^2)	Soil thickness (ft)	Percent glaciation	Percent carbonate bedrock	Percent forested area	Percent urban area
03084500	55.9	8.26	1,124	39.1	2.25	3.88	0	0	60	22
03093000	97.6	1.85	1,047	38.4	1.91	4.61	97	0	48	2.7
03100000	152	1.07	1,085	41.6	1.45	5.04	100	0	36	5.6
03102000	181	1.23	1,095	41.4	2.12	5.21	100	0	38	5.1
03102500	104	2.73	1,206	40.5	2.27	6.12	100	0	44	2.5
03103000	169	2.04	1,051	39.4	2.92	5.61	100	0	35	.7
03104000	608	2.12	1,103	40.2	2.34	5.75	100	0	39	4.6
03104760	2.26	2.17	1,263	41.0	1.67	6.83	100	0	26	2.1
03105800	38.0	4.89	1,227	39.3	1.67	4.39	0	0	47	3.6
03106000	356	6.16	1,190	39.1	2.00	4.33	0	0	53	10
03106100	10.5	2.66	1,422	42.9	2.32	6.27	100	0	45	.2
03106200	29.3	5.70	1,318	40.3	1.96	4.48	0	0	65	1.0
03106500	398	4.39	1,307	40.7	1.89	5.51	42	0	54	2.5
03107700	14.6	7.81	1,161	37.0	2.39	4.87	0	0	75	4.6
03108000	178	8.01	1,113	37.8	2.31	4.36	0	0	64	8.6
03109300	88.7	4.17	1,109	37.0	1.13	5.87	87	0	36	9.5
03109500	496	5.16	1,133	37.0	.44	5.05	56	0	46	9.2
04213000	175	2.01	1,008	42.1	2.10	5.34	100	0	56	2.5
04213075	4.45	1.93	898	42.9	1.66	5.04	100	0	49	9.1

Appendix 4. Low-flow characteristics computed from streamflow-gaging-station data and regression equations for stations used in analysis.

[low-flow characteristics in cubic feet per second]

U.S. Geological Survey streamflow-gaging station	Low-flow region	Observed low-flow characteristic					Predicted low-flow characteristic				
		7-day, 10-year	7-day, 2-year	30-day, 10-year	30-day, 2-year	90-day, 10-year	7-day, 10-year	7-day, 2-year	30-day, 10-year	30-day, 2-year	90-day, 10-year
01427200	5	1.3	3.9	1.8	5.6	3.0	4.2	8.9	5.5	12.0	8.5
01427300	5	1.3	2.7	1.6	3.8	2.3	1.2	3.0	1.7	4.1	2.8
01427400	5	.1	.4	.2	.7	.4	.3	.8	.4	1.2	.8
01427700	5	.7	2.1	1.0	3.2	1.5	1.9	4.7	2.8	6.5	4.4
01428200	5	.7	1.9	.9	2.9	1.4	1.2	3.0	1.7	4.3	2.8
01428750	5	4.9	8.1	6.0	10.7	7.9	2.4	5.6	3.4	7.6	5.4
01429000	5	6.3	11.2	9.0	14.1	13.3	3.7	8.1	5.1	11.1	7.9
01429500	5	2.9	6.2	4.5	8.5	7.2	4.4	9.4	5.9	12.7	9.1
01430000	5	14.1	24.5	18.5	31.3	26.9	12.5	24.9	16.5	33.0	24.4
01431000	5	3.1	6.2	4.2	8.9	8.1	4.0	9.0	5.6	12.3	8.7
01431500	5	17.9	36.5	26.0	47.4	37.2	23.2	44.4	30.1	58.1	43.8
01431680	5	.6	1.1	.7	1.4	.9	.2	.5	.2	.7	.4
01432000	5	22.3	51.6	35.1	59.4	46.3	18.3	35.5	23.8	46.6	34.9
01432100	5	1.3	3.7	1.9	5.4	3.3	1.3	3.2	1.8	4.5	3.0
01432500	5	3.0	8.3	4.1	11.9	7.1	5.2	11.3	7.0	15.2	10.8
01433700	5	.2	.6	.3	.9	.5	.4	.9	.5	1.3	.9
01438300	5	.2	.6	.2	.9	.4	.2	.6	.3	.9	.6
01438700	5	.8	2.2	1.1	3.2	1.9	.8	2.0	1.2	2.9	1.9
01438900	5	.8	1.9	.9	2.6	1.4	.6	1.6	.9	2.3	1.5
01439400	5	.2	.6	.2	.9	.4	.3	.8	.4	1.1	.7
01439500	5	7.4	18.5	10.3	26.1	17.1	9.3	18.8	12.1	24.8	18.1
01440400	5	7.3	13.1	8.9	17.5	12.0	5.7	11.7	7.4	15.5	11.2
01441000	5	16.2	24.3	19.1	29.8	23.3	4.6	10.0	6.6	13.8	10.0
01442500	5	48.3	79.8	56.6	99.1	73.3	31.6	56.4	40.2	72.7	56.3
01443100	2	3.0	4.4	3.1	4.8	3.7	0.9	1.8	1.2	2.2	1.6

Appendix 4. Low-flow characteristics computed from streamflow-gaging-station data and regression equations for stations used in analysis.—Continued

[low-flow characteristics in cubic feet per second]

U.S. Geological Survey streamflow-gaging station	Low-flow region	Observed low-flow characteristic					Predicted low-flow characteristic				
		7-day, 10-year	7-day, 2-year	30-day, 10-year	30-day, 2-year	90-day, 10-year	7-day, 10-year	7-day, 2-year	30-day, 10-year	30-day, 2-year	90-day, 10-year
01446800	2	1.6	3.4	2.0	4.4	3.0	1.	2.5	1.4	3.5	2.4
01447500	2	13.1	24.6	16.6	32.5	24.5	11.2	19.2	13.6	24.1	18.3
01447720	2	28.0	43.3	34.1	58.8	43.2	25.8	40.1	29.8	48.2	37.9
01448100	2	2.2	4.0	2.6	4.8	3.4	1.9	3.6	2.3	4.5	3.4
01448800	2	.7	1.5	.9	2.0	1.4	1.3	2.4	1.6	3.0	2.2
01449360	2	15.2	23.8	17.3	27.5	21.7	6.6	12.4	8.3	15.9	11.7
01449500	2	5.2	8.0	5.7	9.2	6.8	2.3	4.5	2.9	5.8	4.1
01450400	2	3.8	8.4	4.5	10.3	6.5	4.8	10.0	6.4	13.1	9.4
01450500	2	17.0	29.4	19.9	35.4	26.7	9.8	18.0	12.3	22.8	17.1
01451000	2	213	311	253	391	343	195	301	231	362	295
01451500	2	28.5	42.4	31.7	46.9	35.1	42.0	55.9	44.2	59.7	45.9
01451800	2	2.3	7.1	3.8	11.0	7.8	1.6	4.5	2.4	6.7	4.3
01452500	2	13.0	22.6	14.5	25.6	16.6	11.9	19.5	13.8	22.4	16.1
01453000	2	312	447	378	546	472	309	469	364	557	450
01459500	1	.8	2.1	1.3	3.6	2.9	2.8	7.1	4.4	10.9	9.2
01464700	1	.2	.7	.3	1.1	.7	.3	.8	.5	1.2	1.1
01465000	1	3.4	10.1	4.9	15.0	12.9	4.4	10.8	7.1	17.1	15.5
01465500	1	10.4	18.4	14.0	27.2	23.0	8.7	20.0	13.5	30.7	28.0
01465798	1	1.3	3.8	2.8	6.6	7.7	.8	2.1	1.5	3.6	3.7
01467042	1	9.3	16.8	11.3	21.5	17.0	6.0	11.2	8.5	16.0	15.6
01467048	1	12.1	19.2	16.5	27.1	27.0	8.4	15.3	11.9	21.9	21.7
01467086	1	4.4	6.9	6.6	9.8	10.4	5.0	8.5	6.8	11.6	11.5
01467087	1	2.9	5.2	4.7	9.5	11.7	7.2	12.6	10.0	17.8	18.1
01468500	2	44.6	70.2	52.9	82.7	65.8	30.6	53.8	37.6	66.5	51.4
01469500	2	5.1	11.1	6.9	14.9	8.0	8.6	15.2	10.4	18.8	13.8

