In cooperation with the Brazos River Authority

Peak-Discharge Frequency and Potential Extreme Peak Discharge for Natural Streams in the Brazos River Basin, Texas

Water-Resources Investigations Report 98–4178

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

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By Timothy H. Raines

U.S. GEOLOGICAL SURVEY
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Peak-Discharge Frequency and Potential Extreme Peak Discharge for Natural Streams in the Brazos River Basin, Texas

By Timothy H. Raines

Abstract

The 2-, 5-, 10-, 25-, 50-, and 100-year peak discharges were estimated for 186 streamflow-gaging stations with at least 8 years of data for natural streams in and near the Brazos River Basin, Texas. Multiple regression equations were developed to estimate peak-discharge frequency for the 2-, 5-, 10-, 25-, 50-, and 100-year recurrence intervals for each of three hydrologic regions that compose the Brazos River Basin. The equations for each region are a function of significant basin characteristics (explanatory variables). The significant explanatory variables among six that were tested are the contributing drainage area and stream slope for regions 1 and 2 and the contributing drainage area for region 3. For the three sets of equations, the coefficient of determination ranges from 0.59 to 0.93, and the standard error ranges from 0.184 to 0.391 log units. A larger coefficient of determination and a lower standard error generally are associated with the equations for hydrologic regions 2 and 3. Statistics from the regression analysis allow computation of the prediction interval associated with a given significance level for a peak-discharge frequency estimate. The regression equations can be used to estimate peak discharges for sites at, near, or away from sites with streamflow-gaging stations.

The potential extreme peak-discharge curves as related to contributing drainage area were estimated for each of the three hydrologic regions from measured extreme peaks of record at 186 sites with streamflow-gaging stations and from measured extreme peaks at 37 sites without streamflow-gaging stations in and near the Brazos River Basin. The potential extreme peak-discharge curves generally are similar for hydrologic regions 1 and 2, and the curve for region 3 consistently is below the curves for regions 1 and 2, which indicates smaller peak discharges.

INTRODUCTION

Several large and destructive floods have occurred in the Brazos River Basin, Texas, that resulted in loss of lives and substantial damage. The occurrence and magnitude of floods are difficult to predict. Accurate estimates of the frequency (recurrence interval) and magnitude (peak discharge) of floods are useful for water-resource planning and management. Statewide peak-discharge frequency studies have been done by Schroeder (1967) and recently by Asquith and Slade (1997), but no study has been done specifically for the Brazos River Basin. A regional study that is limited to the Brazos River Basin should produce more accurate estimates of peak-discharge frequency for natural streams than the statewide studies. A natural stream is defined as a stream for which the annual peak discharges are not affected by reservoirs, regulation, diversions, urbanization, or any other human-related activity. If a stream was determined to have more than 10 percent of its contributing drainage area affected by regulation or urbanization, the stream was judged to be not in its natural state. Similar regional studies have been done for natural streams in Hays County (Slade and others, 1995), in the vicinity of the Highland Lakes, Central Texas (Asquith and others, 1996), and for tributaries to the Colorado River below Austin (Asquith, 1998).

In 1997, the U.S. Geological Survey (USGS), in cooperation with the Brazos River Authority (BRA), began a study to estimate peak-discharge frequency and potential extreme peak discharge for natural streams in the Brazos River Basin. The objectives of the study were to (1) update the 2-, 5-, 10-, 25-, 50-, and 100-year peak discharges from Asquith and Slade (1997) for the active streamflow-gaging stations, (2) determine geographic regions with similar flood characteristics (hydrologic regions), (3) develop regression equations for each hydrologic region to estimate peak-discharge frequency, and (4) determine upper-limit or envelope curves of peak discharge as a function of contributing drainage area for each hydrologic region to estimate the potential extreme peak discharge.

Purpose and Scope

This report presents the estimated peak-discharge frequency and potential extreme peak discharges for natural streams in hydrologic regions of the Brazos River Basin, Texas. The analysis was limited to 186 active and discontinued streamflow-gaging stations with at least 8 years of peak-discharge data through water year 1996 and 37 sites without streamflow-gaging stations with measured extreme peak discharges in natural streams in and near the Brazos River Basin. Near in this context is defined as one county proximate to the Brazos River Basin boundary. The log-Pearson Type III probability distribution was used to estimate the 2-, 5-, 10-, 25-, 50-, and 100-year peak discharges. Stepwise weighted least-squares regression was used to develop equations to estimate peak-discharge frequency as a function of selected basin characteristics for hydrologic regions of the basin. The potential extreme peak discharge for each region was defined by an envelope curve that relates the measured extreme peak discharge to the contributing drainage area.

Physical Setting

The Brazos River Basin encompasses about 45,000 square miles (mi^2), of which about 35,000 mi^2 is contributing, and extends from northwestern Texas to the Gulf of Mexico (fig. 1). Major tributaries of the Brazos River include the Salt Fork Brazos River, Clear Fork Brazos River, Paluxy River, Nolan River, North Bosque River, Leon River, Lampasas River, San Gabriel River, Little River, and Navasota River. Thirty-nine reservoirs with normal storage capacities exceeding 5,000 acre-feet are located along the Brazos River or its tributaries. Mean annual precipitation, which generally increases from west to east, ranges from about 16 inches (in.) in the northwestern part of the basin to about 50 in. near the mouth at the Gulf of Mexico (National Oceanic and Atmospheric Administration, 1996). The periods of peak discharge generally occur in late spring (May and June) or early fall (September and October).

Since the first data in the Brazos River Basin were collected in 1899, the USGS has operated about 186 continuous and partial-record streamflow-gaging stations (stations) for natural streams in and near the basin (pl. 1; table 1 at end of report). One-hundred and twelve of the 186 stations are within the basin. Forty of the 186 stations are either currently (1996) active or discontinued since 1993. The remaining 146 stations either were discontinued prior to 1994 or the streamflow at the station is regulated by reservoirs or affected by urbanization. The systematic record lengths range from 8 to 68 years of annual peak-discharge data (period of gaged records), although some stations have historical record lengths of more than 130 years (period including an estimated peak generally from a land owner account prior to gaged records and the period of gaged records).

Peak-Discharge Frequency for Streamflow-Gaging Stations

The objective of frequency analysis or extreme-value analysis of streamflow data is to develop relations between the magnitude of extreme events and their frequency of occurrence through the use of a probability distribution. The annual peak-discharge data for each station are assumed to be independent and identically distributed. The frequency usually is expressed as a recurrence interval. A peak discharge having a 2-year recurrence interval is one that has a 50-percent exceedance probability or a 1-in-2 chance of being equaled or exceeded in any year.

Commonly in frequency analysis, a probability distribution is fit to the sample moment statistics (mean, variance, skewness, and kurtosis). The log-Pearson Type III distribution is recommended for flood-frequency analysis by the Interagency Advisory Committee on Water Data (IAWCD) (1982). The log-Pearson Type III distribution is a three-parameter probability distribution that uses a logarithmic transformation of the measured annual flood peaks. The sample mean, standard deviation, and coefficient of skewness are used to estimate the parameters of the distribution. Logarithmic transformations often are effective for reducing the skewness for data that vary by orders of magnitude but give greatly increased weight to small-magnitude observations. A more complete description of peak-discharge frequency analysis using the log-Pearson Type III distribution can be found in Interagency Advisory Committee on Water Data (1982).

The 2-, 5-, 10-, 25-, 50-, and 100-year peak discharges for the 146 stations discontinued prior to

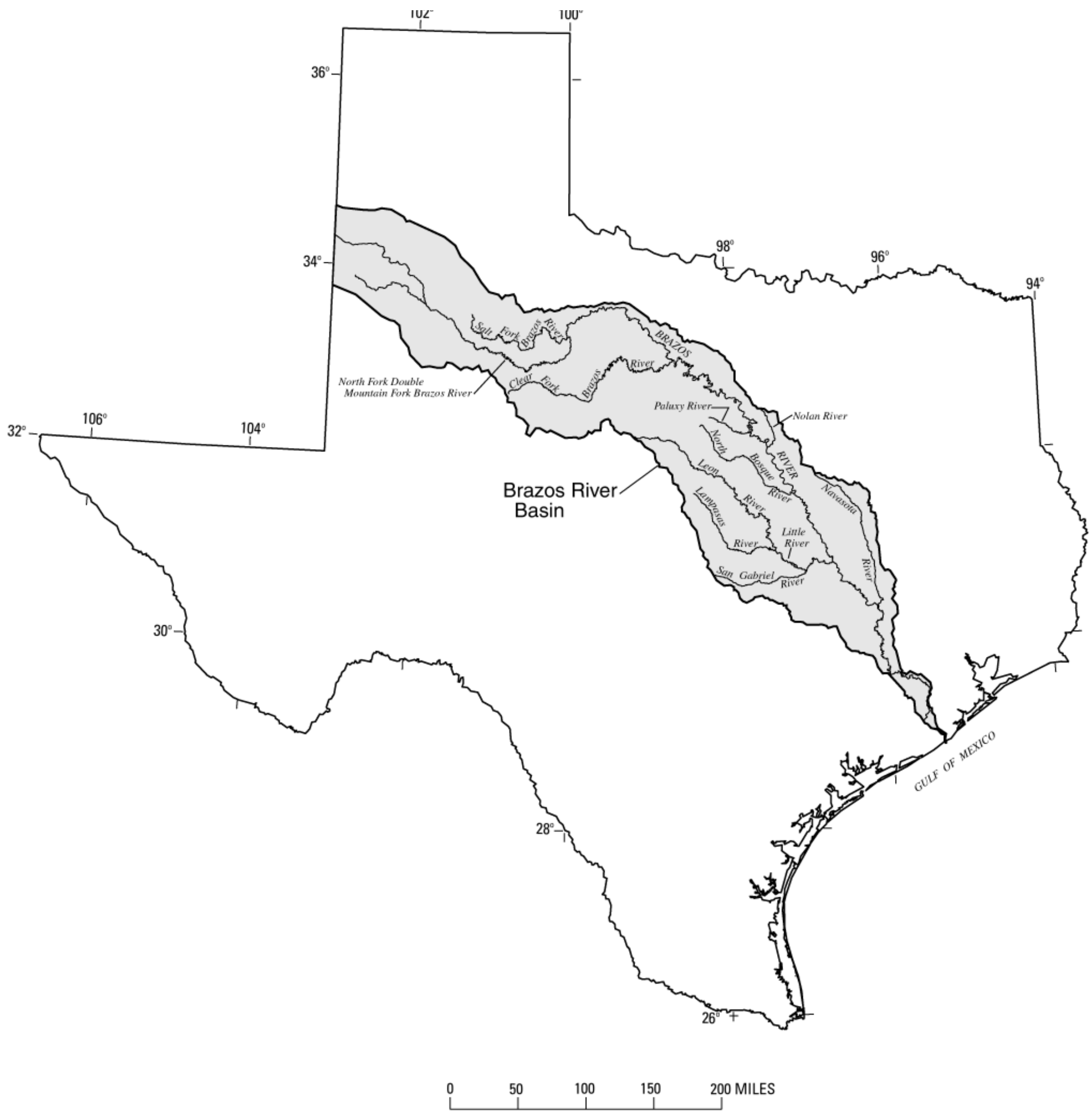


Figure 1. Location of the Brazos River Basin, Texas.

water year 1994 or currently having regulated streamflow (table 1) are from Asquith and Slade (1997). The peak-discharge frequency for the remaining 40 stations (table 1) were updated with annual peaks from water years 1994–96 using the same approach as Asquith and Slade (1997), which follows the guidelines established by the Interagency Advisory Committee on Water Data (1982). Selected frequency characteristics including systematic and historical record lengths, high-outlier thresholds, station and weighted skews, and low-outlier thresholds for the 186 stations in and near the Brazos River Basin are listed in table 1. More information on the use of skew coefficients in streamflow frequency analysis for Texas can be found in Judd and others (1996), and more information on the use of low-outlier thresholds in streamflow frequency analysis for Texas can be found in Asquith and others (1995).

Basin Characteristics for Streamflow-Gaging Stations

Six basin characteristics (table 1) were determined for each station on the basis of previous studies by Schroeder and Massey (1977), Slade and others (1995), Asquith and others (1996), and Asquith and Slade (1997). The six basin characteristics are (1) 2-year, 24-hour precipitation depth, (2) mean annual precipitation, (3) contributing drainage area, (4) stream length, (5) basin shape, and (6) average stream slope. The 2-year, 24-hour precipitation depth (Hershfield, 1962) is the amount of rainfall in a 24-hour duration with a 2-year recurrence interval. The mean annual precipitation is the 30-year average for the period 1951–80 (U.S. Geological Survey, 1986). The contributing drainage area is the area of the stream subbasin that contributes runoff to the stream. The stream length is the length in miles of the longest mapped channel at the 1:100,000 scale from the station to the headwaters. The basin shape is defined as the square of the stream length divided by the contributing drainage area and represents the ratio of the mean basin length to width. The average stream slope is the difference between the stream elevation at the station and the elevation at the headwaters divided by the stream length.

PEAK-DISCHARGE FREQUENCY

In order to develop a linear regression equation to estimate peak-discharge frequency as a function of basin characteristics, a linear relation between the dependent and explanatory variables is needed. Commonly the data for the basin are divided into hydrologically similar regions to produce less variability in the relations between the dependent and explanatory variables. Frequently, the hydrologic regions are determined on the basis of similar climatic characteristics.

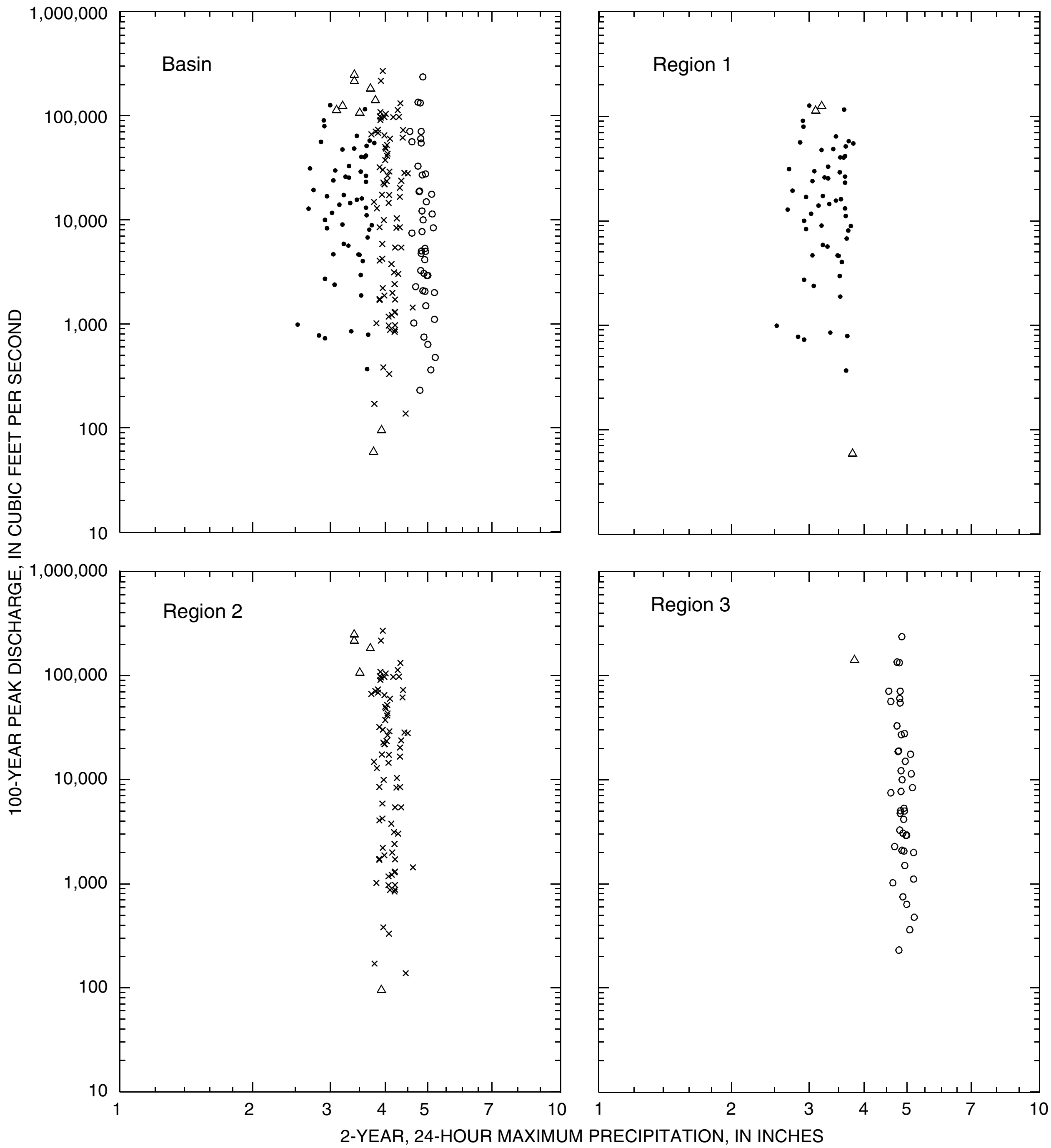
Hydrologic Regions

The Brazos River Basin was divided into three hydrologic regions (pl. 1) on the basis of an analysis of the six selected basin characteristics and the peak-discharge frequency for the 186 streamflow-gaging stations. The three regions are similar to the regions defined by Asquith and Slade (1997). Other regional divisions were examined, including the basin as a single region, three regions similar to the climatic regions of Texas (National Oceanic and Atmospheric Administration, 1996), and four regions (region 1 subdivided into two regions). The three regions shown on plate 1 were selected to provide the best estimates of peak-discharge frequency on the basis of minimizing the standard errors of the weighted least-squares regression analysis discussed in the next section.

The relations of the 100-year peak discharge to the six selected basin characteristics are shown in figures 2–7. Nine stations were excluded from the regression analysis for reasons that will be discussed in the next section. There is not a linear relation between the 2-year, 24-hour precipitation and the 100-year peak discharge (fig. 2) and between the mean annual precipitation and the 100-year peak discharge (fig. 3); but for both relations, there is less variability within each of the three hydrologic regions than within the entire basin. For the relations between the contributing drainage area and the 100-year peak discharge, there is a stronger linear relation with less variability for the three hydrologic regions than for the entire basin (fig. 4); there is more variability in region 1 than in regions 2 and 3. The relations between stream length and the 100-year peak discharge (fig. 5) and basin shape and the 100-year peak discharge (fig. 6) are similar to the relation between the contributing drainage area and the 100-year peak discharge (fig. 4) but are more variable. The relations between stream length and the 100-year peak discharge and between basin shape and the 100-year peak discharge are not very linear for region 1. Stream slope and the 100-year peak discharge appear to be inversely related (fig. 7). There does not seem to be a strong relation between stream slope and the 100-year peak discharge for region 3.

Multiple Regression Equations for Estimation of Peak-Discharge Frequency

Forward stepwise weighted least-squares regression (Helsel and Hirsch, 1992) was used to develop regression equations to estimate the 2-, 5-, 10-, 25-, 50-, and 100-year peak discharges for each of the three hydrologic regions. The peak discharges were used as dependent variables and the contributing drainage area, stream length, basin shape, and stream slope were used as explanatory variables. The 2-year, 24-hour precipitation and mean annual precipitation were not used in the regression analysis because the characteristics indicated no relation to peak discharge, as shown in figures 2–3. Generally only significant variables (those with p-values less than or equal to 0.05 from nested F tests of whether the regression slope coefficients are significantly different from zero) (Helsel and Hirsch, 1992) are included in the equations. In forward stepwise regression, the explanatory variable with the highest



EXPLANATION

- △ Basin characteristic for station not included in regression analysis
- • Basin characteristic for station located in region 1 included in the regression analysis
- × Basin characteristic for station located in region 2 included in regression analysis
- ○ Basin characteristic for station located in region 3 included in regression analysis

Figure 2. Relation of 100-year peak discharge to 2-year, 24-hour maximum precipitation.

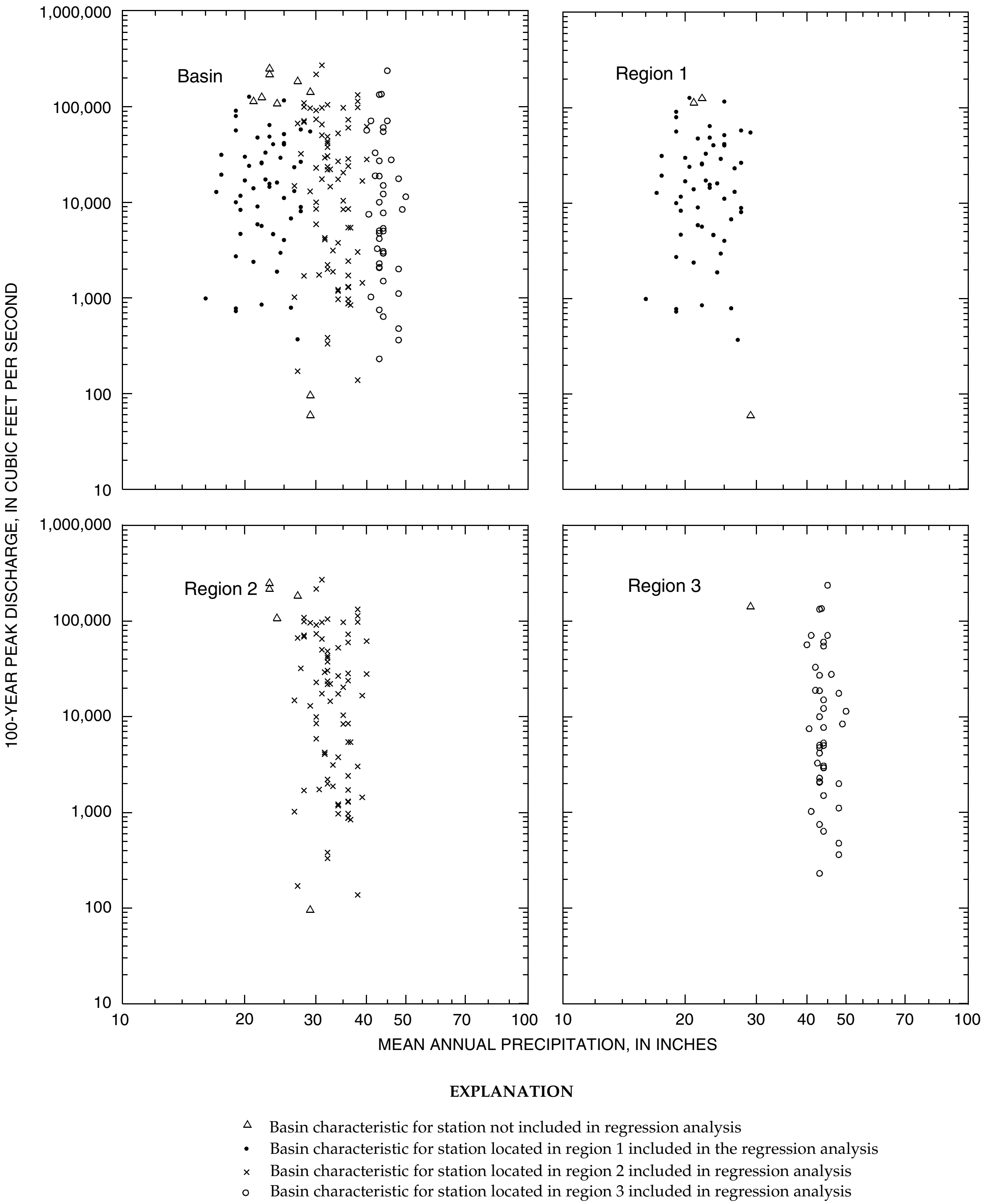


Figure 3. Relation of 100-year peak discharge to mean annual precipitation.

