Methods for Estimating the Magnitude and Frequency of Peak Discharges of Rural, Unregulated Streams in Virginia

U.S. GEOLOGICAL SURVEY
Water-Resources Investigations Report 94-4148

Prepared in cooperation with the

VIRGINIA DEPARTMENT OF TRANSPORTATION

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Multiply	By	To obtain
inch (in)	25.4	millimeter
foot (ft)	0.3048	meter
mile (mi)	1.609	kilometer
square mile (mi^2)	2.590	square kilometer
foot per mile (ft/mi)	2.04	meter per kilometer
cubic foot per second (ft^3/s)	0.02832	cubic meter per second

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

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By James A. Bisese

Abstract

Methods are presented for estimating the peak discharges of rural, unregulated streams in Virginia. A Pearson Type III distribution is fitted to the logarithms of the unregulated annual peak-discharge records from 363 stream-gaging stations in Virginia to estimate the peak discharge at these stations for recurrence intervals of 2 to 500 years. Peak-discharge characteristics for 284 unregulated stations are divided into eight regions based on physiographic province, and regressed on basin characteristics, including drainage area, main channel length, main channel slope, mean basin elevation, percentage of forest cover, mean annual precipitation, and maximum rainfall intensity. Regression equations for each region are computed by use of the generalized least-squares method, which accounts for spatial and temporal correlation between nearby gaging stations. This regression technique weights the significance of each station to the regional equation based on the length of records collected at each station, the correlation between annual peak discharges among the stations, and the standard deviation of the annual peak discharge for each station.

Drainage area proved to be the only significant explanatory variable in four regions, while other regions have as many as three significant variables. Standard errors of the regression equations range from 30 to 80 percent. Alternate equations using drainage area only are provided for the five regions with more than one significant explanatory variable.

Methods and sample computations are provided to estimate peak discharges at gaged and ungaged sites in Virginia for recurrence intervals of 2, 5, 10, 25, 50, 100, 200, and 500 years, and to adjust the regression estimates for sites on gaged streams where nearby gaging-station records are available.

INTRODUCTION

Effective design and placement of structures near streams and on flood plains require understanding the peak-discharge characteristics of those streams. Knowledge of the magnitude and frequency of peak discharge is required to construct highway bridges and culverts; to locate highways, railroads, industries, farms, and residences on flood plains; and to design flood-control structures, such as reservoirs, levees, and floodwalls.

Since 1949, the U.S. Geological Survey (USGS), in cooperation with the Virginia Department of Transportation, has maintained a network of partial-record peak-discharge gaging stations, with as many as 211 gaging stations operating in a given year. Records from continuous-record and partial-record gaging stations provide annual peak-discharge data for more than 538 gaging stations throughout the State (Prugh and others, 1991b). Three hundred and sixty three gaging stations have 10 years or more of unregulated peak-discharge records and are shown on plate 1.

Purpose and Scope

This report summarizes a statistical analysis of peak-discharge data collected in Virginia from 1895 through 1991, and provides methods for estimating the peak discharge of gaged and ungaged streams in Virginia. Basin characteristics and station peak-discharge characteristics are presented for 363 stream-gaging stations located throughout the State. Generalized least-squares regression methods are used with gaging-station records to develop regional equations to estimate the peak discharges at ungaged sites for recurrence intervals of 2, 5, 10, 25, 50, 100, 200, and 500 years. The State is divided into eight peak-discharge regions and equations are presented to estimate peak discharges at ungaged sites in each region.

Methods are given to incorporate peak-discharge data at gaging stations with the regional estimates to improve peak-discharge estimates at sites where nearby gaging-station records are available. This report updates previously published predictive equations and methods for computing peak-discharge (Miller 1978) by using the most current statistical procedures and peak-discharge data.

Previous Studies

Previous statistical analyses of peak-discharge data in Virginia have been reported by Tice (1950), Speer and Gamble (1964a; 1964b; 1965), and Miller (1969; 1978). This report expands on these earlier reports and incorporates 14 years of additional data collected since Miller's (1978) report. Because of the use of more rigorous statistical procedures, and the extended period of records, equations presented in this report should produce more reliable estimates of peak discharge than equations in previous reports.

DEVELOPMENT OF PEAK-DISCHARGE EQUATIONS

Peak-discharge characteristics can be determined for any site on a stream. At a gaging station, the station peak-discharge characteristics include the number of peaks recorded, the average and maximum peak discharges, and probability statistics, for instance the probability that a flood of a given magnitude will be exceeded during a given period of time. A relation of the station peak-discharge characteristics for each station to the topographic and physiographic characteristics of their basins can be derived. This relation can then be used to estimate the peak-discharge characteristics at ungaged sites. The following section describes the computational methods used to determine the peak-discharge characteristics at gaging stations, and also outlines the processes used to derive the relation of individual station peak-discharge characteristics to their basin characteristics.

Peak-Discharge Characteristics at Gaging Stations

The station peak-discharge characteristics can be estimated from the known station peak-discharge records using a frequency analysis. The frequency analysis technique used in this report is described in "Guidelines for Determining Flood Flow Frequency," Bulletin 17B of the Interagency Advisory Committee on Water Data (IACWD) (1982). This technique involves fitting a Pearson Type III frequency distribution to the logarithms of annual peak discharges and is used by all federal agencies for flood-frequency analysis.

Peak-Discharge Data

The peak-discharge data for active stations are published yearly in the annual water-data report for Virginia (Prugh and others, 1991a). All of the peak-discharge data used in this report are contained in "Annual Maximum Stages and Discharges of Selected Streams in Virginia through 1990" (Prugh and others, 1991b), with the exception of data from 1991. The entire peak-discharge data set is available in computer form in the Peak Flow File of the Water Data Storage and Retrieval System (WATSTORE) at the USGS National Center, Reston, Va. Information about the Peak Flow File and instructions on retrieving the peak-discharge data can be found in the "WATSTORE User's Guide, Volume 4" (Lepkin and others, 1981).

Methods for Estimating Peak Discharge at Gaging Stations

Reliably estimating peak-discharge characteristics at any gaging-station by using IACWD procedures requires a minimum of 10 years of gaging-station records. In Virginia, 363 stations of the 538 peak-discharge stations (Prugh, 1991b) have 10 or more years of unregulated peak-discharge records.

The IACWD (1982) procedures also assume that the recorded annual peak-discharge records are representative of both the recorded and the unrecorded annual peaks at the site. This assumption may not be valid where dams or other water diversions exist, or have been constructed upstream of a station during the period-of-data collection (Benson, 1962a; 1962b). Modifications can change the peak-discharge characteristics at a site by reducing or increasing the magnitude of peaks at that site. Examples of such modifications include flood control reservoirs that store water during peak-discharge events, canals that divert flow around gaging stations, or the installation of storm drains and impervious surfaces that may increase runoff rates and increase peak-discharge for a given amount of rainfall. To reduce the problem of using peak-discharge data that represent modified streamflow conditions, the gaging-station records for each station

were screened, and all peaks recorded after the construction of reservoirs that impound more than 10 percent of the total drainage area at a station were removed from the peak-discharge data set. Peak-discharge analysis was performed using only unregulated peaks.

Channel or basin developments that have taken place during the period-of-data collection at other peak-discharge gaging stations can potentially affect the peak-discharge characteristics of the site. A Kendall's Tau trend analysis (Hirsch and others, 1982), which measures monotonic trends within data sets, was used to determine if any statistically significant trends were present in the station peak-discharge records at each station. Records for 14 unregulated stations were found to contain statistically significant trends (5 percent level of significance) (Hirsh and others, 1982). A comparison between the gaging-station records at these stations with the gaging-station records of nearby long-term stations, which do not have significant trends, indicate that at each station the trends can be attributed to the short periods of record. When a subset of concurrent records from the long-term stations was analyzed, the records from the long-term stations, during the same period, also contained a significant trend. Because the trends at the long-term stations are part of the normal variability of annual peak discharges, no adjustments were made to the period of record for these stations.

The IACWD (1982, p. 9) methods for estimating station peak-discharge characteristics fit a Pearson Type III distribution to the logarithms (base-10) of the annual peak-discharge records. The discharge for any selected recurrence interval is determined from this fitted curve. Application of the Pearson Type III distribution requires calculating the mean, variance, and skew of the logarithms of the annual peak-discharge records. These statistics are computed as follows:

$$\bar{\chi} = \frac{1}{N} \sum_{i=1}^{N} \chi_i, \tag{1}$$

$$S^2 = \frac{1}{N-1} \sum_{i=1}^{N} (\chi_i - \bar{\chi})^2, \text{ and} \tag{2}$$

$$G_s = \frac{N}{(N-1)\,(N-2)\,S^3} \sum_{i=1}^{N} (\chi_i - \bar{\chi})^3, \tag{3}$$

where

$\bar{\chi}$ = the mean of the log-transformed annual peak discharges;

χ_i = the log-transformed annual peak discharge for year (i);

N = the number of annual peak discharges recorded at the station (i), (listed in appendix 2);

S^2 = the variance of the log-transformed annual peak discharges;

S = the standard deviation (square root of the variance) of the log-transformed annual peak discharges; and

G_s = the skew coefficient determined at the station.

Studies have shown that the station skew coefficient (G_s) is subject to a large variance because of high and (or) low outlier values (IACWD, 1982). To reduce this variance the station skew coefficient is weighted with a regional skew coefficient obtained from plate 1 in IACWD (1982).

The weighted skew coefficient is computed by weighting the station skew (G_s) and the regional skew (G_r) inversely to their mean square errors (MSE_s, MSE_r) by using the following equation:

$$G_w = \frac{MSE_r\,(G_s) + MSE_s\,(G_r)}{MSE_r + MSE_s}, \tag{4}$$

where

G_w = the weighted skew coefficient;

G_s = the station skew coefficient;

G_r = the regional skew coefficient determined from IACWD (1982);

MSE_r = the mean square error of the regional skew coefficient, determined from IACWD (1982); and

MSE_s = the mean square error of the station skew coefficient, the function of the record length, and the absolute value of the station skew coefficient.

The Pearson Type III analysis assumes that the peak-discharge records collected at a site are statistically similar to peak-discharge events that occurred before and (or) after the period-of-data collection. Additional sources of information are often available that indicate that some peak-discharge events, occurring before, during, or after the period of gaging-station operation, are maximums for an extended period of time.

Historical information about peak-discharges can often be obtained from print media or from interviews with local residents. During peak-discharge events, USGS personnel have often compiled reports about historical peak-discharge events by interviewing local residents. At many gaging stations there is a systematic effort by the USGS to interview residents who have lived in the area long enough to offer details about historical peak-discharge events. This type of eye-witness account is most useful if the local resident can report about peak-discharge events witnessed before the gaging station was established.

The historical information is used to extend the systematic period of record to an extended historical period. In making the historical adjustment, the historic peaks represent the maximum peaks during the historical period, and the remaining peaks are assumed to be representative of the distribution of the unrecorded peaks in the intervening period between the systematic period of record and the extended historical period. Historical adjustments made to the systematic period of record for stations in this study are listed in appendix 2.

At some stations there are peak discharges that are much higher than any other peak in the record, yet there is only a short period of systematic record collection and no historical data that can be used to determine an extended historical period of record for the high-outlier. A study of these high outlier peaks showed that most occurred because of severe storms that affected multiple stations over wide areas across the State. These storms produced the largest peak-discharge records at stations with short periods of record, and at stations with much longer periods of record. For stations with high outlier peaks, comparisons were made between stations to extend a longer historical period of record to short-term stations, based on the longer systematic period of record at nearby stations. Adjustments were made only if a nearby station could be identified that had a longer period of record than the station of interest, if there were concurrent records between the two stations, and if the largest peaks at both stations occurred because of the same storm. The maximum historic period assigned to a high-outlier peak based on this correlation between stations is equal to the systematic period of record at the longer-term station. If no nearby station could be used to extend the historical period of record, the high-outlier peak was retained, and treated as part of the systematic record.

Annual peak discharges that are much lower than average also can have a strong effect on the station peak-discharge estimates. Adjustments to the peak-discharge analysis for stations with low outliers are made using IAWCD (1982) guidelines. These guidelines detail censoring zero flows and peaks below the minimum recordable gage value prior to carrying out any calculation. Tests are then made to identify and censor any peaks that are less than a computed low outlier threshold (IAWCD, 1982, pages 17–19). If any peaks are censored from the record during these tests, the frequency analysis is adjusted by a conditional probability adjustment as described in appendix 5 of Bulletin 17B (IAWCD, 1982).

The station peak-discharge estimates for recurrence intervals of 2, 5, 10, 25, 50, 100, 200, and 500 years listed in appendix 2 are determined by using the equation:

$$\log_{10} Q_{(t)} = \bar{\chi} + K_{(t)} S, \qquad (5)$$

where

$\log_{10} Q_{(t)}$ = the peak discharge estimated for recurrence interval (t), expressed in $\log_{10}$ units;

$K_{(t)}$ = a factor that is a function of the weighted skew for recurrence interval (t) (Interagency Advisory Committee on Water Data, 1982); and

$\bar{\chi}$ and S are determined as shown in equations 1 and 2, or are determined using historical adjustments as defined in IACWD, 1982, pages 17–19.

Computation of station peak-discharge estimates for various recurrence intervals are made by using the USGS computer program that implements the IACWD procedure (Lumb and others, 1990). Details of the computational procedure are found in Section C of "WATSTORE User's Guide, Volume 4" (Lepkin and others, 1981), and in Bulletin 17B (IACWD, 1982).

Accuracy and Limitations of Peak-Discharge Estimates at Gaging Stations

A number of factors contribute to the accuracy of station peak-discharge characteristics listed in appendix 2. Errors in the peak-discharge records can be introduced during field measurement or discharge computation. Because of the quality-assurance procedures used in field-data collection and in reviewing peak-discharge records, these errors are believed to be few and nonsystematic (Hardison, 1969).

Another potential source of error is estimating the peak discharge at a site by using a sample of peak-discharge data that is not representative of the long-term distribution. The station peak-discharge characteristics in

appendix 2 are computed by using only unregulated records as defined in the previous section, "Methods for Estimating Peak Discharge at Gaging Stations," and using only data collected from 1895 through 1991. Caution must be exercised in using the station peak-discharge characteristics in appendix 2 directly, because sites that are currently (1994) unregulated may become regulated in the future. Additionally, some station peak-discharge characteristics are presented in this report for stations that are currently regulated. In these instances, only the peak-discharge records from the period before the regulation began was used in determining the station peak-discharge characteristics listed in appendix 2. Peak-discharge characteristics for these stations are used in the regression analysis, with the period-of-record collection truncated at the beginning of the regulated period.

Continued data collection at a site also may have a significant effect on the discharge estimates. A statistical measure of how well the known peak-discharge gaging-station records define the true long-term peak-discharge distribution is known as the time-sampling error, and this error is assumed to be large compared to other sources of error. The time-sampling error is a function of the number of peak-discharge events recorded at the site, the length of the systematic and (or) historic period of record, the slope and skew of the frequency curve, and the recurrence interval being estimated. The time-sampling error is quantified as the sum of the errors due to the estimation of the mean, standard deviation, and skew for the Pearson Type III analysis (eqs. 1, 2, and 3). The standard error is a measure of the accuracy of the station peak-discharge estimate, and is used in generalized least-squares regression, along with a measure of the correlation of the annual peak discharges among stations, to weight the relative importance of each station in the regional analysis.

Regional Peak-Discharge Analysis

Regional peak-discharge multiple-regression equations can be used to estimate the peak-discharge characteristics at an ungaged site. These equations are developed by regression analysis between the station peak-discharge characteristics and the physiographic characteristics of the drainage basin upstream of each gaging station. The equations also can be used to improve the peak-discharge estimate at a gaged site by reducing the importance of the time-sampling error to the final peak-discharge estimate. A weighted estimate of the regional and station peak-discharge characteristics is considered the best estimate at the gaging station.

Basin Characteristics Data

An earlier peak-discharge study in Virginia (Miller, 1978) determined the basin characteristics at 403 stream-gaging stations in the State, including all but 22 of the stations used in the current study. These basin characteristics include both physiographic and climatologic variables and were used in this study.

Values for the following basin characteristics tested in the regression analysis are listed in appendix 1:

Drainage area (in square miles).—The contributing drainage basin area, determined from either 1:24,000-scale or 1:62,500-scale topographic maps.

Main channel length (in miles).—The total distance from the gaging station to the basin divide, following the channel that drains the largest area, determined from either 1:24,000-scale or 1:62,500-scale topographic maps.

Main channel slope (in feet per mile).—The average slope between points 10 percent and 85 percent of the total channel length from the gaging station to the basin divide.

Mean basin elevation (in feet above sea level).—The average elevation measured from 1:250,000-scale topographic maps, using the transparent grid-sampling method.

Forested area (in percentage of drainage area plus one percent).—The percent of the total basin shown as forested area, measured from 1:250,000-scale topographic maps, using the transparent grid-sampling method.

Mean annual precipitation (in inches).—The mean annual precipitation determined from the "Climatic Data, Annual Summary," (U.S. Weather Bureau, 1968) for Virginia.

2-year, 24-hour rainfall intensity (in inches).—The annual maximum rainfall during a 24-hour period expected to be exceeded on the average once every 2 years, determined from U.S. Weather Bureau (1958).

For the 22 basins not included in Miller (1978), the drainage area, the main channel length, and the main channel slope were determined for the present study by using 1:24,000-scale topographic maps.

Delineation of Peak-Discharge Regions

Initially, peak-discharge characteristics for each peak-discharge gaging station in the entire State were regressed with basin characteristics data by using step-forward and step-backward ordinary least-squares regression analysis. Drainage area, main channel slope, main channel length, and average basin elevation were significant at the 5 percent level in the Statewide regression. Plots of the residuals from this regression showed significant geographic grouping. In particular, the Statewide equation overestimated the peak discharge in the eastern part of the State and underestimated the peak-discharge in the northern part of the State.

Different subgroupings of stations were defined and regressed independently, to improve the fit of the regression equations to the observed data, and to improve the predictive ability of the equations. Stations were split into groups based on hydrologic units, drainage basin size, and physiographic province.

Grouping stations by physiographic province significantly improved the predictive ability of equations generated by using ordinary least-squares regression. The physiographic provinces in Virginia were defined by Fenneman (1938) and include the Coastal Plain, the Piedmont, the Blue Ridge, the Valley and Ridge, and the Appalachian Plateaus. Plots of residuals for these groups showed some geographic trends and led to further testing for significant subgroups within each physiographic province. The final regionalization of the stations used in the remainder of this report is modified from the five physiographic provinces, with the Valley and Ridge split into a northern, central and southern section (split at major basin divides) and the Piedmont split into a northern and southern region (also split at a major basin divide). These peak-discharge regions are defined here to distinguish them from the physiographic provinces. The peak-discharge regions are shown in figure 1. The regions include the Coastal Plain (C), the Northern Piedmont (NP), the Southern Piedmont (SP), the Blue Ridge (B), the Northern (NV), Central (CV), and Southern Valley and Ridge (SV), and the Appalachian Plateaus (AP). The letter designation following the name of each peak-discharge region is used in the appendixes, and on plate 1 as the suffix for each site label.

Stations were assigned to a particular peak-discharge region by overlaying a map of station drainage basins onto a map of the peak-discharge regions shown on figure 1. Because the area of many drainage basins extend across several peak-discharge regions, regression tests were made to determine what percentage of each drainage basin could lie outside of a single region before the regression residuals for that region noticeably increased. Although there was no clear break point, a cutoff of 25 percent was chosen to allow the largest number of basins to be used in the regression, whereas not significantly affecting the regression analysis. Stations located in basins with less than 75 percent of their total area in a single peak-discharge region were not used in regional analysis. These stations are designated as being in a Mixed region (M) on plate 1 and in appendixes 1 and 2.

Peak-discharge data from 284 stations were used in the regional regression analysis. The number of stations in each peak-discharge region vary from 17 stations in the Appalachian Plateaus region to 67 stations in the Southern Piedmont region. Because of the small number of stations in the Appalachian Plateaus region, peak-discharge characteristics from eight stations in the Appalachian Plateaus region of Kentucky were included in the regressions. Published station peak-discharge characteristics for these eight stations were taken directly from Choquette (1988), who used data through 1985.

Dividing the State into peak-discharge regions based on physiographic province reduced the statistical significance of many of the basin characteristics in the regression analysis relative to the Statewide regression and the other regression groupings tested. A statistical summary of the basin characteristics tested in the regional regression analysis is presented in table 1. The variability of the basin characteristics within each peak-discharge region is generally less than the variability of the characteristics between regions. For example, the difference in average basin elevation for stations within each peak-discharge region is much smaller than the difference in average basin elevation between regions. This grouping of basins reduced the statistical significance of many of the characteristics, and minimized the number of parameters used in the final regression equations.

Generalized Least-Squares Regional Regression Analysis

After peak-discharge regions were delineated, regression analysis of the grouped data was made by using the generalized least-squares method (GLS) (Stedinger and Tasker, 1985; Tasker and Stedinger, 1989). This GLS method uses the latitude and longitude of each station to determine the distance between stations. Distance between gaging stations is used to smooth the correlation of peak discharges between the stations. The highly

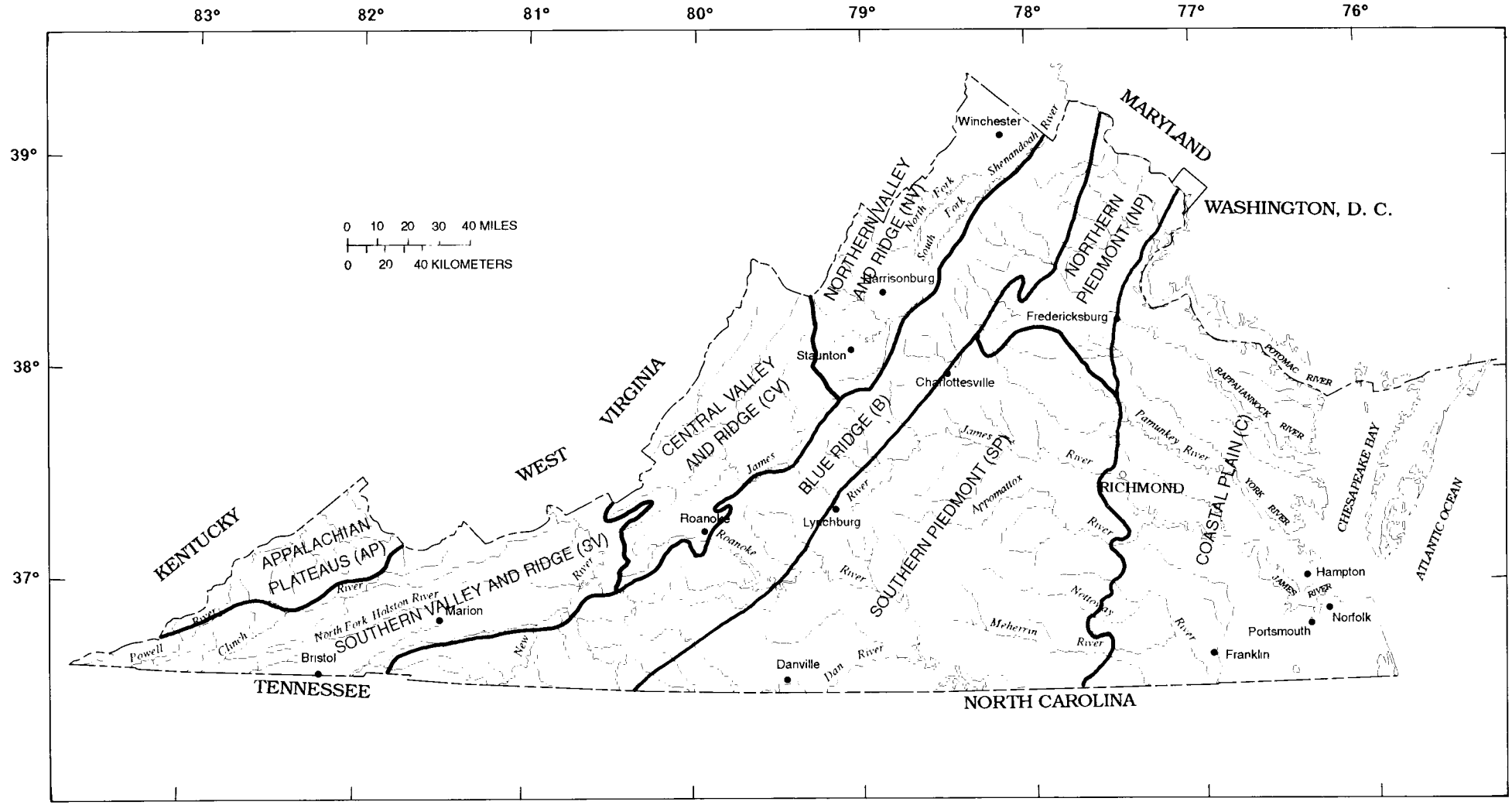

Figure 1. Peak-discharge regions in Virginia.

