Prepared in cooperation with the
Ohio Department of Transportation, and the
U.S. Department of Transportation, Federal Highway Administration

Techniques for Estimating Flood-Peak Discharges of Rural, Unregulated Streams in Ohio

Second Edition

Water-Resources Investigations Report 03-4164

U.S. Department of the Interior
U.S. Geological Survey

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16. Abstract

Regional equations for estimating 2-, 5-, 10-, 25-, 50-, 100-, and 500-year flood-peak discharges at ungaged sites on rural, unregulated streams in Ohio were developed by means of ordinary and generalized least-squares (GLS) regression techniques. One-variable, simple equations and three-variable, full-model equations were developed on the basis of selected basin characteristics and flood-frequency estimates determined for 305 streamflow-gaging stations in Ohio and adjacent states. The average standard errors of prediction ranged from about 39 to 49 percent for the simple equations, and from about 34 to 41 percent for the full-model equations. Flood-frequency estimates determined by means of log-Pearson Type III analyses are reported along with weighted flood-frequency estimates, computed as a function of the log-Pearson Type III estimates and the regression estimates.

Values of explanatory variables used in the regression models were determined from digital spatial data sets by means of a geographic information system (GIS), with the exception of drainage area, which was determined by digitizing the area within basin boundaries manually delineated on topographic maps. Use of GIS-based explanatory variables represents a major departure in methodology from that described in previous reports on estimating flood-frequency characteristics of Ohio streams.

Examples are presented illustrating application of the regression equations to ungaged sites on ungaged and gaged streams. A method is provided to adjust regression estimates for ungaged sites by use of weighted and regression estimates for a gaged site on the same stream.

A region-of-influence method, which employs a computer program to estimate flood-frequency characteristics for ungaged sites based on data from gaged sites with similar characteristics, was also tested and compared to the GLS full-model equations. For all recurrence intervals, the GLS full-model equations had superior prediction accuracy relative to the simple equations and therefore are recommended for use.

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CONVERSION FACTORS AND ABBREVIATIONS

Multiply	By	To obtain
Length		
inch (in.)	25.4	millimeter
foot (ft)	0.3048	meter
mile (mi)	1.609	kilometer
Area		
square mile (mi^2)	2.590	square kilometer
Flow rate		
cubic foot per second (ft^3/s)	0.02832	cubic meter per second
million gallons per day (Mgal/d)	0.04381	cubic meter per second

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INTRODUCTION

Data on the magnitudes of flood-peak discharges with selected exceedance probabilities are commonly referred to as flood-frequency data. The use of the term “frequency” results from a common interpretation of the reciprocal of the annual exceedance probability as an average frequency of recurrence. For example, a flood-peak discharge that has a 1-percent annual exceedance probability is said to be exceeded, on average, once every 100 years (and consequently is called a “100-year flood”). Although many people find the frequency concept easier to grasp than the probability concept, it is important to understand that the frequency concept is based on a long-term average and so the occurrence of a 100-year flood in a given year does not preclude the occurrence of a flood of equal or greater magnitude in the next 100 years, or even in the very next year.

Flood-frequency data have many uses. For example, they are used in the design of bridges, culverts, dams, and spillways to ensure that those structures contain or convey design flow conditions without failure or unnecessary flooding. Flood-frequency data are also used in flood-insurance studies to determine the altitude and boundaries of the water surface associated with prescribed peak-flow conditions. Ultimately, decisions made on the basis of these data can have significant monetary impact on government agencies and private citizens and, at times, may even make the difference between life and death.

The most recent report presenting flood-frequency data and estimation techniques applicable to Ohio streams was published in 1990 (Koltun and Roberts, 1990). Since that time, more than 10 years of additional peak-flow data have been measured at some previously described locations and sufficient data have become available to compute flood-frequency characteristics for other locations for which flood-frequency characteristics have not been previously determined.

Use of geographic information systems (software used to store and analyze spatially referenced data) by the hydrologic community has become common since the last flood-frequency report was published for Ohio in 1990. That, coupled with the availability of high-quality data layers, has made it possible to explore the relation between flood-peak discharges and a variety of factors that previously were difficult or impossible to determine. Given the opportunity to test new explanatory factors, the availability of the additional peak-flow data, and considering the economic and safety-related importance of flood-frequency information and estimation techniques, the U.S. Geological Survey (USGS), in cooperation with the Ohio Department of Transportation (ODOT) and U.S. Department of Transportation, Federal Highway Administration, has developed new flood-frequency estimates and methods for estimating flood-peak discharges of rural, unregulated streams in Ohio.

Purpose and Scope

This report describes the results of a study to (1) develop flood-frequency estimates for selected streamflow-gaging stations in Ohio and adjacent states on the basis of data collected through water year[1] 2001 and (2) develop and present techniques for estimating flood-peak discharges of rural, unregulated streams in Ohio. Two regression-based techniques, regional regression and region of influence, were explored and compared to assess which technique provided flood-frequency estimates with the lowest prediction errors. Explanatory variables used in the regression methods were, with the exception of drainage area, derived from geographic information system (GIS) data layers. Use of GIS-based explanatory variables represents a major departure in methodology from that described in previous reports on estimating flood-frequency characteristics of Ohio streams. Drainage basin boundaries were hand drawn on 7.5-minute USGS quadrangle maps and then digitized to determine drainage areas. The use of GIS data layers to determine drainage areas is not precluded in areas where data quality and drainage-area determination methods yield accurate results. This report supersedes U.S. Geological Survey Water-Resources Investigations Report 89-4126 (Koltun and Roberts, 1990) in that it provides revised flood-frequency estimates for streamflow-gaging stations and presents new methods and equations for estimating flood-peak discharges of rural, unregulated streams in Ohio.

[1] A water year is the period from October 1 to September 30 and is designated by the calendar year in which it ends.

Previous Investigations

There have been several previous reports tabulating flood-frequency data and providing methods for estimating flood-peak discharges of rural, unregulated streams in Ohio (Cross, 1946; Cross and Webber, 1959; Cross and Mayo, 1969; Webber and Bartlett, 1977; Koltun and Roberts, 1990). The most recent of those reports (Koltun and Roberts, 1990) marked the first use of generalized least-squares regression techniques for developing regional-regression equations for Ohio. Koltun and Roberts (1990) also explored the relation between surface-mined area and flood peaks and found a tendency for their regional regression equations to overestimate flood-peak discharges for basins with approximately 30 percent or more surface-mined area.

Acknowledgments

Flood-peak discharge data used in this study were collected under cooperative agreements with a variety of Federal, State, and local agencies. The support provided by these cooperating agencies, the Ohio Department of Transportation, and the Federal Highway Administration of the U.S. Department of Transportation is gratefully acknowledged. The author also thanks Sean Quigley of the U.S. Geological Survey for the extensive GIS support, and Gary Tasker of the U.S. Geological Survey for his help and guidance on GLS-NET and region-of-influence issues.

TECHNIQUES FOR ESTIMATING FLOOD-PEAK DISCHARGES

Two sets of multiple-regression equations are provided for estimating flood-peak discharges with recurrence intervals of 2, 5, 10, 25, 50, 100, and 500 years at ungaged sites on rural, unregulated streams in Ohio. A set of simple equations (table 1), which use drainage area as the only explanatory variable, are provided to facilitate estimation of flood-peak discharges when determination of the GIS-derived explanatory variables used in the more accurate full-model equations is not possible or practical. In addition to drainage area, the full-model equations (table 2) employ GIS-derived explanatory variables that describe the main-channel slope and an indicator of the amount of storage in the basin. The simple equations and the full-model equations implicitly require that the basin centroid (center of mass) can be determined or

Table 1. Simple (drainage-area only) equations for estimating flood-peak discharges of rural, unregulated streams in Ohio

[Q_t, flood-peak discharge with a *t*-year recurrence interval, in cubic feet per second; *DA*, drainage area in square miles]

Equation number	Equation	Average standard error of prediction (percent)	Average equivalent years of record
1	$Q_2 = (RC)(DA)^{0.716}$	39.6	1.9
2	$Q_5 = (RC)(DA)^{0.686}$	39.0	2.6
3	$Q_{10} = (RC)(DA)^{0.674}$	39.5	3.4
4	$Q_{25} = (RC)(DA)^{0.663}$	41.1	4.4
5	$Q_{50} = (RC)(DA)^{0.657}$	42.7	5.1
6	$Q_{100} = (RC)(DA)^{0.652}$	44.4	5.7
7	$Q_{500} = (RC)(DA)^{0.644}$	49.0	6.6

where *RC* is the regression constant for a region taken from the following matrix:

Region	Q_2	Q_5	Q_{10}	Q_{25}	Q_{50}	Q_{100}	Q_{500}
A	106.3	186.1	244.4	321.0	379.6	439.1	582.3
B	69.1	114.9	146.1	184.9	213.0	240.5	302.5
C	188.6	322.7	417.5	539.3	630.6	721.9	936.9

estimated with sufficient accuracy to identify the hydrologic region in which the basin centroid is located.

Drainage area (*DA*) (see appendix B for definitions of basin characteristics) is the only explanatory variable used in the simple equation. Drainage area (*DA*), main-channel slope (*SL*), and the percentage of the basin classified as water and wetlands (*W*) are used as explanatory variables in the full-model equations. Spatial data sets were prepared to facilitate GIS-based determination of *SL* and *W* for streams anywhere in Ohio. These data sets, which include a stream centerline coverage (Quigley, 2003a) derived from the National Hydrography Data set (U.S. Geological Survey, 1999a), a digital elevation model (Quigley, 2003b) derived from the National Elevation Dataset (U.S. Geological Survey, 1999b), a land-cover coverage (Quigley, 2003c) derived from the National Land Cover Dataset (U.S. Geological Survey, 2000), and a flood-region coverage (Quigley, 2003d) are available for download from the USGS node of the National Geospatial Data Clearinghouse (U.S. Geological Survey, 2003). Potential users of these spatial data sets are cautioned to be mindful of measurement units since the spatial data sets use metric units and the regression equations presented in this report use English units.

The multiple-regression equations are applicable to the three regions delineated on figure 1. The appropriate regression constant must be selected from the regression constant matrices shown in tables 1 and 2. The regression constants are selected as a function of the recurrence interval of the flood-peak discharge being estimated and the region in which the basin centroid is located. Because few drainages span region boundaries, determination of the region in which the basin centroid lies is usually straightforward, even without use of a GIS.

Before using the equations, tests for extrapolation should be made by comparing each measured basin-characteristic value for the ungaged site to the ranges of basin-characteristic values in the regression data set for the appropriate region (table 3), or by following the more rigorous procedures outlined in appendix A. Use of the regression equations is not recommended when one or more basin-characteristic value is outside the range of characteristics used for model calibration in the region of interest.

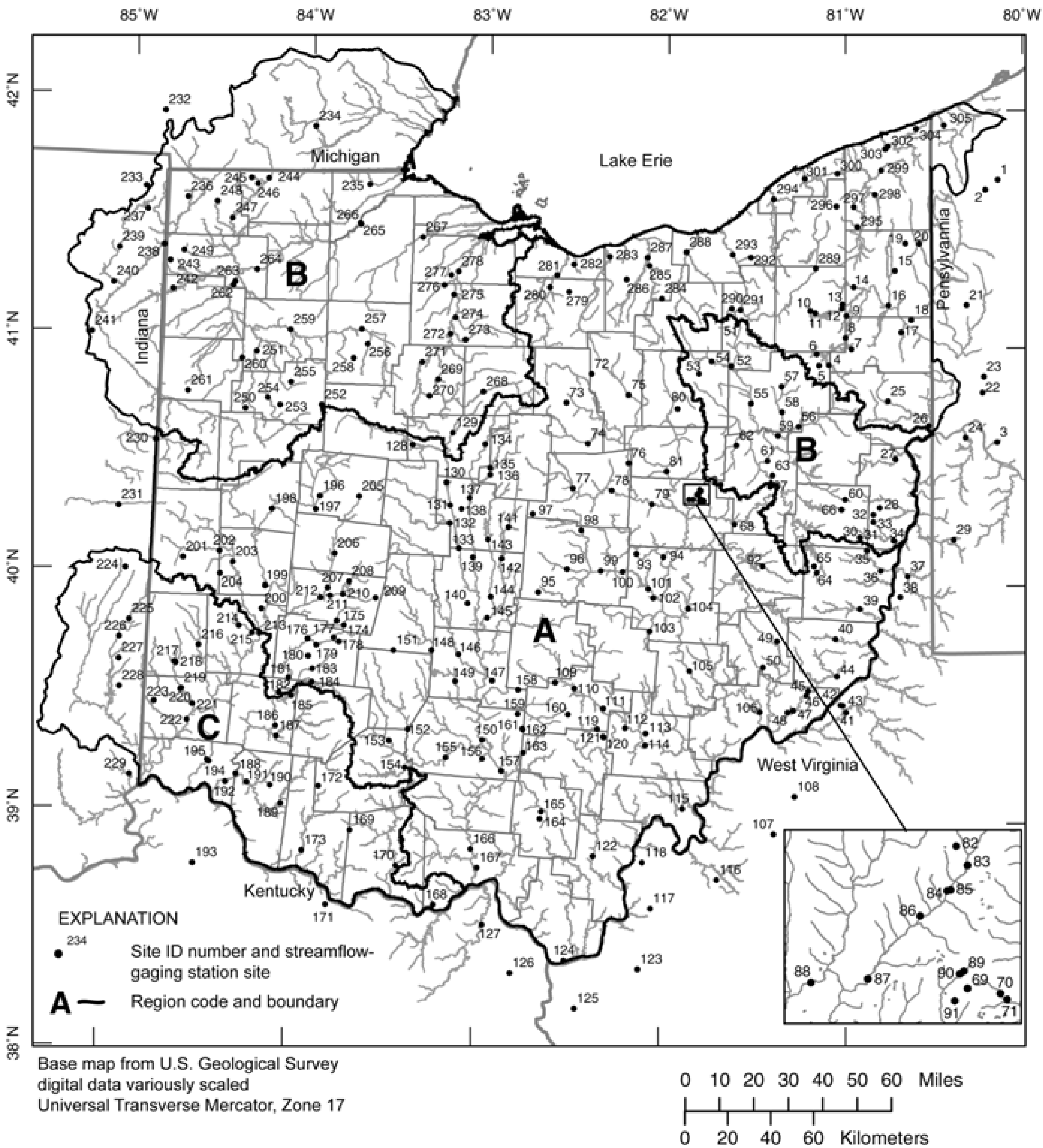

Figure 1. Locations of streamflow-gaging stations used in the analyses.

Table 2. Full-model equations for estimating flood-peak discharges of rural, unregulated streams in Ohio

[Q_t, flood-peak discharge with a *t*-year recurrence interval, in cubic feet per second; *DA*, drainage area in square miles; *SL*, main channel slope in feet per mile; *W*, percentage of drainage area as open water and wetlands]

Equation number	Equation	Average standard error of prediction (percent)	Average equivalent years of record
1	$Q_2 = (RC)(DA)^{0.785}(SL)^{0.174}(W+1)^{-0.178}$	36.2	2.2
2	$Q_5 = (RC)(DA)^{0.766}(SL)^{0.202}(W+1)^{-0.221}$	33.7	3.5
3	$Q_{10} = (RC)(DA)^{0.759}(SL)^{0.217}(W+1)^{-0.241}$	33.5	4.7
4	$Q_{25} = (RC)(DA)^{0.754}(SL)^{0.232}(W+1)^{-0.260}$	34.6	6.2
5	$Q_{50} = (RC)(DA)^{0.751}(SL)^{0.240}(W+1)^{-0.272}$	35.8	7.1
6	$Q_{100} = (RC)(DA)^{0.750}(SL)^{0.248}(W+1)^{-0.281}$	37.2	7.8
7	$Q_{500} = (RC)(DA)^{0.747}(SL)^{0.263}(W+1)^{-0.298}$	41.4	8.9

where *RC* is the regression constant for a region taken from the following matrix:

Region	Q_2	Q_5	Q_{10}	Q_{25}	Q_{50}	Q_{100}	Q_{500}
A	58.9	96.2	121.2	152.4	175.3	197.7	248.6
B	43.1	67.9	83.3	101.5	114.2	126.1	151.5
C	95.9	149.8	183.8	224.9	254.3	282.5	344.4

For a more complete discussion of limitations of the equations, refer to the section titled “Limitations of the Equations” on page 10.

Estimating Flood-Peak Discharge for a Site on an Ungaged Stream

The technique for estimating a flood-peak discharge for a site on an ungaged stream is illustrated in the following example. An estimate of the 100-year flood-peak discharge is needed for a site on an ungaged stream in Butler County, Ohio. First, it is confirmed that the stream is unregulated and the basin is predominately rural. The next steps depend on whether the simple or full-model equation will be used. In either case, the region must be identified that contains the centroid of the ungaged basin. In most instances, the region containing the basin centroid will be obvious once the drainage basin boundary is delineated. In those rare cases where a basin spans more than one region, it may be desirable to use a GIS (or another method with comparable accuracy) to determine the location of the basin centroid. In this case, the basin centroid is determined to lie within region C. The simple 100-year peak-discharge equation for region C (table 1) is

$$Q_{100} = 721.9(DA)^{0.652} .$$

The drainage area (*DA*) for the ungaged site is determined to be 0.29 mi^2 by digitizing or planimetering the area within the basin boundary. Substituting the value determined for drainage area into the equation shown above yields an estimate of Q_{100} of 322 ft^3/s.

The full-model 100-year peak-discharge equation (table 2) for region C is

$$Q_{100} = 282.5(DA)^{0.750}(SL)^{0.248}(W+1)^{-0.281} .$$

By use of a GIS, the main-channel slope (*SL*) and percentage of the basin classified as open water and wetlands (*W*) are determined to be 99.0 ft/mi and 0.25 percent, respectively.

Table 3. Statistics of selected basin characteristics, by region, for streamflow-gaging stations used in the regression analyses

[*DA*, drainage area; *SL*, main channel slope; *W*, percentage of the basin classified as water and wetlands; mi^2, square miles; ft/mi, feet per mile]

Region	Statistic	*DA* (mi^2)	*SL* (ft/mi)	*W* (percent)
A	Maximum	7,422	994	25.8
	Minimum	.01	1.89	.00
	Mean	290.5	54.7	2.13
	Median	64.3	15.3	0.67
B	Maximum	6,330	500	7.78
	Minimum	.04	.97	.00
	Mean	414	25.4	1.95
	Median	60.6	8.94	1.28
C	Maximum	1,713	253	1.13
	Minimum	.25	6.56	.00
	Mean	192.	39.5	.39
	Median	68.7	16.1	.26

Substituting the values for *DA* (determined previously), *SL*, and *W* into the full-model equation shown above yields an estimate of Q_{100} of 328 ft^3/s.

Estimating Flood-Peak Discharge for a Site on a Gaged Stream

The technique for estimating flood-peak discharge for an ungaged site on a gaged stream is illustrated in the following example. An estimate of the 25-year flood-peak discharge is needed for an ungaged site on Big Walnut Creek just upstream of the confluence with Culver Creek in Delaware County, Ohio. The site is upstream from the streamflow-gaging station Big Walnut Creek at Sunbury, Ohio (03228300). First, it is confirmed that the stream is unregulated and the basin is predominately rural. The next steps depend on whether the simple or full-model equation will be used. In either case, the region must be identified that contains the centroid of the ungaged basin. In this case, the basin centroid is determined to lie within region A. The full-model 25-year peak-discharge equation for region A will be used to demonstrate the remainder of the technique.

The full-model 25-year peak-discharge equation (table 2) for region A is

$$Q_{25} = 152.4(DA)^{0.754}(SL)^{0.232}(W+1)^{-0.260} \quad .$$

The drainage area (*DA*) for the ungaged site is determined to be 55.1 mi^2 by digitizing or planimetering the area within the basin boundary. By use of a GIS, the main-channel slope (*SL*) and percentage of the basin classified as open water and wetlands (*W*) are determined to be 6.99 ft/mi and 0.68 percent, respectively. Substituting the values for *DA*, *SL*, and *W* into the full-model equation shown above yields an estimate of Q_{25} of 4,297 ft^3/s.

If the drainage area of an ungaged site on a gaged stream is between 50 and 150 percent of the drainage area of a gaged site on the same stream, then the following method of adjusting the estimated flood-peak discharge of the ungaged site is suggested:

$$Q_{t,\,a(u)} = Q_{t,\,r(u)}\left[R - \frac{2|\Delta DA|(R-1)}{DA_{(g)}}\right] , \qquad (1)$$

where

$$R = \frac{Q_{t,\,w(g)}}{Q_{t,\,r(g)}} , \qquad (2)$$

and

$Q_{t,a(u)}$ is the adjusted flood-peak discharge estimate with a *t*-year recurrence interval for the ungaged site;

$Q_{t,r(u)}$ is the regression estimate of flood-peak discharge with a *t*-year recurrence interval for the ungaged site;

$Q_{t,w(g)}$ is the weighted flood-peak discharge estimate with a *t*-year recurrence interval for the gaged site, reported in table 4 (at back of report);

$Q_{t,r(g)}$ is the regression estimate of flood-peak discharge with a *t*-year recurrence interval for the gaged site, reported in table 4;

$|\Delta DA|$ is the absolute value of the difference in drainage areas of the gaged and ungaged sites; and

$DA_{(g)}$ is the drainage area of the gaged site, reported in table 5 (at back of report).

Equation 1 (page 6) adjusts the regression estimate for the ungaged site by the ratio *R* if the drainage area of the ungaged site is equal to the drainage area of the gaged site, and prorates the adjustment factor to 1 as the drainage area of the ungaged site approaches either 50 percent or 150 percent of the drainage area of the gaged site.

The 55.1 mi^2 drainage area for the ungaged site on Big Walnut Creek is between 50 and 150 percent of the 101 mi^2 drainage area for the gaged site on Big Walnut Creek at Sunbury, Ohio. The 25-year flood-peak discharges for the ungaged and gaged sites are as follows:

$Q_{25,r(u)}$ = 4,297 ft^3/s (as determined earlier),
$Q_{25,w(g)}$ = 7,240 ft^3/s (table 4), and
$Q_{25,r(g)}$ = 6,920 ft^3/s (table 4).

The difference in drainage area between the gaged and ungaged site is

$$\Delta DA = 101 - 55.1 = 45.9 \text{ mi}^2 .$$

Substituting the values shown above into equation 1,

$$Q_{t,\,a(u)} = (4297)\left[\left(\frac{7240}{6920}\right) - \frac{2|45.9|\left(\frac{7240}{6920} - 1\right)}{101}\right] ,$$

$$Q_{t,\,a(u)} = 4{,}315 \text{ ft}^3/\text{s} .$$

If the simple equation had been used instead of the full-model equation, the same method would be used to determine the adjusted flood-peak discharge estimate (except that $Q_{t,\,r(u)}$ would have been determined by means of the simple equation).

Flood-frequency estimates generally are reported to no more than three significant figures. In the previous examples, estimates were reported to the nearest cubic foot per second to facilitate a better understanding of the computational procedures.

DATA COMPILATION

The USGS routinely collects and stores information on annual peak discharges at crest-stage gages and continuous-record streamflow-gaging stations. Crest-stage gages are not operated in a manner designed to determine continuous streamflow, but instead, are intended to provide information on instantaneous peak streamflows that occur between visits to the gage. In contrast, continuous-record streamflow-gaging stations are designed to permit determination of streamflow with high temporal resolution (generally, every 30 to 60 minutes, although shorter time intervals may be used for basins with small drainage areas or where circumstances require more frequent measurements), and peak streamflows are determined by searching the streamflow time series for maximums. In many cases, information from continuous-record streamflow-gaging stations also is stored about peaks that exceed preselected base streamflows but are smaller in magnitude than the annual peak. These latter peaks are referred to as partial-peak streamflows.

Peak-streamflow data collected at continuous-record and crest-stage gages are stored in the USGS National Water Information System (NWIS) database (U.S. Geological Survey, 1998) and are mirrored on the USGS NWISweb internet web server (U.S. Geological Survey, 2002). NWISweb was used to help identify gages with characteristics suitable for use in this study. An NWISweb query was constructed to select all gages that had 10 or more years of annual peak-streamflow data and that are within a geographic area specified so as to include all of Ohio and near-border (within approximately 50 mi.) areas of all adjacent states. Data from gages identified in the query were examined and subsequently screened to remove data for gages that had fewer than 10 years of unregulated peak streamflows or had other problems (for example, urban influences or data-quality problems). Data that passed the screen were examined again as a quality-assurance measure in an attempt to identify errors in peak-flow values and (or) inconsistencies in database codes identifying regulation, urban influences, and other factors associated with each peak-flow datum.

Data from a total of 305 streamflow-gaging stations were selected for use in this study. Of the 305 stations, 264 are in Ohio, 14 are in Indiana, 12 are in West Virginia, 9 are in Pennsylvania, 4 are in Kentucky, and 2 are in Michigan (fig. 1). Although streamflow at some of the stations is presently (2003) regulated (generally as a result of construction of one or more dams upstream from the gage), each of the stations has at least 10 years of unregulated annual peak-discharge record suitable for analysis. The minimum, median, and maximum lengths of unregulated record for the 305 stations were 10, 29, and 88 years, respectively. Streamflow-gaging stations on streams that presently are regulated are identified with bold station numbers in table 4.

DEVELOPMENT OF FLOOD-FREQUENCY ESTIMATES FOR STREAMFLOW-GAGING STATIONS

Flood-frequency estimates for 305 streamflow-gaging stations in Ohio and adjacent states (table 4, fig. 1) were determined by fitting the base-10 logarithms of the annual peak-flow series to a log-Pearson Type III distribution. The flood-peak discharges corresponding to selected annual exceedance probabilities were computed by the following equation:

$$\log(Q_t) = \bar{X} + K(S) \ , \qquad (3)$$

where Q_t is the *t*-year recurrence interval streamflow in cubic feet per second,
$\bar{X}$ is the mean of the logarithms of the annual peak flows,
K is a factor dependent on the recurrence interval and the skew coefficient of the log-transformed annual peak flow series, and
S is the standard deviation of the log-transformed annual peak-flow series.

The flood-frequency estimates were calculated by application of version 4.1 of the USGS program PEAKFQ (Thomas and others, 1998). PEAKFQ performs flood-frequency analyses on the basis of guidelines established by the Interagency Advisory Committee on Water Data (1982). State-specific guidelines were followed in cases where states have adopted specific guidelines that differ from the general guidelines prescribed by the Interagency Committee on Water Data (such as use of a specific generalized skew or wholesale identification of peak streamflows from specific years as being high or low outliers). All flood-frequency estimates reported for streamflow-gaging stations outside Ohio were reviewed and approved by USGS personnel from those states.

Prior to performing the flood-frequency analyses, data from the 305 streamflow-gaging stations were examined for trends by computing Kendall's tau, a nonparametric measure of correlation. This was done because a necessary assumption for the log-Pearson Type III analysis is that the peak-flow data are a reliable and representative time sample of random homogeneous events (Interagency Advisory Committee on Water Data, 1982). Statistically significant (p-value ≤ 0.05) trends were found for 34 of the gages with data from approximately two-thirds of the 34 gages exhibiting negative trends. The 34 gages with significant trends were examined to determine if a physical cause for trends could be identified. Because none could be determined for any of the trends, they were assumed to be due to chance or to result from a short time sample that was not representative of a long-term trend, and consequently data from the 34 gages were retained in the analysis.

DEVELOPMENT OF REGIONAL REGRESSION EQUATIONS

Regional regression equations for estimating flood-peak discharges were developed as a two-step process involving both ordinary and generalized least-squares regression techniques. Ordinary least-squares (OLS) regression techniques were used in the first step to determine the best models relating basin characteristics listed in appendix B to each *t*-year recurrence interval peak discharge estimate. In the second step, the final model identified by means of ordinary least-squares regression techniques was used in generalized least-squares regression analyses to develop equations that can be used for predictive purposes.

Ordinary Least-Square Regression

Each basin characteristic listed in appendix B was tested as a potential regressor variable; however, selection of regressor variables for use in the final model was based on the following criteria:

- The choice of regressor variables, as well as the signs and magnitudes of their associated regression coefficients, must be hydrologically plausible in the context of peak flows. This criterion takes precedence over all other criteria.
- All regressor variables should be statistically significant at the 95-percent confidence level.
- The choice of regressor variables, with the constraints of the first two criteria, should minimize the prediction error sum of squares[2] (PRESS) and maximize the coefficient of determination (R^2, a measure of the proportion of the variation in the dependent variable accounted for by the regression equation).

Previous analyses have shown that the relation between the *t*-year-recurrence-interval peak flows and basin characteristics can vary as a function of the geographic position of a basin (Koltun and Roberts, 1990; Webber and Bartlett, 1977). Those same analyses have shown that the positional variation can, to a large extent, be accounted for by grouping basins into regions. To test for positional variation or bias, regression analyses initially were performed without consideration of geographic regions. Residuals (the difference between the observed and predicted peak-flow values) from these initial models were examined for spatial patterns, the existence of which would indicate that spa-

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[2]The prediction error sum of squares (PRESS) is the sum of squared prediction residuals, which are the differences between the observed values of the dependent variable and the values predicted from a regression equation constructed with all data except that of the observation for which the residual is being determined.

tially-related bias was present in the models. As was anticipated, discernible spatial patterns were observed with the initial models.

Three methods were tested to determine the best approach for eliminating the geographic bias observed with the initial regression models. The first method tested involved use of the geographic coordinates (decimal latitude and longitude) of the basin centroid as regressor variables. The second method tested involved partitioning the basins into regions and use of binary indicator variables to represent the region assignment in the regression analyses. Delineation of regions primarily was based on spatial patterns observed in the residuals along with consideration of drainage-basin and physiographic boundaries. The third and final method tested involved use of climate factors as surrogates for geographic position. Climate factors, introduced by Lichty and Liscum (1978) and further refined by Lichty and Karlinger (1990), integrate long-term rainfall and pan evaporation information and, according to Lichty and Karlinger (1990), delineate regional trends in small-basin flood frequency. Climate factors for 2-year, 25-year, and 100-year recurrence intervals were computed for each basin by means of a computer algorithm that interpolates the climate factor at a specified latitude and longitude (in this case, the latitude and longitude of the basin centroid) from gridded representations of climate-factor isoline maps presented by Lichty and Karlinger (1990).

The second method (partitioning the basins into regions and use of binary indicator variables to represent the region assignment in the regression analyses) was found to be best for eliminating discernible geographic bias and at the same time minimizing the PRESS statistic. Several regional divisions were tested; however, the three-region division used by Koltun and Roberts (1990) ultimately provided the best results.

Simple and full models were selected on the basis of ordinary least-square regression analyses. Both models contain binary indicator variables representing the region in which the basin centroid is located[3]. In addition, the simple model contains drainage area only, whereas the full model contains drainage area, main-channel slope (*SL*), and a variable (*W*) that is the percentage of the basin in three land-cover categories representing open-water and wetland areas.

Generalized Least-Square Regression

The models selected in the OLS regression analyses were used to develop generalized least-squares (GLS) regression equations. The GLS equations were determined by application of version 3.0 of the USGS program GLSNET (Tasker and Stedinger, 1989). Stedinger and Tasker (1985) found that, compared to OLS regression, the GLS procedure provides more accurate parameter (regression coefficient) estimates, better estimates of the accuracy with which the regression model's coefficients are estimated, and almost unbiased estimates of the model error.

Equations developed by means of the GLS technique were tested to ensure that residuals were normally distributed, independent, and had constant variance. In addition, other tests were performed to look for conditions, such as moderate to strong collinearity in regressor variables, that could negatively affect estimation of the regression parameters or their standard errors. No destabilizing conditions were identified.

The improvements afforded by the GLS technique result from the fact that it takes into consideration the variance and spatial correlation structure of the peak-flow characteristics and weights each observation accordingly (Tasker and others, 1986). In addition, the time-sampling error in the estimated Q_t is accounted for in evaluating the accuracy of the regression equation. In contrast, OLS regression assumes equal reliability and variance and no cross-correlation between peak-flow records at the streamflow-gaging stations, and so assigns equal weights to each of the peak-flow estimates.