Appendix 4. Low-flow characteristics computed from streamflow-gaging-station data and regression equations for stations used in analysis.—Continued

[low-flow characteristics in cubic feet per second]

U.S. Geological Survey streamflow-gaging station	Low-flow region	Observed low-flow characteristic					Predicted low-flow characteristic				
		7-day, 10-year	7-day, 2-year	30-day, 10-year	30-day, 2-year	90-day, 10-year	7-day, 10-year	7-day, 2-year	30-day, 10-year	30-day, 2-year	90-day, 10-year
01470500	2	82.9	137	103	165	134	84.4	141	102	172	135
01470720	2	.3	1.2	.7	1.7	1.2	.2	.7	.3	1.1	.6
01470756	2	16.7	30.5	23.4	43.9	35.5	16.7	35.4	22.6	46.6	33.1
01470779	2	26.0	38.4	30.5	44.4	35.1	41.7	53.0	42.9	55.0	43.1
01470960	2	39.7	75.2	49.2	88.5	60.5	41.1	68.1	49.2	80.3	60.2
01471000	2	48.1	78.4	56.0	92.3	69.4	52.7	85.0	62.3	99	75.2
01471510	1	173	279	206	336	245	124	206	150	252	194
01471800	1	1.1	2.4	1.3	2.8	1.5	2.1	3.8	2.5	4.4	3.1
01471980	1	18.4	29.4	22.2	35.2	30.5	19.8	33.0	22.7	38.2	28.8
01472000	1	259	416	300	492	377	183	294	217	356	278
01472157	1	10.5	17.0	13.3	21.7	18.1	9.0	16.5	11.0	20.1	15.2
01472174	1	1.5	2.4	1.8	3.1	2.7	.8	1.7	1.1	2.2	1.6
01472198	1	7.3	12.5	9.6	15.0	14.2	5.3	10.0	6.6	12.4	9.3
01472199	1	4.3	6.5	5.2	8.1	7.6	2.9	5.7	3.7	7.1	5.4
01472500	1	14.5	24.0	20.6	34.9	34.6	15.3	29.6	19.7	38.2	30.5
01473000	1	14.8	32.1	24.1	44.7	41.4	21.1	42.3	28.5	57.0	46.8
01473120	1	1.9	4.4	3.2	6.8	5.6	1.6	4.1	2.7	6.6	5.8
01475300	1	1.3	2.1	1.8	2.9	2.4	1.1	2.0	1.5	2.8	2.6
01475510	1	11.5	18.8	15.4	23.9	22.6	12.0	19.2	15.5	25.3	23.7
01475530	1	1.3	2.0	1.8	2.8	2.6	.9	1.8	1.3	2.6	2.6
01475550	1	4.8	7.2	7.8	11.3	13.8	3.2	6.3	4.8	9.4	9.6
01475850	1	2.5	4.3	3.6	6.3	5.8	2.4	4.7	3.3	6.2	5.2
01476500	1	4.9	11.4	6.5	14.4	9.7	6.4	11.3	8.0	14.3	11.8
01477000	1	13.0	24.7	16.5	31.0	23.0	15.9	26.2	19.7	32.9	28.3
01479820	1	3.5	11.5	5.1	13.7	10.6	4.1	7.8	5.3	10.2	8.4

Appendix 4. Low-flow characteristics computed from streamflow-gaging-station data and regression equations for stations used in analysis.—Continued

[low-flow characteristics in cubic feet per second]

U.S. Geological Survey streamflow-gaging station	Low-flow region	Observed low-flow characteristic					Predicted low-flow characteristic				
		7-day, 10-year	7-day, 2-year	30-day, 10-year	30-day, 2-year	90-day, 10-year	7-day, 10-year	7-day, 2-year	30-day, 10-year	30-day, 2-year	90-day, 10-year
01480300	1	3.2	6.0	4.1	7.3	5.6	1.2	2.8	1.7	3.8	3.1
01480675	1	.7	1.7	1.0	2.4	1.8	.8	1.8	1.1	2.3	1.8
01480800	1	12.1	19.8	14.7	23.8	19.5	12.6	23.1	15.7	28.8	23.3
01481000	1	68.5	117	79.0	136	102	60.2	98.6	71.3	119	97.7
01494980	1	6.7	12.4	8.1	14.4	10.5	3.2	6.6	4.2	8.6	6.9
01500500	5	82.5	138	100	178	137	65.8	121	84.1	157	120
01502500	5	45.8	76.7	55.1	96.3	71.0	26.1	52.8	35.1	70.2	52.1
01502750	5	2.6	5.4	3.5	7.2	5.2	3.4	7.4	4.6	10.0	7.1
01502780	5	.4	1.1	.5	1.5	.9	.4	1.2	.7	1.8	1.2
01507000	5	50.8	81.5	58.3	100	75.4	27.9	56.6	37.0	75.2	55.5
01514000	5	10.4	15.5	11.3	18.5	13.3	5.3	12.7	7.4	17.5	12.0
01516500	5	.1	.3	.1	.5	.3	.1	.2	.1	.4	.2
01518500	5	2.3	5.3	2.8	6.6	3.9	1.3	3.8	2.0	5.6	3.5
01518862	5	1.2	3.2	2.1	5.2	4.0	1.5	4.2	2.3	6.1	4.0
01520000	5	2.3	7.2	3.4	11.7	6.4	5.0	12.8	7.2	18.1	12.1
01531300	5	.5	2.1	.8	2.9	1.7	.8	2.4	1.3	3.7	2.3
01531420	5	.03	.1	.05	.2	.1	.1	.2	.1	.4	.2
01532000	5	2.8	9.6	4.5	14.2	9.5	5.1	12.5	7.2	17.4	11.8
01532600	5	.5	1.8	.8	2.7	1.6	1.3	3.7	2.0	5.5	3.5
01532850	5	.2	.4	.3	.7	.7	.1	.4	.2	.5	.3
01533200	5	.03	.1	.1	.2	.1	.03	.1	.05	.2	.1
01533300	5	.5	1.3	.7	2.0	1.2	.6	1.8	1.0	2.6	1.7
01533500	5	.6	1.5	.8	2.0	1.7	1.0	2.6	1.4	3.7	2.4
01533900	5	.2	.7	.4	1.1	.6	.2	.6	.3	.9	.6
01533950	5	.3	1.0	.6	1.4	1.0	.3	1.0	.5	1.4	.9

Appendix 4. Low-flow characteristics computed from streamflow-gaging-station data and regression equations for stations used in analysis.—Continued

[low-flow characteristics in cubic feet per second]