Table 1. Statistical summary of basin characteristics tested in regional regressions for streams in Virginia

[Location of peak-discharge regions are shown in figure 1. Average elevation is in feet above sea level; mi^2, square miles; ft/mi, feet per mile; in., inch]

Basin characteristic	Mean	Median	Minimum	Maximum
Coastal Plain (C)—29 Sites				
Drainage area (mi^2)	66.4	6.6	0.7	617
Main channel slope (ft/mi)	20.6	14.0	1.6	83
Main channel length (mi)	11.5	4.2	1.2	65
Average basin elevation (ft)	115	110	20	260
Percent forest plus one (percent)	70	72	1	95
Average annual precipitation (in.)	45.1	44.4	41.2	50.9
Two year, 24-hour rainfall (in.)	3.4	3.5	3.1	3.9
Northern Piedmont (NP)—19 Sites				
Drainage area (mi^2)	61.2	7.6	0.1	570
Main channel slope (ft/mi)	67.1	38.0	6.3	400
Main channel length (mi)	9.8	4.5	0.3	54
Average basin elevation (ft)	370	360	310	465
Percent forest plus one (percent)	66	65	40	97
Average annual precipitation (in.)	40.4	39.7	38.9	46.0
Two year, 24-hour rainfall (in.)	3.4	3.3	3.0	3.7
Southern Piedmont (SP)—67 Sites				
Drainage area (mi^2)	279.5	46.0	0.3	2,730
Main channel slope (ft/mi)	35.6	17.4	2.6	173
Main channel length (mi)	30.3	10.3	0.7	184
Average basin elevation (ft)	522	485	80	1,100
Percent forest plus one (percent)	71	73	17	99
Average annual precipitation (in.)	43.3	43.0	39.5	48.3
Two year, 24-hour rainfall (in.)	3.4	3.4	3.0	4.0
Blue Ridge (B)—54 Sites				
Drainage area (mi^2)	158.4	78.8	0.6	1,340
Main channel slope (ft/mi)	120.9	56.8	7.8	880
Main channel length (mi)	22.7	17.0	1.0	131
Average basin elevation (ft)	1,585	1,410	560	3,280
Percent forest plus one (percent)	59	57	17	100
Average annual precipitation (in.)	44.0	43.8	36.6	51.2
Two year, 24-hour rainfall (in.)	3.7	3.6	2.6	4.7
Northern Valley and Ridge (NV)—29 Sites				
Drainage area (mi^2)	247.2	70.1	0.3	1,642
Main channel slope (ft/mi)	139.5	37.9	7.7	973
Main channel length (mi)	28.2	19.4	1.0	145
Average basin elevation (ft)	1,638	1,550	760	3,330
Percent forest plus one (percent)	57	53	2	100
Average annual precipitation (in.)	37.9	38.0	34.0	42.1
Two year, 24-hour rainfall (in.)	3.0	3.0	2.5	3.6

Table 1. Statistical summary of basin characteristics tested in regional regressions for streams in Virginia—Continued
[Location of peak-discharge regions are shown in figure 1. Average elevation is in feet above sea level; mi^2, square miles; ft/mi, feet per mile; in., inch]

Basin characteristic	Mean	Median	Minimum	Maximum
Central Valley and Ridge (CV)—34 Sites				
Drainage area (mi^2)	358.3	111.0	0.7	3,259
Main channel slope (ft/mi)	91.6	28.6	9.3	592
Main channel length (mi)	36.7	31.4	1.7	169
Average basin elevation (ft)	2,077	2,150	1,280	2,890
Percent forest plus one (percent)	77	81	21	99
Average annual precipitation (in.)	40.6	40.5	37.8	43.1
Two year, 24-hour rainfall (in.)	3.0	2.9	2.5	3.5
Southern Valley and Ridge (SV)—35 Sites				
Drainage area (mi^2)	124.3	41.4	1.2	672
Main channel slope (ft/mi)	58.9	39.6	9.7	324
Main channel length (mi)	27.9	14.7	2.2	124
Average basin elevation (ft)	2,379	2,435	1,500	2,810
Percent forest plus one (percent)	52	62	5	96
Average annual precipitation (in.)	43.0	43.5	37.4	48.7
Two year, 24-hour rainfall (in.)	2.6	2.5	2.4	2.8
Appalachian Plateaus (AP)—17 Sites				
Drainage area (mi^2)	160.0	82.3	0.7	554
Main channel slope (ft/mi)	106.0	36.6	10.2	510
Main channel length (mi)	21.8	23.4	1.3	53
Average basin elevation (ft)	2,085	2,000	1,450	2,500
Percent forest plus one (percent)	85	90	1	97
Average annual precipitation (in.)	44.8	44.0	40.5	50.3
Two year, 24-hour rainfall (in.)	2.8	2.8	2.6	2.9

correlated stations, which are often nearby stations, are given less weight in the regional regression analysis. The weighting function used in the GLS method also includes the time-sampling error of the station peak-discharge characteristics. This time sampling error is a function of the length of record, the variability of the annual peak discharges, the skew coefficient, and the recurrence interval of peak-discharge characteristics. Those stations with higher time-sampling error are given less weight in the regional regression analysis

Multiple-parameter regression equations

GLS regressions were tested iteratively. Regressions were initially tested using all seven (variables) basin characteristics. Regression diagnostics were checked, and basin characteristics that were not significant at the 5-percent level were removed, and the regressions recomputed. This process was continued until all of the remaining basin characteristics were significant at the 5-percent level. To determine if the interaction between basin characteristics affected the results, regressions also were tested using sets of only two or three basin characteristics.

Final multiple-parameter regression equations for each of the eight peak-discharge regions are presented in table 2. The drainage area was determined to be the most significant explanatory variable in each peak-discharge region. The drainage area was the only variable significant at the 5-percent level in the Northern Piedmont region, the Blue Ridge region, and both the Central and Southern Valley and Ridge regions. The drainage area and the main channel slope were significant in the Coastal Plain and the Appalachian Plateaus regions. The drainage area, the average basin elevation, and the main channel length were significant in the Southern Piedmont region. In the Northern Valley and Ridge region, the drainage area, the main channel length, and the percentage of forest cover were significant.

The mean annual precipitation and the 2-year 24-hour maximum rainfall were not found to be statistically significant in predicting peak discharge in any region. The general lack of meteorologic effect can be attributed to the fact that within each peak-discharge region there is little climatic zonation with respect to the large storms that are typically responsible for annual peak discharges (Nuckels and others, 1991).

Drainage-area-only regression equations

Because drainage area proved to be the most significant explanatory variable in predicting peak discharge, an alternative to the multiple-parameter GLS regression equations is presented in table 3, using only drainage area. For the four regions with multiple-significant parameters in the regression analysis, these equations are intended to provide estimates of peak discharge that are easier to compute than the full equations. Statistical comparison of these drainage-area-only equations with the multiple-parameter equations indicates that although these equations have higher standard errors than the full equations, and lower equivalent years of record, these equations are not biased compared with the multiple-parameter regression equations. Equations for the four regions with only drainage area in table 2 are repeated in table 3.

Accuracy and Limitations of the Equations

Two estimates of the statistical accuracy of the regression equations are presented in tables 2 and 3. The two estimates are the average standard error of prediction and the average equivalent years of record. The average standard error of prediction is an estimate of how closely the regression equations predict the peak discharge at ungaged sites. The average standard error of prediction is computed as the square root of the sum of the average model error and the average sampling error at each ungaged site (Tasker and Stedinger, 1989). The standard error of prediction is expressed as a percentage. The estimate of peak discharge computed at an ungaged site using the regression equation in tables 2 and 3, will be within the one standard error of prediction about two-thirds of the time.

The equivalent years of record is a measure of how many years of peak-discharge data are needed at a site to have an equivalent statistical accuracy as a peak-discharge characteristics based on the regression estimate (Hardison, 1969, 1971). The equivalent years of record is used to weight the regional regression estimate and the station peak-discharge estimate at peak-discharge gaging stations, and at ungaged sites located near gaging stations.

The use of the equations in this report is limited to estimating peak discharges at sites where basin characteristics are within the range of the basin characteristics of the stations used to develop the regression equations, as listed in table 1. The accuracy and error associated with using these equations for sites outside of these ranges are unknown; therefore, application of the equations to such sites is discouraged.

The regression equations are based primarily on peak-discharge data of rural, unregulated streams in Virginia. The equations are not applicable to urbanized or channelized streams, or to streams where more than 10 percent of the drainage area is impounded. Anderson (1968) presents equations for predicting peak-discharge characteristics for urban streams in Virginia. Sauer and others (1983) provide procedures for estimating urban flood characteristics for watersheds throughout the entire country and include data from Anderson (1968). Because little additional urban stream data has been collected since Anderson's report, equations applicable to urban streams have not been updated and are not presented in this report.

These equations must be used with caution at sites where larger streams just downstream can impact the stage-discharge relation; for example, in areas where large streams downstream may create backwater into the site of interest. These equations also must not be used at sites affected by tides.

The basin characteristics used in computing the discharge from the regression equations are subject to measurement error when determined from maps or other sources of data. A sensitivity analysis for the multiple-parameter, 100-year discharge equation is presented in table 4 (results for the 100-year equation are similar to those for the remaining equations). The analysis indicates the sensitivity of the peak-discharge equations to possible errors in determining each basin characteristic. Table 4 lists the percentage of change in the computed discharge as the value of each variable is increased or decreased by 10, 20, and 30 percent, while the value of the other variables are held constant.

Methods for Regionally Weighting Peak-Discharge Estimates at Gaging Stations

The regional peak-discharge equations in tables 2 and 3 can be used to improve the peak-discharge estimates at gaging stations by using a regional weighting procedure.

Table 2. Multiple-parameter regional regression equations for estimating peak discharges of streams in Virginia

[*A*, drainage area, in square miles; *SI*, main channel slope, in feet per mile; *L*, main channel length, in miles; *El*, average basin elevation, in feet above sea level; *F*, forest, in percent. Peak-discharge regions are shown in figure 1 and plate 1]

Regression equation	Standard error of prediction (percent)	Equivalent years of record
Coastal Plain (C)—29 Sites		
$Q_{(2)} = 2.4\ (A)^{1.005}\ (SI)^{0.852}$	57.1	1.4
$Q_{(5)} = 4.0\ (A)^{0.999}\ (SI)^{0.884}$	59.7	2.5
$Q_{(10)} = 4.9\ (A)^{1.005}\ (SI)^{0.932}$	59.4	3.8
$Q_{(25)} = 6.0\ (A)^{1.016}\ (SI)^{0.998}$	61.0	5.6
$Q_{(50)} = 6.8\ (A)^{1.024}\ (SI)^{1.044}$	64.1	6.7
$Q_{(100)} = 7.6\ (A)^{1.033}\ (SI)^{1.088}$	68.5	7.5
$Q_{(200)} = 8.3\ (A)^{1.042}\ (SI)^{1.130}$	73.9	8.0
$Q_{(500)} = 9.2\ (A)^{1.055}\ (SI)^{1.185}$	82.7	8.5
Northern Piedmont (NP)—19 Sites		
$Q_{(2)} = 179\ (A)^{0.655}$	51.1	1.6
$Q_{(5)} = 317\ (A)^{0.644}$	49.3	3.3
$Q_{(10)} = 438\ (A)^{0.641}$	50.2	4.9
$Q_{(25)} = 626\ (A)^{0.640}$	53.8	6.7
$Q_{(50)} = 793\ (A)^{0.640}$	58.0	7.7
$Q_{(100)} = 984\ (A)^{0.641}$	63.5	8.2
$Q_{(200)} = 1{,}200\ (A)^{0.643}$	70.1	8.5
$Q_{(500)} = 1{,}535\ (A)^{0.646}$	80.4	8.6
Southern Piedmont (SP)—67 Sites		
$Q_{(2)} = 21.6\ (A)^{0.881}\ (E)^{0.310}\ (L)^{-0.423}$	40.2	2.8
$Q_{(5)} = 31.9\ (A)^{0.854}\ (E)^{0.351}\ (L)^{-0.417}$	35.7	6.2
$Q_{(10)} = 38.8\ (A)^{0.848}\ (E)^{0.379}\ (L)^{-0.430}$	35.5	9.3
$Q_{(25)} = 54.8\ (A)^{0.852}\ (E)^{0.392}\ (L)^{-0.463}$	38.0	12.3
$Q_{(50)} = 74.3\ (A)^{0.860}\ (E)^{0.390}\ (L)^{-0.495}$	41.4	13.6
$Q_{(100)} = 101\ (A)^{0.869}\ (E)^{0.382}\ (L)^{-0.529}$	45.7	14.2
$Q_{(200)} = 136\ (A)^{0.879}\ (E)^{0.373}\ (L)^{-0.561}$	50.6	14.4
$Q_{(500)} = 197\ (A)^{0.893}\ (E)^{0.361}\ (L)^{-0.602}$	58.0	14.2
Blue Ridge (B)—54 Sites		
$Q_{(2)} = 95.4\ (A)^{0.760}$	33.4	4.0
$Q_{(5)} = 201\ (A)^{0.726}$	34.1	6.5
$Q_{(10)} = 298\ (A)^{0.710}$	35.5	8.8
$Q_{(25)} = 450\ (A)^{0.695}$	38.8	11.0
$Q_{(50)} = 584\ (A)^{0.687}$	42.2	12.0
$Q_{(100)} = 735\ (A)^{0.680}$	46.2	12.5
$Q_{(200)} = 907\ (A)^{0.674}$	50.7	12.6
$Q_{(500)} = 1{,}165\ (A)^{0.667}$	56.7	12.8
Northern Valley and Ridge (NV)—29 Sites		
$Q_{(2)} = 73.0\ (A)^{0.955}\ (L)^{-0.307}\ (F)^{0.041}$	37.8	3.6
$Q_{(5)} = 119\ (A)^{0.953}\ (L)^{-0.290}\ (F)^{0.063}$	33.5	7.4
$Q_{(10)} = 153\ (A)^{0.944}\ (L)^{-0.273}\ (F)^{0.081}$	31.4	12.2
$Q_{(25)} = 196\ (A)^{0.931}\ (L)^{-0.251}\ (F)^{0.107}$	30.9	18.5
$Q_{(50)} = 228\ (A)^{0.926}\ (L)^{-0.241}\ (F)^{0.124}$	31.9	22.2
$Q_{(100)} = 263\ (A)^{0.925}\ (L)^{-0.237}\ (F)^{0.138}$	33.8	24.4
$Q_{(200)} = 300\ (A)^{0.928}\ (L)^{-0.239}\ (F)^{0.149}$	36.3	25.3
$Q_{(500)} = 356\ (A)^{0.936}\ (L)^{-0.247}\ (F)^{0.161}$	40.8	25.1
Central Valley and Ridge (CV)—34 Sites		
$Q_{(2)} = 89.2\ (A)^{0.788}$	31.0	4.8
$Q_{(5)} = 222\ (A)^{0.712}$	29.3	8.7
$Q_{(10)} = 372\ (A)^{0.668}$	28.6	12.9
$Q_{(25)} = 647\ (A)^{0.620}$	29.5	17.5
$Q_{(50)} = 918\ (A)^{0.591}$	31.4	19.4
$Q_{(100)} = 1{,}254\ (A)^{0.565}$	34.1	20.2
$Q_{(200)} = 1{,}665\ (A)^{0.542}$	37.4	20.2
$Q_{(500)} = 2{,}354\ (A)^{0.514}$	42.6	19.5
Southern Valley and Ridge (SV)—35 Sites		
$Q_{(2)} = 45.7\ (A)^{0.880}$	45.0	1.7
$Q_{(5)} = 89.5\ (A)^{0.825}$	43.4	2.6
$Q_{(10)} = 127\ (A)^{0.800}$	44.2	3.3
$Q_{(25)} = 181\ (A)^{0.774}$	46.6	4.2
$Q_{(50)} = 228\ (A)^{0.759}$	49.1	4.7
$Q_{(100)} = 281\ (A)^{0.745}$	52.0	5.2
$Q_{(200)} = 339\ (A)^{0.733}$	55.3	5.5
$Q_{(500)} = 425\ (A)^{0.718}$	60.2	5.7
Appalachian Plateaus (AP)—17 Sites		
$Q_{(2)} = 262\ (A)^{0.749}\ (SI)^{-0.175}$	33.6	3.5
$Q_{(5)} = 134\ (A)^{0.844}\ (SI)^{0.032}$	21.3	12.2
$Q_{(10)} = 103\ (A)^{0.880}\ (SI)^{0.136}$	18.1	23.5
$Q_{(25)} = 90.4\ (A)^{0.902}\ (SI)^{0.227}$	19.3	31.5
$Q_{(50)} = 87.0\ (A)^{0.910}\ (SI)^{0.280}$	21.9	33.0
$Q_{(100)} = 85.7\ (A)^{0.916}\ (SI)^{0.324}$	24.7	33.4
$Q_{(200)} = 85.0\ (A)^{0.920}\ (SI)^{0.365}$	27.9	33.5
$Q_{(500)} = 85.5\ (A)^{0.923}\ (SI)^{0.411}$	31.9	33.5

Table 3. Drainage-area-only regional regression equations for estimating peak discharges of streams in Virginia

[A, drainage area, in square miles. Peak-discharge regions are shown in figure 1 and plate 1]

Regression equation	Standard error of prediction (percent)	Equivalent years of record
Coastal Plain (C)—29 Sites		
$Q_{(2)} = 57\ (A)^{0.589}$	55.8	1.4
$Q_{(5)} = 106\ (A)^{0.569}$	58.3	2.5
$Q_{(10)} = 153\ (A)^{0.555}$	62.1	3.5
$Q_{(25)} = 230\ (A)^{0.539}$	68.6	4.5
$Q_{(50)} = 302\ (A)^{0.528}$	74.1	5.2
$Q_{(100)} = 388\ (A)^{0.518}$	80.2	5.7
$Q_{(200)} = 489\ (A)^{0.509}$	86.7	6.2
$Q_{(500)} = 652\ (A)^{0.497}$	96.1	6.7
Northern Piedmont (NP)—19 Sites		
$Q_{(2)} = 179\ (A)^{0.655}$	51.1	1.6
$Q_{(5)} = 317\ (A)^{0.644}$	49.3	3.3
$Q_{(10)} = 438\ (A)^{0.641}$	50.2	4.9
$Q_{(25)} = 626\ (A)^{0.640}$	53.8	6.7
$Q_{(50)} = 793\ (A)^{0.640}$	58.0	7.7
$Q_{(100)} = 983\ (A)^{0.641}$	63.5	8.2
$Q_{(200)} = 1{,}200\ (A)^{0.643}$	70.1	8.5
$Q_{(500)} = 1{,}535\ (A)^{0.646}$	80.4	8.6
Southern Piedmont (SP)—67 Sites		
$Q_{(2)} = 122\ (A)^{0.635}$	40.2	2.8
$Q_{(5)} = 233\ (A)^{0.610}$	38.7	5.4
$Q_{(10)} = 335\ (A)^{0.596}$	38.5	8.0
$Q_{(25)} = 504\ (A)^{0.581}$	40.8	10.9
$Q_{(50)} = 661\ (A)^{0.570}$	43.8	12.3
$Q_{(100)} = 849\ (A)^{0.559}$	47.7	13.2
$Q_{(200)} = 1{,}070\ (A)^{0.549}$	52.2	13.7
$Q_{(500)} = 1{,}418\ (A)^{0.538}$	59.0	13.9
Blue Ridge (B)—54 Sites		
$Q_{(2)} = 95\ (A)^{0.760}$	33.4	4.0
$Q_{(5)} = 201\ (A)^{0.726}$	34.1	6.5
$Q_{(10)} = 298\ (A)^{0.710}$	35.5	8.8
$Q_{(25)} = 450\ (A)^{0.695}$	38.8	11.0
$Q_{(50)} = 584\ (A)^{0.687}$	42.2	12.0
$Q_{(100)} = 735\ (A)^{0.680}$	46.2	12.5
$Q_{(200)} = 907\ (A)^{0.674}$	50.7	12.6
$Q_{(500)} = 1{,}165\ (A)^{0.667}$	56.7	12.8
Northern Valley and Ridge (NV)—29 Sites		
$Q_{(2)} = 72\ (A)^{0.785}$	39.2	3.4
$Q_{(5)} = 128\ (A)^{0.794}$	35.0	6.9
$Q_{(10)} = 178\ (A)^{0.796}$	32.7	11.4
$Q_{(25)} = 254\ (A)^{0.797}$	32.1	17.6
$Q_{(50)} = 317\ (A)^{0.798}$	33.2	21.1
$Q_{(100)} = 386\ (A)^{0.800}$	35.3	23.1
$Q_{(200)} = 461\ (A)^{0.802}$	38.2	23.7
$Q_{(500)} = 569\ (A)^{0.805}$	43.2	23.2
Central Valley and Ridge (CV)—34 Sites		
$Q_{(2)} = 89\ (A)^{0.788}$	31.0	4.8
$Q_{(5)} = 222\ (A)^{0.712}$	29.3	8.7
$Q_{(10)} = 372\ (A)^{0.668}$	28.6	12.9
$Q_{(25)} = 647\ (A)^{0.620}$	29.5	17.5
$Q_{(50)} = 918\ (A)^{0.591}$	31.4	19.4
$Q_{(100)} = 1{,}254\ (A)^{0.565}$	34.1	20.2
$Q_{(200)} = 1{,}665\ (A)^{0.542}$	37.4	20.2
$Q_{(500)} = 2{,}354\ (A)^{0.514}$	42.6	19.5
Southern Valley and Ridge (SV)—35 Sites		
$Q_{(2)} = 46\ (A)^{0.880}$	45.0	1.7
$Q_{(5)} = 90\ (A)^{0.825}$	43.4	2.6
$Q_{(10)} = 127\ (A)^{0.800}$	44.2	3.3
$Q_{(25)} = 181\ (A)^{0.774}$	46.6	4.2
$Q_{(50)} = 228\ (A)^{0.759}$	49.1	4.7
$Q_{(100)} = 281\ (A)^{0.745}$	52.0	5.2
$Q_{(200)} = 339\ (A)^{0.733}$	55.3	5.5
$Q_{(500)} = 425\ (A)^{0.718}$	60.2	5.7
Appalachian Plateaus (AP)—17 Sites		
$Q_{(2)} = 93\ (A)^{0.840}$	32.7	3.7
$Q_{(5)} = 162\ (A)^{0.828}$	19.9	14.0
$Q_{(10)} = 230\ (A)^{0.809}$	17.8	24.3
$Q_{(25)} = 341\ (A)^{0.784}$	20.7	27.5
$Q_{(50)} = 441\ (A)^{0.767}$	24.0	26.5
$Q_{(100)} = 557\ (A)^{0.751}$	27.8	25.2
$Q_{(200)} = 691\ (A)^{0.736}$	31.4	24.2
$Q_{(500)} = 902\ (A)^{0.717}$	36.3	23.1

Table 4. Sensitivity analysis of multiple-parameter regional peak-discharge regression equations showing percent change in computed 100-year peak discharge within each of the peak-discharge regions of Virginia

[Percentage of change in basin characteristic from median values in table 1 for each peak-discharge region. Peak-discharge regions are shown in figure 1 and plate 1]

		Percentage of change in basin characteristic						
Peak-discharge region	**Basin characteristic**	**-30**	**-20**	**-10**	**-0**	**+10**	**+20**	**+30**
Coastal Plain	Drainage area	-31	-21	-10	0	10	21	31
	Channel slope	-32	-22	-11	0	11	22	33
Northern Piedmont	Drainage area	-20	-13	-7	0	6	12	18
Southern Piedmont	Drainage area	-27	-18	-9	0	9	17	26
	Basin elevation	-36	-24	-12	0	13	26	39
	Channel length	21	13	6	0	-5	-9	-13
Blue Ridge	Drainage area	-22	-14	-7	0	7	13	20
Northern Valley and Ridge	Drainage area	-28	-19	-9	-0	9	18	27
	Channel length	9	5	3	0	-2	-4	-6
	Percent forest	-5	-3	-1	0	1	3	4
Central Valley and Ridge	Drainage area	-18	-12	-6	0	6	11	16
Southern Valley and Ridge	Drainage area	-23	-15	-8	0	7	15	22
Appalachian Plateaus	Drainage area	-28	-19	-10	-1	8	17	26
	Channel slope	-11	-7	-3	0	3	6	9

This procedure reduces the time-sampling error, and may improve the final discharge estimate at the gaging station because stations with short periods of record may contain an unrepresentative period of high and (or) low peaks. The station discharge is weighted with the regional discharge as:

$$Q_{(t)w} = \frac{Q_{(t)s}(N) + Q_{(t)r}(E)}{N+E}, \quad (6)$$

where

$Q_{(t)w}$ = the weighted discharge in ft^3/s for recurrence interval, (t);

$Q_{(t)s}$ = the station peak discharge in ft^3/s for recurrence interval, (t);

$Q_{(t)r}$ = the peak discharge in ft^3/s determined from the regression equation for recurrence interval, (t);

N = the number of years of peak-discharge records for the site; and

E = the equivalent years of record for the regional regression equation, listed in table 2;

The weighted discharges for all stations used in preparing the regression equations are given in appendix 2. Equation 6 also may be used to update estimates at gaging stations where additional data may be collected, and the station peak-discharge statistics recomputed.

METHODS FOR ESTIMATING PEAK DISCHARGES AT UNGAGED SITES

The appropriate method to calculate the peak-discharge estimates at an ungaged site depends on whether (1) the drainage basin lies within a single peak-discharge region, (2) the drainage area crosses peak-discharge region boundaries, or (3) the ungaged site is located on a gaged stream.

1. The peak-discharge estimates at sites on ungaged streams that lie entirely in a single peak-discharge region can be calculated by use of the multiple-parameter regression equations presented in table 2, or the drainage-area-only equations in table 3, for the appropriate region.

2. The peak-discharge estimates at sites with drainage areas that cross peak-discharge region boundaries are made by first determining the percentage of the basin in each region. Peak-discharge estimates are then computed for the entire basin area by using the appropriate equation for each region. The peak-discharge for the entire basin is computed by multiplying the peak discharge for each part of the basin by the percentage of the entire basin in that region, and summing the contributions from each region.

3. The peak-discharge estimates at an ungaged site located on a gaged stream, where the drainage area of the ungaged site is between 50 and 150 percent of the drainage area at the gaged site, can be adjusted using the following technique (Hannum, 1976; Glatfelter, 1984):

   (a) Estimate the peak discharge at the ungaged site using one of the methods previously described.

   (b) Compute a correction factor for the gaged site as follows:

$$C_g = \frac{Q_{(t)w(gaged)}}{Q_{(t)r(gaged)}}, \quad (7)$$

where

C_g = the correction factor for the gaged site;

$Q_{(t)w(gaged)}$ = the weighted peak-discharge estimate at the gaged site for recurrence interval, (t), from appendix 2; and

$Q_{(t)r(gaged)}$ = the regional regression peak-discharge estimate at the gaged site for recurrence interval, (t), from appendix 2.

   (c) Compute a correction factor for the ungaged site:

$$C_u = C_g - \left(\frac{2|A_g - A_u|}{A_g}\right)(C_g - 1), \quad (8)$$

where

C_u = the correction factor for the ungaged site;

C_g = the correction factor for the gaged site from equation 7;

A_g = the drainage area at the gaged site;

A_u = the drainage area at the ungaged site; and

$|A_g - A_u|$ = the absolute value of the difference between the drainage area of the gaged and the ungaged sites.

   (d) Estimate the adjusted peak discharge at the ungaged site as follows:

$$Q_{(t)a(ungaged)} = C_u Q_{(t)r(ungaged)}, \quad (9)$$

where

$Q_{(t)a(ungaged)}$ = adjusted peak-discharge estimate for the ungaged site for recurrence interval, (t);

C_u = correction factor ratio for the ungaged site, from equation 8; and

$Q_{(t)r(ungaged)}$ = regression peak-discharge estimate for the ungaged site for recurrence interval, (t).

As the difference in the drainage area between the gaged and the ungaged sites approaches either 50 or 150 percent of the drainage area of the gaged site, the correction factor for the ungaged site (C_u) approaches 1, and the adjusted value approaches the regression estimate for the ungaged site.

SAMPLE COMPUTATIONS

Example 1.—Estimate the 50-year peak discharge ($Q_{(50)}$) on Taylors Creek near Montpelier, Va., at an ungaged site that lies entirely within the Southern Piedmont region.

Given: (a) Drainage area (A) is 36.9 mi^2, measured from 1:24,000-scale topographic maps.

(b) Main channel length (L) is 16.1 mi, measured from 1:24,000-scale topographic maps.

(c) Average basin elevation (E) is 1,100 ft, measured by averaging the elevation of 50 points scattered evenly across the basin, measured from 1:24,000-scale topographic maps.

Solution: The regression estimate for the site is computed by the appropriate equation in table 2 for the 50-year discharge:

$$Q_{(50)} = 74.3(A)^{0.860}(E)^{0.390}(L)^{-0.495},$$

Substituting the given basin characteristics:

$$Q_{(50)s} = 74.3(36.9)^{0.860}(1{,}100)^{0.390}(16.1)^{-0.495}, \text{ and}$$

$$Q_{(50)r} = 6{,}392 \text{ ft}^3/\text{s}.$$

Example 2.—Estimate the 100-year peak discharge at an ungaged site on the Smith River, which receives drainage from both the Blue Ridge and Southern Piedmont peak-discharge regions.

Given: (a) The drainage area at the site is 216 mi^2.

(b) The average basin elevation is 1,400 ft.

(c) The main channel length is 38.8 mi.

(d) 76 percent of the basin is located in the Southern Piedmont region, and the remaining 24 percent is in the Blue Ridge region (from fig. 1 and pl. 1).