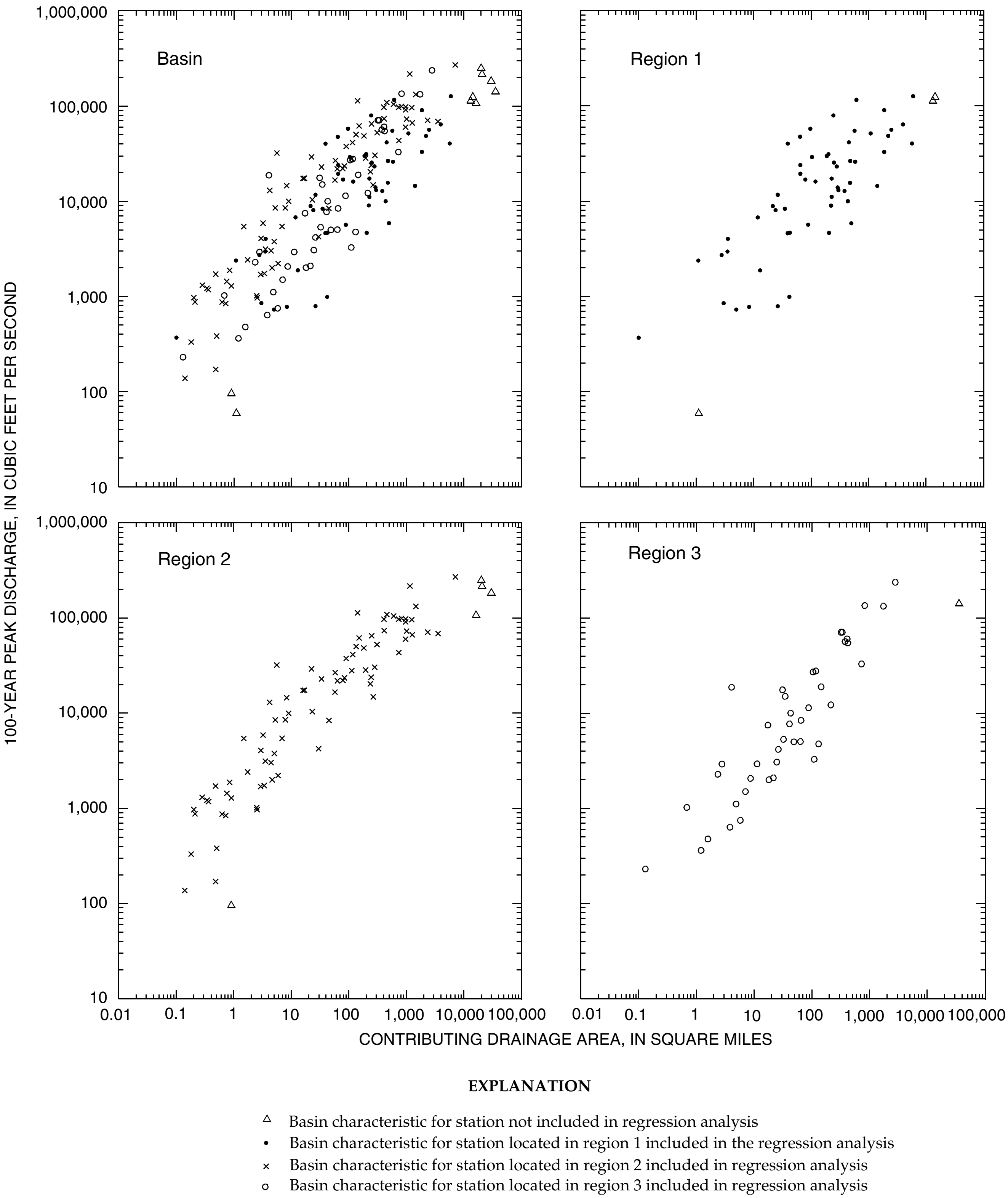
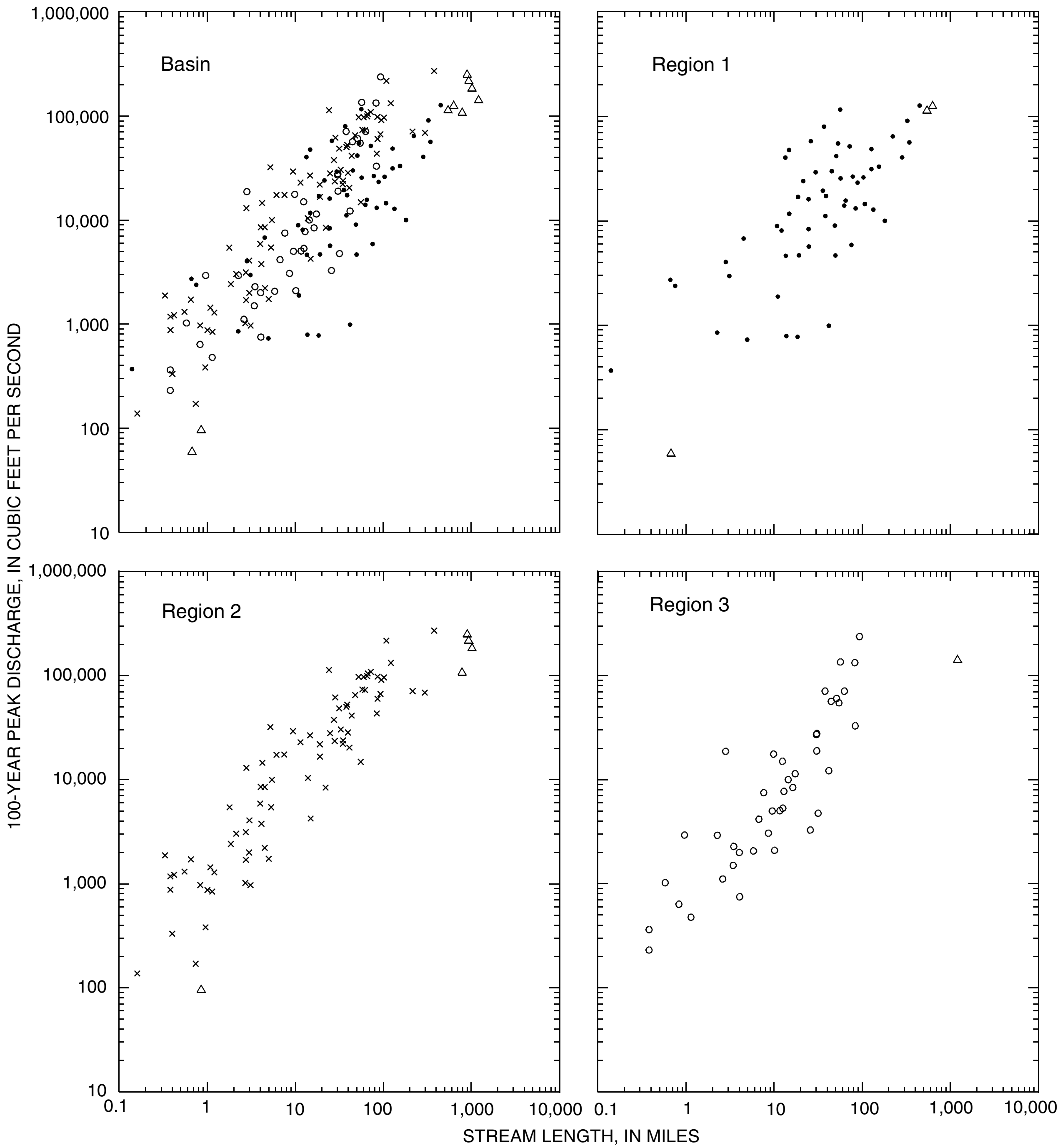


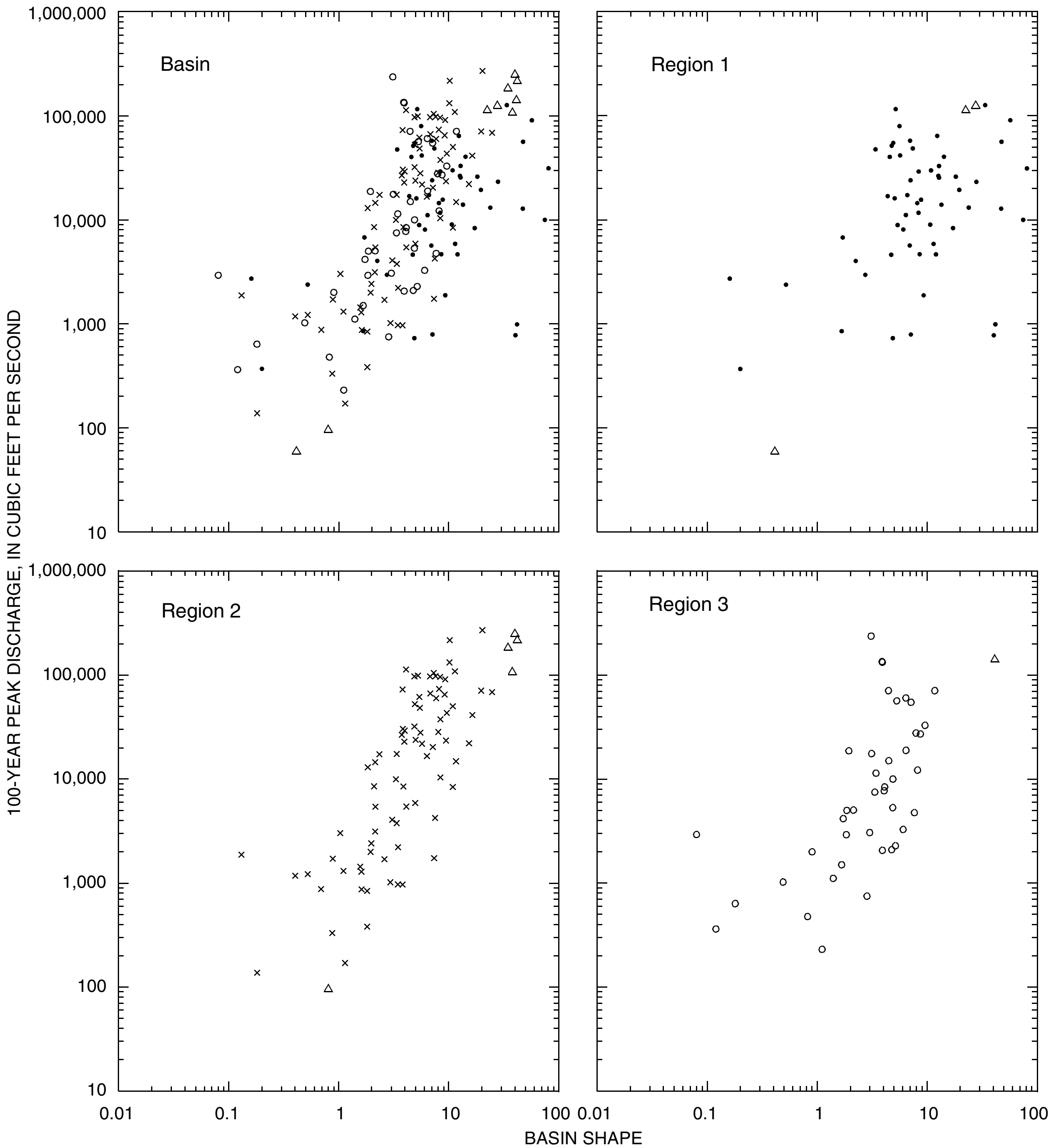
Figure 4. Relation of 100-year peak discharge to contributing drainage area.



EXPLANATION

△ Basin characteristic for station not included in regression analysis
• Basin characteristic for station located in region 1 included in the regression analysis
× Basin characteristic for station located in region 2 included in regression analysis
○ Basin characteristic for station located in region 3 included in regression analysis

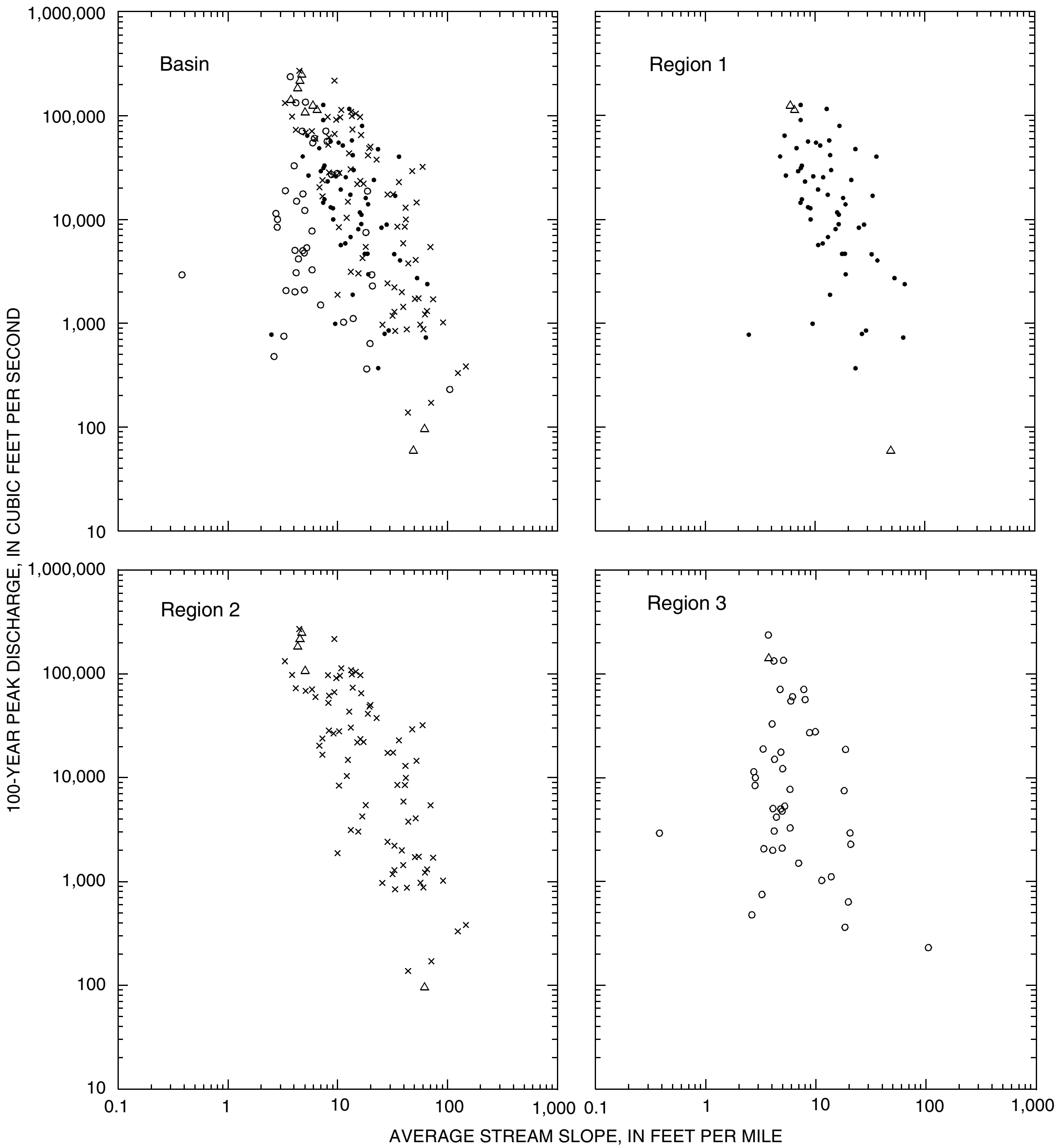
Figure 5. Relation of 100-year peak discharge to stream length.



EXPLANATION

- △ Basin characteristic for station not included in regression analysis
- • Basin characteristic for station located in region 1 included in the regression analysis
- × Basin characteristic for station located in region 2 included in regression analysis
- ○ Basin characteristic for station located in region 3 included in regression analysis

Figure 6. Relation of 100-year peak discharge to basin shape.



EXPLANATION

- △ Basin characteristic for station not included in regression analysis
- • Basin characteristic for station located in region 1 included in the regression analysis
- × Basin characteristic for station located in region 2 included in regression analysis
- ○ Basin characteristic for station located in region 3 included in regression analysis

Figure 7. Relation of 100-year peak discharge to average stream slope.

correlation to the dependent variable is included in the equation. Then each successive variable is tested for significance at a specified p-value for inclusion in the equation. The resulting equation contains only statistically significant variables that explain the variance of the dependent variable.

Each data point in weighted least-squares regression is given a different weight on the basis of the relative error of each value for the dependent variable with greater weights assigned to values with greater accuracy. The weights are based on the systematic record length, the historical record length, and the number of high outliers for each of the stations. The weights listed in table 1 are from Asquith and Slade (1997). The weights were updated for the 40 active stations.

Nine stations were excluded from the regression analysis on the basis of the magnitude of the contributing drainage area or of the magnitude of the 100-year peak discharge. Seven of the nine stations were excluded because no unregulated subbasins with contributing drainage areas in excess of 10,000 mi^2 currently exist in the Brazos River Basin (sites 95, 99, 103, 117, 120, 153, and 164). These seven stations are located on the main stem of the Brazos River. Two of the nine stations were excluded because the sites with 100-year peak discharges less than 100 cubic feet per second (ft^3/s) (sites 100 and 138) were judged to be unrepresentative of stations with similar contributing drainage areas. Each of these two stations has less than 10 years of annual peak-discharge data and contributing drainage areas of about 1 mi^2.

The regression equations for estimating the 2-, 5-, 10-, 25-, 50-, and 100-year peak discharges for each region are listed in table 2 (at end of report). The equations to estimate peak-discharge frequency for hydrologic regions 1 and 2 are a function of contributing drainage area and average stream slope. The contributing drainage area is the only explanatory variable for hydrologic region 3. The average stream slope does not have as strong a linear relation to the 100-year peak discharge for region 3 as for regions 1 and 2 (fig. 7). Although the average stream slope was not significant (p-value = 0.180) for the 2-year peak discharge equation for hydrologic region 2, the variable was included in the regression equation to maintain consistency of explanatory variables with the equations for other recurrence intervals. Equations with consistent variables are less likely to produce disproportionate peak discharges; that is, peak discharges for a given recurrence interval that are less than the peak discharges for a smaller recurrence interval. Similarly, the stream slope was significant, although barely (p-value = 0.049), for the 100-year peak discharge equation for hydrologic region 3 but was not included to be consistent with the other five equations for region 3.

The coefficient of determination (R^2) ranges from 0.59 to 0.69 for region 1, from 0.90 to 0.93 for region 2, and from 0.85 to 0.90 for region 3. The standard error of the regression equation ranges from 0.301 to 0.391 log units for region 1; from 0.195 to 0.239 log units for region 2; and 0.184 to 0.272 log units for region 3. The coefficient of determination is smaller and the standard error is larger for region 1 than regions 2 and 3 for each recurrence interval. The larger standard error for region 1 is the result of the greater variability of the peak discharge as a function of contributing drainage area and stream slope compared to other two regions (figs. 4, 7). There is less deviation from a straight line drawn through the data points in regions 2 and 3 than in region 1.

Prediction Intervals

The prediction interval for the regression equations is computed from the following equations (Helsel and Hirsch, 1992, p. 300):

$$\log Q_{TU} = \log Q_T + t_{(\alpha/2,\, n-p)}[s^2(1+h_o)]^{0.5}, \qquad (1)$$

$$\log Q_{TL} = \log Q_T - t_{(\alpha/2,\, n-p)}[s^2(1+h_o)]^{0.5}, \qquad (2)$$

where

Q_{TU} = upper limit of the T-year recurrence interval peak discharge,

Q_{TL} = lower limit of the T-year recurrence interval peak discharge,

Q_T = T-year recurrence interval peak discharge,

$t_{(\alpha/2,\, n-p)}$ = critical value of the t-distribution for a 100(1-α)-percent prediction interval,

α = significance level,

n = number of stations in regression equation,

p = number of explanatory variables in regression equation plus one for the constant,

s = standard error of the regression equation in log units, and

h_o = leverage of the site.

The leverage of the site is a mathematical expression of the distance of the basin characteristics for the selected site to the center of the space defined by the explanatory variables in the regression equation. The leverage of the site is computed from the following equation (Helsel and Hirsch, 1992, p. 301):

$$h_o = x_o \{X^T W^{-1} X\}^{-1} x_o^T, \quad (3)$$

where

x_o = row vector of the log of the basin characteristics for the selected site,

$\{X^T W^{-1} X\}^{-1}$ = covariance matrix of the regression equation, and

x_o^T = column vector of the log of the basin characteristics for the selected site (transposed x_o matrix).

A 90-percent (100-α) prediction interval indicates that there is a 90-percent chance that the true peak discharge is within the upper and lower interval values. The covariance matrices and t-values for selected α levels are listed in table 3 (at end of report).

Application of Regression Equations and Prediction Intervals

The application of the regression equation listed in table 2 is limited to sites with natural streams in the Brazos River Basin as shown on plate 1. Because the regression equations were developed on the basis of annual peak discharges for stations in and near the Brazos River Basin, the applicability to sites outside the area is questionable. In addition, the applicability of the equations is limited to sites for which the ranges of explanatory variables are within those used to develop the equations. In general these include sites with 2-year, 24-hour precipitation between 2.50 and 5.25 in.; mean annual precipitation between 16 and 50 in.; contributing drainage areas between 0.10 and 7,000 mi^2; stream lengths between 0.10 and 450 miles (mi); basin shapes between 0.08 and 81; and average stream slopes between 0.38 and 148 feet per mile (ft/mi). The graphs in figures 8–13 provide a basis to check the applicability of the regression equations for sites in each region. If the basin characteristics for a selected site plot outside the cluster of data for its associated region, the estimated peak discharge might be in error. Although stream length and basin shape do not appear in the regression equations, each variable was used in the development of the equations and should be considered when assessing the applicability of the equations.