U.S. Geological Survey streamflow-gaging station	Low-flow region	Observed low-flow characteristic					Predicted low-flow characteristic				
		7-day, 10-year	7-day, 2-year	30-day, 10-year	30-day, 2-year	90-day, 10-year	7-day, 10-year	7-day, 2-year	30-day, 10-year	30-day, 2-year	90-day, 10-year
01534000	5	17.3	35.5	24.2	50.1	38.5	18.5	38.4	25.0	51.4	37.7
01538000	2	3.6	6.9	5.0	9.0	7.4	4.2	8.3	5.5	10.8	8.2
01538900	2	1.3	3.4	1.6	4.9	3.1	2.1	4.2	2.8	5.6	4.3
01539000	2	16.8	36.4	21.2	50.2	37.2	26.2	46.4	33.3	59.5	47.8
01540000	2	36.9	74.9	56.5	107	100	30.6	56.0	39.7	72.7	58.1
01540300	2	2.3	4.5	3.1	5.6	4.4	3.5	6.4	4.3	8.0	6.1
01541000	3	27.6	50.3	34.9	66.2	48.9	22.9	41.1	29.0	55.9	40.6
01541200	3	24.7	44.8	27.7	58.3	36.4	26.4	47.4	33.5	64.2	46.9
01541308	3	1.3	1.9	1.6	2.4	2.1	.6	1.2	.8	1.7	1.1
01541400	3	.7	1.6	.9	2.1	1.4	.6	1.4	.9	2.1	1.3
01541500	3	21.3	41.9	28.5	55.0	42.9	21.7	42.1	27.9	56.1	39.6
01542330	3	.04	.1	.1	.2	.1	.1	.2	.1	.3	.2
01542500	3	131	189	152	243	221	96.8	173	121	226	169
01542780	5	.4	2.1	.9	3.5	1.8	.7	2.4	1.4	3.8	2.4
01542810	5	.1	.3	.2	.5	.3	.1	.3	.1	.5	.3
01542830	5	.7	2.1	1.3	3.2	2.3	1.0	3.3	2.0	5.3	3.5
01542900	5	.2	1.0	.6	1.8	1.2	.3	1.1	.6	1.9	1.2
01543000	5	4.1	15.6	9.5	26.8	18.9	10.1	26.6	17.7	39.8	28.0
01543500	5	14.3	44.0	26.5	73.0	49.7	32.9	77.9	55.0	113	83.3
01543600	5	.4	1.9	1.0	3.4	2.1	.5	1.6	.9	2.7	1.6
01543680	5	1.0	2.7	1.5	3.8	2.4	.4	1.6	.9	2.6	1.6
01543700	5	5.6	14.6	9.4	22.1	15.0	3.7	11.3	6.8	17.5	11.6
01544500	5	4.8	12.2	7.6	17.1	11.5	2.6	8.1	4.8	12.7	8.3
01545600	5	1.7	4.4	2.7	6.7	4.4	.9	3.0	1.7	4.8	3.0
01546000	2	2.2	6.8	3.7	12.1	11.3	4.8	10.5	6.8	14.4	11.1

Appendix 4. Low-flow characteristics computed from streamflow-gaging-station data and regression equations for stations used in analysis.—Continued

[low-flow characteristics in cubic feet per second]

U.S. Geological Survey streamflow-gaging station	Low-flow region	Observed low-flow characteristic					Predicted low-flow characteristic				
		7-day, 10-year	7-day, 2-year	30-day, 10-year	30-day, 2-year	90-day, 10-year	7-day, 10-year	7-day, 2-year	30-day, 10-year	30-day, 2-year	90-day, 10-year
01546400	2	13.8	18.6	15.2	20.8	18.7	18.8	24.8	20.0	26.7	21.4
01546500	2	28.9	41.1	30.9	43.8	33.3	31.0	38.4	32.1	40.5	33.0
01547200	2	100	131	105	140	114	42.9	63.4	49.8	73.7	60.5
01547700	2	.6	2.8	1.1	4.0	2.3	1.4	3.3	2.1	4.7	3.5
01547800	2	1.7	2.4	2.1	2.9	3.5	.9	1.8	1.2	2.3	1.8
01547950	2	14.9	29.0	19.2	37.2	26.0	12.6	21.8	15.9	27.9	22.9
01548005	2	115	147	125	166	141	74.4	114	88.9	137	114
01548400	5	.9	2.3	1.2	3.1	1.9	.6	1.9	.9	2.7	1.7
01548500	5	24.1	49.4	33.4	67.6	48.6	24.5	52.4	32.6	70.8	50.6
01548800	5	.2	.7	.2	1.0	.4	.2	.9	.5	1.5	.9
01549000	5	32.9	78.0	46.4	106	89.9	31.0	66.8	42.5	91.0	65.6
01549500	5	.7	2.4	1.3	3.8	2.6	.7	2.0	1.0	2.9	1.8
01549550	5	3.4	10.4	5.9	15.6	10.7	2.9	7.6	4.2	10.9	7.2
01549700	5	37.2	82.0	51.6	115	76.7	40.4	85.5	55.2	116	84.4
01549750	2	.7	1.5	1.0	2.0	1.3	1.4	2.7	1.7	3.4	2.5
01549780	2	.3	.8	.3	1.2	.6	.4	.9	.6	1.2	.9
01549900	2	.1	.4	.2	.6	.4	.3	.6	.4	.9	.7
01550000	2	7.6	16.5	11.2	24.3	18.5	5.7	11.9	8.0	16.5	13.2
01551850	2	.4	1.1	.5	1.6	.9	.6	1.3	.8	1.9	1.4
01551900	2	.4	1.1	.5	1.6	.9	.5	1.1	.7	1.6	1.2
01552000	2	22.1	48.5	28.8	68.1	48.9	30.4	55.3	39.8	72.4	59.2
01552500	2	1.1	3.0	1.7	4.3	3.3	1.9	3.9	2.5	5.2	3.7
01553000	2	1.0	3.6	1.5	5.1	3.0	1.5	3.6	2.2	5.0	3.6
01553130	2	1.1	1.5	1.3	1.8	1.7	.4	.8	.5	1.1	.8
01553480	2	10.4	19.0	12.4	22.4	16.0	14.9	26.0	18.5	32.6	25.1

Appendix 4. Low-flow characteristics computed from streamflow-gaging-station data and regression equations for stations used in analysis.—Continued

[low-flow characteristics in cubic feet per second]

U.S. Geological Survey streamflow-gaging station	Low-flow region	Observed low-flow characteristic					Predicted low-flow characteristic				
		7-day, 10-year	7-day, 2-year	30-day, 10-year	30-day, 2-year	90-day, 10-year	7-day, 10-year	7-day, 2-year	30-day, 10-year	30-day, 2-year	90-day, 10-year
01554800	2	2.5	3.8	2.8	4.4	3.5	2.4	4.8	3.1	6.1	4.5
01555000	2	37.6	58.7	43.7	68.9	54.9	66.4	98	75.9	114	91.0
01555200	2	6.0	12.5	7.8	15.8	11.5	11.5	20.5	14.3	25.8	19.4
01555300	2	1.1	3.2	1.5	4.1	2.4	1.9	4.2	2.6	5.8	4.1
01555500	2	6.5	17.7	9.4	24.0	16.4	16.7	29.3	20.9	37.4	29.8
01555570	2	4.3	12.1	6.2	16.4	10.8	10.2	17.6	12.5	22.0	17.5
01555780	2	2.9	5.1	3.6	6.0	4.5	1.8	3.9	2.5	5.3	3.9
01555850	2	1.2	2.2	1.5	2.5	1.8	.5	1.1	.7	1.5	1.1
01556000	2	47.7	66.0	54.9	74.5	63.3	28.9	46.8	35.2	57.6	46.2
01556500	2	11.3	14.6	12.9	17.5	15.4	5.6	11.0	7.4	14.6	11.2
01557500	2	3.0	5.8	4.0	7.3	5.4	1.9	4.2	2.7	5.8	4.4
01558000	2	59.0	79.5	66.0	85.3	73.8	22.2	37.2	27.4	46.1	36.9
01558600	2	1.7	4.0	2.4	5.0	3.3	1.7	4.1	2.5	5.8	4.3
01559000	2	178	248	198	278	226	132	187	152	219	183
01559200	2	1.0	1.7	1.1	2.0	1.4	.7	1.6	1.0	2.2	1.7
01559500	2	10.5	15.0	12.4	17.8	15.8	7.1	13.9	9.5	18.6	14.8
01559700	2	.1	.2	.1	.3	.2	.1	.2	.1	.3	.2
01560000	2	9.4	15.5	12.1	19.9	16.2	5.8	12.7	8.2	17.7	13.3
01560800	2	.5	1.1	.7	1.5	1.0	0.9	1.6	1.1	2.1	1.5
01562000	2	68.1	105	77.8	122	94.5	44.5	79.1	58.0	102	82.5
01562500	2	1.6	3.8	2.3	5.4	3.7	3.8	7.3	5.0	9.8	7.6
01564500	2	4.3	10.2	6.4	14.6	10.5	7.2	15.8	10.3	22.0	16.8
01564800	2	1.0	1.5	1.1	1.6	1.2	.6	1.2	.8	1.5	1.2
01565000	2	18.4	27.1	20.2	30.6	24.1	28.4	43.0	33.0	50.9	41.3
01565700	2	.4	.9	.5	1.1	.8	.5	1.1	.7	1.5	1.0