As summarized by Pope and others (2001), uncertainty in a flow estimate that was predicted for an ungaged site by means of the regression equations can be measured by the standard error of prediction, S_p, which is computed as the square root of the mean square error of prediction, MSE_p. The MSE_p is the sum of two components—the mean square error resulting from the model, γ^2, and the sampling mean square error, $MSE_{s,i}$, which results from estimating model parameters from samples of the population. The mean square model error, γ^2, is a characteristic of the model and consequently is a constant for all sites. The mean square sample error, $MSE_{s,i}$, for a given site, however, depends on the values of the explanatory variables used to develop the flow estimate at that site. The standard error of prediction for a site, i, is computed as

$$S_{p,\,i} = (\gamma^2 + MSE_{s,\,i})^{\frac{1}{2}} , \qquad (4)$$

and, therefore, differs from site to site. If the values of the explanatory variables for the gaged sites used in the regression are assumed to be a representative sample of all sites, then the average accuracy of prediction for the regression

[3]To simplify use of the regression equations, information conveyed by the binary indicator variables is included in the regression constants that vary as a function of region and recurrence interval.

model can be determined by computing the average standard error of prediction:

$$S_p = \left\{ \gamma^2 + \frac{1}{n} \sum_{i=1}^{n} MSE_{s,i} \right\}^{\frac{1}{2}} . \qquad (5)$$

The standard error of the model (SE_{model}) can be converted from base-10 log units to percent error by the following formula:

$$\%SE_{model} = 100\left(e^{5.302(\gamma^2)} - 1\right)^{\frac{1}{2}} . \qquad (6)$$

Similarly, the average standard error of prediction can be transformed from base-10 log units to percent error by substituting S_p^2 for γ^2 in equation 6. Computation of $S_{p,i}$ for a given ungaged site, i, involves fairly complex matrix algebra. Computational procedures and the required matrices are provided in appendix A.

The standard errors of the model, which measure how well the regression model fits the data used to construct it, ranged from about 38 to 48 percent for the simple equations, and from 33 to 40 percent for the full-model equations. This error term is comparable to errors often cited and referred to as the ‘model error’ or ‘standard error of estimate’ in earlier studies in which ordinary least-squares regression was used to develop predictive equations. The average standard errors of prediction, which provide a better overall measure of the predictive ability of a model, ranged from about 39 to 49 percent for the simple equations (table 1), and from about 34 to 41 percent for the full-model equations (table 2).

Another measure of predictive ability of the regression equations is equivalent years of record (Hardison, 1971). Equivalent years of record are the number of years of peak-flow record needed to develop an estimate by means of the log-Pearson Type III technique that would be equal in accuracy to an estimate made by means of the regression equations. Equivalent years of record are shown along with the average standard errors of prediction in tables 1 and 2.

Weighted estimates of the *t*-year peak discharges (Q_{t_w}) are reported in table 4 for the 305 streamflow-gaging stations. The weighted estimates are preferred for gaged sites over the log-Pearson Type III estimates or the regression estimates alone because they represent a weighted average of two independent estimates. The weighted estimates were determined as follows:

$$Q_{t_w} = 10^{\left(\frac{\log(Q_{t_o})(\omega) + \log(Q_{t_r})(\omega_e)}{\omega + \omega_e}\right)} , \qquad (7)$$

where

Q_{t_o} is the log-Pearson Type III estimate of the *t*-year peak discharge;

Q_{t_r} is the regression estimate of the *t*-year peak discharge;

ω_e is the equivalent years of record for the regression estimate as defined by Hardison (1971); and

ω is **either** the systematic record length, in years, if no historic peak-discharge data are available for the site, **or** the effective record length, in years, if historic peak-discharge data are available for the site. The effective record length is computed as follows:

$$\omega = \omega_s + \left(D\left(0.55 - 0.1\ln\left(\frac{P}{1-P}\right)\right)\right) , \qquad (8)$$

where

$$D = minimum(200, (\omega_h - \omega_s)) ;$$

$$P = 1 - (N_p/(\omega_h + \omega_s)) ;$$

N_p is the number of historic peaks;
ω_h is the historic record length, in years; and
ω_s is the systematic record length, in years.

Limitations of the Equations

The regression equations presented in this report can be used to develop flood-frequency estimates for streams in Ohio draining predominately rural basins[4] that are free of appreciable regulation. In general, basins having usable storage of less than 103 acre-feet per square mile are considered to be unregulated; however, the flood-peak discharges for an ungaged site directly below a large reservoir could be considered regulated regardless of the usable storage criterion (Benson, 1962).

The applicability of the regression equations is unknown when the basin-characteristic values associated with an ungaged site are outside a space defined by the basin characteristics of the calibration data set. Methods for detecting when that condition occurs are discussed in appendix A.

[4]See Sherwood (1993) for information on techniques for estimating flood-frequency characteristics of urban streams.

The full-model equations require use of a GIS to determine values of the regressor variables. Because of limited resolution of the stream coverage, it may not be possible to determine the main-channel slope for some small basins (usually with drainage areas less than about 1 square mile) by application of the technique described in appendix B. In those instances, it is acceptable to substitute a main-channel slope determined by computing the difference in elevation at points 10 and 85 percent of the distance along the main channel from the point of interest to the basin divide (as shown on USGS 7.5-minute topographic maps), divided by the channel distance between the two points.

In a previous report that presented equations for estimating flood-peak discharges of rural, unregulated streams in Ohio, Koltun and Roberts (1990) identified a tendency for the equations to overestimate peak discharges for basins with greater than 30 percent surfaced-mined area (as determined from USGS 7.5-minute topographic maps). Because this report predominately makes use of basin characteristics determined from spatial data layers, the relation between surface-mined area and peak discharges was reexamined in terms of land-cover characteristics identified in the National Land Cover data set (NLCD) (U.S. Geological Survey, 2000). The NLCD does not have a land-cover class that corresponds to surface-mined area only. It does, however, have a land-cover class that includes quarries, strip mines, and gravel pits (land cover class code 32). The percentage of basin areas classified as quarries, strip mines, and (or) gravel pits ranged from 0 to 10.1 percent for the 305 streamflow-gaging stations considered in this study. Of the 15 stations with greater than 0.3 percent of their drainage classified as quarries, strip mines, and (or) gravel pits, 10 and 12 stations had log-Pearson Type III estimates for the 2-year and 100-year recurrence-interval peak discharges, respectively, that were smaller than their corresponding full-model equation regression estimates. These results indicate a tendency for the full-model regression equations to overestimate peak discharges for basins with greater than 0.3 percent of their drainage classified as quarries, strip mines, and (or) gravel pits. This same bias was not evident with the simple equations; however, that does not necessarily imply that the simple equations provide more accurate results for surface-mined basins.

REGION OF INFLUENCE

The region-of-influence method employs a computer program to estimate flood-frequency characteristics for ungaged sites on the basis of data from gaged sites with similar characteristics (Tasker and Slade, 1994). For the ungaged site of interest, the computer program develops a unique regression equation from a subset of gaged sites, called a region of influence (Burn, 1990a, b), selected from the database of all gaged sites.

Selection of the subset of gaged sites used to develop the regression equation is based on a Euclidean distance metric (Tasker and others, 1996) determined as:

$$d_{uj} = \left(\sum_{k=1}^{p} \left(\frac{x_{uk} - x_{jk}}{\mathrm{sd}(X_k)} \right)^2 \right)^{\frac{1}{2}} , \qquad (9)$$

where

d_{uj} is the distance between the ungaged site and the jth gaged site in terms of the basin characteristics,

p is the number of basin characteristics used to compute the distance metric (d_{ij}),

X_k is the kth basin characteristic,

$\mathrm{sd}(X_k)$ is the sample standard deviation of X_k,

x_{uk} is the value of X_k at the ungaged site, and

x_{jk} is the value of X_k at the jth gaged site.

The distance metric, d_{uj}, is computed for each gaged site in combination with the ungaged site and then ranked in ascending order. Data from gaged sites with the N smallest distance metrics are used to construct an equation by means of generalized least-squares techniques.

To use the region-of-influence technique, the optimum number of gaged sites (N) forming the region of influence and the identity and number of basin characteristics (p) used to compute the distance metric must be determined by the analyst in advance. In addition, the form of the regression model must be set or, at a minimum, the universe of possible explanatory variables must be chosen. It also is worth noting that the characteristics used to determine the distance metric (and consequently the region of influence) can be different than the characteristics used in the regression model.

In this study, the variables used in the GLS full-model equations were chosen to define the universe of potential explanatory variables in the region-of-influence regression model. A step-backward selection process was used to remove variables from the model whose parameter estimate was less than the estimated standard deviation of the parameter estimate.

The selection of optimum values of N and p was done by trial and error, using minimization of PRESS/n determined for the resulting equations as the objective criterion. Several factors were tested to determine the composition of an acceptable distance metric. Among others, tested factors included the basin characteristics used in the GLS full-model equations, the decimal latitude and longitude of the basin centroid, region indicator variables, and climate factors. The best results were obtained when the basin characteristics used in the GLS full-model equations and the decimal lati-

Table 6. PRESS/n values for selected numbers of sites in the region-of-influence and for the generalized least-squares full-model equations

Number of sites (*n*) in region of influence	PRESS/n for indicated recurrence interval						
	2-year	5-year	10-year	25-year	50-year	100-year	500-year
10	0.0371	0.0359	0.0394	0.0459	0.0496	0.0545	0.0695
15	.0311	.0317	.0333	.0377	.0421	.0476	.0614
20	.0305	.0303	.0321	.0370	.0408	.0452	.0571
25	.0300	.0289	.0300	.0347	.0387	.0431	.0559
30	.0298	.0285	.0297	.0328	.0365	.0400	.0525
35	.0300	.0285	.0301	.0335	.0367	.0409	.0530
40	.0298	.0287	.0305	.0338	.0374	.0418	.0530
45	.0299	.0290	.0304	.0338	.0373	.0414	.0531
50	.0302	.0287	.0300	.0333	.0369	.0412	.0529
55	.0306	.0291	.0306	.0343	.0379	.0422	.0549
60	.0309	.0292	.0303	.0336	.0374	.0416	.0540
65	.0306	.0291	.0307	.0344	.0383	.0424	.0538
70	.0307	.0292	.0303	.0343	.0380	.0424	.0547
75	.0313	.0296	.0312	.0353	.0393	.0438	.0565
80	.0312	.0297	.0316	.0355	.0394	.0438	.0567
85	.0313	.0298	.0318	.0356	.0395	.0440	.0570
90	.0312	.0301	.0319	.0355	.0396	.0443	.0568
GLS full model	0.0267	0.0246	0.0254	0.0282	0.0316	0.0359	0.0495

tude and longitude of the basin centroid were used to compute the distance metric.

The optimum number of gaged sites (N) forming the region of influence was determined by means of an iterative process in which each observation for a streamflow-gaging station was treated as if it were an ungaged site and used in a region-of-influence regression analysis. The number of gaged sites used to construct the region of influence was increased from 10 to 30 in increments of 5 and prediction residuals were computed for each region size. PRESS/n was computed for each region size and recurrence interval, and the results were tabulated and compared to PRESS/n for the GLS full-model (table 6). For all recurrence intervals, a region size of 20 stations resulted in minimum PRESS/n values; however, the GLS full-model equations had lower PRESS/n values for all recurrence intervals, indicating that the GLS full-model equations had superior prediction accuracy.

In some applications of the region-of-influence technique, the streamflow-gaging-station data considered for inclusion in the region of influence are constrained to one or more specific physical regions (Lorenz and others, 1997; Pope and others, 2001). To determine whether region-specific region-of-influence models provide improved accuracy, an analysis similar to that described above was conducted to compare the GLS full-model equations to region-of-influence models constructed using data from specific regions and region combinations. For example, a region-of-influence model was constructed with data from gaged sites only in region A and PRESS/n values were computed for stations in that region. In that case, the PRESS/n values were compared to the average squared residual determined by means of the

GLS full-model equations for only those stations in region A. For all recurrence intervals, the GLS full-model equations had lower PRESS/n values than the region-of-influence models, indicating that the GLS full-model equations had superior prediction accuracy.

SUMMARY AND CONCLUSIONS

Estimates of peak discharges with recurrence intervals of 2, 5, 10, 25, 50, 100, and 500 years were developed by means of log-Pearson Type III analyses for 305 streamflow-gaging stations in Ohio and adjacent states. These estimates, along with measures of selected basin characteristics, were used in ordinary and generalized least-squares regression analyses to develop regional equations for estimating flood-frequency characteristics at ungaged sites on rural, unregulated streams in Ohio. Two sets of equations were developed; simple equations, based on drainage area only, and full-model equations, based on drainage area, main-channel slope, and the percentage of the basin classified as water and wetlands. Values of explanatory variables used in the regression models were determined from digital spatial data sets by means of a geographic information system, with the exception of drainage area, which was determined by digitizing the area within basin boundaries manually delineated on topographic maps. The simple equations and the full-model equations implicitly require that the basin centroid can be determined or estimated with sufficient accuracy to identify the hydrologic region in which the basin centroid is located. In addition, both sets of equations are applicable to streams in Ohio draining predominately rural basins that are free of appreciable regulation.

A region-of-influence method, which employs a computer program to estimate flood-frequency characteristics for ungaged sites on the basis of data from gaged sites with similar characteristics, was tested and compared to the GLS full-model equations. For all recurrence intervals, a region size of 20 stations resulted in minimum PRESS/n values; however, the GLS full-model equations had lower PRESS/n values for all recurrence intervals indicating that the GLS full-model equations had superior prediction accuracy.

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DATA TABLES

Table 4. Flood-frequency data for streamflow-gaging stations

[Bold station numbers indicate peak streamflows at this station presently (2003) are considered regulated. For each station, the upper numbers are the log-Pearson Type III estimates, the middle numbers are regression estimates, and the lower numbers are weighted estimates. Streamflow-gaging stations are in Ohio unless indicated otherwise. Abbreviations: ft^3/s, cubic feet per second.]

Map ID (fig. 1)	Station number	Station name	Latitude	Longitude	Flood-peak discharge (ft^3/s) for indicated recurrence interval, in years							Record		Largest recorded discharge	
					2	5	10	25	50	100	500	Years	Period used	Calendar year	Magnitude (ft^3/s)
1	03022500	French Creek at Saegerstown, Pa.	41°42′50″	80°08′50″	10,500	13,800	15,900	18,500	20,400	22,300	26,600	19	1913, 1922-1939	1913	26,300
					10,100	14,400	17,400	21,100	23,900	26,700	33,100				
					10,400	13,900	16,100	19,000	21,100	23,200	28,000				
2	03023000	Cussewago Creek near Meadville, Pa.	41°40′20″	80°12′55″	1,540	2,110	2,540	3,130	3,610	4,130	5,500	28	1911-1938	1913	5,250
					2,070	3,030	3,680	4,490	5,080	5,670	7,030				
					1,560	2,160	2,630	3,270	3,780	4,330	5,730				
3	03086100	Big Sewickley Creek near Ambridge, Pa.	40°36′27″	80°09′49″	622	1,010	1,320	1,790	2,180	2,630	3,870	16	1963-1978	1975	2,540
					1,000	1,740	2,280	2,990	3,530	4,080	5,410				
					662	1,120	1,510	2,070	2,550	3,050	4,380				
4	03086500	Mahoning River at Alliance	40°55′58″	81°05′41″	2,120	3,380	4,380	5,840	7,090	8,490	12,400	60	1942-2001	1959	9,740
					2,440	3,710	4,580	5,700	6,520	7,340	9,250				
					2,130	3,390	4,390	5,830	7,040	8,380	12,000				
5	03087000	Beech Creek near Bolton	40°55′50″	81°08′50″	1,080	1,580	1,910	2,310	2,600	2,890	3,530	12	1944-1954, 1959	1950	2,210
					820	1,330	1,700	2,160	2,510	2,860	3,690				
					1,040	1,530	1,850	2,260	2,570	2,880	3,600				
6	03088000	Deer Creek at Limaville	40°58′45″	81°09′35″	1,060	1,340	1,540	1,790	1,990	2,190	2,690	15	1942-1955, 1959	1959	3,660
					944	1,400	1,710	2,090	2,380	2,660	3,300				
					1,050	1,350	1,560	1,840	2,050	2,270	2,810				
7	03089500	Mill Creek near Berlin Center	41°00′01″	80°58′07″	972	1,360	1,620	1,940	2,180	2,420	2,980	36	1942-1977	1946	1,900
					725	1,130	1,410	1,760	2,020	2,280	2,890				
					959	1,340	1,600	1,920	2,160	2,400	2,970				
8	**03090500**	Mahoning River below Berlin Dam near Berlin Center	41°02′54″	81°00′05″	5,560	7,410	8,530	9,850	10,800	11,700	13,600	12	1931-1942	1937	8,630
					4,700	6,800	8,230	10,000	11,400	12,700	15,700				
					5,430	7,290	8,460	9,910	11,000	12,000	14,400				

Table 4. Flood-frequency data for streamflow-gaging stations—Continued

[Bold station numbers indicate peak streamflows at this station presently (2003) are considered regulated. For each station, the upper numbers are the log-Pearson Type III estimates, the middle numbers are regression estimates, and the lower numbers are weighted estimates. Streamflow-gaging stations are in Ohio unless indicated otherwise. Abbreviations: ft^3/s, cubic feet per second.]

Map ID (fig. 1)	Station number	Station name	Latitude	Longitude	Flood-peak discharge (ft^3/s) for indicated recurrence interval, in years							Record		Largest recorded discharge	
					2	5	10	25	50	100	500	Years	Period used	Calendar year	Magnitude (ft^3/s)
9	03092000	Kale Creek near Pricetown	41°08′23″	80°59′43″	1,090	1,660	2,100	2,750	3,300	3,920	5,630	52	1942-1993	1959	3,890
					733	1,110	1,370	1,700	1,940	2,180	2,730				
					1,080	1,620	2,040	2,640	3,130	3,670	5,140				
10	03092090	West Branch Mahoning River near Ravenna	41°09′41″	81°11′50″	922	1,310	1,590	1,960	2,250	2,550	3,300	36	1966-2001	1979	2,810
					757	1,150	1,420	1,760	2,010	2,260	2,840				
					915	1,300	1,570	1,940	2,220	2,510	3,230				
11	03092100	Hinkley Creek near Charlestown	41°09′10″	81°10′05″	334	499	625	805	955	1,120	1,560	23	1947-1969	1959	2,400
					457	715	894	1,120	1,290	1,450	1,840				
					342	518	656	853	1,010	1,180	1,620				
12	**03092500**	West Branch Mahoning River near Newton Falls	41°10′18″	81°01′16″	2,570	3,730	4,530	5,590	6,400	7,230	9,270	40	1927-1966	1959	8,340
					2,320	3,420	4,170	5,110	5,810	6,490	8,100				
					2,560	3,710	4,500	5,540	6,330	7,140	9,110				
13	03092600	Ordnance Creek near Newton Falls	41°11′20″	81°01′05″	37	66	89	121	147	175	246	13	1950-1962	1956	103
					29	51	67	88	104	120	157				
					35	62	81	106	126	146	196				
14	03093000	Eagle Creek at Phalanx Station	41°15′40″	80°57′16″	2,680	3,780	4,500	5,400	6,050	6,700	8,200	72	1927-1934, 1938-2001	1979	8,150
					2,290	3,350	4,070	4,970	5,640	6,300	7,830				
					2,680	3,770	4,490	5,380	6,030	6,680	8,170				
15	03094900	Walnut Creek at Cortland	41°19′49″	80°43′28″	487	816	1,050	1,370	1,610	1,860	2,460	31	1947-1977	1959	1,470
					337	518	640	793	905	1,020	1,270				
					478	788	1,000	1,280	1,480	1,690	2,190				
16	**03096000**	Mosquito Creek at Niles	41°11′02″	80°45′39″	1,580	2,450	3,060	3,840	4,450	5,050	6,510	14	1930-1943	1943	3,080
					2,550	3,600	4,300	5,170	5,810	6,440	7,880				
					1,630	2,550	3,210	4,050	4,690	5,330	6,820				

Table 4. Flood-frequency data for streamflow-gaging stations—Continued

[Bold station numbers indicate peak streamflows at this station presently (2003) are considered regulated. For each station, the upper numbers are the log-Pearson Type III estimates, the middle numbers are regression estimates, and the lower numbers are weighted estimates. Streamflow-gaging stations are in Ohio unless indicated otherwise. Abbreviations: ft^3/s, cubic feet per second.]

Map ID (fig. 1)	Station number	Station name	Latitude	Longitude	Flood-peak discharge (ft^3/s) for indicated recurrence interval, in years							Record		Largest recorded discharge	
					2	5	10	25	50	100	500	Years	Period used	Calendar year	Magnitude (ft^3/s)
17	03098500	Mill Creek at Youngstown	41°04′19″	80°41′26″	1,470	2,410	3,190	4,350	5,360	6,510	9,790	35	1913, 1944-1977	1913	7,140
					1,880	2,850	3,510	4,350	4,970	5,590	7,030				
					1,490	2,440	3,210	4,350	5,320	6,390	9,370				
18	03098700	Crab Creek at Youngstown	41°07′20″	80°38′08″	671	857	982	1,140	1,270	1,390	1,700	24	1959-1982	1959	2,140
					633	1,000	1,260	1,590	1,840	2,080	2,660				
					669	868	1,010	1,200	1,340	1,490	1,850				
19	03102900	Clear Creek at Dilworth	41°26′45″	80°39′56″	64	123	175	254	324	404	632	31	1947-1977	1958	749
					105	182	238	310	364	418	546				
					66	129	182	263	331	407	611				
20	03102950	Pymatuning Creek at Kinsman	41°26′34″	80°35′18″	1,420	1,960	2,310	2,720	3,010	3,290	3,900	36	1966-2001	1986	2,740
					1,520	2,080	2,430	2,880	3,190	3,510	4,210				
					1,420	1,970	2,320	2,730	3,030	3,310	3,940				
21	03104760	Harthegig Run near Greenfield, Pa.	41°11′10″	80°19′38″	175	273	342	434	505	577	756	12	1969-1980	1980	398
					168	283	365	470	548	627	812				
					174	275	348	446	521	597	779				
22	03106000	Connoquenessing Creek near Zelienople, Pa.	40°49′01″	80°14′33″	7,970	10,700	12,600	15,100	17,000	19,000	23,800	86	1916-2001	1924	23,000
					8,760	13,600	17,100	21,500	24,800	28,200	36,100				
					7,990	10,800	12,800	15,500	17,500	19,600	24,800				
23	**03106500**	Slippery Rock Creek at Wurtemburg, Pa.	40°53′02″	80°14′02″	7,480	10,900	13,200	16,100	18,400	20,600	26,000	57	1912-1932, 1934-1969	1937	19,000
					7,780	11,400	14,000	17,200	19,600	22,000	27,600				
					7,490	10,900	13,200	16,200	18,400	20,700	26,200				
24	03108000	Raccoon Creek at Moffatts Mill, Pa.	40°37′40″	80°20′16″	3,720	5,550	6,820	8,490	9,770	11,100	14,300	76	1916-1932, 1942-1994, 1996-2001	1922	10,000
					3,620	5,460	6,670	8,140	9,190	10,200	12,500				
					3,720	5,540	6,810	8,460	9,720	11,000	14,100				

Table 4. Flood-frequency data for streamflow-gaging stations—Continued

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Map ID (fig. 1)	Station number	Station name	Latitude	Longitude	Flood-peak discharge (ft^3/s) for indicated recurrence interval, in years: 2	5	10	25	50	100	500	Record: Years	Record: Period used	Largest recorded discharge: Calendar year	Largest recorded discharge: Magnitude (ft^3/s)
25	03109000	Lisbon Creek at Lisbon	40°46′55″	80°45′53″	382	614	797	1,060	1,290	1,540	2,230	35	1947-1981	1958	1,500
					468	816	1,070	1,410	1,660	1,920	2,540				
					387	631	828	1,110	1,350	1,610	2,290				
26	03109500	Little Beaver Creek near East Liverpool	40°40′33″	80°32′27″	8,980	13,300	16,400	20,600	24,000	27,600	36,800	86	1916-2001	1941	25,000
					9,710	14,500	17,800	22,000	25,100	28,300	35,600				
					8,990	13,300	16,400	20,700	24,100	27,600	36,700				
27	03110000	Yellow Creek near Hammondsville	40°32′16″	80°43′31″	3,020	4,390	5,420	6,840	8,000	9,240	12,500	61	1941-2001	1952	9,580
					3,060	4,590	5,590	6,810	7,680	8,520	10,400				
					3,020	4,400	5,430	6,840	7,970	9,170	12,300				
28	03110980	Consol Run at Bloomingdale	40°19′56″	80°48′44″	6	12	17	24	30	37	55	10	1978-1987	1980	17
					10	20	28	38	45	53	70				
					8	15	22	32	39	47	65				
29	03111150	Brush Run near Buffalo, Pa.	40°11′54″	80°24′28″	533	933	1,240	1,670	2,010	2,380	3,310	21	1961-1978, 1983-1985	1978	1,700
					527	887	1,140	1,450	1,670	1,890	2,400				
					533	926	1,220	1,610	1,910	2,230	2,990				
30	03111450	Branson Run at Georgetown	40°12′26″	80°55′22″	58	102	139	193	239	290	433	11	1978-1987, 1990	1990	190
					90	152	195	247	284	320	402				
					64	115	157	215	260	305	416				
31	03111455	South Fork Short Creek at Georgetown	40°12′27″	80°55′12″	224	360	461	601	714	834	1,140	11	1978-1987, 1990	1990	620
					399	620	766	942	1,070	1,190	1,460				
					247	410	536	706	836	966	1,270				
32	03111470	Little Piney Fork at Parlett	40°18′07″	80°50′55″	63	129	191	291	385	497	839	10	1978-1987	1987	222
					111	189	242	308	355	401	506				
					70	144	207	298	371	448	648				

Table 4. Flood-frequency data for streamflow-gaging stations—Continued

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Map ID (fig. 1)	Station number	Station name	Latitude	Longitude	Flood-peak discharge (ft^3/s) for indicated recurrence interval, in years							Record		Largest recorded discharge	
					2	5	10	25	50	100	500	Years	Period used	Calendar year	Magnitude (ft^3/s)
33	03111490	Piney Fork tributary near Piney Fork	40°16′18″	80°50′48″	15	26	35	50	63	78	125	10	1978-1987	1978	73
					46	83	108	140	163	186	238				
					21	40	59	86	108	131	187				
34	03111500	Short Creek near Dillonvale	40°11′36″	80°44′04″	2,820	4,120	4,970	6,020	6,780	7,530	9,220	60	1942-2001	1990	8,200
					2,570	3,820	4,630	5,620	6,320	7,000	8,510				
					2,810	4,110	4,950	5,990	6,750	7,480	9,140				
35	03111540	Sloan Run tributary near Harrisville	40°09′07″	80°52′59″	49	133	224	388	551	756	1,430	10	1978-1987	1978	180
					66	129	178	244	295	348	476				
					53	132	202	305	390	482	731				
36	03111548	Wheeling Creek below Blaine	40°04′01″	80°48′31″	2,620	4,040	5,030	6,320	7,300	8,290	10,700	18	1983-1987, 1989-2001	1998	5,470
					3,170	5,000	6,300	7,960	9,210	10,500	13,400				
					2,670	4,170	5,250	6,670	7,760	8,850	11,500				
37	03112000	Wheeling Creek at Elm Grove, W. Va.	40°02′40″	80°39′40″	9,120	13,700	16,800	21,100	24,300	27,700	36,000	60	1941-2000	1943	22,100
					7,500	11,700	14,800	18,700	21,600	24,500	31,500				
					9,050	13,500	16,700	20,800	24,000	27,300	35,400				
38	03113700	Little Grave Creek near Glendale, W. Va.	39°57′40″	80°42′04″	495	940	1,310	1,870	2,340	2,870	4,320	12	1970-1977, 1980, 1994-1996	1976	1,400
					481	875	1,170	1,570	1,880	2,190	2,950				
					492	923	1,270	1,750	2,140	2,550	3,610				
39	03114000	Captina Creek at Armstrongs Mills	39°54′31″	80°55′27″	6,120	9,320	11,600	14,700	17,100	19,600	25,900	52	1927-1935, 1959-2001	1980	21,900
					4,170	6,590	8,320	10,500	12,200	13,900	17,800				
					6,040	9,160	11,400	14,300	16,500	18,900	24,700				
40	03114240	Wood Run near Woodsfield	39°46′56″	81°03′21″	65	133	192	284	365	456	713	10	1978-1987	1981	240
					88	169	230	313	377	442	602				
					70	144	208	298	371	449	646				

Table 4. Flood-frequency data for streamflow-gaging stations—Continued

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Map ID (fig. 1)	Station number	Station name	Latitude	Longitude	Flood-peak discharge (ft^3/s) for indicated recurrence interval, in years							Record		Largest recorded discharge	
					2	5	10	25	50	100	500	Years	Period used	Calendar year	Magnitude (ft^3/s)
41	03114500	Middle Island Creek at Little, W. Va.	39°28′30″	80°59′50″	13,500	17,600	20,400	23,900	26,600	29,300	35,900	79	1875, 1916-1922, 1926-1995, 1997	1875	30,000
					10,100	15,500	19,200	24,100	27,700	31,300	39,900				
					13,400	17,500	20,300	24,000	26,700	29,500	36,200				
42	03114550	Buffalo Run near Friendly, W. Va.	39°30′23″	81°01′41″	207	369	493	665	804	950	1,320	12	1966-1977	1974	585
					117	217	293	393	470	548	738				
					183	315	408	531	626	726	975				
43	03114600	Little Buffalo Run near Friendly, W. Va.	39°30′10″	81°00′59″	254	416	535	697	825	959	1,290	11	1967-1977	1974	635
					162	303	411	555	666	779	1,050				
					229	377	484	629	744	863	1,160				
44	03115280	Trail Run near Antioch	39°37′29″	81°02′54″	629	979	1,260	1,670	2,030	2,420	3,530	10	1978-1987	1981	2,020
					460	818	1,080	1,430	1,700	1,970	2,630				
					590	930	1,190	1,570	1,870	2,200	3,040				
45	03115400	Little Muskingum River at Bloomfield	39°33′47″	81°12′14″	7,340	10,900	13,600	17,400	20,600	24,000	33,100	29	1959-1981, 1996-2001	1998	32,300
					5,890	9,260	11,600	14,700	17,000	19,400	24,800				
					7,240	10,800	13,400	17,000	19,900	23,000	31,100				
46	03115410	Graham Run near Bloomfield	39°32′36″	81°12′52″	20	40	58	84	106	130	194	10	1978-1987	1979	79
					32	63	88	122	148	175	240				
					24	50	73	105	131	158	225				
47	03115500	Little Muskingum River at Fay	39°28′48″	81°17′09″	7,650	11,200	13,600	16,900	19,500	22,100	28,600	20	1916-1935	1935	16,800
					6,470	10,000	12,500	15,700	18,100	20,500	26,100				
					7,550	11,000	13,500	16,700	19,200	21,700	28,000				
48	03115510	Moss Run near Wingett	39°28′24″	81°18′52″	221	369	493	681	847	1,040	1,590	10	1978-1987	1980	760
					185	343	462	621	743	867	1,170				
					212	360	481	653	793	944	1,340				

Table 4. Flood-frequency data for streamflow-gaging stations—Continued

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Map ID (fig. 1)	Station number	Station name	Latitude	Longitude	Flood-peak discharge (ft^3/s) for indicated recurrence interval, in years							Record		Largest recorded discharge	
					2	5	10	25	50	100	500	Years	Period used	Calendar year	Magnitude (ft^3/s)
49	03115600	Barnes Run near Summerfield	39°46′20″	81°22′26″	540	1,090	1,580	2,350	3,060	3,870	6,290	33	1947-1979	1957	2,350
					319	569	756	1,000	1,190	1,380	1,840				
					519	1,010	1,420	2,010	2,510	3,070	4,640				
50	03115710	Buffalo Run tributary near Dexter City	39°39′41″	81°26′58″	44	52	58	64	69	74	86	10	1978-1987	1984	69
					40	79	108	148	178	210	287				
					43	62	78	101	120	139	185				
51	03115973	Schocalog Run at Copley Junction	41°06′11″	81°36′12″	114	134	146	159	168	176	194	10	1992-2001	1997	151
					124	186	225	271	303	334	400				
					116	147	169	198	218	237	278				
52	03116000	Tuscarawas River at Clinton	40°55′40″	81°37′58″	1,320	1,810	2,130	2,530	2,840	3,140	3,850	53	1913, 1927-1978	1935	2,700
					1,990	2,660	3,070	3,540	3,870	4,180	4,840				
					1,330	1,830	2,170	2,590	2,900	3,210	3,930				
53	03116100	Little Chippewa Creek near Smithville	40°53′39″	81°48′46″	739	1,150	1,440	1,820	2,120	2,430	3,180	26	1947-1972	1969	3,930
					527	822	1,010	1,250	1,410	1,570	1,920				
					721	1,110	1,370	1,700	1,950	2,200	2,800				
54	03116200	Chippewa Creek at Easton	40°56′47″	81°44′35″	1,800	3,070	4,250	6,210	8,080	10,400	17,900	23	1959-1981	1969	12,500
					2,470	3,550	4,240	5,070	5,650	6,210	7,430				
					1,830	3,120	4,250	6,010	7,580	9,390	14,800				
55	03117000	Tuscarawas River at Massillon	40°46′13″	81°31′27″	4,120	5,440	6,330	7,480	8,350	9,230	11,400	63	1939-2001	1969	10,700
					5,660	7,690	8,960	10,500	11,500	12,500	14,700				
					4,150	5,500	6,430	7,620	8,520	9,440	11,600				
56	03117500	Sandy Creek at Waynesburg	40°40′21″	81°15′36″	3,400	4,830	5,860	7,240	8,330	9,470	12,400	63	1939-2001	1959	15,000
					4,170	6,020	7,220	8,670	9,690	10,700	12,900				
					3,410	4,870	5,920	7,320	8,420	9,560	12,400				

Table 4. Flood-frequency data for streamflow-gaging stations—Continued

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Map ID (fig. 1)	Station number	Station name	Latitude	Longitude	Flood-peak discharge (ft^3/s) for indicated recurrence interval, in years: 2	5	10	25	50	100	500	Record: Years	Record: Period used	Largest recorded discharge: Calendar year	Largest recorded discharge: Magnitude (ft^3/s)
57	03118000	Middle Branch Nimishillen Creek at Canton	40°50′29″	81°21′14″	629	935	1,170	1,500	1,780	2,080	2,890	60	1942-2001	1959	2,470
					969	1,420	1,720	2,060	2,310	2,540	3,050				
					637	951	1,190	1,540	1,820	2,120	2,910				
58	03118500	Nimishillen Creek at North Industry	40°44′03″	81°21′08″	3,140	4,410	5,260	6,330	7,130	7,930	9,820	80	1922-2001	1959	8,600
					3,010	4,360	5,220	6,260	7,000	7,700	9,260				
					3,140	4,410	5,250	6,320	7,120	7,910	9,780				
59	03119000	Sandy Creek at Sandyville	40°38′04″	81°22′28″	7,200	10,500	12,700	15,300	17,200	19,000	23,000	24	1924-1947	1937	14,200
					6,560	9,290	11,000	13,100	14,600	16,100	19,200				
					7,160	10,400	12,500	15,000	16,700	18,400	22,200				
60	03119700	Conotton Creek at Jewett	40°21′59″	81°00′13″	491	753	938	1,180	1,370	1,560	2,020	35	1947-1981	1963	1,170
					611	991	1,250	1,570	1,800	2,020	2,530				
					497	770	967	1,230	1,430	1,630	2,110				
61	**03122500**	Tuscarawas River below Dover Dam near Dover	40°31′47″	81°25′48″	15,000	20,800	24,700	29,900	33,900	38,000	47,900	15	1913, 1924-1937	1913	62,000
					11,300	14,900	17,100	19,800	21,600	23,400	27,200				
					14,700	20,100	23,600	27,900	31,200	34,400	42,200				
62	03123400	Dundee Creek at Dundee	40°35′35″	81°36′13″	147	273	369	498	600	704	956	21	1966-1986	1969	340
					72	127	166	215	250	285	365				
					131	230	294	374	432	491	633				
63	03125000	Home Creek near New Philadelphia	40°28′06″	81°24′10″	121	210	274	356	419	481	624	43	1937-1979	1969	378
					135	238	310	401	468	533	683				
					122	214	280	365	429	493	640				
64	03125300	West Branch Spencer Creek at Hendrysburg	40°03′30″	81°09′30″	202	420	596	846	1,050	1,260	1,780	16	1950-1965	1950	740
					230	413	550	730	868	1,010	1,340				
					206	418	583	806	979	1,160	1,590				

Table 4. Flood-frequency data for streamflow-gaging stations—Continued

[Bold station numbers indicate peak streamflows at this station presently (2003) are considered regulated. For each station, the upper numbers are the log-Pearson Type III estimates, the middle numbers are regression estimates, and the lower numbers are weighted estimates. Streamflow-gaging stations are in Ohio unless indicated otherwise. Abbreviations: ft^3/s, cubic feet per second.]