Solution: Calculate the 100-year peak discharge for the basin by using each regional equation:

For Blue Ridge—

$$Q_{(100)r} \text{ Region B} = 735(A)^{0.680},$$

$$Q_{(100)r} \text{ Region B} = 735(216)^{0.680}, \text{ and}$$

$$Q_{(100)r} \text{ Region B} = 28{,}430 \text{ ft}^3/\text{s}.$$

For Southern Piedmont—

$$Q_{(100)r} \text{ Region SP} = 101(A)^{0.869}(E)^{0.382}(L)^{-0.529},$$

$$Q_{(100)r} \text{ Region SP} = 101(216)^{0.869}(1400)^{0.382}(38.8)^{-0.529},$$

and

$$Q_{(100)r} \text{ Region SP} = 24{,}790 \text{ ft}^3/\text{s}.$$

Use the percent drainage area in each region as the weighing factor to compute the final estimate for the basin:

$$Q_{(100)r} = (Q_{(100)r} \text{ Region B})(\text{percent in B}) + (Q_{(100)r} \text{ Region SP})(\text{percent in SP}),$$

$$Q_{(100)r} = (28{,}430)(.24) + (24{,}790)(.76), \text{ and}$$

$$Q_{(100)r} = 25{,}660 \text{ ft}^3/\text{s}.$$

Example 3.—Estimate the 50-year peak discharge at an ungaged site on the Blackwater River, 4-mi upstream from the gaged site Blackwater River near Dendron, Va. (USGS 02047500).

Given: (a) The drainage area of the ungaged site is 234 mi^2,

(b) The main channel slope at the ungaged site is 2.7 ft/mi, and

(c) The drainage area of the gaging station is 294 mi^2.

Solution: The drainage area at the site of interest is 78 percent of the drainage area at the gaged site. Using equation 7, the correction factor ratio (C_g) for the gaged station is:

$$C_g = \frac{Q_{(50)w}}{Q_{(50)r}},$$

$$C_g = \frac{7{,}400}{5{,}310} \text{ (from appendix 2), and}$$

$$C_g = 1.39.$$

The correction factor ratio (C_u) for the ungaged site is determined by using equation 8 as:

$$C_u = C_g - \left(\frac{2|A_g - A_u|}{A_g}\right)(C_g - 1),$$

$$C_u = 1.39 - \left(\frac{2|294 - 234|}{294}\right)(1.39 - 1), \text{ and}$$

$$C_u = 1.23.$$

Using the basin characteristics, the 50-year peak-discharge regional regression estimate for the ungaged site in the Coastal Plain peak-discharge region is:

$$Q_{(50)r} = 6.8(A)^{1.024}(SI)^{1.044},$$

$$Q_{(50)r} = 6.8(234)^{1.024}(2.7)^{1.044}, \text{ and}$$

$$Q_{(50)r} = 5{,}266 \text{ ft}^3/\text{s}.$$

And the adjusted discharge is estimated by multiplying the correction factor (C_u) and the regional estimate as:

$$Q_{(50)w} = C_u(Q_{(50)r}),$$

$$Q_{(50)w} = 1.23(5{,}266), \text{ and}$$

$$Q_{(50)w} = 6{,}480 \text{ ft}^3/\text{s}.$$

SUMMARY

This report provides methods for estimating the magnitude and frequency of peak discharges of rural, unregulated streams in Virginia. Peak-discharge characteristics and basin characteristics are presented for 363 stream-gaging stations in Virginia, and 8 stations in Kentucky. Station records were screened to remove data collected from urban, channelized, and regulated streams.

The State was divided into eight peak-discharge regions based on physiographic provinces, and peak-discharge characteristics for 284 stream-gaging stations

were regressed on explanatory drainage-basin characteristics. Generalized least-squares regression methods were used to define regression equations for these regions.

The generalized least-squares regression indicates that the drainage area is the most significant basin characteristic to predict the magnitude of peak discharges in each region. The main channel slope is also significant in the Coastal Plain and the Appalachian Plateaus regions. The drainage area, the average basin elevation, and the main channel length are significant in the Southern Piedmont region; and in the Northern Valley and Ridge region, the drainage area, the main channel length, and the percent forest cover are significant. In the Northern Piedmont region, the Blue Ridge region, and the Central and Southern Valley and Ridge regions, the drainage area is the only basin characteristic significant at the 5-percent level. Additional equations using drainage-area only are presented for all the regions in Virginia.

Regression equations presented for the eight regions can be used to estimate the magnitude and frequency of peak discharges for unregulated streams in the State. For streams where peak-discharge data are available, peak-discharge estimates can be improved by weighting the regional regression equation with the gaged-site data.

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APPENDIXES

Appendix 1. Basin characteristics at peak-discharge gaging stations in Virginia

[Modified from Miller, 1978, p. 34–51; Kentucky stations are from Choquette (1987, p. 98–105); Peak-discharge regions are shown in figure 1 and plate 1; M, is mixed regions; --, no data is available; latitude and longitude are reported in degrees, minutes, and seconds; R., river; nr, near; Cr., creek; Trib., tributary; SF, south fork; NF, north fork; MF, middle fork; WB, west branch; SB, south branch]

Station number	Station name	Peak-discharge region	Latitude	Longitude	Drainage area (square miles)	Main channel slope (feet per mile)	Main channel length (mile)	Mean basin elevation (feet)	Percent forest (percent plus one)	Mean annual precipitation (inch)	24 hour, 2 year rainfall (inch)
01484800	Guy Creek near Nassawadox	C	37 30 00	75 52 12	1.72	14.8	3.1	20	20	44.0	3.43
01613900	Hogue Creek near Hayfield	NV	39 12 36	78 17 24	15	167	7.9	1,200	70	37.0	2.80
01615000	Opequon Creek near Berryville	NV	39 10 47	78 04 11	57.4	17.4	20.2	760	38	38.4	3.04
01616000	Abrams Creek near Winchester	NV	39 10 47	78 05 24	16.5	37.8	9.9	800	42	38.3	2.93
01620500	North River near Stokesville	NV	38 20 24	79 14 23	17.2	148	9.6	3,330	98	42.1	3.65
01621000	Dry River at Rawley Springs	NV	38 30 00	79 02 59	72.6	107	15	2,870	100	39.1	2.80
01621200	War Branch near Hinton	NV	38 28 11	78 59 23	9.45	88.2	4.6	1,830	74	35.5	2.80
01621400	Blacks Run at Harrisonburg	NV	38 25 47	78 52 47	5.52	37.9	4.4	1,350	2	38.5	3.00
01621450	Blacks Run Trib near Harrisonburg	NV	38 23 24	78 55 12	.72	176	1.4	1,290	8	37.4	2.83
01622000	North River near Burketown	NV	38 20 24	78 54 35	379	43.2	38.9	2,040	52	39.0	3.09
01622100	North River Trib at Mt Crawford	NV	38 19 47	78 56 23	1.55	100	2.9	1,250	25	39.0	3.24
01622300	Buffalo Branch Trib near Augusta Springs	NV	38 09 35	79 16 11	.55	973	1.5	2,000	95	39.5	2.95
01622400	Buffalo Branch Trib near Christian	NV	38 12 00	79 13 11	.49	950	1	1,800	63	37.8	2.88
01624300	Middle River near Verona	NV	38 14 24	79 02 24	178	17.1	30.1	2,000	65	37.2	2.84
01624800	Christians Creek near Fisherville	NV	38 07 48	78 59 23	70.1	26.7	19.4	1,550	40	38.9	3.19
01625000	Middle River near Grottoes	NV	38 15 35	78 51 35	375	10.2	64	1,600	30	39.3	3.04
01626000	South River near Waynesboro	M	38 03 36	78 54 35	127	15.3	23.4	1,820	67	45.9	3.95
01626850	South River near Dooms	M	38 05 24	78 52 47	149	12.9	--	--	--	--	--
01627500	South River at Harriston	M	38 13 11	78 50 24	212	10.6	41.8	1,740	61	43.9	3.85
01628500	SF Shenandoah River near Lynnwood	NV	38 19 12	78 45 36	1,084	27.4	55.6	1,750	45	40.2	3.25
01629500	SF Shenandoah River near Luray	NV	38 38 59	78 31 48	1,377	12.9	97.2	1,680	54	41.4	3.36
01629945	Chub Run near Stanley	B	38 34 47	78 27 35	3.16	272.2	2.4	1,470	57	49.0	4.35
01631000	SF Shenandoah River at Front Royal	NV	38 54 35	78 12 35	1,642	7.73	145	1,600	50	41.6	3.45
01632000	NF Shenandoah River at Cootes Store	NV	38 38 24	78 50 59	210	44.3	25.8	2,020	89	35.8	3.09
01632300	Long Meadow near Broadway	NV	38 34 47	78 45 36	8.15	48.8	5.4	1,260	15	37.4	2.90
01632900	Smith Creek near New Market	NV	38 41 23	78 38 24	93.2	20.5	25.1	1,400	50	38.0	3.58
01632950	Crooked Run Trib near Conicville	NV	38 47 59	78 43 11	.31	500	1	1,450	98	35.2	2.87
01632970	Crooked Run near Mt Jackson	NV	38 45 35	78 41 23	6.49	61.8	4.5	1,200	45	35.2	2.78
01633000	NF Shenandoah River at Mt Jackson	NV	38 45 00	78 38 24	506	24.3	45.9	1,670	53	37.0	3.14
01633500	Stony Creek at Columbia Furnace	NV	38 52 11	78 37 47	79.4	28.6	20.4	2,030	86	34.0	2.80

Appendix 1. Basin characteristics at peak-discharge gaging stations in Virginia—Continued

Station number	Station name	Peak-discharge region	Latitude	Longitude	Drainage area (square miles)	Main channel slope (feet per mile)	Main channel length (mile)	Mean basin elevation (feet)	Percent forest (percent plus one)	Mean annual precipitation (inch)	24 hour, 2 year rainfall (inch)
01633650	Pughs Run near Woodstock	NV	38 55 47	78 32 59	3.66	292.1	2.5	1,510	60	35.2	2.52
01634000	NF Shenandoah River near Strasburg	NV	38 58 47	78 20 24	768	9.86	103	1,430	50	36.5	3.03
01634500	Cedar Creek near Winchester	NV	39 04 47	78 19 47	103	33	23.4	1,350	86	34.6	2.87
01635500	Passage Creek near Buckton	NV	38 57 36	78 16 11	87.8	34.3	31.1	1,490	81	38.7	3.25
01636210	Happy Creek at Front Royal	B	38 54 35	78 11 23	14	212	5.4	1,330	58	36.6	3.50
01638480	Catoctin Creek at Taylorstown	B	39 15 00	77 34 47	89.6	14.1	27.5	600	30	41.3	3.19
01643700	Goose Creek near Middlebrug	B	38 59 24	77 47 59	123	16.8	22.9	700	40	39.8	3.18
01644000	Goose Creek near Leesburg	B	39 01 12	77 34 47	332	8.25	40.6	660	35	40.0	3.18
01644100	SF Sycolin Creek near Leesburg	B	39 04 12	77 36 35	2.05	71.7	3.1	560	17	39.9	3.00
01644291	Stave Run near Reston	NP	38 57 00	77 22 12	.08	166.6	.35	400	90	38.9	3.30
01644295	Smilax Branch at Reston	NP	38 57 00	77 22 12	.32	125	.8	410	85	38.9	3.30
01645700	Difficult Run near Fairfax	NP	38 52 11	77 20 24	4.29	50	2.4	410	73	39.5	3.55
01645784	Snakeden Branch at Reston	NP	38 55 47	77 20 59	.79	76.4	1.1	--	--	--	--
01646000	Difficult Run near Great Falls	NP	38 58 47	77 15 00	57.9	16	13.3	360	60	39.0	3.29
01646200	Scott Run near Mclean	NP	38 57 36	77 12 35	4.69	54	4.2	363	50	39.0	3.70
01646600	Pemmit Run near Falls Church	NP	38 54 35	77 10 48	2.87	59.4	--	--	--	--	--
01652400	Long Branch at Arlington	NP	38 51 35	77 07 47	.94	101.1	--	--	--	--	--
01652430	Doctors Run at Arlington	C	38 51 35	77 05 59	.9	81.2	--	--	--	--	--
01652500	Fourmile Run at Alexandria	M	38 50 24	77 04 47	14.4	45.4	7.2	220	14	39.0	3.70
01652600	Holmes Run at Merrifield	NP	38 51 35	77 12 35	2.7	36.8	--	--	--	--	--
01652610	Holmes Run near Annandale	NP	38 51 00	77 10 12	7.1	--	--	--	--	--	--
01652910	Back Lick Run at Alexandria	M	38 47 59	77 07 47	13.4	--	--	--	--	--	--
01653000	Cameron Run at Alexandria	M	38 48 36	77 06 35	33.7	32.9	10.9	270	46	39.3	3.66
01653900	Accotink Creek at Fairfax	NP	38 51 35	77 16 11	6.8	--	--	--	--	--	--
01654000	Accotink Creek near Annandale	NP	38 48 36	77 13 48	23.5	19.3	10	320	65	39.7	3.61
01654500	Long Branch at Annandale	NP	38 48 36	77 14 23	3.71	46.7	4	350	65	39.4	3.65
01655350	Pohick Creek near Springfield	NP	38 45 35	77 13 48	15	23.8	10	340	60	39.0	3.50
01655500	Cedar Run near Warrenton	B	38 44 24	77 47 24	12.3	77.1	4.8	640	33	39.9	3.25
01656000	Cedar Run near Catlett	M	38 38 24	77 37 47	93.4	18.3	20.3	430	36	40.4	3.29
01656100	Cedar Run near Aden	M	38 37 11	77 32 59	155	--	--	--	--	--	--

Appendix 1. Basin characteristics at peak-discharge gaging stations in Virginia—Continued

[Modified from Miller, 1978, p. 34–51; Kentucky stations are from Choquette (1987, p. 98–105); Peak-discharge regions are shown in figure 1 and plate 1; M, is mixed regions; --, no data is available; latitude and longitude are reported in degrees, minutes, and seconds; R., river; nr, near; Cr., creek; Trib., tributary; SF, south fork; NF, north fork; MF, middle fork; WB, west branch; SB, south branch]

Station number	Station name	Peak-discharge region	Latitude	Longitude	Drainage area (square miles)	Main channel slope (feet per mile)	Main channel length (mile)	Mean basin elevation (feet)	Percent forest (percent plus one)	Mean annual precipitation (inch)	24 hour, 2 year rainfall (inch)
01656200	Broad Run near Warrenton	B	38 48 36	77 48 36	2.94	187	2	788	32	40.3	3.18
01656500	Broad Run at Buckland	B	38 46 48	77 40 12	50.5	23.6	16.3	610	38	40.1	3.16
01656600	Broad Run Trib at Buckland	NP	38 46 48	77 40 12	.79	80.8	1.8	380	61	40.4	3.15
01656650	Broad Run near Bristow	M	38 45 00	77 33 36	89.6	28.7	--	--	--	--	--
01656700	Occoquan River near Manassas	M	38 42 36	77 27 00	343	7.7	42.2	360	45	40.8	3.22
01656725	Bull Run near Catharpin	NP	38 53 24	77 34 11	25.8	28.2	7.3	440	40	39.6	3.04
01656960	Cub Run near Bull Run	NP	38 49 12	77 28 11	49.9	28.7	--	--	--	--	--
01657000	Bull Run near Manassas	NP	38 47 59	77 27 35	148	7.5	26.5	380	47	39.7	3.11
01657415	Bull Run near Clifton	NP	38 46 12	77 24 35	185	--	--	--	--	--	--
01657500	Occoquan River near Occoquan	NP	38 42 36	77 19 47	570	6.34	53.6	350	47	40.3	3.21
01658500	SF Quantico Creek near Independent Hill	NP	38 35 24	77 25 48	7.64	29.2	4.8	340	97	40.5	3.10
01660400	Aquia Creek near Garrisonville	NP	38 29 24	77 25 48	34.9	14.3	13.5	310	65	40.3	3.27
01661600	Great Wicomico River near Horse Head	C	37 53 24	76 27 00	6.98	19	3.5	80	66	41.6	3.08
01661800	Bush Mill Stream near Heathsville	C	37 52 48	76 29 23	6.82	20.3	4.2	80	85	41.7	3.08
01661900	Carter Run near Marshall	B	38 47 59	77 52 12	19.5	25.2	9.0	--	--	--	--
01662000	Rappahannock River near Warrenton	B	38 40 47	77 54 00	195	20.7	23.9	770	44	39.2	3.36
01662300	Thornton River Trib near Thornton Gap	B	38 40 12	78 17 24	1.38	880	2	2,210	100	46.1	4.21
01662500	Rush River at Washington	B	38 42 36	78 09 00	14.7	243	7.5	1,410	62	40.0	3.87
01662800	Battle Run near Laurel Mills	B	38 39 35	78 04 11	27.6	50	9.2	1,500	55	41.5	3.70
01663000	Thornton River near Laurel Mills	B	38 37 48	78 03 36	142	47.3	19.8	1,060	53	43.0	3.88
01663500	Hazel River at Rixeyville	B	38 35 24	77 58 11	287	29.5	31.7	980	41	39.8	3.93
01664000	Rappahannock River at Remington	B	38 31 48	77 48 36	620	9.43	39.7	790	43	40.2	3.65
01664500	Rappahannock River at KellySFord	B	38 28 47	77 46 48	641	7.83	44.2	770	43	40.7	3.64
01664800	Harpers Run near Morrisville	NP	38 31 12	77 43 11	2.28	59.4	2.1	350	75	46.0	3.26
01665000	Mountain Run near Culpeper	M	38 28 47	78 02 59	15.9	35.7	5.5	420	35	41.5	3.81
01665050	Pony Mountain Branch near Culpeper	NP	38 27 00	77 57 35	.3	400	.8	465	52	42.4	3.58
01665500	Rapidan River near Ruckersville	B	38 16 48	78 20 24	114	89.5	22.8	1,540	65	48.0	4.20
01666500	Robinson River near Locust Dale	M	38 19 12	78 05 59	179	35	30.2	940	65	42.5	3.90
01667000	Rapidan River at Rapidan	M	38 18 36	78 03 36	446	19.2	48	1,000	60	39.9	3.54
01667500	Rapidan River near Culpeper	M	38 21 00	77 58 48	472	14.9	54.6	860	53	43.2	3.67

Appendix 1. Basin characteristics at peak-discharge gaging stations in Virginia—Continued

Station number	Station name	Peak-discharge region	Latitude	Longitude	Drainage area (square miles)	Main channel slope (feet per mile)	Main channel length (mile)	Mean basin elevation (feet)	Percent forest (percent plus one)	Mean annual precipitation (inch)	24 hour, 2 year rainfall (inch)
01667600	Cedar Run Trib near Culpeper	NP	38 23 59	78 00 36	.58	71.4	0.9	360	70	41.7	3.60
01668000	Rappahannock River near Fredericksburg	M	38 19 12	77 31 11	1,596	6.64	70.2	660	54	42.5	3.49
01668300	Farmers Hall Creek near Champlain	C	38 00 00	76 58 48	2.18	46.7	2	120	68	41.5	3.45
01668500	Cat Point Creek near Montross	C	38 02 23	76 49 47	45.6	13.5	10.4	110	82	41.2	3.31
01668800	Hoskins Creek near Tappahannock	C	37 55 47	76 57 00	15.5	12.5	8	110	75	42.2	3.31
01669000	Piscataway Creek near Tappahannock	C	37 52 48	76 54 00	28	14	7.6	120	69	42.2	3.52
01669500	Dragon Swamp near Church View	C	37 40 47	76 43 48	84.9	4.08	19.7	120	71	43.2	3.35
01669800	My Ladys Swamp near Saluda	C	37 34 47	76 31 48	4.81	26.6	3.3	70	64	44.5	3.24
01670000	Beaverdam Swamp near Ark	C	37 28 11	76 33 36	6.63	10.9	4.2	90	90	45.7	3.29
01670300	Contrary Creek near Mineral	SP	38 02 23	77 52 47	5.53	43.2	--	--	--	--	--
01671000	North Anna River near Doswell	SP	37 53 24	77 29 23	441	3.64	58.6	320	73	41.7	3.47
01671100	Little River near Doswell	SP	37 52 11	77 30 36	107	5.02	31.9	290	72	41.8	3.68
01671500	Bunch Creek near Boswells Tavern	SP	38 01 48	78 11 23	4.37	32.8	4.2	420	75	42.5	3.43
01671615	Fosters Creek near Ferncliff	SP	37 57 36	78 11 23	.61	109.4	.85	570	46	40.9	3.41
01671650	Waldrop Creek near Louisa	SP	38 00 00	78 04 11	2.85	45.9	2.9	460	78	42.3	3.38
01671750	Harris Creek near Trevilians	SP	38 01 12	78 02 59	3.31	33.3	2.8	480	86	42.3	3.38
01672500	South Anna River near Ashland	SP	37 47 59	77 32 59	394	2.92	82.1	350	72	41.8	3.52
01673000	Pamunkey River near Hanover	SP	37 46 12	77 19 47	1,081	3.48	82.5	310	74	42.2	3.60
01673500	Totopotomoy Creek near Atlee	C	37 40 12	77 22 47	5.89	14.5	5.1	170	65	43.0	3.66
01673550	Totopotomoy Creek near Studley	C	37 39 35	77 15 36	26.2	28.7	--	--	--	--	--
01673800	Po River near Spotsylvania	NP	38 10 12	77 35 24	77.4	8.7	20	340	88	42.2	3.48
01674000	Mattaponi River near Bowling Green	M	38 03 36	77 23 24	257	6.89	37.7	280	81	42.0	3.51
01674100	Motto River Trib near Cedon	C	38 05 24	78 31 11	1.64	44.4	1.8	260	73	42.0	3.55
01674200	Reedy Creek near Dawn	C	37 52 48	77 21 35	16.8	8.96	9	180	85	42.0	3.68
01674500	Mattaponi River near Beulahville	M	37 53 24	77 09 35	601	3.42	74.1	210	76	42.1	3.59
01674700	Aylett Creek at Aylett	C	37 46 48	77 06 35	6.17	28.7	4	120	80	43.0	3.66
01677000	Ware Creek near Toano	C	37 26 23	76 47 24	6.29	25	2.8	--	--	--	--
02009500	Cattail Run near Bolar	CV	38 16 12	79 40 12	.74	800	2	2,380	70	40.8	2.80
02011400	Jackson River near Bacova	CV	38 02 23	79 52 47	158	--	--	--	--	--	--
02011460	Back Creek near Sunrise	CV	38 15 00	79 46 11	60.1	--	--	--	--	--	--

Appendix 1. Basin characteristics at peak-discharge gaging stations in Virginia—Continued

[Modified from Miller, 1978, p. 34–51; Kentucky stations are from Choquette (1987, p. 98–105); Peak-discharge regions are shown in figure 1 and plate 1; M, is mixed regions; --, no data is available; latitude and longitude are reported in degrees, minutes, and seconds; R., river; nr, near; Cr., creek; Trib., tributary; SF, south fork; NF, north fork; MF, middle fork; WB, west branch; SB, south branch]

Station number	Station name	Peak-discharge region	Latitude	Longitude	Drainage area (square miles)	Main channel slope (feet per mile)	Main channel length (mile)	Mean basin elevation (feet)	Percent forest (percent plus one)	Mean annual precipitation (inch)	24 hour, 2 year rainfall (inch)
02011480	Back Creek at Rt 600 nr Mountain Grove	CV	38 07 48	79 51 35	85.8	27	5.3	--	--	--	--
02011500	Back Creek near Mountian Grove	CV	38 04 12	79 54 00	134	44.4	33.4	2,890	90	40.9	2.86
02012500	Jackson River at Falling Spring	CV	37 52 48	79 58 48	411	25.3	57.6	2,480	80	40.8	2.74
02012950	Sweet Spgs Cr Trib at Sweet Chalybeate	CV	37 39 35	80 14 23	.66	592	1.7	2,330	68	37.8	2.55
02013000	Dunlap Creek near Covington	CV	37 47 59	80 02 59	164	40.5	27.3	2,230	87	38.5	2.56
02014000	Potts Creek near Covington	CV	37 43 47	80 02 24	153	27.3	39.8	2,320	85	38.6	2.62
02014500	Smith Creek near Clifton Forge	CV	37 51 00	79 50 59	12.4	259	6.5	2,250	99	40.8	3.08
02015600	Cowpasture River near Head Waters	CV	38 19 12	79 26 23	11.3	63.3	6.4	2,450	81	40.5	3.30
02015700	Bullpasture River at Williamsville	CV	38 12 00	79 34 11	110	41.5	22.9	2,200	80	40.1	2.90
02016000	Cowpasture River near Clifton Forge	CV	37 47 23	79 45 36	461	12.4	74.3	2,030	81	40.1	2.84
02016500	James River at Lick Run	CV	37 46 12	79 46 48	1,373	15.3	93.4	2,210	82	40.0	2.75
02017000	Meadow Creek at New Castle	CV	37 29 24	80 06 35	13.8	161	7.9	2,220	37	39.2	3.05
02017300	Craig Creek at New Caslte	CV	37 30 00	80 05 59	112	26	30.3	2,000	80	40.5	3.00
02017400	Johns Creek Trib near New Castle	CV	37 33 36	80 00 00	1.57	480	3	2,160	98	38.3	2.75
02017500	Johns Creek at New Castle	CV	37 30 35	80 06 35	104	22.2	35.3	2,210	90	38.2	2.70
02017700	Craig Creek Trib near New Castle	CV	37 33 36	80 00 00	2.05	295	3	1,740	99	40.0	2.95
02018000	Craig Creek at Parr	CV	37 40 12	79 54 35	329	12.1	65.1	2,150	88	39.4	2.90
02018500	Catawba Creek near Catawba	CV	37 28 11	80 00 36	34.3	37.8	17	1,880	68	42.6	3.30
02018800	North Fork near Fincastle	CV	37 32 23	79 55 48	4.17	164	4.4	2,840	96	41.5	2.80
02019000	Catawba Creek near Fincastle	CV	37 32 59	79 49 47	104	29.8	32.8	1,500	60	42.2	3.27
02019400	Mill Creek near Buchanan	CV	37 30 00	79 45 36	29.6	41.6	10.2	1,280	21	42.0	3.40
02019500	James River at Buchanan	CV	37 31 48	79 40 48	2,075	11.5	131	2,080	81	40.4	2.88
02020100	Renick Run near Buchanan	CV	37 35 24	79 37 47	2.06	258	3.2	1,660	70	42.8	3.19
02020200	Calfpasture River near West Augusta	CV	38 16 12	79 17 59	12.8	156	6	2,420	98	41.5	3.55
02020500	Calfpasture River Ab Mill Cr at Goshen	CV	37 59 24	79 29 23	144	21.3	32.4	2,520	91	39.7	3.01
02021000	Calfpasture River at Goshen	CV	37 59 24	79 29 23	190	21.3	32.6	2,450	91	39.8	2.90
02021500	Maury River at Rockbridge Baths	CV	37 54 35	79 25 12	329	18.2	41.8	2,200	88	39.9	2.87
02021700	Cedar Grove Branch nr Rockbridge Baths	CV	37 52 48	79 23 24	12.3	112	4.9	1,510	29	42.0	2.96

Appendix 1. Basin characteristics at peak-discharge gaging stations in Virginia—Continued