Appendix 4. Low-flow characteristics computed from streamflow-gaging-station data and regression equations for stations used in analysis.—Continued

[low-flow characteristics in cubic feet per second]

U.S. Geological Survey streamflow-gaging station	Low-flow region	Observed low-flow characteristic					Predicted low-flow characteristic				
		7-day, 10-year	7-day, 2-year	30-day, 10-year	30-day, 2-year	90-day, 10-year	7-day, 10-year	7-day, 2-year	30-day, 10-year	30-day, 2-year	90-day, 10-year
01565800	2	3.1	5.4	3.6	6.2	4.5	2.4	5.3	3.3	7.1	5.2
01565900	2	.3	.9	.4	1.3	.8	.4	1.0	.6	1.5	1.0
01566000	2	8.7	18.1	12.9	25.5	19.2	11.8	23.0	15.8	30.5	23.5
01566500	2	2.4	4.0	3.2	5.7	4.9	3.1	6.7	4.3	9.0	6.6
01566900	2	1.4	3.2	1.9	4.4	2.9	3.3	7.0	4.6	9.5	7.1
01567500	2	2.3	3.2	2.7	3.7	3.1	1.5	2.4	1.7	2.9	2.2
01568000	2	15.9	25.3	19.7	32.1	26.1	20.0	32.5	24.4	40.4	33.0
01569000	2	4.0	7.4	5.1	9.3	7.8	4.6	8.2	5.7	10.3	8.2
01569300	2	3.1	4.9	3.7	5.4	4.4	2.8	5.5	3.7	7.4	5.7
01569400	2	.2	.5	.3	.7	.5	.3	.6	.4	.9	.6
01569800	2	18.4	23.5	19.6	25.1	21.2	25.0	27.9	24.1	27.2	23.9
01570000	2	63.1	110	76.1	124	95.3	69.7	106	82.4	125	102
01571000	2	.2	.6	.3	1.2	.8	.3	.8	.4	1.2	.8
01571185	2	1.8	3.3	2.1	3.9	2.7	1.5	2.8	1.9	3.5	2.6
01571200	2	38.0	51.2	41.4	56.1	46.6	30.0	40.9	33.0	46.2	39.3
01571300	2	2.5	3.9	2.8	4.3	3.2	1.2	2.1	1.4	2.6	1.9
01571500	2	87.4	114	94.8	124	106	59.0	78.3	64.3	87.7	74.4
01572000	2	2.3	4.7	3.0	6.5	4.5	4.0	8.3	5.2	10.8	7.9
01573500	2	1.4	2.5	1.8	3.2	2.6	1.2	2.3	1.5	3.0	2.3
01573700	2	.6	2.1	1.0	2.9	1.8	.8	1.9	1.2	2.7	1.9
01573850	1	1.0	2.3	1.4	3.0	2.2	1.9	3.9	2.4	4.8	3.6
01574500	1	7.1	11.5	9.3	14.7	12.7	7.9	15.3	10.2	19.5	14.7
01576085	1	.5	.8	.7	1.2	1.2	.6	1.3	.8	1.7	1.3
01576754	1	89.5	147	109	184	152	68.5	119	84.9	151	128
01577500	1	29.6	48.2	33.1	58.2	39.2	33.3	53.6	37.5	61.0	45.6

Appendix 4. Low-flow characteristics computed from streamflow-gaging-station data and regression equations for stations used in analysis.—Continued

[low-flow characteristics in cubic feet per second]

U.S. Geological Survey streamflow-gaging station	Low-flow region	Observed low-flow characteristic					Predicted low-flow characteristic				
		7-day, 10-year	7-day, 2-year	30-day, 10-year	30-day, 2-year	90-day, 10-year	7-day, 10-year	7-day, 2-year	30-day, 10-year	30-day, 2-year	90-day, 10-year
01578400	1	1.5	2.7	1.9	3.2	2.5	.5	1.2	.7	1.6	1.2
01603500	2	1.8	3.0	2.2	3.7	2.8	1.4	2.7	1.9	3.6	2.7
01613500	2	6.3	11.1	8.0	15.8	12.5	6.4	13.1	8.7	17.7	13.1
01614090	2	.3	.8	.4	1.0	.7	.6	1.1	.7	1.4	1.1
01614200	2	.4	.9	.5	1.2	.7	.3	.7	.4	.9	.7
01614500	2	55.7	91.3	66.1	105	81.6	38.9	65.3	48.8	83.4	68.6
01639300	2	.6	1.5	.9	2.2	1.6	.7	1.3	.9	1.8	1.3
03007800	3	14.8	34.2	20.7	46.2	34.3	14.6	29.8	18.5	38.5	26.5
03009000	3	.9	2.2	1.2	3.3	1.9	1.9	3.9	2.5	5.4	3.6
03009680	3	17.2	25.5	22.1	37.1	39.6	12.6	23.2	15.8	31.1	22.2
03010500	3	30.7	63.4	42.3	88.4	61.0	38.5	71.5	47.8	92.8	67.3
03010650	3	1.6	3.6	2.2	4.9	3.2	1.3	3.1	1.7	4.1	2.5
03010655	3	5.6	11.8	7.3	15.7	9.9	4.8	10.7	6.2	13.9	9.1
03010950	3	6.5	10.3	7.7	12.2	9.4	2.8	5.4	3.6	7.4	5.1
03011020	3	126	216	158	288	213	114	203	140	260	195
03011800	3	4.8	8.6	6.2	11.7	8.7	3.0	5.8	3.8	7.9	5.4
03013000	3	31.0	48.3	35.1	58.7	41.5	18.3	33.8	23.7	46.6	33.4
03015000	3	71.6	122	86.5	141	132	61.3	103	77.5	141	107
03015280	3	.9	1.9	1.3	2.7	2.0	.8	1.6	1.0	2.3	1.5
03015400	3	.8	1.6	1.0	2.2	1.3	1.3	2.4	1.7	3.6	2.4
03015500	3	34.1	53.9	40.3	68.6	50.4	27.0	45.1	34.1	62.9	47.1
03015800	3	.9	2.2	1.3	3.3	1.9	2.2	4.4	2.9	6.2	4.2
03017500	3	16.4	30.0	22.1	42.3	35.4	16.7	30.5	21.2	41.5	29.8
03017800	3	.8	1.6	.9	2.1	1.3	.6	1.2	.8	1.8	1.1
03019000	3	24.5	45.7	35.8	61.4	44.7	33.2	59.4	42.0	80.2	58.7

Appendix 4. Low-flow characteristics computed from streamflow-gaging-station data and regression equations for stations used in analysis.—Continued

[low-flow characteristics in cubic feet per second]