Map ID (fig. 1)	Station number	Station name	Latitude	Longitude	Flood-peak discharge (ft^3/s) for indicated recurrence interval, in years							Record		Largest recorded discharge	
					2	5	10	25	50	100	500	Years	Period used	Calendar year	Magnitude (ft^3/s)
65	03125450	Robinson Run near Hendrysburg	40°05′08″	81°10′27″	97	130	150	174	191	207	244	10	1978-1987	1978	147
					214	387	517	689	820	954	1,280				
					116	181	237	318	380	443	587				
66	03127950	Clear Fork near Jewett	40°19′28″	81°01′20″	209	380	534	782	1,010	1,290	2,140	11	1978-1987, 1990	1990	1,270
					284	467	592	745	855	963	1,210				
					220	399	550	769	948	1,140	1,660				
67	03128650	Mud Run tributary at Wainwright	40°25′07″	81°24′57″	11	19	26	37	47	58	89	10	1978-1987	1981	38
					70	127	169	224	266	308	410				
					17	36	55	86	112	140	209				
68	**03129000**	Tuscarawas River at Newcomerstown	40°15′41″	81°36′33″	21,300	31,100	38,400	48,500	56,600	65,300	88,200	17	1913, 1922-1937	1913	83,000
					19,000	25,300	29,300	34,100	37,400	40,600	47,600				
					21,100	30,500	37,000	45,700	52,300	59,200	76,600				
69	03129012	White Eyes Creek tributary near Coshocton	40°21′41″	81°47′52″	3	11	20	38	56	80	160	19	1940-1958	1946	35
					5	11	16	23	29	35	49				
					4	11	18	28	37	46	71				
70	03129014	White Eyes Creek tributary near Coshocton	40°21′36″	81°47′04″	99	212	321	507	686	905	1,610	65	1937-2001	1957	1,140
					78	150	206	281	339	398	544				
					98	205	303	459	601	766	1,260				
71	03129016	White Eyes Creek tributary near Coshocton	40°21′29″	81°46′53″	30	68	105	170	233	311	559	25	1938-1955, 1957-1963	1946	193
					30	59	82	113	137	162	222				
					30	66	98	149	192	242	381				
72	03129300	Whetstone Creek tributary near Olivesburg	40°53′15″	82°24′25″	42	71	93	124	150	177	249	28	1950-1977	1969	310
					35	65	87	116	138	160	212				
					41	70	92	122	146	171	235				

Table 4. Flood-frequency data for streamflow-gaging stations—Continued

[Bold station numbers indicate peak streamflows at this station presently (2003) are considered regulated. For each station, the upper numbers are the log-Pearson Type III estimates, the middle numbers are regression estimates, and the lower numbers are weighted estimates. Streamflow-gaging stations are in Ohio unless indicated otherwise. Abbreviations: ft^3/s, cubic feet per second.]

Map ID (fig. 1)	Station number	Station name	Latitude	Longitude	Flood-peak discharge (ft^3/s) for indicated recurrence interval, in years: 2	5	10	25	50	100	500	Record: Years	Record: Period used	Largest recorded discharge: Calendar year	Largest recorded discharge: Magnitude (ft^3/s)
73	03130500	Touby Run at Mansfield	40°45′53″	82°32′43″	403	627	788	1,010	1,180	1,350	1,790	33	1947-1978, 1987	1987	1,030
					325	537	687	879	1,020	1,170	1,500				
					398	618	775	985	1,150	1,320	1,730				
74	03132000	Clear Fork at Butler	40°35′37″	82°25′20″	3,310	5,430	7,250	10,100	12,700	15,800	25,100	31	1946-1975, 1987	1987	21,300
					3,450	5,230	6,460	8,030	9,190	10,400	13,100				
					3,310	5,410	7,180	9,860	12,200	14,900	22,700				
75	03134000	Jerome Fork at Jeromeville	40°48′07″	82°12′01″	2,540	4,090	5,430	7,590	9,570	11,900	19,200	31	1913, 1926-1949, 1959, 1962-1964, 1966, 1969	1969	27,000
					3,430	5,320	6,640	8,330	9,590	10,900	13,800				
					2,580	4,160	5,540	7,670	9,570	11,800	18,200				
76	**03136000**	Mohican River at Greer	40°30′53″	82°11′44″	10,700	15,100	18,200	22,300	25,500	28,800	37,200	17	1913, 1922-1937	1913	55,000
					16,500	24,500	30,100	37,300	42,600	47,900	60,500				
					11,100	16,000	19,600	24,500	28,400	32,300	42,000				
77	03136500	Kokosing River at Mount Vernon	40°24′20″	82°30′00″	4,350	6,750	8,710	11,700	14,300	17,200	25,800	48	1954-2001	1959	38,000
					5,070	7,770	9,650	12,100	13,900	15,600	19,900				
					4,380	6,810	8,790	11,700	14,200	17,000	24,700				
78	03137000	Kokosing River at Millwood	40°23′51″	82°17′09″	9,730	16,300	21,700	29,600	36,400	44,000	65,400	54	1913, 1922-1974	1959	75,900
					9,390	14,100	17,400	21,700	24,800	27,900	35,300				
					9,720	16,200	21,300	28,700	34,900	41,700	60,300				
79	**03138500**	Walhonding River below Mohawk Dam at Nellie	40°20′29″	82°03′56″	19,600	28,900	34,900	42,200	47,500	52,600	63,900	17	1913, 1922-1937	1913	102,000
					23,900	35,300	43,200	53,500	61,100	68,700	86,700				
					19,900	29,600	36,100	44,200	50,100	55,900	69,000				
80	03138900	Jennings Ditch tributary near Wooster	40°44′45″	81°55′48″	76	195	331	600	895	1,300	2,830	18	1946, 1966-1982	1946	1,880
					124	232	314	423	507	593	801				
					81	202	327	537	735	970	1,700				

Table 4. Flood-frequency data for streamflow-gaging stations—Continued

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Map ID (fig. 1)	Station number	Station name	Latitude	Longitude	Flood-peak discharge (ft^3/s) for indicated recurrence interval, in years							Record		Largest recorded discharge	
					2	5	10	25	50	100	500	Years	Period used	Cal-endar year	Magni-tude (ft^3/s)
81	03139000	Killbuck Creek at Kill-buck	40°28′53″	81°59′10″	3,340	5,370	7,210	10,300	13,100	16,700	28,100	71	1931-2001	1969	47,500
					8,040	11,700	14,200	17,300	19,600	21,900	27,300				
					3,410	5,520	7,450	10,600	13,500	17,000	28,000				
82	03139930	Little Mill Creek tribu-tary near Coshocton	40°24′23″	81°48′11″	63	135	203	315	421	546	933	35	1937-1971	1957	382
					84	158	215	290	347	406	550				
					65	138	205	310	402	507	807				
83	03139940	Little Mill Creek near Coshocton	40°24′01″	81°47′54″	155	306	434	626	790	972	1,470	35	1937-1971	1969	724
					181	335	452	608	727	849	1,150				
					157	309	437	622	776	942	1,380				
84	03139960	Little Mill Creek near Coshocton	40°23′32″	81°48′24″	301	591	836	1,210	1,520	1,880	2,850	35	1937-1971	1957	1,404
					256	467	626	836	997	1,160	1,560				
					297	575	802	1,130	1,400	1,690	2,460				
85	03139970	Little Mill Creek tribu-tary near Coshocton	40°23′33″	81°48′19″	26	65	105	173	237	315	552	34	1938-1971	1957	216
					40	78	107	147	177	209	285				
					27	67	106	166	218	277	441				
86	03139980	Little Mill Creek near Coshocton	40°23′03″	81°49′04″	414	810	1,140	1,620	2,020	2,470	3,650	35	1937-1971	1957	1,590
					380	684	912	1,210	1,440	1,680	2,250				
					411	796	1,100	1,540	1,900	2,270	3,260				
87	03139990	Little Mill Creek near Coshocton	40°21′51″	81°50′20″	701	1,420	2,080	3,180	4,210	5,440	9,290	36	1935, 1937-1971	1935	9,020
					584	1,040	1,370	1,820	2,160	2,510	3,340				
					694	1,380	1,990	2,940	3,790	4,760	7,640				
88	03140000	Mill Creek near Coshocton	40°21′46″	81°51′45″	1,230	2,360	3,440	5,250	7,000	9,150	16,200	65	1937-2001	1969	8,720
					1,280	2,120	2,720	3,500	4,090	4,680	6,090				
					1,230	2,350	3,380	5,040	6,590	8,420	14,100				

Table 4. Flood-frequency data for streamflow-gaging stations—Continued

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Map ID (fig. 1)	Station number	Station name	Latitude	Longitude	Flood-peak discharge (ft^3/s) for indicated recurrence interval, in years							Record		Largest recorded discharge	
					2	5	10	25	50	100	500	Years	Period used	Calendar year	Magnitude (ft^3/s)
89	03140010	Spoon Creek tributary near Coshocton	40°22′01″	81°47′58″	22	57	92	154	212	283	503	31	1940-1970	1957	240
					26	50	69	94	113	133	181				
					22	56	87	134	175	221	350				
90	03140020	Spoon Creek tributary near Coshocton	40°21′58″	81°48′04″	7	16	26	44	62	84	162	61	1939-1972, 1975-2001	1957	116
					17	34	48	66	80	95	130				
					7	18	29	48	65	87	153				
91	03140030	Spoon Creek tributary near Coshocton	40°21′27″	81°48′11″	14	33	50	78	104	133	214	30	1940-1969	1957	76
					13	27	38	53	65	77	107				
					14	31	46	69	87	106	158				
92	03142200	Salt Fork near Cambridge	40°05′05″	81°27′20″	1,740	2,590	3,220	4,080	4,780	5,520	7,430	11	1957-1967	1963	3,890
					1,910	3,010	3,780	4,760	5,490	6,220	7,950				
					1,760	2,670	3,350	4,280	5,010	5,760	7,630				
93	03144000	Wakatomika Creek near Frazeysburg	40°07′57″	82°08′53″	4,270	7,070	9,190	12,100	14,500	17,100	23,600	65	1937-2001	1979	16,800
					4,090	6,420	8,070	10,200	11,800	13,300	17,100				
					4,270	7,040	9,110	12,000	14,200	16,600	22,700				
94	**03144500**	Muskingum River at Dresden	40°07′13″	81°59′59″	46,100	68,600	84,800	106,000	123,000	141,000	186,000	17	1913, 1922-1937	1913	228,000
					53,800	73,700	87,200	105,000	117,000	130,000	159,000				
					46,600	69,100	85,100	106,000	122,000	139,000	179,000				
95	03144800	Etna Creek at Etna	39°58′08″	82°40′55″	108	191	259	359	444	538	799	18	1966-1982, 1990	1979	365
					106	186	245	320	377	435	571				
					107	190	254	343	414	489	680				
96	03145500	Raccoon Creek at Granville	40°03′50″	82°31′35″	4,060	6,090	7,290	8,640	9,520	10,300	11,900	10	1940-1948, 1959	1959	8,700
					2,600	4,090	5,140	6,470	7,470	8,460	10,800				
					3,880	5,750	6,830	8,070	8,940	9,760	11,500				

Table 4. Flood-frequency data for streamflow-gaging stations—Continued

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Map ID (fig. 1)	Station number	Station name	Latitude	Longitude	Flood-peak discharge (ft^3/s) for indicated recurrence interval, in years							Record		Largest recorded discharge	
					2	5	10	25	50	100	500	Years	Period used	Calendar year	Magnitude (ft^3/s)
97	03145600	Otter Fork near Centerburg	40°17′35″	82°43′09″	125	208	272	364	440	523	747	31	1947-1977	1959	445
					179	292	370	468	541	613	780				
					130	217	287	384	463	546	756				
98	03146000	North Fork Licking River at Utica	40°13′41″	82°27′06″	4,910	6,360	7,310	8,500	9,380	10,300	12,400	24	1940-1948, 1956, 1959,	1979	10,200
					3,570	5,610	7,060	8,910	10,300	11,700	15,000		1970-1982		
					4,790	6,270	7,270	8,580	9,570	10,600	13,000				
99	03146500	Licking River near Newark	40°03′33″	82°20′23″	11,800	17,800	22,100	27,700	32,100	36,700	48,000	62	1940-2001	1959	45,000
					10,700	16,000	19,700	24,400	27,900	31,400	39,700				
					11,800	17,700	21,900	27,400	31,700	36,100	47,000				
100	03147000	Licking River at Toboso	40°03′26″	82°13′12″	12,800	20,100	25,200	31,800	36,700	41,700	53,300	45	1903-1906,	1959	49,800
					12,700	18,900	23,300	28,800	33,000	37,100	46,900		1913, 1922-1961		
					12,800	20,100	25,100	31,500	36,300	41,100	52,500				
101	**03147500**	Licking River below Dillon Dam near	39°59′18″	82°04′50″	13,900	24,200	32,300	43,900	53,400	63,700	90,800	22	1913,	1959	47,000
		Dillon Falls			14,800	22,400	27,700	34,600	39,700	44,900	57,100		1940-1960		
					14,000	24,000	31,400	41,600	49,500	57,900	79,000				
102	03147900	Timber Run near Zanesville	39°57′00″	82°03′07″	803	1,340	1,730	2,260	2,670	3,090	4,130	31	1947-1977	1976	2,430
					702	1,220	1,600	2,100	2,480	2,870	3,790				
					793	1,320	1,710	2,220	2,620	3,030	4,030				
103	03148300	Moxahala Creek at Roseville	39°48′38″	82°04′13″	2,350	3,390	4,150	5,200	6,050	6,960	9,340	25	1963-1987	1963	5,600
					2,110	3,180	3,910	4,840	5,520	6,200	7,770				
					2,330	3,360	4,120	5,140	5,950	6,790	8,940				
104	03149500	Salt Creek near Chandlersville	39°54′31″	81°51′38″	3,180	4,130	4,720	5,430	5,940	6,440	7,560	14	1935-1947,	1940	5,240
					2,560	4,070	5,140	6,520	7,550	8,580	11,000		2001		
					3,090	4,120	4,820	5,730	6,420	7,120	8,720				

Table 4. Flood-frequency data for streamflow-gaging stations—Continued

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Map ID (fig. 1)	Station number	Station name	Latitude	Longitude	Flood-peak discharge (ft^3/s) for indicated recurrence interval, in years: 2	5	10	25	50	100	500	Record: Years	Record: Period used	Largest recorded discharge: Calendar year	Largest recorded discharge: Magnitude (ft^3/s)
105	**03150000**	Muskingum River at Mcconnelsville	39°38′42″	81°51′00″	55,800	85,800	107,000	135,000	156,000	178,000	232,000	17	1913, 1922-1937	1913	270,000
					62,900	85,600	101,000	121,000	135,000	150,000	184,000				
					56,300	85,800	106,000	132,000	152,000	172,000	220,000				
106	03150600	Tupper Creek at Devola	39°28′24″	81°27′58″	139	224	292	391	475	569	828	15	1966-1980	1980	470
					115	209	279	372	442	513	684				
					134	220	288	383	460	542	752				
107	03154500	Reedy Creek near Reedy, W. Va.	38°57′40″	81°23′25″	3,620	4,920	5,790	6,920	7,780	8,660	10,800	30	1952-1978, 1997, 2000, 2002	2000	8,700
					2,940	4,780	6,100	7,800	9,080	10,400	13,400				
					3,580	4,900	5,830	7,040	7,980	8,940	11,300				
108	03155500	Hughes River at Cisco, W. Va.	39°07′07″	81°16′39″	14,300	19,500	22,900	27,100	30,200	33,300	40,500	64	1916-1920, 1930-1931, 1939-1994, 1997	1950	28,100
					9,950	15,300	19,000	23,800	27,300	30,900	39,400				
					14,200	19,300	22,600	26,800	29,900	33,100	40,400				
109	03157000	Clear Creek near Rockbridge	39°35′18″	82°34′43″	2,630	4,100	5,310	7,160	8,790	10,700	16,200	62	1940-2001	1948	16,000
					3,070	4,920	6,240	7,950	9,230	10,500	13,600				
					2,650	4,140	5,380	7,240	8,840	10,600	15,700				
110	03157500	Hocking River at Enterprise	39°33′54″	82°28′29″	7,010	10,900	14,100	19,000	23,300	28,300	42,800	71	1907, 1932-2001	1907	36,000
					9,810	14,900	18,400	23,000	26,300	29,700	37,700				
					7,070	11,000	14,300	19,300	23,600	28,400	42,300				
111	03158100	Hayden Run near Haydenville	39°28′57″	82°19′06″	83	149	207	298	381	477	765	12	1966-1977	1968	370
					131	243	328	439	525	612	822				
					91	173	245	353	442	539	795				
112	03158220	Glen Run near Doanville	39°24′06″	82°11′44″	106	171	219	283	334	387	520	11	1977-1987	1981	250
					126	228	304	403	479	556	742				
					110	186	246	330	395	462	626				

Table 4. Flood-frequency data for streamflow-gaging stations—Continued

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Map ID (fig. 1)	Station number	Station name	Latitude	Longitude	Flood-peak discharge (ft^3/s) for indicated recurrence interval, in years: 2	5	10	25	50	100	500	Record: Years	Period used	Largest recorded discharge: Calendar year	Magnitude (ft^3/s)
113	03159450	Mill Creek near Chauncey	39°22′46″	82°05′04″	120	197	256	340	409	483	679	10	1978-1987	1981	265
					174	319	428	573	684	796	1,070				
					131	230	313	432	527	626	872				
114	03159500	Hocking River at Athens	39°19′44″	82°05′16″	12,200	17,700	22,000	28,200	33,300	39,000	54,500	90	1873, 1884, 1907, 1913, 1916-2001	1907	50,000
					15,400	22,600	27,600	34,000	38,700	43,400	54,500				
					12,200	17,900	22,200	28,400	33,600	39,200	54,500				
115	03159540	Shade River near Chester	39°03′49″	81°52′55″	3,540	5,080	6,290	8,050	9,550	11,200	15,900	36	1966-2001	1997	15,600
					4,380	6,860	8,600	10,800	12,500	14,200	18,100				
					3,580	5,210	6,500	8,380	9,940	11,700	16,300				
116	03159700	Grasslick Run near Ripley, W. Va.	38°45′53″	81°40′40″	149	243	321	442	549	672	1,030	13	1965-1977	1971	615
					96	178	241	323	385	449	604				
					136	222	291	388	469	556	789				
117	03201440	Sixteenmile Creek near Pliny, W. Va.	38°38′39″	82°02′53″	298	474	617	831	1,020	1,220	1,820	13	1965-1977	1973	870
					113	205	273	361	428	496	659				
					245	374	464	588	689	798	1,090				
118	03201480	Threemile Creek Tributary near Pt. Pleasant, W. Va.	38°50′15″	82°05′42″	134	243	326	438	526	617	839	13	1965-1977	1965	299
					107	203	276	374	450	528	716				
					128	231	307	410	489	572	773				
119	03201550	Starr Run near New Plymouth	39°23′46″	82°20′49″	52	83	106	139	166	194	268	10	1978-1987	1983	125
					54	104	142	193	232	272	370				
					53	90	121	165	200	236	326				
120	03201600	Sandy Run above Big Four Hollow Creek near Lake Hope	39°21′45″	82°18′47″	109	269	446	783	1,140	1,610	3,340	11	1971-1981	1974	990
					131	244	330	444	532	621	838				
					114	261	397	604	784	986	1,570				

Table 4. Flood-frequency data for streamflow-gaging stations—Continued

[Bold station numbers indicate peak streamflows at this station presently (2003) are considered regulated. For each station, the upper numbers are the log-Pearson Type III estimates, the middle numbers are regression estimates, and the lower numbers are weighted estimates. Streamflow-gaging stations are in Ohio unless indicated otherwise. Abbreviations: ft^3/s, cubic feet per second.]

Map ID (fig. 1)	Station number	Station name	Latitude	Longitude	Flood-peak discharge (ft^3/s) for indicated recurrence interval, in years							Record		Largest recorded discharge	
					2	5	10	25	50	100	500	Years	Period used	Calendar year	Magnitude (ft^3/s)
121	03201700	Big Four Hollow Creek near Lake Hope	39°21′48″	82°18′51″	118	308	528	970	1,460	2,130	4,760	13	1971-1983	1974	1,200
					133	248	334	450	538	629	848				
					121	289	450	705	932	1,190	1,980				
122	03202000	Raccoon Creek at Adamsville	38°51′32″	82°21′43″	6,090	8,990	11,100	14,100	16,500	19,100	25,900	78	1916-1935, 1937, 1939-1985, 1992-2001	1968	20,000
					10,400	15,400	18,900	23,200	26,500	29,700	37,300				
					6,160	9,150	11,400	14,500	17,100	19,700	26,600				
123	03204500	Mud River near Milton, W. Va.	38°23′18″	82°06′48″	6,260	9,930	12,900	17,200	20,900	25,000	36,500	44	1938-1980, 1997	1979	20,700
					6,910	10,900	13,700	17,300	20,000	22,700	29,200				
					6,280	9,980	12,900	17,200	20,800	24,700	35,300				
124	03205995	Sandusky Creek near Burlington	38°25′03″	82°30′36″	100	143	175	219	254	291	388	10	1978-1987	1979	242
					107	201	273	369	442	518	701				
					102	161	211	283	340	400	547				
125	03207000	Twelvepole Creek at Wayne, W. Va.	38°13′05″	82°26′55″	6,470	10,100	12,800	16,400	19,300	22,300	30,000	32	1916-1922, 1928-1931, 1939, 1947-1966	1939	22,000
					7,800	12,200	15,300	19,400	22,400	25,500	32,700				
					6,530	10,200	13,000	16,700	19,700	22,700	30,400				
126	03216563	Mile Branch near Rush, Ky.	38°21′50″	82°47′45″	192	273	327	395	445	495	613	12	1976-1987	1980	378
					112	204	272	361	429	498	664				
					173	252	307	381	438	496	638				
127	03217000	Tygarts Creek near Greenup, Ky.	38°33′51″	82°57′08″	7,090	11,600	15,200	20,300	24,700	29,400	42,500	62	1934, 1937, 1941-2000	1997	34,400
					9,740	14,400	17,400	21,200	24,000	26,800	33,000				
					7,150	11,700	15,300	20,400	24,600	29,200	41,400				
128	03217500	Scioto River at Larue	40°34′28″	83°23′15″	5,300	7,960	9,640	11,600	13,000	14,300	17,200	25	1913, 1927-1935, 1938-1951, 1959	1959	16,300
					5,280	7,910	9,710	12,000	13,700	15,400	19,200				
					5,300	7,960	9,640	11,700	13,100	14,500	17,500				

Table 4. Flood-frequency data for streamflow-gaging stations—Continued

[Bold station numbers indicate peak streamflows at this station presently (2003) are considered regulated. For each station, the upper numbers are the log-Pearson Type III estimates, the middle numbers are regression estimates, and the lower numbers are weighted estimates. Streamflow-gaging stations are in Ohio unless indicated otherwise. Abbreviations: ft^3/s, cubic feet per second.]

Map ID (fig. 1)	Station number	Station name	Latitude	Longitude	Flood-peak discharge (ft^3/s) for indicated recurrence interval, in years							Record		Largest recorded discharge	
					2	5	10	25	50	100	500	Years	Period used	Calendar year	Magnitude (ft^3/s)
129	03218000	Little Scioto River above Marion	40°37′43″	83°10′11″	1,090	1,710	2,200	2,900	3,500	4,140	5,920	38	1939-1976	1959	5,160
					1,580	2,380	2,900	3,520	3,960	4,380	5,310				
					1,110	1,750	2,260	2,970	3,560	4,180	5,810				
130	03219500	Scioto River near Prospect	40°25′10″	83°11′50″	6,000	8,100	9,400	10,900	12,000	13,100	15,400	88	1913, 1915-2001	1913	27,000
					8,880	12,800	15,500	18,900	21,400	23,900	29,600				
					6,040	8,200	9,570	11,200	12,400	13,600	16,100				
131	03219590	Bokes Creek near Warrensburg	40°19′20″	83°10′30″	2,010	2,990	3,640	4,460	5,070	5,660	7,030	16	1982-1997	1987	4,420
					2,470	3,840	4,800	6,030	6,940	7,840	9,960				
					2,050	3,110	3,850	4,810	5,520	6,240	7,870				
132	03220000	Mill Creek near Belle-point	40°14′54″	83°10′26″	4,640	6,900	8,600	11,000	13,000	15,100	20,900	60	1913, 1943-2001	1997	21,800
					4,320	6,580	8,150	10,200	11,600	13,100	16,600				
					4,630	6,880	8,570	10,900	12,900	14,900	20,400				
133	03221000	Scioto River below O’Shaughnessy Dam near Dublin	40°08′36″	83°07′14″	12,900	19,600	24,500	31,300	36,700	42,500	57,400	81	1913, 1922-2001	1913	74,500
					14,200	20,500	24,800	30,200	34,200	38,200	47,400				
					12,900	19,600	24,500	31,200	36,500	42,200	56,600				
134	03223000	Olentangy River at Claridon	40°34′58″	82°59′20″	3,110	4,690	5,950	7,780	9,330	11,100	15,900	55	1947-2001	1959	14,900
					4,120	6,360	7,920	9,910	11,400	12,900	16,400				
					3,130	4,770	6,060	7,940	9,510	11,200	15,900				
135	03224000	Shaw Creek at Shaw-town	40°29′00″	82°57′25″	807	1,120	1,340	1,650	1,890	2,150	2,830	10	1947-1955, 1959	1959	4,120
					1,130	1,860	2,380	3,050	3,550	4,060	5,240				
					839	1,220	1,520	1,940	2,280	2,630	3,500				
136	03224500	Whetstone Creek near Ashley	40°27′18″	82°57′28″	2,810	4,210	5,320	6,980	8,390	9,990	14,500	20	1955-1974	1959	19,100
					3,130	4,930	6,210	7,840	9,060	10,300	13,200				
					2,840	4,290	5,460	7,140	8,540	10,100	14,100				

Table 4. Flood-frequency data for streamflow-gaging stations—Continued

[Bold station numbers indicate peak streamflows at this station presently (2003) are considered regulated. For each station, the upper numbers are the log-Pearson Type III estimates, the middle numbers are regression estimates, and the lower numbers are weighted estimates. Streamflow-gaging stations are in Ohio unless indicated otherwise. Abbreviations: ft^3/s, cubic feet per second.]