Sites At or Near Streamflow-Gaging Stations

For sites at or near stations, either of two estimates of peak discharge could be used—the estimate computed from the systematic record using the log-Pearson Type III distribution (table 1) or an estimate computed from regression analysis. Although the estimates from each method could be different, there is no hydrologic basis for preferring one over the other. Asquith and others (1996) present a weighting technique for estimating peak discharge that combines both the log-Pearson and the regression estimates. The weighted estimate for peak discharge for a given recurrence interval is computed from equation 4:

$$Q_{TW} = (SE^2_{TR} Q_{TS} + SE^2_{TS} Q_{TR})/(SE^2_{TR} + SE^2_{TS}), \quad (4)$$

where

Q_{TW} = weighted peak discharge at recurrence interval T, in cubic feet per second,

Q_{TS} = log-Pearson Type III peak discharge at recurrence interval T, in cubic feet per second,

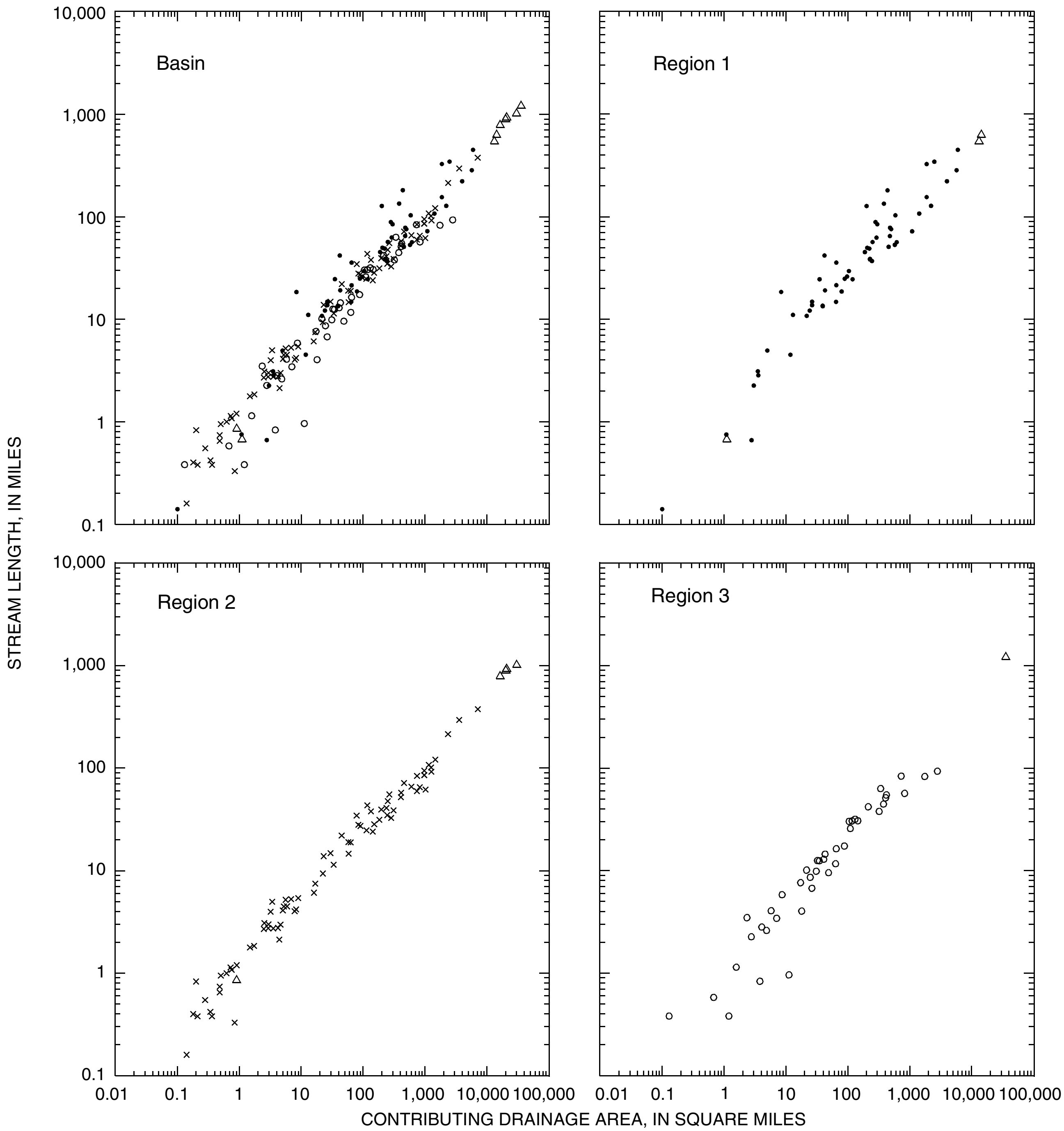
Q_{TR} = regression peak discharge at recurrence interval T, in cubic feet per second,

SE_{TS} = standard error of the log-Pearson Type III distribution, in log-cubic feet per second, and

SE_{TR} = standard error of prediction of the regression at recurrence interval T, in log-cubic feet per second.

The weight factor for the log-Pearson Type III distribution is the square of the standard error (error variance or mean square error) of the log-Pearson Type III distribution. It is computed using the 67-percent prediction interval and PEAKFQ, a computer program to estimate peak-discharge frequency on the basis of the log-Pearson Type III distribution (Slade and Asquith, 1996). The definition of the prediction interval in this report is different from that used in PEAKFQ. The 67-percent prediction interval of this report is equivalent to the {100-(100-67)/2)} = 83.5-percent interval in PEAKFQ.

The weight factor for the regression is the square of the standard error of prediction of the regression. It is estimated to be the difference between the upper (or lower) limit of the prediction interval [Q_{TU} from eq. 1 (or Q_{TL} from eq. 2)] and the predicted T-year recurrence interval peak discharge. Because the predicted T-year recurrence interval peak discharge is midway between



EXPLANATION

- △ Basin characteristic for station not included in regression analysis
- • Basin characteristic for station located in region 1 included in the regression analysis
- × Basin characteristic for station located in region 2 included in regression analysis
- ○ Basin characteristic for station located in region 3 included in regression analysis

Figure 8. Relation of stream length to contributing drainage area.

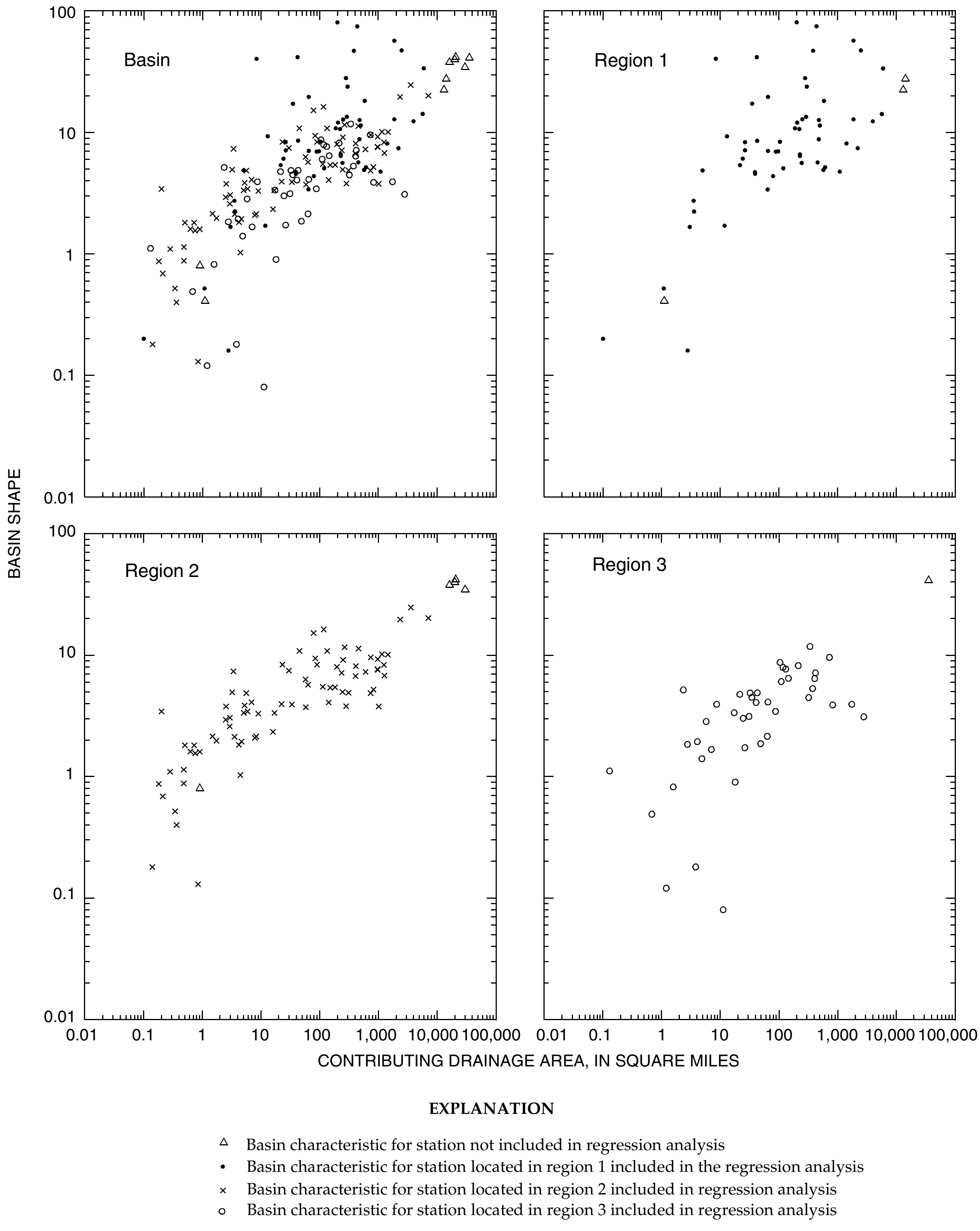


Figure 9. Relation of basin shape to contributing drainage area.

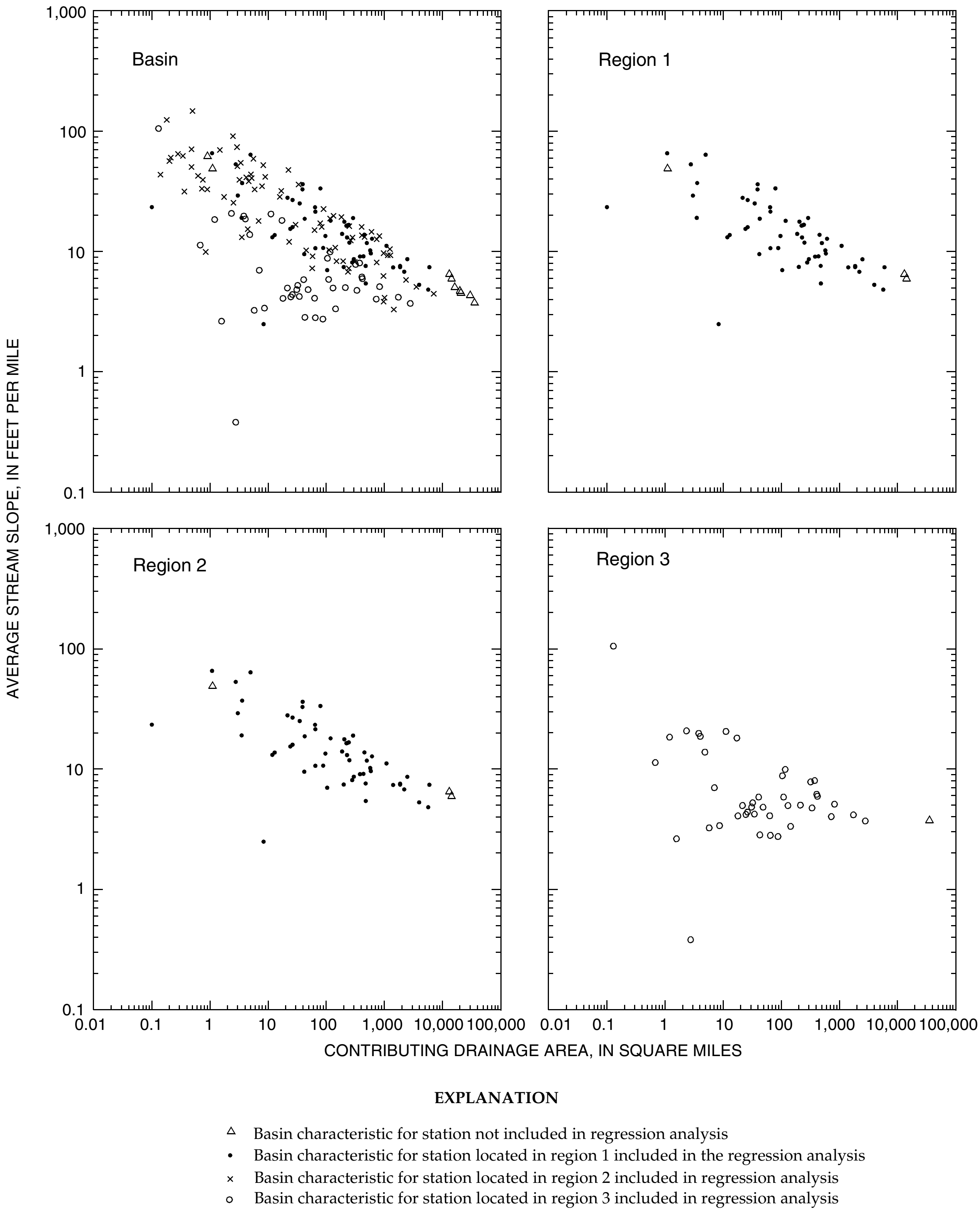
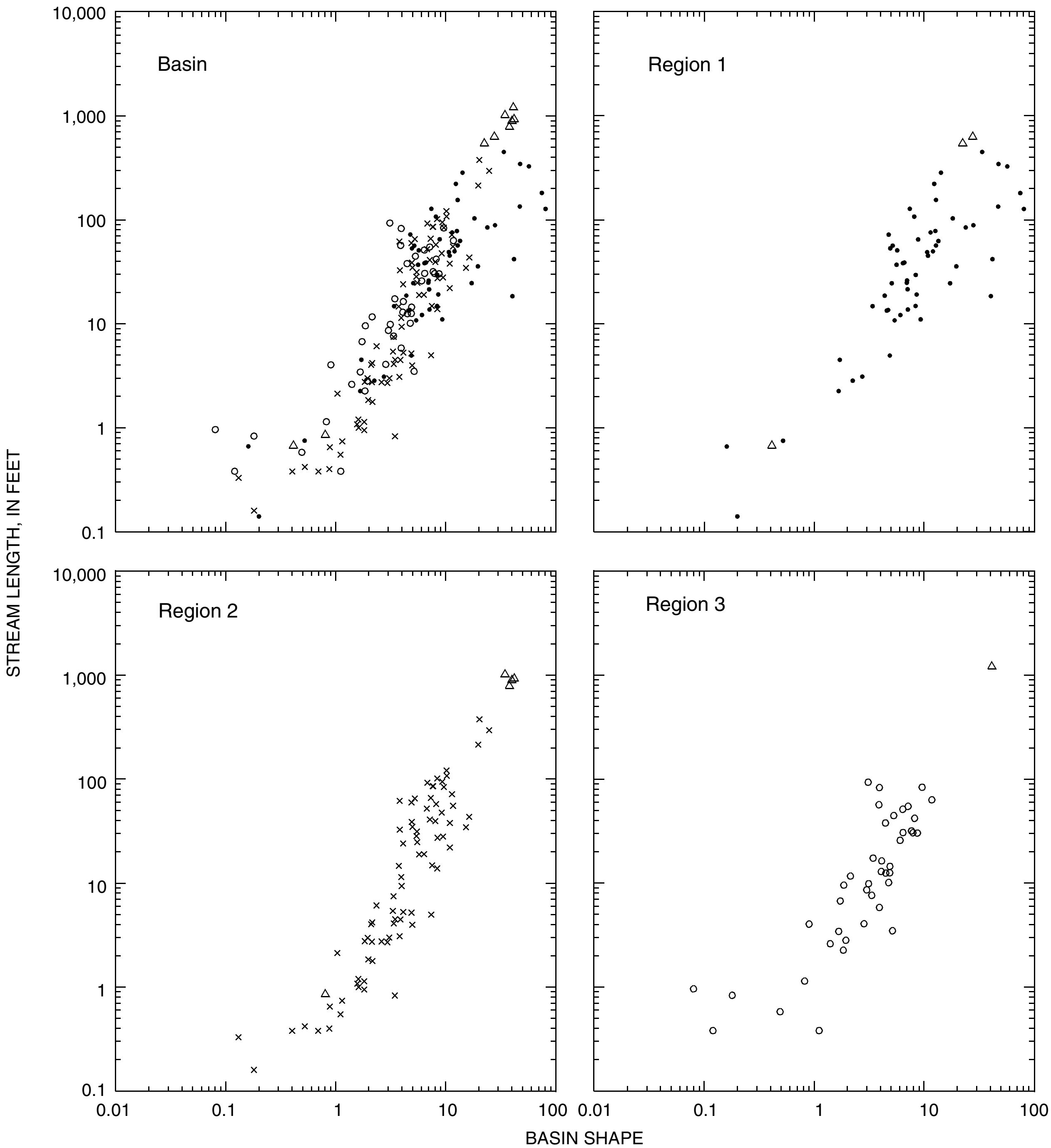


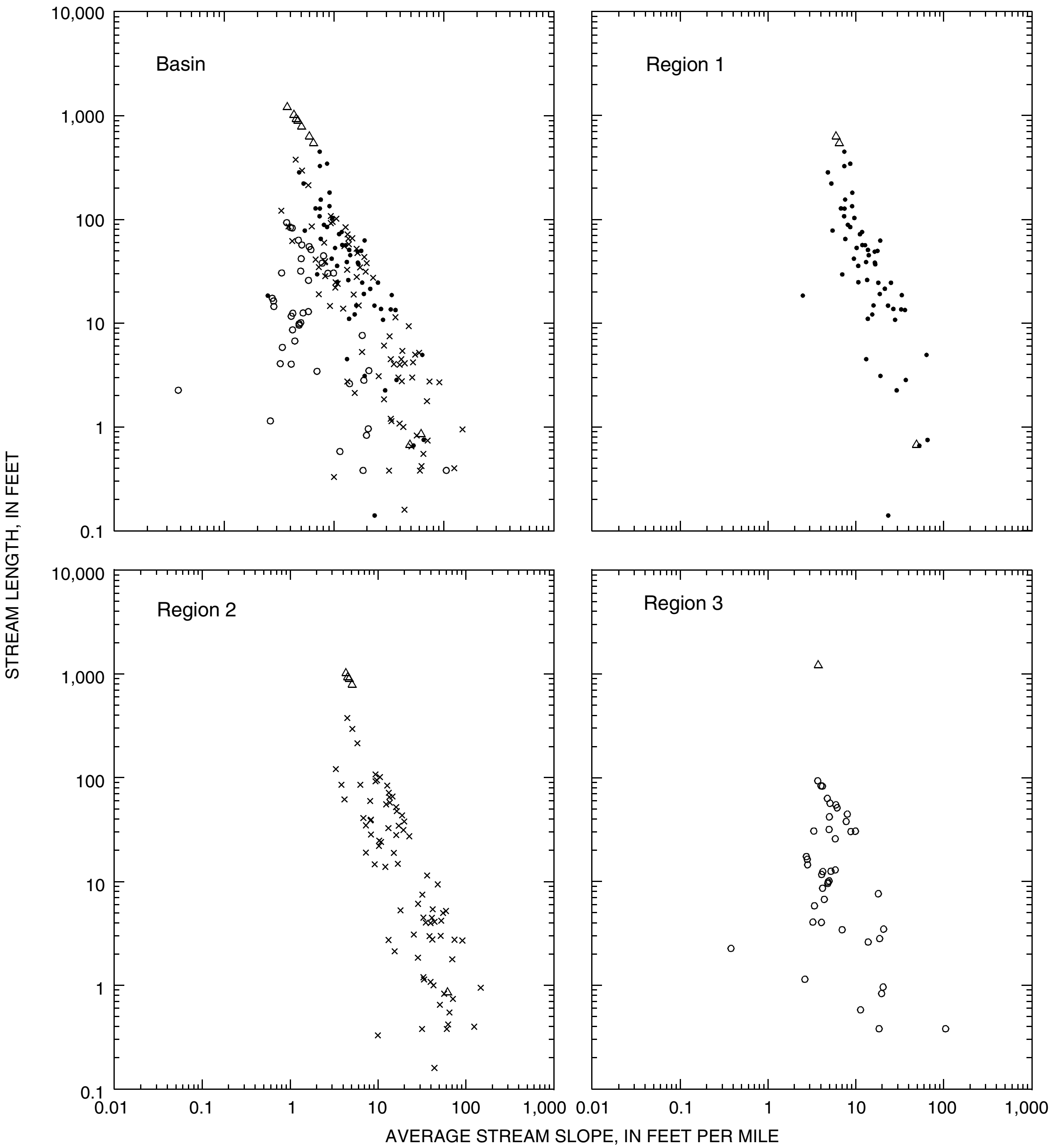
Figure 10. Relation of average stream slope to contributing drainage area.



EXPLANATION

- △ Basin characteristic for station not included in regression analysis
- • Basin characteristic for station located in region 1 included in the regression analysis
- × Basin characteristic for station located in region 2 included in regression analysis
- ○ Basin characteristic for station located in region 3 included in regression analysis

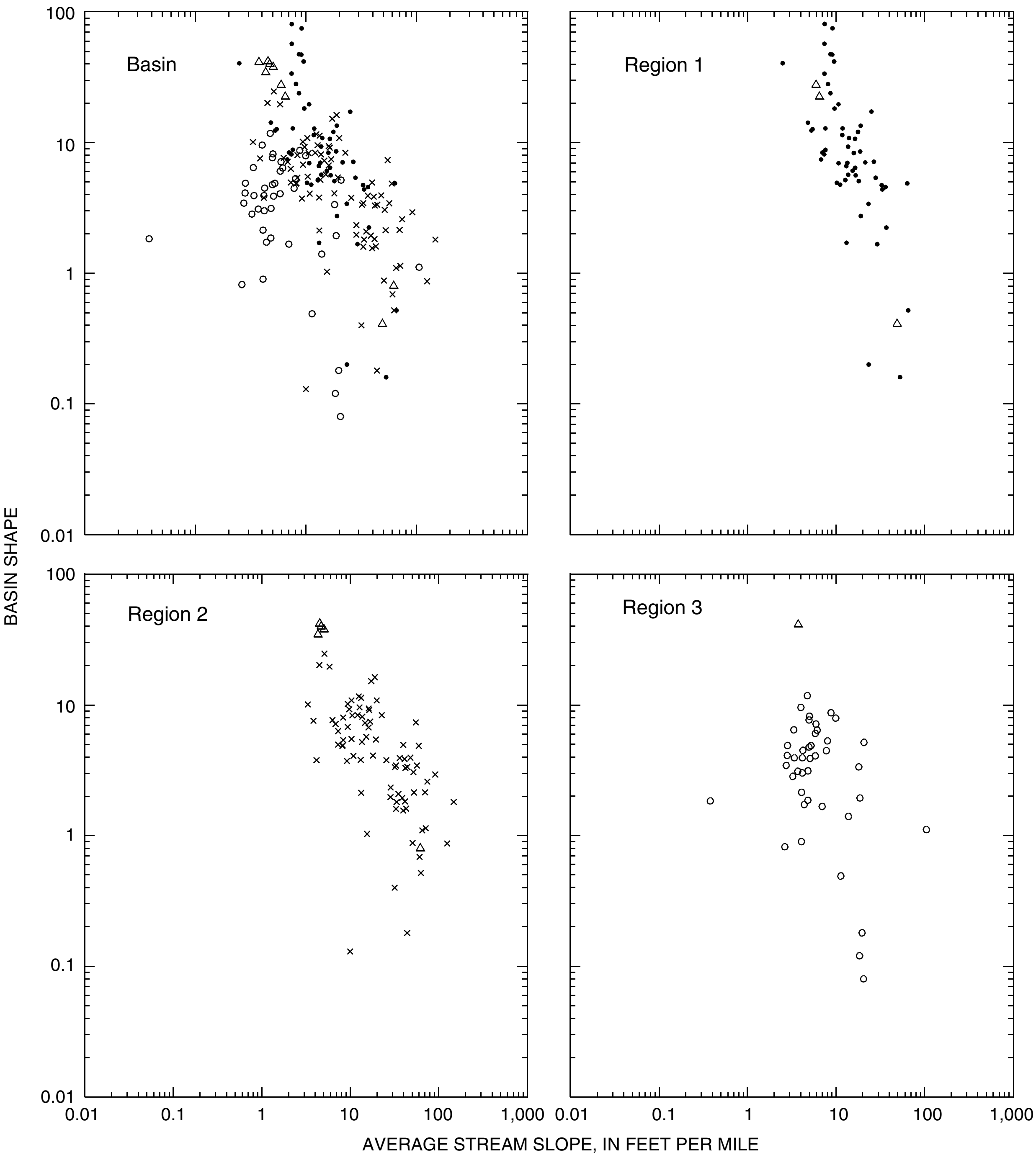
Figure 11. Relation of stream length to basin shape.