Station number	Station name	Peak-discharge region	Latitude	Longitude	Drainage area (square miles)	Main channel slope (feet per mile)	Main channel length (mile)	Mean basin elevation (feet)	Percent forest (percent plus one)	Mean annual precipitation (inch)	24 hour, 2 year rainfall (inch)
02022500	Kerrs Creek near Lexington	CV	37 49 47	79 26 23	35	83.5	10.4	1,900	77	39.3	2.85
02023000	Maury River near Lexington	CV	37 48 36	79 26 23	487	21.1	54.7	1,810	75	40.6	2.92
02023300	South River near Steeles Tavern	B	37 55 47	79 10 12	15.7	162	7	2,750	100	49.0	3.60
02023500	South River near Riverside	M	37 46 48	79 21 35	111	64.2	23	1,820	64	46.5	3.25
02024000	Maury River near Buena Vista	CV	37 45 35	79 23 24	646	19.4	61.9	1,950	70	43.1	3.01
02024500	Maury River at Glasgow	CV	37 37 48	79 26 23	831	16.6	75.7	1,880	68	42.7	3.09
02025000	Pedlar River near Pedlar Mills	B	37 32 23	79 15 00	91	56.8	24.7	2,220	82	44.5	4.25
02025500	James River at Holcombs Rock	CV	37 30 00	79 15 36	3,259	9.3	169	1,990	77	41.0	3.11
02026000	James River at Bent Creek	M	37 32 23	78 49 11	3,683	8.12	209	1,900	77	41.2	3.14
02026500	Tye River at Roseland	B	37 45 00	78 59 23	68	133	17.6	1,740	79	51.2	4.65
02027000	Tye River near Lovingston	B	37 43 11	78 58 48	92.8	99.4	21.3	1,530	72	50.7	4.40
02027500	Piney River at Piney River	B	37 42 00	79 01 48	47.6	151	16.5	2,080	81	49.6	4.48
02027700	Buffalo River Trib near Amherst	SP	37 33 36	78 57 35	.46	173	1	730	90	46.0	3.40
02027800	Buffalo River near Tye River	B	37 36 35	78 55 12	147	27.9	33.4	2,000	70	47.4	3.46
02028000	Tye River near Norwood	B	37 37 48	78 52 47	360	43.2	34.2	1,600	65	49.0	4.17
02028500	Rockfish River near Greenfield	B	37 52 11	78 49 11	94.6	102	13.1	1,400	70	47.2	4.18
02028700	Cove Creek near Covesville	B	37 52 11	78 43 48	4	233	3.2	890	50	45.0	3.85
02028800	Ballinger Creek at Esmont	SP	37 49 47	78 36 35	5.42	45.7	3.1	570	67	45.0	3.45
02028900	Miller Creek near Scottsville	SP	37 48 36	78 30 36	6.6	27.1	4.6	430	40	43.3	3.43
02029000	James River at Scottsville	M	37 47 59	78 29 23	4,584	7.16	248	1,790	76	42.5	3.31
02029200	NF Hardware River at Red Hill	B	37 58 11	78 37 12	11	66.1	3.4	739	45	44.3	3.70
02029400	S B Of NF Hardware River nr N Garden	B	37 57 36	78 39 35	6.59	312	3.7	979	65	44.0	3.85
02029500	Hardware River near Scottsville	M	37 50 24	78 28 11	104	20.8	17.6	800	72	44.8	3.53
02030000	Hardware R Bl Briery Rn nr Scottsville	M	37 48 36	78 27 35	116	18.9	19.8	800	72	44.1	3.48
02030500	Slate River near Arvonia	SP	37 42 00	78 22 47	226	8.36	36.8	550	84	42.2	3.51
02030800	Stockton Creek near Afton	B	38 01 48	78 48 36	2.8	597	2.6	2,000	81	42.3	4.10
02031000	Mechum River near Ivy	B	38 06 00	78 35 24	97	18	18.6	870	60	43.6	3.98
02031500	NF Moormans River near Whitehall	B	38 08 24	78 45 00	11.4	238	6.2	2,170	93	42.0	3.85
02032250	Moormans River near Free Union	B	38 08 24	78 33 36	74.6	78.7	15.8	--	--	--	--
02032400	Buck Mountain Creek near Free Union	B	38 08 59	78 32 24	37	45.2	10.0	--	--	--	--

Appendix 1. Basin characteristics at peak-discharge gaging stations in Virginia—Continued

[Modified from Miller, 1978, p. 34–51; Kentucky stations are from Choquette (1987, p. 98–105); Peak-discharge regions are shown in figure 1 and plate 1; M, is mixed regions; --, no data is available; latitude and longitude are reported in degrees, minutes, and seconds; R., river; nr, near; Cr., creek; Trib., tributary; SF, south fork; NF, north fork; MF, middle fork; WB, west branch; SB, south branch]

Station number	Station name	Peak-discharge region	Latitude	Longitude	Drainage area (square miles)	Main channel slope (feet per mile)	Main channel length (mile)	Mean basin elevation (feet)	Percent forest (percent plus one)	Mean annual precipitation (inch)	24 hour, 2 year rainfall (inch)
02032500	SF Rivanna River near Earlysville	B	38 07 11	78 31 11	216	13	27.2	1,350	56	44.5	4.04
02032530	Parker Branch near Stanardsville	B	38 17 23	78 37 12	3.24	240	2	960	55	48.3	4.16
02032540	Haneytown Creek near Stanardsville	B	38 16 48	78 30 36	4.45	468	4.9	1,800	78	48.5	4.15
02032550	Lynch River at Nortonsville	B	38 14 24	78 32 24	13.6	219	9.2	1,680	83	47.7	4.20
02032680	NF Rivanna River near Profitt	M	38 05 24	78 24 35	176	65.3	14.8	1,400	60	46.3	3.43
02032700	Schenks Branch at Charlottesville	SP	38 02 23	78 28 11	1.34	109	1.4	400	80	45.9	3.49
02033300	Moores Creek near Charlottesville	B	38 00 35	78 34 11	3.52	147	2.1	800	65	44.8	3.55
02033500	Rivanna River near Charlottesville	M	38 01 12	78 27 00	507	8.44	41.1	1,000	60	45.3	3.37
02034000	Rivanna River at Palmyra	M	37 51 35	78 16 11	664	6.39	60.6	800	58	45.4	3.66
02034050	Hunters Branch near Palmyra	SP	37 57 00	78 14 23	1.63	50	2.3	480	71	42.7	3.41
02034250	Whispering Creek at Sprouses Corner	SP	37 31 48	78 28 48	.43	80.4	.7	610	84	39.5	3.44
02034300	Little Willis River at Curdsville	SP	37 24 35	78 27 35	7.07	27.3	5.9	500	73	41.5	3.43
02034500	Willis River at Flanagan Mills	SP	37 40 12	78 10 12	262	6.79	43.2	480	76	40.6	3.42
02035000	James River at Cartersville	M	37 40 12	78 05 24	6,257	6.16	280	1,560	74	42.7	3.35
02035400	Big Lickinghole Creek Trib nr Ferncliff	SP	37 49 47	77 58 11	.55	99	1.3	1,340	93	41.5	3.42
02036500	Fine Creek at Fine Creek Mills	SP	37 36 00	77 49 11	22.1	14.8	9.4	300	86	41.7	3.60
02037500	James River near Richmond	M	37 33 36	77 32 59	6,758	5.51	320.6	1,500	70	43.1	3.64
02037800	Falling Creek near Midlothian	M	37 27 00	77 35 24	18.1	17.5	8	370	98	43.4	3.56
02038000	Falling Creek near Chesterfield	M	37 26 23	77 31 11	32.8	13.2	12.1	270	95	43.5	3.60
02038500	Falling Creek near Drewrys Bluff	M	37 27 36	77 28 11	54	13.2	16.5	240	90	43.6	3.59
02038800	Appomattox River near Appomattox	SP	37 22 48	78 47 24	5.79	55.3	2.6	780	47	42.8	3.32
02038840	Holiday Creek near Toga	SP	37 25 47	78 41 23	1.68	108	2.4	750	99	42.0	3.40
02038845	North Holiday Creek near Toga	SP	37 26 23	78 40 12	1.31	56	2.5	650	99	42.0	3.40
02038850	Holiday Creek near Andersonville	SP	37 25 12	78 38 24	8.53	58.8	5.2	700	99	41.5	3.42
02039000	Buffalo Creek near Hampden Sydney	SP	37 15 35	78 29 23	69.7	12.5	10.7	490	74	42.2	3.25
02039500	Appomattox River at Farmville	SP	37 18 36	78 23 24	303	9.22	37.4	490	75	42.1	3.00
02040000	Appomattox River at Mattoax	SP	37 25 12	77 51 35	726	3.87	84.3	460	75	42.7	3.24
02040500	Flat Creek near Amelia	SP	37 23 24	78 03 36	73	7.7	24.1	390	50	42.5	3.60
02040600	Nibbs Creek Trib near Amelia	SP	37 23 59	77 58 11	.35	142	.8	280	19	42.0	3.42

Appendix 1. Basin characteristics at peak-discharge gaging stations in Virginia—Continued

Station number	Station name	Peak-discharge region	Latitude	Longitude	Drainage area (square miles)	Main channel slope (feet per mile)	Main channel length (mile)	Mean basin elevation (feet)	Percent forest (percent plus one)	Mean annual precipitation (inch)	24 hour, 2 year rainfall (inch)
02041000	Deep Creek near Mannboro	SP	37 16 48	77 52 12	158	7.5	21.5	320	75	43.2	3.63
02041500	Appomattox River near Petersburg	SP	37 13 47	77 32 24	1,335	2.66	120	400	77	42.8	3.37
02041650	Appomattox River at Matoaca	SP	37 13 11	77 28 48	1,344	2.6	123.8	170	64	46.3	3.44
02042200	Glebe Creek Trib near Charles City	C	37 22 11	77 04 11	.7	66.6	1.2	120	43	45.7	3.50
02042250	Bailey Branch Trib at Spring Grove	C	37 10 12	76 59 23	.71	36.4	1.4	100	70	43.0	3.85
02042300	Horsepen Branch at Richmond	C	37 36 00	77 30 36	1.35	83.3	1.6	260	1	43.5	3.54
02042500	Chickahominy River nr Providence Forge	C	37 26 23	77 03 36	248	4.24	45.5	170	63	44.4	3.63
02042700	Collins Run near Providence Forge	C	37 23 59	77 02 59	2.84	22.9	3	100	86	45.6	3.49
02042780	WB Long Hill Swamp near Lightfoot	C	37 18 36	77 46 11	2.47	22.2	1.8	80	92	46.5	3.43
02043500	Cypress Swamp at Cypress Chapel	C	36 37 11	76 35 59	23	6.25	6.5	60	73	50.9	3.85
02044000	Nottoway River near Burkeville	SP	37 04 47	78 12 00	38.7	20.3	9.2	500	86	43.2	3.85
02044200	Falls Creek Trib near Victoria	SP	37 01 48	78 10 12	.34	103	.9	240	85	44.0	3.70
02044500	Nottoway River near Rawlings	SP	36 58 47	77 47 59	309	7.32	37.3	420	69	43.9	3.74
02045500	Nottoway River near Stony Creek	SP	36 53 59	77 24 00	579	5.3	70.4	370	75	44.8	3.59
02046000	Stony Creek near Dinwiddie	SP	37 04 12	77 35 59	112	7.69	22.4	250	82	45.7	3.51
02046400	Jones Hole Swamp Trib near Carson	C	37 04 12	77 20 24	3.02	13.2	3.3	140	82	48.4	3.27
02046500	Anderson Branch at Sussex	C	36 55 12	77 15 36	5.35	10.7	3.8	100	72	49.5	3.15
02046900	Musgrave Branch near Drewryville	C	36 42 00	77 16 11	1.99	24.3	2.4	100	62	47.7	3.20
02047000	Nottoway River near Sebrell	M	36 46 12	77 10 12	1,421	2.92	105	220	79	46.4	3.42
02047500	Blackwater River near Dendron	C	37 01 12	76 52 12	294	2.23	41.9	130	78	46.6	3.19
02048000	Blackwater River at Zuni	C	36 52 11	76 50 24	456	1.9	56	110	81	46.6	3.25
02048400	Seacock Creek near Ivor	C	36 55 12	76 55 48	27.4	5	8.1	96	95	49.0	3.27
02049500	Blackwater River near Franklin	C	36 45 35	76 54 00	617	1.62	64.7	100	80	49.8	3.62
02049700	Cypress Swamp near Burdette	C	36 44 24	76 56 23	8.55	12.5	4.9	50	70	50.0	3.50
02050050	Blackwater River Trib near Holland	C	36 38 59	76 51 35	2.76	26.5	2.2	60	70	50.5	3.65
02050400	North Meherrin River near Briery	SP	37 04 12	78 27 35	1.19	59.1	1.4	590	61	42.7	3.43
02050500	North Meherrin River near Keysville	SP	37 02 59	78 25 12	9.2	33.9	4.1	550	53	42.9	3.45
02051000	North Meherrin River near Lunenburg	SP	37 00 00	78 20 59	55.6	21.2	10.7	470	80	43.4	3.49
02051400	Saddletree Creek near Lawrenceville	SP	36 43 47	77 54 35	.87	50	1.6	280	55	44.4	3.27
02051500	Meherrin River near Lawrenceville	SP	36 43 11	77 49 47	552	4.17	62.4	420	72	44.7	3.35

Appendix 1. Basin characteristics at peak-discharge gaging stations in Virginia—Continued

[Modified from Miller, 1978, p. 34–51; Kentucky stations are from Choquette (1987, p. 98–105); Peak-discharge regions are shown in figure 1 and plate 1; M, is mixed regions; --, no data is available; latitude and longitude are reported in degrees, minutes, and seconds; R., river; nr, near; Cr., creek; Trib., tributary; SF, south fork; NF, north fork; MF, middle fork; WB, west branch; SB, south branch]

Station number	Station name	Peak-discharge region	Latitude	Longitude	Drainage area (square miles)	Main channel slope (feet per mile)	Main channel length (mile)	Mean basin elevation (feet)	Percent forest (percent plus one)	Mean annual precipitation (inch)	24 hour, 2 year rainfall (inch)
02051600	Great Creek near Cochran	SP	36 48 36	77 55 12	30.7	15.8	10	350	75	44.4	3.40
02051650	Rocky Run near Dolphin	SP	36 47 23	77 49 47	1.41	54.2	1.6	320	81	44.3	3.32
02052000	Meherrin River at Emporia	SP	36 41 23	77 32 24	747	3.46	82.9	400	76	44.7	3.40
02052500	Fountains Creek near Brink	SP	36 37 11	77 42 00	65.2	8.8	18.9	300	66	44.8	3.40
02053800	SF Roanoke River near Shawsville	M	37 08 24	80 16 11	110	82.1	12.2	2,300	25	42.8	2.97
02054500	Roanoke River at Lafayette	M	37 14 24	80 12 35	257	43	22.8	1,840	76	42.2	3.00
02055000	Roanoke River at Roanoke	M	37 15 35	79 56 23	395	17.4	45.3	1,680	74	42.2	3.13
02055100	Tinker Creek near Daleville	CV	37 25 12	79 56 23	11.7	92.9	4.2	1,470	26	42.0	3.36
02056000	Roanoke River at Niagara	CV	37 15 00	79 52 12	512	15.4	50.6	1,550	70	42.3	3.23
02056650	Back Creek near Dundee	M	37 13 47	79 52 12	56.8	28.2	18.2	--	--	--	--
02056900	Blackwater River near Rocky Mount	B	37 02 23	79 50 24	115	--	--	--	--	--	--
02057000	Blackwater River near Union Hall	B	37 02 23	79 41 23	208	10.9	57.5	1,360	66	43.4	3.51
02057500	Roanoke River near Toshes	M	37 01 48	79 31 11	1,020	10.1	92.8	1,330	69	42.9	3.45
02057700	Powder Mill Creek at Rocky Mount	B	37 00 35	79 52 12	.64	207	2	1,230	54	43.2	3.46
02058000	Snow Creek at Sago	SP	36 53 59	79 39 00	60	17.4	19.2	1,100	70	43.3	3.77
02058400	Pigg River near Sandy Level	M	36 57 00	79 31 11	350	9.47	66.2	1,100	55	42.6	3.96
02058500	Pigg River near Toshes	M	36 58 47	79 30 36	394	9.47	70.4	1,050	55	43.4	3.67
02059500	Goose Creek near Huddleston	B	37 10 12	79 31 11	188	19	30.5	1,140	63	44.0	4.02
02060500	Roanoke River at Altavista	M	37 06 00	79 17 59	1,789	8.31	119	1,170	66	43.0	3.65
02061000	Big Otter River near Bedford	B	37 21 35	79 25 12	116	25.2	17	870	69	43.8	4.15
02061150	Chestnut Branch near Forest	B	37 22 11	79 23 24	1.65	27.3	2.5	950	36	40.7	3.55
02061300	Nininger Creek near Bedford	B	37 16 12	79 29 23	4.77	66.1	4	975	50	44.0	4.35
02061500	Big Otter River near Evington	B	37 12 36	79 17 59	320	14.2	32	1,010	60	43.0	4.09
02062500	Roanoke River at Brookneal	M	37 02 23	78 57 00	2,415	6.4	150	1,080	57	42.7	3.67
02064000	Falling River near Naruna	SP	37 07 48	78 57 35	173	12.6	22.2	700	67	40.9	3.24
02065100	Snake Creek near Brookneal	SP	37 00 35	78 57 35	1.68	86.7	2	520	70	41.5	3.28
02065300	Right Hand Fork near Appomattox	SP	37 16 12	78 49 11	2.08	119	1.7	700	83	41.5	3.27
02065500	Cub Creek at Phenix	SP	37 04 47	78 45 36	98	11.4	20.4	600	75	41.4	3.28
02066000	Roanoke Creek at Saxe	M	36 54 35	78 44 23	2,977	5.82	179	990	60	42.5	3.59
02066500	Roanoke Creek at Saxe	SP	36 55 47	78 40 12	135	6.82	17.6	490	76	42.3	3.33

Appendix 1. Basin characteristics at peak-discharge gaging stations in Virginia—Continued

Station number	Station name	Peak-discharge region	Latitude	Longitude	Drainage area (square miles)	Main channel slope (feet per mile)	Main channel length (mile)	Mean basin elevation (feet)	Percent forest (percent plus one)	Mean annual precipitation (inch)	24 hour, 2 year rainfall (inch)
02067000	Roanoke River near Clover	M	36 50 24	78 40 12	3,230	5.56	186	940	59	42.5	3.57
02067810	Maple Swamp B Trib nr Meadows of Dan	B	36 44 24	80 26 23	.49	464	.9	520	70	48.0	4.30
02069700	South Mayo River near Nettleridge	M	36 34 12	80 07 47	84.6	38.8	21.4	1,440	40	50.5	3.42
02070000	North Mayo River near Spencer	SP	36 34 12	79 59 23	108	19.3	25.5	1,100	82	48.3	3.52
02072500	Smith River at Bassett	B	36 46 12	80 00 00	259	20.3	44.8	1,450	85	46.3	3.60
02073000	Smith River at Martinsville	M	36 39 35	79 52 47	380	14.9	58.4	1,290	79	46.0	3.58
02074500	Sandy River near Danville	SP	36 37 11	79 30 00	112	17.4	22.2	820	52	44.2	3.57
02075000	Dan River at Danville	SP	36 35 24	79 22 47	2,050	10.4	144	1,030	66	46.6	3.65
02075350	Powells Creek near Turbeville	SP	36 34 47	79 11 23	.28	109.4	.85	460	17	43.7	3.12
02075450	Little Winns Creek near Turbeville	SP	36 35 24	79 05 24	2.3	64.7	2.3	465	58	43.8	3.20
02075500	Dan River at Paces	SP	36 38 24	79 05 24	2,550	7.83	171	1,000	65	43.7	3.20
02075900	Lawsons Creek at Turbeville	SP	36 36 35	79 01 11	8.7	27.3	4.3	500	60	44.0	3.10
02076000	Dan River at South Boston	SP	36 41 23	78 54 00	2,730	6.98	184	900	64	46.0	3.58
02076200	Bearskin Creek near Chatham	SP	36 50 24	79 28 48	4.06	51.9	3.6	850	65	45.0	3.45
02076400	Whitehorn Creek Tributary at Gretna	SP	36 55 47	79 22 12	1.93	68.5	2.6	--	--	--	--
02076500	Georges Creek near Gretna	SP	36 56 23	79 18 36	9.24	11.5	6.9	860	55	42.2	3.99
02076700	Blacks Creek near Mt Airy	SP	36 56 23	79 10 12	3.44	84.1	3	600	93	42.0	3.96
02077000	Banister River at Halifax	SP	36 46 48	78 55 12	547	5.59	62	620	62	43.3	3.82
02077500	Hyco River near Denniston	SP	36 35 24	78 54 00	289	3.05	58.9	550	68	44.5	3.32
02078000	Hyco River near Omega	SP	36 38 24	78 48 36	413	3.05	67.8	530	69	44.7	3.36
02079000	Roanoke River at Clarksville	M	36 37 48	78 32 59	7,320	4.86	207	850	62	44.1	3.57
02079640	Allen Creek near Boydton	SP	36 40 47	78 19 47	53.4	12.5	15.4	400	70	45.4	3.15
03164000	New River near Galax	B	36 38 59	80 58 48	1,131	9.52	111	3,280	55	46.9	3.33
03165000	Chestnut Creek at Galax	B	36 38 59	80 55 12	39	25.3	11	2,560	40	45.0	3.08
03165500	New River at Ivanhoe	B	36 49 47	80 57 00	1,340	8.91	131	3,170	55	46.2	3.16
03166800	Glade Creek at Grahams Forge	SV	36 55 47	80 54 00	7.15	65.8	2.5	--	--	--	--
03167000	Reed Creek at Grahams Forge	SV	36 56 23	80 53 24	247	11.4	41	2,500	43	38.6	2.68
03167300	Mira Fork Tributary near Dugspur	B	36 50 24	80 35 59	.62	534	1	2,860	45	43.5	3.05

Appendix 1. Basin characteristics at peak-discharge gaging stations in Virginia—Continued

[Modified from Miller, 1978, p. 34–51; Kentucky stations are from Choquette (1987, p. 98–105); Peak-discharge regions are shown in figure 1 and plate 1; M, is mixed regions; --, no data is available; latitude and longitude are reported in degrees, minutes, and seconds; R., river; nr, near; Cr., creek; Trib., tributary; SF, south fork; NF, north fork; MF, middle fork; WB, west branch; SB, south branch]

Station number	Station name	Peak-discharge region	Latitude	Longitude	Drainage area (square miles)	Main channel slope (feet per mile)	Main channel length (mile)	Mean basin elevation (feet)	Percent forest (percent plus one)	Mean annual precipitation (inch)	24 hour, 2 year rainfall (inch)
03167500	Big Reed Island Creek near Allisonia	B	36 53 24	80 43 48	278	15.2	46.3	2,570	69	44.6	3.34
03167700	Beaverdam Creek at Hillsville	B	36 46 12	80 43 48	4.13	93.9	2.8	2,600	30	43.0	3.05
03168000	New River at Allisonia	M	36 56 23	80 45 00	2,202	9.56	149	2,910	54	44.3	3.05
03168500	Peak Creek at Pulaski	SV	37 02 59	80 46 48	60.9	47.7	14.2	2,350	72	37.6	2.54
03168600	Peak Creek Tributary near Pulaski	SV	37 04 12	80 46 11	.61	83.3	1.6	2,110	75	38.0	2.48
03168750	Thorne Springs Branch near Dublin	SV	37 05 24	80 44 23	4.77	54.3	3.1	2,110	5	37.8	2.47
03169350	Brush Creek at Terrys Fork	B	37 02 59	80 16 48	1.4	140.9	1.5	2,640	29	43.1	3.25
03169500	Little River near Copper Valley	B	37 00 00	80 31 11	239	9.26	57.7	2,500	50	41.3	2.77
03170000	Little River at Graysonton	B	37 02 23	80 33 36	300	9.73	65.1	2,470	46	43.6	3.45
03171000	New River at Radford	M	37 08 24	80 34 11	2,748	3.43	175.4	2,800	53	39.4	2.50
03171150	Crab Creek Trib near Christiansburg	SV	37 07 48	80 27 35	1.23	109.4	2.2	2,130	13	40.8	2.62
03171500	New River at Eggleston	M	37 17 23	80 37 12	2,941	8.0	199	2,740	51	43.5	2.88
03173000	Walker Creek at Bane	SV	37 16 12	80 42 35	305	20.1	53.7	2,590	64	37.4	2.56
03175500	Wolf Creek near Narrows	SV	37 18 36	80 50 59	223	35.9	45	2,810	71	40.6	2.57
03176500	New River at Glen Lyn	M	37 22 11	80 51 35	3,768	6.72	225	2,700	53	42.3	2.80
03177700	Bluestone River at Bluefield	SV	37 15 35	81 16 48	39.8	31.6	15.2	2,800	90	43.2	2.50
03207400	Prater Creek at Vasant	AP	37 13 11	82 05 59	19.8	119	6.3	1,700	95	40.5	2.78
03207500	Levisa Fork near Grundy	AP	37 17 59	82 07 47	235	36.6	23.5	2,040	92	41.6	2.71
03207800	Levisa Fork at Big Rock	AP	37 21 00	82 12 00	297	26.5	31.8	2,000	90	43.5	2.60
03207962	Dicks Fork at Phyllis, Kentucky	AP	37 26 56	82 20 16	.82	509.9	1.46	2,500	.82	44.0	2.80
03208000	Levisa Fork Below Fishtrap Dam, Kentucky	AP	37 24 57	82 25 15	392	16.9	52.7	1,900	85	44.0	2.80
03208500	Russell Fork at Haysi	AP	37 12 36	82 17 59	286	19.3	23.5	2,120	97	42.6	2.82
03208950	Cranes Nest River near Clintwood	AP	37 07 11	82 26 23	66.5	42.5	17	2,090	95	46.0	2.84
03209000	Pound River Bl Flannagan Dam nr Haysi	AP	37 13 47	82 20 24	221	10.2	41.3	2,000	92	46.9	2.82
03209300	Russell Fork at Elkhorn City, Kentucky	AP	37 17 59	82 17 59	554	21.2	40.27	2,000	86	44.0	2.80
03277290	Bottom Fork near Mayking, Kentucky	AP	37 08 24	82 45 32	3.03	276.1	3.69	2,000	86	41.9	2.80
03277437	Breeding Creek near Isom, Kentucky	AP	37 12 32	82 55 40	.69	366.0	1.34	2,000	86	41.9	2.80

Appendix 1. Basin characteristics at peak-discharge gaging stations in Virginia—Continued