U.S. Geological Survey streamflow-gaging station	Low-flow region	Observed low-flow characteristic					Predicted low-flow characteristic				
		7-day, 10-year	7-day, 2-year	30-day, 10-year	30-day, 2-year	90-day, 10-year	7-day, 10-year	7-day, 2-year	30-day, 10-year	30-day, 2-year	90-day, 10-year
03020400	3	3.3	6.2	4.0	7.8	5.4	2.6	5.3	3.5	7.6	5.0
03020420	3	.8	1.5	1.1	1.9	1.4	.6	1.3	.8	1.9	1.2
03020450	3	1.9	3.6	2.4	4.9	3.3	2.0	4.0	2.7	5.7	3.8
03020500	3	30.2	49.3	37.1	63.8	47.6	20.0	36.0	25.9	50.1	36.3
03021350	3	4.5	10.8	7.4	18.9	12.7	7.2	12.7	9.3	18.1	13.0
03021410	3	2.8	5.6	4.6	10.5	8.6	3.6	6.7	4.8	9.8	6.8
03021500	3	9.6	18.4	13.0	25.9	18.4	15.8	27.4	20.4	38.7	28.3
03022500	3	31.0	52.9	38.9	72.4	48.9	45.8	77.2	58.6	108	81.0
03022540	3	2.8	4.9	3.8	7.0	5.6	1.8	3.5	2.4	5.1	3.4
03023500	3	72.3	123	97.9	155	128	69.9	117	89.5	163	123
03024000	3	62.0	101	78.1	134	109	71.8	120	91.9	167	127
03025000	3	16.6	25.1	19.9	31.1	25.6	9.5	18.2	12.7	25.7	18.0
03025200	3	.6	1.0	.9	1.4	1.2	.2	.5	.3	.8	.5
03025800	3	4.5	7.6	5.5	9.6	7.4	3.0	6.1	4.1	8.6	5.8
03025900	3	1.1	2.2	1.4	2.8	2.0	1.3	3.0	1.9	4.4	2.8
03026500	3	.2	.7	.4	1.0	.6	.5	1.1	.7	1.6	1.0
03028000	3	6.6	12.1	8.4	16.2	11.7	4.8	9.1	6.1	12.5	8.7
03029400	3	.6	1.1	.8	1.5	1.2	.7	1.5	1.0	2.2	1.4
03029500	3	57.0	96.4	69.9	123	103	65.4	111	80.7	148	112
03030600	3	6.3	10.5	8.0	13.7	10.7	4.3	8.3	5.8	11.9	8.2
03031950	3	.4	.9	.7	1.4	1.1	.4	.8	.5	1.2	.8
03032500	3	34.3	60.9	45.5	85.1	65.3	33.6	61.2	43.2	83.2	60.6
03033200	3	3.4	6.9	4.2	8.4	5.6	1.1	2.3	1.5	3.4	2.2
03036800	3	1.4	2.6	1.9	3.8	2.9	2.3	4.4	3.2	6.6	4.5
03038000	3	5.4	9.5		14.1	11.4	10.4	19.6	14.1	27.2	19.9

Appendix 4. Low-flow characteristics computed from streamflow-gaging-station data and regression equations for stations used in analysis.—Continued

[low-flow characteristics in cubic feet per second]

U.S. Geological Survey streamflow-gaging station	Low-flow region	Observed low-flow characteristic					Predicted low-flow characteristic				
		7-day, 10-year	7-day, 2-year	30-day, 10-year	30-day, 2-year	90-day, 10-year	7-day, 10-year	7-day, 2-year	30-day, 10-year	30-day, 2-year	90-day, 10-year
03039200	3	.1	.2	.2	.4	.2	.2	.6	.3	.8	.5
03039925	3	.3	.8	.4	1.1	.6	.3	.5	.3	.8	.5
03042200	3	.3	.6	.4	1.0	.6	.5	1.0	.7	1.5	1.0
03047500	3	155	334	190	412	276	150	242	182	320	249
03048300	3	.4	1.0	.5	1.4	.8	.6	1.5	.9	2.3	1.4
03048800	4	.3	.7	.4	1.1	.7	.2	.6	.4	1.0	.7
03049000	4	3.8	8.3	5.6	13.0	9.3	3.6	7.9	5.4	12.1	8.8
03049610	4	.6	1.5	.9	2.4	1.5	.7	1.6	1.1	2.6	1.8
03049800	4	.04	.2	.1	.4	.3	.1	.2	.1	.3	.2
03072590	4	.1	.5	.3	.9	.5	.3	.8	.5	1.3	.9
03072840	4	2.7	5.5	4.9	9.2	9.3	3.4	7.2	5.0	11.0	8.0
03074300	4	.1	.2	.2	.4	.4	.1	.2	.1	.4	.2
03075040	4	.8	2.5	1.6	4.7	3.4	1.2	2.7	1.9	4.3	3.1
03078000	4	1.6	5.0	2.8	8.5	5.6	2.1	5.9	3.5	9.8	6.9
03078700	4	.3	1.1	.5	1.9	1.0	.4	1.2	.7	2.1	1.5
03078800	4	2.0	5.1	2.9	7.5	4.6	1.0	3.0	1.8	5.0	3.5
03079000	4	18.1	37.0	24.6	55.7	42.2	18.4	43.2	26.8	65.7	47.9
03079600	4	2.0	4.5	3.0	7.2	5.3	1.1	3.1	1.8	5.2	3.6
03080000	4	5.3	12.2	8.5	20.7	15.5	4.3	11.0	6.8	17.6	12.6
03082100	4	1.7	4.0	2.6	6.3	4.4	.8	2.4	1.4	4.1	2.8
03082200	4	.05	.4	.2	.7	.5	.2	.5	.3	.9	.7
03082500	4	32.3	127	55.9	204	151	83.3	172	110	246	183
03083100	4	2.2	5.5	3.4	9.0	6.3	2.4	5.5	3.7	8.7	6.2
03084000	4	.1	.3	.2	.5	.3	.05	.1	.1	.3	.2
03084500	4	.7	2.6	1.5	4.3	3.0	1.1	2.6	1.8	4.1	3.0

Appendix 4. Low-flow characteristics computed from streamflow-gaging-station data and regression equations for stations used in analysis.—Continued

[low-flow characteristics in cubic feet per second]

U.S. Geological Survey streamflow-gaging station	Low-flow region	Observed low-flow characteristic					Predicted low-flow characteristic				
		7-day, 10-year	7-day, 2-year	30-day, 10-year	30-day, 2-year	90-day, 10-year	7-day, 10-year	7-day, 2-year	30-day, 10-year	30-day, 2-year	90-day, 10-year
03093000	4	6.7	10.8	8.5	13.7	11.2	2.2	4.6	3.2	7.2	5.1
03100000	4	3.6	5.8	5.2	9.5	7.3	3.8	7.9	5.5	12.0	8.7
03102000	4	2.9	5.4	3.4	8.0	5.4	4.8	9.7	6.8	14.6	10.6
03102500	4	5.5	10.1	7.0	13.5	9.6	2.5	5.6	3.8	8.7	6.3
03103000	4	1.8	4.4	2.9	6.7	5.1	4.3	8.7	6.1	13.1	9.5
03104000	4	13.1	28.3	18.4	40.6	25.8	21.3	38.8	27.8	55.3	41.0
03104760	4	.05	.1	.1	.1	.2	.02	.1	.05	.1	.1
03105800	4	.6	1.7	.9	2.8	1.6	.7	1.8	1.2	2.9	2.1
03106000	4	11.7	23.7	16.0	34.9	25.3	11.5	22.5	15.7	33.0	24.2
03106100	4	.1	.3	.2	.4	.3	.2	.5	.3	.8	.6
03106200	4	.4	.9	.6	1.7	1.1	.6	1.4	.9	2.4	1.7
03106500	4	30.4	44.6	38.8	59.3	49.2	13.9	27.6	19.0	40.5	29.7
03107700	4	.1	.3	.2	.5	.4	.2	.6	.4	1.0	.7
03108000	4	7.7	11.2	10.4	17.4	16.6	4.7	9.7	6.8	14.6	10.6
03109300	4	4.6	8.6	5.8	11.4	8.3	2.0	4.4	3.0	6.8	4.9
03109500	4	20.3	37.3	28.8	52.3	42.7	16.8	31.5	22.4	45.3	33.5
04213000	3	2.3	7.0	4.2	11.7	7.0	6.5	13.3	9.2	19.7	13.3
04213075	3	.3	.6	.5	1.0	.7	.1	.3	.2	.5	.3

Appendix 5. Base-flow and mean-flow characteristics computed from streamflow-gaging-station data and regression equations for stations used in analysis.