Map ID (fig. 1)	Station number	Station name	Latitude	Longitude	Flood-peak discharge (ft^3/s) for indicated recurrence interval, in years							Record		Largest recorded discharge	
					2	5	10	25	50	100	500	Years	Period used	Calendar year	Magnitude (ft^3/s)
137	**03225500**	Olentangy River near Delaware	40°21′18″	83°04′02″	7,360	10,800	13,100	16,200	18,500	20,800	26,400	39	1911-1935, 1938-1951	1913	41,600
					7,910	11,800	14,600	18,000	20,600	23,200	29,200				
					7,390	10,900	13,300	16,400	18,800	21,200	26,900				
138	03226200	Delaware Run near Delaware	40°18′28″	83°06′35″	340	572	741	966	1,140	1,320	1,760	32	1947-1978	1959	1,050
					322	531	677	864	1,000	1,140	1,470				
					339	567	731	947	1,110	1,280	1,680				
139	03226850	Linworth Run near Linworth	40°06′24″	83°02′35″	78	163	234	337	422	514	750	12	1966-1977	1969	250
					52	94	125	165	195	226	300				
					71	137	185	245	292	340	459				
140	03228000	Scioto Big Run at Briggsdale	39°54′56″	83°03′55″	1,200	1,850	2,350	3,060	3,650	4,280	5,980	33	1947-1979	1973	3,670
					622	1,040	1,340	1,730	2,020	2,320	3,010				
					1,140	1,740	2,170	2,760	3,240	3,750	5,070				
141	03228300	Big Walnut Creek at Sunbury	40°14′10″	82°51′05″	3,970	5,470	6,360	7,400	8,110	8,770	10,200	13	1989-2001	1997	6,700
					2,860	4,430	5,520	6,920	7,950	8,980	11,400				
					3,790	5,240	6,140	7,240	8,050	8,850	10,600				
142	**03228500**	Big Walnut Creek at Central College	40°06′13″	82°53′03″	7,030	10,500	12,900	16,000	18,300	20,600	26,200	17	1939-1954, 1959	1959	23,800
					4,960	7,670	9,580	12,000	13,800	15,700	19,900				
					6,740	9,940	12,100	14,800	16,800	18,800	23,700				
143	**03228805**	Alum Creek at Africa	40°10′56″	82°57′42″	4,360	5,670	6,410	7,240	7,800	8,310	9,350	11	1963-1973	1963	6,460
					3,870	6,180	7,810	9,920	11,500	13,100	16,900				
					4,260	5,800	6,860	8,230	9,260	10,300	12,600				
144	**03229000**	Alum Creek at Columbus	39°56′42″	82°56′28″	4,560	6,850	8,570	11,000	12,900	15,000	20,500	49	1924-1936, 1938-1973	1959	26,400
					4,870	7,530	9,390	11,800	13,500	15,300	19,500				
					4,570	6,890	8,630	11,000	13,000	15,000	20,400				

Table 4. Flood-frequency data for streamflow-gaging stations—Continued

[Bold station numbers indicate peak streamflows at this station presently (2003) are considered regulated. For each station, the upper numbers are the log-Pearson Type III estimates, the middle numbers are regression estimates, and the lower numbers are weighted estimates. Streamflow-gaging stations are in Ohio unless indicated otherwise. Abbreviations: ft^3/s, cubic feet per second.]

Map ID (fig. 1)	Station number	Station name	Latitude	Longitude	Flood-peak discharge (ft^3/s) for indicated recurrence interval, in years							Record		Largest recorded discharge	
					2	5	10	25	50	100	500	Years	Period used	Calendar year	Magnitude (ft^3/s)
145	**03229500**	Big Walnut Creek at Rees	39°51′24″	82°57′26″	12,000	17,400	21,000	25,500	28,800	32,100	39,700	32	1913, 1922-1936, 1939-1954, 1959	1959	59,800
					9,770	14,300	17,500	21,500	24,500	27,400	34,400				
					11,900	17,200	20,700	25,000	28,200	31,400	38,800				
146	03230500	Big Darby Creek at Darbyville	39°42′02″	83°06′37″	8,380	13,100	16,800	22,100	26,500	31,300	44,300	79	1922-1936, 1938-2001	1959	49,000
					10,800	16,200	20,000	24,800	28,400	32,100	40,600				
					8,420	13,200	16,900	22,200	26,600	31,300	44,000				
147	03230600	Hominy Creek at Circleville	39°35′26″	82°55′25″	606	1,010	1,350	1,880	2,350	2,890	4,520	31	1947-1977	1968	3,820
					436	762	1,000	1,320	1,550	1,800	2,370				
					591	977	1,290	1,760	2,150	2,600	3,850				
148	03230800	Deer Creek at Mount Sterling	39°42′54″	83°15′26″	5,730	8,570	10,400	12,800	14,400	16,100	19,800	21	1967-1981, 1996-2001	1968	11,600
					5,490	8,390	10,400	13,000	14,900	16,900	21,400				
					5,710	8,550	10,400	12,800	14,500	16,300	20,200				
149	**03231000**	Deer Creek at Williamsport	39°35′09″	83°07′22″	8,430	15,500	21,600	31,100	39,500	49,300	77,900	36	1927-1935, 1938-1956, 1959, 1961-1967	1959	39,600
					7,370	11,200	13,900	17,300	19,800	22,400	28,300				
					8,390	15,200	20,800	29,200	36,400	44,400	67,000				
150	**03231500**	Scioto River at Chillicothe	39°20′29″	82°58′16″	41,500	66,900	85,200	110,000	129,000	149,000	197,000	60	1908-1967	1913	260,000
					39,900	55,400	66,100	79,600	89,600	99,600	123,000				
					41,500	66,400	84,200	108,000	126,000	144,000	189,000				
151	03231600	East Fork Paint Creek near Sedalia	39°42′36″	83°27′48″	213	340	432	558	656	759	1,020	35	1947-1981	1979	710
					235	395	507	650	757	864	1,110				
					215	345	442	573	675	781	1,040				
152	03232000	Paint Creek near Greenfield	39°22′45″	83°22′32″	5,170	8,770	11,400	15,000	17,800	20,700	27,800	56	1926-1935, 1940-1956, 1959-1981, 1996-2001	1968	21,700
					5,820	8,930	11,100	13,900	15,900	18,000	22,800				
					5,200	8,780	11,400	14,900	17,600	20,400	27,100				

Table 4. Flood-frequency data for streamflow-gaging stations—Continued

[Bold station numbers indicate peak streamflows at this station presently (2003) are considered regulated. For each station, the upper numbers are the log-Pearson Type III estimates, the middle numbers are regression estimates, and the lower numbers are weighted estimates. Streamflow-gaging stations are in Ohio unless indicated otherwise. Abbreviations: ft^3/s, cubic feet per second.]

Map ID (fig. 1)	Station number	Station name	Latitude	Longitude	Flood-peak discharge (ft^3/s) for indicated recurrence interval, in years							Record		Largest recorded discharge	
					2	5	10	25	50	100	500	Years	Period used	Calendar year	Magnitude (ft^3/s)
153	03232300	Rattlesnake Creek at Centerfield	39°19′44″	83°28′32″	5,170	7,140	8,320	9,670	10,600	11,500	13,300	10	1972-1981	1979	7,550
					5,280	8,180	10,200	12,800	14,700	16,700	21,200				
					5,190	7,360	8,810	10,600	12,000	13,300	16,200				
154	**03232500**	Rocky Fork near Barretts Mills	39°13′06″	83°23′08″	6,380	9,350	11,400	14,000	16,000	18,000	22,800	12	1940-1951	1964	13,400
					4,370	6,930	8,760	11,100	12,900	14,700	18,900				
					5,980	8,700	10,500	12,900	14,700	16,500	20,900				
155	**03234000**	Paint Creek near Bourneville	39°15′49″	83°10′01″	20,000	31,600	40,500	53,000	63,300	74,400	104,000	49	1922-1970	1964	56,900
					13,700	20,200	24,800	30,500	34,800	39,000	49,000				
					19,700	30,900	39,100	50,300	59,400	69,100	94,300				
156	03234100	Indian Creek at Massieville	39°15′42″	82°58′08″	1,380	2,510	3,510	5,110	6,580	8,310	13,600	32	1947-1977, 1992	1992	8,200
					719	1,260	1,670	2,200	2,610	3,020	4,020				
					1,320	2,350	3,200	4,470	5,570	6,830	10,500				
157	**03234500**	Scioto River at Higby	39°12′44″	82°51′50″	47,700	77,300	100,000	133,000	161,000	191,000	271,000	43	1913, 1931-1973	1937	177,000
					50,500	70,000	83,400	101,000	113,000	126,000	155,000				
					47,800	76,800	98,700	129,000	154,000	180,000	248,000				
158	03235000	Salt Creek at Tarlton	39°33′20″	82°46′51″	996	1,600	2,070	2,770	3,350	4,000	5,790	31	1947-1977	1968	5,360
					716	1,230	1,600	2,090	2,450	2,830	3,710				
					971	1,550	2,000	2,630	3,150	3,700	5,190				
159	03235080	Bull Creek near Adelphi	39°27′11″	82°46′46″	348	660	928	1,340	1,700	2,120	3,310	11	1977-1987	1983	1,560
					288	514	681	902	1,070	1,240	1,650				
					335	615	834	1,140	1,380	1,650	2,330				
160	03235200	Little Blackjack Branch near South Bloomingville	39°27′23″	82°30′25″	174	356	507	727	909	1,110	1,610	17	1966-1982	1966	683
					123	229	311	418	501	586	791				
					164	320	436	593	716	844	1,160				

Table 4. Flood-frequency data for streamflow-gaging stations—Continued

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Map ID (fig. 1)	Station number	Station name	Latitude	Longitude	Flood-peak discharge (ft^3/s) for indicated recurrence interval, in years							Record		Largest recorded discharge	
					2	5	10	25	50	100	500	Years	Period used	Calendar year	Magnitude (ft^3/s)
161	03235400	West Branch Tar Hollow Creek at Tar Hollow State Park	39°23′35″	82°45′12″	19	33	45	64	80	98	150	28	1950-1977	1968	72
					58	113	156	213	257	303	414				
					22	42	61	90	116	144	219				
162	03235500	Tar Hollow Creek at Tar Hollow State Park	39°23′22″	82°45′03″	109	213	307	462	607	780	1,320	32	1947-1978	1968	957
					177	331	449	606	727	850	1,150				
					114	226	328	490	633	797	1,270				
163	03235995	Salt Creek near Londonderry	39°17′26″	82°44′45″	10,800	16,100	20,300	26,500	31,800	37,700	54,500	30	1963-1979, 1938-1950	1968	59,000
					7,040	11,000	13,800	17,400	20,100	22,800	29,200				
					10,600	15,600	19,500	25,000	29,500	34,500	48,300				
164	03236090	South Branch Little Salt Creek near Jackson	39°00′50″	82°39′01″	170	316	444	645	826	1,040	1,660	11	1975, 1978-1987	1980	555
					132	237	314	415	491	569	753				
					160	289	390	531	645	767	1,090				
165	03236100	South Branch Little Salt Creek at Jackson	39°02′38″	82°38′35″	660	886	1,030	1,190	1,310	1,420	1,680	31	1947-1977	1968	1,400
					294	512	671	879	1,040	1,190	1,570				
					618	829	960	1,120	1,240	1,370	1,650				
166	03237095	Devers Run at Lucasville	38°52′54″	83°01′13″	190	242	275	316	346	375	444	10	1978-1987	1982	330
					163	304	412	556	667	781	1,060				
					183	262	327	418	489	563	737				
167	03237210	Rose Run near Portsmouth	38°48′07″	82°59′03″	96	137	163	194	216	237	283	16	1966-1981	1976	187
					159	303	415	565	681	801	1,090				
					105	166	215	285	339	393	518				
168	03237280	Upper Twin Creek at Mcgaw	38°38′37″	83°12′57″	1,240	2,160	2,810	3,640	4,250	4,850	6,190	39	1960, 1964-2001	1960	7,320
					1,450	2,430	3,140	4,030	4,700	5,370	6,940				
					1,250	2,190	2,850	3,690	4,320	4,930	6,330				

Table 4. Flood-frequency data for streamflow-gaging stations—Continued

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Map ID (fig. 1)	Station number	Station name	Latitude	Longitude	Flood-peak discharge (ft^3/s) for indicated recurrence interval, in years							Record		Largest recorded discharge	
					2	5	10	25	50	100	500	Years	Period used	Cal-endar year	Magni-tude (ft^3/s)
169	03237300	West Branch Turkey Run near Win-chester	38°56′56″	83°40′19″	200	350	477	672	846	1,050	1,630	22	1956-1977	1956	720
					160	277	358	461	537	612	786				
					194	334	444	599	726	863	1,230				
170	03237500	Ohio Brush Creek near West Union	38°48′13″	83°25′16″	20,700	30,600	38,100	48,600	57,200	66,500	91,200	70	1927-1935, 1941-2001	1997	77,700
					15,000	22,200	27,000	33,000	37,400	41,800	51,800				
					20,500	30,100	37,300	47,100	55,000	63,400	85,500				
171	03238030	Lawrence Creek near Maysville, Ky.	38°38′04″	83°47′32″	276	458	602	813	992	1,190	1,730	12	1975-1986	1982	790
					303	519	671	863	1,010	1,150	1,480				
					282	475	626	834	998	1,170	1,600				
172	03238400	Harwood Creek near Fayetteville	39°07′50″	83°51′00″	133	221	286	375	445	519	701	12	1966-1977	1970	385
					149	254	328	420	487	554	708				
					136	230	301	394	464	536	705				
173	03238500	Whiteoak Creek near Georgetown	38°51′29″	83°55′43″	10,200	13,900	16,300	19,300	21,500	23,600	28,700	74	1924-1935, 1940-2001	1964	22,400
					9,470	14,100	17,200	21,100	24,000	26,800	33,200				
					10,200	13,900	16,300	19,400	21,700	23,900	29,200				
174	03239000	Little Miami River near Selma	39°48′36″	83°44′21″	1,390	2,930	4,270	6,300	8,060	10,000	15,400	25	1953-1977	1959	7,920
					1,760	2,830	3,570	4,530	5,240	5,960	7,640				
					1,420	2,920	4,150	5,920	7,370	8,910	12,900				
175	03239500	North Fork Little Miami River near Pitchin	39°49′40″	83°46′38″	379	842	1,310	2,150	2,980	4,040	7,630	25	1953-1977	1959	3,350
					1,090	1,720	2,170	2,730	3,150	3,570	4,540				
					410	912	1,410	2,240	3,020	3,930	6,720				
176	03240000	Little Miami River near Oldtown	39°44′54″	83°55′53″	2,620	4,790	6,590	9,260	11,600	14,100	21,200	49	1953-2001	1959	14,800
					3,760	5,880	7,370	9,290	10,700	12,200	15,500				
					2,660	4,850	6,640	9,270	11,500	13,900	20,300				

Table 4. Flood-frequency data for streamflow-gaging stations—Continued

[Bold station numbers indicate peak streamflows at this station presently (2003) are considered regulated. For each station, the upper numbers are the log-Pearson Type III estimates, the middle numbers are regression estimates, and the lower numbers are weighted estimates. Streamflow-gaging stations are in Ohio unless indicated otherwise. Abbreviations: ft^3/s, cubic feet per second.]

Map ID (fig. 1)	Station number	Station name	Latitude	Longitude	Flood-peak discharge (ft^3/s) for indicated recurrence interval, in years							Record		Largest recorded discharge	
					2	5	10	25	50	100	500	Years	Period used	Calendar year	Magnitude (ft^3/s)
177	03240500	North Fork Massie Creek at Cedarville	39°45′25″	83°47′25″	701	1,500	2,240	3,460	4,600	5,940	10,000	14	1955-1968	1963	3,030
					1,140	1,830	2,320	2,940	3,410	3,870	4,960				
					748	1,560	2,260	3,300	4,170	5,110	7,660				
178	03241000	South Fork Massie Creek near Cedarville	39°44′20″	83°45′50″	718	1,370	1,960	2,890	3,740	4,750	7,780	14	1955-1968	1963	3,470
					745	1,210	1,540	1,960	2,270	2,580	3,310				
					722	1,340	1,840	2,560	3,160	3,800	5,550				
179	03241500	Massies Creek at Wilberforce	39°43′22″	83°52′58″	1,490	2,700	3,680	5,110	6,310	7,630	11,200	49	1953-2001	1959	7,300
					2,320	3,750	4,760	6,070	7,050	8,030	10,400				
					1,520	2,750	3,760	5,200	6,400	7,680	11,100				
180	03241600	Shawnee Creek at Xenia	39°40′32″	83°55′32″	383	675	873	1,120	1,290	1,460	1,820	30	1948-1977	1968	1,820
					316	550	720	941	1,110	1,280	1,680				
					377	658	846	1,080	1,250	1,410	1,780				
181	03242050	Little Miami River near Spring Valley	39°35′00″	84°01′49″	7,300	12,100	15,900	21,200	25,500	30,100	42,400	41	1926-1935, 1940-1952, 1959, 1963-1964, 1969-1983	1963	38,000
					8,130	12,400	15,400	19,200	22,000	24,900	31,600				
					7,330	12,200	15,800	21,000	25,100	29,400	40,700				
182	03242100	Wayne Creek at Waynesville	39°31′08″	84°04′47″	258	448	596	806	980	1,170	1,660	16	1966-1981	1974	880
					132	246	332	446	534	623	839				
					229	384	495	644	762	886	1,200				
183	03242150	Caesar Creek near Xenia	39°37′25″	83°54′09″	3,060	3,980	4,550	5,240	5,730	6,200	7,260	15	1969-1983	1975	5,170
					2,410	3,820	4,820	6,100	7,060	8,010	10,300				
					2,980	3,960	4,610	5,450	6,090	6,720	8,170				
184	03242200	Anderson Fork near New Burlington	39°33′59″	83°54′10″	2,520	3,410	3,970	4,650	5,130	5,590	6,620	15	1969-1983	1975	5,510
					2,480	3,920	4,930	6,230	7,190	8,160	10,400				
					2,510	3,500	4,160	5,030	5,670	6,300	7,750				

Table 4. Flood-frequency data for streamflow-gaging stations—Continued

[Bold station numbers indicate peak streamflows at this station presently (2003) are considered regulated. For each station, the upper numbers are the log-Pearson Type III estimates, the middle numbers are regression estimates, and the lower numbers are weighted estimates. Streamflow-gaging stations are in Ohio unless indicated otherwise. Abbreviations: ft^3/s, cubic feet per second.]

Map ID (fig. 1)	Station number	Station name	Latitude	Longitude	Flood-peak discharge (ft^3/s) for indicated recurrence interval, in years							Record		Largest recorded discharge	
					2	5	10	25	50	100	500	Years	Period used	Calendar year	Magnitude (ft^3/s)
185	**03242300**	Caesar Creek at Harveysburg	39°30′27″	84°00′42″	6,990	11,200	14,700	20,300	25,300	31,200	48,900	16	1959, 1961-1975	1959	26,000
					5,700	8,960	11,300	14,200	16,400	18,700	23,900				
					6,880	10,900	14,200	19,000	23,100	27,700	40,900				
186	**03242500**	Little Miami River near Fort Ancient	39°22′42″	84°05′32″	19,300	31,100	39,700	51,200	60,300	69,700	92,900	17	1939-1952, 1959, 1963-1964	1959	67,000
					13,900	21,200	26,400	33,000	38,000	43,000	54,700				
					18,800	29,900	37,600	47,500	55,200	63,000	82,200				
187	03244000	Todd Fork near Roachester	39°20′07″	84°05′12″	10,500	16,100	20,200	25,800	30,300	35,000	47,100	22	1953-1974	1959	25,500
					8,980	13,200	16,000	19,500	22,100	24,600	30,300				
					10,400	15,800	19,600	24,600	28,500	32,500	42,600				
188	**03245500**	Little Miami River at Milford	39°10′17″	84°17′53″	30,500	44,000	53,400	65,800	75,300	85,200	110,000	54	1913, 1916-1917, 1926-1976	1959	84,100
					31,800	44,800	53,400	64,100	71,900	79,500	97,100				
					30,500	44,000	53,400	65,600	74,900	84,500	108,000				
189	03246500	East Fork Little Miami River at Williamsburg	39°03′09″	84°03′02″	10,700	14,400	16,800	19,600	21,700	23,700	28,200	21	1950-1953, 1959, 1961-1975, 2000	1964	19,800
					9,170	13,400	16,200	19,700	22,300	24,700	30,400				
					10,600	14,300	16,700	19,600	21,800	23,900	28,700				
190	03247100	Paterson Run near Owensville	39°07′38″	84°06′44″	583	721	799	886	944	997	1,110	31	1947-1977	1962	952
					403	663	842	1,070	1,230	1,390	1,760				
					566	714	806	918	998	1,080	1,240				
191	**03247500**	East Fork Little Miami River at Perintown	39°08′13″	84°14′17″	19,700	27,400	32,200	38,000	42,200	46,200	55,100	57	1913, 1916-1920, 1925-1973, 1975-1977	1964	42,400
					16,200	23,500	28,300	34,300	38,700	43,000	52,900				
					19,600	27,200	32,000	37,700	41,900	45,900	54,900				
192	03248000	Little Miami River at Plainville	39°08′13″	84°21′11″	38,300	52,200	62,000	75,000	85,100	95,600	122,000	14	1964, 1966-1978	1964	93,000
					40,100	55,600	65,800	78,400	87,700	96,700	118,000				
					38,500	52,700	62,700	75,700	85,700	95,900	121,000				

Table 4. Flood-frequency data for streamflow-gaging stations—Continued

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Map ID (fig. 1)	Station number	Station name	Latitude	Longitude	Flood-peak discharge (ft^3/s) for indicated recurrence interval, in years: 2	5	10	25	50	100	500	Record: Years	Record: Period used	Largest recorded discharge: Calendar year	Largest recorded discharge: Magnitude (ft^3/s)
193	03254400	North Fork Grassy Creek near Piner, Ky.	38°47′31″	84°30′50″	2,620	4,980	7,180	10,900	14,400	18,700	32,600	16	1968-1983	1970	20,200
					1,400	2,300	2,940	3,740	4,330	4,920	6,290				
					2,420	4,320	5,830	8,010	9,860	11,900	17,900				
194	03255500	Mill Creek at Reading	39°13′14″	84°26′49″	3,300	4,260	4,850	5,570	6,080	6,570	7,670	53	1939-1991	1945	5,780
					4,260	6,540	8,080	10,000	11,400	12,800	16,000				
					3,330	4,380	5,070	5,930	6,560	7,180	8,560				
195	**03258000**	West Fork Mill Creek at Lockland	39°13′35″	84°27′22″	3,520	5,010	5,940	7,040	7,820	8,550	10,200	14	1939-1952	1947	6,310
					2,570	4,040	5,040	6,300	7,220	8,130	10,200				
					3,390	4,830	5,730	6,830	7,630	8,410	10,200				
196	03260700	Bokengehalas Creek near De Graff	40°20′50″	83°53′28″	672	951	1,140	1,380	1,560	1,750	2,190	44	1958-2001	1959	1,780
					1,600	2,610	3,340	4,280	4,990	5,700	7,400				
					699	1,020	1,260	1,580	1,830	2,080	2,670				
197	03260800	Stony Creek near De Graff	40°17′27″	83°54′36″	1,040	1,750	2,280	3,000	3,580	4,170	5,670	18	1958-1975	1959	2,770
					1,970	3,120	3,910	4,940	5,700	6,460	8,240				
					1,110	1,900	2,520	3,360	4,030	4,700	6,340				
198	03261500	Great Miami River at Sidney	40°17′13″	84°09′00″	6,830	10,700	13,600	17,800	21,200	25,000	35,000	89	1913-2001	1913	44,000
					7,510	10,600	12,600	15,100	17,000	18,900	23,100				
					6,840	10,700	13,600	17,700	21,000	24,600	34,000				
199	03262750	Millers Ditch at Tipp City	39°57′59″	84°10′22″	108	200	276	390	488	596	897	17	1966-1982	1981	625
					101	184	247	328	391	454	606				
					107	196	267	367	448	533	754				
200	03263100	Poplar Creek near Vandalia	39°52′10″	84°11′21″	400	658	851	1,120	1,330	1,560	2,130	31	1947-1977	1959	1,130
					280	499	662	874	1,040	1,200	1,590				
					388	636	817	1,060	1,260	1,460	1,970				

Table 4. Flood-frequency data for streamflow-gaging stations—Continued

[Bold station numbers indicate peak streamflows at this station presently (2003) are considered regulated. For each station, the upper numbers are the log-Pearson Type III estimates, the middle numbers are regression estimates, and the lower numbers are weighted estimates. Streamflow-gaging stations are in Ohio unless indicated otherwise. Abbreviations: ft^3/s, cubic feet per second.]

Map ID (fig. 1)	Station number	Station name	Latitude	Longitude	Flood-peak discharge (ft^3/s) for indicated recurrence interval, in years							Record		Largest recorded discharge	
					2	5	10	25	50	100	500	Years	Period used	Calendar year	Magnitude (ft^3/s)
201	03263700	Bridge Creek near Greenville	40°04′13″	84°37′45″	350	550	673	816	912	1,000	1,180	31	1947-1977	1958	754
					288	483	621	797	929	1,060	1,370				
					345	542	665	812	915	1,010	1,220				
202	03264000	Greenville Creek near Bradford	40°06′08″	84°25′48″	3,070	4,790	6,060	7,820	9,240	10,800	14,700	71	1913, 1932-2001	1913	18,200
					4,500	6,810	8,410	10,400	12,000	13,500	17,000				
					3,100	4,850	6,160	7,970	9,420	11,000	14,900				
203	03265000	Stillwater River at Pleasant Hill	40°03′28″	84°21′22″	9,840	15,100	18,800	23,900	27,800	31,800	42,000	86	1913, 1917-2001	1913	51,400
					9,300	13,800	16,900	20,900	23,800	26,700	33,600				
					9,830	15,000	18,700	23,700	27,500	31,500	41,300				
204	03265100	Hog Run tributary at Laura	40°00′30″	84°25′26″	36	61	80	106	127	150	207	28	1950-1977	1953	204
					49	88	116	152	178	205	269				
					37	65	86	116	140	165	226				
205	03266500	Mad River at Zanesfield	40°21′01″	83°40′28″	409	725	989	1,390	1,730	2,120	3,230	33	1947-1979	1972	2,100
					505	865	1,130	1,470	1,730	1,990	2,610				
					414	738	1,010	1,400	1,730	2,100	3,080				
206	03267000	Mad River near Urbana	40°06′27″	83°47′57″	2,480	3,730	4,590	5,730	6,600	7,490	9,640	68	1926-1931, 1940-2001	1959	8,000
					5,010	7,960	10,100	12,800	14,800	16,900	21,800				
					2,520	3,840	4,800	6,070	7,060	8,060	10,500				
207	03267900	Mad River at St. Paris Pike at Eagle City	39°57′51″	83°49′54″	5,360	7,130	8,190	9,410	10,300	11,000	12,700	34	1959, 1966-1995, 1999-2001	1959	18,300
					7,930	12,300	15,500	19,500	22,500	25,500	32,700				
					5,470	7,450	8,750	10,400	11,600	12,700	15,200				
208	03268000	Buck Creek at New Moorefield	39°59′31″	83°42′53″	1,840	2,520	3,060	3,830	4,490	5,220	7,240	17	1943-1959	1959	8,130
					2,480	4,000	5,090	6,500	7,560	8,620	11,200				
					1,900	2,700	3,370	4,350	5,160	6,030	8,290				

Table 4. Flood-frequency data for streamflow-gaging stations—Continued

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Map ID (fig. 1)	Station number	Station name	Latitude	Longitude	Flood-peak discharge (ft^3/s) for indicated recurrence interval, in years							Record		Largest recorded discharge	
					2	5	10	25	50	100	500	Years	Period used	Calendar year	Magnitude (ft^3/s)
209	03268300	Beaver Creek at Brighton	39°55′46″	83°34′04″	253	469	631	851	1,020	1,200	1,620	19	1959-1977	1959	1,000
					234	399	518	670	784	899	1,170				
					250	455	602	794	939	1,090	1,440				
210	03268500	Beaver Creek near Springfield	39°56′26″	83°44′56″	1,850	2,870	3,590	4,540	5,280	6,030	7,870	21	1943-1959, 1973-1976	1948	4,980
					1,470	2,340	2,950	3,730	4,310	4,890	6,260				
					1,820	2,800	3,480	4,370	5,040	5,730	7,400				
211	**03269000**	Buck Creek at Springfield	39°55′57″	83°49′02″	3,180	5,440	7,200	9,730	11,800	14,100	20,200	56	1913, 1915-1921, 1924-1956, 1959-1973	1929	13,000
					4,280	6,760	8,530	10,800	12,500	14,200	18,300				
					3,210	5,490	7,280	9,810	11,900	14,100	19,900				
212	**03269500**	Mad River near Springfield	39°55′23″	83°52′13″	7,770	12,600	16,400	21,600	25,800	30,400	42,300	63	1904-1905, 1913-1973	1913	55,400
					11,200	17,100	21,400	26,800	30,900	35,000	44,700				
					7,840	12,800	16,600	21,900	26,200	30,700	42,500				
213	**03270500**	Great Miami River at Dayton	39°45′55″	84°11′51″	36,700	57,200	70,500	86,800	98,500	110,000	135,000	29	1893-1921	1913	250,000
					29,700	41,900	50,300	61,000	68,900	76,700	95,000				
					36,500	56,300	69,000	84,300	95,300	106,000	129,000				
214	03270800	Wolf Creek at Trotwood	39°47′39″	84°18′36″	1,570	2,410	2,960	3,650	4,160	4,670	5,810	25	1959, 1963-1986	1959	3,900
					1,750	2,760	3,450	4,310	4,950	5,570	7,000				
					1,590	2,450	3,040	3,780	4,340	4,880	6,120				
215	03271000	Wolf Creek at Dayton	39°46′00″	84°14′12″	4,370	6,460	7,940	9,920	11,500	13,100	17,100	28	1939-1950, 1959, 1987-2001	1959	12,500
					4,080	6,280	7,770	9,630	11,000	12,300	15,400				
					4,350	6,440	7,910	9,870	11,400	12,900	16,700				
216	03271800	Twin Creek near Ingomar	39°42′28″	84°31′30″	7,580	10,900	13,400	17,000	20,100	23,400	32,600	38	1959, 1963-1999	1959	30,300
					8,760	13,100	16,000	19,600	22,300	24,900	30,900				
					7,630	11,000	13,600	17,300	20,400	23,600	32,300				

Table 4. Flood-frequency data for streamflow-gaging stations—Continued

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Map ID (fig. 1)	Station number	Station name	Latitude	Longitude	Flood-peak discharge (ft^3/s) for indicated recurrence interval, in years							Record		Largest recorded discharge	
					2	5	10	25	50	100	500	Years	Period used	Calendar year	Magnitude (ft^3/s)
217	03272695	Trippetts Branch at Camden	39°38′03″	84°39′08″	100	179	236	313	373	433	578	10	1978-1987	1983	247
					92	168	223	294	347	400	526				
					98	175	230	303	359	414	546				
218	03272700	Sevenmile Creek at Camden	39°37′45″	84°38′40″	3,200	5,260	6,960	9,520	11,800	14,300	21,500	31	1971-2001	1989	20,200
					4,160	6,430	7,970	9,890	11,300	12,700	15,900				
					3,250	5,370	7,080	9,580	11,700	14,000	20,200				
219	03272800	Sevenmile Creek at Collinsville	39°31′23″	84°36′39″	6,130	9,760	12,500	16,300	19,300	22,600	31,100	17	1959, 1961-1976	1968	16,800
					6,080	9,180	11,300	13,900	15,800	17,700	22,000				
					6,130	9,680	12,300	15,700	18,400	21,200	28,100				
220	03272900	Collins Creek at Collinsville	39°31′05″	84°36′53″	241	351	420	502	559	614	730	17	1966-1982	1968	409
					212	379	500	656	773	891	1,170				
					235	358	443	552	634	715	899				
221	03273500	Fourmile Creek near Hamilton	39°27′30″	84°32′50″	14,500	21,300	25,300	29,900	33,000	35,800	41,400	23	1938-1960	1959	44,500
					12,500	18,500	22,600	27,600	31,300	34,900	43,300				
					14,400	21,000	24,900	29,500	32,700	35,600	41,800				
222	**03274000**	Great Miami River at Hamilton	39°23′28″	84°34′20″	43,400	60,700	73,600	91,700	107,000	123,000	165,000	15	1907-1921	1913	352,000
					40,300	56,800	68,100	82,600	93,300	104,000	129,000				
					43,200	60,300	72,900	90,100	104,000	119,000	157,000				
223	03274100	Blake Run near Reily	39°27′59″	84°45′22″	61	111	149	202	244	287	395	36	1939-1940, 1942-1943, 1947-1978	1960	307
					74	133	175	228	268	307	400				
					62	115	155	209	251	294	397				
224	03274880	Greens Fork Tributary near Lynn, Ind.	40°01′14″	84°56′24″	95	167	222	299	360	426	592	10	1973-1982	1979	240
					152	264	344	445	519	594	766				
					107	195	265	361	434	508	685				