Station number	Station name	Peak-discharge region	Latitude	Longitude	Drainage area (square miles)	Main channel slope (feet per mile)	Main channel length (mile)	Mean basin elevation (feet)	Percent forest (percent plus one)	Mean annual precipitation (inch)	24 hour, 2 year rainfall (inch)
03277450	Carr Fork near Sassafras, Kentucky	AP	37 13 51	83 02 09	60.6	17.1	19.81	1,450	95	48.0	2.80
03400500	Poor Fork at Cumberland, Kentucky	AP	36 58 26	82 59 34	82.3	28.1	25.8	2,500	90	48.0	2.90
03471100	Dickey Creek at Sugar Grove	B	36 46 12	81 25 12	7.28	140	5.2	3,150	84	41.5	2.60
03471200	SF Holston River at Teas	M	36 46 12	81 27 00	31.1	61.2	5.3	3,090	70	41.5	2.70
03471500	SF Holston R at Riverside nr Chilhowie	M	36 45 35	81 37 47	76.1	32	18.4	2,870	83	42.0	2.83
03472500	Beaverdam Creek at Damascus	B	36 37 48	81 47 24	56	56.9	17.3	2,950	89	45.7	2.77
03473000	SF Holston Creek near Damascus	M	36 38 59	81 50 24	301	23.2	37.3	2,930	76	43.2	2.03
03473500	MF Holston River at Groseclose	SV	36 53 24	81 20 59	7.39	46.2	3.6	2,710	49	39.0	2.69
03473800	Staley Creek near Marion	SV	36 49 12	81 28 11	8.33	154	5.4	2,500	95	40.5	2.48
03474000	MF Holston River at Sevenmile Ford	SV	36 48 36	81 37 12	132	24.3	25	2,480	64	40.0	2.50
03474500	MF Holston River at Chilhowie	SV	36 47 59	81 40 48	155	21.5	29.4	2,470	60	40.5	2.49
03474700	Hutton Creek near Chilhowie	SV	36 46 48	81 43 48	8.32	82.1	3.7	2,230	22	43.0	2.50
03474800	Hall Creek near Glade Spring	SV	36 45 35	81 47 59	7.9	68.2	4.4	2,110	25	43.5	2.55
03475000	MF Holston River near Meadowview	SV	36 42 36	81 49 11	211	14.6	42.8	2,390	51	41.4	2.52
03475600	Cedar Creek near Meadowview	SV	36 45 00	81 51 35	3.38	65.9	2.2	2,610	6	44.4	2.72
03475700	Spring Creek near Abingdon	SV	36 40 47	82 02 24	2.99	54.8	2.8	2,120	14	46.0	2.62
03477500	Beaver Creek near Wallace	SV	36 38 24	82 06 35	13.7	40.4	7.7	2,180	11	45.6	2.58
03478400	Beaver Creek near Bristol	SV	36 37 48	82 07 47	27.7	40	9.3	2,140	14	45.6	2.58
03487800	Lick Creek near Chatham Hill	SV	36 57 36	81 28 11	25.5	39.1	14.7	2,770	96	42.6	2.65
03487850	Possum Jaw Creek near Chatham Hill	SV	36 57 36	81 27 35	4.36	114	4.7	2,510	63	43.0	2.65
03487900	Sprouts Creek near Chatham Hill	SV	36 58 11	81 30 36	7.64	324	2.8	2,760	76	42.6	2.65
03488000	NF Holston River near Saltville	SV	36 53 59	81 45 00	222	21.7	47.6	2,730	63	43.4	2.58
03488500	NF Holston River at Holston	SV	36 46 12	82 04 11	402	17.7	72.8	2,500	65	44.8	2.41
03489500	NF Holston River at Mendota	SV	36 42 00	82 18 36	493	13.9	93.2	2,480	66	44.1	2.51
03489800	Cove Creek near Shelleys	SV	36 38 59	82 20 59	17.3	68.3	8.4	1,500	70	45.9	2.52
03489850	Cove Creek near Hilton	SV	36 38 59	82 21 35	17.6	62.7	8.9	1,500	70	45.9	2.52
03489870	Big Moccasin Creek near Hansonville	SV	36 44 24	82 19 11	41.9	24.4	22.1	2,110	30	45.0	2.50
03489900	Big Moccasin Creek near Gate City	SV	36 38 59	82 32 59	79.6	16.7	51.9	2,290	25	46.0	2.50
03490000	NF Holston River near Gate City	SV	36 36 35	82 34 11	672	9.69	124	2,370	64	44.4	2.50
03521500	Clinch River at Richlands	SV	37 05 24	81 46 48	139	23	37.5	2,580	34	44.8	2.65

Appendix 1. Basin characteristics at peak-discharge gaging stations in Virginia—Continued

[Modified from Miller, 1978, p. 34–51; Kentucky stations are from Choquette (1987, p. 98–105); Peak-discharge regions are shown in figure 1 and plate 1; M, is mixed regions; --, no data is available; latitude and longitude are reported in degrees, minutes, and seconds; R., river; nr, near; Cr., creek; Trib., tributary; SF, south fork; NF, north fork; MF, middle fork; WB, west branch; SB, south branch]

Station number	Station name	Peak-discharge region	Latitude	Longitude	Drainage area (square miles)	Main channel slope (feet per mile)	Main channel length (mile)	Mean basin elevation (feet)	Percent forest (percent plus one)	Mean annual precipitation (inch)	24 hour, 2 year rainfall (inch)
03523000	Cedar Creek near Lebanon	SV	36 54 35	82 02 24	51.5	39.6	15.6	2,400	40	43.5	2.48
03524000	Clinch River at Cleveland	SV	36 56 23	82 09 00	528	14.9	86.9	2,490	42	43.9	2.65
03524500	Guest River at Coeburn	M	36 55 47	82 27 35	87.3	13.1	25.9	2,520	81	47.6	2.92
03525000	Stony Creek at Fort Blackmore	SV	36 46 12	82 34 47	41.4	178	13.8	2,800	93	47.7	2.82
03526000	Copper Creek near Gate City	SV	36 40 12	82 34 11	106	16.1	44.7	2,100	35	45.5	2.52
03527000	Clinch River at Speers Ferry	M	36 38 59	82 45 00	1,126	9.36	148	2,300	50	45.3	2.67
03529500	Powell River at Big Stone Gap	AP	36 52 11	82 46 48	112	41.2	23.4	2,480	84	48.6	2.66
03530000	SF Powell River at Big Stone Gap	SV	36 51 35	82 46 11	40	156	14.6	2,370	63	48.7	2.65
03530500	NF Powell River at Pennington Gap	AP	36 46 12	83 01 48	70	59.4	14.8	2,500	95	50.3	2.70
03531000	Powell River near Pennington Gap	M	36 43 47	83 00 00	290	21.5	45.9	2,270	67	49.1	2.77
03531500	Powell River near Jonesville	M	36 39 35	83 05 24	319	16.8	58.9	2,290	64	49.4	2.73

Appendix 2. Peak-discharge characteristics for stream-gaging stations in Virginia—Continued

[Systematic period and number of years of record (N) reflect peaks used in computations. Stations where the systematic period is greater than the number of peaks implies that there are periods of missing record during the systematic period. Peak-discharge regions shown in figure 1 and plate 1. Peak-discharge values are presented in the following order: top line (S) is station estimate computed from the log-Pearson type III analysis; second line (R) is computed from the regional regression; third line (W) is a weighted average of the two estimates. Stations not used in regressions list station estimate only. --, no data is available]

Station number	Period of record	Number of peaks (N)	Systematic period	Historical period	Peak-discharge region		Peak-discharge (cubic feet per second) Recurrence interval (years) 2	5	10	25	50	100	200	500
01484800	1965-91	27	27	--	C	S	28	52	73	108	141	181	228	304
						R	41	74	105	154	198	249	308	397
						W	28	53	77	115	151	194	245	325
01613900	1961-91	31	31	--	NV	S	837	1,540	2,080	2,840	3,450	4,100	4,770	5,720
						R	611	1,130	1,590	2,290	2,890	3,550	4,270	5,330
						W	811	1,450	1,930	2,630	3,210	3,840	4,530	5,540
01615000	1944-91	48	48	--	NV	S	2,160	4,030	5,640	8,120	10,300	12,800	15,700	20,000
						R	1,610	2,970	4,150	5,920	7,400	9,030	10,800	13,500
						W	2,110	3,870	5,290	7,410	9,240	11,300	13,700	17,300
01616000	1950-91	24	42	--	NV	S	483	813	1,080	1,460	1,780	2,130	2,520	3,100
						R	611	1,120	1,570	2,240	2,810	3,420	4,090	5,080
						W	498	876	1,220	1,760	2,220	2,710	3,240	4,000
01620500	1947-91	45	45	--	NV	S	668	1,500	2,430	4,270	6,330	9,200	13,200	20,700
						R	665	1,240	1,760	2,570	3,260	4,030	4,860	6,090
						W	668	1,450	2,240	3,620	4,980	6,750	9,110	13,500
01621000	1943-86	31	44	55	NV	S	2,260	3,990	5,680	8,660	11,700	15,500	20,500	29,100
						R	2,290	4,300	6,080	8,800	11,100	13,800	16,700	21,100
						W	2,260	4,030	5,760	8,700	11,500	14,800	18,900	25,900
01621200	1949-76	27	28	--	NV	S	548	960	1,320	1,890	2,420	3,030	3,760	4,920
						R	465	852	1,200	1,720	2,160	2,650	3,190	3,990
						W	539	938	1,280	1,820	2,310	2,860	3,500	4,490
01621400	1949-61	13	13	40	NV	S	469	690	867	1,130	1,350	1,610	1,890	2,330
						R	244	412	543	715	848	988	1,140	1,370
						W	425	605	737	929	1,090	1,280	1,500	1,830

Appendix 2. Peak-discharge characteristics for stream-gaging stations in Virginia—Continued

[Systematic period and number of years of record (N) reflect peaks used in computations. Stations where the systematic period is greater than the number of peaks implies that there are periods of missing record during the systematic period. Peak-discharge regions shown in figure 1 and plate 1. Peak-discharge values are presented in the following order: top line (S) is station estimate computed from the log-Pearson type III analysis; second line (R) is computed from the regional regression; third line (W) is a weighted average of the two estimates. Stations not used in regressions list station estimate only. --, no data is available]

Station number	Period of record	Number of peaks (N)	Systematic period	Historical period	Peak-discharge region		Peak-discharge (cubic feet per second) Recurrence interval (years) 2	5	10	25	50	100	200	500
01621450	1966-75	10	10	25	NV	S	41	69	96	141	185	239	306	419
						R	52	90	122	166	201	239	279	336
						W	43	76	107	154	194	239	290	370
01622000	1924-91	63	68	130	NV	S	7,150	13,400	19,600	30,600	41,800	56,200	74,700	107,000
						R	8,080	15,100	21,100	30,100	37,700	46,200	55,800	70,400
						W	7,210	13,600	19,800	30,500	40,700	53,200	68,900	96,200
01622100	1966-75	10	10	--	NV	S	58	102	138	194	242	298	361	457
						R	91	163	225	319	396	478	565	692
						W	65	123	179	265	336	411	492	607
01622300	1967-76	10	10	--	NV	S	53	74	89	110	128	146	166	194
						R	44	80	113	165	210	258	309	383
						W	50	76	100	140	174	210	248	300
01622400	1967-91	21	25	--	NV	S	50	84	114	163	207	261	324	426
						R	44	78	110	157	197	241	288	355
						W	49	83	113	161	203	252	308	394
01624300	1968-86	19	19	50	NV	S	4,340	7,500	10,200	14,600	18,500	23,100	28,600	37,200
						R	4,290	8,040	11,300	16,300	20,500	25,200	30,400	38,300
						W	4,330	7,640	10,600	15,400	19,600	24,300	29,700	37,900
01624800	1968-91	24	24	--	NV	S	2,440	3,830	4,790	6,040	6,990	7,940	8,910	10,200
						R	1,980	3,640	5,090	7,240	9,050	11,000	13,200	16,500
						W	2,370	3,780	4,900	6,570	7,970	9,480	11,100	13,400
01625000	1924-91	65	68	115	NV	S	6,190	11,700	16,200	23,000	28,700	35,000	42,000	52,300
						R	6,720	12,500	17,500	24,800	31,000	37,700	45,200	56,400
						W	6,220	11,800	16,400	23,400	29,200	35,700	42,900	53,400

Appendix 2. Peak-discharge characteristics for stream-gaging stations in Virginia—Continued

Station number	Period of record	Number of peaks (N)	Systematic period	Historical period	Peak-discharge region		Peak-discharge (cubic feet per second) Recurrence interval (years) 2	5	10	25	50	100	200	500
01626000	1943-91	40	49	--	M	S	2,660	5,910	9,360	15,800	22,600	31,600	43,400	64,600
01626850	1975-91	17	17	25	M	S	2,910	6,110	9,360	15,200	21,100	28,800	38,600	55,700
01627500	1924-91	50	68	120	M	S	5,090	10,100	14,100	19,900	24,700	29,700	35,100	42,800
01628500	1931-91	61	61	120	NV	S	16,200	30,100	42,400	62,200	80,400	102,000	127,000	168,000
						R	19,600	36,800	51,100	72,100	90,000	110,000	133,000	168,000
						W	16,400	30,700	43,600	64,200	82,600	104,000	129,000	168,000
01629500	1924-91	33	68	120	NV	S	19,300	38,000	55,600	85,100	113,000	147,000	189,000	257,000
						R	21,000	39,700	55,800	79,900	100,000	123,000	149,000	189,000
						W	19,500	38,300	55,600	83,000	108,000	136,000	170,000	224,000
01629945	1959-91	32	33	--	B	S	174	382	573	880	1,160	1,480	1,850	2,420
						R	229	464	676	1,000	1,290	1,610	1,970	2,510
						W	179	394	593	909	1,190	1,520	1,880	2,450
01631000	1900-91	67	92	120	NV	S	20,700	38,900	55,400	82,100	107,000	136,000	171,000	227,000
						R	21,900	41,600	58,700	84,400	106,000	131,000	158,000	199,000
						W	20,700	39,200	55,900	82,600	107,000	135,000	167,000	219,000
01632000	1924-91	67	68	155	NV	S	8,110	14,500	19,600	26,900	32,900	39,300	46,300	56,300
						R	5,330	10,000	14,100	20,400	25,800	31,800	38,600	48,900
						W	7,950	14,000	18,700	25,300	30,900	37,100	44,000	54,100
01632300	1950-77	24	28	--	NV	S	128	296	477	816	1,170	1,650	2,260	3,370
						R	360	639	874	1,210	1,490	1,780	2,110	2,580
						W	144	348	572	953	1,300	1,710	2,190	3,000
01632900	1961-91	30	31	--	NV	S	2,030	3,830	5,430	7,970	10,300	13,000	16,100	21,100
						R	2,420	4,500	6,320	9,060	11,400	13,900	16,800	21,000
						W	2,070	3,970	5,710	8,430	10,800	13,500	16,500	21,000
01632950	1966-75	10	10	--	NV	S	23	34	42	53	62	71	81	95
						R	29	52	74	108	137	168	201	248
						W	24	39	54	79	100	121	144	174

Appendix 2. Peak-discharge characteristics for stream-gaging stations in Virginia—Continued

[Systematic period and number of years of record (N) reflect peaks used in computations. Stations where the systematic period is greater than the number of peaks implies that there are periods of missing record during the systematic period. Peak-discharge regions shown in figure 1 and plate 1. Peak-discharge values are presented in the following order: top line (S) is station estimate computed from the log-Pearson type III analysis; second line (R) is computed from the regional regression; third line (W) is a weighted average of the two estimates. Stations not used in regressions list station estimate only. --, no data is available]

Station number	Period of record	Number of peaks (N)	Systematic period	Historical period	Peak-discharge region		Peak-discharge (cubic feet per second) Recurrence interval (years) 2	5	10	25	50	100	200	500
01632970	1972-91	19	20	--	NV	S	701	1,270	1,740	2,470	3,100	3,820	4,630	5,870
						R	320	581	810	1,150	1,440	1,760	2,100	2,610
						W	623	1,030	1,310	1,720	2,080	2,500	2,980	3,730
01633000	1943-91	49	49	155	NV	S	10,300	17,400	22,800	30,400	36,600	43,300	50,400	60,700
						R	10,100	19,000	26,600	37,900	47,500	58,300	70,400	88,900
						W	10,300	17,500	23,400	32,200	39,600	47,700	56,400	69,100
01633500	1943-76	30	34	63	NV	S	1,930	3,590	5,060	7,390	9,510	12,000	14,900	19,500
						R	2,260	4,240	6,010	8,710	11,000	13,600	16,500	20,700
						W	1,960	3,690	5,290	7,830	10,100	12,700	15,600	20,000
01633650	1971-91	21	21	--	NV	S	114	229	340	528	712	940	1,220	1,690
						R	225	407	567	809	1,010	1,240	1,480	1,850
						W	124	259	397	627	833	1,070	1,340	1,760
01634000	1926-89	64	64	120	NV	S	11,100	20,200	28,200	40,800	52,200	65,600	81,100	106,000
						R	11,800	22,300	31,500	45,300	57,100	70,200	84,700	107,000
						W	11,100	20,400	28,600	41,700	53,400	66,800	82,200	106,000
01634500	1936-91	55	56	--	NV	S	3,110	6,320	9,450	14,800	20,100	26,700	34,900	48,700
						R	2,780	5,230	7,400	10,700	13,600	16,800	20,300	25,600
						W	3,090	6,180	9,020	13,600	17,900	23,000	29,200	39,600
01635500	1933-91	59	59	--	NV	S	2,210	4,340	6,510	10,400	14,400	19,600	26,400	38,300
						R	2,180	4,120	5,860	8,560	10,900	13,400	16,200	20,300
						W	2,210	4,310	6,380	9,920	13,300	17,600	22,900	32,300
01636210	1936-77	31	42	--	B	S	797	1,600	2,460	4,050	5,750	8,010	11,000	16,600
						R	709	1,370	1,950	2,820	3,570	4,420	5,370	6,770
						W	786	1,560	2,330	3,680	5,050	6,820	9,120	13,200

Appendix 2. Peak-discharge characteristics for stream-gaging stations in Virginia—Continued

Station number	Period of record	Number of peaks (N)	Systematic period	Historical period	Peak-discharge region		Peak-discharge (cubic feet per second) Recurrence interval (years) 2	5	10	25	50	100	200	500
01638480	1971-91	21	21	40	B	S	3,880	7,470	10,700	15,900	20,600	26,300	32,800	43,300
						R	2,900	5,280	7,270	10,200	12,800	15,600	18,700	23,400
						W	3,700	6,870	9,530	13,600	17,300	21,500	26,400	33,900
01643700	1966-91	24	26	100	B	S	3,480	6,020	8,040	11,000	13,400	16,100	19,000	23,200
						R	3,690	6,640	9,110	12,800	15,900	19,400	23,200	28,900
						W	3,510	6,150	8,320	11,500	14,200	17,200	20,400	25,200
01644000	1889-91	65	103	--	B	S	6,990	14,100	21,000	33,400	45,700	61,300	81,100	115,000
						R	7,860	13,700	18,400	25,500	31,400	38,000	45,300	55,900
						W	7,040	14,000	20,700	32,100	43,100	56,900	74,100	103,000
01644100	1966-77	12	12	25	B	S	348	573	757	1,030	1,270	1,540	1,850	2,310
						R	165	339	497	741	956	1,200	1,470	1,880
						W	290	480	638	886	1,110	1,360	1,650	2,090
01644291	1972-81	10	10	15	NP	S	100	155	202	274	339	414	501	639
						R	34	62	87	125	158	195	237	300
						W	88	127	157	206	251	305	368	468
01644295	1968-78	11	11	20	NP	S	80	156	225	336	438	559	702	928
						R	85	152	211	302	383	474	577	735
						W	80	155	220	323	415	521	644	836
01645700	1950-70	20	21	30	NP	S	470	717	894	1,130	1,320	1,510	1,710	1,980
						R	464	810	1,110	1,590	2,010	2,500	3,060	3,930
						W	470	730	936	1,240	1,500	1,780	2,080	2,520
01645784	1972-91	12	20	--	NP	S	323	526	681	899	1,080	1,270	1,480	1,780
01646000	1935-91	57	57	--	NP	S	1,570	2,990	4,510	7,460	10,700	15,100	21,200	32,800
						R	2,550	4,330	5,900	8,390	10,600	13,300	16,300	21,100
						W	1,600	3,050	4,600	7,540	10,700	14,900	20,700	31,800

Appendix 2. Peak-discharge characteristics for stream-gaging stations in Virginia—Continued

[Systematic period and number of years of record (N) reflect peaks used in computations. Stations where the systematic period is greater than the number of peaks implies that there are periods of missing record during the systematic period. Peak-discharge regions shown in figure 1 and plate 1. Peak-discharge values are presented in the following order: top line (S) is station estimate computed from the log-Pearson type III analysis; second line (R) is computed from the regional regression; third line (W) is a weighted average of the two estimates. Stations not used in regressions list station estimate only. --, no data is available]

Station number	Period of record	Number of peaks (N)	Systematic period	Historical period	Peak-discharge region		Peak-discharge (cubic feet per second)							
							Recurrence interval (years)							
							2	5	10	25	50	100	200	500
01646200	1961-73	13	13	--	NP	S	1,110	2,190	3,230	5,000	6,720	8,860	11,500	15,900
						R	492	858	1,180	1,680	2,130	2,650	3,240	4,170
						W	1,010	1,790	2,410	3,380	4,290	5,400	6,760	9,030
01646600	1961-70	10	10	--	NP	S	621	931	1,160	1,480	1,740	2,020	2,330	2,760
01652400	1961-75	15	15	--	NP	S	683	909	1,070	1,300	1,480	1,670	1,880	2,180
01652430	1966-75	10	10	--	C	S	662	1,040	1,360	1,860	2,300	2,820	3,430	4,380
01652500	1947-91	40	45	--	M	S	2,900	5,270	7,320	10,500	13,400	16,700	20,600	26,600
01652600	1960-72	12	13	20	NP	S	562	1,160	1,710	2,640	3,520	4,570	5,840	7,890
01652610	1960-72	12	13	25	NP	S	740	1,380	2,010	3,150	4,310	5,810	7,750	11,200
01652910	1960-70	11	11	--	M	S	2,110	3,700	5,020	7,000	8,710	10,600	12,800	16,100
01653000	1956-91	36	36	50	M	S	4,020	6,720	8,800	11,700	14,200	16,800	19,600	23,600
01653900	1961-70	10	10	25	NP	S	1,170	2,170	3,130	4,800	6,450	8,520	11,100	15,600
01654000	1947-91	44	45	50	NP	S	2,050	3,890	5,610	8,500	11,300	14,600	18,800	25,600
						R	1,410	2,420	3,310	4,720	5,980	7,450	9,140	11,800
						W	2,020	3,750	5,300	7,810	10,200	13,100	16,600	22,400
01654500	1947-69	22	23	--	NP	S	426	989	1,630	2,930	4,390	6,430	9,260	14,700
						R	422	738	1,010	1,450	1,840	2,280	2,790	3,580
						W	426	948	1,490	2,460	3,470	4,800	6,590	9,890
01655350	1961-70	10	10	25	NP	S	809	1,180	1,500	2,000	2,450	2,990	3,620	4,640
						R	1,050	1,810	2,480	3,540	4,490	5,580	6,850	8,830
						W	842	1,320	1,780	2,530	3,210	3,970	4,850	6,210

Appendix 2. Peak-discharge characteristics for stream-gaging stations in Virginia—Continued

Station number	Period of record	Number of peaks (N)	Systematic period	Historical period	Peak-discharge region		Peak-discharge (cubic feet per second) Recurrence interval (years) 2	5	10	25	50	100	200	500
01655500	1951-91	41	41	50	B	S	909	2,010	3,080	4,890	6,630	8,730	11,300	15,400
						R	642	1,250	1,770	2,580	3,270	4,050	4,920	6,210
						W	881	1,880	2,790	4,260	5,620	7,240	9,170	12,200
01656000	1951-91	41	41	50	M	S	3,410	6,160	8,660	12,800	16,700	21,400	27,100	36,400
01656100	1973-87	15	15	--	M	S	9,080	11,600	13,400	15,700	17,500	19,300	21,200	23,800
01656200	1950-89	35	40	50	B	S	84	131	164	207	241	274	309	356
01656500	1951-86	35	36	60	B	S	1,680	3,230	4,730	7,350	9,950	13,200	17,400	24,500
						R	1,880	3,480	4,840	6,880	8,630	10,600	12,700	15,900
						W	1,700	3,260	4,750	7,230	9,600	12,500	16,100	22,100
01656600	1966-75	10	10	25	NP	S	99	192	288	465	650	896	1,220	1,810
						R	153	273	377	539	682	846	1,030	1,320
						W	106	209	314	493	664	874	1,140	1,580
01656650	1975-86	12	12	--	M	S	3,100	6,000	8,490	12,300	15,700	19,500	23,800	30,400
01656700	1969-81	13	13	25	M	S	11,400	20,000	26,800	36,900	45,400	54,800	65,200	80,600
01656725	1970-86	17	17	50	NP	S	1,970	3,520	5,100	7,980	11,000	15,000	20,200	29,700
						R	1,500	2,570	3,520	5,010	6,350	7,910	9,710	12,500
						W	1,920	3,330	4,660	6,940	9,230	12,200	16,000	22,900
01656960	1973-86	14	14	25	NP	S	3,050	5,620	7,670	10,600	13,100	15,700	18,600	22,700
01657000	1951-81	31	31	50	NP	S	6,820	11,800	16,100	23,200	29,700	37,400	46,600	61,500
						R	4,710	7,920	10,800	15,300	19,400	24,200	29,900	38,800
						W	6,700	11,300	15,300	21,500	27,300	34,200	42,400	55,900
01657415	1972-84	13	13	50	NP	S	9,800	15,000	19,800	27,600	35,200	44,400	55,800	74,900
						R	5,450	9,150	12,400	17,600	22,400	28,000	34,500	44,800
						W	9,470	14,100	18,200	25,000	31,400	39,300	49,100	65,700

Appendix 2. Peak-discharge characteristics for stream-gaging stations in Virginia—Continued

[Systematic period and number of years of record (N) reflect peaks used in computations. Stations where the systematic period is greater than the number of peaks implies that there are periods of missing record during the systematic period. Peak-discharge regions shown in figure 1 and plate 1. Peak-discharge values are presented in the following order: top line (S) is station estimate computed from the log-Pearson type III analysis; second line (R) is computed from the regional regression; third line (W) is a weighted average of the two estimates. Stations not used in regressions list station estimate only. --, no data is available]

Station number	Period of record	Number of peaks (N)	Systematic period	Historical period	Peak-discharge region		Peak-discharge (cubic feet per second)							
							Recurrence interval (years)							
							2	5	10	25	50	100	200	500
01657500	1914-55	25	42	50	NP	S	12,500	18,600	22,900	28,900	33,600	38,600	43,800	51,200
						R	11,400	18,900	25,600	36,200	46,000	57,500	71,100	92,700
						W	12,500	18,600	23,300	30,200	36,100	42,400	49,400	59,600
01658500	1952-91	40	40	--	NP	S	489	990	1,510	2,490	3,530	4,920	6,750	10,100
						R	677	1,180	1,610	2,300	2,910	3,620	4,440	5,710
						W	496	1,000	1,520	2,460	3,420	4,670	6,290	9,210
01660400	1972-91	20	20	40	NP	S	1,470	2,710	4,000	6,380	8,900	12,300	16,700	24,900
						R	1,830	3,130	4,270	6,070	7,700	9,600	11,800	15,200
						W	1,500	2,770	4,040	6,280	8,540	11,400	15,200	21,900
01661600	1969-91	20	23	--	C	S	738	960	1,140	1,390	1,610	1,860	2,130	2,540
						R	206	375	540	818	1,080	1,390	1,760	2,340
						W	685	872	1,020	1,250	1,470	1,730	2,030	2,500
01661800	1964-91	28	28	--	C	S	168	291	394	549	685	838	1,010	1,280
						R	213	389	561	854	1,130	1,460	1,850	2,470
						W	170	299	414	598	767	962	1,190	1,540
01661900	1977-91	15	15	25	B	S	1,100	1,980	2,790	4,140	5,430	7,010	8,940	12,100
01662000	1943-91	49	49	75	B	S	4,020	7,150	9,930	14,400	18,600	23,500	29,300	38,700
						R	5,240	9,280	12,600	17,600	21,800	26,500	31,600	39,200
						W	4,100	7,370	10,300	15,000	19,200	24,100	29,800	38,900
01662300	1967-76	10	10	20	B	S	51	83	110	149	183	221	264	329
						R	122	254	375	563	728	915	1,130	1,440
						W	65	127	190	290	377	472	576	735
01662500	1954-77	24	24	--	B	S	517	977	1,440	2,260	3,110	4,210	5,630	8,150
						R	735	1,420	2,010	2,920	3,700	4,570	5,550	7,000
						W	545	1,060	1,570	2,440	3,290	4,330	5,620	7,830