EXPLANATION

- △ Basin characteristic for station not included in regression analysis
- • Basin characteristic for station located in region 1 included in the regression analysis
- × Basin characteristic for station located in region 2 included in regression analysis
- ○ Basin characteristic for station located in region 3 included in regression analysis

Figure 12. Relation of stream length to average stream slope.



EXPLANATION

- △ Basin characteristic for station not included in regression analysis
- • Basin characteristic for station located in region 1 included in the regression analysis
- × Basin characteristic for station located in region 2 included in regression analysis
- ○ Basin characteristic for station located in region 3 included in regression analysis

Figure 13. Relation of basin shape to average stream slope.

the upper and lower limits of the prediction interval, the standard error of prediction of the regression is computationally equivalent to one-half the difference between the upper limit of the prediction interval and the lower limit of the prediction interval.

Whether a site is considered “near” a station is problematic and a matter of judgment. As Asquith and Slade (1997, p. 13) concluded, the peak-discharge frequency at a station becomes increasingly less applicable to a site as the distance between the site and the station increases.

Sites Not At or Near Streamflow-Gaging Stations

The regional regression equations (table 2) were developed to estimate peak-discharge frequency for sites not at or near stations. For example, the 100-year peak discharge for a selected site in Waller County with a contributing drainage area of 10 mi^2 is estimated as follows:

From plate 1, Waller County is in region 3; and from the regression equations listed in table 2, $Q_{100} = 523CDA^{0.746} = 523(10)^{0.746} = 2{,}910\ ft^3/s$.

The 90-percent prediction interval for the 100-year peak discharge is computed as follows:

The row vector of the basin characteristics comprises a 1 for the regression constant and a 1 for the log of the contributing drainage area, 10 mi^2. The basin characteristics row vector is a 1 X 2 matrix for region 3 (but will be a 1 X 3 matrix for regions 1 and 2 with a third column for the log of stream slope): $x_o = [1\ 1]$. From equation 3, the leverage, h_o, is computed using the covariance matrix from table 3:

$$h_o = \begin{bmatrix} 1 & 1 \end{bmatrix} \begin{bmatrix} 0.45651 & -0.09854 \\ -0.09854 & 0.03691 \end{bmatrix} \begin{bmatrix} 1 \\ 1 \end{bmatrix}$$

$$= \begin{bmatrix} 0.35797 & -0.06163 \end{bmatrix} \begin{bmatrix} 1 \\ 1 \end{bmatrix} = 0.29634.$$

After computing the leverage, equations 1 and 2 can be applied. From table 2, s = 0.272; from table 3, n – p = 40 and for $\alpha = 0.10$, $t_{0.05,\,40} = 1.684$:

$$\log Q_{100L} = \log (2{,}910) - 1.684[0.272^2 (1 + 0.29634)]^{0.5} = 3.4639 - 0.52152 = 2.9424$$

$$Q_{100L} = 876;$$

and similarly

$$\log Q_{100U} = 3.4639 + 0.52152 = 3.9854$$

$$Q_{100U} = 9{,}670.$$

There is a 90-percent probability that the 100-year peak discharge for the selected site is contained within the prediction interval of 876 to 9,760 ft^3/s. The 50-percent prediction interval is estimated by substituting the critical value of the t-distribution from table 3 into the above example computation.

POTENTIAL EXTREME PEAK DISCHARGE

In addition to peak-discharge frequency estimates, analysis of measured extreme peak discharges for hydrologic regions in the Brazos River Basin is useful for estimation of extreme flood potential. The USGS routinely has documented extreme peak discharges at sites in natural streams without streamflow-gaging stations. Thirty-seven sites with measured extreme peak discharges but no stations are in the study area (pl. 1; table 4 at end of report). These data, combined with the 186 systematic or historical peak discharges of record measured at sites with stations (table 4), provide a basis to estimate potential extreme peak discharges. The peak of record (table 4) was measured within the last 3 years (1994–96 water years) at 9 of the 40 active stations.

The most common technique for determining potential extreme peak discharges is to use an envelope curve of the peak discharge as a function of contributing drainage area (Crippen and Bue, 1977; Thomas and others, 1994; Asquith and Slade, 1995; and Asquith and others, 1996). The curve generally is curvilinear and “contains,” in the sense of an umbrella over, all the measured extreme peak discharges. The potential extreme peak discharge curves for the three hydrologic regions of the Brazos River Basin (figs. 14–16) were defined by peak-discharge data from sites both with and without streamflow-gaging stations. Given the location of a site within the basin and its contributing drainage area, the potential extreme peak-discharge curve provides a quick estimate of peak discharge on the basis of the measured extreme peak discharges in the region.

The potential extreme peak discharge curves generally are similar for regions 1 and 2, and the curve for region 3 consistently is below the curves for region 1 and 2, indicating smaller peak discharges (fig. 17). The magnitudes of extreme floods in region 3 are less severe than those in regions 1 and 2 for contributing drainage areas of the same size, which could be the result of flatter stream slopes in region 3.

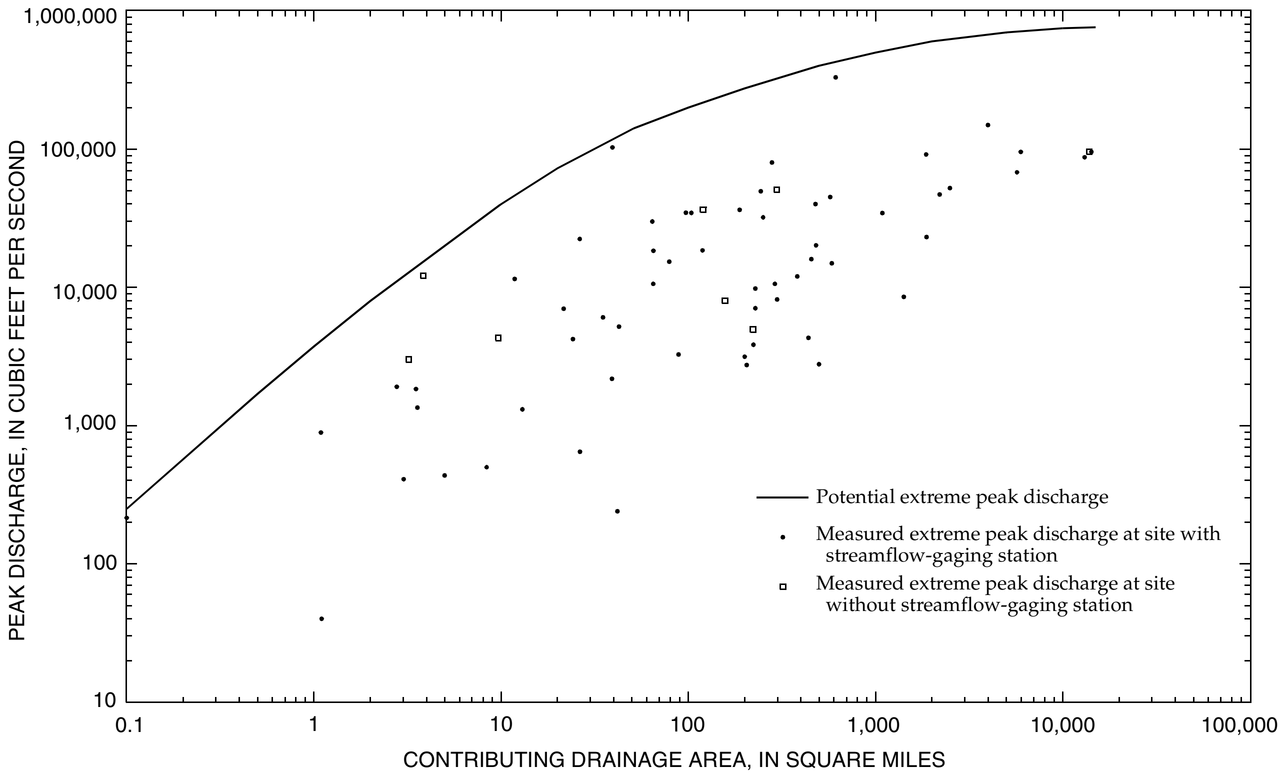


Figure 14. Potential extreme peak discharge for hydrologic region 1, Brazos River Basin, Texas.

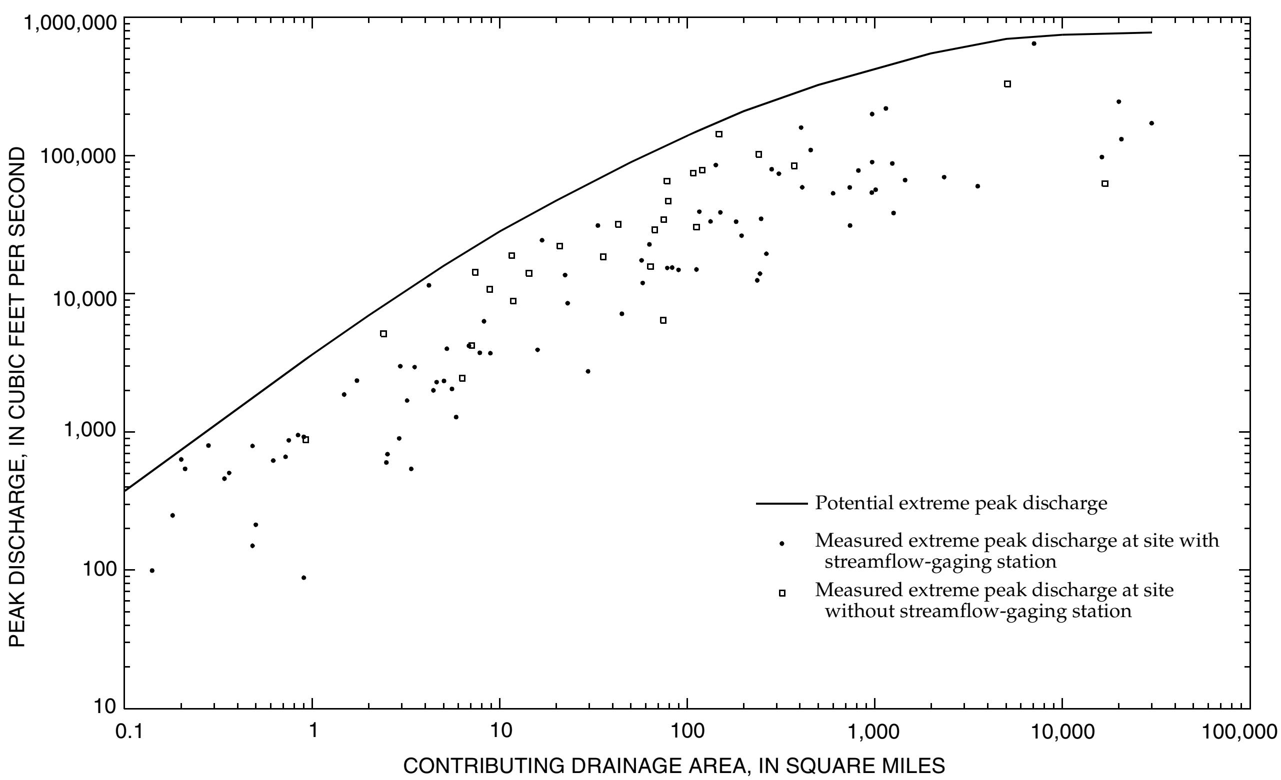


Figure 15. Potential extreme peak discharge for hydrologic region 2, Brazos River Basin, Texas.

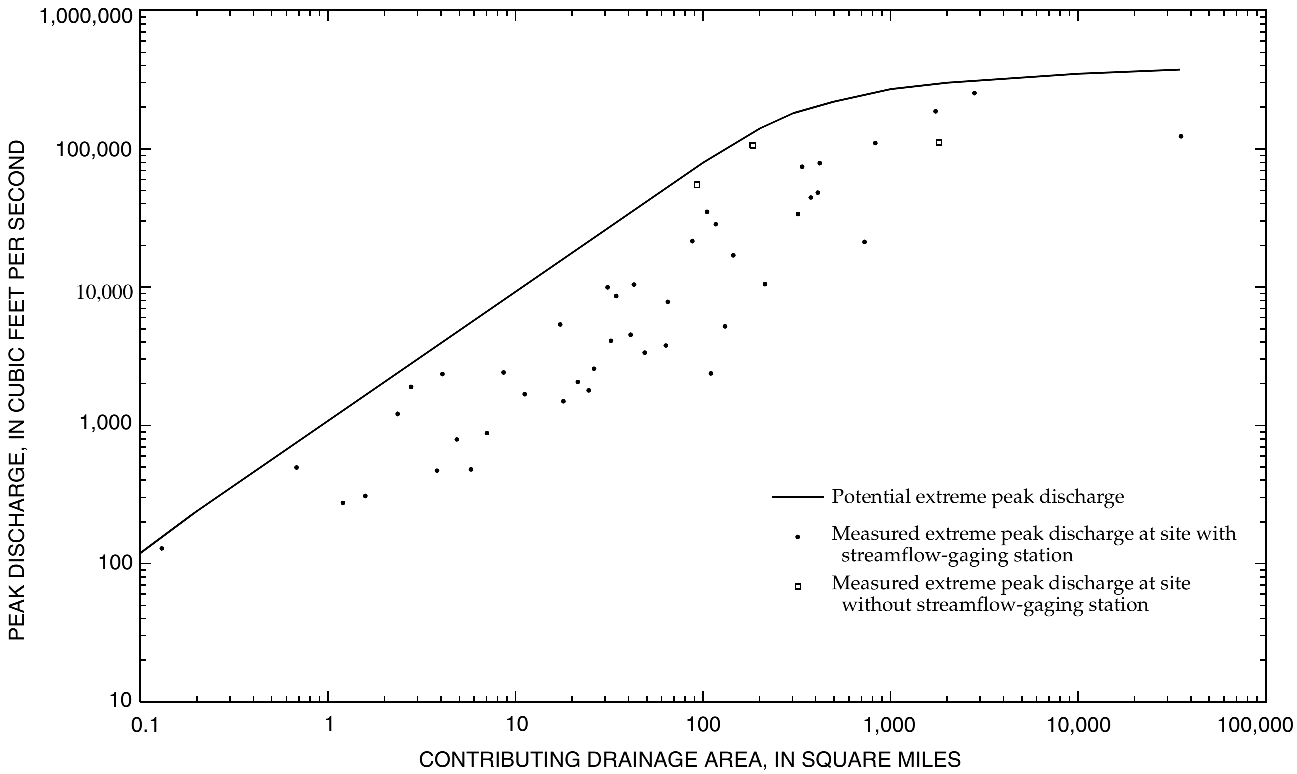


Figure 16. Potential extreme peak discharge for hydrologic region 3, Brazos River Basin, Texas.

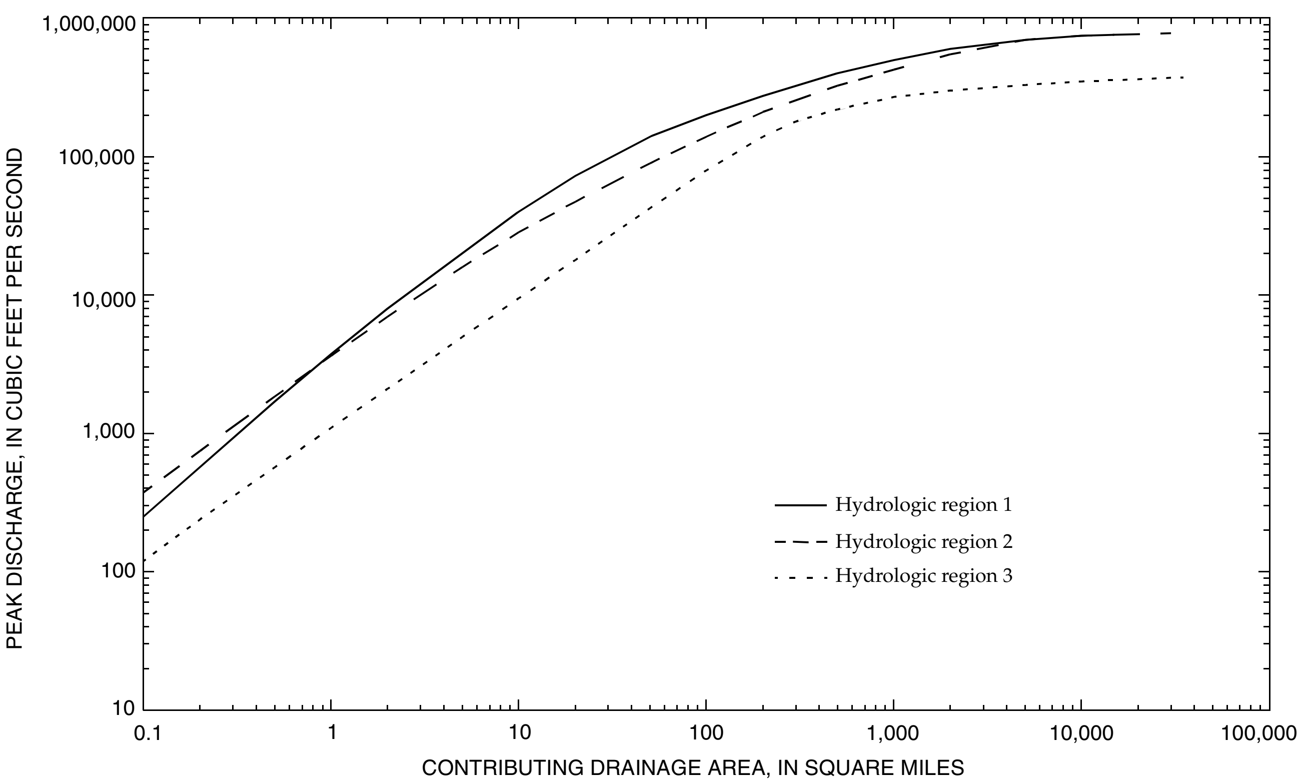


Figure 17. Potential extreme peak discharge curves for hydrologic regions, Brazos River Basin, Texas.

SUMMARY

Accurate estimates of the magnitude and recurrence intervals of peak discharge are useful for water-resource planning and management in a river basin. The contributing drainage area of the Brazos River Basin is about 35,000 mi^2. One-hundred and eighty-six streamflow-gaging stations that have at least 8 years of peak-discharge data are in and near the Brazos River Basin. Forty of the 186 stations currently (1996) are active or have been discontinued since 1993. The remaining 146 stations either were discontinued prior to 1994 or have streamflow regulated by reservoirs.

The 2-, 5-, 10-, 25-, 50-, and 100-year peak discharges were estimated for each station by fitting the log-Pearson Type III distribution to the sample-moment statistics of the annual maximum discharges. Six selected basin characteristics were compiled for each site: 2-year, 24-hour precipitation; mean annual precipitation; contributing drainage area; stream length; basin shape; and average stream slope. The Brazos River Basin was divided into three hydrologic regions on the basis of similar climatic characteristics.

Forward stepwise weighted least-squares regression was used to develop regression equations to estimate the peak-discharge frequency for selected recurrence intervals as a function of selected basin characteristics for each of the three hydrologic regions. The regression equations to estimate the 2-, 5-, 10-, 25-, 50-, and 100-year peak discharges are a function of contributing drainage area and stream slope for regions 1 and 2 and a function of only contributing drainage area for region 3. The coefficient of determination ranges from 0.59 to 0.69 for region 1, from 0.90 to 0.93 for region 2, and from 0.85 to 0.90 for region 3. The standard error ranges from 0.301 to 0.391 log units for region 1, from 0.195 to 0.239 log units for region 2 and from 0.184 to 0.272 log units for region 3. The coefficient of determination is smaller and the standard error is larger for region 1 than regions 2 and 3 for each recurrence interval. Statistics from the regression analysis allow computation of the prediction interval associated with a given significance level for a peak-discharge frequency estimate. The regression equations can be used to estimate peak discharges for sites at, near, or away from sites with streamflow-gaging stations.

The extreme flood potential for each region is estimated by an envelope curve of the measured extreme peak discharges as a function of the contributing drainage area. The potential extreme peak-discharge curves generally are similar for regions 1 and 2, and the curve for region 3 consistently is below the curves for regions 1 and 2, indicating smaller peak discharges.