Table 4. Flood-frequency data for streamflow-gaging stations—Continued

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Map ID (fig. 1)	Station number	Station name	Latitude	Longitude	Flood-peak discharge (ft^3/s) for indicated recurrence interval, in years							Record		Largest recorded discharge	
					2	5	10	25	50	100	500	Years	Period used	Calendar year	Magnitude (ft^3/s)
225	03275500	East Fork Whitewater River at Richmond, Ind.	39°48′24″	84°54′26″	5,250	8,850	11,600	15,400	18,400	21,600	29,900	30	1913, 1950-1978	1969	15,000
					5,730	8,530	10,400	12,700	14,400	16,100	19,900				
					5,270	8,820	11,400	15,000	17,700	20,600	27,700				
226	03275600	East Fork Whitewater River at Abington, Ind.	39°43′57″	84°57′35″	7,140	10,300	12,400	15,000	16,900	18,800	23,300	36	1966-2001	1999	16,700
					7,920	11,500	13,900	16,900	19,000	21,100	26,000				
					7,170	10,400	12,500	15,200	17,200	19,200	23,700				
227	03275800	West Run near Liberty, Ind.	39°38′24″	84°57′18″	73	130	176	244	302	365	539	17	1973-1989	1989	255
					83	151	200	264	311	359	470				
					75	136	184	252	306	362	504				
228	03275900	Templeton Creek near Fairfield, Ind.	39°31′20″	84°56′51″	387	790	1,150	1,740	2,270	2,890	4,750	10	1973-1982	1980	1,900
					589	963	1,220	1,540	1,770	2,010	2,540				
					421	835	1,180	1,650	2,040	2,440	3,480				
229	03276640	Tanners Creek Tributary near Lawrenceburg, Ind.	39°09′18″	84°52′20″	93	164	223	308	381	462	683	17	1973-1989	1974	300
					76	139	185	245	290	334	440				
					89	157	209	281	339	399	551				
230	03322500	Wabash River near New Corydon, Ind.	40°33′50″	84°48′10″	4,040	5,320	6,030	6,800	7,300	7,740	8,620	37	1952-1988	1959	8,720
					4,230	5,940	7,080	8,500	9,550	10,600	12,900				
					4,040	5,350	6,100	6,940	7,500	8,010	9,060				
231	03325500	Mississinewa River near Ridgeville, Ind.	40°16′48″	84°59′33″	3,910	5,910	7,300	9,120	10,500	11,900	15,400	55	1947-2001	1958	13,900
					3,440	5,260	6,520	8,120	9,310	10,500	13,300				
					3,900	5,880	7,250	9,030	10,400	11,800	15,100				
232	04096515	South Branch Hog Creek near Allen, Mich.	41°56′55″	84°49′40″	271	405	496	612	700	788	996	31	1970-2000	1985	664
					844	1,190	1,400	1,640	1,810	1,970	2,330				
					286	437	547	690	798	904	1,150				

Table 4. Flood-frequency data for streamflow-gaging stations—Continued

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Map ID (fig. 1)	Station number	Station name	Latitude	Longitude	Flood-peak discharge (ft^3/s) for indicated recurrence interval, in years							Record		Largest recorded discharge	
					2	5	10	25	50	100	500	Years	Period used	Calendar year	Magnitude (ft^3/s)
233	04099060	Pigeon Creek. Tributary near Ellis, Ind.	41°37′43″	84°54′56″	45	77	100	134	160	189	262	10	1973-1982	1981	110
					66	106	132	164	186	208	255				
					49	84	111	146	172	198	258				
234	04176000	River Raisin near Adrian, Mich.	41°54′15″	83°58′50″	2,830	3,980	4,700	5,570	6,190	6,790	8,120	47	1954-2000	1982	6,660
					4,900	6,580	7,620	8,840	9,700	10,500	12,300				
					2,870	4,060	4,820	5,750	6,420	7,060	8,460				
235	04176900	Hill Ditch near Richards	41°39′54″	83°40′05″	81	161	230	334	425	527	812	35	1947-1981	1972	340
					139	214	263	320	361	400	485				
					85	166	234	332	412	497	719				
236	04177400	Eagle Creek tributary near Montpelier	41°35′10″	84°40′50″	71	110	137	173	199	227	292	26	1950-1975	1956	195
					78	121	148	180	202	223	270				
					71	111	139	174	200	226	286				
237	04177720	Fish Creek at Hamilton, Ind.	41°31′55″	84°54′12″	384	574	716	914	1,070	1,250	1,700	32	1970-2001	1996	1,510
					642	895	1,050	1,230	1,350	1,470	1,720				
					393	593	743	948	1,110	1,280	1,700				
238	04178000	St. Joseph River near Newville, Ind.	41°23′08″	84°48′06″	4,390	6,330	7,680	9,440	10,800	12,200	15,500	54	1947-1996, 1998-2001	1996	10,400
					6,360	8,600	10,000	11,700	12,800	13,900	16,400				
					4,430	6,410	7,780	9,570	10,900	12,300	15,600				
239	04179500	Cedar Creek at Auburn, Ind.	41°21′57″	85°03′08″	882	1,170	1,350	1,570	1,730	1,890	2,250	39	1943-1978, 1980-1982	1982	2,100
					1,520	2,180	2,600	3,090	3,430	3,760	4,480				
					902	1,210	1,420	1,690	1,880	2,070	2,490				
240	04180000	Cedar Creek near Cedarville, Ind.	41°13′08″	85°04′35″	3,250	4,160	4,690	5,300	5,710	6,090	6,900	55	1947-2001	1991	5,580
					3,440	4,760	5,580	6,550	7,230	7,880	9,300				
					3,260	4,190	4,740	5,380	5,820	6,230	7,100				

Table 4. Flood-frequency data for streamflow-gaging stations—Continued

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Map ID (fig. 1)	Station number	Station name	Latitude	Longitude	Flood-peak discharge (ft^3/s) for indicated recurrence interval, in years							Record		Largest recorded discharge	
					2	5	10	25	50	100	500	Years	Period used	Cal-endar year	Magni-tude (ft^3/s)
241	04182590	Harber Ditch at Fort Wayne, Ind.	41°00′27″	85°10′58″	688	865	969	1,090	1,170	1,250	1,410	27	1965-1991	1991	1,100
					527	785	947	1,140	1,270	1,400	1,680				
					676	857	966	1,100	1,190	1,280	1,470				
242	04183500	Maumee River at Antwerp	41°11′56″	84°44′40″	14,000	18,200	20,900	24,400	26,900	29,500	35,600	71	1912-1982	1913	40,000
					17,400	23,200	26,900	31,300	34,400	37,300	43,800				
					14,100	18,400	21,200	24,800	27,400	30,000	36,200				
243	04183750	Racetrack Run at Hicksville	41°18′58″	84°46′00″	50	93	126	173	211	251	352	10	1978-1987	1981	173
					30	52	67	85	98	110	139				
					44	76	96	122	140	159	204				
244	04184500	Bean Creek at Powers	41°40′39″	84°13′56″	2,180	3,130	3,720	4,420	4,900	5,370	6,370	43	1941-1982, 2001	1982	4,900
					2,870	4,000	4,700	5,540	6,120	6,680	7,900				
					2,200	3,170	3,770	4,500	5,010	5,490	6,540				
245	04184750	Spring Creek at Fay-ette	41°40′32″	84°19′47″	268	325	356	389	411	430	469	10	1978-1987	1982	395
					147	246	312	394	452	509	636				
					235	299	339	391	430	468	551				
246	04184760	Bean Creek tributary near Fayette	41°39′08″	84°17′34″	58	73	81	91	98	105	119	10	1978-1987	1985	91
					42	71	90	114	131	147	183				
					53	72	85	101	113	125	151				
247	04185000	Tiffin River at Stryker	41°30′16″	84°25′47″	3,480	4,930	5,820	6,860	7,580	8,260	9,710	70	1913, 1922-1928, 1937, 1941-2001	1982	7,800
					4,930	6,800	7,980	9,370	10,400	11,300	13,300				
					3,520	5,000	5,920	7,010	7,770	8,490	10,000				
248	04185150	Beaver Creek tributary near Montpelier	41°34′19″	84°31′03″	96	125	143	164	179	194	225	10	1978-1987	1980	150
					34	57	74	93	107	121	151				
					74	97	110	126	138	151	180				

Table 4. Flood-frequency data for streamflow-gaging stations—Continued

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Map ID (fig. 1)	Station number	Station name	Latitude	Longitude	Flood-peak discharge (ft^3/s) for indicated recurrence interval, in years							Record		Largest recorded discharge	
					2	5	10	25	50	100	500	Years	Period used	Calendar year	Magnitude (ft^3/s)
249	04185440	Unnamed Tributary to Lost Creek near Farmers	41°21′42″	84°41′28″	425	675	868	1,140	1,370	1,610	2,260	16	1986-2001	1998	1,770
					190	304	380	471	536	599	738				
					378	572	698	860	983	1,110	1,440				
250	04185945	Auglaize River tributary near Spencerville	40°42′27″	84°19′06″	87	135	168	210	241	272	344	10	1978-1987	1986	180
					43	75	96	123	142	161	202				
					72	109	132	160	181	202	251				
251	04186500	Auglaize River near Fort Jennings	40°56′55″	84°15′58″	5,130	7,480	8,920	10,600	11,800	12,900	15,200	76	1922-1936, 1941-2001	1992	12,800
					4,980	7,210	8,630	10,400	11,600	12,700	15,300				
					5,130	7,460	8,900	10,600	11,800	12,900	15,200				
252	04186800	King Run near Harrod	40°43′56″	83°53′47″	94	125	145	167	183	199	232	21	1966-1986	1982	167
					50	88	115	148	172	195	248				
					86	117	136	161	179	197	238				
253	04187100	Ottawa River at Lima	40°43′29″	84°07′35″	2,900	3,620	4,070	4,610	4,990	5,370	6,220	11	1989-1999	1991	4,590
					2,190	3,160	3,780	4,520	5,030	5,530	6,620				
					2,790	3,530	4,000	4,580	5,010	5,420	6,370				
254	04187500	Ottawa River at Allentown	40°45′18″	84°11′41″	3,110	4,470	5,310	6,290	6,970	7,620	8,990	52	1924-1935, 1939, 1943-1981	1959	7,740
					2,600	3,740	4,460	5,320	5,930	6,510	7,780				
					3,100	4,430	5,250	6,200	6,870	7,490	8,850				
255	04187945	Rattlesnake Creek near Cairo	40°49′20″	84°04′16″	130	188	225	268	298	326	388	10	1978-1987	1981	280
					76	123	154	191	217	243	298				
					116	166	196	232	257	282	338				
256	04188500	Eagle Creek near Findlay	40°59′35″	83°39′05″	2,100	2,870	3,350	3,900	4,280	4,650	5,430	13	1947-1957, 1959, 1981	1981	6,500
					1,340	2,030	2,480	3,020	3,410	3,780	4,610				
					2,030	2,770	3,210	3,720	4,090	4,440	5,220				

Table 4. Flood-frequency data for streamflow-gaging stations—Continued

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Map ID (fig. 1)	Station number	Station name	Latitude	Longitude	Flood-peak discharge (ft^3/s) for indicated recurrence interval, in years: 2	5	10	25	50	100	500	Record: Years	Record: Period used	Largest recorded discharge: Calendar year	Largest recorded discharge: Magnitude (ft^3/s)
257	04189000	Blanchard River near Findlay	41°03′21″	83°41′17″	5,150	7,610	9,200	11,100	12,500	13,800	16,800	75	1913, 1924-1936, 1941-2001	1913	22,000
					4,790	6,820	8,100	9,640	10,700	11,800	14,100				
					5,140	7,580	9,130	11,000	12,300	13,600	16,500				
258	04189100	Tiderishi Creek near Jenera	40°55′53″	83°43′39″	200	309	375	450	501	547	640	31	1947-1977	1959	480
					198	316	394	488	554	618	760				
					200	309	377	457	511	562	667				
259	04189500	Blanchard River at Glandorf	41°02′40″	84°04′55″	8,020	11,300	13,500	16,300	18,400	20,500	25,500	13	1922-1928, 1947-1951, 1959	1959	17,700
					7,590	10,600	12,600	14,900	16,500	18,100	21,500				
					7,990	11,200	13,300	16,000	18,000	19,900	24,500				
260	04190350	Little Auglaize River tributary at Ottoville	40°55′05″	84°20′47″	53	80	97	117	131	144	173	10	1978-1987	1981	109
					59	96	121	150	171	191	235				
					54	85	105	131	150	167	205				
261	04190500	Roller Creek Atio City	40°46′16″	84°38′15″	211	310	378	466	534	603	771	31	1947-1977	1959	890
					214	341	425	526	598	667	819				
					212	313	384	476	546	616	782				
262	04191480	Beetree Run near Junction	41°13′21″	84°24′33″	95	132	154	180	198	214	249	11	1977-1987	1985	165
					74	117	144	177	200	222	269				
					90	128	151	179	199	218	259				
263	04191500	Auglaize River near Defiance	41°14′15″	84°23′57″	25,700	36,900	44,300	53,500	60,200	67,000	82,400	88	1913, 1915-2001	1913	120,000
					21,600	29,800	35,000	41,300	45,800	50,100	59,600				
					25,600	36,600	43,800	52,700	59,200	65,600	80,400				
264	04192500	Maumee River near Defiance	41°17′31″	84°16′52″	45,400	61,000	70,800	82,700	91,400	99,800	119,000	72	1925-1936, 1939-1975, 1979-2001	1982	104,000
					36,300	47,500	54,600	63,200	69,200	75,000	87,700				
					45,200	60,500	70,000	81,500	89,800	97,800	116,000				

Table 4. Flood-frequency data for streamflow-gaging stations—Continued

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Map ID (fig. 1)	Station number	Station name	Latitude	Longitude	Flood-peak discharge (ft^3/s) for indicated recurrence interval, in years							Record		Largest recorded discharge	
					2	5	10	25	50	100	500	Years	Period used	Calendar year	Magnitude (ft^3/s)
265	04192900	Reitz Run at Waterville	41°29′50″	83°42′35″	34	65	92	135	173	217	343	21	1966-1986	1969	165
					60	99	126	157	180	202	249				
					36	70	99	141	175	211	305				
266	04193500	Maumee River at Waterville	41°30′00″	83°42′46″	51,700	69,900	82,300	98,200	110,000	123,000	153,000	81	1900-1901, 1913, 1922-1936, 1939-2001	1913	180,000
					34,200	43,600	49,400	56,300	61,200	65,900	75,900				
					51,300	68,900	80,600	95,300	107,000	118,000	145,000				
267	04195500	Portage River at Woodville	41°26′58″	83°21′41″	6,440	8,700	10,100	11,700	12,800	13,800	16,100	70	1913, 1929-1935, 1940-2001	1913	17,000
					5,270	7,370	8,690	10,300	11,400	12,400	14,800				
					6,410	8,650	10,000	11,600	12,700	13,700	16,000				
268	04196000	Sandusky River near Bucyrus	40°48′13″	83°00′21″	2,600	3,920	4,890	6,230	7,310	8,460	11,500	49	1926-1935, 1939-1951, 1959, 1964-1981, 1987, 1996-2001	1959	13,500
					1,900	2,830	3,430	4,160	4,670	5,170	6,270				
					2,570	3,860	4,780	6,030	7,010	8,050	10,700				
269	04196500	Sandusky River near Upper Sandusky	40°51′02″	83°15′23″	4,770	6,760	8,000	9,480	10,500	11,500	13,700	60	1922-1936, 1938-1981, 2001	1959	10,000
					4,660	6,750	8,090	9,710	10,900	12,000	14,400				
					4,760	6,760	8,000	9,500	10,600	11,600	13,800				
270	04196700	St. James River near Upper Sandusky	40°46′51″	83°18′12″	208	302	358	419	460	497	570	31	1947-1977	1959	408
					229	370	463	575	656	733	905				
					210	309	371	445	495	542	639				
271	04196800	Tymochtee Creek at Crawford	40°55′22″	83°20′56″	3,680	4,970	5,720	6,550	7,110	7,620	8,660	41	1961-2001	1991	6,700
					3,460	4,970	5,930	7,070	7,880	8,650	10,400				
					3,670	4,970	5,730	6,610	7,200	7,750	8,890				
272	04197000	Sandusky River near Mexico	41°02′39″	83°11′42″	8,700	12,200	14,500	17,200	19,100	20,900	25,000	60	1922-1937, 1939-1982	1937	19,000
					9,560	13,500	16,100	19,200	21,300	23,400	28,100				
					8,720	12,300	14,600	17,300	19,200	21,100	25,300				

Table 4. Flood-frequency data for streamflow-gaging stations—Continued

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Map ID (fig. 1)	Station number	Station name	Latitude	Longitude	Flood-peak discharge (ft^3/s) for indicated recurrence interval, in years: 2	5	10	25	50	100	500	Record: Years	Period used	Largest recorded discharge: Calendar year	Magnitude (ft^3/s)
273	04197100	Honey Creek at Melmore	41°01′20″	83°06′35″	2,600	3,450	3,940	4,470	4,820	5,140	5,770	41	1961-2001	1981	4,400
					2,560	3,730	4,480	5,370	6,000	6,600	7,930				
					2,600	3,470	3,980	4,560	4,950	5,320	6,060				
274	04197170	Rock Creek at Tiffin	41°06′49″	83°10′06″	1,270	1,850	2,190	2,570	2,830	3,060	3,530	19	1983-2001	1998	2,640
					965	1,490	1,840	2,250	2,550	2,840	3,470				
					1,230	1,780	2,110	2,490	2,750	2,990	3,510				
275	04197300	Wolf Creek at Bettsville	41°14′58″	83°14′08″	1,600	2,060	2,350	2,710	2,980	3,250	3,860	21	1961-1981	1962	4,280
					1,450	2,180	2,640	3,200	3,600	3,980	4,820				
					1,590	2,070	2,390	2,810	3,110	3,410	4,100				
276	04197400	East Branch Wolf Creek at Ft Seneca	41°12′40″	83°10′50″	1,760	2,220	2,500	2,840	3,080	3,310	3,830	15	1961-1975	1969	2,780
					1,560	2,340	2,850	3,460	3,890	4,310	5,220				
					1,730	2,240	2,570	2,990	3,290	3,590	4,260				
277	04197500	Havens Creek at Havens	41°17′36″	83°11′50″	139	207	249	299	333	365	434	31	1947-1977	1956	312
					168	264	326	400	452	502	612				
					141	212	258	314	353	390	470				
278	04198000	Sandusky River near Fremont	41°18′28″	83°09′32″	15,500	20,800	24,000	27,600	30,100	32,500	37,400	76	1924-1936, 1939-2001	1978	36,500
					13,700	19,200	22,800	27,000	30,000	32,900	39,400				
					15,400	20,800	23,900	27,600	30,100	32,500	37,600				
279	04198100	Norwalk Creek near Norwalk	41°13′58″	82°32′28″	346	607	810	1,100	1,330	1,580	2,230	36	1947-1982	1969	1,880
					329	562	729	945	1,110	1,270	1,660				
					345	603	799	1,070	1,280	1,510	2,080				
280	04198500	East Branch Huron River near Norwalk	41°14′58″	82°38′52″	2,650	4,350	5,640	7,460	8,940	10,500	14,700	14	1924-1935, 1959, 1969	1969	22,000
					2,670	4,180	5,250	6,600	7,620	8,630	11,000				
					2,660	4,330	5,570	7,270	8,610	10,000	13,600				

Table 4. Flood-frequency data for streamflow-gaging stations—Continued

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Map ID (fig. 1)	Station number	Station name	Latitude	Longitude	Flood-peak discharge (ft^3/s) for indicated recurrence interval, in years							Record		Largest recorded discharge	
					2	5	10	25	50	100	500	Years	Period used	Calendar year	Magnitude (ft^3/s)
281	04199000	Huron River at Milan	41°18′06″	82°36′25″	8,170	12,100	14,900	18,900	22,200	25,700	34,800	46	1950-1981, 1988-2001	1969	49,600
					8,060	12,200	15,100	18,800	21,500	24,300	30,700				
					8,170	12,100	14,900	18,900	22,100	25,500	34,200				
282	04199155	Old Womans Creek at Berlin Road near Huron	41°20′54″	82°30′50″	926	1,230	1,430	1,690	1,880	2,080	2,560	13	1988-1994, 1996-2001	1997	1,940
					1,000	1,630	2,070	2,640	3,070	3,500	4,510				
					937	1,310	1,580	1,960	2,250	2,550	3,240				
283	04199500	Vermilion River near Vermilion	41°22′55″	82°19′01″	5,770	8,800	11,200	14,700	17,600	20,900	30,100	33	1950-1981, 2001	1969	40,800
					5,390	8,000	9,800	12,100	13,800	15,400	19,300				
					5,750	8,740	11,100	14,300	17,000	20,000	27,900				
284	04199800	Neff Run near Litchfield	41°12′33″	82°01′26″	71	97	115	138	156	175	220	17	1966-1982	1969	152
					75	131	172	224	263	303	396				
					72	104	128	163	190	217	283				
285	04200000	East Branch Black River at Elyria	41°20′51″	82°05′40″	4,610	7,500	9,810	13,200	16,100	19,300	28,100	15	1923-1935, 1959, 1969	1969	23,100
					6,160	9,580	12,000	15,200	17,500	19,900	25,500				
					4,700	7,690	10,100	13,500	16,300	19,400	27,500				
286	04200100	Plum Creek at Oberlin	41°17′15″	82°13′12″	298	501	652	861	1,030	1,200	1,640	31	1947-1977	1969	1,560
					233	371	465	584	671	758	958				
					294	487	626	810	952	1,100	1,460				
287	04200500	Black River at Elyria	41°22′49″	82°06′17″	7,300	10,800	13,700	17,900	21,500	25,700	37,400	57	1945-2001	1969	51,700
					7,520	11,100	13,500	16,600	18,900	21,200	26,500				
					7,310	10,800	13,700	17,800	21,300	25,200	36,200				
288	04201500	Rocky River near Berea	41°24′24″	81°53′14″	8,110	11,100	13,000	15,500	17,300	19,100	23,300	70	1924-1935, 1944-2001	1959	21,400
					6,980	10,700	13,400	16,800	19,300	21,900	28,000				
					8,090	11,100	13,000	15,500	17,400	19,300	23,700				

Table 4. Flood-frequency data for streamflow-gaging stations—Continued

[Bold station numbers indicate peak streamflows at this station presently (2003) are considered regulated. For each station, the upper numbers are the log-Pearson Type III estimates, the middle numbers are regression estimates, and the lower numbers are weighted estimates. Streamflow-gaging stations are in Ohio unless indicated otherwise. Abbreviations: ft^3/s, cubic feet per second.]

Map ID (fig. 1)	Station number	Station name	Latitude	Longitude	Flood-peak discharge (ft^3/s) for indicated recurrence interval, in years							Record		Largest recorded discharge	
					2	5	10	25	50	100	500	Years	Period used	Calendar year	Magnitude (ft^3/s)
289	**04202000**	Cuyahoga River at Hiram Rapids	41°20′26″	81°10′01″	1,580	2,310	2,770	3,320	3,700	4,070	4,860	24	1928-1935, 1945-1960	1959	3,670
					2,740	3,860	4,610	5,540	6,220	6,890	8,440				
					1,610	2,380	2,880	3,490	3,920	4,330	5,230				
290	04206212	North Fork at Bath Center	41°10′08″	81°38′04″	366	570	719	922	1,080	1,250	1,680	10	1992-2001	1992	885
					362	606	781	1,010	1,180	1,350	1,750				
					365	581	741	957	1,120	1,300	1,710				
291	04206220	Yellow Creek at Botzum	41°09′47″	81°35′02″	1,010	1,200	1,300	1,410	1,480	1,550	1,690	10	1992-2001	1993	1,340
					1,220	1,920	2,420	3,050	3,530	4,000	5,120				
					1,050	1,340	1,570	1,870	2,090	2,310	2,790				
292	04207200	Tinkers Creek at Bedford	41°23′04″	81°31′39″	2,750	3,890	4,730	5,880	6,810	7,800	10,400	39	1963-2001	1969	7,220
					1,830	2,650	3,200	3,880	4,380	4,870	6,010				
					2,700	3,790	4,560	5,610	6,430	7,300	9,530				
293	04208000	Cuyahoga River at Independence	41°23′43″	81°37′48″	8,850	11,700	13,600	16,000	17,800	19,600	24,100	73	1922-1923, 1928-1936, 1940-2001	1959	24,800
					9,560	13,200	15,700	18,800	21,100	23,300	28,500				
					8,860	11,700	13,600	16,100	18,000	19,800	24,300				
294	04209000	Chagrin River at Willoughby	41°37′51″	81°24′13″	8,850	13,500	17,000	22,100	26,300	31,000	43,600	66	1913, 1926-1935, 1940-1984, 1988-1993, 1996-1999	1948	28,000
					5,140	7,550	9,210	11,300	12,900	14,400	18,000				
					8,750	13,200	16,600	21,300	25,200	29,400	40,700				
295	04210000	Phelps Creek near Windsor	41°30′56″	80°56′07″	1,860	2,690	3,190	3,770	4,160	4,510	5,260	18	1942-1959	1959	4,600
					929	1,420	1,770	2,200	2,520	2,840	3,590				
					1,770	2,510	2,940	3,430	3,760	4,090	4,800				
296	04210090	Montville Ditch at Montville	41°36′04″	81°03′03″	28	54	76	107	132	160	233	12	1966-1977	1977	95
					39	70	93	124	146	169	223				
					30	59	82	114	139	165	228				

Table 4. Flood-frequency data for streamflow-gaging stations—Continued

[Bold station numbers indicate peak streamflows at this station presently (2003) are considered regulated. For each station, the upper numbers are the log-Pearson Type III estimates, the middle numbers are regression estimates, and the lower numbers are weighted estimates. Streamflow-gaging stations are in Ohio unless indicated otherwise. Abbreviations: ft^3/s, cubic feet per second.]

Map ID (fig. 1)	Station number	Station name	Latitude	Longitude	Flood-peak discharge (ft^3/s) for indicated recurrence interval, in years							Record		Largest recorded discharge	
					2	5	10	25	50	100	500	Years	Period used	Calendar year	Magnitude (ft^3/s)
297	04210100	Hoskins Creek at Hartsgrove	41°36′00″	80°57′12″	201	324	419	553	663	783	1,100	36	1947-1977, 1982-1986	1959	700
					224	338	415	511	581	650	809				
					202	325	418	548	653	765	1,060				
298	**04211000**	Rock Creek near Rock Creek	41°39′05″	80°50′10″	2,510	3,670	4,420	5,340	6,010	6,670	8,160	25	1942-1966	1959	8,000
					1,170	1,600	1,870	2,210	2,460	2,700	3,240				
					2,430	3,460	4,090	4,820	5,350	5,870	7,050				
299	04211500	Mill Creek near Jefferson	41°45′11″	80°48′03″	3,320	4,600	5,510	6,740	7,720	8,750	11,400	33	1942-1974	1959	9,810
					1,680	2,370	2,830	3,410	3,830	4,240	5,190				
					3,240	4,440	5,260	6,340	7,190	8,070	10,300				
300	04212000	Grand River near Madison	41°44′26″	81°02′48″	8,780	11,600	13,300	15,500	17,100	18,700	22,300	51	1923-1936, 1938-1974	1959	21,100
					7,390	10,000	11,800	13,900	15,500	17,100	20,800				
					8,750	11,500	13,300	15,400	17,000	18,600	22,200				
301	04212100	Grand River near Painesville	41°43′08″	81°13′41″	12,700	15,700	17,300	19,100	20,200	21,300	23,300	27	1975-2001	1986	18,700
					8,420	11,400	13,400	15,800	17,700	19,400	23,600				
					12,500	15,400	16,900	18,700	19,900	21,000	23,400				
302	04212500	Ashtabula River near Ashtabula	41°51′20″	80°45′44″	4,440	6,400	7,720	9,430	10,700	12,000	15,200	54	1925-1936, 1939-1947, 1950-1979, 1994-1996	1959	11,600
					2,380	3,360	4,020	4,850	5,450	6,050	7,420				
					4,380	6,260	7,500	9,080	10,300	11,500	14,300				
303	04212600	Hubbard Run tributary at Ashtabula	41°50′38″	80°46′42″	105	143	170	206	235	264	341	17	1966-1982	1969	270
					80	136	176	227	266	304	394				
					101	141	171	212	244	277	360				
304	04213000	Conneaut Creek at Conneaut	41°55′37″	80°36′15″	6,130	8,950	10,800	13,200	14,900	16,600	20,500	66	1923-1936, 1950-2001	1959	17,000
					3,990	5,950	7,290	9,000	10,300	11,500	14,500				
					6,070	8,820	10,600	12,900	14,500	16,100	19,900				

Table 4. Flood-frequency data for streamflow-gaging stations—Continued

[Bold station numbers indicate peak streamflows at this station presently (2003) are considered regulated. For each station, the upper numbers are the log-Pearson Type III estimates, the middle numbers are regression estimates, and the lower numbers are weighted estimates. Streamflow-gaging stations are in Ohio unless indicated otherwise. Abbreviations: ft^3/s, cubic feet per second.]