Appendix 2. Peak-discharge characteristics for stream-gaging stations in Virginia—Continued

Station number	Period of record	Number of peaks (N)	Systematic period	Historical period	Peak-discharge region		Peak-discharge (cubic feet per second) Recurrence interval (years) 2	5	10	25	50	100	200	500
01662800	1959-91	33	33	--	B	S	1,120	2,270	3,480	5,700	8,040	11,100	15,200	22,600
						R	1,190	2,240	3,150	4,520	5,700	7,010	8,480	10,700
						W	1,130	2,260	3,400	5,380	7,350	9,880	13,100	18,800
01663000	1943-56	14	14	50	B	S	5,370	10,500	15,700	25,000	34,500	46,700	62,400	90,200
						R	4,120	7,370	10,100	14,100	17,500	21,300	25,600	31,800
						W	5,060	9,370	13,200	19,400	25,400	32,700	41,700	56,600
01663500	1937-90	50	54	100	B	S	7,460	14,000	20,600	32,200	43,900	59,000	78,400	112,000
						R	7,030	12,300	16,600	23,000	28,400	34,400	41,100	50,800
						W	7,430	13,800	19,900	30,400	40,700	53,800	70,400	99,000
01664000	1943-91	49	49	150	B	S	11,700	19,700	26,900	38,700	49,800	63,100	79,100	105,000
						R	12,600	21,500	28,700	39,300	48,300	58,100	69,000	84,900
						W	11,800	19,900	27,200	38,800	49,500	62,200	77,300	102,000
01664500	1886-1952	31	67	150	B	S	12,300	22,800	32,600	49,000	64,700	83,900	107,000	146,000
						R	13,000	22,000	29,400	40,300	49,400	59,400	70,500	86,800
						W	12,400	22,700	31,900	46,600	60,200	76,400	95,800	127,000
01664800	1966-75	10	10	30	NP	S	200	415	612	933	1,230	1,580	1,990	2,640
						R	307	539	743	1,060	1,340	1,670	2,040	2,610
						W	213	444	654	984	1,280	1,620	2,010	2,620
01665000	1950-91	42	42	--	M	S	639	1,360	2,130	3,610	5,220	7,400	10,300	15,800
01665050	1958-91	32	34	--	NP	S	61	114	158	223	277	338	405	504
						R	81	146	202	290	367	455	554	705
						W	62	117	163	233	293	359	433	543
01665500	1943-91	48	49	90	B	S	4,130	8,270	12,200	18,600	24,800	32,200	41,200	55,800
						R	3,490	6,280	8,630	12,100	15,100	18,400	22,000	27,400
						W	4,070	8,000	11,500	17,200	22,400	28,600	36,000	47,900

Appendix 2. Peak-discharge characteristics for stream-gaging stations in Virginia—Continued

[Systematic period and number of years of record (N) reflect peaks used in computations. Stations where the systematic period is greater than the number of peaks implies that there are periods of missing record during the systematic period. Peak-discharge regions shown in figure 1 and plate 1. Peak-discharge values are presented in the following order: top line (S) is station estimate computed from the log-Pearson type III analysis; second line (R) is computed from the regional regression; third line (W) is a weighted average of the two estimates. Stations not used in regressions list station estimate only. --, no data is available]

Station number	Period of record	Number of peaks (N)	Systematic period	Historical period	Peak-discharge region		Peak-discharge (cubic feet per second) Recurrence interval (years) 2	5	10	25	50	100	200	500
01666500	1943-91	49	49	90	M	S	5,430	10,200	14,500	21,500	27,900	35,600	44,700	59,400
01667000	1901-66	35	66	90	M	S	7,980	15,100	21,600	32,100	41,900	53,600	67,500	89,800
01667500	1931-91	61	61	90	M	S	9,240	16,900	23,800	34,900	45,200	57,400	71,900	95,200
01667600	1966-75	10	10	--	NP	S	77	105	126	152	172	194	215	246
						R	125	223	309	442	560	694	846	1,080
						W	82	127	169	234	289	349	412	503
01668000	1908-91	84	84	100	M	S	27,700	43,600	56,500	75,800	92,700	112,000	133,000	167,000
01668300	1966-91	26	26	--	C	S	72	148	228	380	542	759	1,050	1,580
						R	138	260	387	615	838	1,110	1,440	1,990
						W	74	156	245	415	594	829	1,130	1,680
01668500	1944-91	48	48	--	C	S	584	1,240	1,950	3,320	4,820	6,870	9,640	14,800
						R	1,010	1,810	2,590	3,910	5,170	6,660	8,430	11,300
						W	594	1,260	1,990	3,380	4,860	6,860	9,520	14,500
01668800	1965-91	27	27	50	C	S	142	236	317	443	558	692	849	1,100
						R	321	575	814	1,210	1,580	2,010	2,510	3,300
						W	149	257	362	539	704	897	1,120	1,470
01669000	1952-90	39	39	50	C	S	286	552	813	1,270	1,730	2,310	3,040	4,310
						R	641	1,150	1,640	2,470	3,260	4,190	5,290	7,050
						W	295	578	868	1,390	1,900	2,550	3,360	4,740
01669500	1944-81	38	38	50	C	S	581	1,230	1,900	3,110	4,350	5,950	7,990	11,600
						R	683	1,170	1,580	2,230	2,800	3,440	4,170	5,270
						W	585	1,230	1,870	2,960	4,040	5,380	7,050	9,890

Appendix 2. Peak-discharge characteristics for stream-gaging stations in Virginia—Continued

Station number	Period of record	Number of peaks (N)	Systematic period	Historical period	Peak-discharge region		Peak-discharge (cubic feet per second) Recurrence interval (years) 2	5	10	25	50	100	200	500
01669800	1971-91	19	21	--	C	S	160	231	292	387	473	574	693	883
						R	189	348	508	784	1,050	1,360	1,740	2,350
						W	162	241	317	448	571	716	886	1,150
01670000	1950-88	39	39	--	C	S	113	241	365	578	785	1,040	1,350	1,870
						R	122	218	305	446	573	720	888	1,150
						W	113	239	359	558	746	973	1,250	1,690
01670300	1976-91	16	16	--	SP	S	487	978	1,440	2,200	2,910	3,780	4,820	6,510
01671000	1927-72	46	46	75	SP	S	5,420	8,950	12,000	16,700	21,000	26,100	32,000	41,300
						R	4,950	8,010	10,500	14,300	17,500	21,200	25,300	31,400
						W	5,410	8,860	11,800	16,300	20,400	25,100	30,600	39,300
01671100	1962-91	30	30	75	SP	S	1,740	3,300	4,730	7,070	9,260	11,900	15,100	20,200
						R	1,780	2,980	3,950	5,450	6,750	8,220	9,870	12,300
						W	1,740	3,250	4,560	6,610	8,460	10,600	13,200	17,200
01671500	1949-79	31	31	75	SP	S	250	445	639	986	1,340	1,800	2,400	3,460
						R	281	515	723	1,060	1,360	1,720	2,120	2,750
						W	253	456	657	1,000	1,350	1,780	2,330	3,290
01671615	1961-91	31	31	--	SP	S	122	270	429	733	1,060	1,500	2,080	3,150
						R	107	208	304	468	623	811	1,030	1,390
						W	120	255	390	637	895	1,230	1,680	2,480
01671650	1969-91	22	23	--	SP	S	367	830	1,310	2,200	3,100	4,270	5,770	8,400
						R	232	431	611	905	1,170	1,490	1,860	2,430
						W	346	704	1,020	1,550	2,080	2,750	3,580	5,010
01671750	1969-91	23	23	--	SP	S	521	940	1,350	2,080	2,810	3,760	4,970	7,090
						R	272	504	716	1,060	1,380	1,760	2,190	2,880
						W	483	813	1,110	1,630	2,160	2,850	3,730	5,270

Appendix 2. Peak-discharge characteristics for stream-gaging stations in Virginia—Continued

[Systematic period and number of years of record (N) reflect peaks used in computations. Stations where the systematic period is greater than the number of peaks implies that there are periods of missing record during the systematic period. Peak-discharge regions shown in figure 1 and plate 1. Peak-discharge values are presented in the following order: top line (S) is station estimate computed from the log-Pearson type III analysis; second line (R) is computed from the regional regression; third line (W) is a weighted average of the two estimates. Stations not used in regressions list station estimate only. --, no data is available]

Station number	Period of record	Number of peaks (N)	Systematic period	Historical period	Peak-discharge region		Peak-discharge (cubic feet per second) Recurrence interval (years) 2	5	10	25	50	100	200	500
01672500	1928-91	62	64	75	SP	S	4,010	6,530	8,740	12,300	15,600	19,500	24,100	31,600
						R	4,000	6,530	8,540	11,500	13,900	16,600	19,600	23,900
						W	4,010	6,520	8,710	12,200	15,300	19,000	23,400	30,500
01673000	1942-91	50	50	75	SP	S	8,970	13,800	17,700	23,300	28,100	33,400	39,400	48,300
						R	9,360	14,800	19,100	25,800	31,600	38,100	45,400	56,200
						W	8,990	13,900	17,800	23,700	28,700	34,300	40,600	50,000
01673500	1945-77	30	33	--	C	S	113	210	302	459	612	802	1,040	1,440
						R	138	249	354	526	684	869	1,080	1,420
						W	114	213	308	470	626	817	1,050	1,440
01673550	1978-91	14	14	--	C	S	307	511	687	964	1,210	1,510	1,860	2,400
01673800	1963-91	29	29	50	NP	S	1,850	3,070	4,110	5,740	7,220	8,930	10,900	14,100
						R	3,080	5,220	7,110	10,100	12,800	16,000	19,700	25,500
						W	1,900	3,240	4,460	6,410	8,170	10,200	12,600	16,300
01674000	1928-91	50	64	65	M	S	3,140	5,870	8,150	11,600	14,600	17,900	21,700	27,300
01674100	1967-76	10	10	50	C	S	101	162	217	310	398	508	642	867
						R	99	187	278	438	594	784	1,010	1,390
						W	101	167	233	351	468	610	782	1,070
01674200	1951-91	39	41	50	C	S	175	275	370	533	694	898	1,150	1,600
						R	262	464	647	943	1,210	1,520	1,870	2,420
						W	178	284	390	575	756	979	1,260	1,730
01674500	1928-91	49	64	100	M	S	3,580	6,330	8,600	12,000	15,000	18,300	22,000	27,700
01674700	1969-88	19	20	--	C	S	219	375	512	734	940	1,190	1,480	1,950
						R	258	478	700	1,090	1,460	1,920	2,460	3,350
						W	222	386	541	806	1,060	1,360	1,730	2,320

Appendix 2. Peak-discharge characteristics for stream-gaging stations in Virginia—Continued

Station number	Period of record	Number of peaks (N)	Systematic period	Historical period	Peak-discharge region		Peak-discharge (cubic feet per second) Recurrence interval (years) 2	5	10	25	50	100	200	500
01677000	1980-91	12	12	30	C	S	49	80	108	153	197	249	313	420
02009500	1966-75	10	10	--	CV	S	32	39	44	51	56	61	66	73
02011400	1972-91	19	20	75	CV	S	3,640	5,550	7,140	9,590	11,800	14,300	17,200	21,700
02011460	1975-91	17	17	75	CV	S	2,430	3,680	4,750	6,430	7,960	9,750	11,900	15,300
02011480	1974-84	11	11	--	CV	S	4,370	6,180	7,430	9,060	10,300	11,600	12,900	14,700
						R	2,980	5,290	7,260	10,200	12,700	15,500	18,600	23,200
						W	3,970	5,820	7,350	9,700	11,700	13,900	16,200	19,600
02011500	1951-84	34	34	75	CV	S	5,830	8,620	10,500	12,900	14,700	16,500	18,300	20,800
						R	4,230	7,260	9,780	13,500	16,600	19,900	23,700	29,100
						W	5,630	8,350	10,300	13,100	15,400	17,700	20,200	23,700
02012500	1913-79	56	67	75	CV	S	10,200	15,800	19,700	24,600	28,200	31,900	35,500	40,400
						R	10,200	16,100	20,700	27,000	32,100	37,600	43,400	51,800
						W	10,200	15,800	19,800	25,000	29,000	33,100	37,200	42,900
02012950	1967-86	15	20	25	CV	S	40	124	226	428	647	941	1,330	2,010
						R	64	165	282	500	719	991	1,330	1,900
						W	47	142	255	470	690	971	1,330	1,950
02013000	1929-91	63	63	75	CV	S	5,010	8,070	10,400	13,600	16,200	19,000	22,000	26,200
						R	4,960	8,390	11,200	15,300	18,700	22,400	26,400	32,300
						W	5,000	8,110	10,500	13,900	16,800	19,800	23,000	27,700
02014000	1929-91	53	63	122	CV	S	3,710	5,670	7,080	8,970	10,400	12,000	13,600	15,800
						R	4,700	7,980	10,700	14,600	17,900	21,500	25,400	31,200
						W	3,770	5,900	7,570	9,980	11,900	14,000	16,100	19,000
02014500	1947-56	10	10	--	CV	S	425	733	988	1,370	1,710	2,090	2,520	3,170
						R	648	1,330	2,000	3,080	4,060	5,200	6,510	8,580
						W	520	1,070	1,630	2,540	3,330	4,200	5,180	6,660

Appendix 2. Peak-discharge characteristics for stream-gaging stations in Virginia—Continued

[Systematic period and number of years of record (N) reflect peaks used in computations. Stations where the systematic period is greater than the number of peaks implies that there are periods of missing record during the systematic period. Peak-discharge regions shown in figure 1 and plate 1. Peak-discharge values are presented in the following order: top line (S) is station estimate computed from the log-Pearson type III analysis; second line (R) is computed from the regional regression; third line (W) is a weighted average of the two estimates. Stations not used in regressions list station estimate only. --, no data is available]

Station number	Period of record	Number of peaks (N)	Systematic period	Historical period	Peak-discharge region		Peak-discharge (cubic feet per second)							
							Recurrence interval (years)							
							2	5	10	25	50	100	200	500
02015600	1949-91	41	43	75	CV	S	307	683	1,110	1,960	2,910	4,230	6,080	9,630
						R	603	1,250	1,880	2,910	3,850	4,930	6,190	8,180
						W	331	760	1,260	2,200	3,180	4,460	6,140	9,260
02015700	1961-91	31	31	--	CV	S	4,020	6,380	8,440	11,700	14,800	18,400	22,700	29,700
						R	3,620	6,310	8,570	11,900	14,700	17,800	21,300	26,300
						W	3,970	6,360	8,470	11,800	14,800	18,200	22,200	28,500
02016000	1913-91	67	79	--	CV	S	10,500	15,800	20,000	25,900	30,800	36,200	42,200	50,900
						R	11,200	17,500	22,300	29,000	34,400	40,100	46,200	54,900
						W	10,500	15,900	20,200	26,300	31,300	36,800	42,800	51,700
02016500	1878-1979	58	102	112	CV	S	29,100	43,900	54,100	67,400	77,500	87,700	98,100	112,000
						R	26,500	38,100	46,200	57,000	65,500	74,300	83,500	96,300
						W	29,000	43,500	53,300	65,900	75,500	85,300	95,300	109,000
02017000	1930-57	27	28	78	CV	S	174	252	306	379	435	493	554	638
02017300	1967-91	23	25	78	CV	S	3,930	5,960	7,720	10,500	13,100	16,100	19,600	25,400
						R	3,670	6,390	8,680	12,100	14,900	18,000	21,500	26,600
						W	3,900	6,040	7,970	11,000	13,700	16,800	20,400	26,000
02017400	1967-76	10	10	--	CV	S	81	179	281	469	665	920	1,250	1,840
						R	127	306	503	856	1,200	1,620	2,130	2,970
						W	102	254	429	742	1,040	1,410	1,860	2,600
02017500	1927-91	65	65	78	CV	S	2,970	4,370	5,280	6,410	7,230	8,040	8,830	9,870
						R	3,470	6,060	8,260	11,500	14,300	17,300	20,600	25,600
						W	3,000	4,500	5,590	7,090	8,270	9,470	10,700	12,300
02017700	1968-91	24	24	--	CV	S	167	369	570	923	1,270	1,710	2,250	3,160
						R	157	370	601	1,010	1,400	1,880	2,460	3,400
						W	164	369	585	969	1,340	1,800	2,360	3,290

Appendix 2. Peak-discharge characteristics for stream-gaging stations in Virginia—Continued

Station number	Period of record	Number of peaks (N)	Systematic period	Historical period	Peak-discharge region		Peak-discharge (cubic feet per second) Recurrence interval (years) 2	5	10	25	50	100	200	500
02018000	1926-91	66	66	100	CV	S	7,500	11,500	14,700	19,400	23,300	27,700	32,500	39,800
						R	8,590	13,800	17,800	23,500	28,200	33,100	38,500	46,200
						W	7,540	11,700	15,000	19,900	24,000	28,600	33,500	40,900
02018500	1944-91	48	48	50	CV	S	1,460	2,790	4,140	6,580	9,090	12,400	16,600	24,200
						R	1,450	2,750	3,940	5,790	7,410	9,240	11,300	14,500
						W	1,460	2,780	4,090	6,360	8,600	11,400	15,000	21,400
02018800	1969-91	22	23	--	CV	S	379	886	1,470	2,640	3,960	5,810	8,380	13,300
						R	275	613	965	1,570	2,130	2,810	3,610	4,900
						W	351	773	1,210	2,010	2,850	3,960	5,450	8,210
02019000	1928-37	10	10	--	CV	S	2,960	5,430	7,610	11,100	14,200	17,900	22,300	29,100
						R	3,470	6,060	8,260	11,500	14,300	17,300	20,600	25,600
						W	3,090	5,680	7,940	11,300	14,300	17,500	21,200	26,800
02019400	1928-73	21	46	50	CV	S	2,180	4,240	6,220	9,610	12,900	17,100	22,200	30,800
						R	1,290	2,480	3,570	5,280	6,790	8,500	10,400	13,400
						W	2,020	3,740	5,230	7,630	9,910	12,700	16,100	22,000
02019500	1878-1989	100	112	120	CV	S	37,500	56,200	69,800	88,200	103,000	118,000	135,000	158,000
						R	36,700	51,100	60,900	73,700	83,600	93,800	104,000	119,000
						W	37,500	55,900	69,100	86,700	100,000	115,000	130,000	152,000
02020100	1968-91	24	24	--	CV	S	366	631	854	1,200	1,500	1,840	2,230	2,830
						R	158	371	603	1,010	1,410	1,890	2,460	3,410
						W	295	515	725	1,090	1,450	1,860	2,350	3,120
02020200	1949-76	27	28	50	CV	S	536	1,170	1,820	2,960	4,100	5,540	7,350	10,400
						R	665	1,360	2,040	3,140	4,140	5,290	6,630	8,720
						W	559	1,230	1,900	3,040	4,120	5,420	7,010	9,640
02020500	1939-91	53	53	60	CV	S	5,600	10,400	14,900	22,400	29,600	38,300	48,900	66,500
						R	4,480	7,640	10,300	14,100	17,300	20,800	24,600	30,200
						W	5,530	10,100	14,100	20,500	26,300	33,200	41,600	55,500

Appendix 2. Peak-discharge characteristics for stream-gaging stations in Virginia—Continued

[Systematic period and number of years of record (N) reflect peaks used in computations. Stations where the systematic period is greater than the number of peaks implies that there are periods of missing record during the systematic period. Peak-discharge regions shown in figure 1 and plate 1. Peak-discharge values are presented in the following order: top line (S) is station estimate computed from the log-Pearson type III analysis; second line (R) is computed from the regional regression; third line (W) is a weighted average of the two estimates. Stations not used in regressions list station estimate only. --, no data is available]

Station number	Period of record	Number of peaks (N)	Systematic period	Historical period	Peak-discharge region		Peak-discharge (cubic feet per second)							
							Recurrence interval (years)							
							2	5	10	25	50	100	200	500
02021000	1926-38	13	13	--	CV	S	7,000	11,700	15,400	20,800	25,300	30,200	35,600	43,600
						R	5,570	9,310	12,300	16,700	20,400	24,300	28,600	34,900
						W	6,690	10,900	14,100	18,600	22,500	26,700	31,400	38,300
02021500	1929-91	63	63	--	CV	S	9,430	15,900	21,600	30,400	38,500	48,000	59,200	77,000
						R	8,590	13,800	17,800	23,500	28,200	33,100	38,500	46,200
						W	9,400	15,700	21,100	29,200	36,400	44,700	54,400	69,900
02021700	1967-91	24	25	50	CV	S	364	732	1,130	1,880	2,700	3,810	5,310	8,130
						R	644	1,320	1,990	3,070	4,040	5,180	6,490	8,540
						W	410	882	1,420	2,370	3,280	4,420	5,850	8,370
02022500	1927-91	65	65	--	CV	S	2,300	4,840	7,180	11,000	14,600	18,800	23,700	31,600
						R	1,470	2,790	3,990	5,860	7,500	9,340	11,400	14,600
						W	2,220	4,470	6,380	9,380	12,100	15,400	19,300	25,500
02023000	1926-69	36	44	92	CV	S	9,580	14,800	18,900	24,700	29,500	34,900	40,700	49,300
						R	11,700	18,200	23,100	30,000	35,500	41,400	47,600	56,500
						W	9,740	15,200	19,600	26,000	31,200	36,800	42,800	51,600
02023300	1951-87	34	37	50	B	S	757	1,390	1,960	2,860	3,690	4,660	5,810	7,620
						R	773	1,490	2,110	3,050	3,870	4,780	5,800	7,310
						W	758	1,410	1,990	2,900	3,730	4,690	5,810	7,550
02023500	1936-69	14	34	55	M	S	2,390	5,090	7,780	12,500	17,300	23,300	30,800	43,700
02024000	1939-91	53	53	114	CV	S	11,200	18,000	23,800	32,700	40,700	49,900	60,500	77,100
						R	14,600	22,300	27,900	35,700	42,000	48,500	55,500	65,300
						W	11,300	18,400	24,400	33,300	41,000	49,600	59,400	74,500
02024500	1896-1905	10	10	--	CV	S	18,700	29,400	37,700	49,800	60,000	71,100	83,500	102,000
						R	17,800	26,600	33,100	41,800	48,700	55,900	63,600	74,400
						W	18,500	28,400	35,600	45,300	53,200	61,600	70,700	84,100

Appendix 2. Peak-discharge characteristics for stream-gaging stations in Virginia—Continued

Station number	Period of record	Number of peaks (N)	Systematic period	Historical period	Peak-discharge region		Peak-discharge (cubic feet per second) Recurrence interval (years) 2	5	10	25	50	100	200	500
02025000	1942-69	16	28	50	B	S	3,420	7,140	10,700	16,500	22,000	28,700	36,700	49,600
						R	2,940	5,340	7,350	10,400	12,900	15,800	18,900	23,600
						W	3,310	6,550	9,320	13,600	17,400	21,900	27,100	35,100
02025500	1900-91	83	92	125	CV	S	48,800	71,700	87,800	109,000	125,000	142,000	160,000	184,000
						R	52,300	70,500	82,300	97,500	109,000	121,000	133,000	150,000
						W	48,900	71,600	87,400	108,000	124,000	140,000	156,000	179,000
02026000	1870-1991	71	122	125	M	S	51,900	78,900	98,500	125,000	146,000	168,000	191,000	223,000
02026500	1928-38	11	11	--	B	S	2,760	4,570	6,010	8,100	9,860	11,800	14,000	17,100
						R	2,350	4,320	5,980	8,460	10,600	12,900	15,600	19,400
						W	2,640	4,470	5,990	8,280	10,200	12,400	14,800	18,400
02027000	1934-91	54	58	100	B	S	3,580	6,630	9,500	14,400	19,100	24,900	32,100	44,300
						R	2,980	5,410	7,460	10,500	13,100	16,000	19,200	23,900
						W	3,540	6,480	9,170	13,600	17,800	23,000	29,300	39,800
02027500	1950-91	42	42	100	B	S	1,570	3,320	5,220	8,880	12,900	18,300	25,700	39,500
						R	1,800	3,330	4,640	6,600	8,280	10,200	12,200	15,300
						W	1,590	3,320	5,100	8,340	11,700	16,200	22,100	32,800
02027700	1966-91	18	26	--	SP	S	31	64	99	162	228	315	428	630
						R	84	166	245	376	497	640	806	1,070
						W	37	86	140	231	317	424	555	779
02027800	1961-91	31	31	100	B	S	4,650	9,720	14,300	21,800	28,500	36,500	45,700	60,000
						R	4,230	7,560	10,300	14,500	18,000	21,800	26,200	32,500
						W	4,600	9,290	13,300	19,500	24,900	31,200	38,300	49,200
02028000	1940-60	21	21	100	B	S	7,000	13,800	19,900	29,900	39,300	50,400	63,500	84,600
						R	8,350	14,500	19,500	27,000	33,200	40,200	47,800	59,100
						W	7,200	13,900	19,800	28,900	36,900	46,200	57,000	73,600

Appendix 2. Peak-discharge characteristics for stream-gaging stations in Virginia—Continued

[Systematic period and number of years of record (N) reflect peaks used in computations. Stations where the systematic period is greater than the number of peaks implies that there are periods of missing record during the systematic period. Peak-discharge regions shown in figure 1 and plate 1. Peak-discharge values are presented in the following order: top line (S) is station estimate computed from the log-Pearson type III analysis; second line (R) is computed from the regional regression; third line (W) is a weighted average of the two estimates. Stations not used in regressions list station estimate only. --, no data is available]

Station number	Period of record	Number of peaks (N)	Systematic period	Historical period	Peak-discharge region		Peak-discharge (cubic feet per second)							
							Recurrence interval (years)							
							2	5	10	25	50	100	200	500
02028500	1943-91	49	49	100	B	S	3,450	6,950	10,500	16,800	23,300	31,600	42,300	61,100
						R	3,030	5,490	7,560	10,600	13,300	16,200	19,400	24,200
						W	3,420	6,750	9,950	15,400	20,900	27,700	36,400	51,300
02028700	1944-76	23	33	50	B	S	401	823	1,210	1,860	2,460	3,180	4,040	5,410
						R	273	551	799	1,180	1,510	1,890	2,310	2,940
						W	383	766	1,100	1,640	2,140	2,720	3,400	4,470
02028800	1967-78	12	12	30	SP	S	871	1,350	1,780	2,490	3,160	3,970	4,960	6,610
						R	425	782	1,110	1,650	2,150	2,730	3,410	4,470
						W	750	1,100	1,420	2,010	2,580	3,290	4,140	5,540
02028900	1967-78	10	12	30	SP	S	1,010	1,720	2,380	3,490	4,570	5,910	7,560	10,400
						R	392	711	995	1,450	1,870	2,360	2,920	3,790
						W	813	1,200	1,530	2,130	2,730	3,490	4,430	6,000
02029000	1871-1991	70	121	125	M	S	59,200	94,000	121,000	160,000	192,000	227,000	266,000	323,000
02029200	1950-74	22	25	30	B	S	293	806	1,520	3,260	5,600	9,420	15,600	29,700
						R	590	1,150	1,640	2,380	3,030	3,750	4,560	5,770
						W	324	866	1,540	2,960	4,640	7,140	10,900	18,900
02029400	1949-69	21	21	30	B	S	475	1,290	2,200	3,920	5,730	8,090	11,100	16,400
						R	400	792	1,140	1,670	2,130	2,650	3,230	4,100
						W	462	1,140	1,800	2,890	3,940	5,220	6,790	9,320
02029500	1927-38	12	12	--	M	S	2,890	5,260	7,250	10,300	12,900	15,900	19,300	24,500
02030000	1939-91	53	53	--	M	S	2,950	6,460	10,400	18,100	26,600	38,500	54,700	85,600
02030500	1927-91	65	65	--	SP	S	4,310	7,720	11,100	17,200	23,500	31,600	42,200	61,200
						R	3,960	6,650	8,930	12,400	15,400	18,700	22,300	27,800
						W	4,310	7,620	10,800	16,300	21,900	29,100	38,300	55,000