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Table 1. Peak-discharge frequency estimates, analysis information, and basin characteristics for stations with at least 8 years

[Modified from Asquith and Slade (1997, table 1). USGS, U.S. Geological Survey; yr(s), year(s); ft^3/s, cubic feet per second; LPIII, log-Pearson
absence of historical streamflow data or high-outlier threshold is that provided by Interagency Advisory Committee on Water Data (1982)
peak-streamflow frequency analysis; EQN, low-outlier threshold estimated from regression equation (Asquith and others, 1995); trib., tributary;
than that provided by regression equation used in peak-streamflow frequency analysis—LPIII frequency distribution could not be fitted

Site no. (pl. 1)	USGS station no.	USGS station name	Hydrologic region (pl. 1)	Latitude	Longitude	Natural systematic record: Period	Natural systematic record: (yrs)[1]	Historical record length (yrs)[2]	Weight factor (yrs)[3]	High-outlier threshold (ft^3/s)	No. of high outliers
1	07298000	North Tule Draw at Reservoir near Tulia, Texas	1	34°33'34"	101°42'33"	1941–73	31	0	31	NONE	0
2	07307500	Quitaque Creek near Quitaque, Texas	1	34°14'24"	101°07'03"	1946–59	14	0	14	NONE	0
3	07307720	Cottonwood Creek trib. near Afton, Texas	1	33°44'20"	100°50'30"	1967–74	8	0	8	NONE	0
4	07311783	South Wichita River below Flow Dam near Guthrie, Texas	1	33°37'19"	100°12'31"	1987–96	10	0	10	NONE	0
5	07311790	South Fork Wichita River at Ross Ranch near Benjamin, Texas	1	33°39'18"	100°00'49"	1971–79	9	0	9	NONE	0
6	07311800	South Fork Wichita River near Benjamin, Texas	1	33°38'39"	99°48'02"	1961–96	36	0	36	NONE	0
7	07311900	Wichita River near Seymour, Texas	1	33°42'01"	99°23'18"	1961–79	19	0	19	NONE	0
8	07314200	North Fork Little Wichita River trib. near Archer City, Texas	1	33°39'50"	98°43'30"	1966–74	9	0	9	NONE	0
9	07314500	Little Wichita River near Archer City, Texas	1	33°39'45"	98°36'46"	1932–46	15	0	15	NONE	0
10	08042700	North Creek near Jacksboro, Texas	1	33°16'57"	98°17'53"	1956–73	18	59	35	5,700	2
11	08044200	Walker Creek near Boyd, Texas	2	33°04'32"	97°34'58"	1966–74	9	0	9	2,515	0
12	08048500	Marine Creek at Fort Worth, Texas	2	32°48'16"	97°21'48"	1942–57	8	51	24	24,400	1
13	08048900	Deer Creek trib. near Crowley, Texas	2	32°35'06"	97°21'04"	1967–74	8	0	8	NONE	0
14	08049550	Big Bear Creek near Grapevine, Texas	2	32°54'48"	97°07'44"	1967–79	13	0	13	NONE	0
15	08049700	Walnut Creek near Mansfield, Texas	2	32°34'51"	97°06'06"	1961–96	36	0	36	NONE	0
16	08063180	Briar Creek trib. near Corsicana, Texas	2	32°02'54"	96°34'49"	1966–74	9	0	9	NONE	0
17	08063500	Richland Creek near Richland, Texas	2	31°57'02"	96°25'16"	1939–62	24	0	24	NONE	0
18	08063550	Alvarado Branch near Alvarado, Texas	2	32°24'49"	97°12'20"	1966–74	9	0	9	NONE	0
19	08063620	Kings Branch near Reagor Springs, Texas	2	32°20'41"	96°47'02"	1965–74	10	0	10	NONE	0
20	08064500	Chambers Creek near Corsicana, Texas	2	32°06'29"	96°22'14"	1913–60	22	74	43	48,000	2
21	08064700	Tehuacana Creek near Streetman, Texas	2	31°50'54"	96°17'23"	1968–96	29	65	40	85,700	1
22	08065200	Upper Keechi Creek near Oakwood, Texas	2	31°34'11"	95°53'17"	1962–96	35	0	35	NONE	0
23	08065700	Caney Creek near Madisonville, Texas	2	30°56'12"	95°56'07"	1964–76	13	0	13	NONE	0
24	08065800	Bedias Creek near Madisonville, Texas	2	30°53'03"	95°46'39"	1968–96	29	0	29	NONE	0
25	08067500	Cedar Bayou near Crosby, Texas	3	29°58'20"	94°59'10"	1972–96	25	0	25	NONE	0
26	08067550	Welch Branch near Huntsville, Texas	3	30°38'33"	95°40'47"	1966–74	9	0	9	NONE	0
27	08067750	Landrum Creek trib. near Montgomery, Texas	3	30°21'03"	95°41'50"	1966–74	9	0	9	NONE	0
28	08068000	West Fork San Jacinto River near Conroe, Texas	3	30°14'40"	95°27'25"	1913–72	37	60	46	101,000	1
29	08068300	Mill Creek trib. near Dobbin, Texas	3	30°15'37"	95°46'14"	1967–74	8	0	8	NONE	0
30	08068500	Spring Creek near Spring, Texas[4]	3	30°06'37"	95°26'10"	1929–75	37	115	64	48,300	1
31	08068520	Spring Creek at Spring, Texas	3	30°05'31"	95°24'21"	1929–96	58	117	77	48,300	2
32	08068720	Cypress Creek at Katy-Hockley Road near Hockley, Texas	3	29°57'00"	95°48'29"	1976–95	21	0	21	NONE	0
33	08068740	Cypress Creek at House-Hahl Road near Cypress, Texas	3	29°57'32"	95°43'03"	1975–96	22	0	22	5,110	1
34	08068780	Little Cypress Creek near Cypress, Texas	3	30°00'57"	95°41'50"	1983–95	13	0	13	NONE	0
35	08068800	Cypress Creek at Grant Road near Cypress, Texas	3	29°58'24"	95°35'54"	1983–95	13	0	13	NONE	0
36	08069500	West Fork San Jacinto River near Humble, Texas	3	30°01'37"	95°15'28"	1929–54	26	90	51	187,000	2

Footnotes at end of table.

of annual peak-streamflow data from natural streams in and near the Brazos River Basin, Texas

Type III; hr, hour; in., inches; mi^2, square miles; mi, miles; ft/mi, feet per mile; NONE, either no high-outlier threshold available because of guidelines if historical record and number of high outliers equal zero or no low-outlier threshold used; WTD, weighted skew coefficient used in STA, station skew used in peak-streamflow frequency analysis—generalized or weighted skew not used; VISUAL, low-outlier threshold other adequately to data; SH, State Highway]

Site no. (pl. 1)	Peak discharge for indicated recurrence interval (ft^3/s)						Skew calcu-lation option	Station skew	Final skew for LPIII distri-bution	Low-outlier thresh-old source	Low-outlier thresh-old (ft^3/s)	2-yr 24-hr precip-itation (in.)	Mean annual precip-itation (in.)	Contrib-uting drainage area (mi^2)	Stream length (mi)	Basin shape factor (dimen-sionless)	Stream slope (ft/mi)
	2 yr	5 yr	10 yr	25 yr	50 yr	100 yr											
1	784	2,650	4,870	9,170	13,700	19,400	WTD	-0.481	-0.180	EQN	45	2.75	17.5	65	35.73	19.65	10.65
2	1,060	2,140	3,150	4,830	6,410	8,310	WTD	.916	.240	EQN	184	2.95	19.5	35	24.57	17.25	25.10
3	391	757	1,070	1,530	1,930	2,380	WTD	-.558	-.046	EQN	NONE	3.07	21.0	1.09	.75	.52	65.62
4	708	1,740	2,810	4,720	6,620	9,010	WTD	.152	.103	EQN	NONE	3.20	21.5	223	48.82	10.68	16.39
5	786	1,640	2,390	3,580	4,650	5,870	WTD	-.711	-.033	EQN	NONE	3.22	21.5	499	75.60	11.45	11.76
6	3,220	6,280	9,250	14,400	19,500	26,000	STA	.533	.533	EQN	NONE	3.25	22.0	584	103.20	18.24	9.63
7	8,970	14,200	18,200	23,700	28,200	33,000	WTD	-.127	.085	EQN	NONE	3.31	22.5	1,874	155.18	12.85	7.57
8	79	135	180	247	304	368	WTD	.228	.205	EQN	NONE	3.64	27.0	.10	.14	.20	23.43
9	3,150	6,380	9,500	14,800	20,000	26,500	WTD	.897	.359	EQN	NONE	3.62	27.5	481	78.11	12.68	5.42
10	1,770	3,270	4,440	6,100	7,460	8,900	WTD	-.569	-.177	EQN	NONE	3.73	27.5	21.60	10.79	5.39	27.97
11	483	987	1,470	2,290	3,090	4,070	WTD	1.528	.324	EQN	24	3.88	31.5	2.95	3.00	3.06	51.35
12	359	1,380	2,850	6,350	10,800	17,500	WTD	.296	.194	EQN	37	3.93	31.0	16.80	7.50	3.35	31.92
13	772	1,140	1,390	1,720	1,970	2,220	WTD	-.784	-.074	VISUAL	200	3.95	32.0	5.86	4.50	3.45	32.84
14	1,320	2,020	2,520	3,190	3,710	4,250	WTD	-.289	-.041	VISUAL	400	3.94	31.5	29.60	14.88	7.48	16.76
15	3,180	6,500	9,390	13,800	17,700	22,000	WTD	-.526	-.086	EQN	462	3.98	32.0	62.80	18.94	5.71	15.07
16	422	540	616	708	775	842	WTD	.261	.046	EQN	NONE	4.20	36.5	.72	1.14	1.81	33.33
17	22,200	38,500	51,000	68,400	82,500	97,500	WTD	-.331	-.117	EQN	5,385	4.17	35.0	734	59.77	4.87	8.12
18	556	880	1,110	1,410	1,640	1,880	WTD	-1.205	-.173	EQN	NONE	3.98	33.0	.84	.33	.13	9.94
19	342	481	575	694	784	875	WTD	-.105	-.021	VISUAL	200	4.10	36.0	.62	1.00	1.61	42.65
20	16,600	27,200	34,700	44,700	52,400	60,300	WTD	-.368	-.210	EQN	4,463	4.10	36.0	963	85.89	7.66	6.26
21	6,750	14,800	24,800	46,500	73,200	114,000	STA	.940	1.172	EQN	2,242	4.27	38.0	142	24.06	4.08	10.77
22	3,650	10,500	18,000	31,600	45,100	62,000	WTD	-.763	-.124	EQN	335	4.38	40.0	150	28.42	5.39	8.31
23	4,570	8,820	12,400	17,900	22,700	28,100	WTD	.342	-.008	EQN	676	4.50	40.0	112	24.82	5.50	10.31
24	9,190	19,200	28,000	42,800	54,000	70,900	WTD	-.223	-.065	EQN	1,718	4.55	41.0	321	37.84	4.46	7.80
25	2,250	3,560	4,570	5,990	7,150	8,410	WTD	.195	.150	EQN	NONE	5.15	49.0	64.90	16.34	4.11	2.81
26	208	488	767	1,250	1,710	2,280	WTD	.233	.056	EQN	15	4.69	43.0	2.35	3.48	5.16	20.74
27	77	116	143	178	204	230	WTD	-.765	-.139	VISUAL	20	4.80	43.0	.13	.38	1.11	105.26
28	10,700	26,700	43,100	71,900	100,000	135,000	WTD	-.068	.005	EQN	1,691	4.75	43.5	828	56.73	3.89	5.09
29	260	1,320	2,980	6,910	11,700	18,700	WTD	-.979	-.187	EQN	15	4.78	43.0	4.07	2.81	1.94	18.68
30	4,950	12,400	20,000	33,000	45,400	60,400	WTD	-.130	-.071	EQN	652	4.82	44.0	409	51.18	6.40	6.15
31	5,680	12,900	19,800	31,200	42,000	54,800	WTD	-.296	.008	EQN	873	4.83	44.0	419	54.75	7.15	5.93
32	1,230	1,780	2,140	2,600	2,940	3,270	WTD	-.972	-.140	VISUAL	700	4.82	42.5	110	25.80	6.05	5.85
33	1,460	2,190	2,740	3,500	4,110	4,760	WTD	.198	.179	VISUAL	700	4.83	43.0	131	31.72	7.68	4.96
34	1,290	2,470	3,470	4,970	6,270	7,720	WTD	-.075	-.019	EQN	NONE	4.85	44.0	41	12.91	4.07	5.84
35	2,570	4,540	6,110	8,350	10,200	12,200	WTD	-.152	-.037	EQN	NONE	4.85	44.0	214	41.89	8.20	5.01
36	16,400	32,300	47,600	74,100	100,000	133,000	WTD	.812	.469	EQN	5,173	4.81	43.0	1,741	82.72	3.93	4.16

Table 1. Peak-discharge frequency estimates, analysis information, and basin characteristics for stations with at least 8 years

Site no. (pl. 1)	USGS station no.	USGS station name	Hydrologic region (pl. 1)	Latitude	Longitude	Natural systematic record Period	Natural systematic record (yrs)[1]	Historical record length (yrs)[2]	Weight factor (yrs)[3]	High-outlier threshold (ft^3/s)	No. of high outliers
37	08070200	East Fork San Jacinto River near New Caney, Texas	3	30°08'43"	95°07'27"	1985–96	12	0	12	48,500	1
38	08070500	Caney Creek near Splendora, Texas	3	30°15'34"	95°18'08"	1944–96	53	57	55	35,000	2
39	08071000	Peach Creek at Splendora, Texas	3	30°13'57"	95°10'05"	1940–77	34	83	54	24,700	3
40	08071500	San Jacinto River near Huffman, Texas	3	29°59'40"	95°08'00"	1929–53	17	78	41	237,000	2
41	08072300	Buffalo Bayou near Katy, Texas	3	29°44'35"	95°48'24"	1981–96	16	0	16	NONE	0
42	08072700	South Mayde Creek near Addicks, Texas	3	29°48'03"	95°41'32"	1974–84	10	0	10	NONE	0
43	08072730	Bear Creek near Barker, Texas	3	29°49'50"	95°41'12"	1980–96	17	0	17	2,010	1
44	08072760	Langham Creek at West Little Yourk Road near Addicks, Texas	3	29°52'01"	95°38'47"	1981–96	16	0	16	NONE	0
45	08072800	Langham Creek near Addicks, Texas	3	29°50'08"	95°37'30"	1974–84	11	0	11	NONE	0
46	08073800	Bering Ditch at Woodway Drive at Houston, Texas	3	29°45'22"	95°29'44"	1965–73	9	0	9	NONE	0
47	08074020	Whiteoak Bayou at Alabonson Road at Houston, Texas	3	29°52'14"	95°28'49"	1984–93	9	0	9	NONE	0
48	08074100	Cole Creek at Guhn Road at Houston, Texas	3	29°51'24"	95°30'55"	1965–72	8	0	8	NONE	0
49	08074900	Willow Waterhole Bayou at Landsdowne Street at Houston, Texas	3	29°39'01"	95°29'11"	1965–72	8	0	8	NONE	0
50	08075300	Sims Bayou at Carlsbad Street at Houston, Texas	3	29°37'33"	95°29'56"	1965–72	8	0	8	NONE	0
51	08075600	Berry Bayou trib. at Globe Street at Houston, Texas	3	29°39'00"	95°14'48"	1965–72	8	0	8	NONE	0
52	08075700	Berry Creek at Galveston Road at Houston, Texas	3	29°40'59"	95°15'11"	1965–72	8	0	8	NONE	0
53	08075750	Hunting Bayou trib. at Cavalcade Street at Houston, Texas	3	29°48'00"	95°20'02"	1965–72	8	0	8	NONE	0
54	08076180	Garners Bayou near Humble, Texas	3	29°56'03"	95°14'02"	1987–95	9	0	9	NONE	0
55	08077550	Cowart Creek near Friendswood, Texas	3	29°30'46"	95°13'21"	1966–74	9	0	9	NONE	0
56	08078000	Chocolate Bayou near Alvin, Texas	3	29°22'09"	95°19'14"	1947–96	50	0	50	15,200	1
57	08079500	North Fork Double Mountain Fork Brazos River at Lubbock, Texas	1	33°35'08"	101°49'40"	1940–51	12	0	12	NONE	0
58	08079570	Barnum Springs Draw near Post, Texas	1	33°16'54"	101°23'30"	1966–74	9	0	9	NONE	0
59	08079575	North Fork Double Mountain Fork Brazos River near Post, Texas	1	33°14'52"	101°20'24"	1984–93	10	0	10	NONE	0
60	08079580	Rattlesnake Creek near Post, Texas	1	33°13'36"	101°23'30"	1966–74	9	0	9	1,563	0
61	08079600	Double Mountain Fork Brazos River at Justiceburg, Texas	1	33°02'18"	101°11'50"	1962–96	35	0	35	NONE	0
62	08080500	Double Mountain Fork Brazos River near Aspermont, Texas	1	33°00'29"	100°10'49"	1925–96	68	98	78	91,400	1
63	08080510	Guest-Flowers Draw near Aspermont, Texas	1	33°07'25"	100°08'15"	1965–74	10	0	10	NONE	0
64	08080540	McDonald Creek near Post, Texas	1	33°21'03"	101°13'36"	1966–78	13	0	13	12,180	0
65	08080700	Running Water Draw at Plainview, Texas	1	34°10'44"	101°42'08"	1939–78	37	99	59	12,000	1
66	08080750	Callahan Draw near Lockney, Texas	1	33°59'48"	101°32'54"	1966–74	9	0	9	NONE	0
67	08080918	Red Mud Creek near Spur, Texas	1	33°19'24"	100°55'18"	1966–74	9	0	9	14,770	0
68	08081200	Croton Creek near Jayton, Texas	1	33°17'18"	100°25'52"	1960–86	27	0	27	NONE	0
69	08081500	Salt Croton Creek near Aspermont, Texas	1	33°24'03"	100°24'29"	1957–77	21	0	21	NONE	0
70	08082000	Salt Fork Brazos River near Aspermont, Texas	1	33°20'02"	100°14'16"	1924–63	27	64	41	52,200	1
71	08082100	Stinking Creek near Aspermont, Texas	1	33°14'00"	100°12'47"	1966–83	18	0	18	NONE	0
72	08082180	North Croton Creek near Knox City, Texas	1	33°22'59"	100°04'51"	1966–86	21	66	38	32,100	1
73	08082500	Brazos River at Seymour, Texas	1	33°34'51"	99°16'02"	1924–73	50	68	57	95,400	1
74	08082700	Millers Creek near Munday, Texas	1	33°19'45"	99°27'53"	1964–96	33	35	34	NONE	0
75	08082900	North Elm Creek near Throckmorton, Texas	1	33°10'50"	99°22'05"	1966–78	9	0	9	NONE	0
76	08083100	Clear Fork Brazos River near Roby, Texas	1	32°47'15"	100°23'18"	1962–96	34	0	34	NONE	0

Footnotes at end of table.

of annual peak-streamflow data from natural streams in and near the Brazos River Basin, Texas—Continued

Site no. (pl. 1)	Peak discharge for indicated recurrence interval (ft^3/s) 2 yr	5 yr	10 yr	25 yr	50 yr	100 yr	Skew calcu- lation option	Station skew	Final skew for LPIII distri- bution	Low- outlier thresh- old source	Low- outlier thresh- old (ft^3/s)	2-yr 24-hr precip- itation (in.)	Mean annual precip- itation (in.)	Contrib- uting drainage area (mi^2)	Stream length (mi)	Basin shape factor (dimen- sionless)	Stream slope (ft/mi)
37	5,280	12,700	20,700	35,500	50,900	70,900	WTD	1.631	0.281	EQN	1,741	4.83	45.0	338	63.05	11.76	4.74
38	2,730	5,740	8,790	14,300	19,900	27,100	WTD	.871	.476	EQN	755	4.86	43.0	105	30.24	8.71	8.79
39	1,510	4,140	7,160	13,000	19,300	27,700	WTD	.191	.181	EQN	231	4.94	46.0	117	30.45	7.93	9.91
40	25,500	52,700	80,000	128,000	176,000	237,000	WTD	.765	.440	EQN	6,846	4.87	45.0	2,800	93.22	3.10	3.70
41	1,890	2,750	3,320	4,020	4,530	5,030	WTD	-1.006	-.215	VISUAL	700	4.84	43.0	63.30	11.65	2.14	4.08
42	989	1,790	2,460	3,470	4,340	5,320	WTD	.625	.105	EQN	NONE	4.93	44.0	32.30	12.55	4.88	5.23
43	619	953	1,200	1,540	1,800	2,090	WTD	.279	.079	EQN	NONE	4.87	43.0	21.50	10.11	4.76	4.96
44	867	1,400	1,790	2,290	2,680	3,060	WTD	-.895	-.212	EQN	NONE	4.90	44.0	24.60	8.61	3.01	4.19
45	1,210	2,000	2,620	3,490	4,210	4,990	WTD	.328	.062	EQN	NONE	4.94	44.0	48.90	9.54	1.86	4.81
46	940	1,420	1,760	2,210	2,560	2,920	WTD	-.172	-.021	VISUAL	100	4.98	44.0	2.77	2.26	1.84	.38
47	4,250	6,780	8,620	11,100	13,000	15,000	WTD	-.481	-.085	EQN	NONE	4.96	44.0	34.50	12.44	4.49	4.22
48	476	729	907	1,140	1,320	1,500	WTD	-.664	-.108	VISUAL	80	4.95	44.0	7.05	3.43	1.67	6.98
49	864	1,360	1,710	2,180	2,550	2,930	WTD	-.625	-.080	EQN	NONE	5.00	44.0	11.20	.96	.08	20.51
50	327	418	474	541	589	635	WTD	-.698	-.089	VISUAL	150	5.00	44.0	3.81	.83	.18	19.76
51	174	252	305	373	425	477	WTD	-.671	-.059	EQN	NONE	5.20	48.0	1.58	1.14	.82	2.63
52	451	622	738	886	998	1,110	WTD	.067	.057	EQN	NONE	5.18	48.0	4.86	2.61	1.40	13.83
53	153	206	243	290	325	362	WTD	1.096	.181	EQN	NONE	5.08	48.0	1.20	.38	.12	18.42
54	3,190	5,790	7,990	11,400	14,300	17,600	WTD	.347	.145	EQN	NONE	5.10	48.0	31.0	9.85	3.13	4.82
55	997	1,290	1,470	1,690	1,850	2,000	WTD	-.530	-.033	VISUAL	600	5.18	48.0	18	4.03	.90	4.07
56	2,320	3,960	5,340	7,440	9,290	11,400	WTD	-.177	.317	EQN	417	5.12	50.0	87.70	17.36	3.44	2.74
57	57	636	2,120	7,290	15,800	31,300	WTD	-.955	-.217	EQN	NONE	2.70	17.5	200	127.22	80.93	7.43
58	111	221	315	459	585	727	WTD	-.139	-.048	EQN	NONE	2.92	19.0	4.99	4.94	4.88	63.77
59	2,610	4,350	5,620	7,330	8,650	10,000	WTD	-1.166	-.199	EQN	NONE	2.92	19.0	438	181.22	74.98	9.11
60	138	392	686	1,260	1,880	2,720	WTD	1.255	.146	EQN	NONE	2.92	19.0	2.77	.66	.16	53.03
61	7,960	18,400	28,500	45,300	60,900	79,600	WTD	-.100	-.032	EQN	1,425	2.91	19.0	244	36.99	5.61	16.67
62	14,800	29,000	40,900	58,700	73,800	90,600	WTD	-.462	-.114	EQN	2,692	2.90	19.0	1,864	326.26	57.11	7.41
63	99	217	325	501	662	849	WTD	-.503	-.017	EQN	NONE	3.35	22.0	3.02	2.25	1.67	29.16
64	1,010	2,670	4,530	8,090	11,900	16,900	WTD	.963	.187	EQN	NONE	2.95	20.0	79.20	18.63	4.38	33.46
65	230	1,010	2,170	4,850	8,100	12,800	WTD	-.113	-.079	EQN	17	2.68	17.0	382	134.24	47.17	9.07
66	136	252	349	498	627	774	WTD	.544	.093	EQN	4	2.83	19.0	8.37	18.42	40.54	2.49
67	2,010	4,740	7,550	12,600	17,700	24,000	WTD	1.407	.194	EQN	NONE	3.05	20.5	65.10	21.44	7.06	21.42
68	2,970	5,960	8,050	10,600	12,400	14,000	STA	-.780	-.780	EQN	349	3.15	21.0	290	62.55	13.49	18.99
69	2,820	7,610	13,000	23,100	33,800	47,600	WTD	.209	.115	VISUAL	600	3.20	21.5	64.30	14.78	3.40	23.31
70	16,600	26,300	33,100	42,200	49,200	56,400	WTD	-.331	-.141	EQN	NONE	2.86	19.0	2,496	344.29	47.49	8.62
71	587	1,300	1,990	3,170	4,290	5,660	WTD	.200	.124	EQN	NONE	3.30	22.0	88.80	24.85	6.96	10.69
72	1,180	3,420	6,090	11,500	17,400	25,500	WTD	.249	.185	EQN	214	3.31	22.0	251	56.74	12.83	11.85
73	24,400	44,000	60,000	83,700	104,000	127,000	WTD	-.059	.042	EQN	5,959	3.00	20.5	5,972	448.91	33.74	7.40
74	413	1,780	3,950	9,510	17,000	29,100	WTD	.014	.220	EQN	35	3.52	24.5	104	29.54	8.39	7.00
75	313	767	1,240	2,090	2,950	4,020	WTD	-.235	.119	EQN	NONE	3.56	25.0	3.58	2.83	2.24	37.04
76	1,000	2,740	4,680	8,360	12,200	17,300	WTD	.014	.105	EQN	144	3.22	22.5	228	38.86	6.62	13.09

Table 1. Peak-discharge frequency estimates, analysis information, and basin characteristics for stations with at least 8 years