Map ID (fig. 1)	Station number	Station name	Latitude	Longitude	Flood-peak discharge (ft^3/s) for indicated recurrence interval, in years							Record		Largest recorded discharge	
					2	5	10	25	50	100	500	Years	Period used	Calendar year	Magnitude (ft^3/s)
305	04213040	Raccoon Creek near West Springfield, Pa.	41°56′42″	80°26′51″	131	219	284	374	445	520	708	35	1961-1995	1969	408
					173	286	365	467	542	618	796				
					133	224	292	386	460	536	725				

Table 5. Selected basin characteristics of streamflow-gaging stations

[Bold station numbers indicate peak streamflows at this station presently (2003) are considered regulated. Station names and locations are given in table 4. Abbreviations: DA, drainage area; SL, main channel slope; W, percentage of the basin area classified in the National Land Cover Dataset as the sum of water and wetlands; CF2, CF25, CF100, climate factors with 2-, 25-, and 100-year recurrence intervals, respectively; MBE, mean basin elevation; CR, circularity ratio; DD, drainage density; MAP_c, mean annual precipitation at basin centroid; MAP_m, mean annual precipitation averaged over basin area; AOS, average maximum overland slope of land surface in basin; Water, Developed, Barren, ForestUp, HerbNat, HerbCult, Wetland, percentages of basin area classified in the National Land Cover Dataset as water, developed, barren, forested uplands, herbaceous upland natural, and herbaceous planted/cultivated, respectively; nd, not determined; ft, feet; ft/mi, feet per mile; in., inches; mi^{-1}, 1/miles; mi^2, square miles]

Map ID (fig. 1)	Station number	Region	DA (mi^2)	SL (ft/mi)	W (%)	CF_2	CF_{25}	CF_{100}	MBE (ft)	CR	DD (mi^{-1})	MAP_c (in.)	MAP_m (in.)	AOS (%)	Water[a] (%)	Developed (%)	Barren (%)	ForestUp (%)	HerbNat (%)	HerbCult (%)	Wetland (%)
1	03022500	A	629	8.15	3.87	1.91	2.70	2.92	1,404	2.31	0.75	44.3	45.4	6.05	0.34	0.97	0.14	53.20	0.00	41.82	3.54
2	03023000	A	90.2	11.08	7.90	1.87	2.67	2.88	1,248	1.58	0.67	44.2	44.2	3.76	0.66	1.93	0.00	49.65	0.00	40.51	7.24
3	03086100	A	15.6	51.21	0.02	1.93	2.68	2.88	1,099	1.61	0.82	37.4	37.3	14.09	0.02	3.77	0.09	83.85	0.00	12.27	0.00
4	03086500	A	89.2	12.3	2.79	1.89	2.66	2.85	1,177	1.55	0.69	37.3	37.4	4.79	1.39	7.53	0.04	24.68	0.00	64.96	1.40
5	03087000	A	17.4	25.99	1.66	1.89	2.66	2.85	1,207	1.67	0.64	37.3	37.3	3.42	0.49	7.95	0.00	23.00	0.00	67.39	1.18
6	03088000	A	33.2	13.12	9.70	1.89	2.66	2.85	1,153	1.58	0.83	37.6	37.5	2.15	3.42	1.89	0.00	26.21	0.00	62.20	6.28
7	03089500	A	19.1	15.81	3.94	1.89	2.66	2.85	1,175	1.52	0.62	36.9	36.9	4.35	0.78	0.38	0.00	30.44	0.00	65.24	3.16
8	**03090500**	A	248	7.94	4.61	1.89	2.66	2.85	1,143	1.79	0.70	37.2	37.3	3.32	3.83	5.54	0.14	29.04	0.00	57.77	3.68
9	03092000	A	21.9	15.13	7.12	1.89	2.66	2.85	1,021	1.47	0.54	37.1	37.2	2.26	0.37	0.82	0.34	44.37	0.00	47.35	6.75
10	03092090	A	21.8	25.87	10.22	1.88	2.66	2.85	1,160	1.53	0.82	39.5	39.4	2.66	0.65	2.07	0.06	39.81	0.00	47.85	9.56
11	03092100	A	10.6	23.69	6.35	1.88	2.66	2.85	1,138	1.91	1.00	39.0	38.9	2.77	0.40	1.88	0.36	63.27	0.00	28.14	5.95
12	**03092500**	A	96.3	13.99	7.03	1.88	2.66	2.85	1,096	1.69	0.73	38.3	38.4	2.96	5.00	2.02	0.26	45.92	0.00	40.46	6.33
13	03092600	A	0.21	110	4.89	1.88	2.66	2.85	1,001	1.40	nd	37.7	37.7	1.50	0.00	0.00	10.12	60.91	0.00	24.08	4.89
14	03093000	A	97.6	17.84	10.50	1.88	2.66	2.85	1,047	1.58	0.73	39.8	39.4	2.81	0.61	1.78	0.25	49.32	0.00	38.14	9.90
15	03094900	A	8.45	16.95	9.66	1.89	2.67	2.86	1,091	1.39	0.54	37.0	37.1	1.35	0.47	7.86	0.00	37.86	0.00	44.62	9.19
16	**03096000**	A	138	7.48	11.48	1.89	2.67	2.86	990	1.69	0.51	36.9	37.4	1.44	9.57	10.11	0.03	33.63	0.00	35.86	10.79
17	03098500	A	66.3	18.21	5.39	1.89	2.66	2.86	1,114	1.91	0.78	36.2	36.3	4.34	1.90	25.48	0.01	30.24	0.00	38.88	3.49
18	03098700	A	14	46.06	6.65	1.89	2.66	2.86	1,057	1.40	0.77	37.0	37.0	2.95	0.71	31.83	0.00	44.86	0.00	16.66	5.95
19	03102900	A	1.13	46.47	1.86	1.89	2.67	2.87	1,091	1.49	0.83	38.2	38.4	1.74	0.03	0.03	0.00	23.49	0.00	74.62	1.83
20	03102950	A	96.7	2.14	12.94	1.89	2.67	2.87	1,033	1.76	0.49	39.5	39.7	2.11	0.47	0.32	0.00	31.86	0.00	54.89	12.47
21	03104760	A	2.26	53.67	3.87	1.89	2.67	2.87	1,263	1.34	0.96	40.8	40.8	3.95	0.00	2.11	0.12	26.12	0.00	67.77	3.87
22	03106000	A	356	10.82	0.13	1.93	2.69	2.90	1,194	1.64	0.76	38.9	39.1	10.66	0.12	4.71	0.84	56.26	0.00	38.07	0.01
23	**03106500**	A	398	13.1	3.36	1.93	2.69	2.90	1,310	1.83	0.82	40.4	40.6	7.74	1.16	1.64	1.47	54.86	0.00	38.68	2.20
24	03108000	B	178	11.02	0.35	1.93	2.67	2.87	1,118	1.72	0.76	37.6	37.8	13.25	0.35	3.51	2.42	67.61	0.00	26.11	0.00

Table 5. Selected basin characteristics of streamflow-gaging stations—Continued

[Bold station numbers indicate peak streamflows at this station presently (2003) are considered regulated. Station names and locations are given in table 4. Abbreviations: DA, drainage area; SL, main channel slope; W, percentage of the basin area classified in the National Land Cover Dataset as the sum of water and wetlands; CF2, CF25, CF100, climate factors with 2-, 25-, and 100-year recurrence intervals, respectively; MBE, mean basin elevation; CR, circularity ratio; DD, drainage density; MAP_c, mean annual precipitation at basin centroid; MAP_m, mean annual precipitation averaged over basin area; AOS, average maximum overland slope of land surface in basin; Water, Developed, Barren, ForestUp, HerbNat, HerbCult, Wetland, percentages of basin area classified in the National Land Cover Dataset as water, developed, barren, forested uplands, herbaceous upland natural, and herbaceous planted/cultivated, respectively; nd, not determined; ft, feet; ft/mi, feet per mile; in., inches; mi^{-1}, 1/miles; mi^2, square miles]

Map ID (fig. 1)	Station number	Region	DA (mi^2)	SL (ft/mi)	W (%)	CF_2	CF_{25}	CF_{100}	MBE (ft)	CR	DD (mi^{-1})	MAP_c (in.)	MAP_m (in.)	AOS (%)	Water[a] (%)	Developed (%)	Barren (%)	ForestUp (%)	HerbNat (%)	HerbCult (%)	Wetland (%)
25	03109000	A	6.19	56.66	0.40	1.89	2.66	2.85	1,181	1.46	0.85	37.3	37.3	5.62	0.38	1.85	0.00	23.61	0.00	74.14	0.02
26	03109500	A	496	9.54	1.42	1.90	2.66	2.85	1,138	1.87	0.84	37.2	37.3	9.09	1.11	3.64	0.57	48.71	0.00	45.66	0.31
27	03110000	B	147	15.74	1.12	1.92	2.66	2.84	1,147	1.56	0.76	38.5	38.5	14.40	0.79	0.69	0.19	69.40	0.00	28.60	0.33
28	03110980	B	0.04	500	0.00	1.92	2.66	2.85	1,273	1.09	nd	39.1	39.1	9.92	0.00	0.00	0.00	18.80	0.00	81.20	0.00
29	03111150	B	10.3	48.21	0.00	1.94	2.69	2.88	1,192	1.41	0.57	38.9	38.9	12.98	0.00	0.19	0.00	27.91	0.00	71.89	0.00
30	03111450	B	1.31	41.38	0.99	1.92	2.66	2.85	1,146	1.44	nd	39.3	39.3	8.39	0.93	0.30	0.52	41.90	0.00	56.29	0.05
31	03111455	B	10.9	41.38	4.33	1.92	2.66	2.85	1,157	1.32	2.12	39.4	39.4	8.92	3.98	0.38	0.10	40.67	0.00	54.52	0.35
32	03111470	B	1.57	80.16	1.59	1.92	2.66	2.85	1,231	1.31	0.92	39.2	39.2	8.77	1.39	0.09	0.00	13.65	0.00	84.68	0.20
33	03111490	B	0.44	130	1.05	1.92	2.66	2.85	1,166	1.55	nd	39.3	39.3	9.29	0.64	0.24	0.00	70.75	0.00	27.96	0.40
34	03111500	B	123	20.42	2.34	1.92	2.66	2.85	1,126	1.41	0.85	39.3	39.3	12.42	1.99	2.66	0.96	52.13	0.00	41.92	0.34
35	03111540	A	0.34	254	0.00	1.93	2.66	2.85	1,168	1.15	nd	39.3	39.3	9.75	0.00	0.54	0.00	57.85	0.00	41.60	0.00
36	03111548	A	97.7	20.58	1.15	1.93	2.66	2.85	1,135	1.46	0.78	39.5	39.5	11.14	0.91	3.03	1.16	43.53	0.00	51.13	0.24
37	03112000	A	281	14.96	0.31	1.95	2.69	2.88	1,218	1.77	0.67	40.2	40.3	18.75	0.30	0.97	0.41	69.59	0.00	28.71	0.00
38	03113700	A	4.95	133.39	0.03	1.93	2.67	2.85	1,224	1.33	0.84	39.7	39.7	20.83	0.03	0.49	0.00	70.38	0.00	29.10	0.00
39	03114000	A	134	20.68	0.84	1.93	2.66	2.85	1,169	1.44	0.58	41.7	41.6	13.66	0.72	1.02	0.18	51.23	0.00	46.73	0.13
40	03114240	A	0.53	254.63	0.39	1.93	2.67	2.85	1,132	1.50	0.44	41.7	41.7	16.48	0.39	0.00	0.00	71.81	0.00	27.80	0.00
41	03114500	A	458	8.65	0.25	1.96	2.68	2.86	1,032	1.73	0.74	44.7	44.6	25.28	0.23	0.35	0.09	86.69	0.00	12.62	0.02
42	03114550	A	0.88	120	0.29	1.96	2.67	2.86	924	1.27	nd	42.9	42.9	17.23	0.29	0.00	0.00	86.43	0.00	13.28	0.00
43	03114600	A	1.22	138.17	0.00	1.96	2.67	2.86	922	1.28	0.42	42.9	42.9	19.56	0.00	0.00	0.00	88.25	0.00	11.75	0.00
44	03115280	A	5.45	79.98	0.22	1.96	2.67	2.86	963	1.49	0.64	42.7	42.7	20.57	0.20	0.08	0.00	84.48	0.00	15.22	0.03
45	03115400	A	210	13.76	0.30	1.96	2.67	2.85	986	1.70	0.62	41.9	41.8	21.90	0.29	0.14	0.00	81.39	0.00	18.16	0.01
46	03115410	A	0.13	289	0.00	1.96	2.67	2.85	819	1.13	nd	42.2	42.2	15.96	0.00	0.00	0.00	77.75	0.00	22.25	0.00
47	03115500	A	258	9.94	0.38	1.96	2.67	2.85	970	1.81	0.63	42.2	41.8	22.55	0.36	0.12	0.00	82.76	0.00	16.73	0.02
48	03115510	A	1.52	112.63	0.02	1.96	2.67	2.85	885	1.56	0.84	40.6	40.6	21.63	0.00	0.00	0.00	76.51	0.00	23.47	0.02
49	03115600	A	3.46	80.68	0.31	1.96	2.67	2.85	1,031	1.33	0.67	39.4	39.4	18.95	0.27	0.27	0.02	54.36	0.00	45.04	0.04
50	03115710	A	0.19	366	0.76	1.96	2.67	2.85	968	1.37	nd	39.3	39.3	21.13	0.76	0.00	1.14	91.67	0.00	6.44	0.00

Table 5. Selected basin characteristics of streamflow-gaging stations—Continued

[Bold station numbers indicate peak streamflows at this station presently (2003) are considered regulated. Station names and locations are given in table 4. Abbreviations: DA, drainage area; SL, main channel slope; W, percentage of the basin area classified in the National Land Cover Dataset as the sum of water and wetlands; CF2, CF25, CF100, climate factors with 2-, 25-, and 100-year recurrence intervals, respectively; MBE, mean basin elevation; CR, circularity ratio; DD, drainage density; MAP_c, mean annual precipitation at basin centroid; MAP_m, mean annual precipitation averaged over basin area; AOS, average maximum overland slope of land surface in basin; Water, Developed, Barren, ForestUp, HerbNat, HerbCult, Wetland, percentages of basin area classified in the National Land Cover Dataset as water, developed, barren, forested uplands, herbaceous upland natural, and herbaceous planted/cultivated, respectively; nd, not determined; ft, feet; ft/mi, feet per mile; in., inches; mi^{-1}, 1/miles; mi^2, square miles]

Map ID (fig. 1)	Station number	Region	DA (mi^2)	SL (ft/mi)	W (%)	CF_2	CF_{25}	CF_{100}	MBE (ft)	CR	DD (mi^{-1})	MAP_c (in.)	MAP_m (in.)	AOS (%)	Water[a] (%)	Developed (%)	Barren (%)	ForestUp (%)	HerbNat (%)	HerbCult (%)	Wetland (%)
51	03115973	B	3.65	8.66	5.64	1.86	2.63	2.82	1,022	1.44	1.06	37.3	37.3	2.91	1.07	47.72	1.18	19.77	0.00	25.68	4.57
52	03116000	B	174	2.47	7.20	1.86	2.63	2.82	1,074	2.07	0.93	37.1	37.1	3.62	2.47	27.84	0.56	25.92	0.00	38.48	4.72
53	03116100	B	16.4	10.67	0.78	1.87	2.63	2.82	1,071	1.45	0.94	37.0	37.0	2.75	0.25	13.09	0.00	12.04	0.00	74.09	0.53
54	03116200	B	146	7.69	2.41	1.86	2.63	2.82	1,070	2.01	0.77	37.0	37.0	2.90	1.04	6.54	0.01	17.66	0.00	73.38	1.37
55	03117000	B	518	5.14	4.76	1.86	2.63	2.82	1,069	1.97	0.84	37.1	37.1	3.63	1.94	16.92	0.22	21.63	0.00	56.47	2.82
56	03117500	B	253	13.68	2.57	1.89	2.66	2.85	1,162	1.68	0.80	37.9	37.9	9.54	0.95	1.89	0.43	37.34	0.00	57.77	1.62
57	03118000	B	43.1	13.56	4.23	1.89	2.65	2.84	1,150	1.69	0.95	37.2	37.2	2.73	1.46	11.24	1.16	11.88	0.00	71.50	2.77
58	03118500	B	175	11.18	2.57	1.89	2.65	2.84	1,138	1.69	1.06	37.1	37.2	3.47	1.00	30.52	0.30	14.74	0.00	51.87	1.57
59	03119000	B	481	11.19	2.87	1.89	2.65	2.84	1,141	1.89	0.88	37.5	37.6	7.32	1.22	12.48	0.42	30.24	0.00	53.98	1.65
60	03119700	B	14.3	58.26	1.24	1.92	2.66	2.84	1,198	1.44	0.83	39.1	39.1	10.92	1.03	1.50	0.00	56.16	0.00	41.09	0.21
61	**03122500**	B	1,405	2.18	3.18	1.88	2.65	2.84	1,099	2.17	0.83	37.4	37.6	6.85	1.77	11.14	0.32	33.37	0.00	51.50	1.91
62	03123400	B	0.74	153.05	1.07	1.90	2.65	2.83	1,116	1.19	0.91	37.8	37.8	8.29	0.15	0.15	3.94	35.75	0.00	59.08	0.92
63	03125000	B	1.64	89.91	0.17	1.91	2.65	2.84	994	1.31	1.00	39.1	39.1	14.66	0.06	1.30	0.00	36.09	0.00	62.44	0.11
64	03125300	A	2.26	95.31	0.49	1.93	2.66	2.85	1,190	1.39	0.76	39.4	39.7	11.71	0.49	4.82	0.00	42.20	0.00	52.49	0.00
65	03125450	A	1.97	121.19	0.55	1.93	2.66	2.85	1,156	1.37	0.76	38.5	38.5	11.79	0.30	0.04	2.38	59.73	0.00	37.30	0.25
66	03127950	B	5.45	68.2	1.76	1.92	2.66	2.84	1,187	1.27	0.71	39.3	39.3	12.44	1.39	0.08	0.00	72.72	0.00	25.44	0.36
67	03128650	A	0.55	101	1.45	1.91	2.66	2.84	1,010	1.22	nd	38.7	38.7	19.26	0.46	0.00	0.00	92.64	0.00	5.91	0.99
68	**03129000**	B	2,443	2.11	1.51	1.90	2.65	2.84	1,085	2.11	0.84	38.2	37.9	9.26	1.80	7.42	0.44	39.85	0.00	49.07	1.42
69	03129012	A	0.01	994	0.00	1.91	2.64	2.83	1,115	1.06	nd	37.0	37.0	10.73	0.00	0.00	0.00	0.00	0.00	100.00	0.00
70	03129014	A	0.44	221	0.08	1.91	2.64	2.83	1,067	1.20	nd	37.0	37.0	11.88	0.00	0.00	0.00	39.39	0.00	60.53	0.08
71	03129016	A	0.12	372	0.32	1.91	2.64	2.83	1,050	1.15	nd	37.1	37.1	11.56	0.00	0.00	0.00	30.10	0.00	69.58	0.32
72	03129300	A	0.24	47.7	0.44	1.86	2.62	2.81	1,224	1.21	nd	38.7	38.7	1.59	0.44	0.00	0.00	9.75	0.00	89.81	0.00
73	03130500	A	5.44	34.52	2.78	1.90	2.62	2.81	1,352	1.56	1.63	38.0	38.0	3.58	0.64	35.75	0.00	26.49	0.00	34.98	2.14
74	03132000	A	136	11.59	2.26	1.90	2.63	2.82	1,300	1.51	0.68	38.6	38.6	5.49	1.43	2.20	0.01	37.69	0.00	57.84	0.83
75	03134000	A	120	12.96	1.17	1.86	2.62	2.82	1,124	1.65	0.62	38.5	38.4	3.10	0.26	3.77	0.00	24.90	0.00	70.17	0.91
76	**03136000**	A	948	6.67	0.52	1.90	2.63	2.82	1,169	1.65	0.68	38.7	38.4	5.40	1.10	3.33	0.00	33.21	0.00	61.12	1.23

Table 5. Selected basin characteristics of streamflow-gaging stations—Continued

[Bold station numbers indicate peak streamflows at this station presently (2003) are considered regulated. Station names and locations are given in table 4. Abbreviations: DA, drainage area; SL, main channel slope; W, percentage of the basin area classified in the National Land Cover Dataset as the sum of water and wetlands; CF2, CF25, CF100, climate factors with 2-, 25-, and 100-year recurrence intervals, respectively; MBE, mean basin elevation; CR, circularity ratio; DD, drainage density; MAP_c, mean annual precipitation at basin centroid; MAP_m, mean annual precipitation averaged over basin area; AOS, average maximum overland slope of land surface in basin; Water, Developed, Barren, ForestUp, HerbNat, HerbCult, Wetland, percentages of basin area classified in the National Land Cover Dataset as water, developed, barren, forested uplands, herbaceous upland natural, and herbaceous planted/cultivated, respectively; nd, not determined; ft, feet; ft/mi, feet per mile; in., inches; mi^{-1}, 1/miles; mi^2, square miles]

Map ID (fig. 1)	Station number	Region	DA (mi^2)	SL (ft/mi)	W (%)	CF_2	CF_{25}	CF_{100}	MBE (ft)	CR	DD (mi^{-1})	MAP_c (in.)	MAP_m (in.)	AOS (%)	Water[a] (%)	Developed (%)	Barren (%)	ForestUp (%)	HerbNat (%)	HerbCult (%)	Wetland (%)
77	03136500	A	202	12.31	1.27	1.91	2.63	2.82	1,215	1.53	0.64	39.5	39.4	3.61	0.79	0.55	0.00	26.57	0.00	71.61	0.48
78	03137000	A	455	10.06	1.10	1.91	2.63	2.82	1,167	1.71	0.68	39.8	39.5	5.03	0.73	1.29	0.04	30.83	0.00	66.74	0.37
79	**03138500**	A	1,505	5.94	0.30	1.90	2.63	2.82	1,161	1.73	0.69	38.8	38.8	5.88	0.99	2.50	0.02	34.50	0.00	61.03	0.96
80	03138900	A	0.9	125.63	0.08	1.90	2.64	2.82	1,070	1.40	0.47	36.7	36.7	5.82	0.00	0.12	0.00	34.74	0.00	65.07	0.08
81	03139000	A	464	6.45	2.54	1.90	2.64	2.82	1,065	1.95	0.72	36.9	37.3	6.94	1.07	2.70	0.11	29.35	0.00	65.30	1.47
82	03139930	A	0.54	219	0.73	1.91	2.64	2.83	1,129	1.24	nd	37.2	37.2	10.55	0.00	0.00	0.00	38.22	0.00	61.06	0.73
83	03139940	A	1.44	160.15	0.30	1.91	2.64	2.83	1,114	1.21	0.93	37.1	37.1	11.19	0.00	0.00	0.00	41.76	0.00	57.94	0.30
84	03139960	A	2.38	116.11	0.23	1.91	2.64	2.83	1,096	1.26	1.01	37.1	37.1	11.80	0.00	0.00	0.00	45.29	0.00	54.48	0.23
85	03139970	A	0.19	188	0.00	1.91	2.64	2.83	1,041	1.16	nd	37.2	37.2	8.77	0.00	0.00	0.00	26.02	0.00	73.98	0.00
86	03139980	A	4.02	102.07	0.20	1.91	2.64	2.83	1,069	1.39	0.77	37.1	37.1	12.19	0.00	0.00	0.00	47.67	0.00	52.13	0.20
87	03139990	A	7.16	92.62	0.23	1.91	2.64	2.83	1,031	1.43	0.74	37.2	37.1	12.37	0.00	0.08	0.00	45.55	0.00	54.14	0.23
88	03140000	A	27.2	19.61	0.19	1.91	2.64	2.83	1,010	1.53	0.95	37.2	37.3	12.01	0.02	0.03	0.00	39.00	0.00	60.78	0.17
89	03140010	A	0.12	247	0.85	1.91	2.64	2.83	1,150	1.22	nd	37.0	37.0	10.33	0.00	0.00	0.00	9.35	0.00	89.80	0.85
90	03140020	A	0.06	406	0.52	1.91	2.64	2.83	1,132	1.10	nd	37.0	37.0	13.96	0.00	0.00	0.00	97.92	0.00	1.56	0.52
91	03140030	A	0.04	375	0.00	1.91	2.64	2.83	1,104	1.10	nd	37.2	37.2	9.31	0.00	0.00	0.00	12.41	0.00	87.59	0.00
92	03142200	A	55.6	20.24	2.00	1.93	2.66	2.84	979	1.60	0.81	33.7	35.4	13.17	0.90	0.50	0.13	65.00	0.00	32.37	1.09
93	03144000	A	140	10.76	0.33	1.92	2.64	2.83	999	1.66	0.78	39.6	39.6	10.52	0.08	0.08	0.00	50.31	0.00	49.27	0.25
94	**03144500**	A	5,993	1.91	0.98	1.90	2.64	2.82	1,071	1.99	0.76	37.8	38.2	9.25	1.52	4.19	0.27	41.70	0.00	51.21	1.11
95	03144800	A	1.1	35.42	0.82	1.97	2.65	2.83	1,067	1.16	0.85	39.3	39.3	1.11	0.00	0.75	0.00	8.40	0.00	90.03	0.82
96	03145500	A	82.7	11.66	0.78	1.93	2.64	2.82	1,111	1.64	0.59	39.8	39.9	3.30	0.28	1.64	0.00	25.80	0.00	71.79	0.49
97	03145600	A	3.17	10.9	2.19	1.92	2.64	2.82	1,207	1.58	1.05	40.0	39.9	2.04	0.09	0.37	0.00	12.90	0.00	84.54	2.10
98	03146000	A	116	16.78	0.92	1.92	2.64	2.82	1,127	2.06	0.58	40.0	39.8	2.31	0.12	0.76	0.00	18.20	0.00	80.13	0.80
99	03146500	A	537	12.95	1.69	1.93	2.64	2.82	1,055	1.64	0.61	40.3	40.1	3.91	1.08	3.91	0.04	26.55	0.00	67.82	0.61
100	03147000	A	672	11.57	1.45	1.93	2.64	2.82	1,045	1.60	0.63	40.6	40.1	5.28	0.92	3.26	0.03	31.66	0.00	63.60	0.53
101	**03147500**	A	742	9.7	0.41	1.93	2.64	2.82	1,029	1.90	0.64	41.0	40.1	5.73	1.18	2.96	0.03	33.49	0.00	61.78	0.56
102	03147900	A	10.1	56.13	0.23	1.93	2.65	2.83	911	1.50	0.66	39.3	39.3	9.92	0.14	3.91	0.00	40.07	0.00	55.79	0.09

Table 5. Selected basin characteristics of streamflow-gaging stations—Continued

[Bold station numbers indicate peak streamflows at this station presently (2003) are considered regulated. Station names and locations are given in table 4. Abbreviations: DA, drainage area; SL, main channel slope; W, percentage of the basin area classified in the National Land Cover Dataset as the sum of water and wetlands; CF2, CF25, CF100, climate factors with 2-, 25-, and 100-year recurrence intervals, respectively; MBE, mean basin elevation; CR, circularity ratio; DD, drainage density; MAP_c, mean annual precipitation at basin centroid; MAP_m, mean annual precipitation averaged over basin area; AOS, average maximum overland slope of land surface in basin; Water, Developed, Barren, ForestUp, HerbNat, HerbCult, Wetland, percentages of basin area classified in the National Land Cover Dataset as water, developed, barren, forested uplands, herbaceous upland natural, and herbaceous planted/cultivated, respectively; nd, not determined; ft, feet; ft/mi, feet per mile; in., inches; mi^{-1}, 1/miles; mi^2, square miles]

Map ID (fig. 1)	Station number	Region	DA (mi^2)	SL (ft/mi)	W (%)	CF_2	CF_{25}	CF_{100}	MBE (ft)	CR	DD (mi^{-1})	MAP_c (in.)	MAP_m (in.)	AOS (%)	Water[a] (%)	Developed (%)	Barren (%)	ForestUp (%)	HerbNat (%)	HerbCult (%)	Wetland (%)
103	03148300	A	80.6	7.72	2.49	1.97	2.66	2.84	928	1.77	0.81	39.9	39.9	13.03	2.15	1.90	2.53	64.48	0.00	28.60	0.34
104	03149500	A	75.7	11.64	0.34	1.93	2.65	2.83	903	1.63	0.64	39.1	39.0	9.46	0.20	0.54	0.03	42.29	0.00	56.81	0.14
105	**03150000**	A	7,422	1.91	1.11	1.91	2.64	2.82	1,052	1.90	0.74	37.6	38.5	9.06	1.46	3.93	0.27	41.86	0.00	51.49	0.98
106	03150600	A	0.99	56.32	0.15	1.96	2.67	2.85	727	1.22	0.58	39.4	39.4	12.26	0.15	6.18	0.00	72.81	0.00	20.87	0.00
107	03154500	A	79.4	16.63	0.06	1.99	2.69	2.87	910	1.51	0.69	43.4	43.4	20.30	0.05	0.17	0.00	76.86	0.00	22.91	0.00
108	03155500	A	453	7.72	0.15	1.97	2.68	2.86	965	1.57	0.64	43.2	43.4	22.29	0.12	0.48	0.71	85.24	0.00	13.42	0.03
109	03157000	A	89	14.96	0.25	1.98	2.65	2.83	984	1.67	0.70	38.5	38.8	8.84	0.21	0.55	0.47	36.25	0.00	62.49	0.04
110	03157500	A	459	10.67	0.81	1.97	2.65	2.83	955	1.80	0.73	38.9	39.3	8.86	0.69	2.55	0.13	38.03	0.00	58.47	0.13
111	03158100	A	1.04	88.01	0.03	1.98	2.66	2.84	875	1.36	0.66	38.5	38.5	18.06	0.00	0.00	0.03	97.19	0.00	2.74	0.03
112	03158220	A	1.09	100.45	0.85	1.98	2.66	2.84	814	1.38	0.72	38.9	38.9	15.31	0.65	0.75	0.00	70.18	0.00	28.23	0.20
113	03159450	A	1.48	108.09	0.24	1.98	2.66	2.84	847	1.36	0.65	39.7	39.7	19.88	0.24	0.05	0.00	84.73	0.00	14.98	0.00
114	03159500	A	943	6.02	0.94	1.98	2.66	2.84	902	2.15	0.67	39.9	39.5	12.39	0.78	2.32	0.31	56.74	0.00	39.69	0.17
115	03159540	A	156	9.6	0.30	1.99	2.66	2.84	803	1.95	0.61	40.0	40.0	14.52	0.23	0.26	0.52	58.85	0.00	40.07	0.06
116	03159700	A	0.7	130.13	0.52	1.99	2.68	2.86	883	1.26	0.69	43.5	43.5	9.77	0.52	0.58	0.05	53.56	0.00	45.29	0.00
117	03201440	A	1.04	36.41	0.00	2.02	2.68	2.85	837	1.35	0.78	41.4	41.4	12.01	0.00	0.00	0.00	75.63	0.00	24.37	0.00
118	03201480	A	0.7	154.15	0.00	2.01	2.67	2.85	717	1.22	0.67	42.0	42.0	12.09	0.00	0.05	1.12	74.49	0.00	24.34	0.00
119	03201550	A	0.3	176	0.24	1.98	2.66	2.84	910	1.19	nd	39.4	39.4	16.80	0.00	0.00	0.00	74.14	0.00	25.62	0.24
120	03201600	A	0.98	112.29	0.04	1.98	2.66	2.84	943	1.62	0.59	39.4	39.4	18.02	0.00	0.00	0.00	97.21	0.00	2.76	0.04
121	03201700	A	1.01	103.3	0.00	1.98	2.66	2.84	936	1.35	0.64	39.5	39.5	18.03	0.00	0.03	0.00	95.36	0.00	4.60	0.00
122	03202000	A	585	5.02	0.78	1.99	2.66	2.84	814	1.90	0.63	40.7	40.6	14.31	0.60	0.87	1.43	70.39	0.00	26.52	0.19
123	03204500	A	256	11.58	0.07	2.01	2.70	2.87	915	1.76	0.79	43.7	43.9	24.53	0.05	0.15	0.84	91.58	0.00	7.36	0.02
124	03205995	A	0.73	125.82	0.00	2.03	2.68	2.86	759	1.42	0.50	42.0	42.0	21.06	0.00	0.88	0.00	84.65	0.00	14.47	0.00
125	03207000	A	291	20.54	0.67	2.05	2.70	2.88	1,020	1.78	0.82	44.6	43.7	29.40	0.66	0.10	1.10	93.61	0.00	4.52	0.00
126	03216563	A	0.94	119.36	1.15	2.04	2.68	2.86	855	1.27	0.65	41.9	41.9	22.62	1.15	2.35	1.55	86.64	0.00	8.31	0.00
127	03217000	C	242	8.85	0.44	2.05	2.68	2.86	940	2.02	0.67	42.1	42.5	16.79	0.12	0.65	0.46	91.76	0.00	6.69	0.32
128	03217500	A	257	3.38	0.48	1.94	2.62	2.80	1,010	1.90	0.76	36.1	35.9	1.21	0.11	1.08	0.00	7.28	0.00	91.16	0.36

Table 5. Selected basin characteristics of streamflow-gaging stations—Continued

[Bold station numbers indicate peak streamflows at this station presently (2003) are considered regulated. Station names and locations are given in table 4. Abbreviations: DA, drainage area; SL, main channel slope; W, percentage of the basin area classified in the National Land Cover Dataset as the sum of water and wetlands; CF2, CF25, CF100, climate factors with 2-, 25-, and 100-year recurrence intervals, respectively; MBE, mean basin elevation; CR, circularity ratio; DD, drainage density; MAP_c, mean annual precipitation at basin centroid; MAP_m, mean annual precipitation averaged over basin area; AOS, average maximum overland slope of land surface in basin; Water, Developed, Barren, ForestUp, HerbNat, HerbCult, Wetland, percentages of basin area classified in the National Land Cover Dataset as water, developed, barren, forested uplands, herbaceous upland natural, and herbaceous planted/cultivated, respectively; nd, not determined; ft, feet; ft/mi, feet per mile; in., inches; mi^{-1}, 1/miles; mi^2, square miles]