[streamflow characteristics in cubic feet per second]

U.S. Geological Survey streamflow-gaging station	Observed base-flow characteristic			Predicted base-flow characteristic			Observed mean-flow characteristic		Predicted mean-flow characteristic	
	10-year base flow	25-year base flow	50-year base flow	10-year base flow	25-year base flow	50-year base flow	Harmonic mean	Mean annual flow	Harmonic mean	Mean annual flow
01428750	27.9	23.5	21.0	28.8	25.6	23.9	24.6	77.7	19.1	75.0
01429000	48.4	42.3	38.5	40.8	36.3	33.8	34.3	118	27.3	107
01429500	44.8	40.1	37.3	44.3	39.6	36.9	26.0	114	27.9	111
01430000	130	120	113	108	96.7	90.1	78.6	302	76.0	285
01431000	52.3	48.9	46.9	47.6	42.3	39.3	26.2	133	30.7	127
01431500	177	156	144	183	163	152	133	487	131	490
01432000	206	192	183	150	134	125	108	397	108	399
01439500	111	95.1	85.8	81.2	72.8	68.0	67.6	234	54.0	200
01440400	60.8	53.6	49.2	50.4	45.3	42.5	43.5	134	33.0	120
01441000	56.9	48.7	43.7	51.5	46.2	43.2	59.1	121	38.3	121
01442500	231	203	186	209	189	177	222	553	169	498
01447500	90.5	80.3	74.0	70.9	63.8	59.8	76.4	187	53.1	182
01447720	120	107	99.0	93.8	84.4	79.1	126	263	78.3	247
01449360	52.0	45.1	40.8	37.7	33.7	31.5	56.1	100	29.3	94.2
01449500	21.2	19.1	17.8	16.5	15.0	14.1	14.9	37.4	11.0	35.7
01450500	69.6	61.0	55.9	56.1	50.1	46.7	73.3	150	43.2	132
01451000	1,000	913	856	711	640	600	901	1,920	639	1,780
01451500	48.4	40.1	35.3	64.1	56.6	52.3	69.9	99.5	104	119
01451800	31.0	26.8	24.2	26.4	23.0	21.1	23.2	90.5	20.9	78.9
01452500	23.8	19.0	16.3	29.3	25.5	23.4	35.7	53.0	46.6	60.5

Appendix 5. Base-flow and mean-flow characteristics computed from streamflow-gaging-station data and regression equations for stations used in analysis.—Continued

[streamflow characteristics in cubic feet per second]

U.S. Geological Survey streamflow-gaging station	Observed base-flow characteristic			Predicted base-flow characteristic			Observed mean-flow characteristic		Predicted mean-flow characteristic	
	10-year base flow	25-year base flow	50-year base flow	10-year base flow	25-year base flow	50-year base flow	Harmonic mean	Mean annual flow	Harmonic mean	Mean annual flow
01453000	1,030	945	890	997	894	835	1,290	2,150	1,080	2,400
01459500	26.4	23.5	21.9	60.3	53.4	49.6	11.8	139	45.6	149
01465000	56.2	47.1	41.8	71.7	63.5	58.9	39.6	226	69.0	197
01465500	83.6	71.3	64.1	115	102	94.7	65.1	282	118	307
01465798	7.0	6.0	5.5	11.6	10.3	9.7	8.9	32.0	14.7	31.3
01467042	24.0	20.0	17.7	20.3	18.2	17.0	33.5	66.8	24.8	58.0
01467048	30.8	27.7	25.9	26.8	24.0	22.4	42.3	90.4	33.6	75.9
01467086	10.9	9.9	9.2	7.9	7.1	6.6	14.1	26.6	9.7	24.7
01467087	10.4	9.7	9.3	14.5	13.0	12.1	13.1	40.4	18.7	44.7
01468500	137	118	107	116	104	98.0	152	275	98.4	274
01469500	39.1	31.3	26.5	40.5	36.6	34.4	31.6	91.5	32.2	94.5
01470500	297	259	237	301	271	254	339	706	270	718
01470720	4.6	3.9	3.6	3.8	3.3	3.1	3.1	12.6	2.8	11.3
01470756	98.4	82.0	72.1	101	88.6	81.7	97.2	265	97.9	255
01470779	54.5	46.4	41.5	41.2	35.6	32.4	72.4	106	72.7	77.2
01470960	120	95.4	81.0	107	93.2	85.5	138	284	143.0	242
01471000	136	113	99.1	131	114	105	168	316	177	294
01471510	698	650	622	650	577	536	756	1,490	787	1,510
01471980	55.3	49.2	45.6	66.5	59.0	54.8	66.5	127	68.3	136
01472000	756	632	558	846	752	699	989	1,910	1,030	1,940

Appendix 5. Base-flow and mean-flow characteristics computed from streamflow-gaging-station data and regression equations for stations used in analysis.—Continued

[streamflow characteristics in cubic feet per second]

U.S. Geological Survey streamflow-gaging station	Observed base-flow characteristic			Predicted base-flow characteristic			Observed mean-flow characteristic		Predicted mean-flow characteristic	
	10-year base flow	25-year base flow	50-year base flow	10-year base flow	25-year base flow	50-year base flow	Harmonic mean	Mean annual flow	Harmonic mean	Mean annual flow
01472157	35.9	31.0	28.1	37.6	33.4	31.0	42.0	86.6	26.7	90.3
01472174	4.2	3.5	3.1	2.9	2.5	2.3	5.4	10.5	2.0	8.2
01472198	25.8	23.3	21.8	23.1	20.4	18.8	29.3	59.3	17.4	58.5
01472199	16.6	14.7	13.5	15.8	14.1	13.1	16.7	36.6	11.7	37.6
01472500	68.7	58.2	52.0	94.9	84.1	78.0	75.0	251	75.1	234
01473000	94.2	77.3	67.5	161	142	132	115	389	137	415
01473120	17.3	14.4	12.6	25.8	22.7	21.0	14.6	79.2	21.6	70.5
01475300	4.0	3.6	3.4	2.9	2.6	2.5	4.8	9.1	2.8	8.2
01475510	26.5	23.2	21.2	19.0	17.0	15.9	37.2	64.3	22.3	57.4
01475530	2.8	2.5	2.3	2.3	2.0	1.9	3.9	7.3	2.5	7.2
01475550	11.8	10.8	10.3	9.9	8.8	8.2	5.4	33.9	12.0	30.7
01475850	10.5	9.8	9.5	9.9	8.9	8.3	11.4	22.3	8.0	24.8
01476500	21.5	18.8	17.1	19.5	17.5	16.3	24.8	43.3	16.0	48.4
01477000	37.6	32.8	29.9	35.3	31.5	29.4	50.4	89.0	33.2	92.5
01479820	18.0	16.8	16.2	15.7	13.8	12.7	20.8	37.1	14.8	39.8
01480300	10.0	8.7	7.9	8.5	7.4	6.8	12.5	25.9	6.7	26.6
01480675	4.7	4.0	3.7	5.0	4.4	4.1	4.6	12.3	3.2	12.8
01480800	37.4	34.0	32.1	47.8	42.1	39.0	44.1	86.7	41.8	122
01481000	164	141	128	167	147	136	225	385	165	431
01500500	673	578	520	500	442	409	483	1,560	356	1,480

Appendix 5. Base-flow and mean-flow characteristics computed from streamflow-gaging-station data and regression equations for stations used in analysis.—Continued

[streamflow characteristics in cubic feet per second]