Site no. (pl. 1)	USGS station no.	USGS station name	Hydro-logic region (pl. 1)	Latitude	Longitude	Natural systematic record Period	Natural systematic record (yrs)[1]	His-torical record length (yrs)[2]	Weight factor (yrs)[3]	High-outlier thresh-old (ft^3/s)	No. of high out-liers
77	08083240	Clear Fork Brazos River at Hawley, Texas	1	32°35'53"	99°48'53"	1968–89	22	0	22	NONE	0
78	08083245	Mulberry Creek near Hawley, Texas	1	32°34'04"	99°47'32"	1969–89	21	0	21	NONE	0
79	08083400	Little Elm Creek near Abilene, Texas	1	32°23'29"	99°51'08"	1964–79	16	0	16	NONE	0
80	08083420	Cat Claw Creek at Abilene, Texas	1	32°28'31"	99°44'56"	1971–79	9	0	9	NONE	0
81	08083470	Cedar Creek at Abilene, Texas	1	32°26'56"	99°43'13"	1971–79	9	0	9	NONE	0
82	08084000	Clear Fork Brazos River at Nugent, Texas	1	32°41'24"	99°40'09"	1924–38	15	0	15	46,562	0
83	08084800	California Creek near Stamford, Texas	1	32°55'51"	99°38'32"	1963–96	34	100	56	40,000	1
84	08085300	Humphries Draw near Haskell, Texas	1	33°10'40"	99°34'30"	1966–78	9	0	9	NONE	0
85	08085500	Clear Fork Brazos River at Fort Griffin, Texas[5]	1	32°56'04"	99°13'27"	1924–38	15	103	47	149,000	1
86	08086050	Deep Creek at Moran, Texas	1	32°33'33"	99°10'11"	1963–78	13	0	13	9,789	1
87	08086100	Hubbard Creek near Albany, Texas	1	32°41'21"	99°09'52"	1962–75	14	0	14	NONE	0
88	08086150	North Fork Hubbard Creek near Albany, Texas[6]	1	32°42'27"	99°16'29"	1963–90	28	103	54	103,000	1
89	08086212	Hubbard Creek below Albany, Texas[6]	1	32°43'58"	99°08'25"	1967–96	30	121	60	330,000	1
90	08086260	Pecan Creek near Eolian, Texas	1	32°35'01"	99°01'57"	1967–75	9	0	9	NONE	0
91	08086290	Big Sandy Creek above Breckenridge, Texas[6]	1	32°38'54"	99°00'15"	1977–96	20	121	54	80,000	1
92	08086300	Big Sandy Creek near Breckenridge, Texas	1	32°39'52"	99°00'01"	1962–75	14	0	14	NONE	0
93	08086500	Hubbard Creek near Breckenridge, Texas	1	32°50'13"	98°56'52"	1955–62	8	0	8	NONE	0
94	08087300	Clear Fork Brazos River at Eliasville, Texas[5]	1	32°57'36"	98°45'59"	1916–51	31	102	56	68,000	1
95	08088000	Brazos River near South Bend, Texas	1	33°01'27"	98°38'37"	1939–61	23	0	23	NONE	0
96	08088100	Salt Creek at Olney, Texas	1	33°22'13"	98°44'40"	1958–77	20	0	20	NONE	0
97	08088300	Briar Creek near Graham, Texas	1	33°12'43"	98°37'06"	1959–89	31	0	31	NONE	0
98	08088450	Big Cedar Creek near Ivan, Texas	1	32°49'39"	98°43'25"	1965–89	25	0	25	NONE	0
99	08089000	Brazos River near Palo Pinto, Texas	1	32°51'45"	98°18'08"	1924–40	17	0	17	NONE	0
100	08089100	Elm Creek trib. near Graford, Texas	1	32°54'35"	98°17'35"	1966–74	9	0	9	NONE	0
101	08090500	Palo Pinto Creek near Santo, Texas	1	32°37'51"	98°10'50"	1951–63	13	84	38	45,100	1
102	08090850	Cidwell Branch near Granbury, Texas	2	32°35'41"	97°46'24"	1966–74	9	0	9	NONE	0
103	08091000	Brazos River near Glen Rose, Texas	2	32°16'18"	97°39'48"	1924–40	17	0	17	NONE	0
104	08091500	Paluxy River at Glen Rose, Texas	2	32°13'53"	97°46'37"	1908–82	35	106	60	59,000	1
105	08091700	Panter Branch near Tolar, Texas	2	32°20'59"	97°51'25"	1966–74	9	0	9	NONE	0
106	08092000	Nolan River at Blum, Texas	2	32°09'02"	97°24'09"	1948–63	16	0	16	NONE	0
107	08093200	Bond Branch near Hillsboro, Texas	2	32°02'16"	97°06'27"	1965–74	10	0	10	NONE	0
108	08093250	Hackberry Creek at Hillsboro, Texas	2	32°00'20"	97°08'59"	1981–92	12	0	12	NONE	0
109	08093500	Aquilla Creek near Aquilla, Texas	2	31°50'40"	97°12'04"	1936–79	41	93	59	74,200	1
110	08094000	Green Creek Subwatershed No. 1 near McKinney, Texas	2	32°09'57"	98°20'28"	1955–77	23	0	23	NONE	0
111	08095000	North Bosque River near Clifton, Texas[5]	2	31°47'09"	97°34'04"	1924–67	44	138	76	200,000	1
112	08095200	North Bosque River at Valley Mills, Texas[5]	2	31°40'10"	97°28'09"	1960–67	8	138	52	220,000	1
113	08095220	South Bosque River near McGregor, Texas	2	31°23'22"	97°22'54"	1967–74	8	0	8	NONE	0
114	08095250	Willow Branch at McGregor, Texas	2	31°26'24"	97°25'18"	1967–74	8	0	8	NONE	0
115	08095300	Middle Bosque River near McGregor, Texas	2	31°30'33"	97°21'56"	1960–96	36	0	36	NONE	0
116	08095400	Hog Creek near Crawford, Texas	2	31°33'20"	97°21'22"	1960–79	20	0	20	NONE	0

Footnotes at end of table.

of annual peak-streamflow data from natural streams in and near the Brazos River Basin, Texas—Continued

Site no. (pl. 1)	Peak discharge for indicated recurrence interval (ft^3/s) 2 yr	5 yr	10 yr	25 yr	50 yr	100 yr	Skew calcu-lation option	Station skew	Final skew for LPIII distri-bution	Low-outlier thresh-old source	Low-outlier thresh-old (ft^3/s)	2-yr 24-hr precip-itation (in.)	Mean annual precip-itation (in.)	Contrib-uting drainage area (mi^2)	Stream length (mi)	Basin shape factor (dimen-sionless)	Stream slope (ft/mi)
77	2,000	3,910	5,670	8,560	11,300	14,500	WTD	0.650	0.265	EQN	NONE	3.33	23.0	1,416	107.32	8.13	7.37
78	960	1,700	2,290	3,150	3,860	4,650	WTD	-.222	-.006	EQN	NONE	3.48	23.5	205	49.71	12.06	17.69
79	540	1,190	1,780	2,740	3,610	4,620	WTD	-.486	-.053	VISUAL	100	3.50	23.5	39.10	13.58	4.72	32.85
80	765	1,050	1,240	1,490	1,680	1,880	WTD	.502	.172	EQN	NONE	3.53	24.0	13	11.01	9.32	13.71
81	685	2,040	3,680	7,060	10,900	16,100	WTD	.678	.202	EQN	NONE	3.54	24.0	119	24.57	5.07	18.02
82	7,870	14,500	20,400	29,800	38,400	48,600	WTD	1.013	.317	EQN	1,786	3.40	23.0	2,199	127.69	7.42	6.78
83	1,970	3,920	5,780	8,920	11,900	15,600	WTD	-.002	.356	VISUAL	500	3.45	23.0	478	64.88	8.81	7.58
84	1,050	1,520	1,850	2,280	2,610	2,960	WTD	-.458	.060	EQN	NONE	3.52	24.5	3.51	3.10	2.74	19.05
85	8,860	16,900	24,400	37,100	49,400	64,300	WTD	.631	.453	EQN	NONE	3.45	23.0	3,988	222.26	12.39	5.28
86	5,610	7,120	8,090	9,300	10,200	11,100	WTD	.020	.155	VISUAL	2,000	3.63	25.0	228	38.25	6.42	16.47
87	6,560	12,900	18,300	26,500	33,600	41,600	WTD	-.882	-.039	EQN	945	3.62	25.0	454	50.80	5.68	13.76
88	1,040	3,650	7,250	15,400	25,400	40,300	WTD	.228	.219	EQN	NONE	3.59	25.0	39.30	13.39	4.57	36.26
89	5,810	16,800	29,400	54,200	80,800	116,000	WTD	.145	.095	EQN	898	3.60	25.0	613	56.36	5.18	12.75
90	388	492	562	651	719	789	WTD	1.162	.340	EQN	NONE	3.66	26.0	26.40	13.72	7.13	26.78
91	3,270	6,040	8,690	13,200	17,700	23,200	WTD	1.329	.619	EQN	1,072	3.62	26.5	280	88.70	28.10	8.10
92	4,660	6,710	8,160	10,100	11,600	13,100	WTD	-.251	.087	EQN	NONE	3.62	26.5	298	84.39	23.90	8.63
93	13,100	20,800	26,900	35,800	43,300	51,600	WTD	.594	.265	EQN	NONE	3.63	25.0	1,089	72.07	4.77	11.15
94	11,100	17,500	22,300	29,100	34,600	40,400	WTD	.215	.089	VISUAL	3,000	3.53	23.5	5,697	284.58	14.22	4.81
95	25,700	43,200	57,000	77,100	94,000	113,000	WTD	.007	.130	EQN	5,110	3.10	21.0	13,107	541.97	22.41	6.47
96	474	1,140	1,860	3,260	4,760	6,770	WTD	1.155	.412	EQN	NONE	3.65	26.0	11.80	4.50	1.71	13.13
97	687	1,620	2,570	4,270	5,960	8,070	WTD	.114	.164	EQN	111	3.68	27.5	24.20	12.14	6.09	15.41
98	1,760	6,240	12,100	24,400	38,400	57,700	WTD	-.412	-.010	EQN	138	3.69	27.5	97	26.06	7.00	13.47
99	36,700	57,400	72,400	92,500	108,000	125,000	WTD	-.811	-.052	EQN	NONE	3.20	22.0	14,245	627.67	27.66	5.93
100	25	34	40	47	53	59	WTD	-.326	.103	VISUAL	7	3.76	29.0	1.10	.67	.41	48.93
101	10,400	18,500	25,300	35,700	44,700	55,000	WTD	.151	.169	EQN	2,427	3.78	29.0	573	53.08	4.92	10.20
102	130	328	536	907	1,280	1,740	WTD	-.462	.051	EQN	NONE	3.88	30.5	3.37	4.98	7.35	54.70
103	39,300	55,800	67,400	82,700	94,700	107,000	WTD	.415	.136	EQN	5,893	3.50	24.0	16,252	784.02	37.82	5.04
104	9,680	24,300	36,000	51,500	62,800	73,700	STA	-.811	-.811	VISUAL	9,000	3.85	30.0	410	57.73	8.13	13.64
105	1,200	2,380	3,450	5,160	6,710	8,540	WTD	.210	.131	EQN	31	3.88	30.0	7.82	4.04	2.09	34.92
106	11,700	16,400	19,700	23,900	27,100	30,400	WTD	.687	.091	EQN	1,228	3.95	32.0	282	32.79	3.81	13.11
107	179	372	533	769	966	1,180	WTD	-.907	-.278	EQN	NONE	4.07	34.0	.36	.38	.40	31.59
108	3,720	7,780	11,300	16,800	21,500	26,800	WTD	-.023	-.132	EQN	NONE	4.05	34.0	57.90	14.69	3.73	9.15
109	9,930	18,100	24,800	34,700	43,200	52,700	WTD	.149	.029	EQN	NONE	4.04	34.0	308	38.85	4.90	8.19
110	783	2,000	3,380	6,070	9,010	13,000	WTD	.725	.346	EQN	145	3.83	29.0	4.19	2.77	1.83	41.45
111	18,700	34,300	46,400	63,400	77,100	91,600	WTD	-.251	-.213	EQN	3,617	3.90	30.0	968	94.77	9.28	9.69
112	28,700	61,200	90,000	135,000	174,000	218,000	WTD	-.120	-.134	EQN	5,420	3.91	30.0	1,146	108.03	10.18	9.32
113	1,680	4,220	6,590	10,400	13,700	17,400	WTD	-1.089	-.326	EQN	NONE	4.08	34.0	15.90	6.10	2.34	28.48
114	339	500	610	752	860	969	WTD	.513	-.081	EQN	NONE	4.07	34.0	2.52	3.09	3.79	25.49
115	11,700	20,300	26,600	35,200	41,800	48,600	WTD	-1.120	-.261	EQN	1,361	4.01	32.0	182	31.47	5.44	19.39
116	6,820	10,900	13,600	17,100	19,600	22,100	WTD	-.715	-.344	EQN	480	3.99	32.5	78.20	34.53	15.25	17.20

Table 1. Peak-discharge frequency estimates, analysis information, and basin characteristics for stations with at least 8 years

Site no. (pl. 1)	USGS station no.	USGS station name	Hydrologic region (pl. 1)	Latitude	Longitude	Natural systematic record: Period	Natural systematic record: (yrs)[1]	Historical record length (yrs)[2]	Weight factor (yrs)[3]	High-outlier threshold (ft^3/s)	No. of high outliers
117	08096500	Brazos River at Waco, Texas	2	31°32'06"	97°04'22"	1899–1940	42	94	60	246,000	1
118	08096550	Box Branch at Robinson, Texas	2	31°29'28"	97°08'47"	1966–74	9	0	9	NONE	0
119	08096800	Cow Bayou Subwatershed No. 4 near Bruceville, Texas	2	31°19'59"	97°16'02"	1958–75	18	0	18	NONE	0
120	08097500	Brazos River near Marlin, Texas	2	31°17'18"	96°58'10"	1939–51	13	0	13	NONE	0
121	08098203	Brushy Creek Watershed C near Riessel, Texas	2	31°31'11"	96°53'34"	1939–75	32	0	32	NONE	0
122	08098206	Brushy Creek Watershed D near Riessel, Texas	2	31°30'38"	96°53'32"	1938–70	28	0	28	NONE	0
123	08098227	Brushy Creek Watershed Y-2 near Riessel, Texas	2	31°28'30"	96°52'46"	1939–75	37	0	37	NONE	0
124	08098239	Brushy Creek Watershed Y near Riessel, Texas	2	31°28'36"	96°52'36"	1939–75	36	0	36	NONE	0
125	08098242	Brushy Creek Watershed G near Riessel, Texas	2	31°28'59"	96°52'06"	1938–75	24	0	24	NONE	0
126	08098263	Brushy Creek Watershed W-1 near Riessel, Texas	2	31°27'27"	96°52'48"	1938–75	38	0	38	NONE	0
127	08098281	Brushy Creek Watershed W-2 near Riessel, Texas	2	31°27'19"	96°52'55"	1938–75	38	0	38	NONE	0
128	08098300	Little Pond Creek near Burlington, Texas	2	31°01'35"	96°59'17"	1963–82	20	0	20	NONE	0
129	08099300	Sabana River near De Leon, Texas	2	32°06'50"	98°36'19"	1961–79	19	0	19	NONE	0
130	08099350	Sabana River trib. near De Leon, Texas	2	32°06'44"	98°33'58"	1966–74	9	0	9	131	0
131	08099500	Leon River near Hasse, Texas	2	31°57'28"	98°27'32"	1939–53	15	46	27	38,500	1
132	08100100	Edison Creek near Hamilton, Texas	2	31°46'10"	98°07'25"	1966–74	9	0	9	NONE	0
133	08100400	Bermuda Branch near Gatesville, Texas	2	31°32'26"	97°47'53"	1967–74	8	0	8	NONE	0
134	08100500	Leon River at Gatesville, Texas[7]	2	31°25'58"	97°45'42"	1908–59	9	52	25	70,000	1
135	08100800	Hoffman Branch near Hamilton, Texas	2	31°35'01"	98°11'45"	1966–74	9	0	9	NONE	0
136	08101000	Cowhouse Creek at Pidcoke, Texas[7]	2	31°17'05"	97°53'05"	1900–93	43	112	67	110,000	1
137	08102500	Leon River near Belton, Texas	2	31°04'12"	97°26'28"	1913–54	31	42	36	56,500	2
138	08102900	School Branch near Lampasas, Texas	2	31°13'48"	98°09'25"	1967–74	8	0	8	83	0
139	08103800	Lampasas River near Kempner, Texas	2	31°04'54"	98°00'59"	1963–93	31	0	31	NONE	0
140	08103900	South Fork Rocky Creek near Briggs, Texas	2	30°54'41"	98°02'12"	1963–96	34	93	54	31,200	1
141	08104000	Lampasas River at Youngsport, Texas	2	30°57'26"	97°42'30"	1925–73	49	0	49	NONE	0
142	08104700	North Fork San Gabriel River near Georgetown, Texas	2	30°39'42"	97°42'40"	1969–79	11	0	11	NONE	0
143	08104850	South Fork San Gabriel River near Bertram, Texas	2	30°43'14"	98°06'15"	1967–74	8	0	8	NONE	0
144	08104900	South Fork San Gabriel River at Georgetown, Texas	2	30°37'32"	97°41'27"	1968–93	26	0	26	NONE	0
145	08105000	San Gabriel River at Georgetown, Texas	2	30°39'14"	97°39'18"	1921–73	39	122	70	155,000	2
146	08105100	Berry Creek near Georgetown, Texas	2	30°41'28"	97°39'21"	1968–93	26	0	26	NONE	0
147	08105400	San Gabriel River near Circleville, Texas	2	30°37'43"	97°28'23"	1925–76	19	0	19	NONE	0
148	08105700	San Gabriel River at Laneport, Texas	2	30°41'39"	97°16'43"	1965–79	15	0	15	NONE	0
149	08105900	Avery Branch near Taylor, Texas	2	30°29'11"	97°27'27"	1967–74	8	0	8	2,353	0
150	08106500	Little River at Cameron, Texas	2	30°49'53"	96°57'01"	1918–53	36	102	59	647,000	1
151	08108200	North Elm Creek near Cameron, Texas	2	30°55'52"	97°01'13"	1963–73	11	0	11	NONE	0
152	08108800	Little Branch near Bryan, Texas	2	30°45'14"	96°28'01"	1966–74	9	0	9	NONE	0
153	08109000	Brazos River near Bryan, Texas	2	30°36'52"	96°29'10"	1900–40	21	0	21	NONE	0
154	08109700	Middle Yegua Creek near Dime Box, Texas	2	30°20'21"	96°54'16"	1963–96	34	84	51	12,500	1
155	08109800	East Yegua Creek near Dime Box, Texas	2	30°24'26"	96°49'02"	1963–96	34	0	34	NONE	0
156	08110000	Yegua Creek near Somerville, Texas	2	30°19'18"	96°30'26"	1925–66	42	0	42	NONE	0

Footnotes at end of table.

Site no. (pl. 1)	Peak discharge for indicated recurrence interval (ft^3/s)						Skew calculation option	Station skew	Final skew for LPIII distribution	Low-outlier threshold source	Low-outlier threshold (ft^3/s)	2-yr 24-hr precipitation (in.)	Mean annual precipitation (in.)	Contributing drainage area (mi^2)	Stream length (mi)	Basin shape factor (dimensionless)	Stream slope (ft/mi)
	2 yr	5 yr	10 yr	25 yr	50 yr	100 yr											
117	51,000	89,600	121,000	167,000	205,000	249,000	WTD	0.227	0.075	EQN	14,409	3.40	23.0	20,007	893.32	39.89	4.68
118	94	252	411	677	926	1,220	WTD	-.422	-.240	EQN	NONE	4.14	34.0	.34	.42	.52	62.49
119	909	1,590	2,090	2,750	3,260	3,780	WTD	-.662	-.323	VISUAL	350	4.13	34.0	5.04	4.11	3.36	43.90
120	49,300	85,900	114,000	153,000	184,000	216,000	WTD	.008	-.148	EQN	NONE	3.40	23.0	20,645	930.43	41.93	4.51
121	256	470	640	880	1,080	1,290	WTD	-.113	-.163	EQN	29	4.20	36.0	.90	1.20	1.60	32.83
122	426	813	1,130	1,600	1,990	2,420	WTD	.029	-.107	EQN	36	4.20	36.0	1.73	1.85	1.97	28.44
123	88	214	332	519	687	877	WTD	-.314	-.249	EQN	NONE	4.21	36.0	.21	.38	.69	60.44
124	167	412	643	1,010	1,340	1,720	WTD	-.374	-.273	EQN	13	4.21	36.0	.48	.65	.88	50.47
125	934	1,820	2,550	3,610	4,490	5,450	STA	-.183	-.183	VISUAL	200	4.21	36.0	6.84	5.29	4.10	17.97
126	167	377	559	831	1,060	1,310	WTD	-.522	-.332	EQN	18	4.21	36.0	.28	.55	1.10	65.04
127	92	237	371	583	768	974	STA	-.373	-.373	EQN	6	4.21	36.0	.20	.83	3.44	56.63
128	3,230	5,190	6,500	8,130	9,300	10,400	STA	-.432	-.432	VISUAL	1,000	4.25	35.0	23	13.87	8.36	12.06
129	4,880	8,190	10,200	12,300	13,700	14,900	STA	-.878	-.878	EQN	637	3.77	26.5	264	55.41	11.63	12.37
130	54	79	98	125	147	171	WTD	1.597	.357	EQN	NONE	3.78	27.0	.48	.74	1.14	71.11
131	6,060	14,500	22,800	36,900	50,400	66,800	WTD	-.168	-.004	EQN	NONE	3.72	27.0	1,261	92.52	6.79	9.33
132	289	536	748	1,080	1,360	1,700	WTD	.528	.143	EQN	NONE	3.88	28.0	2.91	2.75	2.60	73.97
133	65	121	170	244	309	383	WTD	.900	.090	VISUAL	10	3.96	32.0	.50	.95	1.81	147.37
134	7,170	16,200	25,000	39,800	53,900	71,000	WTD	.211	.073	EQN	NONE	3.80	28.0	2,342	214.75	19.69	5.81
135	185	1,240	3,310	9,260	17,900	32,200	WTD	-.651	-.079	EQN	11	3.88	27.5	5.56	5.20	4.87	59.28
136	12,300	28,400	43,000	66,000	86,300	109,000	WTD	-.308	-.225	EQN	1,045	3.90	28.0	455	71.88	11.36	13.24
137	17,300	28,900	37,600	49,500	58,900	68,800	WTD	-.051	-.116	EQN	3,709	3.85	28.0	3,542	296.12	24.76	5.09
138	50	63	71	81	88	95	WTD	1.478	.157	EQN	1	3.92	29.0	.90	.85	.80	61.76
139	10,800	24,600	37,600	58,400	77,400	99,400	WTD	.196	-.115	EQN	1,289	3.89	28.0	818	65.33	5.22	13.46
140	2,840	6,260	9,310	14,000	18,200	22,900	WTD	-1.608	-.172	VISUAL	400	3.96	30.0	33.30	11.44	3.93	36.15
141	16,200	31,500	44,200	63,000	78,900	96,400	WTD	-.108	-.118	EQN	2,604	3.91	29.0	1,240	101.61	8.33	10.49
142	7,090	15,900	24,100	37,700	50,300	65,100	WTD	.374	-.015	EQN	312	3.98	31.0	248	47.70	9.17	16.30
143	690	1,810	2,990	5,140	7,290	9,990	WTD	.640	.021	EQN	NONE	3.97	30.0	8.90	5.42	3.30	41.75
144	7,590	15,600	22,400	32,500	41,000	50,300	WTD	-.395	-.215	EQN	879	4.00	31.0	133	38.03	10.88	19.84
145	13,000	26,600	38,900	58,600	76,600	97,500	WTD	.157	.074	EQN	2,072	3.98	31.0	405	52.23	6.73	16.02
146	4,290	8,250	11,400	15,900	19,600	23,600	WTD	-.419	-.230	EQN	116	4.03	32.0	83.10	28.01	9.44	16.04
147	16,800	33,600	47,600	68,400	85,900	105,000	WTD	-.237	-.175	EQN	NONE	4.01	32.0	599	66.06	7.29	14.60
148	14,100	23,100	28,700	35,200	39,500	43,500	STA	-.700	-.700	EQN	1,812	4.05	32.0	738	84.12	9.59	12.68
149	691	1,190	1,580	2,150	2,620	3,140	WTD	1.892	.043	EQN	NONE	4.19	33.0	3.52	2.74	2.13	13.17
150	28,600	62,100	94,700	151,000	204,000	271,000	WTD	.433	.194	EQN	7,832	3.95	31.0	7,065	377.85	20.21	4.46
151	3,710	5,040	5,890	6,930	7,680	8,420	WTD	.096	-.135	VISUAL	1,000	4.24	35.0	44.80	22.08	10.88	10.25
152	58	81	95	113	126	138	WTD	-.091	-.179	EQN	NONE	4.45	38.0	.14	.16	.18	43.75
153	70,100	99,500	119,000	145,000	164,000	183,000	WTD	.358	-.024	EQN	NONE	3.70	27.0	29,949	1,016.45	34.50	4.30
154	1,550	4,570	7,510	12,100	16,100	20,400	WTD	-.676	-.557	EQN	112	4.32	35.0	236	41.08	7.15	6.79
155	1,880	5,180	8,420	13,700	18,500	23,900	WTD	-.634	-.375	EQN	188	4.35	36.0	244	34.84	4.97	7.25
156	6,790	17,000	26,700	42,500	56,800	73,200	WTD	-.289	-.241	EQN	587	4.39	36.0	1,009	61.83	3.79	4.14