Map ID (fig. 1)	Station number	Region	DA (mi^2)	SL (ft/mi)	W (%)	CF_2	CF_{25}	CF_{100}	MBE (ft)	CR	DD (mi^{-1})	MAP_c (in.)	MAP_m (in.)	AOS (%)	Water[a] (%)	Devel-oped (%)	Barren (%)	ForestUp (%)	HerbNat (%)	HerbCult (%)	Wetland (%)
129	03218000	B	72.4	5.77	0.41	1.91	2.62	2.80	977	1.81	0.81	37.4	37.7	0.86	0.09	2.42	0.53	4.82	0.00	91.82	0.32
130	03219500	A	567	2.23	0.75	1.93	2.62	2.80	994	2.68	0.78	35.8	36.4	1.13	0.24	2.20	0.07	7.21	0.00	89.77	0.51
131	03219590	A	83.2	7.06	0.52	1.94	2.62	2.80	1,030	2.22	0.82	36.5	36.5	1.03	0.14	0.42	0.00	6.61	0.00	92.46	0.38
132	03220000	A	178	6.59	0.75	1.94	2.63	2.81	1,037	1.95	0.76	36.2	36.5	1.67	0.22	2.10	0.15	14.80	0.00	82.20	0.53
133	03221000	A	980	3.08	0.74	1.94	2.62	2.80	998	2.31	0.81	36.1	36.6	1.28	0.40	1.87	0.15	8.79	0.00	88.30	0.49
134	03223000	A	157	8.87	0.74	1.91	2.62	2.80	1,072	1.52	0.74	38.3	38.3	1.25	0.21	2.27	0.00	12.96	0.00	84.03	0.52
135	03224000	A	25.4	12.05	0.08	1.92	2.62	2.80	1,043	1.92	0.65	38.5	38.4	1.19	0.01	0.06	0.00	13.35	0.00	86.52	0.06
136	03224500	A	98.7	14.7	0.74	1.91	2.63	2.82	1,115	1.87	0.64	38.6	38.5	1.83	0.61	1.67	0.00	19.51	0.00	78.07	0.13
137	**03225500**	A	393	6.32	0.76	1.92	2.62	2.80	1,047	1.68	0.76	38.1	38.1	1.27	0.79	2.28	0.00	14.57	0.00	81.86	0.49
138	03226200	A	5.84	11.4	0.84	1.94	2.63	2.81	966	1.61	1.63	37.4	37.4	1.84	0.23	1.72	0.00	12.82	0.00	84.62	0.61
139	03226850	A	0.4	60	0.99	1.95	2.64	2.82	869	1.59	nd	38.6	38.6	1.19	0.09	67.81	0.00	13.98	0.00	17.22	0.90
140	03228000	A	11	25.62	0.65	1.98	2.65	2.82	867	1.32	0.67	38.3	38.3	1.75	0.19	37.79	0.00	15.82	0.00	45.74	0.45
141	03228300	A	101	8.67	0.89	1.92	2.64	2.82	1,145	1.92	0.58	39.6	39.4	2.01	0.13	0.37	0.06	24.48	0.00	74.21	0.76
142	**03228500**	A	190	9.9	0.59	1.92	2.64	2.82	1,079	2.03	0.67	39.3	39.2	2.11	2.15	0.94	0.27	23.85	0.00	71.82	0.96
143	**03228805**	A	122	10.91	0.00	1.93	2.63	2.81	998	1.91	0.68	38.4	38.4	2.00	3.35	0.95	0.00	24.63	0.00	70.17	0.90
144	**03229000**	A	189	8.4	0.46	1.94	2.63	2.81	952	2.24	0.74	37.8	38.5	2.03	2.40	16.31	0.07	23.64	0.00	56.71	0.86
145	**03229500**	A	544	7.74	1.87	1.93	2.64	2.82	981	1.68	0.73	39.2	38.9	1.92	1.79	14.62	0.15	23.14	0.00	59.34	0.96
146	03230500	A	534	9.03	0.80	1.95	2.63	2.81	998	1.85	0.86	37.6	37.6	1.45	0.33	1.87	0.02	9.45	0.00	87.87	0.47
147	03230600	A	5.66	50.85	0.27	1.98	2.65	2.83	845	1.45	0.66	38.9	39.0	3.37	0.18	1.50	0.00	12.73	0.00	85.50	0.08
148	03230800	A	228	8.18	0.67	2.00	2.65	2.82	1,018	1.62	0.78	38.0	38.3	1.26	0.36	1.83	0.00	4.94	0.00	92.55	0.31
149	**03231000**	A	333	7.43	0.54	2.00	2.65	2.82	967	1.79	0.80	38.5	38.5	1.27	0.90	1.40	0.04	5.53	0.00	91.89	0.24
150	**03231500**	A	3,849	2.89	1.25	1.95	2.63	2.81	949	2.11	0.78	37.9	38.0	1.63	0.83	6.48	0.15	12.02	0.00	80.04	0.47
151	03231600	A	3.82	7.82	0.15	2.01	2.65	2.82	1,059	1.86	0.83	39.2	39.0	1.58	0.00	1.02	0.00	1.67	0.00	97.16	0.15
152	03232000	A	249	5.27	0.15	2.01	2.65	2.83	1,025	1.88	0.95	39.4	39.3	1.22	0.11	1.98	0.00	3.40	0.00	94.46	0.03
153	03232300	A	209	7.03	0.21	2.02	2.65	2.83	1,055	1.95	0.87	40.3	40.4	1.25	0.10	0.90	0.02	4.73	0.00	94.14	0.11
154	**03232500**	A	140	16.75	0.41	2.02	2.66	2.83	1,009	1.59	0.69	42.6	42.3	5.25	2.48	2.41	0.01	26.24	0.00	68.59	0.28

Table 5. Selected basin characteristics of streamflow-gaging stations—Continued

[Bold station numbers indicate peak streamflows at this station presently (2003) are considered regulated. Station names and locations are given in table 4. Abbreviations: DA, drainage area; SL, main channel slope; W, percentage of the basin area classified in the National Land Cover Dataset as the sum of water and wetlands; CF2, CF25, CF100, climate factors with 2-, 25-, and 100-year recurrence intervals, respectively; MBE, mean basin elevation; CR, circularity ratio; DD, drainage density; MAP_c, mean annual precipitation at basin centroid; MAP_m, mean annual precipitation averaged over basin area; AOS, average maximum overland slope of land surface in basin; Water, Developed, Barren, ForestUp, HerbNat, HerbCult, Wetland, percentages of basin area classified in the National Land Cover Dataset as water, developed, barren, forested uplands, herbaceous upland natural, and herbaceous planted/cultivated, respectively; nd, not determined; ft, feet; ft/mi, feet per mile; in., inches; mi^{-1}, 1/miles; mi^2, square miles]

Map ID (fig. 1)	Station number	Region	DA (mi^2)	SL (ft/mi)	W (%)	CF_2	CF_{25}	CF_{100}	MBE (ft)	CR	DD (mi^{-1})	MAP_c (in.)	MAP_m (in.)	AOS (%)	Water[a] (%)	Developed (%)	Barren (%)	ForestUp (%)	HerbNat (%)	HerbCult (%)	Wetland (%)
155	**03234000**	A	807	5.49	0.73	2.02	2.66	2.83	1,008	1.97	0.79	40.1	40.4	3.36	0.83	1.49	0.00	14.54	0.00	83.00	0.13
156	03234100	A	9.6	81.69	0.24	2.01	2.66	2.84	858	1.32	0.77	40.0	40.0	13.22	0.23	1.38	0.00	72.95	0.00	25.43	0.00
157	**03234500**	A	5,131	2.78	1.05	1.99	2.65	2.82	950	2.12	0.77	38.1	38.5	2.48	0.81	5.23	0.12	14.64	0.00	78.81	0.38
158	03235000	A	11.5	29.54	0.04	1.98	2.65	2.83	1,035	1.58	0.97	39.2	39.3	4.45	0.02	0.77	0.00	18.62	0.00	80.57	0.02
159	03235080	A	3.13	64.78	0.21	1.99	2.66	2.84	977	1.50	0.90	40.3	40.4	13.99	0.20	0.17	0.00	63.49	0.00	36.12	0.01
160	03235200	A	0.89	119.27	0.04	1.98	2.66	2.84	976	1.18	0.85	40.2	40.2	15.34	0.04	0.00	0.00	86.37	0.00	13.58	0.00
161	03235400	A	0.3	213	0.00	1.99	2.66	2.84	1,032	1.30	nd	40.4	40.4	26.42	0.00	0.00	0.00	97.73	0.00	2.27	0.00
162	03235500	A	1.35	145.16	0.00	1.99	2.66	2.84	1,021	1.33	0.88	40.4	40.4	25.27	0.00	0.00	0.00	98.41	0.00	1.59	0.00
163	03235995	A	268	13.27	0.35	1.98	2.66	2.84	927	1.70	0.70	40.3	40.2	16.53	0.28	0.28	0.08	68.09	0.00	31.20	0.07
164	03236090	A	1.28	41.23	0.20	2.02	2.67	2.85	830	1.45	1.21	40.7	40.7	12.57	0.14	0.42	0.00	66.47	0.00	32.91	0.06
165	03236100	A	3.76	29.72	0.13	2.02	2.67	2.85	788	1.41	0.86	40.6	40.6	11.00	0.07	2.23	0.00	47.43	0.00	50.21	0.07
166	03237095	A	1.22	158.55	0.12	2.03	2.67	2.85	774	1.30	1.06	40.0	40.0	17.02	0.03	2.24	0.00	82.34	0.00	15.30	0.09
167	03237210	A	1.04	261.05	0.03	2.03	2.67	2.85	824	1.15	0.83	39.9	39.9	29.25	0.00	0.76	0.00	92.81	0.00	6.39	0.03
168	03237280	C	12.2	75.37	0.01	2.07	2.68	2.85	979	1.67	0.64	41.1	41.3	29.67	0.00	0.00	0.00	99.09	0.00	0.90	0.00
169	03237300	C	0.89	36.71	0.12	2.07	2.68	2.84	1,027	1.26	0.51	43.3	43.3	4.02	0.12	1.60	0.00	24.92	0.00	73.36	0.00
170	03237500	C	387	12.53	0.41	2.06	2.67	2.84	898	1.86	0.66	42.2	42.3	7.76	0.25	0.56	0.00	39.23	0.00	59.80	0.15
171	03238030	C	1.9	45.43	0.10	2.08	2.68	2.85	900	1.26	1.09	44.4	44.4	5.71	0.10	4.03	0.76	20.20	0.00	74.91	0.00
172	03238400	C	0.88	22.32	0.00	2.07	2.68	2.84	992	1.21	0.66	42.7	42.7	0.71	0.00	0.00	0.00	4.75	0.00	95.25	0.00
173	03238500	C	218	11.21	0.35	2.07	2.68	2.84	985	1.59	0.62	43.1	43.1	2.68	0.28	1.02	0.02	17.06	0.00	81.55	0.07
174	03239000	A	48.9	8.91	0.20	2.01	2.65	2.82	1,109	1.73	0.97	38.7	38.8	1.49	0.01	1.05	0.00	3.73	0.00	95.03	0.19
175	03239500	A	28.9	12.35	1.45	2.01	2.65	2.82	1,086	1.96	0.85	38.8	38.8	1.65	1.16	2.90	0.06	6.29	0.00	89.29	0.29
176	03240000	A	129	11.59	0.60	2.01	2.65	2.82	1,064	2.04	0.96	39.0	38.9	1.97	0.31	2.22	0.01	9.20	0.00	87.97	0.29
177	03240500	A	28.9	7.69	0.21	2.01	2.65	2.82	1,087	1.62	1.08	39.1	39.1	1.29	0.07	0.09	0.00	2.36	0.00	97.34	0.14
178	03241000	A	17.1	6.34	0.06	2.01	2.65	2.82	1,085	1.55	0.91	39.3	39.2	0.83	0.01	0.03	0.00	1.69	0.00	98.22	0.05
179	03241500	A	63.2	13.57	0.19	2.01	2.65	2.82	1,070	1.61	0.94	39.2	39.2	1.56	0.08	0.91	0.03	5.05	0.00	93.82	0.12
180	03241600	A	4.21	25.42	0.05	2.02	2.65	2.82	1,023	1.55	0.78	39.5	39.5	2.39	0.00	8.97	0.00	4.87	0.00	86.10	0.04

Table 5. Selected basin characteristics of streamflow-gaging stations—Continued

[Bold station numbers indicate peak streamflows at this station presently (2003) are considered regulated. Station names and locations are given in table 4. Abbreviations: DA, drainage area; SL, main channel slope; W, percentage of the basin area classified in the National Land Cover Dataset as the sum of water and wetlands; CF2, CF25, CF100, climate factors with 2-, 25-, and 100-year recurrence intervals, respectively; MBE, mean basin elevation; CR, circularity ratio; DD, drainage density; MAP_c, mean annual precipitation at basin centroid; MAP_m, mean annual precipitation averaged over basin area; AOS, average maximum overland slope of land surface in basin; Water, Developed, Barren, ForestUp, HerbNat, HerbCult, Wetland, percentages of basin area classified in the National Land Cover Dataset as water, developed, barren, forested uplands, herbaceous upland natural, and herbaceous planted/cultivated, respectively; nd, not determined; ft, feet; ft/mi, feet per mile; in., inches; mi^{-1}, 1/miles; mi^2, square miles]

Map ID (fig. 1)	Station number	Region	DA (mi^2)	SL (ft/mi)	W (%)	CF_2	CF_{25}	CF_{100}	MBE (ft)	CR	DD (mi^{-1})	MAP_c (in.)	MAP_m (in.)	AOS (%)	Water[a] (%)	Developed (%)	Barren (%)	ForestUp (%)	HerbNat (%)	HerbCult (%)	Wetland (%)
181	03242050	A	366	8.5	0.54	2.02	2.65	2.82	997	1.99	0.87	39.2	39.1	2.52	0.26	12.39	0.21	11.14	0.00	75.72	0.28
182	03242100	A	1.01	103.57	0.04	2.03	2.66	2.83	902	1.30	0.83	40.3	40.3	3.76	0.04	0.36	0.00	14.34	0.00	85.27	0.00
183	03242150	A	71.4	11.99	0.49	2.02	2.65	2.82	1,043	1.36	0.81	39.6	39.6	1.46	0.36	1.98	0.00	5.73	0.00	91.79	0.14
184	03242200	A	77.8	8.13	0.25	2.02	2.65	2.83	1,042	1.92	0.82	41.1	40.7	1.38	0.15	0.62	0.00	5.06	0.00	94.08	0.10
185	**03242300**	A	209	8.93	0.00	2.02	2.65	2.82	1,016	1.93	0.80	40.2	40.1	1.85	1.41	0.96	0.00	8.37	0.00	89.14	0.13
186	**03242500**	A	680	7.31	0.00	2.02	2.65	2.82	987	2.00	0.83	39.6	39.6	2.57	0.90	7.16	0.13	12.12	0.00	79.47	0.22
187	03244000	C	219	11.37	0.87	2.03	2.66	2.83	1,001	1.45	0.67	41.5	41.4	2.86	0.73	2.55	0.05	16.06	0.00	80.46	0.14
188	**03245500**	C	1,203	6.72	0.70	2.03	2.66	2.83	946	1.86	0.75	40.3	40.6	2.98	0.86	7.78	0.14	16.78	0.00	74.23	0.21
189	03246500	C	237	6.99	0.47	2.04	2.66	2.83	997	1.68	0.61	42.4	42.4	1.68	0.32	1.24	0.18	13.07	0.00	85.04	0.14
190	03247100	C	3.34	21.03	0.26	2.07	2.68	2.84	897	1.55	0.56	42.8	42.8	1.41	0.16	0.98	0.00	20.34	0.00	78.42	0.10
191	**03247500**	C	476	8.25	0.52	2.07	2.68	2.84	932	1.76	0.62	42.7	42.6	2.65	1.04	2.97	0.10	24.54	0.00	71.17	0.19
192	03248000	C	1,713	6.56	1.12	2.04	2.66	2.83	938	1.87	0.70	41.1	41.2	2.97	0.91	6.76	0.15	19.62	0.00	72.36	0.21
193	03254400	C	13.6	37.95	0.00	2.12	2.69	2.85	830	1.35	1.28	43.2	43.2	14.89	0.00	2.87	0.00	58.81	0.00	38.32	0.00
194	03255500	C	73	15.93	0.36	2.07	2.67	2.83	718	1.54	0.75	41.6	41.6	4.42	0.30	49.22	0.00	16.99	0.00	33.43	0.06
195	**03258000**	C	35.6	20.46	0.26	2.10	2.68	2.84	803	1.59	0.76	41.7	41.7	5.21	0.90	62.70	0.00	24.11	0.00	12.13	0.16
196	03260700	A	36.3	28.78	0.78	1.95	2.62	2.80	1,187	1.48	0.78	36.0	36.1	2.55	0.33	10.19	0.04	13.53	0.00	75.45	0.45
197	03260800	A	59.1	10.8	0.78	1.96	2.63	2.80	1,112	2.21	0.98	36.9	36.7	2.74	0.26	0.38	0.00	12.09	0.00	86.75	0.51
198	03261500	A	541	1.89	2.10	1.96	2.62	2.80	1,069	1.78	0.84	36.1	36.2	1.67	1.64	1.80	0.13	9.78	0.00	86.19	0.46
199	03262750	A	0.83	60	0.17	2.03	2.65	2.81	889	1.44	nd	37.6	37.6	1.40	0.00	36.14	0.00	6.69	0.00	56.99	0.17
200	03263100	A	3.11	50.47	0.07	2.04	2.65	2.82	976	1.19	3.18	37.2	37.2	2.56	0.00	55.32	0.00	12.87	0.00	31.74	0.07
201	03263700	A	4.83	8.73	0.14	2.06	2.65	2.82	1,066	1.57	1.85	37.3	37.4	1.89	0.08	0.50	0.00	4.64	0.00	94.72	0.06
202	03264000	A	193	6.39	0.92	2.06	2.65	2.82	1,085	1.83	1.00	36.9	37.4	1.45	0.25	2.21	0.00	6.90	0.00	89.96	0.67
203	03265000	A	503	4.52	0.58	2.05	2.65	2.82	1,037	1.59	0.90	36.9	37.2	1.29	0.19	1.45	0.00	5.88	0.00	92.09	0.40
204	03265100	A	0.46	12.9	0.05	2.05	2.65	2.82	1,007	1.21	nd	37.1	37.1	0.44	0.00	0.05	0.00	4.54	0.00	95.35	0.05
205	03266500	A	7.31	60.02	1.02	1.95	2.62	2.80	1,372	1.26	0.72	36.2	36.2	6.49	0.71	0.14	0.00	41.89	0.00	56.96	0.31
206	03267000	A	162	18.85	0.39	1.96	2.63	2.80	1,177	1.92	0.82	36.9	37.2	3.52	0.11	0.47	0.00	16.72	0.00	82.41	0.28

Table 5. Selected basin characteristics of streamflow-gaging stations—Continued

[Bold station numbers indicate peak streamflows at this station presently (2003) are considered regulated. Station names and locations are given in table 4. Abbreviations: DA, drainage area; SL, main channel slope; W, percentage of the basin area classified in the National Land Cover Dataset as the sum of water and wetlands; CF2, CF25, CF100, climate factors with 2-, 25-, and 100-year recurrence intervals, respectively; MBE, mean basin elevation; CR, circularity ratio; DD, drainage density; MAP_c, mean annual precipitation at basin centroid; MAP_m, mean annual precipitation averaged over basin area; AOS, average maximum overland slope of land surface in basin; Water, Developed, Barren, ForestUp, HerbNat, HerbCult, Wetland, percentages of basin area classified in the National Land Cover Dataset as water, developed, barren, forested uplands, herbaceous upland natural, and herbaceous planted/cultivated, respectively; nd, not determined; ft, feet; ft/mi, feet per mile; in., inches; mi^{-1}, 1/miles; mi^2, square miles]

Map ID (fig. 1)	Station number	Region	DA (mi^2)	SL (ft/mi)	W (%)	CF_2	CF_{25}	CF_{100}	MBE (ft)	CR	DD (mi^{-1})	MAP_c (in.)	MAP_m (in.)	AOS (%)	Water[a] (%)	Developed (%)	Barren (%)	ForestUp (%)	HerbNat (%)	HerbCult (%)	Wetland (%)
207	03267900	A	310	15.56	0.53	1.96	2.63	2.80	1,141	1.81	0.78	38.0	37.7	3.02	0.26	2.40	0.00	14.76	0.00	82.30	0.27
208	03268000	A	65.3	22.14	0.56	2.01	2.65	2.82	1,156	1.57	0.73	38.2	38.1	2.83	0.13	0.66	0.00	9.90	0.00	88.88	0.43
209	03268300	A	3.33	16.75	0.36	2.00	2.65	2.82	1,207	1.53	0.70	38.2	38.2	2.10	0.10	1.07	0.00	5.53	0.00	93.05	0.26
210	03268500	A	39.2	16.84	1.36	2.01	2.65	2.82	1,143	1.58	0.67	38.4	38.4	2.40	0.76	1.69	0.00	8.83	0.00	88.12	0.60
211	**03269000**	A	139	17.57	0.61	2.01	2.65	2.82	1,125	1.74	0.80	38.3	38.3	2.59	2.52	7.90	0.00	9.70	0.00	79.40	0.48
212	**03269500**	A	490	14.44	0.58	1.96	2.63	2.81	1,126	1.87	0.80	38.2	38.0	2.87	0.92	5.49	0.00	13.29	0.00	79.97	0.34
213	**03270500**	A	2,511	3.23	1.01	2.01	2.63	2.80	1,032	1.91	0.86	37.3	37.2	1.80	0.83	4.85	0.06	9.49	0.00	84.42	0.36
214	03270800	C	22.7	16.6	0.22	2.05	2.65	2.82	993	1.73	0.90	38.4	38.5	1.90	0.13	6.67	0.00	9.47	0.00	83.64	0.09
215	03271000	C	68.7	15.97	0.33	2.05	2.65	2.82	951	1.60	0.88	38.2	38.3	2.01	0.19	18.27	0.30	9.86	0.00	71.24	0.14
216	03271800	C	197	10.5	0.26	2.06	2.66	2.82	1,044	1.52	0.88	39.3	39.0	1.52	0.10	0.87	0.00	7.21	0.00	91.66	0.16
217	03272695	C	0.33	130.91	0.11	2.07	2.66	2.82	970	1.44	0.33	40.0	40.0	6.97	0.11	0.21	0.00	52.25	0.00	47.43	0.00
218	03272700	C	69	16.11	0.23	2.07	2.66	2.82	1,060	1.80	0.77	39.8	39.8	1.86	0.10	3.23	0.00	11.19	0.00	85.35	0.13
219	03272800	C	120	15.19	0.57	2.07	2.66	2.82	1,026	1.71	0.80	40.0	39.9	2.83	0.45	2.94	0.00	15.07	0.00	81.42	0.12
220	03272900	C	0.94	134.98	0.08	2.07	2.66	2.83	825	1.27	0.46	40.2	40.2	4.72	0.04	0.15	0.00	23.45	0.00	76.32	0.04
221	03273500	C	307	14.9	0.67	2.07	2.66	2.82	985	1.49	0.77	40.1	40.2	2.90	0.53	2.38	0.00	15.25	0.00	81.69	0.14
222	**03274000**	A	3,630	3.38	0.90	2.03	2.65	2.81	998	1.93	0.84	37.3	37.9	2.10	0.76	6.51	0.08	10.79	0.00	81.56	0.30
223	03274100	C	0.29	76.05	0.25	2.08	2.66	2.83	937	1.27	0.62	40.9	40.9	5.72	0.00	2.95	0.00	14.64	0.00	82.16	0.25
224	03274880	C	0.78	48.95	0.13	2.07	2.66	2.82	1,200	1.28	0.56	38.5	38.5	1.75	0.13	0.04	0.00	0.89	0.00	98.93	0.00
225	03275500	C	121	13.63	1.05	2.06	2.66	2.82	1,117	1.91	0.76	39.5	39.3	2.95	0.42	5.92	0.00	13.52	0.00	79.51	0.63
226	03275600	C	200	9.46	1.13	2.07	2.66	2.82	1,086	1.75	0.72	39.8	39.6	3.22	0.31	6.35	0.00	14.45	0.00	78.07	0.82
227	03275800	C	0.3	100	0.00	2.08	2.66	2.82	991	1.12	nd	40.9	40.9	2.39	0.00	0.00	0.00	8.71	0.00	91.29	0.00
228	03275900	C	5.39	20.32	0.19	2.08	2.67	2.83	1,004	1.40	0.66	41.2	41.2	2.12	0.00	0.00	0.00	8.41	0.00	91.40	0.18
229	03276640	C	0.25	253	0.79	2.12	2.69	2.85	636	1.38	nd	42.5	42.5	13.91	0.79	0.00	0.00	47.52	0.00	51.68	0.00
230	03322500	A	262	5.34	7.75	2.00	2.63	2.79	930	1.75	0.67	35.8	35.8	1.25	7.26	1.95	0.12	5.22	0.00	84.96	0.49
231	03325500	A	133	7.63	1.01	2.01	2.63	2.80	1,051	1.86	0.77	37.2	37.1	1.01	0.05	1.01	0.00	4.16	0.00	93.82	0.96
232	04096515	B	48.7	4.89	6.19	1.88	2.59	2.77	1,091	1.41	0.96	36.0	35.9	2.33	2.18	1.20	0.00	17.28	0.00	75.33	4.01

Table 5. Selected basin characteristics of streamflow-gaging stations—Continued

[Bold station numbers indicate peak streamflows at this station presently (2003) are considered regulated. Station names and locations are given in table 4. Abbreviations: DA, drainage area; SL, main channel slope; W, percentage of the basin area classified in the National Land Cover Dataset as the sum of water and wetlands; CF2, CF25, CF100, climate factors with 2-, 25-, and 100-year recurrence intervals, respectively; MBE, mean basin elevation; CR, circularity ratio; DD, drainage density; MAP_c, mean annual precipitation at basin centroid; MAP_m, mean annual precipitation averaged over basin area; AOS, average maximum overland slope of land surface in basin; Water, Developed, Barren, ForestUp, HerbNat, HerbCult, Wetland, percentages of basin area classified in the National Land Cover Dataset as water, developed, barren, forested uplands, herbaceous upland natural, and herbaceous planted/cultivated, respectively; nd, not determined; ft, feet; ft/mi, feet per mile; in., inches; mi^{-1}, 1/miles; mi^2, square miles]

Map ID (fig. 1)	Station number	Region	DA (mi^2)	SL (ft/mi)	W (%)	CF_2	CF_{25}	CF_{100}	MBE (ft)	CR	DD (mi^{-1})	MAP_c (in.)	MAP_m (in.)	AOS (%)	Water[a] (%)	Developed (%)	Barren (%)	ForestUp (%)	HerbNat (%)	HerbCult (%)	Wetland (%)
233	04099060	B	1.22	12.46	1.67	1.90	2.59	2.77	1,031	1.21	1.00	35.4	35.4	2.95	0.40	0.00	0.00	11.39	1.25	85.69	1.27
234	04176000	B	463	5.74	7.78	1.81	2.58	2.78	921	2.01	1.10	33.7	33.4	3.67	2.90	2.82	0.00	20.93	0.00	68.48	4.88
235	04176900	B	3.52	15.7	4.37	1.84	2.59	2.80	651	1.49	nd	33.2	33.2	0.96	0.62	43.47	0.00	37.14	0.00	15.02	3.74
236	04177400	B	1.84	9.66	3.91	1.89	2.59	2.78	892	1.21	1.21	34.7	34.7	0.86	0.00	0.00	0.00	7.39	0.00	88.70	3.91
237	04177720	B	37.5	3.6	6.86	1.90	2.59	2.77	958	1.70	0.83	35.3	35.2	2.99	4.64	1.18	0.28	16.48	0.52	74.68	2.22
238	04178000	B	610	4.77	4.70	1.89	2.59	2.78	956	1.98	0.83	34.8	35.0	2.17	1.23	1.08	0.02	15.74	0.12	78.34	3.47
239	04179500	B	87.3	4.77	2.38	1.91	2.60	2.77	937	1.96	1.26	35.1	35.1	2.12	0.44	1.97	0.00	7.36	0.00	88.30	1.93
240	04180000	B	270	4.37	3.57	1.92	2.60	2.77	907	1.99	1.06	35.0	35.2	2.26	0.61	2.28	0.06	9.53	0.00	84.56	2.96
241	04182590	B	21.9	3.32	1.05	1.98	2.62	2.78	804	1.83	1.77	35.0	35.0	0.86	0.18	6.33	0.00	3.89	0.00	88.73	0.86
242	04183500	B	2,129	3.48	2.65	1.92	2.60	2.78	875	3.00	0.85	34.2	35.1	1.62	0.76	4.02	0.05	9.56	0.04	83.69	1.89
243	04183750	B	0.34	30.8	0.85	1.91	2.60	2.78	809	1.28	nd	34.3	34.3	0.97	0.00	0.00	0.00	5.76	0.00	93.39	0.85
244	04184500	B	206	7.12	5.16	1.87	2.59	2.78	952	2.20	0.98	34.6	34.6	2.44	1.99	1.06	0.00	17.09	0.00	76.69	3.17
245	04184750	B	2.58	20.71	0.26	1.88	2.59	2.78	818	1.44	0.70	34.4	34.4	1.32	0.00	3.23	0.00	3.05	0.00	93.45	0.26
246	04184760	B	0.56	27.56	1.30	1.88	2.59	2.78	751	1.17	0.46	34.3	34.3	1.29	0.45	0.00	0.00	4.02	0.00	94.68	0.84
247	04185000	B	410	5.44	3.70	1.88	2.59	2.78	862	1.99	0.77	34.5	34.3	1.82	1.09	1.26	0.00	11.36	0.00	83.68	2.62
248	04185150	B	0.4	45	1.90	1.89	2.59	2.78	846	1.24	nd	33.8	33.9	2.26	0.00	0.00	0.00	4.24	0.00	93.86	1.90
249	04185440	B	4.23	17.64	1.30	1.91	2.60	2.78	817	1.31	0.50	34.2	34.2	1.79	0.10	0.00	0.00	8.30	0.00	90.39	1.20
250	04185945	B	0.51	20.29	0.00	1.97	2.62	2.79	864	1.71	0.34	35.2	35.2	1.32	0.00	0.00	0.00	2.15	0.00	97.85	0.00
251	04186500	B	332	4.85	0.57	1.97	2.62	2.79	891	2.34	0.75	35.7	35.4	1.50	0.24	2.06	0.00	8.13	0.00	89.24	0.34
252	04186800	B	0.53	55.27	0.34	1.93	2.62	2.80	1,041	1.20	0.63	35.5	35.5	1.49	0.00	0.00	0.00	9.75	0.00	89.90	0.34
253	04187100	B	128	5.23	1.58	1.93	2.62	2.79	949	1.83	0.66	35.4	35.6	1.26	0.99	5.13	0.09	9.88	0.00	83.32	0.59
254	04187500	B	160	4.97	1.51	1.93	2.62	2.79	934	2.00	0.69	35.4	35.6	1.40	0.90	8.03	0.07	11.49	0.00	78.90	0.61
255	04187945	B	1.45	10.41	1.07	1.95	2.61	2.79	850	1.28	2.00	35.2	35.2	1.44	0.00	0.00	0.00	6.66	0.00	92.26	1.07
256	04188500	B	55	9.07	0.70	1.93	2.61	2.80	888	2.16	0.88	35.2	35.3	0.90	0.23	0.82	0.00	7.51	0.00	90.96	0.48
257	04189000	B	346	4.59	1.22	1.93	2.62	2.80	869	1.82	0.81	35.4	35.5	1.05	0.61	3.32	0.00	6.33	0.00	89.12	0.61
258	04189100	B	4.65	10.75	0.71	1.92	2.61	2.79	845	1.36	0.80	35.0	35.0	0.75	0.02	0.00	0.00	6.14	0.00	93.14	0.69

Table 5. Selected basin characteristics of streamflow-gaging stations—Continued

[Bold station numbers indicate peak streamflows at this station presently (2003) are considered regulated. Station names and locations are given in table 4. Abbreviations: DA, drainage area; SL, main channel slope; W, percentage of the basin area classified in the National Land Cover Dataset as the sum of water and wetlands; CF2, CF25, CF100, climate factors with 2-, 25-, and 100-year recurrence intervals, respectively; MBE, mean basin elevation; CR, circularity ratio; DD, drainage density; MAP_c, mean annual precipitation at basin centroid; MAP_m, mean annual precipitation averaged over basin area; AOS, average maximum overland slope of land surface in basin; Water, Developed, Barren, ForestUp, HerbNat, HerbCult, Wetland, percentages of basin area classified in the National Land Cover Dataset as water, developed, barren, forested uplands, herbaceous upland natural, and herbaceous planted/cultivated, respectively; nd, not determined; ft, feet; ft/mi, feet per mile; in., inches; mi^{-1}, 1/miles; mi^2, square miles]