U.S. Geological Survey streamflow-gaging station	Observed base-flow characteristic			Predicted base-flow characteristic			Observed mean-flow characteristic		Predicted mean-flow characteristic	
	10-year base flow	25-year base flow	50-year base flow	10-year base flow	25-year base flow	50-year base flow	Harmonic mean	Mean annual flow	Harmonic mean	Mean annual flow
01502500	342	290	258	254	223	206	249	839	175	760
01507000	374	323	291	275	242	223	261	887	181	824
01514000	107	93.4	85.4	78.3	68.7	63.3	53.4	280	42.9	232
01516500	3.7	2.9	2.4	3.6	3.1	2.8	1.1	12.4	1.6	12.9
01518500	35.6	30.5	27.5	35.4	30.5	27.8	16.2	112	16.6	124
01518862	29.8	24.2	21.0	33.6	29.3	26.9	13.4	102	17.6	111
01520000	77.5	67.1	61.0	94.7	82.1	75.0	33.7	294	49.1	327
01532000	88.2	73.9	65.6	82.3	71.8	66.0	35.7	287	44.9	261
01532850	3.6	3.5	3.4	3.1	2.7	2.5	1.7	10.2	1.5	8.2
01533500	16.0	14.3	13.3	17.4	15.3	14.2	6.3	47.2	8.7	48.5
01533950	5.6	4.7	4.1	7.4	6.5	6.1	3.1	17.3	4.2	20.0
01534000	180	154	137	192	169	157	128	541	130	558
01538000	28.0	24.4	22.1	29.8	26.7	25.0	22.3	64.8	20.2	76.7
01539000	182	161	149	159	141	131	132	475	108	431
01540000	261	225	202	197	174	161	235	698	138	545
01541000	190	164	148	216	193	180	156	555	160	572
01541200	236	223	216	252	225	210	207	591	187	664
01541308	6.3	5.7	5.3	6.1	5.6	5.2	5.4	12.9	4.1	14.8
01541500	194	164	146	225	200	186	163	574	152	609
01542500	985	902	853	902	805	749	858	2,450	678	2,460

Appendix 5. Base-flow and mean-flow characteristics computed from streamflow-gaging-station data and regression equations for stations used in analysis.—Continued

[streamflow characteristics in cubic feet per second]

U.S. Geological Survey streamflow-gaging station	Observed base-flow characteristic			Predicted base-flow characteristic			Observed mean-flow characteristic		Predicted mean-flow characteristic	
	10-year base flow	25-year base flow	50-year base flow	10-year base flow	25-year base flow	50-year base flow	Harmonic mean	Mean annual flow	Harmonic mean	Mean annual flow
01542810	3.0	2.6	2.4	3.9	3.5	3.3	1.1	8.6	2.0	9.2
01543000	141	121	108	204	184	172	63.5	449	137	496
01543500	386	336	307	514	463	433	189	1,130	367	1,260
01544500	84.9	75.7	70.2	82.3	73.5	68.5	45.3	225	46.3	214
01545600	27.4	23.4	20.9	32.1	28.8	26.9	16.7	72.8	17.7	78.2
01546000	64.2	60.7	58.8	62.5	55.3	51.3	27.5	210	36.5	160
01546400	32.8	28.8	26.5	37.0	32.3	29.8	40.0	65.2	50.2	76.7
01546500	53.5	46.0	41.5	54.3	47.5	43.7	66.7	93.2	79.2	110
01547200	194	171	157	158	140	129	237	403	162	347
01547700	20.3	17.5	15.7	22.2	19.6	18.1	8.1	58.3	11.8	60.4
01547800	12.8	11.6	10.9	7.9	7.0	6.6	9.1	23.6	3.9	19.7
01547950	115	96.9	85.5	90.7	80.9	75.4	90.2	262	52.6	236
01548005	332	287	260	337	298	276	373	773	300	784
01548500	296	256	232	273	241	223	179	837	152	797
01549000	400	354	327	359	318	294	264	1,140	206	1,020
01549500	20.4	17.9	16.4	15.7	13.8	12.7	9.6	58.1	7.4	46.9
01549700	468	404	366	449	397	368	298	1,390	262	1,280
01549780	3.9	3.3	2.9	3.9	3.5	3.2	2.4	10.9	2.0	10.6
01550000	109	94.7	85.9	78.8	69.5	64.3	65.0	286	40.9	226
01552000	267	229	206	247	220	205	180	759	153	664

Appendix 5. Base-flow and mean-flow characteristics computed from streamflow-gaging-station data and regression equations for stations used in analysis.—Continued

[streamflow characteristics in cubic feet per second]

U.S. Geological Survey streamflow-gaging station	Observed base-flow characteristic			Predicted base-flow characteristic			Observed mean-flow characteristic		Predicted mean-flow characteristic	
	10-year base flow	25-year base flow	50-year base flow	10-year base flow	25-year base flow	50-year base flow	Harmonic mean	Mean annual flow	Harmonic mean	Mean annual flow
01552500	19.3	17.1	15.9	19.3	17.4	16.3	11.0	47.8	11.8	46.0
01553130	5.0	4.5	4.2	4.0	3.6	3.4	4.1	9.1	2.2	9.2
01555000	183	156	139	228	203	189	163	439	220	508
01555500	78.7	65.5	57.7	83.2	73.0	67.4	55.2	225	59.7	238
01556000	155	134	121	169	149	138	157	394	143	423
01556500	71.5	66.4	63.4	56.8	50.7	47.3	45.8	149	37.9	149
01557500	30.5	26.9	24.8	25.6	22.7	21.1	20.9	72.5	13.9	64.0
01558000	185	167	156	137	122	114	174	373	110	327
01559000	485	431	399	500	443	410	532	1,090	494	1,150
01559500	58.8	48.4	42.1	67.9	60.1	55.7	44.5	148	39.5	173
01559700	2.0	1.7	1.5	2.7	2.4	2.2	.7	5.5	1.3	7.4
01560000	82.6	72.8	67.0	78.8	69.1	63.6	52.6	230	50.1	234
01562000	307	260	231	365	320	295	278	915	280	1,000
01562500	32.8	25.4	21.0	41.8	36.9	34.1	13.8	95.0	23.2	118
01564500	71.3	58.4	50.9	101	89.1	82.4	37.4	242	61.5	271
01565000	101	90.6	84.4	103	90.7	84.0	71.1	206	89.8	240
01565700	2.6	2.1	1.9	3.5	3.1	2.8	2.4	7.5	3.4	8.0
01566000	85.8	66.6	54.9	117	104.0	95.8	57.7	256	80.8	289
01566500	26.3	22.8	20.7	31.7	27.9	25.8	15.9	76.8	21.1	80.5
01567500	7.8	6.8	6.2	7.4	6.5	5.9	7.5	19.1	5.3	18.7

Appendix 5. Base-flow and mean-flow characteristics computed from streamflow-gaging-station data and regression equations for stations used in analysis.—Continued

[streamflow characteristics in cubic feet per second]