Table 1. Peak-discharge frequency estimates, analysis information, and basin characteristics for stations with at least 8 years

Site no. (pl. 1)	USGS station no.	USGS station name	Hydro-logic region (pl. 1)	Latitude	Longitude	Natural systematic record		His-torical record length (yrs)[2]	Weight factor (yrs)[3]	High-outlier thresh-old (ft³/s)	No. of high out-liers
						Period	(yrs)[1]				
157	08110100	Davidson Creek near Lyons, Texas	2	30°25'10"	96°32'24"	1963–96	34	94	54	23,200	2
158	08110350	Plummers Creek at Mexia, Texas	2	31°39'45"	96°29'56"	1966–74	9	0	9	NONE	0
159	08110430	Big Creek near Freestone, Texas	2	31°30'25"	96°19'31"	1980–96	17	0	17	NONE	0
160	08110500	Navasota River near Easterly, Texas	2	31°10'12"	96°17'51"	1925–61	37	117	64	90,000	1
161	08111000	Navasota River near Bryan, Texas[8]	2	30°52'10"	96°11'32"	1952–61	10	0	10	NONE	0
162	08111100	Winkleman Creek near Brenham, Texas	2	30°15'19"	96°15'44"	1966–74	9	0	9	NONE	0
163	08111700	Mill Creek near Bellville, Texas	3	29°52'51"	96°12'18"	1964–93	30	0	30	NONE	0
164	08114000	Brazos River at Richmond, Texas	3	29°34'56"	95°45'27"	1903–40	21	0	21	NONE	0
165	08114900	Seabourne Creek near Rosenberg, Texas	3	29°31'27"	95°48'28"	1967–74	8	0	8	NONE	0
166	08115000	Big Creek near Needville, Texas	3	29°28'35"	95°48'45"	1947–96	49	0	49	NONE	0
167	08115500	Fairchild Creek near Needville, Texas	3	29°26'45"	95°45'41"	1947–54	8	0	8	NONE	0
168	08116400	Dry Creek near Rosenberg, Texas	3	29°30'42"	95°44'48"	1959–79	21	48	31	2,410	1
169	08117500	San Bernard River near Boling, Texas	3	29°18'48"	95°53'37"	1955–96	42	0	42	NONE	0
170	08118500	Bull Creek near Ira, Texas	1	32°36'00"	101°05'38"	1948–62	10	31	18	22,400	1
171	08119000	Bluff Creek near Ira, Texas	1	32°35'29"	101°03'02"	1948–65	18	0	18	4,311	0
172	08120500	Deep Creek near Dunn, Texas	1	32°34'25"	100°54'27"	1952–86	34	106	61	36,400	2
173	08123620	Sulphur Springs Draw near Wellman, Texas	1	33°04'36"	102°27'54"	1966–74	9	0	9	NONE	0
174	08143700	Brown's Creek trib. near Goldthwaite, Texas	2	31°31'01"	98°34'00"	1966–74	9	0	9	NONE	0
175	08152700	Little Flatrock Creek near Marble Falls, Texas	2	30°30'52"	98°18'44"	1967–74	8	0	8	NONE	0
176	08154700	Bull Creek at Loop 360 near Austin, Texas	2	30°22'19"	97°47'04"	1979–96	18	0	18	NONE	0
177	08155200	Barton Creek at SH 71 near Oak Hill, Texas	2	30°17'46"	97°55'31"	1976–96	15	0	15	NONE	0
178	08155300	Barton Creek at Loop 360 at Austin, Texas	2	30°14'40"	97°48'07"	1929–96	21	68	37	39,400	1
179	08158840	Slaughter Creek at Farm Road 1826 near Austin, Texas	2	30°12'32"	97°54'11"	1980–94	19	0	19	NONE	0
180	08158900	Fox Branch near Oak Hill, Texas	2	30°14'01"	97°52'29"	1966–74	9	0	9	NONE	0
181	08159150	Wilbarger Creek near Pflugerville, Texas	2	30°27'16"	97°36'02"	1921–80	17	87	42	2,300	1
182	08159450	Reeds Creek near Bastrop, Texas	2	30°00'26"	97°15'03"	1965–74	10	0	10	NONE	0
183	08160000	Dry Creek at Buescher Lake near Smithville, Texas	2	30°02'32"	97°09'34"	1940–66	26	32	28	1,870	1
184	08160800	Redgate Creek near Columbus, Texas	3	29°47'56"	96°31'55"	1962–96	35	0	35	NONE	0
185	08161580	Dry Branch trib. near Altair, Texas	3	29°34'39"	96°28'16"	1967–74	8	0	8	NONE	0
186	08162600	Tres Palacios River near Midfield, Texas	3	28°55'40"	96°10'15"	1971–96	26	0	26	NONE	0

[1] Natural systematic record reflects number of annual peak discharges from natural basins. Many stations became regulated during period of operation. Regulated annual peak discharges not included in peak-streamflow frequency analysis.
[2] Historical record length reflects that known when peak-streamflow frequency analysis was done (1994–95). For many stations, this represents a minimum historical record.
[3] Weight factor computed from empirical equations (G.D. Tasker, U.S. Geological Survey, written commun., 1994).
[4] Historical record length assumed equal to that for nearby station 08068520.

of annual peak-streamflow data from natural streams in and near the Brazos River Basin, Texas—Continued

Site no. (pl. 1)	Peak discharge for indicated recurrence interval (ft^3/s) 2 yr	5 yr	10 yr	25 yr	50 yr	100 yr	Skew calcu-lation option	Station skew	Final skew for LPIII distri-bution	Low-outlier thresh-old source	Low-outlier thresh-old (ft^3/s)	2-yr 24-hr precip-itation (in.)	Mean annual precip-itation (in.)	Contrib-uting drainage area (mi^2)	Stream length (mi)	Basin shape factor (dimen-sionless)	Stream slope (ft/mi)
157	3,570	7,940	11,800	17,700	22,800	28,500	WTD	-0.410	-0.240	EQN	533	4.42	36.0	195	39.52	8.01	8.30
158	1,180	1,690	2,020	2,430	2,730	3,030	WTD	-.514	-.179	EQN	NONE	4.28	38.0	4.42	2.13	1.03	15.41
159	1,860	4,020	6,080	9,530	12,800	16,700	WTD	-.343	.125	EQN	251	4.32	39.0	57.10	19.00	6.32	7.25
160	12,800	28,300	41,800	62,100	79,200	98,000	WTD	-.360	-.301	EQN	1,823	4.30	38.0	968	85.66	7.58	3.83
161	11,900	29,500	46,600	75,000	101,000	133,000	WTD	.002	-.152	EQN	1,376	4.33	38.0	1,454	121.28	10.12	3.30
162	302	555	748	1,010	1,220	1,440	WTD	-.819	-.290	EQN	20	4.62	39.0	.75	1.08	1.56	39.49
163	13,600	22,800	29,900	39,800	47,900	56,500	WTD	.098	-.014	VISUAL	5,500	4.60	40.0	376	44.62	5.30	8.01
164	59,100	81,800	96,600	115,000	128,000	141,000	WTD	-.425	-.125	EQN	NONE	3.80	29.0	35,441	1,207.80	41.16	3.73
165	269	395	479	586	667	747	WTD	-1.052	-.142	EQN	NONE	4.90	43.0	5.78	4.06	2.84	3.24
166	2,510	4,170	5,420	7,150	8,540	10,000	WTD	-.110	-.049	EQN	NONE	4.88	43.0	42.80	14.47	4.89	2.83
167	997	1,680	2,210	2,940	3,530	4,160	WTD	-.399	-.045	EQN	NONE	4.92	43.0	26.20	6.73	1.73	4.39
168	689	995	1,220	1,530	1,790	2,060	STA	.307	.307	EQN	NONE	4.93	43.0	8.65	5.83	3.93	3.38
169	7,040	12,200	16,300	22,300	27,300	32,900	WTD	-.061	.050	EQN	1,619	4.75	42.0	727	83.45	9.58	4.01
170	1,460	3,070	4,550	6,930	9,130	11,700	WTD	.531	.057	EQN	160	3.03	19.5	26.30	14.82	8.35	15.94
171	968	1,680	2,260	3,120	3,850	4,670	WTD	.626	.132	EQN	103	3.05	19.5	42.60	19.10	8.56	18.72
172	2,370	5,610	9,020	15,300	21,700	29,900	WTD	.430	.260	EQN	334	3.08	20.0	188	45.17	10.85	14.02
173	32	116	223	439	674	986	WTD	-.251	-.135	EQN	NONE	2.53	16.0	41.80	41.80	41.80	9.50
174	118	250	375	584	782	1,020	WTD	.588	.182	EQN	NONE	3.82	26.5	2.48	2.70	2.94	91.06
175	220	749	1,400	2,690	4,080	5,900	WTD	-.163	-.113	EQN	NONE	3.94	30.0	3.20	3.98	4.95	39.57
176	3,280	7,690	11,700	17,900	23,300	29,300	WTD	-.806	-.280	EQN	322	4.09	31.5	22.30	9.40	3.96	47.82
177	2,270	6,850	11,700	20,200	28,200	37,700	WTD	-.829	-.317	EQN	125	4.00	32.0	89.70	27.41	8.38	22.62
178	3,410	9,130	14,700	23,900	32,100	41,500	WTD	-.627	-.333	VISUAL	1,000	4.04	32.0	116	43.53	16.33	18.84
179	650	2,120	3,840	7,090	10,400	14,600	WTD	-.387	-.195	EQN	54	4.07	32.5	8.24	4.20	2.14	52.32
180	49	99	142	208	267	332	WTD	.244	-.036	EQN	NONE	4.08	32.0	.18	.40	.87	124.32
181	596	980	1,240	1,550	1,780	2,000	WTD	-.816	-.480	EQN	NONE	4.15	32.0	4.61	2.99	1.94	38.44
182	230	840	1,660	3,450	5,550	8,520	WTD	.537	.042	EQN	20	4.32	36.0	5.22	4.49	3.86	40.91
183	226	756	1,390	2,590	3,840	5,440	WTD	-.314	-.184	EQN	21	4.35	36.5	1.48	1.78	2.15	69.96
184	1,760	3,060	4,040	5,360	6,400	7,490	WTD	-.395	-.230	EQN	NONE	4.60	40.5	17.30	7.61	3.35	18.11
185	133	283	417	626	811	1,020	WTD	-.128	-.091	EQN	8	4.65	41.0	.68	.58	.49	11.31
186	5,210	8,320	10,600	13,800	16,300	18,900	WTD	-.072	-.013	EQN	NONE	4.79	42.0	145	30.55	6.44	3.33

[5] High outlier occurred after basin became regulated. Historical record length assumed to extend to date of high outlier occurrence because of extreme magnitude of flood.
[6] Historical record length assumed equal to that for nearby station 08085500.
[7] Only one high outlier used in analysis because of fit of LPIII distribution to the data, although others are available.
[8] Published high outlier is regulated peak; its inclusion in analysis caused poor fit of LPIII distribution. Therefore, no high outlier used in analysis.

Table 2. Regression equations for estimation of peak-discharge frequency for hydrologic regions of the Brazos River Basin, Texas

[ft^3/s, cubic feet per second; yr, year; Q_T, peak discharge with T-year recurrence interval, in cubic feet per second; CDA, contributing drainage area, in square miles; SL, stream slope, in feet per mile]

Hydrologic region and recurrence interval	Weighted least-squares regression equation for corresponding recurrence interval	Coefficient of determination (R^2)	Standard error of estimate ($log\text{-}ft^3/s$)	No. of stations included in analysis
Region 1				
2 yr	$Q_2 = 6.56\ CDA^{0.720}\ SL^{0.750}$	0.63	0.391	56
5 yr	$Q_5 = 20.5\ CDA^{0.673}\ SL^{0.723}$	.69	.318	56
10 yr	$Q_{10} = 38.5\ CDA^{0.647}\ SL^{0.701}$	.69	.301	56
25 yr	$Q_{25} = 78.1\ CDA^{0.618}\ SL^{0.672}$	.67	.304	56
50 yr	$Q_{50} = 125\ CDA^{0.598}\ SL^{0.650}$	.64	.317	56
100 yr	$Q_{100} = 192\ CDA^{0.580}\ SL^{0.629}$	.59	.336	56
Region 2				
2 yr	$Q_2 = 117\ CDA^{0.627}\ SL^{0.198}$	.90	.237	79
5 yr	$Q_5 = 196\ CDA^{0.640}\ SL^{0.270}$	.93	.199	79
10 yr	$Q_{10} = 250\ CDA^{0.648}\ SL^{0.309}$	.93	.195	79
25 yr	$Q_{25} = 318\ CDA^{0.656}\ SL^{0.352}$	.92	.206	79
50 yr	$Q_{50} = 369\ CDA^{0.662}\ SL^{0.381}$	.91	.221	79
100 yr	$Q_{100} = 420\ CDA^{0.668}\ SL^{0.407}$	.90	.239	79
Region 3				
2 yr	$Q_2 = 173\ CDA^{0.595}$	.88	.184	42
5 yr	$Q_5 = 262\ CDA^{0.643}$	.90	.186	42
10 yr	$Q_{10} = 324\ CDA^{0.671}$	.89	.203	42
25 yr	$Q_{25} = 404\ CDA^{0.703}$	.87	.230	42
50 yr	$Q_{50} = 464\ CDA^{0.725}$	.86	.250	42
100 yr	$Q_{100} = 523\ CDA^{0.746}$	.85	.272	42

Table 3. Covariance matrices and critical values for prediction intervals of regression equations for estimation of peak-discharge frequency for hydrologic regions of the Brazos River Basin, Texas

[CDA, contributing drainage area, in square miles; SL, stream slope, in feet per mile; n, number of stations used in regression analysis; p, number of explanatory variables in regression equation plus one (for regression constant)]

Covariance matrices

Hydrologic region		Matrix		
		Constant	**CDA**	**SL**
1	Constant	1.71516	-0.26887	-0.98122
	CDA	-.26887	.05284	.13243
	SL	-.98122	.13243	.61891
		Constant	**CDA**	**SL**
2	Constant	1.10652	-.17812	-.63850
	CDA	-.17812	.03309	.09762
	SL	-.63850	.09762	.38259
		Constant	**CDA**	
3	Constant	.45651	-.09854	
	CDA	-.09854	.03691	

Critical values of the t-distribution

Hydrologic region	Degrees of freedom of regression equation (n – p)	Critical value for 50-percent prediction interval ($\alpha = 0.50$)[1]	Critical value for 90-percent prediction interval ($\alpha = 0.10$)[1]
1	53	0.6791	1.674
2	76	.6777	1.665
3	40	.6807	1.684

[1] Critical values of t-distribution reflect a two-tailed test; therefore, a 50-percent prediction interval ($\alpha = 0.50$) uses an $\alpha/2$ (0.25) critical t-value.

Table 4. Measured extreme peak discharges for sites with and without streamflow-gaging stations in natural streams in and near the Brazos River Basin, Texas

[mi^2, square miles; ft^3/s, cubic feet per second; trib., tributary]

Site no. (pl. 1)	Stream name	Hydro-logic region (pl. 1)	Latitude	Longitude	Contrib-uting drainage area (mi^2)	Measured extreme peak discharge	
						Date	Discharge (ft^3/s)
	Sites with streamflow-gaging stations						
1	North Tule Draw at Reservoir near Tulia, Texas	1	34°33'34"	101°42'33"	65	06/10/1965	10,600
2	Quitaque Creek near Quitaque, Texas	1	34°14'24"	101°07'03"	35	08/04/1957	6,060
3	Cottonwood Creek trib. near Afton, Texas	1	33°44'20"	100°50'30"	1.09	06/14/1969	890
4	South Wichita River below Flow Dam near Guthrie, Texas	1	33°37'19"	100°12'31"	223	09/18/1996	3,850
5	South Fork Wichita River at Ross Ranch near Benjamin, Texas	1	33°39'18"	100°00'49"	499	05/28/1975	2,780
6	South Fork Wichita River near Benjamin, Texas	1	33°38'39"	99°48'02"	584	06/01/1990	14,900
7	Wichita River near Seymour, Texas	1	33°42'01"	99°23'18"	1,874	09/20/1965	23,100
8	North Fork Little Wichita River trib. near Archer City, Texas	1	33°39'50"	98°43'30"	.10	09/16/1966	215
9	Little Wichita River near Archer City, Texas	1	33°39'45"	98°36'46"	481	05/16/1989	20,100
10	North Creek near Jacksboro, Texas	1	33°16'57"	98°17'53"	21.60	04/28/1957	6,990
11	Walker Creek near Boyd, Texas	2	33°04'32"	97°34'58"	2.95	03/02/1970	2,990
12	Marine Creek at Fort Worth, Texas	2	32°48'16"	97°21'48"	16.80	04/20/1942	24,400
13	Deer Creek trib. near Crowley, Texas	2	32°35'06"	97°21'04"	5.86	10/18/1971	1,280
14	Big Bear Creek near Grapevine, Texas	2	32°54'48"	97°07'44"	29.60	03/27/1977	2,750
15	Walnut Creek near Mansfield, Texas	2	32°34'51"	97°06'06"	62.80	05/17/1989	22,800
16	Briar Creek trib. near Corsicana, Texas	2	32°02'54"	96°34'49"	.72	05/10/1968	660
17	Richland Creek near Richland, Texas	2	31°57'02"	96°25'16"	734	05/12/1948	58,900
18	Alvarado Branch near Alvarado, Texas	2	32°24'49"	97°12'20"	.84	05/07/1969	950
19	Kings Branch near Reagor Springs, Texas	2	32°20'41"	96°47'02"	.62	04/25/1970	620
20	Chambers Creek near Corsicana, Texas	2	32°06'29"	96°22'14"	963	00/00/1913	54,000
21	Tehuacana Creek near Streetman, Texas	2	31°50'54"	96°17'23"	142	05/17/1989	85,700
22	Upper Keechi Creek near Oakwood, Texas	2	31°34'11"	95°53'17"	150	05/04/1990	38,900
23	Caney Creek near Madisonville, Texas	2	30°56'12"	95°56'07"	112	04/12/1969	15,000
24	Bedias Creek near Madisonville, Texas	2	30°53'03"	95°46'39"	321	09/14/1974	33,800
25	Cedar Bayou near Crosby, Texas	3	29°58'20"	94°59'10"	64.90	10/18/1994	7,800
26	Welch Branch near Huntsville, Texas	3	30°38'33"	95°40'47"	2.35	03/24/1973	1,210
27	Landrum Creek trib. near Montgomery, Texas	3	30°21'03"	95°41'50"	.13	03/10/1968	129
28	West Fork San Jacinto River near Conroe, Texas	3	30°14'40"	95°27'25"	828	11/25/1940	110,000
29	Mill Creek trib. near Dobbin, Texas	3	30°15'37"	95°46'14"	4.07	06/13/1973	2,350
30	Spring Creek near Spring, Texas	3	30°06'37"	95°26'10"	409	00/00/1929	48,300
31	Spring Creek at Spring, Texas	3	30°05'31"	95°24'21"	419	10/18/1994	78,800
32	Cypress Creek at Katy-Hockley Road near Hockley, Texas	3	29°57'00"	95°48'29"	110	01/20/1979	2,370

Footnotes at end of table.

Table 4. Measured extreme peak discharges for sites with and without streamflow-gaging stations in natural streams in and near the Brazos River Basin, Texas—Continued

Site no. (pl. 1)	Stream name	Hydro-logic region (pl. 1)	Latitude	Longitude	Contrib-uting drainage area (mi^2)	Measured extreme peak discharge	
						Date	Discharge (ft^3/s)
	Sites with streamflow-gaging stations—Continued						
33	Cypress Creek at House-Hahl Road near Cypress, Texas	3	29°57'32"	95°43'03"	131	10/19/1994	5,200
34	Little Cypress Creek near Cypress, Texas	3	30°00'57"	95°41'50"	41	10/18/1994	4,520
35	Cypress Creek at Grant Road near Cypress, Texas	3	29°58'24"	95°35'54"	214	10/18/1994	10,500
36	West Fork San Jacinto River near Humble, Texas	3	30°01'37"	95°15'28"	1,741	05/31/1929	187,000
37	East Fork San Jacinto River near New Caney, Texas	3	30°08'43"	95°07'27"	338	10/19/1994	74,100
38	Caney Creek near Splendora, Texas	3	30°15'34"	95°18'08"	105	06/14/1973	35,000
39	Peach Creek at Splendora, Texas	3	30°13'57"	95°10'05"	117	10/08/1949	28,500
40	San Jacinto River near Huffman, Texas	3	29°59'40"	95°08'00"	2,800	11/26/1940	253,000
41	Buffalo Bayou near Katy, Texas	3	29°44'35"	95°48'24"	63.30	02/21/1994	3,780
42	South Mayde Creek near Addicks, Texas	3	29°48'03"	95°41'32"	32.30	08/31/1981	4,080
43	Bear Creek near Barker, Texas	3	29°49'50"	95°41'12"	21.50	08/31/1981	2,060
44	Langham Creek at West Little Yourk Road near Addicks, Texas	3	29°52'01"	95°38'47"	24.60	06/20/1993	1,790
45	Langham Creek near Addicks, Texas	3	29°50'08"	95°37'30"	48.90	08/31/1981	3,360
46	Bering Ditch at Woodway Drive at Houston, Texas	3	29°45'22"	95°29'44"	2.77	10/11/1970	1,900
47	Whiteoak Bayou at Alabonson Road at Houston, Texas	3	29°52'14"	95°28'49"	34.50	03/04/1992	8,610
48	Cole Creek at Guhn Road at Houston, Texas	3	29°51'24"	95°30'55"	7.05	03/20/1972	878
49	Willow Waterhole Bayou at Landsdowne Street at Houston, Texas	3	29°39'01"	95°29'11"	11.20	06/23/1968	1,680
50	Sims Bayou at Carlsbad Street at Houston, Texas	3	29°37'33"	95°29'56"	3.81	06/23/1968	470
51	Berry Bayou trib. at Globe Street at Houston, Texas	3	29°39'00"	95°14'48"	1.58	02/09/1966	308
52	Berry Creek at Galveston Road at Houston, Texas	3	29°40'59"	95°15'11"	4.86	05/10/1968	789
53	Hunting Bayou trib. at Cavalcade Street at Houston, Texas	3	29°48'00"	95°20'02"	1.20	10/23/1970	275
54	Garners Bayou near Humble, Texas	3	29°56'03"	95°14'02"	31.0	03/04/1992	9,980
55	Cowart Creek near Friendswood, Texas	3	29°30'46"	95°13'21"	18	06/13/1973	1,490
56	Chocolate Bayou near Alvin, Texas	3	29°22'09"	95°19'14"	87.70	07/26/1979	21,500
57	North Fork Double Mountain Fork Brazos River at Lubbock, Texas	1	33°35'08"	101°49'40"	200	05/07/1949	3,150
58	Barnum Springs Draw near Post, Texas	1	33°16'54"	101°23'30"	4.99	05/31/1968	435
59	North Fork Double Mountain Fork Brazos River near Post, Texas	1	33°14'52"	101°20'24"	438	05/20/1985	4,320
60	Rattlesnake Creek near Post, Texas	1	33°13'36"	101°23'30"	2.77	08/23/1971	1,910
61	Double Mountain Fork Brazos River at Justiceburg, Texas	1	33°02'18"	101°11'50"	244	05/06/1969	49,600
62	Double Mountain Fork Brazos River near Aspermont, Texas	1	33°00'29"	100°10'49"	1,864	09/26/1955	91,400
63	Guest-Flowers Draw near Aspermont, Texas	1	33°07'25"	100°08'15"	3.02	06/09/1967	410
64	McDonald Creek near Post, Texas	1	33°21'03"	101°13'36"	79.20	06/09/1968	15,300

Footnotes at end of table.