Appendix 2. Peak-discharge characteristics for stream-gaging stations in Virginia—Continued

Station number	Period of record	Number of peaks (N)	Systematic period	Historical period	Peak-discharge region		Peak-discharge (cubic feet per second) Recurrence interval (years) 2	5	10	25	50	100	200	500
02030800	1967-91	23	25	--	B	S	166	318	458	690	909	1,170	1,490	2,010
						R	209	425	620	921	1,180	1,480	1,810	2,320
						W	171	337	494	751	987	1,260	1,590	2,110
02031000	1943-91	23	49	65	B	S	4,100	8,120	11,500	16,400	20,600	25,100	30,100	37,300
						R	3,080	5,590	7,700	10,800	13,500	16,500	19,800	24,600
						W	3,930	7,470	10,200	14,300	17,600	21,400	25,500	31,500
02031500	1943-84	27	42	65	B	S	606	1,150	1,690	2,610	3,520	4,680	6,130	8,610
						R	606	1,180	1,680	2,440	3,100	3,840	4,670	5,910
						W	606	1,160	1,680	2,560	3,410	4,440	5,710	7,830
02032250	1972-91	14	20	65	B	S	4,050	8,690	13,000	19,800	26,200	33,500	42,100	55,500
02032400	1979-91	13	13	--	B	S	2,620	4,680	6,440	9,200	11,700	14,500	17,800	23,000
02032500	1943-66	16	24	50	B	S	6,000	11,600	17,400	28,000	39,300	54,200	74,000	110,000
						R	5,670	10,000	13,600	18,900	23,400	28,400	33,900	42,000
						W	5,940	11,100	15,900	23,900	31,700	41,500	54,000	75,500
02032530	1967-76	10	10	--	B	S	664	1,180	1,650	2,390	3,090	3,910	4,890	6,480
						R	233	473	688	1,020	1,310	1,630	2,000	2,550
						W	496	831	1,110	1,550	1,960	2,450	3,030	3,920
02032540	1967-91	16	25	--	B	S	389	745	1,040	1,490	1,870	2,300	2,770	3,470
						R	297	596	862	1,270	1,630	2,030	2,480	3,150
						W	374	711	992	1,420	1,780	2,200	2,660	3,340
02032550	1967-91	20	25	35	B	S	3,760	10,500	17,600	30,200	42,500	57,500	75,600	105,000
02032680	1971-91	21	21	50	M	S	7,330	12,600	16,700	22,500	27,300	32,400	37,900	45,800
02032700	1950-88	37	39	--	SP	S	369	617	831	1,170	1,480	1,840	2,260	2,940
						R	155	292	418	631	834	1,080	1,370	1,820
						W	340	535	699	978	1,250	1,570	1,960	2,580

Appendix 2. Peak-discharge characteristics for stream-gaging stations in Virginia—Continued

[Systematic period and number of years of record (N) reflect peaks used in computations. Stations where the systematic period is greater than the number of peaks implies that there are periods of missing record during the systematic period. Peak-discharge regions shown in figure 1 and plate 1. Peak-discharge values are presented in the following order: top line (S) is station estimate computed from the log-Pearson type III analysis; second line (R) is computed from the regional regression; third line (W) is a weighted average of the two estimates. Stations not used in regressions list station estimate only. --, no data is available]

Station number	Period of record	Number of peaks (N)	Systematic period	Historical period	Peak-discharge region		Peak-discharge (cubic feet per second)							
							Recurrence interval (years)							
							2	5	10	25	50	100	200	500
02033300	1967-91	16	25	--	B	S	154	468	887	1,830	3,000	4,760	7,360	12,700
						R	248	502	730	1,080	1,390	1,730	2,120	2,700
						W	166	475	838	1,540	2,290	3,320	4,730	7,340
02033500	1926-43	10	18	40	M	S	9,030	13,600	17,700	24,400	30,800	38,500	47,900	63,400
02034000	1934-91	58	58	--	M	S	15,100	28,700	41,500	63,000	83,800	109,000	141,000	193,000
02034050	1967-76	10	10	30	SP	S	117	262	438	814	1,270	1,940	2,930	4,990
						R	159	299	427	636	829	1,050	1,310	1,720
						W	127	277	431	707	996	1,390	1,920	2,940
02034250	1962-77	14	16	30	SP	S	27	70	115	196	277	379	505	716
						R	87	171	252	390	522	680	868	1,170
						W	33	93	158	270	379	510	668	923
02034300	1951-61	11	11	--	SP	S	392	467	513	570	611	652	692	744
						R	393	717	1,000	1,460	1,860	2,330	2,860	3,670
						W	392	549	707	958	1,170	1,390	1,630	1,950
02034500	1927-91	64	65	--	SP	S	2,700	5,080	7,360	11,300	15,100	19,900	25,900	36,100
						R	4,040	6,730	8,980	12,400	15,300	18,500	22,100	27,400
						W	2,740	5,190	7,520	11,400	15,100	19,700	25,200	34,500
02035000	1899-91	93	93	122	M	S	68,100	105,000	135,000	180,000	219,000	262,000	312,000	387,000
02035400	1962-77	16	16	30	SP	S	50	118	196	349	518	751	1,070	1,670
02036500	1945-90	46	46	--	SP	S	491	1,210	2,000	3,550	5,220	7,470	10,500	16,000
						R	752	1,300	1,780	2,540	3,230	4,030	4,960	6,370
						W	503	1,220	1,960	3,300	4,670	6,430	8,720	12,800

Appendix 2. Peak-discharge characteristics for stream-gaging stations in Virginia—Continued

Station number	Period of record	Number of peaks (N)	Systematic period	Historical period	Peak-discharge region		Peak-discharge (cubic feet per second) Recurrence interval (years) 2	5	10	25	50	100	200	500
02037500	1935-91	57	57	125	M	S	74,100	118,000	152,000	200,000	240,000	284,000	331,000	402,000
02037800	1952-91	36	40	50	M	S	399	776	1,160	1,870	2,600	3,560	4,820	7,090
02038000	1955-91	36	37	50	M	S	633	1,250	1,840	2,860	3,860	5,100	6,640	9,250
02038500	1943-91	21	22	25	M	S	1,010	2,190	3,410	5,640	7,950	11,000	14,900	21,800
02038800	1955-76	16	22	50	SP	S	442	843	1,220	1,870	2,500	3,280	4,250	5,870
						R	535	994	1,430	2,140	2,800	3,580	4,480	5,900
						W	454	880	1,290	1,970	2,620	3,410	4,350	5,910
02038840	1972-91	19	20	50	SP	S	249	550	885	1,540	2,270	3,270	4,640	7,230
						R	184	353	510	763	991	1,250	1,560	2,020
						W	238	480	714	1,140	1,590	2,180	2,970	4,410
02038845	1972-91	20	20	50	SP	S	90	242	426	807	1,250	1,870	2,750	4,440
						R	139	266	384	572	742	936	1,160	1,500
						W	96	248	411	704	1,010	1,400	1,920	2,860
02038850	1967-91	25	25	50	SP	S	479	1,240	2,210	4,360	6,990	11,000	16,900	29,300
						R	543	998	1,410	2,070	2,660	3,330	4,100	5,280
						W	487	1,180	1,920	3,330	4,910	7,160	10,400	16,800
02039000	1947-91	45	45	50	SP	S	1,500	2,990	4,310	6,390	8,260	10,400	12,900	16,800
						R	2,280	3,920	5,360	7,700	9,840	12,300	15,200	19,600
						W	1,540	3,080	4,450	6,630	8,590	10,900	13,500	17,500
02039500	1926-91	66	66	90	SP	S	4,690	8,610	11,900	16,900	21,300	26,200	31,800	40,200
						R	4,910	8,150	10,900	15,100	18,700	22,800	27,400	34,300
						W	4,700	8,570	11,800	16,600	20,800	25,500	30,800	38,800
02040000	1901-91	71	91	--	SP	S	5,870	10,000	13,800	19,900	25,600	32,500	40,800	54,300
						R	7,380	12,000	15,700	21,200	25,900	31,000	36,600	44,800
						W	5,910	10,100	14,000	20,100	25,700	32,300	40,200	53,000

Appendix 2. Peak-discharge characteristics for stream-gaging stations in Virginia—Continued

[Systematic period and number of years of record (N) reflect peaks used in computations. Stations where the systematic period is greater than the number of peaks implies that there are periods of missing record during the systematic period. Peak-discharge regions shown in figure 1 and plate 1. Peak-discharge values are presented in the following order: top line (S) is station estimate computed from the log-Pearson type III analysis; second line (R) is computed from the regional regression; third line (W) is a weighted average of the two estimates. Stations not used in regressions list station estimate only. --, no data is available]

Station number	Period of record	Number of peaks (N)	Systematic period	Historical period	Peak-discharge region		Peak-discharge (cubic feet per second)							
							Recurrence interval (years)							
							2	5	10	25	50	100	200	500
02040500	1947-91	34	45	100	SP	S	1,470	2,440	3,150	4,100	4,840	5,610	6,400	7,490
						R	1,570	2,680	3,610	5,030	6,270	7,660	9,210	11,500
						W	1,470	2,470	3,230	4,330	5,230	6,210	7,270	8,790
02040600	1966-75	10	10	35	SP	S	85	207	358	685	1,080	1,680	2,560	4,390
						R	54	103	149	227	302	394	503	677
						W	75	150	222	361	520	743	1,060	1,660
02041000	1940-91	46	52	--	SP	S	3,250	6,510	9,460	14,200	18,600	23,700	29,700	39,200
						R	3,060	5,070	6,770	9,470	11,900	14,800	18,000	22,900
						W	3,240	6,340	9,010	13,100	16,800	21,200	26,200	34,200
02041500	1927-66	40	40	65	SP	S	7,620	10,700	13,300	17,100	20,500	24,300	28,700	35,500
						R	10,400	16,600	21,500	28,700	34,800	41,400	48,700	59,400
						W	7,740	11,200	14,200	18,900	22,900	27,400	32,300	39,900
02041650	1970-91	22	22	65	SP	S	10,100	15,700	20,000	26,100	31,200	36,700	42,800	51,600
						R	7,930	12,200	15,400	20,300	24,700	29,500	35,000	43,000
						W	9,880	15,100	18,900	24,400	29,000	34,200	39,900	48,400
02042200	1948-76	25	29	--	C	S	30	98	204	491	910	1,640	2,900	5,990
						R	59	114	172	277	379	506	660	913
						W	31	99	199	443	766	1,290	2,130	4,070
02042250	1968-91	20	24	--	C	S	49	109	171	283	399	548	739	1,070
						R	36	68	100	154	205	266	338	453
						W	48	104	158	250	341	456	599	844
02042300	1965-91	27	27	--	C	S	778	1,250	1,630	2,220	2,740	3,340	4,020	5,070
						R	139	269	410	674	939	1,270	1,680	2,380
						W	717	1,100	1,390	1,840	2,260	2,760	3,360	4,330

Appendix 2. Peak-discharge characteristics for stream-gaging stations in Virginia—Continued

Station number	Period of record	Number of peaks (N)	Systematic period	Historical period	Peak-discharge region		Peak-discharge (cubic feet per second) Recurrence interval (years) 2	5	10	25	50	100	200	500
02042500	1942-91	50	50	--	C	S	1,480	2,550	3,470	4,920	6,250	7,800	9,610	12,500
						R	2,070	3,520	4,820	6,880	8,730	10,900	13,300	17,100
						W	1,490	2,570	3,530	5,060	6,460	8,100	10,000	13,100
02042700	1948-77	26	30	40	C	S	124	252	393	667	971	1,390	1,970	3,090
						R	98	180	260	395	522	673	849	1,130
						W	123	244	371	607	858	1,200	1,650	2,510
02042780	1970-91	21	22	--	C	S	95	135	169	220	265	317	377	470
						R	145	252	342	503	666	868	1,110	1,510
						W	98	151	200	278	347	426	515	652
02043500	1954-91	32	38	--	C	S	520	780	978	1,260	1,490	1,750	2,030	2,440
						R	265	462	635	906	1,150	1,420	1,730	2,200
						W	511	760	948	1,220	1,440	1,690	1,980	2,390
02044000	1947-91	45	45	50	SP	S	1,900	3,320	4,510	6,320	7,910	9,720	11,800	14,900
						R	1,460	2,540	3,500	5,050	6,450	8,070	9,930	12,800
						W	1,870	3,210	4,320	6,010	7,520	9,260	11,300	14,300
02044200	1968-91	24	24	--	SP	S	82	151	216	327	435	568	733	1,010
						R	48	91	130	197	262	340	433	581
						W	77	133	184	273	361	472	609	840
02044500	1940-91	42	52	--	SP	S	4,570	8,670	12,600	19,300	25,900	34,200	44,400	61,700
						R	4,770	7,860	10,500	14,500	18,000	21,900	26,400	33,100
						W	4,580	8,570	12,200	18,200	23,800	30,700	39,100	53,100
02045500	1930-91	62	62	--	SP	S	5,640	9,160	12,100	16,800	20,900	25,700	31,300	40,000
						R	6,100	9,860	12,900	17,500	21,400	25,800	30,600	37,700
						W	5,650	9,200	12,200	16,900	21,000	25,700	31,200	39,700
02046000	1940-91	46	52	62	SP	S	1,870	3,640	5,330	8,250	11,100	14,700	19,100	26,500
						R	2,060	3,410	4,520	6,290	7,900	9,740	11,800	15,100
						W	1,880	3,610	5,200	7,830	10,300	13,400	17,100	23,400

Appendix 2. Peak-discharge characteristics for stream-gaging stations in Virginia—Continued

[Systematic period and number of years of record (N) reflect peaks used in computations. Stations where the systematic period is greater than the number of peaks implies that there are periods of missing record during the systematic period. Peak-discharge regions shown in figure 1 and plate 1. Peak-discharge values are presented in the following order: top line (S) is station estimate computed from the log-Pearson type III analysis; second line (R) is computed from the regional regression; third line (W) is a weighted average of the two estimates. Stations not used in regressions list station estimate only. --, no data is available]

Station number	Period of record	Number of peaks (N)	Systematic period	Historical period	Peak-discharge region		Peak-discharge (cubic feet per second) Recurrence interval (years) 2	5	10	25	50	100	200	500
02046400	1967-76	10	10	--	C	S	56	82	102	130	153	178	205	245
						R	65	118	166	243	313	394	486	627
						W	57	88	117	164	206	254	308	387
02046500	1949-83	26	35	--	C	S	91	180	253	361	452	553	662	822
						R	97	173	242	352	451	565	695	894
						W	92	179	251	359	452	555	670	841
02046900	1966-75	10	10	--	C	S	61	88	107	135	158	182	208	247
						R	72	133	192	292	386	497	627	833
						W	62	95	127	180	229	285	349	444
02047000	1940-91	51	52	62	M	S	8,120	13,200	17,700	25,000	31,900	40,100	50,100	66,400
02047500	1940-91	50	52	62	C	S	2,150	3,590	4,720	6,340	7,700	9,180	10,800	13,200
						R	1,420	2,360	3,140	4,310	5,310	6,440	7,680	9,550
						W	2,140	3,530	4,610	6,130	7,400	8,780	10,300	12,500
02048000	1940-88	47	49	62	C	S	2,770	4,520	5,960	8,120	9,990	12,100	14,500	18,200
						R	1,930	3,180	4,210	5,740	7,050	8,510	10,100	12,500
						W	2,750	4,470	5,850	7,900	9,670	11,700	13,900	17,400
02048400	1950-76	27	27	50	C	S	302	597	906	1,490	2,100	2,930	4,030	6,070
						R	261	451	615	866	1,090	1,340	1,610	2,030
						W	301	584	869	1,370	1,880	2,530	3,370	4,870
02049500	1940-91	51	52	62	C	S	3,110	4,990	6,510	8,780	10,700	13,000	15,400	19,200
						R	2,280	3,740	4,910	6,650	8,130	9,780	11,600	14,300
						W	3,100	4,950	6,430	8,620	10,500	12,600	15,000	18,600
02049700	1950-76	27	27	50	C	S	126	184	225	280	324	370	419	487
						R	177	317	448	662	858	1,090	1,350	1,760
						W	129	194	248	332	406	488	579	710

Appendix 2. Peak-discharge characteristics for stream-gaging stations in Virginia—Continued

Station number	Period of record	Number of peaks (N)	Systematic period	Historical period	Peak-discharge region		Peak-discharge (cubic feet per second) Recurrence interval (years) 2	5	10	25	50	100	200	500
02050050	1967-91	25	25	30	C	S	154	243	320	440	550	678	828	1,070
						R	108	199	290	444	591	766	973	1,300
						W	151	238	315	441	559	699	865	1,130
02050400	1966-75	10	10	35	SP	S	260	348	409	489	550	613	679	769
						R	158	302	438	664	876	1,130	1,420	1,890
						W	229	328	424	585	730	892	1,070	1,340
02050500	1949-73	21	25	--	SP	S	789	1,070	1,260	1,520	1,710	1,900	2,110	2,380
						R	595	1,080	1,520	2,240	2,910	3,680	4,580	5,980
						W	762	1,070	1,340	1,770	2,140	2,540	2,980	3,610
02051000	1947-91	43	45	50	SP	S	2,620	4,330	5,710	7,770	9,550	11,500	13,800	17,100
						R	1,850	3,180	4,360	6,250	7,980	9,970	12,300	15,800
						W	2,570	4,160	5,440	7,400	9,130	11,100	13,400	16,800
02051400	1958-76	19	19	--	SP	S	59	152	264	501	780	1,180	1,760	2,910
						R	90	168	239	357	469	602	759	1,010
						W	63	156	255	437	631	895	1,250	1,920
02051500	1889-1991	66	103	--	SP	S	7,250	11,300	14,700	20,000	24,600	30,000	36,200	46,000
						R	6,400	10,400	13,700	18,700	22,900	27,700	32,900	40,700
						W	7,230	11,300	14,600	19,800	24,400	29,600	35,700	45,200
02051600	1958-91	34	34	--	SP	S	957	2,470	4,200	7,630	11,400	16,500	23,400	36,200
						R	1,030	1,780	2,430	3,470	4,410	5,510	6,770	8,710
						W	963	2,350	3,730	6,150	8,590	11,800	15,900	23,200
02051650	1966-75	10	10	--	SP	S	130	212	280	380	468	567	678	849
						R	143	267	379	568	748	964	1,220	1,620
						W	133	234	327	480	619	782	968	1,250
02052000	1940-91	42	52	120	SP	S	8,150	12,600	16,200	21,400	25,900	30,900	36,500	45,000
						R	7,300	11,800	15,400	20,800	25,300	30,400	35,900	44,200
						W	8,120	12,500	16,000	21,300	25,800	30,800	36,400	44,900

Appendix 2. Peak-discharge characteristics for stream-gaging stations in Virginia—Continued

[Systematic period and number of years of record (N) reflect peaks used in computations. Stations where the systematic period is greater than the number of peaks implies that there are periods of missing record during the systematic period. Peak-discharge regions shown in figure 1 and plate 1. Peak-discharge values are presented in the following order: top line (S) is station estimate computed from the log-Pearson type III analysis; second line (R) is computed from the regional regression; third line (W) is a weighted average of the two estimates. Stations not used in regressions list station estimate only. --, no data is available]

Station number	Period of record	Number of peaks (N)	Systematic period	Historical period	Peak-discharge region		Peak-discharge (cubic feet per second)							
							Recurrence interval (years)							
							2	5	10	25	50	100	200	500
02052500	1940-91	39	52	--	SP	S	1,370	2,760	4,080	6,280	8,370	10,900	14,000	19,100
						R	1,450	2,460	3,300	4,610	5,790	7,140	8,670	11,000
						W	1,380	2,720	3,920	5,840	7,620	9,730	12,200	16,300
02053800	1961-91	31	31	35	M	S	2,340	4,700	6,850	10,300	13,500	17,300	21,700	28,700
02054500	1940-91	49	52	90	M	S	6,080	9,910	12,800	17,000	20,400	24,100	28,100	33,800
02055000	1878-91	94	114	115	M	S	7,600	12,700	16,400	21,400	25,200	29,200	33,300	38,900
02055100	1957-91	35	35	50	CV	S	813	1,900	2,990	4,900	6,770	9,090	11,900	16,700
						R	619	1,280	1,920	2,970	3,930	5,030	6,310	8,330
						W	782	1,730	2,600	4,050	5,430	7,130	9,190	12,600
02056000	1927-91	65	65	115	CV	S	10,500	16,500	21,100	27,500	32,700	38,400	44,500	53,400
						R	12,200	18,900	23,900	30,900	36,600	42,500	48,900	58,000
						W	10,600	16,700	21,400	28,000	33,400	39,100	45,400	54,300
02056650	1975-91	17	17	40	M	S	2,270	5,030	7,630	11,900	15,900	20,600	26,100	34,800
02056900	1977-91	15	15	100	B	S	4,160	7,410	9,640	12,400	14,400	16,300	18,200	20,500
						R	3,510	6,320	8,690	12,200	15,200	18,500	22,200	27,600
						W	3,980	7,000	9,220	12,300	14,800	17,500	20,400	24,500
02057000	1925-63	39	39	100	B	S	4,440	7,610	10,100	13,800	16,800	20,200	23,800	29,200
						R	5,510	9,730	13,200	18,400	22,800	27,700	33,000	41,000
						W	4,530	7,880	10,600	14,700	18,100	21,900	26,000	32,000
02057500	1926-63	38	38	75	M	S	15,900	25,100	32,000	41,800	49,700	58,200	67,400	80,600
02057700	1967-91	24	25	--	B	S	130	179	214	262	300	340	383	444

Appendix 2. Peak-discharge characteristics for stream-gaging stations in Virginia—Continued

Station number	Period of record	Number of peaks (N)	Systematic period	Historical period	Peak-discharge region		Peak-discharge (cubic feet per second) Recurrence interval (years) 2	5	10	25	50	100	200	500
02058000	1935-44	10	10	50	SP	S	1,530	2,340	3,070	4,250	5,350	6,680	8,280	10,900
						R	2,010	3,590	4,990	7,100	8,880	10,800	13,000	16,200
						W	1,620	2,740	3,860	5,590	7,050	8,680	10,500	13,400
02058400	1964-91	28	28	65	M	S	8,110	14,200	19,600	28,400	36,700	46,700	58,600	78,100
02058500	1931-63	33	33	60	M	S	7,980	12,200	15,600	20,700	25,100	30,000	35,700	44,300
02059500	1924-91	65	68	--	B	S	5,640	10,700	15,400	23,000	30,100	38,700	48,900	65,500
						R	5,100	9,040	12,300	17,200	21,300	25,800	30,900	38,300
						W	5,610	10,600	15,000	22,000	28,500	36,200	45,300	59,900
02060500	1931-62	32	32	75	M	S	29,700	43,800	53,900	67,300	77,700	88,600	99,900	116,000
02061000	1940-60	18	21	--	B	S	4,430	7,910	10,800	15,200	19,000	23,200	28,100	35,300
						R	3,530	6,360	8,740	12,300	15,300	18,600	22,300	27,700
						W	4,240	7,460	10,100	14,000	17,300	21,100	25,400	31,700
02061150	1960-76	17	17	--	B	S	142	382	674	1,280	1,980	2,970	4,350	7,030
						R	140	290	426	638	823	1,030	1,270	1,630
						W	141	355	581	987	1,400	1,950	2,660	3,920
02061300	1949-74	25	26	--	B	S	562	903	1,190	1,650	2,060	2,550	3,110	4,010
						R	313	626	906	1,330	1,710	2,130	2,600	3,300
						W	521	840	1,120	1,550	1,950	2,410	2,950	3,790
02061500	1937-91	55	55	60	B	S	7,730	14,200	20,200	30,200	39,600	51,000	64,900	87,700
						R	7,640	13,300	18,000	24,800	30,600	37,100	44,200	54,600
						W	7,720	14,100	19,900	29,200	37,800	48,200	60,600	80,700
02062500	1924-62	39	39	100	M	S	30,600	46,500	58,700	76,400	91,200	107,000	125,000	152,000
02064000	1930-91	56	62	--	SP	S	4,400	8,170	11,800	17,900	23,900	31,400	40,800	56,600
						R	4,170	7,120	9,700	13,700	17,200	21,200	25,600	32,400
						W	4,390	8,060	11,500	17,100	22,500	29,100	37,300	51,100

Appendix 2. Peak-discharge characteristics for stream-gaging stations in Virginia—Continued

[Systematic period and number of years of record (N) reflect peaks used in computations. Stations where the systematic period is greater than the number of peaks implies that there are periods of missing record during the systematic period. Peak-discharge regions shown in figure 1 and plate 1. Peak-discharge values are presented in the following order: top line (S) is station estimate computed from the log-Pearson type III analysis; second line (R) is computed from the regional regression; third line (W) is a weighted average of the two estimates. Stations not used in regressions list station estimate only. --, no data is available]

Station number	Period of record	Number of peaks (N)	Systematic period	Historical period	Peak-discharge region		Peak-discharge (cubic feet per second) Recurrence interval (years) 2	5	10	25	50	100	200	500
02065100	1967-91	21	25	50	SP	S	184	400	599	922	1,220	1,560	1,960	2,590
						R	177	334	480	719	940	1,200	1,500	1,980
						W	183	380	552	829	1,080	1,380	1,730	2,270
02065300	1967-91	24	25	50	SP	S	146	289	425	657	881	1,160	1,500	2,060
						R	251	477	690	1,040	1,380	1,770	2,220	2,940
						W	156	328	497	780	1,050	1,360	1,740	2,360
02065500	1940-90	45	51	75	SP	S	1,840	3,470	4,820	6,840	8,560	10,500	12,600	15,700
						R	2,500	4,300	5,860	8,270	10,400	12,700	15,400	19,400
						W	1,870	3,550	4,980	7,130	8,980	11,000	13,300	16,700
02066000	1878-1962	63	85	114	M	S	34,000	51,700	65,600	86,000	103,000	123,000	144,000	177,000
02066500	1947-72	25	26	32	SP	S	1,720	2,880	3,800	5,160	6,310	7,590	9,010	11,100
						R	3,310	5,600	7,590	10,700	13,600	16,800	20,600	26,200
						W	1,820	3,210	4,460	6,430	8,160	10,100	12,200	15,400
02067000	1930-52	23	23	114	M	S	35,300	53,200	66,800	86,000	102,000	119,000	137,000	165,000
02067810	1970-79	10	10	--	B	S	67	110	144	195	239	289	344	427
02069700	1963-91	29	29	43	M	S	2,490	4,860	7,270	11,700	16,200	22,200	29,900	43,800
02070000	1929-91	63	63	--	SP	S	2,860	5,450	7,950	12,300	16,600	22,100	28,900	40,700
						R	2,990	5,260	7,280	10,300	12,800	15,500	18,600	23,000
						W	2,870	5,420	7,850	11,900	15,900	20,800	26,800	37,100
02072500	1938-49	12	12	50	B	S	11,200	19,700	26,900	37,800	47,400	58,300	70,600	89,600
						R	6,510	11,400	15,500	21,400	26,500	32,100	38,300	47,400
						W	10,600	18,300	24,400	33,600	41,600	50,800	61,200	76,900