U.S. Geological Survey streamflow-gaging station	Observed base-flow characteristic			Predicted base-flow characteristic			Observed mean-flow characteristic		Predicted mean-flow characteristic	
	10-year base flow	25-year base flow	50-year base flow	10-year base flow	25-year base flow	50-year base flow	Harmonic mean	Mean annual flow	Harmonic mean	Mean annual flow
01568000	101	82.5	71.6	111	97.8	90.4	79.1	289	78.7	280
01569000	24.0	19.9	17.5	24.5	22.0	20.6	22.4	60.4	14.1	55.0
01569800	28.0	24.9	23.1	11.4	9.9	9.0	35.9	43.0	20.5	23.1
01570000	201	156	129	218	189	172	255	557	242	552
01571000	4.9	4.0	3.5	5.5	4.8	4.5	2.3	14.9	4.7	14.8
01571500	162	144	134	133	117	108	199	292	134	291
01572000	19.2	14.6	11.8	22.9	20.3	18.8	13.6	57.6	16.4	58.2
01573500	10.0	8.8	8.0	9.4	8.4	7.8	7.9	23.4	5.1	21.0
01574500	27.9	23.4	20.8	29.8	25.6	23.4	37.9	73.9	24.7	88.1
01576085	2.9	2.5	2.3	3.9	3.4	3.1	2.6	7.2	4.4	8.1
01576754	260	221	199	285	248	228	345	616	466	603
01577500	62.2	47.1	38.4	52.9	45.8	41.8	93.1	157	38.6	168
01578400	3.2	2.7	2.3	2.5	2.1	1.9	4.7	8.0	2.0	6.9
01603500	13.3	11.3	10.2	17.2	15.1	14.0	8.6	32.3	10.9	40.5
01613500	68.6	66.6	65.6	83.5	73.5	67.8	38.6	162	60.9	208
01614090	3.5	2.9	2.6	4.2	3.8	3.5	2.1	7.3	2.2	9.4
01614500	211	177	157	193	167	153	228	595	147	634
03007800	150	130	118	146	130	121	118	446	89.7	398
03009680	128	116	109	124	111	104	89.3	301	83.7	306
03010500	369	330	307	356	318	297	233	942	245	948

Appendix 5. Base-flow and mean-flow characteristics computed from streamflow-gaging-station data and regression equations for stations used in analysis.—Continued

[streamflow characteristics in cubic feet per second]

U.S. Geological Survey streamflow-gaging station	Observed base-flow characteristic			Predicted base-flow characteristic			Observed mean-flow characteristic		Predicted mean-flow characteristic	
	10-year base flow	25-year base flow	50-year base flow	10-year base flow	25-year base flow	50-year base flow	Harmonic mean	Mean annual flow	Harmonic mean	Mean annual flow
03010655	56.8	50.9	47.5	52.8	46.8	43.4	38.0	152	29.0	147
03011020	1,030	909	833	987	882	820	765	2,770	731	2,720
03011800	34.5	30.9	28.7	31.7	28.6	26.8	27.7	77.1	19.7	75.8
03013000	205	178	162	153	134	124	153	539	119	472
03015000	663	556	488	478	422	390	441	1,460	421	1,430
03015280	10.6	9.8	9.2	8.7	7.7	7.2	6.2	23.2	5.4	22.9
03015500	210	189	175	237	212	198	173	591	194	625
03017500	185	166	154	182	164	153	115	428	124	438
03019000	271	231	207	359	324	303	168	824	254	869
03020500	199	181	169	205	183	170	163	535	153	538
03021350	72.9	65.0	60.0	60.1	53.2	49.3	42.3	218	47.5	171
03021410	44.1	39.5	36.5	35.7	31.7	29.4	24.4	130	26.7	97.2
03021500	148	134	126	135	119	111	73.5	415	110	382
03022500	386	352	332	379	335	310	202	1,040	329	1,110
03022540	22.2	19.8	18.3	19.4	17.2	15.9	16.8	55.1	13.0	53.4
03023500	622	569	538	580	513	474	418	1,740	517	1,720
03024000	620	552	510	597	528	488	479	1,730	532	1,770
03025000	112	98.3	90.0	105	93.3	86.7	82.6	271	73.8	282
03025200	4.9	4.4	4.2	3.6	3.2	3.0	3.3	8.8	1.9	9.2
03026500	6.2	5.4	5.0	6.3	5.7	5.3	2.6	14.5	3.5	15.0

Appendix 5. Base-flow and mean-flow characteristics computed from streamflow-gaging-station data and regression equations for stations used in analysis.—Continued

[streamflow characteristics in cubic feet per second]

U.S. Geological Survey streamflow-gaging station	Observed base-flow characteristic			Predicted base-flow characteristic			Observed mean-flow characteristic		Predicted mean-flow characteristic	
	10-year base flow	25-year base flow	50-year base flow	10-year base flow	25-year base flow	50-year base flow	Harmonic mean	Mean annual flow	Harmonic mean	Mean annual flow
03028000	51.5	45.6	42.2	49.6	44.6	41.8	39.1	125	32.3	122
03029400	7.9	6.9	6.3	10.1	9.1	8.5	4.0	19.8	5.8	23.5
03029500	577	502	457	622	561	525	550	1,490	473	1,540
03031950	5.7	5.2	4.9	4.3	3.8	3.5	3.3	13.3	2.7	12.4
03032500	296	246	216	325	289	269	224	876	247	901
03038000	89.2	77.6	70.6	122	108	101	42.7	278	89.0	325
03039200	2.8	2.6	2.5	2.3	2.1	1.9	1.0	6.2	1.2	6.4
03039925	3.6	3.0	2.7	3.0	2.7	2.6	2.4	7.8	1.6	7.0
03042200	5.6	5.1	4.8	6.1	5.5	5.1	2.4	13.2	3.6	14.4
03047500	1,040	871	767	1,170	1,050	977	895	3,020	1,020	3,230
03049000	67.9	60.6	56.2	71.6	63.2	58.4	34.0	189	45.9	202
03049800	2.0	1.6	1.5	2.9	2.6	2.4	.8	6.1	1.6	8.1
03072590	6.5	5.6	5.1	9.7	8.6	7.9	1.9	19.2	6.5	27.3
03072840	48.7	42.5	38.9	55.9	48.8	44.8	27.1	155	34.8	173
03074300	2.8	2.5	2.4	3.4	3.1	2.9	1.0	7.1	1.9	7.8
03078000	49.0	44.0	40.9	37.3	33.1	30.7	19.8	119	22.9	107
03079000	232	206	191	199	175	162	145	659	144	626
03080000	103	91.3	84.0	94.2	84.5	79.0	53.8	265	68.3	244
03082200	7.1	6.4	6.0	6.7	6.0	5.5	1.5	19.0	3.9	17.1
03082500	817	761	730	960	859	801	488	2,510	845	2,620

Appendix 5. Base-flow and mean-flow characteristics computed from streamflow-gaging-station data and regression equations for stations used in analysis.—Continued

[streamflow characteristics in cubic feet per second]

U.S. Geological Survey streamflow-gaging station	Observed base-flow characteristic			Predicted base-flow characteristic			Observed mean-flow characteristic		Predicted mean-flow characteristic	
	10-year base flow	25-year base flow	50-year base flow	10-year base flow	25-year base flow	50-year base flow	Harmonic mean	Mean annual flow	Harmonic mean	Mean annual flow
03084000	1.8	1.5	1.4	2.0	1.8	1.6	1.0	5.5	1.3	6.2
03084500	21.1	15.4	12.1	26.8	23.8	22.1	8.6	76.9	17.5	78.4
03093000	30.6	25.0	21.7	36.8	32.0	29.3	30.1	114	22.3	119
03100000	65.5	59.3	55.8	63.2	55.0	50.3	28.0	200	47.5	210
03102000	75.7	65.8	59.9	76.0	66.1	60.6	23.6	213	56.8	251
03102500	47.3	40.9	37.1	43.5	37.8	34.7	32.9	142	29.0	141
03103000	54.9	46.8	42.3	59.2	51.0	46.4	19.2	201	40.1	206
03104000	193	161	142	238	207	190	109	692	184	806
03104760	.8	.7	.6	.8	.7	.6	.3	3.3	.5	2.9
03106000	136	112	96.5	153	134	123	87.1	458	108	481
03106500	183	156	140	185	162	149	166	553	132	570
03108000	77.2	67.9	62.2	76.6	67.4	62.2	51.4	205	46.7	228
03109500	165	141	126	173	151	138	132	516	117	590
04213000	69.0	58.9	52.9	89.0	78.3	72.2	27.2	270	62.8	256
04213075	2.0	1.7	1.4	2.3	2.0	1.9	1.9	6.4	1.4	6.5