Table 4. Measured extreme peak discharges for sites with and without streamflow-gaging stations in natural streams in and near the Brazos River Basin, Texas—Continued

Site no. (pl. 1)	Stream name	Hydro-logic region (pl. 1)	Latitude	Longitude	Contrib-uting drainage area (mi^2)	Measured extreme peak discharge	
						Date	Discharge (ft^3/s)
	Sites with streamflow-gaging stations—Continued						
65	Running Water Draw at Plainview, Texas	1	34°10'44"	101°42'08"	382	06/06/1941	12,000
66	Callahan Draw near Lockney, Texas	1	33°59'48"	101°32'54"	8.37	06/04/1974	500
67	Red Mud Creek near Spur, Texas	1	33°19'24"	100°55'18"	65.10	06/03/1974	18,400
68	Croton Creek near Jayton, Texas	1	33°17'18"	100°25'52"	290	10/18/1960	10,600
69	Salt Croton Creek near Aspermont, Texas	1	33°24'03"	100°24'29"	64.30	08/30/1966	29,900
70	Salt Fork Brazos River near Aspermont, Texas	1	33°20'02"	100°14'16"	2,496	09/25/1955	52,200
71	Stinking Creek near Aspermont, Texas	1	33°14'00"	100°12'47"	88.80	05/05/1982	3,260
72	North Croton Creek near Knox City, Texas	1	33°22'59"	100°04'51"	251	08/30/1966	32,100
73	Brazos River at Seymour, Texas	1	33°34'51"	99°16'02"	5,972	10/16/1926	95,400
74	Millers Creek near Munday, Texas	1	33°19'45"	99°27'53"	104	08/04/1978	34,600
75	North Elm Creek near Throckmorton, Texas	1	33°10'50"	99°22'05"	3.58	04/30/1966	1,350
76	Clear Fork Brazos River near Roby, Texas	1	32°47'15"	100°23'18"	228	10/18/1965	7,050
77	Clear Fork Brazos River at Hawley, Texas	1	32°35'53"	99°48'53"	1,416	09/30/1980	8,540
78	Mulberry Creek near Hawley, Texas	1	32°34'04"	99°47'32"	205	05/28/1980	2,750
79	Little Elm Creek near Abilene, Texas	1	32°23'29"	99°51'08"	39.10	09/18/1974	2,180
80	Cat Claw Creek at Abilene, Texas	1	32°28'31"	99°44'56"	13	08/03/1978	1,310
81	Cedar Creek at Abilene, Texas	1	32°26'56"	99°43'13"	119	10/13/1981	18,500
82	Clear Fork Brazos River at Nugent, Texas	1	32°41'24"	99°40'09"	2,199	09/08/1932	47,000
83	California Creek near Stamford, Texas	1	32°55'51"	99°38'32"	478	08/04/1978	40,000
84	Humphries Draw near Haskell, Texas	1	33°10'40"	99°34'30"	3.51	08/15/1971	1,840
85	Clear Fork Brazos River at Fort Griffin, Texas	1	32°56'04"	99°13'27"	3,988	08/04/1978	149,000
86	Deep Creek at Moran, Texas	1	32°33'33"	99°10'11"	228	01/21/1968	9,800
87	Hubbard Creek near Albany, Texas	1	32°41'21"	99°09'52"	454	05/13/1965	16,000
88	North Fork Hubbard Creek near Albany, Texas	1	32°42'27"	99°16'29"	39.30	08/04/1978	103,000
89	Hubbard Creek below Albany, Texas	1	32°43'58"	99°08'25"	613	08/04/1978	330,000
90	Pecan Creek near Eolian, Texas	1	32°35'01"	99°01'57"	26.40	05/06/1969	648
91	Big Sandy Creek above Breckenridge, Texas	1	32°38'54"	99°00'15"	280	10/13/1981	80,000
92	Big Sandy Creek near Breckenridge, Texas	1	32°39'52"	99°00'01"	298	05/13/1965	8,170
93	Hubbard Creek near Breckenridge, Texas	1	32°50'13"	98°56'52"	1,089	04/26/1957	34,500
94	Clear Fork Brazos River at Eliasville, Texas	1	32°57'36"	98°45'59"	5,697	08/05/1978	68,000
95	Brazos River near South Bend, Texas	1	33°01'27"	98°38'37"	13,107	05/04/1941	87,400
96	Salt Creek at Olney, Texas	1	33°22'13"	98°44'40"	11.80	04/29/1966	11,500

Footnotes at end of table.

Table 4. Measured extreme peak discharges for sites with and without streamflow-gaging stations in natural streams in and near the Brazos River Basin, Texas—Continued

Site no. (pl. 1)	Stream name	Hydro-logic region (pl. 1)	Latitude	Longitude	Contrib-uting drainage area (mi^2)	Measured extreme peak discharge	
						Date	Discharge (ft^3/s)
	Sites with streamflow-gaging stations—Continued						
97	Briar Creek near Graham, Texas	1	33°12'43"	98°37'06"	24.20	09/18/1986	4,230
98	Big Cedar Creek near Ivan, Texas	1	32°49'39"	98°43'25"	97	10/13/1981	34,700
99	Brazos River near Palo Pinto, Texas	1	32°51'45"	98°18'08"	14,245	06/16/1930	95,600
100	Elm Creek trib. near Graford, Texas	1	32°54'35"	98°17'35"	1.10	04/30/1966	40
101	Palo Pinto Creek near Santo, Texas	1	32°37'51"	98°10'50"	573	05/26/1957	45,100
102	Cidwell Branch near Granbury, Texas	2	32°35'41"	97°46'24"	3.37	04/29/1966	540
103	Brazos River near Glen Rose, Texas	2	32°16'18"	97°39'48"	16,252	05/18/1935	97,600
104	Paluxy River at Glen Rose, Texas	2	32°13'53"	97°46'37"	410	00/00/1908	59,000
105	Panter Branch near Tolar, Texas	2	32°20'59"	97°51'25"	7.82	09/16/1972	3,750
106	Nolan River at Blum, Texas	2	32°09'02"	97°24'09"	282	05/17/1989	79,600
107	Bond Branch near Hillsboro, Texas	2	32°02'16"	97°06'27"	.36	05/09/1968	505
108	Hackberry Creek at Hillsboro, Texas	2	32°00'20"	97°08'59"	57.90	06/16/1981	12,000
109	Aquilla Creek near Aquilla, Texas	2	31°50'40"	97°12'04"	308	00/00/1936	74,200
110	Green Creek Subwatershed No. 1 near McKinney, Texas	2	32°09'57"	98°20'28"	4.19	04/30/1956	11,500
111	North Bosque River near Clifton, Texas	2	31°47'09"	97°34'04"	968	12/20/1991	200,000
112	North Bosque River at Valley Mills, Texas	2	31°40'10"	97°28'09"	1,146	12/21/1991	220,000
113	South Bosque River near McGregor, Texas	2	31°23'22"	97°22'54"	15.90	09/17/1974	3,930
114	Willow Branch at McGregor, Texas	2	31°26'24"	97°25'18"	2.52	09/17/1974	690
115	Middle Bosque River near McGregor, Texas	2	31°30'33"	97°21'56"	182	10/31/1974	33,300
116	Hog Creek near Crawford, Texas	2	31°33'20"	97°21'22"	78.20	10/04/1959	15,400
117	Brazos River at Waco, Texas	2	31°32'06"	97°04'22"	20,007	09/27/1936	246,000
118	Box Branch at Robinson, Texas	2	31°29'28"	97°08'47"	.34	05/01/1966	460
119	Cow Bayou Subwatershed No. 4 near Bruceville, Texas	2	31°19'59"	97°16'02"	5.04	05/10/1968	2,340
120	Brazos River near Marlin, Texas	2	31°17'18"	96°58'10"	20,645	05/03/1944	132,000
121	Brushy Creek Watershed C near Riessel, Texas	2	31°31'11"	96°53'34"	.90	03/29/1965	922
122	Brushy Creek Watershed D near Riessel, Texas	2	31°30'38"	96°53'32"	1.73	03/29/1965	2,360
123	Brushy Creek Watershed Y-2 near Riessel, Texas	2	31°28'30"	96°52'46"	.21	05/01/1944	542
124	Brushy Creek Watershed Y near Riessel, Texas	2	31°28'36"	96°52'36"	.48	04/09/1957	791
125	Brushy Creek Watershed G near Riessel, Texas	2	31°28'59"	96°52'06"	6.84	03/29/1965	4,200
126	Brushy Creek Watershed W-1 near Riessel, Texas	2	31°27'27"	96°52'48"	.28	05/01/1944	800
127	Brushy Creek Watershed W-2 near Riessel, Texas	2	31°27'19"	96°52'55"	.20	05/01/1944	633
128	Little Pond Creek near Burlington, Texas	2	31°01'35"	96°59'17"	23	05/24/1975	8,570

Footnotes at end of table.

Table 4. Measured extreme peak discharges for sites with and without streamflow-gaging stations in natural streams in and near the Brazos River Basin, Texas—Continued

Site no. (pl. 1)	Stream name	Hydro-logic region (pl. 1)	Latitude	Longitude	Contrib-uting drainage area (mi^2)	Measured extreme peak discharge	
						Date	Discharge (ft^3/s)
	Sites with streamflow-gaging stations—Continued						
129	Sabana River near De Leon, Texas	2	32°06'50"	98°36'19"	264	04/26/1990	19,500
130	Sabana River trib. near De Leon, Texas	2	32°06'44"	98°33'58"	.48	04/24/1973	150
131	Leon River near Hasse, Texas	2	31°57'28"	98°27'32"	1,261	05/24/1952	38,500
132	Edison Creek near Hamilton, Texas	2	31°46'10"	98°07'25"	2.91	05/27/1968	900
133	Bermuda Branch near Gatesville, Texas	2	31°32'26"	97°47'53"	.50	07/25/1971	213
134	Leon River at Gatesville, Texas	2	31°25'58"	97°45'42"	2,342	00/00/1908	70,000
135	Hoffman Branch near Hamilton, Texas	2	31°35'01"	98°11'45"	5.56	10/19/1971	2,050
136	Cowhouse Creek at Pidcoke, Texas	2	31°17'05"	97°53'05"	455	12/20/1991	110,000
137	Leon River near Belton, Texas	2	31°04'12"	97°26'28"	3,542	00/00/1913	60,000
138	School Branch near Lampasas, Texas	2	31°13'48"	98°09'25"	.90	05/25/1968	88
139	Lampasas River near Kempner, Texas	2	31°04'54"	98°00'59"	818	12/20/1991	78,000
140	South Fork Rocky Creek near Briggs, Texas	2	30°54'41"	98°02'12"	33.30	06/19/1976	31,200
141	Lampasas River at Youngsport, Texas	2	30°57'26"	97°42'30"	1,240	05/17/1965	87,900
142	North Fork San Gabriel River near Georgetown, Texas	2	30°39'42"	97°42'40"	248	09/17/1974	35,000
143	South Fork San Gabriel River near Bertram, Texas	2	30°43'14"	98°06'15"	8.90	08/28/1974	3,720
144	South Fork San Gabriel River at Georgetown, Texas	2	30°37'32"	97°41'27"	133	09/08/1981	33,400
145	San Gabriel River at Georgetown, Texas	2	30°39'14"	97°39'18"	405	00/00/1921	160,000
146	Berry Creek near Georgetown, Texas	2	30°41'28"	97°39'21"	83.10	10/31/1974	15,500
147	San Gabriel River near Circleville, Texas	2	30°37'43"	97°28'23"	599	05/29/1929	53,400
148	San Gabriel River at Laneport, Texas	2	30°41'39"	97°16'43"	738	10/31/1974	31,200
149	Avery Branch near Taylor, Texas	2	30°29'11"	97°27'27"	3.52	05/01/1972	2,950
150	Little River at Cameron, Texas	2	30°49'53"	96°57'01"	7,065	00/00/1852	647,000
151	North Elm Creek near Cameron, Texas	2	30°55'52"	97°01'13"	44.80	06/21/1968	7,170
152	Little Branch near Bryan, Texas	2	30°45'14"	96°28'01"	.14	05/01/1966	99
153	Brazos River near Bryan, Texas	2	30°36'52"	96°29'10"	29,949	05/04/1944	172,000
154	Middle Yegua Creek near Dime Box, Texas	2	30°20'21"	96°54'16"	236	12/22/1991	12,500
155	East Yegua Creek near Dime Box, Texas	2	30°24'26"	96°49'02"	244	05/24/1975	14,000
156	Yegua Creek near Somerville, Texas	2	30°19'18"	96°30'26"	1,009	07/01/1940	56,800
157	Davidson Creek near Lyons, Texas	2	30°25'10"	96°32'24"	195	10/17/1994	26,400
158	Plummers Creek at Mexia, Texas	2	31°39'45"	96°29'56"	4.42	04/18/1966	2,000
159	Big Creek near Freestone, Texas	2	31°30'25"	96°19'31"	57.10	12/21/1991	17,500
160	Navasota River near Easterly, Texas	2	31°10'12"	96°17'51"	968	00/00/1899	90,000

Footnotes at end of table.

Table 4. Measured extreme peak discharges for sites with and without streamflow-gaging stations in natural streams in and near the Brazos River Basin, Texas—Continued

Site no. (pl. 1)	Stream name	Hydro-logic region (pl. 1)	Latitude	Longitude	Contrib-uting drainage area (mi^2)	Measured extreme peak discharge	
						Date	Discharge (ft^3/s)
	Sites with streamflow-gaging stations—Continued						
161	Navasota River near Bryan, Texas	2	30°52'10"	96°11'32"	1,454	12/23/1991	66,600
162	Winkleman Creek near Brenham, Texas	2	30°15'19"	96°15'44"	.75	03/24/1973	870
163	Mill Creek near Bellville, Texas	3	29°52'51"	96°12'18"	376	06/13/1973	44,400
164	Brazos River at Richmond, Texas	3	29°34'56"	95°45'27"	35,441	06/06/1929	123,000
165	Seabourne Creek near Rosenberg, Texas	3	29°31'27"	95°48'28"	5.78	06/13/1973	480
166	Big Creek near Needville, Texas	3	29°28'35"	95°48'45"	42.80	06/26/1960	10,400
167	Fairchild Creek near Needville, Texas	3	29°26'45"	95°45'41"	26.20	05/18/1953	2,560
168	Dry Creek near Rosenberg, Texas	3	29°30'42"	95°44'48"	8.65	10/31/1959	2,410
169	San Bernard River near Boling, Texas	3	29°18'48"	95°53'37"	727	06/28/1960	21,200
170	Bull Creek near Ira, Texas	1	32°36'00"	101°05'38"	26.30	04/12/1954	22,400
171	Bluff Creek near Ira, Texas	1	32°35'29"	101°03'02"	42.60	07/05/1948	5,200
172	Deep Creek near Dunn, Texas	1	32°34'25"	100°54'27"	188	00/00/1892	36,400
173	Sulphur Springs Draw near Wellman, Texas	1	33°04'36"	102°27'54"	41.80	08/24/1966	240
174	Brown's Creek trib. near Goldthwaite, Texas	2	31°31'01"	98°34'00"	2.48	10/04/1969	600
175	Little Flatrock Creek near Marble Falls, Texas	2	30°30'52"	98°18'44"	3.20	05/26/1970	1,690
176	Bull Creek at Loop 360 near Austin, Texas	2	30°22'19"	97°47'04"	22.30	05/13/1982	13,700
177	Barton Creek at SH 71 near Oak Hill, Texas	2	30°17'46"	97°55'31"	89.70	12/20/1991	14,900
178	Barton Creek at Loop 360 at Austin, Texas	2	30°14'40"	97°48'07"	116	00/00/1929	39,400
179	Slaughter Creek at Farm Road 1826 near Austin, Texas	2	30°12'32"	97°54'11"	8.24	12/20/1991	6,330
180	Fox Branch near Oak Hill, Texas	2	30°14'01"	97°52'29"	.18	09/04/1967	249
181	Wilbarger Creek near Pflugerville, Texas	2	30°27'16"	97°36'02"	4.61	00/00/1921	2,300
182	Reeds Creek near Bastrop, Texas	2	30°00'26"	97°15'03"	5.22	05/16/1965	4,000
183	Dry Creek at Buescher Lake near Smithville, Texas	2	30°02'32"	97°09'34"	1.48	06/30/1940	1,870
184	Redgate Creek near Columbus, Texas	3	29°47'56"	96°31'55"	17.30	05/22/1979	5,360
185	Dry Branch trib. near Altair, Texas	3	29°34'39"	96°28'16"	.68	06/13/1973	495
186	Tres Palacios River near Midfield, Texas	3	28°55'40"	96°10'15"	145	10/17/1983	17,000
	Sites without streamflow-gaging stations						
187	Mulberry Creek near Brice, Texas[1]	1	34°40'45"	101°55'00"	296	07/16/1960	50,700
188	North Fork Little Wichita River below Archer City, Texas[1]	1	33°39'00"	98°48'00"	222	09/10/1929	4,950
189	Big Fossil Creek tributary near Haslet, Texas[2]	2	32°55'30"	97°21'30"	.92	09/07/1962	878
190	Big Fossil Creek at Haltom City, Texas[2]	2	32°50'30"	97°16'00"	42.8	09/07/1962	31,800
191	Harriet Creek near Haslet, Texas[2]	2	32°58'30"	97°18'30"	14.3	09/07/1962	14,100
192	Red Oak Creek near Palmer, Texas[3]	2	32°26'12"	96°41'24"	63.6	04/26/1974	15,700
193	San Jacinto River near Humble, Texas[4]	3	30°02'00"	95°16'00"	1,811	05/29/1929	111,000
194	Ku Creek near Aspermont, Texas[2]	1	33°11'00"	100°15'00"	3.2	09/25/1955	3,000

Footnotes at end of table.

Table 4. Measured extreme peak discharges for sites with and without streamflow-gaging stations in natural streams in and near the Brazos River Basin, Texas—Continued

Site no. (pl. 1)	Stream name	Hydro-logic region (pl. 1)	Latitude	Longitude	Contrib-uting drainage area (mi^2)	Measured extreme peak discharge	
						Date	Discharge (ft^3/s)
	Sites without streamflow-gaging stations—Continued						
195	Gonzales Creek at Breckenridge, Texas[4]	1	32°46'00"	98°54'00"	157	09/21/1924	7,960
196	Brazos River near Mineral Wells, Texas[4]	1	32°47'00"	98°12'00"	13,860	06/16/1930	95,600
197	Rock Creek near Mineral Wells, Texas[2]	2	32°48'50"	98°02'30"	74.4	07/27/1962	6,440
198	Turkey Creek near Mineral Wells, Texas[2]	1	32°54'30"	98°05'00"	9.66	07/27/1962	4,300
199	Pollards Creek near Mineral Wells, Texas[2]	1	32°48'30"	98°07'30"	3.84	07/27/1962	12,100
200	Brazos River near Whitney, Texas[4]	2	31°51'00"	97°19'00"	16,900	09/28/1936	63,000
201	Childress Creek near China Springs, Texas[4]	2	31°43'00"	97°20'00"	79	09/27/1936	47,000
202	Aquilla Creek near Gholson, Texas[4]	2	31°44'00"	97°12'00"	372	09/27/1936	84,500
203	East Buffalo Creek at Cleburne, Texas[5]	2	32°20'19"	97°22'48"	35.6	05/08/1973	18,500
204	West Buffalo Creek at Cleburne, Texas[5]	2	32°20'25"	97°23'19"	11.8	05/08/1973	8,870
205	Green Creek near Dublin, Texas[2]	2	32°09'00"	98°18'00"	11.6	05/23/1952	18,900
206	Seven Mile Draw at Ames, Texas[2]	2	31°31'00"	97°47'00"	2.4	09/26/1936	5,140
207	Sulphur Creek near Lampasas, Texas[2]	2	31°02'17"	98°11'36"	78	05/12/1957	65,300
208	Burleson Creek near Lampasas, Texas[2]	2	31°05'02"	98°11'56"	7.4	05/12/1957	14,300
209	Sulphur Creek below Lampasas, Texas[4]	2	31°04'35"	98°08'50"	112	09/27/1936	30,400
210	Sulphur Creek near mouth below Lampasas, Texas[1]	2	31°04'23"	98°08'20"	108	05/12/1957	74,600
211	Salado Creek below Salado, Texas[4]	2	30°58'00"	97°30'00"	148	09/10/1921	143,000
212	Little River near Little River, Texas[4]	2	30°59'00"	97°24'00"	5,100	09/10/1921	331,000
213	North San Gabriel River near Georgetown, Texas[1]	2	30°39'20"	97°41'50"	240	04/24/1957	102,000
214	South San Gabriel River near Leander, Texas[1]	2	30°37'05"	97°51'05"	120	04/24/1957	78,800
215	Brushy Creek at Round Rock, Texas[1]	2	30°31'00"	97°40'00"	74.7	09/10/1921	34,500
216	Harris Creek near McGregor, Texas[2]	2	31°28'00"	97°22'30"	8.85	06/16/1964	10,800
217	Harris Creek near McGregor, Texas[2]	2	31°28'30"	97°19'00"	20.9	06/16/1964	22,100
218	Deep Creek near Snyder, Texas[1]	1	32°43'00"	100°56'00"	120	06/19/1939	36,400
219	Hamilton Creek near Marble Falls, Texas[4]	2	30°38'00"	98°14'00"	67	09/15/1936	29,100
220	Little Barton Creek near Bee Cave, Texas[1]	2	30°18'00"	97°58'00"	6.3	05/28/1929	2,450
221	Little Piney Creek near Bastrop, Texas[6]	2	30°01'00"	97°16'38"	7.08	05/12/1969	4,220
222	Rabbs Creek near Warda, Texas[1]	3	30°01'50"	96°54'40"	92.8	06/30/1940	55,000
223	Buckners Creek near LaGrange, Texas[1]	3	29°53'07"	96°53'55"	184	06/30/1940	106,000

[1] Data adapted from Patterson, 1963.
[2] Data adapted from Ruggles, 1966.
[3] Data adapted from Schroeder, 1972.
[4] Data adapted from Williams and Crawford, 1940.
[5] Data adapted from Schroeder, 1971.
[6] Data adapted from Schroeder, 1967.