Appendix 2. Peak-discharge characteristics for stream-gaging stations in Virginia—Continued

Station number	Period of record	Number of peaks (N)	Systematic period	Historical period	Peak-discharge region		Peak-discharge (cubic feet per second) Recurrence interval (years) 2	5	10	25	50	100	200	500
02073000	1930-49	20	20	62	M	S	8,170	12,300	16,000	22,000	27,700	34,400	42,600	56,100
02074500	1930-91	62	62	--	SP	S	3,750	6,750	9,410	13,700	17,600	22,300	27,900	36,800
						R	2,990	5,190	7,120	10,100	12,600	15,400	18,600	23,300
						W	3,720	6,580	9,060	13,000	16,600	20,800	25,700	33,700
02075000	1935-49	15	15	75	SP	S	30,800	42,000	50,500	62,600	72,700	83,600	95,700	113,000
						R	18,900	30,800	40,900	55,000	66,400	78,400	91,200	110,000
						W	30,000	40,600	48,900	61,000	71,300	82,500	94,800	113,000
02075350	1958-91	33	34	--	SP	S	71	132	182	257	322	394	473	591
						R	50	99	145	221	294	380	480	640
						W	69	124	171	245	312	388	475	608
02075450	1958-74	17	17	--	SP	S	232	448	637	936	1,200	1,510	1,870	2,430
						R	213	397	565	843	1,100	1,400	1,760	2,310
						W	228	431	607	891	1,150	1,460	1,810	2,370
02075500	1951-91	40	41	75	SP	S	23,700	32,700	39,100	47,700	54,500	61,600	69,200	79,900
						R	21,100	34,200	45,200	60,500	72,700	85,500	99,200	119,000
						W	23,600	32,900	40,100	50,300	58,600	67,300	76,400	89,300
02075900	1951-61	11	11	25	SP	S	830	1,480	2,120	3,260	4,420	5,910	7,840	11,300
						R	539	976	1,370	2,010	2,610	3,300	4,100	5,340
						W	759	1,260	1,720	2,510	3,310	4,320	5,590	7,780
02076000	1901-52	35	52	90	SP	S	23,500	35,200	44,000	56,500	66,800	78,000	90,200	108,000
						R	21,000	33,900	44,600	59,500	71,300	83,900	97,200	117,000
						W	23,400	35,000	44,100	57,300	68,100	79,700	92,300	111,000
02076200	1967-91	18	25	--	SP	S	460	960	1,440	2,250	3,030	3,990	5,160	7,080
						R	350	661	949	1,410	1,820	2,290	2,820	3,650
						W	444	874	1,250	1,880	2,460	3,160	4,000	5,350

Appendix 2. Peak-discharge characteristics for stream-gaging stations in Virginia—Continued

[Systematic period and number of years of record (N) reflect peaks used in computations. Stations where the systematic period is greater than the number of peaks implies that there are periods of missing record during the systematic period. Peak-discharge regions shown in figure 1 and plate 1. Peak-discharge values are presented in the following order: top line (S) is station estimate computed from the log-Pearson type III analysis; second line (R) is computed from the regional regression; third line (W) is a weighted average of the two estimates. Stations not used in regressions list station estimate only. --, no data is available]

Station number	Period of record	Number of peaks (N)	Systematic period	Historical period	Peak-discharge region		Peak-discharge (cubic feet per second)							
							Recurrence interval (years)							
							2	5	10	25	50	100	200	500
02076400	1966-75	10	10	25	SP	S	171	254	319	413	493	582	682	830
02076500	1950-91	42	42	--	SP	S	481	895	1,240	1,750	2,190	2,680	3,230	4,040
						R	551	1,020	1,450	2,110	2,680	3,330	4,060	5,160
						W	485	909	1,270	1,830	2,310	2,850	3,450	4,350
02076700	1966-91	21	26	--	SP	S	258	543	843	1,400	1,990	2,760	3,780	5,630
						R	293	548	781	1,160	1,510	1,910	2,370	3,090
						W	263	544	820	1,300	1,780	2,390	3,170	4,530
02077000	1905-91	64	87	--	SP	S	6,410	10,800	14,500	20,300	25,600	31,800	39,000	50,500
						R	7,180	11,900	15,800	21,600	26,600	32,000	37,900	46,700
						W	6,440	10,800	14,600	20,500	25,800	31,900	38,900	49,900
02077500	1930-91	46	56	--	SP	S	3,400	5,560	7,200	9,500	11,400	13,300	15,500	18,500
						R	4,030	6,740	8,990	12,300	15,000	18,000	21,300	26,100
						W	3,420	5,650	7,410	9,950	12,000	14,300	16,700	20,300
02078000	1934-50	17	17	57	SP	S	4,960	7,380	9,230	11,900	14,100	16,500	19,100	23,000
						R	5,140	8,510	11,300	15,400	18,800	22,500	26,500	32,500
						W	4,980	7,600	9,780	13,100	15,900	18,900	22,200	27,000
02079000	1935-52	18	18	74	M	S	68,900	99,700	124,000	158,000	187,000	219,000	254,000	306,000
02079640	1962-91	30	30	--	SP	S	2,190	3,640	4,730	6,230	7,440	8,700	10,000	11,900
						R	1,450	2,500	3,390	4,790	6,040	7,470	9,090	11,500
						W	2,120	3,420	4,370	5,750	6,930	8,220	9,660	11,800
03164000	1930-91	62	62	150	B	S	20,400	31,400	39,900	51,900	61,800	72,600	84,400	102,000
						R	19,900	33,300	44,100	59,700	72,900	87,400	103,000	127,000
						W	20,400	31,600	40,300	53,000	63,500	74,900	87,400	106,000

Appendix 2. Peak-discharge characteristics for stream-gaging stations in Virginia—Continued

Station number	Period of record	Number of peaks (N)	Systematic period	Historical period	Peak-discharge region		Peak-discharge (cubic feet per second) Recurrence interval (years) 2	5	10	25	50	100	200	500
03165000	1940-91	48	52	75	B	S	1,750	3,080	4,250	6,090	7,770	9,750	12,100	15,800
						R	1,540	2,880	4,030	5,750	7,220	8,870	10,700	13,400
						W	1,740	3,060	4,210	6,020	7,660	9,570	11,800	15,300
03165500	1878-1982	55	105	150	B	S	21,800	32,500	41,800	56,400	69,900	85,700	105,000	135,000
						R	22,700	37,600	49,700	67,200	81,900	98,100	116,000	142,000
						W	21,900	32,900	42,500	57,700	71,400	87,400	106,000	137,000
03166800	1976-91	16	16	--	SV	S	203	780	1,570	3,300	5,320	8,170	12,100	19,400
						R	258	454	607	827	1,010	1,210	1,420	1,720
						W	225	606	1,030	1,830	2,670	3,760	5,150	7,540
03167000	1909-91	73	83	100	SV	S	4,240	6,360	7,980	10,300	12,200	14,300	16,500	19,800
						R	5,850	8,440	10,300	12,900	14,900	17,000	19,100	22,100
						W	4,260	6,400	8,040	10,400	12,300	14,400	16,700	20,000
03167300	1967-89	15	23	--	B	S	61	116	161	225	279	337	399	489
						R	66	142	213	323	420	531	657	847
						W	62	121	173	252	320	395	478	601
03167500	1909-91	60	83	100	B	S	6,360	9,150	11,100	13,800	15,900	18,100	20,400	23,600
						R	6,860	12,000	16,300	22,500	27,800	33,700	40,200	49,700
						W	6,390	9,400	11,700	14,900	17,500	20,300	23,100	27,200
03167700	1971-91	20	21	--	B	S	284	451	586	786	960	1,150	1,370	1,710
						R	280	564	818	1,210	1,550	1,930	2,360	3,000
						W	284	476	646	912	1,140	1,400	1,680	2,120
03168000	1930-91	62	62	150	M	S	33,800	51,000	63,800	81,600	96,000	111,000	128,000	151,000
03168500	1927-61	17	35	--	SV	S	2,110	3,210	4,040	5,210	6,160	7,190	8,310	9,930
						R	1,700	2,660	3,370	4,350	5,140	5,970	6,840	8,060
						W	2,070	3,140	3,930	5,030	5,930	6,900	7,940	9,450

Appendix 2. Peak-discharge characteristics for stream-gaging stations in Virginia—Continued

[Systematic period and number of years of record (N) reflect peaks used in computations. Stations where the systematic period is greater than the number of peaks implies that there are periods of missing record during the systematic period. Peak-discharge regions shown in figure 1 and plate 1. Peak-discharge values are presented in the following order: top line (S) is station estimate computed from the log-Pearson type III analysis; second line (R) is computed from the regional regression; third line (W) is a weighted average of the two estimates. Stations not used in regressions list station estimate only. --, no data is available]

Station number	Period of record	Number of peaks (N)	Systematic period	Historical period	Peak-discharge region		Peak-discharge (cubic feet per second)							
							Recurrence interval (years)							
							2	5	10	25	50	100	200	500
03168600	1949-76	16	28	--	SV	S	16	57	115	247	410	654	1,010	1,730
03168750	1957-91	34	35	50	SV	S	87	240	408	719	1,040	1,440	1,950	2,820
						R	181	325	439	605	742	891	1,050	1,280
						W	90	245	410	706	998	1,360	1,800	2,520
03169350	1957-76	20	20	--	B	S	94	207	325	544	771	1,070	1,450	2,140
						R	123	257	379	569	735	924	1,140	1,460
						W	98	217	339	552	758	1,010	1,330	1,870
03169500	1901-40	10	40	50	B	S	3,670	5,600	7,140	9,400	11,300	13,500	15,900	19,500
						R	6,120	10,800	14,600	20,300	25,100	30,400	36,300	44,900
						W	4,070	6,780	9,210	12,900	15,900	19,200	22,800	28,100
03170000	1929-91	63	63	--	B	S	6,640	10,800	13,800	18,000	21,300	24,700	28,400	33,400
						R	7,270	12,700	17,200	23,700	29,300	35,500	42,300	52,300
						W	6,670	10,900	14,200	18,800	22,500	26,400	30,600	36,500
03171000	1878-1939	45	62	150	M	S	37,600	63,400	86,300	123,000	158,000	200,000	250,000	332,000
03171150	1957-76	20	20	--	SV	S	59	142	223	354	474	615	776	1,020
						R	55	106	149	212	265	324	389	483
						W	58	138	211	325	426	540	670	865
03171500	1878-1939	26	62	150	M	S	32,200	54,700	76,200	114,000	151,000	198,000	257,000	360,000
03173000	1878-1991	55	114	115	SV	S	6,620	9,870	12,300	15,600	18,300	21,200	24,300	28,700
						R	7,050	10,000	12,200	15,200	17,500	19,900	22,300	25,800
						W	6,630	9,870	12,300	15,600	18,300	21,100	24,100	28,500
03175500	1909-91	62	83	--	SV	S	5,400	7,680	9,090	10,700	11,900	13,000	14,000	15,300
						R	5,350	7,760	9,510	11,900	13,800	15,700	17,700	20,500
						W	5,400	7,680	9,110	10,800	12,000	13,200	14,300	15,700

Appendix 2. Peak-discharge characteristics for stream-gaging stations in Virginia—Continued

Station number	Period of record	Number of peaks (N)	Systematic period	Historical period	Peak-discharge region		Peak-discharge (cubic feet per second) Recurrence interval (years) 2	5	10	25	50	100	200	500
03176500	1878-1939	26	62	150	M	S	36,800	62,300	86,100	127,000	166,000	215,000	276,000	380,000
03177700	1966-80	15	15	--	SV	S	703	940	1,100	1,310	1,460	1,620	1,780	2,000
						R	1,170	1,870	2,400	3,130	3,720	4,340	5,000	5,930
						W	734	1,020	1,250	1,560	1,800	2,060	2,320	2,670
03207400	1951-77	27	27	40	AP	S	832	1,900	2,890	4,470	5,880	7,510	9,350	12,200
						R	1,060	1,940	2,720	3,950	5,020	6,220	7,570	9,580
						W	862	1,920	2,800	4,160	5,370	6,750	8,310	10,700
03207500	1929-91	42	63	--	AP	S	10,300	18,200	24,200	32,300	38,600	45,200	52,100	61,500
						R	8,290	15,100	20,500	28,100	34,300	40,900	48,000	57,900
						W	10,100	17,500	22,700	30,300	36,400	42,900	49,900	59,500
03207800	1968-91	24	24	63	AP	S	8,220	16,000	22,600	32,400	40,700	49,900	60,000	75,000
						R	10,500	18,200	24,100	32,300	38,800	45,700	52,900	62,900
						W	8,460	16,700	23,300	32,300	39,500	47,100	55,200	66,700
03207962	1975-84	10	10	--	AP	S	52	120	184	289	387	502	636	847
						R	76	138	201	311	415	540	687	923
						W	59	130	195	304	405	526	667	892
03208000	1938-67	30	30	107	AP	S	11,900	17,400	21,100	25,700	29,100	32,400	35,800	40,200
						R	13,900	22,700	29,000	37,400	44,100	50,900	57,900	67,500
						W	12,000	18,400	23,500	30,700	36,200	41,800	47,500	55,200
03208500	1927-91	65	65	--	AP	S	13,200	23,000	30,200	40,100	47,800	55,800	64,000	75,300
						R	10,700	17,400	22,300	29,000	34,300	39,800	45,500	53,300
						W	13,100	22,100	28,000	35,600	41,600	47,800	54,300	63,100
03208950	1964-90	27	27	65	AP	S	2,250	4,160	5,790	8,310	10,500	13,100	16,000	20,500
						R	3,140	5,220	6,880	9,320	11,300	13,500	15,900	19,200
						W	2,350	4,490	6,340	8,910	11,000	13,300	15,900	19,800

Appendix 2. Peak-discharge characteristics for stream-gaging stations in Virginia—Continued

[Systematic period and number of years of record (N) reflect peaks used in computations. Stations where the systematic period is greater than the number of peaks implies that there are periods of missing record during the systematic period. Peak-discharge regions shown in figure 1 and plate 1. Peak-discharge values are presented in the following order: top line (S) is station estimate computed from the log-Pearson type III analysis; second line (R) is computed from the regional regression; third line (W) is a weighted average of the two estimates. Stations not used in regressions list station estimate only. --, no data is available]

Station number	Period of record	Number of peaks (N)	Systematic period	Historical period	Peak-discharge region		Peak-discharge (cubic feet per second)							
							Recurrence interval (years)							
							2	5	10	25	50	100	200	500
03209000	1920-65	40	46	75	AP	S	9,520	14,800	18,500	23,400	27,100	30,900	34,800	40,100
						R	9,900	13,700	16,300	19,900	22,700	25,600	28,400	32,300
						W	9,530	14,700	18,100	22,300	25,500	28,800	32,100	36,500
03209300	1957-66	10	10	--	AP	S	19,800	32,800	43,000	57,600	69,800	83,000	97,500	119,000
						R	17,300	30,600	40,500	53,800	64,300	75,200	86,500	102,000
						W	19,500	32,100	41,800	55,400	66,500	78,200	90,800	109,000
03277290	1976-85	10	10	--	AP	S	167	325	464	683	879	1,110	1,370	1,770
						R	224	408	584	880	1,150	1,460	1,830	2,400
						W	184	376	550	823	1,060	1,340	1,660	2,160
03277437	1977-84	10	10	--	AP	S	98	156	204	276	339	411	493	619
						R	70	118	165	247	324	414	520	687
						W	88	132	176	256	329	413	509	658
03277450	1964-75	12	12	--	AP	S	3,030	4,080	4,800	5,740	6,450	7,180	7,930	8,970
						R	3,430	4,690	5,600	6,970	8,080	9,240	10,400	12,100
						W	3,070	4,240	5,140	6,390	7,360	8,340	9,330	10,700
03400500	1940-90	51	51	--	AP	S	3,560	5,840	7,500	9,720	11,500	13,200	15,100	17,600
						R	3,960	6,170	7,850	10,300	12,300	14,400	16,600	19,700
						W	3,590	5,910	7,630	9,990	11,900	13,800	15,900	18,800
03471100	1967-77	11	11	--	B	S	231	354	443	564	659	759	863	1,010
						R	431	852	1,220	1,790	2,280	2,830	3,450	4,380
						W	272	489	693	1,010	1,270	1,560	1,860	2,310
03471200	1967-91	13	25	50	M	S	1,170	1,890	2,510	3,490	4,380	5,430	6,660	8,620
03471500	1908-91	63	84	90	M	S	1,910	2,930	3,740	4,910	5,910	7,010	8,240	10,100

Appendix 2. Peak-discharge characteristics for stream-gaging stations in Virginia—Continued

Station number	Period of record	Number of peaks (N)	Systematic period	Historical period	Peak-discharge region		Peak-discharge (cubic feet per second) Recurrence interval (years) 2	5	10	25	50	100	200	500
03472500	1948-91	44	44	90	B	S	2,040	3,050	3,760	4,700	5,420	6,170	6,950	8,020
						R	2,030	3,750	5,210	7,390	9,260	11,300	13,700	17,100
						W	2,040	3,130	3,980	5,170	6,130	7,140	8,210	9,730
03473000	1867-1991	61	125	--	M	S	6,550	9,630	12,100	15,700	18,800	22,300	26,200	32,100
03473500	1948-90	42	43	50	SV	S	175	307	411	560	685	820	966	1,180
						R	266	466	623	849	1,030	1,240	1,450	1,760
						W	177	313	422	580	712	855	1,010	1,240
03473800	1951-77	26	27	50	SV	S	209	282	337	414	477	546	620	729
						R	296	515	686	931	1,130	1,350	1,590	1,920
						W	214	298	366	464	544	628	719	848
03474000	1942-91	50	50	84	SV	S	3,290	5,150	6,610	8,730	10,500	12,500	14,700	17,900
						R	3,370	5,030	6,250	7,920	9,250	10,600	12,100	14,100
						W	3,290	5,140	6,590	8,670	10,400	12,300	14,400	17,500
03474500	1907-31	14	25	84	SV	S	3,610	5,610	7,230	9,650	11,700	14,100	16,800	20,900
						R	3,880	5,740	7,110	8,970	10,400	12,000	13,600	15,800
						W	3,630	5,620	7,210	9,510	11,500	13,600	16,000	19,600
03474700	1969-90	16	22	--	SV	S	238	458	671	1,040	1,390	1,840	2,400	3,340
						R	295	514	685	930	1,130	1,350	1,580	1,920
						W	241	464	672	1,020	1,340	1,740	2,220	3,030
03474800	1970-91	13	22	--	SV	S	392	757	1,060	1,510	1,900	2,320	2,790	3,480
						R	282	493	658	894	1,090	1,300	1,520	1,850
						W	382	718	984	1,360	1,680	2,020	2,400	2,950
03475000	1932-91	37	60	--	SV	S	3,870	5,620	6,890	8,610	9,990	11,400	13,000	15,200
						R	5,090	7,410	9,100	11,400	13,200	15,100	17,000	19,700
						W	3,900	5,690	7,000	8,810	10,300	11,800	13,400	15,600

Appendix 2. Peak-discharge characteristics for stream-gaging stations in Virginia—Continued

[Systematic period and number of years of record (N) reflect peaks used in computations. Stations where the systematic period is greater than the number of peaks implies that there are periods of missing record during the systematic period. Peak-discharge regions shown in figure 1 and plate 1. Peak-discharge values are presented in the following order: top line (S) is station estimate computed from the log-Pearson type III analysis; second line (R) is computed from the regional regression; third line (W) is a weighted average of the two estimates. Stations not used in regressions list station estimate only. --, no data is available]

Station number	Period of record	Number of peaks (N)	Systematic period	Historical period	Peak-discharge region		Peak-discharge (cubic feet per second)							
							Recurrence interval (years)							
							2	5	10	25	50	100	200	500
03475600	1967-91	23	25	--	SV	S	43	59	71	86	99	112	126	145
03475700	1971-91	21	21	--	SV	S	133	223	292	389	469	554	646	777
						R	120	221	302	421	520	629	747	917
						W	132	223	293	394	477	567	664	803
03477500	1946-65	20	20	--	SV	S	196	283	338	406	456	504	550	611
						R	458	776	1,020	1,370	1,650	1,960	2,280	2,750
						W	207	312	389	496	580	667	755	874
03478400	1958-91	34	34	56	SV	S	338	598	821	1,170	1,480	1,840	2,260	2,910
						R	852	1,390	1,790	2,360	2,820	3,310	3,830	4,570
						W	351	629	874	1,250	1,590	1,980	2,420	3,090
03487800	1966-91	26	26	--	SV	S	1,240	1,760	2,110	2,550	2,880	3,220	3,560	4,030
						R	792	1,300	1,680	2,220	2,650	3,110	3,610	4,300
						W	1,220	1,720	2,060	2,500	2,850	3,200	3,570	4,070
03487850	1967-78	12	12	--	SV	S	400	583	710	877	1,010	1,140	1,270	1,460
						R	167	302	409	564	693	833	985	1,200
						W	360	520	630	780	902	1,030	1,170	1,370
03487900	1967-77	11	11	--	SV	S	272	434	562	749	906	1,080	1,270	1,560
						R	274	479	640	871	1,060	1,270	1,490	1,800
						W	272	444	582	785	956	1,140	1,350	1,640
03488000	1862-1991	74	130	--	SV	S	5,960	8,930	11,200	14,400	17,000	19,900	23,100	27,700
						R	5,330	7,730	9,480	11,900	13,700	15,700	17,700	20,500
						W	5,950	8,900	11,100	14,300	16,900	19,700	22,700	27,200
03488500	1952-77	26	26	40	SV	S	9,930	15,000	18,900	24,500	29,100	34,200	39,700	47,800
						R	8,990	12,600	15,200	18,800	21,500	24,400	27,400	31,400
						W	9,890	14,800	18,600	23,800	28,000	32,600	37,600	45,000

Appendix 2. Peak-discharge characteristics for stream-gaging stations in Virginia—Continued

Station number	Period of record	Number of peaks (N)	Systematic period	Historical period	Peak-discharge region		Peak-discharge (cubic feet per second) Recurrence interval (years) 2	5	10	25	50	100	200	500
03489500	1921-31	11	11	--	SV	S	9,450	14,000	17,300	21,700	25,300	29,000	33,000	38,600
						R	10,800	14,900	17,900	22,000	25,200	28,400	31,800	36,400
						W	9,560	14,100	17,400	21,800	25,200	28,900	32,600	38,000
03489800	1951-91	41	41	75	SV	S	854	1,130	1,330	1,590	1,800	2,020	2,260	2,590
						R	563	941	1,230	1,640	1,970	2,330	2,710	3,250
						W	841	1,120	1,320	1,600	1,820	2,060	2,300	2,660
03489850	1967-78	12	12	--	SV	S	1,060	1,430	1,680	1,980	2,210	2,430	2,650	2,950
						R	571	954	1,250	1,660	2,000	2,360	2,750	3,290
						W	988	1,340	1,580	1,890	2,140	2,410	2,680	3,060
03489870	1966-91	26	26	--	SV	S	1,680	2,690	3,380	4,280	4,960	5,640	6,320	7,230
						R	1,230	1,950	2,500	3,260	3,870	4,510	5,190	6,150
						W	1,660	2,630	3,290	4,140	4,790	5,440	6,110	7,020
03489900	1953-77	25	25	40	SV	S	2,370	3,330	3,990	4,870	5,540	6,240	6,960	7,970
						R	2,160	3,310	4,170	5,350	6,300	7,290	8,320	9,780
						W	2,360	3,330	4,010	4,920	5,640	6,390	7,170	8,250
03490000	1862-1991	61	130	--	SV	S	14,000	20,400	25,300	32,100	37,800	44,000	50,700	60,700
						R	14,100	19,300	23,000	28,000	31,800	35,800	39,900	45,500
						W	14,000	20,400	25,200	31,900	37,500	43,500	50,100	59,800
03521500	1901-91	48	91	--	SV	S	3,550	5,220	6,410	8,000	9,250	10,500	11,900	13,800
						R	3,530	5,250	6,520	8,250	9,620	11,000	12,500	14,600
						W	3,550	5,220	6,410	8,010	9,270	10,600	12,000	13,900
03523000	1953-91	26	39	40	SV	S	2,320	2,860	3,150	3,470	3,680	3,870	4,040	4,240
						R	1,470	2,310	2,950	3,820	4,520	5,260	6,040	7,140
						W	2,260	2,810	3,130	3,520	3,800	4,080	4,370	4,730
03524000	1862-1991	75	130	--	SV	S	10,700	16,300	20,200	25,400	29,500	33,600	37,900	43,900
						R	11,400	15,800	18,900	23,200	26,500	29,900	33,400	38,300
						W	10,700	16,300	20,200	25,300	29,300	33,400	37,700	43,500

Appendix 2. Peak-discharge characteristics for stream-gaging stations in Virginia—Continued

[Systematic period and number of years of record (N) reflect peaks used in computations. Stations where the systematic period is greater than the number of peaks implies that there are periods of missing record during the systematic period. Peak-discharge regions shown in figure 1 and plate 1. Peak-discharge values are presented in the following order: top line (S) is station estimate computed from the log-Pearson type III analysis; second line (R) is computed from the regional regression; third line (W) is a weighted average of the two estimates. Stations not used in regressions list station estimate only. --, no data is available]

Station number	Period of record	Number of peaks (N)	Systematic period	Historical period	Peak-discharge region		Peak-discharge (cubic feet per second)							
							Recurrence interval (years)							
							2	5	10	25	50	100	200	500
03524500	1950-91	42	42	75	M	S	2,730	4,350	5,720	7,830	9,720	11,900	14,400	18,400
03525000	1918-77	29	60	75	SV	S	3,000	5,230	6,970	9,450	11,500	13,700	16,100	19,500
						R	1,210	1,930	2,470	3,230	3,830	4,470	5,150	6,100
						W	2,860	4,820	6,260	8,230	9,820	11,500	13,400	16,000
03526000	1948-91	44	44	--	SV	S	2,810	4,270	5,390	6,990	8,320	9,770	11,400	13,700
						R	2,780	4,200	5,250	6,680	7,830	9,020	10,300	12,000
						W	2,810	4,270	5,390	6,970	8,280	9,700	11,300	13,500
03527000	1921-91	71	71	130	M	S	20,400	30,200	37,300	46,900	54,400	62,300	70,500	82,100
03529500	1945-91	46	47	--	AP	S	4,840	7,440	9,470	12,400	14,800	17,500	20,500	24,900
						R	4,660	8,100	10,800	14,800	18,100	21,600	25,300	30,700
						W	4,820	7,590	10,000	13,500	16,300	19,200	22,400	27,000
03530000	1945-77	29	33	--	SV	S	2,340	3,510	4,400	5,640	6,650	7,750	8,940	10,700
						R	1,180	1,880	2,410	3,140	3,730	4,360	5,020	5,950
						W	2,240	3,320	4,100	5,190	6,090	7,060	8,110	9,660
03530500	1945-91	46	47	75	AP	S	3,880	5,980	7,660	10,100	12,300	14,600	17,300	21,300
						R	3,070	5,510	7,530	10,500	13,100	15,800	18,800	23,100
						W	3,810	5,860	7,600	10,300	12,600	15,100	17,800	21,900
03531000	1921-31	11	11	--	M	S	13,200	18,800	22,900	28,600	33,100	37,900	43,000	50,200
03531500	1932-91	60	60	75	M	S	11,100	17,300	22,300	29,500	35,700	42,500	50,200	61,700