Map ID (fig. 1)	Station number	Region	DA (mi^2)	SL (ft/mi)	W (%)	CF_2	CF_{25}	CF_{100}	MBE (ft)	CR	DD (mi^{-1})	MAP_c (in.)	MAP_m (in.)	AOS (%)	Water[a] (%)	Developed (%)	Barren (%)	ForestUp (%)	HerbNat (%)	HerbCult (%)	Wetland (%)
259	04189500	B	644	3.47	0.98	1.92	2.61	2.79	841	1.89	0.83	35.0	35.2	1.01	0.43	2.64	0.01	5.99	0.00	90.38	0.55
260	04190350	B	1.04	6.13	0.25	1.96	2.62	2.79	752	1.77	0.49	34.8	34.8	0.42	0.00	0.25	0.00	1.17	0.00	98.34	0.25
261	04190500	B	5.14	9.56	0.54	1.98	2.62	2.79	829	1.46	0.83	35.5	35.5	0.63	0.03	0.02	0.00	4.37	0.00	95.07	0.52
262	04191480	B	1.66	3.42	0.54	1.90	2.60	2.78	710	1.26	0.76	34.4	34.4	0.45	0.02	0.54	0.00	8.92	0.00	90.00	0.52
263	04191500	B	2,318	3.98	0.80	1.95	2.61	2.79	815	1.93	0.75	35.0	34.9	0.93	0.41	2.26	0.05	5.97	0.00	90.91	0.39
264	04192500	B	5,545	2.53	1.95	1.91	2.60	2.78	832	2.20	0.77	33.9	34.8	1.28	0.61	2.79	0.05	8.04	0.01	87.15	1.34
265	04192900	B	0.98	9.93	0.35	1.85	2.60	2.79	652	1.11	0.38	33.0	33.0	0.43	0.00	0.00	0.00	2.30	0.00	97.35	0.35
266	04193500	B	6,330	0.97	1.87	1.91	2.60	2.78	816	2.11	0.73	34.1	34.8	1.20	0.64	2.61	0.05	7.50	0.01	87.96	1.23
267	04195500	B	428	3.13	1.29	1.86	2.60	2.79	722	1.71	0.61	33.9	34.0	0.59	0.31	1.58	0.12	4.33	0.00	92.67	0.98
268	04196000	B	88.8	11.23	1.42	1.87	2.61	2.80	1,100	1.72	0.81	38.2	38.1	1.55	0.69	4.73	0.00	13.12	0.00	80.72	0.73
269	04196500	B	298	7.84	1.26	1.90	2.61	2.80	996	2.28	0.83	38.0	37.5	1.45	0.64	1.98	0.01	10.65	0.00	86.09	0.62
270	04196700	B	5.29	10.36	0.27	1.92	2.62	2.80	890	1.57	0.93	36.2	36.1	0.64	0.00	0.16	0.00	3.80	0.00	95.77	0.27
271	04196800	B	229	3.88	0.90	1.93	2.62	2.80	898	1.84	0.69	36.1	36.1	0.98	0.33	0.09	0.00	8.34	0.00	90.67	0.57
272	04197000	B	774	5.95	1.06	1.91	2.62	2.80	925	1.83	0.74	36.3	36.7	1.29	0.50	1.09	0.02	9.50	0.00	88.33	0.56
273	04197100	B	149	5.04	0.99	1.86	2.60	2.80	952	1.61	0.77	37.6	37.4	1.08	0.11	0.72	0.02	9.87	0.00	88.40	0.88
274	04197170	B	34.6	9.5	0.44	1.86	2.60	2.80	873	2.04	0.60	36.5	36.5	1.73	0.02	1.65	0.00	12.95	0.00	84.96	0.41
275	04197300	B	66.2	6.49	0.73	1.86	2.60	2.80	769	1.67	0.60	35.6	35.5	0.71	0.10	2.09	0.00	4.04	0.00	93.14	0.63
276	04197400	B	70.1	7.19	0.67	1.86	2.60	2.80	785	1.54	0.69	36.1	36.0	0.88	0.04	1.82	0.00	6.63	0.00	90.88	0.63
277	04197500	B	4.28	8.8	1.41	1.85	2.60	2.80	689	1.64	0.57	35.1	35.1	0.32	0.00	2.61	0.00	6.36	0.00	89.62	1.41
278	04198000	B	1,251	5.5	1.06	1.86	2.60	2.80	891	1.77	0.72	36.6	36.6	1.24	0.42	1.36	0.07	9.26	0.00	88.24	0.64
279	04198100	A	4.92	16.64	0.12	1.85	2.62	2.81	919	1.31	0.76	35.7	35.7	0.74	0.00	0.00	0.00	13.45	0.00	86.43	0.11
280	04198500	A	85.5	12.8	0.97	1.85	2.61	2.81	877	1.43	0.58	35.8	36.0	1.76	0.52	2.07	0.00	16.83	0.00	80.14	0.44
281	04199000	A	371	10.1	1.02	1.85	2.61	2.81	868	1.59	0.63	36.3	36.5	1.82	0.49	2.11	0.00	15.24	0.00	81.62	0.54
282	04199155	A	22.1	26.93	1.55	1.84	2.61	2.81	769	1.57	0.76	35.3	35.4	2.91	0.12	1.29	0.00	19.75	0.00	77.41	1.43
283	04199500	A	262	6.4	1.68	1.85	2.62	2.81	970	1.87	0.62	36.0	36.7	2.23	0.47	0.86	0.00	24.48	0.00	72.99	1.21
284	04199800	A	0.76	24.99	0.81	1.85	2.62	2.82	940	1.47	0.42	36.3	36.3	1.02	0.20	0.45	0.00	17.26	0.00	81.47	0.61

Table 5. Selected basin characteristics of streamflow-gaging stations—Continued

[Bold station numbers indicate peak streamflows at this station presently (2003) are considered regulated. Station names and locations are given in table 4. Abbreviations: DA, drainage area; SL, main channel slope; W, percentage of the basin area classified in the National Land Cover Dataset as the sum of water and wetlands; CF2, CF25, CF100, climate factors with 2-, 25-, and 100-year recurrence intervals, respectively; MBE, mean basin elevation; CR, circularity ratio; DD, drainage density; MAP_c, mean annual precipitation at basin centroid; MAP_m, mean annual precipitation averaged over basin area; AOS, average maximum overland slope of land surface in basin; Water, Developed, Barren, ForestUp, HerbNat, HerbCult, Wetland, percentages of basin area classified in the National Land Cover Dataset as water, developed, barren, forested uplands, herbaceous upland natural, and herbaceous planted/cultivated, respectively; nd, not determined; ft, feet; ft/mi, feet per mile; in., inches; mi^{-1}, 1/miles; mi^2, square miles]

Map ID (fig. 1)	Station number	Region	DA (mi^2)	SL (ft/mi)	W (%)	CF_2	CF_{25}	CF_{100}	MBE (ft)	CR	DD (mi^{-1})	MAP_c (in.)	MAP_m (in.)	AOS (%)	Water[a] (%)	Developed (%)	Barren (%)	ForestUp (%)	HerbNat (%)	HerbCult (%)	Wetland (%)
285	04200000	A	217	36.46	2.04	1.85	2.62	2.82	935	1.93	0.48	36.5	36.5	1.82	0.38	1.42	0.00	29.11	0.00	67.43	1.66
286	04200100	A	4.83	9.68	3.15	1.84	2.62	2.82	832	1.50	1.18	35.1	35.2	1.56	0.81	4.33	0.00	18.26	0.00	74.26	2.34
287	04200500	A	396	8.24	2.26	1.85	2.62	2.82	903	1.55	0.50	35.8	36.2	1.76	0.50	2.94	0.02	27.39	0.00	67.39	1.76
288	04201500	A	267	37.63	2.87	1.85	2.63	2.82	985	1.59	0.52	37.2	36.9	3.36	1.04	15.67	0.26	38.03	0.00	43.17	1.83
289	**04202000**	A	151	7.98	12.14	1.88	2.66	2.85	1,193	1.78	0.80	42.3	42.4	3.08	3.59	1.63	0.21	48.59	0.00	35.97	10.02
290	04206212	A	5.58	52.64	2.51	1.85	2.63	2.82	1,129	1.53	0.55	37.6	37.5	4.90	0.53	11.54	1.71	50.44	0.00	33.80	1.97
291	04206220	A	30.7	39.08	4.29	1.86	2.63	2.82	1,070	1.79	0.63	37.4	37.4	5.35	1.61	12.46	0.42	43.25	0.00	39.58	2.68
292	04207200	A	83.9	8.46	8.93	1.88	2.66	2.85	1,057	1.74	0.68	40.2	39.3	3.26	2.13	24.83	0.70	42.18	0.07	23.29	6.79
293	04208000	A	707	7.87	9.45	1.88	2.66	2.85	1,083	2.45	0.73	38.9	39.1	4.23	2.59	17.32	0.53	41.69	0.05	30.96	6.86
294	04209000	A	246	16.02	5.48	1.87	2.66	2.85	1,065	1.80	0.62	41.8	40.8	5.37	1.25	11.98	0.50	60.35	0.00	21.69	4.23
295	04210000	A	25.6	49.1	12.47	1.88	2.66	2.85	1,121	1.92	0.48	42.6	42.6	2.71	1.07	0.21	0.00	44.54	0.00	42.79	11.40
296	04210090	A	0.29	52.64	1.12	1.86	2.65	2.86	1,252	1.27	0.90	43.4	43.4	2.23	0.50	0.00	0.00	71.55	0.00	27.33	0.62
297	04210100	A	5.42	30.59	25.84	1.86	2.66	2.86	1,116	1.92	0.52	42.5	42.9	1.25	1.15	0.43	0.00	45.71	0.00	28.02	24.69
298	**04211000**	A	69.2	2.9	17.91	1.88	2.66	2.86	937	1.59	0.46	40.2	40.2	1.14	2.32	0.51	0.00	33.88	0.00	46.66	16.63
299	04211500	A	82	11.15	18.52	1.87	2.66	2.87	966	1.47	0.52	42.6	42.1	1.03	0.47	0.63	0.00	32.03	0.00	48.82	18.05
300	04212000	A	581	7.33	16.42	1.88	2.66	2.86	945	1.55	0.52	40.5	40.4	1.99	1.03	0.84	0.06	41.09	0.00	41.58	15.39
301	04212100	A	685	6.84	15.18	1.86	2.66	2.86	956	1.77	0.53	41.5	40.5	2.48	1.00	1.23	0.07	43.72	0.00	39.80	14.18
302	04212500	A	121	13.74	17.74	1.87	2.66	2.87	949	1.90	0.58	41.9	41.3	2.08	0.58	0.43	0.00	39.94	0.00	41.88	17.16
303	04212600	A	0.88	81.69	6.48	1.86	2.66	2.86	832	1.26	0.90	38.9	38.9	5.46	0.37	2.35	0.00	63.64	0.00	27.53	6.11
304	04213000	A	175	10.82	3.10	1.87	2.66	2.87	1,009	2.26	0.57	42.1	42.1	3.48	0.45	1.76	0.00	55.87	0.00	39.27	2.65
305	04213040	A	2.53	56.77	6.27	1.87	2.66	2.87	822	1.73	0.61	40.5	40.5	3.31	1.27	3.59	0.00	58.41	0.00	31.74	4.99

[a]Values shown have not been adjusted for any post-regulation increase in the percentage of open water.

APPENDIXES

A. Statistical Techniques for Determining Confidence Intervals and Testing for Extrapolation
B. Basin Characteristics Tested as Potential Regressor Variables

APPENDIX A—STATISTICAL TECHNIQUES FOR DETERMINING CONFIDENCE INTERVALS AND TESTING FOR EXTRAPOLATION

The linear model relating basin characteristics to *t*-year peak flows can be written in matrix form as:

$$\boldsymbol{Y} = \boldsymbol{X}\boldsymbol{B}$$

where

- $\boldsymbol{Y}$ is a column vector of logarithms of the n observed peak discharges,
- $\boldsymbol{X}$ is a (*n* by *p)* matrix of consisting of *p*-1 basin characteristics augmented by a column of ones in the first column, and
- **B** is a column vector of *p* regression coefficients.

For example, the matrix form of the simple equation for the 2-year peak discharge (Q_2) is

$$\begin{bmatrix} \log(Q_{2,1}) \\ \log(Q_{2,2}) \\ "" \\ \log(Q_{2,305}) \end{bmatrix} = \begin{bmatrix} 1 & \log(DA_1) & R1_1 & R2_1 \\ 1 & \log(DA_2) & R1_2 & R2_2 \\ "" & "" & "" & "" \\ 1 & \log(DA_{305}) & R1_{305} & R2_{305} \end{bmatrix} \begin{bmatrix} 1.84 \\ 0.72 \\ 0.44 \\ 0.19 \end{bmatrix}$$

where

- $Q_{2,i}$ is the observed 2-year peak discharge for the *i*th gage site;
- DA_i is the drainage area for the *i*th site;
- $R1_i$ equals 1 if site is in region C, otherwise 0; and
- $R2_i$ equals 1 if site is in region A, otherwise 0.

The mean square sampling error for an ungaged site ($MSE_{s,0}$) with basin characteristics given by the row vector

$$x_0 = \begin{bmatrix} 1 & \log(DA_0) & R1_0 & R2_0 \end{bmatrix} ,$$

is calculated as

$$MSE_{s,0} = x_0 \{X^T \Lambda^{-1} X\}^{-1} x_0^T , \qquad \text{(1A)}$$

where Λ is the (*n* by *n*) covariance matrix associated with $\boldsymbol{Y}$. The off-diagonal elements of Λ are the sample covariance of the estimated *t*-year peaks at sites *i* and *j*. The diagonal elements of Λ are the sums of model error variance, γ^2, and the time-sampling error for each site. Appendix tables 1A and 2A list the (*p* by *p*) matrices $\{X^T \Lambda^{-1} X\}^{-1}$ for the simple- and full-model equations, respectively, and appendix table 3A lists the model error variances for both models. The mean square error of a prediction (MSE_p), in base-10 logarithmic units, at a specific ungaged site can be estimated as

$$MSE_{p,0} = (\gamma^2 + MSE_{s,0}) . \qquad \text{(2A)}$$

With $MSE_{p,0}$ known, the standard error of prediction, in percent, can be calculated as

$$SE_{\text{prediction}} = 100 \left\{ e^{5.302(MSE_{p,0})} - 1 \right\}^{\frac{1}{2}} . \qquad \text{(3A)}$$

Confidence limits for a predicted peak discharge, $\hat{y}$, can be calculated as

$$\hat{y}_u = C\hat{y} \text{ and } \hat{y}_u = \frac{1}{C}\hat{y} , \qquad \text{(4A)}$$

where $\hat{y}_u$ and $\hat{y}_l$ are the upper and lower confidence limits, respectively, for the prediction, and

$$C = 10^{\left[t_{\frac{\alpha}{2}, n-p} (MSE_{p,0})^{\frac{1}{2}} \right]} , \qquad \text{(5A)}$$

where

- $t_{\frac{\alpha}{2}, n-p}$ is Student's *t* with a specified alpha (α) level and *n-p* degrees of freedom.

The applicability of the regression equations presented in this report is unknown when the basin-characteristic values associated with an ungaged site are outside a space defined by the basin characteristics of the calibration data set. This space, called a regressor variable hull (RVH), contains as many dimensions as there are regressor (explanatory) variables in the regression equation (Montgomery and Peck, 1982). When points defined by the basin characteristics of the ungaged site lie within or on the boundary of the RVH, then the estimation generally can be determined by interpolation. If the point lies outside of the RVH, then estimation will require extrapolation, which may lead to poor performance of the regression equation.

Table 1A. Matrix $\{X^T \Lambda^{-1} X\}^{-1}$ for the simple equations in table 1

[Numbers are in scientific notation. Order of variables in matrix is constant, *DA*, *R1*, *R2*]

2-year recurrence interval			
1.16710E-03	-2.31670E-04	-5.30300E-04	-5.01710E-04
-2.31670E-04	1.03160E-04	1.74400E-05	1.30820E-05
-5.30300E-04	1.74400E-05	1.71270E-03	5.12540E-04
-5.01710E-04	1.30820E-05	5.12540E-04	6.56310E-04
5-year recurrence interval			
1.17960E-03	-2.34730E-04	-5.33260E-04	-4.88860E-04
-2.34730E-04	1.04780E-04	1.63510E-05	9.40110E-06
-5.33260E-04	1.63510E-05	1.78330E-03	5.24120E-04
-4.88860E-04	9.40110E-06	5.24120E-04	6.71170E-04
10-year recurrence interval			
1.28500E-03	-2.55830E-04	-5.82840E-04	-5.24160E-04
-2.55830E-04	1.13710E-04	1.79100E-05	9.04120E-06
-5.82840E-04	1.79100E-05	1.97620E-03	5.74110E-04
-5.24160E-04	9.04120E-06	5.74110E-04	7.32470E-04
25-year recurrence interval			
1.46910E-03	-2.92510E-04	-6.69420E-04	-5.91950E-04
-2.92510E-04	1.29290E-04	2.08500E-05	9.67320E-06
-6.69420E-04	2.08500E-05	2.29640E-03	6.59040E-04
-5.91950E-04	9.67320E-06	6.59040E-04	8.37500E-04
50-year recurrence interval			
1.62750E-03	-3.24120E-04	-7.44240E-04	-6.52590E-04
-3.24120E-04	1.42860E-04	2.34350E-05	1.05400E-05
-7.44240E-04	2.34350E-05	2.56860E-03	7.31950E-04
-6.52590E-04	1.05400E-05	7.31950E-04	9.28360E-04
100-year recurrence interval			
1.79710E-03	-3.58020E-04	-8.24900E-04	-7.18950E-04
-3.58020E-04	1.57550E-04	2.62470E-05	1.15790E-05
-8.24900E-04	2.62470E-05	2.86010E-03	8.10390E-04
-7.18950E-04	1.15790E-05	8.10390E-04	1.02670E-03
500-year recurrence interval			
2.22320E-03	-4.43540E-04	-1.03090E-03	-8.90890E-04
-4.43540E-04	1.95290E-04	3.35310E-05	1.43470E-05
-1.03090E-03	3.35310E-05	3.59990E-03	1.01060E-03
-8.90890E-04	1.43470E-05	1.01060E-03	1.28010E-03

Table 2A. Matrix $\{X^T \Lambda^{-1} X\}^{-1}$ for the full-model equations in table 2

[Numbers are in scientific notation. Order of variables in matrix is the constant, *DA*, *R1*, *R2*,*SL*, *W*]

2-year recurrence interval					
4.54790E-03	-8.99300E-04	3.11990E-05	3.80580E-05	-2.05630E-03	-7.11670E-04
-8.99300E-04	2.44190E-04	-1.17110E-04	-9.49400E-05	4.38970E-04	5.18860E-06
3.11990E-05	-1.17110E-04	1.62520E-03	5.36590E-04	-3.56110E-04	1.78840E-04
3.80580E-05	-9.49400E-05	5.36590E-04	6.36160E-04	-3.02170E-04	1.24250E-05
-2.05630E-03	4.38970E-04	-3.56110E-04	-3.02170E-04	1.27400E-03	1.62770E-04
-7.11670E-04	5.18860E-06	1.78840E-04	1.24250E-05	1.62770E-04	1.20510E-03
5-year recurrence interval					
4.20270E-03	-8.23370E-04	3.66640E-05	3.78010E-05	-1.89990E-03	-6.63320E-04
-8.23370E-04	2.23900E-04	-1.10060E-04	-8.72510E-05	4.02240E-04	1.41760E-06
3.66640E-05	-1.10060E-04	1.58090E-03	5.07680E-04	-3.40240E-04	1.57760E-04
3.78010E-05	-8.72510E-05	5.07680E-04	6.00110E-04	-2.76250E-04	3.47630E-06
-1.89990E-03	4.02240E-04	-3.40240E-04	-2.76250E-04	1.19410E-03	1.47170E-04
-6.63320E-04	1.41760E-06	1.57760E-04	3.47630E-06	1.47170E-04	1.15070E-03
10-year recurrence interval					
4.41680E-03	-8.58800E-04	3.01230E-05	2.85370E-05	-1.99220E-03	-6.99520E-04
-8.58800E-04	2.33230E-04	-1.14260E-04	-8.87350E-05	4.18580E-04	-7.30140E-07
3.01230E-05	-1.14260E-04	1.71770E-03	5.40890E-04	-3.58700E-04	1.62610E-04
2.85370E-05	-8.87350E-05	5.40890E-04	6.37140E-04	-2.83340E-04	1.00360E-06
-1.99220E-03	4.18580E-04	-3.58700E-04	-2.83340E-04	1.25830E-03	1.52710E-04
-6.99520E-04	-7.30140E-07	1.62610E-04	1.00360E-06	1.52710E-04	1.22810E-03
25-year recurrence interval					
4.93700E-03	-9.53190E-04	1.99710E-05	1.57460E-05	-2.22020E-03	-7.84350E-04
-9.53190E-04	2.58620E-04	-1.25650E-04	-9.54670E-05	4.63140E-04	-3.51180E-06
1.99710E-05	-1.25650E-04	1.98380E-03	6.12930E-04	-4.00270E-04	1.79840E-04
1.57460E-05	-9.54670E-05	6.12930E-04	7.19800E-04	-3.08460E-04	-2.15280E-07
-2.22020E-03	4.63140E-04	-4.00270E-04	-3.08460E-04	1.40680E-03	1.68710E-04
-7.84350E-04	-3.51180E-06	1.79840E-04	-2.15280E-07	1.68710E-04	1.39280E-03

Table 2A. Matrix $\{X^T\Lambda^{-1}X\}^{-1}$ for the full-model equations in table 2—Continued

[Numbers are in scientific notation. Order of variables in matrix is the constant, *DA, R1, R2,SL, W*]

50-year recurrence interval					
5.43670E-03	-1.04610E-03	1.31300E-05	7.16140E-06	-2.44160E-03	-8.65090E-04
-1.04610E-03	2.83820E-04	-1.37180E-04	-1.03000E-04	5.07490E-04	-5.71520E-06
1.31300E-05	-1.37180E-04	2.22420E-03	6.80410E-04	-4.40410E-04	1.97670E-04
7.16140E-06	-1.03000E-04	6.80410E-04	7.98080E-04	-3.35190E-04	-5.69570E-07
-2.44160E-03	5.07490E-04	-4.40410E-04	-3.35190E-04	1.54920E-03	1.84710E-04
-8.65090E-04	-5.71520E-06	1.97670E-04	-5.69570E-07	1.84710E-04	1.54680E-03
100-year recurrence interval					
6.00170E-03	-1.15230E-03	7.50220E-06	-1.58710E-07	-2.69420E-03	-9.55990E-04
-1.15230E-03	3.12760E-04	-1.50650E-04	-1.12160E-04	5.58630E-04	-8.06540E-06
7.50220E-06	-1.50650E-04	2.48950E-03	7.56080E-04	-4.86400E-04	2.18440E-04
-1.58710E-07	-1.12160E-04	7.56080E-04	8.86420E-04	-3.66960E-04	-7.78340E-07
-2.69420E-03	5.58630E-04	-4.86400E-04	-3.66960E-04	1.71120E-03	2.03110E-04
-9.55990E-04	-8.06540E-06	2.18440E-04	-7.78340E-07	2.03110E-04	1.71980E-03
500-year recurrence interval					
7.51510E-03	-1.44000E-03	-1.60590E-07	-1.18110E-05	-3.38080E-03	-1.19830E-03
-1.44000E-03	3.91660E-04	-1.88220E-04	-1.38730E-04	6.99030E-04	-1.42530E-05
-1.60590E-07	-1.88220E-04	3.18480E-03	9.57620E-04	-6.12600E-04	2.75900E-04
-1.18110E-05	-1.38730E-04	9.57620E-04	1.12350E-03	-4.56960E-04	-1.29600E-06
-3.38080E-03	6.99030E-04	-6.12600E-04	-4.56960E-04	2.15090E-03	2.53290E-04
-1.19830E-03	-1.42530E-05	2.75900E-04	-1.29600E-06	2.53290E-04	2.18280E-03

Table 3A. Model error variances and maximum mean-square sampling errors for regression models

Recurrence interval (years)	Model error variance (γ^2) for indicated model		Maximum mean-square sampling error (MSE_s) for indicated model	
	Simple	Full	Simple	Full
2	0.02684	0.02256	0.00211	0.00241
5	.02590	.01944	.00222	.00235
10	.02664	.01925	.00242	.00253
25	.02854	.02019	.00280	.00288
50	.03047	.02148	.00312	.00319
100	.03272	.02314	.00346	.00354
500	.03906	.02816	.00433	.00445

Tests for extrapolation can be performed by comparing the basin-characteristic values of the ungaged site to the ranges of values observed in the calibration data set for the appropriate region (table 3, in the body of this report). In addition, one can test for extrapolation by computing the mean-square sampling error for the ungaged site ($MSE_{s,0}$), as described earlier in the appendix, and comparing it to the maximum mean-square sampling error (appendix table 3A) of the calibration data set for the appropriate model and recurrence interval. If one or more basin characteristic values lies outside of the range of values of the calibration data set, or if the mean-square sampling error for the ungaged site is larger than the maximum mean square sampling error of the calibration data set, then the estimate is an extrapolation.

REFERENCES

Montgomery, D.C., and Peck, E.A., 1982, Introduction to linear regression analysis: New York, Wiley, 504 p.

APPENDIX B—BASIN CHARACTERISTICS TESTED AS POTENTIAL REGRESSOR VARIABLES

DA, drainage area (square miles)—the area, measured from a USGS 7.5 minute topographic map, in a horizontal plane, that is contained within the topographic divide for a specified location on a stream. The use of GIS data layers to determine drainage area is not precluded in areas where data quality and drainage-area determination methods yield accurate results that are comparable to map-based determinations.

SL, main channel slope (feet per mile)—the difference in elevation, in ft, between values assigned to digital elevation model (DEM) grid cells collocated with the upstream and downstream end points of the main channel, as identified from the National Hydrography data set (NHD) (U.S. Geological Survey, 1999a), divided by the centerline length of the main channel, in miles. The main channel is identified in the NHD by an attribute, called level, that represents the main path of water flow through a drainage network. Stream reaches contained within the basin boundary that are assigned the lowest value of the level attribute compose the main channel. Because of limited resolution of the 1:100,000 scale NHD stream coverage, it was not possible to determine the main-channel slope for some small basins (usually with drainage areas less than about 1 mi^2) by application of the technique described above. In those instances, main-channel slope was determined instead by computing the difference in elevation at points 10 and 85 percent of the distance along the main channel from the point of interest to the basin divide (as shown on USGS 7.5 minute topographic maps), divided by the channel distance between the two points. A regression analysis of main-channel slopes determined for basins with drainage areas less than or equal to 5 mi^2 by means of the map-based 10-85 method and by means of the GIS technique (where a GIS determination was possible) indicated that the slopes were comparable. A no-intercept regression model relating the 10-85 main-channel slope to the GIS-based main-channel slope yielded the following equation with a redefined adjusted R^2 value of 0.95 and a standard error of estimate of 20.1 ft/mi:

$$SL_g = 1.002 SL_{10-85} \qquad (1B)$$

where:

SL_g is the GIS-based slope (ft/mi), and
$SL_{10\text{-}85}$ is the map-based 10-85 slope (ft/mi).

Based on equation 1B, it appears likely that main-channel slopes determined by means of the map-based 10-85 method can be used with minimal error as a substitute for the GIS-based slopes for basins with drainage areas less than or equal to 5 mi^2. It is recommended that this substitution be done only in those cases where no NHD stream centerlines are contained in the basin.

W, percentage of the basin classified as water and wetlands[1] (percent)—determined by (1) summing the areas of the 1992 National Land Cover data set (NLCD) grid cells (U.S. Geological Survey, 2000) contained within the basin boundary that are classified as open water, woody wetlands, or emergent herbaceous wetlands (land-cover class codes 11, 91, and 92, respectively), (2) dividing by the area of the basin, and then (3) multiplying by 100.

CF_2, CF_{25}, and CF_{100}, Climate factors with recurrence intervals of 2, 25, and 100 years, respectively (dimensionless)— Introduced by Lichty and Liscum (1978) and further refined by Lichty and Karlinger (1990). Integrates long-term rainfall and pan evaporation information, and, according to Lichty and Karlinger (1990), delineates regional trends in small-basin flood frequency. Computed for each basin by means of a computer algorithm that interpolates the climate factor at the latitude and longitude of the basin centroid from gridded representations of climate factor isoline maps presented by Lichty and Karlinger (1990).

MBE, mean basin elevation (feet)—determined as the average of elevations associated with digital elevation model (DEM) grid cells in the National Elevation data set (U.S. Geological Survey, 1999b) that are contained within the basin boundary. The vertical datum for *MBE* is the North American Vertical Datum of 1988 (NAVD 88).

CR, circularity ratio (dimensionless)—a measure of basin shape (circular versus elongated); determined as

$$CR = P/(4\pi DA)^{\frac{1}{2}}, \qquad (2B)$$

where
P is the perimeter of the basin, in miles, and
DA is the drainage area. in square miles.

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[1]The 1992 NLCD data reflect land cover characteristics during the early 1990's. Some of the gaging stations whose data were used in this study are located on streams that are presently regulated. In many cases, the regulation resulted from completion of one or more in-channel reservoirs. To better reflect land cover conditions during the unregulated period associated with the data used in this analysis, water areas used to compute *W* were reduced by the surface areas of in-channel reservoirs whose construction resulted in the regulated designation for streamflow at a gaging station, as well as all upstream in-channel reservoirs built thereafter.

DD, drainage density (1/miles)— ratio of the total length of streams within the basin boundary, as determined from the National Hydrography data set (U.S. Geological Survey, 1999a), to the drainage area (*DA*).

MAP_c, mean annual precipitation at the basin centroid (inches)—the value assigned to the mean annual precipitation grid cell from the Parameter-elevation Regressions on Independent Slopes Model (PRISM) data set (Daly and others, 1994) that is collocated with the basin centroid.

MAP_m, mean annual precipitation averaged over the basin area (inches)—determined by averaging values assigned to the mean annual precipitation grid cells from the PRISM data set (Daly and others, 1994) that are located within the basin boundary.

AOS, average maximum overland slope of the land surface (percent)—determined as the average value associated with grid cells contained within the basin boundary that are assigned the maximum rate of change in elevation, in percent, relative to adjacent grid cells. The maximum rate of change assignment was made by means of the SLOPE command in ArcGrid using the PERCENTRISE option to select output in percent.

Water, percentage of the basin classified as water (percent)—determined by (1) summing the areas of the 1992 NLCD grid cells (U.S. Geological Survey, 2000) contained within the basin boundary that are classified as open water (land-cover class code 11), (2) dividing by the area of the basin, and then (3) multiplying by 100.

Developed, percentage of the basin classified as developed (percent)—determined by (1) summing the areas of the 1992 NLCD grid cells (U.S. Geological Survey, 2000) contained within the basin boundary that are classified as low- or high-intensity residential, or commercial/industrial/transportation (land-cover class codes 21, 22, and 23, respectively), (2) dividing by the area of the basin, and then (3) multiplying by 100.

Barren, percentage of the basin classified as barren (percent)—determined by (1) summing the areas of the 1992 NLCD grid cells (U.S. Geological Survey, 2000) contained within the basin boundary that are classified as bare rock/sand/clay, quarries/strip mines/gravel pits, or transitional (land cover class codes 31, 32, and 33, respectively), (2) dividing by the area of the basin, and then (3) multiplying by 100.

ForestUp, percentage of the basin classified as forested upland (percent)—determined by (1) summing the areas of the 1992 NLCD grid cells (U.S. Geological Survey, 2000) contained within the basin boundary that are classified as deciduous forest, evergreen forest, or mixed forest (land cover class codes 41, 42, and 43, respectively), (2) dividing by the area of the basin, and then (3) multiplying by 100.

HerbNat, percentage of the basin classified as herbaceous upland natural/semi-natural vegetation (percent)—determined by (1) summing the areas of the 1992 NLCD grid cells (U.S. Geological Survey, 2000) contained within the basin boundary that are classified as grasslands/herbaceous (land-cover class code 71), (2) dividing by the area of the basin, and then (3) multiplying by 100.

HerbCult, percentage of the basin classified as herbaceous planted/cultivated (percent)—determined by (1) summing the areas of the 1992 NLCD grid cells (U.S. Geological Survey, 2000) contained within the basin boundary that are classified as pasture/hay, row crops, small grains, fallow, or urban/recreational grasses (land cover class codes 81-85, respectively), (2) dividing by the area of the basin, and then (3) multiplying by 100.

Wetland, percentage of the basin classified as wetland (percent)—determined by (1) summing the areas of the 1992 NLCD grid cells (U.S. Geological Survey, 2000) contained within the basin boundary that are classified as woody wetlands or emergent herbaceous wetlands (land-cover class codes 91and 92, respectively), (2) dividing by the area of the basin, and then (3) multiplying by 100.

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